



EPA Presents

THE NATIONAL BUILDING COMPETITION

Working off the Waste with ENERGY STAR®

2010 COMPETITION SUMMARY





On April 27, 2010, EPA launched the first-ever National Building Competition. Teams from fourteen buildings of all shapes and sizes located around the country went head to head to see who could work off the waste with help from EPA's ENERGY STAR program and reduce their energy use the most.

The teams faced numerous challenges, including equipment malfunctions, staff departures, extreme temperatures, and tight budgets. In the face of these challenges, the competitors demonstrated that a strategic approach to energy efficiency can help organizations overcome obstacles and achieve sustained, lasting improvement.

Together, the contestants reduced their energy consumption by more than 44 million KBtu a year, saved more than \$950,000, and reduced greenhouse gas emissions equal to the annual electricity use of nearly 600 homes.

These fourteen organizations are changing the landscape of energy efficiency in the buildings where Americans work, play, and learn.

Victory was hard fought. One competitor came out ahead. All fourteen are winners.

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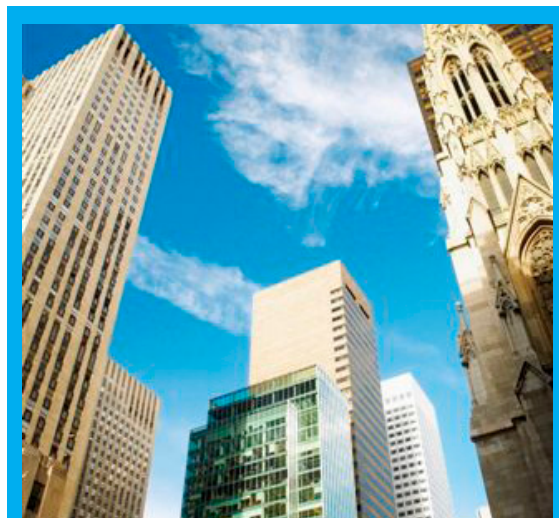
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Buildings and Climate Change

Every building, from the smallest school to the tallest skyscraper, uses energy most often generated by the burning of fossil fuels. The burning of fossil fuels releases greenhouse gases into the atmosphere and contributes to climate change. In fact, the nearly 5 million buildings in the U.S. where we work, play and learn are responsible for nearly 20 percent of both the nation's energy use and greenhouse gas emissions at a cost of over \$100 billion per year.

For nearly two decades, EPA's ENERGY STAR program has offered powerful tools that have revolutionized energy efficiency in the commercial marketplace. At the heart of this transformation is the importance of measuring energy use in order to manage it. The energy performance of hundreds of thousands of buildings representing billions of square feet has been measured through ENERGY STAR, and tens of thousands of buildings across all 50 states and the District of Columbia have earned the ENERGY STAR label for superior energy efficiency. The results speak for themselves—in 2008 alone, ENERGY STAR partners in the commercial marketplace helped prevent greenhouse gas emissions equal to the annually electricity use of more than 60 million American homes.

Despite this tremendous progress, a great deal of work remains to be done. Innovative solutions are needed to drive greater consumer awareness and demand for energy efficiency as well as to create a national dialogue about the role everyone plays in improving the energy efficiency of the places where we work, play, and learn.



30%

of the energy that buildings use every day is wasted. Rooting out inefficiencies and other sources of energy waste can save billions of dollars each year.

Why a "Waste Loss" Competition?

For years, many organizations have been dedicating substantial time and effort to improving the energy efficiency of the buildings they own or manage, with impressive results. However, the energy efficiency of commercial buildings was a topic of conversation among a pretty narrow audience. It wasn't something you'd see on the evening news or discuss at the dinner table.

The concept of going on a diet and working off the pounds is one many Americans can relate to—and the steps involved with healthy weight-loss are the same steps as those to strategically work off energy waste.

These steps include: set a goal; regularly weigh-in; make improvements following a strategic approach (not a crash diet); share tips and ideas with others on a similar journey; and celebrate success. Here was the analogy that would bring the energy efficiency conversation to the dinner table. America



could follow along and cheer as teams from buildings across the country worked to reduce energy use in much the same way many of us have tried to shed those extra pounds.

A quick look at a few popular national pastimes shows that America also has a competitive streak. From March Madness and Monday Night Football to American Idol and Survivor - we love a good game. This facet of American culture added the final dimension to EPA's strategy—a head to head competition. Put a diverse group of buildings on a diet, add a dash of spirited rivalry and a little national media attention, and you've got an idea that could help raise awareness and spur greater energy efficiency in the buildings where Americans work, play, and learn.

And thus EPA's National Building Competition was born.



Selecting the Final Fourteen

EPA selected fourteen contestants out of a pool of nearly 200 applications from ENERGY STAR partners. The final group represented a variety of commercial buildings of different types, sizes, ages, and locations—including a building constructed in 1896 and another in 2006 as well as one representing 60,000 square feet and another covering nearly one million square feet. The starting “weight” of the final fourteen contestants also varied. Some were using a great deal of energy and were significantly “overweight” at the start of the competition while others were already making progress and performing better than the average building. The final group of contestants reflected the philosophy of the competition—that everyone could set a goal and improve energy efficiency.



Rules of the Game

The game was straightforward: the building that demonstrated the greatest percent-based reduction in weather-normalized energy use intensity during the 24-month performance period was recognized as the winner.

The competition was designed to be transparent, rooted in objective analysis, and to work within the existing infrastructure and tools available through the ENERGY STAR program:

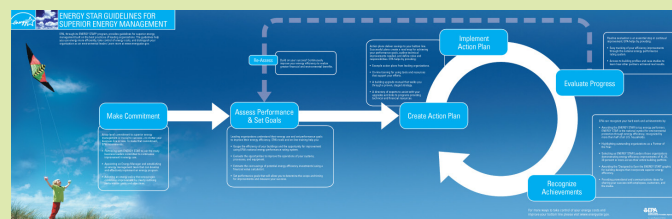
- Any ENERGY STAR commercial or industrial partner could apply for the National Building Competition by nominating one or more of the commercial facilities they own or manage.
- Participants were required to benchmark and share their building’s monthly energy use data with Portfolio Manager, EPA’s ENERGY STAR online energy measurement tool. The competition was based on 24 months of energy use data (September 1, 2008 – August 31, 2010).
- Participants were required submit monthly energy use data for each fuel source from their utility or third party provider for the entire 24 months of the competition in order to provide independent verification of the performance of each contestant. Participants were also required to submit a signed statement certifying the accuracy of all data entered into Portfolio Manager for the competition.

Contestants also agreed to participate in a mid-point “weigh-in” that identified the weather-normalized energy use intensity and percent-based energy reduction of each competitor as of the halfway mark; educate and incorporate the building’s occupants into its energy savings plan, if not already doing so; share information with the media and the general public about steps taken to reduce energy use; and, in the case of the winner, host a media event at the building.

Tools for an Energy Efficient Lifestyle

The National Building Competition encouraged an energy efficient lifestyle—not a fad diet—where improvements and behaviors were sustainable and replicable. EPA offered

well as the ENERGY STAR Building Upgrade Manual and other technical resources available from EPA. The measurement, tracking and verification elements of the competition



EPA’s ENERGY STAR Guidelines for Energy Management provide a roadmap for organizations to use as they get started on the road to efficiency.

support and guidance to help contestants along the way. The “How To” guidance for improving energy efficiency was outlined in EPA’s Guidelines for Energy Efficiency as

were accessed through Portfolio Manager. The ENERGY STAR partner network offered a pool of mentors and trainers committed to energy efficiency and superior energy management. Monthly calls with

the competitors and EPA as well as regular email communications provided valuable assistance and advice.

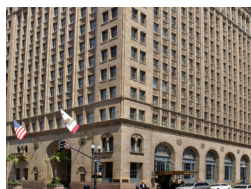
Meet the Competitors



1525 Wilson Boulevard, Arlington, VA
Sitting on top of a hill across the Potomac River from Washington, D.C., this 12-story office building covers more than 316,000 square feet and was built in 1987.



522 Fifth Avenue, New York City, NY
Originally constructed in 1896, this Class A Midtown office building has recently undergone a facelift and the building's new management team has made energy efficiency a priority for this 595,000 square foot facility.



Courtyard by Marriott San Diego Downtown, San Diego, CA
Occupying an old 1920s bank building in San Diego's historic Gaslamp District, the Courtyard by Marriott encompasses 182,000 square feet and offers guests eco-friendly options.



Crystal River Elementary School Carbondale, CO
Don't let the backpacks and sneakers throw you off; twelve middle school math students make up the all-star Energy Team that is helping this 80,000 square foot elementary school built in 2006 become more energy efficient.



JCPenney Store #1778, Los Angeles, CA
At this 100,000 square foot JCPenney store built in 1977, daily energy use reports are posted for all associates to see, including comparisons to the company's other stores, to help raise awareness and motivate action.



Maplewood Mall, Saint Paul, MN
Built in 1976 and covering 945,000 square feet, all managers at the Maplewood Mall are trained in reducing energy costs, and energy savings are part of the operations director's annual goal.



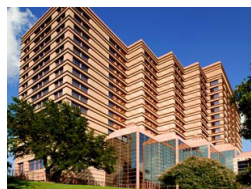
Memorial Arts Building at Woodruff Arts Center, Atlanta, GA
The team from the Memorial Arts Building has set their sights on "greening the arts" with this 295,000 square foot building constructed in 1968.



Morrison Residence Hall, Chapel Hill, NC
Morrison Dormitory is a 10 story, 200,000 square foot residence hall constructed in 1965. Housing 800 students, it is home to the campus' Sustainability Living Learning Community.



Sears Glen Burnie, Glen Burnie, MD
This Sears store, built outside Baltimore in 1996, covers 195,000 square feet and is stepping up its energy efficiency by replacing lighting and training employees on effective ways to manage energy use in the store.



Sheraton Austin Hotel at the Capitol, Austin, TX
Covering 330,000 square feet, the Sheraton Austin Hotel at the Capitol, built in 1986, goes green year-round through monthly energy audits and retrofits.



Solon Family Health Center, Cleveland, OH
Built in 1978, the Cleveland Clinic's Solon Family Health Center covers 60,000 square feet and improved maintenance procedures and made upgrades, and they even help employees fund their own energy-saving project ideas.



Tucker Residence Hall, Raleigh, NC
Tucker Residence Hall is a 63-year-old dorm that covers more than 67,000 square feet, houses NC State's first-year college program, and includes smart technology in the common areas.



Van Holten Primary School, Bridgewater, NJ
At Van Holten, a group of students monitors energy use and reminds staff and students of good energy behaviors at this older school built in 1963 covering 52,000 square feet.



Virginia Beach Convention Center, Virginia Beach, VA
The over 500,000 square foot Virginia Beach Convention Center was designed with innovation and energy efficiency in mind when it fully opened in January 2007.

Spreading the Word

EPA developed a multi-pronged strategy to tell the story of the competition, understanding that a combination of tactics would most effectively drive national interest in the competition. It was important to make it fun, interactive, and compelling so that the competition would inspire and motivate individuals and organizations across the country.

At the heart of the strategy was the weight-loss analogy. That helped drive the development of the competition identifier with a measuring tape around the “waist” of a building. This visual

helped explain the concept in a simple, visually appealing manner. The tag line “Working off the Waste with ENERGY STAR” also helped draw the connection between the purpose of the competition and the EPA as sponsor.

A new partnership between EPA and television personality Bob Harper from NBC’s hit show, *The Biggest Loser*, also reinforced the weight-loss analogy and helped tell the energy efficiency story. As the competition’s celebrity trainer, Bob Harper provided a series of four short videos that offered encouragement and tips for the buildings participating in the competition. Bob’s videos drew heavily on the energy fitness analogy and attracted thousands of viewers on YouTube and the competition’s website. While Bob’s training tips were directed at the competitors, they were relevant for any individual or organization interested in improving energy efficiency and fighting climate change. The addition of a celebrity fitness trainer helped the competition reach and connect with mainstream America.

The social portal of the competition was its website, energystar.gov/BuildingContest. Loaded with pictures and videos as well

Meet the Competition’s Celebrity Trainer: Bob Harper

Through a series of four engaging videos, television personality Bob Harper of NBC’s hit show *The Biggest Loser* encouraged the fourteen teams and followers nationwide to improve their energy fitness and fight climate change. (energystar.gov/BuildingContest)

A Social Group

twitter.com/EnergyStarBldgs/contestants

A live Twitter feed on the National Building Competition website provided a virtual library of energy management project ideas, tips, and suggestions. EPA also offered countdown clues on Twitter hinting at the competition’s mid-point and final rankings. To the right and below is a small sampling of tweets, photos, and videos that competitors posted.



VFD’s, new lighting fixtures (some current fixtures are as old as the mall - 36 years!), re-circuiting. Do I hear, “Workin’ off the Waste”!



The heat wave has really given the HVAC units a workout. Monitoring EMS, we found a few units that needed a check-up. Repairs in process.



Today we worked with our banquets team on a program to ensure lights are off in unused banquet spaces. Pacing \$3,000 below budget for June!



Accenture, a 2-floor tenant, has set their monitors to go into “sleep mode” after 20 min of inactivity. Est. savings: 10,000 kWh per month!



If you forget to turn something off at Van Holten, the SEE Squad students will leave you an “Oops” sticker as a reminder!



Lighting retro-commissioning...from two-bulb, 64-watt fixture to a single bulb, 28-watt fixture with same light output. Amazing!



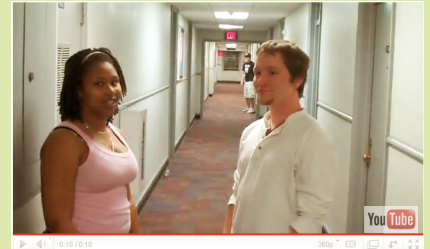
Cleveland Clinic pulled out all the stops for their energy-saving pep rally.



Installing new MERV 14 HVAC filters at Virginia Beach Convention Center



Bob Harper gives Crystal River Elementary School students tips for their energy diet.



Residents of Tucker Hall discuss the merits (and creepiness) of occupancy sensors in the halls.

as interesting content that was updated regularly, the competition website served as a powerful ambassador of the National Building Competition.

A unique feature of the website was a live Twitter feed with regular tweets from each contestant that kept viewers up-to-date on their activities. Tweets ranged from spirited proclamations of victory to technical project updates. The Twitter feed allowed viewers to follow along and learn about the ins and outs of energy management. It also offered the competitors a voice and gave a sense of real-time action rather than limiting the flow of information solely to after-the-fact reports and case studies. The Twitter feed created a virtual library of tips and suggestions that the competitors could draw upon for ideas and solutions that they may not otherwise have been aware of. With hundreds of tweets by the competitors and countless retweets by followers, the social media component of Twitter added a unique viral element to the competition.

The website also provided profiles of each contestant, the mid-point and final rankings of all competitors, and ideas for how everyone can save energy at home and at work. Contestants and viewers also received energy-saving tips and encouragement from an EPA blog and an "Advice from the Experts" blog authored by ENERGY STAR Partner of the Year award winners.

In the News

National and regional broadcast and print outlets as well as online and social media networking sites chronicled the launch and progress of the National Building Competition. Over 200 stories at the launch alone helped spread the word, drive awareness, and spur greater activity.

Advice from the Experts

To assist the competitors as well as competition followers in the quest to lower energy use, EPA assembled the best and brightest energy managers, efficiency experts, service providers, and sustainability professionals to blog about advice and best-practices. Topics included the business case for energy efficiency, how to get employees onboard,



Servidyne coaches an under-performing building into shape.

saving energy without leaving your desk, and more. In the spirit of the competition, a blog about nighttime walkthroughs from ENERGY

STAR Sustained Excellence award winner Servidyne, Inc. comes to life in a video and features an honorary National Building Competition mascot!

Watch at energystar.gov/BuildingContest

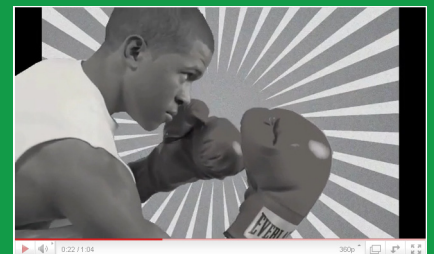
A College Rivalry Heats Up



Separated by only twenty miles in the Research Triangle area of North Carolina, the rivalry between the University of North Carolina (UNC) Tar Heels and the North Carolina State (NC State) Wolfpack is heated on both sides. The Tar Heels added the National Building Competition to their list of victories, but NC State gets

a prize for team spirit! Check out their Tucker Hall Victory Trailer and other student videos NC State developed during the competition on the ENERGY STAR YouTube Channel.

Watch all videos at: youtube.com/EPAEnergyStar



NC State created a spoof boxing video to play up their rivalry against UNC Chapel Hill.

Spotlight on Successful Strategies

The National Building Competition offers a rich inventory of best practices and successful strategies for improving the energy efficiency of commercial buildings. Many of the approaches employed by the fourteen teams serve as shining examples of how organizations can work off their own energy waste, and provide models for others to follow. Outlined below are five examples of successful strategies that help tell the story of how these fourteen buildings saved money and helped fight climate change.

1) Pursuing Energy Efficiency through a Whole Building Approach

While no two energy efficiency strategies are alike, the most successful competitors shared a common characteristic — rather than focusing on individual components, they addressed and balanced opportunities across building systems. Through the ENERGY STAR program, EPA recommends a five-stage approach to planning and implementing profitable, energy-saving building upgrades. Each stage includes changes that will affect the upgrades performed in subsequent stages, so when they are performed sequentially, they maximize opportunities for saving energy and money.

EPA's Building Upgrade Manual outlines the recommended stages, including retrocommissioning (ensuring systems are performing as intended), lighting, supplemental load reductions (reducing the energy used by people, computers, etc.), air distribution systems, and heating and cooling systems. While each facility has different needs and characteristics that influence just how the stages are implemented, UNC's Morrison Hall exemplifies the effectiveness of this approach through their best practices. Morrison identified and repaired underperform-

ing equipment, such as repairing and tuning their solar hot water system to provide maximum benefit. They also completed extensive lighting retrofits, including replacing 200 64-watt CFLs on balconies with 13-watt CFLs and changing out 50 20-watt halogen lamps with cooler and more efficient 4-watt LED lamps.

Morrison also made numerous adjustments to air distribution systems and HVAC systems to improve efficiency and has established procedures to ensure continuous improvement. The variable air volume (VAV) system settings were fine-tuned to reduce fan power requirements and eliminate wasteful simultaneous heating and cooling in overlapping zones. Economizers cool buildings by bringing in outside air when it's sufficiently cool



JCPenney's store manager, Nancy Gutzmer, is programming her lights to come on at store opening and to shut off at store close. The unit has the ability to program general lighting and accent lighting



A group of Colorado middle school students (pictured at left) entered nearby Crystal River Elementary School in the competition. With help from teachers, administration officials, and others, these young students have toured boiler rooms, spoken at school board meetings, and educated other students on ways to save energy in the school. See how they did on page 13.

and dry, and Morrison enabled these energy-saving controls below 65 degrees, thereby reducing the load on the compressor.

In a similar manner, at 522 5th Avenue Hines focused on tune ups and retrocommissioning systems; controlling lighting; heating and cooling only when necessary; and replacing chillers, pumps and variable speed drives (VSDs).

2) Improving Lighting

When tasked with cutting energy use, most competitors immediately set their sights on lighting. And with good reason—lighting generally makes up the largest portion of a commercial building’s electricity bill, accounting for more than a third of the electricity used. Inefficient lighting also produces large amounts of waste heat, or “heat gain.” By reducing heat gain, efficient lighting also reduces a building’s cooling requirements.

With good design, the energy consumed by lighting in most buildings can be cut at least in half while maintaining or improving lighting quality. What is good design? The competitors effectively demonstrated three lighting strategies:

- Increased passive daylighting
- Reduced unnecessary lighting
- Upgraded to more efficient lighting systems

A good start is to use daylight whenever possible. Marriott modified their lobby lighting scheme to take advantage of passive daylighting, while students at Van Holten and tenants at 1525 Wilson both worked by natural light whenever possible. Sheraton took it a step further by launching an internal contest to see which office could make the most out of natural light.

Competitors also worked to reduce or eliminate lighting where appropriate, by installing and using automatic controls to dim or turn off lights, and looking for opportunities to de-lamp (or reduce the number of lamps required per fixture). Occupancy sensors were a go-to technology, and competitors installed them in offices, restrooms, hallways, utility closets, and storage rooms to automatically turn off lights when no one is present. JCPenney



High-efficiency pumps, variable frequency drives, and a new chiller fill the new plant inside the Hines-managed 522 Fifth Avenue building.

also installed a lighting control panel that provides five different lighting—and energy-saving—levels for various store activities, while Virginia Beach Convention Center disabled unnecessary architectural lights outside meeting suites. Hines, the management company at 522 5th Avenue, set the building automation system to automatically turn off lights at 10:00 p.m., which has the added benefit of helping to prevent light pollution. And both Hines and Sears found opportunities for delamping, with fewer energy-efficient bulbs doing the same or better job as the lights they replaced.

Next up for competitors? Choosing lighting systems that are efficient and also deliver the right amount of light for the tasks being performed. Compact fluorescent lights (CFLs) were a popular choice for obvious reasons—on average, they use about 75 percent less energy, produce about 75 percent less heat, and last up to 10 times longer than standard incandescent bulbs. Among the numerous CFL projects completed by competitors, Virginia Beach

Convention Center changed 240 incandescent bulbs to energy-efficient CFLs in their meeting suites—saving an estimated \$6,920 annually.

Competitors also embraced light-emitting diode (LED) technology for its high efficiency, low heat loss, and durability. 1525 Wilson Boulevard, managed by Glenborough LLC, replaced 175 30-watt incandescent exit signs with 3-watt LED exit signs and



Replacing old lighting with light emitting diodes (LED) at JCPenney.

realized savings of about 3,400 kWh/month. Hines and Sheraton Austin Hotel at the Capitol also installed LED exit signs, which are at least 80 percent more efficient than their incandescent counterparts. JCPenney outfitted their store with 300 high efficiency LED light bulbs, which are expected to yield 4-6 percent energy savings, not including any additional savings from the heating, ventilation and cooling (HVAC) load reduction. Solon Family Health Center, Morrison Residence Hall, and Tucker Residence Hall had the same bright idea and installed new LED lighting in lobbies, halls, and other common areas.

3) Raising Awareness and Engaging Occupants

In addition to making technological changes to improve lighting and other building systems, all of the competitors recognized the critical role people play in driving down energy use. From educating occupants to turn off lights and enable power management features to engaging and rewarding staff for finding new opportunities to save energy, small changes can make a big impact.

Effective communication is the keystone for engaging occupants, and competitors spread the word in a variety of ways. Morrison hung laminated fliers with energy-saving tips and information in high traffic and captive audience areas. JCPenney posted notes and signs near light switches in every office area, hallway, and restroom as a reminder to turn off lights in unoccupied rooms. Hines used elevator cab energy dashboards to show energy use and motivate change. 1525 Wilson held an educational brownbag lunch that was attended by more than 70 people. Afterward, one of their primary tenants activated the “sleep mode” settings on monitors, saving an estimated 10,000 Kwh/month. The Schools for Energy Efficiency (SEE) program at Van Holton Primary School employed an eye-catching aware-

ness campaign including posters, light switch stickers, tip sheets, regular communication pieces, and educational classroom activities and assemblies. They also engaged students in a SEE squad, in which student volunteers monitored different areas of the building and left “Wow!” stickers for remembering to turn off lights and other electronics and “Oops” stickers as a reminder when equipment was left running.

Many of the competitors also built momentum by sharing results and rewarding improvement. Courtyard by Marriott San Diego Downtown created a Green Committee to identify sustainability opportunities and gave bonuses to associates based on reductions. They also created guest room door hangers with information about the contest, hung a bulletin board, and handed out information to guests upon check-in to motivate them to save energy during their stay. Sheraton offered a \$5 incentive to guests for participating in their Make a Green Choice program, which they also advertised online and explained at check-in. Solon offered incentives to each floor that actively participated in the competition, such as new cabinets in the break room or new water filters in the kitchen, and launched a parallel contest, “Walking off the Waste,” to encourage healthy living. Though many of these changes in behavior save only small amounts of energy at one time, taken continuously over a longer period, they can



The Solon Family Health Center tied in the building’s waste-loss goals in with the staff’s personal health goals. Employees began taking the stairs instead of the elevator — burning calories and saving energy at the same time!



As they pored over Tucker Hall’s steam bills for the purposes of this competition, the energy team at NC State University noticed something odd. Upon further examination, they discovered a leaky check valve near the steam meter. Up to that point, the meter had been measuring — and the utility had been billing for — not only steam, but also a near-constant flow

of leaking condensate. A few months after spending about \$1,000 to replace the leaky valve, NC State University Housing has already saved nearly \$20,000.

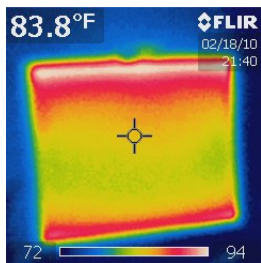
As a result, Tucker Hall’s percent reduction is an accurate reflection of their utility bill savings, but the exact change in energy use cannot be measured.

yield impressive results and provide big wins in the fight against climate change.

4) Using Innovative Diagnostic Tools

While many of the competitors turned to proven tools to find opportunities for savings, several competitors dug deeper into their toolboxes to find innovative and interesting technologies that might give them the edge. Two of these technologies include thermal imaging cameras and interval smart meters.

Thermal imaging cameras work by detecting infrared heat radiation and displaying colder objects as blue and warmer objects as red. They can be used to find areas of heat loss or gain that are otherwise invisible to the naked eye. Sears put their thermal imaging camera to work looking for hot equipment that could cause energy loss through inefficiencies. And the students at Van Holten were surprised to learn how much heat a computer monitor puts off when seen through the camera's viewfinder. It



Students at Van Holten learned how much heat a computer monitor puts off with help from a thermal imaging camera.

inspired them to keep monitors turned off when not in use to save energy and reduce heat gain.

JCPenney and Crystal River Elementary School also “see” energy efficiency opportunities with the help of an interval smart meter. Rather than waiting for a monthly energy bill—and potentially finding out about problems weeks late—both the store and the school are equipped with interval

smart meters that record energy usage in 15-minute intervals. These data are then used to estimate the daily energy use, which is reviewed so problems can be identified and addressed the next day.

5) Tracking & Reporting

As noted earlier, at the heart of the movement to make commercial buildings more energy-efficient is the importance of measuring energy use in order to manage it. Tracking and reporting played key roles in the success of these competitors, providing actionable data to inform decision makers and demonstrating the results of energy efficiency efforts.

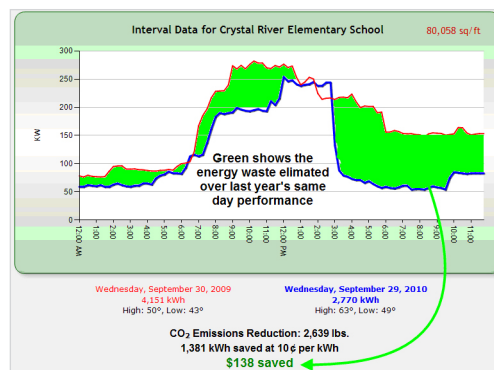
While all competitors were required to measure and track energy performance in EPA's Portfolio Manager, many competitors also supplemented this software with their own energy tracking technologies. Morrison and Hines both displayed energy use information on an intuitive dashboard, and Hines also put this information in front of occupants in elevator cabs to get them thinking about energy savings. JCPenney's Energy Center is a Web-based application that provides daily energy use updates to keep savings efforts on track, while Van Holten relies on utility tracking software to generate monthly and quarterly energy performance summaries and comparisons.

In addition to keeping track of energy use, reporting is crucial to maintaining momentum, showing progress, and demonstrating the value of efficiency efforts. To ensure continuous improvement, Morrison monitors energy consumption on a monthly basis for each commodity and investigates deviations in energy use of more than 5 percent. They also look for red flags in their building automation system, such as when a system is put into manual mode, indicating an occupant has overridden the controls.

Among the many different ways competitors show results, Van Holten shares quarterly reports of each building's energy use with key district personnel, reviews energy use with the district coordinator on a regular basis, and shares information about building progress and successes with staff, parents, and students. This builds further support among community members for energy efficiency efforts. Marriott holds monthly Green Meetings, posts their ENERGY STAR scores on their website, and reports their ENERGY STAR score quarterly to management and ownership. Likewise, Sheraton monitors energy consumption with daily reports and reviews information with staff

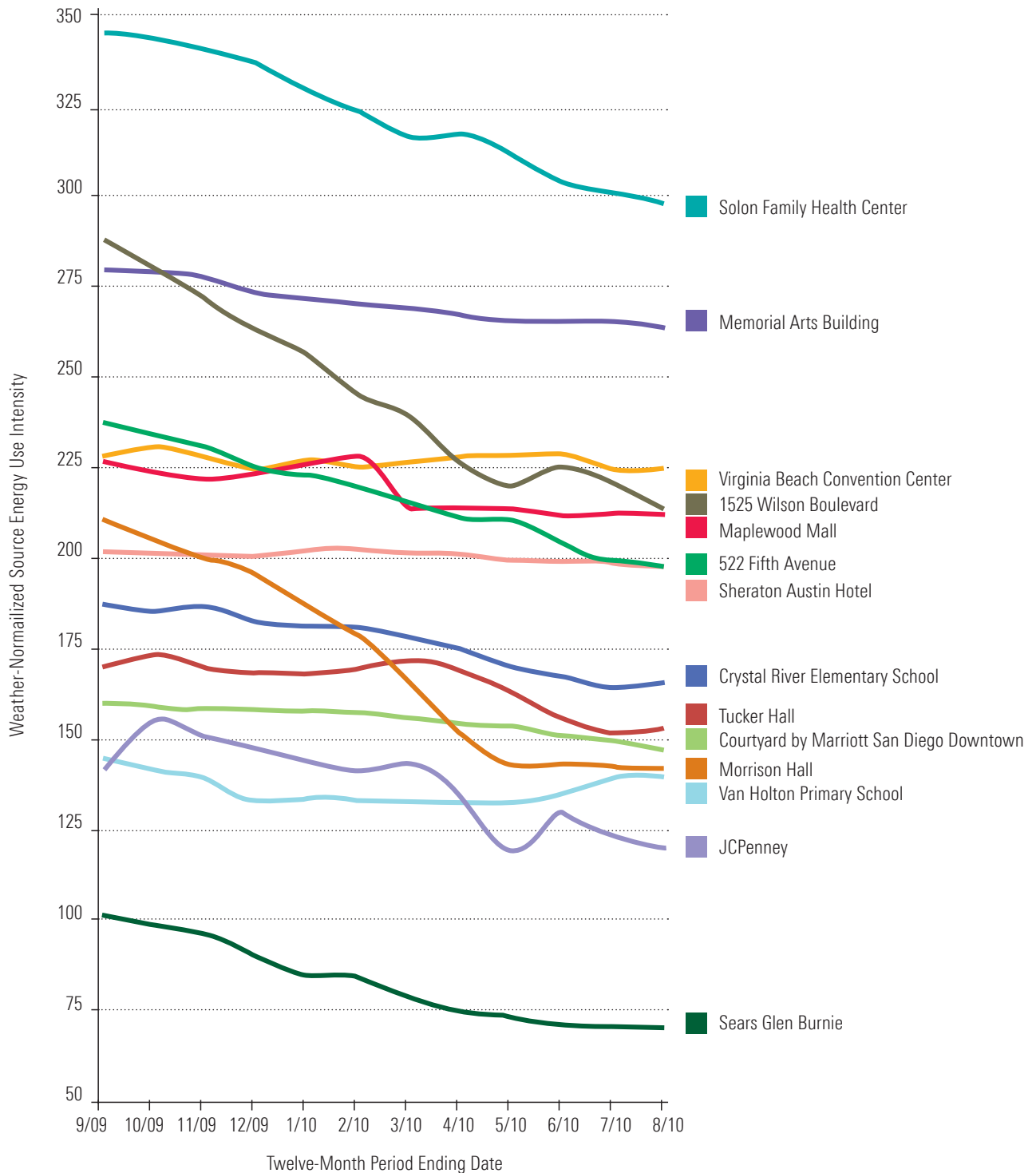
everyday. And Hines has created a monthly retro-commissioning tracking report to educate and inform employees and clients and holds a monthly meeting to review their energy performance report.

The efforts of these and other competitors to track and report data over time set the stage for more energy savings, more money savings, and a bigger punch in the fight against climate change.



Crystal River Elementary School's interval smart meter takes readings every 15 minutes, showing opportunities for energy savings throughout the day.

Impressive Results



How were competitors judged?

Buildings were judged on the percent that they reduced their EUI. The building with the greatest percent reduction was declared to be the winner. EPA also adjusted each building's percentage to normalize for weather, thereby ensuring that no building was credited or penalized due to changes in weather over the course of the competition.

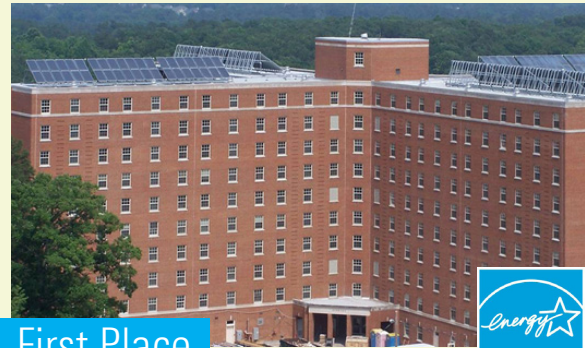
What is Energy Use Intensity?

EUI is calculated by dividing the amount of energy a building consumes in one year (measured in kBtu) by its total floorspace. Generally, a low EUI signifies good energy performance, although certain building types will always use more energy than others.

And the Winners Are...

In a fierce competition where the final top rankings were separated by just a few percentage points, the winner of the National Building Competition is Morrison Residence Hall at the University of North Carolina (Chapel Hill). Morrison Residence Hall reduced its energy use by 35.7 percent in just one year, saving more than \$250,000 on their energy bills and reducing more than 730 metric tons of carbon dioxide equivalent. It also earned the EPA ENERGY STAR label for superior energy efficiency.

The Sears store in Glen Burnie, Maryland, came in second place with a 31.7% energy reduction, and the JCPenney store in Orange, California, claimed third place with energy savings of 28.4%.



First Place

Morrison Hall, UNC at Chapel Hill

Reduced Energy Use by:

35.7%

Energy Saved:

11.7 million kBtu

Greenhouse Gas Emissions Prevented:

733 metric tons



Sears Glen Burnie

Reduced by: **31.7%**

Energy saved: **2.1 million kBtu**

GHGs Prevented: **272 metric tons**



JCPenney, Orange, CA

Reduced by: **28.4%**

Energy saved: **1.4 million kBtu**

GHGs Prevented: **152 metric tons**

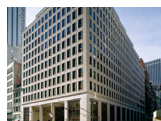


1525 Wilson Boulevard

Reduced by: **28.0%**

Energy saved: **8 million kBtu**

GHGs Prevented: **1,218 metric tons**



522 Fifth Avenue

Reduced by: **18.1%**

Energy saved: **10.6 million kBtu**

GHGs Prevented: **1,038 metric tons**



Solon Family Health Center, Cleveland Clinic

Reduced by: **13.9%**

Energy saved: **760,000 kBtu**

GHGs Prevented: **201 metric tons**



Crystal River Elementary School

Reduced by: **12.2%**

Energy saved: **890,000 kBtu**

GHGs Prevented: **133 metric tons**



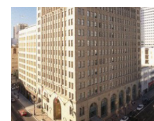
Tucker Hall, NC State University

Reduced by: **10.3%***

Energy saved: **1 million kBtu**

GHGs Prevented: **104 metric tons**

* Percent reduction is an accurate reflection of their utility bill savings, but the exact change in energy use cannot be measured.



Courtyard by Marriott San Diego Downtown

Reduced by: **8.6%**

Energy saved: **1.7 million kBtu**

GHGs Prevented: **94 metric tons**



Maplewood Mall

Reduced by: **6.7%**

Energy saved: **3.2 million kBtu**

GHGs Prevented: **671 metric tons**



Memorial Arts Building, Woodruff Arts Center

Reduced by: **5.7%**

Energy saved: **1.4 million kBtu**

GHGs Prevented: **283 metric tons**

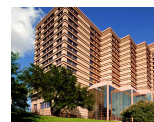


Van Holten Primary School

Reduced by: **5.3%**

Energy saved: **400,000 kBtu**

GHGs Prevented: **43 metric tons**



Sheraton Austin Hotel

Reduced by: **1.9%**

Energy saved: **80,000 kBtu**

GHGs Prevented: **106 metric tons**



Virginia Beach Convention Center

Reduced by: **1.5%**

Energy saved: **730,000 kBtu**

GHGs Prevented: **-204 metric tons**

Full results at www.energystar.gov/buildingcontest

Results and Impacts

While one competitor came out on top, all fourteen are winners. Together, the competitors reduced their energy use by more than 44 million kBtu, saved more than \$950,000 in utility bills, and reduced carbon dioxide emissions equal to the electricity use of nearly 600 homes for a year.

Four buildings earned EPA's ENERGY STAR for superior energy efficiency; at the start of the competition, not a single building had been awarded the ENERGY STAR.

The competition also showed that the energy performance of many different types of buildings can improve, and superior efficiency isn't determined by one factor alone. The oldest building in the competition, built in the late 1800s, finished in the Top 5. The "heaviest" building at the start of the competition did well, but didn't win. The "thinnest" building at kickoff continued its progress, and earned an impressive second place finish.

Perhaps most importantly, the competitors provided invaluable insight into effective energy management strategies and practices that will inform and drive energy efficiency in the commercial marketplace for years to come.

The 14 buildings reduced their total greenhouse gas emissions by 4,896 metric tons. That about the same as...



Nearly 940 vehicles off the road



The annual electricity use of nearly 600 homes



Carbon sequestered by more than 125,500 tree seedlings grown for 10 years

Second-Generation Competitions

The National Building Competition has spurred imitation around the country. Some teams that competed have decided to host their own version of EPA's National Building Competition among their own buildings. NC State University, home to Tucker Hall (bottom right), will pit all campus buildings against each other in a 2011 match. And the inspiration extends beyond the competitors: Garfield County, Colorado, home to Crystal River Elementary School (top right), rallied behind the school as it

competed on the national stage. Now, seeing the excitement and motivation the contest created, county leaders are exploring plans to host a county-wide building competition next year. EPA's Region VIII office plans to pit Colorado school districts against each other in a state competition. The state of Georgia is working on its own competition plans, which, together with NC State, Garfield County, the state of Colorado, and others, is ensuring that the spirit of competition and energy-saving lives on.



Top Ten Energy Efficiency Tips from the Competitors

There are many different ways to improve energy efficiency, but these ideas shared by the contestants in the National Building Competition are sure to help you work off the energy waste!

1. Check **weather-stripping** and replace worn or missing weather-stripping to stop air-infiltration.
2. Check **night lighting** to identify lights that are on that shouldn't be.
3. Install **occupancy sensors** in conference rooms, store rooms, or any area not continuously occupied
4. Control the **heating, ventilation and air conditioning** (HVAC) system to use only the heating and cooling necessary based on occupancy and temperature.
5. Regularly **monitor and report** on energy performance to management, stakeholders, and others in order to maintain efficiency and raise awareness.
6. Recircuit lighting and HVAC to one **central circuit** to provide better control and access.
7. **Plant trees** along west-facing windows to provide shade from the summer sun.
8. **Upgrade lighting**, including incandescent to energy efficient compact fluorescent and light-emitting diode (LED) versions.
9. Install **variable frequency drives** (VFDs) on fans to slow them down and match demand.
10. **Involve building occupants** in efforts to save energy by posting energy efficiency tips in key locations around the building.

Find more tips and ideas at energystar.gov/buildingcontest.



Occupancy sensors in the Courtyard by Marriott San Diego Downtown keep tabs of lighting needs.



Replacing incandescent floodlights with efficient compact fluorescent models at the Virginia Beach Convention Center.



New shade trees line the west side of the Solon Family Health Center.



Posting signage about the competition proved to be helpful for Morrison Hall at UNC-Chapel Hill.

Looking Ahead

The 2010 National Building Competition may be over, but that doesn't mean it's time to stop looking for ways to work off the waste! It's not just about becoming more energy efficient for a moment in time—it's about continuous improvement, and keeping the waste off for good.

While just fourteen buildings participated in the first-ever National Building Competition, the impacts will be felt far and wide. National organizations are taking the lessons learned from the individual buildings that participated in the competition and applying the practices across entire portfolios of buildings.

In response to the interest expressed by many organizations, EPA is happy to announce that the National Building Competition will return again next year. Details and key dates

will be publicized in December. Stay tuned to energystar.gov/BuildingContest for the latest breaking news on Season Two of the National Building Competition!

The concept of the National Building Competition is also ideal for adoption by others—whether by states, localities or private organizations. EPA has been notified that plans are underway for several National Building Competition spinoffs in 2011, so keep your eyes open for a potential competition in your neighborhood next year.

And don't forget, EPA's ENERGY STAR program has all the tools you need to maintain your energy fitness long after the competition is over. Join ENERGY STAR as a partner and start saving energy today!



At the Courtyard by Marriott San Diego Downtown, management communicates to guests and employees through a regularly updated "green board."

“This was a motivating competition that resulted in a number of national-level organizations **elevating energy reduction strategies to another level.**”

- Glenborough, LLC

“This competition engaged our associates in a way **we didn’t expect or think possible.**”

- Sears

“While we didn’t have the best percent reduction of the competitors, the importance of this national competition brought new meaning to our day-to-day efforts for both our staff and guests and has helped our team to see our, and every building’s, **role as part of the bigger picture.**”

- Sheraton Austin Hotel

energystar.gov/BuildingContest