S. Hrg. 108–506

IMPACT OF ENVIRONMENTAL REGULATIONS ON OIL REFINING

HEARING

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED EIGHTH CONGRESS

SECOND SESSION

ON

THE ENVIRONMENTAL REGULATORY FRAMEWORK AFFECTING OIL REFINING AND GASOLINE POLICY

MAY 12, 2004

Printed for the use of the Committee on Environment and Public Works

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ONE HUNDRED EIGHTH CONGRESS
SECOND SESSION

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C O N T E N T S

Page

MAY 12, 2004

OPENING STATEMENTS

Allard, Hon. Wayne, U.S. Senator from the State of Colorado 7
Boxer, Hon. Barbara, U.S. Senator from the State of California 13
Carper, Hon. Thomas R., U.S. Senator from the State of Delaware 31
Cornyn, Hon. John, U.S. Senator from the State of Texas 41
Inhofe, Hon. James M., U.S. Senator from the State of Oklahoma 1
Jeffords, Hon. James M., U.S. Senator from the State of Vermont 5
Lieberman, Hon. Joseph I., U.S. Senator from the State of Connecticut, prepared statement 33
Reid, Hon. Harry, U.S. Senator from the State of Nevada, prepared statement 26
Thomas, Hon. Craig, U.S. Senator from the State of Wyoming 39
Voinovich, Hon. George V., U.S. Senator from the State of Ohio 9
Wyden, Hon. Ron, U.S. Senator from the State of Oregon 9

WITNESSES

Cooper, Mark, director of Research, Consumer Federation of America 21
Prepared statement 75
Dosher, John, director, Jacobs Consultancy 23
Prepared statement 242
Responses to additional questions from Senator Jeffords 243
Early, A. Blakeman "Blake," American Lung Association 17
Prepared statement 64
Response to additional question from Senator Jeffords 68
Ports, Michael, president, Ports Petroleum Company, Inc., on behalf of the Society of Independent Gasoline Marketers of America and the National Association of Convenience Stores 19
Prepared statement 69
Responses to additional questions from:
Senator Inhofe 71
Senator Jeffords 73
Slaughter, Bob, president, National Petrochemical and Refiners Association, Appearing on behalf of the American Petroleum Institute 15
Prepared statement 44
Responses to additional questions from:
Senator Inhofe 61
Senator Jeffords 62

ADDITIONAL MATERIAL

Articles:
Bhat, Vasanthakumar N., Ectoxicology, Does Environmental Compliance Pay? 344–348
Situation Analysis 304–307
USA Today, Oil Firms Reap Benefits of High Gas Prices 15
Charts:
A New Refinery from Concept to Operation 3–4
Cumulative Regulatory Impacts on Refineries, 2002–2010 53
Diesel Prices in California and Surrounding States 303
Gasoline Price in California and Surrounding States 302

Page

—Continued
Gasoline Price Outlook 52
Petroleum Demand & Number of Refineries 2
Petroleum Refining: Applicable Regulations..... 55–60
Recent California Gasoline Prices, California Energy Commission..... 280–301
Total Capacity Grew Since Mid-1990's 5
Weekly Diesel Rack Prices 250–252
Weekly Gasoline Rack Prices 247–249
What We Pay for in a Gallon of Regular Gasoline (March 2004) 51
Letters from:
Arizona Clean Fuels to Senator Inhofe 304
California Environmental Protection Agency to Senator Boxer 244
Reports:
Consumer Federation of America:
Ending the Gasoline Price Spiral, July 2001..... 80–133
Fueling Profits: Industry Consolidation, Excess Profits & Federal Neglect Domestic Causes of Recent Gasoline and Natural Gas Price Shocks, May 2004..... 178–241
Spring Break in the U.S. Oil Industry: Price Spikes, Excess Profits and Excuses, October 2003..... 134–177
Gasoline Pricing in California, May 2002, Attorney General Bill Lockyer..... 264–279
NBER Working Paper No. 6776, Environmental Regulation and Productivity: Evidence from Oil Refineries, Berman, Eli and Bui, Linda T.M..... 308–343
2003 California Gasoline Price Study Final Report, Energy Information Administration, Department of Energy, November 2003..... 253–263

IMPACT OF ENVIRONMENTAL REGULATIONS ON OIL REFINING

WEDNESDAY, MAY 12, 2004

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The committee met, pursuant to notice, at 9:30 a.m. in room 406, Senate Dirksen Building, the Hon. James M. Inhofe (chairman of the committee) presiding.

Present: Senators Inhofe, Jeffords, Wyden, Boxer, Carper, Allard, Voinovich, Thomas, and Cornyn.

OPENING STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator INHOFE. The hearing will come to order.

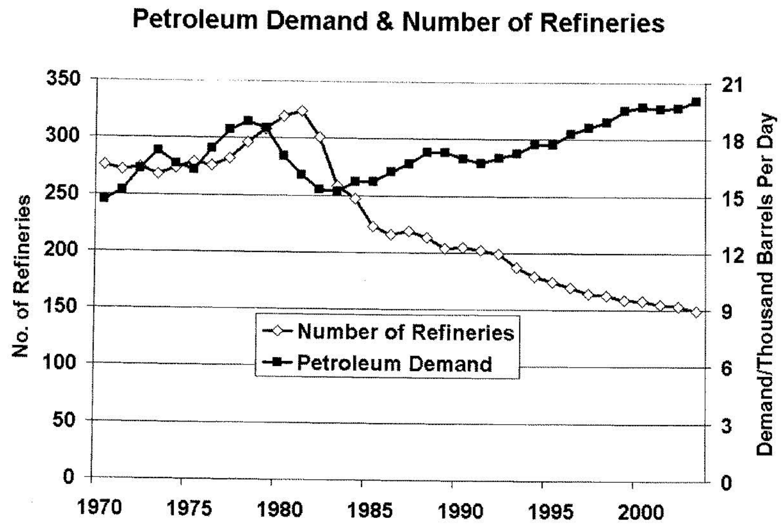
Consistent with the Inhofe-Jeffords policy of starting on time, we will start on time. The purpose of today's hearing is to examine the environmental regulatory framework affecting gasoline refining. It seems every time gasoline prices rise, some Member of Congress calls for an FTC investigation for price fixing. The FTC spends several months investigating, and by the time they issue their conclusion, which is always no conclusion, prices have dropped and the public loses interest. Unfortunately, those Members of Congress never point out that many of the reasons for the high gasoline prices start right here in Congress with the laws that we pass and with the Federal Agencies who implement those regulations.

In the past decades, our laws and regulations have improved the environment. However, we have picked the low hanging fruit. Today is critical. It is critical that American people realize that our environmental regulations are not free but have a very real price. It should not come as a surprise that gasoline prices are high. In May 2001, President Bush's National Energy Plan identified the significant fuels related issues that are the subject of much rhetoric today. Crude oil costs control by OPEC represents half the cost of gasoline. We have very little impact on OPEC and cause the cartel to a little more than lip service.

Historically, two factors lifted us out of the oil crisis of the 1970's. First, we ban producing domestic oil from Alaska, and second, President Reagan lifted price controls that the Carter administration had imposed and allowed the market to work better. Today we again have two possibilities. First, we could look at our domestic sources in Alaska, ANWR, the National Petroleum Reserve. The loudest message we could send to OPEC would be to their pocketbook, which means domestic production.

In fact, the International Energy Agency released a study on the impact of high oil prices on the global economy just this month. In analyzing the effects of sustained high prices, the IEA concluded that the United States would suffer the least because we still produce 40 percent of our own oil. Second, realizing that increasing domestic production is not realistic, then we must look to the market, as President Reagan did.

We have a chart here that I think is self-explanatory.



It talks about what has happened to the refineries and our capacity in America. The refiners have dropped and yet the production and the petroleum demand is up so production is down. Demand is up. This is a simple product the market—supply and demand.

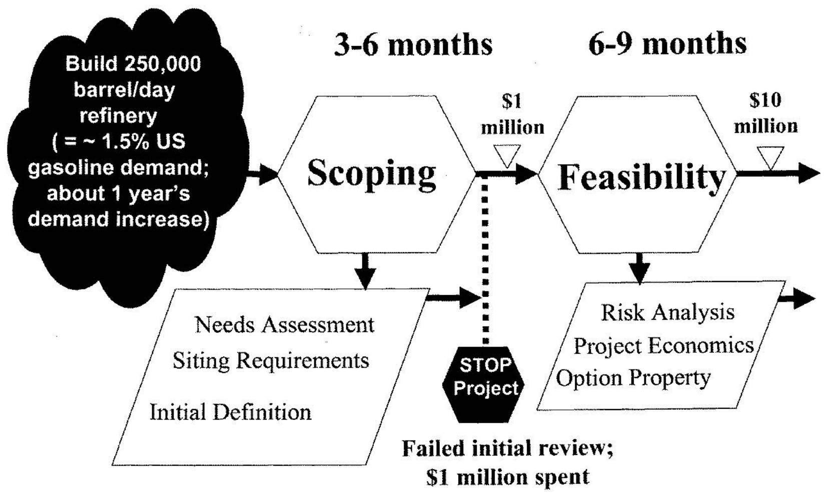
But the market supply/demand balance is extremely tight.

This chart shows that while demand for gasoline—that is the blue line—continues to grow. Our number of refineries—that is the yellow—have dropped significantly. In 1981 we had 324 refineries. Today we have only 149, less than half.

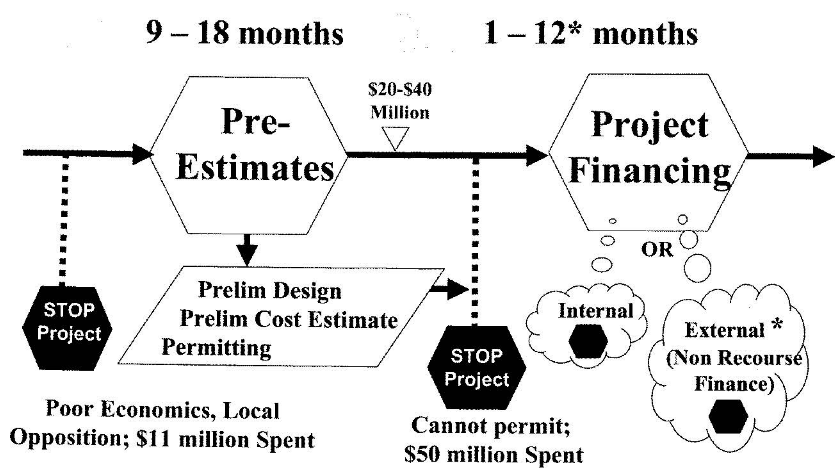
With demand for gasoline continuing to increase, one would think that the market would move to meet that demand, and that companies would be pleased to produce more gasoline. However, the last time a new refinery was built in this country was 1976.

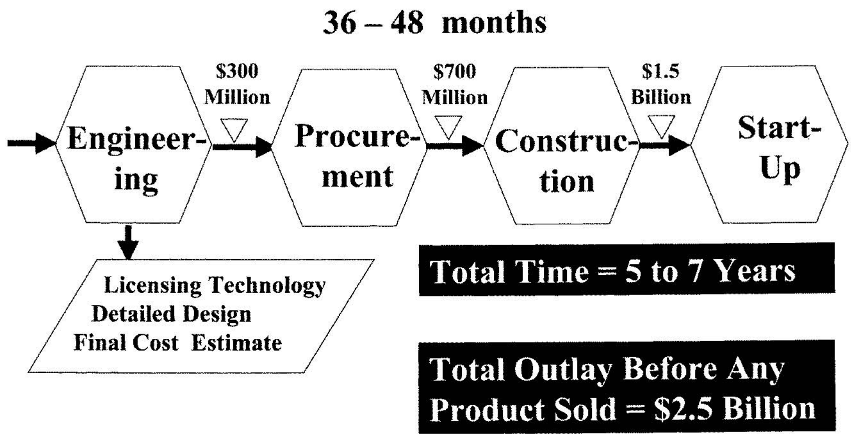
The second chart is a three-part chart. This chart depicts the best case scenario to scope, site, and construct a new 250,000 barrel-a-day refinery. Again, in the best case, assuming no opposition from special interests and environmental groups. Without wrangling with "Not In My Back Yard" issues, it would take 5 to 7 years at a cost of $2.5 billion. However, this best case scenario, as costly and time-intensive as it is, is far from reality.

A New Refinery . . .



. . .from concept to operation





A new project would face a maze of environmentally related permits from hazardous waste to water and air emissions. I have in my hand a five-page single-spaced list of the environmental laws that apply to refineries, which I will submit for the record.

Without objection, so ordered.

[The referenced document follows on page 55.]

Senator INHOFE. Since industry is constrained from building new refineries, then it seems reasonable to expand existing ones to meet consumer demand. Unfortunately, special interests led opposition to the New Source Review, and has prevented industry from any meaningful expansions. Many disagree over New Source Review policies, but that disagreement underlies the problem. New Source Review adds uncertainty to the market. That uncertainty prevents the market from working effectively. People are not going to be readily investing their resources if that uncertainty is there.

Uncertainty as a constrained and tight market leads to significant price volatility. Recently, the distinguished ranking member of the Energy and Natural Resources Committee suggested that EPA rollback its Tier II sulfur rules to importers, even though our domestic refiners have spent billions of dollars to meet the more stringent specifications.

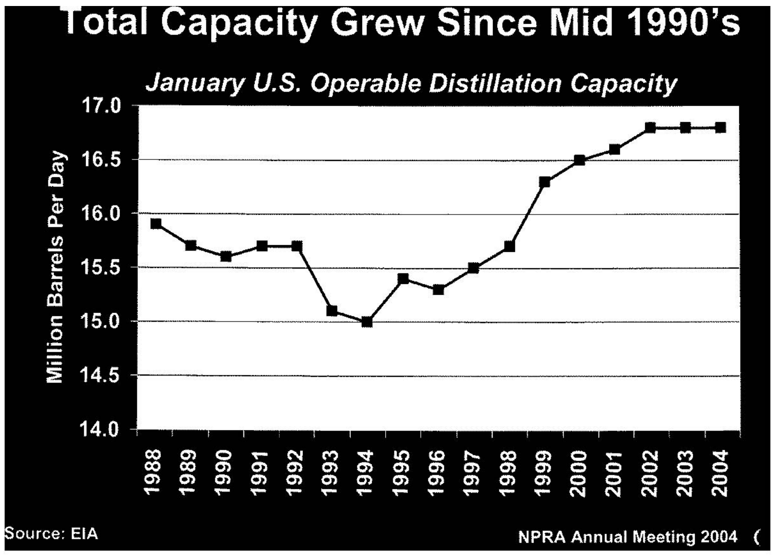
I applaud the Bush EPA for putting environmental quality first. However, the effect of even the thought of a rollback created more volatility in the market, temporarily sending crude oil futures up $1 a barrel.

In hopes to appear responsive to constituents, some Members of Congress have suggested that we drastically alter the situation with respect to “boutique” fuels, or gasoline blends produced to meet a particular need of a particular geographic area. Price volatility is a very real problem when there is a supply disruption. Neighboring areas do not make these special blends, so they are unable to meet the supply shortfall.

However, given the experience of the proposed sulfur regulation rollback, sweeping changes to our fuel policies without careful consideration and study can have detrimental price impacts for consumers. That is why I worked to conclude a carefully crafted study in H.R. 6, the House-Senate Conference Report of the Energy bill, to consider environmental and economic impacts of new fuels policy.

In this constrained market, we must consider the economy and the environment. More stringent environmental regulations means that refiners must make environmental upgrades rather than increased capacity to meet consumer demand.

The third chart is self-explanatory. You do not just have to take my word for it. The Energy Information Agency concluded that tighter product specifications will result in the increasing likelihood of outrageous outages, diminishing yields, and prime fuels.



Speaking of H.R. 6, in the absence of an energy policy, something that we have been trying to establish in America since the Reagan days, this is a very serious problem.

Domestic production would be the answer to a lot of these problems. It is not just in ANWR. Our Energy bill that was not passed had incentives for domestic production. In my State of Oklahoma, for example, is one of the largest of the marginal wells. Those are wells of 15 barrels or less. It would have put it back in.

This is a statistic that I can stand behind. If we had all of the plugged marginal wells flowing today that have been plugged over the last 10 years, it would equal more than we are importing from Saudi Arabia today.

These are problems that we are dealing with that are very serious problems. I look forward to our witnesses' testimony on this subject.

Senator INHOFE. Senator Jeffords.

OPENING STATEMENT OF HON. JAMES M. JEFFORDS, U.S. SENATOR FROM THE STATE OF VERMONT

Senator JEFFORDS. Thank you, Mr. Chairman.

The committee will be examining several very important issues today as we take testimony on the environmental regulatory framework affecting oil refining and gasoline policy. Since late 2002, gasoline prices have been extremely volatile, with the national average spiking above $1.70 three times. But gasoline prices have been recording record breaking in recent days and so have the calls for quick Federal action.

I am certain that every member of the committee has heard from their constituents about gas prices. The nationwide pump price for regular gasoline has set a new record, exceeding $1.75 per gallon. Inflated gasoline pricing harms our constituents in several ways. It takes dollars from their pocketbooks and it raises the prices of other goods and services needed by families in Vermont and across the country due to increased transportation costs.

I am concerned, Mr. Chairman, that other harm to our constituents due to these high prices may be in the form of premature calls to repeal or revise our Federal environmental laws. This hearing, its very title, makes an unfounded assumption that our Nation's environmental laws are to blame for the current price of gasoline. These are important laws, important for the health of our citizens and our environment.

These laws, and their regulations, have dramatically reduced harmful emissions from motor vehicles by removing lead and sulfur, adding catalytic converters, and specifying specific performance requirements for both vehicles and fuels. They are also requiring refineries to modernizing their pollution control equipment at certain times so they do not worsen local air quality.

While compliance with these laws has imposed some financial costs, it also has achieved real benefits, well in excess of the costs to refineries or at the pump. In fact, according to EPA's announcement yesterday, they indicate that the public health benefits of the new rule to reduce sulfur in diesel for non-road heavy-duty engines, will be 40 times the cost of implementing the rule.

This same pattern exists for many of the fuel and pollution controls that the Nation adopted so far. Whatever contributions, the cost of environmental compliance in the manufacturing of fuels meet the requirements of the Clean Air Act to the overall price of gasoline. I am very skeptical that these costs are a primary driver behind the current recent price fluctuations we have seen.

We routinely implement our environmental laws in a deliberate and measured way. In the case of the Clean Air Act, the compliant motor fuels, all of them have been phased in over long timeframes in consultation with the industry.

We have done this specifically to try to avoid market shocks and price spikes. These are not new requirements. They are not a surprised, and the costs associated with meeting them are known.

Mr. Chairman, it also appears that the financial resources to meet these requirements are available. Major newspapers across the country have reported very high first quarter profits for the oil industry. For example, USA Today reported on April 29, 2004, that ConocoPhillips, the third largest U.S. oil company, reported first quarter earnings of $1.6 billion, or up 33 percent from $1.2 billion in the first quarter of last year. BP reported similar profits.

Both companies cited higher prices for their products and higher profits on refining as one of the reasons for this increase. These are very high profits, much higher than those in other sectors of our economy. These profits have been made with the current environmental regulations in place.

During this hearing, I will be listening closely for any documented real-world evidence that witnesses may have to show that environmental regulations are actually contributing to increases in the gasoline prices, and in a significant way.

There is one thing that we do know with certainty. Our country's voracious appetite for petroleum is continuing to cause environmental and national security problems.

We cannot ignore the health and environmental consequences of growing consumption. We owe it to our children to reduce our appetite now and find new, cleaner, and if possible, renewable fuels to help our transportation be strong.

Thank you, Mr. Chairman.

Senator INHOFE. Thank you, Senator Jeffords.

Senator Allard.

OPENING STATEMENT OF HON. WAYNE ALLARD, U.S. SENATOR FROM THE STATE OF COLORADO

Senator ALLARD. Thank you, Mr. Chairman. I appreciate the fact that you are willing to step forward and hold this hearing. I think it is very important in light of the fact of many of the challenges that we are facing today with the supplies of fuel and the high cost of gasoline. In my State of Colorado, I think the average price is around $1.92 a gallon and in isolated areas like Vail, Colorado, for example,

I think it is running around $2.30 a gallon. Somebody said, "What is the difference?" The answer is: "Well, communities like Vail pass a lot of laws that makes it difficult and expensive to do business in that community."

We are seeing that same event happening. We have other places in Colorado, for example, Durango, which is $2.03 per gallon. But again, it is a fairly remote area. It costs to get things supplied there, but then also there are communities that have done a lot to raise the cost of doing business in the very locale.

There are many factors that affect the price of gasoline, but we must ask ourselves if Congress is doing anything to lift some of the burden, or if we are adding on, particularly if it is unnecessary rules and regulations where there is duplication.

One factor is that of the overall price of crude oil and the numerous costs required to convert crude to gasoline, approximately 46 percent of the cost of gas comes directly from the price of crude oil. Nearly 60 percent of our crude oil is imported from foreign countries. Our reliance on imported sources mean we have little or no control over crude oil prices.

Other problems are worldwide unrest and OPEC's ability to raise and lower the supply of oil through quotas which manipulates prices. One of the biggest factors, however, is just simply supply and demand. In States like Colorado, summertime brings increased travel which brings about an increased demand for gasoline. When the demand for gas rises but supply remains essentially the same, prices increase.

Some ask, "Why do not refiners simply increase their output?" The answer is quite simple—because they cannot.

There have been no new refineries built since 1976.

Restrictions and requirements instituted by Congress make it so difficult and extremely expensive to build new capacity.

It would likely take 5 to 7 years to get a project through design, permitting, and construction. Few companies can afford to do this.

We must be aware of the effects of the myriad of laws we pass each year. We must not throw up so many regulatory roadblocks that we are forced to turn to other countries for all of our gasoline supply. We must not make the production or use of our domestic sources so expensive that costs forces us to continues to increase our reliance on foreign sources.

Mr. Chairman, I am looking forward to hearing the comments from our panel and their view of the industry and where we are heading. Thank you very much.

Senator INHOFE. Thank you, Senator Allard.

STATEMENT OF HON. WAYNE ALLARD, U.S. SENATOR FROM THE STATE OF COLORADO

Mr. Chairman, I want to thank you for holding this very important hearing. Gas prices are up all over the country. Colorado has not been hit as hard as some states, but is certainly feeling the pinch. In Pueblo and Grand Junction people are paying about $1.96 per gallon, in Fort Collins they're paying about $1.90 a gallon.

And there are areas like Vail, where they are out of the way, so it costs more to get products there. But, they also cause price increases by instituting a lot of regulations that business and products have to comply with. They are paying $2.30 per gallon. Another area that's out of the way, but has brought some of this about through regulations, is Durango, where it's $2.03.

Those of us who have run our own businesses know what it's like to get hit by all of these regulations. It runs up the cost of doing business, which runs up the cost of your products.

We are all aware that there are many factors that affect the price of gasoline. But we must ask ourselves if we, in Congress, are doing anything to lift some of the burden of these elevated costs, or if we're adding to the burden.

One factor that must be taken into account is that of the overall price of crude oil and the numerous costs required to convert crude to its useable form of gasoline. As Mr. Slaughter mentions in his testimony, approximately 46 percent of the cost of gas comes directly from the price of crude oil. We must remember that nearly 60 percent of our crude oil is imported from foreign countries.

Our reliance on imported sources means that our country has little to no control over crude oil prices. Unrest in many of the countries that provide oil to the world causes uncertainty in the supply. This uncertainty can drive up prices. Additionally, the Organization of the Petroleum Exporting Countries (OPEC) is able to raise and lower their supply of oil through a calculated system of quotas, which manipulates prices.

Another important factor is obviously the impact of supply and demand. In states like Colorado, summertime brings increased travel; this in turn brings about an increased demand for gasoline. When the demand for gas rises, but supply remains essentially the same, prices increase.

Some ask, "why don't refiners simply increase their output?" The answer to that question is quite simply, because they can't. There have been no new refineries built since 1976. Restrictions and requirements instituted by Congress make it so difficult and extremely expensive to build new capacity. In addition to the cost factor, it would likely take 5 to 7 years to get a project through design, permitting and construction. Few companies can afford to do this. We must not throw up so many regulatory roadblocks that we end up turning to other countries for all of our gasoline supply.

I am supportive of an energy policy that calls for greater dependence on domestic energy sources, including oil, natural gas, clean coal, nuclear, and renewable resources. But, we must also be aware of the effects of the myriad of laws we pass each year. We must not make the production or use of our domestic sources so expensive that costs force us to again increase our reliance on foreign sources.

Senator INHOFE. Senator Wyden.

OPENING STATEMENT OF HON. RON WYDEN, U.S. SENATOR FROM THE STATE OF OREGON

Senator WYDEN. Thank you very much, Mr. Chairman.

I believe, Mr. Chairman and colleagues, the claim that environmental rules are driving up gasoline prices at the pump is a smoke screen to hide the fact that anti-competitive practices are a much bigger force in driving up these huge gas price hikes our citizens have seen.

I point to three examples, Mr. Chairman. First, I have on my website now internal oil industry documents that demonstrate that in the past oil companies have reduced refinery capacity to boost profits. Now these are oil industry documents and they are available for review.

Second, Senator Boxer and I are intimately familiar with what is going on on the West Coast where Shell is now looking at closing a very profitable refinery without even looking for a buyer aggressively. It is incredible as it sounds. You actually get tax breaks for doing something like this. I think it is also worth noting that Shell has never tried to claim that environmental rules had anything to do with the Bakersfield refinery shut down.

But I also think—and this just strikes me as incredible, Mr. Chairman—that this committee ought to be investigating the fact that oil companies are now exporting petroleum products out of the United States, even as domestic prices continue to skyrocket. Last week an industry publication, the Oil Price Information Service, reported that April 2004 was the busiest month ever for exports of diesel.

So at a time when our citizens are getting shellacked, the oil industry is saying that we are seeing a record amount of diesel actually being exported with cargoes going from the Pacific Northwest, to Japan, to the Gulf of Mexico, and to other areas. I think we will hear also the way the refineries work, of course, is if a refinery produced more diesel and export larger amounts, that tightens not just the diesel supply, but also the gas supply because it will allow the refineries that these are fungible.

So I think if we are talking about an investigation, we ought to be investigating record amounts of diesel being exported at a time when our consumers are getting shellacked.

Mr. Chairman, you have always been very gracious to me.

I am anxious to work with you on these matters in a bipartisan way.

Senator INHOFE. Thank you, Senator Wyden.

Senator Voinovich.

OPENING STATEMENT OF HON. GEORGE V. VOINOVICH, U.S. SENATOR FROM THE STATE OF OHIO

Senator VOINOVICH. Thank you, Mr. Chairman. I really appreciate your responding to my request to have this hearing.

Senator INHOFE. I meant to mention that. That was your request. We did have a hearing on natural gas prices that are creating a serious problem, too. Senator Voinovich said, "You know, we have the same problem in the field." I appreciate your calling this to our attention.

Senator VOINOVICH. It is interesting because the hearings that we had in the past were in the Governmental Affairs Committee under my subcommittee, and it is now where it should be in the Environment and Public Works Committee.

This is the fourth hearing I have attended on the high cost of gasoline since I have been in the Senate. At these hearings that we have in the past, we were assured that we would see more price stability. Unfortunately, gas prices are still not stable. I was amazed at the statistic that Senator Allard gave us about the price of gasoline out in Colorado.

Consumers are paying the highest price ever per gallon of self-serve regular gasoline. Prices continue to increase.

The Energy Information Administration on Monday said the national average price was $1.94 a gallon. I have seen estimates that prices could reach as high as $3 per gallon in the coming months. This kind of increase does raise eyebrows and raises lots of questions.

The American people are getting fed up with paying these high gas prices and everyone is busy pointing to a whole host of reasons for price hikes over the past several years—lack of domestic production, lack of new refinery construction since 1976, and I think the Chairman did a wonderful job of outlining how difficult it is to build a refinery—reformulated gasoline, alleged price gouging, and collusion by oil companies, the law of supply and demand, pipeline and other transportation problems, and you name it.

Frankly, most people do not care what the reason is.

They want results. They want to know what we will do in the short term to bring down prices. They want to know what our long-term plan is as well.

One of the problems that we are facing is that for far too long our country has not had a comprehensive energy policy. It is moved ahead with environmental laws and regulations with little consideration of how it would affect our economic well being. Our country has the responsibility to develop a policy that harmonizes the needs of our economy and our environment. They are not competing needs. A sustainable environment is critical to a strong economy and a sustainable economy is critical to providing the funding necessary to improve our environment.

In my State we have lots of just-in-time manufacturers who transport components and finished products to far and wide. They rely on low gas prices, or at least stable gas prices for their survival.

Mr. Chairman, I think that one of the most positive things that we can do in this session of the Congress is to pass the Energy bill. It is long overdue. We have been debating it since 2002, back and forth. We need to pass that Energy bill. I have to congratulate my colleagues on the fact that we passed the energy tax provisions in the Frist ETI bill. I think that was very positive. It was a bipartisan piece of legislation.

The last thing I want to say today is this. I think we are living in a dream world, folks. We are living in a dream world. We are living in a dream world because we have the most unstable situation, in my memory and in our history, in the Middle East. I remember 1973. We had the 1973 war.

Syria and Egypt attacked Israel and Israel won the war. The OPEC nations got together and decided to teach us a lesson.

They were not real happy with us because they thought we sided with the Israelites in that war. They put on an embargo.

Does anybody remember it?

I remember it well. And at that time we were relying on 35 percent of our oil on foreign sources. Today it is up to 63 percent, and it is projected that by 2018 it could go to 73 percent.

I want to tell you something. Saudi Arabia is the third largest producer of oil for this country. They are third—1.4 million barrels a day—the third largest supplier to the United States of America.

I have read a lot about what is going on in Saudi Arabia.

The fact of the matter is, folks, that 95 percent of the people in Saudi Arabia are supporters of Osama bin Ladin. If they have a chance to overthrow that government, they will.

You can bet your bottom dollar that if they do, they will cutoff our oil supply like that. All we have to do is think about 9/11 and what they did. They went to our financial heart and did a job on us.

I think we need to get moving. We are dealing with the world the way it was 15 years ago. All of us—Republicans and Democrats—have to get together and figure out how we can be less reliant on foreign oil. That means more supply and more efforts at conservation. It has to be a major aggressive action. We cannot have business as usual.

Thank you, Mr. Chairman.

Senator INHOFE. Thank you, Senator Voinovich.

STATEMENT OF HON. GEORGE V. VOINOVICH, U.S. SENATOR FROM THE STATE OF OHIO

Thank you, Mr. Chairman.

Last month, I asked the committee Chairman, Senator Inhofe, to conduct a hearing on the impact of environmental laws on gasoline prices. I am pleased that he responded positively.

Today's hearing is the fourth hearing I've attended on the high cost of gasoline in our Nation. Since 2000, the Committee on Government Affairs, of which I am also a member, has held a series of hearing on this issue. At these hearings, we were assured that we would have more stability of prices. Unfortunately, prices are still not stable. Today, consumers are paying the highest price ever per gallon of self-serve regular gasoline, and that price continues to increase. I am very concerned that this is just the beginning of a summer of record-breaking gas prices since there are still 4 months of high gasoline demand to come.

You cannot pick up a newspaper or turn on a television without reading or hearing about the high price of gasoline in our Nation today. I have to tell you it's not possible for me to visit a gas station these days without coming across people who are downright angry. When people pumping their gas start talking to each other across the islands about the "blankety-blank" price of gasoline, you know they are mad. I don't blame them. They are angry because the increase is affecting them where it hurts, right in the pocketbook. It's affecting people who have to drive long distances to make a living. It's affecting vacation plans for those families who have planned to take long trips this summer. It's particularly affecting people who live on the financial edge those of whom we sometimes forget how much high gas prices can impact on their ability to pay for food and other essentials. This problem is compounded because these same people see an increased burden on their income because of high natural gas and electricity costs.

According to the Energy Information Administration, on Monday the national average price of regular grade gasoline was $1.94 per gallon. I've seen estimates that gasoline prices could reach as high as $3.00 per gallon in some parts of the country in the coming months.

The kind of gas price increases we are seeing do more than raise eyebrows, they raise questions.

The American people are getting fed up with paying these high gas prices. Politicians, analysts and business owners are busy pointing to a whole host of reasons for price hikes over the past several years:—Lack of domestic production;—Lack of new refinery construction since 1976;—Reformulated gasoline;—Alleged price gouging and collusion by oil companies;—Economics and the law of supply and demand;—Pipeline and other transportation problems; and—You name it. Frankly, most people don't care what the reason is and they are getting tired of the finger pointing.

Four years ago, at a hearing in the Government Affairs Committee, I asked what we were going to do now to bring down gasoline prices, and what were we going to do at that time to make sure that we don't end up in this predicament 5 years down the road. It's important to remember that gasoline prices at that time were an average of $1.65 per gallon.

All too often in government, when a problem comes up, we have a tendency to treat it as if we would a barking dog: give it a bone and a little attention to make it stop barking, and when it stops barking, ignore it until it starts barking again.

Such neglectful treatment of such a vital component of our nation's economy is unconscionable and reflects the inability of this Congress and the Administration to adopt a comprehensive energy policy. In spite of the efforts of some of us since 2002 to adopt such a policy and it was disheartening that our attempt last fall was frustrated because we were unable to get cloture on the bill. The American people need to understand that the passage of a comprehensive energy bill is key to our economic prosperity and dealing responsibly with our reliance on foreign oil.

The American people want results. They want to know what we will do in the short term to bring down prices, and they want to know what our long term plan is as well. No one wants to see a lengthy continuation of what we're going through at this time and, no one wants to see this situation repeat itself years from now.

One of the problems we are facing is that, for far too long, our country has not had a comprehensive energy policy and has moved ahead with environmental laws and regulations with little consideration of how it would affect our economic well-being.

The U.S. Senate has a responsibility to develop a policy that harmonizes the needs of our economy and our environment. These are not competing needs. A sustainable environment is critical to a strong economy, and a sustainable economy is critical to providing the funding necessary to improve our environment.

We need to enact a policy that broadens our base of energy resources to create stability, guarantee reasonable prices, and protect America's security. It has to be a policy that will keep energy affordable. Finally, it has to be a policy that won't cripple the engines of commerce that fund the research that will yield environmental protection technologies for the future.

The Energy bill is also important to my home state. Ohio has many just-in-time manufacturers who transport components and finished products far and wide. They rely on low gas prices or at least stable gas prices for their economic survival. Passing the Energy bill will help provide that stability by allowing us to increase domestic production and reduce our reliance on volatile foreign sources of oil.

Yesterday's overwhelming vote in favor of the energy tax provisions in the FSC bill is a step in the right direction. I'm pleased that my colleagues avoided the demagoguery and voted in favor of this provision. For example, the provision will provide certainty for our marginal oil producers by creating counter-cyclical incentives that only take effect when the price is low. Five years ago, we lost the production of many marginal wells when crude prices dipped below $13 per barrel and many of the small producers couldn't break even. These incentives will guarantee a minimum price for these producers, protecting our domestic supply of oil from future low prices.

In order to continue to meet our domestic petroleum needs, we must pass an energy policy that will increase production and provide certainty to our producers. We also must consider conservation and energy efficiency measures that will help us use less oil. We must consider common-sense CAFE standards that will help decrease our reliance on fossil fuels. Unfortunately, we were unable to consider exploring for oil in the Arctic National Wildlife Refuge (ANWR). ANWR would be a step in the right direction toward increasing our domestic energy supply. nationwide, our pipelines are operating at capacity, and, if a break or other problem is experienced, then the gasoline being distributed to the gas stations will be interrupted, which will be reflected in the price at the pump as we saw in the Midwest in 2000. The best way to alleviate this problem with our distribution system is to improve our infrastructure.

We also must deal with our refining capacity. New Source Review has placed America's refiners in limbo. Permitting requirements have made it difficult for refineries to expand capacity or to construct new refineries. There have been no new refineries built in this country since 1976.

Today, there are 149 refineries in the United State. They are stretched to the limit because they are operating at 94 percent capacity. In 1981, when there were over 300 refineries in this country, just over 68 percent of the capacity was being utilized.

Our problem with our reliance on foreign oil is frightening. Thirty years ago, we relied on 35 percent foreign oil to meet our energy needs. Today our reliance averages 60 percent and it is expected to increase to 73 percent by the year 2025 according to the Energy Information Administration. This problem will be exacerbated because of China's growing demand for oil.

Many people forget what led to the oil embargo of 1973. The Arab states believed that their complaints against Israel were going unheeded. In order to punish the United States, they cutoff our access to the oil supply we were relying on in the Middle East. I believe we are more vulnerable than we have ever been. Political unrest continues in the Middle East, and I am concerned that many of the foreign oil supplies we rely on are vulnerable to potential terrorist attacks. Can you imagine what al Qaeda would do if they were able to get control of Saudi Arabia and the oil fields there?

If the Congress is serious about dealing with our current oil supply crisis, we must pass the energy bill now. Band-aids will no longer work the patient is hemorrhaging. We can't continue with our head in the sand any longer.

Thank you and I look forward to hearing the testimony of today's witnesses.

Senator INHOFE. Senator Boxer.

OPENING STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator BOXER. Thank you, Mr. Chairman.

We are living in a dream world. You are right. I do remember those long lines in the 1970's. I also remember how the Japanese automobile companies came in and stole our market share. They make cars that had fuel economy. Now we cannot even get a vote in the U.S. Senate to increase fuel economy by a few gallons. Let us tell us straight. Let us tell all the sides of the story.

Senator Voinovich, I would like to associate myself with your anger and your fear about where we are going without an energy policy. But I think we see things a little differently. When we tried on our side of the aisle—and some on your side of the aisle—to stop the export of Alaskan oil. We need it in this country. We could not even win that vote.

There is a lot of things that we could put on the table here today, but one thing I want to put on the table, Mr. Chairman, is this. You and I are really good friends. We just do not see the world the same way when it comes to the issue of the environment versus the economy. This is an old fight. Shifting the blame from the oil industry and our own inaction to environmental laws simply does not fly.

I come from California which leads the Nation in controlling pollution from refineries and motor vehicles. I have heard this false argument for years. The people want clean air. They want to have their gas. You do not have to make this false choice. According to the California Environmental Protection Agency, the regulations we have on the books add five cents per gallon for gasoline and three cents per gallon for diesel for the cost of our gasoline. If you ask people in California if they have been hit by huge increases in the cost of their gasoline, they will say that three cents to five cents is worth it.

I would like to insert into the record a letter from the California EPA on California's Cleaner Fuels.

Senator INHOFE. Without objection, so ordered.

[The referenced document follows on page 244.]

Senator BOXER. These are the facts. Environmental regulations are not the reason gas prices have skyrocketed.

But they are the reason that we have cleaner air and better public health. California's regulations reduce ozone-forming emissions by 15 percent, toxic air pollution emissions by 50 percent, nitrogen oxides by 7 percent, and diesel particulate matter by 25 percent.

That is all Greek to a lot of us. But what does it mean?

It means reduced incidents of asthma, fewer premature deaths from heart disease, and fewer cases of cancer. Mr. Chairman, I asked my staff to find out what cancer costs us a year in our society. Not all of this could be attributed to dirty air. But all of cancer is $189 billion a year in direct medical costs, lost productivity, and lost productivity due to premature death.

So when we clean the air and we lengthen life, and we spare families the agony of these diseases, it is a far greater cost than three to five cents a gallon. According to U.S. EPA, low sulfur gas requirements will have a public health benefit equal to more than $24 billion a year. Low sulfur on road diesel fuel will provide health benefits to the tune of $51 billion per year.

This is from our U.S. EPA. A new non-road diesel rule will result in $80 billion per year in public health benefits outweighing costs by 40-to–1. These measures have been bipartisan. It would break my heart to see if in the Environment Committee we started to dismantle these things.

I hope we would not rehash this. I hope we would do something positive about high gas prices. For what it is worth to you, Mr. Chairman, I have put out a plan on that. I have worked with Senator Wyden on this. I think it makes sense.

First, for our State, we need an oxygenate waiver because we meet the Clean Air Act without that oxygenate requirement.

We should stop filling and exchange oil in the strategic petroleum reserve, which is 96 percent full; encourage FTC to turn their information investigation of gas prices into a formal investigation, encourage them to that; and have automatic investigations when you have these rapid price increases.

By the way, the FTC Chairman, in a meeting with me said he cannot explain why the prices on the West Coast are so high. It is an anomaly, he says. He is not pointing to any refineries. He is saying that there is absolutely no reason.

My light is on, but I would like 20 seconds to finish; if that is all right?

Senator INHOFE. We will make it up next time.

Senator BOXER. Thank you so much. I think we should subject OPEC to U.S. antitrust laws—that is a Mike DeWine bill—and cease and desist orders in highly concentrated areas—that is a Ron Wyden bill, and I am proud to be a cosponsor. When you see Shell Oil wanting to shut down their refinery in Bakersfield, which is so profitable, that is going to hurt us. It is going to hurt our consumers. We should have GAO assess whether we can maintain the same air quality while decreasing the number of these “boutique” fuels.

I would like to put into the record an article in USA Today, “The high prices that consumers are paying for gas and natural gas are fattening oil companies’ profits dramatically.”

Senator INHOFE. Without objection, so ordered.

[The referenced document follows:]

[From USA Today, April 29, 2004]

OIL FIRMS REAP BENEFITS OF HIGH GAS PRICES

(By James R. Healey)

The high prices that consumers are paying for gasoline and natural gas are fattening oil companies’ profits dramatically.

ConocoPhillips, the No. 3 U.S. oil company, reported first-quarter earnings Wednesday of $1.6 billion, up 33 percent from $1.2 billion in the first quarter last year and about 17 percent more than Wall Street had forecast. It cited higher prices for its products and cost savings from merging Conoco and Phillips.

BP reported Tuesday that first-quarter profit was $4.2 billion, up 24 percent over a year earlier, boosted by a gain on the sale of stakes in two Chinese companies. Higher profit margins on refining also were cited. Smaller and independent refiners reported earnings increases of 45 percent to more than 100 percent vs. the first quarter a year ago.

Average gasoline prices have set daily records this month, finally easing this week. The nationwide average for unleaded regular is $1.807, AAA reported Wednesday, slightly less than the record $1.81 reported Saturday.

Rather than being exploitive of consumers, industry analysts agreed, oil companies are either making money off high crude-oil prices caused by speculators or are reaping the benefits of investing in lower-cost refining.

“I’m not defending the oil companies, but almost every one reported losses” in the late 1990’s, said A.F. Alhajji, oil expert at the Ohio Northern University’s College of Business Administration.

“The only thing that could rain on the parade is if the economy would crash. As long as demand outpaces supply, your margins are good,” said Mary Rose Brown, spokeswoman for Valero, the largest independent U.S. refiner. Valero’s first-quarter earnings were $248 million, vs. $170 million a year ago.

Gasoline demand is up 3.4 percent this year, she said, despite high prices.

Valero does not produce oil and must buy it. However, it has invested in technology allowing it to use so-called sour crude. That’s much cheaper than the sweet crude other refiners must use to meet tightening Federal standards for low-sulfur, clean-air gasoline.

Kerr-McGee and Unocal said first-quarter results were twice as good as they were a year ago. Amerada Hess was up 60 percent.

Senator BOXER. I do not think we should shed too many tears for the oil companies, but I would shed a lot of tears for our families if we start to unravel environmental laws.

I thank you.

Senator INHOFE. Thank you, Senator Boxer.

We will cutoff opening statements at this time.

We are very pleased to have the distinguished panel before us today. Their names and identifications are printed.

We will start with opening statements. I will ask you to adhere to our 5-minute rule. We will start with you, Mr. Slaughter, president of the National Petrochemical and Refiners Association.

STATEMENT OF BOB SLAUGHTER, PRESIDENT, NATIONAL PETROCHEMICAL AND REFINERS ASSOCIATION, ON BEHALF OF THE AMERICAN PETROLEUM INSTITUTE

Mr. SLAUGHTER. Thank you, Mr. Chairman. I am also appearing today on behalf of the American Petroleum Institute, as well as our home association, the National Petrochemical and Refiners Association. Together those associations represent virtually all refiners in the United States.

We have already had discussions about the factors that affect the delivered cost of gasoline. Forty-five to fifty percent of the cost of making gasoline reflects the cost of the crude oil. As we all know, our feed stock price has gone up 60 percent in the last year.

This chart shows you that roughly 70 percent of the delivered cost of gasoline reflects the cost of crude oil, plus the cost of State and Federal taxes. Only about 20 percent of the cost represents the cost of refining, including profit. Of course, crude oil prices have been propped up by a very strong international demand, as well as the activities of OPEC.

The other major influence is that there is a very strong demand for gasoline in the United States. API estimates that we will again hit the 9.4 million barrel per day demand figure that we reached last summer.

Senator INHOFE. Mr. Slaughter, do you have copies of these to enter into the record? I think it would be very important that we have these charts in the record?

Mr. SLAUGHTER. Yes, sir; they are attached to our statement.

Senator INHOFE. Thank you.

Mr. SLAUGHTER. By the way, this particular chart shows the very strong correlation between crude prices and gasoline prices. Since crude prices are the major factor for gasoline manufacturing costs, it makes sense that the crude and gasoline price curves are essentially very similar.

As I said, we are also facing a very strong demand, really a record demand, again this summer for gasoline because of the rapidly improving U.S. economy. With demand this strong and feedstock prices so high, it is fortunate that refineries have been able to run at record rates of utilization and produce record amounts of gasoline for this time of the year. Refineries have been operating at very high utilization rates, 94.5 percent, and we think even higher as we speak even before the start of the summer driving season and producing record volumes.

But there are factors that adversely affect how much gasoline is actually available to consumers. One is the amount of refining capacity. There are problems in increasing domestic refining capacity, Mr. Chairman, which you explored in your opening statement.

The other factor is environmental regulations which play a role in limiting the amount of gasoline available to consumers. The situation like today when high demand means that every gallon counts, shortcomings are serious indeed.

I want to point to Chart Number 3. One reason why refineries are not building and capacity increases have slowed is the fact that most of the refining industry's investment capital for the last two decades has been used to comply with regulatory initiatives, pursuant to the Clean Air Act.

Because this committee has jurisdiction over the act, it is fitting that we are here today to discuss aspects of energy policy. The Clean Air Act amendments of 1990 have actually set national fuels policy for the last 15 years.

In short, energy and fuels policy is a byproduct of environmental legislation that this committee approved in 1990. Unfortunately, regulatory activities under the Act pay little attention to the impact on fuel supply. So it is fitting to review what you have asked us to do and where we are in implementation of this Clean Air Act schedule.

We are midway in the total redesign of gasoline and diesel that you have asked us to do. There are many other requirements. This blizzard of regulatory requirements affecting refiners in this decade will cost $20 billion of investment capital to implement, this group of uncoordinated and often overlapping programs.

In the 1990's, the industry spent roughly the same amount of money on the first wave of fuel and facility changes mandated by the Act. API estimates that since 1993 about $89 billion has been spent to protect the environment. More than half was spent in the refining sector. As you will notice on the time line, we are just halfway through implementation of the substantial redesign of the American fuel slate and facility regulation.

Both NPRA and API support requirements for the orderly production and use of cleaner burning fuels to address health and environmental concerns. We have been leaders in that area. We also support continuing environmental improvements at refineries and other facilities.

But given the magnitude of the investments involved, we believe the program should be crafted to help industry maintain the flow of adequate and affordable energy supplies to consumers. What happens in the real world is that supply considerations take a far back seat to the pursuit of environmental goals, preferably the greatest reduction in emissions at the earliest possible date. Supply considerations raised by industry are marginalized or dismissed.

It has been pointed out today that these environmental programs have very significant benefits. We do not argue with the very significant benefits they have, but they also have very significant costs, Mr. Chairman.

We think that Congress should join with the industry and other stakeholders in doing a better job of matching supply costs, supply impacts of environmental legislation. We would urge Congress as a first step to find the additional two votes to pass the Conference Report on H.R. 6, Comprehensive Energy legislation, and get the United States started to move toward the real 21st century energy policy.

Thank you for you time. I would ask that my full statement be placed in the record in its entirety.

Senator INHOFE. Without objection, so ordered.

Thank you, Mr. Slaughter.

Mr. Early.

STATEMENT OF A. BLAKEMAN "BLAKE" EARLY, AMERICAN LUNG ASSOCIATION

Mr. EARLY. Good morning, Mr. Chairman. I am Blakeman Early. I am happy to appear today on behalf of the American Lung Association. The Lung Association is celebrating its 100th anniversary this year.

I am going to focus my testimony on the fuels issues which we think most affect the refining industry. Obviously, there are important requirements of the Clean Air Act, such as NSR, and I will touch on NSR, but there are other requirements that affect the industry. We think the fuel requirements are the most important.

The reformulated gas program has been proven to be cost effective at reducing both evaporate and tail pipe emissions from today's vehicles, and is routinely reducing toxic air pollutants by 30 percent. This translates into a relative cancer risk reduction of 18 to 23 percent in the areas that are using reformulated gasoline. This success of this program is why some States have adopted either RFG or formulas that are cousins to RFG, commonly referred to as “boutique” fuels.

The low sulfur gasoline on-road and non-road diesel fuel programs, and their associated emissions control requirements, unlike RFG, are part of the package that cleanup both the fuel and require very sophisticated new tail pipe emissions equipment, to reduce engine emissions by 90 percent or more.

The cleaner fuel reduces emissions modestly from the vehicles and engines that are used today, but the new technology engines will provide large emissions reductions when they replace today's dirty ones. The health benefits are enormous.

Senator Boxer has already gone through this—$24 billion for the gasoline sulfur rule, $51 billion for the non-road or the on-road diesel road, and $83 billion in health benefit savings each year, which translates into few early deaths, fewer hospitalizations, fewer cancers, fewer asthma attacks, and fewer lost days at work and school, as a result of the reduction of smog and fine particles attributable to these programs.

Each of these regulations implementing these clean fuel programs were the product of a broad, lengthy, and public process that reached a delicate political and substantive compromise. No party got everything it wanted. Each rule provides large and critical emission reductions.

Any attempt to modify these rules at this juncture without thorough evaluation, risks disrupting these programs in ways that could reduce or delay the large public health benefits we need them to deliver. Those who propose changes bear a heavy burden of showing the need and demonstrating the benefit.

Air pollution still threatens millions of people. The Lung Association's state-of-the-air report just released found that 55 percent of the U.S. population lives in areas with monitored unhealthy levels of smog and particle pollution.

Vulnerable peoples subject to this pollution include 29 million children, 10 million adults, and children with asthma, and 17 million people with cardiovascular disease.

We believe that many of these areas may want to adopt a clean fuels program using either RFG, low volatility alternatives, or low sulfur diesel. We believe that should Congress choose to change the law or otherwise influence gasoline policy, it should do so in a way that makes it easier for areas that exceed air pollution standards to adopt clean fuels programs and not lock in the use of dirtier conventional fuels. We need clean fuel programs to be broadly adopted to obtain clean air and to protect the public health as soon as possible.

There is no evidence that the current clean fuels program significantly influences current gasoline price increases. As is customary when gasoline price spikes occur, some have suggested that the clean fuels program, often referred to as "boutique" fuels are responsible. While it appears that clean gasoline programs in both California and the Chicago/Milwaukee area have contributed temporary price spikes in the past.

There is little evidence presented publicly demonstrating that clean fuel programs across the country are contributing in any significant way to today's high gasoline prices. Both convention and clean fuels have risen in price 30 cents or more over the last year. This increase has occurred in virtually all parts of the country, regardless of where the gasoline comes from or who makes it.

More significantly, the increases in price for conventional gasoline and clean gasoline have pretty much been the same. Attached to my testimony I have prepared an unscientific chart that illustrates my point. If producing clean gasoline were a major factor, the prices of these fuels would be rising at a faster rate. As my chart shows, this does not appear to be happening.

The point is that many other factors that impacted gasoline price, led by unsustainable growth and demand, and the price of crude oil currently topping $40 a barrel have historically driven prices, and do so today. Clean fuel requirements have an insignificant impact in comparison.

With respect to the New Source Review rules adopted by the Bush administration, I would like to point out that unlike the process to adopt fuels rules, the so-called NSR reforms adopted were not changes long considered by the Clinton administration, and were not carefully analyzed and adopted through a collaborative public process.

They would make the refiners' ability to expand or change their process easier. They will not lower gasoline prices much, if any, but it will increase air pollution by a significant amount. We urge you to oppose those NSR changes.

Thank you, Mr. Chairman. I would ask that my full statement be placed in the record in its entirety.

Senator INHOFE. Without objection, so ordered.

Thank you, Mr. Early.

Mr. Ports.

STATEMENT OF MICHAEL PORTS, PRESIDENT, PORTS PETROLEUM COMPANY, INCORPORATED, ON BEHALF OF THE SOCIETY OF INDEPENDENT GASOLINE MARKETERS OF AMERICA AND THE NATIONAL ASSOCIATION OF CONVENIENCE STORES

Mr. PORTS. Good morning, Mr. Chairman, and Senator Voinovich from my State of Ohio.

Senator VOINOVICH. Welcome, Mr. Ports. We are very happy to have you here today.

Mr. PORTS. My name is Mike Ports. I am president of Ports Petroleum Company, Incorporated, an independent motor fuels marketer headquartered in Wooster, OH. I appear before the committee today representing the Society of Independent Gasoline Marketers of America, and the National Association of Convenience Stores.

Today SIGMA and NACS members sell approximately 80 percent of the gasoline and diesel fuel purchased by motorists each year. While my company does not retail gasoline and diesel fuel in Oklahoma, many SIGMA and NACS members, including Love's Country Stores of Oklahoma City and QuikTrip of Tulsa, are major Oklahoma marketers. Mr. Chairman, Tom Love and Chester Cadieux ask that I extend their personal greetings to you at this hearing.

Thank you for inviting me to testify today on the environmental regulatory framework affecting oil refining and gasoline policy. Today retail gasoline prices across the Nation are at some of the highest levels in history. Diesel fuel prices are not far behind.

Fortunately, the congressional reaction to, and the media coverage of, the motor fuel price volatility we have experienced in 2004 has taken on an educated tone. In general, with a few notable exceptions, allegations of price gouging and collusion have been replaced by a discussion of high crude oil prices, increases in demand, supply constraints, or dislocation caused by refinery problems and "boutique" fuels, stringent environmental regulations, and lack of growth in domestic refining capacity.

Simply stated, the environmental compliance burdens placed on the Nation's domestic motor fuel refining industry over the past 20 years have effectively destroyed the world's most efficient commodity, manufacturing, and distribution system. To enhance the quality of our air, an objective which SIGMA and NACS are completely supportive, the Government has imposed on domestic refiners tens of billions of dollars in costs, and has fragmented the motor fuel distribution system into islands of "boutique" fuels.

But as for all other good things, there is a price for this cleaner air that ultimately must be paid by consumers of gasoline and diesel fuel. Congress has a choice to make with respect to motor fuel refining policy. It could continue down the path followed for the past two decades. This path, as we have witnessed, results in static or reduced domestic refining capacity, balkanization of the motor fuel markets, increased imports, increased volatility, and wholesale and retail prices, and rising costs for consumers.

Right now on our current path there is disincentive for refiners to increase capacity due to the costs involved and the lack of opportunity to achieve a reasonable return on investment.

Alternatively, we can embark on a different path, one that continues to encourage clean fuels; one that restores fungibility to the gasoline and diesel fuel supply system; one that encourages rather than discourages expansion of domestic refining capacity; or one that changes the fundamental economic calculus that a refiner makes when it decides whether to spend the huge sums necessary to make the upgrades required to produce clean fuels or to close to refinery.

SIGMA and NACS urge Congress to examine closely this alternative path. If we do not like the current situation, then we collectively need to chart a new course in order to change the future. It is time for Congress to enact a set of Federal motor fuel refining policies to preserve and, if possible, to increase domestic refining capacity, restore fungibility to the motor fuels supply and distribution system, and enhance available supplies of gasoline and diesel fuel.

These goals should not be viewed as an either/or situation. Our Nation can have a clean environment and still enjoy affordable, plentiful supplies of gasoline and diesel fuel. But we must embark on a new path together.

As an initial matter, several provisions in the fuels title of the Conference Report on H.R. 6, the Comprehensive Energy Policy Bill under consideration by Congress, will be important first steps toward achieving these goals. However, SIGMA and NACS suggest that the enactment of H.R. 6 is only the first step. To build on the provisions in H.R. 6, at a minimum, the following steps must be considered.

Prevent the spread of new "boutique" fuels during the implementation of the new ozone air quality standard, if necessary through a Federal preemption of fuels regulations, or the introduction of a basket of Federal fuels that a State may adopt, and restore fungibility without loosening environmental protections to the Nation's gasoline and diesel fuel supplies by reducing the number of fuels permitted.

Restoring fungibility to the refining and distribution system, while maintaining environmental protections, will require the simultaneous adoption of policies to promote the preservation and expansion of domestic refining capacity.

In summary, SIGMA and NACS asks that you always keep in mind that every time the government changes fuels specifications, manufacturers are faced with the decision to allocate capital to a refinery or stop making specification fuels. In every such instance, some manufacturers will determine that the additional investment is unjustified and the relevant facility's production will be lost to the market.

Consequently, the choice is clear. Continue our current domestic motor fuel refining policies, or perhaps it is better described as a lack of a policy, or choose a new path that encourages the production by domestic refiners of plentiful supplies of clean gasoline and diesel fuel.

Thank you for inviting me again to testify today. I would be pleased to answer any questions my testimony may have raised. I would ask that my full statement be placed in the record in its entirety.

Senator INHOFE. Without objection, so ordered.

Thank you, Mr. Ports.

Dr. Cooper.

STATEMENT OF MARK COOPER, DIRECTOR OF RESEARCH, CONSUMER FEDERATION OF AMERICA

Mr. COOPER. Thank you, Mr. Chairman, and members of the committee. I greatly appreciate the opportunity to appear today and applaud the committee for inviting consumers to present their view of the current situation in the gasoline markets. Ultimately it is the consumers who pay the bill.

The current records cap a wild 4-year ride, a roller coaster on gasoline prices.

When the first signs of trouble began 3 or 4 years ago, CFA began to look and do research into the question. We do not lose interest. We stick with it when the prices are low as well as when they are high. In three reports, we have testified at least three or four times—I testified before Senator Voinovich—we have offered an examination that looks at the complex interaction of all the factors that are affecting our prices.

We believe that increasing demand here in America and around the world has tightened markets every place. This reinforces the pricing power of dominant international producers. Domestic markets are tight, too, because refining capacity in stocks have not kept up with demand.

In our view, consolidation in the industry has interacted with environmental regulations to reduce capacity. Given today's hearing, I want to focus on that point of our comprehensive analysis.

A 2003 study for Rand Corporation underscored the behavioral change that took place in the industry in the 1990's. "Relying on . . . existing plants and equipment to the greatest possible extent, even if that ultimately meant curtailing output of certain refined product . . . was the industry policy. They were openingly questioning the once universal imperative of a refinery not 'going short,' that is, not having enough product to meet demand. Rather than investing in operating refineries to ensure that markets will fully supply all the time, refiners suggested that they were focusing first on ensuring their branded retailers are adequately supplied by curtailing sales to the wholesale markets, if needed."

So business decisions interact with environmental decisions, as was underscored in the Federal Trade Commission report about the 2002 price spikes in the Midwest. A significant part of the reduction in the supply of RFG was caused by the investment decisions of three firms. When they determined how they would comply with the stricter EPA regulations for summer grade RFG, that took effect in the spring of 2000.

Each independently concluded that it was profitable to limit capital expenditure to upgrade their refineries only to the extent necessary to supply their branded gas stations and contractual obligations. As a result of these decisions, these three firms produced in the aggregate 23 percent less summer grade RFG.

Business decisions respond to the investment incentives that public policy sets for them. That is the way our economy works. So 3 years ago we began advocating a balanced policy to reduce pressures on domestic gasoline markets. The three prongs of that policy include efficiency, flexibility, and transparency.

Given the subject of today's hearing, I will focus on flexibility since that involves refinery capacity. I wrote this 3 years ago, and we have reiterated it in every piece of testimony and every report we have written. "Expanding refinery capacity by 10 percent equals approximately 1.5 million barrels a day."

This would require 15 new refineries if the average size is the current example the Chairman gave and involved a much larger refinery. This is less than one-third the number shut down in the past 10 years and less than one-quarter of the number shut down in the past 15 years.

Placed in the context of redeveloping recently abandoned facilities or expansion of existing facilities, the task of adding refinery capacity does not appear to be daunting. Such an expansion of capacity has not been in the economic interest of the businesses making those decisions.

Therefore, public policies to identify sites study why many facilities have been shut down and establish programs to expand capacity should be pursued. Consumers need more capacity to loosen this market. That approach has not been adopted, but we remain convinced that such a balanced approach can expand refining capacity in a pro-competitive and consumer-friendly manner.

Ironically, 25 years ago when I came to Washington to work on energy policy, consumers were supporting what was known then as the small refiner bias. This was a policy that was intended to keep those hundreds of refineries that have disappeared in business. It cost money, and we knew it cost money. But the answer was the presence of independent refiners was a significant pro-competitive, pro-consumer, force in the industry. We supported it because this is an industry that needs competition.

What we recommended 3 years ago, and repeatedly over the course of 3 years, is that we update that policy to get more capacity and more competition into this industry.

Thank you, Mr. Chairman. I would ask that my full statement be placed in the record in its entirety.

Senator INHOFE. Without objection, so ordered.

Thank you, Dr. Cooper.

Mr. Dosher.

STATEMENT OF JOHN DOSHER, DIRECTOR, JACOBS CONSULTANCY

Mr. DOSHER. Mr. Chairman and members of the committee, my name is John Dosher. I am the director of Jacobs Consultancy, formerly known as Pace Consultants. I would like to thank the committee for the opportunity to testify at this hearing and to provide you my independent views on the refining industry.

Much of my work for Jacobs during my 40-plus years with the firm has been heavily focused on helping financial institutions and refiners to develop financing for major asset acquisitions and expansion projects. Due to the poor health and uncertain climate for investments in the refining industry, gasoline supply in the United States is now tight and is expected to get even tighter.

It may be helpful to the committee for me to review historical as well as expected clean fuels regulations impacting the refining industry. The exhibits I refer to are attached to my written testimony.

The first regulation shown in Exhibit 1 initiated in 1973 was the removal of lead from gasoline. This was required for catalytic converters in cars and was phased in over a 10-year period. In 1989, the EPA instituted vapor-pressure controls to reduce hydrocarbon emissions. These vapor-pressure controls were further tightened in 1992.

Based on the Clean Air Act Amendments of 1990, many large refiners had to use reformulated gasoline which by law required additional emission reductions. These reductions continued to become more stringent, even through today, with the use of more stringent and complex emission models. The RFG regulations also required the addition of oxygenates, such as MTBE or ethanol.

Under the amendments, conventional gasoline, which is used in non-RFG areas, could not be more polluting than a baseline set for each refinery as determined by 1990 production qualities. The amendments also allowed for second round emission reductions. This resulted in the creation of low sulphur gasoline regulations that began this year, and ultra-low sulfur diesel regulations requirements in 2006 that are also accompanied by an addition of new catalytic converters and other changes to large trucks.

I should also note that California has already implemented much more stringent standards for gasoline and diesel compared to the Federal standards. Possible further Federal clean fuels initiatives pending would be the removal of MTBE from gasoline, renewable fuel standards, and additional ultra-low sulfur standards for non-road diesel and other transport fuels. Several States have already implemented MTBE bans.

All of this has lead to uncertainty in the refining industry, particularly when it comes to the financial aspects of the business. Let me present the following charts to illustrate this. Uncertainty of required investment leads to lower asset value. This is illustrated for the refining industry by Exhibit 2 which shows recent transactions. The market for buying and selling refineries has ranged from 5 percent to 35 percent of replacement costs over the last few years.

Replacement costs is the cost to build a new refinery of the same size and configuration. The most recent transaction has been approximately 15 percent of replacement costs and occurred earlier year. It is also indicative that if an existing refinery sells for 20 percent of replacement costs, it becomes difficult to justify building a new facility at 100 percent of replacement costs.

Exhibit 3 outlines the landscape of financing for the refining industry. A refiner can typically borrow anywhere from 30 percent to 50 percent of their market value. The refinery value is the collateral for the loan. We look at this market value as a percent of replacement costs. A refinery which is valued at 20 percent of replacement cost can then expect to get financing in the range of 7 percent to 10 percent of replacement costs.

The clean fuels program for low sulfur gasoline and ultra low sulfur diesel are costing 8 percent to 12 percent of replacement cost. This means that a refiner's available credit is more than totally tied up with the clean fuels project and is not available for expansions.

Other requirements will put reasonable refiners in a more serious bind. A good example is the NOx reduction required for ozone in the Houston-Galveston area. Our analysis of capital costs to meet substantial reductions of NOx adds another 3 percent to 6 percent of replacement cost for refiners' needs.

You can quickly see that in today's market there is not a great deal of room for independent refiners to raise the funds needed for clean fuels and expansion. Some refiners could shut down. To meet our demand for gasoline and products, two goals must be met.

Uncertainty and future regulations must be resolved quickly. Regulations must be made and implemented in a manner to minimize the economic impact of the refining industry.

Thank you, Mr. Chairman. I would ask that my full statement be placed in the record in its entirety.

Senator INHOFE. Without objection, so ordered.

Thank you very much, Mr. Dosher.

We will start our round of questions at this time.

Either Mr. Dosher or Mr. Slaughter, in the opening statement by Senator Jeffords he talked about the first quarter profits—I think he said ConocoPhillips, but he is also referring, I think, to the industry as a whole.

Would either one of you have any knowledge of what happened during the year 2002 or 2003 in terms of the profits?

Mr. Dosher?

Mr. DOSHER. A general measure of profits is what is called the “crack spread” which is the weighted average difference of gasoline in diesel over crude oil. We would say the average of that number was about $4.90 for 2003. Year-to-date, as of last week, it was somewhat over $6. So profits have increased.

Senator INHOFE. Any comments, Mr. Slaughter?

Mr. SLAUGHTER. Just, Mr. Chairman, that the first quarter 2004 profits for major integrated companies declined roughly 3 percent in the first quarter. Shell was down 16 percent. Exxon was down 23 percent. Marathon was down 16 percent. Total industry profits were down 0.3 of a percent.

Senator INHOFE. Thank you. Dr. Cooper, I would agree with you. We need to expand capacity. I have a letter here from Mr. R.G. McGuiness from Arizona where they have been working on starting a new refinery now for 10 years. He is only right now getting to the initial permitting phase. Do you have any comments about that? I would agree with you on expanding the capacity. How do you do it?

Mr. COOPER. Well, the reason we focused on the closed sites—and your graph shows that in the last 10 years we have closed an awful lot of sites. The question that we raised was those are the places where refineries had existed.

They were closed as a result of business decisions, we were told. They seemed to us to be the prime targets of possibilities for restarting the facilities in many cases that may still be there, or expansion of other facilities that had been chosen.

That is why we wanted a public process to identify those locations. We think that makes it easier for those communities involved—since that is where they live; they are living with a refinery, or they recently did—to deal with that. That is why we focused on those places. We knew there was capacity there. It was taken out of businesses, Senator Wyden suggested, for economic reasons.

What we wanted to know was what would it take to get those places restarted. In a certain sense that is the low-hanging fruit for capacity expansion in the industry. We stuck with that.

Senator INHOFE. Any responses to that line of reasoning?

Mr. SLAUGHTER. What I would just say, Mr. Chairman, is that you cannot ignore the economics of the industry. There are tremendous costs that go into the refining business. We are talking about

$20 billion of costs for investments, just for environmental programs in this decade, and $40 billion if you take the last two decades together.

You cannot ignore the fact that you have to have massive amounts of capital in order to be in this business and make these changes and produce products.

Senator INHOFE. Let me interrupt you, then. In his opening remarks, Senator Wyden said that the regulations are not costly. You hear this on both sides. How can you quantify the cost of regulations, or have you done that?

Mr. SLAUGHTER. It is difficult to do so, other than, as I said, the API has a figure that $89 billion has been spent for environmental improvements over the last two decades, over half of which was spent in refining. It seems very strange.

The industry certainly admits that it is very important to have an aggressive clean fuels program. The only question is whether you can obtain the same benefits in a way that does less damage to supply. The industry is a major investor in clean fuels, but can we do it in a better way?

Senator INHOFE. I see. Dr. Cooper's testimony, I think it was in your written testimony, almost brings you to the conclusion that the refiners are purposely not expanding and not building. I would like to have you respond to that.

Mr. DOSHER. As illustrated by my testimony, in terms of quantifying the costs to meet environmental requirements, it turns out to be 8 percent to 12 percent in an existing refinery, what it costs to build a new refinery, the replacement cost is very high.

What I found is that certain people cannot raise the money to do this. Therefore, they may not do that. They may shut down. People are not deliberately withholding production. They are putting these facilities in where they can afford to and where they can get the financing to do so.

Senator INHOFE. Well, something is there because as I said in my opening statement, we have less than one-half the refineries today that we had 20 years ago.

Senator Boxer.

Senator BOXER. Thank you, so much. Mr. Chairman, I think this has been a really fine panel. Thank you for putting it together.

Senator Harry Reid has asked, because he was delayed on the floor, that I put his statement in the record.

Senator INHOFE. Without objection, so ordered.

[The prepared statement of Senator Reid follows:]

STATEMENT OF HON. HARRY REID, U.S. SENATOR FROM THE STATE OF NEVADA

Mr. Chairman, I want to thank you for calling this hearing today on gasoline prices. As you know, gasoline prices are at a record high across the Nation and have reached alarming levels in Nevada and California.

A regular, unleaded gallon of gasoline this morning costs $2.21 in Las Vegas, $2.26 in Reno, while higher blend fuels are approaching $2.50 per gallon.

Since the first of the year, the price of gasoline has increased more than 57 cents in Las Vegas and Reno.

There is no doubt that the price of crude oil has contributed to higher gasoline prices in Nevada and throughout the country in the last few years. However, this outrageous 57-cent increase in Nevada since January has not been driven by the rising cost of crude oil, but by corporate greed and profit.

Big oil companies and refiners are getting rich and middle class families are getting gouged.

This is not speculation on my part.

It's clearly documented by the California Energy Commission and the DOE Energy Information Administration that refiner margins (i.e., refiner's cost plus profits) have doubled and tripled. The oil companies weren't content to make 25 cents on every gallon of gasoline. They now make 50 to 75 cents for every gallon of gasoline.

Some say this is an example of the law of supply and demand. That it is . . . the refiners have the supply and they'll demand your pocketbook.

I have received hundreds of letters from Nevadans whose budgets are being stretched by these skyrocketing prices. Gasoline isn't a luxury for families . . . it is a necessity. Families have to put gas in their vehicles so they can drive to work, take their children to school, and go to the grocery store.

The big oil companies control the supply, and they know that families really have little choice in the matter . . . they literally have consumers over a barrel.

While consumers were paying record prices, the oil companies were reaping record profits.

The first quarter profits for the big oil companies were recently released. What a shock—the refining and marketing profits of the big four oil companies have increased by a staggering amount over 1 year ago!

BP up 165 percent

Chevron-Texaco—up 294 percent

Conoco-Phillips—up 44 percent

ExxonMobil—up 125 percent

And major California refineries owned by Valero and Tesoro that supply the Las Vegas and Reno area have reported "record" profits and project even bigger gains in the months ahead.

Not "good" profits, not "great" profits, but "record" profits.

Senator BOXER. Mr. Chairman, it is an interesting statement. I want to read some of the parts of it here.

"The outrageous 50 cent increase in Nevada since January"—that is per gallon—"has not been driven by the rising cost of crude oil but by corporate greed and profit. Big oil companies and refiners are getting rich and middle class families are getting gouged. The refiners have the supply and they will demand your pocketbook."

He goes on to show—and Mr. Slaughter I am going to ask you a question on this—some of the increases in profit. BP is up 165 percent in their profit. Chevron-Texaco up 294 percent. ConocoPhillips up 44 percent. Exxon-Mobile up 125 percent. He says, "Not good profits, or great profits, but record profits."

So here you have an industry that is having a banner year. There are all sorts of articles. As a matter of fact, Senator Jeffords gave me, "High gas prices at pump mean profits for oil companies." That is NBC a month ago. "Chevron-Texaco parlays high gas prices into higher profits." AP, May 1st. "Oil firms reap benefits of high gas prices." USA Today, April 29th. "Exxon's profits best in 13 years." Dallas Morning News.

That is good news. So what is your problem?

Mr. SLAUGHTER. Well, the fact of the matter is that the companies that you are talking about are international concerns that are engaged in all aspects of the oil business.

If you look specifically at refining, the return on investment in refining generally reverts to about 5 percent, normally.

There are good years and bad years, and many more bad years than good years, Senator Boxer. It reverts to 5 percent, which is about what you can get in an investment return.

Senator BOXER. But some of these companies have their own refineries.

Mr. SLAUGHTER. They have their own refineries, but they are a separate part of the business. If you look at the refinery performance, it is far below the numbers you have mentioned.

Senator BOXER. OK. Thank you. That is a really important point. They keep their records separate. But at the end of the day, it is all about the oil company. It owns these refineries.

I want to make a point to you which I think is important.

I am going to direct it to Mr. Ports and Dr. Cooper. A lot of you who represent the oil industry are sympathetic to it, and are basically saying, "Woe is us. We are just doing really badly." As I said, I want to point out that you are here, Mr. Slaughter, begging us to take action when the oil companies are doing just fine.

Yes, some of the things that they do are only doing 5 percent. I know a lot of small people that would love that, too, but let us set that aside. The bottom line is that at the end of the day the oil companies are doing fine, and we have clean air regulations here since the 1970's, and an attempt by some—not all of us obviously—to repeal a lot of these laws.

Mr. Ports, I want to talk about your comment on these refineries. You are decrying laws that discourage the building of refineries. I am with Dr. Cooper here in his testimony who is representing the consumers. I would like for you to show me how the oil companies are trying to build new refineries.

We have a Bakersfield situation where Shell Oil wants to shut down their refinery now. You know what they said, Mr. Slaughter, to us, to the people? "We are losing money. It is a disaster." Guess what? We found that through a lot of hard work by groups through the Freedom of Information Act that they were the most absolutely profitable refinery, and one of the best in the country, doing really well. So then they backed off and said, "Oh, I guess we were wrong." Then they said, "No one wants to buy it." We said, "Really?" Then we found out that was not true.

So here you have a situation where I believe something is rotten here because they are saying they did not make money.

Dr. Cooper, do you think maybe they are trying to not expand the supply, but keep the supply tight?

It reminds me of our electricity crisis, Mr. Chairman, when we had this false shortage of electricity. People are going to jail for it, thank goodness. I praise the AG's office for moving on it. But people created a shortage in other ways. This is the way that is at least to me a little more evident. Here is a situation where you have a refinery making money. The oil companies are doing just great, thank you, and they are going to shut it down.

Dr. Cooper, do you sense that there is not this great desire to build these refineries?

Mr. COOPER. Well, the evidence to which Senator Wyden points looks back at the key period of the major mergers in the late 1990's. There were corporate documents which discuss the way to increase the profitability of the industry and the refining sector. These are all vertically integrated companies. The role of the majors in refining has expanded dramatically, the FRS companies that the Energy Information Administration tracks.

So there was a policy documented in those corporate documents discovered in the Rand study. Gaining control of that sector, making business decisions, and even the Energy Policy Development Group pointed out that there were business decisions made about the reduction of capacity.

The situation today is that we have refineries running at levels of utilization that strain those refineries. They are running at too high a capacity because we do not have enough capacity and we need more spare capacity. But there is not a big inclination to expand it. That is why we have advocated public policies that create the incentives to expand capacity.

Senator BOXER. Thank you.

Senator INHOFE. Thank you, Dr. Cooper.

Senator Allard.

Senator ALLARD. Thank you, Mr. Chairman. I want to thank the panel for their comments.

I guess those of us who have been in business for ourselves recognize that there are always a few bad actors and whatever. It is unfortunate that just a few can, I think, create a problem for the rest of the industry.

But what I have noted with time is that many times when there are accusations of the oil companies or refineries taking excess profits, they go ahead and then take it to the court. They process it and find out it is null. There was not an excess. This is the majority of cases. I am not denying that there are not a few now and then. But certainly this is by far the majority of the cases. Our challenge, of course, is to catch those that perhaps do that.

But I think it's unfair to paint the entire industry as someway or another as profiteers. The fact is that over time this country has proven that free enterprise works, free markets work. There are those who want to shut that down.

I have to remind myself of the latter part of the Carter years when we had cars in line around blocks and blocks waiting to get fuel because they thought it was such a great idea to fix prices. We ended up with the loss of supply and not enough gasoline to go around.

So I do think the regulatory burden does have some impact on supply and demand. As we look at the regulatory burden, my question to you is: Are any of these regulations that are creating a problem now for your industry, are they duplicative? Where they somehow or the other tend to stack on one another but when you look at the total benefit of those regulations, they tend to keep addressing the same thing over again.

I think this is something that can be helpful if you can identify for this committee those that are duplicated and get those. I think then it gives us some concept or some form or perhaps maybe we can address the burden of rules and regulations on your industry.

Mr. Slaughter.

Mr. SLAUGHTER. Senator Allard, if I could, I would just say a word on that. It not exactly duplicative but all of the things on this chart, particularly the fuels regulations, require facility changes in order to be implemented so we can make all these clean fuels for consumers, both gasoline and diesel over the next few years.

There are difficulties in making changes at facilities.

I do need to mention that forward movement on the reform of the New Source Review program is absolutely essential to allowing the industry even to do this work. So that is an area where there is great interaction because we need New Source Review reform so we can make changes at facilities to make these cleaner fuels, and also so that we can add capacity in some situations as well where it is warranted and justified by the economics.

So I would say that there is a definite link between the New Source Review program and all the other programs we have talked about today.

Senator ALLARD. Well, I think you make a good comment on the fact that it is the various levels of government that keep stacking on. You have local and you have zoning regulations and everything right on up to the Federal.

Are there any rules and regulations at the Federal level?

Could you make a list for us that we can look at?

Mr. SLAUGHTER. Yes, we would be glad to do that, sir.

But the most helpful thing that could be done on the Federal level is to pass the Comprehensive Energy Bill Conference Report, and to particularly remove the 2 percent oxygenization requirement for reformulated gasoline, which has caused problems over the last decade, and is causing problems today.

We would be glad to make a more detailed list for you.

Senator ALLARD. Thank you.

Senator INHOFE. Without objection, so ordered.

Senator ALLARD. The problem we have again is this. When I served in the State legislature, we had a debate between using as oxygenated products—whether you use alcohol, which is ethanol, or whether go ahead and use MTBE.

The thing that is holding up that bill is this conflict about MTBE. In the State legislature the environmental community says, "Well, we do not want to use the oxygenated product with alcohol. We want to use MTBE."

Now the oil and gas companies are being sued because there are problems with MTBE. Now maybe there is a supplier problem, the way the initial retailer was storing it and it was unfortunate the way it got into the ground, and then the whole industry gets slapped.

The other thing is that policymakers, certainly the environmental community, were arguing that they wanted MTBE.

Now the are starting to blame the oil industry for that. I sympathize with you in getting caught in that dilemma. That is one of the things that happens with these sort of mandates.

Mr. Slaughter.

Mr. SLAUGHTER. Senator, if I could, I would just say that the industry did not support the mandate in reformulated gasoline of 2 percent. Congress essentially, in passing that program, required us to develop a whole industry to supply oxygenate into gasoline which, as you pointed out, now people are trying to penalize the industry.

Senator ALLARD. I see my time has run out. Thank you, Mr. Chairman.

Senator INHOFE. Thank you, Senator Allard.

Senator Carper.

OPENING STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE STATE OF DELAWARE

Senator CARPER. Thanks, Mr. Chairman. And to our witnesses, thank you for joining us and for your testimony today.

I understand your comments, Mr. Early, you spoke to the health care costs that are associated with not regulating, at least to some extent, the refinery of oil into gasoline.

One of my colleagues said earlier that there are costs to regulations. I think that was echoed by some at the witness table. There are also costs to not regulating. There are costs that are measured in human lives. There are costs that are measured in health care that we spend for folks who are afflicted and who need to be cared for, hospitalized, and in some cases, die.

Could you help us quantify that a little bit, Mr. Early, please?

Mr. EARLY. Senator, obviously that is why I am here. I have already quoted the EPA estimates that are estimates of monetizable health benefits. There are many non-monetizable adverse health effects that occur as a result of exposure to excess levels of air pollution, particularly cancer-causing pollution.

None of these numbers well reflect the impact of rushing a child to the hospital because he or she is having an asthma attack. This truly reflects the impact that that experience has on that family. Reducing these air pollutants can reduce the number of emergency hospital visitations for kids with asthma, for adults with asthma, and for some of our elderly.

One of the things that is very interesting about the new research on air pollution is that fine particle pollution is triggering heart attacks at a rate that we did not previously understand. So reducing heart attacks is an example.

You cannot put a number of avoiding a heart attack that is truly meaningful. You have the numbers before you there.

They are massive in terms of the benefits that are measurable or monetizable using EPA's methodology. It truly is stunning.

I wanted to make one comment about how these rules have been developed. It would be interesting to have Mr. Slaughter respond to them. These rules that EPA developed, from my perspective, do not get any better than this. By that I mean they were developed with a very comprehensive and collaborative process. They gave the industry, on average, a 4-year lead time before the sulfur rules went into effect.

The sulfur rules were phased in over 3 years for large refiners and 5 years for small refiners. There is a special small refinery hardship waiver. There is banking and trading of sulfur credits.

It just does not get any better this if you are going to address environmental requirements while softening the impact of the requirement on the industry. There is a lot of talk about these different requirements.

But I think that the Agency really has done a masterful job at trying to reach a balance. We did not get the health benefits as quickly from these regulations as we would have liked to have seen, but they are being phased in a way that does provide the industry with the ability to adjust in a way that we do not believe would be a major adverse impact on their ability to do business.

Senator CARPER. It is not every day that folks from the environmental community or the medical community, the health community, praise EPA for much that they have done. I think this is especially noteworthy.

Mr. EARLY. In yesterday's Washington Post there was an article on the new non-road diesel role. I thought it was very illustrative because it had complimentary remarks from the Lung Association and the National Association of Manufacturers. This does not happen very often.

Senator CARPER. That is for sure.

Mr. Slaughter, you have been given an opening here to make a comment. Do you want to?

Mr. SLAUGHTER. Thank you, Senator Carper. I will just say that it is a collaborative process but most of the industry recommendations that affected supply were not taken.

Essentially some relief was given to subsets of the refining industry. But the major part of the industry that has to go ahead and make these large investments really was still given a Herculean task in not only gasoline sulfur rules, but right on top in the same timeframe, are the diesel sulfur rules which are extremely challenging which have to be implemented in 2006.

Now on top of that is the program that was announced yesterday, which is marginally better. Some of the industry recommendations were taken. But that is in comparison to the previous two when really very few of the industry's more serious recommendations on supply were taken. So everyone can participate, but only a few are listened to.

Senator CARPER. Thank you. Yesterday we voted on the so-called Frist ETI bill. As we all know, it included substantial energy provisions that provide incentives to the production of solar energy, greater production of wind energy, and geothermal. There are incentives there to encourage us to use ethanol more—soy diesel, bidiesel fuels. There are incentives there to encourage us as consumers to purchase, and for manufacturers to manufacture hybrid-powered vehicles, a combination of internal combustion and electric-powered vehicles, clean-burn diesel vehicles.

That is the kind of thing that we need to be doing a whole more of. Quite frankly I am pleased with what we did yesterday. I think it has a substantial long-term salutary effect here.

Mr. Chairman, I would like to ask for unanimous consent to do two things. One is to enter my own statement into the record.

Senator INHOFE. Without objection, so ordered.

Senator CARPER. Also, Senator Lieberman, who is not here, has asked that his statement and attachments be entered as well. I would appreciate that.

Senator INHOFE. Without objection, so ordered.

[The prepared statement of Senator Carper follows:]

STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE STATE OF IDAHO

Mr. Chairman—Over the years since Congress enacted the Clean Air Act, we have made significant strides in protecting human health and the environment. Statistics show that air quality has improved significantly, even as our economy has expanded at an unprecedented pace.

Recent clean air regulations affecting passenger cars, trucks, and buses are an essential part of this success story, and promise even further progress as they are fully implemented in coming years. The bottom line is that we can expect producers to make gasoline that is clean-burning, to operate refineries without emitting tons of harmful pollution, and to be able to do so without sending the price of gasoline skyrocketing.

These regulations improve the quality of the air thousands breathe, result in fewer premature deaths, and provide billions of dollars in public health benefits. For example:

- The Tier 2/Gasoline Sulfur Rule will prevent 4,300 premature deaths and result in $25 billion in public health benefits each year;
- The Heavy Duty Diesel Rule will result in 8,300 fewer premature deaths and $51 billion in public health benefits each year;
- The Off-Road Diesel Engine Rule announced yesterday will result in 12,000 fewer premature deaths and 15,000 fewer heart attacks each year, resulting in $80 billion in public health benefits each year.

Regulating emissions from industrial facilities such as refineries are an important part of this success story. In Delaware, the story of the Motiva refinery provides an example of hard work that has yielded progress and results. Once the largest emitter of sulfur dioxide in the country, Motiva has agreed to install scrubbers significantly reducing their emissions. It is important to note that this regional air quality victory did not detract from Motiva's attractiveness as an acquisition target last week Motiva was purchased by Premcor, Inc.

In general, the overall financial success of oil companies does not seem to be negatively impacted by environmental regulations. In fact, profits for many companies have grown as gasoline prices have climbed. According to Bloomberg, current margins on processing crude oil into gasoline are 69 percent above the 10-year average and the second-widest since at least 1990.

The statements from today's witnesses largely focus on oil and gasoline supplies under the current circumstances, this is not only an economic issue, but a critical national security issue as well. Mr. Slaughter's testimony states that an important component of recent gas price increases is the strong demand for gasoline. Today, passenger cars and light trucks account for approximately 40 percent of the oil consumed by Americans. If we are looking for the long-term fix that several of the witnesses advocate, shouldn't we be trying to also decrease demand, rather than just increase supply? Under the circumstances, I believe that it makes sense to pursue conservation and energy efficiency initiatives. For example, by raising the fuel efficiency of American-made cars, trucks, and SUVs, we could significantly decrease the amount of foreign oil that we import. And, we might be able to have a faster impact by including conservation efforts in an overall policy mix, rather than just relying on increased production.

Another important aspect of supply and demand involves alternative fuels. I believe that we should be devoting more research and development resources to developing fuels that can reduce our reliance on imported petroleum. Yesterday, the Senate approved some of the tax provisions of the long-delayed energy bill. Included was support for the production and use of biodiesel and ethanol. Last week, the Senate failed to adopt a Renewable Fuels Standard when it was offered. The point here is that there are several things we can do, besides increasing production of traditional gasoline and diesel.

With past progress, the promise of even better air quality in our future, tremendous public health benefits, and little financial downside for companies, there is no reason to take backward steps. Environmental policy must be based on, and adhere to, a long-term vision dedicated to protecting public health and the environment. Above all, environmental policy should not be geared to the ebb and flow of short-term events such as the vagaries of gasoline pump prices.

Mr. Chairman, thank you.

[The prepared statement of Senator Lieberman follows:]

STATEMENT OF HON. JOSEPH I. LIEBERMAN, U.S. SENATOR FROM THE STATE OF CONNECTICUT

Thank you, Mr. Chairman, for calling this important hearing today. With gas prices rising to their highest level in decades, I appreciate this forum to focus on the causes. However, I do not believe that the environmental regulatory framework the focus of today's hearing is truly to blame for these problems.

Any claims that environmental regulations at oil refineries are to blame for recent gas price spikes should fall upon deaf ears the two are not related. For the refineries that we will hear about today, environmental regulations are not a new or different expense. They are known costs of doing business, and any well-run business would have accounted for these costs in their plans long before it would have to spike gas prices or run short of production.

Widely accepted academic reviews of the oil and gas industry bolster this argument. For example, one paper by Eli Berman of Boston University from 1998 analyzed the effect of environmental regulations on the oil refineries in the Los Angeles Air Basin and found that despite regulatory obligations, productivity in the Los Angeles Basin rose sharply, at a time when other regions were experiencing decreased refinery capacity. I believe this example casts doubt on the veracity of claims that environmental regulations are strangling the refining capacity of this country. Mr. Chairman, I ask that this paper be submitted for the record.

[See referenced document follows on page 308.]

Another paper by Vasanthakumar Bhat of Pace University from 1998 analyzed an oil refinery with a good environmental compliance record and found that compliance actually had a positive effect on the firm's bottom line. The paper concluded that in order to comply with environmental regulations companies had to become innovative and efficient. Because they found ways to create a more cost-effective processes to reduce emissions they ended up with a higher profit margin. Mr. Chairman, I also ask that this paper be submitted for the record.

[See referenced document follows on page 344.]

In fact, in recent history, the refining capacity of the United States has expanded, not shrunk. According to EIA data, total U.S. refinery capacity has been growing all through the 1990's, despite environmental regulations. Mr. Chairman, I ask that a chart from the Energy Information Administration's March 2004 presentation on refining capacity be placed in the record.

Now, the provisions of the Clean Air Act that apply regulation to the refineries' products admittedly may result in a patchwork quilt of varying gasoline requirements throughout the Nation, which could make it more difficult for refiners to provide a secured supply to all areas. But we tried to address that problem, Mr. Chairman, in S. 791 that passed unanimously through this committee. Unfortunately, the delicate compromise that S. 791 represented a compromise between American Petroleum Institute, the corngrowers, and environmental interests was decimated by the energy bill conference and the insistence of MTBE producers on liability protection, a delayed phaseout of MTBE, noxious legislative findings, and several other poisonous provisions. I fear that the greed displayed in that conference may have set back our attempts to fix the gasoline requirements through the Nation for a while to come.

But none of this would be so much of a problem if our Nation did not have an ever-expanding appetite for petroleum products. How can we act surprised that oil prices are on the rise give the laws of supply and demand when Congress continues to refuse to raise the nation's fuel economy standards even the slightest bit? In a time when we do not wish to be dependant on the Middle East for reasons of national security, and in a time when the OPEC cartel is turning off the spigots to our economy, our Nation must come to grips with our addiction to oil and begin to wean ourselves away from it. Finally, as we look for a culprit for the gas price spikes, I think it is important not to overlook the most obvious possibility. In the first quarter of this year, we all know that gas prices were abnormally high. In the first quarter of this year, we also know that the oil industry reported record profits according to one company, as a result of "higher prices for its products." Wouldn't it be a reasonable assumption to make that the oil industry's high profits were financed by high prices at the pump? I recognize there are more complexities involved here, and OPEC is driving up the prices of oil throughout the world, but if one were to take a step back and view the larger picture, it just may be that simple.

The bottom line is that the rise in oil and gas prices is indeed a serious problem for my constituents and for our Nation and deserves investigation and hopefully a solution. But, to make the unsupported conclusion that the prices are somehow caused by environmental regulations, while ignoring the more obvious causes and effects, is not a productive way to get prices down. It is merely a convenient way to use a very real and immediate problem to chip away at environmental protections designed to protect our health and environment.

Senator CARPER. Thank you, Mr. Chairman.

Senator INHOFE. Senator Voinovich.

Senator VOINOVICH. Mr. Chairman, I would request that my entire statement be inserted in the record.

Senator INHOFE. Without objection, so ordered.

Senator VOINOVICH. Mr. Slaughter, it has been alleged by some people that there is collusion among the oil companies and the refiners. I have participated now in three previous hearings. We asked the FTC to look into the situation. In no case did they come back and say that they found collusion.

I have also again asked to the FTC to look into whether or not there has been collusion. I think that is something that is always out there. People say, "Well, that is the reason for it." I think it is a smoke screen to avoid relooking at the problem that we are confronted with.

We have changed the New Source Review rules. I am interested in your comment on that. Will that lead to more refineries being built or will it make it easier for refineries to do a better job?

Then we have Mr. Ports talking about "boutique" reformulated gas, which I know in several instances have been the cause of problems in terms of the price going up because there are so many "boutique" gasolines out there. The question really is: Is there a way that we could control the number of "boutique" gas products on the market in order to try to make that more sensible?

Then the last thing is: What is it going to take to build more refineries? We are focusing on refineries today.

There is a lot more to it.

I guess the first question I want to ask all of you is:

Do you support the Energy bill?

Mr. SLAUGHTER. Yes.

Mr. EARLY. Absolutely not.

Mr. PORTS. Yes, we have.

Mr. COOPER. We oppose it.

Mr. DOSHER. Some parts. With respect to the refining industry, I support.

Senator VOINOVICH. So here it is. We have that one out of the way.

Senator INHOFE. For clarification, is that H.R. 6 that you are referring to?

Senator VOINOVICH. Yes, the Conference Report.

Senator BOXER. That is two-and-a-half votes out of five, which is our country today; is it not?

Senator VOINOVICH. What is it going to take to get more refineries? Do we all agree that more refineries would help increase the supply and reduce the price?

Mr. PORTS. Yes. More supply is always good for marketers.

Senator VOINOVICH. Does anyone disagree with that?

Mr. COOPER. Especially when they are independents.

Senator VOINOVICH. All right. But the fact is that you agree, Dr. Cooper, if you had more refineries things would be better and the price would be done and we would have more gasoline available; is that right?

Mr. COOPER. Yes; absolutely.

Senator VOINOVICH. What is it going to take to get the refineries?

Mr. SLAUGHTER. Well, basically, it is going to take some admission that there are significant costs imposed in the industry for environmental sources.

Senator VOINOVICH. But the New Source Review, the new rules by the Administration that have been taken——

Mr. SLAUGHTER. They will be helpful, Senator Voinovich, because they will allow the industry to install new technology without fear of triggering extensive New Source Review requirements as long as the emissions do not go up at the facility. Actual emissions do not go up. You can go ahead and make the changes in the refineries that we need to, to try to keep up with the growing demand for supply here.

It will help upgrade refineries. It should help to add some capacity to existing refineries. Hopefully, it would also encourage people to take another look at siting new ones.

Senator VOINOVICH. I support those new ambient air standards, the ozone for particulate matter. They are here and we need to comply with it. We need to get on with it.

But with the new standards, will there be more demand for "boutique" fuel?

Mr. EARLY. Senator, I would like to jump into this conversation. Many of the "boutique" fuel requirements that are on the books today were, in fact, encouraged by regional oil refiners as an alternative to the reformulated gasoline program. I am quite certain that Mr. Slaughter will confirm this.

This is not a thing that State regulators just sort of made up. They collaborated with local refiners to try to get a clean fuel that was affordable, but also emissions reductions.

Senator VOINOVICH. But the fact is that you have Chicago. You have other areas. When I was Governor, I had a choice. I could have gone with reformulated gasoline in the Cincinnati area. I decided against it because of what it added to it. We put in an alternative and got credit in terms of emissions testing.

But do you think we ought to look at this whole issue of "boutique" fuel?

Mr. EARLY. If you do that, given the fact that Ohio, for example, has something like 29 new non-attainment counties, we would argue that if you are going to consolidate different kinds of fuels, that you would want to consolidate them to make them cleaner rather than something else.

Now, I think it is important from the get-go to understand that EPA's 30-part-per-million sulfur cap on gasoline—which is phasing in this year and will be fully phased in in 2006—will, for the sulfur requirement of gasoline, do exactly what you are talking about. All the reformulated gas, as well as conventional gas, will have the same sulfur level. So you will not have any conflicting requirements from State-to-State.

You could do that for some of the other components that contribute to smog, most notably the volatility, the RVP, and have a uniform—but we would argue—low RVP for both conventional and reformulated gas so that these fuels would be more fungible. But they would also be cleaning up the air where they are needed.

Senator VOINOVICH. But you would agree that it would be worthy for the EPA to look at this whole area of reformatted gas, or "boutique" gasoline to see if we can get the same environmental benefits that we have, but do it in a more orderly fashion?

Mr. EARLY. The Agency has already done that. They issued a report in October 2002 that reflects some of the things that I am saying.

Senator VOINOVICH. Do you have any comments on that?

Mr. COOPER. Senator, let me take two points. To the extent that the cost of compliance can be demonstrated to be significant, then we think underwriting compliance rather than relaxing existing standards, is a good idea.

I read that sentence from our 1991 report. We understand this costs money. We want the refinery capacity. We want to find out a way to get it built. To the extent that Mr. Dosher has a problem, we think Congress ought to step up and say "Here is the way we balanced the two interests," and that is by supporting underwriting the costs of compliance if he demonstrates it significantly.

Second of all, Mr. Early has made exactly the point that as a consumer advocate we like big markets. The bigger the market, the better off the consumer is. So what we need is a public policy that looks very carefully at how to get those markets as big as they can be without significantly reducing air quality. We can do that.

Senator VOINOVICH. My time is expired. Thank you.

Thank you, Mr. Chairman.

Senator INHOFE. Senator Wyden.

Senator WYDEN. Thank you, Mr. Chairman.

I have a question for you, Mr. Slaughter. You said that refineries are not particularly profitable. I just find that very puzzling because if you look at the companies' own quarterly reports, it contradicts what you have said.

For example, Exxon's quarterly report—this is their document—"Exxon-Mobile's refining profit rose 39 percent to $1 billion." They are not just the most profitable oil company. Last year they were the most profitable American company in history.

How do you reconcile what you said that they are not making money? By the way, it is in everybody else's quarterly reports as well—Chevron, Texaco, the same reason. They are citing the primary reason of the average refined product margins go up.

What is behind the fact that these quarterly reports of the companies contradict what you have told the committee this morning?

Mr. SLAUGHTER. Senator, the quarterly reports and annual reports are just that. They are snapshots in time. The fact of the matter is that over the last couple of decades, and particularly in the last decade, refinery profitability has been 5 percent, which is basically below the norm.

One of the questions that we always have to ask is: What is the basis of comparison? Which quarter are you comparing it to? The refining industry has had some very bad quarters.

If you compare a current snapshot with that particular quarter, you come up with numbers like you have.

All I can say is that for instance the U.S. Department of Energy found that the return on investment in the refining industry in 2002 was negative 2.7 percent. It was 10.5 percent in the entire oil and gas production business, Senator but negative 2.7 percent in refining.

It is a very tough business, refining. Some years there are good years, but there are many more anemic or poor ones.

Senator WYDEN. Certainly for the last 6 months at a time when our consumers are getting hosed, all of the information indicates that these refinery margins are a big driver and, in fact, certainly refinery margins using again the Government's own data from the Energy Information Agency.

Refinery margin increases are something like three times the crude oil price increase, which is what you cited.

I just find it hard to reconcile what you have told us today with what the Government documents and the companies' own quarterly statements are getting into.

But I want to ask you about something that I just learned about recently. I just find this shocking. This is the question of the huge amount of diesel that is now being exported. I cited earlier again oil industry publications, the Oil Price Information publication for April 2004 which indicated that this is one of the busiest months ever for exporting, actually taking diesel that serves all of the communities we represent out of the United States and exported. Traders are saying that it may be twice or triple the usual spring rate.

What is behind that? Does that again tighten the market for our consumers at a time when they need this fuel?

Mr. SLAUGHTER. Senator, according to EIA export data, we understand that the OPEC's figures are incomplete data. The EIA data through March on distillate exports, show that those exports have declined in the period from January to March of this year from what they were in 2003 or 2002.

I think a lot of times, particularly in the trade press, when people talk about increases or decreases, they compare apples and oranges, or the actual numbers are minuscule. We have really not a very large foreign trade, particular in exports, of our products. We have a net dependency on product imports in this country now.

So the trade is really coming the other way because we have been unable to build new refining capacity to keep up with our demand. We actually now are having to import 10 percent of our gasoline, and to import 10 percent of other petroleum products.

So this number is an aberration and evidently does not even reflect the numbers for this year, as evidenced by the Energy Information Administration.

Senator WYDEN. But you are citing the older data. I am talking about now. I will just read it to you. "Action was particularly brisk in the first half of April with plenty of cargoes exported out of the Gulf Coast to the Northwest. The buyers included refiners, traders, and users based essentially all over the world. The international traders say that it is going to be twice or triple the usual spring rate."

You are not troubled by any of this?

Mr. SLAUGHTER. Senator, I would be surprised if there are many industries in the United States that retain a larger percentage of their production in the United States than the refining industry does. The demand is so strong for fuels in the United States that our industry can barely keep up with it.

Most of those products go right here in the United States. There is minimal trade externally. Frankly, regardless of what the trade press says, it is just an asterisk when it comes to the output of America's refineries for the domestic market.

Senator WYDEN. I will tell you. People in my State do not see an asterisk when they get clobbered at the pump, sir.

These people are getting pounded. I will tell you. I think if people in my part of the world hear about something like this, they are going to be asking for action a lot more aggressive than anything I have proposed in the past.

What all of you have said today contradicts Government figures. It contradicts the oil industry quarter reports, and to say that it is an asterisk to have diesel exported from the United States I think is a very regrettable statement, given the kind of hurt that we are seeing in our communities around the country.

Thank you, Mr. Chairman.

Senator INHOFE. Thank you, Senator Wyden.

Senator Thomas.

OPENING STATEMENT OF HON. CRAIG THOMAS, U.S. SENATOR FROM THE STATE OF WYOMING

Senator THOMAS. Thank you, Mr. Chairman.

This is very technical stuff, obviously. Let me go back just a little bit and talk about the costs, as I understand it, for gas, about 46 percent of it is the oil, and about 25 percent is taxes. Are we focusing on the high price of gas because of refining?

Mr. SLAUGHTER. Well, if you are asking me, Senator, I thought that this committee hearing was to analyze the cost factors in making gasoline. We have pointed out that the refining costs themselves, which include all these billions of dollars for these programs, is only 20 percent of the delivery price. But it is extremely important because that is one of the portions of the price that actually is within our control here in the United States with appropriate policy.

I do not understand why some people want to talk about the tremendous benefit coming from some of these expenditures, but do not want to recognize that there are any costs associated with them. It does affect some of the costs of making gasoline that actually public policy in the United States can affect if it is done appropriately.

Senator THOMAS. I am sure, but I guess we need to know where to focus. We are used to oil prices that run from $23 a barrel to $28 a barrel. Now they are $40 a barrel.

I guess another curiosity is this. Maybe none of you maybe are involved. But why is it when you drive 100 miles around different places, there is a 15 cents to 20 cents difference per gallon in the gas?

Mr. PORTS. Motor fuel marketing is a very competitive business. Everybody responds to the competition within their area. In some instances, there may be different tax rates.

Certainly you get into some local tax rates. You get into some differences in competitiveness. Again, they will fluctuate.

Truly a lot of it, particularly between the States, is tax.

Senator THOMAS. I am not talking about different States.

I am talking about just 20 miles apart.

Mr. EARLY. Senator, I would observe that RFG is supposed to cost roughly a nickel more per gallon. We are not denying that there is not a cost for producing cleaner gasoline. But as you drive in a particular area, as you just observed, you can see gasoline prices in a local area fluctuating by as much as 20 cents.

We come back to the discussion and say, "Well, is this nickel a gallon really having a major impact on what is going on here when the prices in a given area might change by 20 cents?"

Senator THOMAS. Let me ask you, Mr. Early. You said you are opposed to the energy policy for the future. We can talk about alternatives and talk about hydrogen and whatever. What do you propose to do if you do not like an energy policy that causes us to look into the future?

Mr. EARLY. Well, the Lung Association primary opposes the Energy bill because of the fuels title which is dramatically different from what this committee reported, which we did report. The reformulated gasoline in RFG programs were very different reported from this committee than what was adopted in H.R. 6. It makes some very bad changes.

Senator THOMAS. Bad changes might reduce the cost from $40 a barrel down to $25 a barrel.

Mr. EARLY. It is a question of cost to whom.

Senator THOMAS. OK. You do not need to go any further. You are just opposed to doing anything further with fuel.

Mr. EARLY. The other thing I would observe is that in my opinion H.R. 6 did not sufficiently address the demand side.

There has been so much talk about the demand side.

Senator THOMAS. That is exactly what it is doing. It is doing research on the demand side. Exactly. My God.

Mr. Cooper, most industries would be fairly happy with 90 percent of their capacity being used.

Mr. COOPER. On average American industries probably run in the mid-80's.

Senator THOMAS. We are not having a shortage of gas; are we? Is there anyone that cannot buy a gallon of gas?

Mr. COOPER. On a momentary basis, as has happened in Phoenix, the price ran way up because capacity is at the limit. The fundamental difference between——

Senator THOMAS. What about the oil costs? Does that have anything to do with it?

Mr. COOPER. We did a report and there are clearly three factors that have driven the price of oil up. They have converged at this moment. They are all at very high levels.

No. 1, the international price of crude. No. 2, the price following in this country. No. 3, a very clear shift in the domestic spread, the refining and marketing spread is up.

Natural gas tracks crude oil much closer than it did in the 1990's.

So all three of those things have contributed to the increase in price. The difference with energy is that when that system runs at very high levels of utilization, there is no elasticity of demand. We cannot cut back in our demand very quickly without feeling the pain. We cannot increase supply because it is a pipeline-type of industry, and a refinery fixed capital investment industry.

So in the short term, there is very little elasticity of demand. That is why you get these price spikes. That is why you need a significant amount of spare capacity around, particularly stocks on hand to meet the demand.

Senator THOMAS. Well, if is the case, why is oil the only thing that has doubled in cost?

Mr. COOPER. It is the convergence of the three things that I mentioned over the past 3 years.

Senator THOMAS. I do not think so. I do not agree with you. I do not think that is the case. The clear cost increase has been in the cost of oil.

Mr. COOPER. Well, it depends over what period you look.

We compared 5 years in the 1990's to the first 4 years of this century.

Senator THOMAS. It seems like it is pretty confusing what all of you have been talking about.

Thank you, Mr. Chairman.

Senator INHOFE. Thank you, Senator Thomas.

Senator Cornyn.

Senator CORNYN. Thank you, Mr. Chairman.

Senator BOXER. Mr. Chairman, are we not having discussions on turns?

Senator INHOFE. Senator Boxer, you have not had a chance? Oh, I am sorry. Please suspend, Senator Cornyn. Oh, you did.

Senator BOXER. I thought we were going to back and forth. That is OK.

Senator INHOFE. We do not go back and forth until everyone has had a round. Then that is going to be the end of it.

Senator BOXER. Well, I need to stay for another round.

I have a——

Senator INHOFE. Well, you can stay, but you will be alone.

Senator BOXER. I will be alone. That is fine. I do not mind if you leave because I do not think that——

Senator INHOFE. Senator Cornyn.

OPENING STATEMENT OF HON. JOHN CORNYN, U.S. SENATOR FROM THE STATE OF TEXAS

Senator CORNYN. Thank you, Mr. Chairman. Thank you for holding this hearing. I appreciate all the witnesses being here today.

This must be enormously confusing for the American people to figure out how to get to the bottom of this, but I want to ask about some things that even I think I understand, and ask for your reaction.

One is, of course, is that we understand the basic law of supply and demand. Not even Congress can repeal that one.

This relates to what Senator Wyden alluded to. Perhaps we are dealing now with global markets. We cannot expect that people who are in the business of selling a product for a profit are not going to take advantage of the opportunity to sell it in an open market at a higher price or, for that matter, to do business in places where the cost of doing business is cheaper.

We have been talking a lot about the creation of jobs, and indeed the loss of jobs, in this country due to our lack of competitiveness in this country in a number of areas, whether it is in terms of the cost of health care that discourage employers from creating new jobs because they know that additional health care costs could well put them in a competitive disadvantage.

We have talked about the regulatory scheme, or lack of one in this country leading to what mainly I think is a huge problem and that is regulation by litigation which I want to talk about for a minute. Obviously there are taxes. There is our failure to enact a national energy policy. And, of course, there is the lawsuit lottery.

I would like to ask Mr. Cooper a question. In my previous life, I was attorney general of Texas. Of course, we were engaged in consumer protection. We had a common cause with the people in your line of business to the extent that we were trying to make sure that consumers got the information and what they deserved in terms of what they paid for, a fair price for a service or a product.

You appear to agree that decreasing domestic refining capacity has been hurtful to consumers and that you think that one of the things we need to do is to increase production capacity. I would just ask you this.

What public policies could Congress enact which would increase domestic refining capacity, in your opinion?

Mr. COOPER. Well specific public policies that we have advocated for 3 years now is doing an inventory of sites, to identify those places where refiners were closed recently, as the best places to shorten that timeframe and find an environment in which you have the least resistance to the expansion of capacity.

We thought that was an interesting idea. Again, there are 20 or 50 refineries, depending on how far you go back, that had been closed. That was a critical issue to us—to find the place where it is easiest to balance the consumer interests and the environmental interests.

Senator CORNYN. Let me ask you a little bit about that.

I know the confusion about New Source Review and the litigation that has spawned from that lack of certainty that the industry could have because of Congress' failure to act, that has discouraged the increase of capacity of refineries; has it not?

Mr. COOPER. Uncertainty raises the cost of capital. We would also support, as I read from our first report on this, identifying the specific compliance costs and underwriting those. I have been doing this since we had it back in the 1980's. It kept refineries in business. We can have the number of refineries we want. We think we can do it within the confines of a responsible environmental policy.

Senator CORNYN. Well, my other objection to this regulation by litigation and Congress' failure to act is that even though I am sure that we would agree that people who are injured as a result of the fault of some other person are entitled to fair compensation is that this regulation by litigation scheme, in addition to discouraging the creation of new capacity, increasing supply and lowering price, deliveries so inefficiently any compensation to the person who is actually harmed. I think it is imperative that Congress step in.

In closing, I just want to mention MTBE. Maybe I misunderstood Senator Allard. I think he indicated that the MTBE safe harbor provision has somehow held up the Energy bill. But I would just note for the record, and I think I am correct on this, Mr. Chairman, that actually when the MTBE safe harbor was taken out of the Energy bill, it actually got less votes on the floor than it did when it was in.

My only point here in talking about the regulatory confusion and in talking about the Federal Government being so schizophrenic when on one hand it mandates the industry, in essence, the creation of a product like MTBE, which has caused cleaner burning fuels, and then comes along later on and cuts the legs out from under that very same industry by saying that you can no longer sell that product even though it has made the air cleaner for millions of Americans.

I know my time has expired. Thank you for your indulgence, Mr. Chairman.

Senator INHOFE. Thank you, Senator Cornyn.

Let me just make a comment because it has been implied that perhaps I am not being fair, we had one round of questions. My staff informs me that we allowed you to go 2 minutes over, which I was happy to do.

I think this might be something that would encourage better attendance. Yes, we do have more Republicans than Democrats attending this. Perhaps that will be helpful in encouraging more participation from your side.

We did made the announcement, though, that we would have one extended round and that would be it. Things are getting redundant right now. With that, I am going to adjourn and dismiss the panel.

However, if you want to stay and visit, certainly you would be welcomed.

Senator BOXER. Mr. Chairman, I would just have to say I have been here for 12 years. I have never ever seen a situation where a Senator would like to have another round of questions. Right now I have heard reports that in my State there is some gasoline selling for $3. I just have a couple of comments. I just feel you are being unfair.

Senator INHOFE. Senator, let me say this. What you have said is not true. This happens all the time. You announce that you are going to have just one round. You have one round, and to say that you have never heard of that is——

Senator BOXER. Could I ask unanimous consent that I be allowed to——

Senator INHOFE. We are adjourned.

Senator BOXER. You have not heard my UC. Could you wait?

I would ask unanimous consent that I be allowed to place some documents into the record and explain very briefly what they are.

Senator ALLARD. I object, Mr. Chairman. I do not object to her putting the documents in the record. But I object to you taking the time of this committee after it has been agreed that both sides, each individual, would have an opportunity, a certain amount of time, to make their case.

Now if you want to redo your unanimous consent and ask that just the documents be put in the record, I would not object. But to ask that you make a statement in regard to that, is beyond me.

Senator BOXER. Are you so fearful of words, Senator Allard? I asked unanimous consent that I may place into the record two articles that show oil company executives directly contradicting Mr. Slaughter and saying that future is bright for the refining industry. I thank you.

Senator ALLARD. Mr. Chairman, I object.

Senator INHOFE. This meeting is adjourned. The panel is dismissed.

I appreciate very much your attendance here today. It was a well-balanced panel. I believe it was very helpful.

[Whereupon, at 11:23 a.m., the committee was adjourned, to reconvene at the call of the chair.]

STATEMENT OF BOB SLAUGHTER, PRESIDENT, NATIONAL PETROCHEMICAL & REFINERS ASSOCIATION AND THE AMERICAN PETROLEUM INSTITUTE

OVERVIEW

Mr. Chairman and members of the committee, thank you for the opportunity to appear today to discuss the impact of environmental regulations on fuel supply. My name is Bob Slaughter, and I am President of NPRA, the National Petrochemical & Refiners Association. I am also appearing today on behalf of the American Petroleum Institute (API).

NPRA is a national trade association with 450 members, including those who own or operate virtually all U.S. refining capacity, and most U.S. petrochemical manufacturers. API is a national trade association representing more than 400 companies engaged in all sectors of the U.S. oil and natural gas industry.

To summarize our message today, we urge policymakers in Congress and the Administration to encourage the production of an abundant supply of petroleum products for U.S. consumers. By the end of my testimony, I will outline and discuss key factors that will provide perspective about the current, as well as the anticipated future situation the Nation confronts regarding gasoline supply and demand.

Before addressing these topics in detail, however, I want to state emphatically that NPRA and API support requirements for the orderly production and use of cleaner-burning fuels to address health and environmental concerns, while at the same time maintaining the flow of adequate and affordable gasoline and diesel supplies to the consuming public.

For example, according to EPA, the new Tier II low sulfur gasoline program, initiated in January, will have the same effect as removing 164 million cars from the road when fully implemented.

Since 1970, clean fuels and clean vehicles account for about 70 percent of all U.S. emission reductions from all sources, according to EPA. Over the past 10 years, U.S. refiners have invested about $47 billion in environmental improvements, much of that to make cleaner fuels.

Unfortunately, however, Federal environmental policies have often neglected the impact of environmental regulations on fuel supply, and policymakers have often taken supply for granted, except in times of obvious market instability. This attitude must end. A healthy and growing U.S. economy requires a steady, secure, and predictable supply of petroleum products.

Although there is much finger pointing regarding current gasoline market conditions, there are no silver bullet solutions for balancing supply and demand. Indeed most of the problems in today's gasoline market result from the high price of crude oil and strong demand for gasoline due to the improving U.S. economy. U.S. refineries have produced increased amounts of gasoline and distillates so far this year compared to last year.

Instead of engaging in a fruitless search for dubious quick-fix "solutions", or, even worse, taking action that could be harmful, we urge Congress, the Administration, and the motoring public to exercise continued patience with the free market system. The nation's refiners are working hard to meet rising demand while complying with extensive regulatory controls that affect both our facilities and the products we manufacture.

To summarize our policy recommendations, we urge the committee first to find the necessary two additional Senate votes to pass the Conference Report on H.R. 6. This is the most important action that can be taken to improve U.S. energy security. Putting the conference report on the President's desk is the best way to move energy policy forward into the 21st century. Congress should also support the New Source Review (NSR) reforms which have spanned two Administrations, which will encourage capacity expansions and efficient operation of existing refineries; it should resist any new "Federal fuel recipes" or hasty action on the subject of boutique fuels; and act to repeal the 2 percent RFG oxygenation requirement.

UNDERSTANDING GASOLINE MARKET FUNDAMENTALS: HIGH CRUDE PRICES; STRONG GASOLINE DEMAND GROWTH

In order to fully appreciate the impact of environmental regulations on fuel supply, we should first consider the dynamics of current gasoline markets. It is important to begin with the most significant factor affecting gasoline prices: crude oil. The cost of crude oil represents about 45 percent of the total cost of a finished gallon of gasoline. Crude oil prices have increased 60 percent since April 2003, recently crossing the $40 per barrel threshold. High demand for crude from Asia and the United States, plus OPEC activities to restrain crude production in recent years, are the most important factors affecting crude prices.

The other key factor underlying current gasoline market conditions is the tight supply/demand balance. This is due to steadily increasing gasoline demand (growing population, Americans drive larger vehicles greater distances) and the meager growth in refining capacity in the United States. Due to U.S. economic recovery, the U.S. Energy Information Administration (EIA) estimates that growth in our gasoline demand is averaging 4.5 percent. Gasoline demand currently averages approximately 9 million barrels per day. Domestic refineries produce about 90 percent of U.S. gasoline supply, while 10 percent is imported. Therefore, growing demand can only be met by either increasing domestic refinery production or by relying on more foreign gasoline imports. Unfortunately, our rising gasoline demand and the need for more domestic gasoline production capacity collide with public policies, local opposition, and regulatory obstacles that deter increased domestic refining capacity.

IT IS IMPORTANT TO ENCOURAGE ADDITIONAL DOMESTIC REFINING CAPACITY

Domestic refining capacity is a scarce asset. There are currently 149 U.S. refineries owned by almost 60 companies in 33 states. Their capacity is roughly 16.8 million barrels per day. In 1981, there were 321 refineries in the United States with a capacity of 18.6 million barrels per day. No new refinery has been built in the United States since 1976, and it is unlikely that one will be built here in the foreseeable future, due to economic, public policy and political considerations, including siting costs, environmental requirements, industry profitability and, most importantly, "not in my backyard" (NIMBY) public attitudes.

U.S. refining capacity has increased slightly in recent years, but it has become increasingly difficult to keep pace with the growth in demand for petroleum products. Because new refineries have not been built, refiners have increased capacity at existing sites to offset the impact of capacity lost elsewhere due to refinery closures. But it is now becoming harder to add capacity at existing sites due in part to more stringent environmental regulations. Proposed capacity expansions can often become difficult and contentious at the state and local level, even when necessary to produce cleaner fuels pursuant to regulatory requirements. We hope that policymakers will recognize the importance of domestic refining capacity expansions to success of the nation's environmental policies, and help inform the public of the need for these facility improvements. New Source Review reform will also provide an important tool to help add new U.S. refining capacity.

For this reason, we urge policymakers to recognize the importance of sustaining the Administration's NSR reforms so that domestic refiners can continue to meet the growing public demand for gasoline and comply with new environmental programs. These reforms have been under consideration since 1996 and reflect significant public review and comment. The NSR reforms should facilitate new domestic refining capacity expansions. Those reforms will also encourage the installation of more technologically advanced equipment and provide greater operational flexibility while maintaining a facility's environmental performance.

Common sense dictates that it is in our nation's best interest to manufacture the lion's share of the petroleum products required for U.S. consumption in domestic refineries and petrochemical plants. Nevertheless, we currently import more than 62 percent of the crude oil and oil products we consume. Reduced U.S. refining capacity clearly affects our supply of refined petroleum products and the flexibility of the supply system, particularly in times of unforeseen disruption or other stress. Unfortunately, EIA predicts "substantial growth" in refining capacity only in the Middle East, Central and South America, and the Asia/Pacific region, not in the United States.

INDUSTRY IS WORKING HARD TO KEEP PACE WITH GROWING DEMAND FOR FUEL

Tight gasoline market conditions often lead to calls for industry investigations. More than two dozen Federal and state investigations over the last several decades have found no evidence of wrongdoing or illegal activity. For example, after a 9-

month FTC investigation into the causes of price spikes in local markets in the Midwest during the spring and summer of 2000, former FTC Chairman Robert Pitofsky stated, "There were many causes for the extraordinary price spikes in Midwest markets. Importantly, there is no evidence that the price increases were a result of conspiracy or any other antitrust violation. Indeed, most of the causes were beyond the immediate control of the oil companies." Similar investigations before and since have reached the same conclusion.

As this statement is written, product prices and supply are again a hot topic in the media and in political debates. In addition to the usual tight supply/demand balance for gasoline and other petroleum products, critical external factors are contributing to high gasoline costs this year:

- Higher crude oil costs (Crude oil recently crossed the $40 threshold.);
- Increased consumer demand (EIA calculates current gasoline demand at 8.9–9 mm b/d and predicts it could rise to equal a record 9.4 mm b/d this summer);
- Implementation of state MTBE bans and an ethanol mandate in California, Connecticut, & New York (These states represent one-sixth of U.S. gasoline sales.);
- Rollout of Tier II gasoline with reduced sulfur, a new standard which may have affected imports temporarily; and
- Changeover to summer fuel formulations.

We would like to discuss some of these factors in more detail.

The most significant cost factor in gasoline manufacture is the cost of the feedstock, crude oil. This currently represents slightly less than half of the cost of a gallon of gasoline (45 percent), while taxes add another 25 percent to the price. Thus, over 70 percent of the retail cost of gallon of gasoline is attributable to these two components, crude oil costs and tax, which are beyond the control of refiners. (See Attachment 1.) Most significantly, crude oil and gasoline costs closely track each other. (See Attachment 2.)

Since April of 2003, crude oil prices have escalated nearly 60 percent, and recently breached the $40 benchmark. Factors driving crude prices include: (1) high demand, spurred by significant economic growth in Asia (with Chinese demand for oil up 30 percent this year), (2) decisions by OPEC to reduce output, including a 10 percent output cut not yet totally implemented, and (3) continued uncertainties about crude and product production capabilities in the Middle East.

Despite these powerful influences on gasoline manufacturing, cost and demand, refiners are addressing supply challenges and working hard to supply sufficient volumes of gasoline and other petroleum products to the public. During the 4-week period ending April 30, 2004, EIA reported that refiners produced 8.7 million barrels per day of gasoline, a 5-percent increase over the same period last year.

Refineries are running at record levels, producing record amounts of gasoline and distillate for this time of year. Refiners have been operating at an average utilization rate of 93 percent even before the start of the summer driving season. To put this in perspective, peak utilization rates for other manufacturers average about 82 percent. At times, during the summer, refiners have operated at rates close to 98 percent. However, these high rates cannot be sustained for long periods.

In addition to coping with the higher fuel costs and growing demand, refiners are implementing significant transitions in major gasoline markets. Nationwide, the amount of sulfur in gasoline was reduced from 300 parts per million (ppm) to a corporate average of 120 ppm effective January 1, 2004, giving refiners an additional challenge in both the manufacture and distribution of fuel. Equally significant, California, New York and Connecticut bans on use of MTBE went into effect January 1. This is a major change affecting one-sixth of the nation's gasoline market. Where MTBE was used as an oxygenate in reformulated gasoline it accounted for as much as 11 percent of RFG supply at its peak, and substitution of ethanol for MTBE does not replace all of the volume lost by removing MTBE. (Ethanol's properties generally cause it to replace only about 50 percent of the volume lost when MTBE is removed.) The missing volume must be supplied by additional gasoline or gasoline blendstocks.

Due to these changes in U.S. gasoline specifications, the volume of gasoline imports declined roughly 10 percent earlier this year, although volumes have recently increased somewhat. As U.S. fuel specifications change, foreign refiners may not be able to supply the U.S. market without making expensive upgrades at their facilities. They may eventually elect to do so, but a time lag may occur.

Refiners are also just completing the annual switch to summer gasoline blends, a process which is complicated by the ethanol mandate in markets like New York, Connecticut and California that previously experienced little ethanol use. This is because of the need to adjust the gasoline blend for increased ozone precursor emissions in warm weather.

Obviously, refiners face a daunting task in rationalizing all these changes in order to deliver the fuels that consumers and the nation's economy need. But they are succeeding. And regardless of current press stories, we need to remember that American gasoline and other petroleum products remain a bargain when compared to the price consumers in other large industrialized nations pay for those products.

REFINERS FACE A BLIZZARD OF REGULATORY REQUIREMENTS AFFECTING BOTH FACILITIES AND PRODUCTS

Refiners currently face the massive task of complying with fourteen new environmental regulatory programs with significant investment requirements, all in the same 2002—2010 timeframe. (See Attachment 3.) For the most part, these regulations are undertaken pursuant to the Clean Air Act. Some will require additional emission reductions at facilities and plants, while others will require further changes in clean fuel specifications. NPRA estimates that refiners are in the process of investing about $20 billion to sharply reduce the sulfur content of gasoline and both highway and off-road diesel. Refiners may face additional investment requirements to deal with limitations on ether use, as well as compliance costs for controls on Mobile Source Air Toxics and other limitations. These costs do not include additional, significant investments needed to comply with stationary source regulations affecting refineries.

On the horizon are other potential environmental regulations which could force additional large investment requirements. They are: the challenges posed by increased ethanol use, possible additional changes in diesel fuel content involving cetane, and the potential for a proliferation of new fuel specifications driven by the need for states to comply with the new 8-hour ozone NAAQS standard. The industry must also supply two new mandatory RFG areas (Atlanta and Baton Rouge) under the "bump up" policy of the current 1-hour ozone NAAQS.

These are just some of the pending and potential air quality challenges that the industry faces. Refineries are also subject to extensive regulations under the Clean Water Act, Toxic Substances Control Act, Safe Drinking Water Act, Oil Pollution Act of 1990, Resource Conservation and Recovery Act, Emergency Planning and Community Right-To-Know (EPCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and other Federal statutes. The industry also complies with OSHA standards and many state statutes. A complete list of Federal regulations impacting refineries is included with this statement. (See Attachment 4.)

API estimates that, since 1993, about $89 billion (an average of $9 billion per year) has been spent to protect the environment. This amounts to $308 for every person in the United States. More than half of the $89 billion was spent in the refining sector.

A KEY GOVERNMENT ADVISORY PANEL HAS JOINED INDUSTRY IN URGING REGULATORY SENSITIVITY TO SUPPLY CONCERNS

The National Petroleum Council (NPC) issued a landmark report on the state of the refining industry in 2000. Given the limited return on investment in the industry and the capital requirements of environmental regulations, the NPC urged policymakers to pay special attention to the timing and sequencing of any changes in product specifications. Failing such action, the report cautioned that adverse fuel supply ramifications may result. Unfortunately, this warning has been widely disregarded.

We would point to the public rulemaking record illustrating recommendations industry has made on environmental regulations over the past 8 years. Industry has consistently supported continued environmental progress, but cautioned regulators to balance environmental and energy goals by considering the supply implications of multiple new regulatory requirements. Industry has commented on many new stationary source and fuel proposals, urging adoption of more reasonable standards with adequate lead-time to make the necessary facility changes in order to mitigate potential supply shortfalls. Many times, if not most, industry recommendations have been rejected, as regulators opted to promulgate more stringent standards without leaving a margin of safety for energy supply security. We are now beginning to experience the impact of these decisions.

Continuing America's environmental progress through increased supply of cleaner fuels is a crucial part of U.S. policy, but environmental improvements are not free. There are sizable costs. All too often this reality is underestimated or ignored. Heavy investment requirements affect U.S. production capabilities. And again, as we are beginning to experience, imported products may be harder to come by at least initially, since U.S. gasoline (and soon diesel) specifications may be too strict for foreign refineries to manufacture without making significant investments to upgrade facilities. This means that product imports may decline at the outset of a new regulatory program while foreign suppliers decide whether to invest or to sell in non-U.S. markets.

At the same time, when the domestic industry has made the significant capital expenditures required by the regulations, it is important that final regulations not be changed except in cases of absolute necessity. Stability and certainty in regulatory implementation is needed to encourage and recognize the investment of the regulated industry in the new regulations. A far better approach than granting waivers is to develop regulations that reflect the need for caution regarding continued fuel supply at the very beginning when regulations are finalized, not during the implementation period when investments have been made.

This year as gasoline markets began to reflect the implementation of Tier II gasoline sulfur reduction, policymakers were perceived to be considering easing the new gasoline sulfur specifications for some gasoline importers as a "relief valve" for the market, despite conflicting indications whether or not any real problems existed. This action would have adversely affected the refining industry, which has already made substantial investments in gasoline sulfur reductions and is in the process of making equally large investments in diesel sulfur reductions. Perhaps even more importantly, a program change would have eliminated part of the environmental benefits of the Tier II program, all for the benefit of foreign suppliers. Fortunately, no action was taken to waive gasoline sulfur requirements at this early date.

As a general rule, when any party suggests that regulatory relief is needed, it is important that EPA consult with and work closely with EIA, which has expertise in gasoline supply and demand analysis.

Waivers may merit consideration on rare occasions, and they are a tool available to regulators. But there should be a high burden of proof for waiver proponents. Waivers by their very nature can cause uncertainty and unfair loss of investment in the affected market. However, where there is universal agreement that a particular rule or policy no longer is valid or better options exist for reaching desired objectives, then certainly that policy should be reconsidered. An example is the 2 percent oxygenate requirement for reformulated gasoline (RFG).

REFINERS WILL DO THEIR BEST TO MEET SUPPLY CHALLENGES, BUT SOME FACILITIES MAY CLOSE

Domestic refiners will rise to meet the supply challenges in the short and the long term with the support of policymakers and the public. They have demonstrated the ability to adapt to new challenges and maintain the supply of products needed by consumers across the nation. But certain economic realities cannot be ignored and they will impact the industry. Refiners will, in most cases, make the investments necessary to comply with the environmental programs outlined above. In some cases, however, where refiners are unable to justify the costs of investment at some facilities, facilities may close or the refiner may exit certain petroleum product markets. These are economic decisions based on facility profitability relative to the size of the required investment needed to stay in business either across the board or in one product line, such as U.S. highway diesel fuel.

EIA summarizes the impact of past and future refinery closures: "Since 1987, about 1.6 million barrels per day of capacity has been closed. This represents almost 10 percent of today's capacity of 16.8 million barrels per calendar day . . . The United States still has 1.8 million barrels of capacity under 70 MB/CD (million barrels per calendar day) in place, and closures are expected to continue in future years. Our estimate is that closures will occur between now and 2007 at a rate of about 50–70 MB/CD per year." (EIA, J. Shore, "Supply Impact of Losing MTBE & Using Ethanol," October 2002, p. 4.)

Refining industry profitability is also not well understood. The 10-year average return on investment in the industry is about 5.4 percent; this is about what investors could receive by investing in government bonds, with little or no risk. It is also less than half of the S&P Industrials figure of a 12.7 percent return. This relatively low level of refiners' return, which incorporates the cost of capital expenditures required to meet environmental regulations, is another reason why domestic refinery capacity additions have been modest and also one reason why new refineries are unlikely to be constructed here. (Last year was a relatively good year for the refining industry with average rates of return at 6.4 percent, above the rate of return for previous years; however, in the industry's long experience, rates of return over time revert to the mean of about 5 percent.)

Data compiled by DOE (Performance Profiles of Major Energy Producers) show that over the 10 year period from 1993–2002, the return on investment (net income/

investment in place) for the refining sector averaged 5.5 percent, compared to an average return of 12.7 percent for the S&P Industrials. In 2002, the return was a negative 2.7 percent for refining, compared to 6.6 percent for the S&P Industrials.

THERE ARE NO "QUICK FIXES" TO CURRENT MARKET CONDITIONS. POLICYMAKERS AND THE PUBLIC SHOULDN'T LOSE FAITH IN THE FREE MARKET

Modern energy policy relies upon an important tool which encourages market participants to meet consumer demand in the most cost-efficient way: market pricing. The free market swiftly provides buyers and sellers with price and supply information to which they can quickly respond. Refiners need maximum flexibility to react to this market information as they make decisions about product manufacture and distribution. Mandates and other command-and-control policy mechanisms reduce this needed flexibility and add unnecessary cost to gasoline manufacture.

Industry appreciates the patience and restraint that the public and policymakers have shown in responding to current market conditions and the higher cost of gasoline. Consumers clearly want and need abundant supplies of clean fuels at market-based prices. Fuel manufacturers do their best to meet this demand and will continue to work with policymakers to support policies that increase the supply of clean fuels while maintaining adequate supplies. In the short term, there are no "silver bullets" to alleviate the high costs of gasoline for consumers this summer. Putting the current situation in a broader, more positive perspective, however, the United States has some of the cleanest and most cost-effective fuels in the world.

We ask that policymakers take particular care in considering the impact of so-called "boutique fuel" gasolines. In many cases, these programs represent a local area's attempt to address its own air quality needs in a more cost-effective way than with RFG, which is burdened by an overly prescriptive recipe and an oxygenation mandate. Industry supports further study of the "boutique fuels" phenomenon, but urges members of the committee to resist imposition of any additional fuel specification changes. Further changes in fuel specifications in the 2004—2010 timeframe could add greater uncertainty to a situation which already provides significant challenges to all market participants.

CONCLUSION

There is a very close connection between Federal energy and environmental policies. Unfortunately, these policies are often debated and decided separately and thus in a vacuum. As a result, positive impacts for one policy area sometimes conflict with or even undermine goals and objectives in the other.

Industry therefore requests that an updated energy policy be adopted incorporating the principle that, in the case of new environmental initiatives affecting fuels, environmental objectives must be balanced with energy supply requirements. As explained above, the refining industry is in the process of redesigning much of the current fuel slate to obtain desirable improvements in environmental performance. This task will continue because consumers desire higher-quality and cleaner-burning fuels. And our members want to satisfy their customers. They ask only that the programs be well-designed, coordinated, appropriately timed and cost-effective. The committee can advance both the cause of cleaner fuels and preserve the domestic refining industry by adopting this principle as part of the nation's energy and environmental policies.

A healthy and diverse U.S. refining industry serves the nation's interest in maintaining a secure supply of energy products. Rationalizing and balancing our nation's energy and environmental policies will protect this key American resource. Given the challenges of the current and future refining environment, the Nation is fortunate to retain a refining industry with many diverse and specialized participants. Refining is a tough business, but the continuing diversity and commitment to performance within the industry demonstrate that it has the vitality needed to continue its important work, especially with the help of a supply oriented national energy policy.

RECOMMENDATIONS

We make the following recommendations to address concerns regarding fuel supplies, environmental regulations, and market issues.

• The Senate should redouble its efforts to obtain the two votes needed to pass the Conference Report on H.R. 6, a balanced and fair energy bill that brings energy policy into the 21st century. This is the most important step needed to encourage new energy supply and streamline regulations.

• Public policymakers should balance environmental policy objectives and energy supply concerns in formulating new regulations and legislation.

• EPA should grant the California and New York requests to waive the 2 percent oxygen requirement for Federal RFG. This will give refiners increased flexibility to deal with changing market conditions. It will also allow them to blend gasoline to meet the standards for reformulated gasoline most efficiently and economically, without a mandate.

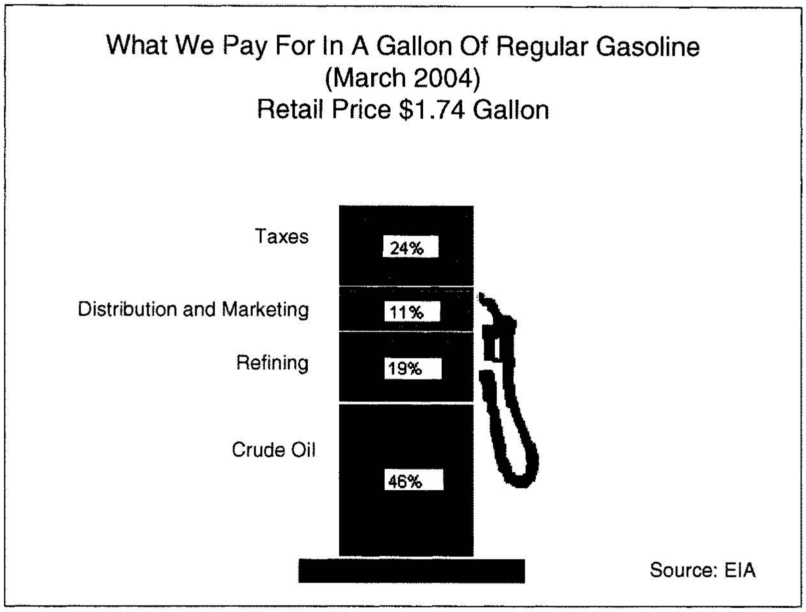
• Congress should support the New Source Review reforms and encourage capacity expansions at existing refineries.

• Congress should be cautious in making any policy changes affecting "boutique fuels."

• Policymakers must resist turning the clock backward to the failed policies of the past. Experience with price constraints and allocation controls in the 1970's and 1980's demonstrates the failure of price regulation, which adversely impacted both fuel supplies and consumers.

The industry looks forward to continuing to work with this committee, and thanks the Chairman for holding this important hearing. I would be glad to answer any questions raised by our testimony today.

Attachment 1



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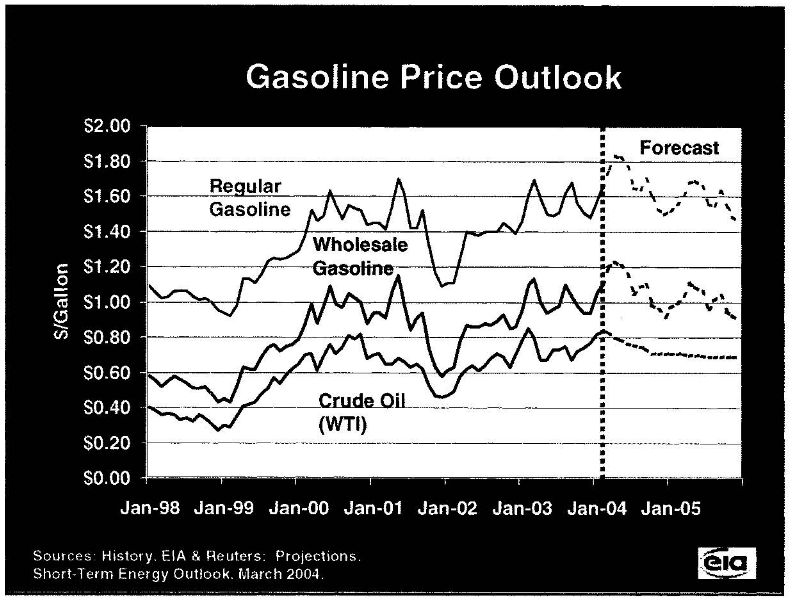

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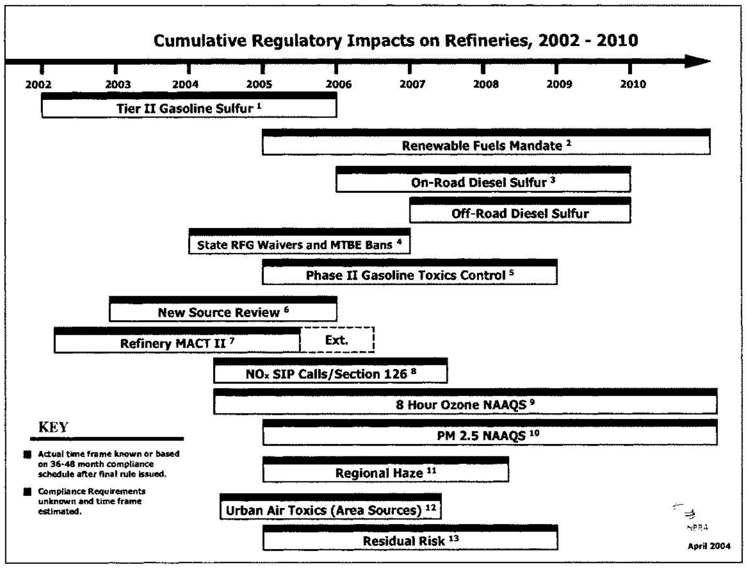

•Regulatory Blizzard shows fuel and facility regulations that impact refineries.

•There are many overlapping requirements. These are significant new programs affecting fuels and facilities.

•$20 billion cost for compliance with gasoline and diesel desulfurization, MTBE transition issues, and MSAT.

•New Source Review (NSR) Reforms are essential to maintain domestic refining capacity and produce cleaner fuels.

•NPRA strongly supports the NSR reform.

1. Longer compliance time for refineries in Alaska and Rocky Mountain states as well as small refineries covered by the Small Business Regulatory Enforcement and Flexibility Act (SBREFA). Additional compliance time is available for these refineries if they produce ultra low sulfur highway diesel beginning in 2006.
2. Proposed energy bill (HR 6) includes an ethanol mandate which increases to 5 billion gallons in 2012.
3. Longer compliance time for small refiners covered by SBREFA.
4. Many state legislatures are considering bans on MTBE. CA, NY and CT bans effective January 2004. EPA is considering waiver requests from NY and CA for exemptions from the 2% oxygen mandate for RFG.
5. Phase II Mobile Source Air Toxics Rule to be proposed at the end of 2004. It is uncertain whether fuels and/or vehicles will be further regulated.
6. New Source Review reform (program changes and RMRR) is subject to litigation. Refiners face uncertainty in meeting regulatory requirements. Refiners support the reforms. EPA is continuing enforcement actions under the old rules.
7. Some facilities may delay compliance until May 2009 if they install a hydrotreater.
8. SIPs due by April 2005 for 21 states and the District of Columbia to address downwind NOx transport; compliance by May 2007.
9. Ozone non-attainment designations made April 2004. State Implementation Plans (SIPs) are due by June 2007. Compliance, depending upon classification, required between 2007 – 2021.
10. PM 2.5 non-attainment designations due at the end of 2004. SIPs due in the 2007-2008 timeframe.
11. Regional Haze SIPs due January 2008. Plans will include new plant controls for older facilities (built 1962- 1977) in 2011-2013 timeframe (BART controls) in areas with visibility problems.
12. Urban Air Toxics Strategy includes potential controls of gasoline loading facilities at refineries. Estimated compliance schedule.
13. Proposal is expected in 2004. A final rule is expected in 2005 with compliance by 2009.

•Explains dates and relevance of Regulatory Blizzard items.

Attachment 4
Source: API, 1997

Appendix A
PETROLEUM REFINING: APPLICABLE REGULATIONS

Name	Code of Federal Regulation (CFR) Cite	Effective Date
CLEAN AIR ACT (CAA)		
New Source Performance Standards (NSPSs)	40 CFR Part 60	
Subpart A: General Provisions	40 CFR Part 60	mid 1970s
Subpart Cb: Designated Facilities - Existing Sulfuric Acid Units	40 CFR Part 60	1991
Subpart D: Fossil-Fuel Fired Steam Generators Constructed After 8/17/71	40 CFR Part 60	1977
Subpart Da: Electric Utility Steam Generating Units Constructed After 9/18/78	40 CFR Part 60	1978
Subpart Db: Industrial-Commercial-Institutional Steam Generating Units	40 CFR Part 60	1987
Subpart Dc: Small Industrial-Commercial-Institutional Steam Generating Units	40 CFR Part 60	1990
Subpart H: Sulfuric Acid Units	40 CFR Part 60	1977
Subpart J: Petroleum Refineries	40 CFR Part 60	1978
Subpart K: Storage Vessels for Petroleum Liquids Constructed, Reconstructed or Modified between 6/11/73 and 5/19/78	40 CFR Part 60	1977
Subpart Ka: Storage Vessels for Petroleum Liquids Constructed, Reconstructed or Modified between 5/18/78 and 7/23/84	40 CFR Part 60	1980
Subpart Kb: Volatile Organic Liquid Storage	40 CFR Part 60	1987
Subpart GG: Stationary Gas Turbines	40 CFR Part 60	1978
Subpart UU: Asphalt Processing and Roofing Manufacturing	40 CFR Part 60	1982
Subpart VV: Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry (SOCMI)	40 CFR Part 60	1983
Supart XX: Bulk Gasoline Terminals	40 CFR Part 60	1983
Subpart GGG: Equipment Leaks of VOC in Petroleum Refineries	40 CFR Part 60	1984
Subpart III: VOC Emissions for SOCMI Air Oxidation Unit Processes	40 CFR Part 60	1990
Subpart NNN: VOC Emissions for SOCMI Distillation Processes	40 CFR Part 60	1990
Subpart QQQ: VOC Emissions for Petroleum Refinery Wastewater Systems	40 CFR Part 60	1988
Subpart RRR: SOCMI Reactor Processes	40 CFR Part 60	1993
National Emission Standards for Hazardous Air Pollutants (NESHAPs)		
Subpart A: General Provisions	40 CFR Part 61	1973
Subpart J/V: Equipment Leaks (Fugitive Emission Sources) of Benzene	40 CFR Part 61	mid 1980s
Subpart M: Asbestos	40 CFR Part 61	1984
Subpart Y: Benzene Emissions from Benzene Storage Vessels	40 CFR Part 61	mid 1980s
Subpart BB: Benzene Emissions from Benzene Transfer Operations	40 CFR Part 61	mid 1980s
Subpart FF: Benzene Waste Operations	40 CFR Part 61	1993

Name	Code of Federal Regulation (CFR) Cite	Effective Date
NESHAPs for Source Categories		
Subpart A: General Provisions	40 CFR Part 63	1994
Subpart B: Control Technology Determination	40 CFR Part 63	1994
Subpart F: SOCMI	40 CFR Part 63	1994
Subpart G: SOCMI Process Vents, Storage Vessels, Transfer Operations, and Wastewater	40 CFR Part 63	1994
Subpart H: Equipment Leaks	40 CFR Part 63	1994
Subpart I: NESHAP for Organic Hazardous Air Pollutants (HON); Certain Processes Subject to the Negotiated Regulation for Equipment Leaks	40 CFR Part 63	1994
NESHAP for HON (partially under stay pending reconsideration for compressors, surge control vessels, and bottom receivers)	40 CFR Part 63	4/22/94
Subpart Q: Industrial Cooling Towers	40 CFR Part 63	1994
Subpart R: Stage I Gasoline Distribution Facilities	40 CFR Part 63	12/14/94
Subpart T: Halogenated Solvent Cleansing (MACT)	40 CFR Part 63	12/2/94
Subpart Y: NESHAP for Marine Tank Vessel Loading and Unloading Operations (MACT)	40 CFR Parts 9, 63	mid 1995
Subpart CC: NESHAP for Petroleum Refining — Phase I (MACT)	40 CFR Parts 9, 60, 63	mid 1995
Stack Height Provisions	40 CFR Part 51, Subpart G	1986
Control Technology Guidelines (CTGs)		
Petroleum Liquid Storage In External Floating Roof Tanks	40 CFR Part 52	1978
Petroleum Liquid Storage in Fixed Roof Tanks	40 CFR Part 52	1977
Petroleum Refinery Equipment Leaks	40 CFR Part 52	1978
Refinery Vacuum Producing Systems, Wastewater Separators and Process Unit Turnarounds	40 CFR Part 52	1977
SOCMI Air Oxidation Processes	40 CFR Part 52	1984
SOCMI Distillation Operations and Reactor Processes	40 CFR Part 52	1993
Tank Truck Gasoline Loading Terminals	40 CFR Part 52	1977
Fuels		
Fuel and Fuel Additives:		
Registration Requirements	40 CFR Part 79	5/27/94
Interim Requirements for Deposit Control Gasoline Additives	40 CFR Part 80	1/1/95
Reid Vapor Pressure Limitation	40 CFR Part 80	late 1980s
Oxygenated Fuel Requirement	40 CFR Part 80	1992
Lead Phaseout	40 CFR Part 80	12/31/95
Reformulated Gasoline	40 CFR Part 80	1/1/95
Low Sulfur Diesel	40 CFR Part 85	1993
Permits		
State Operating Permit Program - Title V (Revised 8/29/94)	40 CFR Part 70	1992
Prevention of Significant Deterioration (new sources in attainment areas) and New Source Review (new sources in non-attainment areas); LAER requirements (existing source)	40 CFR Part 52	1978
Stratospheric Ozone	40 CFR Part 82	1990-2015

Name	Code of Federal Regulation (CFR) Cite	Effective Date
Acid Rain Provisions	40 CFR Parts 72, 73, 75, 77, 78	ongoing
Nitrogen Oxides Emission Reduction Program	40 CFR Part 76	1994
CLEAN WATER ACT (CWA)		
Discharge of Oil: Notification Requirements	40 CFR Part 110	1987
Designation of Hazardous Substances	40 CFR Part 116	1978
Notice of Discharge of a Reportable Quantity	40 CFR Part 117	late 1970s
Spill Prevention, Control, and Countermeasures (SPCC) Requirements for Oil Storage	40 CFR Part 112	mid 1970s
General Provisions for Effluent Guidelines and Standards	40 CFR Part 401	1974
Toxic Pollutant Effluent Standards	40 CFR Part 129	1977
Effluent Guidelines and Categorical Pretreatment Standards	40 CFR Part 419	late 1970s - mid 1980s
Water Quality Standards for Toxic Pollutants	40 CFR Part 131	2/5/93
General National Pretreatment Standards	40 CFR Part 403	early 1980s
Great Lakes Water Quality Guidance	40 CFR Parts 9, 122, 123, 131, 132	early 1995
NPDES		
Stormwater Application, Permit, and Reporting Requirements Associated with Industrial Activities	40 CFR Part 122	5/4/92
Permit	40 CFR Parts 121-125	early 1980s
OIL POLLUTION ACT (OPA)		
Natural Resource Damage Assessments (NRDA) under National Oceanic and Atmospheric Administration	15 CFR Part 990	early 1996
Response Plans for Marine Transportation-Related Facilities (interim final rule)	33 CFR Parts 150, 154	1/19/93
Oil Pollution Prevention; Non-Transportation-Related Onshore Facilities	40 CFR Parts 9, 112	8/30/94
RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)		
Non-Hazardous Waste Requirements (Subtitle D)	40 CFR Parts 256, 257 (Federal guidelines for state/local requirements)	late 1970s, early 1980s
Subtitle C Requirements		
General Requirements for Hazardous Waste Management	40 CFR Part 260	late 1970s
Identification and Listing of Hazardous Wastes and Toxicity Characteristics	40 CFR Part 261	late 1970s
Standards Applicable to Generators of Hazardous Wastes		
Subpart A: General Provisions	40 CFR Part 262	early 1980s
Subpart B: Shipping Manifest	40 CFR Part 262	early 1980s
Subpart C: Packaging, Labeling, Marking, and Placarding	40 CFR Part 262	early 1980s
Subpart D: Recordkeeping and Reporting	40 CFR Part 262	early 1980s
Subparts E & F: Exports and Imports	40 CFR Part 262	early 1980s
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (and generally for Interim Status)		
Subparts A & B: General Provisions & Facility Standards	40 CFR Part 264 (265)	early 1980s
Subparts C & D: Preparedness, Prevention, & Emergency Plans	40 CFR Part 264 (265)	early 1980s
Subpart E: Recordkeeping/Reporting Requirements	40 CFR Part 264 (265)	early 1980s

Name	Code of Federal Regulation (CFR) Cite	Effective Date
Subpart F: Releases from Units	40 CFR Part 264	early 1980s
Subpart F: Groundwater Monitoring Requirements (Interim Status only)	40 CFR Part 265	early 1980s
Subpart G: Closure and Post-closure Requirements	40 CFR Part 264 (265)	1986
Subpart H: Financial Responsibility Requirements	40 CFR Part 264 (265)	early 1980s
Subparts I, J, K, & L: Use and Management of Containers, Tank Systems, Surface Impoundments, & Waste Piles	40 CFR Part 264 (265)	early 1980s (except tanks: 1986)
Liners and Leak Detection for Hazardous Waste Land Disposal Units	40 CFR Part 264 (265)	1992
Double Liners and Leachate Collection Systems for Hazardous Waste Disposal Units	40 CFR Parts 144, 264 (265)	1992
Subparts M, N, & O: Land Treatment, Landfills, & Incinerators	40 CFR Part 264 (265)	early 1980s
Subpart S: Corrective Action	40 CFR Part 264 (265)	1985 (1993)
Subparts AA, BB, & CC: Air Emission Standards for Process Vents; Equipment Leaks; & Tanks, Surface Impoundments, and Containers	40 CFR Part 264 (265)	
Phase I	40 CFR Part 264 (265)	1990
Phase II	40 CFR Part 264 (265)	1994
Standards for the Management of Specific Hazardous Wastes	40 CFR Part 266	1985
Land Disposal Restrictions	40 CFR Part 268	1986
Phase I: Contaminated Debris and Newly Identified Wastes, F037 and F038 Petroleum	40 CFR Parts 148, 268	1992, 1993
Phase II: Set Treatment Standards (BDAT) for TC Wastes and Establish Universal Treatment Standards	40 CFR Parts 148, 268	1994
Permits	40 CFR Parts 270, 271, 272	1980s
Standards for the Management of Used Oil: Used Oil Destined for Recycling	40 CFR Part 279	1993
Underground Storage Tanks: Technical Standards and Corrective Action	40 CFR Part 280	1988
SAFE DRINKING WATER ACT (SDWA)		
Underground Injection Control Regulations	40 CFR Parts 144, 146	12/16/93
SUPERFUND (CERCLA)		
Natural Resource Damage Assessments (also under CWA)	43 CFR Part 11	3/17/94
Reportable Quantities Releases (Notification to National Response Center)	40 CFR Part 302	mid 1980s
Extremely Hazardous Substances (EHSs) Emergency Planning	40 CFR Part 355	1987
EHS Release Notification (Notification to State Emergency Response Commission, Local Emergency Response Commission) and Follow-up	60 CFR Part 355	mid 1980s
Community Right-To-Know		
Hazardous Chemicals (Material Safety Data Sheet Chemicals) Inventory Reporting	40 CFR Part 370	late 1980s
Toxic Chemical Release Reporting	40 CFR Part 372	1988
Expansion of TRI List	40 CFR Part 372	11/30/94

Name	Code of Federal Regulation (CFR) Cite	Effective Date
TOXIC SUBSTANCES CONTROL ACT (TSCA)		
General Provisions	40 CFR Part 702	1982
Reporting and Recordkeeping Requirements	40 CFR Parts 704, 710	1988, late 1970s
Chemical Information Rule	40 CFR Part 712	1982
Health & Safety Data Reporting	40 CFR Parts 716	.1986
Premanufacture Notification (and Exemptions)	40 CFR Parts 720 (723)	1983 (1995)
Significant New Uses	40 CFR Part 721	1988
Chromium Comfort D Cooling Towers	40 CFR Part 749	1990
Rules for Controlling Polychlorinated Biphenyls	40 CFR Part 761	1979
Asbestos-Containing Products Labelling Requirements	40 CFR Part 763	1979

Update of Appendix A[1]

Name	Code of Federal Regulation (CFR) Cite
CLEAN AIR ACT (CAA)	
New Source Performance Standards	40 CFR Part 60
Subpart CCCC: Commercial and Industrial Solid Waste Incineration Units	40 CFR Part 60
NESHAPS for Source Categories	40 CFR Part 63
Subpart EEE: Hazardous Waste Combustors	40 CFR Part 63
Subpart UUU: Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units (Refinery MACT II)	40 CFR Part 63
Subpart EEEE: Organiz Liquids Distribution (Non- Gasoline)	40 CFR Part 63
Subpart FFFF: Miscellaneous Organic Chemical Manufacturing	40 CFR Part 63
Subpart YYYY: Stationary Combustion Turbines	40 CFR Part 63
Subpart GGGGG: Site Remidiation	40 CFR Part 63
Subpart LLLLL: Asphalt Roofing and Asphalt Processing	40 CFR Part 63
Subpart DDDDD: Industrial/Commerical/Institutional Boilers and Process Heaters	40 CFR Part 63
Subpart ZZZZZ: Reciprocating Internal Combustion Engines	40 CFR Part 63
Fuels	40 CFR Part 80
Subpart H: Tier II Gasoline Sulfur	40 CFR Part 80
Subpart I: Ultra Low Sulfur Highway Diesel	40 CFR Part 80
Subpart J: Mobile Source Air Toxics	40 CFR Part 80

[1] As of April 2004 Source: NPRA

RESPONSES BY BOB SLAUGHTER TO ADDITIONAL QUESTIONS FROM SENATOR INHOFE

Question 1a. Is the New Source Review reform a rollback of regulatory obligations for refineries?

Response. No. Refiners are currently complying with over 50 regulations under the Clean Air Act and many more under other statutes. (See attached list.) There are more new regulations in the pipeline. Historically, the New Source Review program was intended as a regulatory tool to keep areas in attainment with the NAAQS. The NSR program itself was not intended as an emissions reduction program. Instead, it was contemplated as a program to limit the air quality impacts from siting new facilities or undertaking major changes at existing facilities, provided that the actions resulted in significant emissions increases. Over time, and through retroactive reinterpretations, NSR evolved into a regulatory program controlling virtually all changes to manufacturing facilities, including those that increase efficiency and even some that decrease emissions, thus discouraging energy supply and efficiency. This is why the NSR reforms are necessary. The reforms have been under consideration since 1996, through two administrations, and reflect significant public review and comment as well as bipartisan support.

Question 1b. Assuming that New Source Review reforms were put into effect, would they have an impact on refining capacity and fuel supply?

Response. The New Source Review reforms will provide an important tool to help add new U.S. refining capacity, while continuing environmental progress, including the production of cleaner fuels. For this reason, we urge policymakers to recognize the importance of sustaining the Administration's NSR reforms so that domestic refiners can continue to meet the growing public demand for gasoline and comply with new environmental programs. The NSR reforms should facilitate new domestic refining capacity expansions because they will allow facility owners to make more efficient use of capital with greater regulatory certainty. The reforms will also encourage the installation of more technologically advanced equipment and provide greater operational flexibility while maintaining a facility's environmental performance.

Question 2. What new regulatory programs are planned for gasoline and diesel fuel for the next few years? Has the supply impacts of these programs been adequately studied? Has someone reviewed the cumulative impacts of fuel requirements on supply?

Response. The phase-in for EPA's Tier 2 gasoline sulfur reduction program began on January 1, 2004. The final regulations will be effective for most gasoline on January 1, 2006. However, the phase-in period is longer for refineries in the Rocky Mountains area and for small refineries.

There may be local or regional changes in gasoline formulations in new 8-hour ozone nonattainment areas. In addition, a few state MTBE bans will be effective in the next few years (i.e., Arizona, Maine, Missouri, Kentucky, and New Hampshire) and this could affect fuel specifications in those areas.

EPA's limited phase-in for the highway diesel sulfur reduction program will begin on June 1, 2006 and will last for 4 years (Actually 80 percent of volume must meet the 15 ppm specification on the first day). The phase-in for the Agency's sulfur reduction program for nonroad diesel will begin on June 1, 2007 and extend for at least 3 years.

Low emissions diesel standards will be effective in 110 counties in eastern and central Texas on April 1, 2005; these state regulations are different from Federal standards. Highway and nonroad diesel will be subject to a state 15 ppm sulfur cap on June 1, 2006 in California and in the 110 counties in eastern and central Texas. There is no 4-year phase-in or small refiner extensions in these state programs.

NPRA and API support the orderly evolution and use of cleaner-burning fuels to reflect health and environmental concerns and to provide adequate gasoline supplies to the motoring public. However, this can only be achieved if energy and environmental policymaking is integrated and the costs and benefits of new regulatory requirements are carefully weighed in the context of their impact on energy supplies. We continue to urge policymakers and stakeholders to focus on the supply side of the energy equation and not to take adequate energy supply for granted, as we believe has been the case in recent years.

We would point to the public rulemaking record illustrating recommendations industry has made on environmental regulations over the past 8 years. Industry has consistently supported continued environmental progress, but cautioned regulators to balance environmental and energy goals by considering the supply implications of multiple new regulatory requirements. Industry has commented on many new stationary source and fuel proposals, urging adoption of more reasonable standards with adequate lead-time to make the necessary facility changes in order to mitigate potential supply shortfalls. Many times, if not most, these industry recommendations have been rejected, as regulators opted to promulgate more stringent standards without leaving a margin of safety for energy supply security. We are now beginning to experience the impact of these decisions.

The National Petroleum Council (NPC) issued a landmark report on the state of the refining industry in 2000. Given the limited return on investment in the industry and the capital requirements of environmental regulations, the NPC urged policymakers to pay special attention to the timing and sequencing of any changes in product specifications. Failing such action, the report cautioned that adverse fuel supply ramifications may result. Unfortunately, this warning has been widely disregarded.

Question 3. In my statement, I referred to the difficulties industry faces in building a new refinery actually. Actually according to Dr. Cooper's testimony, it would seem that refiners purposefully do not build new refineries or upgrade existing ones in order to force up prices. I was sent a letter from the CEO of Arizona Clean Fuels addressed to me about his company's experience in trying to build a new refinery. He states that his company has been trying to build a new refinery for over 10 years, and is only now reaching the initial permitting phase. Why do some many critics of your industry focus on market manipulation while ignoring the very real challenges businesses must face in order to meet consumer demand?

Response. We believe the media and industry experts and analysts have communicated the right information to the public about factors affecting current market conditions and petroleum supplies and costs. Consumers are informed that high crude oil costs and growing demand for transportation fuels are the primary drivers in today's fuel markets. There are some opponents of fossil fuels who will always ignore the facts and make misrepresentations about the refining business and its products. Our industry stays focused on our obligation to produce reliable supplies of petroleum products to fuel the Nation and meet the needs of our customers. At the hearing, NPRA and API were encouraged by Dr. Cooper's remarks, on behalf of the Consumer Federation of America, focusing on the need for more domestic refining capacity and his organization's support for the NSR reforms.

Question 4. We hear about polls that the public is very willing to pay for environmental improvements. What is your organization's experience with motorists? Are they supportive of clean fuels programs? Are they aware of the higher manufacturing costs?

Response. Generally, the public is very supportive of clean fuels programs; however, they often reject any increased costs that result from those programs. This may indicate inadequate consumer education by EPA and others concerning the real costs of environmental progress. Policymakers have overwhelming emphasized the environmental benefits of regulations while understating and underestimating the actual costs to consumers, states, and industry and the impacts on energy supply. Energy and environmental goals should be more balanced in setting policy.

RESPONSES BY BOB SLAUGHTER TO ADDITIONAL QUESTIONS FROM SENATOR JEFFORDS

Question 1. In your testimony, you have also encouraged Congress to resist any new Federal fuel blends and further study the boutique fuels problem. Wouldn't adopting the provisions of the Senate-passed Energy bill that standardize the north-south requirements for Federal reformulated gasoline be a step that we could take without really imposing a "new" requirement?

Response. The Conference Report on H.R. 6 standardizes the Volatile Organic Compound (VOC) standard for Federal reformulated gasoline (RFG) in the summer for the north and south. This would impose a new requirement in northern RFG markets by requiring a more severe reformulation of the summer fuel. As an example, Chicago and Milwaukee currently have a "special" VOC waiver to allow for increased use of ethanol in RFG in the summer. The Conference Report language would nullify the waiver and require a lower RVP fuel in these cities which means additional changes to the base gasoline blendstock known as RBOB which could have supply implications. The Conference Report also contains provision for a comprehensive study of the boutique fuels issue which is the appropriate approach. NPRA and API strongly encourage the Senate to pass the Conference Report on H.R. 6.

Would NPRA support requiring summertime "floor" for RVP for all gasoline the same as for reformulated gasoline?

An existing EPA regulation specifies a summertime floor for RVP for conventional gasoline; see 40 CFR 80.45(f) (1) (ii): 6.4 psi. This value (6.4 psi) for conventional gasoline is the same as the regulation for Federal RFG at 40 CFR 80.45(f) (1)(i).

Question 2. You indicated that the New Source Review reforms should facilitate new domestic refining capacity expansions. The NSR reforms most applicable to the refining business became effective on March 3, 2003. What new refinery capacity expansions have occurred or been planned since then?

Response. The New Source Review reforms, both the equipment replacement rule and the December 31, 2002, rule are currently subject to litigation which has created uncertainty in the states and in industry. Refining capacity expansions will continue to be subject to significant permitting and stakeholder processes. A clear and concise NSR program, however, should help expedite the review process. Other obstacles to new or expanded refining capacity remain and will also play a part in refiners' decisions about investing in new capacity.

Question 3. As I understand, no automobile manufacturer recommends that any of its new vehicles use a gasoline grade with higher than 91 octane. Why do most major retailers carry gasoline with 93 octane?

Response. Refiners market three grades of gasoline as a service to their customers, which allows the public to make informed choices about the appropriate fuels for their vehicles based on personal preference, cost and/or vehicle performance. Perhaps the best answer is to provide an analogy by asking a similar question: Why do most major grocery stores carry multiple brands of peanut butter, all at different prices? And the answer is consumers want a choice of products, as do motorists.

Question 4a. Throughout your testimony, you have suggested that environmental requirements still present difficulties for refiners.

Hasn't EPA done a lot with phasing-in requirements, banking and trading, and other changes to make compliance easier, especially small refiners?

Response. EPA has included some "flexibilities" in the final gasoline and diesel desulfurization rules by phasing in requirements, and allowing for banking and trading. These are positive actions; however, the economy, national security, energy supply and consumers would be better served by adopting policies and regulations that better balance energy supply needs with environmental progress. These policy discussions and decisions should occur early in the rulemaking process before formulating the regulations. The "bells and whistles" features referred to in your question cannot offset the negative impact on supply of a program that is fundamentally flawed in its approach or timing.

Question 4b. Doesn't the cost of crude and gasoline demand overwhelm environmental requirements as the cause of high fuel prices?

Response. While it is correct that the crude oil costs and growing gasoline demand are the key factors impacting today's gasoline markets, environmental policies and regulations have been adopted without adequate attention to energy supply and impacts on industry, and consumers. The petroleum industry has been spending roughly $9 billion per year on environmental compliance for some time. For U.S. refiners, environmental regulations have forced resources to be directed to regulatory mandates, rather than allowing facilities to have flexibility in making decisions on how to make their facilities and products cleaner and more efficient. These regulatory mandates are substantial and also divert resources from other capital projects for upgrades and energy efficiency.

Question 5. Congress explicitly exempted petroleum from Superfund liability in 1980. Instead, petroleum companies were subject to a polluter pays fee to fund the clean up of toxic waste dumps. The Bush administration has opposed reauthorizing this fee, which expired in 1995. This is about a $500 million annual exemption.

Response. Is it correct petroleum companies today are neither subject to Superfund liability for cleaning up toxic waste spills nor do they pay into the "Superfund Trust Fund," which has gone bankrupt except for annual congressional appropriations?

The Comprehensive Environmental Response, Compensation and Liability Act (Superfund) is a Federal program created to pay for the cleanup of "orphan" waste disposal sites. Prior to 1996, the Superfund was funded from three separate taxes on industry: the petroleum tax, the chemical tax, and the corporate environmental tax. The petroleum industry paid $7.5 billion, or almost 60 percent, of all Superfund taxes prior to their expiration, yet its share of the liability for cleaning up Superfund sites was less than 10 percent, according to EPA. More than 70 percent of all non-Federal facility Superfund cleanups are paid for by responsible parties, including the vast majority of those sites for which the petroleum industry is responsible.

Moreover, the 1990 Oil Pollution Act separately holds petroleum companies liable for cleaning up potential oil spills, and a five-cent-per-barrel tax on crude oil has created a $787 million trust fund to ensure that any such cleanups occur. In addition, a separate 0.1 cent-per-gallon excise tax on gasoline has been used to ensure the cleanup of leaking underground storage tanks. Hazardous waste site cleanups are also required under the Resource Conservation and Recovery Act (RCRA) and the potential for new future Superfund sites is greatly reduced by RCRA regulations on waste handling. These laws ensure that even the relatively few petroleum cleanup sites not voluntarily cleaned up by the industry are in fact cleaned up.

As an "on-budget" trust fund, expenditures from the Superfund trust fund are subject to the Federal budget rules and the annual appropriations process, regardless of whether the taxes are reinstated. Annual budget authority for the Superfund program has remained stable. Congress has again fully funded the program for 2004, and the Administration has requested more than $100 million in additional funding for 2005. Future cleanups are not in jeopardy, and responsible parties will continue to pay for cleaning up the sites for which they are responsible, thereby ensuring the continued application of the "polluter pays" principle.

Question 6. In your testimony, you argue in favor of the passage of the H.R. 6 Conference Report. At the request of Senator Sununu, the Energy Information Administration did an analysis of the effect of the H.R. 6 Conference Report would have on gasoline prices. EIA found the effect would be "negligible."

Response. NPRA believes that EIA's analysis missed several changes that will improve gasoline supply and cost. Elimination of the 2 percent oxygenate mandate for RFG demonstrates just one provision which will result in significant flexibility and cost efficiency in gasoline manufacture.

Passage of the Conference Report on H.R. 6 is the most important action that can be taken to improve U.S. energy security. Putting the conference report on the President's desk is the best way to move energy policy forward into the 21st century and maintain a healthy, viable U.S. refining industry which is in the best interests of the nation.

Statement of A. Blakeman "Blake" Early, American Lung Association

Mr. Chairman and members of the committee, my name is A. Blakeman Early. I am pleased to appear today on behalf of the American Lung Association. Celebrating its 100th anniversary this year, the American Lung Association has been working to promote lung health through the reduction of air pollution for over 30 years. I am here today to discuss elements of the Clean Air Act that impact the oil refining industry and gasoline policy.

CLEAN FUELS ARE A CORNERSTONE OF THE CLEAN AIR ACT

The Clean Air Act programs that we believe most affect the refining industry are the Reformulated Gasoline Program (RFG) and the low-sulfur requirements for gasoline, on-road diesel, and very soon we hope off-road diesel fuel. We recognize that there are important stationary source requirements of the Clean Air Act that impact the refining industry. However, because of their importance, I will limit my comments to the most significant fuel requirements of the law.

REFORMULATED GASOLINE

As has been demonstrated in California and across the Nation, reformulated gasoline can be an effective tool in reducing both evaporative and tailpipe emissions from cars and trucks that contribute to smog. Based on separate cost effectiveness analyses by both EPA and California, when compared to all available emissions control options, reformulated gasoline (RFG) is a cost-effective approach to reducing the pollutants that contribute to smog.[1] Compared to conventional gasoline, RFG has also been shown to reduce toxic air emissions from vehicles by approximately 30 percent.[2] A study done by the Northeast States for Coordinated Air Use Management, an organization of state air quality regulators, estimated that ambient reduction of toxic air pollutants achieved by RFG translates into a reduction in the rel-

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[1] U.S. Environmental Protection Agency, Regulatory Impact Analysis, 59 FR 7716, docket No. A–92–12, 1993.

[2] Report of the Blue Ribbon Panel on Oxygenates, September 1999, pp. 28–29.

ative cancer risk associated with conventional gasoline by a range of 18 to 23 percent in many areas of the country where RFG is used.[3]

The benefits from RFG accrue from evaporative and tailpipe emissions reductions from vehicles on the road today, as well as from non-road gasoline powered engines, such as lawn mowers. They begin as soon as the fuel is used in an area. As with most Clean Air Act programs, the RFG program has cost less than estimated and the emissions benefits have been greater than expected or required by law. It is no wonder that RFG or other clean gasoline programs are in use in 15 states, according to EPA.

LOW SULFUR CONVENTIONAL GASOLINE

This year begins the phase in of sulfur reduction requirements for all gasoline, which will be fully implemented by the end of 2006. These requirements derive from the Tier 2/Gasoline Sulfur rule issued during the Clinton administration. This program is even more significant than the RFG program because the lower sulfur levels required in conventional gasoline will reduce tailpipe emissions from vehicles and other engines used today not just in RFG areas, but virtually across the Nation. More importantly, the limit on sulfur in gasoline enables the use of very sophisticated technology on a new generation of gasoline-powered vehicles (including SUVs) that will generate very low rates of tailpipe emissions. These emissions reductions will grow as the new cleaner vehicles replace older dirtier ones. This program is so important to offset the growth in vehicle emission attributable to the fact that each year more people are driving more vehicles more miles than ever before.

The estimated benefits from the Tier2/Gasoline Sulfur rule will be enormous. EPA estimates that when fully implemented, the program will reduce premature mortality, hospital admissions from respiratory causes and a range of other health benefits that have a monetized benefit of over $24 billion each year.[4] The actual benefits will likely be higher if history is any guide in these matters.

At this point I am going to say something unexpected. It is important to note that with respect to the RFG program and the Tier 2 sulfur reduction program the refining industry is getting the job done and at a cost below what it and others predicted. Moreover, refiners are reducing toxic emissions from RFG by a significantly larger percentage than the minimum required by the Clean Air Act Some refiners, such as BP have met low sulfur goals ahead of legal requirements and are using their success as a marketing tool and even have received public recognition from American Lung Association state affiliates. We at the American Lung Association want to give credit where credit is due.

LOW SULFUR ON-ROAD DIESEL FUEL

While the Tier 2 rule was issued by the Clinton administration, the value of clean fuels has not been lost on the Bush administration. The Heavy Duty Diesel Engine/Diesel Fuel rule was first issued in the Clinton administration reaffirmed by the Bush administration in January 2000. Like the Tier 2 rule, this rule will provide immediate benefits from reductions of both NOx and particulate emissions from diesel fueled vehicles on the road today but also enable the application of new technology to a new generation of heavy duty diesel engines used in trucks and buses in the future that will reduce particle and NOx emissions from the vehicles by 90 percent. The sulfur reduction requirements for on-road diesel fuel are phased in beginning in 2007.

Diesel emissions are an important contributor of NOx, a precursor of smog. More importantly, heavy-duty diesel emissions generate a large amount of fine particle air pollution that is associated with premature mortality and cancer. The EPA estimates that when fully implemented, the HD Diesel Engine/Diesel Fuel rule will provide health benefits that approximately double the Tier 2 rule at a monetized calculation of nearly $51 billion each year.[5]

Finally, in further recognition of the importance diesel emissions play as a contributor to both smog and fine particle pollution, the Bush administration issued just yesterday a new Off-Road Diesel Engine/Diesel Fuel rule Through phased reductions of sulfur in off-road diesel fuel this rule will achieve immediate emissions reductions from a diverse group of diesel engines used in construction, electricity generation and even trains and marine vessels. The clean fuel requirements of this rule, too, will enable a new generation of much cleaner off-road diesel engines which

[3] Relative Cancer Risk of Reformulated Gasoline and Conventional Gasoline Sold in the Northeast, August 1998, p. ES–6, found at www.Nescaum.org

[4] Tier 2/Sulfur Regulatory Impact Analysis, December 1999, p. VII–54.

[5] HD Engine/Diesel Fuel Regulatory Impact Analysis, January 18, 2001, p. VII–64.

will result in lower diesel emissions far into the future as older engines are replaced.

My understanding is that the estimate of health benefits from this rule will be even greater than the HD Engine/Diesel Fuel rule in large part because this category of engines and their fuel have been under regulated in comparison to other engine sectors. EPA projects that, when fully implemented, health benefits to include: 12,o00 fewer premature deaths, 15,000 fewer heart attacks, 6,000 fewer emergency room visits by children with asthma, and 8,900 fewer respiratory-related hospital admissions each year.[6]

WE OPPOSE CHANGES TO CLEAN FUELS PROGRAMS THAT WEAKEN OR DELAY EMISSIONS REDUCTIONS

Each of the regulations implementing the clean fuels programs and requirements were the product of a broad, lengthy and public process that ultimately reached a delicate political and substantive compromise. No party got everything it wanted. Each rule provides large and critical emissions reductions needed to protect public health. Any attempt to modify these rules at this juncture without thorough evaluation risks disrupting these programs in ways to could reduce or delay the large public health benefits we need them to deliver. Such changes also risk penalizing those refiners who have made the commitment to meet the requirements of these programs, some times earlier than required. Those who propose changes bear a heavy burden of showing the need and demonstrating the benefit.

AIR POLLUTION STILL THREATENS MILLIONS OF AMERICANS

Although we have made important progress in reducing air pollution, the battle is far from being won. This is true in part due to improved research in recent years which indicates that exposure to lower levels of smog over longer periods can have adverse health effects. The adverse impact of smog is being magnified also by the increase in the number of people with asthma. Smog is an important trigger of asthma attacks. New research has also revealed the lethality of so-called fine particle air pollution not only among those previously known as vulnerable such as people with asthma or chronic lung disease, but also among those with cardiovascular disease. This research is the foundation of the establishment of the 8-hour NAAQS for ozone and the NAAQS for PM 2.5 promulgated in 1997. Additional research since then has reinforced the need for these standards.[7]

This committee received testimony from Dr. George Thurston just a few weeks ago demonstrating that the progress in reducing 8-hour levels of ozone has stalled in recent years. A graph in his testimony, based on EPA monitoring data shows the decline in 8-hour ozone levels to be essentially flat between 1996 and 2002.[8]

At the end of April, the American Lung Association released its State of the Air 2004 report identifying all the counties nation-wide with air pollution monitors that monitored unhealthy levels of smog and fine particles over the 2000–2002-time period. The report found that counties that are home to nearly half the U.S. population, 136 million people, experienced multiple days of unhealthy ozone each year. The report further found that over 81 million Americans live in areas where they are exposed to unhealthful short-term levels of fine particle air pollution. In all, the report found that 441 counties, home to 55 percent of the U.S. population have monitored unhealthy levels of either ozone or particle pollution. Among those vulnerable to the effects of air pollution living in these counties include 29 million children, 10 million adults and children with asthma and nearly 17 million people with cardiovascular disease.[9] As impressive as these numbers may seem, it is undoubtedly an under estimate of the nature of the air pollution problem in this country because far from every county has a monitor for either smog or particle pollution.

WE NEED GREATER USE OF CLEAN FUELS IN AREAS WITH UNHEALTHY LEVELS OF SMOG AND PARTICULATE AIR POLLUTION

As you know, on April 15 EPA designated all or part of 474 counties in non-attainment with the 8-hour National Ambient Air Quality Standard for Ozone. EPA

[6] EPA Regulatory Announcement: Low-Emission Nonroad Diesel Engines and Fuel. May 11, 2003.

[7] See Annotated Bibliography of Ozone Health Studies, January 27, 2003 and Fact Sheet on Fine Particles, May 2003 at *www.cleanairstandards.org* a website of the American Lung Association.

[8] Statement of George D. Thurston, Sc.D., before the Senate Environment and Public Works Committee, April 1, 2004, p.6.

[9] State of the Air: 2004, pp. 5–11 at www.lungusa.org

has committed to designate counties in non-attainment for the fine particle or $PM_{2.5}$ air quality standard in December. These areas will be required to evaluate and select emissions reduction strategies that, in combination with the Federal programs aimed at air pollution transported over long distances, will enable them to achieve the 8-hour standard and fine particle standards. The American Lung Association believes that many new non-attainment areas may want to adopt a clean fuels program using either RFG or a low volatility alternative or obtaining low sulfur diesel sooner than required by the regulations previously described. We believe that should Congress choose to change the law or otherwise influence gasoline policy, it should do so in a way that makes it easier for areas that exceed air pollution standards to adopt clean fuels programs and not "lock in" the use of dirtier conventional fuels. We need clean fuels programs to be broadly adopted to obtain clean air and protect the public health as soon as possible.

THERE IS NO EVIDENCE THAT CURRENT CLEAN FUELS PROGRAMS SIGNIFICANTLY INFLUENCE CURRENT GASOLINE PRICE INCREASES

As is customary when gasoline prices spike, some have recently suggested that the clean fuels programs, often referred to as "boutique fuels" are responsible. While it appears that clean gasoline programs in both California and the Chicago/Milwaukee area have contributed to temporary price spikes in the past, we believe there has been little evidence presented publicly demonstrating that clean fuels programs across the country are contributing in any significant way to today's high gasoline prices. Indeed, the evidence would suggest that systemic influences in gasoline production and marketing are the reason gasoline prices are as high as they are today. We believe this to be the case because: (1) gasoline prices have increased nation-wide, (2) conventional and clean gasoline prices are rising at the same rate, (3) in some areas, conventional gasoline is priced at or near the price of clean gasolines, (4) refiners are posting higher profits than they did a year ago when prices were lower.

Both conventional and clean fuels have risen in price $.30 cents a gallon or more from a year ago. This increase has occurred in virtually all parts of the country regardless of where their gasoline comes from or who makes it. More significantly, the increases in price for conventional gasoline and clean gasolines have pretty much been the same. Attached to the end of my testimony I have prepared an unscientific chart that illustrates my point. I believe a more comprehensive examination of the data will support my conclusions. I encourage the committee to ask DOE or EPA to conduct such an examination.

If the cost of producing clean gasoline were a major factor, the prices of these fuels would be rising at a faster rate. As my chart shows, this does not appear to be happening. What is noteworthy is that in the West, the "rack" or wholesale cost of conventional gasoline in the states that border California, which has the most stringent fuel requirements in the country, has risen more than in California. In Las Vegas conventional gasoline is actually more expensive than the average rack price in California and Reno is almost the same. When I first began to research the explanation for this counter-intuitive alignment of prices I was shocked, shocked to learn that there is gambling in Las Vegas and Reno! Could it be that refiners were callously over-charging for gasoline in Las Vegas and Reno because of the proliferation of so many high rolling gamblers in these two cities? Then I noticed Portland also had the same expensive conventional gasoline and was forced to abandon my theory. In New York the RFG sold in the New York City/Connecticut area will for the first time use the same low volatility blend-stock used in the Chicago/Milwaukee market because of new state MTBE bans. Yet the price of conventional gasoline in Albany has risen at the same rate and maintains the same price spread as a year ago. Note also that Atlanta, which has required the use of a low volatility; low sulfur "boutique" for several years has experienced a price increase no greater than Macon, which uses conventional gasoline. Atlanta's fuel prices have consistently been below the national average price for conventional gasoline for reasons that remain a mystery.

The point is that the many other factors that impact gasoline price, lead by unsustainable growth in demand and the price of crude oil which is currently at or near $40 per barrel, have historically driven price and do so today. Clean fuel requirements have an insignificant impact in comparison.

Finally, I must note that across the board, refiners are making more money this year than a year ago. The attached USA Today story pretty much tells the story. The cost of gasoline is high because demand continues to grow at an unsupportable pace. Refiners could make money by producing more gasoline, but selling it at a lower price. It is pretty obvious that they are not choosing this strategy. It is apparently easier and more profitable to maintain a larger gap between demand and supply and earn higher profits on a lower level of production.

RETAIL PRICE RISE COMPARISON OF CG & RFG

(Cents per gallon)

	5/6/03	5/6/04	Change
Chicago (RFG)	158.10	201.30	+43.20
Champaign (CG)	141.70	186.00	+44.30
St. Louis (RFG)	137.80	183.60	+45.80
Milwaukee (RFG)	156.40	196.40	+40.00
Madison (CG)	150.20	192.00	+41.80
Allentown (CG)	147.80	179.30	+31.50
Philadelphia (RFG)	160.30	182.60	+22.30
Atlanta (GG-low S, Low RVP)	133.10	173.70	+40.60
Macon (CG)	129.80	169.50	+39.70
Denver/Boulder (CG-low RVP)	144.70	182.30	+37.60
Colorado Springs (CG)	145.60	185.10	+39.50
Albany (CG)	162.60	186.10	+23.50
New York (RFG)	174.80	200.10	+25.30

GASOLINE RACK PRICES

(Cents per gallon)

	5/1/03	4/29/04	Change
Portland	97.22	152.05	+54.83
Reno	95.95	148.25	+52.30
Las Vegas	98.83	153.03	+54.20
California Average	100.73	151.27	+50.54

RESPONSE BY A. BLAKEMAN EARLY TO ADDITIONAL QUESTION FROM SENATOR JEFFORDS

Question. Mr. Port's testimonies suggested that the Federal Government pre-empt state fuel regulation or prepare a basked of "Federal fuels" that a state might adopt. The latter already seems to exist in the form of California's clean fuels. Could we be assured that the result of preemption or a choice of only one or two fuels would be equal or better in terms of public health protection

Response. Under Section 211 (c) of the Clean Air Act, EPA has authority to control or prohibit a fuel or fuel additive that contributes to air pollution that may reasonably be anticipated to endanger public health or welfare or impair the performance of an emission control device in general use. A state is only allowed to control or prohibit a fuel or fuel additive under the Clean Air Act if it can show, and EPA agrees, such measure is needed to achieve a national primary or secondary ambient air quality standard.

States have historically adopted controls on fuels and fuel additives that were more stringent, in terms of public health protection, than the federally permissible fuels (typically conventional gasoline with a summertime RVP limit). Given this history, we see little reason to believe that a full pre-emption of state authority to adopt fuel additive or fuel controls, as Mr. Ports advocates, would lead to greater public health protection. Indeed, this history is a clear demonstration why the American Lung Association has long advocated retention of state authority to adopt air pollution control measures that are more stringent than Federal measures in order to better protect public health.

STATEMENT OF MICHAEL PORTS, PRESIDENT, PORTS PETROLEUM COMPANY, INC., ON BEHALF OF THE SOCIETY OF INDEPENDENT GASOLINE MARKETERS OF AMERICA AND THE NATIONAL ASSOCIATION OF CONVENIENCE STORES

I. INTRODUCTION

Good morning, Mr. Chairman, Senator Jeffords, and members of the committee. My name is Mike Ports. I am President of Ports Petroleum Company, an independent motor fuels marketer headquartered in Wooster, Ohio. Ports Petroleum owns and operates 60 high volume unbranded retail motor fuels outlets. Our company operates these stores under the "Fuel Mart" name in 11 states from Ohio to Nebraska, south to Mississippi, and east to Georgia.

I appear before the committee today representing the Society of Independent Gasoline Marketers of America and the National Association of Convenience Stores. While my company does not retail gasoline and diesel fuel in Oklahoma, many SIGMA and NACS members, including Love's Country Stores of Oklahoma City and QuikTrip of Tulsa, are major Oklahoma marketers. I speak in part on their behalf today. Mr. Chairman, Tom Love and Chester Cadieux asked that I extend their personal greetings to you at this hearing.

II. THE ASSOCIATIONS

SIGMA is an association of more than 250 independent motor fuel marketers operating in all 50 states. Last year, SIGMA members sold more than 48 billion gallons of motor fuel, representing more than 30 percent of all motor fuels sold in the United States in 2003. SIGMA members supply more than 28,000 retail outlets across the Nation and employ more than 270,000 workers nationwide.

NACS is an international trade association comprised of more than 1,700 retail member companies operating more than 100,000 stores. The convenience store industry as a whole sold 124.4 billion gallons of motor fuel in 2003 and employs 1.4 million workers across the Nation.

Together, SIGMA and NACS members sell approximately 80 percent of the gasoline and diesel fuel purchased by motorists each year.

III. GENERAL COMMENTS ON REFINING AND GASOLINE POLICY

Thank you for inviting me to testify today on the environmental regulatory framework affecting oil refining and gasoline policy. My company does not refine gasoline or diesel fuel, but we do sell it to thousands of consumers every day. Consequently, the environmental regulations that govern refining of crude oil into gasoline and diesel fuel do not apply to my company directly. But it would be a mistake to conclude that my company, all SIGMA and NACS members, and all American citizens have not been negatively affected both by the economic burdens imposed on refiners by environmental protection regulations and by the lack of a Federal policy to insure that these burdens do not lead to motor fuel supply shortages and retail price volatility.

Unfortunately, extreme wholesale and retail price volatility has become the norm, rather than the exception. NACS and SIGMA have been called to testify before congressional committees regularly since 1996 as these committees investigate the underlying causes for periodic price spikes in the gasoline and diesel fuel markets. Our message has remained consistent with what you will hear from me today.

Today, retail gasoline prices across the Nation are at some of the highest levels in history and diesel fuel prices are not far behind. Despite a common misperception, rising retail gasoline and diesel fuel prices generally do not benefit motor fuel retailers. In fact, rising wholesale prices have the opposite effect—retailer margins are compressed and marketers record lower in-store sales.

Historically, negative public reaction to rising retail gasoline prices led the media and some legislators to allege "price gouging" by retailers and to launch investigations into retailer pricing practices. Such investigations have uniformly found that rising retail prices are caused by fully justified market forces, particularly product supply shortages or unusual demand increases, rather than collusion or price gouging.

The congressional reaction to, and the media coverage of, the price volatility we have experienced in 2004, however, has taken on a much less strident and more reasonable and educated tone. In general, with a few notable exceptions, allegations of price gouging and collusion have been replaced by a discussion of high crude oil prices, increases in demand, supply constraints or dislocations caused by refinery problems and "boutique" fuels, stringent environmental regulations, and lack of growth in domestic refining capacity. SIGMA and NACS welcome this more responsible dialog regarding the underlying causes for the price volatility we are experiencing thus far in 2004. We hope that this dialog will result in meaningful, systemic reforms of the nation's motor fuel refining and distribution policies—reforms SIGMA and NACS have called for every year since 1996.

Simply stated, the environmental compliance burdens placed on the nation's domestic motor fuel refining industry over the past 20 years have effectively destroyed the world's most efficient commodity manufacturing and distribution system. To enhance the quality of our air, an objective of which SIGMA and NACS are completely supportive, the government has imposed on domestic refiners tens of billions of dollars in costs and has fragmented the motor fuels distribution system into islands of boutique fuels. But as for all other good things, there is a price for this cleaner air that ultimately must be paid by consumers of gasoline and diesel fuel.

As long as the motor fuels refining and distribution system works perfectly, supplies are adequate and retail prices remain relatively stable. However, if there are any new stresses placed on the system, such as a pipeline disruption or an increase in world oil prices, the industry no longer has the flexibility to react and counterbalance these forces.

Currently, our Nation does not have a rational or comprehensive motor fuel refining policy. Instead, environmental protection policies—well-intentioned, but poorly implemented from the perspective of motor fuel supplies—have compromised the ability of the domestic motor fuel refining and marketing industries to meet consumer demand.

Congress has a choice to make with respect to motor fuel refining policy. It can continue down the path followed for the past two decades. This path, as we have witnessed, results in static or reduced domestic refining capacity, balkanization of the motor fuel markets, increased imports, increased volatility in wholesale and retail prices, and rising costs for consumers. Right now, on our current path, there is a disincentive for refiners to increase capacity due to the costs involved and the lack of opportunity to achieve a reasonable return on that investment.

Alternatively, we can embark on a different path. One that continues to encourage clean fuels. One that restores fungibility to the gasoline and diesel fuel supply system. One that encourages, rather than discourages, expansion of domestic refining capacity. One that changes the fundamental economic calculus that a refiner makes when it decides whether to spend the huge sums necessary to make the upgrades required to produce clean fuels or to close the refinery.

SIGMA and NACS urge Congress to examine closely this alternative path. If we don't like the current situation, then we collectively need to chart a new course in order to change the future.

IV. RECOMMENDATIONS FOR COMPREHENSIVE MOTOR FUELS POLICY

I must stress that there are no short-term solutions to the challenges facing the nation's refining and marketing industry. The challenges have been building for 20 years. In fact, we have more challenges in the near future in the form of the new ultra low sulfur on-road diesel fuel program, scheduled to be implemented in 2006. Our nation's fuels distribution system is even now not certain this product can be moved from the refinery to the consumer without significant contamination. As a result, in addition to the challenges we are facing with gasoline supplies, SIGMA and NACS are concerned about on-road diesel fuel supply shortages, and significant price volatility, in 2006 and beyond.

It is time for Congress to enact a set of Federal motor fuel refining policies to:

- Preserve and, if possible, increase domestic refining capacity;
- Restore fungibility to the motor fuel supply and distribution system; and,
- Enhance the available supplies of gasoline and diesel fuel.

These goals should not be viewed as an "either/or" situation. Our Nation can have a clean environment and still enjoy affordable, plentiful supplies of gasoline and diesel fuel. But we must embark on a new path together.

As an initial matter, several provisions in the fuels title of the Conference Report on H.R. 6, the comprehensive energy policy bill under consideration by Congress, will be important first steps toward achieving these goals. In particular, the repeal of the Federal reformulated gasoline oxygen mandate, the blending of compliant RFGs, and the study on the negative supply impact of boutique fuels promise some relief to the refining and marketing industries. SIGMA and NACS urge Congress to pass H.R. 6 as soon as possible.

However, NACS and SIGMA suggest that the enactment of H.R. 6 is only the first step. To build on the provisions in H.R. 6, at a minimum, the following steps must be considered:

• Prevent the spread of new boutique fuels during the implementation of the new ozone air quality standard, if necessary through a Federal pre-emption of fuels regulation or the introduction of a basket of "Federal fuels" that a state may adopt; and,

• Restore fungibility, without loosening environmental protections, to the nation's gasoline and diesel fuel supplies by reducing the number of fuels permitted.

Restoring fungibility to the refining and distribution system while maintaining environmental protections will require the simultaneous adoption of policies to promote the preservation and expansion of domestic refining capacity. Congress, at a minimum, also must consider the following:

• Assist domestic refiners through the Federal tax code to enable them to produce uniform clean fuels;

• Streamline siting and permitting procedures to permit the expansion of existing refineries and, eventually, the construction of new domestic refineries; and,

• Finalize New Source Review regulations to remove uncertainty from refinery routine maintenance and expansion plans.

None of the policies listed above are without controversy. However, NACS and SIGMA urge this committee to end the gridlock that has stifled meaningful action on any of these policies for the past decade. Consumers across the nation—your constituents—are paying for this gridlock every day when they buy gasoline and diesel fuel. Our members remain ready and willing to assist the committee in its efforts to achieve these goals.

In summary, SIGMA and NACS ask you to always keep in mind that every time the government changes fuel specifications manufacturers are faced with a decision to allocate capital to a refinery or to stop making specification fuels. In every such instance, some manufacturers will determine than additional investment is unjustified and the relevant facilities' production will be lost to the market. Consequently, the choice is clear. Continue our current domestic motor fuel refining policies—or perhaps it is better described as a lack of a policy—or choose a new path that encourages the production by domestic refiners of plentiful supplies of clean gasoline and diesel fuel.

Thank you again for inviting me to testify today. I would be pleased to answer any questions my testimony may have raised.

RESPONSES BY MICHAEL PORTS TO ADDITIONAL QUESTIONS FROM SENATOR INHOFE

Question 1. In his testimony before the committee, Mr. Early, representing the American Lung Association, stated that no evidence existed that environmental protection programs are the cause, even in part, of the increases in retail gasoline prices. Do you agree with this statement, or is evidence available that environmental protection programs have, at least in part, contributed to increased retail price volatility?

Response. As SIGMA and NACS stated in its formal testimony before the committee at the hearing, we are supportive of reasonable and scientifically supported clean fuels programs and do not support any effort to "roll back" existing environmental protection programs.

Despite this position, it is disingenuous to state categorically that environmental protection programs have not contributed to increased retail gasoline price volatility. Environmental protection programs impact retail gasoline prices, directly and indirectly, in at least three ways—each of which leads to upward pressure on retail prices.

First, as has been noted in numerous statements from the Environmental Protection Agency ("EPA") in its rulemakings covering both emissions from petroleum refineries and clean fuel programs, there are direct costs to these environmental protection programs. Simply stated, the nation's domestic refiners must expend billions of dollars to upgrade refining processes to reduce emissions and to produce cleaner fuels for the nation's consumers to use in their cars and trucks. EPA has variously estimated these costs as adding between 1 and 8 cents per gallon for each of the environmental protection programs covering the refining industry over the past decade, including the refinery MACT standards, the reformulated gasoline program, and the gasoline and diesel fuel sulfur reduction programs. In addition, EPA has predicted in each of these rulemaking proceedings that some refineries will not be able to make the investments necessary to achieve the new regulatory standards and will close. When the "cost" of environmental upgrades is added to the reduction in gasoline and diesel fuel supplies, the direct cost of environmental programs covering the domestic refining industry is easy to calculate.

Second, apart from direct costs of environment protection programs, there are substantial indirect costs that flow directly from the programs. As stated above, EPA repeatedly has estimated the "cost," on a cents per gallon basis, of numerous environmental protection programs. What these estimates ignore is that the direct "cost" of environmental upgrades constitutes only a small portion of the upward "price" pressure that these upgrades exert on gasoline and diesel fuel prices.

This disconnect between cost and price is a common economic principle. Diamonds have a high price not because the cost of production is high, but because diamonds are rare, demand for diamonds is high, and supplies of diamonds are limited.

The same analysis applies to gasoline and diesel fuel prices. While the cost of producing a gallon of gasoline or diesel fuel is relevant in terms of determining these products' wholesale and retail prices, it is the economic axiom of supply and demand that dictates the price consumers pay for gasoline and diesel fuel. Thus, while the direct cost increases associated with environmental protection programs may be measured in a few cents per gallon for each program, the analysis of the impact of these programs on the price of a gallon of gasoline or diesel fuel cannot cease once direct costs are considered.

Such an analysis also must consider indirect costs imposed by the combined impact of these environmental programs—in terms of reducing the number of refineries producing these products, decreased outputs from operating refineries to produce these clean fuels, and the destruction of the fungibility of the domestic gasoline and diesel fuel markets—to determine the true "cost" of these environmental programs. This complete analysis of "costs," direct and indirect, leads to the conclusion that the direct "costs" of environmental protection programs have little or no relationship to the "price" that these programs exact from consumers. In recent months, policymakers have come to understand that the indirect costs of these programs may in fact be substantially higher than the direct costs.

Third, as noted above, environmental protection programs—most notably the reformulated gasoline oxygenate mandate—have been responsible for the severe balkanization of the nation's gasoline (and, to a lesser extent to date, diesel fuel) markets into islands of unique "boutique" fuels. This reduction in gasoline fungibility, and the prohibition against moving an alternative blend of gasoline from an area with ample supplies to an area experiencing supply shortages, is directly responsible for the majority of the retail gasoline price spikes the Nation has experienced over the past decade.

Again, the law of supply and demand operates effectively in the gasoline markets. If gasoline supplies in a region are low because of a natural disaster, a refinery or pipeline outage, or other distribution system problems, it generally is not lawful to supply that area with gasoline blends from surrounding areas because of environmental program restrictions. These artificial supply barriers impose a direct price penalty on consumers each time a supply shortage occurs.

To date, EPA has addressed severe supply shortages in various markets by granting temporary "enforcement discretion" letters for specific geographic areas. These temporary "waivers" permit non-compliant fuel to be sold in these areas for the duration of the supply crisis. SIGMA and NACS generally do not support such "waivers" of fuel specifications because they disadvantage stakeholders that have secured adequate supplies of compliant product in the covered market. More importantly, however, waivers are a short-term, ad-hoc solution to a longer term problem—the gasoline and diesel fuel markets have been balkanized and supply crises will continue to occur periodically unless some rationality and fungibility is returned to the nation's motor fuel distribution system.

In sum, the assertion that no evidence exists that environmental protection programs have caused, in whole or in part, directly or indirectly, increased gasoline price volatility is simply wrong. Ample evidence exists of such a causal relationship to anyone who understands the fundamental rules of supply and demand or who drives a car or truck.

Question 2. All of the witnesses at the hearing state their support for continuing environmental protection programs to reduce emissions and clean the air. Are there portions of existing EPA fuels programs that, if reviewed and/or discarded, can improve gasoline supplies without causing a reduction in environmental protection?

Response. Yes. SIGMA and NACS strongly posit that the following steps would improve gasoline supplies without a reduction in environmental protection:

• Repeal the oxygenate mandate of the Federal reformulated gasoline ("RFG") program under Section 211(k) of the Clean Air Act. Refiners can produce gasoline to meet Federal clean air standards without the addition of ethanol or MTBE. The oxygenate mandate only serves to boost the ethanol and MTBE production industries and to encourage the balkanization of gasoline markets as states seek to adopt a cleaner fuel without joining the Federal RFG program with its oxygenate mandate.

• Either repeal Section 21 1(c)(4)(C) of the Clean Air Act, which permits states to adopt boutique fuels, or place significant additional restrictions on the approval of these unique fuel blends. All fuels would continue to be required to meet Federal clean fuel standards and such Federal pre-emption would help to restore fungibility to the nation's gasoline and diesel fuel markets. Such a step would succeed in halting further balkanization of the motor fuel markets. However, any attempt to reduce the number of boutique fuels currently in the marketplace must be undertaken very carefully in order to minimize the negative impact that such step could have on overall supplies.

• Finalize changes to the New Source Review regulations under which the nation's refineries operate to return certainty to the regulatory system. Currently, uncertainty with respect to the repairs or equipment replacement that will trigger NSR has led refiners to delay indefinitely capacity expansions.

Question 3. Recently, some Senators attempted to add a Renewable Fuels Standard to completely unrelated legislation as an amendment. What do you think was the motivation of doing that, and what are NACS' and SIGMA's positions to breaking—apart provisions in piecemeal fashion?

Response. SIGMA and NACS do not support the adoption of a renewable fuel standard ("RFS"). However, SIGMA and NACS have urged Congress to enact the conference report on H.R. 6, despite the fact that H.R. 6 contains an RFS. We have supported the conference report because it also contains provisions to repeal the RFG oxygenate mandate, reform the Federal underground storage tank program, permit the blending of compliant RFGs at retail, and declares that gasoline containing MTBE should not be considered a "defective product."

SIGMA and NACS continue to support the enactment of the conference report on H.R. 6 as reported by the House and Senate conferees and do not support breaking the legislation up into separate parts.

RESPONSES BY MICHAEL PORTS TO ADDITIONAL QUESTIONS FROM SENATOR JEFFORDS

Question 1. In your testimony, you suggest that Congress should create incentives for refiners to invest in new capacity without sacrificing environmental goals. Can you provide the committee with one very specific example of something Congress could do that would not jeopardize public health protections but would lower the price that consumers see at the pump?

Response. The single most effective step that Congress could take to reduce the upward pressure on gasoline prices without sacrificing environmental standards would be to repeal the RFG oxygenate mandate under Section 211(k) of the Clean Air Act.

Question 2. In your testimony, you argue in favor of the passage of the H.R. 6 Conference Report. At the request of Senator Sununu, the Energy Information Administration did an analysis of the effect that the H.R. 6 Conference Report would have on gasoline prices. The EIA found the effect would be "negligible." I am interested in your views. Which of this bill's provisions do you believe would expand supplies of gasoline and lower prices?

Response. As an initial matter, let me state that SIGMA and NACS believe that there were additional, significant steps that Congress could have taken—but did not take—to expand gasoline supplies and lower prices as it considered the various bills leading up to the conference report on H.R. 6. These steps include tax incentives for refiners to expand existing refineries and construct new facilities and meaningful restrictions on the continued balkanization of the motor fuels markets through the creation of new boutique fuels.

However, for various reasons, Congress did not include those provisions in the conference report. Nonetheless, SIGMA and NACS support the even limited measures to increase supplies and lower prices contained in the conference report on H.R. 6 and remain hopeful that Congress will consider additional steps to increase supplies, restrict boutique fuels, and lower prices to consumers in the near future.

The following provisions of the conference report on H.R. 6 will expand supplies of gasoline, reduce the incidence of product shortages and price spikes, and should exert a downward pressure on gasoline prices:

• The reasonable phase-out of MTBE as a gasoline additive under Section 1504 of the conference report;

• The repeal of the RFG oxygenate mandate under Section 1506 of the conference report immediately upon enactment in California and 270 days after enactment in the rest of the nation;

• The "boutique fuels" provision in Section 1509 of the conference report prohibiting EPA from approving a new boutique fuel unless EPA concludes that the new fuel will not cause fuel supply problems; and,

• The blending of compliant gasolines provision in Section 1514 of the conference report that permits marketers to blend batches of compliant RFG for a maximum of two separate "blending periods" of ten consecutive days each summer starting in 2005.

Question 3. More than a year ago, the Environment and Public Works committee reported S. 791 favorably. That's the Federal Reformulated Fuels Act, which would slightly reduce the demand for gasoline by increasing the use of ethanol, ban MTBE and eliminate the oxygenate requirement. That bill also include some detailed studies on the matter of boutique fuels. Do you support this legislation?

Response. SIGMA and NACS did not indicate its support for S. 791 as it was approved by the committee in June 2003. Our concerns with this bill were numerous, including:

• The inclusion of an RFS, which we do not support;

• The rapid implementation of a ban on the use of MTBE as a gasoline additive, which could have caused gasoline shortages with the removal of MTBE over a short timeframe (MTBE represented approximately 6 percent of overall gasoline supplies in the nation);

• The lack of comprehensive Federal underground storage tank reform in the bill;

• The lack of authorization for retailers to blend compliant RFG in their storage tanks; and,

• The lack of a provision on defective product liability for MTBE.

SIGMA and NACS continued to express these concerns to legislators in both chambers between the approval of S. 791 by the committee and the conference on H.R. 6. When the conference report on H.R. 6 was published, sufficient changes had been made to the fuels title of the conference report that SIGMA and NACS expressed publicly their support for the conference report.

Question 4. In the spring of 2002, at hearings before the Permanent Subcommittee on Investigations, Senators Voinovich and Levin asked executives from some of the major oil companies whether the U.S. needed more refineries. Of the 5 companies, including ExxonMobil, BP, ChevronTexaco, and Shell, only Marathon said we could use more refining capacity. The others said we had enough and, considering the economics, referred to rely on imports. Has anything changed in the last 2 years to suggest that we need more refining capacity?

Response. As an initial matter, SIGMA and NACS would agree with Marathon's statement that the Nation needs additional domestic refining capacity. The gasoline price spike we have witnessed over the past 6 months provides ample evidence of that need. According to the U.S. Energy Information Administration, while crude oil prices have risen dramatically this year, the percentage of the price of a gallon of gasoline attributed to crude oil prices has actually fallen this year as gasoline price increases have risen faster than crude oil prices. The percentage of the price of a gallon of gasoline attributed to refining costs has expanded significantly (increasing by 92 percent between January and May) in 2004.

The primary reasons why these refining margins, or "crack spreads," have been able to increase so precipitously is the tightness of overall gasoline supplies and the lack of supply relief from foreign sources (due at least in part to EPA's new gasoline sulfur standards) we have witnessed in 2004. If our Nation were to add a mere 5 percent to the existing domestic refining capacity, gasoline supplies would increase significantly, competition between refiners to sell that additional gasoline would escalate, and wholesale and retail gasoline prices should decline as a result.

SIGMA and NACS agree with the comments of the other refiners before the Subcommittee that the current economics of petroleum refining generally do not support, over the long term, significant capital investments to expand domestic refining capacity. However, as we have noted above, SIGMA and NACS urge Congress to examine strategies to alter these economics in the future to encourage domestic refiners to expand gasoline and diesel fuel refining capacity.

As a final comment, in the future, SIGMA and NACS suggest that Congress also consult with consumers and their motor fuel distribution industry proxy, the independent motor fuel marketers, as to whether additional domestic refining capacity is needed, not solely the refining companies that benefit financially from tight gasoline supplies.

Question 5. Would you support a tax or tariff on oil and gas coming into this country from countries with lower environmental standards than ours to level the international trade playing field?

Response. SIGMA does not support taxes or tariffs on imported oil and or finished crude products, such as gasoline and diesel fuel. NACS has not taken a position on this issue.

Question 6. The U.S. transportation sector emits about 10 percent of the world's carbon dioxide emissions. Several of the world's largest petroleum companies, like BP and ChevronTexaco, are taking significant steps to diversify into other energy sources and reduce their greenhouse gas emissions. Do you agree that we need to take greater steps to reduce the threat of global warming by reducing emissions from mobile sources?

Response. Neither SIGMA nor NACS has the technical expertise to answer this question and thus we respectfully decline to speculate through an answer.

Question 7. Do you support efforts to reduce gasoline demand in the U.S., which would relieve the strain on refining capacity—measures such as a gas tax, increases in corporate average fuel economy, or other demand side measures?

Response. Again, neither SIGMA nor NACS has the technical expertise to answer this question. We are gasoline and diesel fuel marketers that sell these motor fuels to consumers. Demand for these products continues to rise, despite existing conservation and other demand side measures. Reports by the Energy Information Administration indicate that demand for refined petroleum products will continue to grow significantly over the next several decades. Regardless of the impact conservation or renewable fuels programs may have on reducing the rate of growth in the demand for petroleum, measures to increase domestic refining capacity will be necessary to keep pace with demand.

In general, SIGMA and NACS do not support increases in Federal motor fuel excise taxes, particularly if those increases result in a further disparity between tax rates for hydrocarbon-based fuels and certain alternative fuels. In addition, excise taxes are regressive and impose the greatest financial burden on those in our society least able to shoulder that burden. SIGMA and NACS, however, have listened with interest to the discussions on Capitol Hill regarding potential increases to the Federal motor fuels excise taxes and have not historically opposed modest increases provided that the revenue is dedicated to preserving and expanding our nation's transportation infrastructure.

STATEMENT OF MARK COOPER, DIRECTOR OF RESEARCH CONSUMER FEDERATION OF AMERICA ON BEHALF OF CONSUMER FEDERATION OF AMERICA AND CONSUMERS UNION

Mr. Chairman and Members of the committee, my name is Dr. Mark Cooper. I am Director of Research of the Consumer Federation of America. The Consumer Federation of America (CFA) is a non-profit association of 300 groups, which was founded in 1968 to advance the consumer interest through research, advocacy and education. I am also testifying on behalf of Consumers Union, the independent, non-profit publisher of Consumer Reports.

I greatly appreciate the opportunity to appear before you today to discuss the problem of rising gasoline prices and gasoline price spikes, and the impact that environmental regulations may have on these increases. Over the past 2 years, our organizations have looked in detail at the oil industry and the broad range of factors that have affected rising oil and gasoline prices. We submit two major studies conducted by the Consumer Federation of America on this topic for the record.[1]

Three years ago, the analysis we provided in one of these reports, Ending the Gasoline Price Spiral, showed that the explanation given by the oil industry and the Administration for the high and volatile price of gasoline is oversimplified and incomplete. This explanation points to policies that do not address important underlying causes of the problem and, therefore, will not provide a solution.

- Blaming high gasoline prices on high crude oil prices ignores the fact that over the past few years, the domestic refining and marketing sector has imposed larger increases on consumers at the pump than crude price increases would warrant.
- Blaming tight refinery markets on Clean Air Act requirements to reformulate gasoline ignores the fact that in the mid-1990's the industry adopted a business strategy of mergers and acquisitions to increase profits that was intended to tighten refinery markets and reduce competition at the pump.

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[1] Cooper, Mark, *Ending the Gasoline Price Spiral* (Washington D.C.: Consumer Federation of America July 2001). Cooper, Mark, *Spring Break in the Oil Industry: Price Spikes, Excess Profits and Excuses* (Washington D.C.: Consumer Federation of America, October 2003.

• Claiming that the antitrust laws have not been violated in recent price spikes ignores the fact that forces of supply and demand are weak in energy markets and that local gasoline markets have become sufficiently concentrated to allow unilateral actions by oil companies to push prices up faster and keep them higher longer than they would be in vigorously competitive markets.

• Eliminating the small gasoline markets that result from efforts to tailor gasoline to the micro-environments of individual cities will not increase refinery capacity or improve stockpile policy to ensure lower and less volatile prices, if the same handful of companies dominate the regional markets.

Thus, the causes of record energy prices involve a complex mix of domestic and international factors. The solution must recognize both sets of factors, but the domestic factors must play an especially large part in the solution, not only because they are directly within the control of public policy, but also because careful consideration of what can and cannot be done leads to a very different set of policy recommendations than the Administration and the industry have been pushing, or the Congress is considering in the pending energy legislation.

Because domestic resources represent a very small share of the global resources base and are relatively expensive to develop, it is folly to exclusively pursue a supply side solution to the energy problem. The increase in the amount of oil and gas produced in America will not be sufficient to put downward pressure on world prices; it will only increase oil company profits, especially if large subsidies are provided, as contemplated in pending energy legislation. Moreover, even if the United States could affect the market price of basic energy resources, which is very unlikely, that would not solve the larger structural problem in domestic markets.

THE UNDERLYING STRUCTURAL PROBLEM IN DOMESTIC PETROLEUM MARKETS

Our analysis shows that energy markets have become tight in America because supply has become concentrated and demand growth has put pressure on energy markets. This gave a handful of large companies pricing power and rendered the energy markets vulnerable to price shocks. While the operation of the domestic energy market is complex and many factors contribute to pricing problems, one central characteristic of the industry stands out it has become so concentrated in several parts of the country that competitive market forces are weak. Long-term strategic decisions by the industry about production capacity interact with short-term (mis)management of stocks to create a tight supply situation that provides ample opportunities to push prices up quickly. Because there are few firms in the market and because consumers cannot easily cut back on energy consumption, prices hold above competitive levels for significant periods of time.

The problem is not a conspiracy, but the rational action of large companies with market power. With weak competitive market forces, individual companies have flexibility for strategic actions that raise prices and profits. Individual companies can let supplies become tight in their area and keep stocks low, since there are few competitors who might counter this strategy. Companies can simply push prices up when demand increases because they have no fear that competitors will not raise prices to steal customers. Individual companies do not feel compelled to quickly increase supplies with imports, because their control of refining and distribution ensures that competitors will not be able to deliver supplies to the market in their area. Because there are so few suppliers and capacity is so tight, it is easy to keep track of potential threats to this profit maximizing strategy. Every accident or blip in the market triggers a price shock and profits mount. Moreover, operating the complex system at very high levels of capacity places strains on the physical infrastructure and renders it susceptible to accidents.

It has become evident that stocks of product are the key variables that determine price shocks. In other words, stocks are not only the key variable; they are also a strategic variable. The industry does a miserable job of managing stocks and supplying product from the consumer point of view. Policymakers have done nothing to force them to do a better job. If the industry were vigorously competitive, each firm would have to worry a great deal more about being caught with short supplies or inadequate capacity and they would hesitate to raise prices for fear of losing sales to competitors. Oil companies do not behave this way because they have power over price and can control supply. Mergers and acquisitions have created a concentrated industry in several sections of the country and segments of the industry. The amount of capacity and stocks and product on hand are no longer dictated by market forces, they can be manipulated by the oil industry oligopoly to maximize profits.

Much of this increase in industry profits, of course, has been caused by an intentional withholding of gasoline supplies by the oil industry. In a March 2001 report, the Federal Trade Commission (FTC) noted that by withholding supply, industry was able to drive prices up, and thereby maximize profits.[2] The FTC identified the complex factors in the spike and issued a warning.

> The spike appears to have been caused by a mixture of structural and operating decisions made previously (high capacity utilization, low inventory levels, the choice of ethanol as an oxygenate), unexpected occurrences (pipeline breaks, production difficulties), errors by refiners in forecasting industry supply (misestimating supply, slow reactions), and decisions by firms to maximize their profits (curtailing production, keeping available supply off the market). The damage was ultimately limited by the ability of the industry to respond to the price spike within three or 4 weeks with increased supply of products. However, if the problem was short-term, so too was the resolution, and similar price spikes are capable of replication. Unless gasoline demand abates or refining capacity grows, price spikes are likely to occur in the future in the Midwest and other areas of the country.[3]

A 2003 Rand study of the refinery sector reaffirmed the importance of the decisions to restrict supply. It pointed out a change in attitude in the industry, wherein "[i]ncreasing capacity and output to gain market share or to offset the cost of regulatory upgrades is now frowned upon."[4] In its place we find a "more discriminating approach to investment and supplying the market that emphasized maximizing margins and returns on investment rather than product output or market share."[5] The central tactic is to allow markets to become tight.

> Relying on existing plants and equipment to the greatest possible extent, even if that ultimately meant curtailing output of certain refined product openly questioned the once-universal imperative of a refinery not "going short" that is not having enough product to meet market demand. Rather than investing in and operating refineries to ensure that markets are fully supplied all the time, refiners suggested that they were focusing first on ensuring that their branded retailers are adequately supply by curtaining sales to wholesale market if needed.[6]

The Rand study drew a direct link between long-term structural changes and the behavioral changes in the industry, drawing the connection between the business strategies to increase profitability and the pricing volatility. It issued the same warning that the FTC had offered 2 years earlier.

> For operating companies, the elimination of excess capacity represents a significant business accomplishment: low profits in the 1980's and 1990's were blamed in part on overcapacity in the sector. Since the mid-1990's, economic performance industry-wide has recovered and reached record levels in 2001. On the other hand, for consumers, the elimination of spare capacity generates upward pressure on prices at the pump and produces short-term market vulnerabilities. Disruptions in refinery operations resulting from scheduled maintenance and overhauls or unscheduled breakdowns are more likely to lead to acute (i.e., measured in weeks) supply shortfalls and price spikes.[7]

The spikes in the refiner and marketer take at the pump in 2002, 2003, and early 2004, were larger than the 2000 spike that was studied by the FTC. The weeks of elevated prices now stretch into months. The market does not correct itself. The roller coaster has become a ratchet. The combination of structural changes and business strategies has ended up costing consumers billions of dollars. Until the Federal Government is willing to step in to stop oil companies from employing this anti-consumer strategy, there is no reason to believe that they will abandon this practice on their own.

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[2] Federal Trade Commission, *Midwest Gasoline Price Investigation*, March 29, 2001.

[3] Federal Trade Commission, *Midwest Gasoline Price Investigation*, March 29, 2001, pp. i. . . 4.

[4] Peterson, D.J. and Serej Mahnovski, *New Forces at Work in Refining: Industry Views of Critical Business and Operations Trends* (Santa Monica, CA: RAND Corporation, 2003), p. 16.

[5] Peterson and Mahnovski, p. 42.

[6] Peterson and Mahnovski, p. 17.

[7] Peterson and Mahnovski, p. xvi.

A COMPREHENSIVE DOMESTIC SOLUTION

As we demonstrated in a report last year, Spring Break In the U.S. Oil Industry: Price Spikes, Excess Profits and Excuses,[8] the structural conditions in the domestic gasoline industry have only gotten worse as demand continues to grow and mergers have been consummated. The increases in prices and industry profits should come as no surprise.

We all would like immediate, short-term relief from the current high prices, but what we need is an end to the roller coaster and the ratchet of energy prices. That demands a balanced, long-term solution. Breaking OPEC's pricing power would relieve a great deal of pressure from consumers' energy bills, but the short-term prospects are not promising in that regard either. There, too, we need a long-term strategy that works on market fundamentals.

Three years ago, we outlined a comprehensive policy to implement permanent institutional changes that would reduce the chances that markets will be tight and reduce the exposure of consumers to the opportunistic exploitation of markets when they become tight. Those policies made sense then; they make even more sense today. The Federal Government has done little to move policy in that direction since it declared an energy crisis in early 2001.

To achieve this reduction of risk, public policy should be focused on achieving four primary goals:

- Restore reserve margins by increasing both fuel efficiency (demand-side) and production capacity (supply side).
- Increase market flexibility through stock and storage policy.
- Discourage private actions that make markets tight and/or exploit market disruptions by countering the tendency to profiteer by withholding of supply.
- Promote a more competitive industry.

EXPAND RESERVE MARGINS BY STRIKING A BALANCE BETWEEN DEMAND REDUCTION AND SUPPLY INCREASES

Improving vehicle efficiency (reduction in fleet average miles per gallon) equal to economy wide productivity over the past decade (when the fleet failed to progress) would have a major impact on demand. It would require the fleet average to improve at the same rate it did in the 1980's. It would raise average fuel efficiency by five miles per gallon, or 20 percent over a decade. This is a mid-term target. This rate of improvement should be sustainable for several decades. This would reduce demand by 1.5 million barrels per day and return consumption to the level of the mid-1980's.

Expanding refinery capacity by 10 percent equals approximately 1.5 million barrels per day. This would require 15 new refineries, if the average size equals the refineries currently in use. This is less than one-third the number shut down in the past 10 years and less than one-quarter of the number shut down in the past 15 years. Alternatively, a 10 percent increase in the size of existing refineries, which is the rate at which they increased over the 1990's, would do the trick, as long as no additional refineries were shut down.

Placed in the context of redevelopment of recently abandoned facilities or expansion of existing facilities, the task of adding refinery capacity does not appear daunting. Such an expansion of capacity has not been in the interest of the businesses making the capacity decisions. Therefore, public policies to identify sites, study why so many facilities have been shut down, and establish programs to expand capacity should be pursued.

EXPANDING STORAGE AND STOCKS

It has become more and more evident that private decisions on the holding of crude and product in storage will maximize short-term private profits to the detriment of the public. Increasing concentration and inadequate competition allows stocks to be drawn down to levels that send markets into price spirals.

The Strategic Petroleum Reserve is a crude oil stockpile that has been developed as a strategic developed for dire emergencies that would result in severe shortfalls of crude.[9] It could be viewed and used differently, but it has never been used as

[8] Cooper, Mark, *Spring Break in the Oil Industry: Price Spikes, Excess Profits and Excuses* (Washington D.C.: Consumer Federation of America, October 2003.

[9] Gove, Philip Babcock, *Webster's Third New International Dictionary* (Springfield MA: 1986), p. 2247, "a reserve supply of something essential as processed food or a raw material) accumulated within a country for use during a shortage caused by emergency conditions (as war)."

an economic reserve to respond to price increases. Given its history, draw-down of the SPR is at best a short-term response.

Private oil companies generally take care of storage of crude oil and product to meet the ebb and flow of demand.[10] The experience of the past 4 years indicates that the marketplace is not attending to economic stockpiles. Companies do not willingly hold excess capacity for the express purpose of preventing price increases. They will only do so if they fear that a lack of supply or an increase in brand price would cause them to lose business to competitors who have available stocks. Regional gasoline markets appear to lack sufficient competition to discipline anti-consumer private storage policies.

Public policy must expand economic stocks of crude and product. Gasoline distributors (wholesale and/retail) can be required to hold stocks as a percentage of retail sales. Public policy could also either directly support or give incentives for private parties to have sufficient storage of product. It could lower the cost of storage through tax incentives when drawing down stocks during seasonal peaks. Finally, public policy could directly underwrite stockpiles. We now have a small Northeast heating oil reserve. It should be continued and sized to discipline price shocks, not just prevent shortages. Similarly, a Midwest gasoline stockpile should be considered.

REDUCING INCENTIVES FOR MARKET MANIPULATION

In the short term, government must turn the spotlight on business decisions that make markets tight or exploit them. Withholding of supply should draw immediate and intense public scrutiny, backed up with investigations. Since the Federal Government is likely to be subject to political pressures not to take action, state government should be authorized and supported in market monitoring efforts. A joint task force of Federal and state attorneys general could be established on a continuing basis. The task force should develop data bases and information to analyze the structure, conduct and performance of gasoline and natural gas markets.

As long as huge windfall profits can be made, private sector market participants will have a strong incentive to keep markets tight. The pattern of repeated price spikes and volatility has now become an enduring problem. Because the elasticity of demand is so low—because gasoline and natural gas are so important to economic and social life—this type of profiteering should be discouraged. A windfall profits tax that kicks in under specific circumstances would take the fun and profit out of market manipulation.

Ultimately, market manipulation, including the deliberate withholding of supply, should be made illegal. This is particularly important for commodity and derivative markets.

PROMOTING A WORKABLY COMPETITIVE MARKET

Further concentration of these industries is quite problematic. The Department of Justice Merger Guidelines should be rigorously enforced. Moreover, the efficiency defense of consolidation should be viewed skeptically, since inadequate capacity is a problem in these markets. The low elasticity of supply and demand should be considered in antitrust analysis.

Restrictive marketing practices, such as zonal pricing and franchise restrictions on supply acquisition, should be examined and discouraged. These practices restrict flows of product into markets at key moments.

Consideration of expanding markets with more uniform reformulation requirements should not involve a relaxation of clean air requirements. Any expansion of markets should ensure that total refinery capacity is not reduced.

Every time energy prices spike, policymakers scramble for quick fixes. Distracted by short-term approaches and focused on placing blame on foreign energy producers and environmental laws, policymakers have failed to address the fundamental causes of the problem. In the 4 years since the energy markets in the United States began to spin out of control we have done nothing to increase competition, ensure expansion of capacity, require economically and socially responsible management of crude and product stocks, or slow the growth of demand by promoting energy efficiency. We have wasted 4 years and consumers are paying the price with record highs at the pump.

[10] Gove, *Webster's Third International,* p. 2252, "The holding and housing of goods from the time they are produced until their sale."

CFA Consumer Federation of America

ENDING THE GASOLINE PRICE SPIRAL

MARKET FUNDAMENTALS FOR CONSUMER-FRIENDLY POLICIES TO STOP THE WILD RIDE

July 2001

TABLE OF CONTENTS

EXECUTIVE SUMMARY iii

The Upward Spiral Of Gasoline Prices
Supply
Demand
Consumer-Friendly Policies To Break The Price Spiral
Restore Reserve Margins By Developing Both Efficiency And Production.
Increase Market Flexibility.
Promote A More Competitive Industry
Deter Private Actions That Make Markets Tight Or Exploit Market Disruptions.
Provide Adequate Energy Assistance For Low-Income Households.

I. INTRODUCTION 1

A. Context For The Analysis Of Gasoline Markets
B. Outline Of The Paper

II. MARKET FUNDAMENTALS 5

A. Analytic Framework And Context
1. Analyzing Complex Markets
2. Recognizing The Complexity Of Gasoline Markets
B. Fundamentals Of Gasoline Supply
C. Fundamentals Of Gasoline Demand
D. A Tightening Market
1. Increases In Gasoline Demand
2. The Failure Of Supply-Side Capacity To Expand
E. Conclusion

III. MARKET ANALYSIS

A. Structure: Business Decisions That Make Markets Tight
1. Reducing Capacity
2. Concentration Of Ownership
3. Vertical Integration
B. Conduct: Exploiting Tight Markets
C. Performance: Profiting From Price Increases
D. Conclusion

IV. EQUITY CONSIDERATIONS: THE IMPACT OF EXPENDITURES AND PRICE CHANGES FOR GASOLINE ON HOUSEHOLDS 40

A. Expenditure Patterns
B. Energy Expenditures And Tax Cuts

V. POLICY RESPONSES 43

A. Economic Fundamentals And Policy Principles
1. Supply
2. Demand
3. Distributional Effects

B. Policy Targets
1. Expand Reserve Margins By Striking A Balance Between Demand Reduction And Supply Increases
2. Expanding Storage And Stocks
3. Taking The Fun And Profit Out Of Market Manipulation
4. Promoting A Workably Competitive Market
5. Low-Income Assistance

C. Conclusion

LIST OF FIGURES

1: The Gasoline Price Ratchet Of 2000-01 2
2: Gasoline Expenditures As A Percentage Of Income 3
3: Gasoline Consumption By Income And Urban Status 16
4: Motor Vehicle Fuel Efficiency 19
5: Refinery Capacity And Product Supplied 20
6: Gasoline Stocks 21
7: U.S. Refinery Capacity 23
8: Increasing Refiner/Marketer Share Of Gasoline Pump Price 37
9: Changes In Supply Demand Fundamentals: 1995-1999 39

LIST OF TABLES

1: Growth In Policy Relevant Factors Affecting Gasoline Consumption 17
2: Describing Market Concentration For Purposes Of Public Policy 26
3: Concentration Of Refineries In Regional Petroleum Markets 29
4: Concentration Of Gasoline Distribution In State Markets 30
5: Increasing Profits For Oil Operations 38
6: Household Gasoline Consumption By Income Groups (1994) 41
7: Distribution Of Energy Expenditures And Tax Cuts By Income Quintiles 42
8: Distribution Of Energy Expenditures And Tax Cuts By Income Levels 42

EXECUTIVE SUMMARY

THE UPWARD SPIRAL OF GASOLINE PRICES

Although gasoline prices have traditionally risen during the summer driving months of June-August, in the past two years the seasonal upswing has turned into a much more violent price spiral – a sharp price spike followed by a modest decline with stabilization at a higher level than previous years (see Exhibit ES-1). The new plateau for pricing today is over 20 cents per gallon higher. The increased cost per household amounts to over $150 per year.

The underlying driver of this ratchet has been an increase in the refiner/marketer share of the pump price, not foreign crude oil price increases. The refiner/marketer share doubled in 2000 and doubled again in the first five months of 2001, representing an increased cost to consumers of over $11 billion just since January 2001.

This paper demonstrates that the price ratchet has resulted from a combination of inadequate capacity and inadequate competition in the industry. The underlying tight market condition is the result of both increasing demand and business decisions that slowed the growth of long-term capacity. The price spiral occurs because suppliers who face weak competition find they can take unilateral actions in tight markets to quickly increase prices and profits and stabilize them at higher levels. Public policy must recognize all three factors, supply, demand and competition, if the price ratchet is to be broken in a consumer-friendly fashion.

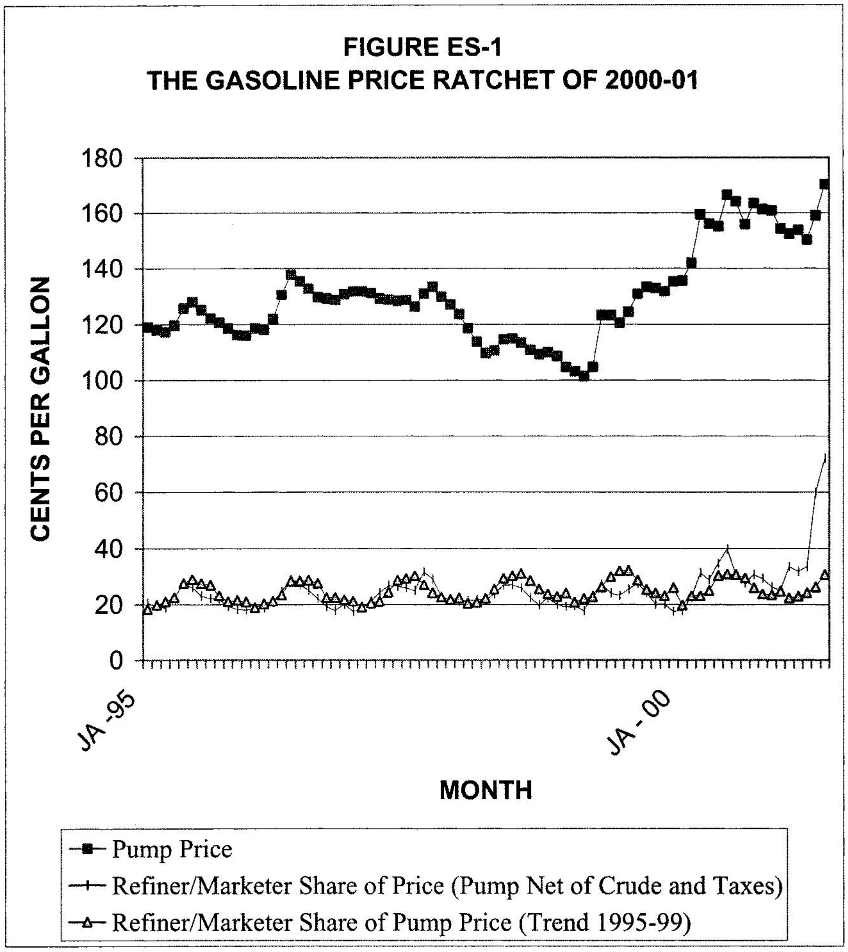
SUPPLY

There are two clearly identifiable trends affecting the supply side of the gasoline market – a reduction in capacity relative to demand and an increase in concentration.

In 1985 refinery capacity equaled daily consumption of petroleum products. By 2000, daily consumption exceeded refinery capacity by almost 20 percent. The problem is not simply that no new refineries have been built, but that in the past 15 years about 75 refineries were closed. Reductions in storage capacity and the number of gasoline stations of over ten percent have also taken place in just the past half-decade.

These reductions in capacity have been driven in part by a merger wave that has resulted in a significant increase in the concentration of ownership of refinery capacity and gasoline outlets. Four-fifths of regional refinery markets have reached levels of concentration that trigger competitive concerns, even by the standards adopted by the antitrust division of the Reagan administration's Department of Justice. In these markets, the largest four firms account for at least one-half and as much as three quarters of the refined product output. A similar trend has been in evidence at the level of gasoline stations.

Even more ominous for short-term price volatility is the fact that stockpiles have declined dramatically. Storage capacity has been reduced and economic reserves – reserves above what is needed just to keep the system running – have been slashed. The industry now typically has no more than a day or two of gasoline supplies above it operational minimum, compared to a week or so in the 1980s. Thus, there is little reserve capacity to dampen price increases.



Source: U. S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Tables 9.4, for pump prices; *Petroleum Marketing Monthly,* Table 1 for crude prices and Table 6 for prices net of taxes; *Petroleum Supply Monthly*, Table S.4 for quantity supplied.

The mergers and reduction of capacity have been driven by business decisions. Larger, more vertically integrated companies may be more efficient, but they can also exploit tight markets. Gasoline markets have been slow to respond to price increases. The price differentials that build up before product imports are used to increase supplies are far larger than the transportation cost of imports. There is clear evidence of cases in which individual decisions not to increase supplies were intended to keep prices up.

The industry and the Administration have argued repeatedly that the problem of moving product into gasoline markets has been caused by fragmentation of markets due to clean air requirements. Because different markets require different additives to meet their summer clean air targets this makes each market small and inhibits the movement of supply from one area to the next. This compounds the market concentration problem, since within those smaller markets individual suppliers have greater market power, but the underlying structural trends of reduced capacity and increased concentration in the industry must receive primary attention.

DEMAND

The demand side of the market creates additional pressures and vulnerabilities to price spirals. The demand for gasoline does not respond quickly to price in the short term. When demand is "inelastic" as it is in the gasoline market, suppliers have a better chance of making price increases stick when there is little spare capacity. Increasing demand has reduced spare capacity.

Over the 1990s, gasoline consumption grew by a total of almost 20 percent, compared to the 1980s when it grew by only 10 percent. The number of drivers and passenger vehicles increased, as the driving age population expanded. Gasoline consumption per passenger vehicles grew by about 7 percent. Of that increase about three quarters was caused by an increase in the number of miles driven and one quarter was caused by the shift to SUVs.

While the shift to SUVs was one striking feature of the 1990s, an equally striking and more important feature of the demand side was the failure of fuel efficiency to improve. If the fuel efficiency of autos had increased as rapidly in the 1990s as it did in the 1980s, autos would have been 20 percent more efficient, getting about 4 miles per gallon more, in 2000. (If there had not been a shift to SUV's, the average fleet efficiency would have been about 1 mile per gallon higher.)

CONSUMER-FRIENDLY POLICIES TO BREAK THE PRICE SPIRAL

In summary, this analysis demonstrates that gasoline markets are volatile and suffer competitive problems. Market fundamentals (inadequate capacity and inelastic supply and demand), market structures (ownership concentration and vertical integration), corporate conduct (capacity and production decisions), and market performance (price and profits) all point toward the potential for the abuse of market power.

Vigorous and broad based public policies should be pursued to implement permanent institutional changes that reduce the chances that markets will be tight and reduce the exposure of consumers to the opportunistic exploitation of markets when they become tight. To achieve this reduction of risk, public policy should be focused on achieving five goals.

Restore reserve margins by developing both efficiency and production.

(1) Increasing fuel efficiency at the rate achieved in the 1980s in the decade ahead would save about 1.5 million barrels per day. That rate of progress could be sustained over several decades.

(2) Increasing refinery capacity by 10 percent, either through expansion at existing refineries or redevelopment of less than one half the refineries closed in the past decade, would add another 1.5 million barrels per day.

(3) To the extent investments to meet clean air standards are a barrier to capacity expansion, public policy should find a way to lower the cost of compliance, directly through subsidies or indirectly through research on new technologies, rather than lower the standards.

Increase market flexibility.

(4) Expand stockpiles with tax incentives to hold and draw down supplies in the fact of price increases, and/or mandatory stocks requirements as a percentage of sales, and/or government owned/privately operated supplies could add to existing stockpiles.

(5) Larger, more uniform product markets should be developed to expand to increase supply responsiveness, without lowering clear air standards.

Promote a more competitive industry

(6) Further concentration of the petroleum industry should be resisted by vigorous enforcement of the Department of Justice Merger Guidelines.

(7) Restrictive marketing practices, such as zonal pricing and franchise restrictions on supply acquisition should be investigated and discouraged.

Deter private actions that make markets tight or exploit market disruptions.

(8) Withholding of supply should draw immediate and intense public and governmental scrutiny through a joint federal state task force of attorney's general.

(9) The task force or some other entity should develop ongoing databases and information for evaluating industry structure and conduct.

(10) The incentives to manipulate markets can be reduced by imposing a windfall profits tax that triggers under specific circumstances of price and profit increases.

(11) Ultimately, market manipulation could be made illegal.

Provide adequate energy assistance for low-income households.

(10) Assistance policies directly targeted at transportation expenditures should be considered.

(11) Energy assistance programs should be indexed to energy prices.

I. INTRODUCTION

A. CONTEXT FOR THE ANALYSIS OF GASOLINE MARKETS

Ever since the gasoline lines and oil price shocks of the 1970s, the price and availability of gasoline have been a flashpoint for U.S. energy policy and politics. While consumers have become accustomed to an upswing in prices during the summer driving months of June-August, followed by a downturn in the fall, in the past two years the seasonal upswing has turned into a much more violent price spiral – a sharp price spike followed by a much smaller decline with stabilization at a higher level than previous years (see Figure 1).

The underlying driver of this ratchet has been an increase in the refiner/marketer share of the pump price, not foreign crude oil price increases. The refiner/marketer share doubled in 2000 and doubled again in the first five months of 2001, representing an increase of $11 billion just since January 2001.

These prices increases are felt deeply by consumers because gasoline is a necessity for daily activity. The new plateau for pricing is about 20 cents per gallon higher.[1] The increased cost per household amounts to approximately $150 per year.

Moreover, the impact of gasoline price increases is not evenly distributed (see Exhibit 2). Lower and middle income households (those with income below $30,000 per year) who have automobiles spend between 5 and 10 percent of their income on gasoline.[2] For them, the 20-cent per gallon increase could take an additional one percent of their income. In contrast, upper income households (those with incomes above $75,000 per year) devote less than 2 percent of their income to gasoline consumption. For them the increase would be only .2 percent.

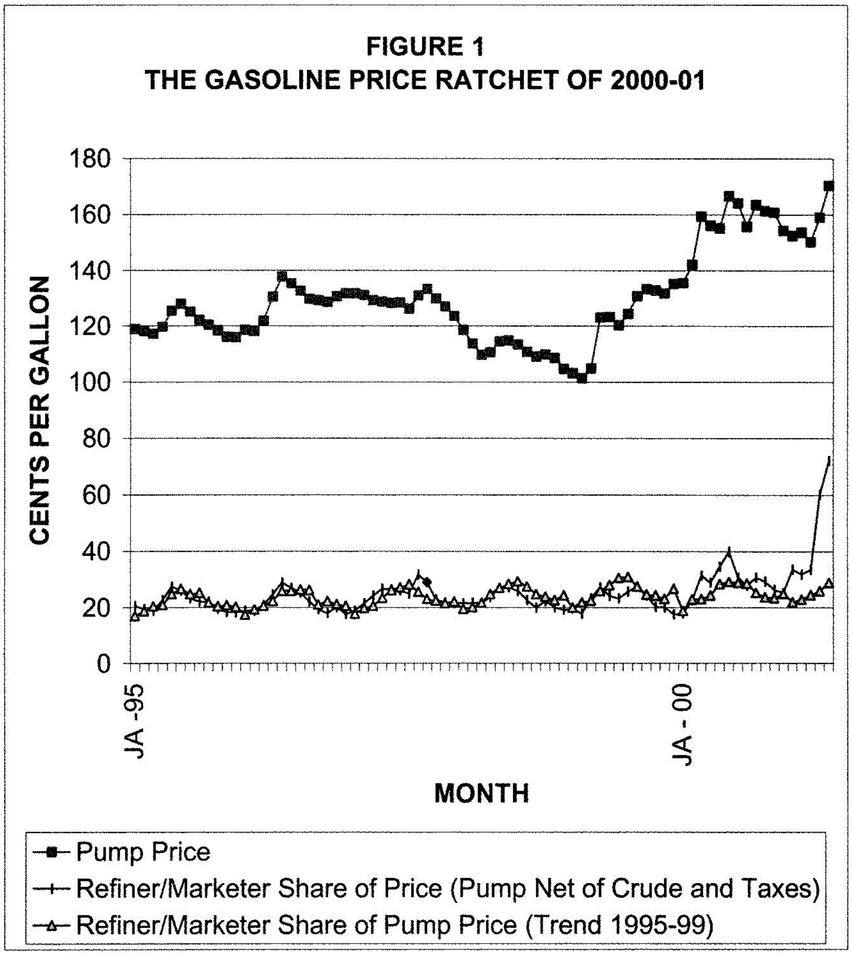
Judging from public opinion polls, the energy price roller coaster imposes substantial discomfort on consumers[3] and raises doubts about the underlying causes.[4] The public certainly seems to have rejected the explanation offered by President Bush in releasing the National Energy Policy Task Force Report that "Overdependence on any one source of energy, especially

[1] The spread in February 2001, even before the most recent gasoline spiral took off was "about 5 cents over what we would typically see this time of year," (see Cook, John, *Petroleum Outlook: More Volatility?*, Energy Information Administration presentation to the MPRA Annual Meeting, March 19, 2001, slide 14).

[2] The most recent federal data available is for 1994, thus this statement is based on the U.S. Department of Energy, Energy Information Administration, *Household Vehicle Energy Consumption: 1994*, Table 5.2, compared to *Residential Energy Consumption Survey: 1994*, Table 5.1.

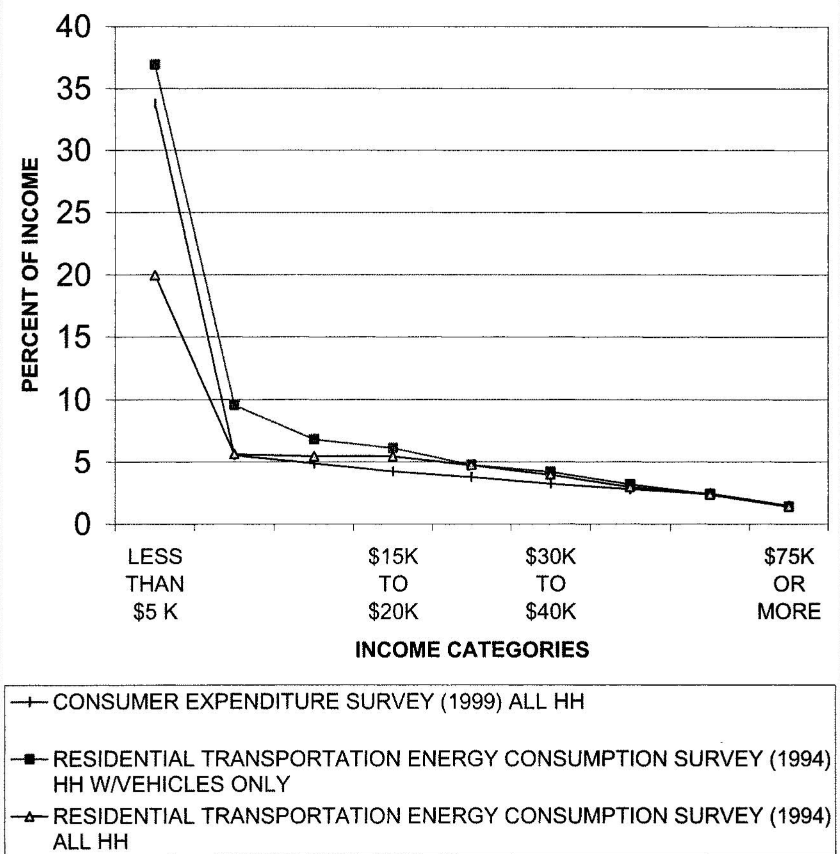
[3] In a Bloomberg poll of June 3, 2001 41% said the price of gasoline was a big problem, while 43% said it was a small problem. Only 15 percent said it was not a problem.

[4] Results from a Field Poll in California (May 24, 2001) and a national public opinion poll (reported on NBC nightly news on May 22, 2001) show that the majority of respondents reject the notion that supply shortages have increased prices. Rather they blame the problem on companies and governments (domestic or foreign). In a Bloomberg poll of June 3, 2001, oil companies were most often cited as the cause of high gasoline prices (43%) followed by oil producing nations (32%) and the Bush administration (9%).



Source: U. S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Tables 9.4, for pump prices; *Petroleum Marketing Monthly,* Table 1 for crude prices and Table 6 for prices net of taxes; *Petroleum Supply Monthly*, Table S.4 for quantity supplied.

FIGURE 2
GASOLINE EXPENDTURES AS A PERCENTAGE OF INCOME



Source: U.S. Department of Energy, *Household Vehicle Energy Consumption: 1994*, Table 5.2; *Residential Energy Consumption Survey: 1994*, Table 5.1.U. S. Bureau of the Census, Department of Labor Statistics, *Consumer Expenditure Survey: 1999*, Table 2.

a foreign source,'leaves us vulnerable to price shocks, supply interruptions and in the worst case, blackmail."[5] The public does not support the policy of drilling for more oil to respond to foreign threats[6] as the best solution to a problem that they believe is domestic in nature.[7]

B. OUTLINE OF THE PAPER

Is public opinion misguided?[8] Or, is there an explanation of recent price spikes that is consistent with their perceptions and policy preferences?

This paper presents a multifaceted view of the gasoline price problem that considers both the supply and demand sides of the market, taking into account basic conditions and market structures. It demonstrates that the gasoline market suffers from a lack of capacity, an inability to respond quickly to price increases or supply disruptions and a lack of competition. Furthermore, to a significant extent the lack of capacity and the slow response of supply to price changes are the result of a lack of competition. Looking beyond the crisis of the moment, the paper concludes that fundamental public policy measures should be instituted to prevent the inherent volatility of energy markets from continually buffeting the public.

Chapter II presents the analytic framework. It discusses the market fundamentals that make the analysis of energy markets extremely complex and also renders the gasoline market volatile and vulnerable to market abuse.

Chapter III analyzes the structure, conduct and performance of the gasoline market. It shows that business decisions and government policies interacted to suppress production capacity and constrict market flexibility. Moreover, because the industry is dominated by a small number of large, international, vertically integrated companies, exploitation of tight markets results in rapid, short-term price spikes and increases in profits.

Chapter IV analyzes briefly the equity issues in rising gasoline prices.

Chapter V presents policy observations based upon the analysis of structural problems in the gasoline market. It then discusses specific long and short-term measures that can be taken to alleviate the immediate burden on consumers, prevent excessive market volatility from harming the public, and to diminish the potential for price manipulation.

The analysis and recommendations are at the same level of detail as the Bush Administration's recent *National Energy Policy*. It discusses broad trends and basic structures in

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[5] "Text of the Speech of President Bush," *Washington Post*, May 18, 2001.

[6] National Energy Policy Development Group, *National Energy Policy*, May 2001, (hereafter, NEPDG).

[7] An *ABC/Washington Post* public opinion poll in early June 2001, found that 81 percent of the respondents strongly supported a policy to "require car manufacturers to improve the fuel efficiency of vehicles sold in this country," compared to 49 percent who strongly supported "increase in oil and gas drilling." A *New York Times* poll, June 22, 2001,shows that conservation is preferred to drilling by more than three-to-one.

[8] After the House of Representatives voted to block drilling in wilderness and national monument areas, Bill Tauzin (R-La.) Chairman of the House Energy and Commerce Committee is reported to have said "The vote yesterday was literally like an ostrich sticking its head in the sand hoping the problem doesn't show up," *Energy Daily*, June 25, 2001.

the industry. It recommends principles for energy policy and the most promising targets for policy development. In this way, it tells policymakers were to devote their attention in developing policy, but it does not provide detailed cost benefit analysis of specific policy measures.

II. MARKET FUNDAMENTALS

A. ANALYTIC FRAMEWORK AND CONTEXT

1. Analyzing Complex Markets

The paper uses the structure, conduct, performance paradigm (SCP) to evaluate the pricing behavior in the gasoline market.[9] The analytic framework enables us to understand the causes of the problems in the industry and arrive at policies to respond effectively. The elements of the approach can be described as follows.

In SCP analysis the central concern is with market performance, since that is the outcome that affects consumers most directly. The concept of performance is multidimensional. [10] The measures of performance to which we traditionally look are pricing, quality and profits. Pricing and profits address both efficiency and fairness. They are the most direct measure of how society's wealth is being allocated and distributed.

The performance of industries is determined by a number of factors, most directly the conduct of market participants. Do they compete? What legal tactics do they employ? How do they advertise and price their products? [11]

Conduct is affected and circumscribed by market structure. [12] Market structure includes an analysis of the number and size of the firms in the industry, their cost characteristics and

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[9] Scherer, F. M. and David Ross, Industrial *Market Structure and Economic Performance* (Boston, Houghton Mifflin: 1990). Shepherd, William, G., *The Economics of Industrial Organization* (Prentice Hall, Engelwood Cliffs, N.J., 1985).

[10] Scherer and Ross, p. 4.

> We begin with the fundamental proposition that what society wants from producers of goods and services is good performance. Good performance is multidimensional... Decisions as to what, how much and how to produce should be efficient in two respects: Scarce resources should not be wasted, and production decisions should be responsive qualitatively and quantitatively to consumer demands.
>
> The operations of producers should be progressive, taking advantage of opportunities opened up by science and technology to increase output per unit of input and to provide consumers with superior new products, in both ways contributing to the long-run growth of real income per person.

[11] Scherer and Ross, p. 4.

> Performance in particular industries or markets is said to depend upon the conduct of sellers and buyers in such matters as pricing policies and practices, overt and taciturn interfirm cooperation, product line and advertising strategies, research and development commitments, investment in production facilities, legal tactics (e. g. enforcing patent rights), and so on.

[12] Scherer and Ross, p. 5.

barriers to entry. Basic conditions of supply and demand also deeply affect market structure.[13]

The focal point of market structure analysis is to assess the ability of markets to support competition, which "has long been viewed as a force that leads to an ideal solution of the economic performance problem, and monopoly has been condemned."[14] The predominant reason for the preference for competitive markets reflects the economic performance they generate, although there are political reasons to prefer such markets as well.[15] In particular, competition fosters efficient allocation of resources, absence of excess profit, lowest cost production and provides a strong incentive to innovate.[16] Where competition breaks down, firms are said to have market power[17] and the market falls short of these results.[18]

> Conduct depends in turn upon the structure of the relevant market, embracing such features as the number and size distribution of buyers and sellers, the degree of physical or subjective differentiation prevailing among competing seller's products, the presence or absence of barriers to entry of new firms, the ratio of fixed to total costs in the short run for a typical firm, the degree to which firms are vertically integrated from raw material production to retail distribution and the amount of diversity or conglomerateness characterizing individual firms' product lines.

[13] Scherer and Ross, p. 5.

> Market structure and conduct are also influenced by various basic conditions. For example, on the supply side, basic conditions include the location and ownership of essential raw materials; the characteristics of the available technology (e.g. batch versus continuous process productions or high versus low elasticity of input substitution); the degree of work force unionization; the durability of the product; the time pattern of production (e.g. whether goods are produced to order or delivered from inventory); the value/weight characteristics of the product an so on. A list of significant basic conditions on the demand side must include at least the price elasticity of demand at various prices; the availability of (and cross elasticity of demand for) substitute products; the rate of growth and variability over time of demand; the method employed by buyers in purchasing (e.g. acceptance of list prices as given versus solicitation of sealed bids versus haggling); and the marketing characteristics of the product sold (e.g. specialty versus convenience shopping method).

[14] Scherer and Ross, p. 15.

[15] Scherer and Ross, p. 18.

[16] Scherer and Ross, p. 20.

> The cost of producing the last unit of output – the marginal cost – is equal to the price paid by consumers for that unit... It implies efficiency of resource allocation...
>
> With price equal to average total cost for the representative firm, economic (that is, supra normal) profits are absent...
>
> In long-run equilibrium, each firm is producing its output at the minimum point on its average total cost curve...
>
> One further benefit is sometimes attributed to the working of competition, although with less logical compulsion. Because of the pressure of prices on costs, entrepreneurs may have especially strong incentives to seek and adopt cost-saving technological innovation. Indeed, if industry capacity is correctly geared to demand at all times, the *only* way competitive firms can earn positive economic profits is through innovative superiority.

[17] Scherer and Ross, pp. 17...18.

> Pure monopolists, oligopolists, and monopolistic competitors share a common characteristic: each recognizes that its output decisions have a perceptible influence on price... All three types possess some degree of power over price, and so we say that they possess monopoly power or market power...

Pure and perfect competition is rare, but the competitive goal is important.[19] Therefore, a great deal of attention has been focused on the relative competitiveness of markets and the conditions that make markets more competitive or workably competitive.[20] Further, specific measures of the extent of market power based on elasticities of supply and demand and market concentration (measured by the market shares of firms) have been developed.[21]

> The power over price possessed by a monopolist or oligopolist depends upon the firm's size *relative to* the market in which it is operating.

[18] Scherer and Ross, Chapter 18.

[19] Scherer and Ross, p. 16...17.

[20] Summarizing the literature, Scherer and Ross, pp. 53-54 develop a long list of characteristic.

[21] As already noted, Scherer and Ross point out that market power allows a firm to set price above cost and achieve above normal profits. Landes, W. M. and R. A. Posner, "Market Power in Anti-trust Cases," *Harvard Law Review*, 19: 1981, two prominent conservative economic analysts offer a similar concept. The most frequent starting point for a discussion of the empirical measurement of the price impact of monopoly power is the *Lerner Index.* As Scherer and Ross (PP. 70...71) note, the *Lerner Index*, is defined as

> [L]= (Price – Marginal Cost)/ Price.
>
> Its merit is that it directly reflects the allocatively inefficient departure of price from marginal cost associated with monopoly. Under pure competition, [LI]=0. The more a firm's pricing departs from the competitive norm, the higher is the associated Lerner Index value. A related performance-oriented approach focuses on some measure of the net profits realized by firms or industries.

Landes and Posner (pp. 938-945) state the price cost margin as the firm's elasticity of demand. They then transform the index into an expression that uses market shares of firms and the market elasticity of demand and supply.

> We point out that the Lerner index provides a precise economic definition of market power, and we demonstrate the functional relationship between market power on the one hand and market share, market elasticity of demand, and supply elasticity of fringe competitors on the other.

$$L = \frac{(P - C)}{P} = \frac{1}{E_d} \qquad \frac{S_d}{e_m^d + e_j^s (1 - s_i)}$$

where:

S_d = the market share of the dominant firm

e_m = elasticity of demand in the market

e_j^s = elasticity of supply of the competitive fringe

s_i = market share of the fringe.

In words this formula says that the markup of price over cost will be directly related to the market share of the dominant firm and inversely related to the ability of consumers to reduce consumption (the elasticity of demand) and the ability of other firms (the competitive fringe) to increase output (the elasticity of this supply). These are market characteristics and fundamentals that are accessible to economic analysts. They form the focal point of the analysis in this paper.

2. Recognizing the Complexity of Gasoline Markets

The multidimensional view of markets offered by the SCP framework fits the fundamental economic traits of energy production and consumption well. Energy markets are highly complex. Their volatility poses particular challenges for policy and economic analysis.[22]

Contrasting energy commodities to financial instruments like stocks and bonds, a recent book entitled *Energy Risk*, identified the uniqueness of energy markets. The key elements are the supply-side difficulties of production, transportation and storage, and the demand side challenges of providing for a continuous flow of energy to meet inflexible demand, which is subject to seasonal consumption patterns.

> [T]he deliverables in money markets consist of a "piece of paper" or its electronic equivalent, which are easily stored and transferred and are insensitive to weather conditions. Energy markets paint a more complicated picture. Energies respond to the dynamic interplay between producing and using; transferring and storing; buying and selling – and ultimately "burning" actual physical products. Issues of storage, transport, weather and technological advances play a major role here.
>
> In energy markets, the supply side concerns not only the storage and transfer of the actual commodity, but also how to get the actual commodity out of the ground. The end user truly consumes the asset. Residential users need energy for heating in the winter and cooling in the summer, and industrial users' own products continually depend on energy to keep the plants running and to avoid

[22] To appreciate the volatility of these markets and the challenge they pose for analysis, we can consider the problems that the Department of Energy has had in projecting gasoline prices. We can start with a mid-1997, report from the Department of Energy (U.S. Department of Energy, Energy Information Administration, *Motor Gasoline Assessment: Spring 199,* July 1997, p. 45) that attempted to anticipate gasoline prices just a few months ahead by stating the following.

> A mid-June update of the April Short-Term-Energy Outlook bodes well for drivers. Summer gasoline prices should stay below last year's summer prices as a result of low crude oil prices and normal seasonal declines from June.

Within a month, prices were rising dramatically. Less than a year later, the Department of Energy's *Assessment of Summer 1997 Motor Gasoline Price Increase* (U.S. Department of Energy, Energy Information Administration, May 1998, p. 1) described what had happened as follows.

> As the summer of 1997 was coming to a close, consumers experienced yet another surge in gasoline prices. Unlike the previous increase in spring 1996, crude oil was not a factor. The late summer 1997 price increase was brought about by the supply/demand fundamentals in the gasoline markets, rather than the crude oil markets.
>
> The nature of the summer 1997 gasoline price increase raised questions regarding production and imports. Given very strong demand in July and August, the seemingly limited supply response required examination. In addition, the price increase that occurred on the West Coast during late summer exhibited behavior different than the increase east of the Rocky Mountains.

A similar ambivalence afflicted the summer of 2001 predictions, with early warning of very high prices followed by downward revisions. Volatility is certainly the order of the day (see Cook, John, *Petroleum Outlook: More Volatility?*, Energy Information Administration presentation to the MPRA Annual Meeting, March 19, 2001).

> the high cost of stopping and restarting them. Each of these energy participants – be they producers or end users – deals with a different set of fundamental drivers, which in turn affect the behavior of energy markets...
>
> What makes energies so different is the excessive number of fundamental price drivers, which cause extremely complex price behavior.[23]

A recent analysis of the Midwest price spikes of 2000 conducted by the Federal Trade Commission demonstrates the complex interaction of these factors the gasoline market. Very tight gasoline supplies in the Midwest were the result of long-term trends in supply and demand, business decisions and regulatory requirements, as well as unforeseen events. The price increase was exacerbated by the failure of the industry to react quickly to increase supply and decisions to keep supply off the market.

> Prices rose both because of factors beyond the industry's immediate control and because of conscious (but independent) choices by industry participants...
>
> In sum, the evidence does not indicate that the price spike in Midwest gasoline in the spring and early summer 2000 was caused by a violation of the antitrust laws. The spike appears to have been caused by a mixture of structural and operating decisions made previously (high capacity utilization, low inventory levels, the choice of ethanol as an oxygenate), unexpected occurrences (pipeline breaks, production difficulties), errors by refiners in forecasting industry supply (misestimating supply, slow reactions), and decisions by firms to maximize their profits (curtailing production, keeping available supply off the market). The damage was ultimately limited by the ability of the industry to respond to the price spike within three or four weeks with increased supply of products. However, if the problem was short-term, so too was the resolution, and similar price spikes are capable of replication. Unless gasoline demand abates or refining capacity grows, price spikes are likely to occur in the future in the Midwest and other areas of the country.[24]

These two observations, one generally about energy, the other specific to gasoline, set the stage for the complex picture that must be drawn to understand gasoline pricing behavior. They both point to the important role of supply and demand fundamentals.

B. FUNDAMENTALS OF GASOLINE SUPPLY

On the supply side of the gasoline market, because of the nature of the underlying molecules, the production, transportation and distribution networks are extremely demanding, real time systems. Energy is handled at high pressure, high temperature and under other physical conditions that are, literally, explosive. These systems require perfect integrity and real time balancing much more than other commodities.

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[23] Pillipovic, Dragana, *Energy Risk: Valuing and Managing Energy Derivates* (McGraw-Hill, New York: 1998), p. 3.

[24] Federal Trade Commission, *Midwest Gasoline Price Investigation*, March 29, 2001, pp. i... 4.

Transportation and distribution infrastructure is extremely capital intensive and inflexible. Many sources of energy are located far from consumers, requiring transportation over long distances. The commodities are expensive to transport and store delivered over a network that is sunk in place with limited ability to expand in the short and medium term.

Refineries and pipelines, two key parts of the gasoline distribution chain, are not only capital intensive, but they take long lead times to build. They have significant environmental impacts. In the short term, their capacity is relatively fixed. Refineries must be reconfigured to change the yield of products. Although oil pipelines have largely depreciated their historic, sunk costs, expansion would be capital intensive. Thus, pipeline capacity is generally fixed capacity.

Accidents have a special role in networks such as these. Because of the demanding physical nature of the network, they are prone to happen. Because of the volatile nature of the commodity, accidents tend to be severe. Because of the integrated nature of the network and demanding real time performance, accidents are highly disruptive and difficult to fix.

One critically important effect of these physical and economic characteristics is to render the supply-side of the market inelastic.[25] By this term, economists mean that as prices increase (or decrease) supply does not increase (or decrease) very much. The elasticity is measured in terms of percentage changes. For example, if a ten percent increase in price results in a 20 percent increase in demand, the price elasticity of supply is said to equal 2 (20%/10%). When the elasticity is greater than 1, demand is said to be elastic. Alternatively, if a 10 percent increase in price results in a 2 percent increase in supply, the elasticity of is said to be .2, and this is considered inelastic.

Given the basic infrastructure of supply in the industry, the availability of stocks to meet changes in demand is the critical factor in determining the flexibility of supply. Under all circumstances, since output is slow to respond to price changes because of its inelasticity, stockpiles, storage and importation of product become a critical element of the gasoline market.[26] Stocks are the key factor in policy responses to market power where supply is inelastic.[27]

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[25] Consodine, Timothy J. and Eunnyeong Heo, "Price and Inventory Dynamics in Petroleum Product Markets," *Energy Economics*, 22 (2000), p. 527, conclude "supply curves for the industry are inelastic and upward sloping." See also "Separatiblity, Functional Form and Regulatory Policy In Models of Interfuel Substitution," *Energy Economics*, 1989.

[26] Consodine, Timothy J., "Inventories Under Joint Production: An Empirical Analysis of Petroleum Refining," *Review of Economics and Statistics*, 1997, p. 527, "high inventory levels depress prices... In some cases, imports of product are more variable than production or inventories.

[27] Pirrong, Stephen Craig, *The Economics, Law and Public Policy of Market Power Manipulation* (Kluwer, Boston, MA, 1996), pp. 10... 24... 59.

> Economic frictions (including transportation, storage, and search costs) which impede the transfer of the underlying commodity among different parties separated in space or time can create the conditions that the large trade can exploit in order to cause a supracompetitive price...
>
> Although the formal analysis examines transportation costs as the source of friction, the consumption distortion results suggest that any friction that makes it costly to return a commodity to it original owners (such as storage costs or search costs) may facilitate manipulation.

Every investigation of every product price spike in the past several years points to 'unusually low stock' as a primary driver of price shocks. The issue is so fundamental and the theme so often repeated, it is worth reviewing the track record of the past half-decade to drive the message home.

The U.S. Department of Energy identified "lower than normal gasoline stocks" in a chapter entitled "Spring '96 Gasoline Price Runup,"[28] and gave stocks an even more prominent role in a chapter entitled "Petroleum Stocks: Causes and Effects of Lower Inventories" noting that

> stocks are needed to keep petroleum supplies moving smoothly from wellhead to end-users. As an immediate source of supply, stocks provide a cushion against normal and unexpected demand and supply fluctuations. Crude oil, distillate, and total gasoline stocks dropped in 1995 and reached new lows in 1996, drawing attention to the long-term downward trend.[29]

Again, the U.S. Department of Energy remarks on the role of stocks in the 1997 price runup as follows:

> Gasoline stocks plummeted, dropping 15 million barrels, compared to an average monthly decline (for the 1992-1996 period) of 4 million barrels. Stocks ended the month at near-record low levels. Gasoline suppliers were left facing August, which is usually the highest demand month of the year, with virtually no inventory.[30]

In analyzing the Midwest price spike of 2000, the Department of Energy again found stocks to be the culprit, starting an analysis entitled *Supply of Chicago/Milwaukee Gasoline Spring 2000* as follows:

> This summer's run-up in Midwest Gasoline prices, like other recent price spikes, stemmed from a number of factors. The stage was set for gasoline volatility as a result of tight crude oil supplies, which led to low product stocks and relatively high crude oil prices. With little stock cushion to absorb unexpected events, Midwest gasoline prices surged when a number of supply problems developed,

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The extent of market power depends on supply and demand conditions, seasonal factors, and transport costs. These transport cost related frictions are likely to be important in many markets, including grains, non-precious meals, and petroleum products.

Transportation costs are an example of an economic friction that isolates geographically dispersed consumers. The results therefore suggest that any form of transactions costs the impedes the transfer of a commodity among consumers can make manipulation possible...

All else equal, the lower the storage costs for a commodity, the more elastic its demand.

See also, William Jeffrey and Brian Wright, *Storage and Commodity Markets* (1991); Deaton Angus and Guy Laroque, "On the Behavior of Commodity Prices," *Review of Economics and Statistics* 1992.

[28] Energy Information Administration, *Petroleum 1996: Issues and Trends,* September 1997, p. 27.

[29] Id., p. 85.

[30] Energy Information Administration, *Assessment of Summer 1997,* p. 5.

including pipeline and refinery supply problems, and an unexpectedly difficult transition to summer-grade Phase II reformulated gasoline.[31]

Finally, in explaining the early spring price runup in 2001, inventories were the starting point (p. 1): " Low petroleum inventories set the stage for our current situation, as they did last year both for heating oil and for gasoline."[32]

C. FUNDAMENTALS OF GASOLINE DEMAND

The continuous flow of large quantities of product to meet highly seasonal demand is the central characteristic of the demand side of the market. Many discussions of the gasoline market start from the premise that people drive a lot, perhaps too much. But in order to design proper policies to deal with gasoline demand and how it affects the market, we must have an appreciation for why people drive as much as they do. Examining price and income elasticities leads to the conclusion that energy is a necessity of daily life. Recognizing this fact leads to policy choices that can have the greatest impact while imposing the least cost and inconvenience on consumers.

Gasoline consumption is determined by the physical and economic structure of daily life. People need to drive on a daily basis because of the way our communities are built and our transportation systems designed. Stores are far from homes. Homes are far from work. Social and after-school activities are dispersed. In most communities, mass transit is scarce and inconvenient. It is necessary to drive to get from here to there. We own more cars and drive more miles on a household basis over time. These trends and patterns have become stronger and more deeply entrenched as our society has become wealthier and the tendency for two-earner households has grown. For the past three decades there has been an almost a perfect, one-to-one correspondence between economic growth and the growth of total miles driven.[33]

The result of the underlying socioeconomic determinants of automobile travel is to render demand "inelastic." The demand elasticity for gasoline has been studied hundreds of times in the U.S. and abroad. The best estimate of short-term elasticity (usually measured by

[31] Joanne Shore, Petroleum Division. The FTC reached a similar conclusion in its Midwest Gasoline Price Investigation, at note 23.

[32] "Statement of John Cook, Director, Petroleum Division, U.S. Department of Energy, *Subcommittee on Energy and Air Quality, Committee on Energy and Commerce, U.S. House of Representative*, May 15, 2001, p.1.

[33] *National Energy Policy*, p. 3-13.

demand response in a period of about a year) is .2.[34] The best estimate of the long-term elasticity is about .4.[35] Both of these are quite low.

The low elasticity of demand is the critical factor in rendering the gasoline market volatile and vulnerable to abuse.[36] When demand is inelastic, consumers are vulnerable to price increases, since they cannot cut back on or find substitutes for their use of the commodity. When the most important market force in disciplining market power, demand elasticity, is as low as observed for gasoline, there are many opportunities to exercise market power.

Because automobiles and driving are necessities, not luxury goods, people buy a certain amount to meet their daily needs, but they do not consume much more beyond meeting those needs.[37] As a result, everyone buys a basic amount of energy, but the amount grows more

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[34] Espey, Molly, "Gasoline Demand Revisited: An International Meta-Analysis of Elasticities," *Energy Economics* 20 (1998), 273-295, identifies 363 estimates of short-term elasticity. The median is -.23 for the short term and -.43 for the long term. Kayser, Hilke, A., "Gasoline Demand and Car Choice: Estimating Gasoline Demand Using Household Information," *Energy Economics* 22 (2000), estimated the short term elasticity in the U.S. at -.23. Puller, Steven L. and Lorna A. Greening, "Household Adjustment to Gasoline Price Change: An Analysis Using 9 years of US Survey Data," *Energy* Economics 21 (1999) 37-52, find a one-year price elasticity of -.34, but model a more complex structure of responses within shorter periods. They find a larger elasticity of miles traveled in the first quarter after a price shock (-.69 to -.76), but that demand "snaps back." The larger reduction in miles driven is still, "inelastic." Moreover, the reduction in miles driven is larger than the reduction in fuel consumed since it appears that households cut back on the most efficient driving miles (i.e. higher speed vacation miles).

[35] Espy, Molly, "Explaining the Variation in Elasticity Estimates of Gasoline Demand in the United States: A Meta-analysis," *The Energy Journal,* 17, 1996, Table 2, shows the average elasticity of demand for U.S. only studies at -.42.

[36] Landes and Posner point out that when demand elasticities are low, market power becomes a substantial problem. In their words, Lerner Index "comes apart."

> [T]he formula "comes apart" when the elasticity of demand is 1 or less. The intuitive reason is that a profit-maximizing firm would not sell in the inelastic region of its demand curve, because it could increase its revenues by raising price and reducing quantity. Suppose, for example, that the elasticity of demand were .5. This would mean that if the firm raised its price by one percent, the quantity demanded of its product would fall by only one-half of one percent. Thus its total revenues would be higher, but its total costs would be lower because it would be making fewer units of its product.
>
> Raising price in these circumstances necessarily increases the firm's profits, and this is true as long as the firm is in the inelastic region of its demand curve, where the elasticity of demand is less than 1.
>
> If the formula comes apart when the elasticity of demand facing the firm is l or less, it yields surprising results when the elasticity of demand is just a little greater than 1. For example, if the elasticity of demand is 1.01, equation (la) implies that the firm's price will be 101 times its marginal cost. There is a simple explanation: a firm will produce where its demand elasticity is close to one only if its marginal cost is close to zero, and hence a relatively low price will generate a large proportional deviation of price from marginal cost

[37] Hsing, Yu, "On the Variable Elasticity of the Demand for Gasoline: The Case of the U.S.A.," *Energy Economics,* April 1990, p. 134, notes that the income elasticity declines over time and draws an analogy with expenditures on food,

> The declining income elasticity in the long-run indicates that the proportion of income spent on gasoline continues to decline as income rises. This is because the demand for gasoline like many food commodities has its limit beyond which saturation is reached.

slowly than income. The implications of this pattern of consumption are that expenditures on gasoline tend to take a larger share of the income of lower income households.

Economists talk about this as the income elasticity of demand. They measure the income elasticity as the percentage change in consumption compared to the percentage change in income. If a ten percent increase in income leads to 5 percent change in demand for gasoline, it is said to have an income elasticity of demand of .5 and to be inelastic. The studies of gasoline find that its income elasticity is in the range of .5 to .8.[38]

The price and income elasticities described above are typical of necessities. Because the price elasticity is low, consumers have difficulty substituting for this commodity when its price increases. Yet, because the income elasticity is high relative to the price elasticity, the price increase will take a relatively large share of income. This indicates a large decrease in consumer welfare with the price increases.[39]

When the price of a necessity goes up, lower income people suffer a large loss in their well-being. Because gasoline is a necessity, it becomes more and more difficult to reduce consumption as income declines. That is, poorer households will try to spend less for this

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[38] Espey, "Gasoline," finds .39 for the short term and .8 for the long term for the wide range of studies. For U.S. specific studies Espy, "Explaining," find .62. Hilke finds .5 for the U.S. for the short term, as do Dahl, C.A. and T. Sterner, "Analyzing Gasoline Demand Elasticities: A Survey," *Energy Economics* 13 (1991) 203-310.

[39] Lester Taylor, Telecommunications Demand: A Survey and Critique (Cambridge Massachusetts: MIT press, 1980), p. 82), describes another necessity, telephone service, as follows:

> When substitution effects are large relative to income effects, consumers can substitute away from goods whose prices have risen with little loss in utility. However, when income effects are large relative to substitution effects, an increase in price means a relatively large decrease in utility...since the income effect is indicated to be large relative to the substitution effect in the price elasticity of demand..the welfare of these households may be significantly decreased by increase in the price.

A similar discussion for energy that revolves around the difficulty of cutting back on energy consumption in the short term is provided by Hunt, Lester and Neil Manning, "Energy Price and Income Elasticities of Demand: Some Estimates for the UK Using the Cointegration Procedure," *Scottish Journal of Political Economy*, May 1989, pp. 189-190.

> Our results suggest the long-run income-elasticity of energy demand is around .4 and .5, whereas the short-run (impact) income elasticity is around .6 to .8. The affect of a change in income on energy demand is, therefore, greater in the short-run than in the long run. This may follow from the inflexibility of firms' and households' energy-using capital and appliance stocks in the short-run; an increase in income will, therefore bring about an immediate decrease in the derived demand for energy in the short-term, but this derived demand is reduced in the longer term as more energy efficient machines are installed.
>
> The long-run price elasticity of energy demand estimate is approximately -.3 and the short-run (impact) elasticity approximately -.1. Therefore, the effect of a change in the real price of energy is less in the short-run than in the long-run which is in contrast to the above case for income changes. This may also reflect the fixed nature of the machine and appliance stocks in that a rise in the real price of energy produces a modest fall in energy consumption in the short-term. Energy consumption falls further in the longer-term, however, as the price increase induces the installation of more energy efficient domestic appliances and capital goods.

Note that in this discussion, as in the case of U.S. data, the long run elasticity of demand with respect to income is about twice the long run elasticity of demand with respect to price, satisfying the fundamental condition for a necessity as described by Taylor, but both are inelastic.

commodity at lower levels of income, but they find it more and more difficult to do so because it is a necessity. As a result, as described in Figure 2 in the introduction, at each lower level of income, expenditures for this commodity rise as a percentage of income, although they fall in absolute value. Households are forced to spend a larger share of their income on telephone service to maintain their well-being.

People drive a substantial amount because they have to and a substantial amount more if they can afford to. Income and place of residence are prominent variables influencing gasoline consumption.[40] To gain a perspective on the magnitude of the impact of placed of residence and income on gasoline consumption we note that approximately 79 percent of households that live in center cities have vehicles, compared to 92 percent of households that live in suburbs and rural areas. Approximately 67 percent of all households eligible for federal assistance have a vehicle. In contrast over 98 percent of all households with incomes above $50,000 have a vehicle.

Even among households that have a vehicle, we observe substantial differences in consumption across place of residence and income. Households that have vehicles in rural and suburban areas use considerably more gasoline than those in central cities. Figure 3 contrasts data on gasoline consumption by households that reside in center cities to those that reside in the suburbs and rural areas. It presents data for households that own vehicles across income levels.

Those who reside in rural and suburban areas drive more than those who live in center cities. The difference is larger for upper income households than for lower income households. Households eligible for federal assistance who reside in suburban or rural areas consume over 20 percent more gasoline than households eligible for federal assistance who reside in center cities. Households with income above $50,000 per year who reside in the suburbs or rural areas consume over 40 percent more gasoline than their counterparts who reside in center cities. Upper income households who live in rural areas consume over twice as much gasoline as lower income households who live in center cities. When vehicle ownership is factored in, the difference in consumption between rural upper income and urban lower income households would be a factor of three.

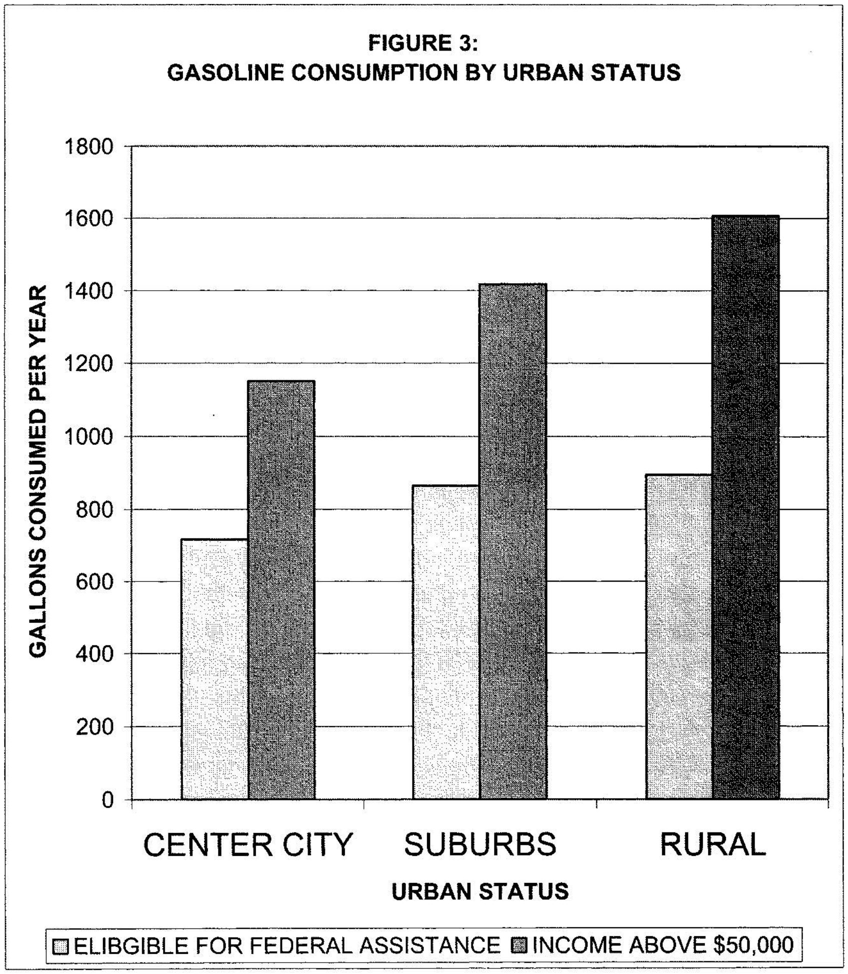
D. A TIGHTENING MARKET

1. Increases in Gasoline Demand

Understanding the nature of demand for gasoline is critical for developing policy to influence consumption. For policy purposes, not all of the factors that affect demand are accessible or relevant. The growth in the adult population, which propels the growth in the number of vehicles, is not something we would or could change, even though the number of drivers and cars increased by about 10 percent over the past decade.[41] Slowing income

[40] Greening, Lorna, et al., "Use of Region, Life Cycle and Role Variables in the Short-Run Estimation of the Demand for Gasoline and Miles Traveled," *Applied Economics*, 27, 1995, review a number of variables that affect driving and gasoline consumption. The income and region variables are important in all cases, as are two earner families.

[41] *Statistical Abstract of the United States: 2001*, Table 1026;



Source: U.S. Department of Energy, *Household Vehicle Energy Consumption: 1994*, Table 5.9

growth just to reduce gasoline consumption is not a likely candidate, even though that influenced the number of miles and the types of cars driven.[42]

It is the behavior of the population, given it size and wealth on which policy focuses. While the pattern of daily life determines the number of miles driven, the quality of the vehicle fleet determines the number of gallons consumed to cover those miles (see Table 1). The types of cars chosen and efficiency of the vehicles combine to determine gas mileage. Once the community is laid out and the car is chosen, the ability to change the amount of gasoline consumed is limited, without suffering deprivation.[43]

Table 1 presents the key drivers of gasoline consumption over the past two decades, the number of vehicles, the mileage per vehicle and the fuel efficiency of the vehicles. Total gasoline consumption grew by about 1.5 percent per year in the 1990s. This increase reflected the combination of increasing miles driven, a shift from cars to light trucks, which includes SUVs and changes in the fuel efficiency of the vehicle fleet.

TABLE 1: GROWTH IN POLICY RELEVANT FACTORS AFFECTING GASOLINE CONSUMPTION

	COMPOUND ANNUAL CHANGE	
	1990s	1980s
TOTAL GASOLINE CONSUMPTION	1.5%	1.0%
VEHICLES REGISTERED		
CARS	0	.9
LIGHT TRUCKS	8.9	5.1
VEHICLE USAGE (MILES PER VEHICLE)		
CARS	1.3	1.7
LIGHT TRUCKS	0	1.3
FUEL EFFICIENCY (MILES PER GALLON, MPG)		
CARS	.6	2.4
LIGHT TRUCKS	.7	2.8

Sources and notes: Average annual changes are presented because the length of the period for which data is available differs between the two decades. For the 1980s, the data is 1980 to 1990. For the 1990s, the data is 1990 to 1999. U. S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Tables 1.10; 3.4; U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States*, various issues, Motor Vehicle Registrations; U.S. Federal Highway Administration, *Highway Statistics: Light Trucks.*

[42] *Monthly Energy Review: December 2000*, Table 10.1; *Statistical Abstract*, Table 1049; *National Energy Policy*, p. 3-13.

[43] Telling people not to do things means they are being deprived. Giving them alternative ways to do them (including changing modes of transportation or using more fuel efficient cars, which usually entails using more capital and less fuel) is a substitution. *Webster's Third New International Dictionary, Unabridged* (Springfield, MA, 1986) defines a substitute as "something that is put in the place of something else or is available for use instead of something else." This is in contrast to the definition of deprivation, "to take away, to take something away from."

The increase in gasoline consumption per vehicle can be decomposed into the increase in mileage and the change in vehicle type. Mileage accounts for about three quarters of the increase. One quarter of the increase was caused by the shift to SUVs.

While the shift to SUVs was one striking feature of the 1990s, an equally striking and more important feature of the demand side was the failure of fuel efficiency to improve. Fuel economy improvements did not keep up. Between 1973 and 1979 (the first two energy price shocks caused by the 1973 Arab-Israel war and the subsequent Arab oil embargo and the Iranian Revolution) average fuel efficiency increased by just under 1 percent per year. Between 1979 and 1990-911 (The Iraqi invasion of Kuwait) average fuel efficiency increased by 2.5 percent per year (see Figure 4). Since 1991 there has been virtually no improvement in fuel efficiency.

If the fuel efficiency of autos had increased as rapidly in the 1990s as it did in the 1980s, autos would have been 20 percent more efficient, getting about 4 miles per gallon more, in 2000. If there had not been a shift to SUVs, the average fleet efficiency would have been about 1 mile per gallon higher.[44]

2. The Failure of Supply-side Capacity to Expand

Supply-side production capacity has not increased as fast as demand. Consequently, over the past decade and a half, all elements of the supply-side have become constrained relative to demand.

Refinery capacity has not expanded to keep up with the growth in demand. Figure 5 shows the relationship between refinery output and demand. In 1985 refinery capacity equaled daily consumption of petroleum products but by 2000, daily consumption exceeded refinery capacity by almost 20 percent. As discussed in the next Chapter, the decline in refinery capacity is partly the result of consolidation in the industry.

Figure 6 shows the relationship between stocks and demand for gasoline. Stocks are measured as the number of days of demand for gasoline in storage. It shows both total stocks and the amount of stock above what is considered the lower operational inventory. Because of the nature of operations of gasoline delivery systems, a certain level of stock is needed to keep the system running in real time.[45] Operations are subject to disruption should stocks fall

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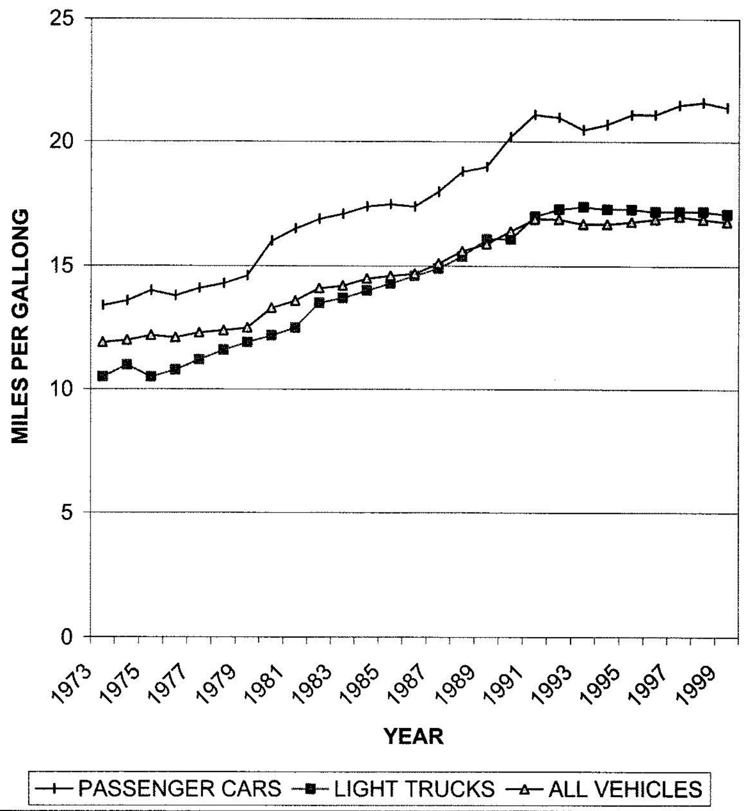
[44] Greene, David, L. "Why CAFÉ Worked," *Energy Policy,* 26 (1998), p. 602, concludes this was the impact in the period 1975-1996.

[45] U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Monthly,* April 2000, p. 145, defines the lower operational inventory as follows.

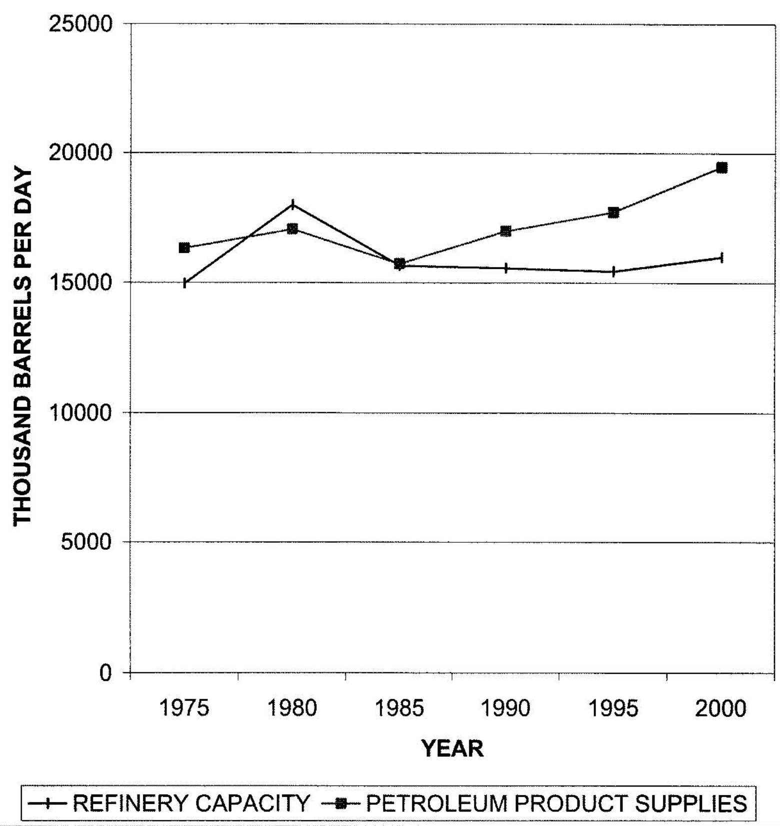
> Lower operational Inventory (LOI): The lower operational inventory is the lower end of the demonstrated operational inventory range updated for known and definable changes in the petroleum delivery system. While not implying shortages, operational problems or price increases, the LOI is indicative of a situation where inventory-related supply flexibility could be constrained or non-existent. The significance of these constraints depends on local refinery capability to meet demand and the availability and deliverability of products from other regions or foreign sources.

FIGURE 4
MOTOR VEHICLE FUEL EFFICIENCY



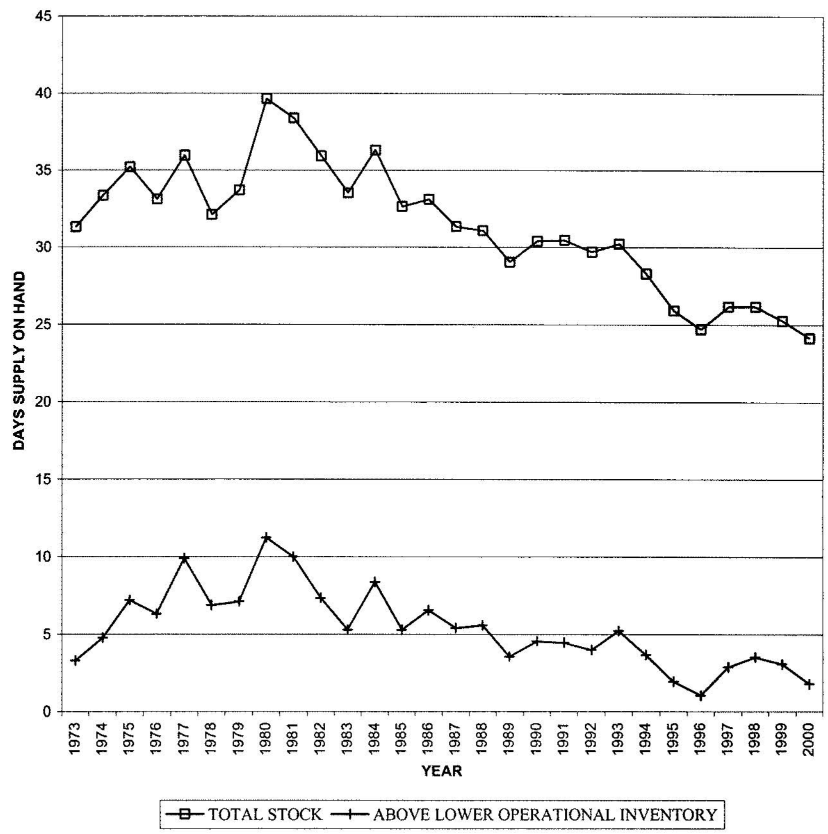
Source: U. S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Tables 1.10.

FIGURE 5
REFINERY CAPACITY AND PRODUCT SUPPLIED



Source: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual,* various issues, Tables S1, 36.

FIGURE 6: GASOLINE STOCKS



SOURCE: Source: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Monthly,* various issues, Table, S4, Figure S6.

below this level.[46] Thus, it is stocks above this level that are available to respond to shifts in demand or price.

In recent years, stockpiles have declined dramatically when measured as a percentage of demand. In the early 1980s, stocks on hand would run at 40 days supply during off-peak periods and 35 days supply during the peak period.[47] By the mid-1990s, stocks were running in the range of 30 to 35 days supply. Recently stocks have plunged to a range of 20 to 25 days. More importantly, the reserves above the lower operational inventory levels have declined to very low levels. They generally are in the range of a couple of days, compared to a week or more in the 1980s. As discussed in the next Chapter, this decline in stocks is at least partially the result of consolidation in the industry.[48]

D. CONCLUSION

Physical and economic fundamentals set the context for markets, they do not determine market structure, conduct or performance. The current situation has developed over a substantial period of time for a variety of reasons. The recent report of the National Energy Policy Development Group blames environmental and other regulation for the failure to expand refinery and pipeline capacity.[49] The failure to keep stocks up is explained as a derivative of the capacity constraints, since there is never an opportunity to produce product for storage. The inability to move product from one market to the next is attributed to fragmentation of markets because of "boutique" fuels that require specific blends to meet the clean air requirements of individual markets. A close look at the behavior of the gasoline market suggests that that there is a lot more to the problem than that.

III. MARKET ANALYSIS

A. STRUCTURE: BUSINESS DECISIONS THAT MAKE MARKETS TIGHT

1. Reducing Capacity

While refinery capacity has been steady over the past two decades, a large number of small refineries have been shut down (see Figure 7). In the early 1980s, a public policy to

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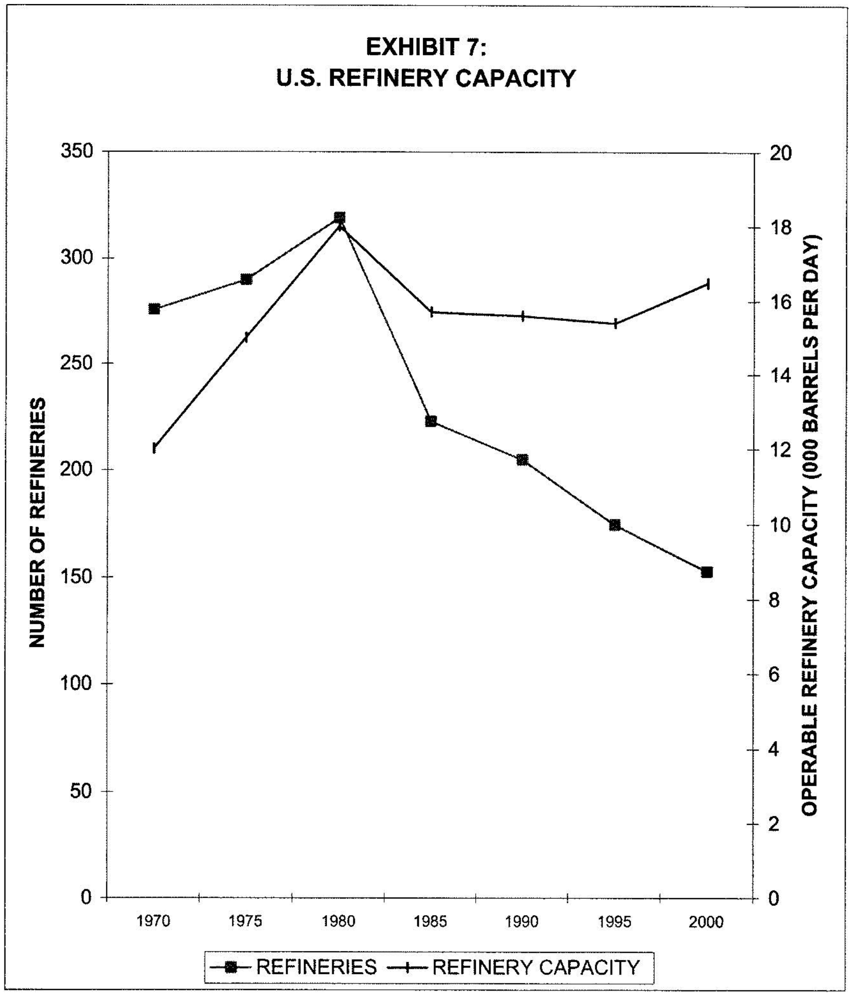
[46] The general literature of stock and storage behavior shows that stocks are typically kept to ensure operational flow (see Pyndick, Robert S., "Inventories and the Short-Run Dynamics of Commodity Prices," *Rand Journal of Economics*, Spring 1994, "The Present Value Model of Rational Commodity Pricing," *The Economic Journal*, May 1993;Consodine, Inventories. In figure 6, the LOI is placed at 185 million barrels throughout the period, although it may have varied over time. As supplies have become tight, operators may have squeezed the LOI down. With refinery capacity stable over the past ten years, using a constant level for the period on which this paper focuses provides a sound basis for analysis.

[47] *Petroleum 1996: Issues and Trends*, September 1997, p. 90.

[48] NEPDG, p. 7-13, recognizes the existence of the problem, but brushes it aside.

[49] Virtually all of the recommendations dealing with this infrastructure addresses environmental and regulatory matter, see Chapter 7.



Source: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual,* various issues, Tables S1, 36.

support small refineries was terminated. This accounted for the loss of about 100 refineries between 1980 and 1985. Since then, scores of other refineries have been shut down. Government did not close refineries, private businesses did. In the 1990s, alone approximately 50 refineries were closed. In just the past five years over 20 refineries have been shut down.

The complaint that no new refineries have been built in recent years loses it compelling public policy impact.[50] Blaming this on the Clean Air Act misses the point. Consolidation of the refinery industry is a business decision that began long before changes in the Clean Air Act amendments of 1990 and continued after the adjustment to changes in gasoline formulation.

In fact, at the time of the 1995 changes in Clean Air Act requirements the Department of Energy conducted a study of the impact of environmental requirements on the refining industry. It concluded that "pollution abatement operating costs have been and continue to be a small part of overall operating costs."[51] Similarly, general reviews of the industry at the time concluded that "a close examination reveals that the change in refining costs attributable to RFG had no major impact on margin behavior between 1993 and 1995."[52]

Just as with refineries, the decline in storage is attributable in part to a reduction in capacity. Storage capacity declined by over 10 percent in the past half decade.[53] The reduction in capacity equals over ten days' supply, and ten days of working storage capacity. The secular decline in gasoline stocks is a critically important factor in keeping markets tight.[54] The recent National Energy Task force recognized the trend. Government did not choose to carry much lower stocks, private businesses did.[55]

> Ongoing industry consolidation, in an effort to improve profitability, inevitably leads to the sale or closure of redundant facilities by the new combined ownership. This has been particularly true of terminal facilities, which can lead to reductions in inventory and system flexibility. While excess capacity may have

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[50] NEPG, p. 7-13.

[51] U.S. Department of Energy, Energy Information Administration, *The Impact of Environmental Compliance Costs on U.S. Refining Profitability* (October 1997) p. 3, shows operating costs per gallon associated with pollution abatement at about $.01 per gallon and large capital costs for a short period of time to meet new requirements, but these had already begun to decline by 1995. The impact of capital expenditures must also be small, in the range of a penny per gallon. Other studies lead to similar estimates of costs associated with pollution abatement of a few cents per gallon, see Nadim, Farahad, et al., "United States Experience with Gasoline Additives," *Energy Policy*, 29 (2001).

[52] U.S. Department of Energy, Energy Information Administration, *Petroleum 1996: Issues and Trends* (September 1997), p. 137.

[53] U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual,* Table 44.

[54] Pirrong, p. 70.

> This is true because the demand for a storable commodity is a derived demand equal to the sum of the demand curve for immediate consumption and the demand curves for future consumption (net of production and storage costs). The ability of consumers and producers to respond to sudden increases in supplies through storage and the adjustment of future consumption or production decisions (such as, increasing future consumption or reducing future shipments of the commodity to the delivery market) tends to dampen the price response to an increase in supply of a storable commodity.

[55] *Midwest Gasoline Price Investigation*, note 23 citing OECD and DOE documents states "Higher crude prices led producers to draw down inventories in anticipation of replacing them later at lower prices."

deterred some new capacity investments in the past, more recently other factors, such as regulations, have deterred investment.[56]

The prominent role of business decisions in reducing capacity immediately raises the concern that these decisions are intended to reduce competitive market forces and secure market power for major industry players. While mergers and acquisitions or facility closings are justified by claims of efficiency gains, [57] they have a real economic effect of reducing competition. Recently revealed documents from the mid-1990s indicate that industry officials and corporate officers were concerned about how to reduce capacity, with observations like

> "if the U.S. petroleum industry doesn't reduce its refining capacity, it will never see any substantial increase in refinery profits," said a Chevron Corporation document in November 1995.
>
> A Texaco official, in a March 1996 memorandum, said refinery overcapacity was "the most critical factor" facing the industry and was responsible for "very poor refining financial results."[58]

2. Concentration of Ownership

A wave of mergers in the industry has resulted in a level of concentration that creates the basis for business behaviors and strategies that can exploit market power. Several major mergers between vertically integrated companies in the top tier of the oil industry (Exxon-Mobile, BP-Amoco-Arco, Chevron-Texaco, Phillips-Tosco) have pushed petroleum product markets to levels of concentration that are a serious concern.

The U.S. Department of Justice (DOJ) defines market levels of concentration to determine the extent of review of mergers.[59] DOJ is unlikely to challenge mergers between companies in markets that are in unconcentrated. To make this assessment, it calculates the index of concentration known as the HHI (Hirshman-Herfindahl index). [60] Another way to

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[56] NPEG, p. 7-13.

[57] The certainly have value on the stock market (see Edwards, Kenneth John D. Jackson and Henry L. Thompson, "A Note on Vertical Integration and Stock Ratings of Oil Companies in the U.S.," *The Energy Journal*, 2000).

[58] "Oil Data Show Industry Role in Shortages a Possibility," *New York Times*, June 15, 2001.

[59] U.S. Department of Justice, *Merger Guidelines*, revised 1997.

[60] Shepherd, p. 389, gives the following formulas for the Herfindahl-Hirschman Index (HHI) and the Concentration Ratio (CR):

$$H = \sum_{i=1}^{n} S_i^2$$

$$CR_m = \sum_{i=1}^{m} S_i$$

where
n = the number of firms
m= the market share of the largest firms (4 for the 4 firm concentration ratio)
S_i = the share of the ith firm.

quantify market concentration is to calculate the market share of the largest 4 firms (4 firm concentration ratio or CR4).

Under Merger Guidelines issued early in Ronald Reagan's first term, the DOJ considers a market with an HHI of 1000 or less to be unconcentrated. Such a market would have the equivalent of ten equal sized competitors. In such a market, the 4-firm concentration ratio would be 40 percent (see Table 2). Any market with a concentration above this level was deemed to be a source of concern and increases in concentration through mergers would receive scrutiny.

TABLE 2: DESCRIBING MARKET CONCENTRATION FOR PURPOSES OF PUBLIC POLICY

DEPARTMENT OF JUSTICE MERGER GUIDELINES	EQUIVALENTS IN TERMS OF EQUAL SIZED FIRMS	HHI	4-FIRM SHARE
↑	5 EQUAL SIZED FIRMS	HHI= 2000	CR4=80
HIGHLY CONCENTRATED		HHI= 1800 OR MORE	
	6 EQUAL SIZED FIRMS	HHI= 1667	CR4=67
UNCONCENTRATED ↓	10 EQUAL SIZED FIRMS	HHI= 1000	CR4=40

Sources: U.S. Department of Justice, *Horizontal Merger* Guidelines, revised April 8, 1997, for a discussion of the HHI thresholds; Shepherd, William, G., *The Economics of Industrial Organization* (Prentice Hall, Engelwood Cliffs, N.J., 1985), for a discussion of 4 firm concentration ratios.

The DOJ considers a market with an HHI of 1800 as the point where a market is considered highly concentrated. In terms of equal sized competitors, this level falls between five and six. A market with six equal sized competitors would have an HHI of 1667. In such a market, the four firm concentration ratio would be 67. A market with five equal sized competitors would have an HHI of 2000. The four firm concentration ratio would be 80 percent.

Shepherd describes these thresholds in terms of four-firm concentration ratios as follows:[61]

[61] Shepherd, p. 4.

Tight Oligopoly: The leading four firms combined have 60-100 percent of the market; collusion among them is relatively easy.

Loose Oligopoly: The leading four firms, combined, have 40 percent or less of the market; collusion among them to fix prices is virtually impossible.

Shepherd refers to collusion, but that is not the only concern of is not the only concern of market power analysis, or the Merger Guidelines. The Merger Guidelines of the Department of Justice recognize that market power can be exercised with coordinated, or parallel activities and even unilateral actions.

Market power to a seller is the ability profitably to maintain prices above competitive levels for a significant period of time.*/ In some circumstances, a sole seller (a "monopolist") of a product with no good substitutes can maintain a selling price that is above the level that would prevail if the market were competitive. Similarly, in some circumstances, where only a few firms account for most of the sales of a product, those firms can exercise market power, perhaps even approximating the performance of a monopolist, by either explicitly or implicitly coordinating their actions. Circumstances also may permit a single firm, not a monopolist, to exercise market power through unilateral or non-coordinated conduct --conduct the success of which does not rely on the concurrence of other firms in the market or on coordinated responses by those firms. In any case, the result of the exercise of market power is a transfer of wealth from buyers to sellers or a misallocation of resources.

*/ Sellers with market power also may lessen competition on dimensions other than price, such as product quality, service or innovation.[62]

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[62] Horizontal Merger Guidelines, at section 0.1. Lawrence Sullivan and Warren S. Grimes, *The Law of Antitrust: An Integrated Handbook,* Hornbook Series (West Group, St. Paul, 2000), pp. 596-597, describe the DOJ approach as follows:

The coordination that can produce adverse effects can be either tacit or express. And such coordination need not be unlawful in and of itself. According to the 1992 Guidelines, to coordinate successfully, firms must

(1) reach terms of interaction that are profitable to the firms involved and

(2) be able to detect and punish deviations. The conditions likely to facilitate these two elements are discussed separately, although they frequently overlap.

In discussing how firms might reach terms for profitable coordination, the Guidelines avoid using the term "agreement," probably because no agreement or conspiracy within the meaning of Section 1 of the Sherman Act is necessary for the profitable interaction to occur. As examples of such profitable coordination, the Guidelines list "common price, fixed price differentials, stable market shares, or customer or territorial restrictions." Sometimes the facilitating device may be as simple as a tradition or convention in an industry.

The go on to not the mechanisms that might be used and the usefulness of the HHI index in this regard.

Oligopoly conditions may or may not require collusion that would independently violate Section 1 of the Sherman Act. A supracompetitive price level may be maintained through price leadership (usually the leader is the largest firm), through observance of a well-established trade rule (e.g., a

Because the supply and demand elasticities for gasoline are so low[63] and the expenditures on energy are so large,[64] we believe these industries should be held to close scrutiny. The critical level for scrutiny is the unconcentrated threshold (10 or more equal sized firms)[65] because short-term inelasticity allows sharp increases in price and the size of expenditures on this commodity creates large price impacts and transfers of wealth in short periods of time.

As Table 3 shows, recent mergers have pushed three of the five regional refining markets (Petroleum Administrative Defense Districts of PADD) in the country into a danger zone of concentration. There has clearly been a sharp increase in the level of concentration in all markets except the Mountain West. The East Coast, Mountain West and West Coast all fall well into the concentrated zone. The upper Midwest is close to the upper limit of the unconcentrated zone based on HHI with the four firm concentration ratio moving well above the unconcentrated level.

Product markets are much smaller than refinery markets. That is, while refineries may serve a broad area, most consumers buy virtually all of their gasoline in the metropolitan area in which they live. Most studies of gasoline prices use the metropolitan area as the unit of analysis. While we lack data on a city-by-city basis, some data is readily available on a state-by-

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> convention of a 50 percent markup in price among competing retailers), or through strategic discipline of nonconforming members of the industry...
>
> To the extent that one or very few members of a concentrated industry have much higher market shares than other members, the opportunities for strategic disciplining may expand... The expanded ability of the larger firm to coerce price discipline is reflected in the Herfindahl-Hirschman Index (HHI), which will assign a high concentration index to an industry with a very large participant. An industry with the same number of participants, each of them roughly equal in size, will have a lower index.

[63] Landes and Posner (p. 947) stress the importance of adjusting scrutiny based on the market characteristics.

> Market Share Alone Is Misleading. -Although the formulation of the Lerner index... provides an economic rationale for inferring market power from market share, it also suggests pitfalls in mechanically using market share data to measure market power. Since market share is only one of three factors... that determine market power, inferences of power from share alone can be misleading. In fact, if market share alone is used to infer power, the market share measure... which is determined without regard to market demand or supply elasticity (separate factors in the equation), will be the wrong measure. The proper measure will attempt to capture the influence of market demand and supply elasticity on market power.

[64] Landes and Posner (p. 954) also argued that the size of the market at issue should be considered, "if very high market shares are required to justify a finding of monopoly power in a small market, then a lower market share should suffice in a large market."

[65] Given the low elastiticities it can be argued that even ten equal sized firms may not ensure a workably competitive market. As J. W. Friedman, Oligopoly Theory (Cambridge: Cambridge University Press, 1983), pp. 8-9, points out the economic literature would support a much less concentrated market as fully competitive.

> Where is the line to be drawn between oligopoly and competition? At what number do we draw the line between few and many? In principle, competition applies when the number of competing firms is infinite; at the same time, the textbooks usually say that a market is competitive if the cross effects between firms are negligible. Up to six firms one has oligopoly, and with fifty firms or more of roughly equal size one has competition; however, for sizes in between it may be difficult to say. The answer is not a matter of principle but rather an empirical matter.

state basis. It confirms that the trend of increasing concentration has brought the industry to a level that is a source of concern.

TABLE 3:
CONCENTRATION OF REFINERIES IN REGIONAL PETROLEUM MARKETS

PETROLEUM ADMINISTRTIVE DEFENSE DISTRICT (PADD)		1994		2000	
		HHI	4-FIRM CR	HHI	4-FIRM CR
I.	East Coast	1297	62	2007	77
II.	Upper Midwest	731	40	980	52
III.	Gulf Coast	453	29	753	42
IV.	Mountain West	1000	49	1061	51
V.	West Coast	1037	54	1376	67

Source: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual 1999,* Volume 1 (June 2000); Table 38 for market shares, p. 122 for PADDs. The states in each PADD are as follows I = ME, NH, VT, MA, RI, CT, NY, NJ, PA, WV, DE, MD, VA, NC, SC, GA, FL; II= OH, MI, IN, KY, TN, IL, WI, MN, IA, MO, OK, KS, MB, SD, ND, III= AL, MI, AK, LA, TX, NM; IV= MT, WY, CO, UT, ID; V= WA, OR, NV, AZ, CA, HI AK.

Notes: HHI = Hirschman Hefindahl Index (market shares of all firms squared and summed);
4-Firm CR = Four Firm Concentration Ratio (market share of the four largest firms)

Table 4 presents several analyses of the concentration of gasoline distribution at the state level. We have prepared analyses of California, Illinois, Wisconsin and Connecticut based on the number of branded gasoline stations in each state. We have selected a time frame similar to that of the prior refinery analysis. California was selected since the West is frequently mentioned in discussions of high gasoline prices. There was also a U.S. Department of Energy study available for comparison. Illinois and Wisconsin were selected because they have been focal points of concern in recent price spikes. Connecticut is included since it represents another PADD and there was a separate analysis available for comparison.

We observe sharp increases in concentration in each of these states. Each is now well into a range of concentration that is a source of concern for competitiveness. The level of concentration we estimate on the basis of outlets is consistent with the other analyses that are based on volumes of sales. The trend of increasing concentration is observable in all cases.

TABLE 4:
CONCENTRATION OF GASOLINE DISTRIBUTION IN STATE MARKETS

CALIFORNIA								
CFA-Outlets	1994					1999		
	HHI	4-Firm CR	5-Firm CR			HHI	4-Firm CR	5-Firm CR
	1143	60	69			1432	73	90
DOE Reformulated Volume				1997				
				HHI	5-Firm CR			
				1290	74			
CONNECTICUT								
CFA-Outlets	1994					1999		
	HHI	4-Firm CR				HHI	4-Firm CR	
	1022	53				1415	65	
Lundberg Total Volume				1998		1999		
				HHI	4-Firm CR	HHI	4-Firm CR	
				1110	55	1264	62	
ILLINOIS								
CFA-Outlets	1994					1999		
	HHI	4-Firm CR				HHI	4-Firm CR	
	1053	55				1311	63	
WISCONSIN	1994					1999		
CFA-Outlets	HHI	4-Firm CR				HHI	4-Firm CR	
	1175	65				1400	66	

SOURCES: CFA, calculated from *National Petroleum News*, Annual Survey of Outlets; *Lundberg, Connecticut of Market Report: February, 1999*; DOE, U.S. Department of Energy, Energy Information Administration, *Assessment of Summer 1997 Motor Gasoline Price Increase*, May 1998, p. 64

3. Vertical Integration

The previous discussion focuses on horizontal concentration. Vertical integration between the segments of the industry may have an impact as well. Vertical integration by dominant firms may create a barrier to entry requiring entry at two stages of production,[66] or foreclosing critical inputs for competitors in downstream markets.[67] Vertical arrangements may restrict the ability of downstream operators to respond to local market conditions,[68]

Vertical integration not only removes important potential competitors across stages of production,[69] but also may trigger a wave of integrative mergers,[70] rendering small independents at any stage extremely vulnerable to a variety of attacks.[71]

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[66] Scherer and Ross, p. 526, formulate the issue as follows "To avoid these hazards, firms entering either of the markets in question might feel compelled to enter both, increasing the amount of capital investment required for entry.

[67] Shepherd, pp. 289-290, describes this issue as follows:

> When all production at a level of an industry is "in-house," no market at all exists from which independent firms can buy inputs. If they face impediments or delays in setting up a new supplier, competition at their level will be reduced. The clearest form of this is the rise in capital a new entrant needs to set up at both levels.
>
> Ores, special locations, or other indispensable inputs may be held by the integrated firm and withheld from others. The integration prevents the inputs from being offered in a market, and so outsiders are excluded. A rational integrated firm might choose to sell them at a sufficiently high price.

[68] Shepherd, p. 294, argues that integration by large firms creates this problem. Restrictions may be set on areas, prices or other dimension ... Only when they are done by small-share firms may competition be increased. When done by leading firms with market shares above 20 percent, the restrictions do *reduce* competition.

[69] Perry, martin K., "Vertical Integration: Determinants and Effects," Richard Schmalensee and Robert D. Willig, *Handbook of Industrial Organization* (Amsterdam, North Holland: 1989), p. 197.

> Potential competition may be important for some markets. If one such potential entrant merges with a firm already inside the market, the ranks of actual plus potential competitors are reduced by one. Unless the entrant is in a vertical relation, the conglomerate reduces the total degree of competitive constraint, even if only slightly.
>
> In addition, [Bain] pointed out that vertical merger also eliminated one of the most natural potential entrants into each stage. Indeed, these two theories are complements. It is difficult to argue that firms in neighboring stages are the most likely entrants without also believing that entry at both stages is more difficult than entry at one stage.

[70] Perry, p. 247.

> The first firms to integrate into neighboring stages reduce the number of alternative sources for other firms at either stage. This "thinning" of the market can increase the costs of market or contractual exchange. Subsequent integration by other firms then becomes more likely.

[71] Scherer and Ross, pp. 526-527.

> It is possible that business firms undertake vertical integration mergers not to enhance the level of monopoly power at some stage, but to redistribute it. Oligopolies often settle down into behavioral patterns in which price competition atrophies, even though some or all sellers suffer from excess capacity. Non-price rivalry then becomes crucial to the distribution of sales. One form of nonprice competition is the acquisition of downstream enterprises which, all else (such as prices) being equal, will purchase from their upstream affiliates. If acquisition of this sort deflects significant amounts of sales, disadvantaged rivals are apt to acquire other potential customers in self-defense,

Gasoline markets are vulnerable to these negative effects of vertical integration. Product must move downstream from the refinery or the tanker to the pump. Vertically integrated operations are closed to independent sources of supply. They may impose zonal pricing formulas or restrictions of sources of supply on their distribution outlets.[72]

With vertical integration the market may be less responsive that it could be both in the short term, since competing product has difficulty getting into individual markets at the end of a vertically[73] integrated chain and in the long term because new competitors in any market may have to enter at several stages of the business. The FTC found this to have had a substantial impact on the market in its study of the Midwestern gasoline market.

> A significant part of the reduction in the supply of RFG was caused by the investment decisions of three firms. When determining how they would comply with the stricter EPA regulations for summer-grade RFG that took effect in the spring 2000, three Midwest refiners each independently concluded it was most profitable to limit capital expenditures to upgrade their refineries only to the extent necessary to supply their branded gas stations and contractual obligations. As a result of these decisions, these three firms produced, in the aggregate, 23 percent less summer -grade RFG during the second quarter of 2000 than in 1999. Consequently, these three firms were able to satisfy only the needs of their branded gas stations and their contractual obligations, and could not produce summer -grade RFG to sell on the spot market as they had done in prior years.[74]

> and reciprocal fear of foreclosure precipitates a bandwagon effect in which the remaining independent downstream enterprises are feverishly sought.

Shepherd, p. 290.

> Triggering: If there are 10 nonintegrated firms and only one of them integrates, then little affect on competition might occur. But if this action induces the other 9 to do the same, the ultimate impact of the first "triggering" move may be large. Any increase in market power is magnified.

[72] Borenstein, Severin, A. Colin Cameron and Richard Gilbert, "Do Gasoline Prices Respond Asymmetrically to Crude Oil Price Changes, *Quarterly Journal of Economics,* 1997.

[73] Scherer and Ross, pp. 526-527.

> It is possible that business firms undertake vertical integration mergers not to enhance the level of monopoly power at some stage, but to redistribute it. Oligopolies often settle down into behavioral patterns in which price competition atrophies, even though some or all sellers suffer from excess capacity. Non-price rivalry then becomes crucial to the distribution of sales. One form of nonprice competition is the acquisition of downstream enterprises which, all else (such as prices) being equal, will purchase from their upstream affiliates. If acquisition of this sort deflects significant amounts of sales, disadvantaged rivals are apt to acquire other potential customers in self-defense, and reciprocal fear of foreclosure precipitates a bandwagon effect in which the remaining independent downstream enterprises are feverishly sought.

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[74] FTC, *Midwest Gasoline Price Investigation,* p. 4.

The past half-decade has certainly experienced a merger wave of vertically integrated firms including Exxon-Mobile, BP-Amoco-Arco, Chevron-Texaco, and Phillips-Tosco.[75] The dominant firms spend an immense amount of their capital on mergers and acquisitions.[76]

B. CONDUCT: EXPLOITING TIGHT MARKETS

The tightening of supply reflects private business decisions in other ways. As suggested by the Federal Trade Commission report, individual companies now may have pricing power, not through collusion but through individual action.[77] That is, with supply and demand tight and a small number of suppliers in each market, individual suppliers recognize that they can influence the price, at least for short periods of time, by withholding supplies. They are no longer the price takers we find in competitive markets; they become price makers in oligopolistic markets.

> In addition, at least one firm increased its summer-grade RFG production substantially and, as a result, had excess supplies of RFG available and had additional capacity to produce even more RFG at the time of the price spike. It thus found itself with considerable market power in the short term. This firm did sell off some inventoried RFG, but acknowledged that it limited the magnitude of its response because it recognized that increasing supply to the market would push down prices and thereby reduce the profitability of its overall RFG sales.[78]

In recent years, imports have begun to fill the gap as prices increase. However, The price gap that develops before imports increase far exceeds the cost of transportation. As the Department of Energy put it

> The gasoline price difference between the United States East coast (New York Harbor) and Rotterdam was in the 0-4 cents per-gallon range from 1991 to 1994, but it has been in the 3-8 cents per gallon range since. Since transportation costs are in the 3-5 cents-per-gallon range, Europe to United States movements are economically attractive. Gasoline from the Middle East (particularly Saudi Arabia) has been finding its way to U.S. markets because Asian refining growth has impacted the need and economics for gasoline imports. Finally, any strength in U.S. gasoline markets attracts some increases in

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[75] U.S. Department of Energy, Energy Information Administration, *Performance Profiles of Major Energy Producers: 1999*, p. 19 , notes the first two mega-mergers – Exxon-Mobile and BP-Amoco. This was followed by the Chevron-Texaco merger.

[76] Id., p. 15, shows that even excluding mega-mergers like Exxon-Mobil, mergers and acquisitions equal 15 to 25 percent of total additions to investment. Similarly, Id. P. 55, remarks on the growth of nonintegrated refiners (p. 55), but recent of the 13 companies noted, at least four (including three of the largest) are either a joint venture of vertically integrated companies or have recently been reintegrated through merger. Joint operating agreements also abound in the industry.

[77] FTC. *Midwest Gasoline Price Investigation.* The West Coast gasoline market has also been the object of repeated complaints about pricing behavior.

[78] FTC, *Midwest Gasoline Price Investigation*, p. 4.

> imports from traditional Western hemisphere sources, such as Venezuela, Virgin Islands, and Canada.[79]

In fact, the "strength" in the U.S. market represents a sustained run up of over 20 cents at the pump and over 30 cents in the refiner/marketer share. This is a much larger "price difference" than historically has been the case and raises the question of why didn't gasoline from foreign sources "find their way" to the U.S. sooner to restrain price increases.

Prices run up quickly because of even slight disruptions in the supply demand balance and producers are slow to react because they do not fear that others can bring product to market and steal their business. Consequently, prices are said to be sticky downward.[80] There is a debate about whether gasoline prices change asymmetrically with respect to crude oil prices. The majority of published studies find support for the "rockets and feathers" view.[81] Prices rise like rockets and float down like feathers. The debate centers around whether the price changes in crude oil (up and down) are fully and finally reflected in the pump price. Borenstein and the General Accounting Office find the difference to be a penny or two per gallon.[82]

> Finally, in the transmission of price increases from wholesale to retail, we find evidence of asymmetry: retail prices change more quickly in response to wholesale price increases than to wholesale price decreases...
>
> The asymmetry implies that variability in crud oil prices, even if there is no systematic increase or decrease in price, is costly to consumers.[83]

Borenstein offers two explanations that raise the possibility of "short run market power among retailers."[84]

> Hypothesis 1. Prices are sticky downward because when input prices fall the old output price offers a natural focal point for oligopolistic sellers...
>
> An oligopolistic coordination equilibrium of the kind described here is consistent with a rapid response of prices to positive cost shocks and a slow response to

---

[79] U.S. Department of Energy, Energy Information Administration, *Assessment of Summer 1997 Motor Gasoline Price Increase*, May 1998, p. 17.

[80] Energy Information Administration, *Price Changes in the Gasoline Market,* March 1999, reviews several decades of studies with mixed results in the analysis of gasoline price asymmetry – the tendency of prices to increase rapidly, but fall slowly. The report concludes that there is strong evidence of pattern asymmetry (i.e. prices do rise faster than they fall) but not amount asymmetry (eventually the fall back all the way). This is not the majority view, however.

[81] Bacon, Robert W., "Rockets and Feathers: The Asymmetric Speed of Adjustment of UK Retail Gasoline Prices to Cost Changes," *Energy Economics* 1991; Reilly, Barry and Robert Witt, "Petrol Price Asymmetry Revisited," *Energy Economics,* 1998.

[82] Borenstein, Gasoline Prices, p. 322; U.S. General Accounting Office, "Energy Security and Policy: Analysis of the pricing of Crude Oil and Petroleum Products (Washington, DC, March 1993).

[83] Id., pp. 306... 322.

[84] Id., p. 305.

> negative shocks. The response to costs shocks would be asymmetric because retailers would refrain from cutting prices in response to a negative price shock and would instead rely on prevailing prices as a focal point for oligopolistic coordination. Retailers would not exercise similar restraint after a positive cost shock...
>
> If stations in an area are operating at competitive margins and then the wholesale price of gasoline declines, it seems plausible that each station might maintain its retail price until it sees convincing evidence (in the form of lower sales) that competing stations have lowered price. The sellers are certainly not price takers and the buyers are not completely informed about the price of each seller...
>
> Hypothesis 3: Volatile crude oil prices create a signal-extraction problem for consumers that lowers the expected payoff from search and makes retail outlets less competitive...
>
> This result is consistent with the theoretical work... which demonstrates that consumers may search less when the common input prices of all retailers become variable, causing short-run decreases in the elasticity of demand that each retailer faces. It is also consistent with a model of sticky downward price adjustment in an oligopoly with imperfect monitoring[85]

One fundamental difference between the price spikes of recent years and the "rockets and feathers" debate should be underscored. In the recent circumstances, we are not dealing with crude oil price changes, so the question is not whether refiner/marketer margins "catch up," or whether some of the change in price ends up in the refiner/marketer pockets (bottom line). The recent price spikes have been entirely driven by refiner/marketer margins. Even if margins return to historic levels after the spike, there is no doubt that a net increase in marketer margins has occurred. The question is why? The following example serves to underscore the problem.

The *Wall Street Journal* recently identified the company that "withheld" supplies during the summer 2000 price spike in the Midwest as Marathon oil.[86] Within that market, Marathon "only" has a market share of 16 percent in a market that is just below the cutoff point of the unconcentrated level. It is the number two refiner in that market. Does it have market power?

In the short term, it may well have such power, as the following example shows. Assume a demand elasticity of .2 and a supply elasticity of .5. Assume no collusion between firms. Nevertheless, the unilateral action of such a firm could raise prices by 25 percent in the

[85] Id., p. 324... 328... 335.

[86] "FTC Alleges Marathon Ashland Withheld Gasoline to Increase Profits," June 11, 2001.

short term.[87] Even if this were only applied to refiner/marketer margins, the impact on price would be about $.05 per gallon. These are exactly the orders of magnitude of price effects at issue in the "rockets and feathers" gasoline price literature. More importantly, if the three dominant firms acted in parallel, as suggested by the above FTC observation on refinery investment decisions, margins could double, [88] which is what has been observed over the past two years. It may not sustain that price increase in the long term, but even $.05 per gallon even in one-market costs consumers hundreds of millions of dollars.

C. PERFORMANCE: PROFITING FROM PRICE INCREASES

The first indicator of performance to which economic analysts look for signs of market power is price. We have shown that the run-up in prices cannot be attributed to rising costs of compliance with clean air rules. Nor, as we have pointed out, are they the result of crude oil price changes. Figure 8 presents the same data as Figure 1, except that we overlay each year since 1995 one on top of the other. We start in January 1995, since that was the start of the new reformulated gasoline standard. It shows the remarkable increase in refiner/marketer margins over the past eighteen months.

The second indicator to which economic analysts look for signs of the exercise of market power is profits. The bottom line, literally and figuratively, has been a sharp run up in oil company profits over the same 18-month period (see Table 5).[89]

The profits of the integrated oil companies that dominate the refining sector have hit record highs, measured in terms of return on equity, in the past eighteen months. The price spiral of recent years has resulted in a sharp increase in industry profits. Net income from refining and marketing doubled in 2000, compared to 1999. In the first quarter of 2001, profits increased by almost 75 percent. Overall profits for these companies followed a similar pattern

[87] The formula for estimating the Lerner index is:

$$L = \frac{(P - C)}{P} = \frac{1}{E_d} \qquad \frac{S}{e_m^d + e_j^s(1 - s_i)}$$

Under the assumptions specified we arrive at the following estimate

L=.16/(.2 +(.84*.5))
L=.5/.62
L=.258

[88] The three firm market share is approximately 50 percent. Therefore,

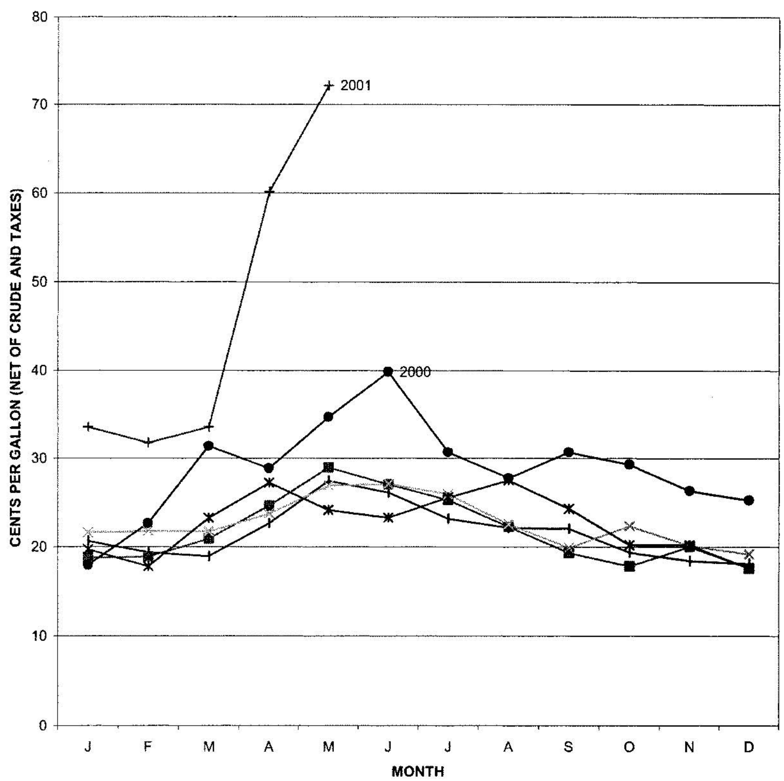
L=.5/(.2 +(.5*.5))

L=.5/.45

L=1.11

[89] Public Citizen, *Record Oil Company Profits Underscore Market Consolidation*, May 31, 2001; *Fortune 500*, July 18, 2001; *Business Week First Quarter Results*, May 21, 2001

FIGURE 8
INCREASING REFINER/MARKETER SHARE OF GASOLINE PUMP PRICE: 1995-2001



Source: Source: U. S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Tables 9.4, for pump prices; *Petroleum Marketing Monthly,* Table 1 for crude prices and Table 6 for prices net of taxes.

TABLE 5:
INCREASING PROFITS FOR OIL OPERATIONS

	PERCENT INCREASE IN PROFITS ANNUAL 1999 – 2000	1ST Q 2000 - 2001
MAJORS (9 FIRMS)		
REFINING AND MARKETING	93	71
INTEGRATED OIL (Exploration, production, refining and marketing)	145	76
PETROLEUM REFINING (FORTUNE, 16 FIRMS)	148	
COAL OIL AND GAS (BUSINESS WEEK, 27 FIRMS)		89

Sources: Public Citizen, *Record Oil Company Profits Underscore Market Consolidation*, May 31, 2001; *Fortune 500*, July 18, 2001; *Business Week First Quarter Results*, May 21, 2001

It should be noted that although 1999 was a slightly below average year, 2000 was an extremely good year. *Fortune* reports return on equity of 25 percent in 2000,[90] while *Business Week* reports 22 percent.[91] This is almost twice the historic average for the industry and about 50 percent more than other large corporations.[92] Thus, even as prices "settle down" to 2000 levels, they are coming to rest at a plateau that is incorporating excessive rates of profit.

D. CONCLUSION

In the past half decade the industry has undergone a major merger wave and subsequent consolidation and restriction of capacity (see Figure 9). While demand for petroleum products grew about 10 percent, refinery capacity continued to fall short. More importantly, the number of refineries, the amount of storage capacity and the number of branded gasoline stations each declined by more than ten percent. This contraction and consolidation reflected business decisions and in the past two years, they have had their inevitable effect. Price spirals of recent years have resulted in a sharp increase in industry profits.

In summary, this analysis demonstrates that gasoline markets are volatile and suffer competitive problems. Market fundamentals including basic conditions (inadequate capacity and inelastic supply and demand), market structures (ownership concentration and vertical integration), corporate conduct (capacity and production decisions), and market performance (price and profits) all point toward the potential for the abuse of market power.

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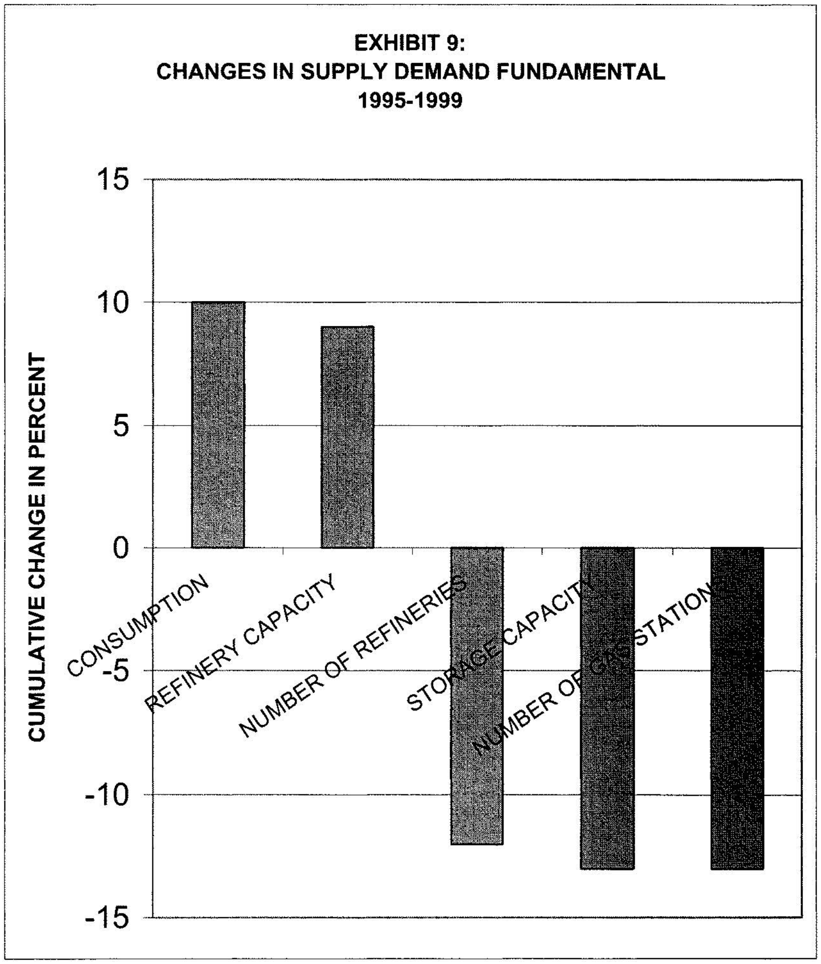
[90] *Fortune 500*, July 18, 2001.

[91] *Business Week*, Spring 2001, p. 92.

[92] U.S. Department of Energy, Energy Information Administration, *Performance Profile*, pp. 7-8.



Sources: Source: U. S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Tables 3.1a, for consumption; *Petroleum Supply Annual*, Table 36 for refinery capacity and number, Table 44 for storage capacity, *National Petroleum New*, Mid-July Special for number of branded gasoline stations.

IV. EQUITY CONSIDERATIONS: THE IMPACT OF EXPENDITURES AND PRICE CHANGES FOR GASOLINE ON HOUSEHOLDS

Economics focuses on efficiency. It has difficulty dealing with distributional or equity issues.[93] In simple terms, economists treat every dollar equally. As a practical matter, an additional dollar gained or lost may mean much more to a low-income person than a wealthy one.[94] This chapter briefly reviews the equity impacts of expenditures on gasoline. These impacts have certainly played a part in the policy debate.

A. EXPENDITURE PATTERNS

In Figure 2 we presented the percentage of income spent by those households with vehicles at each income level from the 1994 Residential Transportation Energy Consumption Survey, as well as the expenditures for all households in that survey and the Consumer Expenditure Survey of 1999. It shows the pattern of a necessity, with lower income households spending a larger percentage of their income on gasoline.

Table 6 provides more detail on this issue. Approximately 87 percent of all households had a vehicle. They consumed over 1000 per gallons per year. On average households with vehicles spend over $1,000 per year.

Virtually all upper middle and upper income households (incomes above $50,00 per year) have a vehicle. They consume about 1300 to 1400 gallons per year and spend about $1,500 per year.

Far fewer lower income households have a vehicle and those with vehicles consume considerably less energy. Households with incomes below $10,000 or those eligible for federal assistance) consume 700 to 800 gallons per year and spend $800 to $900 per year.

Expenditures for recent years exhibit similar patterns. Averaged across all households (as opposed to those with vehicles) upper income households spend about three times as much

[93] Scherer and Ross, p. 4, note as one of their performance indicators the following:

> The distribution of income should be equitable. Equity is notoriously difficult to define, but it implies at least that producers do not secure rewards in excess of what is needed to call forth the amount of services supplied.

[94] Id., p. 28, offers the following observation on the equity issue in terms of evaluating the impact of monopoly versus competition.

> If all families of a given size have similar income utility functions, the marginal utility of income must be higher for the multitudes who supply only their labor services than for the wealthy few with substantial monopoly shareholdings. A redistribution of income away from monopolists and toward labor suppliers will therefore add to the sum of utility for all citizens. Yet however appealing this may appear on intuitive grounds, there is no scientific way of making the interperonsal utility comparison required to support it. Therefore, we tread warily when we say that competition is beneficial not only because it allocated resources efficiently, but also in terms of income distribution equity.

TABLE 6: HOUSEHOLD GASOLINE CONSUMPTION BY INCOME GROUPS (1994)

INCOME GROUP	1994 HOUSEHOLD TRANSPORTATION PERCENT WITH VEHICLE	CONSUMPTION, HOUSEHOLDS WITH VEHICLES		AVERAGE ALL HOUSEHOLDS	1999 CES AVERAGE ALL HOUSEHOLDS
		GALLONS PER YEAR	$/YEAR	$/YEAR	$/YEAR
LOW INCOME					
LESS THAN $10,000	58	670	772	448	512
ELIGIBLE FOR FEDERAL ASSISTANCE	67	828	957	641	
AVERAGE INCOME	87	1067	1234	1076	1071
UPPER INCOME					
$50,000 TO 74,999	98	1325	1528	1497	1576
$75,000 OR MORE	99	1443	1692	1675	

Source: U.S. Department of Energy, *Household Vehicle Energy Consumption: 1994*, Table 5.2, 5.18; *Residential Energy Consumption Survey: 1994*, Table 5.1.U. S. Bureau of the Census, Department of Labor Statistics, *Consumer Expenditure Survey: 1999*, Table 2.

on gasoline as lower income households. While consumption rises with income, it does not rise as fast as income. Therefore, the expenditure on gasoline takes a smaller and a larger share of the income of lower income households.

Among very low-income households (incomes below $5,000), gasoline expenditures take a third of income for those who have a vehicle. For the lower income group as a whole, the percentage is about 15 percent. For lower and lower middle income households, gasoline expenditures take 5 to 10 percent of income for households with vehicles. For all households in these groups, the average percentage of income devoted to gasoline is between 3 and 7 percent. Conversely, for upper income households gasoline expenditures take less than two percent of income.

B. ENERGY EXPENDITURES AND TAX CUTS

This pattern of spending helps to explain the skeptical reaction that met President Bush's claim that one reason to rush the income tax cut was to offset energy price increases.[95] Because of the distribution of energy expenditures, there is a mismatch between energy price increases and tax cuts. Those upper income households who get most dollar savings from the tax cut do not incur most gasoline expenditures. They receive about 1.5 times as much.

Table 7 shows the distribution of gasoline expenditures and tax cuts by income quintiles. The bottom two quintiles (low and lower middle income) pay about a quarter of the gasoline

[95] NBC, *Evening News,* May 14, 2001.

bill, but they receive about one-twelfth of the tax cuts. The wealthiest 20 percent of the population pays about 31 percent of the gasoline bill but receives about 59 percent of the fully phased in tax cut.

TABLE 7: DISTRIBUTION OF ENERGY EXPENDITURES AND TAX CUTS BY INCOME QUINTILES
(Percent accruing to each income group)

QUINTILES	GASOLINE[a/] EXPENDITURE	TAX CUT PHASE IN[b/] 2006
Lower	9%	1%
Lower Middle	14	7
Middle	20	14
Upper Middle	25	19
Upper	31	59

SOURCES
Gasoline, Bureau of the Census, Department of Labor Statistics, *Consumer Expenditure Survey: 1999*, Table 2. Quintiles =Table 1, "Quintiles of Income Before Taxes: Average Annual Expenditures and Characteristics, Consumer Expenditure Survey, 1999," Available at the BLS Home page. Tax Cut, Quintiles = *Bush Tax Plan Benefits are Similar to Campaign Proposal: Skewed Toward Wealthy*, Citizens for Tax

Table 8 shows a similar analysis broken down by income levels. Those with incomes below $30,000 pay about 30 percent of the gasoline bill, but they receive about 20 percent of the tax cut in 2001 and only 11 percent in 2006. Over the seven-year phase in period, they receive only 14 percent of the tax cut, less than half their share of the energy bill. Those with incomes above $50,000 pay about 47 percent of the energy bill, but they receive about 58 percent of the 2001 tax cut and about 76 percent of the fully phased in tax cut. Over the seven-year phase in of the tax cut, they receive about 70 percent of the tax cut, more than twice their share of the gasoline bill.

TABLE 8: DISTRI BUTION OF ENERGY EXPENDITURES AND TAX CUTS BY INCOME LEVELS

INCOME GROUP	GASOLINE[a/] EXPENDITURE	TAX CUT PHASE IN[b/] 2001	2006	TOTAL 2001-2006
Less Than $10k	6%	2%	0%	0%
$10K to $20K	12	7	4	5
$20K to $30K	12	12	7	9
$30K to $40K	12	12	7	8
$40K to $50K	11	11	7	8
$50K or more	47	58	76	70

SOURCES:
Gasoline, Bureau of the Census, Department of Labor Statistics, *Consumer Expenditure Survey: 1999*, "Income Before Taxes Average Annual Expenditures and Characteristics, Consumer Expenditure Survey, 1999," Available at the BLS Home page. Tax Cut = *Distributional Effects of A Chairman's Mark of the "Restoring Earnings to Lift Individuals and Empower Families ('Relief') Act of 200*, Joint Committee on Taxation, May 11, 2001

V. POLICY RESPONSES

A. ECONOMIC FUNDAMENTALS AND POLICY PRINCIPLES

Public policy responses must reflect physical and economic reality. Since the laws of physics cannot be repealed, public policy must be cognizant of the increased likelihood and severe impact of accidents in energy industries, like refineries and pipelines. Physical and institutional structures must be prepared to deal with accidents in this industry.

The low short run elasticity plays a critical role in price volatility and the exercise of market power. The extremely low elasticity of demand is one of the key characteristics of the gasoline market. Suppliers are well aware of the rigidities in the market and can take advantage of them under the right circumstances. Because the gasoline market is so large, even small and short term pricing abuse imposes substantial costs on the public.

Under these circumstances, firms with relatively small market shares can increase profits by withholding supplies, unless the elasticity of supply is high. Unfortunately, petroleum product markets do not exhibit very elastic supply. Reserve margins and stocks are crucial.

1. Supply

Avenues for increasing supply are available, but they may not be pursued, if left to industry business decisions. Since short-term elasticities are quite low, a variety of resources that can be called upon to meet demand quickly are necessary to prevent price volatility. Having reserve margins of production and transport capacity would dampen price volatility. Stockpiles and storage are the best option when demand shifts or supply is interrupted. Import of product is an important option when refinery capacity is not available or, depending on geographic location, when pipeline capacity is not available.

The recent closure of refineries also suggests an avenue for expanding capacity. The most readily available path to expanding capacity may be to identify existing facilities that have been shuttered, or sites that have been recently abandoned to expand capacity while minimizing environmental impact should be explored. Each of these options should be considered, particularly in markets where capacity is tight and ownership is concentrated.

The behavior of small refiners in response to the elimination of programs that supported their existence makes it clear that public policy can affect the number and geographic distribution of refinery capacity. If we want geographically dispersed refinery capacity to promote local responses to supply problems, we just have to pay for it.

2. Demand

In the long run, reducing the size of the market, without imposing deprivation on consumers, is the major policy challenge.

The consumption patterns deeply embedded in spatial relationships lead us to conclude that increased fuel economy is the more readily achievable approach to reducing gasoline consumption than changing living patterns. Reducing fuel use per vehicle allows existing mobility patterns to be preserved, while consumption is reduced.

Shifting preferences for vehicles (toward higher efficiency vehicle types) requires greater change in social behaviors. It is also vulnerable to changes in taste. Moreover, it requires a change in the stock over a substantial period of time, perhaps a decade. While policies to affect these behaviors should be pursued, their complexities and difficulties should be recognized.

Attempting to overlay mass transit on existing living patterns may be pursued as a long-term strategy. However, given consumer preferences and the spatial distribution of activity, this is a substantial task. The increasing suburbanization of living patterns frequently results in relatively low densities and high costs for mass transit. Changing the geographic distribution of work, home and play, requires the greatest amount of social change.

3. Distributional Effects

Equity impacts of rising energy prices, particularly as they affect low and lower middle income households, must be dealt with directly. Neither general tax cuts nor existing energy assistance programs, such as the Low Income Home Energy Assistance Program (LIHEAP), address the problem of rising or volatile transportation energy costs. Even if it could be argued that LIHEAP addresses the general energy needs of groups, ad hoc efforts to increase programs like LIHEAP tend to fall short and come long after the impacts of rising energy prices have been felt.

B. POLICY TARGETS

It is time for public policy to seek permanent institutional changes that both reduce the chances that markets will be tight and reduce the exposure of consumers to the opportunistic exploitation of markets when they become tight. To achieve this reduction of risk public policy should be focused on achieving five primary goals

- Restore reserve margins by developing both efficiency (demand-side) and production (supply-side).
- Increase market flexibility through stock and storage policy.
- Discourage private actions that make markets tight/or exploit market disruptions by countering the tendency to profiteer by withholding of supply.
- Promote a more competitive industry.
- Address the disproportionate burden that rising energy price place on lower income households.

1. Expand Reserve Margins By Striking A Balance Between Demand Reduction and Supply Increases

We have earlier identified the hierarchy of policies to reduce demand. Increasing the fuel efficiency of the fleet through increased standards for mileage and use of hybrid vehicles should be given top priority. Shifting preferences for vehicle types and modes of transportation through taxes and incentives are a second category to be considered.

A goal of achieving an improvement of vehicle efficiency (reduction in fleet average miles per gallon) equal to economy wide productivity over the past decade (when the fleet failed to progress) would have a major impact on demand. It would require the fleet average to improve at the same rate it did in the 1980s. It would raise average fuel efficiency by five miles per gallon, or 20 percent. This is a mid-term target. This rate of improvement should be sustainable for several decades. This would reduce demand by 1.5 million barrels per day. This would return consumption to the level of the mid-1980s.

Expanding refinery capacity by 10 percent equals approximately 1.5 million barrels per day. This would require 15 refineries, if the average size equals the refineries currently in use. This is less than one-third the number shut down in the past ten years and less than one quarter of the number shut down in the past fifteen years. Alternatively, a ten percent increase in the size of existing refineries, which is the rate at which they increased over the 1990s, would do the trick, as long as no additional refineries were shut down.

Placed in the context of redevelopment of recently abandoned facilities or expansion of existing facilities, the task of adding refinery capacity does not appear to be daunting. Such an expansion of capacity has not been in the interest of the businesses making the capacity decisions. Therefore, public policies to identify sites, study why so many facilities have been shut down, and establish programs to expand capacity should be pursued.

Once the magnitude of the task on the supply-side is placed in perspective, and given the objective analysis of the environmental costs involved, the call to overturn environmental laws loses its force. It seems that expansion of supply-side capacity can be accomplished within the current confines of environmental laws. To the extent that the costs of compliance can be demonstrated to be a significant problem, then underwriting compliance (directly through financial subsidies or indirectly through research) rather than relaxing standards should be pursued.

This combination of demand-side and supply-side policies to improve the long run market balance would restore the supply/demand balance to levels that typified the mid-1980s.

2. Expanding Storage And Stocks

It has become more and more evident that private decisions on the holding of stocks will maximize short term private profits to the detriment of the public. Increasing concentration and inadequate competition allows stocks to be drawn down to levels that send markets into price spirals. While the strategic petroleum reserve has been developed as a strategic stockpile and companies generally take care of operating stocks, the marketplace is clearly not attending to economic stockpiles. Companies will not willingly hold excess capacity for the express purpose of preventing price increases. They will only do so if they fear that a lack of supply or an increase in brand price would cause them to lose business to competitors who have available stocks. Regional gasoline markets appear to lack sufficient competition to discipline anti-consumer private stock policies.

Public policy must expand stocks. Participants in the distribution of gasoline can be required to hold stocks as a percentage of retail sales. Public policy could also either directly support or give incentives for private parties to keep storage. It could lower cost of storage through tax incentives by draw down stocks during seasonal peaks. Finally, public policy could directly underwrite stockpiles. We now have a small Northeast heating oil reserve. It should be continued and sized to discipline price shocks, not just prevent shortages. Similarly, a Midwest gasoline stockpile should be considered.

3. Taking The Fun And Profit Out Of Market Manipulation

In the short term, government must turn the spotlight on business decisions that make markets tight or exploit them.

Withholding of supply should draw immediate and intense public scrutiny. It needs to be backed up with investigations. Since the federal government is likely to be subject to political pressures not to take action, state government should be authorized and supported in market monitoring efforts. A joint task force of federal and state attorney's general could be established on a continuing basis. The task force should develop databases and information to analyze the structure, conduct and performance of gasoline markets.

As long as huge windfall profits can be made, private sector market participants will have a strong incentive to keep markets tight. The pattern of repeated price spikes and volatility has now become an enduring problem. Because the elasticity of demand is so low – because gasoline is so important to economic and social life – this type of profiteering should be discouraged. A windfall profits tax that kicks in under specific circumstances will take the fun and profit out of market manipulation.

Ultimately, market manipulation could be made illegal.

4. Promoting A Workably Competitive Market

Further concentration of these industries is quite problematic. The Department of Justice Merger Guidelines should be rigorously enforced. Moreover, the efficiency defense of consolidation should be looked on skeptically, since inadequate capacity is a market problem.

Restrictive marketing practices, such as zonal pricing and franchise restrictions on supply acquisition should be examined and discouraged. These practices restrict flows of product into markets at key moments.

Markets should be expanded by creating more uniform product requirements. These should not result in a relaxation of clean air requirements.

5. Low-income assistance

Rather than fight repeated battles over supplemental appropriations, it would be more effective to index assistance payments to energy prices. It may be time to consider new programs that deal directly with transportation fuel costs. Transportation energy is a necessity in the 21^{st} century.

D. CONCLUSION

Reviewing this list of policy targets, it can be seen that several policies that the National Energy Policy Task force recommended have been included. The problem with the task force recommendations is that it took far too narrow a view and placed priority on one factor, expanding capacity. The nature and extent of competition and demand are market fundamentals that require equal consideration and emphasis.

Consumer Federation of America

SPRING BREAK IN THE U.S. OIL INDUSTRY:

PRICE SPIKES, EXCESS PROFITS AND EXCUSES

MARK COOPER

OCTOBER 2003

Contents

EXECUTIVE SUMMARY 1

I. GASOLINE PRICE SHOCKS ARE A DOMESTIC REFINING AND DISTRIBUTION PROBLEM 7

BILLIONS OF DOLLARS OF DOMESTIC OVERCHARGES CAUSE HIGH GASOLINE PRICES 7
THE DOMESTIC REFINER/MARKETER SPREAD 10
PROFITING FROM PRICE INCREASES IN CONCENTRATED MARKETS 14

II. ECONOMIC FUNDAMENTALS OF GASOLINE MARKETS 16

INADEQUATE COMPETITION IN THE OIL INDUSTRY IS A MAJOR CAUSE OF PRICE SPIKES 16
DEMAND IS INELASTIC AND GENERALLY PREDICTABLE 17
SUPPLY IS INELASTIC 20

III. BUSINESS STRATEGIES CREATE AND EXPLOIT MARKET POWER 21

SUPPLY IS TIGHT AS A RESULT OF BUSINESS DECISIONS TO NOT ADD CAPACITY 21
THE DOMESTIC OIL INDUSTRY HAS BECOME DANGEROUSLY CONCENTRATED 26
CONDUCT: EXPLOITING TIGHT MARKETS 31

IV. POLICIES TO COMBAT SHORT TERM VOLATILITY AND CREATE LONG TERM STABILITY 34

EXPAND RESERVE MARGINS BY STRIKING A BALANCE BETWEEN DEMAND REDUCTION AND SUPPLY INCREASES 34
EXPANDING STORAGE AND STOCKS 35
TAKING THE FUN AND PROFIT OUT OF MARKET MANIPULATION 35
PROMOTING A WORKABLY COMPETITIVE MARKET 36

ENDNOTES 37

LIST OF EXHIBITS

EXHIBIT I-1: DOMESTIC PRICE INCREASES ACCOUNT FOR TWO-THIRDS OF THE GASOLINE PRICE INCREASE SINCE THE ELECTION OF GEORGE BUSH............7
EXHIBIT I-2: DOMESTIC REFINER/MARKETER SPREAD: 1995-2003.................... 8
EXHIBIT I-3: DOMESTIC REFINER/MARKETER SPREAD: SEASONAL BASIS............11
EXHIBIT I-4: ACTUAL VS. HISTORIC DOMESTIC SPREAD: 1995-2003..................12
EXHIBIT I-5: DOMESTIC REFINER/MARKETER SPREAD: SEASONAL BASIS........... 13
EXHIBIT I-6: RESIDENTIAL HEATING OIL SPREAD.................................... 14
EXHIBIT I-7: REFINING/MARKETING OPERATING INCOME............................ 15
EXHIBIT II-1: GASOLINE PRODUCT SUPPLIED... 18
EXHIBIT II-2: LIGHT VEHICLE FUELS EFFICIENCY....................................19
EXHIBIT III-1: OIL INDUSTRY MERGERS AFFECTING REFINING CAPACITY SINCE 1995..22
EXHIBIT III-2: REFINERY CAPACITY AND PRODUCT SUPPLIED........................23
EXHIBIT III-3: REFINERIES AND REFINERY CAPACITY................................ 24
EXHIBIT III-4: GASOLINE STOCKS ON HAND: DAYS OF SUPPLY ABOVE OPERATIONAL INVENTORY LEVELS..25
EXHIBIT III-5: CONCENTRATION OF REFINERIES IN REGIONAL MARKETS..........27
EXHIBIT III-6: CONCENTRATION OF GASOLINE DISTRIBUTION IN STATE MARKETS.. 28
EXHIBIT III-7: OUTLETS AND REFINERY INTEGRATION 30

Consumer Federation of America

SPRING BREAK IN THE U.S. OIL INDUSTRY: PRICE SPIKES, EXCESS PROFITS AND EXCUSES

EXECUTIVE SUMMARY

DOMESTIC GASOLINE PRICE SHOCKS

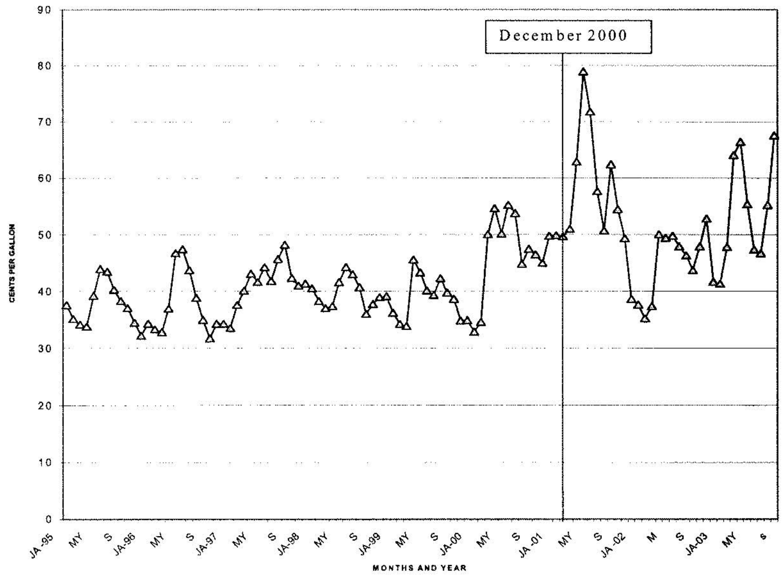
While the politicians in Washington furiously debate whether to drill for oil in pristine and environmentally fragile areas, gasoline consumers across the nation have suffered through a wild price spiral that makes the debate irrelevant. The largest cause of rising gasoline prices in recent years is the domestic refining and marketing sector, not crude oil prices or where it comes from.

Over half of the average increase of 26 cents per gallon in the price paid at the pump since the election of George Bush has been caused by domestic refining and marketing charges. The four price spikes since December 2000 caused by domestic refining and marketing have resulted in an increase of over $30 billion in gasoline prices (see Exhibit ES-1).

This paper shows that business decisions are a major cause of the problem. While the operation of the domestic oil market is complex and many factors contribute to pricing problems, one central characteristic of the industry stands out – it has become so concentrated in several parts of the country that competitive market forces are weak. Long-term strategic decisions by the industry about production capacity interact with short-term (mis)management of stocks to create a tight supply situation that provides ample opportunities to push prices up quickly. Because there are few firms in the market, prices hold above competitive levels for significant periods of time. With an administration in Washington that is very unlikely to criticize or restrain the oil industry (both the President and the Vice President came out of the industry), oil companies have the opportunity to flex their pricing power.

The problem is not a conspiracy, but the rational action of large companies with market power. With weak competitive market forces, individual companies have flexibility for strategic actions that raise prices and profits:

EXHIBIT ES-1: DOMESTIC REFINER/MARKETER SPREAD: 1995-2003

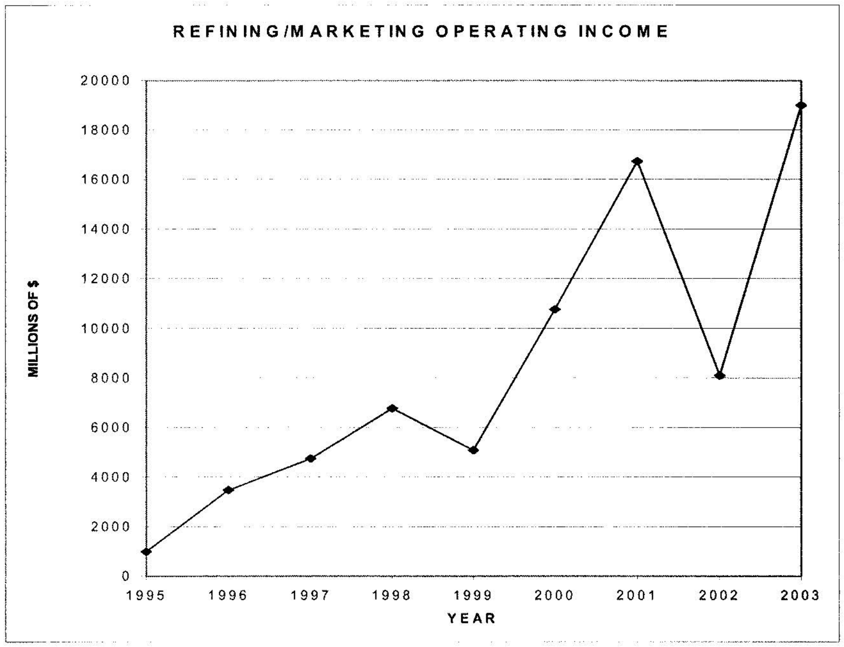


Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, *Petroleum Marketing Monthly*, *Weekly Petroleum Status Report*, various issues.

- Individual companies can let supplies become tight in their area and keep stocks low, since there are few competitors who might counter this strategy.
- Companies can simply push prices up when demand increases because they have no fear that competitors will not raise prices to steal customers.
- Individual companies do not feel compelled to quickly increase supplies with imports, because their control of refining and distribution ensures that competitors will not be able to deliver supplies to the market in their area.
- Because there are so few suppliers and capacity is so tight, it is easy to keep track of potential threats to this profit maximizing strategy.

Every accident or blip in the market triggers a price shock and profits mount (see Exhibit ES-2). Moreover, operating the complex system at very high levels of capacity places strains on the physical infrastructure and renders it susceptible to accidents.

EXHIBIT ES-2: REFINING/MARKETING OPERATING INCOME



Source: Energy Information Administration, U.S. Department of Energy, *Performance Profiles of Major Energy Producers: 2001* (January 2003), Table B32; *National Petroleum News*, "Signs of Life," March 2003, Corporate, Downstream Earnings for Major Oil Continue to Rebound," October, 2003; oil industry Second Quarter 2003 financial reports. 2003 estimated based on comparison of 1H01 to 1H03.

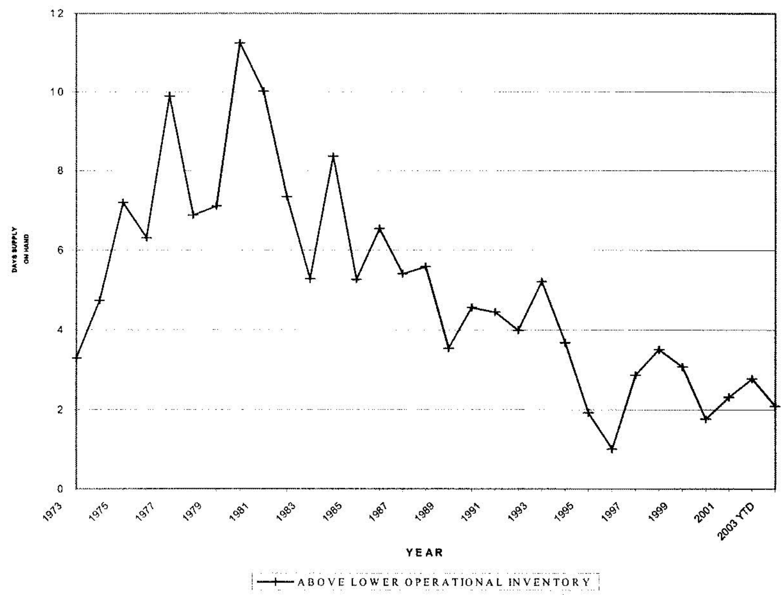
Yet, policymakers have done nothing to address these underlying problems, other than wring their hands and remark about how tight refining capacity is and how low stockpiles were prior to the spike.

SUPPLY

There are two clearly identifiable trends affecting the supply side of the gasoline market – a reduction in capacity relative to demand and an increase in concentration.

In 1985 refinery capacity equaled daily consumption of petroleum products. By 2000, daily consumption exceeded refinery capacity by almost 20 percent. The problem is not

EXHIBIT ES-3: GASOLINE STOCKS ON HAND: DAYS OF SUPPLY ABOVE OPERATIONAL INVENTORY LEVELS



Source: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Monthly*, various issues, Table, S4, Figure S6; *Weekly Petroleum Status Report.*

simply that no new refineries have been built, but that in the past 15 years about 75 refineries were closed. Reductions in storage capacity and the number of gasoline stations of over ten percent have also taken place in just the past half-decade.

These reductions in capacity have been driven in part by a merger wave that has resulted in a significant increase in the concentration of ownership of refinery capacity and gasoline outlets. Four-fifths of regional refinery markets have reached levels of concentration that trigger competitive concerns, even by the standards adopted by the antitrust division of the Reagan administration's Department of Justice. In these markets, the largest four firms account for at least one-half and as much as three quarters of the refined product output. A similar trend has been in evidence at the level of gasoline stations.

Even more ominous for short-term price volatility is the fact that stockpiles have declined dramatically (see Exhibit ES-3). Storage capacity has been reduced and economic reserves – reserves above what is needed just to keep the system running – have been slashed.

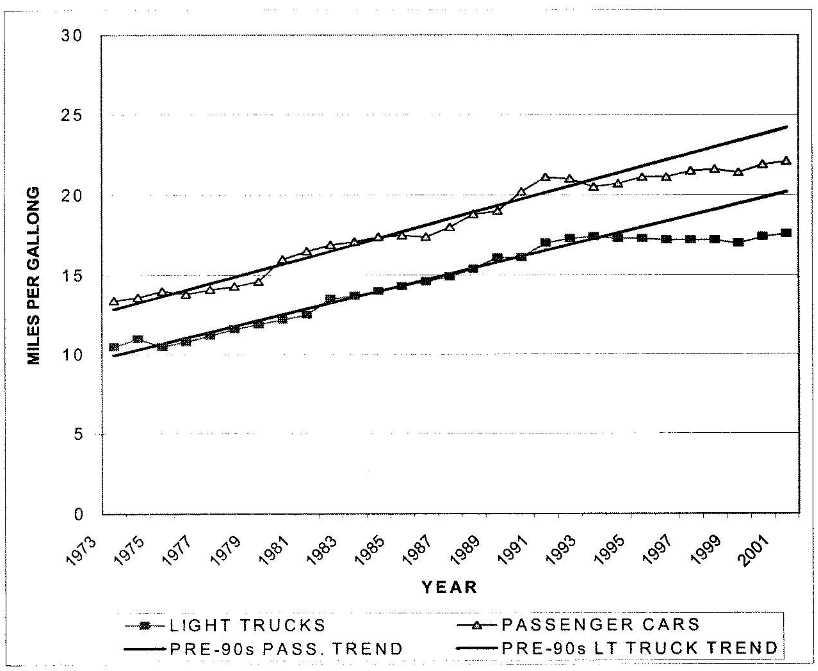
The industry now typically has no more than a day or two of gasoline supplies above its operational minimum, compared to a week or so in the 1980s. Thus, there is little reserve capacity to dampen price increases.

DEMAND

The demand side of the market creates additional pressures and vulnerabilities to price spirals. The demand for gasoline does not respond quickly to price in the short term. When demand is "inelastic" as it is in the gasoline market, suppliers have a better chance of making price increases stick when there is little spare capacity. Increasing demand has reduced spare capacity.

From the second oil price shock in 1979 through 1991, fuel efficiency improved by almost 50 percent (see Exhibit ES-4). In the ensuing decade, there was little if any progress because public policy stopped requiring improvements in fuel efficiency. Had fuel efficiency

EXHIBIT ES-4: LIGHT VEHICLE FUELS EFFICIENCY



Source: U. S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Tables 1.10.

continued to improve, the U.S. would be consuming well over a million barrels per day less of gasoline.

Consumer-Friendly Policies To Break The Price Spiral

In summary, this analysis demonstrates that gasoline markets are volatile and suffer competitive problems. Market fundamentals (inadequate capacity and inelastic supply and demand), market structures (ownership concentration and vertical integration), corporate conduct (capacity and production decisions), and market performance (price and profits) all point toward the potential for the abuse of market power.

Vigorous and broad based public policies should be pursued to implement permanent institutional changes that reduce the chances that markets will be tight and reduce the exposure of consumers to the opportunistic exploitation of markets when they become tight. To achieve this reduction of risk, public policy should be focused on achieving several interrelated goals.

Restore reserve margins by developing both efficiency and production: Increasing fuel efficiency at the rate achieved in the 1980s in the decade ahead would save about 1.5 to 2 million barrels per day in the decade ahead. Increasing refinery capacity by 10 percent, either through expansion at existing refineries or redevelopment of less than one half of the refineries closed in the past decade, would add another 1.5 to 2 million barrels per day.

Increase market flexibility: Expanding stockpiles – with tax incentives to hold and draw down supplies in the fact of price increases, and/or mandatory stocks requirements as a percentage of sales, and/or government owned/privately operated supplies – could alleviate the chronic problem of inadequate stockpiles.

Promote a more competitive industry: Further concentration of the petroleum industry should be resisted by vigorous enforcement of the Department of Justice Merger Guidelines. Restrictive marketing practices, such as zonal pricing and franchise restrictions on supply acquisition, should be investigated and discouraged.

Deter private actions that make markets tight or exploit market disruptions. Withholding of supply should draw immediate and intense public and governmental scrutiny through a joint federal state task force of attorney's general. Manipulation of product, commodityand derivatives markets should be prevented. The incentives to manipulate markets can be reduced by imposing a windfall profits tax that triggers under specific circumstances of price and profit increases.

I. GASOLINE PRICE SHOCKS ARE A DOMESTIC REFINING AND DISTRIBUTION PROBLEM

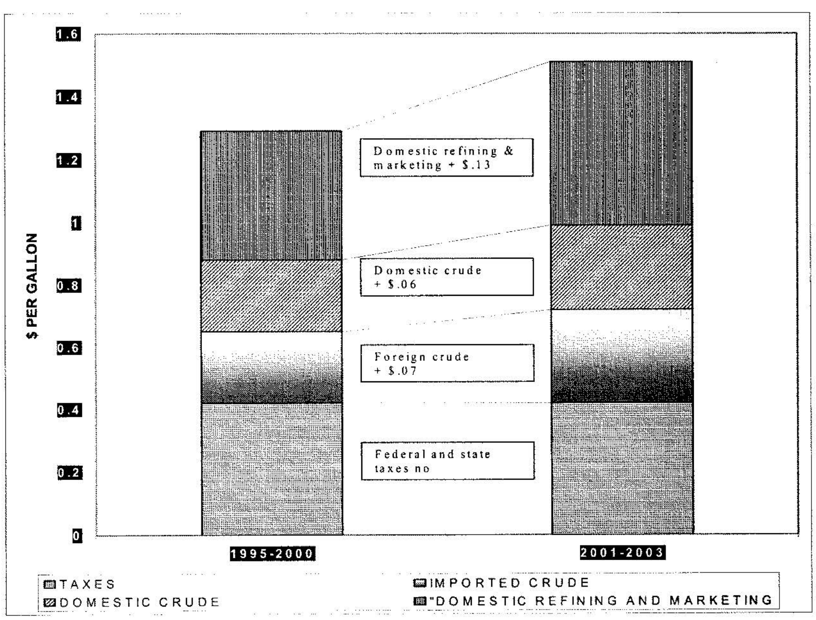
BILLIONS OF DOLLARS OF DOMESTIC OVERCHARGES CAUSE HIGH GASOLINE PRICES

While the politicians in Washington furiously debate whether to drill for oil in pristine and environmentally fragile areas, gasoline consumers across the nation have suffered through a wild price spiral that makes the debate irrelevant. The largest cause of rising gasoline prices in recent years is the domestic refining and marketing sector, not crude oil prices or where it comes from.

Since December 2000, the increase in the domestic average pump price that is taken by domestic refiners and markets has cost the American public over $30 billion.

Of the 26 cent per gallon increase in the average price paid at the pump since the election of George Bush as President in December 2000 (see Exhibit I-1):

EXHIBIT I-1: DOMESTIC PRICE INCREASES ACCOUNT FOR TWO-THIRDS OF THE GASOLINE PRICE INCREASE SINCE THE ELECTION OF GEORGE BUSH

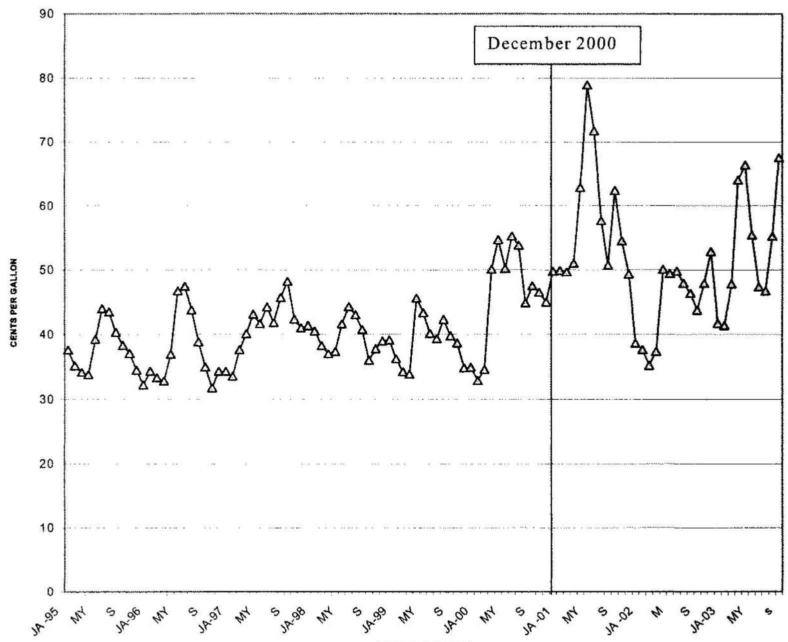


Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, *Petroleum Marketing Monthly*, *Petroleum Supply Monthly*, various issues, Tables S1, 36; *Weekly Petroleum Status Report*, various issues.

- 13 cents has been caused by an increase in the domestic refiner/marketer charges.
- 7 cents has been caused by an increase in the price of imported oil,
- 6 cents has been caused by an increase in the price of domestic oil.

For the past three years the domestic refining and marketing segment of the oil industry has taken the American gasoline consumer on a wild roller coaster ride (see Exhibit I-2). A pipeline breaks here, a refinery goes out there, or a blackout shuts down production for a day someplace else. Because stocks are so tight, prices shoot up, and stay up for an extended period of time. For one nebulous reason or another, dire predictions about larger increases are made. Loud claims of price gouging are heard from the public and some policymakers.[1] The

EXHIBIT I-2: DOMESTIC REFINER/MARKETER SPREAD: 1995-2003



Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, *Petroleum Marketing Monthly*, *Weekly Petroleum Status Report*, various issues.

ride ends, however, before the worst happens and everyone breathes a sigh of relief. A few months later, the episode is repeated.

Little attention is paid to the fact that prices never seem to get back down to where they started and even less attention is given to the underlying dynamics of why this keeps happening or what might be done about it. It is more convenient for politicians to blame accidents or crude oil production and the OPEC cartel and to act as if tight markets and a lack of stocks are acts of nature, than to confront the problem caused by the domestic oil companies.[2]

While the operation of the domestic oil market is complex and many factors contribute to pricing problems, one central characteristic of the industry stands out – it has become so concentrated in several parts of the country that competitive market forces are weak. Long-term strategic decisions by the industry about production capacity interact with short-term (mis)management of stocks to create a tight supply situation that provides ample opportunities to push prices up quickly. Because there are few firms in the market, prices hold above competitive levels for significant periods of time. With an administration in Washington that is very unlikely to criticize or restrain the oil industry (both the President and the Vice President came out of the industry) oil companies have the opportunity to flex their pricing power.

The problem is not a conspiracy, but the rational action of large companies with market power. With weak competitive market forces, individual companies have flexibility for strategic actions that raise prices and profits:

- Individual companies can let supplies become tight in their area and keep stocks low, since there are few competitors who might counter this strategy.

- Companies can simply push prices up when demand increases because they have no fear that competitors will not raise prices to steal customers.

- Individual companies do not feel compelled to quickly increase supplies with imports, because their control of refining and distribution ensures that competitors will not be able to deliver supplies to the market in their area.

- Because there are so few suppliers and capacity is so tight, it is easy to keep track of potential threats to this profit maximizing strategy.

Every accident or blip in the market triggers a price shock and profits mount. Moreover, operating the complex system at very high levels of capacity places strains on the physical infrastructure and renders it susceptible to accidents.

Given the importance of gasoline in the economy, "consumers of petroleum products in the United States expect that, as with water and electricity, public officials will ensure the reliability and affordability of supplies."[3] Americans have come to believe that the price spikes are the result of industry manipulation.[4] This paper shows that there are important ways in which this suspicion is well-founded. Over the past three years policymakers have failed to do provide consumers with a stable market and things are getting worse, not better.[5] While policymakers cannot stop accidents from happening, they can adopt policies that decrease their likelihood and, more importantly, diminish the impact that accidents have on American consumers.

The Domestic Refiner/Marketer Spread

This analysis focuses on what the U.S. Energy Information Administration calls the spread – the total pump price minus crude oil costs and gasoline taxes. It is referred to as the "domestic refiner/marketer spread" throughout the report because this cost is overwhelmingly paid to domestic refiners and marketers.[6]

The analysis focuses on gasoline. Although gasoline represents only half of the petroleum products supplied to the domestic market, and the prices for these other products have been affected by similar upward price pressures, the majority of these price increases are paid indirectly by the public. Gasoline costs are paid directly.

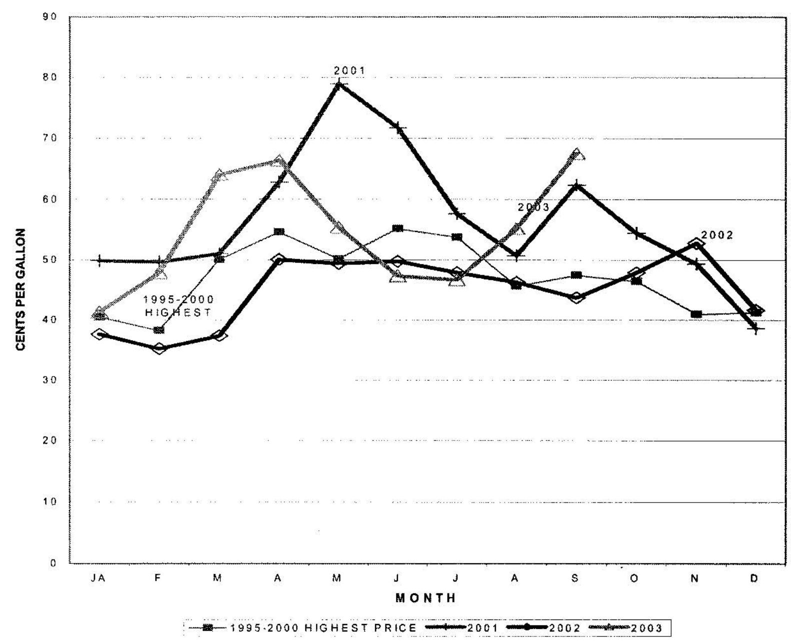
As shown in Exhibit I-2 above, the pattern of increase in the domestic spread on gasoline began in 2000, at the end of the Clinton Administration, but gained much greater intensity during the Bush Administration. When one looks at the pattern of price behavior and the movement of the domestic refiner/marketer spread in recent years, one cannot help but be struck by the dramatic change in behavior that took place after 2000.

From January 1995, when the Clean Air Act Amendments changed the behavior of the domestic refining industry, until January 2000, domestic refiner/marketer spread remained in a narrow range and followed a clear seasonal trend with moderate increases during the summer driving season. In the spring of 2000 margins jumped up, in conjunction with a much larger increase in world crude prices. In January 2001, the spread skyrocketed and remained far above historic levels.

There are two fundamental differences between price increases in 2000 and those since. First, the margin increase in 2001-2003 has been about twice as large as the 2000 increase in the spread. Second, crude oil price increases in 2001-2003 were about half as large. In other words, the domestic spread has played a much larger role in the rising price of gasoline at the pump since December 2000.

A glance at the domestic refiner/marketer spread on a seasonal basis puts this shift in industry behavior in sharp relief (see Exhibit I-3). The highest recorded monthly domestic spread since 1995 for every month of the year has occurred since December 2000 — December 2000; January, February, May, June July, October, 2001; November 2002; March, April, August and September 2003.

EXHIBIT I-3: DOMESTIC REFINER/MARKETER SPREAD: SEASONAL BASIS



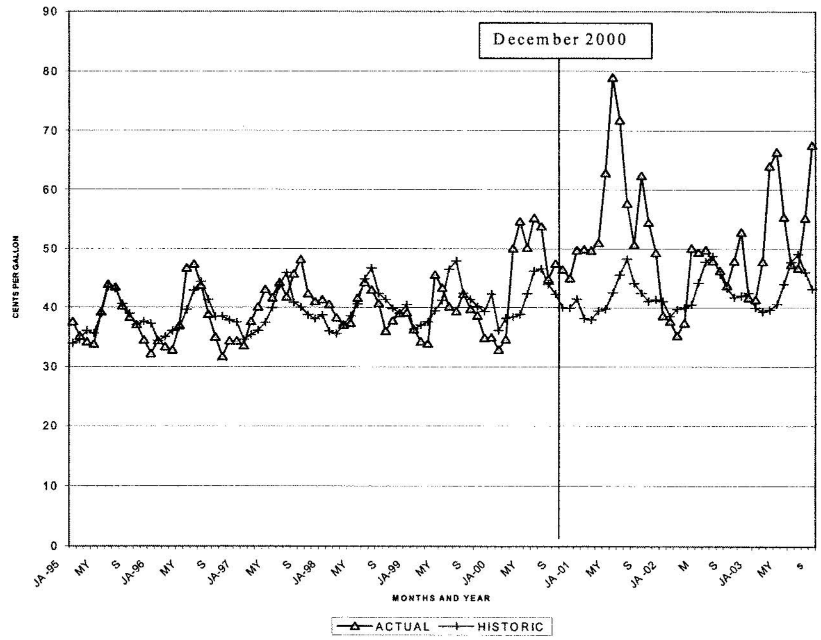
Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, *Weekly Petroleum Status Report*, various issues.

Another way to appreciate the dramatic change in domestic pricing patterns is to compare actual prices to expected prices based on historic trends. Exhibit I-4 presents a model that predicts domestic spreads on the basis of aggregate demand and season using data from January 1995 to December 2000. The fit for the model in Exhibit I-4 is quite good, except for the summer of 2000. Since December 2000, prices have been much higher than would have been expected. The total $30 billion increase noted above is derived from this analysis.

Exhibit I-5 presents another view of the change in domestic pricing. It compares the average monthly spread for 1995-2000 to the monthly spread for 2001 – 2003. This view shows the change in sharper terms and produces a higher estimate of the increase in consumer pump prices caused by the domestic refiner/marketer spread.

Industry experts and Department of Energy officials wring their hands about tight supplies, refineries that are running at capacity and difficult transitions to new fuels, but deny

EXHIBIT I-4: ACTUAL VS. HISTORIC DOMESTIC SPREAD: 1995-2003

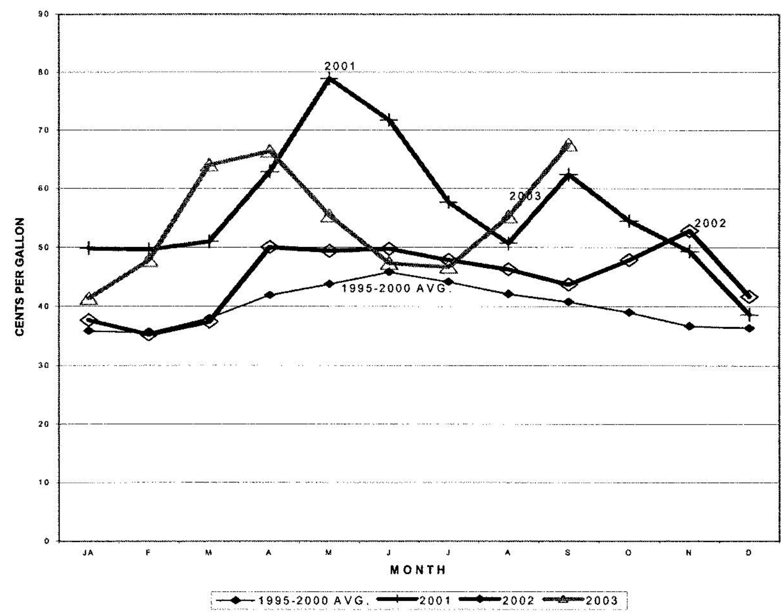


Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, *Petroleum Marketing Monthly*, *Petroleum Supply Monthly*, various issues; *Weekly Petroleum Status Report*, various issues.

any wrongdoing.[7] The explanations they offer are more like excuses than analysis. For example, the following excerpt from the Energy Information Administration *Summer 2003 Motor Gasoline Outlook* gives a flavor of the effort to gloss over fundamental problems:

> This summer, motor gasoline markets are expected to be tighter than last summer. Total spreads (retail price, excluding taxes, minus crude oil prices) are expected to average 55 cents per gallon compared to 41 cents per gallon in 2002. This results primarily from higher refinery utilization brought about by the increase in demand combined with low beginning-of-season inventory levels. But the projected spread is less than the 58 cents observed in the summer of 2001, when stocks were at record low levels and the Midwest suffered from ethanol-related blending problems.[8]

EXHIBIT I-5: DOMESTIC REFINER/MARKETER SPREAD: SEASONAL BASIS

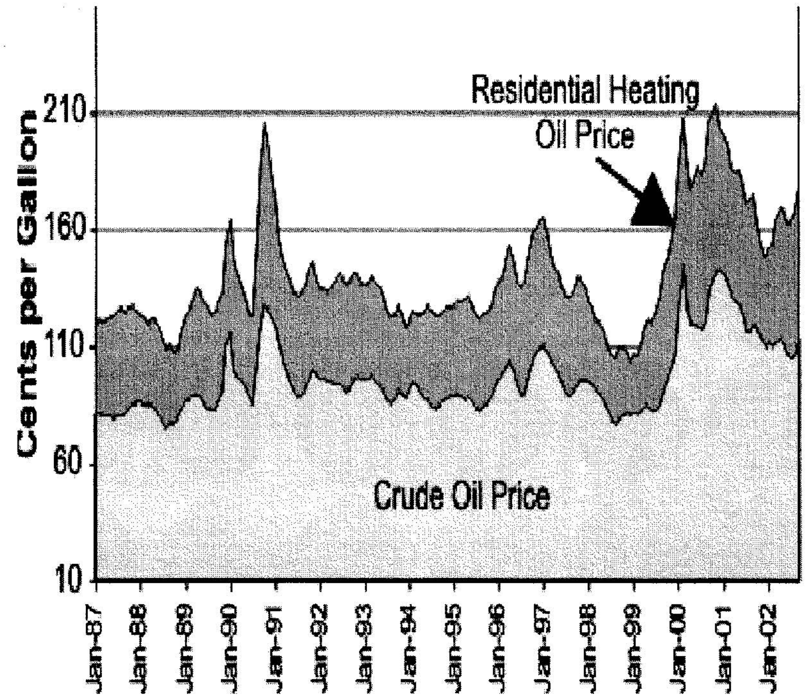


Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, *Weekly Petroleum Status Report*, various issues.

The EIA tries to soften the blow of a very high spread by comparing it to the astronomical level of 2001, rather than the level of 2002, which was itself significantly higher than the 1995-1999 average. The past summer did not go as the EIA expected. The only thing that seems to be predictable is that we will not have enough stocks on hand to deal with the inevitable accidents and incidents that seem to drive up prices.

Exhibit I-6 shows an EIA graph for residential heating oil. This is another product for which the public pays directly. The high price season is the winter, not the summer, but the pattern of increases in the domestic spread since December 2000 is similar.

EXHIBIT I-6: RESIDENTIAL HEATING OIL SPREAD



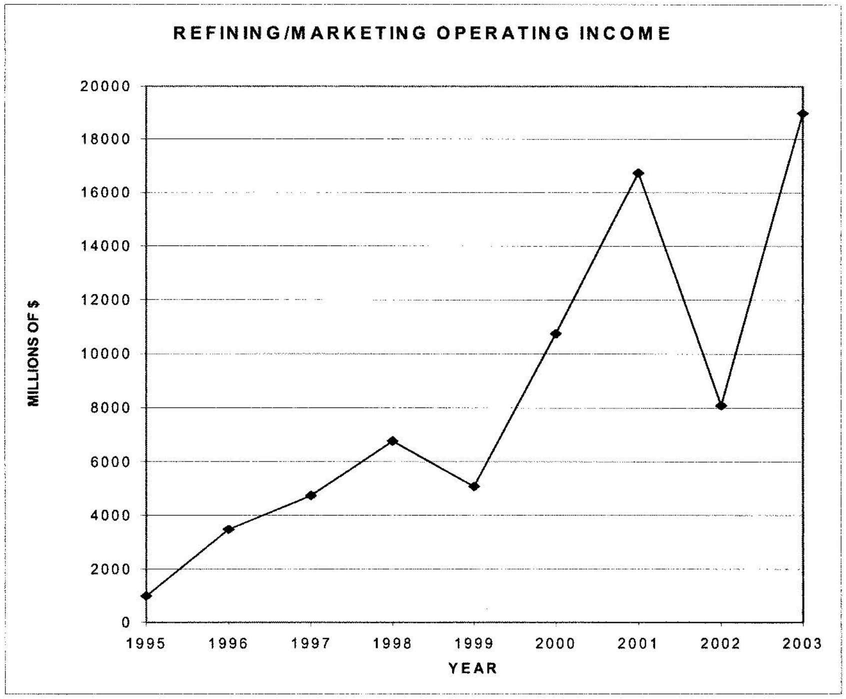
Source: Energy Information Administration, *Residential Heating Oil: What Consumers Should Know* (Washington, D.C., 2003), Figure 2.

Profiting From Price Increases In Concentrated Markets

If price increases are not caused by cost increases, crude oil or otherwise, they result in increases in profits. Thus, after price, the second important indicator to which economic analysts look for signs of the exercise of market power and market failure is profits.

The bottom line, literally and figuratively, was a sharp run up in oil company profits in 2000 and 2001 (see Exhibit I-7). Net operating income (income before special items and taxes) tripled from 1997-1999 to 2001. More recent data on the comprehensive basis gathered by the Department of Energy is not available, but general filings from the Securities and Exchange Commission are available.

Exhibit I-7: Refining/Marketing Operating Income



Source: Energy Information Administration, U.S. Department of Energy, *Performance Profiles of Major Energy Producers: 2001* (January 2003), Table B32; *National Petroleum News*, "Signs of Life," March 2003, Corporate, Downstream Earnings for Major Oil Continue to Rebound," October, 2003; oil industry Second Quarter 2003 financial reports. 2003 estimated based on comparison of 1H01 to 1H03.

Tracking profits from publicly available sources is difficult because some of the companies do not break out domestic operations, while mergers make long term trends difficult and the allocation of one-time charges to specific lines of business are frequently not identified.[9] While profits were down in 2002, due to very low prices early in the year as a result of the severe economic downturn and travel slow-down following September 11, they were still just above the levels of the late 1990s.

It should be noted that although 1999 was a slightly below average year, 2000 was an extremely good year. *Fortune* reports return on equity of 25 percent in 2000,[10] while *Business*

Week reports 22 percent.[11] This is almost twice the historic average for the industry and about 50 percent more than other large corporations achieved.[12] These extremely high profits for 2001 were at such astronomical rates of profit that they were not sustainable. The weak economy lowered prices and profits early in 2002, but by the end of 2002, profits had increased dramatically. The sharp price increases in 2003 are producing another very high level of profits. By the first half of 2003 the industry was seeing record profits once again.

A recent Rand study drew the connection between the business strategies to increase profitability and the pricing volatility.

> For operating companies, the elimination of excess capacity represents a significant business accomplishment: low profits in the 1980s and 1990s were blamed in part on overcapacity in the sector. Since the mid-1990s, economic performance industry-wide has recovered and reached record levels in 2001. On the other hand, for consumers, the elimination of spare capacity generates upward pressure on prices at the pump and produces short-term market vulnerabilities. Disruptions in refinery operations resulting from scheduled maintenance and overhauls or unscheduled breakdowns are more likely to lead to acute (i.e., measured in weeks) supply shortfalls and price spikes.[13]

II. ECONOMIC FUNDAMENTALS OF GASOLINE MARKETS

INADEQUATE COMPETITION IN THE OIL INDUSTRY IS A MAJOR CAUSE OF PRICE SPIKES

World events simply cannot explain a domestic refiner/marketer spread that is well above its historic levels or repeated price spikes, even when international markets are quiet. We must look to domestic factors to understand the cause of the domestic price increases.

This paper shows that the fundamental problem lies in the supply-side of the domestic market, not the demand-side. The conduct of the oil industry clearly contributes to the problem. Oil companies do not have an interest in preventing the price spikes because they profit handsomely from them. Consequently, they have done a very poor job of preparing themselves for these shocks.

- Over the 1990s, the industry dramatically reduced capacity to tighten markets.
- It is not about to expand refinery and storage capacity to alleviate a structurally tight supply demand balance.
- The industry does not manage stocks to prevent price spikes.
- The industry does not respond quickly to higher prices by increasing product supplies.

It has become evident to all observers of the domestic oil market that stocks of crude and especially product are the key variables that determine price shocks. In other words, stocks are not only the key variable, they are also a strategic variable. The oil industry does a miserable job of managing stocks and supplying product from the consumer point of view. Policymakers have done nothing to force them to do a better job.

If the industry were vigorously competitive, each firm would have to worry a great deal more about being caught with short supplies or inadequate capacity and they would hesitate to raise prices, for fear of losing sales to competitors. Oil companies do not behave this way because they have power over price and can control supply. Mergers and acquisitions have created a concentrated industry in several sections of the country and segments of the industry. The amount of refinery capacity, stocks and product on hand are no longer dictated by market forces, they can be manipulated by the oil industry oligopoly to maximize profits.

Demand is Inelastic and Generally Predictable

To be sure, the oil industry only controls the supply-side of the market. Markets might not become so tight if consumers stopped buying so much gasoline. Unfortunately, the ability of consumers to cut back on gasoline is severely limited and the industry knows it.

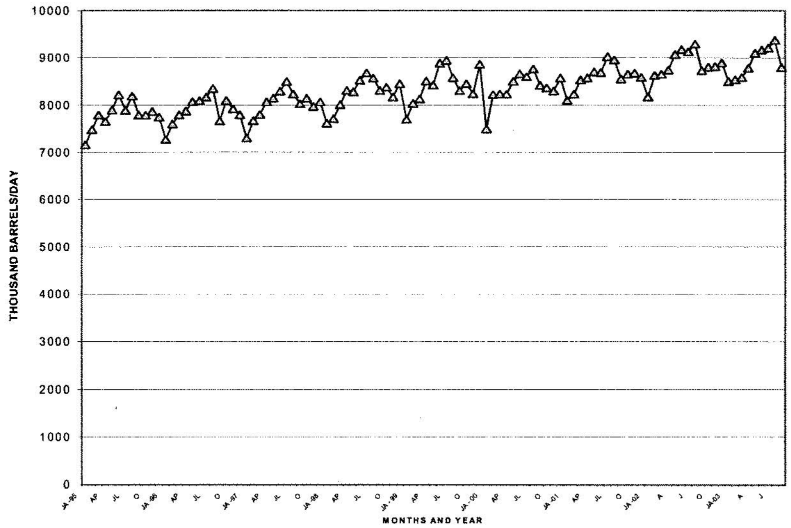
Demand is generally predictable in a seasonal pattern (see Exhibit II-1). With demand quite predictable and inelastic, price is determined by the supply side. The flow of product and stockpiles are critical. Supplies must be adequate to deal with shifts in demand. Demand may help to set the stage, but it is supply that provides the action.

The demand side of the market creates pressures and vulnerabilities to price spirals. The demand for gasoline does not respond quickly to price in the short term – it is quite inelastic. By this term, economists mean that as prices increase (or decrease) demand does not decrease (or increase) very much. Elasticity is measured in terms of percentage changes. For example, if a ten percent increase in price results in a 20 percent decrease in demand, the price elasticity of demand is said to equal -2 (20%/10%). When the elasticity is greater than 1 in absolute value, demand is said to be elastic. Alternatively, if a 10 percent increase in price results in a 2 percent decrease in demand, the elasticity is said to be -.2, and this is considered inelastic.

The demand elasticity for gasoline has been studied hundreds of times in the U.S. and abroad. The best estimate of short-term elasticity (usually measured by demand response in a period of about a year) is -.2.[14] The best estimate of the long-term elasticity is about -.4.[15] Both of these are quite low.

The low elasticity of demand is grounded in the daily life of Americans. Many discussions of the gasoline market start from the premise that people drive a lot, perhaps too much. But we must have an appreciation for why people drive as much as they do. Examining price and income elasticities leads to the conclusion that gasoline is a necessity of

EXHIBIT II-1: GASOLINE PRODUCT SUPPLIED



Source: U. S. Department of Energy, Energy Information Administration, *Petroleum Supply Monthly*, Table S.4, *Weekly Petroleum Status Report*, various issues.

daily life. Recognizing this fact leads to policy choices that can have the greatest impact, while imposing the least cost and inconvenience on consumers.

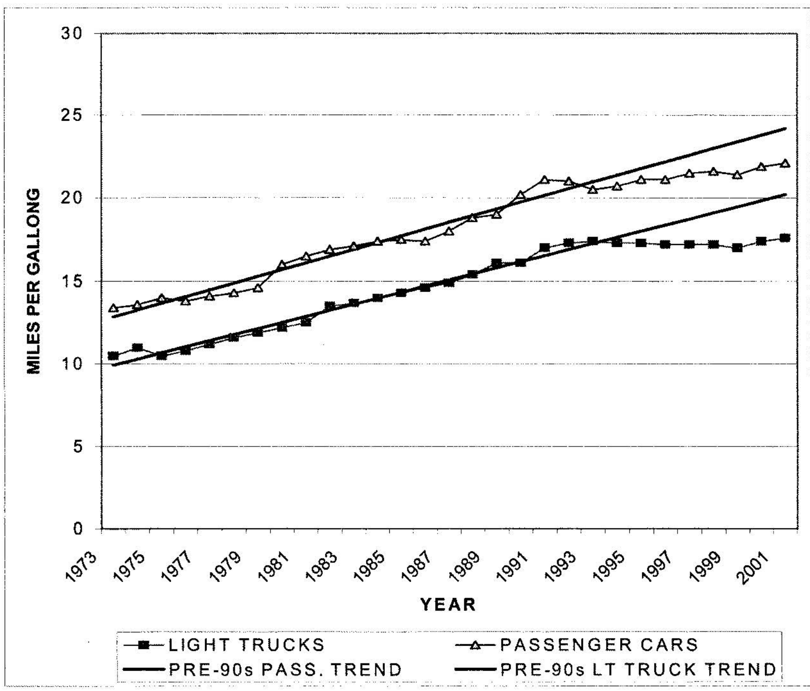
Gasoline consumption is determined by the physical and economic structure of daily life. People need to drive on a daily basis because of the way our communities are built and our transportation systems are designed. Stores are far from homes. Homes are far from work. Social and after-school activities are dispersed. In most communities, mass transit is scarce and inconvenient. It is necessary to drive to get from here to there. We own more cars and drive more miles on a household basis over time. These trends and patterns have become stronger and more deeply entrenched as our society has become wealthier and the number of two-earner households has grown. For the past three decades there has been an almost perfect, one-to-one correspondence between economic growth and total miles driven.[16]

Because automobiles and driving are necessities, not luxury goods, people buy a certain amount to meet their daily needs, but they do not consume much more beyond meeting those needs.[17] Households that have vehicles in rural and suburban areas use considerably more gasoline than those in central cities. They have to. They live farther from work, friends and local businesses. Because gasoline consumption is so deeply embedded into the routine of daily life, we would not expect it to fluctuate wildly.

The inability of consumers to reduce demand is the critical factor in rendering the gasoline market volatile and vulnerable to abuse.[18] When demand is inelastic, consumers are vulnerable to price increases, since they cannot cut back on or find substitutes for their use of the commodity. When the most important market force in disciplining market power, demand elasticity, is as low as observed for gasoline, there are many opportunities to exercise market power.

Because demand is deeply embedded in the patterns of daily life in our society, a central public policy in the 1980s focused on increasing the fuel efficiency of the vehicle fleet (see Exhibit II-2). From the second oil price shock in 1979 through 1991, fuel efficiency

EXHIBIT II-2: LIGHT VEHICLE FUELS EFFICIENCY



Source: U. S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Tables 1.10.

improved by almost 50 percent. In the ensuing decade, there was little if any progress. Public policy allowed the demand side to put pressure on the market.

Supply is Inelastic

Short-term supply in the oil industry is also extremely inelastic. That is, it cannot be quickly increased. The key elements are the supply-side difficulties of production, transportation and storage for providing for a continuous flow of energy.[19]

Because of the nature of the underlying molecules, the production, transportation and distribution networks are extremely demanding, real time systems. Energy is handled at high pressure, high temperature and under other physical conditions that are, literally, explosive. These systems require perfect integrity and real time balancing much more than other commodities.

Transportation and distribution infrastructure is extremely capital intensive and inflexible. Many sources of energy are located far from consumers, requiring transportation over long distances. The commodities are expensive to transport and store. They are delivered over a network that is sunk in place with limited ability to expand in the short and medium term.

Refineries and pipelines, two key parts of the gasoline distribution chain, are not only capital intensive, but they take long lead times to build. They have significant environmental impacts. In the short term, their capacity is relatively fixed. Refineries must be reconfigured to change the yield of products. Although oil pipelines have largely depreciated their historic, sunk costs, expansion would be capital intensive. Thus, pipeline capacity is generally fixed capacity as well.

Accidents have a special role in networks such as these. Because of the demanding physical nature of the network, accidents are prone to happen. Because of the volatile nature of the commodity, accidents tend to be severe. Because of the integrated nature of the network and demanding real time performance, accidents are highly disruptive and difficult to fix.

These physical and economic characteristics render the supply-side of the market inelastic.[20] Given the basic infrastructure of supply in the industry, the availability of excess capacity and stocks to meet changes in demand is the critical factor in determining the flexibility of supply. Since output is slow to respond to price, stockpiles, storage and importation of product become a critical element of the gasoline market.[21]

Stocks are the key factor in policy responses to market power where supply is inelastic. [22] Every investigation of every product price spike in the past several years points to 'unusually low stock' as a primary driver.[23] But stock levels are no accident; they are the result of business decisions.

III. BUSINESS STRATEGIES CREATE AND EXPLOIT MARKET POWER

SUPPLY IS TIGHT AS A RESULT OF BUSINESS DECISIONS TO NOT ADD CAPACITY

There are two clearly identifiable trends affecting the supply side of the gasoline market – a reduction in capacity relative to demand and an increase in concentration. These trends result from the business decisions of oil companies.

The National Energy Task Force of 2001 recognized that reduction in capacity was a business decision. Government did not choose to carry much lower stocks, private businesses did.[24]

> Ongoing industry consolidation, in an effort to improve profitability, inevitably leads to the sale or closure of redundant facilities by the new combined ownership. This has been particularly true of terminal facilities, which can lead to reductions in inventory and system flexibility. While excess capacity may have deterred some new capacity investments in the past, more recently other factors, such as regulations, have deterred investment.[25]

The prominent role of business decisions in reducing capacity raises the concern that these decisions are intended to reduce competitive market forces and secure market power for major industry players. While mergers and acquisitions or facility closings are nominally justified by claims of efficiency gains,[26] they have a real economic effect of reducing competition.

As a recent Rand study put it, the 1990s witnessed a change in attitude in the industry, wherein "[i]ncreasing capacity and output to gain market share or to offset the cost of regulatory upgrades is now frowned upon."[27] In its place we find a "more discriminating approach to investment and supplying the market that emphasized maximizing margins and returns on investment rather than product output or market share."[28]

Documents from the mid-1990s indicate that industry officials and corporate officers were concerned about how to reduce capacity, with observations such as "if the U.S. petroleum industry doesn't reduce its refining capacity, it will never see any substantial increase in refinery profits," from a Chevron Corporation document written in November 1995. A Texaco official, in a March 1996 memorandum, said refinery overcapacity was "the most critical factor" facing the industry and was responsible for "very poor refining financial results."[29]

Soon after these observations were made by senior oil industry management a string of mergers hit the industry (see Exhibit III-1). In the past half-decade there has been a merger wave of vertically integrated firms including Exxon-Mobile, BP-Amoco-Arco, Chevron-Texaco, and Phillips-Tosco-Conoco.[30] The dominant firms have spent an immense amount of their capital on mergers and acquisitions.[31]

EXHIBIT III-1: OIL INDUSTRY MERGERS AFFECTING REFINING CAPACITY SINCE 1995

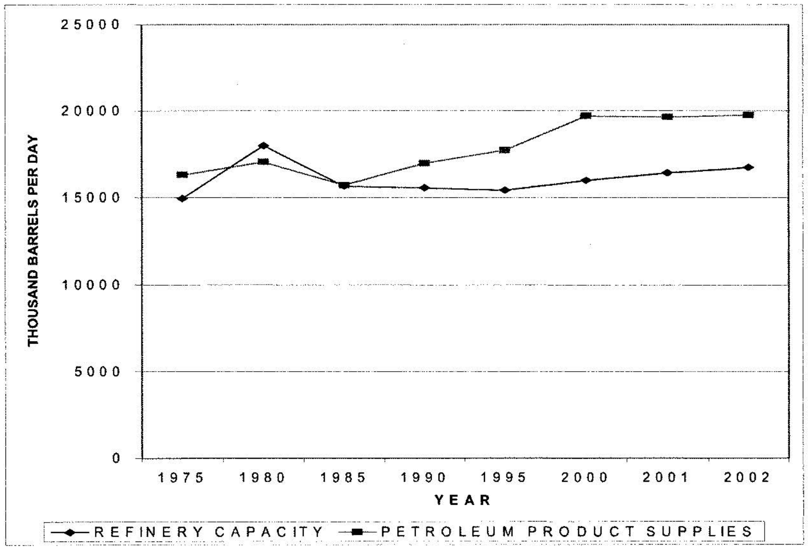
1996	Tosco/Circle K Ultramar/Diamond Shamrock (UDS)
1997	Tosco/Unocal
1998	BP/Amoco Shell/Texaco Citgo/Chalmett/Hess
1999	BP/ARCO Exxon/Mobil Marathon/Ashland UDS/total
2001	Phillips/Tosco Valero/UDS Valero/Huntaway
2002	Phillips/Connoco Shell/Motiva/Equilon/Dear Park Chevron/Texaco

Source: Energy Information Administration, U.S. Department of Energy, *Performance Profiles of Major Energy Producers: 2001* (January 2003), Figure 33; Energy Information Administration, U.S. Department of Energy, *Restructuring: The Changing Face of Motor Gasoline Marketing*, xxx, Table 1.

With oil companies merging and eliminating "redundant" capacity, it should not be surprising to find that capacity has not kept up. Refinery capacity has not expanded to keep up with the growth in demand. Exhibit II-2 shows the relationship between refinery output and demand. In 1985 refinery capacity equaled daily consumption of petroleum products. By 2002, daily consumption exceeded refinery capacity by almost 20 percent.

In the early1980s, a public policy providing support for small refineries was terminated. This accounted for the loss of about 100 refineries between 1980 and 1985 (See Exhibit III-3). Since then, scores of other refineries have been shut down. Government did not close refineries, private businesses did. In the 1990s alone, approximately 50 refineries were closed. Since 1995, over 20 refineries have been shut down. The number of operating refineries has been reduced by 13 percent since 1995. The refineries get larger, but smaller in number and are owned by fewer and fewer entities. Over the last two decades of the twentieth century the number of firms engaged in refining in the United States declined by two-thirds.[32]

EXHIBIT III-2: REFINERY CAPACITY AND PRODUCT SUPPLIED

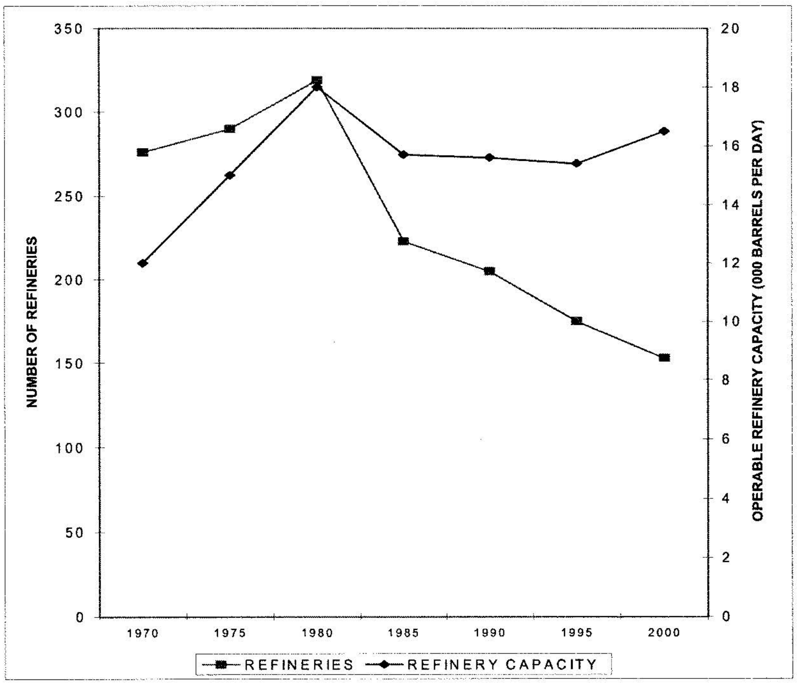


Source: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual*, various issues, Tables S1, 36; *Weekly Petroleum Status Report*, various issues.

Once these trends become clear, the complaint by policymakers that no new refineries have been built in recent years loses it compelling public policy impact.[33] Similarly, blaming the decline of capacity relative to demand on the Clean Air Act does not stand close scrutiny. Consolidation of the refinery industry was a conscoius business decision that began long before amendments to the Clean Air Act in 1990 and continued after changes in gasoline formulation.

In fact, at the time of the 1995 changes in Clean Air Act requirements the Department of Energy conducted a study of the impact of environmental requirements on the refining industry. It concluded that "pollution abatement operating costs have been and continue to be a small part of overall operating costs."[34] Similarly, general reviews of the industry at the time concluded that "a close examination reveals that the change in refining costs attributable to RFG had no major impact on margin behavior between 1993 and 1995."[35] In fact, overall operating costs have been declining.[36]

EXHIBIT III-3: REFINERIES AND REFINERY CAPACITY

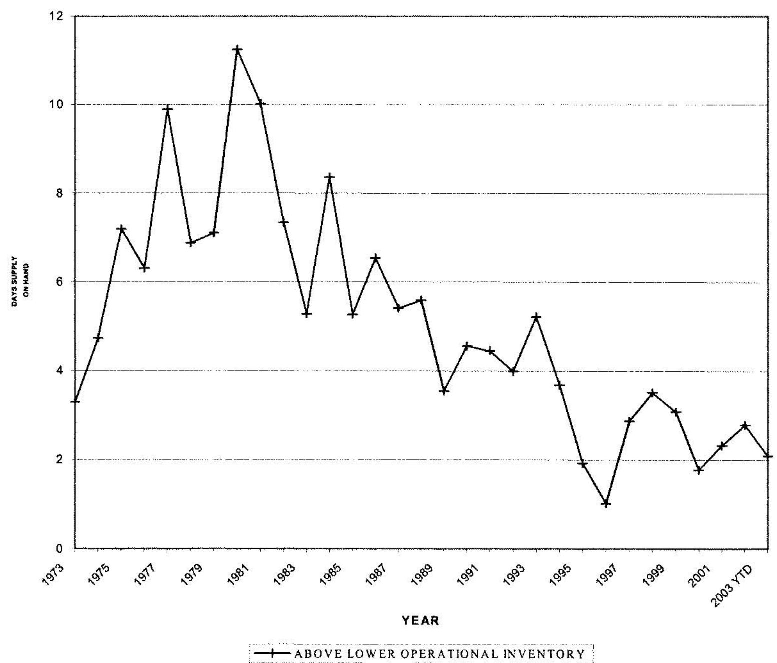


Source: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual*, various issues, Tables S1, 36.

Reductions of over 10 percent in storage capacity and more than 10 percent in the number of gasoline stations have also taken place in just the past half-decade. Just as with refineries, the decline in storage is attributable in part to a reduction in capacity.[37] The reduction in capacity equals over ten days' supply, and ten days of working storage capacity. The decline in gasoline stocks is a critically important factor in keeping markets tight.[38]

Exhibit III-4 shows the relationship between stocks and demand for gasoline. Stocks are measured as the number of days of demand of gasoline held in storage. The Exhibit shows that the amount of stock above what is considered the lower operational inventory has declined. Because of the nature of operations of gasoline delivery systems, a certain level of

EXHIBIT III-4: GASOLINE STOCKS ON HAND: DAYS OF SUPPLY ABOVE OPERATIONAL INVENTORY LEVELS



Source: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Monthly*, various issues, Table, S4, Figure S6; *Weekly Petroleum Status Report.*

stock is needed to keep the system running in real time (the lower operational level).[39] Operations are subject to disruption should stocks fall below this level.[40] It is the stocks above this level that are available to respond to shifts in demand or price. The reserves above the lower operational inventory level have declined to very low levels. They generally are in the range of a couple of days, compared to four or five days in the early 1990s and over a week in the 1980s.

The tight supply demand balance that results from industry decisions to close refineries may also contribute directly to occurrence of accidents. The extremely high capacity utilization that creates high levels of profit also puts additional stress on equipment.[41]

Over the course of the last decade, the number of gasoline stations has declined as well, while the number of vehicles that need to be supported has grown. The number of gasoline stations has declined by 16 percent, from 210 thousand to 176 thousand. The number of motor vehicles has increased by 16 percent, from 189 million to 210 million. As a consequence, the number of motor vehicles per station has increased by 39 percent, from 900 to 1250. Each station pumps more gas, but there are fewer competitors.

The Domestic Oil Industry has become Dangerously Concentrated

The wave of mergers in the industry noted above has resulted in a level of concentration that creates the basis for business behaviors and strategies that can exploit market power. Several major mergers between vertically integrated companies in the top tier of the oil industry have pushed petroleum product markets to levels of concentration that are a serious concern.

Because the supply and demand elasticities for gasoline are so low[42] and the expenditures on energy are so large,[43] we believe these industries should be held to close scrutiny because the exercise of market power results in higher prices.[44] Antitrust authorities have failed to exercise proper caution to protect the public interest and consumers are suffering as a result.

Antitrust authorities use two measures of market concentration. The four firm concentration ratio is equal to the market share of the four largest firms. If the four largest firms control 60 percent or more of the market, the market is a tight oligopoly.[45] William Shepherd describes these thresholds in terms of four firm concentration ratios as follows:[46]

> Tight Oligopoly: The leading four firms combined have 60-100 percent of the market; collusion among them is relatively easy.
>
> Loose Oligopoly: The leading four firms combined have 40 percent or less of the market; collusion among them to fix prices is virtually impossible.

The HHI (Hirshman Herfindahl Index), a measure used by the Department of Justice, is the sum of the square of the market shares of all firms in a market. Under its Merger Guidelines, the DOJ considers a market with an HHI of 1000 or less to be unconcentrated. Such a market would have the equivalent of ten equal-sized competitors. In such a market, the four firm concentration ratio would be 40 percent. Any market with a concentration above this level is deemed to be a source of concern. The DOJ considers an HHI of 1800 as the point at which a market is highly concentrated. This level falls between five and six equal-sized competitors.

Shepherd refers to collusion in his discussion, but it is important to note that it is not the only concern of market power analysis or the Merger Guidelines. The DOJ Guidelines are oriented toward conditions under which a broad range of anticompetitive behaviors are sufficiently likely to occur as to require regulatory action. The Merger Guidelines recognize that market power can be exercised with coordinated, or parallel, activities and even unilateral actions in situations where there are small numbers of market players.[47] The area of noncollusive, oligopoly behavior has received a great deal of attention. A variety of models have been developed in which it is demonstrated that small numbers of market participants interacting in the market, especially on a repeated basis, can learn to signal, anticipate, and parallel one another to achieve outcomes that capture a substantial share of the potential monopoly profits.[48]

Exhibit III-5 shows two measures of market concentration. Oil companies, like all capitalist enterprises, will seek to gain market power. Antitrust authorities are charged with ensuring they do not succeed. Unfortunately, over the past decade when, a host of mergers were approved, antitrust authorities did not take the fundamentals sufficiently into account. They have prevented a few local markets from becoming highly concentrated, but that was far too lenient a standard. Because supply and demand are so inelastic and vertical leverage is so

EXHIBIT III-5: CONCENTRATION OF REFINERIES IN REGIONAL MARKETS

		1994		2000	
PETROLEUM ADMINISTRTIVE		HHI	4-FIRM	HHI	4-FIRM
DEFENSE DISTRICT (PADD)		CR			CR
I.	East Coast	1297	62	2007	77
II.	Upper Midwest	731	40	980	52
III.	Gulf Coast	453	29	753	42
IV.	Mountain West	1000	49	1061	51
V.	West Coast	1037	54	1376	67

Source: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual 1999,* Volume 1 (June 2000); Table 38 for market shares, p. 122 for PADDs. The states in each PADD are as follows I = ME, NH, VT, MA, RI, CT, NY, NJ, PA, WV, DE, MD, VA, NC, SC, GA, FL; II= OH, MI, IN, KY, TN, IL, WI, MN, IA, MO, OK, KS, MB, SD, ND, III= AL, MI, AK, LA, TX, NM; IV= MT, WY, CO, UT, ID; V= WA, OR, NV, AZ, CA, HI AK.

important, antitrust authorities should have insisted that markets remain unconcentrated (i.e. below the moderately concentrated threshold).

The recent mergers have pushed three of the country's five regional refining markets (Petroleum Administrative Defense Districts or PADD) into a danger zone of concentration.

This concentration reflects a business decision in which "operating refineries have sought to concentrate their activities in markets where they hold a leading market share."[49]

There has clearly been a sharp increase in the level of concentration in all markets except the Mountain West. The East Coast, Mountain West and West Coast all fall well above the unconcentrated zone. The upper Midwest is close to the upper limit of the unconcentrated zone based on HHI with the four firm concentration ratio moving well above the unconcentrated level.

Product markets are much smaller than refinery markets. That is, while refineries may serve a broad area, most consumers buy virtually all of their gasoline in the metropolitan area in which they live. Most studies of gasoline prices use the metropolitan area as the unit of analysis. While we lack data on a city-by-city basis, some data is readily available on a state-by-state basis. It confirms that the trend of increasing concentration has brought the industry to a level that is a source of concern.

EXHIBIT III-6: CONCENTRATION OF GASOLINE DISTRIBUTION IN STATE MARKETS

State / Source	Year	HHI	4-Firm CR	5-Firm CR	Year	HHI	4-Firm CR	5-Firm CR
CALIFORNIA								
CFA-Outlets	1994	1143	60	69	1999	1432	73	90
DOE Reformulated Volume	1997	1290		74				
CONNECTICUT								
CFA-Outlets	1994	1022	53		1999	1415	65	
Lundberg Total Volume	1998	1110	55		1999	1264	62	
ILLINOIS								
CFA-Outlets	1994	1053	55		1999	1311	63	
WISCONSIN								
CFA-Outlets	1994	1175	65		1999	1400	66	

Sources: CFA, calculated from *National Petroleum News*, Annual Survey of Outlets; *Lundberg, Connecticut of Market Report: February, 1999*; DOE, U.S. Department of Energy, Energy Information Administration, *Assessment of Summer 1997 Motor Gasoline Price Increase*, May 1998, p. 64

Exhibit III-6 presents several analyses of the concentration of gasoline distribution at the state level. We have prepared analyses of California, Illinois, Wisconsin and Connecticut based on the number of branded gasoline stations in each state. We have selected a time frame similar to that of the prior refinery analysis. California was selected because the West is frequently mentioned in discussions of high gasoline prices. There was also a U.S. Department of Energy study available for comparison. Illinois and Wisconsin were selected because they have been focal points of concern in recent price spikes. Connecticut is included because it represents another PADD and there was a separate analysis available for comparison.

We observe sharp increases in concentration in each of these states. Each is now well into a range of concentration that is a source of concern for competitiveness. The level of concentration we estimate on the basis of outlets is consistent with the other analyses that are based on volumes of sales. The trend of increasing concentration is observable in all cases.

These analyses do not take mergers in the past two years into account. As described in Exhibit III-1, they certainly made matters worse. Moreover, the previous discussion focuses on horizontal concentration. Vertical integration between segments of the industry may have an impact as well. Vertical integration by dominant firms may create a barrier to entry requiring entry at two stages of production,[50] or foreclosing critical inputs for competitors in downstream markets.[51] Vertical arrangements may restrict the ability of downstream operators to respond to local market conditions.[52]

Vertical integration not only removes important potential competitors across stages of production,[53] but also may trigger a wave of integrative mergers,[54] rendering small independents at any stage extremely vulnerable to a variety of attacks.[55]

Gasoline markets are vulnerable to the negative effects of vertical integration. Product must move downstream from the refinery or the tanker to the pump. Vertically integrated operations are closed to independent sources of supply. They may impose zonal pricing formulas or restrictions on sources of supply on their distribution outlets.[56] With vertical integration, the market may be less responsive than it could be both in the short term, since competing product has difficulty getting into individual markets at the end of a vertically [57] integrated chain, and in the long term because new competitors in any market may have to enter at several stages of the business.

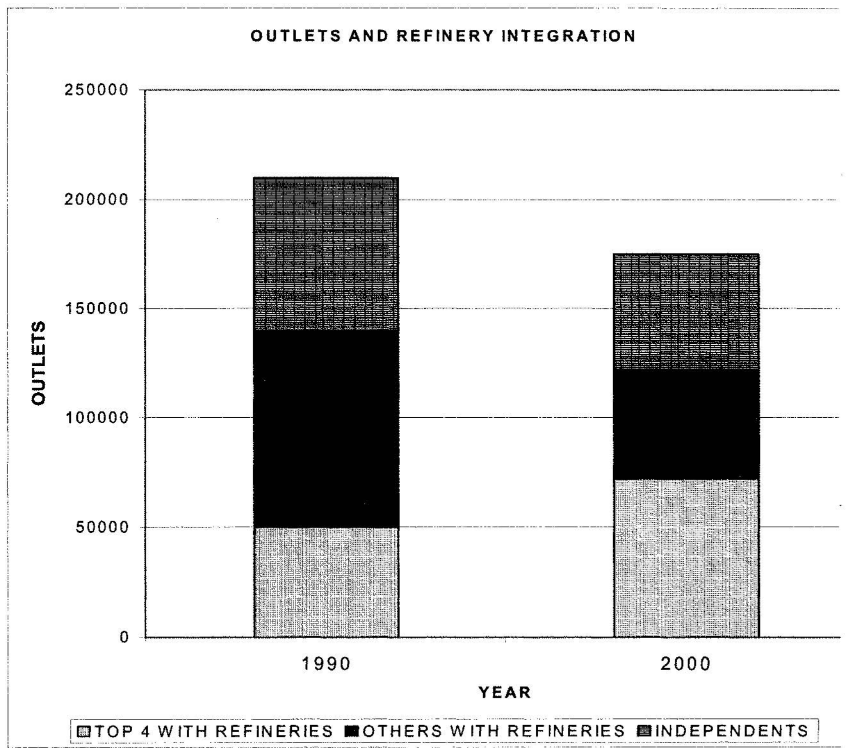
An interesting study of cities across the country as well as the first merger in the wave of late 1990s mergers (the Tosco/Unocal merger of 1997) finds support for this concern. The study finds that both horizontal concentration and vertical integration are associated with high prices:

> Upstream concentration is positively correlated with price, the market share of independents is negatively correlated with price and the average market share of the vertically integrated suppliers covaries positively with wholesale price...

Moreover, the incentive to raise price is also positively correlated with the geographic proximity of integrated stations to rival independents, indicating that the greater the degree of competition, or cross-price elasticity, between integrated retailers and rival independent retailers, the greater the integrated firm's incentive to raise rivals' wholesale costs.[58]

In light of these findings, the integration of refining and distribution is important. The percentage of stations owned by companies that also own refineries did not change much over the decade, but the size of the largest integrated owners increased dramatically (see Exhibit III-

EXHIBIT III-7: OUTLETS AND REFINERY INTEGRATION



Source: Energy Information Administration, U.S. Department of Energy, *Restructuring: The Changing Face of Motor Gasoline Marketing*, Table 2; McEwan, Ron, "Position and Status of Retail 'Brand' Within the Industry," *National Petroleum News*, August 2001.

7). The integrated companies also appear to be more regionalized.[59] Each company covers a smaller area more densely, resulting in less competition.

CONDUCT: EXPLOITING TIGHT MARKETS

Concentrated markets like these facilitate the exercise of market power. If a small number of companies dominate a market, collusion may become easier, but several decades of economic analysis has shown that non-collusive behaviors that reduce competition and increase price are an equal concern.[60] With small numbers of companies it becomes easier to monitor the behavior of other market participants, signal intentions, dominate product or geographic markets, or to take unilateral actions that influence price.

> The Federal Trade Commission analysis of the Midwest price spikes of 2000 provides an important base of understanding. It describes the first price spike after the merger wave of the late 1990s. It demonstrates the complex interaction of factors in the gasoline market, but also introduces the element of decisions that caused supplies to be tight and kept them that way:
>
> Prices rose both because of factors beyond the industry's immediate control and because of conscious (but independent) choices by industry participants...
>
> In sum, the evidence does not indicate that the price spike in Midwest gasoline in the spring and early summer 2000 was caused by a violation of the antitrust laws. The spike appears to have been caused by a mixture of structural and operating decisions made previously (high capacity utilization, low inventory levels, the choice of ethanol as an oxygenate), unexpected occurrences (pipeline breaks, production difficulties), errors by refiners in forecasting industry supply (misestimating supply, slow reactions), and decisions by firms to maximize their profits (curtailing production, keeping available supply off the market). The damage was ultimately limited by the ability of the industry to respond to the price spike within three or four weeks with increased supply of products. However, if the problem was short-term, so too was the resolution, and similar price spikes are capable of replication. Unless gasoline demand abates or refining capacity grows, price spikes are likely to occur in the future in the Midwest and other areas of the country.[61]

Approximately $26 billion of the $30 billion increase in the domestic spread occurred in the price spikes in the ensuing 30 months. It is not only short-term decisions about refinery runs and stocks that affect the market greatly as it becomes concentrated. With few players, longer-term decisions also have a major impact. The FTC found these decisions to have had a substantial impact on the market in its study of the midwestern gasoline market.

> A significant part of the reduction in the supply of RFG was caused by the investment decisions of three firms. When determining how they would

comply with the stricter EPA regulations for summer-grade RFG that took effect in the spring 2000, three Midwest refiners each independently concluded it was most profitable to limit capital expenditures to upgrade their refineries only to the extent necessary to supply their branded gas stations and contractual obligations. As a result of these decisions, these three firms produced, in the aggregate, 23 percent less summer – grade RFG during the second quarter of 2000 than in 1999. Consequently, these three firms were able to satisfy only the needs of their branded gas stations and their contractual obligations, and could not produce summer – grade RFG to sell on the spot market as they had done in prior years. [62]

A Rand study found this to be a widespread phenomenon.

Relying on… existing plant and equipment to the greatest possible extent, even if that ultimately meant curtailing output of certain refined product… openly questioned the once-universal imperative of a refinery not "going short" – that is not having enough product to meet market demand. Rather than investing in and operating refineries to ensure that markets are fully supplied all the time, refiners suggested that they were focusing first on ensuring that their branded retailers are adequately supply by curtailing sales to wholesale market if needed.[63]

Moreover, the industry has become so concentrated that the ability to implement strategic policies to affect the supply demand balance has been shifted to the producers. As one study noted:

Of note, a few refiners are contemplating the potential for a significant easing of demand, perhaps as soon as 2010, prompted by the introduction of highly efficient motor vehicles. Such thinking may create pressure to minimize increases in capacity and other investments in plant and equipment in the mid-term, thus contributing to higher and more volatile prices and better profit margins.[64]

As suggested by the Federal Trade Commission report, individual companies now may have pricing power, not through collusion but through individual action.[65] That is, with supply and demand tight and a small number of suppliers in each market, individual suppliers recognize that they can influence the price, at least for short periods of time, by withholding supplies. They are no longer the price takers we find in competitive markets; they become price makers:

In addition, at least one firm increased its summer-grade RFG production substantially and, as a result, had excess supplies of RFG available and had additional capacity to produce even more RFG at the time of the price spike. It thus found itself with considerable market power in the short term. This firm did sell off some inventoried RFG, but acknowledged that it limited the

> magnitude of its response because it recognized that increasing supply to the market would push down prices and thereby reduce the profitability of its overall RFG sales.[66]

In recent years, imports have begun to fill the gap as prices increase. However, the price gap that develops before imports increase far exceeds the cost of transportation. As the Department of Energy put it:

> The gasoline price difference between the United States East coast (New York Harbor) and Rotterdam was in the 0-4 cents per-gallon range from 1991 to 1994, but it has been in the 3-8 cents per gallon range since. Since transportation costs are in the 3-5 cents-per-gallon range, Europe to United States movements are economically attractive. Gasoline from the Middle East (particularly Saudi Arabia) has been finding its way to U.S. markets because Asian refining growth has impacted the need and economics for gasoline imports. Finally, any strength in U.S. gasoline markets attracts some increases in imports from traditional Western hemisphere sources, such as Venezuela, Virgin Islands, and Canada.[67]

In fact, the "strength" in the U.S. market represents a sustained run up of over 20 cents at the pump and over 10 cents in the refiner/marketer share. This is a much larger "price difference" than historically has been the case and raises the question of why didn't gasoline from foreign sources "find their way" to the U.S. sooner to restrain price increases. The domestic industry is hostile to imports, with "many refining industry representatives in the RAND discussion spoke about "unfair foreign competition" and the need for duties and other measures to restrain imports."[68]

Prices run up quickly because of even slight disruptions in the supply demand balance and producers are slow to react because they do not fear that others can bring product to market and steal their business. Consequently, prices are said to be sticky downward.[69] There is a debate about whether gasoline prices change asymmetrically with respect to crude oil prices. The majority of published studies find support for the "rockets and feathers" view.[70] Prices rise like rockets and float down like feathers.[71] The debate centers around whether the price changes in crude oil (up and down) are fully and finally reflected in the pump price. In separate analyses Severin Borenstein and the U.S. General Accounting Office find the difference to be a penny or two per gallon.[72]

One fundamental difference between the price spikes of recent years and the "rockets and feathers" debate should be underscored. In the recent circumstances, we are not dealing with crude oil price changes alone, so the question is not whether refiner/marketer margins "catch up," or whether some of the change in crude oil price ends up in the refiner/marketer pockets (bottom line). The recent price spikes have been significantly driven by refiner/ marketer margins. Even if margins return to historic levels after the spike, there is no doubt that a net increase in marketer margins has occurred.

IV. POLICIES TO COMBAT SHORT TERM VOLATILITY AND CREATE LONG TERM STABILITY

Two years ago, in response to the first evidence of a price ratchet, we recommended a broad and comprehensive set of responses to this complex problem.[73] Those policies made sense then; they make even more sense today. The Federal government has done little to move policy in that direction.

It is time for public policy makers to seek to institute permanent institutional changes that both reduce the chances that markets will be tight and reduce the exposure of consumers to the opportunistic exploitation of markets when they become tight. To achieve this reduction of risk public policy should be focused on achieving five primary goals:

- Restore reserve margins by increasing both vehicle fuel efficiency (demand-side) and production capacity (supply-side).
- Increase market flexibility through stock and storage policy.
- Discourage private actions that make markets tight and/or exploit market disruptions by countering the tendency to profiteer by withholding of supply.
- Promote a more competitive industry.

Expand Reserve Margins By Striking A Balance Between Demand Reduction and Supply Increases

Improving vehicle efficiency (reduction in fleet average miles per gallon) equal to economy wide productivity over the past decade (when the fleet failed to progress) would have a major impact on demand. It would require the fleet average to improve at the same rate it did in the 1980s. It would raise average fuel efficiency by five miles per gallon, or 20 percent over a decade. This is a mid-term target. This rate of improvement should be sustainable for several decades. This would reduce demand by 1.5 to 2 million barrels per day and return consumption to the level of the mid-1980s.[74]

Expanding refinery capacity by 10 percent equals approximately 1.5 million barrels per day. This would require 15 new refineries, if the average size equals the refineries currently in use. This is less than one-third the number shut down in the past ten years and less than one-quarter of the number shut down in the past fifteen years. Alternatively, a ten percent increase in the size of existing refineries, which is the rate at which they increased over the 1990s, would do the trick, as long as no additional refineries were shut down.

Placed in the context of redevelopment of recently abandoned facilities or expansion of existing facilities, the task of adding refinery capacity does not appear daunting. Such an expansion of capacity has not been in the interest of the businesses making the capacity decisions. Therefore, public policies to identify sites, study why so many facilities have been shut down, and establish programs to expand capacity should be pursued.

This combination of demand-side and supply-side policies to improve the long run market balance would restore the supply/demand balance to levels that typified the mid-1980s.

Expanding Storage And Stocks

It has become more and more evident that private decisions on the holding of stocks will maximize short-term private profits to the detriment of the public. Increasing concentration and inadequate competition allows stocks to be drawn down to levels that send markets into price spirals. While the Strategic Petroleum Reserve has been developed as a strategic stockpile and companies generally take care of operating stocks, the marketplace is clearly not attending to economic stockpiles. Moreover, the SPR should be filled in a manner that does not harm consumers.

Companies will not willingly hold excess capacity for the express purpose of preventing price increases. They will only do so if they fear that a lack of supply or an increase in brand price would cause them to lose business to competitors who have available stocks. Regional gasoline markets appear to lack sufficient competition to discipline anti-consumer private stock policies.

Public policy must expand stocks. Gasoline distributors (wholesale and/retail) can be required to hold stocks as a percentage of retail sales. Public policy could also either directly support or give incentives for private parties to keep storage. It could lower cost of storage through tax incentives when drawing down stocks during seasonal peaks. Finally, public policy could directly underwrite stockpiles. We now have a small Northeast heating oil reserve. It should be continued and sized to discipline price shocks, not just prevent shortages. Similarly, a Midwest gasoline stockpile should be considered.

Taking The Fun and Profit Out of Market Manipulation

In the short term, government must turn the spotlight on business decisions that make markets tight or exploit them. Withholding of supply should draw immediate and intense public scrutiny, backed up with investigations. Since the federal government is likely to be subject to political pressures not to take action, state government should be authorized and supported in market monitoring efforts. A joint task force of federal and state attorney's general could be established on a continuing basis. The task force should develop databases and information to analyze the structure, conduct and performance of gasoline markets.

As long as huge windfall profits can be made, private sector market participants will have a strong incentive to keep markets tight. The pattern of repeated price spikes and volatility has now become an enduring problem. Because the elasticity of demand is so low – because gasoline is so important to economic and social life – this type of profiteering should be discouraged. A windfall profits tax that kicks in under specific circumstances will take the fun and profit out of market manipulation.

Ultimately, market manipulation should be made illegal. This is particularly important for commodity and derivative markets.

PROMOTING A WORKABLY COMPETITIVE MARKET

Further concentration of these industries is quite problematic. The Department of Justice Merger Guidelines should be rigorously enforced. Moreover, the efficiency defense of consolidation should be viewed skeptically, since inadequate capacity is a market problem.

Restrictive marketing practices, such as zonal pricing and franchise restrictions on supply acquisition should be examined and discouraged. These practices restrict flows of product into markets at key moments.

Markets should be expanded by creating more uniform product requirements. These should not result in a relaxation of clean air requirements.

ENDNOTES

[1] "Consumer Groups Seek Energy Price Probe," *Energy Daily*, March 11, 2003, p. 4.

[2] Peterson and Mahnovski, p. 5, note the following:

> Oil industry research, analyses and policy dialogs conducted in both the private and public sectors tend to emphasize the natural resource side of the business – upstream crude oil exploration and production. Much less analysis and discussion is devoted to oil companies as the downstream manufacturers of intermediate and finished petroleum products.

[3] Peterson and Mahnovski, p. 5.

[4] Harwood, J. "Americans Distrust Institutions in Poll," *Wall Street Journal*, June 13, 2002, cited in Peterson, D. J. and Sergej Mahnovski, *New Forces At Work in Refining: Industry Views of Critical Business and Operations Trends* (Santa Monica: Rand, 2003), p. 19.

[5] For other products imports play a larger role, close to 10 percent for distillate and 50 percent for residual fuel oil.

[6] New imports of gasoline constitute a very small portion of total gasoline product supplied – about 4 percent. Transportation and marketing costs after the product is landed are domestic, but refining costs for this product are not. Ignoring product imports in the analysis of gasoline results in a slight overestimate of the domestic share.

[7] *Do Current High Petroleum Product Prices, ?* (Energy Information Administration, March 12. 2003), pp. 1-2.

[8] Energy Information Administration, *Summer 2003 Motor Gasoline Outlook*, April 2003.

[9] Public Citizen, Record Oil Company Profits Underscore Market Consolidation, May 31, 2001; Fortune 500, July 18, 2001; Business Week First Quarter Results, May 21, 2001

[10] *Fortune 500*, July 18, 2001.

[11] *Business Week*, Spring 2001, p. 92.

[12] U.S. Department of Energy, Energy Information Administration, *Performance Profile*, 2001, pp. 7-8.

[13] Peterson and Mahnovski, p. xvi.

[14] Espey, Molly, "Gasoline Demand Revisited: An International Meta-Analysis of Elasticities," *Energy Economics* 20 (1998), pp. 273-295, identifies 363 estimates of short-term elasticity. The median is -.23 for the short term and -.43 for the long term. Kayser, Hilke, A., "Gasoline Demand and Car Choice: Estimating Gasoline Demand Using Household Information," *Energy Economics* 22 (2000), estimates the short-term elasticity in the U.S. at -.23. Puller, Steven L. and Lorna A. Greening, "Household Adjustment to Gasoline Price Change: An Analysis Using 9 years of US Survey Data," *Energy* Economics 21 (1999), pp. 37-52, find a one-year price elasticity of -.34, but model a more complex structure of responses within shorter periods. They find a larger elasticity of miles traveled in the first quarter after a price shock (-.69 to -.76), but that demand "snaps back." The larger reduction in miles driven is still "inelastic." Moreover, the reduction in miles driven is larger than the reduction in fuel consumed since it appears that households cut back on the most efficient driving miles (i.e. higher speed vacation miles).

[15] Espy, Molly, "Explaining the Variation in Elasticity Estimates of Gasoline Demand in the United States: A Meta-analysis," *The Energy Journal*, 17, 1996, Table 2, shows the average elasticity of demand from U.S. only studies at -.42.

[16] National Energy Policy Development Group, *National Energy Policy* (Washington, D.C.: May 2001) (hereafter NEPDG), p. 3-13.

[17] Hsing, Yu, "On the Variable Elasticity of the Demand for Gasoline: The Case of the U.S.A.," *Energy Economics*, April 1990, p. 134, notes that the income elasticity declines over time and draws an analogy with expenditures on food,

> The declining income elasticity in the long-run indicates that the proportion of income spent on gasoline continues to decline as income rises. This is because the demand for gasoline like many food commodities has its limit beyond which saturation is reached.

[18] Landes, W. M. and R. A. Posner, "Market Power in Anti-trust Cases," *Harvard Law Review*, 19: 1981, point out that when demand elasticities are low, market power becomes a substantial problem.

[19] Federal Trade Commission, *Midwest Gasoline Price Investigation*, March 29, 2001, pp. i...4.

[20] Consodine, Timothy J. and Eunnyeong Heo, "Price and Inventory Dynamics in Petroleum Product Markets," *Energy Economics*, 22 (2000), p. 527, conclude "supply curves for the industry are inelastic and upward sloping." See also "Separatiblity, Functional Form and Regulatory Policy In Models of Interfuel Substitution," *Energy Economics*, 1989.

[21] Consodine, Timothy J., "Inventories Under Joint Production: An Empirical Analysis of Petroleum Refining," *Review of Economics and Statistics*, 1997, p. 527, "high inventory levels depress prices... In some cases, imports of product are more variable than production or inventories.

[22] Pirrong, Stephen Craig, *The Economics, Law and Public Policy of Market Power Manipulation* (Kluwer, Boston, MA, 1996), pp. 10... 24... 59.

> Economic frictions (including transportation, storage, and search costs) which impede the transfer of the underlying commodity among different parties separated in space or time can create the conditions that the large trade can exploit in order to cause a supracompetitive price...
>
> Although the formal analysis examines transportation costs as the source of friction, the consumption distortion results suggest that any friction that makes it costly to return a commodity to it original owners (such as storage costs or search costs) may facilitate manipulation.
>
> The extent of market power depends on supply and demand conditions, seasonal factors, and transport costs. These transport cost related frictions are likely to be important in many markets, including grains, non-precious meals, and petroleum products.
>
> Transportation costs are an example of an economic friction that isolates geographically dispersed consumers. The results therefore suggest that any form of transactions costs that impedes the transfer of a commodity among consumers can make manipulation possible...

All else equal, the lower the storage costs for a commodity, the more elastic its demand.

See also, William Jeffrey and Brian Wright, *Storage and Commodity Markets* (1991); Deaton, Angus and Guy Laroque, "On the Behavior of Commodity Prices," *Review of Economics and Statistics* (1992).

[23] Energy Information Administration, *Petroleum 1996: Issues and Trends*, September 1997, p. 27. The U.S. Department of Energy identified "lower than normal gasoline stocks" in a chapter entitled "Spring '96 Gasoline Price Runup." Energy Information Administration, *Assessment of Summer 1997*, p. 5, remarked on the role of stocks in the 1997 price runup as follows:

Gasoline stocks plummeted, dropping 15 million barrels, compared to an average monthly decline (for the 1992-1996 period) of 4 million barrels. Stocks ended the month at near-record low levels. Gasoline suppliers were left facing August, which is usually the highest demand month of the year, with virtually no inventory.

Joanne Shore, EIA Petroleum Division. In analyzing the Midwest price spike of 2000, the Department of Energy again found stocks to be the culprit, starting an analysis entitled *Supply of Chicago/Milwaukee Gasoline Spring 2000* as follows:

> This summer's run-up in Midwest gasoline prices, like other recent price spikes, stemmed from a number of factors. The stage was set for gasoline volatility as a result of tight crude oil supplies, which led to low product stocks and relatively high crude oil prices. With little stock cushion to absorb unexpected events, Midwest gasoline prices surged when a number of supply problems developed, including pipeline and refinery supply problems, and an unexpectedly difficult transition to summer-grade Phase II reformulated gasoline.

The FTC reached a similar conclusion in its Midwest Gasoline Price Investigation, at note 23.

Finally, in explaining the early spring price runup in 2001, inventories were the starting point –

: " Low petroleum inventories set the stage for our current situation, as they did last year both for heating oil and for gasoline." "Statement of John Cook, Director, Petroleum Division, U.S. Department of Energy," *Subcommittee on Energy and Air Quality, Committee on Energy and Commerce, U.S. House of Representative*, May 15, 2001, p.1.

[24] *Midwest Gasoline Price Investigation*, note 23 citing OECD and DOE documents states "Higher crude prices led producers to draw down inventories in anticipation of replacing them later at lower prices."

[25] NEPDG, p. 7-13.

[26] They certainly have value on the stock market (see Edwards, Kenneth John D. Jackson and Henry L. Thompson, "A Note on Vertical Integration and Stock Ratings of Oil Companies in the U.S.," *The Energy Journal*, 2000).

[27] Peterson and Mahnovski, p. 16.

[28] Peterson and Mahnovksi, p. 42.

[29] "Oil Data Show Industry Role in Shortages a Possibility," *New York Times*, June 15, 2001.

[30] U.S. Department of Energy, Energy Information Administration, *Performance Profiles of Major Energy Producers: 1999*, p. 19 , notes the first two mega-mergers – Exxon-Mobile and BP-Amoco. This was followed by the Chevron-Texaco merger.

[31] Id., p. 15, shows that even excluding mega-mergers like Exxon-Mobil, mergers and acquisitions equal 15 to 25 percent of total additions to investment. Similarly, Id. P. 55, remarks on the growth of nonintegrated refiners (p. 55), but of the 13 companies noted, at least four (including three of the largest) are either a joint venture of vertically integrated companies or have recently been reintegrated through merger. Joint operating agreements also abound in the industry.

[32] Peterson and Mahnovksi, p. xv.

[33] NEPDG, p. 7-13.

[34] U.S. Department of Energy, Energy Information Administration, *The Impact of Environmental Compliance Costs on U.S. Refining Profitability* (October 1997), p. 3, shows operating costs per gallon associated with pollution abatement at about $.01 per gallon and large capital costs for a short period of time to meet new requirements, but these had already begun to decline by 1995. The impact of capital expenditures must also be small, in the range of a penny per gallon. Other studies lead to similar estimates of costs associated with pollution abatement of a few cents per gallon; see Nadim, Farahad, et al., "United States Experience with Gasoline Additives," *Energy Policy*, 29 (2001).

[35] U.S. Department of Energy, Energy Information Administration, *Petroleum 1996: Issues and Trends* (September 1997), p. 137.

[36] Peterson and Mahnovski (p. xv), note that following "a wave of mergers, acquisitions joint ventures and selective divestitures... [whose] aim was cutting costs gaining economies of scale, increasing returns on investment, and boosting profitability... Consolidation and restructuring appear to have had the salutary effect executives intended, "EIA data indicates that mid and large-size refiners reduced their per barrel operating costs."

[37] U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual,* Table 44.

[38] Pirrong, p. 70.

[39] U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Monthly,* April 2000, p. 145, defines the lower operational inventory as follows:

> Lower operational Inventory (LOI): The lower operational inventory is the lower end of the demonstrated operational inventory range updated for known and definable changes in the petroleum delivery system. While not implying shortages, operational problems or price increases, the LOI is indicative of a situation where inventory-related supply flexibility could be constrained or non-existent. The significance of these constraints depends on local refinery capability to meet demand and the availability and deliverability of products from other regions or foreign sources.

[40] The general literature on stock and storage behavior shows that stocks are typically kept to ensure operational flow (see Pyndick, Robert S., "Inventories and the Short-Run Dynamics of Commodity Prices," *Rand Journal of Economics*, Spring 1994, "The Present Value Model of Rational Commodity Pricing," *The Economic Journal*, May 1993;Consodine, Inventories. In Exhibit III-3 , the LOI is placed at 185 million barrels

throughout the period, although it may have varied over time. As supplies have become tight, operators may have squeezed the LOI down. With refinery capacity stable over the past ten years, using a constant level for the period on which this paper focuses provides a sound basis for analysis.

[41] Peterson and Mahnovksi, p. 43.

[42] Landes and Posner (p. 947) stress the importance of adjusting scrutiny based on the market characteristics:

> Market Share Alone Is Misleading. -Although the formulation of the Lerner index... provides an economic rationale for inferring market power from market share, it also suggests pitfalls in mechanically using market share data to measure market power. Since market share is only one of three factors... that determine market power, inferences of power from share alone can be misleading. In fact, if market share alone is used to infer power, the market share measure... which is determined without regard to market demand or supply elasticity (separate factors in the equation), will be the wrong measure. The proper measure will attempt to capture the influence of market demand and supply elasticity on market power.

[43] Landes and Posner (p. 954) also argued that the size of the market at issue should be considered, "if very high market shares are required to justify a finding of monopoly power in a small market, then a lower market share should suffice in a large market."

[44] Recent studies that document the importance of concentration and market power in various markets at a micro level include Sen Anindya, "Higher Prices at Canadian Gas Pumps: International Crude Oil Prices of Local Market Concentration," *Energy Economics*, 2003; Borenstein, Severin and Andrea Shepard, "Sticky Prices, Inventories and Market Power in Wholesale Gasoline markets," *RAND Journal of Economics*, 2002; Delpachitra, Sarath B., " Price Rigidity in the Downstream Petroleum Industry in New Zealand: Where Does it Happen," *Energy Economics*, 2002; Adrangi, Bahram, Arjun Chatrath, Kambiz Raffiee, and Ronald D. Ripple, "Alaska North Slope Crude Oil Price and the Behavior of Diesel Prices in California," *Energy Economics*, 2001; Gilbert, Richard and Justine Hastings, "Vertical Integration in Gasoline Supply: An Empirical Test of Raising Rivals Costs," *Competition Policy Center*, University of California, Berkeley, 2001, Borenstein, Severin, A. Colin Cameron and Richard Gilbert, "Do Gasoline Prices Respond Asymmetrically to Crude Oil Price Changes, *Quarterly Journal of Economics*, 1997.

[45] Shepherd, p. 389.

[46] Shepherd, p. 4.

[47] U.S. Department of Justice and Federal Trade Commission *Horizontal Merger Guidelines*, 1997, at section 0.1.

> The rule of thumb reflected in all iterations of the Merger Guidelines is that the more concentrated an industry, the more likely is oligopolistic behavior by that industry.... Still, the inference that higher concentration increases the risks of oligopolistic conduct seems well grounded. As the number of industry participants becomes smaller, the task of coordinating industry behavior becomes easier. For example, a ten-firm industry is more likely to require some sort of coordination to maintain prices at an oligopoly level, whereas the three-firm industry might more easily maintain prices through parallel behavior without express coordination.

[48] John B. Taylor, Economics (Boston: Houghton Mifflin, 1998); W. Kip Viscusi, John M. Vernon, and Joseph E. Harrington, Jr., *Economics of Regulation and Antitrust* (Cambridge: MIT Press., 2000), Chapter 5; Jean Fudenberg and Jean Tirole, "Noncooperative Game Theory for Industrial Organization: An Introduction and Overview," in Richard Schmalensee and Robert D. Willig, (eds.) *Handbook of Industrial Organization* (New York: North-Holland, 1989).

[49] Peterson and Mahnovksi, p. 24.

[50] Scherer and Ross, p. 526, formulate the issue as follows "To avoid these hazards, firms entering either of the markets in question might feel compelled to enter both, increasing the amount of capital investment required for entry."

[51] Shepherd, pp. 289-290, describes this issue as follows:

> When all production at a level of an industry is "in-house," no market at all exists from which independent firms can buy inputs. If they face impediments or delays in setting up a new supplier, competition at their level will be reduced. The clearest form of this is the rise in capital a new entrant needs to set up at both levels.

Ores, special locations, or other indispensable inputs may be held by the integrated firm and withheld from others. The integration prevents the inputs from being offered in a market, and so outsiders are excluded. A rational integrated firm might choose to sell them at a sufficiently high price.

[52] Shepherd, p. 294, argues that integration by large firms creates this problem. Restrictions may be set on areas, prices or other dimension ... Only when they are done by small-share firms may competition be increased. When done by leading firms with market shares above 20 percent, the restrictions do *reduce* competition.

[53] Perry, martin K., "Vertical Integration: Determinants and Effects," Richard Schmalensee and Robert D. Willig, *Handbook of Industrial Organization* (Amsterdam, North Holland: 1989), p. 197.

[54] Perry, p. 247.

[55] Scherer and Ross, pp. 526-527; Shepherd, p. 290.

[56] Borenstein, Cameron and Gilbert.

[57] Scherer and Ross, pp. 526-527; Shepherd, p. 290.

[58]Gilbert and Hastings, p. 27; see also Hastings, Justine, "Vertical Relationships and Competition in Retail Gasoline Markets: Empirical Evidence from Contract Changes in Southern California," *Competition Policy Center*, 2000.

[59] In 1990, 22 integrated companies covered an average of 28 states. In 1999, 17 companies covered an average of 26 states.

[60] Even introductory economics texts now contain long discussions of strategic behavior and game theory [see, for example, Taylor, *Economics,* Chapter 11] and it has become a routine part of applied policy analysis [Hasting, Justine, "Factors that Affect Prices of Refined Petroleum Products" (Washington, D.C. Federal Trade Commission Public Conference, August 2, 2001)].

[61] Federal Trade Commission, *Midwest Gasoline Price Investigation*, March 29, 2001, pp. i... 4.

[62] FTC, *Midwest Gasoline Price Investigation*, p. 4.

[63] Peterson and Mahnovksi, p. 17.

[64] Peterson and Mahnovski, p. xviii.

[65] FTC. *Midwest Gasoline Price Investigation.* The West Coast gasoline market has also been the object of repeated complaints about pricing behavior.

[66] FTC, *Midwest Gasoline Price Investigation*, p. 4.

[67] U.S. Department of Energy, Energy Information Administration, *Assessment of Summer 1997 Motor Gasoline Price Increase*, May 1998, p. 17.

[68] Peterson and Mahnovski, p. 31.

[69] Energy Information Administration, *Price Changes in the Gasoline Market,* March 1999, reviews several decades of studies with mixed results in the analysis of gasoline price asymmetry – the tendency of prices to increase rapidly, but fall slowly. The report concludes that there is strong evidence of pattern asymmetry (i.e. prices do rise faster than they fall) but not amount asymmetry (eventually they fall back all the way). This is not the majority view, however.

[70] Reilly, Barry and Robert Witt, "Petrol Price Asymmetry Revisited," *Energy Economics*, 1998.

[71] Bacon, Robert W., "Rockets and Feathers: The Asymmetric Speed of Adjustment of UK Retail Gasoline Prices to Cost Changes," *Energy Economics* 1991; Galeotti, Marzio, Alessandro Lanza and Matteo Manera, "Rockets and Feathers Revisited: An International Comparison on European Gasoline Markets," *Energy Economics,* 2003.

[72] Borenstein, Gasoline Prices, p. 322; U.S. General Accounting Office, "Energy Security and Policy: Analysis of the pricing of Crude Oil and Petroleum Products (Washington, DC, March 1993).

[73] Consumer Federation of America, *Ending the Gasoline Price Spiral (July 2001).*

[74] National Research Council, *Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards* (Washington, D.C.: 2002); Union of Concerned Scientists, *Drilling in Detroit* (Wasington, D.C.: 2001).

Consumer Federation of America

Consumers Union

FUELING PROFITS:

INDUSTRY CONSOLIDATION, EXCESS PROFITS & FEDERAL NEGLECT
DOMESTIC CAUSES OF RECENT GASOLINE AND NATURAL GAS PRICE SHOCKS

DR. MARK N. COOPER

May 2004

Contents

EXECUTIVE SUMMARY 1
RECORD HIGH PRICES; RECORD HIGH PROFITS 1
CONCENTRATION AND MARKET POWER AFTER A WAVE OF MERGERS 2
THE FAILURE OF PUBLIC POLICY 4
CHANGING DIRECTION IN PUBLIC POLICY 5

I. INTRODUCTION 7
"THE GAS MORASS OF '04"1 7
PURPOSE AND OUTLINE 7

II. DOMESTIC ENERGY PRICE SHOCKS 8
METHODOLOGY 8
DOMESTIC PRICE RATCHETS 11
THE ROLE OF CRUDE 14
HOUSEHOLD IMPACTS 18
PROFITING FROM PRICE INCREASES IN CONCENTRATED MARKETS 20

III. THE CAUSES OF DOMESTIC PRICE SHOCKS 21
THE MERGER WAVE 22
EXERCISING MARKET POWER OVER PRICE 25
GASOLINE SUPPLY 27
NATURAL GAS SUPPLY 32

IV. WEAK MARKET FUNDAMENTALS PUT ENERGY CONSUMERS AT INCREASED RISK 36
ANTITRUST AND PUBLIC POLICY 36
DEMAND IS INELASTIC 38
SUPPLY IS INELASTIC 39
THE GAS GUZZLER PROBLEM 41
CONCENTRATION IN THE PETROLEUM INDUSTRY CREATES MARKET POWER 43

V. PUBLIC POLICY 48
POLICY ORIENTATION MATTERS 48
THE WRONG EXPLANATIONS LEAD TO THE WRONG POLICY 49
POLICY THAT REFLECTS THE DOMESTIC REALITY 52

ENDNOTES 55

EXECUTIVE SUMMARY

Record High Prices; Record High Profits

With energy prices making front-page headlines and taking center stage in election year debates, policymakers are arguing over whom to blame and scrambling for explanations. This paper analyzes the record gasoline and natural gas prices in the period from January 2000 to March 2004 by decomposing the increases into three components – shifts in the domestic market structure, price increases paid to foreign energy producers when the international price of crude increases, and price increases paid to domestic energy resource producers when domestic prices follow international prices upward.

- Total price increases for gasoline at the pump and natural gas at the wellhead have been over $300 billion over the past four years, resulting in record profits for the industry.

Domestic petroleum companies account for about $250 billion. Changes in domestic market structure accounted for the largest part of this total.

- The gasoline refining and marketing segments of the domestic industry have increased pump prices by $55 billion, exclusive of crude oil price increases.
- Similar changes in the domestic market structure added another $5 billion to the cost of other domestic petroleum products that are used by residential consumers, such as heating oil and propane.
- Natural gas wellhead prices increased by almost $100 billion, separate and apart from anything that OPEC has done, wit $90 billion going to domestic sellers of natural gas.

Another $100 billion went to domestic producers by simply following the global price of energy up. About $60 billion went to foreign producers of energy resources.

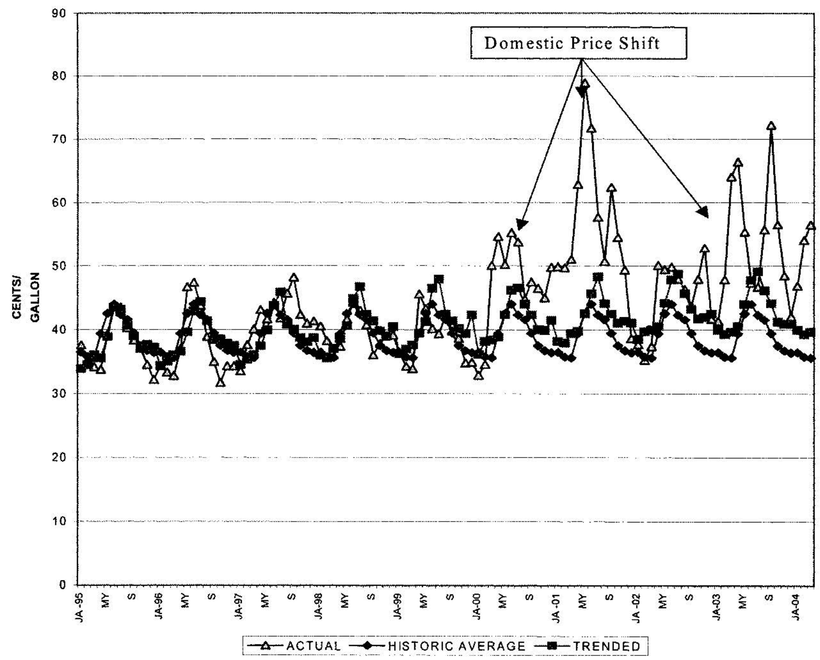
Taken together, in 1999, averaged across all households, expenditures for gasoline, heating oil and natural gas accounted for about $1400 per year of total household expenditures.

- Price increases over the past four years associated with the price shock for these residential items added about $350 per household per year (including all factors). Thus, domestic energy price shocks have increased household energy bills by 25 percent.

- A comparison between 1999 and 2003 is even more dramatic, a $500 increase in average annual household expenditures for these petroleum products, which represents a jump of over 35 percent.

Since these price increases were not caused by cost increases, petroleum industry profits have risen to record highs over the period.

Exhibit ES-1: Domestic Gasoline Spread, Actual and Projected



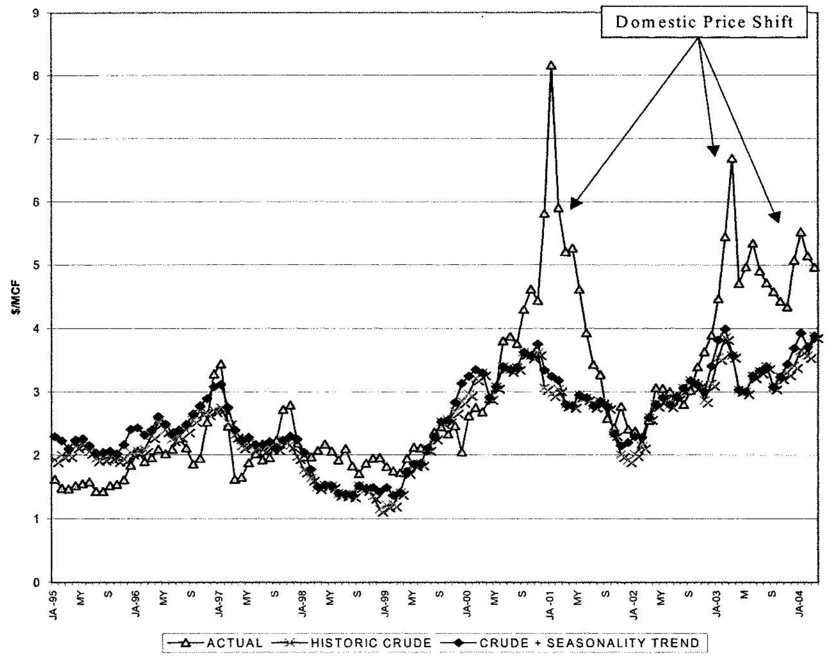
Source: See text for methodology, U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, *Weekly Petroleum Status Report*, various issues and database.

- Domestic petroleum companies enjoyed an increase in 2000 to 2003 of $50 to $80 billion of after-tax windfall profits compared to the 1995-1999 period. Before tax profits were up $70 to $110 billion.
- Domestic petroleum industry profits are headed for another record. First quarter 2004 filings show domestic refining and marketing profits up about 50 percent compared to the first quarter of 2003, while company-wide profits are up about 17 percent.

Concentration and Market Power After a Wave of Mergers

The story that does not get coverage behind the headlines reporting record prices and profits is the merger wave that swept through the petroleum industry between 1997 and 2002.

Exhibit ES-2: Natural Gas Wellhead Prices, Actual and Projected



Source: See text for methodology, U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review, Weekly Petroleum Status Report,* various issues and database.

It concentrated the petroleum industry into the hands of a small number of giant, vertically integrated companies that gained market power over prices.

- The Department of Energy identified a total of major 34 oil and gas companies that merged into 13 over this period, and an 15 refining companies that had shrunk to seven.
- Of the 31 companies listed in the oil and gas sector by *Business Week* in 1995, 21 engaged in mergers with other companies between 1997 and 2002. Of the 21 listed by *Business Week* in 2003, 15 had engaged in mergers in the previous five years.

With increasing concentration, long-term strategic decisions by the industry tighten production capacity interacted with short-term (mis)management of stocks to create a tight supply situation that provides ample opportunities to push prices up quickly.

- In the 1990s alone, approximately 50 refineries were closed. Since 1995, over 20 refineries have been shut down.

- Operating stocks to meet demand and cushion price swings have declined to very low levels. They generally are in the range of a couple of days, compared to four or five days in the early 1990s and over a week in the 1980s.

The move of the majors into natural gas production in the 1990s changed the nature of that sector. Decisions about which wells to produce and which wells to cap, how much to inject into storage, how to use pipeline capacity and ultimately, how to report prices are business decisions that affect the price paid at the wellhead.

- Consolidation came hand in hand with the shift to acquisition of resources through merger (rather than exploration) and a shift of drilling away from exploration.

- The trading markets that drive wellhead natural gas price are quite new and lack price transparency. Enron played a large roll in these markets and when it collapsed, so too did much private trading. The evidence is mounting that manipulation and abusive practices have been part of these markets since 2000.
- The long-term trend to much lower stocks relative to demand is clear in natural gas as well. Compared to the decade of 1985-1994, stocks were about 25 percent lower in the 1995-1999 period. During the price spikes of the new millennium, stocks were 40 to 50 percent lower than the 1985-1994 period and 25 percent lower than the 1995-1999 period.

The Failure of Public Policy

Excessive industry concentration and anti-consumer pricing behavior is the result of lax antitrust law enforcement by both the Clinton and Bush Administrations allowed too many mergers because they did not take the unique characteristics of the energy industry into account. The Federal Trade Commission has failed to recognize the inability of supply and demand to respond to price signals, which allows market power to be abused at much lower levels of concentration than is the case in most other industries.

Because there are few firms in the market and because consumers cannot easily cut back on energy consumption, prices hold above competitive levels for significant periods of time. The problem is not a conspiracy, but the self-intrested action of large companies with market power. With weak competitive market forces, individual companies have flexibility for strategic actions that raise prices and profits.

- Individual companies can let supplies become tight in their area and keep stocks low, since there are few competitors who might counter this strategy, and push prices up when demand increases because they have no fear that competitors will not raise prices to steal customers.

- Every accident or blip in the market triggers a price shock that leads to additional profits. Moreover, operating complex energy systems at very high levels of capacity places strains on the physical infrastructure and renders it susceptible to accidents.

The explanation for the high and volatile price of gasoline offered by the industry and the Bush Administration emphasizes that "overdependence on any one source of energy, especially a foreign source, leaves us vulnerable to price shocks, supply interruptions and in the worst case, blackmail." The explanation is so oversimplified and incomplete that it must be considered at best misleading and it leads to a policy that incorrectly overemphasizes domestic production.

The central premise of the energy bill pushed by the administration is that energy companies need more money to boost production of domestic energy supplies. To that end, a grab bag of subsidies – totaling over $20 billion – was earmarked for the oil and gas industry, while other expensive alternatives also would receive assistance. On the natural gas side, the bill promotes costly backstop technologies, like liquefied natural gas imports and an Alaska natural gas pipeline, that will lock in high gas prices.

Further boosting the profitability of the petroleum industry with subsidies and access to resources in environmentally sensitive areas would not increase production a great deal, nor will it decrease prices to consumers. Over the past four years, the domestic oil and gas industry has enjoyed a huge increase in profitability, but the pricing abuse has gotten worse, not abated.

- Because domestic resources represent a very small share of the global resources base and are relatively expensive to develop, the increase in the amount of oil and gas produced in America will not be sufficient to put downward pressure on world prices.
- Even if the U.S. could affect the market price of basic energy resources, which is very unlikely, that would not solve the structural problem in domestic markets.

Tight markets in the U.S. can best be addressed by relieving pressure on the demand side, yet the energy bill being considered by Congress does little to relieve that pressure. The legislation fails to take serious measures to reduce demand by boosting the efficiency requirements for the most important energy consuming equipment – like automobiles and air conditioners.

Changing Direction In Public Policy

The current uncompetitive and anti-consumer market conditions grew up over decades and they can only be reversed by a long-term policy that seeks to reduce the consumption of petroleum products and relieve the pressures on domestic markets. Vigorous and broad based public policies should be pursued to implement permanent institutional changes that lowerthe chances that markets will be tight and reduce the exposure of consumers to the opportunistic exploitation of markets when they become tight. To achieve this reduction of risk, public policy should be focused on achieving several interrelated goals.

- **Easing tight markets:** Increasing fuel efficiency in the decade ahead at the rate achieved in the 1980s would save about 1.5 million barrels per day. Increasing refinery capacity by 10 percent, either through expansion at existing refineries or redevelopment of less than one half of the refineries closed in the past decade, would add another 1.5 million barrels per day.
- **Increase market flexibility:** Expanding stocks – with tax incentives to hold and draw down supplies in the fact of price increases, mandatory stocks requirements as a percentage of sales, and/or government owned/privately operated supplies – could alleviate the chronic problem of inadequate short-term shortages.
- **Promote a more competitive industry:** Further concentration of the petroleum industry should be resisted by vigorous enforcement of the Department of Justice Merger Guidelines. Restrictive marketing practices, such as zonal pricing and franchise restrictions on supply acquisition should be investigated and discouraged.
- **Deter private actions that make markets tight or exploit market disruptions.** Withholding of supply should draw immediate and intense public and governmental scrutiny through a joint federal state task force of attorney's general. Manipulation of commodity markets should be prevented. The incentives to manipulate markets can be reduced by imposing a windfall profits tax that triggers under specific circumstances of price and profit increases.

I. INTRODUCTION

"The Gas Morass of '04"[1]

The issue of energy prices has moved to the front pages of the nation's newspapers and center stage in election year policy debates. For example, on May 4, 2004, *The New York Times* ran a front-page business section story under the headline, "Drivers Tend to Shrug Off High Gas Prices, for Now."[2] It reported that consumers had not yet reacted strongly to record high prices, in part because the tax cut had cushioned the blow. It cited figures that indicated "the tax cut gave consumers about $70 billion in additional spending power this year, while the rise in crude oil prices... has so far cost Americans only about $35 billion." On the very same day, *The Washington Post* saw more pain in high gasoline prices under the headline "Caught Over a Barrel: Soaring Gas Prices Have Motorists' Wallets Running on Empty."[3] It recounted the lengths to which consumers were going to "save a nickel a gallon."

Public officials appear to be at least as confused as the newspaper headlines. At a recent hearing on gasoline and natural gas prices, for example, the General Counsel of the Federal Trade Commission (FTC) testified that 85 percent of the increase in gasoline prices was caused by increases in crude oil prices.[4] Less than a week later, however, another branch of the federal government contradicted the claim by the FTC. A spokesman for the Energy Information Administration (EIA) observed that 60 percent of recent price increases were caused by the domestic refining sector.[5] By the EIA count, the increase attributable to crude is less than half as much as the FTC claimed at the hearing. A couple of weeks later, however, the EIA spokesperson changed his tune, now claiming that "OPEC production cuts ranked higher as a cause for increased gas prices than tightness in the United States refining market."[6]

The energy price problem is not confined to gasoline markets. It afflicts natural gas as well. A December 2003 report from the Industrial Energy Consumers of America concluded that a "41 month natural gas crisis has cost U.S. consumers over $111 billion."[7] The bad news continued in the winter, summarized in headlines like "Natural Gas Prices Surge and Fingers are Pointing"[8] and "Heating Costs Going Through the Roof."[9]

Purpose and Outline

This paper seeks to fill the gap between the statements by the FTC and the EIA and chart a course through the morass of energy price headlines. It provides a detailed accounting of the sources of recent gasoline and natural gas price increases.[10] It explains the structural causes of those changes.

Section II describes the cost to consumers of the dramatic shift in domestic pricing behavior. It shows that shifts in the domestic market structure have played as large a role in the recent price spikes as increases in the world price of crude. Further, it shows that price increases paid to domestic energy resource producers, when domestic prices follow international prices upward have been far larger than price increases paid directly to foreign energy producers when the international price of crude increases.

Section III explains why domestic producers were able to increase their take in domestic energy markets. It shows that a merger wave in the late 1990s dramatically changed the industry structure, concentrating the petroleum industry into the hands of a small number of giant, vertically integrated companies.[11] The business decisions of these companies restricted capacity, undermined independents and rendered many markets uncompetitive and vulnerable to manipulation.

Section IV explains why the FTC under both the Clinton and Bush administrations failed to stop energy industry mergers and failed to recommend or take policy action against clearly abusive practices in the energy industries. The FTC has failed to recognize that weak market forces (demand and supply that cannot respond easily to price changes) allow firms to exercise market power at lower levels of concentration than in other industries.

Section V explains why the policies embodied in the pending energy bill are misguided and proposes an alternative set of policies. It argues that increased profitability for oil companies through subsidies and permission to drill in environmentally sensitive areas will not produce enough new resources to reduce pressures on the world oil market. Because the same companies that have market power will likely control the additional output, it will do little to alleviate problems in domestic markets. Alternative policies to reduce demand, increase domestic market flexibility, and prevent market manipulation are suggested.

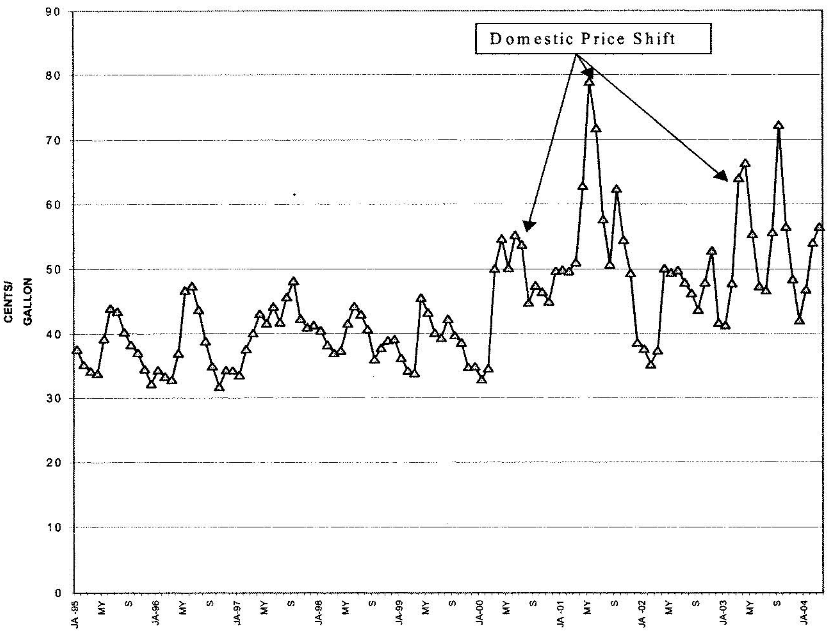
II. DOMESTIC ENERGY PRICE SHOCKS

A quick glance at the testimony of the FTC General Counsel reveals the source of his overestimation of the role of crude oil price increases. The FTC witness relied on an early 1999 analysis and seems to have looked at a long-term trend of prices, rather than looking at the recent and current situation.[12] Exhibits II-1 and II-2, which focus on the price increases resulting from shifts in domestic gasoline and natural gas market structures, show that in doing so he ignored a dramatic change in the pricing pattern of domestic energy sources: energy prices began to destabilize in the spring of 2000 and took off in early 2001.

Methodology

To gauge the magnitude of the domestic price shifts, we have compared the recent price increases to several baseline estimates. As is evident in the disagreement between the FTC and the EIA, the choice of baseline and the period over which one makes comparisons is extremely important. A series of questions must be answered.

Exhibit II-1: Domestic Gasoline Spread

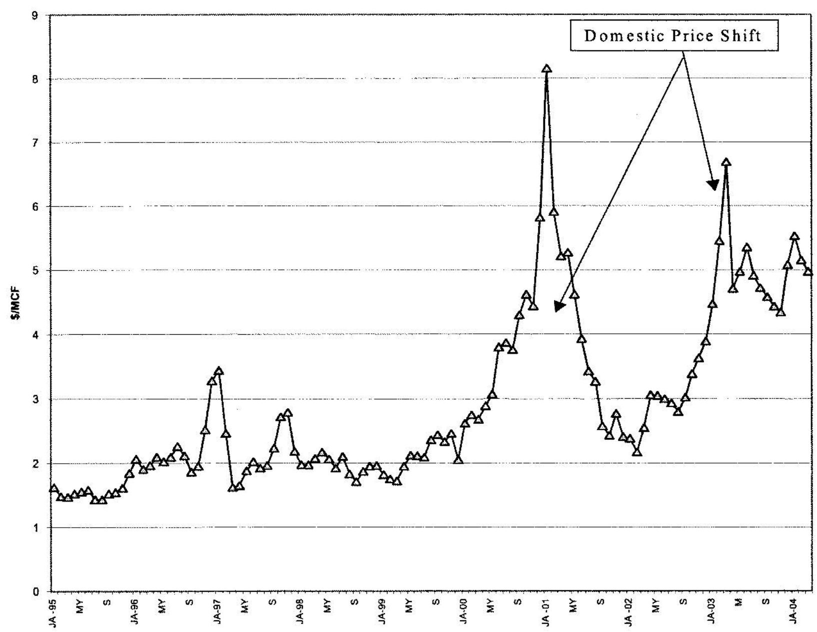


Source: See text for methodology, U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review, Weekly Petroleum Status Report,* various issues and database.

How far back should the analysis go? For purposes of this analysis we go back to January 1995. January 1995 was the implementation date of the Clean Air Act Amendments.[13] The Clean Air Act Amendments affected refinery operations and, in turn, gasoline prices. The Clean Air Act Amendments and electricity restructuring, which began in the mid-1990s, affected natural gas markets as well.[14] Moreover, a merger wave hit the industry in the second half of the 1990s. As discussed below, there is documentary evidence from the mid-1990s that oil industry executives contemplated tightening the supply side of the oil market through the merger wave. **Longer-term comparisons would make the recent pricing abuse appear even greater.**

At what date does the change in behavior take place? The data itself provides an easy answer. There appears to have been a sharp break in the pricing behavior of domestic energy markets in early 2000. This change in behavior escalated sharply in 2001.

Exhibit II-2: Natural Gas Wellhead Prices, Actual and Projected



Source: See text for methodology, U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, *Weekly Petroleum Status Report*, various issues and database.

What factors should be analyzed? For gasoline, we focus on the domestic spread. The domestic spread is defined by the Energy Information Administration as the price at the gasoline pump minus crude oil costs and taxes.[15] This represents the share in the pump price that domestic refining and marketing operations take. (Refining and marketing are also known as downstream operations in the industry.) Neither the cost of crude nor taxes is within the control of domestic energy companies. By calculating the domestic spread, we isolate the impact of changes in the domestic market from changes in the cost of crude, which is an input to the production of gasoline, heating oil and other petroleum products.

For natural gas, we focus on the wellhead price. Natural gas is overwhelmingly (90 percent) a domestic resource. Crude oil is not an input to the production of natural gas, but it does influence the price somewhat, since there are some uses, particularly industrial, in which crude oil and natural gas are substitutes.[16] In order to isolate the effect of crude, we observe that between January 1995 and December 1999, natural gas averaged about 67 percent of the cost of crude. We use this as the historic average.

After isolating the effect of crude prices in this way, we compare crude price movements to domestic energy price movements. We examine the relationship of crude to the domestic factors isolated.

How should baseline prices be calculated? In order to estimate the magnitude of a shift in pricing behavior, we must have some estimate of what prices would have been absent the shift. For purposes of this analysis, and given the context of the debate over current prices, we have chosen two baseline methods.

Above we noted the estimate of the Industrial Energy Consumers of America (IECA) of a $111 billion increase in natural gas wellhead prices. This is based on a simple comparison of prices before and after a specific date (in their case June 2000). While such an estimate presents a baseline, it does not take into account factors such as the cost of crude, seasonality of demand or the general trend of increasing demand. Therefore, we have calculated the price increases using two more sophisticated methods. The results are lower than those calculated by the IECA.

For the domestic gasoline spread, we use the historic average from January 1995 to January 2000 as one baseline. For a more refined estimate, we use a trend line based on the seasonality of demand and the increasing trend of demand.[17]

For natural gas, we base the historic average on the relationship between the price of natural gas and the price of crude oil in the January 1995 to December 1999 period.[18] For the trend line we add in a seasonality factor to the crude-driven price.[19]

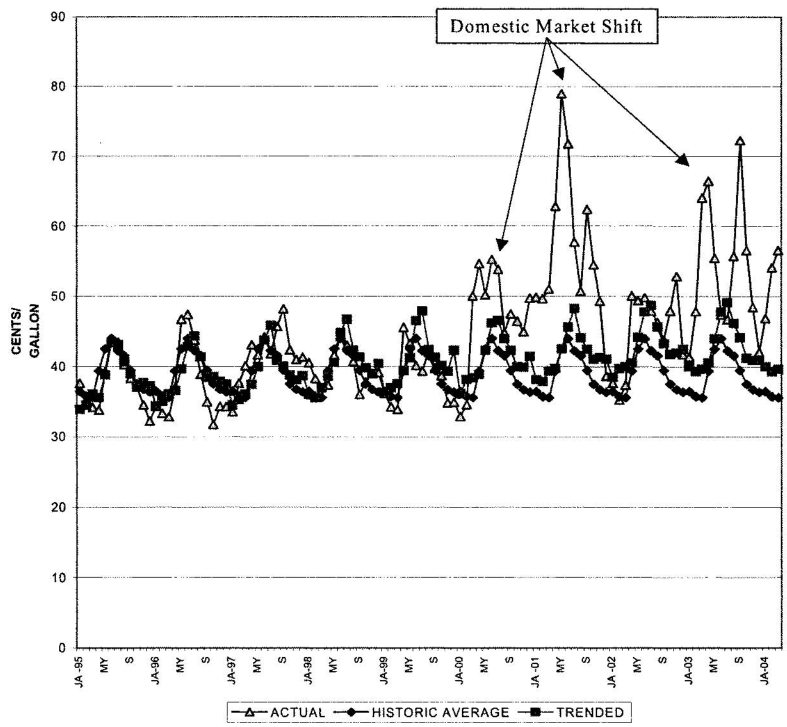
Exhibits II-3 and II-4 above include these baseline estimates and indicate that they are good predictors of prices in the period prior to January 2000.

Domestic Price Ratchets

Exhibit II-3 above shows the domestic spread on gasoline. Throughout the second half of the 1990s, the domestic spread fluctuated seasonally within a narrow range of 32 to 48 cents per gallon. The average domestic spread was about 39 cents per gallon over the period. The domestic spread jumped in mid-2000 and skyrocketed in early 2001. It then plummeted back to historic levels during the winter recession of 2001-2002. It began to rise again in late 2002 and has been above historic levels almost continually ever since. The average spread from January 2000 to March 2004 has been about 51 cents per gallon.

Compared to the historic average, the increased cost to consumers since January 2001 has been about $63 billion. Compared to the trended base line, the increase has been about $48 billion. Only 5 percent of gasoline is imported as product.

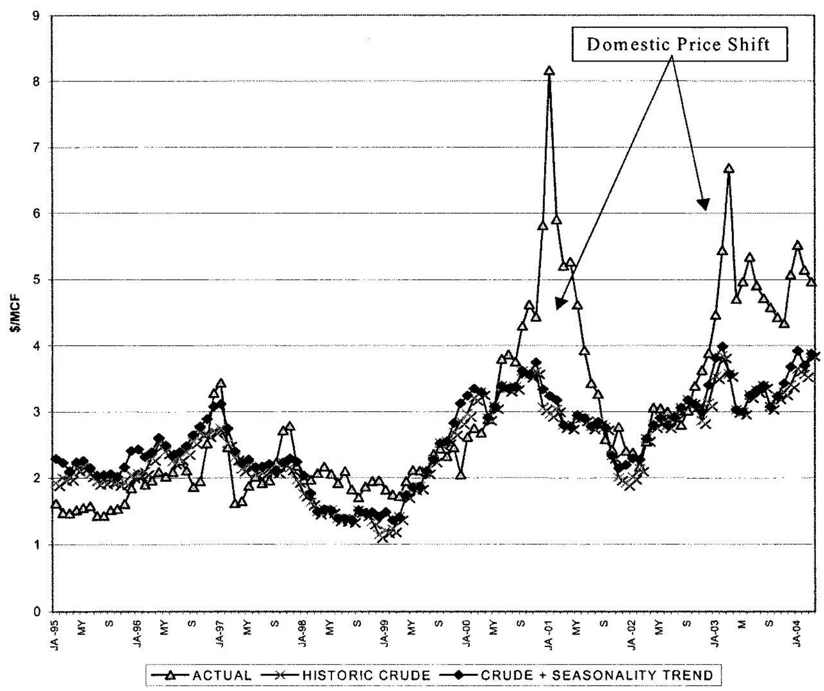
Exhibit II-3: Domestic Gasoline Spread, Actual and Projected



Source: See text for methodology, U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review, Weekly Petroleum Status Report,* various issues and database.

The picture is similar for natural gas, which is overwhelmingly produced from domestic sources (see Exhibit II-4). There was a run-up in prices in mid-2000 and a peak in early 2001, reinforcing the sense of an energy crisis. Prices tumbled during the 2001-2002 recession, but have mounted again and stabilized at over twice the level of the late 1990s. The total increase in the wellhead price of natural gas above the historic relationship to crude was about $98 billion ($99 billion compared to historic and $97.6 billion compared to trended). Of this total, about $15 billion goes to foreign suppliers of natural gas, since the U.S. imports about 15 percent of its total supply.

Exhibit II-4: Natural Gas Wellhead Prices, Actual and Projected

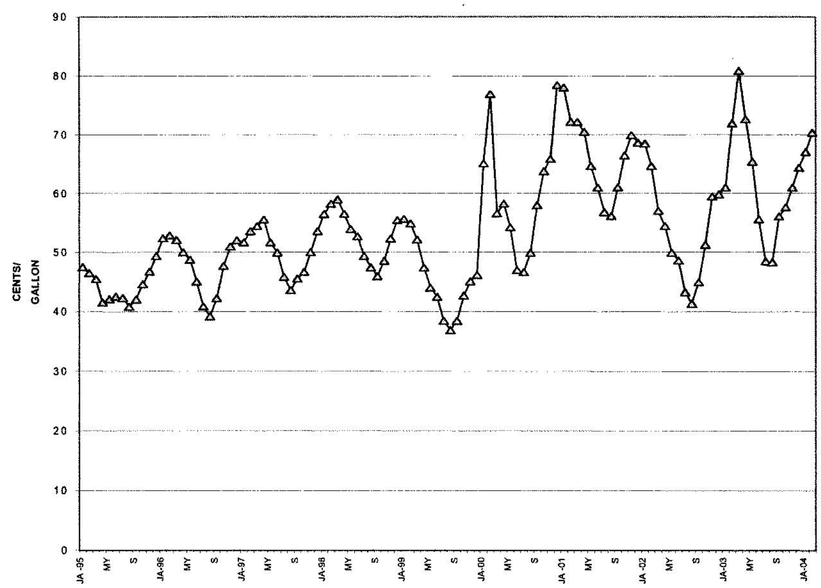


Source: See text for methodology, U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review, Weekly Petroleum Status Report,* various issues and database.

The domestic price shift was much larger after December 2000. The increase in the domestic spread has been much larger since 2001. The increase in 2000 averaged between $.6 billion per month (trended) and $1.0 billion per month (historic average). Since January 2001, the increase has averaged between $1 billion per month (trended) and $1.3 billion per month (historic average). Virtually all of the increase took place after wellhead prices skyrocketed in early 2001.

Exhibit II-5 shows the domestic spread on heating oil. The pattern parallels gasoline, with the winter season being the peak for the domestic heating oil spread. In the January 1995 to December 1999 period, the heating oil domestic spread varied in the narrow range of 40 cents to 60 cents per gallon and averaged 48 cents. Since January 2000 it has varied in a much

Exhibit II-5: Domestic Heating Oil Spread



Source: Energy Information Administration, *Petroleum Marketing Monthly* and *Monthly Energy Review*, various issues and database.

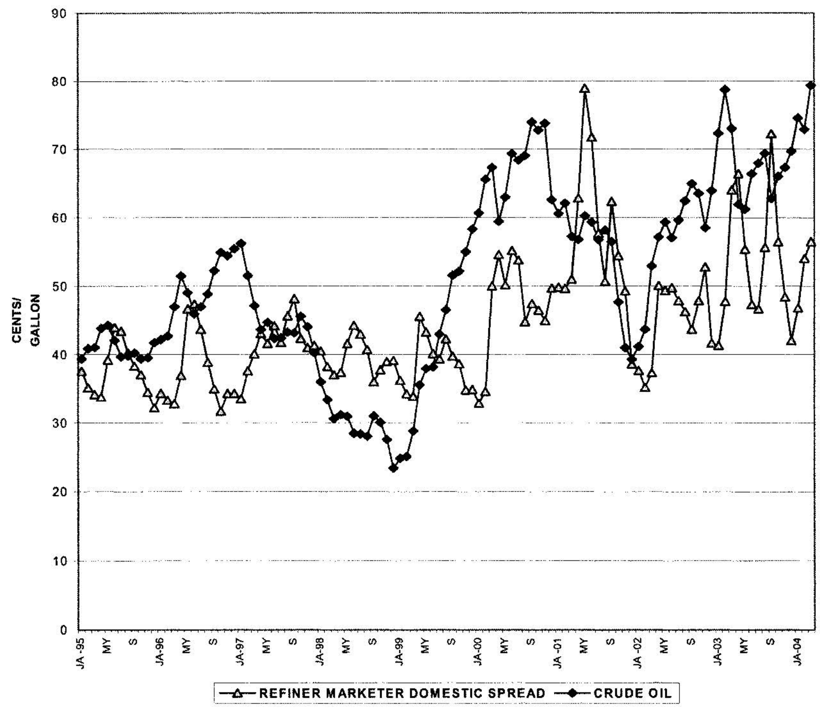
wider range (40 cents to 80 cents) and averaged 62 cents. This increased costs to consumers by $2 to $3 billion per year. The other fuel used by residential consumers – propane – exhibited a similar pattern. The spread moved up in 2000 and peaked in 2001. It moderated somewhat in 2002, but rose again and remained well above historic averages in 2003 and 2004.

The Role of Crude

Exhibit II-6 plots crude oil costs and the domestic spread on the same axes. It is interesting to note that prior to January 2000, there was virtually no relationship between the domestic spread and the price of crude. Nor is there any reason to believe that there should have been. In fact, the regression coefficient for January 1995 to January 2000 was slightly negative, though not statistically significant. After January 2000, there was a positive and statistically significant relationship. The domestic spread rose with crude prices.

Thus, the record prices we see today are the result of the combination of historic highs in both crude oil prices and the domestic spread.

Exhibit II-6: High Crude Oil Prices and High Domestic Gasoline Spreads Combine to Produce Record Prices at the Pump

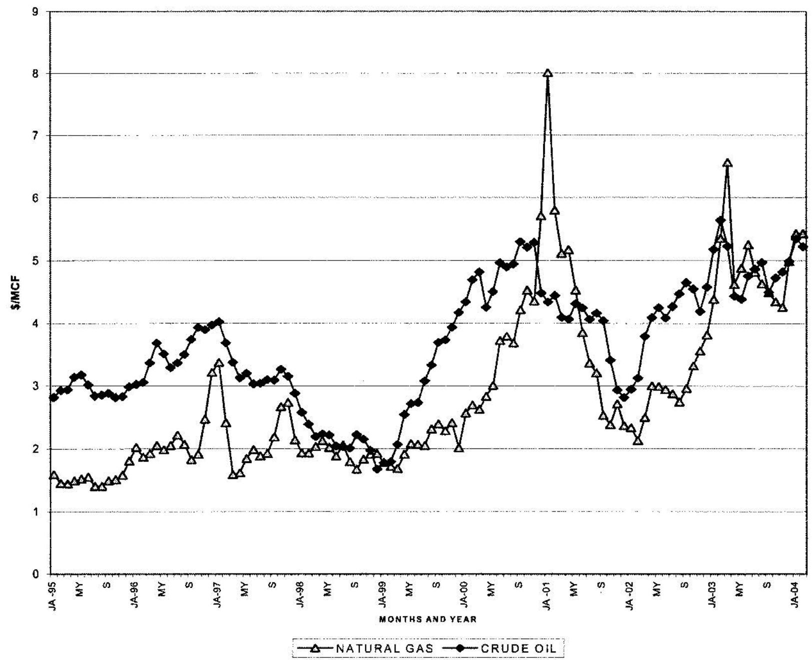


Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review, Petroleum Marketing Monthly, Weekly Petroleum Status Report,* various issues and database.

Exhibit II-7 plots crude oil costs and natural gas wellhead prices. Again, prior to January 2000 the relationship between natural gas and crude oil prices was weak and statistically not significant. While natural gas averaged about 67 percent of crude, it did not follow the price movements of crude very closely. Since January 2000, the relationship has been larger (the regression coefficient is four times as large) and statistically significant. Since January 2000, the natural gas wellhead price has been about 90 percent of the price of crude. Since January 2001, it has been 93 percent.

It would appear that the domestic industry seized the opportunity of rising crude prices to increase their share of the delivered price of energy. In order to accomplish this, of course,

Exhibit II-7: Wellhead Price of Natural Gas and Crude Oil



Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review, Weekly Petroleum Status Report,* various issues and database.

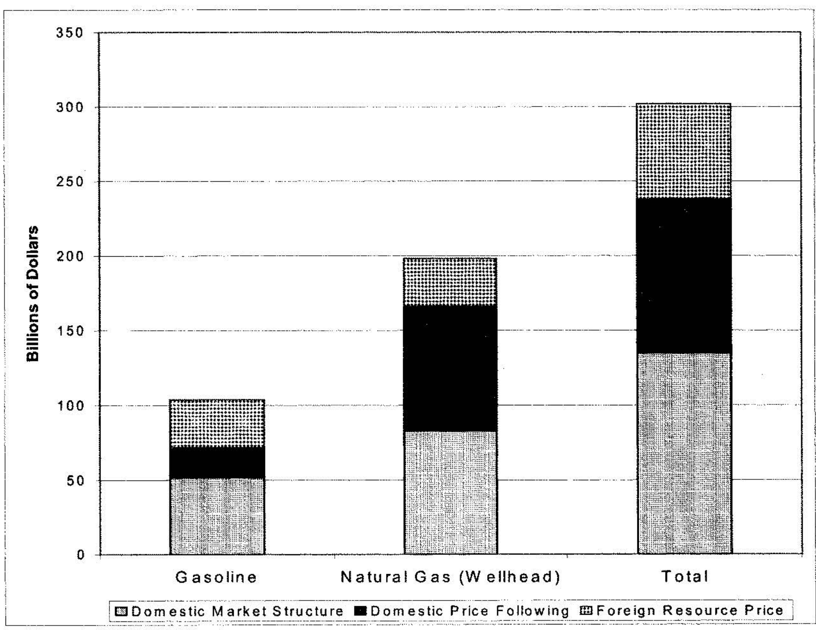
the firms in the industry had to have market power. The next section argues that the consolidation resulting from the 1997-2002 merger wave created that market power.

With both resource costs and domestic pricing practices leading to price increases, care must be exercised in estimating the various components of recent price increases. As with the discussion of the domestic causes of the price increases, how much is attributed to foreign resource prices and how much to domestic factors depends on how far back we look and how we calculate the baseline. Moreover, it is important to separate out domestic price following behavior from the market structure changes described above.

When international prices go up, Americans pay more to foreign producers of energy resources. To the extent that the price of domestic raw materials follows the international price up, consumers also pay more to domestic producers of energy resources. When the domestic price of crude follows the foreign price of crude ("price following"), the increase ends up in the pockets of domestic resource owners. In one sense, the complaints of the large industrial consumers who are losing business to foreign firms or shifting their operations to overseas locations that have not suffered natural gas price increases, remind us that all prices do not follow international prices, penny-for-penny. Domestic market conditions affect how prices follow. When the domestic price rises more than the foreign price or change their relationship to the final price, because of increases in the domestic spread or a shift in natural gas pricing behavior, that is a "domestic price shift."

If we use January 1995 to December 1999 as the base period, as was done above, the average price of crude was \$17.40 per barrel. The total increase in the cost of crude oil as an input for gasoline since December 1999 would be approximately \$49 billion (see Exhibit II-8). This should be compared to the estimate based on the historic average prices since it is based on the same average historic cost approach. The domestic price shift (\$63 billion) is larger than the crude increase. Of the total increase in crude costs of \$49 billion, about \$20

Exhibit II-8: Domestic and Foreign Causes of Recent Price Increases
(Base Crude Cost = \$17.40)



Source: See text for calculations.

billion went to domestic crude producers. Combining market structure changes and domestic price following, we find that 75 percent of the total ($83 billion) went to domestic companies.

Applying the same crude oil price assumptions to natural gas, we find an increase of about $98 billion, equal to the increase we have estimated for the domestic shift. Approximately 85 percent went to domestic companies.

Combining these two estimates, we conclude that of the $310 billion increase, approximately 45 percent was caused by the domestic price shift and 34 percent by domestic price following. Thus, of the total, 79 percent went to domestic companies and 21 percent went to foreign energy suppliers.

Although the above approach is consistent with the overall analysis, it is possible to construct other scenarios in which the raw material costs play a larger role. For example, one might take as the base price the lowest price of crude in the post-January 2000 period (less than $16.50 per barrel), which occurred in December 2001. The domestic spread was at the historic level. Natural gas was close to its historic level. Since then, crude oil prices have increased dramatically. The domestic spread has increased as well. Natural gas prices have stayed much closer to crude prices than they did historically. Taking this view, the total dollar increase is smaller (about $239 billion), but occurred over a shorter period of time. The domestic share of the increase is smaller, about 72 percent. The most important part of the increase in this view is price following, at 43 percent of the total, rather than the market structural changes, at 29 percent of the total.

The bottom line is clear. The domestic price shifts are important under any scenario. The domestic share of the total, combining domestic price shifts and price following, are dominant. Foreign crude price changes are certainly also important.

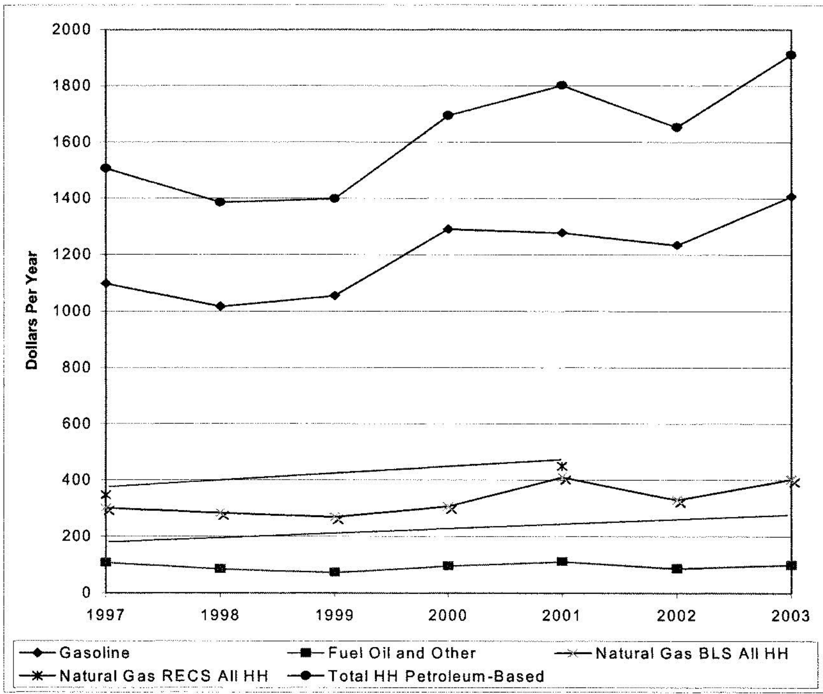
Household Impacts

Part of the increase in energy prices is paid by businesses. They may seek to recover these cost increases from consumers in the prices of goods and services they sell. However, a substantial part of the energy price increases are paid directly by consumers for their household energy costs – gasoline and heating oil, natural gas, for heating, cooking and hot water, and electricity, which is increasingly produced with natural gas.

The average price increase for gasoline was over $.30 per gallon, or over 25 percent. The average price increase at the wellhead was $2.10 per MCF, or over 30 percent of the delivered price to residential consumers.

Taken together, in 1999, household expenditures for gasoline, heating oil and natural gas accounted for about $1400 per year of total household expenditures as reported by the Bureau of Labor Statistics Consumer Expenditure Survey (see Exhibit II-9).[20] This is the average for all households, which includes households that do not own cars and "all electric residences" that use none of these fuels, as well as some that only use gas for cooking, but not

Exhibit II-9: Household Energy Expenditures



Sources: Bureau of Labor Statistics, *Consumer Expenditures*, various years; Energy Information Administration, *Residential Energy Consumption Surveys*, 1997, 2001.

heating. On average, price increases over the past four years associated with the price shock for these residential items added about $350 per household per year (including all factors). Thus, domestic energy price shocks have increased household energy bills by 25 percent. The comparison between 1999 and 2003 is even more dramatic, a $500 increase which represents a jump of over 35 percent.

Thus, not only is the figure large, but also it imposes a substantial direct and indirect burden on residential consumers. Large industrial consumers of natural gas have suffered severe disruptions, plant shut downs and job losses.

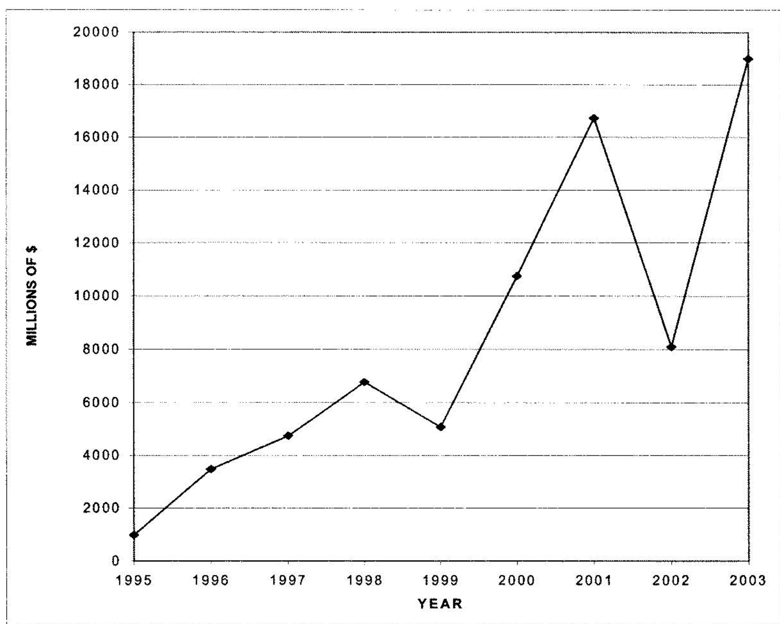
PROFITING FROM PRICE INCREASES IN CONCENTRATED MARKETS

If price increases are not caused by cost increases, they result in profit increases. Thus, after price, the second important indicator to which economic analysts look for signs of the exercise of market power and market failure is profits.

Tracking profits from publicly available sources is difficult because some of the companies do not break out domestic operations, while mergers make long term trends difficult to see and the allocation of one-time charges to specific lines of business are frequently not identified.[21] Very recent data gathered by the Department of Energy are not available, but general filings from the Securities and Exchange Commission are.

The bottom line for the domestic downstream industry, literally and figuratively, was a sharp run up in oil company profits from refining and marketing in 2000 and 2001 (see Exhibit II-10). Net operating income (income before special items and taxes) tripled from

Exhibit II-9: Refining/Marketing Net Operating Income



Source: Energy Information Administration, *Performance Profiles of Major Energy Producers: 1999* (Washington, D.C.: January 2001); *Performance Profiles of Major energy Producers: 2001* (Washington, D.C.: January 2003); *Performance Profiles of Major Energy Producers: 2002* (Washington, D.C.: February 2004).

1997-1999 to 2001. While profits were down in 2002, due to very low prices early in the year as a result of the severe economic downturn and travel slowdown following September 11, they were still just above the levels of the late 1990s. They have skyrocketed since.

It should be noted that although 1999 was a slightly below average year, 2000 was an extremely good year. *Fortune* reported return on equity of 25 percent for the petroleum industry in 2000,[22] while *Business Week* reported 22 percent.[23] This was almost twice the historic average for the industry and about 50 percent more than other large corporations achieved.[24] The extremely high profits for 2001 were not sustainable in the face of the weak economy of early 2002. Prices declined and profits fell early in 2002. By the end of 2002, profits had increased dramatically. The sharp price increases in 2003 produced another year of record high profits.[25]

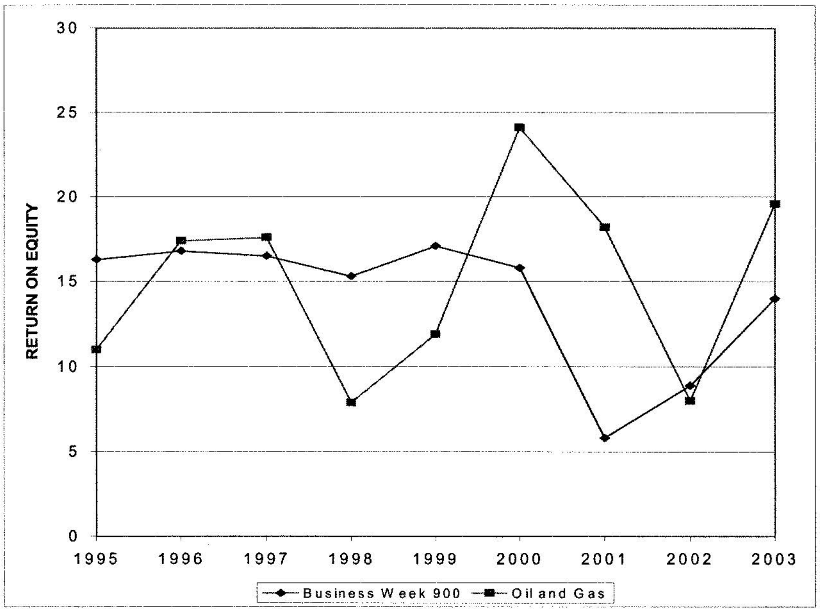
These profits are continuing. Although 2003 was a record year for both downstream operations and total industry profits, the first quarter of 2004 saw large increases in profits, especially in downstream operations. Including BP, which does not break out domestic U.S. operations, downstream profits were up 35 percent, while upstream profits were flat and total industry profits were up 17 percent. If we examine only domestic U.S. operations for companies that have both upstream and downstream operations, we find that downstream, domestic U.S. sector profits increased over 50 percent, while domestic upstream U.S. profits increased just under 10 percent. If the primary problem were foreign owners of energy resources pushing up the price, profit margins on domestic downstream operations would not be soaring.

If we compare the annual after-tax profits of the companies listed by *Business Week* in the oil and gas industry in the first four years of the new millennium to the last five years of the 1990s, we find a huge increase in profits (see Exhibit II-11). After-tax profits increased by over $50 billion, the equivalent of about $75 billion in pre-tax dollars. Exhibit II-8 is based only on the companies included in the *Business Week* survey, which account for less than half of all domestic natural gas and crude oil production and about 80 percent of all refinery capacity. Thus, on an industry-wide basis, the increase in after-tax profits in the 2000-2003 period could be as high as $80 billion. Before taxes, the figure could be as much as $110 billion. In all likelihood, that number will grow dramatically in 2004.

III. THE CAUSES OF DOMESTIC PRICE SHOCKS

To what can we attribute the dramatic shift in domestic pricing behavior? This chapter argues that concentration in the industry created the conditions for the exercise of market power over price by the petroleum industry. That concentration was the result of lax antitrust law enforcement by both the Clinton and Bush Administrations. They allowed too many mergers because they did not take the unique characteristics of the energy industry into account. There are indications that the Clinton Administration began to recognize the mistake

Exhibit II-10: Return on Equity: Oil and Gas Companies



Source: *Business Week 900*, annual results.

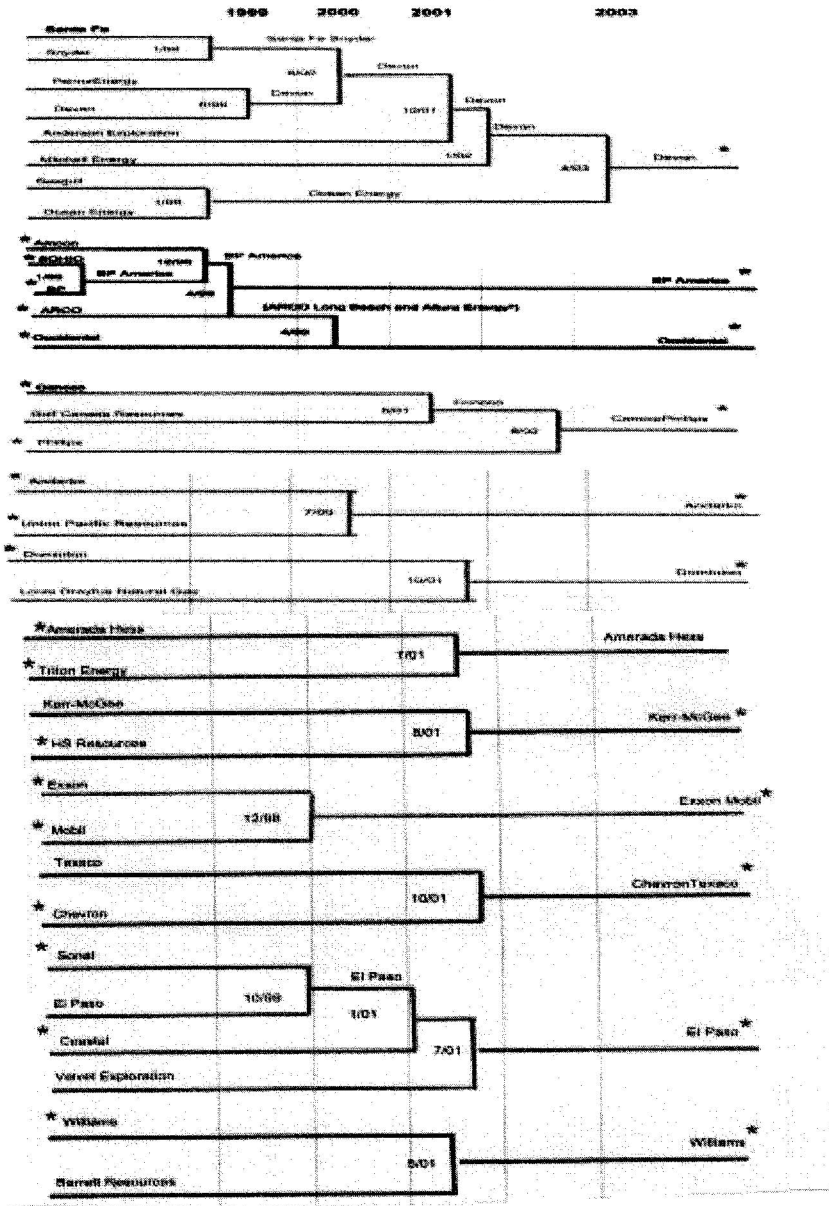
in allowing industry structure to become so concentrated and began to criticize the industry and take steps against it. Thereafter, the Bush Administration was much more friendly to the industry and showed little inclination to criticize it, not to mention to take steps to reign in its market power. A price explosion followed.

The Merger Wave

It was becoming obvious in mid-2000 was that the industry was becoming sufficiently concentrated in several parts of the country that competitive market forces were weak. The problem afflicts both the production of oil and gas and the downstream operations of the oil industry.

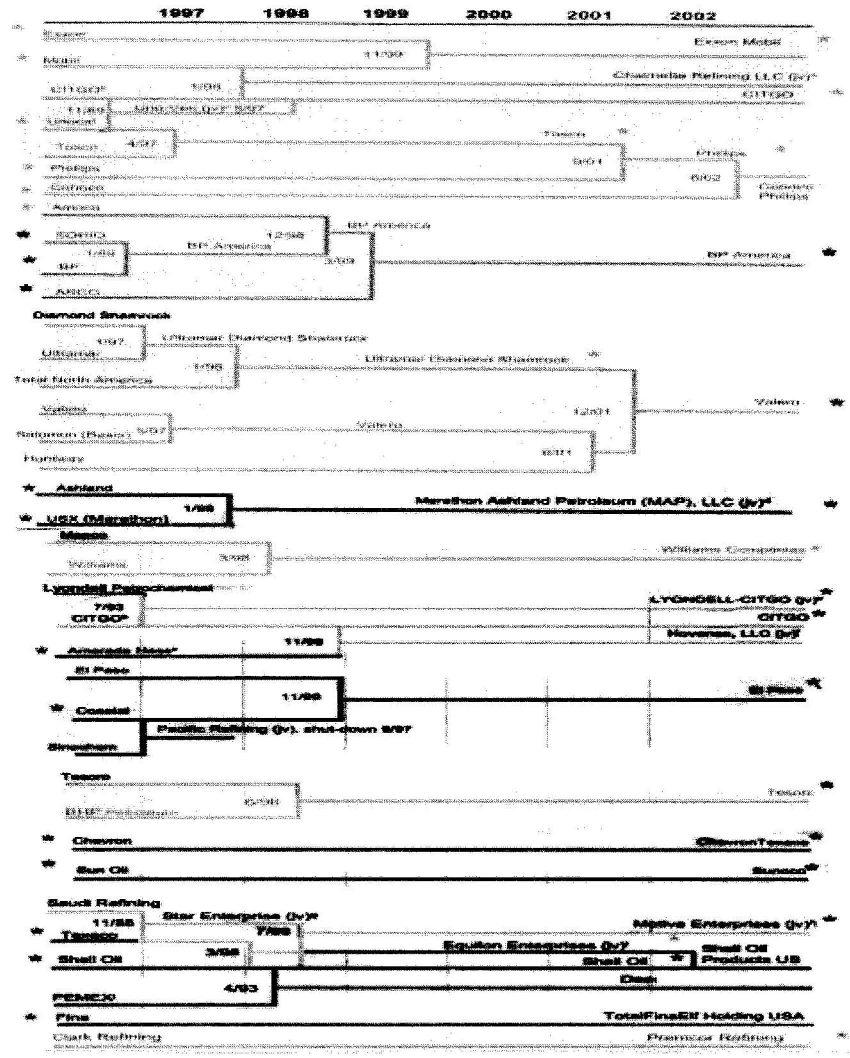
The Department of Energy analyzes major U.S.-based energy producing companies in a program called the Federal Reporting System (FRS). Tracking the "Recent Mergers Affecting Oil and Gas Producers," the FRS report identified a total of 34 companies that merged into 13 (see Exhibit III-1) from 1997 to 2002.[26] The previous year, the report identified 15 refining companies that had shrunk to seven (see Exhibit III-2).[27]

Exhibit III-1: Recent Mergers Affecting Frs Oil And Gas Producers



Source: Energy Information Administration, *Performance Profiles of Major energy Producers: 2002* (Washington, D.C.: February 2004), p. 20.

Exhibit III-2: Genealogy Of The 2001 FRS Refiners



Source: Energy Information Administration, *Performance Profiles of Major energy Producers: 2001* (Washington, D.C.: January 2003), p. 78.

Of the 31 companies listed in the sector by *Business Week* in 1995, 21 engaged in mergers with other companies between 1997 and 2002. Of the 21 listed by *Business Week* in 2003, 15 had engaged in mergers in the previous five years. Almost all of the mergers involved large companies that had previously been listed in the sector. The big got bigger and domestic prices started ratcheting up soon thereafter.

Exercising Market Power Over Price

With increasing concentration, long-term strategic decisions by the industry about production capacity interact with short-term (mis)management of stocks to create a tight supply situation that provides ample opportunities to push prices up quickly. Because there are few firms in the market and because consumers cannot easily cut back on energy consumption, prices hold above competitive levels for significant periods of time.

The problem is not a conspiracy, but the self-interested action of large companies with market power. With weak competitive market forces and high barriers to entry, individual companies have flexibility for strategic actions that raise prices and profits.[28]

- Individual companies can let supplies become tight in their area and keep stocks low, since there are few competitors who might counter this strategy.
- Companies can simply push prices up when demand increases because they have no fear that competitors will not raise prices to steal customers.
- Individual companies do not feel compelled to quickly increase supplies with imports, because their control of refining and distribution ensures that competitors will not be able to deliver supplies to the market in their area.
- Because there are so few suppliers and capacity is so tight, it is easy to keep track of potential threats to this profit-maximizing strategy.
- Every accident or blip in the market triggers a price shock and leads to increased profits.
- Moreover, operating the complex system at very high levels of capacity places strains on the physical infrastructure and renders it susceptible to accidents.

It has become evident that stocks of product are the key variable that determines price shocks.[29] In other words, stocks are not only the key variable; they are also a strategic variable. The industry does a miserable job of managing stocks and supplying product from the consumer point of view. Policymakers have done nothing to force them to do a better job.

If the industry were vigorously competitive, each firm would have to worry a great deal more about being caught with short supplies or inadequate capacity and would hesitate to raise prices for fear of losing sales to competitors. Oil companies do not behave this way because they have power over price and can control supply. The capacity and stocks of product on hand are no longer dictated by market forces, they can be manipulated by the oil industry oligopoly to maximize profits.

A March 2001 FTC report, authored by Chairman Robert Pitofsky in response to the first post-2000 price spike, noted that by withholding supply, industry was able to drive prices up, and thereby maximize profits.[30] The FTC identified the complex factors in the spike and issued a warning:

> The spike appears to have been caused by a mixture of structural and operating decisions made previously (high capacity utilization, low inventory levels, the choice of ethanol as an oxygenate), unexpected occurrences (pipeline breaks, production difficulties), errors by refiners in forecasting industry supply (misestimating supply, slow reactions), and decisions by firms to maximize their profits (curtailing production, keeping available supply off the market). The damage was ultimately limited by the ability of the industry to respond to the price spike within three or four weeks with increased supply of products. However, if the problem was short-term, so too was the resolution, and similar price spikes are capable of replication. Unless gasoline demand abates or refining capacity grows, price spikes are likely to occur in the future in the Midwest and other areas of the country.[31]

A 2003 RAND study of the refinery sector reaffirmed the importance of the decisions to restrict supply. It pointed out a change in attitude in the industry, wherein "[i]ncreasing capacity and output to gain market share or to offset the cost of regulatory upgrades is now frowned upon."[32] In its place we find a "more discriminating approach to investment and supplying the market that emphasized maximizing margins and returns on investment rather than product output or market share."[33] The central tactic is to allow markets to become tight by "relying on… existing plant and equipment to the greatest possible extent, even if that ultimately meant curtailing output of certain refined product."[34]

> Indeed, many Rand discussants openly questioned the once-universal imperative of a refinery not "going short" – that is not having enough product to meet market demand. Rather than investing in and operating refineries to ensure that markets are fully supplied all the time, refiners suggested that they were focusing first on ensuring that their branded retailers are adequately supplied by curtailing sales to wholesale markets if needed.[35]

The RAND study drew a direct link between long-term structural changes and the behavioral changes in the industry, drawing the connection between business strategies to increase profitability and pricing volatility. It issued the same warning that the FTC had offered two years earlier:

> For operating companies, the elimination of excess capacity represents a significant business accomplishment: low profits in the 1980s and 1990s were blamed in part on overcapacity in the sector. Since the mid-1990s, economic performance industry-wide has recovered and reached record levels in 2001. On the other hand, for consumers, the elimination of spare capacity generates upward pressure on prices at the pump and produces short-term market vulnerabilities. Disruptions in refinery operations resulting from scheduled maintenance and overhauls or unscheduled breakdowns are more likely to lead to acute (i.e., measured in weeks) supply shortfalls and price spikes.[36]

The structural conditions in the domestic gasoline industry have only gotten worse as demand continues to grow and mergers have been consummated. The increases in prices and industry profits should come as no surprise. The spikes in the refiner and marketer take at the pump in 2002, 2003, and early 2004 were larger than the 2000 spike that was studied by the FTC. The weeks of elevated prices now stretch into months. The market does not correct itself. The roller coaster has become a ratchet.

Increases in natural gas wellhead prices follow a similar pattern. The increases in mid-2000 were small compared to the much larger increases in 2001, 2003 and 2004. The combination of structural changes and business strategies has cost consumers hundreds of billions of dollars.

Gasoline Supply

There are two clearly identifiable trends affecting the supply side of the gasoline market – a reduction in capacity relative to demand and an increase in concentration. These trends result from the business decisions of oil companies. Even the National Energy Policy Development Group recognized that the reduction in capacity was the result of business decisions of oil companies. Government did not choose to close refineries and carry much lower stocks, private businesses did.[37]

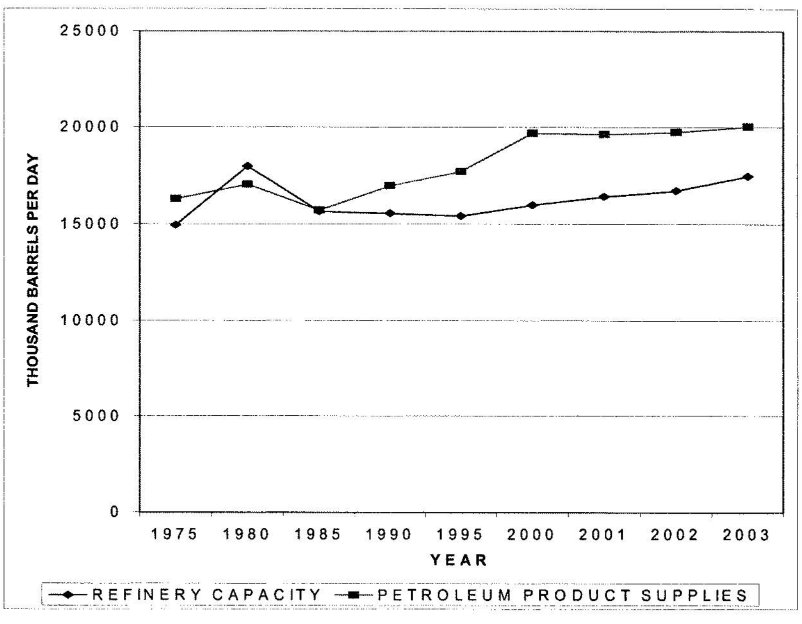
> Ongoing industry consolidation, in an effort to improve profitability, inevitably leads to the sale or closure of redundant facilities by the new combined ownership. This has been particularly true of terminal facilities, which can lead to reductions in inventory and system flexibility. While excess capacity may have deterred some new capacity investments in the past, more recently other factors, such as regulations, have deterred investment.[38]

The prominent role of business decisions in reducing capacity raises the concern that these decisions are intended to reduce competitive market forces and secure market power for major industry players. While mergers and acquisitions or facility closings are nominally justified by claims of efficiency gains,[39] they have a real economic effect of reducing competition.

Documents from the mid-1990s indicate that industry officials and corporate officers were concerned about how to reduce capacity, with observations such as "if the U.S. petroleum industry doesn't reduce its refining capacity, it will never see any substantial increase in refinery profits," from a Chevron Corporation document written in November 1995. A Texaco official, in a March 1996 memorandum, said refinery overcapacity was "the most critical factor" facing the industry and was responsible for "very poor refining financial results."[40]

With oil companies merging and eliminating "redundant" capacity, it should not be surprising to find that capacity has not kept up. Refinery capacity has not expanded to keep up with the growth in demand. Exhibit III-3 shows the relationship between refinery output and demand. In 1985, refinery capacity equaled daily consumption of petroleum products. By 2002, daily consumption exceeded refinery capacity by almost 20 percent.

Exhibit III-3: Refinery Capacity and Product Supplied

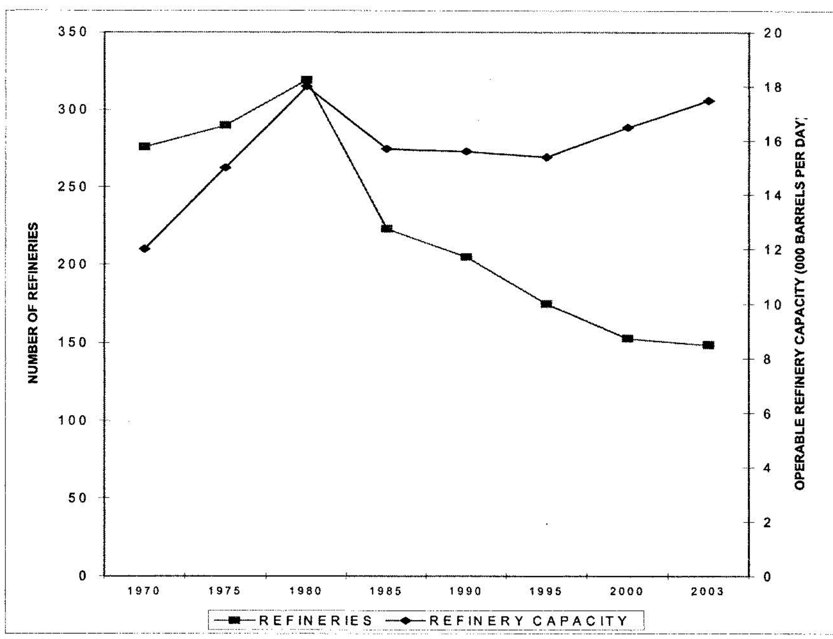


Source: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual*, various issues, Tables S1, 36; *Weekly Petroleum Status Report*, various issues.

In the early1980s, a public policy providing support for small refineries was terminated. This accounted for the loss of about 100 refineries between 1980 and 1985 (See Exhibit III-4). Since then, scores of other refineries have been shut down. Government did not close refineries, private businesses did. In the 1990s alone, approximately 50 refineries were closed. Since 1995, over 20 refineries have been shut down. The number of operating refineries has been reduced by 13 percent since 1995. The refineries get larger, but smaller in number and are owned by fewer and fewer entities. Over the last two decades of the twentieth century, the number of firms engaged in refining in the United States declined by two-thirds.[41]

Once these trends become clear, the complaint that no new refineries have been built in recent years loses its compelling public policy impact.[42] Similarly, blaming the decline of capacity relative to demand on the Clean Air Act does not stand close scrutiny. Consolidation of the refinery industry is a business decision that began long before changes in the Clean Air Act amendments of 1990 and continued after the adjustment to changes in gasoline formulation.

Exhibit III-4: Refineries and Refinery Capacity



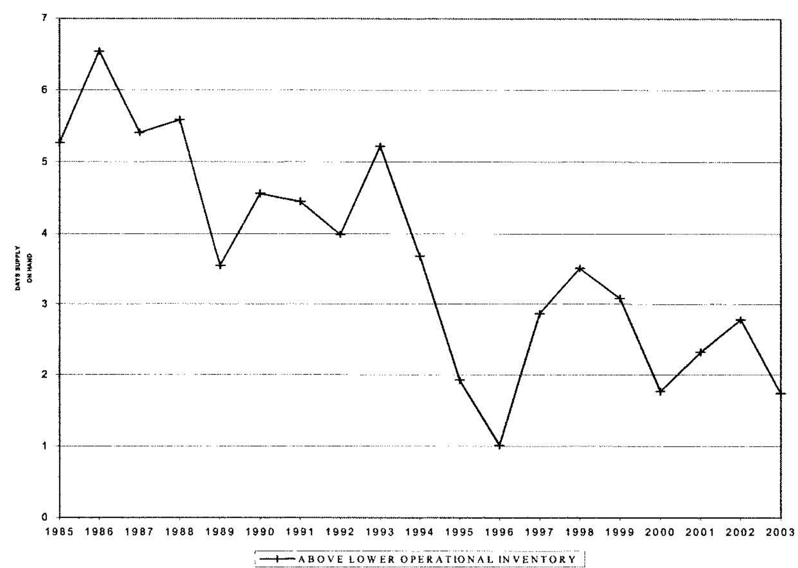
Source: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual*, various issues, Tables S1, 36.

Decisions about stockpiling of product is a business decision. Exhibit III-5 shows the relationship between stocks and demand for gasoline. Stocks are measured as the number of days of demand for gasoline held in storage. The exhibit shows that the amount of stock above what is considered the lower operational inventory has declined. Because of the nature of operations of gasoline delivery systems, a certain level of stock is needed to keep the system running in real time (the lower operational level).[43] Operations are subject to disruption should stocks fall below this level.[44] It is the stocks above this level that are available to respond to shifts in demand or price. The reserves above the lower operational inventory level have declined to very low levels. They generally are in the range of a couple of days, compared to four or five days in the early 1990s and over a week in the 1980s.

Every investigation of every product price spike in the past several years points to "unusually low stock" as a primary driver.[45] But stock levels are no accident; they are the result of business decisions.

In analyzing the Midwest price spike of 2000, the Department of Energy again found stocks to be the culprit, starting an analysis entitled *Supply of Chicago/Milwaukee Gasoline Spring 2000* as follows:

Exhibit III-5: Gasoline Stocks On Hand



Source: U. S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, various issues and database.

> This summer's run-up in Midwest gasoline prices, like other recent price spikes, stemmed from a number of factors. The stage was set for gasoline volatility as a result of tight crude oil supplies, which led to low product stocks and relatively high crude oil prices. With little stock cushion to absorb unexpected events, Midwest gasoline prices surged when a number of supply problems developed, including pipeline and refinery supply problems, and an unexpectedly difficult transition to summer-grade Phase II reformulated gasoline.[46]

In explaining the early spring price run-up in 2001, inventories were the starting point: "Low petroleum inventories set the stage for our current situation, as they did last year both for heating oil and for gasoline."[47]

After the recession of 2001/2002, industry experts and Department of Energy officials again had to wring their hands in 2003 about tight supplies, refineries that are running at capacity and difficult transitions to new fuels, but deny any wrongdoing.[48] The explanations they offer are more like excuses than analysis. For example, the following excerpt from the Energy Information Administration *Summer 2003 Motor Gasoline Outlook* gives a flavor of the effort to gloss over fundamental problems:

> This summer, motor gasoline markets are expected to be tighter than last summer. Total spreads (retail price, excluding taxes, minus crude oil prices) are expected to average 55 cents per gallon compared to 41 cents per gallon in 2002. This results primarily from higher refinery utilization brought about by the increase in demand combined with low beginning-of-season inventory levels. But the projected spread is less than the 58 cents observed in the summer of 2001, when stocks were at record low levels and the Midwest suffered from ethanol-related blending problems.[49]

The EIA tried to soften the blow of a very high spread by comparing it to the astronomical level of 2001, rather than the level of 2002, which was itself significantly higher than the 1995-1999 average. The summer did not go as the EIA expected. The only thing that seems to be predictable is that we will not have enough stocks on hand to deal with the inevitable accidents and incidents that seem to drive up prices.

The tight supply-demand balance that results from industry decisions to close refineries may also contribute directly to the occurrence of accidents. The extremely high capacity utilization that creates high levels of profit also puts additional stress on equipment.[50]

Over the course of the last decade, the number of gasoline stations has declined as well, while the number of vehicles that need to be supported has grown. The number of gasoline stations has declined by 16 percent, from 210 thousand to 176 thousand. The number of motor vehicles has increased by 11 percent, from 189 million to 210 million. As a consequence, the number of motor vehicles per station has increased by 32 percent. Each station pumps more gas, but there are fewer competitors.

NATURAL GAS SUPPLY

Behavior patterns in natural gas raise similar concerns. They cast doubt on the recent claim of the National Petroleum Council that the perception of the natural gas resource base has suddenly changed.[51] First, as a factual matter, non-industry analysts disagree.[52] Second, to the extent that there is a change in resource recovery, it reflects business decisions made over a number of years.

The move of the majors into gas changed the nature of the sector.[53] Decisions by the majors to acquire reserves through mergers and acquisitions, rather than exploration, shifted resources.[54] Decisions about which types of wells to drill may change replacement rates.[55] Exhibit III-6 shows another coincidence that cannot be ignored. The consolidation in the industry came hand-in-hand with the shift to acquisition of resources through merger (rather than exploration) and a shift of drilling away from exploration. A couple of years later the NPC concludes that a change in the resource base is evident. Decisions about which well to produce and which well to cap, how much to inject into storage, how to use pipeline capacity and, ultimately, how to report prices are affected by business decisions.

Standard and Poor's has recently noted that this trend has continued and raised questions about it:

> It is unclear that producers are investing enough to grow production materially – and this follows a year [2003] in which the domestic gas production (including acquisitions) of integrated producers appears to have declined...
>
> [M]ajor integrated companies, which appear to be reinvesting only 30 to 40 percent of their domestic cash flow in the United States, have made strategic decisions to allow their shallow-water and onshore natural gas production to deplete to redeploy capital to international (mainly oil) projects.[56]

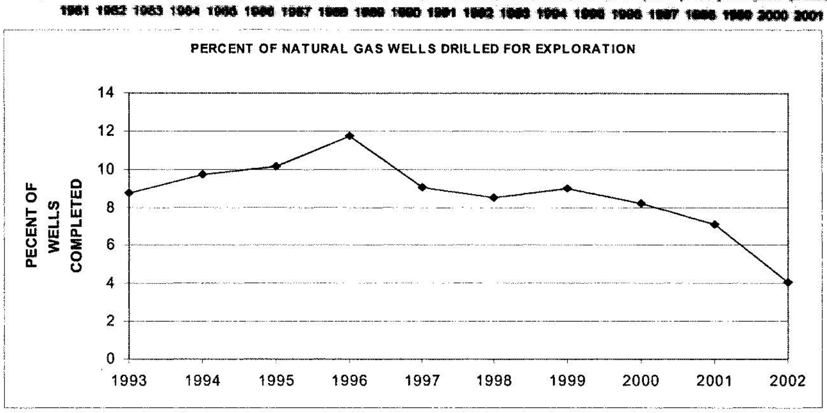
It is also important to recognize in the case of natural gas that the trading markets that drive the wellhead price are quite new. Most were set up in the 1990s, as part of the restructuring of the natural gas industry.[57] Enron played a large role in these markets and when it collapsed, so too did much private trading.[58] Today, the markets are "very thin" and that raises concerns about trading,[59] but the evidence is mounting that manipulation and abusive practices have long been part of these markets.[60]

Thus, it should not be surprising to find that capacity has not kept up and stockpiles are chronically low, causing markets to be tight; that was the outcome the industry sought to achieve with its wave of mergers and consolidation.

For natural gas we find a concern about stocks that is similar to the issue in gasoline markets. Here the question of stocks is very much influenced by the need to build stockpiles to meet the inevitable surge in demand during the winter heating season.[61] One recent study

Exhibit III-6: Shifts In Orientation Of FRS Companies In Acquisition And Development Of Natural Gas Resources

Figure 8. Share of Total U.S. Oil and Natural Gas Reserve Additions Due to Mergers and Acquisitions for FRS Companies, 1981-2001



Source: Energy Information Administration, *Performance Profiles of Major Energy Producers: 2002*, February 2004, p. 82; Table B-16, *Performance Profiles of Major Energy Producers: 1999*, January 2001, B-16.

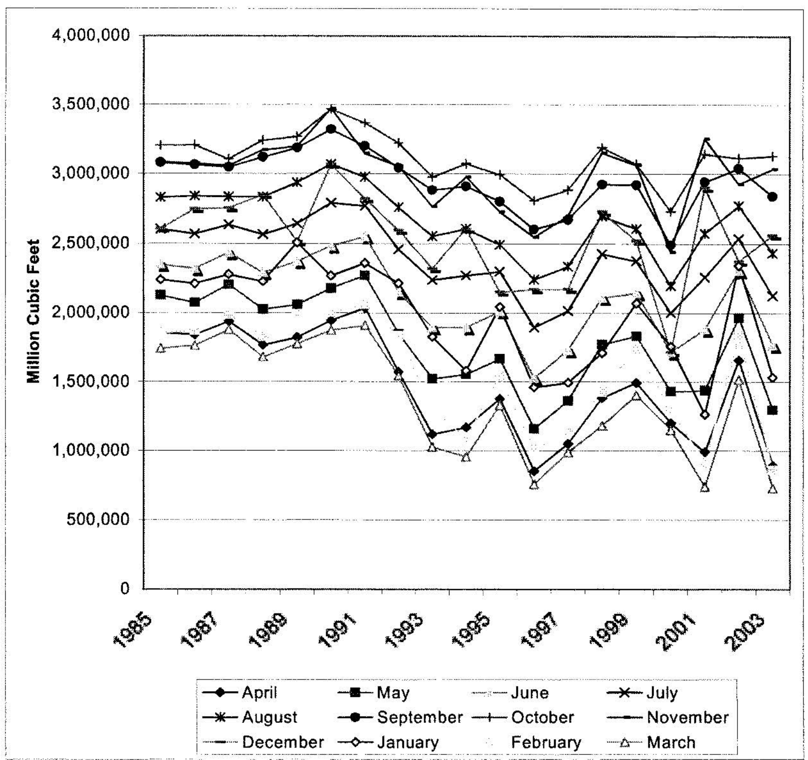
found the volatility of natural gas prices to be greater than oil prices because of the nature of the infrastructure required to deliver natural gas to consumers:

> The dependence of natural gas on more inflexible sources of supply and the greater role of transportation opens the window to profiteering. It appears that volatility in natural gas returns is more persistent than volatility in oil returns. By itself, this result suggests that there may be a 'larger window of profit opportunity' for investors in natural gas than in oil....

> [N]atural gas return volatility responds more to unanticipated events (e.g. supply interruptions, changes in reserves and stocks, etc.), regardless of which market they originate in… For example, a major event-causing shock will lead to an immediate increase in volatility in natural gas returns and culminate in a (relatively) prolonged period of volatility. If prices and thus returns rise in response to volatility, there may be immediate profit opportunities in natural gas following shocks in either market.[62]

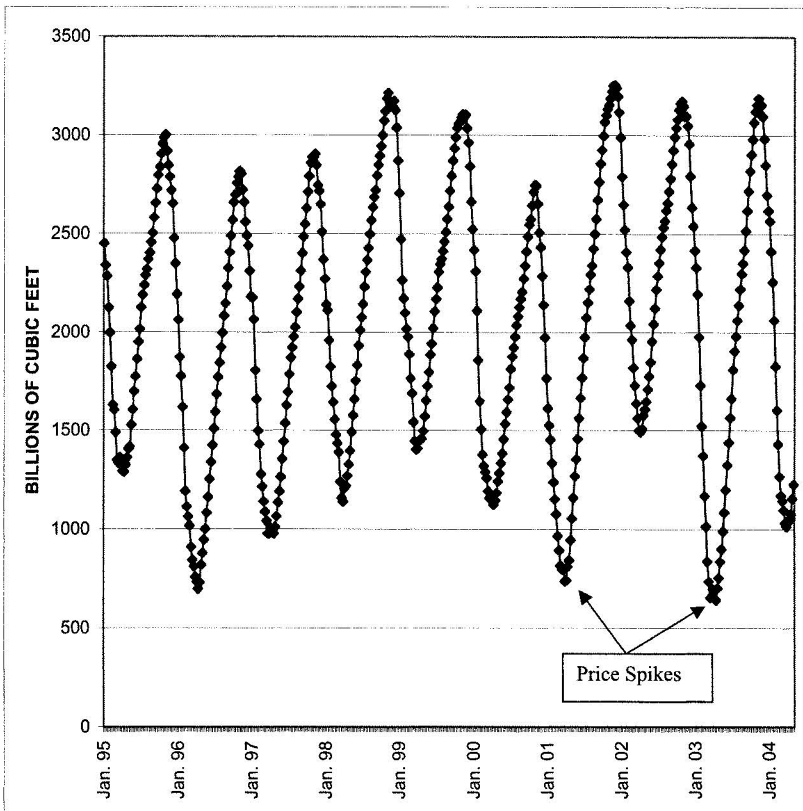
The long-term trend to much lower stocks relative to demand is clear in natural gas as well (see Exhibit III-7 and III-8). Compared to the decade of 1985-1994, stocks were about 25 percent lower in the 1995-1999 period. During the price spikes of the new millennium, the second half of 2000 and the first half of 2001 and 2003, stocks were 40 to 50 percent lower

Exhibit III-7: Natural Gas Storage Since 1985



Source: Energy Information Administration, *Natural Gas Storage: Historical Data*, database than in the 1985-1994 period and 25 percent lower than in the 1995-1999 period. These declines came during a period of a small increase in consumption. Exhibit III-8 can be used to make another point. By the fall of 2003, stocks of natural gas had rebounded to typical levels of previous years, yet prices did not moderate. This set off another round of complaints about market manipulation.[63] There are now investigations into the misreporting of gas in storage.[64]

Exhibit III-8: Working Gas Stocks Since 1995



Source: Energy Information Administration, *Natural Gas Storage: Historical Data*, database

IV. WEAK MARKET FUNDAMENTALS PUT ENERGY CONSUMERS AT INCREASED RISK

Aside from Chairman Pitofsky's analysis of the 2000 gasoline price spike in the upper Midwest, which came after his agency had approved a large part of the mergers that made up the wave, the FTC has generally been uncritical of conditions in the industry. In part this stems from the fact that the FTC views the situation through the very narrow lens of antitrust. In the case of a price spike, it is looking for collusive behavior that drives prices up, but these markets do not require collusion to be manipulated.

When Pitofsky finds that unilateral strategic actions in the long term have tightened the market and short-term tactics take advantage of this tightness, he identifies a public policy problem that is not strictly an antitrust problem at one level. Things may be bad, but there is nothing antitrust authorities can do about it. At another level, however, there is a fundamental flaw in the approach taken by the FTC. As the agency responsible for evaluating mergers in the industry, it has allowed the concentration to take place. Applying routine antitrust standards in its review, it could find no individual mergers it felt violated the antitrust laws. A few minor divestitures were ordered, but the merger wave was allowed to unfold largely unimpeded.

The problem is that the FTC has failed to recognize the unique conditions of the energy industries. Because of the unique conditions of supply and demand in energy markets, market power can be abused at much lower levels of concentration than is normally the case. The *Merger Guidelines* invite just such an analysis; the FTC has failed to consider the possibility. Confronted with a market structure in which consumers are being abused, instead of taking a narrow view, the FTC should consider how to address the problem.

Antitrust and Public Policy

Antitrust practice is based on the structure, conduct, performance paradigm (SCP), which has been the dominant approach for almost three-quarters of a century.[65] In SCP analysis the central concern is with market performance, since that is the outcome that affects consumers most directly. The concept of performance is multidimensional. The measures of performance to which we traditionally look are pricing, quality and profits. Pricing and profits address both efficiency and fairness. They are the most direct measure of how society's wealth is being allocated and distributed. The performance of industries is determined by a number of factors, most directly the conduct of market participants. Do they compete? What legal tactics do they employ? How do they advertise and price their products?

Conduct is affected and circumscribed by market structure. Market structure includes an analysis of the number and size of the firms in the industry, their cost characteristics and barriers to entry. Basic conditions of supply and demand also deeply affect market structure.

The focal point of market structure analysis is to assess the ability of markets to support competition, which "has long been viewed as a force that leads to an ideal solution of the economic performance problem."[66] Pure and perfect competition is rare, but the competitive goal is important.[67] Therefore, a great deal of attention has been focused on the relative competitiveness of markets and the conditions that make markets more competitive or workably competitive.[68] Further, specific measures of the extent of market power based on elasticities of supply and demand and market concentration (measured by the market shares of firms) have been developed.[69]

The multidimensional view of markets offered by the SCP framework fits the fundamental economic traits of energy production and consumption well. Energy markets are highly complex. Their volatility poses particular challenges for policy and economic analysis.

Contrasting energy commodities to financial instruments like stocks and bonds, a recent book entitled *Energy Risk* identified the uniqueness of energy markets. The key elements are the supply-side difficulties of production, transportation and storage, and the demand-side challenges of providing for a continuous flow of energy to meet inflexible demand, which is subject to seasonal consumption patterns.

> [T]he deliverables in money markets consist of a "piece of paper" or its electronic equivalent, which are easily stored and transferred and are insensitive to weather conditions. Energy markets paint a more complicated picture. Energies respond to the dynamic interplay between producing and using; transferring and storing; buying and selling – and ultimately "burning" actual physical products. Issues of storage, transport, weather and technological advances play a major role here.
>
> In energy markets, the supply side concerns not only the storage and transfer of the actual commodity, but also how to get the actual commodity out of the ground. The end user truly consumes the asset. Residential users need energy for heating in the winter and cooling in the summer, and industrial users' own products continually depend on energy to keep the plants running and to avoid the high cost of stopping and restarting them. Each of these energy participants – be they producers or end users – deals with a different set of fundamental drivers, which in turn affect the behavior of energy markets...
>
> What makes energies so different is the excessive number of fundamental price drivers, which cause extremely complex price behavior.[70]

Prices run up quickly because of even slight disruptions in the supply-demand balance and producers are slow to react because they do not fear that others can bring product to market and steal their business. Consequently, prices are said to be "sticky downward."[71] The majority of published studies find support for the "rockets and feathers" view.[72] Prices rise like rockets and float down like feathers.[73] When energy markets become as concentrated as they are in America, the feathers do not float all the way down.

Demand is Inelastic

The continuous flow of large quantities of product to meet highly seasonal demand is the central characteristic of the demand side of the market. In order to design proper policies to deal with energy demand and how it affects the market, we must have an appreciation for why people use energy as they do. Examining price and income elasticities leads to the conclusion that energy is a necessity of daily life. Recognizing this fact leads to policy choices that can have the greatest impact while imposing the least cost and inconvenience on consumers.

Energy consumption is determined by the physical and economic structure of daily life. People need to drive on a daily basis because of the way our communities are built and our transportation systems designed. Stores are far from homes. Homes are far from work. Social and after-school activities are dispersed. In most communities, mass transit is scarce and inconvenient. It is necessary to drive to get from here to there. We own more cars and drive more miles on a household basis over time. These trends and patterns have become stronger and more deeply entrenched as our society has become wealthier and the tendency for two-earner households has grown. For the past three decades there has been an almost perfect, one-to-one correspondence between economic growth and the growth of total miles driven.[74]

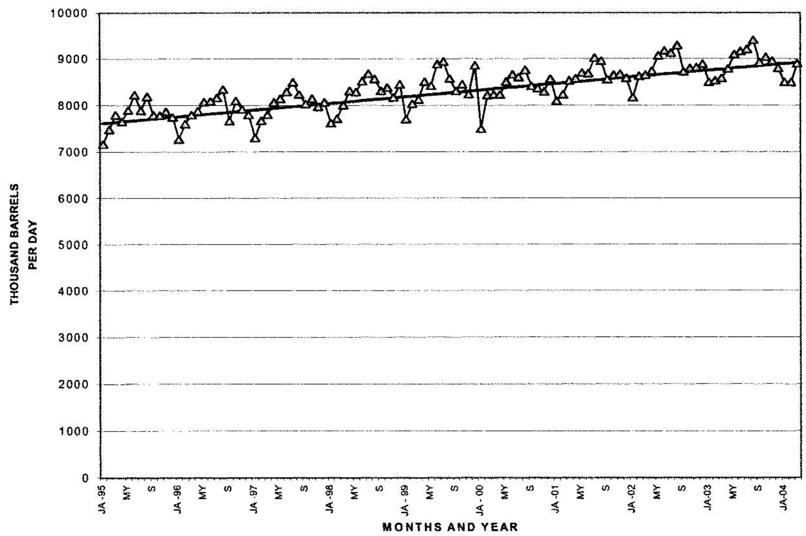
People consume natural gas for heating primarily and, increasingly, indirectly for electricity. The amount they consume is dictated in large part by the kinds of buildings in which they live and work and the energy efficiency of the appliances they use. Natural gas has become the fuel of choice in many residential uses. It has been the favorite of the electricity industry for about a decade.

The result of the underlying socioeconomic determinants of automobile travel is to render gasoline demand "inelastic." The demand elasticity for gasoline has been studied hundreds of times in the U.S. and abroad. The best estimate of short-term elasticity (usually measured by demand response in a period of about a year) is -.2.[75] In other words, when prices increase by 10 percent, demand declines by only 2 percent. The best estimate of the long-term elasticity is about -.4.[76] Both of these are quite low.

While fewer estimates of the elasticity of demand for natural gas have been made, the results are similar.[77] Short-term elasticities are in the range of .3, long-term elasticities are in the range of .6. An occasional estimate of long-term elasticity is in the neighborhood of 1.0, which is not sufficient to discipline market power.

Demand is generally predictable in a seasonal pattern (as shown in Exhibits IV-1 and IV-2). With demand quite predictable and inelastic, price is determined by the supply side. The flow of product and stockpiles are critical. Supplies must be adequate to deal with shifts in demand. Demand may help to set the stage, but it is supply that provides the action.

Exhibit IV-1: Gasoline Consumption



Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, various issues and database.

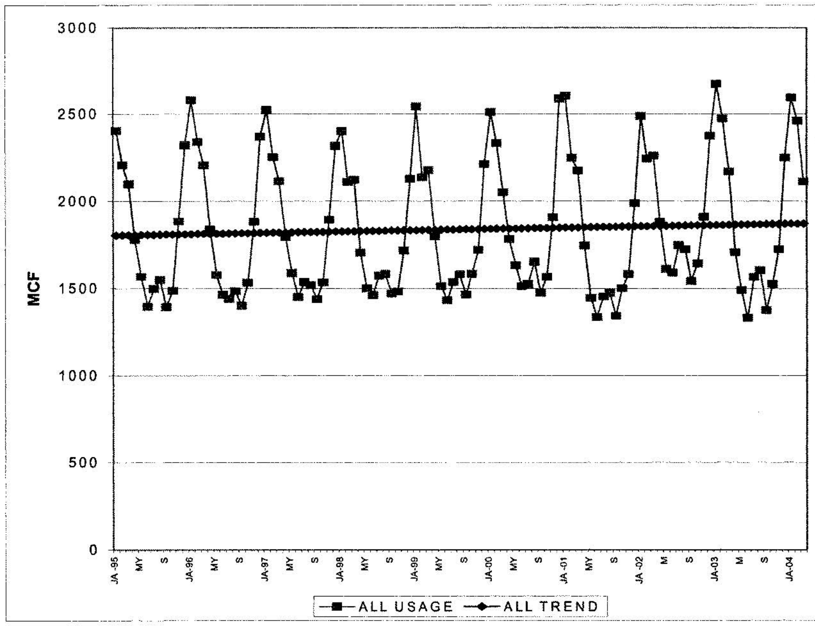
The low elasticity of demand is the critical factor in rendering the energy market volatile and vulnerable to abuse. When demand is inelastic, consumers are vulnerable to price increases, since they cannot cut back on or find substitutes for their use of the commodity. When the most important market force in disciplining market power, demand elasticity, is as low as observed for gasoline and natural gas, there are many opportunities to exercise market power.

Supply is Inelastic

Short-term supply in the energy industry is also extremely inelastic. That is, it cannot be quickly increased. The key elements are the supply-side difficulties of production, transportation and storage for providing for a continuous flow of energy.[78]

Because of the nature of the underlying molecules, the production, transportation and distribution networks are extremely demanding, real time systems. Energy is handled at high pressure, high temperature and under other physical conditions that are, literally, explosive. These systems require perfect integrity and real time balancing much more than other

Exhibit IV-2: Seasonality of Natural Gas Consumption



Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, various issues and database.

commodities. Transportation and distribution infrastructure is extremely capital intensive and inflexible. Many sources of energy are located far from consumers, requiring transportation over long distances. The commodities are expensive to transport and store. They are delivered over a network that is sunk in place with limited ability to expand in the short and medium term.

Refineries, storage facilities and pipelines are not only capital intensive, but they take long lead times to build. They have significant environmental impacts. In the short term, their capacity is relatively fixed. Refineries must be reconfigured to change the yield of products. Although pipelines have largely depreciated their historic, sunk costs, expansion would be capital intensive. Thus, pipeline capacity is generally a fixed capacity as well.

Accidents have a special role in networks such as these. Because of the demanding physical nature of the network, accidents are prone to happen. Because of the volatile nature of the commodity, accidents tend to be severe. Because of the integrated nature of the network and demanding real time performance, accidents are highly disruptive and difficult to fix.

These physical and economic characteristics render the supply-side of the market inelastic.[79] Given the basic infrastructure of supply in the industry, the availability of excess capacity and stocks to meet changes in demand is the critical factor in determining the flexibility of supply. Since output is slow to respond to price, stockpiles, storage and importation of product become critical elements of the gasoline market.[80]

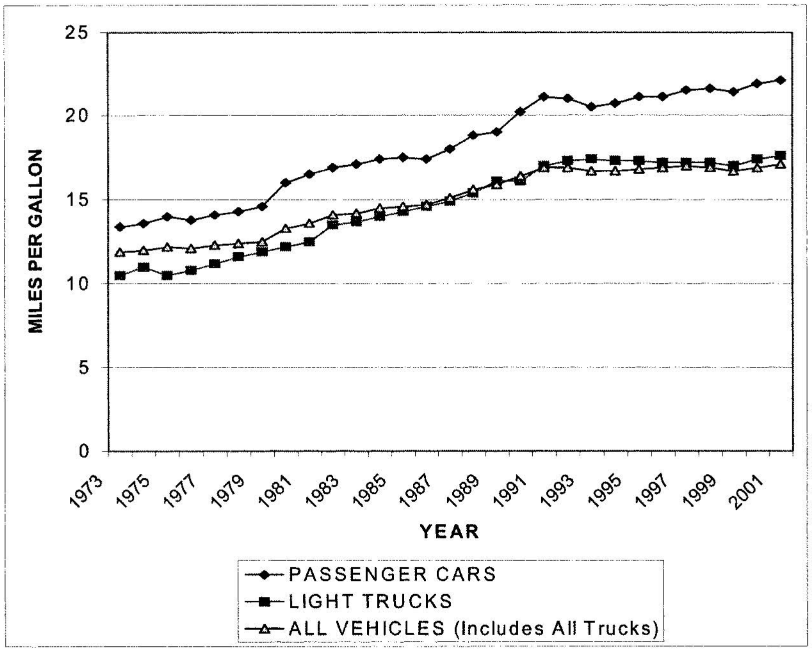
> Stocks are the key factor in policy responses to market power where supply is inelastic.
>
> Economic frictions (including transportation, storage, and search costs) which impede the transfer of the underlying commodity among different parties separated in space or time can create the conditions that the large trader can exploit in order to cause a supracompetitive price...
>
> Although the formal analysis examines transportation costs as the source of friction, the consumption distortion results suggest that any friction that makes it costly to return a commodity to its original owners (such as storage costs or search costs) may facilitate manipulation.
>
> The extent of market power depends on supply and demand conditions, seasonal factors, and transport costs. These transport cost related frictions are likely to be important in many markets, including grains, non-precious metals, and petroleum products.
>
> Transportation costs are an example of an economic friction that isolates geographically dispersed consumers. The results therefore suggest that any form of transaction costs that impedes the transfer of a commodity among consumers can make manipulation possible...
>
> All else equal, the lower the storage costs for a commodity, the more elastic its demand.[81]

The Gas Guzzler Problem

The ability of producers to exercise market power on the supply side is magnified immensely when the supply-demand balance is tight. High levels of demand strain resources and make it difficult to keep stock up. During the 1990s, America shot itself in the pocketbook by building two fleets of gas guzzlers that are helping to keep energy markets tight – low mileage Sport Utility Vehicles/light trucks and natural gas-fired power plants.

Exhibit IV-3 shows that improvement in average gas mileage stopped in the 1990s, primarily because of the increasing use of light trucks, whose fuel efficiency has declined. Overall, average mileage has declined because of the increased use of less efficient SUVs and light trucks.

Exhibit IV-3: Motor Vehicle Fuel Efficiency

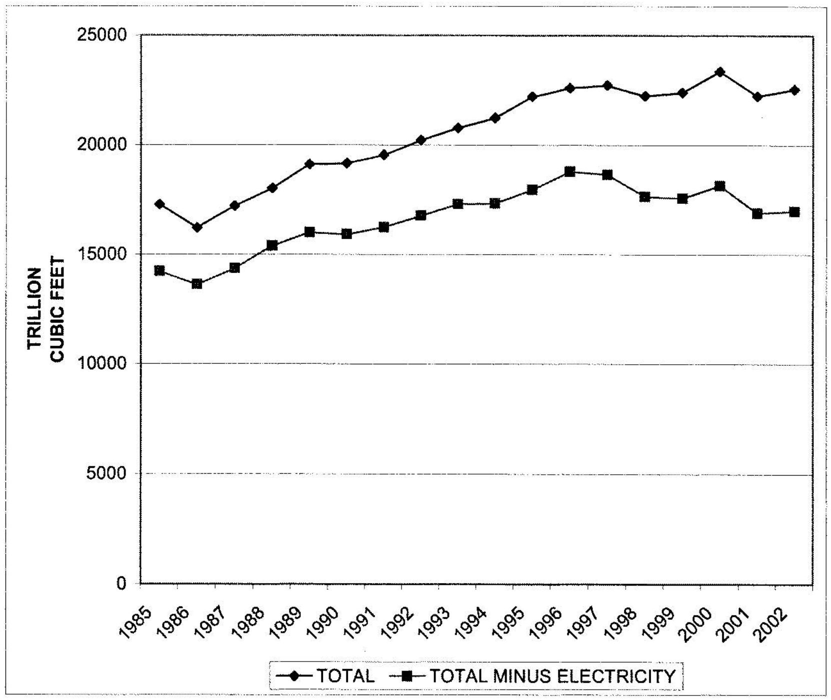


Source: U. S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Table 1.10.

If the rate of improvement in the fleet fuel efficiency had been maintained at historical levels throughout the 1990s, America would be consuming over one million barrels per day less of gasoline.[82] Gasoline savings of that magnitude would have offset the entire decline of domestic production during the 1990s,[83] a figure that would have alleviated the tight gasoline markets and made them much less vulnerable to price shocks. Determined efforts can achieve a much higher level of efficiency in the automobile fleet.

Exhibit IV-4 shows the consumption of natural gas. Overall consumption grew because of the increased consumption in the electricity sector. This increased consumption by gas fired generating plants shifted the pattern of demand more heavily into the summer months. As a result, it has become more difficult to put gas in storage in preparation for the winter heating season. The increase in natural gas consumption in the electricity sector is

Exhibit IV-4: Natural Gas Consumption



Source: U. S. Department of Energy, Energy Information Administration, *Monthly energy Review,* Table 4.4.

equal to about ten percent of total production and 50 percent of natural gas imports.[84] Here too, vigorous promotion of efficiency could substantially reduce consumption and alleviate pressure on natural gas markets.[85]

Concentration in the Petroleum Industry Creates Market Power

Antitrust authorities have traditionally used two measures of market concentration. The four firm concentration ratio is equal to the market share of the four largest firms. If the four largest firms control 60 percent or more of the market, the market is a tight oligopoly.[86] The HHI (Hirshman Herfindahl Index), used by the Department of Justice, is the sum of the square of the market shares of all firms in a market. Under its Merger Guidelines, the DOJ considers a market with an HHI of 1000 or less to be unconcentrated. Such a market would have the equivalent of ten equal-sized competitors. In such a market, the four firm concentration ratio would be 40 percent. Any market with a concentration above this level is deemed to be a source of concern. The DOJ considers an HHI of 1800 as the point at which a market is highly concentrated. This level falls between five and six equal-sized competitors.

The fallacy of blindly applying the statistical formula for market structure analysis was pointed out over two decades ago by two prominent conservative economists. William Landes and Richard Posner use the Lerner index,[87] which measures the amount by which prices can be set above costs as the result of the exercise of market power, and is directly related to the HHI.[88]

Landes and Posner underscore the importance of the elasticity of demand.[89] They point out that when demand elasticities are low, market power becomes a substantial problem. In their words, the Lerner Index "comes apart."

> [T]he formula "comes apart" when the elasticity of demand is 1 or less. The intuitive reason is that a profit-maximizing firm would not sell in the inelastic region of its demand curve, because it could increase its revenues by raising price and reducing quantity. Suppose, for example, that the elasticity of demand were .5. This would mean that if the firm raised its price by one percent, the quantity demanded of its product would fall by only one-half of one percent. Thus its total revenues would be higher, but its total costs would be lower because it would be making fewer units of its product.
>
> Raising price in these circumstances necessarily increases the firm's profits, and this is true as long as the firm is in the inelastic region of its demand curve, where the elasticity of demand is less than 1.
>
> If the formula comes apart when the elasticity of demand facing the firm is l or less, it yields surprising results when the elasticity of demand is just a little greater than 1. For example, if the elasticity of demand is 1.01, equation (la) implies that the firm's price will be 101 times its marginal cost. There is a simple explanation: a firm will produce where its demand elasticity is close to one only if its marginal cost is close to zero, and hence a relatively low price will generate a large proportional deviation of price from marginal cost.[90]

Leonard Waverman notes that by comparison to most industries and standard antitrust practice, the elasticity of demand in energy industries is quite low:

> Arguing that a CED [cross elasticity of demand] of 1 is 'high' is equivalent to arguing that an own-price elasticity of 1.0 is high, an argument which would *not* generally be made. In anti-trust economics own price elasticities well above one are considered as connoting a lack of market power. In his survey of

the empirical literature in the field of industrial organization, "a firm with such an elastic demand curve [elasticity of demand about 12] has little market power."[91]

A second problem with the myopic FTC approach stems from the narrow search for collusion. The *Merger Guidelines* recognize that market power can be exercised with coordinated, or parallel, activities and even unilateral actions in situations where there are small numbers of market players.[92] The area of noncollusive, oligopoly behavior has received a great deal of attention. A variety of models have been developed in which it is demonstrated that small numbers of market participants interacting in the market, especially on a repeated basis, can learn to signal, anticipate, and parallel one another to achieve outcomes that capture a substantial share of the potential monopoly profits.[93]

Nevertheless, even by traditional standards, the wave of industry mergers noted above has resulted in a level of concentration that creates the basis for business behaviors and strategies that can exploit market power. Several major mergers between vertically integrated companies in the top tier of the oil industry have pushed petroleum product markets to levels of concentration that are a serious concern.

Exhibit IV-5 shows the two measures of market concentration. Over the past decade when a host of mergers were approved, antitrust authorities did not take the fundamentals sufficiently into account in reviewing mergers. They have prevented a few local markets from becoming highly concentrated, but that was far too lenient a standard. Because supply and demand are so inelastic and vertical leverage is so important, antitrust authorities should have insisted that markets remain unconcentrated (i.e., below the moderately concentrated threshold).

The recent mergers have pushed three of the country's five regional refining markets (Petroleum Administrative Defense Districts or PADD) into a danger zone of concentration. This concentration reflects a business decision in which "operating refineries have sought to concentrate their activities in markets where they hold a leading market share."[94] There has clearly been a sharp increase in the level of concentration in all markets except the Mountain West. The East Coast, Mountain West and West Coast all fall well above the unconcentrated zone. The upper Midwest is close to the lower limit of the concentrated zone based on HHI, with the four firm concentration ratio moving well above the unconcentrated level.

Product markets are much smaller than refinery markets. That is, while refineries may serve a broad area, most consumers buy virtually all of their gasoline in the metropolitan area in which they live. Most studies of gasoline prices use the metropolitan area as the unit of analysis. While we lack data on a city-by-city basis, some data is readily available on a state-by-state basis. It confirms that the trend of increasing concentration has brought the industry to a level that is a source of concern.

Exhibit IV-5 includes analyses of California, Illinois, Wisconsin and Connecticut based on the number of branded gasoline stations in each state. We have selected a time frame

Exhibit IV-5: Concentration in Domestic Downstream Gasoline Operations

Concentration Of Refineries In Regional Markets

PETROLEUM ADMIN. DEFENSE DISTRICT (PADD)	1994 HHI	1994 4-FIRM CR	2000 HHI	2000 4-FIRM CR
I. East Coast	1297	62	2007	77
II. Upper Midwest	731	40	980	52
III. Gulf Coast	453	29	753	42
IV. Mountain West	1000	49	1061	51
V. West Coast	1037	54	1376	67

Concentration Of Gasoline Distribution In State Markets

State	1994 HHI	1994 4-Firm	1999 HHI	1999 4-Firm
California	1143	60	1432	73
Connecticut	1022	53	1415	65
Illinois	1053	55	1311	63
Wisconsin	1175	65	1400	66

Sources: Refinery: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual 1999*, Volume 1 (June 2000); Table 38 for market shares, p. 122 for PADDs. The states in each PADD are as follows I = ME, NH, VT, MA, RI, CT, NY, NJ, PA, WV, DE, MD, VA, NC, SC, GA, FL; II= OH, MI, IN, KY, TN, IL, WI, MN, IA, MO, OK, KS, MB, SD, ND, III= AL, MI, AK, LA, TX, NM; IV= MT, WY, CO, UT, ID; V= WA, OR, NV, AZ, CA, HI AK.

Gasoline: *National Petroleum News*, Annual Survey of Outlets; *Lundberg, Connecticut Market Report: February, 1999*; DOE, U.S. Department of Energy, Energy Information Administration, *Assessment of Summer 1997 Motor Gasoline Price Increase*, May 1998, p. 64

similar to that of the prior refinery analysis. California was selected because the West is frequently mentioned in discussions of high gasoline prices. There was also a U.S. Department of Energy study available for comparison. Illinois and Wisconsin were selected because they have been focal points of concern in recent price spikes. Connecticut is included because it represents another PADD and there was a separate analysis available for comparison.

We observe sharp increases in concentration in each of these states. Each is now well into a range of concentration that is a source of concern for competitiveness. The level of concentration we estimate on the basis of outlets is consistent with the other analyses that are based on volume of sales.

The previous discussion focuses on horizontal concentration. Vertical integration between segments of the industry may have an impact as well. Vertical integration by dominant firms may create a barrier to entry requiring entry at two stages of production,[95] or foreclosing critical inputs for competitors in downstream markets.[96] Vertical arrangements may restrict the ability of downstream operators to respond to local market conditions.[97] Vertical integration not only removes important potential competitors across stages of production,[98] but also may trigger a wave of integrative mergers,[99] rendering small independents at any stage extremely vulnerable to a variety of attacks.[100]

Gasoline markets are vulnerable to the negative effects of vertical integration. Product must move downstream from the refinery or the tanker to the pump. Vertically integrated operations are closed to independent sources of supply. They may impose zonal pricing formulas or restrictions on sources of supply on their distribution outlets.[101] With vertical integration, the market may be less responsive than it could be both in the short term, since competing product has difficulty getting into individual markets at the end of a vertically[102] integrated chain, and in the long term because new competitors in any market may have to enter at several stages of the business.

An interesting study of cities across the country as well as the first merger in the wave of late 1990s mergers (the Tosco/Unocal merger of 1997) finds support for this concern. The study finds that both horizontal concentration and vertical integration are associated with high prices:

> Upstream concentration is positively correlated with price, the market share of independents is negatively correlated with price and the average market share of the vertically integrated suppliers covaries positively with wholesale price...
>
> Moreover, the incentive to raise price is also positively correlated with the geographic proximity of integrated stations to rival independents, indicating that the greater the degree of competition, or cross-price elasticity, between integrated retailers and rival independent retailers, the greater the integrated firm's incentive to raise rivals' wholesale costs.[103]

In light of these findings, the integration of refining and distribution is important. The percentage of stations owned by companies that also own refineries did not change much over the decade, but the size of the largest integrated owners increased dramatically. The integrated companies also appear to be more regionalized.[104] Each company covers a smaller area more densely, resulting in less competition.

We do not have similarly detailed analysis of the natural gas market, but the court ruling in the lawsuit against Enron can make the point. "Enron was positioned to yank prices up because its Enron Online [EOL] trading platform controlled fully 40 percent of average daily trading on the Henry Hub natural gas spot market. Further, other traders in that market "routinely looked to EOL and Enron for current [Henry Hub] spot market pricing information," according to the CFTC complaint."[105] The Henry Hub is the most important price setting spot market in the nation. That would virtually ensure that the hub was highly concentrated at that time.

These levels of concentration would cause concern in any industry, but in the energy industries they are of extreme concern because the underlying market forces are weak. Because the supply and demand elasticities for gasoline and natural gas are so low[106] and the expenditures on energy are so large,[107] we believe these industries should be held to close scrutiny because the exercise of market power results in higher prices.[108] Antitrust authorities have failed to exercise proper caution to protect the public interest and consumers are suffering as a result.

V. PUBLIC POLICY

It may seem a bit odd to spend time arguing that the attitude of the Administration in Washington toward the energy industry is important. It goes without saying that it is. The close association of both the President and Vice President with the petroleum industry and the aggressive pro-industry position it has taken raises this issue to another level. First, the coincidence between the election of November 2000 and the dramatic increase in prices that followed raises a question – is there a causal link behind the correlation? Second, the search for policy in an atmosphere of crisis is deeply affected by the Administration's attitude.

POLICY ORIENTATION MATTERS

There is no doubt that the Bush Administration represented a dramatic shift in policy. The National Energy Policy Development Group was formed under Vice President Cheney in the spring of 2001. As we have seen, crude oil prices were well off their historic highs at that moment, while the domestic spread was at the first of several peaks. Nevertheless, when the NEPDG released its report, the underlying problem was portrayed as one in which "overdependence on any one source of energy, especially a foreign source, leaves us vulnerable to price shocks, supply interruptions and in the worst case, blackmail."[109] The resulting policy recommendations were tilted strongly in favor of the industry.[110] The Vice President quickly became embroiled in controversy over questions of excessive industry influence in its deliberations, a dispute that is still pending in the Supreme Court.[111]

The high level of engagement of energy industry executives, like Enron's CEO Ken Lay, in securing the rapid appointment of a new Chairman at the Federal Energy Regulatory Commission (FERC), which oversees the natural gas industry, and in gaining access to the policy process was another favorable signal to the industry.[112] The subsequent refusal of the Administration to recognize that manipulation had played a large part in the California energy crisis and the delayed and minuscule penalties imposed sent another signal to industry.[113] The timid approach the FERC took in response to reports of natural gas price manipulation reinforced the message.[114]

The Bush Administration also moved quickly to roll back air conditioner efficiency standards that had been set by the Clinton Administration. These would have curbed the demand for electricity – reducing the need for as many as 50 power plants. They would have particularly affected natural gas consumption, since summer peaking demand draws heavily on natural gas.[115] The administration's luke warm attitude toward to energy efficiency as the cornerstone of the policy response was made clear by the Vice President, when he relegated it to "a personal choice," not a policy option. The Administration recently lost a court battle over this decision, but the signal could not have been stronger.

The tilt toward the industry reached its zenith in the energy bill. As one long-term observer of Washington energy policy put it, "Some blame must rest with the White House and Vice President Cheney, whose task force, meeting in secret with energy industry leaders, wrote the libretto for the bill."[116] The central premise of the energy bill pushed by the administration is that energy companies need more money to boost production of domestic energy supplies. To that end, a grab bag of subsidies – totaling over $20 billion – was earmarked for the oil and gas industry, while other expensive alternatives also would receive assistance.[117] On the natural gas side, the bill promotes costly backstop technologies, like liquefied natural gas imports and an Alaska natural gas pipeline, which will lock in high gas prices.

These signals were in sharp contrast to the reaction of the Clinton Administration to the early signs of trouble in energy markets in 2000. As discussed above, after approving many of the mergers that led to the consolidation in the industry, Clinton appointee Robert Pitofsky had issued a tough FTC report on the gasoline price spikes in the upper Midwest in the summer of 2000.[118] The Department of Energy had begun to express serious concerns about the abuse of market power in the electricity industry.[119] Similarly, the Clinton Administration created a heating oil reserve for the Northeast, another sign that it would take a stronger stance against the industry.

The Wrong Explanations Lead to the Wrong Policy

The explanation for the high and volatile price of gasoline offered by the industry and the Bush Administration is so oversimplified and incomplete that it must be considered at best misleading. At worst, it is wrong because it points to policies that do not address important underlying causes of the problem and therefore will not provide a solution.

This explanation has serious flaws in the gasoline market:

- Blaming high gasoline prices on high crude oil prices ignores the fact that over the past few years the domestic refining and marketing sectors have imposed larger increases on consumers at the pump than crude price increases would warrant.

- Blaming tight refinery markets on Clean Air Act requirements to reformulate gasoline ignores the fact that in the mid-1990s the industry adopted a business strategy of mergers and acquisitions to increase profits that was intended to tighten refinery markets and reduce competition at the pump.

- Claiming that the antitrust laws have not been violated in recent price spikes ignores the fact that forces of supply and demand are weak in energy markets and that local gasoline markets have become sufficiently concentrated to allow unilateral actions by oil companies to push prices up faster and keep them higher longer than they would be in vigorously competitive markets.

- Eliminating the small gasoline markets that result from efforts to tailor gasoline to the micro-environments of individual cities will not increase refinery capacity or improve stockpile policy to ensure lower and less volatile prices if the same handful of companies dominate the regional markets.

There are similar flaws in the explanation for natural gas markets:

- Blaming natural gas price increases on crude oil prices ignores that fact that natural gas wellhead prices have increased much faster than the price of oil.

- It ignores the fact that natural gas markets lack liquidity and transparency and have been manipulated.

- The merger wave led by the major petroleum companies has impacted the natural gas market.

The obsession with domestic drilling is misguided. Because domestic resources represent a very small share of the global resources base and are relatively expensive to develop, it is folly to pursue a supply-side solution to the energy problem:

> This policy will not increase significantly the US production of crude oil, will not reduce significantly OPEC's influence, and it will distort the US macroeconomy. These outcomes are caused by a policy that is not consistent with the depleted state of the domestic resource base and with the economics of international oil.

> In any plausible scenario, however, the actual effect will be close to zero. If OPEC correctly anticipates production from ANWAR (the Arctic Natural Wildlife Reserve), which would not be difficult given its long lead times, OPEC could slow additions to capacity very modestly such that its utilization rate (and its effect on price) would be changed relative to a scenario in which no oil is produced from the ANWR… Regardless of OPEC behavior, the 1-2 mbd [million barrels per day] from ANWR would reduce the OPEC's share of the world oil market by 2-3 percent. Such a change would be virtually undetectable given the large fluctuation in crude oil prices.[120]

The increase in the amount of oil and gas produced in America will not be sufficient to put downward pressure on world prices; it will only increase oil company profits, especially if large subsidies are provided, as contemplated in recent energy legislation. Moreover, even if the U.S. could affect the market price of basic energy resources, which is very unlikely, that would not solve the structural problem in domestic markets.

Tight markets in the U.S. can best be addressed by relieving pressure on the demand side, yet the energy bill being considered by Congress does little to relieve that pressure. Additionally, the legislation fails to take serious measures to reduce demand by boosting the efficiency requirements for the most important energy consuming equipment – like automobiles and air conditioners. As one recent analysis concluded:

> It is not dependence on imported oil per se that makes the economy vulnerable to price swings, but the dependence on oil itself… A reduction in our vulnerability to swings in the price of oil requires a reduction in our use of oil, regardless of where on the planet it is produced.[121]

Further boosting the profitability of the petroleum industry with subsidies and access to resources in environmentally sensitive areas would not increase production a great deal, nor will it decrease prices to consumers. Over the past three years, the domestic oil and gas industry has enjoyed a huge increase in profitability, but the pricing abuse has gotten worse, not abated. With a depleted, costly resource base that represents a very small share of the global total, domestic production simply cannot discipline the world price of oil.

The energy legislation fails to address the factors that have led to the creation of a concentrated market and the industry's consequent failure to respond to increased demand in a responsible manner. The legislation is silent on the market power problem flowing from the high degree of concentration on the supply-side of the market. In fact, in some ways it will make matters worse. It contains language that could make it more difficult to punish fraud in energy commodity markets. In addition, the repeal of the Public Utility Holding Company Act would allow the large oil and gas producers to buy up electric utilities, thereby integrating their natural gas production with consumption. The result would be to further diminish market forces in the industry, exacerbating the problems that are already too painfully evident.

POLICY THAT REFLECTS THE DOMESTIC REALITY

If the U.S. is to both reduce the market power of energy producers and stem the flow of imports, public policy must start immediately and aggressively on an efficiency path to lower energy consumption.[122]

It is time for public policy to seek permanent institutional changes that both reduce the chances that markets will be tight and reduce the exposure of consumers to the opportunistic exploitation of markets when they become tight. To achieve this reduction of risk, public policy should be focused on achieving four primary goals:

- Restore reserve margins by developing both efficiency (demand-side) and expanding refinery capacity (supply-side).
- Increase market flexibility through stock and storage policy.
- Discourage private actions that make markets tight and/or exploit market disruptions by countering the tendency to profiteer by withholding of supply.
- Promote a more competitive industry.

A goal of achieving an improvement of vehicle efficiency (increase in fleet average miles per gallon) equal to economy-wide productivity over the past decade (when the fleet failed to progress) would have a major impact on demand. It would require the fleet average to improve at the same rate it did in the 1980s. It would raise average fuel efficiency by five miles per gallon, or 20 percent. This is a mid-term target. This rate of improvement should be sustainable for several decades. This would reduce demand by 1.5 million barrels per day within a decade.[123] This would return consumption to the level of the mid-1980s.

Expanding refinery capacity by 10 percent equals approximately 1.5 million barrels per day. This would require 15 refineries, if the average size equals the refineries currently in use. This is less than one-third the number shut down in the past ten years and less than one-quarter of the number shut down in the past fifteen years. Alternatively, a ten percent increase in the size of existing refineries, which is the rate at which they increased over the 1990s, would do the trick, as long as no additional refineries were shut down.

Placed in the context of redevelopment of recently abandoned facilities or expansion of existing facilities, the task of adding refinery capacity does not appear daunting. Such an expansion of capacity has not been in the interest of the businesses making the capacity decisions. Therefore, public policies to identify sites, study why so many facilities have been shut down, and establish programs to expand capacity should be pursued.

This combination of demand-side and supply-side policies to improve the long run market balance would restore the supply/demand balance to levels that typified the mid-1980s.

It has become more and more evident that private decisions on the holding of stocks will maximize short-term private profits to the detriment of the public. Increasing concentration and inadequate competition allows stocks to be drawn down to levels that send markets into price spirals. While the strategic petroleum reserve has been developed as a strategic stockpile and companies generally take care of operating stocks, the marketplace is clearly not attending to economic stockpiles. Companies will not willingly hold excess capacity for the express purpose of preventing price increases. They will only do so if they fear that a lack of supply or an increase in brand price would cause them to lose business to competitors who have available stocks. Regional gasoline markets appear to lack sufficient competition to discipline anti-consumer private stock policies.

Public policy must expand stocks. Participants in the distribution of gasoline could be required to hold stocks at a percentage of retail sales. Public policy could also either directly support or give incentives for private parties to keep storage. It could lower the cost of storage through tax incentives by drawing down stocks during seasonal peaks. Finally, public policy could directly underwrite stockpiles. We now have a small Northeast heating oil reserve. It should be continued and sized to discipline price shocks, not just prevent shortages. Similarly, a Midwest gasoline stockpile should be considered.

In the short term, government must turn the spotlight on business decisions that make markets tight or exploit them.

Withholding of supply should draw immediate and intense public scrutiny, backed up with investigations. Since the federal government is likely to be subject to political pressures not to take action, state governments should be authorized and supported in market monitoring efforts. An ongoing joint task force of federal and state attorney's general could be established. The task force should develop databases and information to analyze the structure, conduct and performance of gasoline markets.

As long as huge windfall profits can be made, private sector market participants will have a strong incentive to keep markets tight. Market manipulation could and should be made illegal. The pattern of repeated price spikes and volatility has now become an enduring problem. Because the elasticity of demand is so low – because gasoline is so important to economic and social life – this type of profiteering should be discouraged. A windfall profits tax that kicks in under specific circumstances will take the fun and profit out of market manipulation.

Further concentration of these industries is quite problematic. The Department of Justice *Merger Guidelines* should be rigorously enforced. Moreover, the efficiency defense of consolidation should be looked on skeptically, since inadequate capacity is a market problem.

Restrictive marketing practices, such as zonal pricing and franchise restrictions on supply acquisition should be examined and discouraged. These practices restrict flows of product into markets at key moments.

Markets should be expanded by creating more uniform product requirements. These should not result in a relaxation of clean air requirements.

Decisions by the oil cartel to increase crude prices have cost consumers, but private business decisions about production capacity, stocks and product supply and the failure of public policy to slow the growth of demand by promoting efficiency have cost much more.[124] Given the importance of energy in the economy, "consumers of petroleum products in the United States expect that, as with water and electricity, public officials will ensure the reliability and affordability of supplies."[125] Americans have come to believe that the price spikes are the result of industry manipulation.[126] This paper shows that there are important ways that this suspicion is well-founded. Over the past three years, policymakers have failed to provide consumers with a stable market and things are getting worse, not better.[127]

(Endnotes)

[1] Oldenburg, Don, "Caught Over a Barrel: Soaring Gas Prices Have Motorists' Wallets Running on Empty," *The Washington Post*, May 4, 2004, C-1.

[2] Banerjee, Neela, "Drivers Tend to Shrug Off High Gas Prices, for Now," *The New York Times*, May 4, 2004, C-1.

[3] Oldenburg, May 4, 2004, p. C-1.

[4] Kovacic, William E., "Prepared Statement of the Federal Trade Commission," *Market Forces, Anticompetitive Activity and Gasoline Prices—FTC Initiatives to Protect Competitive Markets*, Subcommittee on Antitrust, Competition Policy and Consumer Rights, Committee on the Judiciary, United States Senate, April 7, 2004.

[5] Beattie, Jeff, "Gas Prices Still Climbing, EIA Says," *The Energy Daily*, April 12, 2004, citing Gary Caruso, Administrator of the Energy Information Administration. The Energy Information Administration, *Short Term Energy Outlook – March 2004*, dated March 9, 2004, stated that "about half of the increase reflects higher crude oil prices, with the remainder reflecting the impact of low inventories, robust demand, and uncertain availability of imports."

[6] Gerth, Jeff, "Higher Oil Prices Are Damaging Global Economy, a Study Shows," *The New York Times*, May 4, 2004, C-6, quoting Gary Caruso, Administrator of the Energy Information Administration.

[7] Industrial Energy Consumers of America, *41 Month Natural Gas Crisis Has Cost U.S. Consumers $111 Billion*, Washington, December 3, 2003.

[8] Romero, Simon, "Natural Gas Prices Surge and Fingers are Pointing," *The New York Times*, December 13, 2003, p. C-1.

[9] "Heating Costs Going Through Roof," *CBS Evening News*, Jan. 20, 2004, www.cbsnews.com; Mayer, Caroline E., "The Cost of Keeping Warm: Weather Threatens to Push Heating Bills to New Heights," *The Washington Post*, January 17, 2002, p. E-1; Hopper, Michael, "Heating Costs Pinch Pockets," *Topeka Capital-Journal*, January 18, 2004; "Low Temperatures, High Prices," *York Daily Record*, January 19, 2004.

[10] At the hearing on *Market Forces, Anticompetitive Activity and Gasoline Prices—FTC Initiatives to Protect Competitive Markets* Subcommittee on Antitrust, Competition Policy and Consumer Rights, Committee on the Judiciary, April 7, 2004, Senator Schumer responded to the statement by Mr. Kovacic by pointing out that the domestic oil companies profit when OPEC's actions raises the price of crude,.

[11] At the hearing on *Market Forces, Anticompetitive Activity and Gasoline Prices—FTC Initiatives to Protect Competitive Markets* Subcommittee on Antitrust, Competition Policy and Consumer Rights, Committee on the Judiciary, April 7, 2004, Senator Wyden appeared as the first witness and raised the issue of market structure.

[12] The study cited was Energy Information Administration, "Price Changes in the Gasoline Market: Are Midwestern Gasoline Prices Downward Sticky?" (Washington, February 1999).

[13] The Clean Air Act of 1990 started the shift to natural gas in the electricity sector.

[14] In fact, at the time of the 1995 changes in Clean Air Act requirements, the Department of Energy conducted a study of the impact of environmental requirements on the refining industry. It concluded that "pollution abatement operating costs have been and continue to be a small part of overall operating costs." (U.S. Department of Energy, Energy Information Administration, *The Impact of Environmental Compliance Costs on U.S. Refining Profitability* [Washington, October 1997], p. 3). The study shows operating costs per gallon associated with pollution abatement at about $.01 per gallon and large capital costs for a short period of time to meet new requirements, but these had already begun to decline by 1995. The impact of capital expenditures must also be small, in the range of a penny per gallon. Other studies lead to similar estimates of costs associated with pollution abatement of a few cents per gallon; see Nadim, Farahad, et al., "United States Experience with Gasoline Additives," *Energy Policy*, 29, 2001. Similarly, general reviews of the industry at the time concluded that "a close examination reveals that the change in refining costs attributable to RFG had no major impact on margin behavior between 1993 and 1995" (U.S. Department of Energy, Energy Information Administration, *Petroleum 1996: Issues and Trends* [Washington, September 1997], p. 137). In fact, overall operating costs have been declining. Peterson, D.J. and Serej Mahnovski, *New Forces at Work in Refining: Industry Views of Critical Business and Operations Trends* (Santa Monica, CA: RAND Corporation, 2003), p.

xv, note that following "a wave of mergers, acquisitions, joint ventures and selective divestitures... [whose] aim was cutting costs, gaining economies of scale, increasing returns on investment, and boosting profitability..." consolidation and restructuring appear to have had the salutary effect executives intended, "EIA data indicates that mid and large-size refiners reduced their per barrel operating costs."

[15] Energy Information Administration, *Summer 2003 Motor Gasoline Outlook* (Washington, April 2003), analyzes the spread.

[16] The evidence indicates that natural gas markets are regional rather than global because of "the existence of a capital intensive and inflexible transportation system," (Soderholm, P., "Fuel Flexibility in Western European Power Sector," *Resource Policy,* 26, 2000, p. 162, cited in Ewing, Bradley T., Farooq Malik and Ozan Ozfidan, "Volatility Transmission in the Oil and Natural Gas Markets," *Energy Economics,* 24, 2002, p. 536. The authors also cite Energy Information Administration, *Performance Profiles of Major Energy Producers* [Washington, 1998]).

> Thus, we find significant direct and indirect transmission of volatility from the natural gas sector to the oil sector. Our results do not indicate that volatility in the oil returns is affected by shocks originating either in the oil sector... or the gas sector... In addition, the estimated coefficient on the cross error term is insignificant, suggesting the absence of an indirect effect of shocks in the natural gas sector on the oil sector.

[17] The prediction equation is Domestic Spread = 1.545 + (Product Supplied * .004524) +(Month of Year * .1562) + Seasonal Adjustment (based on historic averages, Ja=0; F,M,A,O,N,D=-1; M=1,June=4,July=5, A=1)

[18] Wellhead Price= (Crude * .67)/5.75.

[19] Wellhead Price= (Crude * .67)/5.75) + (Month * .137) (N, F =1; D, Ja=2, all others =0).

[20] Available at http://www.bls.gov/cex/home.htm. Exhibit II-9 uses the average for all households. The Energy Information Administration, *Residential Energy Consumption Survey,* allows one to calculate the averge for households that use a fuel, as well as for all households.

[21] Public Citizen, *Record Oil Company Profits Underscore Market Consolidation,* May 31, 2001; Fortune 500, July 18, 2001; *Business Week,* First Quarter Results, May 21, 2001.

[22] *Fortune 500,* July 18, 2001.

[23] *Business Week,* Spring 2001, p. 92.

[24] U.S. Department of Energy, Energy Information Administration, *Performance Profile* (Washington, 2001), pp. 7-8.

[25] "A Record Setting Year," *National Petroleum News,* March 2004.

[26] Energy Information Administration, *Performance Profiles of Major Energy Producers: 2002* (Washington, February 2004), p. 20.

[27] Energy Information Administration, *Performance Profiles of Major Energy Producers: 2001* (Washington, January 2003), p. 78.

[28] Even introductory economics texts now contain long discussions of strategic behavior and game theory [see, for example, Taylor, John B., Economics (Boston: Houghton Mifflin, 1998), Chapter 11] and it has become a routine part of applied policy analysis [Hastings, Justine, "Factors that Affect Prices of Refined Petroleum Products" (Washington, Federal Trade Commission Public Conference, August 2, 2001)].

[29] Ye. Michael, John Zyren and Joanne Short, "Elasticity of Demand for Relative Petroleum Inventory in the Short Run," *International Atlantic Economic Journal,* March 2003; Linn, ScottC. And Zhen Zhu, "Natural Gas Prices and The Gas Storage Report: Public News and Volatility in Energy Futures Markets," *Journal of Futures Markets,* 24: 2004; Esnault, Benoit, "The Need for Regulation fo Gas Storage: The Case of France," *Energy Policy,* 31: 2003.

[30] Federal Trade Commission, *Midwest Gasoline Price Investigation* (Washington, March 29, 2001.

[31] Federal Trade Commission, *Midwest Gasoline,* pp. i... 4.

[32] Peterson and Mahnovski, p. 16.

[33] Peterson and Mahnovksi, p. 42.

[34] Peterson and Mahnovski, p. 17.

[35] Peterson and Mahnovksi, p. 17.

[36] Peterson and Mahnovski, p. xvi.

[37] Federal Trade Commission, *Midwest Gasoline*, note 23, citing Organization for Economic Co-operation and Development and Department of Energy documents states "Higher crude prices led producers to draw down inventories in anticipation of replacing them later at lower prices."

[38] National Energy Policy Development Group, *National Energy Policy* (Washington, May 2001), p. 7-13 (hereafter NEPDG).

[39] They certainly have value on the stock market (see Edwards, Kenneth, John D. Jackson and Henry L. Thompson, "A Note on Vertical Integration and Stock Ratings of Oil Companies in the U.S.," *The Energy Journal*, 2000).

[40] "Oil Data Show Industry Role in Shortages a Possibility," *The New York Times*, June 15, 2001.

[41] Peterson and Mahnovksi, p. xv.

[42] NEPDG, p. 7-13.

[43] U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Monthly* (Washington, April 2000), p. 145, defines the lower operational inventory as follows:

> Lower operational Inventory (LOI): The lower operational inventory is the lower end of the demonstrated operational inventory range updated for known and definable changes in the petroleum delivery system. While not implying shortages, operational problems or price increases, the LOI is indicative of a situation where inventory-related supply flexibility could be constrained or non-existent. The significance of these constraints depends on local refinery capability to meet demand and the availability and deliverability of products from other regions or foreign sources.

[44] The general literature on stock and storage behavior shows that stocks are typically kept to ensure operational flow (see Pyndick, Robert S., "Inventories and the Short-Run Dynamics of Commodity Prices," *RAND Journal of Economics*, Spring 1994, "The Present Value Model of Rational Commodity Pricing," *The Economic Journal*, May 1993).

[45] Energy Information Administration, *Petroleum 1996: Issues and Trends* (Washington, September 1997), p. 27. The U.S. Department of Energy identified "lower than normal gasoline stocks" in a chapter entitled "Spring '96 Gasoline Price Runup." Energy Information Administration, *Assessment of Summer 1997*, p. 5; "Statement of John Cook, Director, Petroleum Division, U.S. Department of Energy," *Subcommittee on Energy and Air Quality, Committee on Energy and Commerce, U.S. House of Representative*, May 15, 2001, p. 1.

[46] Joanne Shore, Petroleum Division. The FTC reached a similar conclusion in its Midwest Gasoline Price Investigation, at note 23.

[47] "Statement of John Cook, Director, Petroleum Division, U.S. Department of Energy, *Subcommittee on Energy and Air Quality, Committee on Energy and Commerce, U.S. House of Representative*, May 15, 2001, p. 1.

[48] U.S. Energy Information Administration, *Do Current High Petroleum Product Prices?* (Washington, March 12, 2003), pp. 1-2.

[49] U.S. Energy Information Administration, *Summer 2003 Motor Gasoline Outlook* (Washington, April 2003).

[50] Peterson and Mahnovksi, p. 43.

[51] *Balancing Natural Gas Policy: Fueling the Demands of a Growing Economy* (Washington, September 2003).

[52] Huntington, Hillard G. "Presentation to The Future of Natural Gas Markets: A Forum at RFF," November 21, 2004, *EMF 20: Natural Gas, Fuel Diversity and North American Energy Markets*, November 2003, shows the NPC estimate as an extreme outlier in terms of price.

[53] Energy Information Administration, *The Majors' Shift to Natural Gas* (Washington, September 2001).

[54] EIA, Performance Profiles: 2002, pp. 81-83.

[55] EIA, Performance Profiles: 2002, pp. 71-72.

[56] Beattie, Jeff, "U.S. Oil and Gas Producers Investing in Mergers, Not More Drilling – S&P," *Energy Daily*, April 26, 2004.

[57] Energy Information Administration, *The Natural Gas Industry and Markets in 2002* (Washington, February 2004), p. 3.

[58] EIA, *The Natural Gas Industry*, p. 2.

[59] Four years after the initial signs of trouble and in spite of reforms instituted by the Federal Energy Regulatory Commission, things were still bad, reflected "In numbers the FERC Chairman Pat Wood compared to a "cold shower," staff of the Federal Energy Regulatory Commission said Wednesday that only 20 percent of companies are reporting all of their natural gas trades and about 10 percent are reporting power trades to public indices." (Davis, Tina, "Gas Prices Reporting Better, But Still Lagging –FERC," *Energy Daily*, May 6, 2004.

[60] Moody, Dian, *Natural Gas Price Indices: Price Manipulation Issues* (Washington: American Public Power Association, January 2003).

[61] Caruso, Guy, *Outlook for Natural Gas & Petroleum,* Energy Information Administration, May 19, 2003; Trapman, William, *Natural Gas Storage,* Energy Information Administration, October 29, 2002, show the low levels of storage in early 2001 and 2003. Policy Development and Energy Sections, *Natural Gas Price Volatility,* June 3, 2003, pp. 3-4, notes storage is in 2003 at the start of the injection season was "50% lower than the previous year" and that "high prices of gas during the storage season make firms think twice about making purchases of gas for injection."

[62] Bradley, Malik and Ozfidan, p. 536.

[63] Johnson, Jeff, "Chemical CEOs Protest Natural Gas Prices," *Chemical and Engineering News,* Feb. 2, 2004.

[64] Lobensz, George, "CFTC Probing Manipulation of Natural Gas Storage Data," *Energy Daily,* May 5, 2004.

[65] Scherer, F. M. and David Ross, *Industrial Market Structure and Economic Performance* (Boston: Houghton Mifflin, 1990). Shepherd, William G., *The Economics of Industrial Organization* (Englewood Cliffs, NJ: Prentice Hall, 1985).

[66] Scherer and Ross, p. 15.

[67] Scherer and Ross, pp. 16…17.

[68] Summarizing the literature, Scherer and Ross, pp. 53-54, develop a long list of characteristics.

[69] Landes, W. M. and R. A. Posner, "Market Power in Anti-trust Cases," *Harvard Law Review*, 19: 1981, two prominent conservative economic analysts offer a similar concept. The most frequent starting point for a discussion of the empirical measurement of the price impact of monopoly power is the *Lerner Index*. As Scherer and Ross (pp. 70…71) note, the *Lerner Index* is defined as:

L = (Price – Marginal Cost)/ Price.

> Its merit is that it directly reflects the allocatively inefficient departure of price from marginal cost associated with monopoly. Under pure competition, [Ll]=0. The more a firm's pricing departs from the competitive norm, the higher is the associated Lerner Index value. A related performance-oriented approach focuses on some measure of the net profits realized by firms or industries.

Landes and Posner (pp. 938-945) state the price cost margin as the firm's elasticity of demand. They then transform the index into an expression that uses market shares of firms and the market elasticity of demand and supply:

> We point out that the Lerner index provides a precise economic definition of market power, and we demonstrate the functional relationship between market power on the one hand and market share, market elasticity of demand, and supply elasticity of fringe competitors on the other.

$$L = \frac{(P-C)}{P} = \frac{1}{E_d} = \frac{S_d}{e_m + e_j^s(1-s_i)}$$

where:

S_d = the market share of the dominant firm

e = elasticity of demand in the market
m
s
e = elasticity of supply of the competitive fringe
j
s = market share of the fringe.
i

In words this formula says that the markup of price over cost will be directly related to the market share of the dominant firm and inversely related to the ability of consumers to reduce consumption (the elasticity of demand) and the ability of other firms (the competitive fringe) to increase output (the elasticity of this supply). These are market characteristics and fundamentals that are accessible to economic analysts.

[70] Pillipovic, Dragana, *Energy Risk: Valuing and Managing Energy Derivates* (New York: McGraw-Hill, 1998), p. 3.

[71] Energy Information Administration, *Price Changes in the Gasoline Market* (Washington, March 1999), reviews several decades of studies with mixed results in the analysis of gasoline price asymmetry – the tendency of prices to increase rapidly, but fall slowly. The report concludes that there is strong evidence of pattern asymmetry (i.e. prices do rise faster than they fall) but not amount asymmetry (eventually they fall back all the way). This is not the majority view, however.

[72] Reilly, Barry and Robert Witt, "Petrol Price Asymmetry Revisited," *Energy Economics*, 1998.

[73] Bacon, Robert W., "Rockets and Feathers: The Asymmetric Speed of Adjustment of UK Retail Gasoline Prices to Cost Changes," *Energy Economics*, 1991; Galeotti, Marzio, Alessandro Lanza and Matteo Manera, "Rockets and Feathers Revisited: An International Comparison on European Gasoline Markets," *Energy Economics*, 2003; Borenstein, Severin and Andrea Shepard, "Sticky Prices, Inventories and Market Power in Wholesale Gasoline Markets," *RAND Journal of Economics*, 2002, p. 322; U.S. General Accounting Office, "Energy Security and Policy: Analysis of the Pricing of Crude Oil and Petroleum Products" (Washington, March 1993). Moreover, one fundamental difference between the price spikes of recent years and the "rockets and feathers" debate should be underscored. In the recent circumstances, we are not dealing with crude oil price changes alone, so the question is not whether refiner/marketer margins "catch up," or whether some of the change in crude oil price ends up in the refiner/marketer pockets (bottom line). The recent price spikes have been significantly driven by refiner/marketer margins. Even if margins return to historic levels after the spike, there is no doubt that a net increase in marketer margins has occurred.

[74] *National Energy Policy*, p. 3-13.

[75] Espey, Molly, "Gasoline Demand Revisited: An International Meta-Analysis of Elasticities," *Energy Economics* 20, 1998, 273-295, identifies 363 estimates of short-term elasticity. The median is -.23 for the short term and -.43 for the long term. Kayser, Hilke A., "Gasoline Demand and Car Choice: Estimating Gasoline Demand Using Household Information," *Energy Economics*, 22, 2000, estimated the short-term elasticity in the U.S. at -.23. Puller, Steven L. and Lorna A. Greening, "Household Adjustment to Gasoline Price Change: An Analysis Using 9 Years of US Survey Data," *Energy Economics*, 21, 1999, pp. 37-52, find a one-year price elasticity of -.34, but model a more complex structure of responses within shorter periods. They find a larger elasticity of miles traveled in the first quarter after a price shock (-.69 to -.76), but that demand "snaps back." The larger reduction in miles driven is still "inelastic." Moreover, the reduction in miles driven is larger than the reduction in fuel consumed since it appears that households cut back on the most efficient driving miles (i.e. higher speed vacation miles).

[76] Espy, Molly, "Explaining the Variation in Elasticity Estimates of Gasoline Demand in the United States: A Meta-analysis," *The Energy Journal*, 17, 1996, Table 2, shows the average elasticity of demand for U.S. only studies at -.42.

[77] See Bohi, Douglas R. *Analyzing Demand Behavior: A Study of Energy Elasticities* (Baltimore: Johns Hopkins University Press, 1981);

[78] Federal Trade Commission, *Midwest Gasoline Price Investigation* (Washington, March 29, 2001), pp. i...4.

[79] Consodine, Timothy J. and Eunnyeong Heo, "Price and Inventory Dynamics in Petroleum Product Markets," *Energy Economics*, 22, 2000, p. 527, conclude "supply curves for the industry are inelastic and upward sloping." See also "Separatiblity, Functional Form and Regulatory Policy in Models of Interfuel Substitution," *Energy Economics*, 1989.

[80] Consodine, Timothy J., "Inventories Under Joint Production: An Empirical Analysis of Petroleum Refining," *Review of Economics and Statistics*, 1997, p. 527, "high inventory levels depress prices... In some cases, imports of product are more variable than production or inventories.

[81] Pirrong, Stephen Craig, *The Economics, Law and Public Policy of Market Power Manipulation* (Boston: Kluwer, 1996), pp. 10... 24... 59. See also, Williams, Jeffrey and Brian Wright, *Storage and Commodity Markets* (Cambridge: Cambridge University Press, 1991); Deaton, Angus and Guy Laroque, "On the Behavior of Commodity Prices," *Review of Economics and Statistics*, 1992.

[82] Friedman, David, et. al., *Drilling in Detroit: Tapping Automaker Ingenuity to Build Safe and Efficient Automobiles* (Washington, D.C.: Union of Concerned Scientists, June 2001). Friedman, David, *A New road: The Technology and Potential of Hybrid* (Washington, D.C.: Union of Concerned Scientists, January 2003), lays out a scenario in which conventional vehicles move to 40 MPG and hybrids move to 60 MPG.

[83] EIA, *Monthly Energy Review*, Table 3.1a.

[84] EIA, *Monthly Energy Review*, Table 4.4.

[85] Ellioit, R. Neal, Anna Monis Shipley, Steven Nadel and Elizabeth Brown, *Natural Gas Price Effects of Energy Efficiency and Renewable Energy Practices and Policies* (Washington: American Council for an Energy Efficient Economy, December 2003).

[86] Shepherd, p. 389.

[87] Landes and Posner, 1981; Ordover, J.A. and R. D. Willig, "Herfindahl Concentration, Rivalry, and Mergers," *Harvard Law Review*, 95, 1982.

[88] W. Kip Viscusi, John M. Vernon, and Joseph E. Harrington, Jr., *Economics of Regulation and Antitrust* (Cambridge: MIT Press, 2000), pp. 147-150.

[89] Landes and Posner, p. 947. "Since market share is only one of three factors in equation (2) that determine market power, inferences of power from share alone can be misleading... The proper measure will attempt to capture the influence of market demand and supply elasticity on market power."

[90] Landes and Posner, p. 942.

[91] Waverman, Leonard, "Econometric Modelling of Energy Demand: When Are Substitutes Good Substitutes?," *Energy Demand: Evidence and Expectations* (Surrey University Press, 1992), p. 16. Urga, Giovanni and Chris Walters, "Dynamic Translog and Linear Logit Models: A Factor Demand Analysis of Interfuel Substitution in US. Industrial Energy Demand," *Energy Economics*, 25:2003, p. 18, concludes that "estimates of long run cross elasticities are well below the threshold of unity."

[92] U.S. Department of Justice and Federal Trade Commission *Horizontal Merger Guidelines* (Washington, 1997), at section 0.1.

> The rule of thumb reflected in all iterations of the Merger Guidelines is that the more concentrated an industry, the more likely is oligopolistic behavior by that industry.... Still, the inference that higher concentration increases the risks of oligopolistic conduct seems well grounded. As the number of industry participants becomes smaller, the task of coordinating industry behavior becomes easier. For example, a ten-firm industry is more likely to require some sort of coordination to maintain prices at an oligopoly level, whereas the three-firm industry might more easily maintain prices through parallel behavior without express coordination.

[93] Taylor, Chapter 11; Viscusi, Vernon, and Harrington, Chapter 5; Jean Fudenberg and Jean Tirole, "Noncooperative Game Theory for Industrial Organization: An Introduction and Overview," in Richard Schmalensee and Robert D. Willig, (eds.) *Handbook of Industrial Organization* (New York: North-Holland, 1989).

[94] Peterson and Mahnovksi, p. 24.

[95] Scherer and Ross, p. 526, formulate the issue as follows "To avoid these hazards, firms entering either of the markets in question might feel compelled to enter both, increasing the amount of capital investment required for entry."

[96] Shepherd, pp. 289-290, describes this issue as follows:

When all production at a level of an industry is "in-house," no market at all exists from which independent firms can buy inputs. If they face impediments or delays in setting up a new supplier, competition at their level will be reduced. The clearest form of this is the rise in capital a new entrant needs to set up at both levels.

Ores, special locations, or other indispensable inputs may be held by the integrated firm and withheld from others. The integration prevents the inputs from being offered in a market, and so outsiders are excluded. A rational integrated firm might choose to sell them at a sufficiently high price.

[97] Shepherd, p. 294, argues that integration by large firms creates this problem. Restrictions may be set on areas, prices or other dimensions ... Only when they are done by small-share firms may competition be increased. When done by leading firms with market shares above 20 percent, the restrictions do *reduce* competition.

[98] Perry, Martin K., "Vertical Integration: Determinants and Effects," in Schmalensee and Willig (eds.), *Handbook of Industrial Organization*, p. 197.

[99] Perry, p. 247.

[100] Scherer and Ross, pp. 526-527; Shepherd, p. 290.

[101] Borenstein, Severin, A. Colin Cameron and Richard Gilbert, "Do Gasoline Prices Respond Asymmetrically to Crude Oil Price Changes?" *Quarterly Journal of Economics,* 1997.

[102] Scherer and Ross, pp. 526-527; Shepherd, p. 290.

[103] Gilbert, Richard and Justine Hastings, "Vertical Integration in Gasoline Supply: An Empirical Test of Raising Rivals' Costs" (Competition Policy Center, University of California, Berkeley, 2001), p. 27; see also Hastings, Justine, "Vertical Relationships and Competition in Retail Gasoline Markets: Empirical Evidence from Contract Changes in Southern California" (Competition Policy Center, University of California, Berkeley, 2000).

[104] In 1990, 22 integrated companies covered an average of 28 states. In 1999, 17 companies covered an average of 26 states.

[105] "Beattie, Judge Green Lights Lawsuit," p. 3.

[106] Landes and Posner, p. 947, stress the importance of adjusting scrutiny based on the market characteristics:

> Market Share Alone Is Misleading. -Although the formulation of the Lerner index... provides an economic rationale for inferring market power from market share, it also suggests pitfalls in mechanically using market share data to measure market power. Since market share is only one of three factors... that determine market power, inferences of power from share alone can be misleading. In fact, if market share alone is used to infer power, the market share measure... which is determined without regard to market demand or supply elasticity (separate factors in the equation), will be the wrong measure. The proper measure will attempt to capture the influence of market demand and supply elasticity on market power.

[107] Landes and Posner, p. 954, also argued that the size of the market at issue should be considered, "if very high market shares are required to justify a finding of monopoly power in a small market, then a lower market share should suffice in a large market."

[108] Recent studies that document the importance of concentration and market power in various markets at a micro level include Sen Anindya, "Higher Prices at Canadian Gas Pumps: International Crude Oil Prices of Local Market Concentration," *Energy Economics,* 2003; Delpachitra, Sarath B., "Price Rigidity in the Downstream Petroleum Industry in New Zealand: Where Does it Happen," *Energy Economics*, 2002; Adrangi, Bahram, Arjun Chatrath, Kambiz Raffiee, and Ronald D. Ripple, "Alaska North Slope Crude Oil Price and the Behavior of Diesel Prices in California," *Energy Economics*, 2001; Gilbert and Hastings; Borenstein, Cameron and Gilbert.

[109] "Text of the Speech of President Bush," in releasing the National Energy Task Force Report, *The Washington Post,* May 18, 2001.

[110] Secretary of the Treasury O'Neill recounts that the Vice President responded to the criticism of some of the administration policies with the blunt statement that, "We won the mid-terms [elections], this is our due."

The Washington Post, January 18, 2004, F-3. The quote is from Secretary of the Treasury O'Neill's account of vice President Cheney's reaction to O'Neill's complaint that the tax cuts would create a severe fiscal crisis.

[111] "Supreme Court to Hear Cheney Task Force Case," *Energy Daily,* December 16, 2003.

[112] *Frontline*, June 6, 2001.

[113] The California Attorney General reached a settlement with Dynegy for $280 million to settle complaints about price manipulation in about 6 months in 2000-2001. Included in the total was a settlement of $3 million that the Federal Energy Regulatory Commission had reached with Dynegy. In other words, the FERC has agreed to just about one penny on the dollar of the ultimate abuse (see Davis, Teena, "Dynegy Settle Power Fight with California," *Energy Daily,* April 28, 2004).

[114] Beattie, Jeff, "FERC Still Unsure About Reliability of Gas Price Reporting," *Energy Daily*, November 5, 2003.

[115] Kubo, Toru, Harvey Sachs, and Steven Nadel, *Opportunities for New Appliance and Equipment Efficiency Standards: Energy and Economic Savings Beyond Current Standards Programs* (Washington, D.C.: American council for an Energy-Efficient Economy, September 2001). Nadel, Steve and Howard Geller, *Smart Energy Policies: Saving Money and Reducing Pollutant Emissions through Greater Energy Efficiency* (Washington, D.C.: American Council for an Energy Efficient Economy, September 2001).

[116] King, Llewellyn, "The Energy Pig-Out Has Been Delayed," *Energy Daily*, December 2, 2003.

[117] King identifies half a dozen columnists and newspapers who are usually strong supporters of President Bush who find the bill unacceptable.

[118] Federal Trade Commission, *Midwest Gasoline Price Investigation*, March 29, 2001, pp. i...4.

[119] Energy Information Administration, *Horizontal Market Power in Restructured Electricity Markets* (March 2000).

[120] Cleveland, Cutler J. and Robert K. Kaufman, "Oil Supply and Oil Politics: Déjà vu All Over Again," *Energy Policy*, 31, 2003, pp. 485-487, point out the obvious math of the situation.

[121] Cleveland and Kaufman, p. 488.

[122] Cleveland and Kaufman, p. 488, note that "Just a 3 mile-per-gallon increase in the fuel efficiency of SUVs alone would reduce the US oil consumer of more than ANWR could supply," citing American Council for an Energy-Efficient Economy, *Vehicle Fuels Economy Standards: Big Energy Savings at a Modest Cost*, 2001.

[123] Friedman, et al.

[124] Peterson and Mahnovski, p. 5, note the following:

> Oil industry research, analyses and policy dialogs conducted in both the private and public sectors tend to emphasize the natural resource side of the business – upstream crude oil exploration and production. Much less analysis and discussion is devoted to oil companies as the downstream manufacturers of intermediate and finished petroleum products.

[125] Peterson and Mahnovski, p. 5.

[126] Harwood, J., "Americans Distrust Institutions in Poll," *Wall Street Journal,* June 13, 2002, cited in Peterson and Mahnovski, *New Forces At Work*, p. 19.

[127] For other products, imports play a larger role, close to 10 percent for distillate and 50 percent for residual fuel oil.

STATEMENT OF JOHN R. DOSHER, DIRECTOR, JACOBS CONSULTANCY

Mr. Chairman, and members of the committee, my name is John Dosher. I am a Director of Jacobs Consultancy, formerly known as Pace Consultants.

I would like to thank the committee for the opportunity to testify at this hearing and provide you my independent views on the refining industry.

Much of my work for Jacobs during my 40+ years with the firm has been heavily focused on helping financial institutions and refiners develop financing for major asset acquisitions and expansion projects.

Due to the poor and uncertain climate for investments in the refining industry, gasoline supply in the United States is now tight and is expected to get even tighter.

It may be helpful to the committee for me to review historical as well as expected clean fuels regulations impacting the refining industry. The first regulation, as shown on Exhibit 1, initiated in 1973, was the removal of lead from gasoline. This was required for the catalytic converters in cars and was phased in over a 10-year period. In 1989, the Environmental Protection Agency (EPA) instituted vapor pressure control to reduce hydrocarbon (volatile organic compounds—VOC) emissions. These vapor pressure standards were further tightened in 1992.

Based on the Clean Air Act Amendments (CAAA) of 1990, many large cities had to use Reformulated Gasoline (RFG) which by law required additional emission reductions. These reductions continue to become more stringent, even through today, with the use of more stringent and complex emission models. The RFG regulations also required the addition of oxygenates, such as MTBE or ethanol.

Under the CAAA, conventional gasoline, which is used in non-RFG areas, could not be more polluting than a baseline set for each refinery as determined by 1990 production qualities. The CAAA also allowed for second round emissions reduction. This resulted in the creation of Low Sulfur Gasoline regulations that began this year, and Ultra Low Sulfur Diesel requirements in 2006 that also are accompanied by the addition of new catalytic converters and other changes to large trucks. I should also note that California has already implemented much more stringent standards for gasoline and diesel compared to the Federal standards.

Possible further Federal clean fuels initiatives pending would be the removal of MTBE from gasoline, renewable fuels (ethanol) standard, and additional ultra low sulfur standards for non-road diesel and other transport fuels. Several states have already implemented MTBE bans.

All of this has led to uncertainty in the refining industry, particularly when it comes to the financial aspects of the business. Let me present the following charts to illustrate this.

Uncertainty of required investment leads to lower asset values. This is illustrated for the refining industry by Exhibit 2, which shows recent transactions. The market for buying and selling refineries has ranged from 5 percent to 35 percent of replacement cost over the last few years. Replacement cost is the cost to build a new refinery. Recent transactions have been approximately 15 percent of replacement cost. It is also indicative that if an existing refinery sells for 20 percent of replacement cost, it becomes difficult to justify building a new facility at 100 percent of replacement costs.

Exhibit 3 outlines the landscape of financing for the refining industry. A refiner can typically borrow anywhere from 35 percent to 50 percent of their market value. The refinery value is the collateral for the loan. We look at this market value as percentage of the refinery's replacement cost.

A refinery which is valued at 20 percent of replacement can then expect to get financing in the range of 7 percent–10 percent of replacement cost. The clean fuels programs for low sulfur gasoline and Ultra Low Sulfur diesel are costing 8 percent–12 percent of replacement cost. This means that the refiner's available credit is more than totally tied up with these clean fuels projects and is not available for expansion projects.

Other requirements will put regional refiners in a more serious bind. A good example is the NOx reduction requirement for ozone in the Houston Galveston area. Our analysis of the capital costs to meet a substantial reduction in NOx emissions adds another 3 percent–6 percent of replacement cost to the refiners' investment needs. You can quickly see that at today's market for refining, there is not a great deal of room for the independent refiner to raise the funds needed for clean fuels and expansions. Some smaller refiners could shut down.

To meet our demand for gasoline and other refined products, as well as continue to improve the environment, three goals must be met:

1. Uncertainty in future regulations must be resolved quickly;
2. Regulations must be made and implemented in a manner to minimize the economic impact to the refining industry

Exhibit 1.—Clean Fuels Requirements and Implementation Dates

Leaded Gasoline	1973
Phase I—VOC	1989
Phase II—VOC	1992
RFG Phase I—Simple	1995
RFG—Complex Model 1	1998
RFG—Complex Model 2	2000
MSAT ("Anti-Backsliding")	2002
Low Sulfur Gasoline	2004
Ultra-Low Sulfur Diesel	2006
Non-Road Diesel	?

Exhibit 2.—Refinery Market

Refinery	Date	Buyer	Percentage Replacement
Equilon Enterprises—El Dorado KS	1999	Frontier	17
Eon—Benecia CA	1999	Valero	37
Equilon Enterprises—Woodriver IL	2000	Tosco	22
BP Amoco-Alliance LA	2000	Tosco	36
BP Amoco-Mandan SD/Salt Lake City UT	2001	Tesoro	46
El Paso Energy-Corpus Christi TX	2001	Valero	24
BP—Yorktown VA	2002	Giant	16
Williams—Memphis TN	2002	Premcor	26
ConocoPhillips-Woods Cross UT	2002	Holly	6
ConocoPhillips-Commerce City CO	2003	Suncor	12
Premcor-Hartford IL	2003	ConocoPhillips	4
El Paso Energy-Eagle Point TX	2003	Sunoco	8
Orion Refining Company-Good Hope LA	2003	Valero	27
Farmland-Coffeyville KS	2003	Pegasus	22.7
Motiva—Delaware City DE	2004	Premcor	16

Exhibit 3.—Who Can Play New High Stakes Games?

Percent of Replacement			
Refinery Market	20	40	50
Loan Amount	7 to 10	14 to 20	18 to 25
Need			
Tier 2	8 to 12	8 to 12	8 to 12
Houston Total	11 to 18	11 to 18	11 to 18
Percent of Available Credit			
Utilized			
Tier 2	100%+	57 to 60	44 to 48
Houston Total	100%+	80 to 90	61 to 72

RESPONSES BY JOHN DOSHER TO ADDITIONAL QUESTIONS FROM SENATOR JEFFORDS

Question 1. Why have so many refineries been closed over the last decade?

Response. Due to earlier overbuilding, fuel efficiency standards, improved technology and other factors there was excess refining capacity in the early to mid-nineties. This lead to low profit margins leading to many shutdowns of smaller and less efficient refineries. Also, during this period California adopted stringent clean fuels standard leading to several refinery shutdowns in that state due to the high costs involved. By the late nineties margins were better but the need for large environmental investments in the rest of the country lead to another round of shutdowns.

Question 2. In the spring of 2002, at hearings before the Permanent Subcommittee on Investigations, Senators Voinovich and Levin asked executives from some of the major oil companies whether the U.S. needed more refineries. Of the 5 companies, including ExxonMobil, BP, ChevronTexaco, and Shell, only Marathon said we could use more refining capacity. The others said we had enough and, considering the economics, preferred to rely on imports.

Has anything changed in the last 2 years to suggest that we need more refining capacity?

Response. We need more domestic refining capacity. In the last 2 years the new specifications on gasoline and diesel have become defined and they are quite tough and expensive to meet. In the past exporters could supply gasoline and diesel to the U.S. opportunistically with no need to invest specially for the U.S. market. With the new specifications this no longer exists and they must install facilities comparable to those required in the U.S. to supply our markets. This may or may not occur and I doubt that imports will grow in line with demand.

Question 3. Would you support a tax or tariff on oil and gas coming into this country from countries with lower environmental standards than ours to level the international trade playing field?

Response. We need imports and a tariff would be counterproductive. With the new specifications in the U.S., foreign refiners no longer have an advantage in supplying our markets.

Question 4. The U.S. transportation sector emits about 10 percent of the world's annual carbon dioxide emissions. Several of the world's largest petroleum companies, like BP and ChevronTexaco, are taking significant steps to diversify into other energy sources and reduce their greenhouse gas emissions. Do you agree that we need to take greater steps to reduce the threat of global warming by reducing emissions from mobile sources?

Response. I am skeptical on global warming but believe we need to reduce emissions from mobile sources. The initiatives already underway will lead to big improvements as new cars and trucks designed to take advantage of the cleaner fuels come onto the road. Also, see comments about the hybrid car below.

Question 5. Do you support efforts to reduce gasoline demand in the United States, which would relieve the strain on refining capacity—measures such as a gas tax, increases in corporate average fuel economy, or other demand side measures?

Response. The hybrid car represents a consumer friendly, free market way to reduce demand and emissions. Although dealers' supplies are sold out, I support extension of the hybrid tax rebate to accelerate market penetration of these high efficiency, high performance vehicles.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY,
Sacramento, CA, May 11, 2004.

Hon. BARBARA BOXER,
U.S. Senate,
Washington DC.

DEAR SENATOR BOXER: Thank you for the opportunity to provide comments that may be helpful to you and others in the upcoming May 12, 2004 hearing of Senator James F. Inhofe's Environmental and Public Works Committee "—to examine the environmental and regulatory framework affecting oil refining and gasoline policy."

One expected subject of interest in the hearing is the issue of regional and local variations in fuel specifications, sometimes referred to as "boutique" fuels, and the impacts that these specifications have on fuel supplies and prices. At times, some parties assert that California has a 'boutique' motor vehicle fuels program, and that this program is responsible for much of the price disparity between transportation fuels in California and the average price in the rest of the nation.

However, as I will explain below, we do not believe that any of these assertions are an accurate characterization of California's fuel requirements.

California does have the most stringent gasoline and diesel fuel specifications in the country. In California, over 65 percent of all ozone forming emissions and 80 percent of the cancer risk posed by toxic air contaminants come from motor vehicles. Due to California's unique air quality needs, the state has been a leader in requiring the cleanest fuels and vehicles in the world.

The air quality benefits from California's fuels programs are significant. California reformulated gasoline reduces ozone forming emissions by 15 percent and emissions of toxic air contaminants by almost 50 percent. Both of these are significantly higher than benefits from Federal reformulated gasolines. Similarly, California diesel results in reductions of nitrogen oxides and diesel particulate matter, considered by California to be a toxic air contaminant, by 7 and 25 percent, respectively. Governor Arnold Schwarzenegger has pledged to reduce air pollution by up to 50 percent by 2010 to meet Federal attainment standards and reduce health impacts. Clean fuels are essential to delivering on that promise. Federal diesel fuel provides no reduction in oxides of nitrogen and only about one-fourth the reduction in particulate matter. It is not sufficient, therefore, to meet our needs.

While statements that California specifications are more stringent than the rest of the Nation are true, California's fuel market is hardly a boutique. California is one of the largest gasoline markets in the world, behind only the United States and roughly equal in size to Japan. Also, California is the fourth largest oil producing state, closely following Alaska, and has the third largest oil refining capability of any state.

Not only is California a very large fuels market, within our state there is a much higher degree of fuel fungibility (the ability to mix one fuel with any other similar grade fuel across a large geographic region) than anywhere else in the nation. California's motor vehicle fuel specifications are applied statewide. As a result, generally any fuel that meets our standards can be sold anywhere in the state. The only exceptions are due to a small variation in the dates for the implementation of summer and winter gasoline volatility specifications, or due to Federal requirements for oxygenates in gasoline that are not applied uniformly statewide. As you know, California has been requesting relief from the Federal oxygenate requirements since 1999. Granting this relief is a simple step that the Federal Government could take to improve both air quality and fuel supply options within California.

Most of California's fuel is produced within the state by 13 refineries that often operate at their capacity. Fuel is distributed within the State through an integrated pipeline network. Demand for transportation fuels has grown steadily in the last 10 years, and now exceeds in-state refining capacity. California receives regular supplies of fuel from other refineries worldwide, and these fuels either meet our standards, or are blended at California refineries into complying products.

However, the West Coast, including California, is isolated from the rest of the United States and has no ability to receive fuel via a pipeline connection to the Gulf Coast. Marine imports serve as the primary external source of petroleum supplies, with the nearest major supply of fuel outside of the West Coast nearly 4 weeks away via ship.

It is true that production of California cleaner burning gasoline and diesel fuel comes at a cost. Both require more processing than either conventional or Federal reformulated fuels. However, the production costs are moderate in comparison to the environmental benefits. The increased cost to produce California reformulated gasoline is estimated to be about five cents per gallon compared to conventional gasoline and less than five cents more than Federal reformulated gasoline. The cost to produce California diesel fuel is estimated at less than three cents per gallon compared to Federal on-road diesel fuel.

These costs account for part of the differences in fuel costs between California and the rest of the country, but are only a small part. It is the combination of high demand, operation of refineries at capacity, and remoteness from additional supplies that lead to the conditions of higher fuel prices in California and in other West Coast states.

The Pacific Northwest, Nevada, and Arizona allow conventional gasoline, Federal reformulated gasoline (in Arizona only), and Federal diesel fuel. Yet these states consistently experience gasoline prices similar to California's when the differences in state and local taxes and the above mentioned costs for California's fuel specifications are considered.

For example, gasoline prices in all of the western states are at or near record highs. When the prices are adjusted to reflect equal state and local taxes, California's prices are less than three cents per gallon greater than the average of the other states based on data available from the AAA Web site (see enclosed data). The current fuel prices and historical price increases cannot be attributed to differences in fuel specifications. This is supported by the results of investigations conducted by the United States Department of Energy—Energy Information Administration (2003) and the California Attorney General (1999, 2004).

While solutions continue to be needed to address the high motor vehicle fuel prices in California and on the West Coast, it is clear that California's cleaner fuels are not a major cause of the problem. Eliminating California's fuel specifications would not significantly lower prices, but would harm the health of our citizens and make it impossible to meet our obligations under the Federal Clean Air Act.

With ever increasing numbers of Americans breathing unhealthy air, it is imperative that citizens be supplied with the lowest emitting vehicles feasible and that motor vehicles use the cleanest burning fuels possible. That is precisely the course we are on in California.

Again, thank you for this opportunity. If you have any questions, please feel free to contact me, at (916) 323–2514 or Alan C. Lloyd, Ph.D., Chairman, California Air Resources Board, at (916) 322–5840.

Best regards,

TERRY TAMMINEN,
Agency Secretary.

Enclosures

Weekly Gasoline Rack Prices

(cents per gallon)

Date	California Cities			Surrounding States			
	Los Angeles	San Francisco	Fresno	Arizona (Phoenix)	Oregon (Portland)	Nevada (Reno)	Nevada (Las Vegas)
	69.49	69.57	70.07	83.42	68.25	68 40	79.61
	62.81	65.99	65.84	80.28	63.25	64 36	73.68
January-02	61.85	63.74	63.52	79 03	62.75	61 68	70.56
	73.99	74.42	74.59	86.64	66.00	64 85	80.64
	72.80	72.33	73.52	88.67	62.75	63 49	80.24
	[illegible]	74.63	75.14	88.60	60.00	64.99	78.87
February-02	[illegible]	78.75	78.76	89.59	63.60	66.85	83.20
	[illegible]	77.91	78.53	89.39	64.38	[illegible]	86.76
	[illegible]	[illegible]	80.90	92.41	66.74	68.02	85.09
	98.88	98.7	99.96	109.25	79.74	88.45	101.76
March-02	99.44	101.2	101.78	113.90	85.63	91.74	104.79
	99.77	101.58	101.74	116.49	88.84	91.78	106.72
	99.38	99.35	100.04	116.79	87.70	89.35	104.74
	[illegible]	99.74	100.13	115.74	[illegible]	91.60	100.62
April-02	[illegible]	[illegible]	98.29	113.03	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	97.10	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	96.98	108.35	[illegible]	[illegible]	94.55
	92.52	92.25	94.06	105.05	81 66	85.00	92.42
	90.79	90.2	92.20	101.77	82.46	82.92	89.50
May-02	93 02	93.26	94.52	101.77	86.29	86.36	91.10
	95.10	96.16	96 65	103.66	86.19	89.44	92.89
	92.81	94.63	94.50	100.64	84.87	89.15	90.89
	[illegible]	[illegible]	98.04	104.46	[illegible]	[illegible]	93.79
June-02	[illegible]	[illegible]	[illegible]	112.28	[illegible]	[illegible]	[illegible]
	[illegible]	100.12	[illegible]	106.45	[illegible]	[illegible]	[illegible]
	[illegible]	98.83	99.67	106.61	[illegible]	[illegible]	98.03
	97.74	98.89	98.88	104.64	92.02	92.64	96.39
July-02	97.24	98.9	98.52	104 88	91.03	90.75	97.18
	96.09	97.66	97.23	112.46	90.70	88.55	95.10
	97.54	98.24	98.33	103 20	89.94	69.45	94.87
	[illegible]	98.27	98.53	103.95	90.08	92.92	98.22
	[illegible]	98.94	99.35	105.63	[illegible]	[illegible]	97.26
August-02	[illegible]	100.59	100.53	106.48	[illegible]	95.14	99.30
	[illegible]	99.09	99.12	107.63	88.23	93.37	98.41
	[illegible]	100.77	100.74	109.44	88.80	94.14	99.67
	104.58	101.11	101.00	110 16	89.48	94.75	100.45
September-02	103.42	100.48	100.77	108 61	89.74	94 59	99.10
	100.67	98.53	99.00	104 33	88.00	92.60	96.46
	100.81	99.2	99.57	104 66	86.93	92.97	99.85
	[illegible]	99.19	99.79	104.01	[illegible]	[illegible]	[illegible]
	[illegible]	98.96	100.12	106.04	[illegible]	[illegible]	100.83
October-02	[illegible]	99.2	100.42	107.24	[illegible]	[illegible]	104.81
	[illegible]	103.06	104.16	107.23	86.29	[illegible]	106.56
	104.74	103.5	103.43	109.02	86.00	102.66	108.11
	101.99	100.84	101.26	107.25	87.50	100.81	104.96
November-02	100.21	98 47	99 05	104.77	91.50	98.56	103.81
	95.45	92.89	92 85	100.72	96.00	94.73	99.81
	90.70	87.19	95 85	96.69	81.13	92.79	98.30
	[illegible]	83.33	94.39	93.81	76.00	88.48	94.83
December-02	89.00	89.57	90.41	98.97	[illegible]	[illegible]	98.33
	90.95	91.2	92.92	103.66	84.25	96.48	100.07
	96.93	96.14	96.98	109.16	87.50	101.14	105.18

Weekly Gasoline Rack Prices

(cents per gallon)

Date	California Cities			Surrounding States			
	Los Angeles	San Francisco	Fresno	Arizona (Phoenix)	Oregon (Portland)	Nevada (Reno)	Nevada (Las Vegas)
	95.80	95.56	96.92	108.25	90.75	101.38	105.37
	96.08	96.59	98.06	107 00	89.75	107.64	108.53
January-03	97.13	100 18	97.13	109.01	96.25	105.90	109.46
	99.50	103.03	103.81	107 93	96 08	108 68	109.95
	105.90	108.33	109.56	111.12	105.42	111.60	114.50
	114.38	[illegible]	116.11	119.64	110.75	113.95	121.18
February-03	118.78	[illegible]	120.40	122.10	[illegible]	[illegible]	122.28
	119.69	[illegible]	125.89	125.87	122.00	[illegible]	125.84
	135.24	[illegible]	[illegible]	136.05	129.75	[illegible]	136.23
	156.65	137.63	141.79	148.55	126.41	135.95	145.19
March-03	168.57	142.25	148.82	157.75	123.17	143.95	151.01
	154.90	135.17	140.88	154.68	109.79	132.58	142 98
	146.23	125.53	128.63	145.12	100.80	119.48	137.26
	131.07	[illegible]	[illegible]	139.65	[illegible]	[illegible]	[illegible]
April-03	111.32	[illegible]	[illegible]	131.08	[illegible]	[illegible]	[illegible]
	106.98	[illegible]	[illegible]	125.02	[illegible]	[illegible]	[illegible]
	107.73	[illegible]	[illegible]	122.08	[illegible]	[illegible]	[illegible]
	89.65	104.91	107 64	121.36	97.22	95.95	98 83
May-03	81.87	94.66	97.68	115.50	84 69	85.15	91 77
	89.13	96.49	100 54	117.15	87.93	92.95	94 63
	102.00	104.88	98.73	116.21	93.61	96.90	97.24
	105.15	[illegible]	106.04	118.30	[illegible]	[illegible]	100.61
June-03	[illegible]	[illegible]	[illegible]	125.05	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	116.62	[illegible]	116.00	105.33
	97.15	115.26	114 92	110 92	98.53	104.77	99.23
	101.40	110.61	113.37	110.99	99.39	104 35	100.65
July-03	98.73	108.33	109.41	110.55	98.23	103.96	102.83
	101.85	107.29	110.87	110.50	98.27	106.45	105.21
	106 32	110 58	111.49	114.19	107 98	108.45	107.71
	121.40	[illegible]	[illegible]	121.80	114.25	116.25	115.85
August-03	[illegible]	[illegible]	[illegible]	139.07	[illegible]	[illegible]	131.64
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	148.07
	139.40	[illegible]	134.54	[illegible]	128.49	135.07	132.88
	128.07	125.8	127.44	137.87	113 21	127.64	125.60
September-03	100.65	112.3	112.34	127.71	103.96	114.48	116.02
	89 15	102.68	106.22	124.26	96 76	106.75	112.17
	91.90	98.18	109.38	122.24	93 89	105.05	108.26
	107.23	[illegible]	108.57	126.80	[illegible]	[illegible]	115.08
	[illegible]	[illegible]	[illegible]	118.50	[illegible]	[illegible]	[illegible]
October-03	102.40	101.39	[illegible]	118.25	[illegible]	[illegible]	117.37
	106.40	104.54	103.99	122.84	98.23	[illegible]	[illegible]
	103.73	103.97	103.20	117.37	104.55	110.25	114.86
	105.32	104 08	108.01	112.91	103.68	111.45	112.18
November-03	115.98	110.47	110.35	116.98	104.53	113.25	115.68
	108.93	104.93	104.81	115.88	101.03	109.90	110.00
	104.84	100.43	102.87	115.23	95.23	106.22	105.75
	103.27	99.37	102.62	115.69	94.68	103.33	105.18
December-03	101.43	96.91	100.54	113.90	95.14	101.82	105.50
	103.55	98.68	99.56	114.35	97.95	102.80	109.29

January-04	104.55	100.04	100.54	115.55	100.38	104.18	112.54
	108.31	103.41	104.81	118.95	107.13	107.63	115.68
	109.15	103.78	106.70	119.25	108.01	107.02	116.48
	114.97	109.71	112.25	123.74	111.38	113.20	119.64
	118.10	111.76	113.53	125.89	110.01	114.07	121.48
February-04	124.08	117.50	119.93	131.56	111.16	116.34	126.82
	128.16	120.98	123.30	134.26	111.32	118.32	129.60
	153.88	141.33	144.28	149.65	123.01	138.01	153.51
	156.60	143.98	145.43	155.23	124.26	137.40	156.93
March-04	146.28	137.57	139.18	153.34	116.43	131.29	154.94
	143.00	133.65	138.43	152.58	114.23	130.51	152.66
	141.97	137.88	141.20	153.37	117.86	132.28	153.59
	144.25	139.43	143.93	156.08	118.72	138.38	157.58
April-04	153.06	147.88	150.00	159.98	128.05	146.67	146.21
	147.79	143.63	143.20	159.36	134.35	141.79	144.09
	148.92	143.48	[illegible]	[illegible]	140.91	141.05	145.15
	147.82	141.78	[illegible]	162.24	143.05	139.91	146.15
	155.23	148.00	150.59	164.73	152.05	148.25	153.03

Source: Oil Price Information Service

Weekly Diesel Rack Prices
(cents per gallon)

Date	California Cities: Los Angeles	California Cities: San Francisco	California Cities: Fresno	Surrounding States: Arizona (Phoenix)	Surrounding States: Oregon (Portland)	Surrounding States: Nevada (Reno)	Surrounding States: Nevada (Las Vegas)
January-02	62.08	61.75	63.20	62.80	55.26	62.33	63.16
	55.53	54.74	55.42	56.49	46.43	55.67	56.31
	54.14	50.50	53.05	54.24	48.08	52.46	52.98
	53.66	59.99	64.15	61.60	57.70	61.63	61.27
	59.59	58.02	61.60	60.55	52.36	58.23	59.09
February-02	59.94	60.23	62.48	59.10	51.57	58.80	[illegible]
	62.67	63.19	65.74	62.62	55.18	61.58	60.73
	64.81	65.01	66.82	63.69	56.50	62.58	62.58
	67.02	[illegible]	70.27	65.84	59.40	64.09	[illegible]
March-02	74.25	79.09	80.11	72.45	69.32	74.60	71.88
	76.47	82.85	83.33	73.60	71.42	76.95	72.76
	78.60	83.37	83.65	75.49	71.65	75.72	74.72
	77.34	79.03	79.77	75.91	72.50	76.97	76.85
April-02	77.39	[illegible]	79.80	77.75	74.83	[illegible]	[illegible]
	[illegible]	[illegible]	75.53	74.69	72.22	[illegible]	[illegible]
	[illegible]	[illegible]	70.47	73.97	72.22	[illegible]	[illegible]
	74.38	[illegible]	76.73	74.21	72.17	75.46	74.60
May-02	72.75	71.50	73.92	72.67	71.89	72.91	72.78
	70.09	69.23	71.53	71.22	73.37	70.87	70.93
	72.42	73.93	77.07	72.01	74.93	71.98	71.79
	74.89	76.67	79.68	74.57	72.99	74.91	74.27
	71.68	75.07	77.74	71.45	69.06	72.81	71.36
June-02	[illegible]	[illegible]	81.16	71.67	67.65	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	73.85	65.41	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	77.58	74.29	65.21	74.40	74.00
July-02	74.20	75.32	77.75	74.48	68.85	74.36	74.07
	73.59	75.04	77.29	73.23	68.80	73.06	72.64
	75.18	75.51	78.20	74.83	69.57	74.05	74.34
	76.12	74.47	78.20	74.79	68.96	75.24	75.13
August-02	77.16	[illegible]	80.93	78.03	75.81	[illegible]	78.88
	[illegible]	[illegible]	82.94	79.46	80.77	79.90	[illegible]
	[illegible]	[illegible]	[illegible]	83.84	81.96	[illegible]	83.20
	88.71	[illegible]	100.50	84.85	80.77	85.41	85.02
	94.59	96.71	102.13	89.93	83.97	91.56	90.52
September-02	99.29	98.87	103.52	94.60	88.14	96.52	95.36
	93.26	91.86	94.45	92.57	85.37	94.27	92.86
	89.00	87.03	88.03	89.80	82.30	90.79	90.53
	89.25	87.00	89.46	89.81	83.14	89.23	89.72
October-02	[illegible]	[illegible]	[illegible]	91.95	83.91	90.10	[illegible]
	85.57	[illegible]	87.78	90.83	84.29	88.24	90.53
	[illegible]	[illegible]	89.99	94.40	86.70	89.47	[illegible]
	86.95	87.46	[illegible]	94.43	85.06	90.73	93.48
	84.26	86.77	90.05	90.35	83.55	88.94	[illegible]
November 02	82.1[illegible]	85.88	88.03	86.47	86.03	66.06	87.79
	80.08	82.20	83.61	84.16	85.16	82.53	85.13
	80.28	81.10	81.83	83.37	81.80	80.69	83.39
	81.14	80.45	81.69	85.23	79.16	80.34	83.32
December-02	80.88	[illegible]	80.63	85.51	75.17	79.58	83.16
	81.97	79.93	82.45	86.13	75.42	80.98	84.11
	91.57	90.73	92.62	91.98	82.48	88.63	91.42
	95.86	94.74	96.39	95.20	88.66	92.68	95.18

Weekly Diesel Rack Prices

(cents per gallon)

Date	California Cities: Los Angeles	California Cities: San Francisco	California Cities: Fresno	Surrounding States: Arizona (Phoenix)	Surrounding States: Oregon (Portland)	Surrounding States: Nevada (Reno)	Surrounding States: Nevada (Las Vegas)
January-03	92 23	91.34	92.62	92.26	87.80	91.33	92 74
	87 20	83.91	96.16	88.36	84 85	85 74	87 73
	91 16	92.58	95.41	90.44	86.52	89.75	90 00
	95 05	94.18	96.12	92.07	86.62	91.12	91 62
	102.05	100 47	102.40	98.49	92.49	98.13	97 59
February-03	107.35	104.98	109.26	106.42	101.76	104.41	105.92
	113.51	110.76	118.28	114.64	110.27	111.59	114.57
	110.71	108.27	111.79	110.12	113.38	108.79	101.61
	118.52	119.22	116.86	118.62	129.08	116.82	119.01
March-03	119.79	118.13	119.87	121.58	144 04	120.73	123.74
	114.97	115.19	117.85	118.01	128 63	119.27	122.17
	97.86	95.64	97.20	102.29	106 60	104 53	109 81
	96.82	92.21	93.36	96.83	93.83	100.04	105.49
April-03	89.98	86.35	89.29	94.20	90.59	98.06	101.24
	87.08	85.93	89.66	[illegible]	86.84	[illegible]	98.61
	89.53	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	98.27
	81.96	81.33	83.64	[illegible]	84.10	89.58	92.08
May-03	79.81	78.52	81 16	81.54	83.86	84.22	86.53
	80.20	78.43	80.89	79.18	79.88	79.81	82.22
	82.44	82.91	85.48	81.56	79.66	81.70	84.44
	81.64	81.96	84.28	79.54	81.38	81.00	80.44
June-03	83.83	85.14	87.22	86.26	83.08	[illegible]	80.73
	97.16	106.31	102.84	[illegible]	86.03	[illegible]	92.37
	85.88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	93.99	[illegible]	[illegible]	[illegible]	96.06	[illegible]	93.55
July-03	86.91	91.94	92.62	84.23	97.18	91.03	83.78
	91.54	92.50	95.75	87.66	92.51	90.90	87.55
	99.04	100 24	104 51	95 95	88.32	98.65	95.93
	99.57	104 02	109.98	95.44	86.63	100.98	95.99
	101.42	106.79	112.51	97.26	90.73	102.39	96.92
August-03	102.60	100.83	108.81	[illegible]	104.90	99.26	101.23
	108.49	105.62	112.29	107.29	106.93	104.69	106.80
	104.13	102.74	109.76	[illegible]	111.26	102.19	103.89
	95.71	95.86	97.99	99.51	99.47	95.01	95.98
September-03	89.53	88.74	92.54	89.40	96.22	89.35	88.20
	87 49	87.04	89.48	84.28	92.05	86.72	84.86
	85.48	84.89	86.47	83.02	91.10	87.37	84.94
	86.09	86 47	89.28	83.65	92.70	87.38	85 07
October-03	88.97	89.26	93.17	87.29	86.78	89.81	87.42
	95.86	94.69	97.92	[illegible]	85.72	96.31	92.15
	96.16	95.08	96.44	92.24	87.47	95.07	91.38
	96.41	95.67	96.84	92.37	87.85	95.69	91.80
	94.08	92.39	94.88	91.84	88.03	94.66	93.08
November-03	99 49	95.05	96.33	93.35	91.66	95 94	95.91
	98.79	95.34	97 32	95.71	95.48	96.59	97 23
	100.92	98.23	101.22	97.37	94.18	96.56	98.34
	99 03	99.15	102.21	96.55	91.25	97.58	96.01
December-03	104.94	100.87	103.41	104.02	97.25	101.44	104.03
	99.84	97.47	99.34	101.18	97.88	98.32	99.72
	100.12	95.31	97.01	99.58	94.56	96.20	99.41

Weekly Diesel Rack Prices

(cents per gallon)

	California Cities			Surrounding States			
Date	Los Angeles	San Francisco	Fresno	Arizona (Phoenix)	Oregon (Portland)	Nevada (Reno)	Nevada (Las Vegas)
January-04	100.85	97.37	98.63	99 98	90.50	98.71	100.96
	101.47	97.35	98.35	101.71	96.65	99 14	101.87
	95 71	92.00	93.68	96.57	90.78	93.57	95.95
	103.65	99.27	100.80	101 44	97 66	99.54	100 86
	107.28	100.64	101.69	107.14	97.31	101 69	106.11
February-04	118.14	117.44	119.69	[illegible]	[illegible]	117.61	118.30
	120.25	115.32	119.35	[illegible]	[illegible]	116.75	120.11
	116.23	109.14	114.52	[illegible]	[illegible]	108.90	112.75
	130.92	126.59	129.30	[illegible]	[illegible]	127.20	128.23
March-04	115.54	109.44	111 65	113.56	112.99	111 20	111 92
	106.96	103 55	105.09	107.38	101.59	105.22	107 94
	116.60	110.45	115.26	114.66	104.17	112.14	116 05
	129.75	119 75	125.36	126.96	106.05	122.60	129 43
April-04	145.33	139.40	142.46	137.59	[illegible]	136.60	136.81
	159.36	147.61	152.19	[illegible]	[illegible]	150.63	151.85
	163.91	153.86	159.82	[illegible]	[illegible]	151.43	155.06
	163.65	152.21	157.54	[illegible]	[illegible]	148.28	142.18
	169.61	159.97	163.49	143.75	145.82	157.88	150.25

SR/O&G/2003-03

2003 California Gasoline Price Study

Final Report

November 2003

Office of Oil and Gas
Energy Information Administration
U.S. Department of Energy
Washington, DC 20585

Contacts and Acknowledgments

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Table of Contents

	Executivo Summary	**iii**
1.	**Introduction**	**1**
2.	**Market Background**	**3**
2.1	*World Petroleum Market Conditions Produced a Backdrop for Volatility*	*4*
2.2	*California Demand and Supply Overview*	*6*
3.	**Removing MTBE and Using Ethanol**	**10**
3.1	*Distribution System Segregation*	*10*
3.2	*Refinery Yield Loss when Switching from MTBE to Ethanol*	*11*
3.3	*Increased Product Needs from Outside the State*	*12*
3.4	*Supply of Ethanol*	*12*
4.	**California Refinery Supply**	**14**
4.1	*Refineries Shifting from MTBE to Ethanol*	*14*
4.2	*Impact of Refinery Unit Outages on First Quarter Gasoline Production*	*17*
4.3	*Impacts of Switch to Ethanol in CARB Gasoline in Second Quarter*	*22*
4.4	*Projected Gasoline Supply When Switch to Ethanol Is Complete*	*24*
5.	**California Gasoline Distribution and Logistics**	**27**
5.1	*Distribution and Logistics Overview*	*27*
5.2	*Northern California Region*	*30*
5.3	*Bakersfield Area*	*33*
5.4	*Southern California Market*	*33*
5.5	*Spring and Summer 2003 Distribution and Logistical Issues*	*36*
5.6	*Next Summer and Beyond*	*39*
6.	**Gasoline Market Structure and Behavior**	**40**
6.1	*Industry/Market Structure*	*40*
6.2	*Price Formation*	*43*
6.3	*Elements of Gasoline Prices*	*45*
6.4	*Factors Causing Prices to Rise and Fall in the Short Term*	*49*
7.	**California Gasoline Prices in Spring and Summer 2003**	**54**
7.1	*Spring and Summer Price Overview*	*54*
7.2	*Explanations for March Price Increase*	*57*

7.3 June Gasoline Price Increase 64

7.4 August Gasoline Price Increase 64

7.5 Implications for Prices in 2004 68

8. Lessons Learned 70

8.1 Smooth Transitions Cannot Be Ensured 70

8.2 Government Regulatory Body Coordination Helps 70

8.3 Reducing Regulatory Uncertainty Encourages Early Preparation 70

8.4 Partial MTBE Elimination is Not Necessarily Worse than a Full Ban 71

8.5 Factors Are Working Both For and Against Smoother Supply Next Year 72

Appendix A. Study Request 73

Appendix B. Physical and Chemical Characteristics of MTBE and Ethanol Affect Emissions 75

Appendix C. Estimating An Outage Severity Factor and Seasonal Production with No Outages 78

Estimating An Outage Severity Factor 78

"No-Outage" Gasoline Yield and Production by Refinery by Month 78

Appendix D. Quantitative Explanation of Gasoline Price Pass-Through 80

Appendix E. Glossary 84

Executive Summary

California was scheduled to ban the use of methyl tertiary butyl ether (MTBE) in gasoline in January 2003, but a number of factors caused the State to delay the ban for one year to January 2004. Many California refiners chose to remove MTBE early,[1] however, and at the beginning of 2003, refiners switched about 45 percent of California gasoline production (about 500 thousand barrels per day) from the use of MTBE to ethanol. As refiners began the transition from winter-specification gasoline to the harder-to-produce summer-specification gasoline using ethanol, the State experienced a price spike. The coincidence of this winter-summer transition with the spring price spike prompted Congressman Doug Ose to request that the Energy Information Administration (EIA) explore whether the switch from MTBE to ethanol caused the price spike and what lay ahead for the California gasoline market. EIA produced a preliminary report in May addressing the specific questions asked by Congressman Ose.[2] This is the final report, in which EIA analyzes the spring price run-up and reviews the California gasoline market during the rest of summer 2003. Our findings regarding the reasons behind the spring run-up are unchanged from the preliminary report.

California uses a reformulated gasoline that meets stricter emission standards than those for Federal reformulated gasoline (RFG).[3] Prior to 2003, most of the State's gasoline contained MTBE, which was used to diminish the gasoline's air emissions and to improve engine performance. Federal RFG is also required to contain 2 percent by weight of oxygen. Although California does not have this requirement, some areas in the State must meet Federal requirements, and MTBE, which contains oxygen, was also used to meet the Federal oxygen requirement. However, detection of MTBE in some water supplies caused the State to ban its use in motor fuel by the end of 2003. As MTBE is eliminated, it is being replaced with ethanol, which, like MTBE, satisfies the Federal RFG standard for oxygen content, while also supplying needed octane. Major gasoline specification changes, such as the removal of MTBE and use of ethanol in its place, can create market dislocations that give rise to price spikes during the transition.

The spring price surge was quite large. After a period of relative stability for much of 2002, gasoline prices throughout the United States began to rise in December. The national average retail price for regular gasoline[4] rose 37 cents per gallon between

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[1] California refiners producing gasoline containing MTBE during spring 2003 will switch to ethanol-blended gasoline later in the year.

[2] Energy Information Administration, *2003 California Gasoline Price Study: Preliminary Findings*, SR/O&G/2003-01, May 2003.
http://www.eia.doe.gov/pub/oil_gas/petroleum/feature_articles/2003/cagasoline/cagasoline.pdf

[3] Federal reformulated gasoline (RFG) is gasoline that, on average, significantly reduces Volatile Organic Compounds (VOC) and air toxics emissions relative to conventional gasoline. It is more difficult to produce than conventional gasoline and originally was required only in the nine cities with the worst ozone nonattainment (Los Angeles, San Diego, Chicago, Houston, Milwaukee, Baltimore, Philadelphia, Hartford, and New York City). Other areas that also have a history of air pollution problems joined the RFG program. Today, RFG represents about 1/3 of U.S. gasoline consumption.

[4] Retail prices used in this report are from Form EIA-878, "Motor Gasoline Price Survey," collected and published each Monday. Higher or lower average prices may have occurred between survey dates.

December 9, 2002, and March 17, 2003, reaching what was then an all-time record (nominal) price of $1.73 per gallon. Over roughly the same period (though beginning two weeks later), California retail regular gasoline prices rose 63 cents to an all-time high of $2.15 per gallon. After peaking on March 17, retail gasoline prices fell sharply through early June, with the U.S. average dropping to $1.47 by June 2, and California falling to $1.70 by June 9.

Gasoline price spikes are not unusual in California. Since the mid-1990s, California has experienced gasoline price run-ups that are more frequent and more severe than price spikes in most of the rest of the United States. Demand growth has caught up with the petroleum supply system in California. Refineries, ports, pipelines and distribution terminals are all experiencing constraints. Many times events, such as refinery outages, that in the past had little impact can push the system out of balance long enough to trigger large price increases. Major factors that contribute to higher prices and volatility in California include:

- The California refinery system runs near its capacity limits, which means there is little excess capability in the region to respond to unexpected shortfalls;
- California is isolated and lies a great distance from other supply sources (e.g., 14 days travel by tanker from the Gulf Coast), which prevents a quick resolution to any supply/demand imbalances; and
- The region uses a unique gasoline that is difficult and expensive to make, and as a result, the number of other suppliers who can provide product to the State are limited.

Because short-term supply responses are no longer available to California, when supply-demand imbalances occur, demand adjustments must play a larger role in returning the market to equilibrium. Consequently, prices rise higher than in other regions where quicker supply solutions exist. Gasoline price spikes are not unusual in California.

Another factor sometimes influences California prices – the Arizona and Nevada markets. California refiners also supply markets in Nevada and parts of Arizona, including fast-growing population centers such as Las Vegas and Phoenix. California prices can, therefore, experience extra upward pressure if these markets attract additional product from California.

Following the Spring gasoline price run-up, two other price surges occurred in 2003, one in June and the other in August. Average California retail gasoline prices rose 11 cents in 2 weeks to peak at $1.81 on June 23, and then took 6 weeks to decline to $1.70 by August 4. Prices began to rise strongly again in August, with the U.S. average retail regular gasoline price rising 23 cents from July 28 to August 25, peaking at a new record nominal high of $1.75. California prices climbed 40 cents from August 4 through August 25, but at $2.10 per gallon, fell short of their March record peak. Both U.S. and California average prices began to decline in September, and by mid-October, had fallen by 18 and 30 cents, respectively.

Price spikes occur when supply becomes tight, usually characterized by gasoline inventories falling rapidly and reaching abnormally low levels. Markets typically tighten for reasons such as loss of gasoline production from refinery outages, the spring transition from winter- to summer-specification gasoline, or unusually strong demand periods that can occur in the summer driving season. In addition, the transition to a new fuel specification, such as changing from MTBE to ethanol as described below, can cause upward price pressure.

Switching from MTBE to Ethanol Affected California Supply

Supply constraints arise in the distribution system when MTBE is replaced by ethanol in gasoline. Refiners produce a base unfinished reformulated gasoline mixture to which the ethanol is added. This base material is referred to as reformulated gasoline blendstock for oxygenate blending, or RBOB. In the case of California, the material is called CARBOB,[5] since it meets more stringent emission standards than Federal RBOB. Ethanol is transported and stored separately from other petroleum products because of its affinity for water in the gasoline distribution system, and the ethanol is only blended into CARBOB as the material is loaded onto trucks to be delivered to retail gasoline stations. CARBOB is also a separate product from MTBE-blended RFG. Terminals have a limited number of tanks and are generally unable to accommodate additional gasoline formulations that must be kept segregated. The result is that terminals that switch to ethanol-blended gasoline may no longer be able to supply gas stations that still require MTBE-blended gasoline, reducing supply system flexibility.

The switch from MTBE to ethanol affected California supply in three ways. As has been described in previous reports by the California Energy Commission (CEC) and EIA, the switch to ethanol reduces the volume of gasoline California refiners can produce. The reduction occurs because only about half the volume of ethanol is used to replace the MTBE removed, and because other light components must be removed to meet summer specifications, since ethanol has a higher blending vapor pressure than MTBE. The result is that for 8 months of the year refiners' gasoline production is reduced by over 10 percent, which must be replaced with supply from outside of the State.

This loss of production capability gives rise to the second supply impact of the switch to ethanol, which is California's need to import both more and different blending components for gasoline production. MTBE, which was largely shipped from outside the State, must be replaced with one-half the quantity of ethanol, which similarly comes from outside California. In addition, the other half of the MTBE volume lost, and the light ends removed when ethanol is added, must be replaced with high-quality components that will meet the rigorous California gasoline specifications. More CARBOB could also be imported, but in the past only a very few refiners around the world could produce the California-quality gasoline. The net result is that the switch pushes California, which has been mostly self-sufficient in meeting its gasoline needs, to require greater volumes of high-quality imports. Since supply is limited, this requirement puts upward pressure on California's gasoline prices.

[5] CARBOB stands for California reformulated gasoline blendstock for oxygenate blending.

The third impact of the switch to ethanol was that the switch in early 2003 was only a partial switch, with a still significant fraction of California gasoline being made with MTBE. This had both positive and negative aspects for the California market. On the positive side, it reduced the volume loss from California refiners and the need for imports. On the negative side, it created a market with two types of gasoline that had to be kept separated, which produced complications within the California distribution and logistics system, as discussed in more detail below.

March Price Run-up

Three factors contributed to the price spike in March:

- An increase in crude oil prices in the first quarter;
- The loss in gasoline production from refinery outages; and
- The loss of market balancing capability that resulted from the market splitting into two types of gasolines: MTBE-blended gasoline and ethanol-blended gasoline.

During the first quarter in California, gasoline production was reduced because of refinery outages for major maintenance. Some of these outages lasted longer than planned, and other unplanned outages added to unexpected production losses. EIA analysis found that the outage level was on the high side of historical outages, as was the reduction in first quarter gasoline production. Not surprisingly, in late February and early March, gasoline inventories were declining as demand exceeded production. However, the gasoline inventories did not fall to low enough levels as might be expected to cause the price increase that occurred. EIA looked for other factors contributing to the price rise and focused on the distribution and logistics market complications arising from the split gasoline market.

California has two major geographically separate gasoline markets. The first is the northern California market with five major refineries in the San Francisco Bay area, which also supply product to northern Nevada. Two refineries in Bakersfield satisfy local demand and also move product north by pipeline. In the south, six refineries located in the Los Angeles area provide product to southern California, Las Vegas, and Arizona. When the shift to ethanol occurred, three refineries in northern California still produced MTBE-blended gasoline, and only one in the south continued to use MTBE. The southern refinery using MTBE was smaller than any one of the three northern refineries using MTBE. On the market side, the independent marketers historically looked to the refiners that had not switched to ethanol-blended gasoline for most of their supply. Given the non-fungibility of the two fuels, retailers could not easily switch back and forth between MTBE- and ethanol-blended gasolines. EIA found from discussions with California gasoline producers, distributors, and retailers, and from analyzing price data, that the split market produced a much tighter supply situation than would be expected from only looking at the inventory data. In particular:

- A number of distributors & retailers reported that one refiner was buying CARBOB and blending it with MTBE in order to provide additional MTBE-blended gasoline supply:

- Some distributors that initially bought MTBE-blended gasoline switched to buying ethanol-blended gasoline to obtain supply;
- Finally, the gasoline spot price in the Los Angeles region rose to exceed the San Francisco price by 7 cents per gallon, reflecting the tighter market in the south because of the short supply of MTBE-blended gasoline relative to demand and the proportionally larger outages in that area.

June and August Price Run-ups

In the summer months, two price spikes occurred: one smaller increase in June and a dramatic run-up in August. June through August are generally the highest gasoline demand months on the West Coast. Crude price changed little during these gasoline price increases, and thus, did not add to the June or August gasoline price surges. In both cases there were sharp inventory declines, and sharp gasoline price rises relative to crude oil prices. The inventory declines and price increases in June were mainly due to refinery outages as California entered what is typically one of its highest gasoline demand months.

From August 1 to August 20, California gasoline prices at the wholesale (spot) level rose about 65 cents per gallon, while retail price rose about 40 cents per gallon from August 4 to August 25 to peak at $2.10. In the first three weeks of August, finished gasoline and blending components were removed from storage at a rate in excess of 142 thousand barrels per day, which is 10 times the average draw rate of 14 thousand barrels per day seen at this time during the past 5 years. Refinery inputs were very high in August, but gasoline production was down 22 thousand barrels per day at the refineries that had shifted from using MTBE to ethanol. Gasoline demand in July in August was at its peak at about 1.02 million barrels per day, which was about 80 thousand barrels per day higher than in March and April. On top of this, a segment of the Kinder Morgan pipeline, which supplies Arizona with gasoline from Texas, ruptured on July 30 and was shut down for much of August. This line represented about one-third of supply into Phoenix, and made the Phoenix area almost completely dependent on supply from Los Angeles, increasing gasoline demand on that refining center by about 30 thousand barrels per day. The California refiners simply were not able to keep up with summer peak demand in California as well as the extra demand from Arizona. Imports or receipts from other U.S. regions could not respond quickly enough to keep inventories from falling rapidly and prices spiking.

Lessons Learned and Looking Ahead to 2004

A number of lessons emerged from this analysis:

- Transitions by their nature increase the potential for volatility. Smooth transitions cannot be assured.
- Government coordination among different departments, such as those issuing permits and those directing fuel change programs, can help make transitions go

more smoothly.

- Reducing regulatory uncertainty encourages early preparation by industry, which can reduce some of the last-minute changes that occur during a transition. For example, the potential for a waiver or removal of the oxygen requirement for Federal RFG provided a large incentive for some refiners and terminal operators to wait as long as possible before investing to use ethanol.
- A partial transition does not necessarily cause more price volatility than a full transition. While the partial transition created market problems this year, a full transition might have been more disruptive. A full transition would have shifted the problem from the distribution system to the production and import part of the supply chain. Instead of replacing a shortfall of 70 thousand barrels per day in the partial transition, the industry would have had to replace 105 thousand barrels per day. It did not seem possible for California to require a full transition in 2003, as some refineries had not received permits in time to make the necessary changes. Furthermore, it probably would not have been possible for California to require refineries that had prepared to eliminate MTBE to postpone their plans without other supply re-adjustments and dislocations. The resulting partial transition, while creating logistical complications, did allow the industry to identify and remedy smaller supply problems in advance of the total State MTBE ban in 2004.

As California looks ahead to 2004, further changes will take place. While the logistical system is expected to remain constrained, several factors should ease many of the logistics problems, including the return to mainly one gasoline[6] in 2004, when MTBE-blended gasoline can no longer be sold; the experience suppliers gained during 2003; and more importantly, the fact that the large refinery outages seen this past spring may not reoccur

EPA's recent decision allowing the elimination of the requirement for an oxygenate in summertime Arizona Cleaner Burning Gasoline (CBG) may make it easier for the California refining industry to supply CBG because it reduces the constraints on the refiners' gasoline blending and may facilitate imports from abroad to serve Arizona.

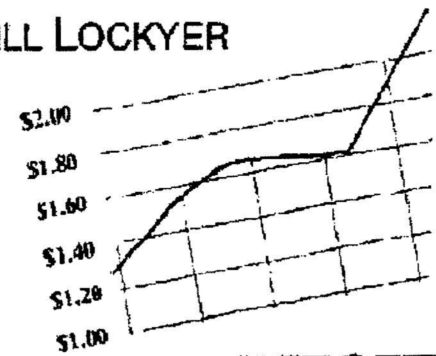
Despite factors functioning to ease the strained system in 2004, other factors are working against smooth supply. These include:

- Total gasoline production capability will be reduced because all refineries will be producing CARBOB.
- More material must be brought in from outside the State, and port constraints, particularly those in southern California, may become more limiting than they were in 2003.
- MTBE bans in New York and Connecticut will create demand for high-quality, summer-grade gasolines, similar to CARBOB, in the second quarter of 2004. This will increase competition for the same type of gasoline and components required by California.

[6] Since not all of California is required to meet Federal RFG standards, some California gasoline can be produced without the use of oxygenates like MTBE or ethanol. A small volume of non-oxygenated RFG was being produced in 2003 and will likely be produced in 2004.

In 2004, factors such as reduced refining capacity and long supply chains will work to increase the probability of price volatility, while other factors will work to reduce market dislocations. Refinery outages, for example, may not be as large in 2004 as occurred in 2003, and with the move to a single fuel, supply-demand imbalances that occur may be resolved more quickly, tempering price surges. Which factors ultimately will dominate cannot be determined in advance.

ATTORNEY GENERAL
BILL LOCKYER



REPORT ON GASOLINE PRICING IN CALIFORNIA

May 2000

Update March 2004

Report on California Gasoline Prices
Attorney General Bill Lockyer
March 2004

During the first three months of this year, California's history of gasoline price spikes has repeated itself – again.

Prices in California reached records levels in the first week of March. The average price of regular gasoline climbed to an all-time high of $2.20 a gallon in Los Angeles, with Bay Area prices close behind at an average of $2.16 a gallon. Nationally, prices also have risen to an average of over $1.70 a gallon, nearing the record of $1.75. Still, $1.70 is more than 30 percent below the price paid by some California drivers.

In November 1999, after gasoline prices in California rose dramatically to peak at $1.62 a gallon, the Attorney General convened a special Task Force on Gasoline Pricing in California. The Task Force issued its report in May 2000. The report focused both on market structure and supply issues. While surrounding circumstances have changed, the market conditions described in the report still exist – most notably tight supplies of refined gasoline and a lack of competition among the companies that produce and sell gasoline These conditions continue to make California susceptible to chronic price spikes.

High gasoline prices drain from the pockets of working families money that could be used for food, clothing and health care. Additionally, they erode the competitiveness of California's industries. A recent analysis of gasoline prices by the Attorney General's Office suggests the following:

- California's gasoline market remains more concentrated and less competitive than the key refining areas east of the Rocky Mountains that supply the rest of the United States. Seven oil companies now control 98 percent of California's refining capacity, and market 90 percent of the gasoline they refine through their own retail networks.

- Short-term supply problems make California especially vulnerable to price spikes. West Coast refiners maintain lower inventory levels relative to consumption than refiners in the rest of the United States and have reduced inventories in recent years.

- The change over from MTBE to ethanol has reduced California's gasoline supply by as much as 10%. Supplies also can decrease as refiners switch from making their winter blend to their summer blend of gasoline.

- The price of crude oil has been trending upward. According to the federal Energy Information Administration, spot-market crude traded at $36.08 barrel on February 27 of this year, compared to $22.37 on March 1, 2002.

- There have been several refinery outages in California, reducing supply and driving up prices.

- Demand for gasoline in California continues to rise. The California Energy Commission projects that by 2013 annual gas consumption will increase by 14 percent, topping 17 billion gallons.

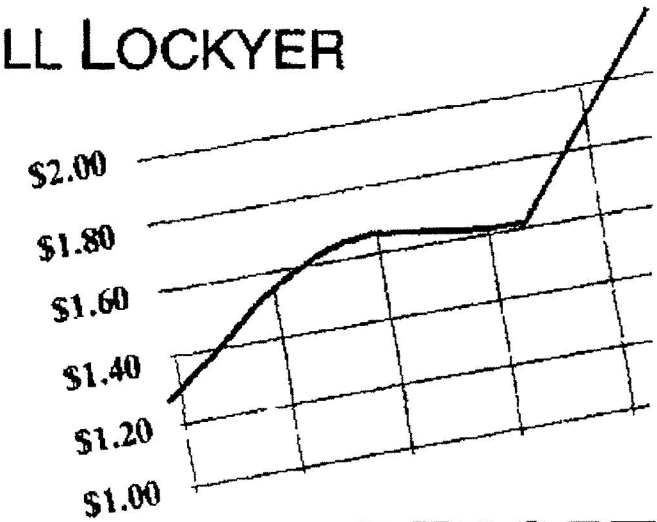
- Oil companies' margins (costs-plus-profit) in California continue to far surpass the national average, especially at the refining stage. And the margins in California jump dramatically in the first three months of the year.

- California faces long-term supply problems as demand for gasoline rises. California has shifted from being a net exporter to a net importer of refined gasoline. Meanwhile, the state's geographic isolation from other refining centers creates challenges for meeting the state's import needs.

The market conditions driving high gasoline prices in California are deeply rooted. It is unrealistic to suggest there is a quick fix. To the extent possible under existing laws, the Attorney General has sought to prevent oil company mergers and unfair business practices from making the marketplace even more concentrated and less competitive. The Attorney General will continue to investigate any unlawful conduct that arises in California's gasoline market.

The Attorney General's reports on gasoline pricing practices also have sought to broaden understanding of the problems facing the state. Without changes in public policy that address market conditions, California will not rid itself of high gasoline prices. Policymakers must begin taking the steps necessary to increase competitiveness, supplies and fuel conservation. They should continue to examine ways to cheaply and expeditiously import refined gasoline into the state, via pipeline or other means, and to reduce California's petroleum dependence through increased fuel economy and non-gasoline based technology.

ATTORNEY GENERAL
BILL LOCKYER



REPORT ON GASOLINE PRICING IN CALIFORNIA

May 2000

Table of Contents

Task Force on California Gasoline Prices: Staff Report

Introduction 1

Overview of California Gasoline Prices 3

Task Force Evaluation of California Gasoline Supply Issues 5

Gasoline Supply Proposals 8

Price Spike Mitigation Proposals 8

State Gasoline Reserve 8

Surcharge on Sale of Non-CARB Gasoline 11

Long-Term Supply Alternatives 13

Pipeline Supply Connection to California 13

Imports 16

Increasing In-State Refining Capacity 19

Conservation Measures 20

Task Force Evaluation of Marketing Issues 23

Gasoline Marketing Proposals 29

Branded Open Supply 29

Zone Pricing Prohibitions 31

Divorcement and Divestiture 33

California Motor Vehicle Fuel Tax: Issues and Proposals 37

Motor Vehicle Fuel Tax 37

Timing of Tax Collection 37

Attorney General's Comments and Recommendations

Attorney General's Comments 39

History and Overview of California Gasoline Prices 41

Factors With an Impact on California Gasoline Prices 45

Proposals to Increase Supply 48

State Gasoline Reserve 48

State Import Purchasing 52

Study of Pipeline Connection to the U.S. Gulf Coast 55

Expansion of In-State Capacity and Independent Refineries 55

Conservation and Alternative Fuels to Mitigate Gasoline Demand 56

Proposals Relating to Market Structure 59

Branded Open Supply 61

Divorcement/ Divestiture 62

Glossary of Terms

Charts

ATTORNEY GENERAL'S COMMENTS & RECOMMENDATIONS

Attorney General's Comments

California's businesses and consumers regularly pay among the highest gasoline prices in the nation. Recent price "spikes" caused by refinery outages sent prices above $2.00 per gallon for self-serve regular gasoline. Regional pricing differences have San Francisco Bay Area motorists paying as much as 20 cents per gallon more than those in Los Angeles, even though the gasoline sold in Los Angeles may well have been refined in the San Francisco Bay area.

These high prices erode the competitiveness of California's industries and reduce the real income of our citizens. The confluence of factors that support high gasoline prices has been a long time in the making, and it is unrealistic to suggest that there is a quick fix to our problem. Even so, it is important to begin taking the steps necessary to increase competitiveness in California gasoline markets, increase gasoline supplies, and further conserve fuel. These initiatives include:

- **Increase Competition and Reduce Prices:** The Attorney General has some power to affect gasoline prices directly. I intend to aggressively use these powers. I have and will review mergers with an eye toward adding new competitors to the California market. I will take all reasonable steps to represent the public interest in disputes affecting gasoline prices. For example, my office recently challenged the legality of a Unocal patent claim to a gasoline formula that could, if enforced, increase prices five cents per gallon. I will act on any genuine opportunity to prevent gasoline prices from climbing higher. While the work of the Task Force is finished, other investigations of California's gasoline market continue.

- **Strategic Gasoline Reserve:** Refiners keep far less gasoline in storage than they did a decade ago. As a result, any refinery outage is now far more likely to cause a substantial price hike. Simply put, the industry's margin for error is smaller than ever. Even a brief disruption of production at a California refinery can spike gasoline prices. To blunt this problem, policy makers should consider a Strategic Gasoline Reserve to be tapped for release to the market when prices begin to spike.

- **Require the State to Purchase Imported Supplies of Fuel for Its Own Use:** State and local governments consume significant amounts of gasoline in police cars, ambulances and other vehicles. By supplying their needs through imports or newly developed supplies in California, government agencies could augment gasoline supplies by two percent or more. This measure could save consumers hundreds of millions of dollars each year.

- **Take Aggressive Steps to Increase Fuel Economy and Use of Alternative Fuels:** There are a number of opportunities to increase fuel economy and to encourage non-gasoline-based technology. Every gallon of gasoline saved by economy or alternative fuel is one that need not be imported or produced in California. These initiatives are an essential part of California's response to supply interruptions, long-term supply needs, and high prices.

- **Free Dealers to Seek the Best Price for Fuels:** Freedom of California retailers and jobbers to seek the lowest priced gasoline is now hampered by a web of restrictive agreements imposed by refiners. These exclusive supply agreements make it impossible for market forces to eliminate regional disparities in gasoline prices. Policy makers should consider banning agreements that frustrate competition.

- **Examine Barriers to Importing Gasoline Via Pipeline:** If we cannot drastically curb demand for gasoline in the near future, California will need new supplies from outside our state. One strategy would extend pipeline access from California to the Gulf Coast and its robust, competitive gasoline market. We should examine the barriers that may exist to pipelines that can bring fuel to California from the rest of the country to facilitate timely use of pipelines to meet our needs.

I believe these initiatives present practical, thoughtful responses to recent gasoline price hikes in California. But they will be criticized by some. The determination to address high gasoline prices and the methods chosen to influence the markets invariably reflect values and philosophy. When markets are not working as they should, government has a role. When those markets affect virtually every business and citizen in our state, it is our obligation to take all reasonable steps to restore healthy and vigorous competition. The measures presented here are designed to do just that while causing minimal impact on the legitimate profit and business interests that participate in our current markets. If these reforms prove insufficient, we may need to go further and review such proposals as mandatory divestment of retail outlets by refiners. The current reforms offer a balanced set of first steps to address longstanding problems in California gasoline markets.

History and Overview of California Gasoline Prices

Introduction

California consumers paid far more for gasoline in recent years than most other consumers in the country. The Attorney General's Preliminary Report on California Gas Pricing issued in November 1999[1] found that in recent years the difference between gasoline prices in California and most of the United States stemmed from (1) a relative lack of competition in the state's gasoline refining and marketing industry, (2) California's unique clean-burning gasoline and distance from potential out-of-state supply sources, and (3) somewhat higher taxes.[2]

California gasoline prices hit then-record highs during the spring and summer of 1999, and "spiked" far above levels in most of the country. Prices in California then averaged 21 cents more per gallon than in the rest of the country. The Preliminary Report found "prices in California are likely to continue to remain significantly higher than in much of the rest of the country, with periodic price spikes like those experienced in 1999." California's refiners were critical of the Preliminary Report, and claimed the dramatic price spikes of 1999 were unique and not predictive of long-term trends.[3]

Gasoline prices across the United States rose sharply this spring. The increases were due in part to higher crude oil prices at the beginning of the year. Crude oil prices have risen the same amount in California as elsewhere. But gasoline prices in California climbed much higher than in the rest of the U.S. to a record high of more than $2.00 per gallon for regular grade in some areas. Prices in California have averaged 21 cents per gallon more than in the rest of the country since March 2000. This spring's unprecedented increase in gasoline prices indicate, contrary to California refiners' views, that the conclusions of the Preliminary Report were sound and that last year's price spikes were far from unique.

The California Gasoline Industry and Prices: 1980s to Present

Gasoline prices in California have not always been higher than in the rest of the country. Chart 13 shows the difference between California retail prices for regular grade gasoline and the average price in the rest of the country each year from 1983 to 2000.[4] Before the mid-1990s, California prices were typically within a few cents per gallon of the national average and, in many years, were actually lower.

After 1996, California statewide gasoline prices began to rise relative to the rest of the

---

[1] Preliminary Report to the Attorney General Regarding California Gasoline Prices. November 22, 1999.

[2] California taxes are approximately five cents per gallon higher than the average gasoline tax in the rest of the U.S. However, even after adjusting for differences in state tax rates, California gasoline prices have been among the nation's highest in recent years.

[3] "The Attorney General's Preliminary Report on Gasoline Prices: The Rest of the Story," WSPA, January 12, 2000.

[4] These figures are adjusted for tax differences between California and the rest of the U.S. Gasoline prices in the U.S. were subject to federal regulation during much of the 1970s. Prices have been completely decontrolled since 1981.

U.S. The increase coincided with two events. First, CARB gasoline was introduced in the spring of 1996, and California experienced the first of a series of price spikes. Except for that first spike, California gasoline prices during 1996 were actually lower than elsewhere.

But it wasn't just the introduction of CARB that affected California prices. The second event was a dramatic change in the competitive structure of the gasoline industry. In the mid-nineties, several independent refiners ceased operation in California. In 1997, on the heels of those closures, Texaco and Shell merged refining and marketing assets to form Equilon; Tosco bought Unocal's refining and marketing assets; and ARCO purchased[5] Thrifty Oil with 260 retail stations, then one of California's largest independent marketer of gasoline. These mergers and acquisitions dramatically increased the level of concentration and vertical integration in the California gasoline industry.[6]

Chart 14 shows how the structure of California's gasoline industry has changed since 1980 when, of 35 refiners operating in California, the largest six controlled 68 percent of California production. While some smaller refiners ceased operating during the 1980s, the level of concentration of supply changed only slightly. By 1990, only 25 refiners operated in the state, but the largest six still accounted for 68 percent of capacity. By 1998, however, the number of refiners in the state dropped to 16 and, as a result of the 1994 mergers and purchases, six companies controlled 86 percent of capacity.[7]

The degree of integration in the gasoline industry has also increased in recent years. California's refiners own the majority of retail gasoline stations and either lease them to the station dealers who must buy supplies directly from the refiners or the refiners operate the stations. There are relatively few independent marketers of gasoline in California. Although exact figures are difficult to obtain because the data is proprietary, representatives on the Task Force from the Western States Petroleum Association stated that generally California refiners own or operate approximately 85 percent of the state's retail stations. Eighty five percent vertical integration is much greater than in most of the U.S. Independent marketers account for a relatively small portion of gasoline sales in California.[8] The affect of the changing competitive structure of the California gasoline industry on relatively high prices is discussed in a later section of this report.

Chart 2 shows the difference between monthly average retail prices between California and those in the rest of the U.S. from 1996, when CARB gasoline was introduced, and 2000. During the first three years CARB was used (1996-1998), California prices averaged approximately six cents per gallon higher than in the rest of the U.S. (the

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[5] This purchase was structured through a long-term lease.

[6] The merger of Exxon and Mobil would have increased the level of concentration in California's gasoline industry even further, but after negotiations with this office and the Federal Trade Commission, the parties agreed to divest Exxon's refining and marketing assets to Valero, a competitor new to California. Likewise, the merger between BP and ARCO will not change the structure of the California gasoline industry since BP did not own any refining or marketing assets in California prior to the merger.

[7] These companies control more than 90 percent of the capacity for producing CARB gasoline.

[8] Independent marketers of gasoline account for less than an estimated 10 percent of gasoline sales in California. This is in sharp contrast with many other large states. For example, independent marketers account for more than 50 percent of retail gasoline outlets in Texas.

difference in the wholesale price between CARB and conventional gasoline produced in California has averaged approximately four cents per gallon). The difference between prices in California and the rest of the U.S. more than doubled in 1999 to an average of 16 cents per gallon. California prices were more than 20 cents per gallon higher than the rest of the country during the spring and summer of last year and, at one point during May, the difference was nearly 40 cents. The series of price spikes in the spring and summer resulted in California consumers paying an additional $1.3 billion for gasoline in 1999.[9]

The difference between California and the rest of the nation narrowed toward the end of 1999 but widened dramatically again this spring. Since March, the average price of a gallon of regular grade gasoline has been 21 cents more than prices in the rest of the U.S

Regional Price Differences

The comparison of average statewide gasoline prices with the rest of the U.S. somewhat masks the large price differences among areas within the state. While prices in California have increased above prices elsewhere, the impact of those increases has been uneven. Prices have risen by a greater degree in San Diego and northern California than in the greater Los Angeles area.[10]

Chart 12 shows the relationship among prices in San Francisco, San Diego, Los Angeles and the U.S. city average price between 1985 and 2000. Prices in all three cities were near the average U.S. price and within a few cents of each other prior to 1990. Since 1999 there is a significantly growing differential. By 1999, prices in San Francisco were more than 20 cents per gallon higher than Los Angeles and 15 cents per gallon higher than San Diego. The price differential between San Diego and Los Angeles narrowed in 1999, coincident with Equilon's divestiture of 29 former Shell and Texaco stations to an independent marketer.[11]

Since the beginning of 1999, gasoline prices in San Francisco have been higher than any major city in the nation, surpassing even Honolulu.[12] San Francisco prices, just eight cents per gallon higher than U.S. city average prices in 1990, rose to 35 cents per gallon higher in 1999. Since March 2000, San Francisco prices have been 25 cents higher than the U.S. city average price.

The differences between retail prices in San Francisco and Los Angeles are commensurate with the prices charged to retail dealers by the refiners whose brands they

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[9] During the first eight months of 1999, California consumed 9.4 billion gallons of gasoline. On average, the spread between California and the rest of the U.S. was 13.6 cents per gallon greater than it was in 1998. Had the spread between California and the rest of the U.S. remained equal to 1998 levels through August (6.7 cents per gallon), Californians would have paid 13.6 cents per gallon less on average, a total of $1.3 billion.

[10] Los Angeles, Orange, Riverside and San Bernardino counties. Together these counties account for approximately 45 percent of the gasoline consumed in the state.

[11] As a condition of the merger between Shell and Texaco's downstream assets, the 16 former Shell and 13 former Texaco brand stations were sold to New West Petroleum pursuant to an agreement with this office and the Federal Trade Commission. (*Oil Daily*, July 28, 1998.)

[12] During most of the 1990s, Honolulu had been the highest price major city in the U.S.

sell. Chart 10 shows differences in the average prices charged by refiners and by retail operations in San Francisco and Los Angeles.

The Preliminary Report concluded that California consumers are likely to face significantly higher prices in the future than those in the rest of the country, with periodic price spikes due to the structure of California's gasoline industry, the state's unique gasoline formulation, and the growing imbalance between local supply and demand. Several members of the Task Force echoed these predictions, noting that California's current environment leaves the state vulnerable to large future price spikes.

Factors With an Impact on California Gasoline Prices

Several factors contribute to California's higher gasoline prices and differences in prices among areas within the state. These factors can best be explained as falling within two categories: supply and market structure.

Supply of CARB Gasoline

A key factor in rising prices and price spikes in California is the supply of CARB gasoline. Supply of gasoline from California refiners has become increasingly limited in recent years. The demand for gasoline has grown in California and in neighboring states supplied by California refiners. As a result, California refiners have little surplus capacity to cover periods of refinery outages.

The supply situation is exacerbated by the fact that California refiners have reduced gasoline inventories in recent years. Levels have fallen by approximately 20 percent since the early 1990s. Inventory levels are maintained at or near minimum operating levels. As a result, California refiners have little surplus inventory to service supply disruptions, such as interruptions in refinery operations.

Finally, not only is California geographically isolated from refining centers, it also requires a specially formulated cleaner-burning gasoline (CARB). While refiners outside the state have some ability to manufacture CARB, they typically do so only when CARB is ordered, not on a day-to-day basis. This generally occurs only after prices have risen substantially in California. As a result, imports of CARB gasoline from outside the state are slow to arrive during in-state supply interruptions.

Outages and resultant interruptions of production occasionally occur in every major refining center. California, however, is not well situated to cover the resulting loss of market supply. Taken together, the factors discussed above contribute to higher prices in California and can result in dramatic price spikes when in-state refiners experience operational difficulties.

The imbalance between in-state supply and demand for CARB gasoline is likely to grow. It is extremely unlikely that a new refinery will be built in California today. Any addition to California refining capacity will likely have to come from expansion of existing facilities. The phase-out of MTBE in California will also reduce gasoline supplies. MTBE currently comprises approximately 11 percent of California's gasoline supply. Potential substitutes such as ethanol would replace some, but not all, of the MTBE volume loss.[13] Meanwhile, the demand for CARB gasoline should continue to grow.

Market Structure and Competitive Issues

A second factor contributing to higher prices in California is the market structure of the gasoline industry. California's gasoline industry is more consolidated and integrated than

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[13] *Oxy Fuel News*, September 6, 1999

in the rest of the U.S. Just six refiners control more than 90 percent of refining capacity in California. Two of these, Chevron and Tosco-76, control nearly half. In contrast, the largest six refiners control less than 60 percent of the refining capacity in Texas, and less than 50 percent of the capacity in states east of the Rocky Mountains.

The degree of vertical integration in California is also greater than in the rest of the nation. The six major refiners in California largely control the distribution channels for gasoline. In addition to refining, they control a majority of the terminal facilities and 85 percent of the retail locations in the state.

There are few independent marketers of gasoline in California. Independent marketers account for an estimated 10 percent of retail gasoline sales. The acquisition of Thrifty Oil by ARCO eliminated one of the state's largest independent marketer.[14] Independent marketers have a much larger presence in the rest of the U.S. than they do in California. Independents such as Racetrac Petroleum, Teco Stores and Sheetz play an important competitive role outside California. These marketers use their considerable buying power to obtain the lowest-cost supply. They are also large enough to import gasoline from other areas if the need arises and are typically more aggressive in pricing lower at the pump than major brand refiners.

Independent marketers have a greater incentive than refiners to import gasoline from out of state during local supply disruptions. Thrifty Oil was a regular importer of gasoline, increasing the state's supply and providing a competitive check on refiners. The independent marketers that remain in California are not large enough to import gasoline. Accordingly, they cannot provide the competitive influence that Thrifty once did, or that independents do in other parts of the U.S.

Independent marketers in California have little influence in metropolitan areas because their ability to distribute to those areas is restricted by the major brand refiners. Refiners typically have contracts with independent marketers that resell branded gasoline to prohibit the marketers from selling that brand in an area that competes with the refiner. Retail dealers (and, in turn, consumers) must purchase their gasoline directly from refiners. Even open dealers (those who own their own stations) typically can only sell branded gasoline they buy directly from a refiner. As a result of these contractual arrangements, independent marketers can bring their buying power to bear in California's major metropolitan areas only by marketing through non-branded gasoline outlets.

Finally, potential importers of gasoline into California face hurdles associated with access to terminal space. There are relatively few independent terminals in California capable of receiving gasoline from a marine tanker and distributing it into the pipeline system. The largest independent terminal in California is GATX in the Los Angeles area. Equilon, the Joint Venture of Shell and Texaco, recently purchased the GATX terminal. The Federal Trade Commission (FTC) and this office are currently reviewing this proposed transaction to determine if it will have an adverse impact on competition.

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[14] Thrifty Oil was a regular importer of gasoline into California, effectively increasing supply to the state. Thrifty imported gasoline into California even after the CARB regulations went into effect in 1996.

Taxes

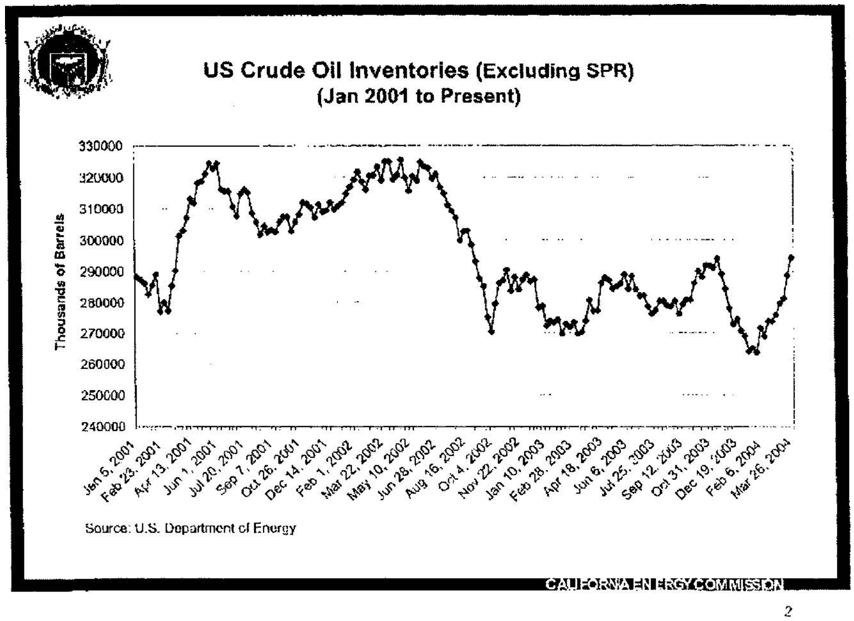
California's gasoline taxes add approximately five cents more per gallon to the price of gasoline than average taxes in the rest of the U.S. Some have suggested eliminating some or all of the tax on gasoline in order to provide relief to consumers during price spikes. Eliminating or reducing taxes will not produce the intended effect of lowering consumer prices in the short run or during price spikes. Reduced gasoline sales tax during a period of price increases due to supply limitations will do little for consumers. Rather, such a tax cut would result in higher margins for the state's refiners and marketers because prices are ultimately set by the interaction of supply and demand. Given California's level of demand, the only thing that will reduce general price levels is an increase in the quantity of gasoline available in the market. A tax cut will do little to increase supply that is constrained by refinery outages and low inventories.

Recent California Gasoline Prices

California Energy Commission
Actions and Recommendations

Assembly Committee on Transportation
Sacramento, California
April 1, 2004

James D. Boyd
Commissioner
California Energy Commission


US Crude Oil Inventories (Excluding SPR)
(Jan 2001 to Present)
Thousands of Barrels
330000
320000
310000
300000
290000
280000
270000
260000
250000
240000
Jan 5, 2001
Feb 23, 2001
Apr 13, 2001
Jun 1, 2001
Jul 20, 2001
Sep 7, 2001
Oct 26, 2001
Dec 14, 2001
Feb 1, 2002
Mar 22, 2002
May 10, 2002
Jun 28, 2002
Aug 16, 2002
Oct 4, 2002
Nov 22, 2002
Jan 10, 2003
Feb 28, 2003
Apr 18, 2003
Jun 6, 2003
Jul 25, 2003
Sep 12, 2003
Oct 31, 2003
Dec 19, 2003
Feb 6, 2004
Mar 26, 2004
Source: U.S. Department of Energy
CALIFORNIA ENERGY COMMISSION
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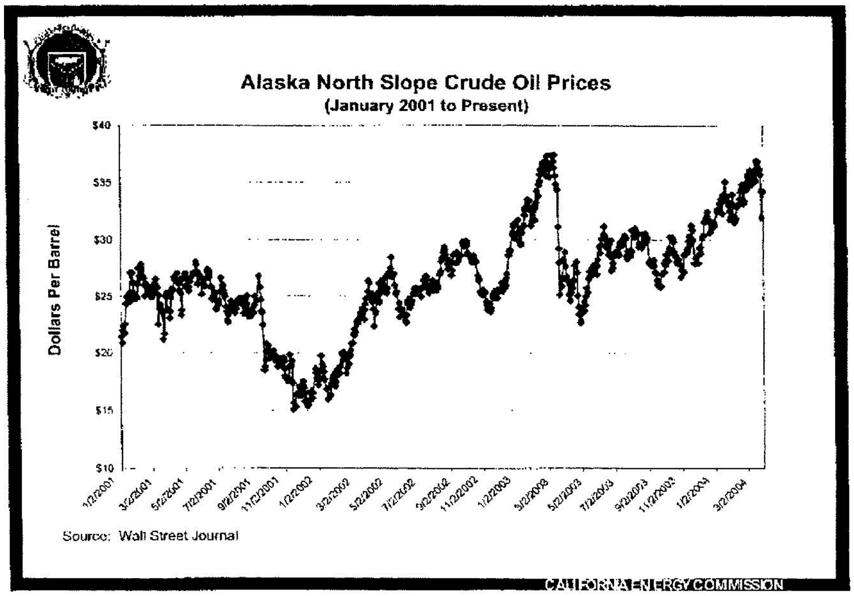
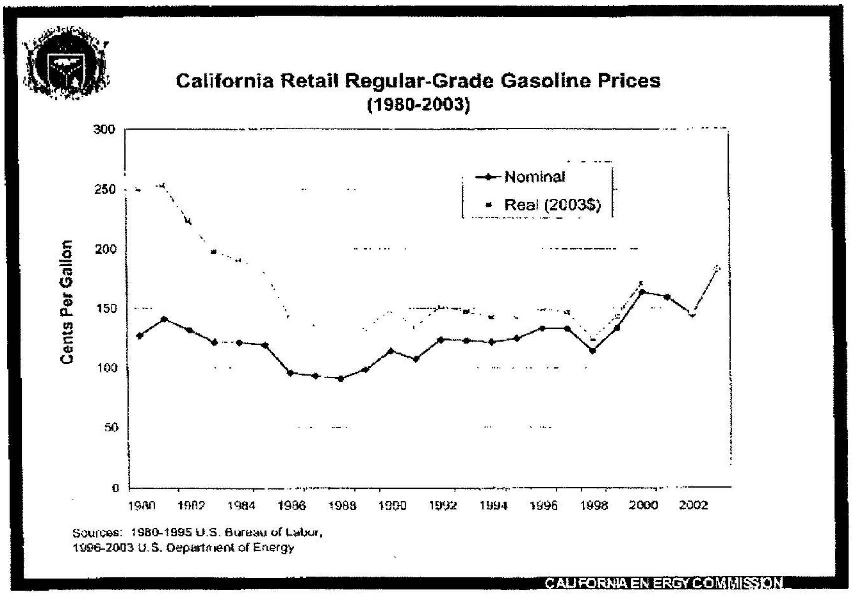

Alaska North Slope Crude Oil Prices
(January 2001 to Present)
Dollars Per Barrel
$40
$35
$30
$25
$20
$15
$10
Source: Wall Street Journal
CALIFORNIA ENERGY COMMISSION

3


California Retail Regular-Grade Gasoline Prices
(1980-2003)
Nominal
Real (2003$)
Cents Per Gallon
300
250
200
150
100
50
0
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
Sources: 1980-1995 U.S. Bureau of Labor,
1996-2003 U.S. Department of Energy
CALIFORNIA ENERGY COMMISSION

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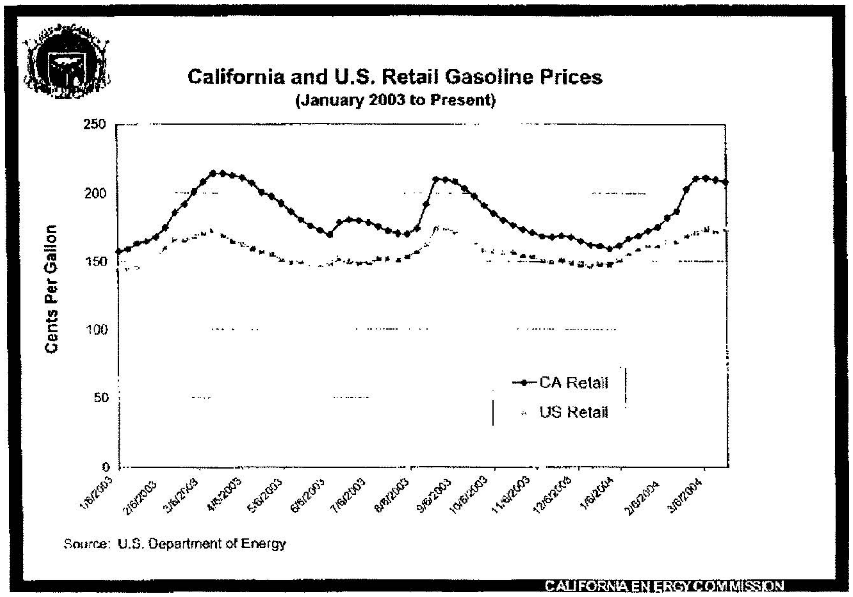
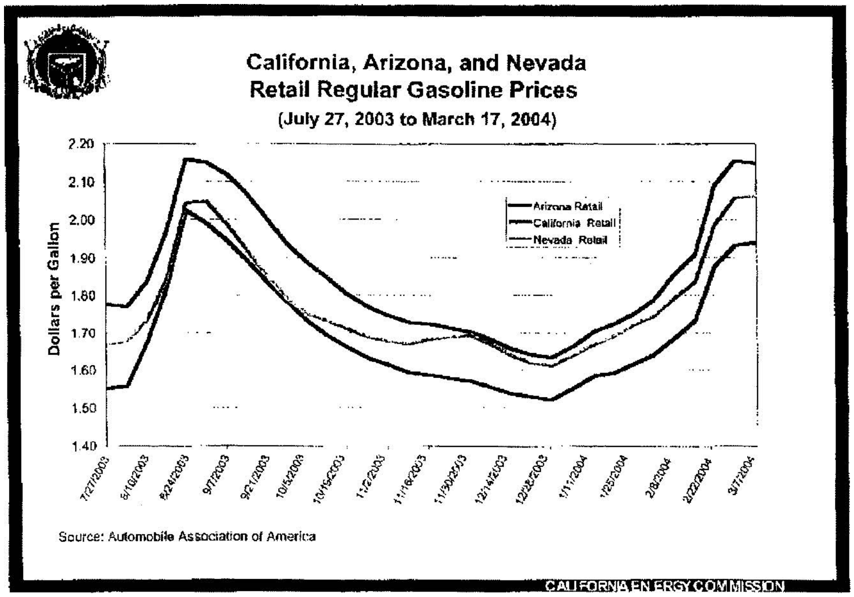
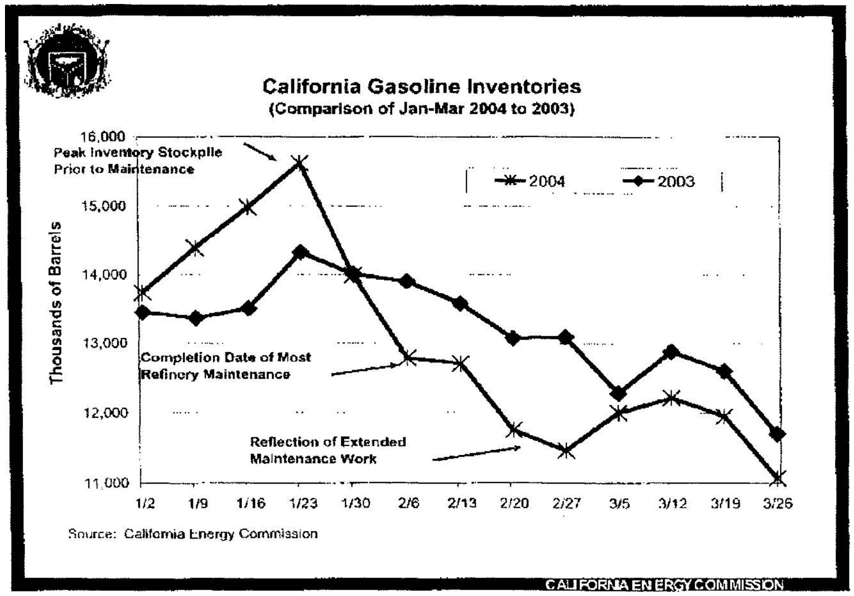
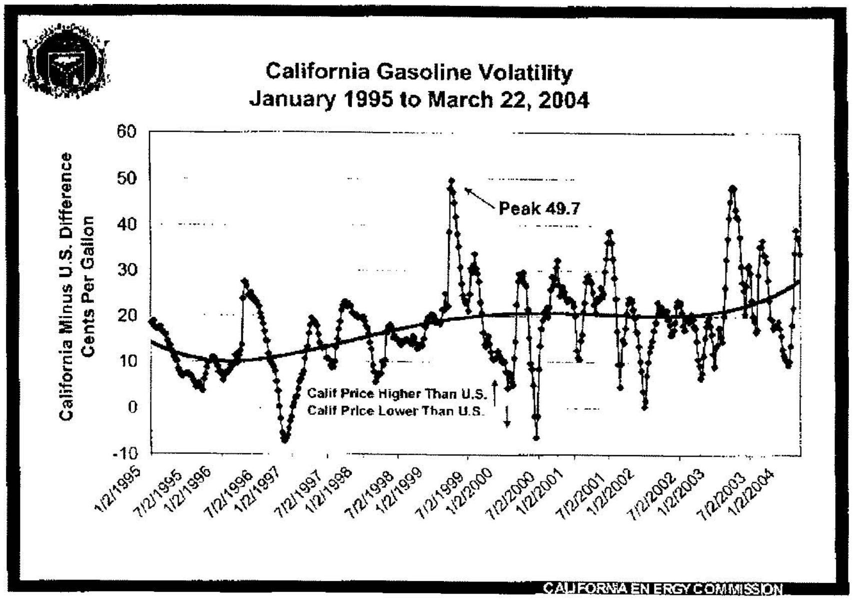

California and U.S. Retail Gasoline Prices
(January 2003 to Present)
Cents Per Gallon
250
200
150
100
50
0
CA Retail
US Retail
Source: U.S. Department of Energy
CALIFORNIA ENERGY COMMISSION


California, Arizona, and Nevada
Retail Regular Gasoline Prices
(July 27, 2003 to March 17, 2004)
Dollars per Gallon
2.20
2.10
2.00
1.90
1.80
1.70
1.60
1.50
1.40
Arizona Retail
California Retail
Nevada Retail
7/27/2003
8/10/2003
8/24/2003
9/7/2003
9/21/2003
10/5/2003
10/19/2003
11/2/2003
11/16/2003
11/30/2003
12/14/2003
12/28/2003
1/11/2004
1/25/2004
2/8/2004
2/22/2004
3/7/2004
Source: Automobile Association of America
CALIFORNIA ENERGY COMMISSION


California Gasoline Inventories
(Comparison of Jan-Mar 2004 to 2003)
Peak Inventory Stockpile Prior to Maintenance
2004
2003
16,000
15,000
14,000
13,000
12,000
11,000
Thousands of Barrels
Completion Date of Most Refinery Maintenance
Reflection of Extended Maintenance Work
1/2
1/9
1/16
1/23
1/30
2/6
2/13
2/20
2/27
3/5
3/12
3/19
3/26
Source: California Energy Commission
CALIFORNIA ENERGY COMMISSION

7


California Gasoline Volatility
January 1995 to March 22, 2004
California Minus U.S. Difference
Cents Per Gallon
60
50
40
30
20
10
0
-10
Peak 49.7
Calif Price Higher Than U.S.
Calif Price Lower Than U.S.
1/2/1995
7/2/1995
1/2/1996
7/2/1996
1/2/1997
7/2/1997
1/2/1998
7/2/1998
1/2/1999
7/2/1999
1/2/2000
7/2/2000
1/2/2001
7/2/2001
1/2/2002
7/2/2002
1/2/2003
7/2/2003
1/2/2004
CALIFORNIA ENERGY COMMISSION

Recent Commission Reports on Transportation Fuels Issues

Feasibility of a Strategic Fuel Reserve in California, Commission AB 2076 report, July 2003

- Concludes a Strategic Reserve would not work
- Recommends a comprehensive evaluation of California's petroleum infrastructure
- Recommends exploring ways to streamline permitting for petroleum infrastructure

Recent Commission Reports on Transportation Fuels Issues (cont)

Gulf Coast to California Petroleum Pipeline Feasibility Study, August 2003

- Does not appear to be an adequate supply of California quality blendstocks to justify construction of a new pipeline
- Concludes that construction and operation of a petroleum product pipeline is not a viable option

Recent Commission Reports on Transportation Fuels Issues (cont)

Reducing California's Petroleum Dependence, AB 2076 Report, August 2003

- Joint study by CEC and CARB
- Options and goals to reduce on-road gasoline and diesel demand
- Conducted a comprehensive evaluation of fuel efficiency and fuel substitution options
- Recommend statewide goals and strategies to reducing gasoline and diesel consumption

CALIFORNIA ENERGY COMMISSION

11

Recent Commission Reports on Transportation Fuels Issues (cont)

Forecasts of California Transportation Energy Demand, 2003-2023, Staff Report, August 2003

- Forecasts annual growth of 1.8 percent for vehicles miles traveled--higher than 1.4 percent population growth
- Forecasts annual on-road demand growth of 1.6 percent for gasoline and 2.4 percent for diesel

CALIFORNIA ENERGY COMMISSION

Recent Commission Reports on Transportation Fuels Issues (cont)

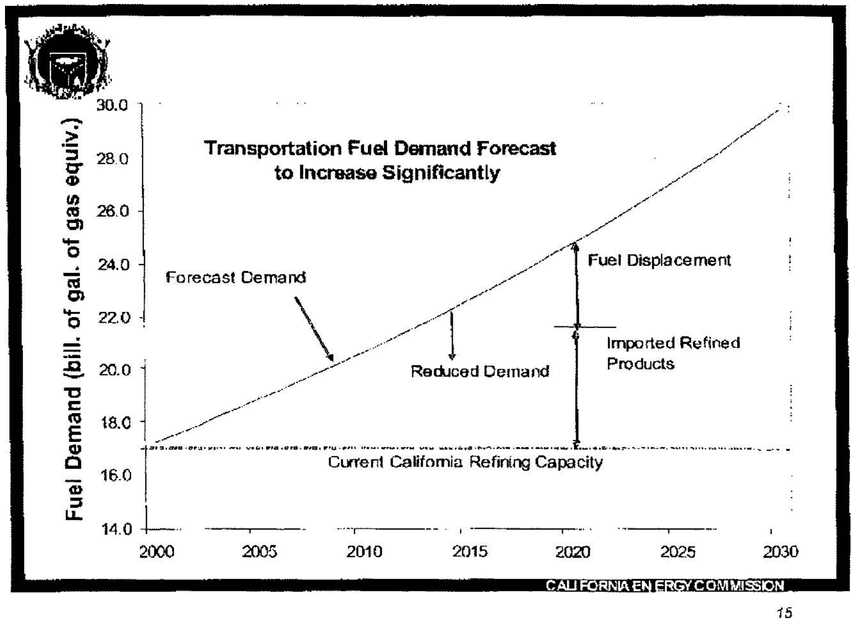
Transportation Fuels, Technologies and Infrastructure Assessment, November 2003

- Conducts an in-depth analysis of issues related to providing adequate, secure and cost-effective transportation fuels

Recent Commission Reports on Transportation Fuels Issues (cont)

Integrated Energy Policy Report, November 2003

- Incorporates conclusions and recommendations of previous studies
- Recommends state actions for transportation, electricity, and natural gas energy markets
- Concludes future supply/demand imbalance in transportation fuels


Transportation Fuel Demand Forecast
to Increase Significantly
Fuel Demand (bill. of gal. of gas equiv.)
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
2000
2005
2010
2015
2020
2025
2030
Forecast Demand
Reduced Demand
Fuel Displacement
Imported Refined Products
Current California Refining Capacity
CALIFORNIA ENERGY COMMISSION
15

2003 Integrated Energy Policy Report

- "*The demand for transportation fuels in California is increasing at an alarming rate, surpassing in-state refining capacity. California's refiners rely increasingly on imported petroleum products to meet demand, and these imports enter through ocean ports facilities that are reaching maximum capacity. The industry must expand its import and storage facilities, otherwise supply constraints and price volatility will continue.*"

CALIFORNIA ENERGY COMMISSION

16

2003 Integrated Energy Policy Report (Cont'd)

- *"The inability of the petroleum industry to meet today's needs without substantial price volatility causes concern about its ability to meet the growing demand for gasoline and diesel in the future. Without assurances from the industry how they will meet growing demand, the state must take aggressive steps to safeguard consumers and the California economy against more severe supply disruptions and price volatility."*

2003 Integrated Energy Policy Report (Cont'd)

- *"The inability of the petroleum industry to meet today's needs without substantial price volatility causes concern about its ability to meet the growing demand for gasoline and diesel in the future. Without assurances from the industry how they will meet growing demand, the state must take aggressive steps to safeguard consumers and the California economy against more severe supply disruptions and price volatility."*

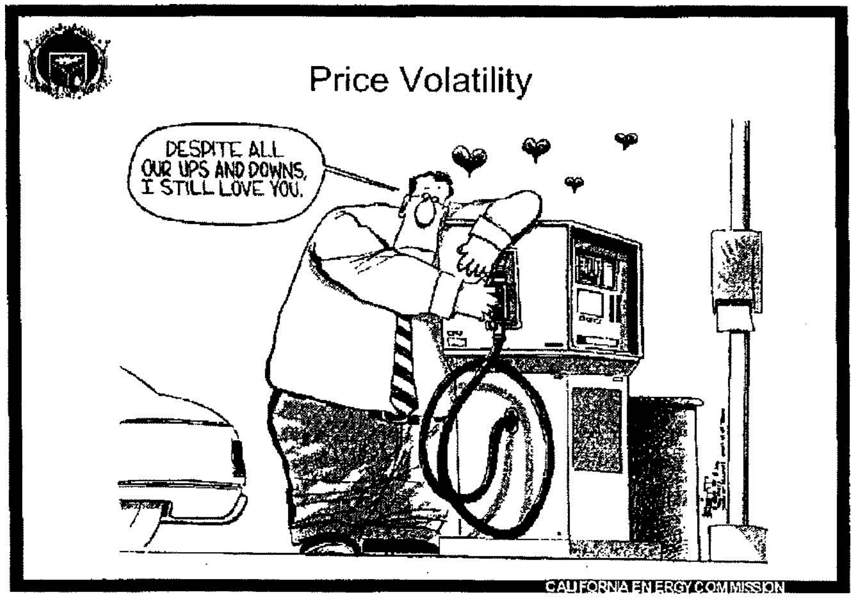
Recommendations of *Strategy to Reduce Petroleum Dependence* (2003) and *Integrated Energy Policy Report* (2003)

- Reduce petroleum consumption to 15 percent below 2003 levels by 2020
- Increase alternative fuel use to 20 percent by 2020
- Double fuel efficiency
  - Increase CAFE standards
  - Increase penetration of hybrid fuel vehicles
  - Adopt tire efficiency standards

CALIFORNIA ENERGY COMMISSION

Current Actions

- Continuing to pursue U.S. Environmental Protection Agency oxygenate waiver
- Working with industry to improve collection of petroleum data
- Undertaking a comprehensive petroleum infrastructure evaluation
- Exploring with stakeholders ways to streamline permitting for petroleum infrastructure
- Conducting a stakeholder-driven process to develop action plans for alternative fuels


Price Volatility
DESPITE ALL OUR UPS AND DOWNS, I STILL LOVE YOU.
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21

GASOLINE PRICES IN CALIFORNIA AND SURROUNDING STATES

RETAIL PRICES

State	Average Retail*	Net State Taxes**	Avg. Retail Price Less Taxes	Differences in Fuel Price vs. CA (less taxes)
CA	$2.22	$0.35	$1.87	--
AZ	$2.04	$0.19	$1.85	-$0.02
NV	$2.17	$0.33	$1.84	-$0.03
OR	$2.13	$0.24	$1.89	$0.02
WA	$2.11	$0.28	$1.83	-$0.04

* Retail prices from AAA as of 5/7/04

** State taxes from American Petroleum Institute as of 4/1/03

RACK PRICES

State	Average Price*	Differences in Fuel Price vs. CA
CA	$1.65	–
AZ	$1.77	$0.12
NV	$1.61	-$0.04
OR	$1.67	$0.02

* Rack prices from Oil Price Information Service (OPIS) as of 5/6/04

DIESEL PRICES IN CALIFORNIA AND SURROUNDING STATES

RETAIL PRICES

State	Average Retail*	Net State Taxes**	Avg. Retail Price Less Taxes	Differences in Fuel Price vs. CA (less taxes)
CA	$2.43	$0.37	$2.06	--
AZ	$2.13	$0.28	$1.85	-$0.21
NV	$2.22	$0.28	$1.94	-$0.12
OR	$2.13	$0.24	$1.89	-$0.17
WA	$2.17	$0.28	$1.89	-$0.17

* Retail prices from AAA as of 5/7/04

** State taxes from American Petroleum Institute as of 4/1/03

RACK PRICES

State	Average Price*	Differences in Fuel Price vs. CA
CA	$1.71	–
AZ	$1.64	-$0.07
NV	$1.71	$0.00
OR	$1.58	-$0.13

* Rack prices from Oil Price Information Service (OPIS) as of 5/6/04

ARIZONA CLEAN FUELS,
Phoenix, AZ, May 11, 2004.

Senator JAMES M. INHOFE,
U.S. Senate,
Chairman Committee on Environment & Public Works,
Washington, DC.

DEAR SIR: After learning of the committee's upcoming hearing on refining issues, I have prepared the attached brief Situation Analysis to address the issue of why a new oil refinery has not been built in the United States in over 20 years. I have been involved in the oil refining industry for over thirty years. In the late 1990's I was CEO of Orion Refining Corporation who spent over $1 billion to refurbish and upgrade a refinery near New Orleans that had been idled since the early 1980's. This was the closest thing to a new refinery project during the 1990's. I am currently the CEO of Arizona Clean Fuels, a company that has been developing a new oil refinery project for Arizona for over 10 years. This project is nearing the completion of the initial permitting stage and is a unique example of the key issues that must be addressed to build a new refinery in this country. I hope the attached paper helps the committee to understand the magnitude of a project such as this and the long lead times that add uncertainty to the overall business decisions involved.

Yours truly,

R.G. MCGINNIS,
CEO, Arizona Clean Fuels, LLC.

SITUATION ANALYSIS

NEW UNITED STATES REFINERY PROJECT DEVELOPMENT CONSIDERATIONS AND ISSUES

The objective of this paper is to briefly highlight the key considerations and issues involved in the corporate, government and public decisions that must be made prior to the implementation of a new oil refinery project in the United States.

The refining industry has successfully gone through a major effort over the past decade to respond to changes in product fuel quality mandated by Clean Fuels requirements. During this time, the industry has met the growing domestic demand for petroleum products by limited capacity expansions of existing refineries, and by imports. No new refineries have been built in the United States in over 20 years and product imports have reached over 2 million barrels per day. Economic growth in other countries has reduced the availability of products to U.S. consumers and increased competition for imports. Recent petroleum product prices have reached and sustained record highs, driven by a growing shortfall in supply. There are a number of reasons that this shortfall is a major concern for the United States, most of which have been documented in abundance recently in the press. It is perhaps sufficient to state that shortfalls create economic hardship and slow the economy. It is also a strategic issue for the United States to grow imports and increase the threat of shortages and embargos.

One of the major solutions to this growing shortfall is to provide additional domestic refining capacity.

The problems and impediments preventing the growth and investment for new refining capacity in the United States are significant. Despite this, a new refinery project, the Arizona Clean Fuels (ACF) project, has been proposed and will be completing engineering design consistent with the final Air Permit expected to be issued later this year. This project will be used below to highlight specific costs and permitting requirements.

NEW REFINERY CONSTRUCTION CONSIDERATIONS

There are four general areas of consideration that drive the feasibility and timing of new refining projects:

1. Overall Project economics driven by product values, feedstock costs, and operating costs,
2. Technology choices driven by crude slate, target product mix, legislated and target product quality requirements (and projected changes)—a lengthy process of project development, engineering and construction,
3. Public Acceptance—significant reluctance in most areas of the United States to allow a new refinery "in my back yard". Public communication and hearings processes are lengthy and often confrontational,

4. Permitting processes for environmental permits, access permits, construction permits and zoning, etc.—driven by Federal, state, and local legislation and zoning.

REFINING ECONOMICS

Historical refining margins in the United States have, on average and in general, not been adequate to support new refinery construction. Returns on Capital Employed have been in the 5 percent to 7 percent range. Capacity expansions and modifications have been economic due to leverage on base infrastructure and facility investments.

Refinery sales transactions over the past 10 years have, on average, been at about 25 percent of the cost of new-build facilities. Condition of the plants, local markets, and a company's perspective on future cash-flows drive the valuation process. These facilities often require significant additional investment to ensure reliable operation and compliance with regulatory requirements.

Refineries are by their nature very costly facilities. The proposed ACF refinery which will produce about 150,000 barrels per day of gasoline, diesel, and jet fuel products, will cost over $2 billion with an additional $500 million required for crude oil and product pipelines. Rapidly growing demand for petroleum products in the southwestern United States makes this project economic.

TECHNOLOGY CHOICES

The refining industry is not traditionally viewed as "high tech". However, the need for high quality products and significant flexibility to process wide ranges of crude oils, and the need to implement state-of-the-art environmental controls, has led to the development of very sophisticated processes. There are several process licensors and choices for each type of facility that a refiner needs. Also, due to the high cost of each process facility, extensive studies and comparisons are required to match a refiner's products and processing objectives.

One area where the industry has led in major technology developments is in the "Best Available Control Technology" for emissions as defined in and required by the Clean Air Act. Every refinery modification and new process unit has required the development and application of specific control technology.

The development of the Arizona Clean Fuels project included an extensive analysis of emission sources and inclusion of the Best Available Control Technology. This will be the first refinery where all sources will be addressed at the same time in this manner.

PUBLIC ACCEPTANCE

A major hurdle to the construction of a new oil refinery is to overcome the historic public perceptions of oil refineries and to obtain public acceptance. Generally, the public has a "not in my back yard" attitude to oil refineries. Certainly, refineries of the past have, to some extent, earned this reaction from the public. Modern facilities have overcome the shortcomings of these previous refineries. The refining industry has developed and implemented emissions controls, operating practices, and outreach programs to address the concerns of both government agencies and the public. Certainly these programs and projects have increased costs, but have been viewed by the industry as necessary.

Refineries have significant benefit to the public by generation of both direct and indirect jobs and economic activity. Local communities can benefit significantly from the operation of a refinery.

Anew refinery, such as the Arizona Clean Fuels project, with the control and monitoring required by current regulations will have minimal impact on the surrounding environment. The proposed locations in Yuma County, Arizona, are remote from population concentrations. The project has gained support from local politicians and business leaders.

PERMITTING PROCESSES

Certainly the most-often noted issue in new refinery construction is that of the extensive permitting that is required. Generally, permits are required from multiple agencies at the Federal, state and local levels. Also permits are required not only for the refinery but also for pipeline and utility services to and from the site. The permitting processes are lengthy and costly. Project developers are also not in control of the pace and timing of permit review and issue and this uncertainty can lead to project delays and cost escalation.

The most extensive and important permit is often the "Air Permit" that is usually issued by the relevant state agency and outlines all requirements for compliance to the Clean Air Act and New Source Performance Standards with emission levels, reporting and Best Available Control Technology requirements. The extensive scope of this permit requires detailed air modeling, technical review of all facilities, and agreement on the Best Available Control Technology. For example, the Arizona Clean Fuels permit application was submitted to the Arizona Department of Environmental Quality on December 22, 1999, and a Draft Permit issued on October 10, 2003—a time period of almost 4 years. In response to the declaration of large portions of Maricopa County as a "NonAttainment Zone" for Federal Ozone standards in the summer of 2003, the proposed refinery was moved to a site in Yuma County and a revision to this Draft Permit is still pending. Following its issue, reviews, public hearings, and final permit drafting will take many months.

Fortunately, some other Federal and state agencies review and comment on the permit and project coincident with the preparation of the Air Permit. For example the EPA, the U.S. Forest Service and the National Park Service will be consulted by ADEQ. However, all of these agencies have seen increased demands on their time and reviews don't always meet the expected timeframes thereby extending the permitting schedule. In the western United States, for example, EPA Region IX encompasses the most dramatic growth seen anywhere in the country. However, large projects that would support and provide jobs for that growing population can be held up for years by the air permitting process alone. This Regional EPA office has a limited number of technical staff members who must review and approve the air permits for every project in California, Nevada, Arizona, Hawaii, and Guam. Similarly, the National Park Service, Bureau of Land Management, and U.S. Forest Service must compete for the services of only a few Federal staff members who have the technical expertise and responsibility to review all proposed major source air permits for projects across the entire western half of the country. This coupled with the lack of regulated or recommended timing requirements for permit issue leads to significant delays. Finally, although industry recognizes the statutory requirement for these agencies to ensure compliance with all regulations, there often appears to be more attention paid to the concerns of a small minority of constituents rather than a balanced review.

Although the Air Permit is one of the most important permits for any project, there are many other rigorous permits that must be obtained for both refinery and pipeline projects from a multitude of agencies. For example:

- NEPA Compliance from a controlling agency such as the Bureau of Land Management
- Land Use Permits from controlling agencies and jurisdictions
- National Historic Preservation Act Compliance
- Access permits from Bureau of Land Management, U.S. Army Corps of Engineers, and State Land Commissions as well as private land owners.
- Military Agency approvals if military facilities involved.

A listing of permits required by the Arizona Clean Fuels refinery and pipeline projects shows about thirty permits required excluding local zoning, access and construction permits. The majority of these permits are not initiated until the Air Permit is issued, since it finalizes the basis for the project. The timing of these can be extensive and is estimated to be about eighteen to twenty-four months. Although design engineering can be done in parallel to these permitting activities, no significant construction can begin until they are in place. Construction of a large refinery such as ACF proposes takes about 3 years. This sequential process results in long lead times for project development and completion.

CONCLUSIONS

The refining industry in the United States has not constructed a new grass roots refinery for over twenty years. Refining economics have generally not supported new refinery costs and the industry has focused on expansions of existing refineries. Major investments in Clean Fuels production and regulatory programs have also absorbed much of the industry capital. The total capital cost of an economically sized facility of about 150,000 barrels per day is approaching $3 billion.

The complexity of the refining processes and technology choices results in lengthy project development times which can be one to 2 years. Following this project definition, corporate strategic decisions, public reviews, local government discussions, and multi-level permitting process typically take four to 5 years before a final "godecision" can be made. Engineering and construction on a significant project is a major undertaking and takes three to 4 years. Total project time from inception to startup is in the order of 10 years.

The massive investments required for development of a new refinery project coupled with uncertainty on timing and final approval of permits, issues of public acceptance and market uncertainty in the future, have deterred the refining industry from new projects.

Some efficiencies may be possible in the overall development timing. Internal corporate engineering and construction efficiencies may reduce overall project timing. Reducing the number of agencies involved in major project permitting through the "lead agency" approach and ensuring internal accountability for permit issue timing could reduce time and workload on all agencies involved.

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ENVIRONMENTAL REGULATION AND PRODUCTIVITY:
EVIDENCE FROM OIL REFINERIES

Eli Berman
Linda T.M. Bui

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Environmental Regulation and Productivity:
Evidence from Oil Refineries
Eli Berman and Linda T.M. Bui
NBER Working Paper No. 6776
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ABSTRACT

We examine the effect of air quality regulation on the productivity of some of the most heavily regulated manufacturing plants in the United States, the oil refineries of the Los Angeles (South Coast) Air Basin. We use direct measures of local air pollution regulation in this region to estimate their effects on abatement investment. Refineries not subject to these local environmental regulations are used as a comparison group. We study the period of increased regulation between 1979 and 1992. On average, each regulation cost $3M per plant on compliance dates and a further $5M per plant on dates of increased stringency. We also construct measures of total factor productivity using plant level data which allow us to observe physical quantities of inputs and outputs for the entire population of refineries. Despite the high costs associated with the local regulations, productivity in the Los Angeles Air Basin refineries *rose* sharply during the 1987 - 1992 period, a period of *decreased* refinery productivity in other regions. We conclude that measures of the cost of environmental regulation may be significantly overstated. The gross costs may be far greater than the net cost, as abatement may be productive.

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Environmental Regulation and Productivity: Evidence from Oil Refineries

Environmental regulation is commonly thought to reduce industrial productivity. Although there has been great concern surrounding the productivity slowdown, the level and stringency of environmental regulation has continued to increase steadily worldwide since the early 1970s as environmental quality has assumed growing importance on both the political and public agenda. In the United States, total pollution abatement control costs are approximately 1.5-2.5% of GDP per year.[1] Pollution abatement control expenditures (PACE) in manufacturing, alone, have increased by more than 137% between 1979 and 1993 at a compound annual rate of approximately 6%. By all indications, this trend will continue.

The gross costs associated with meeting environmental regulation (as measured by PACE) are very high and of growing concern. But does this accurately reflect the *real* costs of regulation? PACE may, in fact, either under or over-estimate the actual costs of regulation. For example, if pollution abatement control expenditures are mismeasured, and miss such costs as the time spent by managers dealing with environmental regulators and regulations, PACE will under-estimate the actual cost of regulation. On the other hand, if environmental regulation induces plants to install cleaner, more efficient technology, pollution abatement expenditures may be productivity enhancing so PACE will over-estimate the actual cost of environmental regulation. In either case, the gross cost of regulating the environment may differ significantly from the net cost.

A large body of literature attempts to quantify the effect of environmental regulation on productivity. Previous empirical work has shown that environmental regulation has had an adverse effect on productivity. In some cases, researchers have found that it has contributed significantly to the productivity slowdown in the U.S. Yet, the most recent discussions on the relationship between environmental regulation and productivity suggest that the effects need not be negative -- and may, indeed be positive (see Jaffe et all (1995)). An obvious question that arises from this literature is, why is there no consensus on the effects of environmental regulation on productivity?

Estimates in this literature may well be confounded by selection bias and measurement error, which may explain the existence of the conflicting results. Selection bias may occur because

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[1] Gross abatement costs, which include transfers to government agencies. Source: PACE Survey, 1993. 1993 figure is $17555 and 1979 figure is $7399.9 in thousands of current dollars.

plants that can most easily implement pollution reduction may actually choose to undertake such abatement activity without the impetus of regulation. Plants may choose to abate for many different reasons, including for strategic purposes or in conjunction with changes in their production process that include cleaner, more efficient technologies. This will depend upon the characteristics of the market in which the plant is competing. Regardless of the reason for the reduction, if researchers measure the effect of environmental regulation on economic outcomes by looking at the relationship between the outcome of interest (eg. productivity) and pollution abatement control expenditures without taking into account the fact that some plants may have *voluntarily* undertaken pollution abatement activities, the estimated relationship will *underestimate* the effect on productivity of regulations which force plants to abate.

Measurement error may also impart a bias, probably towards zero, on the relationship between environmental regulation and economic outcomes that are estimated from a regression of productivity on abatement. Pollution abatement control expenditures may sometimes be difficult to classify. For example, if a plant purchases a new boiler to replace an existing boiler and the new piece of equipment is more efficient and produces less emissions, managers must decide whether part or all of this expenditure should be included as pollution abatement control. The questionnaires that managers must answer to provide data on PACE are often confusing on this point, asking them to classify as PACE all expenditures that they would not have made if no pollution regulations were in place.[2] In addition, the allocation of managerial time devoted to pollution control is difficult to measure. Thus measurement error in PACE data may be responsible for understating the effect on environmental regulation on productivity.

In this paper we take two approaches to investigate the effect on productivity of a specific set of environmental regulations that affect the petroleum refining industry -- one of the single most regulated industries in the United States and one which has had a noticeable decline in employment over the past two decades. In the first approach we use micro-regulatory changes to provide variation between regions to address the estimation problems that have frustrated research to date and get directly at the consequences of environmental regulation on the petroleum industry. We deal with the problems of selection and measurement error bias by estimating the effects of regulatory changes on PACE directly. Thus we examine only variation in abatement behavior of

[2] From an economist's point of view, the questionnaire asks exactly the correct question. It is the question that tries to determine what the counterfactual would be. In practice, however, the question is very difficult to answer.

petroleum refining plants *induced* by changes in local environmental regulation.

In the second approach, we take petroleum refining plants located in a region in Southern California, the South Coast Air Basin, and compare productivity changes in these refineries to those outside the scope of local regulations. We construct measures of total factor productivity using unique data involving detailed products and material records from the Census of Manufactures. We make use of several different measures of productivity to check for the robustness of our results.

Our methodology requires substantial variation in regulations and abatement behavior, which we found by examining *local* regulations and using data on individual plants. In particular, we focus our attention on the set of regional environmental regulations in California enacted by the South Coast Air Quality Management District (SCAQMD), that affect petroleum refining activities. We have constructed a unique data set for this purpose which matches SCAQMD regulations to plant level data on production and abatement collected by the Census Bureau and study how petroleum refineries react to environmental regulations at their adoption dates, compliance dates, and at dates when existing regulations become more stringent. We use two comparison groups in our analysis: the rest of the nation, and the rest of California combined with Texas and Louisiana, allowing the interpretation of our results as predictions of the consequences of applying the local air pollution regulations in the SCAQMD on the average refinery located outside of this regulatory area. Doing so allows us to distinguish the effects of *local* regulation from those of pervasive (state or national) regulations.

The SCAQMD governs air pollution in the South Coast Air Basin of Southern California.[3] We make use of this regulatory region because the South Coast Air Basin has some of the worst air quality in the nation as well as some of the most stringent air pollution regulations. Since the development of national uniform air quality standards for the six criteria air pollutants[4], the South Coast Air Basin has been out of compliance with the federal standards for three of the six pollutants, and has reached compliance for a fourth only in 1994 (check).[5] The air pollution regulations developed by the SCAQMD are of particular interest because some have recently been adopted

[3] This region includes Los Angeles, Orange, Riverside, and the non-desert portion of San Bernardino Counties.

[4] The six criteria air pollutants are SO_x, NO_x, ozone, PM_{10}, airborne lead, VOCs.

[5] South Coast Air Quality Management District, Annual Report, 1994.

nationally by the U.S. Environmental Protection Agency (EPA) and they are often considered for adoption by other AQMDs.

We find strong econometric evidence that South Coast regulations have induced very large investment in air pollution abatement capital and visual evidence that it has induced increases in abatement operating costs. Surprisingly, we find no evidence that these large costs incurred to abate emissions had more than a negative, transitory effect on the productivity of South Coast refineries. These refineries suffered a productivity decline in the 1980s but recovered to the national average by 1992, despite their heavy regulatory burden. In fact, petroleum refining productivity in the South Coast Air Basin between 1987-1992 rose sharply during this period -- both when several environmental regulations came into compliance and when productivity was *falling* in this sector elsewhere in the country. What this suggests is that pollution abatement control expenditures associated with the SCAQMD regulations may, in fact, have been productivity enhancing so that the gross cost of pollution abatement may be an over-estimate of the net cost of regulation.

A natural question that arises from this result is: if environmental regulations in the SCAQMD increased the productivity of oil refineries, why haven't plants adopted the same productivity enhancing technology elsewhere? One possible explanation for this counter-intuitive result comes from the "real options" hypothesis of investment under uncertainty. These issues are discussed further in Section 7. Anecdotal evidence we have taken from firms and regulators in the SCAQMD region support this hypothesis.

The rest of the paper is organized as follows. In Section 2 we discuss the existing literature on the effects of environmental regulation on productivity. Section 3 provides background on petroleum refining and the relevant environmental regulations affecting this industry in California. Section 4 gives the framework from which the econometric model is derived, and in Section 5 we discuss the data that will be used in the estimation. Section 6 has a discussion of the results and Section 7 has concluding remarks and suggests avenues for further research.

2. Literature Review

The belief that environmental regulation is detrimental to productivity is reflected in numerous studies that have focused attention on the role that environmental regulation has played in the productivity slowdown that started in the early 1970s (see Christiansen and Haveman (1981) for a good survey). Recently that belief has been questioned. Environmental regulation may be *productivity enhancing*, by introducing cleaner, more efficient technologies in the workplace. This dichotomy of beliefs underscores the fact that theory, alone, cannot predict the outcome of environmental regulation on productivity. (For a survey of the two opposing views, see Jaffe et al (1995).)

Several different approaches have been taken in the literature to measure the productivity effects of environmental regulation. The three most common approaches include growth accounting, macro-economic general equilibrium modelling, and econometric estimation. A good example of the growth accounting methodology is given in Denison (1979). Denison measures changes in total factor productivity and estimates the incremental environmental cost due to regulation post 1967. Environmental costs measured as annual operating, maintenance and depreciation costs are assumed to crowd out "productive" investment on a one-for-one dollar basis. Denison finds that environmental regulation post 1967 is responsible for between 13-20% of the productivity loss during this period. One of the difficulties in interpreting the results of the growth accounting methodology is that environmental quality is not measured as an "output" of the production process, and therefore will over-estimate the productivity loss associated with regulation (Solow (1992)). Furthermore, highly aggregated studies of the sort done by Denison and many others miss the importance of sectoral differences which drive many of the observed results.

Using a general equilibrium macro-model, Jorgenson and Wilcoxen (1990) model the U.S. economy including a long-term growth component with and without environmental regulation and find that in the absence of all environmental regulation, the capital stock would have been 3.792% higher and GNP would have been more than 2.5% higher. Jorgenson and Wilcoxen separate out the effects of the removal of environmental operating and maintenance costs (responsible for 0.544% reduction in the capital stock and 0.728% reduction in GNP, respectively) from the economy and abatement capital expenditures (2.266% and 1.290%) in an attempt to detail differences in types of environmental regulation. The authors find strong sectoral effects, especially in chemicals, petroleum refining, and primary metals.

There are also several econometric studies that estimate the relationship between environmental regulation and productivity. Good examples include Gray (1987) which investigates the effect of OSHA and EPA regulations on productivity and finds that together, they account for 30% of the measured slowdown in productivity in the 1970s; Gollop and Roberts (1983), who focus on fossil fueled electric power plants and estimate that 44% of the productivity slowdown was attributable to regulation in this sector between 1973 and 1979; Barbera and McConnell (1986, 1990), who find in two separate papers that average capital and labor productivity had been suppressed due to environmental regulation during the 1970s -- and that the results differ across sectors -- chemicals, primary metals, and stone, clay and glass showing a reduction in labor productivity and average capital productivity growing in primary metals after 1973.

In general, these studies provide a consistent finding of small, negative effects of regulation on productivity. The literature indicates that the effects of regulation on productivity (measured as either total factor productivity, labor productivity, or capital productivity) may differ strongly across industrial sectors, and that different measures of productivity may lead to slightly different results. Pollution intensive industries that bear the burden of environmental regulation show the largest negative effect on productivity.

Jaffe et al (1995) note, however, that market based regulations may have a very different effect on productivity than the traditional command and control type strategies that have been studied in the above mentioned articles. Because market based controls provide incentives to plants to continually update and improve their abatement methods, productivity may actually increase under this type of regulation.

3. Background

Historically, the petroleum industry has played an important role in the economy of California. In 1990, the value of California oil and gas production was more than $5.5 billion.[6] California is the fourth largest producer of crude oil in the nation and has 24 operating refineries within the state, with a capacity of nearly 1,870,000 bbls/day. This industry, however, has been pollution intensive and has contributed to the air pollution problems of California as well as to its economic well being. Below, we outline some of the relevant characteristics of this industry and provide a description of the regulatory structure under which this industry operates in California.

A. *Petroleum Refining in California*

In the simplest terms, petroleum refining converts crude oil into useable products, such as gasoline, asphalt, and jet fuel. This process heats crude oil to separate its components into several final products. By altering the temperature and the specific gravity of the crude oil, refineries may alter the over-all composition of their final products. For example, if the price of jet fuel increased

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6 California Department of Conservation study, "A Profile of California's Oil and Gas Industry, 1992-1994," (1996).

significantly, a refinery may produce less motor gasoline and more jet fuel by changing the temperature to which the crude is heated.

Table 1 presents the composition of petroleum refining outputs by percentage volume for 1992 and the corresponding price per barrel of output for 1977-1992. Gasoline, fuel oil, and jet fuel were the three leading products refined in California. The price per barrel of finished product varied widely during this time period. Between 1977 and 1992, gasoline prices increased by approximately 153% (164% and 168% for fuel oil and jet fuel, respectively). Although output prices may have risen dramatically during this time period, the costs of inputs also rose. This wild fluctuation of input and output prices dictates special care in measuring productivity.

California refineries are unusual as they use primarily domestic sources of crude oil in their production. As a percent of the value of materials used in 1992, 45% of input costs at US refineries were due to domestic crude and 34% were from foreign crude. By volume, measured in barrels per day of crude oil, California refineries use 96% domestic crude and only 4% foreign crude. Of the domestic crude, 43% is from California and 46% is from Alaska.[7] Table 2 summarizes the average price per barrel of crude oil from domestic and foreign sources. Notice that corresponding to the large increase in price of refined petroleum products between 1977 and 1982, was a similarly large increase in the cost of domestic and foreign crude oil inputs (190% and 150% increase, respectively).

[Table 2 somewhere near here]

One of the consequences of using California crude in their production process is that California crude is "heavy" crude. This increases both the cost of extracting the oil as well as refining the oil. The price for California crude is largely dependent upon the price of Alaskan and North Slope crude oil[8] -- its major competitor in the California petroleum refining market.[9]

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[7] California Department of Conservation study, "A Profile of California's Oil and Gas Industry, 1992-1994," (1996).

[8] Alaskan/North Slope crude oil typically is a higher quality, "lighter" crude oil which is less expensive to refine.

[9] The Merchant Marine "Jones Act" states that Alaskan/North Slope oil must move in American tankers and the legislation opening up Alaska's Prudhoe Bay prohibits this oil from being exported -- forcing the Alaskan oil to be marketed exclusively in the U.S. In a California Department of Conservation study, they claim that this has kept Alaskan crude oil prices artificially low. This ban was lifted after 1996. (See California Department of Conservation study, 1996.)

B. Air Pollution Regulations and Petroleum Refining in California

Federal involvement in environmental regulation started in 1970 with the creation of the United States Environmental Protection Agency (EPA). Prior to 1970, environmental regulation fell under State and local jurisdiction. The lack of coordination between States and locales in setting environmental standards, as well as a belief that environmental regulation was costly to industry and inhibited competition, led to a fear that there would be a "race to the bottom" in setting environmental standards. Therefore one of the EPA's primary mandates was, and is, to set uniform national standards for environmental quality. Individual states are responsible for developing State Implementation Plans (SIPs) that must be approved by the EPA, which indicate how the state will meet the federal environmental standards. States that fail to provide acceptable SIPs may have federal monies withheld by the EPA or lose control over setting environmental regulations within their own state.

In general, federal environmental regulation is limited to setting national standards based on health criteria. Some exceptions are the minimum level environmental regulations that are imposed on all new sources of pollution (New Source Performance Standards, (NSPS)), and regulations in effect for non-attainment regions and regions considered to be "pristine" (Prevention of Significant Deterioration (PSD) regions). Existing sources of pollution and mobile sources are typically regulated at the State and local level.

Within California, air pollution is regulated by the California Air Resources Board (CARB). Individual air basins are regulated by local authorities that fall under the jurisdiction of the CARB. There are a total of 34 local air pollution control districts (APCD) in California. Typically, mobile sources of pollution are regulated at the state level and stationary sources are regulated by the individual APCDs.

Petroleum production in California largely is located in six separate APCDs: the South Coast Air Quality Management District, the San Joaquin Valley United Air Pollution Control District, the Bay Area Air Quality Management District, the Santa Barbara County Air Pollution Control District, the Ventura County Air Pollution Control District and the Monterey Bay Air Pollution Control District. Within these six Districts, the first three cover the majority of the State's population and petroleum production, but the most stringent regulations are found in the SCAQMD so we focus our attention only on this region.

In terms of their contribution to actual levels of pollution, Table 3 summarizes South Coast petroleum refinery emissions of SO_x and NO_x as a percentage of total California emissions between

1981 and 1991. For both pollutants, there have been substantial declines in refinery emissions -- much larger than the reductions in emissions from regulated, non-refinery sources. This suggests that the regulations in place in the SCAQMD have caused refineries to clean up their emissions at a faster rate than other regulated industries in the same region.

[Table 3 somewhere near here]

Tables 4 and 5 summarize air pollution abatement control expenditures in California. Data on the U.S., Texas, and Louisiana are provided for contrast. In almost every year, environmental costs incurred by California petroleum producers was larger than those incurred in either Texas or Louisiana, although both of those regions have more oil production and refining activity. California's share in total U.S. petroleum air pollution abatement control expenditures rose from 17 to 44% between 1982 and 1992.

[Tables 4 and 5 somewhere near here]

The higher PACE costs in California reflect both the (differentially) higher volume and stringency of regulation in the state. South Coast regulations affecting petroleum refineries are discussed in Section 5 below. (A list of regulations is given in Appendix A.)

4. A Framework for Estimation

Earlier, we emphasized the need to estimate the effects of environmental regulation using a method that can address measurement error and sample selection biases. In this section we derive estimating equations and discuss estimation. First we present a model of production that includes quasi-fixed factors which have their levels set by constraints rather than by cost minimization alone. We treat as quasi-fixed factors those inputs constrained by environmental regulation: pollution abatement capital and abatement operating costs (which include costs of labor, materials, and services). Assume that these are complete measures of the costs of abatement at the plant level. Labor, materials and capital are variable factors.

Assume a cost minimizing firm operating in perfectly competitive markets for inputs and output. There are M "quasi-fixed" inputs and L variable inputs. The variable cost function has the form:

$$CV = H(Y, Z_1, \ldots, Z_M, P_1, \ldots, P_L) \tag{1}$$

where Y is output, the Z_m are quantities of quasi-fixed inputs, and P_l are prices of variable inputs.

Petroleum refineries are subject to a variety of air quality regulations that constrain their behavior. Generally these regulations mandate the use of certain abatement equipment or set maximum emission levels, though there are other forms of regulation. (A full description is given in Appendix A.) Refineries typically comply by installing equipment, redesigning production processes, changing their mix of inputs, increasing maintenance and putting much more effort into measuring and reporting emissions.

Let R be a binary variable measuring regulation. The effect of regulation on abatement activity can be written as:

$$\frac{\Delta Z_m}{\Delta R} \quad \textit{for } m = 1 \textit{ to } M. \tag{2}$$

The demand for variable input X_i may be derived from the solution to the profit maximization problem and approximated with a linear function of the form:[10]

$$X_i = \alpha_i + \pi_i Y + \sum_m^M \beta_{i,m} Z_m + \sum_l^L \gamma_{i,l} P_l \ . \tag{3}$$

Environmental regulation potentially affects the demand for variable inputs X_i through its effect on output, abatement activity (Z) and factor prices.

Two Measures of Effects on Productivity:

Total factor productivity is given by:

$$\begin{aligned} TFP &= \frac{Y}{V}, \\ \textit{where} \quad Y &= \sum_k^K p_k Y_k , \\ V &= \sum_m^M q_m Z_m + \sum_l^L q_l X_l . \end{aligned} \tag{4}$$

Here, p and q represent output and input prices, respectively. This form accommodates both multiple inputs and multiple outputs in production which is important as refineries produce a large range of products other than motor gasoline. Approximately 80% of the value of input is crude oil.

Total factor productivity growth can then be measured as:

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[10] A linear approximation is due to data limitations on pollution abatement capital services, where investment flows are measured rather than capital stocks.

$$TF\dot{P} = \dot{Y} - \sum_{m}^{M} s_m \dot{Z}_m - \sum_{l}^{L} s_l \dot{X}_l. \tag{5}$$

A dot over the variable indicates a rate of change and s_j is the cost share of factor j. In practice we use a divisia index of outputs as well as of inputs, which we suppress here for notational simplicity. Maintaining the assumption that all abatement costs are measured by the Z_m, if abatement inputs are entirely unproductive, this equation indicates that the effects of regulation on productivity growth can be directly measured by examining its effects on abatement inputs, Z_m. This is the approach taken by Gray (1987) in measuring the cost of abatement.

Our experience visiting oil refineries leads us to question both the assumption that abatement costs can be well measured and the assumption that those costs reflect entirely unproductive activity. Costs of abatement are incompletely measured if they are only part of the job of a manager or engineer. Similarly, air pollution is sometimes abated by switching to higher quality and more expensive crude oil. That extra cost was not included in reported abatement costs in the two refineries we visited. On the other hand, abatement activities may be productive. For example, they may induce productive recycling of gases to produce more output or to co-generate power.

An alternative is to ignore the distinction between abatement and other inputs in the measurement of total factor productivity. Let V_l measure the sum of abatement and conventional inputs of type l (labor, capital services, crude oil, other materials). Then:

$$TFPA = \frac{Y}{\sum_{l}^{L} s_l V_l}. \tag{6}$$

Compared to the measure in Equation 4, this measure has the advantage of relaxing both the assumption that all abatement activity is captured in Z and the assumption that Z is entirely unproductive.

Estimation:

We estimate the effects of regulation on Z by measuring regulations directly. That procedure is designed to avoid the biases due to sample selection, measurement error and any potential omitted variables that would occur if we used Z as a regressor -- the common practice in the literature. R is a count of the number of regulations in effect.

The effect of regulation on abatement inputs, Z, can be estimated by:

(7) $$Z_m = a_m + b_m R.$$

We expect the sign of b_m to be positive, as regulations generally increase abatement activity. An exception would occur if a regulation increased one type of activity but decreased another through substitution.

The panel of plants allows estimation including a separate intercept for each plant that remains for more than one period. Equation 7 can be taken to data as:

(7') $$Z_{it} = c_i + d_t + b_m R_{it} + e_{it},$$

assuming $E(R_{it}, e_{it}) = 0$ or,

(7'') $$\Delta Z_{it} = \Delta d_t + b_m \Delta R_{it} + \Delta e_{it},$$

assuming $E(\Delta R_{it}, \Delta e_{it}) = 0$ for $i = 1,\ldots,N_t$ plants and $t = 1,\ldots,T$ years.[11] In some specifications we can include separate intercepts in (7'') for regions. Note that for each South Coast refinery subject to a new regulation, estimation is achieved by comparison to a refinery in another region not subject to the new regulation. This comparison with refineries in other regions is informative for policymakers as they often turn to the South Coast for examples of regulations worth adopting to meet federal ambient air quality standards -- standards which are constantly under pressure to be changed to a more stringent level. A local regulator considering adopting a South Coast regulation could consult b_m from (7'') for an estimate of the cost in abatement activity.[12]

An alternative approach to measuring the costs of environmental regulation is to use the more general approach in Equation 6, which can be calculated for fixed prices in Census years. Census materials and product files allow a rare opportunity to estimate TFP controlling for changes in the value of inputs (including some quality change) using fixed input prices. This has several advantages over the standard practice of fixing the shares, s, using regression coefficients and calculating TFP as a residual. First, measurement error does not impart a bias on estimated averages as it does on regression coefficients. As discussed above, measurement of PACE and capital are especially suspect, particularly at the plant level.[13] Second, this approach allows us to

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11 At most two new regulations are introduced per year, and none of these regulations was ever withdrawn, so $0 \leq \Delta R \leq 2$.

12 The coefficient b_m should be interpreted as the average effect of a number of regulations.

13 See Griliches (1986) for a discussion of measurement error bias in plant level data.

be nonparametric about a production function, avoiding possible bias due to mis-specification. Third, we avoid the possibility of endogeneity bias if output affects the choice of inputs. Finally and most importantly, we can calculate productivity using measures of physical quantities for a number of outputs and inputs that would imply an impractical number of covariates in regression analysis even with fairly large samples. With these Census estimates we compare productivity in the South Coast refineries to that in comparison regions.

We measure employment annually from 1979-93, productivity in census years 1977, 82, 87 and 92. Regulations are recorded annually from 1977-93. Estimation of (7'') requires matching plants across years and with regulations. We describe the data before turning to results.

5. The Data

We make use of plant level data for petroleum refineries (SIC 2911) from two sources -- the Survey of Pollution Abatement and Control Expenditures (PACE), which are linked to plant records contained in the second source and the Longitudinal Research Database ("LRD") panel compiled by the Center for Economic Studies of the Census Bureau. PACE measures expenditures on pollution abatement are available by abatement categories -- air, water, and hazardous wastes -- are also classified by type -- end of line capital outlays, operating and maintenance costs, and depreciation. We use plant level observations on the prices of inputs and outputs from a third source, the Census of Manufactures.

The LRD is constructed from the Annual Survey of Manufactures, which samples the population of manufacturing plants, including large plants (250 or more employees) with certainty. Entry and exit of large plants is well measured by presence or absence on a year-to-year basis. From these data we use the employment, value added, and capital investment variables.

A subset of the data on local regulations originally constructed for the SCAQMD in Berman and Bui (1997) is used in this paper. This regulatory data set matches individual air pollution regulations to specific plants located in the SCAQMD.

In total, we identified 11 separate regulations affecting petroleum refining in the SCAQMD during this time period. For each regulation, we tracked their adoption dates, compliance dates, and dates of increased stringency, as well as the pollutant involved and the required method of compliance. This mapping of regulations to affected industries was done in consultation with the local regulators and with an environmental quality engineer at a refinery who hosted a plant visit. From this information we created the variable R_{it}, which is a count variable for the number of regulations in effect for industry i in year t.

Table 6 describes the PACE sample of refineries. Petroleum refineries are large, capital intensive operations with relatively few employees. Average output is $1.7 billion (1991) with average employment of 372. Air pollution abatement investment is a large cost, averaging $2.1 million per year or 2% of value added. In our sample, 12.9% of plant-years in the population are in California, and 5.6% are in the South Coast Air Basin, which is a significant oil refining center.[14]

Oil refineries generally serve the local market. The proportion of refining capacity in the South Coast Air Basin is approximately the same as the regions' proportion in the population.

Employment and value added decline between 1979 and 1993 in the refining industry. Value added is cyclical, but declined sharply after the 1979 increase in oil prices and did not regain the 1982 level until 1993. Nationally, employment has decreased fairly monotonically over this 15 year period. Census Bureau disclosure regulations prevent a separate description of the South Coast Air Basin plants. They are slightly larger than the national average, in employment, value added, and shipments and follow similar patterns to the national figures in the cyclicality of value added and the decrease in employment.

[Table 6 somewhere near here]

6. Empirical Results

Abatement Investment and Costs

Figures 1 and 2 demonstrate that South Coast refineries have more abatement activity than the U.S. as a whole, providing visual evidence that the South Coast regulations have induced significant abatement activity. Beginning in 1986, when compliance dates for the major regulations begin, South Coast refineries start investing twice as much as those in the rest of the US in abatement as a proportion of shipments (Figure 1). That ratio rises to over four times as much by 1993 when investment to meet "clean gas" regulations begins. Similarly, in the period after 1986 South Coast refineries spent twice as much on abatement operating costs as did other refineries, as a proportion of shipments.

For comparison, we included the two other states with the largest concentrations of oil refining capacity in the country. Note that their trends closely match the national average. Texas

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14 Petroleum refining is concentrated in the Long Beach area of the South Coast Air Basin, just south of Los Angeles.

and Louisiana make good comparison groups for California because they represent a counterfactual with similar concentrations of refining but with far less stringent local air quality regulation. Both Texas and Louisiana use the National Ambient Air Quality Standards as their standards for air quality. California, however, has ambient air quality standards that are more stringent than the national standards. Furthermore, Texas and Louisiana are out of compliance only for ozone, whereas California has been out of compliance with 4 of the 6 criteria air pollutants since the 1970s. Finally, Texas and Louisiana have very different environmental regulatory structures compared to California with relatively little local air quality regulation for manufacturing plants.

Table 7 shows that regulations caused substantial investment in abatement capital. The regulations completely capture the effect of being in the South Coast. That result is robust to using net rather than gross investment, to weighting the regression using sample weights and to using a Louisiana - Texas comparison group rather than the rest of the U.S. Compliance dates with new regulations seem to induce about $3 million in abatement investment for the average refinery, while increases in stringency of regulations induce about $5 million in abatement investment.

Table 8 shows that the change in operating costs is too noisy to learn anything from it. Columns 3 and 4 are the specifications in first differences suggested in Equation 7''.

Productivity

We would like to measure productivity on an annual basis to take advantage of our annual data on regulatory change. Figure 3 shows the ratio of all costs to shipments. This is the inverse of TFP using current, plant-specific prices. South Coast plants seem to have relatively high costs in 1986, but in 1991 and 1992 they are far below the average for U.S. refineries, suggesting a surprising increase in productivity in the period of the greatest increase in regulation and abatement costs.

Could those frequent fluctuations in productivity be due to fluctuations in relative prices rather than in true productivity? To calculate productivity more precisely we used information from the Census of Manufactures (COM). The detailed product and materials data from the COM are a unique resource which give us unusual accuracy in calculating total factor productivity change at fixed prices.[15] Products and materials are identified by seven digit SIC codes. Value (price

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[15] Very little previous research has been conducted using this data source. An exception is Roberts and Supina (1996), who use these data to study cross-plant variation in prices and mark-ups.

x quantity) is reported for all codes and quantities are recorded (whenever they are well-defined). This method is extremely well suited for analysis of petroleum refineries, since (unlike many plants) the majority of materials have well-defined quantities. About 80% of materials consumed fall into two seven digit categories: domestic and foreign crude oil (Table 2). For that reason this data source can provide uniquely high quality measurement of total factor productivity for refineries.

We measure TFP=Y/V as in Equation 6, using both varying and fixed prices.[16] The results are given in Table 9, which reports 3 measures of productivity for each Census year in the South Coast and four other regions for comparison. The first measure, labeled P_{it}, uses plant-specific transaction prices for each input and output to calculate TFP. These prices are calculated by dividing values of inputs or outputs by quantities. The second measure, labeled P_t, uses as a fixed price the annual national average of P_{it}, weighted by quantities of inputs, to calculate TFP. Thus, it fixes prices across plants within the same year. The measure of TFP labeled P uses as a fixed price the 4 period average of P_{it}, weighted by a quantities of inputs. These fixed price calculations could be conducted for the 84% of inputs and the 79% of outputs that had well defined quantities. (For a complete list see the note to Table 9.) For all other inputs and outputs we used the P_{it}.

The first column shows that the fixed price measure of TFP for U.S. refineries shows less fluctuation and a quite different pattern than the measure that ignores price fluctuations. The P_{it} measure declines between 1977 and 1982, then increases in 1987 and decreases in 1992. With fixed prices the *P* measure increases between 1977 and 1982, remains stable through 1987 and drops in 1992. The last three rows show average values for the four Census years. These figures reveal that while in variable prices California and the South Coast appear to be more productive than the U.S. average, at fixed prices they are actually less productive as they benefit from using a higher proportion of cheaper domestic crude oil from California and Alaska.

Our major finding is that the apparent productivity increase in the early 1990s for the South Coast refineries in Figure 3 above is replicated in the Census data even when we measure total factor productivity using fixed prices. Figure 4 shows a comparison of the fixed and variable price series for South Coast TFP. The lower line plots the fixed price series from the rightmost column of Table 4. *Surprisingly, productivity is stable during the period of increased regulatory stringency*

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[16] An additional option would be to use the Tornquist approach, averaging prices over pairs of years for the same plant. The large number of missing plants in the materials records in 1987 and difficulties matching plants between Census years preclude this approach.

in the mid 1980s and actually rises between 1987-92. Figure 5 illustrates that this pattern is not due to a secular increase in productivity in the U.S. in the early 1990s. In fact, the average refinery in the rest of the country experienced a productivity decline in the 1987-92 period. These basic findings are robust to selecting only plants available in all Census years.[17] They are not due to reallocation of production from less-efficient to more efficient plants, but to increased productivity within plants.[18]

7. Concluding Remarks

What we have found is that during an era of unprecedented levels of air quality regulation and investment in abatement activity in the South Coast there was an increase in productivity levels in petroleum refining. This is true even when South Coast refineries are compared to refineries in other regions of the United States. The lack of a significant decrease in productivity attributable to abatement costs and investments brings into question the general interpretation of measured abatement costs (i.e. PACE) as a net cost of regulation. The productivity results suggest that abatement investments are often productive, and therefore, abatement costs, alone, may severely overstate the true cost of environmental regulation.

One of the most puzzling questions that arises from this work is, why haven't other plants adopted the new technology if it is truly more productive? We can offer two plausible explanations. First, there is a gaming aspect to environmental regulation that is not often discussed. Firms may attempt to pre-empt regulators from choosing a technology standard by introducing new abatement technologies to the regulators for adoption. This practice may be used by a firm to (1) reduce the uncertainty of future regulations, or (2) impose costs on either existing or potential local

[17] While in principle all plants are surveyed in Census years, the materials files are missing plants accounting for approximately 40% of refinery output in 1987. At this writing, the mystery of the missing plants remains unresolved at the Census Bureau. There is also some exit and entry of refineries in the population. The basic patterns in Figures 4 and 5 are preserved in a sample of continuously present plants.

[18] A useful decomposition of productivity change into within-plant productivity improvements on the one hand, and reallocations of inputs between plants with differing efficiency on the other is:

$$\Delta \frac{Y}{V} = \sum_{i}^{I} \Delta\left(\frac{Y}{V}\right)_i \left(\frac{\bar{V}_i}{V}\right) + \sum_{i}^{I} \left(\frac{\bar{Y}}{V}\right)_i \Delta\left(\frac{V_i}{V}\right),$$

competitors. This argument relies on the regulated firms competing in a local market where all of their competitors must meet the same environmental regulations that they do. This is the case for petroleum refining in California. So, even if the technology is productivity enhancing, the capital costs associated with the new technology may be high and this may prevent plants outside the regulatory region from voluntarily adopting the technology.

A second, somewhat related explanation may be in the "real options" hypothesis of investment under uncertainty. Plants located outside the local regulatory region face two types of uncertainty -- (1) uncertainty regarding future regulatory levels of stringency and (2) uncertainty regarding the efficacy of untested abatement technologies (as well as their impact on production). Because abatement capital costs are high, these plants would prefer to wait as long as possible before making any abatement investment. There is an obvious advantage to being a follower rather than a leader in the adoption of abatement technology. This means that the required rate of return on their abatement investment would have to be great enough (and higher than that in the South Coast) to compensate them for the additional uncertainty that they face. So, if they believe that the SCAQMD regulations are some of the most stringent in the country and might plausibly be adopted outside of the South Coast, they may wait to see how successful the new abatement technology is, before adopting it, themselves, provided that the technology proves to be productive enough and with a high enough rate of return.[19]

Both of these hypotheses have been given support from discussions with the environmental engineers that we have spoken to during our plant visits.

The finding that abatement costs may be productive should help refocus the debate about what are the true costs of environmental regulation. Using PACE measures, costs are commonly estimated at 1-2% of GDP. But this may, in fact, be a gross over-estimate of the true costs. A more appropriate measure would be the cost net of increased production due to "abatement" activity.

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[19] In this case, we might see productivity gains associated with the adoption of the South Coast abatement technologies outside of the South Coast with some lag. Thus far, the necessary data that we would need to test this hypothesis are not yet available.

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Appendix A

The following is a list of the major environmental regulations imposed on petroleum refining activities in the South Coast Air Quality Management District, Bay Area Air Quality Management District. These regulations were compiled using the regulatory data books along with consultation with the regulators.

South Coast Air Quality Management District

Rule #	Name
1105	Fluid Catalytic Cracking Units -- Oxides of Sulfur
1108	Cutback Asphalt
1108.1	Emulsified Asphalt
1109	Emissions of Oxides of Nitrogen from Boilers and Process Heaters in Petroleum Refiners
1119	Petroleum Coke Calcining Operations -- Oxides of Sulfur
1123	Refinery Process Turnarounds
1146	Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters
1148	Thermally Enhanced Oil Recovery Wells
1158	Storage, Handling and Transport of Petroleum Coke
1173	Fugitive Emissions of VOCs
1176	Sumps and Wastewater Separators

Table 1

Volume and Price of Major
Petroleum Products

Output:	Motor Gasoline	Distillate Fuel Oil	Jet Fuel: Kerosene
Percent of Value of Output in 1992	47%	17.6%	7%
Price Per Barrel:			
1977	$15.64	14.00	14.40
1982	39.50	36.95	38.55
1987	22.97	20.84	21.56
1992	24.90	22.62	23.14

Source: 1992 Census of Manufactures, Industry Series. Petroleum and Coal Products MC92-1-29A.

Table 2

Percentage of Value and Price Per Barrel
of Major Inputs to Petroleum Refining

Material:	Domestic Crude	Foreign Crude
Percent of Value of Materials in 1992	45%	34%
Price Per Barrel:		
1977	$10.85	12.87
1982	31.45	32.18
1987	17.50	17.79
1992	18.65	17.75

Source: 1992 Census of Manufactures, Industry Series. Petroleum and Coal Products MC92-1-29A.

Table 3

Air Emissions Trends in the South Coast by Group
As a Percentage of Total California Emissions: 1981-1991

Pollutant	Year	All Regulated Industries*	Petroleum Refineries	Regulated Industries net of Refineries	Unregulated Industries**
SOx	1981	21.0	18.3	2.7	6.3
	1991	20.0	16.8	3.2	0.8
NOx	1981	28.7	21.3	7.3	6.9
	1991	22.2	16.7	5.5	6.9

Source: California Emissions Database. Numbers are based on authors' calculations.

* Regulated industries are defined as industries that have SCAQMD regulations that affect them.

** Unregulated industries are defined as industries that have no SCAQMD regulations that affect them.

Table 4:

Air Pollution Abatement Control Expenditures:
Total and in the Petroleum Industry (SIC 29)

	U.S.		California		Louisiana		Texas	
Year	Total	Petroleum	Total	Petroleum	Total	Petroleum	Total	Petroleum
1982	1828.2	533.2	174.9	97.9	1629.2	113.7	184.2	117.6
1986	1462.9	273.6	187.2	121.5	61.7	23.3	148.0	91.6
1989	1819.0	146.5	141.0	33.4	61.0	6.2	150.1	31.0
1992	4403.1	2079.8	418.7	352.9	477.6	293.7	777.2	524.8

Source: Current Industrial Reports, Pollution Abatement Costs and Expenditures: 1982, 1986, 1989, 1992.

Table 5:

Air Pollution Abatement Capital Investment and Operating Cost
(Millions of 1987 Dollars)

		Capital Investment		Operating Costs	
Year		California	U.S.	California	U.S.
1977	Petroleum	21.1	167.7	146.9	601.3
	All Manufacturing	89.7	1652.0	221.7	2240.4
	% Petroleum	23.5	10.2	66.3	26.8
1994	Petroleum	1166.8	1982.3	434.6	1742.0
	All Manufacturing	1271.3	4310.6	698.0	6139.1
	% Petroleum	91.8	46.0	62.3	28.4

Sources: Current Industrial Reports, Pollution Abatement Costs and Expenditures: 1977, MA200(77)-2, U.S. Department of Commerce, 1979; Current Industrial Reports, Pollution Abatement Costs and Expenditures: 1994, MA200(94)-1, U.S. Department of Commerce, 1976 (Tables 5 and 9);

Table 6:

Means and Standard Deviations: U.S. and California

Variable	Unweighted Mean	Weighted Mean	Weighted Standard Deviation
Value of Shipments*	2142499	1707848	2890197
Value Added	148899	118772	231349
Employment	461	372	500
Air Pollution Abatement Investment	2647.266	2096.317	7617.564
Net Abatement Investment	1907.022	1495.47	7475.146
Depreciation of Abatement Capital	740.245	600.8471	1795.955
New Regulation Adoption Dates	0.06531	0.05263	0.36945
New Regulation Compliance Dates	0.04963	0.04076	0.2670
New Increased Stringency Dates	0.01463	0.01194	0.1357
Abatement Operating Costs	8294.088	6585.689	16607.46
Difference in Abatement Operating Costs	160.628	141.242	6951.422
South Coast Indicator	0.06792	0.0555	0.22900
California Indicator	0.13636	0.1285	0.3347
Texas Indicator	0.21630	0.2080	0.4060
Louisiana Indicator	0.09874	0.0943	0.2923

* Thousands of 1991 dollars deflated by the PPI.
Source: Pollution Abatement Costs and Expenditures micro data.
Note: The sample contains 1914 observations weighted to represent 2425 plant-years in the population. Sampled from 1979-91, excluding 1983 and 1987. 1992 and 93 data were excluded due to errors. Variables in differences are defined for only those plants in the sample for two consecutive years. Employment is measured in single persons.

Table 7:

Air Pollution Capital Abatement and Regulation

			Net Investment	Weighted	CA, TX, LN
	1	2	3	4	5
South Coast	3109.595 (1361.082)	94.048 (2275)	626.017 (2159.714)	351.264 (2230.178)	1720.04 (2370.629)
California	1126.653 (651.939)	1133.361 (657.063)	825.527 (649.188)	677.151 (583.810)	-297.053 (856.050)
Louisiana					913.701 (1052.369)
Adoption		-636.040 (829.091)	-799.697 (777.092)	-476.073 (831.672)	-2053.156 (923.061)
Compliance		3259.787 (1543.718)	2668.115 (1352.257)	3342.35 (1574.338)	3194.832 (1609.215)
Increased Stringency		5654.71 (3319.96)	5218.969 (3075.041)	6400.267 (3290.404)	4652.069 (3401.78)
Observations	1914	1914	1914	1914	920
R^2	0.055	0.076	0.0845	0.0699	0.0998

Table 8:

Air Pollution Operating Costs and Regulation

	Levels 1	Levels 2	Differences 1	Differences 2
South Coast	2177.769 (1936.457)	-902.975 (2947.176)	96.854 (867.984)	1036.811 (1049.456)
California	5109.752 (1418.036)	5113.708 (1420.291)	276.913 (631.077)	271.984 (631.902)
Adoption		391.455 (1125.326)		-597.787 (974.368)
Compliance		2962.958 (2038.145)		17.231 (513.626)
Increased Stringency		2428.385 (3252.545)		-2436.744 (1548.305)
Observations	1914	1914	1552	1552
R^2	0.0179	0.0194	0.0063	0.0084

Table 9:

Total Factor Productivity Results

Year	Quasi-Fixed Price Productivity	Region				
		USA	California	Louisiana	Texas	SCAQMD
1977:	P_{it}[1]	1.15	1.20	1.17	1.16	1.18
	P_t[2]	1.15	1.13	1.20	1.17	1.13
	P[3]	1.11	1.08	1.16	1.11	1.08
1982:	P_{it}	1.13	1.20	1.12	1.11	1.16
	P_t	1.13	1.08	1.14	1.16	1.05
	P	1.16	1.10	1.20	1.18	1.04
1987:	P_{it}	1.19	1.14	1.20	1.24	1.13
	P_t	1.19	1.03	1.25	1.26	1.03
	P	1.16	1.02	1.21	1.23	1.04
1992:	P_{it}	1.16	1.20	1.14	1.16	1.20
	P_t	1.16	1.13	1.18	1.20	1.15
	P	1.12	1.11	1.14	1.15	1.13
1977-1992:	P_{it}	1.15	1.19	1.15	1.15	1.17
	P_t	1.15	1.10	1.18	1.18	1.08
	P	1.13	1.08	1.17	1.16	1.08

Note: Material inputs and outputs (% of input/output value) for which we calculate fixed prices:
Inputs: Domestic crude (45%), Foreign crude (34%), Foreign unfinished oils (1.7%), Natural gas C_4, 80% purity (1.6%), Isopentane and natural gasoline (1.1%).
Outputs: Motor gasoline (47%), Distillate fuel oil (17.6%), Jet fuel: kerosene type (7%), Heavy fuel oils (3.2%), Liquefied refinery gases: other uses (1.6%), Jet fuel: naphtha type (1.2%), Paving grade asphalt (1.0%).
Percentages are from 1992 statistics. See Tables 1 and 2 for sources.

[1] P_{it}: Productivity measure calculated using current plant-specific implicit prices (value/quantity for each plant year).
[2] P_t: Productivity measure calculated using the weighted average of P_{it} in each year.
[3] P: Productivity measure calculated using the weighted average of P_{it} in all years.

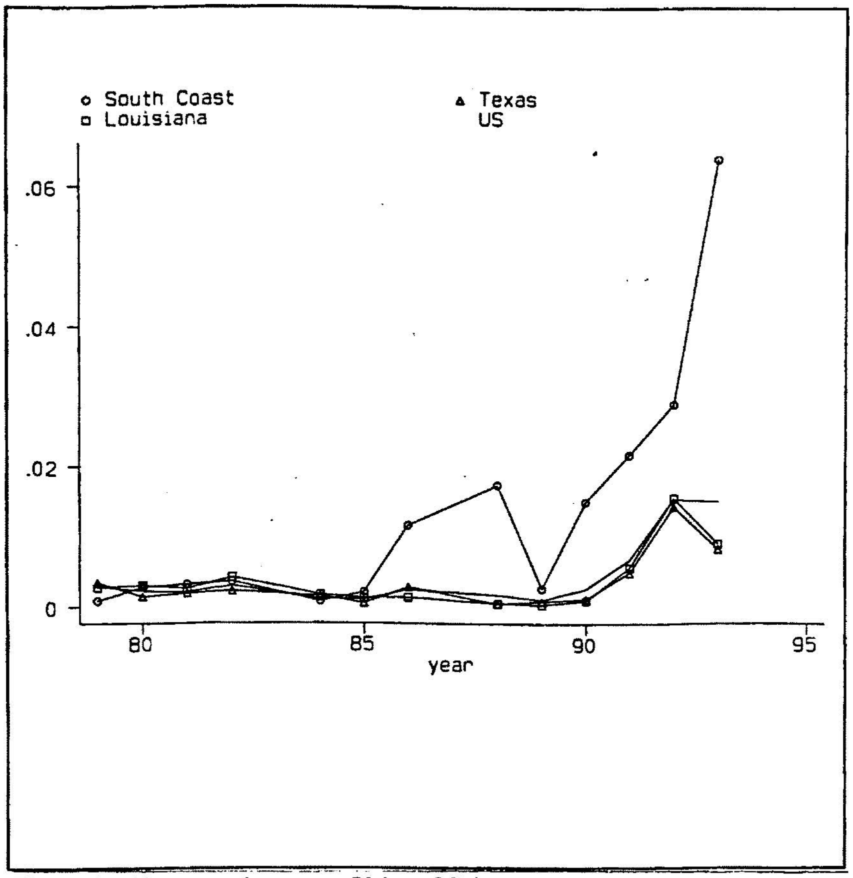

Figure 1: Abatement Investment/Value of Shipments
Source: PACE Survey

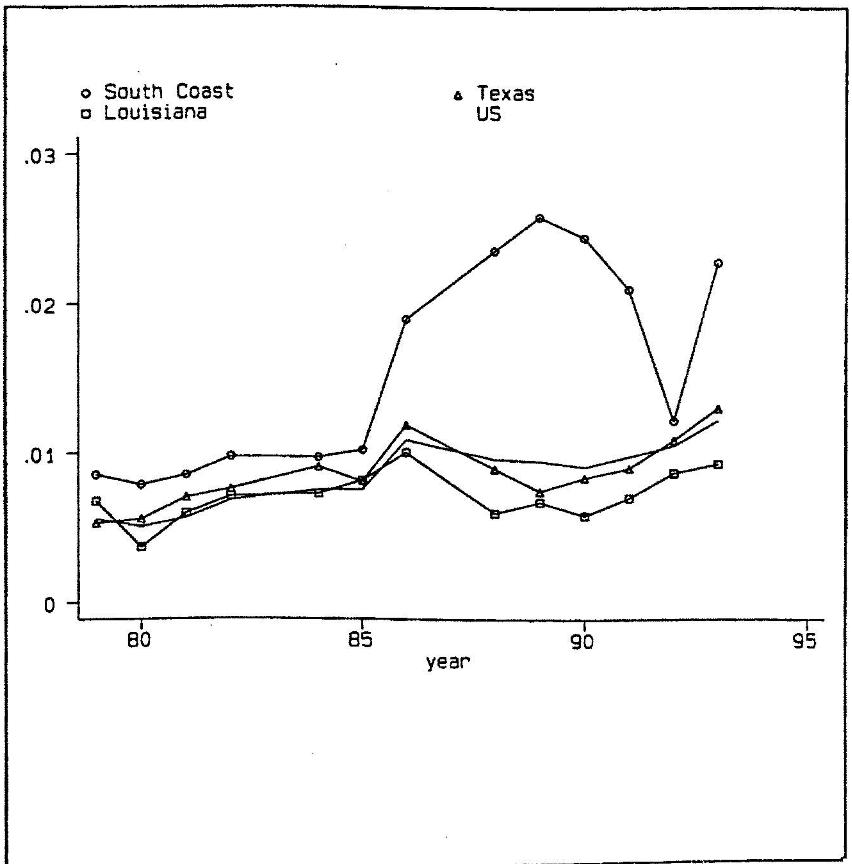

Figure 2: Abatement Cost/Value of Shipments
Source: PACE Survey

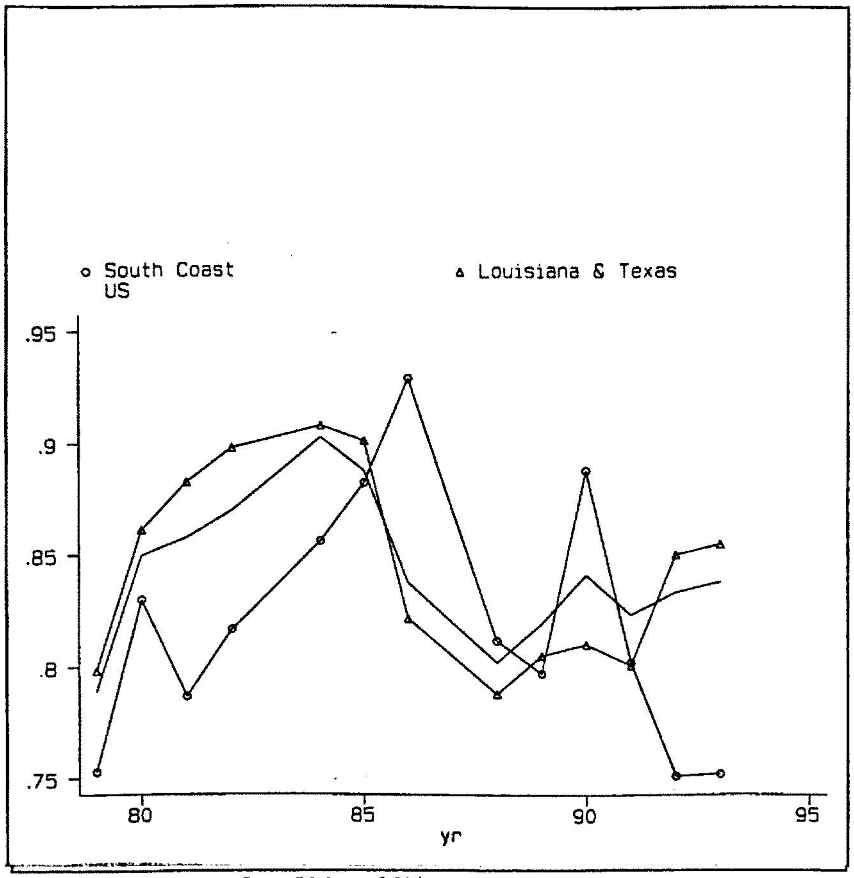

Figure 3: Abatement Costs/Value of Shipments
Source: PACE Survey

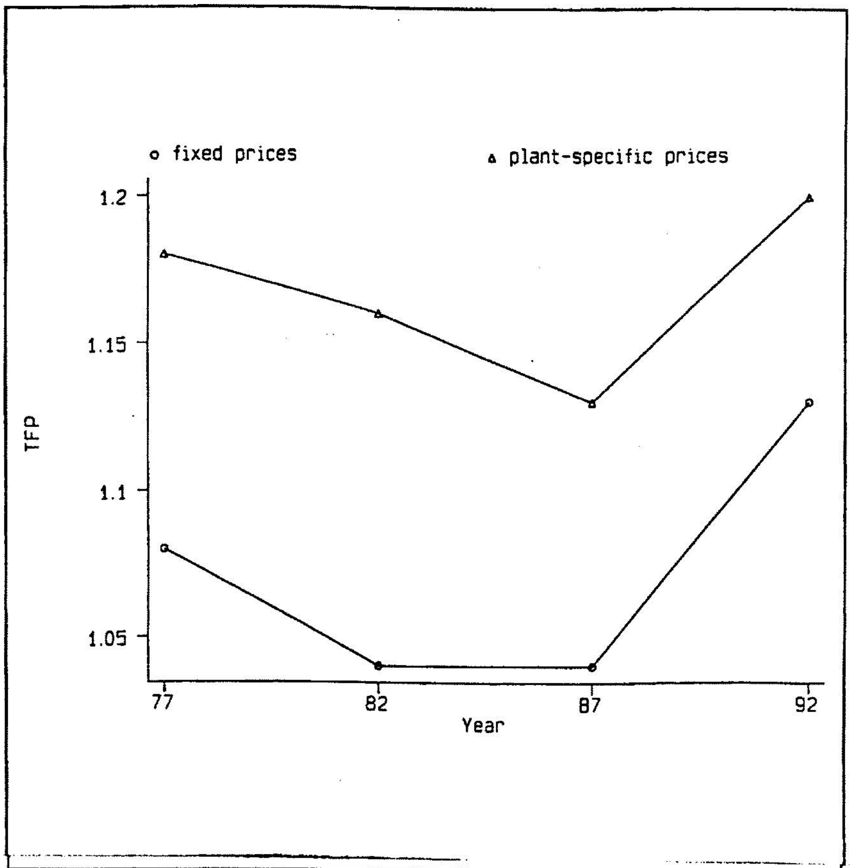

Figure 4: South Coast TFP: Fixed and Plant Specific Prices
Source: COM

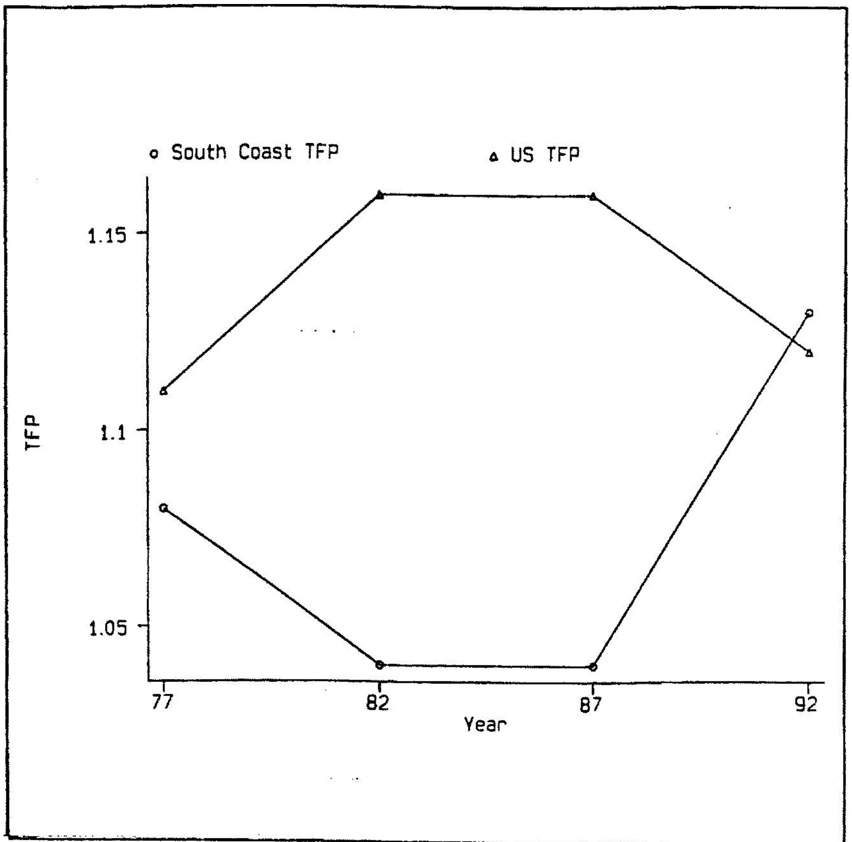

Figure 5: South Coast & U.S. TFP 1977-92
Source: COM
Note: See notes to Table 9.

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Does environmental compliance pay?

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This paper examines the relationship between the environmental compliance and financial performance of large US companies. The environmental performance is measured in penalties assessed for violations of environmental regulations. The financial performance is represented by the profit margins. The regression models developed in this paper suggest that the degrees of environmental compliance have a positive influence on the profit margins. Conventional economic wisdom is that regulations impose costs and restrictions and, therefore, put companies at a competitive disadvantage. However, this paper is consistent with the proponents of environmental regulations who argue that tough regulations force companies to be innovative and as a result make them more productive.

Keywords: regulations; performance; competitive advantage

Introduction

Over the last 25 years, unprecedendent improvements in environmental quality have taken place in the US. The air most Americans breathe is pure, six in ten rivers and streams are suitable for fishing and swimming and most dangerous waste sites have been identified and are being cleaned. Although Americans are driving more miles, auto-emissions have been cut down significantly. According to the US Environmental Protection Agency (1994), total releases by industry had been cut down to 3.2 billion lb (approximately 1.5 billion kg) in 1992 from 4.9 billion (neatly 2.25 billion kg) in 1988. However, these improvements have been achieved at a very high cost. Americans pay approximately $110 billion a year to reduce pollution and environmental degradation and this expenditure is rising. As a proportion of gross domestic product, US environmental spending is approximately 2.2% as compared with 1.6–1.8% for Germany and 1–1.5% for Japan. Command and control regulations have severally restricted industry's ability to decide on its production problems. This has resulted in suboptimal choices about technologies, product designs, product mixes and plant locations. Studies show that environmental regulations reduce productivity (Gray and Shadbegian, 1995). Environmental regulations are blamed for rising lay-offs. Companies argue that environmental regulations are putting them at a severe competitive disadvantage with companies operating in other countries as those companies are not subjected to the same stringent regulations. In addition, they claim that stringent environmental regulations are driving new plants and jobs abroad.

The purpose of this paper is to examine whether non-compliance with environmental regulations provides any competitive advantage to companies. The question being addressed in this paper is whether lack of compliance creates an uneven playing field in a competitive market. The compliance with environmental regulations is measured in total amounts of penalties assessed under various environmental regulations normalized by domestic sales. The pay-off is measured in profit margins.

Background

According to Abelson (1993), there is a 'pathological growth of regulations' in the US. The US Environmental Protection Agency answered to more than 90 committees and subcommittees in 1993 as compared to a mere 15 in the 1970s. The direct annual cost of complying with these requirements is more than $500 billion. More than 125 000 federal bureaucrats are formulating more regulations. Besides the US Congress, states and towns are formulating their own laws of further compliance for companies. Rising threats of lawsuits are forcing companies to change operations to reduce the consequences of legal actions rather than to take advantage of the benefits of environmental planning. During the 1980s, on average approximately 100 were indicted for environmental crimes each year; seven in ten involved in criminal indictments were individuals, 12% were publicly traded stock companies, the median criminal fine for an organization was $50 000 and was rising and approximately one in three individuals

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convicted along with their corporate employers was to serve 7 months in jail and more than one in two individuals convicted without a corporate defendant was to serve 18 months of jail time (Tietenberg, 1991). According to the US Department of Justice, criminal indictments rose from approximately 40 in 1983 to 174 in 1992. The federal fines collected in 1992 exceeded $163 million. The value of federal environmental actions approached $2 billion in 1992 (Council on Environmental Quality, 1993). Therefore, it is of no surprise that compliance with regulations is the top environmental concern of most business leaders according to a survey conducted by McKinsey & Company (1994).

There are two schools of thought on environmental regulations. According to opponents, environmental regulations reduce productivity, destroy jobs, waste resources and drive new plants and investments abroad. For example, Walley and Whitehead (1994) argued that highly profitable environmental projects have been identified and it will be hard for companies to come up with so called 'win–win' projects that will produce positive returns. They also argued that environmental regulations are destroying stock market values of corporations and, therefore, managers should consider shareholder values rather than compliance, emissions or costs when evaluating environmental issues. On the other hand, Porter and van der Linde (1995) argued that innovations and resource productivity caused by regulations will make companies more productive and competitive. Green processes will increase yields, improve utilization of by-products, reduce material handling costs, make work places safer and reduce waste disposal costs. Green products will reduce product costs, cut down packaging costs and improve product resale and scrap values.

Lower emissions should mean lower costs. The wastes discharged consist of materials, labour and equipment hours for which a company has paid. Waste management activities do not add value, instead they add costs of handling, transportation and disposal. Higher pollution typically means inefficient manufacturing processes. Lower pollution improves process yields, enhances the utilization of by-products, lowers energy consumption, makes work places safer and ultimately reduces product costs. The product with higher quality, lower packaging, easy disposal and higher safety secures higher market shares and premium prices. For example, chlorine-free papers secured an initial premium of approximately 25% and 'green' refrigerators 5–10%. Higher prices and lower costs should, therefore, offer higher profit margins to companies producing less pollution (see Figure 1).

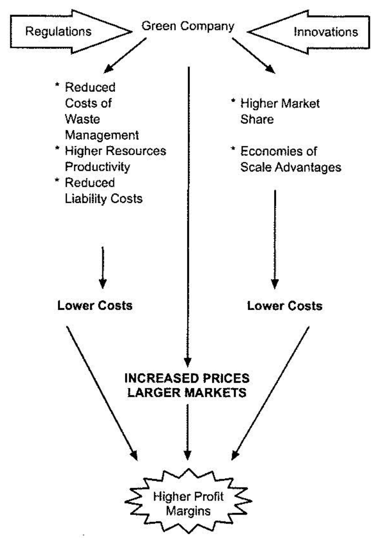

Fig. 1. Relationship between compliance and profit margins.

Data sources

The *Corporate Environmental Profiles Directory* prepared by the Investor Responsibility Research Center (1993) is the major source of data for environmental compliance. This directory contains environmental performance data of large US companies belonging to the Standard and Poor 500 index. The compliance data is represented by the total value of penalties assessed under the Resource Recovery and Recovery Act (RCRA), Clean Air Act (CAA), Clean Water Act (CWA), Safe Drinking Water Act (SDWA), Toxic Substances Control Act and Federal Insecticide, Fungicide and Rodenticide Act (TSCA/FIFRA), Occupational Safety and Health Act (OSHA), Atomic Energy Act (AEA), Mining Safety and Health Act (MSHA) and Endangered Species Act (ESA). The penalties include all reported criminal, civil and administrative penalties assessed against companies for violating a particular environmental law. The penalties are adjusted by dividing the total penalties by domestic revenues for each year. The mean penalty per $1 million of revenue is used as a measure for environmental compliance. A higher penalty per $1 million of revenue represents a higher degree of non-compliance. The financial performance is measured in profit margins. The financial data is from the Compustat database.

Methodology

The objective of this paper is to analyse the impact of compliance on profit margins (sales less cost of goods sold).

It is assumed that the production function of a business can be represented by a Cobb–Douglas function. The inputs consist of assets and labour (employees). The production function can be written as profit margin = constant $(\text{assets})^{a_1}(\text{labour})^{a_2}$. Taking the logarithm of both sides of the equation and replacing log of the constant by a_0, we obtain

$$\text{log profit margin} = a_0 + a_1 \text{ log assets} + a_2 \text{log employees} + \text{error terms} \quad (1)$$

The effects of research and development, advertisement expenses, age of the plant and degrees of environmental non-compliance are incorporated by rewriting Equation 1 as

$$\begin{aligned}\text{log profit margin} &= a_0 + a_1 \text{ log assets} + a_2 \text{ log employees} + a_3 \text{ log R\&D} \\ &+ a_4 \text{ log advertisement} + a_5 \text{ age} + a_6 \text{log (penalties/sales)} + \text{error terms} \quad (2)\end{aligned}$$

Assets should have a positive influence on profit margins. When assets increase, the profit margins typically increase. Similarly, when the number of employees is increased, the profit margin should increase. Therefore, both a_1 and a_2 should be positive. Research and development spending should result in increased profit margins and therefore a_3 should also be positive. Since advertisement expenditure should positively affect profit margins, the sign of a_4 should be positive. Older plants typically have lower productivity and therefore should affect profit margins negatively. a_5, therefore, should be negative.

It is also possible to rewrite Equation 2 by diving penalties/sales by the industry mean of penalties/sales to account for industry effects:

$$\begin{aligned}\text{log profit margin} &= b_0 + b_1 \text{ log assets} + b_2 \text{ log employees} + b_3 \text{ log R\&D} \\ &+ b_4 \text{ log advertisement} + b_5 \text{ age} + b_6 \text{ log (penalties/sales normalized by industry mean)} + \text{error terms} \quad (3)\end{aligned}$$

To remove any fixed effects for different companies, Equation 2 can be rewriten as

$$\begin{aligned}(\text{log profit margin}_{1990} - \text{log profit margin}_{1988}) &= c_1 (\text{log assets}_{1990} - \text{log assets}_{1988}) \\ &+ c_2 (\text{log employees}_{1990} - \text{log employees}_{1988}) \\ &+ c_3 (\text{log R\&D}_{1990} - \text{log R\&D}_{1988}) \\ &+ c_4 (\text{log advertisement}_{1990} - \text{log advertisement}_{1988}) \\ &+ c_5 \text{ age} + c_6 \text{ log (penalties/sales)} + \text{error terms} \quad (4)\end{aligned}$$

In Equation 4, the subscripts represent years.

The company data about assets, number of employees, research and development expenditures, advertisement expenditures, age of the plant and profit margins are from the Compustat database for the years 1987 and 1990. The compliance data for individual companies is the mean of the years 1988–1990. Various parameters can be computed by regressing logarithms of profit margins against logarithms of assets, number of employees, research and development expenditures, advertisement expenses and penalties and the age of the plant.

Empirical results

The regression outputs using Equations 3–5 are given in Table 1. In model 1, profit margins are regressed against assets, employees, research and development expenses, advertisement expenses, age of the plant and penalties per \$1 million of revenue. The signs are as expected and are statistically significant at the 95% level. The F value indicates that the probability of all parameters being zero is very low. The R^2 value of 0.872 suggests that the variations in the dependent variables can explain approximately 87.42% of the variations in the profit margins. The sign for the penalties' parameter is negative, suggesting a negative relationship between environmental non-compliance and profit margins. This result is statistically significant at the 95% confidence level.

Model 1 can be modified by replacing penalties/sales by penalties/sales normalized by industry means. Penalties/sales of each company can be divided by industry mean penalties/sales. There is not much change in the regression results. The signs are as expected. The F value suggests that the probability that all parameters are zero is very low. The R^2 value of 0.8878 indicates that the independent variables explain approximately 89% of the variations in the dependent variable. The sign for the parameter of penalties/sales normalized by industry means is negative. This indicates that there is a negative relationship between non-compliance and profit margins. However, statistical significance suggests that there is only approximately 0.7278 confidence in this conclusion.

Model 3 removes any fixed effects different companies might have on profit margins. The data for 1988 and 1990 is used. Again the F statistic suggests that the probability that all parameters are zero is very low. The R^2 value of 0.8986 indicates that the significant variations in the dependent variable are explained by independent variables. The signs are as expected. The sign for a non-compliance term is negative suggesting negative relationships between non-compliance and profit margins. The statistical significance of this result is >0.95.

To sum up, based on the above results, it is possible to state confidently that non-compliance negatively influences the profit margins of companies. In other words, non-compliance does not create an uneven playing field and a

Table 1. Regression models for profit margins

Model 1

log profit margin $= a_0 + a_1$ log assets $+ a_2$ log employees $+ a_3$ log R&D $+ a_4$ log advertisement $+ a_5$ age $+ a_6$ log (penalties/sales) + error terms

a_0	a_1	a_2	a_3	a_4	a_5	a_6
1.116 (0.0001)	0.650 (0.0001)	0.235 (0.0001)	0.021 (0.0012)	0.027 (0.0002)	−0.000 (0.0383)	−0.0361 (0.0381)

Number of observations = 187
Prob$>F = 0.0001$
$R^2 = 0.8742$

Model 2

log profit margin $= b_0 + b_1$ log assets $+ b_2$ log employees $+ b_3$ log R&D $+ b_4$ log advertisement $+ b_5$ age $+ b_6$ log (penalties/sales normalized by industry mean) + error terms

b_0	b_1	b_2	b_3	b_4	b_5	b_6
1.085 (0.0001)	0.644 (0.0001)	0.250 (0.0001)	0.022 (0.0004)	0.032 (0.0001)	−0.000 (0.0284)	−0.021 (0.2728)

Number of observations = 184
Prob$>F = 0.0001$
$R^2 = 0.8878$

Model 3

(log profit margin$_{1990}$ − log profit margin$_{1988}$) $= c_1$ (log assets$_{1990}$ − log assets$_{1988}$) $+ c_2$ (log employees$_{1990}$ − log employees$_{1988}$) $+ c_3$ (log R&D$_{1990}$ − log R&D$_{1988}$) $+ c_4$ (log advertisement$_{1990}$ − log advertisement$_{1988}$) $+ c_5$ age + c6 log (penalties/sales) + error terms

c_0	c_1	c_2	c_3	c_4	c_5	c_6
0.0476 (0.3647)	0.6939 (0.0001)	0.2013 (0.0002)	0.1180 (0.0458)	0.0338 (0.0458)	−0.0000 (0.0242)	−0.0447 (0.0394)

Number of observations = 186
Prob$>F = 0.0001$
$R^2 = 0.8986$

Numbers in parentheses represent the level of statistical significance.

company cannot generate superior financial results by ignoring environmental laws.

Conclusions

The US spends more on pollution abatement as a proportion of gross domestic product than any other country in the world. Many policy makers fear that the US cannot afford the additional costs of stronger environmental regulations and, therefore, are demanding curtailment of environmental regulations at the federal level. This paper examines the relationship between the degrees of environmental compliance and profit margins of large US companies. A positive relationship between compliance and profitability is found based on the regression models. The analysis presented in this paper suggests that companies with higher degrees of compliance have greater profit margins. Contrary to the conventional wisdom that compliance reduces profitability, the analysis presented in this paper suggests that non-compliance does not bestow any competitive advantage on companies. According to Porter (1990), 'strict government regulations can promote competitive advantage by stimulating and upgrading domestic demand'. Tough product standards can force companies to respond to consumer demands. The relaxation of standards is counterproductive. The conclusion in the present paper is consistent with Porter (1990) hypothesis.

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