ANNEX 1 Key Category Analysis

The United States has identified national key categories based on the estimates presented in this report. The IPCC's *Good Practice Guidance* (IPCC 2000) describes a key category as a "[category] that is prioritized within the national inventory system because its estimate has a significant influence on a country's total inventory of direct greenhouse gases in terms of the absolute level of emissions, the trend in emissions, or both." By definition, key categories are sources or sinks that have the greatest contribution to the absolute overall level of national emissions in any of the years covered by the time series. In addition, when an entire time series of emission estimates is prepared, a determination of key categories must also account for the influence of the trends of individual categories. Therefore, a trend assessment is conducted to identify source and sink categories for which significant uncertainty in the estimate would have considerable effects on overall emission trends. Finally, a qualitative evaluation of key categories should be performed, in order to capture any key categories that were not identified in either of the quantitative analyses, but can be considered key because of the unique country-specific estimation methods.

The methodology for conducting a key category analysis, as defined by IPCC's *Good Practice Guidance* (IPCC 2000), IPCC's *Good Practice Guidance for Land Use, Land-Use Change, and Forestry (IPCC 2003)*, and IPCC's 2006 *Guidelines for National Greenhouse Gas Inventories* IPCC (2006); includes:

- Tier 1 approach (including both level and trend assessments);
- Tier 2 approach (including both level and trend assessments, and incorporating uncertainty analysis); and
- Qualitative approach.

This Annex presents an analysis of key categories, both for sources only and also for sources and sinks (i.e., including LULUCF); discusses Tier 1, Tier 2, and qualitative approaches to identifying key categories; provides level and trend assessment equations; and provides a brief statistical evaluation of IPCC's quantitative methodologies for defining key categories. Table A- 1 presents the key categories for the United States (including and excluding LULUCF categories) using emissions and uncertainty data in this report, and ranked according to their sector and global warming potential-weighted emissions in 2010. The table also indicates the criteria used in identifying these categories (i.e., level, trend, Tier 1, Tier 2, and/or qualitative assessments).

Table A-1: Key Source Categories for the United States (1990-2010)

Tubio A 1. Roy Coulou Sulogoriou ioi tilo Cintou Clute			Tie	er 1			Tie	r 2			
IPCC Source Categories	Gas		Trend Without LULUCF	Level With LULUCF	Trend With LULUCF	Level Without LULUCF	Trend Without LULUCF	Level With LULUCF	Trend With LULUCF	Qual ^a	2010 Emissions (Tg CO ₂ Eq.)
Energy											
CO ₂ Emissions from Stationary Combustion - Coal - Electricity Generation	CO ₂	•	•	•	•	•	•	•	•		1,827.3
CO ₂ Emissions from Mobile Combustion: Road	CO_2	•	•	•	•	•	•	•	•		1,478.9
CO ₂ Emissions from Stationary Combustion - Gas - Electricity Generation	CO ₂	•	•	•	•	•	•	•	•		399.4
CO ₂ Emissions from Stationary Combustion - Gas - Industrial	CO ₂	•	•	•	•	•	•	•	•		394.2
CO ₂ Emissions from Stationary Combustion - Oil - Industrial	CO ₂	•	•	•	•	•	•	•	•		287.4
CO ₂ Emissions from Stationary Combustion - Gas - Residential	CO ₂	•		•	•	•		•			258.8
CO ₂ Emissions from Stationary Combustion - Gas - Commercial	CO ₂	•	•	•	•	•		•			167.7
CO ₂ Emissions from Mobile Combustion: Aviation	CO_2	•	•	•	•	•	•	•	•		142.4
CO ₂ Emissions from Non-Energy Use of Fuels	CO_2	•	•	•	•	•	•	•			125.1
CO ₂ Emissions from Stationary Combustion - Coal - Industrial	CO ₂	•	•	•	•	•	•	•	•		96.2
CO ₂ Emissions from Mobile Combustion: Other	CO_2	•		•							81.5
CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO_2	•	•	•	•						80.7
CO ₂ Emissions from Stationary Combustion - Oil - Commercial	CO ₂	•	•	•	•						51.1
CO ₂ Emissions from Mobile Combustion: Marine	CO_2	•	•	•	•						42.6
CO ₂ Emissions from Stationary Combustion - Oil - U.S. Territories	CO ₂	•	•	•	•						36.7
CO ₂ Emissions from Natural Gas Systems	CO_2	•	•	•	•	•	•	•	•		32.3
CO ₂ Emissions from Stationary Combustion - Oil - Electricity Generation	CO ₂	•	•	•	•		•		•		31.3
CO ₂ Emissions from Stationary Combustion - Coal - Commercial	CO_2		•		•						5.5
Fugitive Emissions from Natural Gas Systems	CH ₄	•	•	•		•	•	•			215.4
Fugitive Emissions from Coal Mining	CH ₄	•	•	•	•	•	•	•	•		72.6
Fugitive Emissions from Petroleum Systems	CH ₄	•	•	•	•	•	•	•	•		31.0
Non-CO ₂ Emissions from Stationary Combustion - Residential	CH ₄					•	•	•	•		3.5

		<u> </u>	Tio	er 1			Tier	r 2			
											2010
		Level	Trend	Level	Trend	Level	Trend	Level	Trend		Emissions
			Without	With	With	Without	Without	With	With		(Tg CO ₂
IPCC Source Categories	Gas	LULUCF	LULUCF	LULUCF	LULUCF	LULUCF	LULUCF	LULUCF	LULUCF	Qual ^a	Eq.)
Non-CO ₂ Emissions from Stationary Combustion -	N ₂ O					•		•			18.5
Electricity Generation	-										
N ₂ O Emissions from Mobile Combustion: Road	N ₂ O	•	•	•	•	•	•	•	•		16.7
Non-CO ₂ Emissions from Stationary Combustion -	N ₂ O						•				2.8
Industrial	_										
International Bunker Fuels ^b	Several									•	129.2
Industrial Processes											
CO ₂ Emissions from Iron and Steel Production &	CO_2	•	•	•	•	•	•	•	•		54.3
Metallurgical Coke Production	_										20.5
CO ₂ Emissions from Cement Production CO ₂ Emissions from Aluminum Production	CO_2 CO_2	•	•	•	•				•		30.5
N ₂ O Emissions from Adipic Acid Production	N ₂ O						•		•		2.8
Emissions from Substitutes for Ozone Depleting	N ₂ O		•		•						114.6
Substances	HiGWP	•	•	•	•	•	•	•	•		114.0
SF ₆ Emissions from Electrical Transmission and											11.8
Distribution	HiGWP		•		•		•		•		11.0
HFC-23 Emissions from HCFC-22 Production	HiGWP			•	•				•		8.1
PFC Emissions from Aluminum Production	HiGWP		•	•	•	•	•	•	•		1.6
Agriculture	mowi					-		-			1.0
CH ₄ Emissions from Enteric Fermentation	CH₄	•	•	•	•	•		•			141.3
CH ₄ Emissions from Manure Management	CH ₄	•	•	•	•	•	•	•	•		52.0
CH ₄ Emissions from Rice Cultivation	CH ₄					•		•			8.6
Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	•	•	•	•	•	•	•	•		162.3
Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	•		•		•	•	•	•		45.5
Waste	- 12										1010
CH ₄ Emissions from Landfills	CH ₄	•	•	•	•	•	•	•	•		107.8
Land Use, Land Use Change, and Forestry	4										20,10
CO ₂ Emissions from Changes in Forest Carbon Stocks	CO ₂			•	•			•	•		(921.8)
CO ₂ Emissions from Urban Trees	CO ₂			•	•			•	•		(98.0)
CO ₂ Emissions from Cropland Remaining Cropland	CO_2			•	•			•	•		(15.6)
CO ₂ Emissions from Landfilled Yard Trimmings and Food											(13.3)
Scraps	CO ₂				•			•	•		, ,
CO ₂ Emissions from Grassland Remaining Grassland	CO_2			•	•			•	•		(8.3)
CH ₄ Emissions from Forest Fires	CH ₄								•		4.8
N ₂ O Emissions from Forest Fires	N_2O								•		4.0
Subtotal Without LULUCF											6,644.0
Total Emissions Without LULUCF											6,802.2
Percent of Total Without LULUCF											97.7%

			Tier 1				Tier	· 2			
											2010
		Level	Trend	Level	Trend	Level	Trend	Level	Trend		Emissions
		Without	Without	With	With	Without	Without	With	With		(Tg CO ₂
IPCC Source Categories	Gas	LULUCF	LULUCF	LULUCF	LULUCF	LULUCF	LULUCF	LULUCF	LULUCF	Quala	Eq.)
Subtotal With LULUCF											5,595.7
Total Emissions With LULUCF											5,747.1
Percent of Total With LULUCF											97.4%

^aQualitative criteria.

Note: Parentheses indicate negative values (or sequestration). Table A-2 provides a complete listing of source categories by IPCC sector, along with notations on the criteria used in identifying key categories, without LULUCF sources and sinks. Similarly,

Table A-3 provides a complete listing of source and sink categories by IPCC sector, along with notations on the criteria used in identifying key categories, including LULUCF sources and sinks. The notations refer specifically to the year(s) in the inventory time series (i.e., 1990 to 2009) in which each source category reached the threshold for being a key category based on either a Tier 1 or Tier 2 level assessment.

^bEmissions from this source not included in totals.

In addition to conducting Tier 1 and 2 level and trend assessments, a qualitative assessment of the source categories, as described in the IPCC's *Good Practice Guidance* (IPCC 2000), was conducted to capture any key categories that were not identified by any quantitative method. One additional key category, international bunker fuels, was identified using this qualitative assessment. International bunker fuels are fuels consumed for aviation or marine international transport activities, and emissions from these fuels are reported separately from totals in accordance with IPCC guidelines. If these emissions were included in the totals, bunker fuels would qualify as a key category according to the Tier 1 approach. The amount of uncertainty associated with estimation of emissions from international bunker fuels also supports the qualification of this source category as key, which would qualify it as a key category according to the Tier 2 approach.

Table A-2: U.S Greenhouse Gas Inventory Source Categories without LULUCF

Table A-2. U.S discilludse das inventory source cates	gurius wit	2010			
		Emissions			
	Direct	(Tg CO ₂	Key	ID	Level in which
IPCC Source Categories	GHG	Eq.)	Category?	Criteria ^a	year(s)?b
Energy		17			. ()
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	1,827.3	•	L ₁ L ₂ T ₁ T ₂	1990, 2010
Electricity Generation	-				
CO ₂ Emissions from Mobile Combustion: Road	CO_2	1,478.9	•	L_1 L_2 T_1 T_2	1990, 2010
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	394.2	•	$L_1 L_2 T_1 T_2$	1990, 2010
Industrial					
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	399.4	•	$L_1 L_2 T_1 T_2$	1990, 2010
Electricity Generation					
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	287.4	•	$L_1 L_2 T_1 T_2$	1990, 2010
Industrial					
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	258.8	•	$L_1 L_2$	1990, 2010
Residential					
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	167.7	•	$L_1 L_2 T_1$	1990, 2010
Commercial	~~				1000 2010
CO ₂ Emissions from Mobile Combustion: Aviation	CO_2	142.4	•	L ₁ L ₂ T ₁ T ₂	1990, 2010
CO ₂ Emissions from Non-Energy Use of Fuels	CO_2	125.1	•	L ₁ L ₂ T ₁ T ₂	1990, 2010
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	96.2	•	$L_1 L_2 T_1 T_2$	1990, 2010
Industrial	CO	90.7			1000 2010
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	80.7	•	$L_1 T_1$	1990, 2010
Residential CO ₂ Emissions from Mobile Combustion: Other	CO_2	81.5		L ₁	1990, 2010
CO ₂ Emissions from Stationary Combustion - Oil -	_	51.1	•	•	· ·
Commercial	CO_2	31.1	•	$L_1 T_1$	1990, 2010
CO ₂ Emissions from Stationary Combustion - Oil - U.S.	CO_2	36.7		L ₁ T ₁	2010
Territories	CO_2	30.7		L 1 11	2010
CO ₂ Emissions from Natural Gas Systems	CO_2	32.3	•	L ₁ L ₂ T ₁ T ₂	1990, 2010
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	31.3	•	$L_1 T_1 T_2$	1990
Electricity Generation	CO_2	31.3		- 2	1770
CO ₂ Emissions from Mobile Combustion: Marine	CO_2	42.6	•	L ₁ T ₁	1990, 2010
CO ₂ Emissions from Incineration of Waste	CO_2	12.1		-1 11	1,,0,2010
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	5.5	•	T ₁	
Commercial	002	0.0		• •	
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	3.5			
U.S. Territories	2				
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	1.5			
U.S. Territories	-				
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	0.7			
Residential	-				
CO ₂ Emissions from Stationary Combustion -	CO_2	0.4			
Geothermal Energy	-				
CO ₂ Emissions from Petroleum Systems	CO_2	0.3			
Fugitive Emissions from Natural Gas Systems	CH_4	215.4	•	$L_1 L_2 T_1 T_2$	1990, 2010
Fugitive Emissions from Coal Mining	CH_4	72.6	•	L ₁ L ₂ T ₁ T ₂	1990, 2010
Fugitive Emissions from Petroleum Systems	CH_4	31.0	•	$L_1 L_2 T_1 T_2$	1990, 2010 ₂
<u> </u>					,2

Fugitive Emissions from Abandoned Underground Coal Mines	CH_4	5.0			
Non-CO ₂ Emissions from Stationary Combustion - Residential	CH_4	3.5	•	$L_2 T_2$	1990
	CH	1.4			
CH ₄ Emissions from Mobile Combustion: Road Non-CO ₂ Emissions from Stationary Combustion -	CH_4 CH_4	1.4 1.4			
Industrial	CH_4	1.4			
Non-CO ₂ Emissions from Stationary Combustion -	CH_4	0.9			
Commercial	CH	0.5			
Non-CO ₂ Emissions from Stationary Combustion -	CH_4	0.5			
Electricity Generation	CH	0.4			
CH ₄ Emissions from Mobile Combustion: Other	CH ₄	0.4			
CH ₄ Emissions from Mobile Combustion: Aviation	CH_4	0.1			
Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	CH ₄	0.1			
CH ₄ Emissions from Mobile Combustion: Marine	CH_4	+			
CH ₄ Emissions from Incineration of Waste	CH_4	+			
N ₂ O Emissions from Mobile Combustion: Road	N_2O	16.7	•	$L_1 L_2 T_1 T_2$	1990
Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	N_2O	18.5	•	$L_2 T_1 T_2$	1990, 2010
Non-CO ₂ Emissions from Stationary Combustion - Industrial	N_2O	2.8	•	T_2	
N ₂ O Emissions from Mobile Combustion: Other	N_2O	1.9			
N ₂ O Emissions from Mobile Combustion: Aviation	N_2O	1.3			
Non-CO ₂ Emissions from Stationary Combustion -	N_2O	0.9			
Residential	-2 -				
N ₂ O Emissions from Mobile Combustion: Marine	N_2O	0.6			
N ₂ O Emissions from Incineration of Waste	N_2^2O	0.4			
Non-CO ₂ Emissions from Stationary Combustion - Commercial	N_2O	0.3			
Non-CO ₂ Emissions from Stationary Combustion - U.S.	N_2O	0.1			
Territories	1120	0.1			
	Several	129.2		0	
International Bunker Fuels ^c	Several	129.2		Q	
International Bunker Fuels ^c Industrial Processes					1990, 2010.
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production &	Several CO ₂	129.2 54.3	•	Q L ₁ L ₂ T ₁ T ₂	1990, 20101
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	54.3	•	L ₁ L ₂ T ₁ T ₂	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production	CO ₂	54.3 30.5	•		1990, 2010 ₁ 1990
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production	CO ₂ CO ₂ CO ₂	54.3 30.5 13.2	•	L ₁ L ₂ T ₁ T ₂	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use	CO ₂ CO ₂ CO ₂ CO ₂	54.3 30.5 13.2 10.0	•	L ₁ L ₂ T ₁ T ₂	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production	CO ₂ CO ₂ CO ₂ CO ₂ CO ₂ CO ₂	54.3 30.5 13.2 10.0 8.7	•	L ₁ L ₂ T ₁ T ₂	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag	CO ₂ CO ₂ CO ₂ CO ₂	54.3 30.5 13.2 10.0	•	L ₁ L ₂ T ₁ T ₂	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4	•	L ₁ L ₂ T ₁ T ₂	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and	CO ₂ CO ₂ CO ₂ CO ₂ CO ₂ CO ₂	54.3 30.5 13.2 10.0 8.7	•	L ₁ L ₂ T ₁ T ₂	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7	•	L ₁ L ₂ T ₁ T ₂	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0	•	L ₁ L ₂ T ₁ T ₂	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production CO ₂ Emissions from Ferroalloy Production	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9 1.7	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production CO ₂ Emissions from Ferroalloy Production CO ₂ Emissions from Ferroalloy Production CO ₂ Emissions from Zinc Production	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9 1.7 1.2	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production CO ₂ Emissions from Ferroalloy Production CO ₂ Emissions from Zinc Production CO ₂ Emissions from Phosphoric Acid Production	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9 1.7 1.2 1.0	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production CO ₂ Emissions from Ferroalloy Production CO ₂ Emissions from Zinc Production CO ₂ Emissions from Phosphoric Acid Production CO ₂ Emissions from Phosphoric Acid Production	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9 1.7 1.2 1.0 0.5	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production CO ₂ Emissions from Ferroalloy Production CO ₂ Emissions from Zinc Production CO ₂ Emissions from Phosphoric Acid Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Lead Production	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9 1.7 1.2 1.0	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production CO ₂ Emissions from Ferroalloy Production CO ₂ Emissions from Zinc Production CO ₂ Emissions from Phosphoric Acid Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Silicon Carbide Production and Consumption	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9 1.7 1.2 1.0 0.5 0.2	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Mammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production CO ₂ Emissions from Ferroalloy Production CO ₂ Emissions from Phosphoric Acid Production CO ₂ Emissions from Phosphoric Acid Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Silicon Carbide Production and Consumption CH ₄ Emissions from Petrochemical Production	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9 1.7 1.2 1.0 0.5 0.2	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production CO ₂ Emissions from Ferroalloy Production CO ₂ Emissions from Phosphoric Acid Production CO ₂ Emissions from Phosphoric Acid Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Petrochemical Production and Consumption CH ₄ Emissions from Iron and Steel Production &	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9 1.7 1.2 1.0 0.5 0.2	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production CO ₂ Emissions from Ferroalloy Production CO ₂ Emissions from Phosphoric Acid Production CO ₂ Emissions from Phosphoric Acid Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Petrochemical Production CO ₄ Emissions from Petrochemical Production CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9 1.7 1.2 1.0 0.5 0.2 0.9 0.5	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Mammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production CO ₂ Emissions from Ferroalloy Production CO ₂ Emissions from Phosphoric Acid Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Silicon Carbide Production and Consumption CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9 1.7 1.2 1.0 0.5 0.2 0.9 0.5	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Mammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production CO ₂ Emissions from Ferroalloy Production CO ₂ Emissions from Phosphoric Acid Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Silicon Carbide Production and Consumption CH ₄ Emissions from Iron and Steel Production CH ₄ Emissions from Ferroalloy Production CH ₄ Emissions from Silicon Carbide Production and Consumption	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9 1.7 1.2 1.0 0.5 0.2 0.9 0.5	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Ammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production CO ₂ Emissions from Ferroalloy Production CO ₂ Emissions from Phosphoric Acid Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Silicon Carbide Production and Consumption CH ₄ Emissions from Iron and Steel Production CH ₄ Emissions from Ferroalloy Production CH ₄ Emissions from Silicon Carbide Production and Consumption CH ₂ Emissions from Nitric Acid Production	CO ₂ CO ₃ CO ₄ CH ₄	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9 1.7 1.2 1.0 0.5 0.2 0.9 0.5 + + 16.7	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_
International Bunker Fuels ^c Industrial Processes CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production CO ₂ Emissions from Cement Production CO ₂ Emissions from Lime Production CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Limestone and Dolomite Use CO ₂ Emissions from Mammonia Production CO ₂ Emissions from Urea Consumption for Non-Ag Purposes CO ₂ Emissions from Soda Ash Production and Consumption CO ₂ Emissions from Petrochemical Production CO ₂ Emissions from Aluminum Production CO ₂ Emissions from Carbon Dioxide Consumption CO ₂ Emissions from Titanium Dioxide Production CO ₂ Emissions from Ferroalloy Production CO ₂ Emissions from Phosphoric Acid Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Lead Production CO ₂ Emissions from Silicon Carbide Production and Consumption CH ₄ Emissions from Iron and Steel Production CH ₄ Emissions from Ferroalloy Production CH ₄ Emissions from Silicon Carbide Production and Consumption	CO ₂	54.3 30.5 13.2 10.0 8.7 4.4 3.7 3.3 3.0 2.2 1.9 1.7 1.2 1.0 0.5 0.2 0.9 0.5	•	L ₁ L ₂ T ₁ T ₂ L ₁ T ₁	_

N ₂ O Emissions from Adipic Acid Production Emissions from Substitutes for Ozone Depleting	$ m N_2O$ HiGWP	2.8 114.6	•	$T_1 \ L_1 \ L_2 \ T_1 \ T_2$	2010
Substances	IIIOWI	114.0		L1 L2 I1 I2	2010
SF ₆ Emissions from Electrical Transmission and Distribution	HiGWP	11.8	•	T_1T_2	
HFC-23 Emissions from HCFC-22 Production	HiGWP	8.1	•	$L_1 T_1 T_2$	1990
PFC, HFC, and SF ₆ Emissions from Semiconductor	HiGWP	5.4			
Manufacture					
PFC Emissions from Aluminum Production	HiGWP	1.6	•	$L_2 T_1 T_2$	1990
SF ₆ Emissions from Magnesium Production and	HiGWP	1.3			
Processing					
Agriculture					
CH ₄ Emissions from Enteric Fermentation	$\mathrm{CH_4}$	141.3	•	$L_1 L_2 T_1$	1990, 2010
CH ₄ Emissions from Manure Management	$\mathrm{CH_4}$	52.0	•	$L_1 L_2 T_1 T_2$	1990, 20102
CH ₄ Emissions from Rice Cultivation	$\mathrm{CH_4}$	8.6	•	L_2	1990, 2010
CH ₄ Emissions from Field Burning of Agricultural	$\mathrm{CH_4}$	0.2			
Residues					
Direct N ₂ O Emissions from Agricultural Soil	N_2O	162.3	•	$L_1 L_2 T_1 T_2$	1990, 2010
Management					
Indirect N ₂ O Emissions from Applied Nitrogen	N_2O	45.5	•	$L_1 L_2 T_2$	1990, 2010
N ₂ O Emissions from Manure Management	N_2O	18.3			
N ₂ O Emissions from Field Burning of Agricultural	N_2O	0.1			
Residues					
Waste					
CH ₄ Emissions from Landfills	$\mathrm{CH_4}$	107.8	•	$L_1 L_2 T_1 T_2$	1990, 2010
CH ₄ Emissions from Wastewater Treatment	$\mathrm{CH_4}$	16.3			
CH ₄ Emissions from Composting	$\mathrm{CH_4}$	1.6			
N ₂ O Emissions from Wastewater Treatment	N_2O	5.0			
N ₂ O Emissions from Composting	N_2O	1.7			

^a For the ID criteria, L refers to a key category identified through a level assessment; T refers to a key category identified through a trend assessment and the subscripted number refers to either a Tier 1 or Tier 2 assessment (e.g., L₂ designates a source is a key category for a Tier 2 level assessment).

Note: LULUCF sources and sinks are not included in this analysis.

Table A-3: U.S Greenhouse Gas Inventory Source Categories with LULUCF

		2010			
		Emissions			
		(Tg CO ₂	Key	ID	Level in which
IPCC Source Categories	Gas	Eq.)	Category?	Criteria ^a	year(s)?b
Energy					
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	1,827.3	•	L ₁ L ₂ T ₁ T ₂	1990, 2010
Electricity Generation					
CO ₂ Emissions from Mobile Combustion: Road	CO_2	1,478.9	•	L_1 L_2 T_1 T_2	1990, 2010
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	399.4	•	$L_1 L_2 T_1 T_2$	1990, 2010
Electricity Generation					
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	394.2	•	$L_1 L_2 T_1 T_2$	1990, 2010
Industrial					
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	287.4	•	$L_1 L_2 T_1 T_2$	1990, 2010
Industrial					
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	258.8	•	$L_1 L_2 T_1$	1990, 2010
Residential					
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	167.7	•	$L_1 L_2 T_1$	1990, 2010
Commercial					
CO ₂ Emissions from Mobile Combustion: Aviation	CO_2	142.4	•	$L_1 L_2 T_1 T_2$	1990, 2010
CO ₂ Emissions from Non-Energy Use of Fuels	CO_2	125.1	•	$L_1 L_2 T_1$	1990, 2010

^b If the source is a key category for both L_1 and L_2 (as designated in the ID criteria column), it is a key category for both assessments in the years provided unless noted by a subscript, in which case it is a key category for that assessment in that year only (.e.g., 1990_2 designates a source is a key category for the Tier 2 assessment only in 1990).

^c Emissions from these sources not included in totals.

⁺ Does not exceed 0.05 Tg $CO_2\;$ Eq.

CO ₂ Emissions from Stationary Combustion - Coal - Industrial	CO_2	96.2	•	L ₁ L ₂ T ₁ T ₂	1990, 2010
CO ₂ Emissions from Mobile Combustion: Other	CO_2	81.5	•	L_1	1990, 2010
CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO_2	80.7	•	L ₁ T ₁	1990, 2010
CO ₂ Emissions from Stationary Combustion - Oil - Commercial	CO_2	51.1	•	L ₁ T ₁	1990, 2010
CO ₂ Emissions from Mobile Combustion: Marine	CO_2	42.6	•	$L_1 T_1$	1990, 2010
CO ₂ Emissions from Stationary Combustion - Oil - U.S. Territories	CO_2	36.7	•	L ₁ T ₁	2010
CO ₂ Emissions from Natural Gas Systems	CO_2	32.3	•	$L_1 L_2 T_1 T_2$	1990, 2010
CO ₂ Emissions from Stationary Combustion - Oil - Electricity Generation	CO_2	31.3	•	$L_1 T_1 T_2$	1990, 2010
CO ₂ Emissions from Incineration of Waste	CO_2	12.1			
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	5.5	•	T_1	
Commercial					
CO ₂ Emissions from Stationary Combustion - Coal - U.S. Territories	CO_2	3.5			
CO ₂ Emissions from Stationary Combustion - Gas - U.S. Territories	CO_2	1.5			
CO ₂ Emissions from Stationary Combustion - Coal - Residential	CO_2	0.7			
CO ₂ Emissions from Stationary Combustion - Geothermal Energy	CO_2	0.4			
CO ₂ Emissions from Petroleum Systems	CO_2	0.3			
Fugitive Emissions from Natural Gas Systems	CH_4	215.4	•	$L_1 L_2$	1990, 2010
Fugitive Emissions from Coal Mining	$\mathrm{CH_4}$	72.6	•	$L_1 L_2 T_1 T_2$	1990, 2010
Fugitive Emissions from Petroleum Systems	CH_4	31.0	•	$L_1 L_2 T_1 T_2$	1990, 2010
Fugitive Emissions from Abandoned Underground Coal Mines	$\mathrm{CH_4}$	5.0			
Non-CO ₂ Emissions from Stationary Combustion - Residential	$\mathrm{CH_4}$	3.5	•	$L_2 T_2$	1990, 2010
CH ₄ Emissions from Mobile Combustion: Road	$\mathrm{CH_4}$	1.4			
Non-CO ₂ Emissions from Stationary Combustion - Industrial	CH_4	1.4			
Non-CO ₂ Emissions from Stationary Combustion - Commercial	CH_4	0.9			
Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	$\mathrm{CH_4}$	0.5			
CH ₄ Emissions from Mobile Combustion: Other	CH_4	0.4			
CH ₄ Emissions from Mobile Combustion: Aviation	CH_4	0.1			
Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	CH_4	0.1			
CH ₄ Emissions from Mobile Combustion: Marine	CH_4	+			
CH ₄ Emissions from Incineration of Waste	CH_4	+			
Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	N ₂ O	18.5	•	L ₂ T ₁ T ₂	1990, 2010
N ₂ O Emissions from Mobile Combustion: Road	N_2O	16.7	•	$L_1 \; L_2 \; T_1 \; T_2$	1990
Non- CO_2 Emissions from Stationary Combustion - Industrial	N_2O	2.8			
N ₂ O Emissions from Mobile Combustion: Other	N_2O	1.9			
N ₂ O Emissions from Mobile Combustion: Aviation	N_2O	1.3			
Non-CO ₂ Emissions from Stationary Combustion - Residential	N ₂ O	0.9			
N ₂ O Emissions from Mobile Combustion: Marine	N_2O	0.6			
N ₂ O Emissions from Incineration of Waste	N_2O	0.4			
Non-CO ₂ Emissions from Stationary Combustion - Commercial	N ₂ O	0.3			
Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	N_2O	0.1			
International Bunker Fuels ^c	Several	129.2		Q	
Industrial Processes					

CO. Emissions from Iron and Steel Production &	CO	54.3	•	L ₁ L ₂ T ₁ T ₂	1990, 2010
CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO_2	34.3	•	L1 L2 I1 I2	1990, 2010
CO ₂ Emissions from Cement Production	CO_2	30.5	•	L ₁ T ₁	1990
CO ₂ Emissions from Lime Production	CO_2	13.2		-1 . 1	-,,,
CO ₂ Emissions from Limestone and Dolomite Use	CO_2	10.0			
CO ₂ Emissions from Ammonia Production	CO_2	8.7			
CO ₂ Emissions from Urea Consumption for Non-Ag	CO_2	4.4			
Purposes					
CO ₂ Emissions from Soda Ash Production and	CO_2	3.7			
Consumption	2				
CO ₂ Emissions from Petrochemical Production	CO_2	3.3			
CO ₂ Emissions from Aluminum Production	CO_2	3.0	•	T_2	
CO ₂ Emissions from Carbon Dioxide Consumption	CO_2	2.2		-	
CO ₂ Emissions from Titanium Dioxide Production	CO_2	1.9			
CO ₂ Emissions from Ferroalloy Production	CO_2	1.7			
CO ₂ Emissions from Zinc Production	CO_2	1.2			
CO ₂ Emissions from Phosphoric Acid Production	CO_2^2	1.0			
CO ₂ Emissions from Lead Production	CO_2	0.5			
CO ₂ Emissions from Silicon Carbide Production and	CO_2^2	0.2			
Consumption	2				
CH ₄ Emissions from Petrochemical Production	CH_4	0.9			
CH ₄ Emissions from Iron and Steel Production &	CH ₄	0.5			
Metallurgical Coke Production	0114	0.0			
CH ₄ Emissions from Ferroalloy Production	CH_4	+			
CH ₄ Emissions from Silicon Carbide Production and	CH ₄	+			
Consumption	C114				
N ₂ O Emissions from Nitric Acid Production	N_2O	16.7			
N ₂ O Emissions from Product Uses	N_2O	4.4			
N ₂ O Emissions from Adipic Acid Production	N_2O	2.8	•	T ₁	
Emissions from Substitutes for Ozone Depleting	HiGWP	114.6	•	L ₁ L ₂ T ₁ T ₂	2010
Substances	mown	114.0		L1 L2 11 12	2010
SF ₆ Emissions from Electrical Transmission and	HiGWP	11.8	•	T_1T_2	
Distribution	mown	11.0		•1 •2	
HFC-23 Emissions from HCFC-22 Production	HiGWP	8.1	•	$L_1 T_1 T_2$	1990
PFC, HFC, and SF ₆ Emissions from Semiconductor	HiGWP	5.4		E1 11 12	1,,,0
Manufacture	1110 111	· · ·			
PFC Emissions from Aluminum Production	HiGWP	1.6	•	$L_2 T_1 T_2$	1990
SF ₆ Emissions from Magnesium Production and	HiGWP	1.3			1,,,0
Processing	1110 111	1.0			
Agriculture					
CH ₄ Emissions from Enteric Fermentation	CH ₄	141.3	•	L ₁ L ₂ T ₁	1990, 2010
CH ₄ Emissions from Manure Management	CH₄	52.0	•	L ₁ L ₂ T ₁ T ₂	1990 ₁ , 2010
CH ₄ Emissions from Rice Cultivation	CH ₄	8.6	•	L ₁ L ₂ 11 12	1990, 2010
CH ₄ Emissions from Field Burning of Agricultural	CH ₄	0.2		L 2	1770, 2010
Residues	C11 ₄	0.2			
Direct N ₂ O Emissions from Agricultural Soil	N_2O	162.3	•	$L_1 L_2 T_1 T_2$	1990, 2010
Management	1120	102.3		L1 L2 11 12	1770, 2010
Indirect N ₂ O Emissions from Applied Nitrogen	N_2O	45.5	•	$L_1 L_2 T_2$	1990, 2010
N ₂ O Emissions from Manure Management	N_2O	18.3		L1 L2 12	1770, 2010
N ₂ O Emissions from Field Burning of Agricultural		0.1			
Residues	N_2O	0.1			
Waste					
	СП	107.8		L.L.T.T.	1000 2010
CH ₄ Emissions from Landfills CH ₄ Emissions from Wastewater Treatment	CH ₄	107.8	•	$L_1 L_2 T_1 T_2$	1990, 2010
	CH ₄	16.5			
CH ₄ Emissions from Composting	CH ₄				
N ₂ O Emissions from Wastewater Treatment	N ₂ O	5.0			
N ₂ O Emissions from Composting	N ₂ O	1.7			
Land Use, Land Use Change, and Forestry	CC	(021.9)		1177	1000 2010
CO ₂ Emissions from Changes in Forest Carbon Stocks	CO_2	(921.8)	•	$L_1 L_2 T_1 T_2$	1990, 2010
CO ₂ Emissions from Urban Trees	CO_2	(98.0)	•	$L_1 L_2 T_1 T_2$	1990, 2010
CO ₂ Emissions from Land Converted to Grassland	CO_2	(23.6)			

CO ₂ Emissions from Cropland Remaining Cropland	CO_2	(15.6)	•	$L_1 L_2 T_1 T_2$	1990, 2010 ₂
CO ₂ Emissions from Landfilled Yard Trimmings and	CO_2	(13.3)	•	$L_2 T_1 T_2$	1990
Food Scraps					
CO ₂ Emissions from Grassland Remaining	CO_2	(8.3)	•	$L_1 L_2 T_1 T_2$	1990
Grassland					
CO ₂ Emissions from Land Converted to Cropland	CO_2	5.9			
CO ₂ Emissions from Urea Fertilization	CO_2	4.1			
CO ₂ Emissions from Liming of Agricultural Soils	CO_2	3.9			
CO ₂ Emissions from Wetlands Remaining Wetlands	CO_2	1.0			
CH ₄ Emissions from Forest Fires	CH_4	4.8	•	T_2	
N ₂ O Emissions from Forest Fires	N_2O	4.0	•	T_2	
N ₂ O Emissions from Settlement Soils	N_2O	1.4			
N ₂ O Emissions from Forest Soils	N_2O	0.4			
N ₂ O Emissions from Wetlands Remaining Wetlands	N_2O	+			

^a For the ID criteria, L refers to a key category identified through a level assessment; T refers to a key category identified through a trend assessment and the subscripted number refers to either a Tier 1 or Tier 2 assessment (e.g., L₂ designates a source is a key category for a Tier 2 level assessment).

Note: Parentheses indicate negative values (or sequestration).

Evaluation of Key Categories

Level Assessment

When using a Tier 1 approach for the level assessment, a predetermined cumulative emissions threshold is used to identify key categories. When source and sink categories are sorted in order of decreasing absolute emissions, those that fall at the top of the list and cumulatively account for 95 percent of emissions are considered key categories. The 95 percent threshold in the IPCC *Good Practice Guidance* (IPCC 2000) was designed to establish a general level where the key category analysis covers approximately 75 to 92 percent of inventory uncertainty.

Including the Tier 2 approach provides additional insight into why certain source categories are considered key, and how to prioritize inventory improvements. In the Tier 2 approach, the level assessment for each category from the Tier 1 approach is multiplied by its percent relative uncertainty. If the uncertainty reported is asymmetrical, the absolute value of the larger uncertainty is used. Uncertainty is not estimated for the following sources: CO₂ emissions from stationary combustion - geothermal energy; CO₂ emissions from mobile combustion by mode of transportation; CH₄ and N₂O emissions from mobile combustion by mode of off-road transportation; and CH₄ from the incineration of waste. While CO₂ emissions from geothermal energy are included in the overall emissions estimate, they are not an official IPCC source category. As a result, there are no guidelines to associate uncertainty with the emissions estimate; therefore, an uncertainty analysis was not conducted. The uncertainty associated with CO₂ from mobile combustion is applied to each mode's emissions estimate, and the uncertainty associated with off-road vehicle CH₄ and N₂O emissions are applied to both CH₄ and N₂O emissions from aviation, marine, and other sources. No uncertainty was associated with CH₄ emissions from waste incineration because emissions are less than 0.05 Gg CH₄ and an uncertainty analysis was not conducted. When source and sink categories are sorted in decreasing order of this calculation, those that fall at the top of the list and cumulatively account for 90 percent of emissions are considered key categories. The key categories identified by the Tier 2 level assessment may differ from those identified by the Tier 1 assessment. The final set of key categories includes all source and sink categories identified as key by either the Tier 1 or the Tier 2 assessment, keeping in mind that the two assessments are not mutually exclusive.

It is important to note that a key category analysis can be sensitive to the definitions of the source and sink categories. If a large source category is split into many subcategories, then the subcategories may have contributions to the total inventory that are too small for those source categories to be considered key. Similarly, a collection of small, non-key source categories adding up to less than 5 percent of total emissions could become key source categories if those source categories were aggregated into a single source category. The United States has attempted to define source and sink categories by the conventions which would allow comparison with other international key categories, while still maintaining the category definitions that constitute how the emissions estimates were calculated for this report. As such, some of the category names used in the key category analysis may differ from the names used in the main body of the report. Additionally, the United States accounts for some source categories, including fossil fuel feedstocks, international

^b If the source is a key category for both L_1 and L_2 (as designated in the ID criteria column), it is a key category for both assessments in the years provided unless noted by a subscript, in which case it is a key category only for that assessment in only that year (.e.g., 1990_2 designates a source is a key category for the Tier 2 assessment only in 1990).

^cEmissions from these sources not included in totals.

⁺ Does not exceed 0.05 Tg CO₂ Eq.

bunkers, and emissions from U.S. territories, that are derived from unique data sources using country-specific methodologies.

Table A- 4 through Table A- 7 contain the 1990 and 2010 level assessments for both with and without LULUCF sources and sinks, and contain further detail on where each source falls within the analysis. Tier 1 key categories are shaded dark gray. Additional key categories identified by the Tier 2 assessment are shaded light gray.

Trend Assessment

The Tier 1 approach for trend assessment is defined as the product of the source or sink category level assessment and the absolute difference between the source or sink category trend and the total trend. In turn, the source or sink category trend is defined as the change in emissions from the base year to the current year, as a percentage of current year emissions from that source or sink category. The total trend is the percentage change in total inventory emissions from the base year to the current year.

Thus, the source or sink category trend assessment will be large if the source or sink category represents a large percentage of emissions and/or has a trend that is quite different from the overall inventory trend. To determine key categories, the trend assessments are sorted in decreasing order, so that the source or sink categories with the highest trend assessments appear first. The trend assessments are summed until the threshold of 95 percent is reached; all categories that fall within that cumulative 95 percent are considered key categories.

For the Tier 2 approach, the trend assessment for each category from the Tier 1 approach is multiplied by its percent relative uncertainty. If the uncertainty reported is asymmetrical, the larger uncertainty is used. When source and sink categories are sorted in decreasing order of this calculation, those that fall at the top of the list and cumulatively account for 90 percent of emissions are considered key categories. The key categories identified by the Tier 2 trend assessment may differ from those identified by the Tier 1 assessment. The final set of key categories includes all source and sink categories identified as key by either the Tier 1 or the Tier 2 assessment, keeping in mind that the two assessments are not mutually exclusive.

Table A- 8 and Table A- 9 contain the 1990 through 2010 trend assessment for both with and without LULUCF sources and sinks, and contain further detail on where each source falls within the analysis. Tier 1 key categories are shaded dark gray. Additional key categories identified by the Tier 2 assessment are shaded light gray.

Table A- 4: 1990 Key Source Category Tier 1 and Tier 2 Analysis—Level Assessment, without LULUCF

		1990				
		Estimate				
	Direct	(Tg CO ₂	Tier 1 Level	Cumulative		Tier 2 Level
IPCC Source Categories	GHG	Eq.)	Assessment	Total	Uncertainty ^a	Assessment
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	1,547.6	0.25	0.25	10%	0.024
Electricity Generation						
CO ₂ Emissions from Mobile Combustion: Road	CO_2	1,188.9	0.19	0.44	8%	0.015
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	409.9	0.07	0.51	10%	0.007
Industrial						
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	281.2	0.05	0.56	18%	0.008
Industrial						
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	238.0	0.04	0.59	7%	0.003
Residential						
Fugitive Emissions from Natural Gas Systems	CH_4	189.6	0.03	0.63	30%	0.009
CO ₂ Emissions from Mobile Combustion: Aviation	CO_2	179.3	0.03	0.65	8%	0.002
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	175.3	0.03	0.68	5%	0.001
Electricity Generation						
Direct N ₂ O Emissions from Agricultural Soil Management	N_2O	155.8	0.03	0.71	57%	0.014
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	155.3	0.03	0.73	17%	0.004
Industrial						
CH ₄ Emissions from Landfills	CH_4	147.7	0.02	0.76	52%	0.012
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	142.1	0.02	0.78	7%	0.002
Commercial						
CH ₄ Emissions from Enteric Fermentation	CH_4	133.8	0.02	0.80	18%	0.004
CO ₂ Emissions from Non-Energy Use of Fuels	CO_2	119.6	0.02	0.82	23%	0.004
CO ₂ Emissions from Iron and Steel Production &	CO_2	99.6	0.02	0.84	17%	0.003
Metallurgical Coke Production						

CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	97.5	0.02	0.85	8%	0.001
Electricity Generation	CO ₂	71.5	0.02	0.03		0.001
CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO ₂	97.4	0.02	0.87	5%	0.001
Fugitive Emissions from Coal Mining	CH_4	84.1	0.01	0.88	16%	0.002
CO ₂ Emissions from Mobile Combustion: Other	CO_2	73.3	0.01	0.90	8%	0.001
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	64.9	0.01	0.91	5%	< 0.001
Commercial	2 2					
CO ₂ Emissions from Mobile Combustion: Marine	CO_2	44.5	0.01	0.91	8%	0.001
Indirect N ₂ O Emissions from Applied Nitrogen	N_2O	44.1	0.01	0.92	150%	0.011
N ₂ O Emissions from Mobile Combustion: Road	N_2O	40.3	0.01	0.93	26%	0.002
CO ₂ Emissions from Natural Gas Systems	$\widetilde{\text{CO}_2}$	37.6	0.01	0.93	30%	0.002
HFC-23 Emissions from HCFC-22 Production	HFCs	36.4	0.01	0.94	10%	0.001
Fugitive Emissions from Petroleum Systems	CH_4	35.2	0.01	0.94	149%	0.009
CO ₂ Emissions from Cement Production	CO_2	33.3	0.01	0.95	14%	0.001
CH ₄ Emissions from Manure Management	CH_4	31.7	0.01	0.95	20%	0.001
CO ₂ Emissions from Stationary Combustion - Oil - U.S.	CO_2	27.2	< 0.01	0.96	12%	0.001
Territories						
SF ₆ Emissions from Electrical Transmission and	SF_6	26.7	< 0.01	0.96	25%	0.001
Distribution						
PFC Emissions from Aluminum Production	PFCs	18.4	<0.01	0.97	51%	0.002
N ₂ O Emissions from Nitric Acid Production	N_2O	17.6	< 0.01	0.97	40%	0.001
CH ₄ Emissions from Wastewater Treatment	CH ₄	15.9	< 0.01	0.97	31%	0.001
N ₂ O Emissions from Adipic Acid Production	N_2O	15.8	< 0.01	0.97	9%	< 0.001
N ₂ O Emissions from Manure Management	N_2O	14.8	< 0.01	0.98	24%	0.001
CO ₂ Emissions from Ammonia Production	CO_2	13.0	< 0.01	0.98	25%	0.001
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	12.0	< 0.01	0.98	15%	< 0.001
Commercial	CO	11.5	<0.01	0.08	00/	<0.001
CO ₂ Emissions from Lime Production	CO_2 CO_2	11.5 8.0	<0.01 <0.01	0.98 0.98	9% 24%	<0.001 <0.001
CO ₂ Emissions from Incineration of Waste Non-CO ₂ Emissions from Stationary Combustion -	N_2O	7.4	<0.01	0.98	173%	0.001
Electricity Generation	11/20	7.4	<0.01	0.55	17370	0.002
CH ₄ Emissions from Rice Cultivation	CH ₄	7.1	< 0.01	0.99	153%	0.002
CO ₂ Emissions from Aluminum Production	CO_2	6.8	< 0.01	0.99	49%	0.002
Fugitive Emissions from Abandoned Underground Coal	CH_4	6.0	< 0.01	0.99	22%	< 0.001
Mines	C11 ₄	0.0	(0.01	0.55	2270	10.001
SF ₆ Emissions from Magnesium Production and Processing	SF_6	5.4	< 0.01	0.99	4%	< 0.001
CO ₂ Emissions from Limestone and Dolomite Use	CO_2	5.1	< 0.01	0.99	18%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion -	CH ₄	4.6	< 0.01	0.99	223%	0.002
Residential						
N ₂ O Emissions from Product Uses	N_2O	4.4	< 0.01	0.99	8%	< 0.001
CH ₄ Emissions from Mobile Combustion: Road	CH_4	4.2	< 0.01	0.99	10%	< 0.001
CO ₂ Emissions from Soda Ash Production and	CO_2	4.1	< 0.01	0.99	7%	< 0.001
Consumption	~~	• •	0.04	0.00		
CO ₂ Emissions from Urea Consumption for Non-Ag	CO_2	3.8	< 0.01	0.99	47%	< 0.001
Purposes	N. O	2.5	0.01	0.00	000/	0.001
N ₂ O Emissions from Wastewater Treatment	N_2O	3.5	< 0.01	0.99	99%	0.001
CO ₂ Emissions from Petrochemical Production	CO_2	3.3 3.3	< 0.01	1.00	29%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion - Industrial	N_2O	3.3	< 0.01	1.00	207%	0.001
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	3.0	< 0.01	1.00	15%	< 0.001
Residential	CO_2	5.0	<0.01	1.00	13/0	<0.001
PFC, HFC, and SF ₆ Emissions from Semiconductor	Several	2.9	< 0.01	1.00	10%	< 0.001
Manufacture	Severar	2.7	(0.01	1.00	1070	10.001
CO ₂ Emissions from Ferroalloy Production	CO_2	2.2	< 0.01	1.00	12%	< 0.001
N ₂ O Emissions from Mobile Combustion: Aviation	N_2O	1.7	< 0.01	1.00	1%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion -	CH ₄	1.6	< 0.01	1.00	49%	< 0.001
Industrial	- =				- / -	
CO ₂ Emissions from Phosphoric Acid Production	CO_2	1.5	< 0.01	1.00	18%	< 0.001
CO ₂ Emissions from Carbon Dioxide Consumption	CO_2	1.4	< 0.01	1.00	30%	< 0.001
N ₂ O Emissions from Mobile Combustion: Other	N_2O	1.3	< 0.01	1.00	4%	< 0.001
CO ₂ Emissions from Titanium Dioxide Production	$\widetilde{\text{CO}}_2$	1.2	< 0.01	1.00	13%	< 0.001
	•					

CH4 Emissions from Iron and Steel Production & CH4 1.0 < < < < < <	Non-CO ₂ Emissions from Stationary Combustion - Residential	N_2O	1.1	< 0.01	1.00	200%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion - CH ₄ 0.9 <0.01 1.00 142% <0.001 Commercial CH ₄ Emissions from Petrochemical Production CH ₄ 0.9 <0.01 1.00 30% <0.001 CD ₂ Emissions from Stationary Combustion - Coal - U.S. CO ₂ 0.6 <0.01 1.00 19% <0.001 CD ₂ Emissions from Stationary Combustion - Coal - U.S. CO ₂ 0.6 <0.01 1.00 19% <0.001 CD ₂ Emissions from Mobile Combustion: Marine N ₂ O 0.6 <0.01 1.00 13% <0.001 N ₂ O Emissions from Mobile Combustion: Marine N ₂ O 0.5 <0.01 1.00 15% <0.001 N ₂ O Emissions from Incineration of Waste N ₂ O 0.5 <0.01 1.00 320% <0.001 N ₂ O Emissions from Incineration of Waste N ₂ O 0.5 <0.01 1.00 320% <0.001 N ₂ O Emissions from Petroleum Systems CO ₂ 0.4 <0.01 1.00 1.00 NA <0.001 Energy CD ₂ Emissions from Petroleum Systems CO ₂ 0.4 <0.01 1.00 1.00 NA <0.001 Non-CO ₂ Emissions from Stationary Combustion - N ₂ O 0.4 <0.01 1.00 1.00 79% <0.001 CO ₂ Emissions from Stationary Combustion - N ₂ O 0.4 <0.01 1.00 1.00 79% <0.001 CO ₂ Emissions from Stationary Combustion - CH ₄ 0.3 <0.01 1.00 79% <0.001 CO ₂ Emissions from Composting N ₂ O 0.4 <0.01 1.00 79% <0.001 CO ₂ Emissions from Composting N ₂ O 0.4 <0.01 1.00 79% <0.001 CO ₂ Emissions from Substitutes for Ozone Depleting Substances Several 0.3 <0.01 1.00 9% <0.001 CO ₂ Emissions from Mobile Combustion: Other CH ₄ 0.3 <0.01 1.00 50% <0.001 CO ₂ Emissions from Mobile Combustion: Other CH ₄ 0.3 <0.01 1.00 50% <0.001 CO ₂ Emissions from Field Burning of Agricultural Residues N ₂ O 0.1 <0.01 1.00 2% <0.001 Non-CO ₂ Emissions from Field Burning of Agricultural Residues N ₂ O 0.1 <0.01 1.00 2% <0.001 Non-CO ₂ Emissions from Stationary Combustion - U.S. N ₂ O 0.1 <0.01 1.00 57% <0.001 Non-CO ₂ Emissions from Stationar		CH_4	1.0	< 0.01	1.00	22%	< 0.001
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Non-CO ₂ Emissions from Stationary Combustion -	CH_4	0.9	< 0.01	1.00	142%	< 0.001
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	CH ₄ Emissions from Petrochemical Production	CH_4	0.9	< 0.01	1.00	30%	< 0.001
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		CO_2	0.6	< 0.01	1.00	19%	< 0.001
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		CO_2	0.6	< 0.01	1.00	19%	< 0.001
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		_					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	CO ₂ Emissions from Stationary Combustion - Geothermal						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		CO_2	0.4	< 0.01	1.00	149%	< 0.001
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Non-CO ₂ Emissions from Stationary Combustion -	2					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		CO_2	0.4	< 0.01	1.00	10%	< 0.001
Non-CO $_2$ Emissions from Stationary Combustion - CH $_4$ 0.3 <0.01 1.00 76% <0.001 Electricity Generation Emissions from Substitutes for Ozone Depleting Substances Several 0.3 <0.01 1.00 9% <0.001 CH $_4$ Emissions from Composting CH $_4$ 0.3 <0.01 1.00 50% <0.001 CH $_4$ Emissions from Mobile Combustion: Other CH $_4$ 0.3 <0.01 1.00 4% <0.001 CH $_4$ Emissions from Field Burning of Agricultural Residues CH $_4$ 0.2 <0.01 1.00 42% <0.001 CH $_4$ Emissions from Mobile Combustion: Aviation CH $_4$ 0.2 <0.01 1.00 2% <0.001 N $_2$ 0 Emissions from Stationary Combustion - U.S. N $_2$ 0 0.1 <0.01 1.00 31% <0.001 Territories Non-CO $_2$ Emissions from Stationary Combustion - U.S. CH $_4$ + 0.01 1.00 57% <0.001 Territories CH $_4$ Emissions from Silicon Carbide Production and CH $_4$ + 0.01 1.00 9% <0.001 CH $_4$ Emissions from Mobile Combustion: Marine CH $_4$ + 0.01 1.00 6% <0.001 CH $_4$ Emissions from Ferroalloy Production CH $_4$ Emissions from Ferroalloy Production CH $_4$ Emissions from Incineration of Waste CH $_4$ + 0.01 1.00 NE 0.001 CO $_2$ Emissions from Incineration of Waste CH $_4$ + 0.01 1.00 NE 0.001 CH $_4$ Emissions from Stationary Combustion - Gas - U.S. CO $_2$ + 0.01 1.00 17% 0.0001	•	N_2O	0.4	< 0.01	1.00	50%	< 0.001
Electricity Generation Emissions from Substitutes for Ozone Depleting Substances Several CH ₄ Emissions from Composting CH ₄ Emissions from Mobile Combustion: Other CH ₄ Emissions from Mobile Combustion: Other CH ₄ Emissions from Field Burning of Agricultural Residues CH ₄ U.2 0.01 CH ₄ Emissions from Mobile Combustion: Aviation CH ₄ Emissions from Mobile Combustion: Aviation CH ₄ Emissions from Field Burning of Agricultural Residues N ₂ O CH ₄ Emissions from Field Burning of Agricultural Residues N ₂ O CH ₄ U.2 0.01 Non-CO ₂ Emissions from Stationary Combustion - U.S. N ₂ O CH ₄ U.2 0.01 Non-CO ₂ Emissions from Stationary Combustion - U.S. CH ₄ U.2 0.01 Non-CO ₂ Emissions from Stationary Combustion - U.S. CH ₄ U.2 0.01 CH ₄ U.2 0.01		_	0.3	< 0.01	1.00	76%	< 0.001
Emissions from Substitutes for Ozone Depleting Substances Several 0.3 <0.01 1.00 9% <0.001 CH_4 Emissions from Composting CH_4 0.3 <0.01 1.00 50% <0.001 CH_4 Emissions from Mobile Combustion: Other CH_4 0.3 <0.01 1.00 4% <0.001 CH_4 Emissions from Field Burning of Agricultural Residues CH_4 0.2 <0.01 1.00 4% <0.001 CH_4 Emissions from Mobile Combustion: Aviation CH_4 0.2 <0.01 1.00 2% <0.001 N_2O Emissions from Field Burning of Agricultural Residues N_2O 0.1 <0.01 1.00 31% <0.001 N_2O Emissions from Stationary Combustion - U.S. N_2O 0.1 <0.01 1.00		7					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		Several	0.3	< 0.01	1.00	9%	< 0.001
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			0.3	< 0.01	1.00	50%	< 0.001
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	CH ₄ Emissions from Mobile Combustion: Other	CH_4	0.3	< 0.01	1.00	4%	< 0.001
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	CH ₄ Emissions from Field Burning of Agricultural Residues	CH_4	0.2	< 0.01	1.00	42%	< 0.001
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		CH_4	0.2	< 0.01	1.00	2%	< 0.001
Territories $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	N ₂ O Emissions from Field Burning of Agricultural Residues	N_2O	0.1	< 0.01	1.00	31%	< 0.001
Territories $CH_4 \ Emissions \ from \ Silicon \ Carbide \ Production \ and \\ Consumption \\ CH_4 \ Emissions \ from \ Mobile \ Combustion: \ Marine \\ CH_4 \ Emissions \ from \ Mobile \ Combustion: \ Marine \\ CH_4 \ Emissions \ from \ Ferroalloy \ Production \\ CH_4 \ Emissions \ from \ Ferroalloy \ Production \\ CH_4 \ Emissions \ from \ Incineration \ of \ Waste \\ CH_4 \ H \ <0.01 \ 1.00 \ NE \ <0.001 \\ CO_2 \ Emissions \ from \ Stationary \ Combustion \ - \ Gas \ - \ U.S. \\ CO_2 \ H \ <0.01 \ 1.00 \ 17\% \ <0.001$		N_2O	0.1	< 0.01	1.00	203%	< 0.001
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		CH_4	+	< 0.01	1.00	57%	< 0.001
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	·	CH_4	+	< 0.01	1.00	9%	< 0.001
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	•	CH_4	+	< 0.01	1.00	6%	< 0.001
CH_4 Emissions from Incineration of Waste CH_4 + <0.01 1.00 NE <0.001 CO_2 Emissions from Stationary Combustion - Gas - U.S. CO_2 + <0.01 1.00 17% <0.001							
CO_2 Emissions from Stationary Combustion - Gas - U.S. CO_2 + <0.01 1.00 17% <0.001							
		2					

Table A-5: 1990 Key Source Category Tier 1 and Tier 2 Analysis—Level Assessment, with LULUCF

		1990				
		Estimate				
	Direct	(Tg CO ₂	Tier 1 Level (Cumulative		Tier 2 Level
IPCC Source Categories	GHG	Eq.)	Assessment	Total	Uncertainty ^a	Assessment
CO ₂ Emissions from Stationary Combustion - Coal -	CO ₂	1,547.6	0.22	0.22	10%	0.021
Electricity Generation						
CO ₂ Emissions from Mobile Combustion: Road	CO_2	1,188.9	0.17	0.39	8%	0.013
CO ₂ Emissions from Changes in Forest Carbon Stocks	CO_2	701.4	0.10	0.49	12%	0.012
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	409.9	0.06	0.54	10%	0.006
Industrial						
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	281.2	0.04	0.58	18%	0.007
Industrial						
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	238.0	0.03	0.62	7%	0.002
Residential						
Fugitive Emissions from Natural Gas Systems	CH_4	189.6	0.03	0.65	30%	0.008

Note: LULUCF sources and sinks are not included in this analysis.

^a Percent relative uncertainty. If the corresponding uncertainty is asymmetrical, the uncertainty given here is the larger and always positive. NE Uncertainty not estimated.

⁺ Does not exceed 0.05 Tg CO_2 Eq.

CO ₂ Emissions from Mobile Combustion: Aviation	CO ₂	179.3	0.03	0.67	8%	0.002
CO ₂ Emissions from Stationary Combustion - Gas - Electricity Generation	CO_2	175.3	0.02	0.70	5%	0.001
Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	155.8	0.02	0.72	57%	0.013
CO ₂ Emissions from Stationary Combustion - Coal - Industrial	$\widetilde{\text{CO}_2}$	155.3	0.02	0.74	17%	0.004
CH ₄ Emissions from Landfills	CH_4	147.7	0.02	0.76	52%	0.011
CO ₂ Emissions from Stationary Combustion - Gas - Commercial	CO_2	142.1	0.02	0.78	7%	0.001
CH ₄ Emissions from Enteric Fermentation	CH_4	133.8	0.02	0.80	18%	0.003
CO ₂ Emissions from Non-Energy Use of Fuels	CO_2	119.6	0.02	0.82	23%	0.004
CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO_2	99.6	0.01	0.83	17%	0.002
CO ₂ Emissions from Stationary Combustion - Oil - Electricity Generation	CO_2	97.5	0.01	0.84	8%	0.001
CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO_2	97.4	0.01	0.86	5%	0.001
Fugitive Emissions from Coal Mining	CH_4	84.1	0.01	0.87	16%	0.002
CO ₂ Emissions from Mobile Combustion: Other	CO_2	73.3	0.01	0.88	8%	0.001
CO ₂ Emissions from Stationary Combustion - Oil - Commercial	CO_2	64.9	0.01	0.89	5%	< 0.001
CO ₂ Emissions from Urban Trees	CO_2	57.1	0.01	0.90	23%	0.002
CO ₂ Emissions from Grassland Remaining Grassland	CO ₂	52.2	0.01	0.91	32%	0.002
CO ₂ Emissions from Mobile Combustion: Marine	CO ₂	44.5	0.01	0.91	8%	0.001
Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	44.1	0.01	0.92	150%	0.009
N ₂ O Emissions from Mobile Combustion: Road CO ₂ Emissions from Natural Gas Systems	N_2O CO_2	40.3 37.6	0.01 0.01	0.92 0.93	26% 30%	0.001 0.002
HFC-23 Emissions from HCFC-22 Production	HFCs	36.4	0.01	0.93	10%	0.002
Fugitive Emissions from Petroleum Systems	CH ₄	35.2	< 0.01	0.93	149%	0.001
CO ₂ Emissions from Cement Production	CO_2	33.3	< 0.01	0.94	14%	0.007
CH ₄ Emissions from Manure Management	CH ₄	31.7	< 0.01	0.95	20%	0.001
CO ₂ Emissions from Cropland Remaining Cropland	CO_2	29.4	< 0.01	0.95	192%	0.008
CO ₂ Emissions from Stationary Combustion - Oil - U.S. Territories	CO_2	27.2	<0.01	0.96	12%	< 0.001
SF ₆ Emissions from Electrical Transmission and Distribution	SF_6	26.7	< 0.01	0.96	25%	0.001
CO ₂ Emissions from Landfilled Yard Trimmings and Food Scraps	CO ₂	24.2	< 0.01	0.96	57%	0.002
CO ₂ Emissions from Land Converted to Grassland	CO_2	19.8	< 0.01	0.97	15%	< 0.001
PFC Emissions from Aluminum Production	PFCs	18.4	< 0.01	0.97	51%	0.001
N ₂ O Emissions from Nitric Acid Production	N_2O	17.6	< 0.01	0.97	40%	0.001
CH ₄ Emissions from Wastewater Treatment	CH_4	15.9	< 0.01	0.97	31%	0.001
N ₂ O Emissions from Adipic Acid Production	N_2O	15.8	< 0.01	0.98	9%	< 0.001
N ₂ O Emissions from Manure Management	N_2O	14.8	< 0.01	0.98	24%	0.001
CO ₂ Emissions from Ammonia Production	CO_2	13.0	< 0.01	0.98	25%	< 0.001
CO ₂ Emissions from Stationary Combustion - Coal - Commercial	CO ₂	12.0	<0.01	0.98	15%	<0.001
CO ₂ Emissions from Lime Production	CO_2	11.5	< 0.01	0.98	9%	< 0.001
CO ₂ Emissions from Incineration of Waste Non-CO ₂ Emissions from Stationary Combustion -	CO ₂ N ₂ O	8.0 7.4	<0.01 <0.01	0.98	24% 173%	<0.001 0.002
Electricity Generation CH ₄ Emissions from Rice Cultivation	CH_4	7.1	< 0.01	0.99	153%	0.002
CO ₂ Emissions from Aluminum Production	CO_2	6.8	<0.01	0.99	49%	< 0.002
Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	6.0	< 0.01	0.99	22%	< 0.001
SF ₆ Emissions from Magnesium Production and Processing	SF_6	5.4	< 0.01	0.99	4%	< 0.001
CO ₂ Emissions from Limestone and Dolomite Use	CO_2	5.1	< 0.01	0.99	18%	< 0.001
CO ₂ Emissions from Liming of Agricultural Soils	CO_2	4.7	< 0.01	0.99	112%	0.001
Non-CO ₂ Emissions from Stationary Combustion - Residential	CH ₄	4.6	< 0.01	0.99	223%	0.001
N ₂ O Emissions from Product Uses	N ₂ O	4.4	< 0.01	0.99	8%	< 0.001
CH ₄ Emissions from Mobile Combustion: Road	CH_4	4.2	< 0.01	0.99	10%	< 0.001

CO ₂ Emissions from Soda Ash Production and	CO_2	4.1	< 0.01	0.99	7%	< 0.001
Consumption						
CO ₂ Emissions from Urea Consumption for Non-Ag	CO_2	3.8	< 0.01	0.99	47%	< 0.001
Purposes						
N ₂ O Emissions from Wastewater Treatment	N_2O	3.5	< 0.01	0.99	99%	< 0.001
CO ₂ Emissions from Petrochemical Production	CO_2	3.3	< 0.01	0.99	29%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion -	N_2O	3.3	< 0.01	0.99	207%	0.001
Industrial						
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	3.0	< 0.01	0.99	15%	< 0.001
Residential	_					
PFC, HFC, and SF ₆ Emissions from Semiconductor	Several	2.9	< 0.01	1.00	10%	< 0.001
Manufacture						
CH ₄ Emissions from Forest Fires	CH_4	2.5	< 0.01	1.00	148%	0.001
CO ₂ Emissions from Urea Fertilization	CO_2	2.4	< 0.01	1.00	43%	< 0.001
CO ₂ Emissions from Ferroalloy Production	CO_2	2.2	< 0.01	1.00	12%	< 0.001
CO ₂ Emissions from Land Converted to Cropland	CO_2	2.2	< 0.01	1.00	40%	< 0.001
N ₂ O Emissions from Forest Fires	N_2O	2.1	< 0.01	1.00	147%	< 0.001
=	N_2O	1.7	< 0.01	1.00	1%	< 0.001
N ₂ O Emissions from Mobile Combustion: Aviation						
Non-CO ₂ Emissions from Stationary Combustion -	CH_4	1.6	< 0.01	1.00	49%	< 0.001
Industrial	CO	1.5	.0.01	1.00	100/	.0.001
CO ₂ Emissions from Phosphoric Acid Production	CO_2	1.5	< 0.01	1.00	18%	< 0.001
CO ₂ Emissions from Carbon Dioxide Consumption	CO_2	1.4	< 0.01	1.00	30%	< 0.001
N ₂ O Emissions from Mobile Combustion: Other	N_2O	1.3	< 0.01	1.00	4%	< 0.001
CO ₂ Emissions from Titanium Dioxide Production	CO_2	1.2	< 0.01	1.00	13%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion -	N_2O	1.1	< 0.01	1.00	200%	< 0.001
Residential						
CO ₂ Emissions from Wetlands Remaining Wetlands	CO_2	1.0	< 0.01	1.00	38%	< 0.001
N ₂ O Emissions from Settlement Soils	N_2O	1.0	< 0.01	1.00	163%	< 0.001
CH ₄ Emissions from Iron and Steel Production &	CH_4	1.0	< 0.01	1.00	22%	< 0.001
Metallurgical Coke Production						
Non-CO ₂ Emissions from Stationary Combustion -	CH_4	0.9	< 0.01	1.00	142%	< 0.001
Commercial						
CH ₄ Emissions from Petrochemical Production	CH_4	0.9	< 0.01	1.00	30%	< 0.001
CO ₂ Emissions from Stationary Combustion - Coal - U.S.	CO_2	0.6	< 0.01	1.00	19%	< 0.001
Territories	-					
CO ₂ Emissions from Zinc Production	CO_2	0.6	< 0.01	1.00	19%	< 0.001
N ₂ O Emissions from Mobile Combustion: Marine	N_2O	0.6	< 0.01	1.00	23%	< 0.001
CO ₂ Emissions from Lead Production	CO_2	0.5	< 0.01	1.00	15%	< 0.001
N ₂ O Emissions from Incineration of Waste	N_2O	0.5	< 0.01	1.00	320%	< 0.001
CO ₂ Emissions from Stationary Combustion - Geothermal	CO_2	0.4	< 0.01	1.00	NA	< 0.001
Energy	002	0.1	(0.01	1.00	1111	(0.001
CO ₂ Emissions from Petroleum Systems	CO_2	0.4	< 0.01	1.00	149%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion -	N_2O	0.4	< 0.01	1.00	79%	< 0.001
Commercial	1120	0.4	<0.01	1.00	1970	<0.001
	CO	0.4	<0.01	1.00	100/	<0.001
CO ₂ Emissions from Silicon Carbide Production and	CO_2	0.4	< 0.01	1.00	10%	< 0.001
Consumption	NO	0.4	.0.01	1.00	500/	.0.001
N ₂ O Emissions from Composting	N_2O	0.4	< 0.01	1.00	50%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion -	CH_4	0.3	< 0.01	1.00	76%	< 0.001
Electricity Generation						
Emissions from Substitutes for Ozone Depleting Substances		0.3	< 0.01	1.00	9%	< 0.001
CH ₄ Emissions from Composting	CH_4	0.3	< 0.01	1.00	50%	< 0.001
CH ₄ Emissions from Mobile Combustion: Other	CH_4	0.3	< 0.01	1.00	4%	< 0.001
CH ₄ Emissions from Field Burning of Agricultural Residues	CH_4	0.2	< 0.01	1.00	42%	< 0.001
CH ₄ Emissions from Mobile Combustion: Aviation	CH_4	0.2	< 0.01	1.00	2%	< 0.001
N ₂ O Emissions from Field Burning of Agricultural Residues	N_2O	0.1	< 0.01	1.00	31%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion - U.S.	N_2O	0.1	< 0.01	1.00	203%	< 0.001
Territories						
N ₂ O Emissions from Forest Soils	N_2O	0.1	< 0.01	1.00	211%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion - U.S.	$\widetilde{\mathrm{CH}_{4}}$	+	< 0.01	1.00	57%	< 0.001
Territories	•					

CH ₄ Emissions from Silicon Carbide Production and	CH_4	+	< 0.01	1.00	9%	< 0.001
Consumption						
CH ₄ Emissions from Mobile Combustion: Marine	CH_4	+	< 0.01	1.00	6%	< 0.001
CH ₄ Emissions from Ferroalloy Production	CH_4	+	< 0.01	1.00	12%	< 0.001
N ₂ O Emissions from Wetlands Remaining Wetlands	N_2O	+	< 0.01	1.00	74%	< 0.001
CH ₄ Emissions from Incineration of Waste	CH_4	+	< 0.01	1.00	NE	< 0.001
CO ₂ Emissions from Stationary Combustion - Gas - U.S.	CO_2	+	< 0.01	1.00	17%	< 0.001
Territories						

^a Percent relative uncertainty. If the corresponding uncertainty is asymmetrical, the uncertainty given here is the larger and always positive. NE Uncertainty not estimated. + Does not exceed 0.05 Tg CO₂ Eq.

		2010				
		Estimate				
	Direct	(Tg CO ₂	Tier 1 Level	Cumulative		Tier 2 Level
IPCC Source Categories	GHG	Eq.)	Assessment	Total	Uncertainty ^a	Assessment
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	1,827.3	0.27	0.27	10%	0.026
Electricity Generation	2	Ź				
CO ₂ Emissions from Mobile Combustion: Road	CO_2	1,478.9	0.22	0.49	8%	0.017
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	399.4	0.06	0.54	5%	0.003
Electricity Generation	-					
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	394.2	0.06	0.60	10%	0.006
Industrial						
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	287.4	0.04	0.64	18%	0.008
Industrial	-					
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	258.8	0.04	0.68	7%	0.003
Residential						
Fugitive Emissions from Natural Gas Systems	CH_4	215.4	0.03	0.71	30%	0.009
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	167.7	0.02	0.74	7%	0.002
Commercial						
Direct N ₂ O Emissions from Agricultural Soil	N_2O	162.3	0.02	0.76	57%	0.014
Management						
CO ₂ Emissions from Mobile Combustion: Aviation	CO_2	142.4	0.02	0.78	8%	0.002
CH ₄ Emissions from Enteric Fermentation	CH_4	141.3	0.02	0.80	18%	0.004
CO ₂ Emissions from Non-Energy Use of Fuels	CO_2	125.1	0.02	0.82	23%	0.004
Emissions from Substitutes for Ozone Depleting	Several	114.6	0.02	0.84	9%	0.001
Substances						
CH ₄ Emissions from Landfills	CH_4	107.8	0.02	0.86	52%	0.008
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	96.2	0.01	0.87	17%	0.002
Industrial						
CO ₂ Emissions from Mobile Combustion: Other	CO_2	81.5	0.01	0.88	8%	0.001
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	80.7	0.01	0.89	5%	0.001
Residential	~~~			0.00	4 401	0.000
Fugitive Emissions from Coal Mining	CH ₄	72.6	0.01	0.90	16%	0.002
CO ₂ Emissions from Iron and Steel Production &	CO_2	54.3	0.01	0.91	17%	0.001
Metallurgical Coke Production	CH	52 0	0.01	0.02	200/	0.002
CH ₄ Emissions from Manure Management	CH ₄	52.0	0.01	0.92	20%	0.002
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	51.1	0.01	0.93	5%	< 0.001
Commercial	N O	45.5	0.01	0.02	150%	0.010
Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	43.5	0.01 0.01	0.93 0.94	150%	0.010 <0.001
CO ₂ Emissions from Mobile Combustion: Marine	CO ₂	36.7	0.01	0.94	12%	0.001
CO ₂ Emissions from Stationary Combustion - Oil - U.S. Territories	CO_2	30.7	0.01	0.93	12%	0.001
CO ₂ Emissions from Natural Gas Systems	CO ₂	32.3	< 0.01	0.95	30%	0.001
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	31.3	<0.01	0.95	8%	< 0.001
Electricity Generation	CO_2	31.3	<0.01	0.90	0.70	<0.001
Fugitive Emissions from Petroleum Systems	CH_4	31.0	< 0.01	0.96	149%	0.007
CO ₂ Emissions from Cement Production	CO ₂	30.5	<0.01	0.96	14%	0.007
Non-CO ₂ Emissions from Stationary Combustion -	N_2O	18.5	<0.01	0.90	173%	0.001
Electricity Generation	11,20	10.5	₹0.01	0.77	17370	0.005
N ₂ O Emissions from Manure Management	N ₂ O	18.3	< 0.01	0.97	24%	0.001
1.70 Zimosiono nom manaro munagoment	1,20	10.5	\0.01	0.71	2-170	0.001

N ₂ O Emissions from Nitric Acid Production	N_2O	16.7	< 0.01	0.97	40%	0.001
N ₂ O Emissions from Mobile Combustion: Road	N_2O	16.7	< 0.01	0.97	26%	0.001
CH ₄ Emissions from Wastewater Treatment	CH_4	16.3	< 0.01	0.98	31%	0.001
CO ₂ Emissions from Lime Production	CO_2	13.2	< 0.01	0.98	9%	< 0.001
CO ₂ Emissions from Incineration of Waste	CO_2	12.1	< 0.01	0.98	24%	< 0.001
SF ₆ Emissions from Electrical Transmission and	SF_6	11.8	< 0.01	0.98	25%	< 0.001
Distribution						
CO ₂ Emissions from Limestone and Dolomite Use	CO_2	10.0	< 0.01	0.98	18%	< 0.001
CO ₂ Emissions from Ammonia Production	CO_2	8.7	< 0.01	0.99	25%	< 0.001
CH ₄ Emissions from Rice Cultivation	CH_4	8.6	< 0.01	0.99	153%	0.002
HFC-23 Emissions from HCFC-22 Production	HFCs	8.1	< 0.01	0.99	10%	< 0.001
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	5.5	< 0.01	0.99	15%	< 0.001
Commercial	2					
PFC, HFC, and SF ₆ Emissions from Semiconductor	Several	5.4	< 0.01	0.99	10%	< 0.001
Manufacture				****		
N ₂ O Emissions from Wastewater Treatment	N_2O	5.0	< 0.01	0.99	99%	0.001
Fugitive Emissions from Abandoned Underground Coal	CH_4	5.0	< 0.01	0.99	22%	< 0.001
Mines	C114	5.0	10.01	0.55	2270	(0.001
N ₂ O Emissions from Product Uses	N_2O	4.4	< 0.01	0.99	8%	< 0.001
CO ₂ Emissions from Urea Consumption for Non-Ag	CO_2	4.4	< 0.01	0.99	47%	< 0.001
Purposes	CO_2	4.4	<0.01	0.77	47/0	<0.001
1	CO_2	3.7	< 0.01	0.99	7%	< 0.001
CO ₂ Emissions from Soda Ash Production and	CO_2	3.7	<0.01	0.99	7 70	<0.001
Consumption	CII	2.5	-0.01	0.00	2220/	0.001
Non-CO ₂ Emissions from Stationary Combustion -	CH_4	3.5	< 0.01	0.99	223%	0.001
Residential	CO	2.5	0.01	0.00	100/	0.001
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	3.5	< 0.01	0.99	19%	< 0.001
U.S. Territories			0.04	0.00	• • • •	0.004
CO ₂ Emissions from Petrochemical Production	CO_2	3.3	< 0.01	0.99	29%	< 0.001
CO ₂ Emissions from Aluminum Production	CO_2	3.0	< 0.01	0.99	49%	< 0.001
N ₂ O Emissions from Adipic Acid Production	N_2O	2.8	< 0.01	1.00	9%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion -	N_2O	2.8	< 0.01	1.00	207%	0.001
Industrial						
CO ₂ Emissions from Carbon Dioxide Consumption	CO_2	2.2	< 0.01	1.00	30%	< 0.001
N ₂ O Emissions from Mobile Combustion: Other	N_2O	1.9	< 0.01	1.00	4%	< 0.001
CO ₂ Emissions from Titanium Dioxide Production	CO_2	1.9	< 0.01	1.00	13%	< 0.001
N ₂ O Emissions from Composting	N_2O	1.7	< 0.01	1.00	50%	< 0.001
CO ₂ Emissions from Ferroalloy Production	CO_2	1.7	< 0.01	1.00	12%	< 0.001
CH ₄ Emissions from Composting	CH_4	1.6	< 0.01	1.00	50%	< 0.001
PFC Emissions from Aluminum Production	PFCs	1.6	< 0.01	1.00	51%	< 0.001
CO ₂ Emissions from Stationary Combustion - Gas - U.S.	CO_2	1.5	< 0.01	1.00	17%	< 0.001
Territories	-					
CH ₄ Emissions from Mobile Combustion: Road	CH_4	1.4	< 0.01	1.00	10%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion -	CH_4	1.4	< 0.01	1.00	49%	< 0.001
Industrial	-					
N ₂ O Emissions from Mobile Combustion: Aviation	N_2O	1.3	< 0.01	1.00	1%	< 0.001
SF ₆ Emissions from Magnesium Production and	SF_6	1.3	< 0.01	1.00	4%	< 0.001
Processing	51 6	1.0	10.01	1.00	.,,	10.001
CO ₂ Emissions from Zinc Production	CO_2	1.2	< 0.01	1.00	19%	< 0.001
CO ₂ Emissions from Phosphoric Acid Production	CO_2	1.0	< 0.01	1.00	18%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion -	CH_4	0.9	< 0.01	1.00	142%	< 0.001
Commercial	C11 ₄	0.7	<0.01	1.00	142/0	<0.001
	CH	0.0	<0.01	1.00	200/	<0.001
CH ₄ Emissions from Petrochemical Production	CH_4	0.9	< 0.01	1.00	30%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion -	N_2O	0.9	< 0.01	1.00	200%	< 0.001
Residential	CO	0.7	-0.01	1.00	1.50/	-0.001
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	0.7	< 0.01	1.00	15%	< 0.001
Residential N. F. in the Maria Maria	N. C	0.5	0.01	1.00	2224	0.001
N ₂ O Emissions from Mobile Combustion: Marine	N_2O	0.6	< 0.01	1.00	23%	< 0.001
CO ₂ Emissions from Lead Production	CO_2	0.5	< 0.01	1.00	15%	< 0.001
CH ₄ Emissions from Iron and Steel Production &	CH_4	0.5	< 0.01	1.00	22%	< 0.001
Metallurgical Coke Production						

Non-CO ₂ Emissions from Stationary Combustion -	CH_4	0.5	< 0.01	1.00	76%	< 0.001
Electricity Generation						
CH ₄ Emissions from Mobile Combustion: Other	CH_4	0.4	< 0.01	1.00	4%	< 0.001
CO ₂ Emissions from Stationary Combustion - Geothermal Energy	CO_2	0.4	< 0.01	1.00	NA	< 0.001
N ₂ O Emissions from Incineration of Waste	N_2O	0.4	< 0.01	1.00	320%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion - Commercial	N_2O	0.3	< 0.01	1.00	79%	< 0.001
CO ₂ Emissions from Petroleum Systems	CO_2	0.3	< 0.01	1.00	149%	< 0.001
CH ₄ Emissions from Field Burning of Agricultural Residues	CH_4	0.2	< 0.01	1.00	42%	< 0.001
CO ₂ Emissions from Silicon Carbide Production and Consumption	CO_2	0.2	< 0.01	1.00	10%	< 0.001
CH ₄ Emissions from Mobile Combustion: Aviation	CH_4	0.1	< 0.01	1.00	2%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	N_2O	0.1	< 0.01	1.00	203%	< 0.001
N ₂ O Emissions from Field Burning of Agricultural Residues	N_2O	0.1	< 0.01	1.00	31%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	CH ₄	0.1	< 0.01	1.00	57%	< 0.001
CH ₄ Emissions from Mobile Combustion: Marine	CH_4	+	< 0.01	1.00	6%	< 0.001
CH ₄ Emissions from Ferroalloy Production	CH_4	+	< 0.01	1.00	12%	< 0.001
CH ₄ Emissions from Silicon Carbide Production and Consumption	CH ₄	+	< 0.01	1.00	9%	< 0.001
CH ₄ Emissions from Incineration of Waste	CH_4	+	< 0.01	1.00	NE	< 0.001

Table A-7: 2010 Key Source Category Tier 1 and Tier 2 Analysis—Level Assessment with LULUCF

		2010				
		Estimate				
	Direct	(Tg CO ₂	Tier 1 Level	Cumulative		Tier 2 Level
IPCC Source Categories	GHG	Eq.)	Assessment	Total	Uncertainty ^a	Assessment
CO ₂ Emissions from Stationary Combustion - Coal -	CO ₂	1,827.3	0.23	0.23	10%	0.022
Electricity Generation						
CO ₂ Emissions from Mobile Combustion: Road	CO_2	1,478.9	0.19	0.42	8%	0.015
CO ₂ Emissions from Changes in Forest Carbon Stocks	CO_2	921.8	0.12	0.53	12%	0.014
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	399.4	0.05	0.59	5%	0.003
Electricity Generation						
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	394.2	0.05	0.63	10%	0.005
Industrial						
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	287.4	0.04	0.67	18%	0.007
Industrial						
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	258.8	0.03	0.70	7%	0.002
Residential						
Fugitive Emissions from Natural Gas Systems	CH_4	215.4	0.03	0.73	30%	0.008
CO ₂ Emissions from Stationary Combustion - Gas -	CO_2	167.7	0.02	0.75	7%	0.001
Commercial						
Direct N ₂ O Emissions from Agricultural Soil	N_2O	162.3	0.02	0.77	57%	0.012
Management						
CO ₂ Emissions from Mobile Combustion: Aviation	CO_2	142.4	0.02	0.79	8%	0.001
CH ₄ Emissions from Enteric Fermentation	CH_4	141.3	0.02	0.81	18%	0.003
CO ₂ Emissions from Non-Energy Use of Fuels	CO_2	125.1	0.02	0.82	23%	0.004
Emissions from Substitutes for Ozone Depleting	Several	114.6	0.01	0.84	9%	0.001
Substances						
CH ₄ Emissions from Landfills	CH_4	107.8	0.01	0.85	52%	0.007
CO ₂ Emissions from Urban Trees	CO_2	98.0	0.01	0.87	23%	0.003
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	96.2	0.01	0.88	17%	0.002
Industrial						
CO ₂ Emissions from Mobile Combustion: Other	CO_2	81.5	0.01	0.89	8%	0.001

Note: LULUCF sources and sinks are not included in this analysis.

^a Percent relative uncertainty. If the corresponding uncertainty is asymmetrical, the uncertainty given here is the larger and always positive. NE Uncertainty not estimated.

⁺ Does not exceed 0.05 Tg CO_2 Eq.

CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO_2	80.7	0.01	0.90	5%	0.001
Fugitive Emissions from Coal Mining	CH_4	72.6	0.01	0.91	16%	0.001
CO ₂ Emissions from Iron and Steel Production &	CO_2	54.3	0.01	0.91	17%	0.001
Metallurgical Coke Production						
CH ₄ Emissions from Manure Management	CH_4	52.0	0.01	0.92	20%	0.001
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	51.1	0.01	0.93	5%	< 0.001
Commercial						
Indirect N ₂ O Emissions from Applied Nitrogen	N_2O	45.5	0.01	0.93	150%	0.009
CO ₂ Emissions from Mobile Combustion: Marine	CO_2	42.6	0.01	0.94	8%	< 0.001
CO ₂ Emissions from Stationary Combustion - Oil - U.S. Territories	CO_2	36.7	< 0.01	0.94	12%	0.001
CO ₂ Emissions from Natural Gas Systems	CO ₂	32.3	< 0.01	0.95	30%	0.001
CO ₂ Emissions from Stationary Combustion - Oil -	CO_2	31.3	< 0.01	0.95	8%	< 0.001
Electricity Generation	2					
Fugitive Emissions from Petroleum Systems	CH_4	31.0	< 0.01	0.95	149%	0.006
CO ₂ Emissions from Cement Production	CO_2	30.5	< 0.01	0.96	14%	0.001
CO ₂ Emissions from Land Converted to Grassland	CO_2	23.6	< 0.01	0.96	15%	< 0.001
Non-CO ₂ Emissions from Stationary Combustion -	N ₂ O	18.5	< 0.01	0.96	173%	0.004
Electricity Generation						
N ₂ O Emissions from Manure Management	N ₂ O	18.3	< 0.01	0.97	24%	0.001
N ₂ O Emissions from Nitric Acid Production	N_2O	16.7	< 0.01	0.97	40%	0.001
N ₂ O Emissions from Mobile Combustion: Road	N_2O	16.7	< 0.01	0.97	26%	0.001
CH ₄ Emissions from Wastewater Treatment	CH_4	16.3	< 0.01	0.97	31%	0.001
CO ₂ Emissions from Cropland Remaining Cropland	CO_2	15.6	< 0.01	0.97	192%	0.004
CO ₂ Emissions from Landfilled Yard Trimmings and	CO_2	13.3	< 0.01	0.98	57%	0.001
Food Scraps						
CO ₂ Emissions from Lime Production	CO_2	13.2	< 0.01	0.98	9%	< 0.001
CO ₂ Emissions from Incineration of Waste	CO_2	12.1	< 0.01	0.98	24%	< 0.001
SF ₆ Emissions from Electrical Transmission and	SF_6	11.8	< 0.01	0.98	25%	< 0.001
Distribution						
CO ₂ Emissions from Limestone and Dolomite Use	CO_2	10.0	< 0.01	0.98	18%	< 0.001
CO ₂ Emissions from Ammonia Production	CO_2	8.7	< 0.01	0.98	25%	< 0.001
CH ₄ Emissions from Rice Cultivation	CH_4	8.6	< 0.01	0.98	153%	0.002
CO ₂ Emissions from Grassland Remaining Grassland	CO_2	8.3	< 0.01	0.99	32%	< 0.001
HFC-23 Emissions from HCFC-22 Production	HFCs	8.1	< 0.01	0.99	10%	< 0.001
CO ₂ Emissions from Land Converted to Cropland	CO_2	5.9	< 0.01	0.99	40%	< 0.001
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	5.5	< 0.01	0.99	15%	< 0.001
Commercial						
PFC, HFC, and SF ₆ Emissions from Semiconductor	Several	5.4	< 0.01	0.99	10%	< 0.001
Manufacture						
N ₂ O Emissions from Wastewater Treatment	N_2O	5.0	< 0.01	0.99	99%	0.001
Fugitive Emissions from Abandoned Underground Coal	CH_4	5.0	< 0.01	0.99	22%	< 0.001
Mines						
CH ₄ Emissions from Forest Fires	CH_4	4.8	< 0.01	0.99	148%	0.001
N ₂ O Emissions from Product Uses	N_2O	4.4	< 0.01	0.99	8%	< 0.001
CO ₂ Emissions from Urea Consumption for Non-Ag	CO_2	4.4	< 0.01	0.99	47%	< 0.001
Purposes						
CO ₂ Emissions from Urea Fertilization	CO_2	4.1	< 0.01	0.99	43%	< 0.001
N ₂ O Emissions from Forest Fires	N_2O	4.0	< 0.01	0.99	147%	0.001
CO ₂ Emissions from Liming of Agricultural Soils	CO_2	3.9	< 0.01	0.99	112%	0.001
CO ₂ Emissions from Soda Ash Production and	CO_2	3.7	< 0.01	0.99	7%	< 0.001
Consumption						
Non-CO ₂ Emissions from Stationary Combustion -	CH_4	3.5	< 0.01	0.99	223%	0.001
Residential						
CO ₂ Emissions from Stationary Combustion - Coal -	CO_2	3.5	< 0.01	0.99	19%	< 0.001
U.S. Territories						
CO ₂ Emissions from Petrochemical Production	CO_2	3.3	< 0.01	0.99	29%	< 0.001
CO ₂ Emissions from Aluminum Production	CO_2	3.0	< 0.01	1.00	49%	< 0.001
N ₂ O Emissions from Adipic Acid Production	N_2O	2.8	< 0.01	1.00	9%	< 0.001

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PFC Emissions from Aluminum Production PFCs 1.6 <0.01 1.00 51% <0.001 CO ₂ Emissions from Stationary Combustion - Gas - U.S. CO ₂ 1.5 <0.01 1.00 17% <0.001 Territories N ₂ O Emissions from Settlement Soils N ₂ O 1.4 <0.01 1.00 163% <0.001 CH ₄ Emissions from Mobile Combustion: Road CH ₄ 1.4 <0.01 1.00 10% <0.001 Non-CO ₂ Emissions from Stationary Combustion - CH ₄ 1.4 <0.01 1.00 49% <0.001 Industrial N ₂ O Emissions from Mobile Combustion: Aviation N ₂ O 1.3 <0.01 1.00 1% <0.001 SF ₆ Emissions from Magnesium Production and SF ₆ 1.3 <0.01 1.00 4% <0.001
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Territories $N_2O \ Emissions \ from \ Settlement \ Soils \qquad N_2O \qquad 1.4 \qquad <0.01 \qquad 1.00 \qquad 163\% \qquad <0.001$ $CH_4 \ Emissions \ from \ Mobile \ Combustion: \ Road \qquad CH_4 \qquad 1.4 \qquad <0.01 \qquad 1.00 \qquad 10\% \qquad <0.001$ $Non-CO_2 \ Emissions \ from \ Stationary \ Combustion - \qquad CH_4 \qquad 1.4 \qquad <0.01 \qquad 1.00 \qquad 49\% \qquad <0.001$ $Industrial \qquad N_2O \ Emissions \ from \ Mobile \ Combustion: \ Aviation \qquad N_2O \qquad 1.3 \qquad <0.01 \qquad 1.00 \qquad 1\% \qquad <0.001$ $SF_6 \ Emissions \ from \ Magnesium \ Production \ and \qquad SF_6 \qquad 1.3 \qquad <0.01 \qquad 1.00 \qquad 4\% \qquad <0.001$
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N_2O Emissions from Mobile Combustion: Aviation N_2O 1.3 <0.01 1.00 1% <0.001 SF ₆ Emissions from Magnesium Production and SF ₆ 1.3 <0.01 1.00 4% <0.001
SF_6 Emissions from Magnesium Production and SF_6 1.3 < 0.01 1.00 4% < 0.001
Processing
CO_2 Emissions from Zinc Production CO_2 1.2 <0.01 1.00 19% <0.001
CO ₂ Emissions from Phosphoric Acid Production CO ₂ 1.0 <0.01 1.00 18% <0.001
CO ₂ Emissions from Wetlands Remaining Wetlands CO ₂ 1.0 <0.01 1.00 38% <0.001
Non-CO ₂ Emissions from Stationary Combustion - CH_4 0.9 < 0.01 1.00 142% < 0.001
Commercial
CH ₄ Emissions from Petrochemical Production CH ₄ 0.9 <0.01 1.00 30% <0.001
Non-CO ₂ Emissions from Stationary Combustion - N_2O 0.9 <0.01 1.00 200% <0.001
Residential
CO ₂ Emissions from Stationary Combustion - Coal - CO ₂ 0.7 <0.01 1.00 15% <0.001
Residential
Metallurgical Coke Production Non-CO. Emissions from Stationers Combustion. CH. 0.5 co. 0.01 1.00 7.00 co. 0.001
Non-CO ₂ Emissions from Stationary Combustion - CH ₄ 0.5 <0.01 1.00 76% <0.001
Electricity Generation
CH ₄ Emissions from Mobile Combustion: Other CH ₄ 0.4 <0.01 1.00 4% <0.001
CO_2 Emissions from Stationary Combustion - CO_2 0.4 <0.01 1.00 NA <0.001
Geothermal Energy
N_2O Emissions from Incineration of Waste N_2O 0.4 <0.01 1.00 320% <0.001
N_2O Emissions from Forest Soils N_2O 0.4 <0.01 1.00 211% <0.001
Non-CO ₂ Emissions from Stationary Combustion - N_2O 0.3 <0.01 1.00 79% <0.001
Commercial
CO_2 Emissions from Petroleum Systems CO_2 0.3 <0.01 1.00 149% <0.001
CH_4 Emissions from Field Burning of Agricultural CH_4 0.2 <0.01 1.00 42% <0.001
Residues
${ m CO_2}$ Emissions from Silicon Carbide Production and ${ m CO_2}$ 0.2 <0.01 1.00 10% <0.001
Consumption
CH_4 Emissions from Mobile Combustion: Aviation CH_4 0.1 < 0.01 1.00 2% < 0.001
Non-CO ₂ Emissions from Stationary Combustion - U.S. N_2O 0.1 <0.01 1.00 203% <0.001
Territories
N_2O Emissions from Field Burning of Agricultural N_2O 0.1 <0.01 1.00 31% <0.001
Residues
Non-CO ₂ Emissions from Stationary Combustion - U.S. CH ₄ 0.1 <0.01 1.00 57% <0.001
Territories
CH_4 Emissions from Mobile Combustion: Marine CH_4 + <0.01 1.00 6% <0.001
CH_4 Emissions from Ferroalloy Production CH_4 + <0.01 1.00 12% <0.001
CH_4 Emissions from Silicon Carbide Production and CH_4 + <0.01 1.00 9% <0.001
Consumption
N_2O Emissions from Wetlands Remaining Wetlands N_2O + <0.01 1.00 74% <0.001
CH ₄ Emissions from Incineration of Waste CH_4 + <0.01 1.00 NE <0.001
^a Percent relative uncertainty. If the corresponding uncertainty is asymmetrical, the uncertainty given here is the larger and always positive.

^a Percent relative uncertainty. If the corresponding uncertainty is asymmetrical, the uncertainty given here is the larger and always positive.

NE Uncertainty not estimated.

+ Does not exceed 0.05 Tg CO₂ Eq.

Table A-8: 1990-2010 Key Source Category Tier 1 and 2 Analysis—Trend Assessment, without LULUCF

Table A- 0. 1330-2010 Rey Soulce Valegory 1		1990	2010	, 33 III OII L, WILIIL			
		Estimate	Estimate			Percent	Cumulative
	Direct	(Tg CO ₂	(Tg CO ₂	Tier 1 Trend	Tier 2 Trend	Contribution	Contribution
IPCC Source Categories	GHG	Eq.)	Eq.)	Assessment	Assessment	to Trend (%)	to Trend (%)
CO ₂ Emissions from Stationary Combustion -	CO ₂	175.3	399.4	0.03	0.001	15.1	15
Gas - Electricity Generation							
CO ₂ Emissions from Mobile Combustion:	CO_2	1,188.9	1,478.9	0.02	0.002	12.2	27
Road							
CO ₂ Emissions from Stationary Combustion - Coal - Electricity Generation	CO_2	1,547.6	1,827.3	0.02	0.002	8.7	36
Emissions from Substitutes for Ozone Depleting Substances	Several	0.3	114.6	0.02	0.001	8.4	44
CO ₂ Emissions from Stationary Combustion - Oil - Electricity Generation	CO_2	97.5	31.3	0.01	0.001	5.6	50
CO ₂ Emissions from Stationary Combustion -	CO_2	155.3	96.2	0.01	0.002	5.5	56
Coal - Industrial							
CO ₂ Emissions from Stationary Combustion -	CO_2	409.9	394.2	0.01	0.001	4.3	60
Gas - Industrial							
CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO_2	99.6	54.3	0.01	0.001	4.1	64
CO ₂ Emissions from Mobile Combustion: Aviation	CO_2	179.3	142.4	0.01	0.001	4.1	68
CH ₄ Emissions from Landfills	CH_4	147.7	107.8	0.01	0.004	4.1	72
HFC-23 Emissions from HCFC-22 Production	HFCs	36.4	8.1	< 0.01	< 0.001	2.4	75
N ₂ O Emissions from Mobile Combustion: Road	N ₂ O	40.3	16.7	< 0.01	0.001	2.0	77
CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO ₂	97.4	80.7	< 0.01	< 0.001	2.0	79
CO ₂ Emissions from Stationary Combustion - Oil - Industrial	CO_2	281.2	287.4	< 0.01	0.001	1.7	80
CO ₂ Emissions from Stationary Combustion - Oil - Commercial	CO_2	64.9	51.1	< 0.01	< 0.001	1.5	82
Fugitive Emissions from Coal Mining	CH_4	84.1	72.6	< 0.01	< 0.001	1.5	83
PFC Emissions from Aluminum Production	PFCs	18.4	1.6	< 0.01	0.001	1.4	85
SF ₆ Emissions from Electrical Transmission and Distribution	SF ₆	26.7	11.8	< 0.01	0.001	1.3	86
CH ₄ Emissions from Manure Management	CH_4	31.7	52.0	< 0.01	< 0.001	1.2	87
N ₂ O Emissions from Adipic Acid Production	N_2O	15.8	2.8	< 0.01	< 0.001	1.1	88
CO ₂ Emissions from Stationary Combustion - Gas - Commercial	$\widetilde{\text{CO}_2}$	142.1	167.7	< 0.01	< 0.001	0.8	89
Non-CO ₂ Emissions from Stationary	N_2O	7.4	18.5	< 0.01	0.002	0.8	90
Combustion - Electricity Generation	-						
Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	155.8	162.3	< 0.01	0.001	0.7	90
CO ₂ Emissions from Natural Gas Systems	CO_2	37.6	32.3	< 0.01	< 0.001	0.7	91
Fugitive Emissions from Petroleum Systems	CH_4	35.2	31.0	< 0.01	0.002	0.6	92
CO ₂ Emissions from Stationary Combustion - Coal - Commercial	CO_2	12.0	5.5	< 0.01	< 0.001	0.6	92
CO ₂ Emissions from Non-Energy Use of Fuels	CO_2	119.6	125.1	< 0.01	< 0.001	0.5	93
CO ₂ Emissions from Stationary Combustion - Oil - U.S. Territories	CO_2	27.2	36.7	< 0.01	< 0.001	0.5	93
CO ₂ Emissions from Mobile Combustion: Marine	CO_2	44.5	42.6	< 0.01	< 0.001	0.5	94
CH ₄ Emissions from Enteric Fermentation	CH_4	133.8	141.3	< 0.01	< 0.001	0.5	94
CO ₂ Emissions from Cement Production	CO_2	33.3	30.5	< 0.01	< 0.001	0.5	95
Fugitive Emissions from Natural Gas Systems	CH_4	189.6	215.4	< 0.01	< 0.001	0.5	95
CO ₂ Emissions from Ammonia Production	CO_2	13.0	8.7	< 0.01	< 0.001	0.4	96

SF ₆ Emissions from Magnesium Production and Processing	SF_6	5.4	1.3	< 0.01	< 0.001	0.3	96
CO ₂ Emissions from Aluminum Production	CO_2	6.8	3.0	< 0.01	< 0.001	0.3	96
CO ₂ Emissions from Limestone and Dolomite Use	CO_2	5.1	10.0	< 0.01	< 0.001	0.3	97
CO ₂ Emissions from Stationary Combustion - Gas - Residential	CO_2	238.0	258.8	< 0.01	< 0.001	0.3	97
CH ₄ Emissions from Mobile Combustion: Road	CH_4	4.2	1.4	< 0.01	< 0.001	0.2	97
CO ₂ Emissions from Incineration of Waste	CO_2	8.0	12.1	< 0.01	< 0.001	0.2	97
Indirect N ₂ O Emissions from Applied	N_2O	44.1	45.5	< 0.01	0.001	0.2	98
Nitrogen							
CO ₂ Emissions from Stationary Combustion - Coal - U.S. Territories	CO_2	0.6	3.5	< 0.01	< 0.001	0.2	98
N ₂ O Emissions from Nitric Acid Production	N_2O	17.6	16.7	< 0.01	< 0.001	0.2	98
CO ₂ Emissions from Stationary Combustion -	$\overline{\text{CO}_2}$	3.0	0.7	< 0.01	< 0.001	0.2	98
Coal - Residential							
PFC, HFC, and SF ₆ Emissions from Semiconductor Manufacture	Several	2.9	5.4	< 0.01	< 0.001	0.2	98
N ₂ O Emissions from Manure Management	N_2O	14.8	18.3	< 0.01	< 0.001	0.1	98
Fugitive Emissions from Abandoned	$\widetilde{\mathrm{CH}_{4}}$	6.0	5.0	< 0.01	< 0.001	0.1	99
Underground Coal Mines							
Non-CO ₂ Emissions from Stationary Combustion - Residential	CH_4	4.6	3.5	< 0.01	< 0.001	0.1	99
CO ₂ Emissions from Stationary Combustion -	CO_2	+	1.5	< 0.01	< 0.001	0.1	99
Gas - U.S. Territories							
N ₂ O Emissions from Composting	N_2O	0.4	1.7	< 0.01	< 0.001	0.1	99
N ₂ O Emissions from Wastewater Treatment	N_2O	3.5	5.0	< 0.01	< 0.001	0.1	99
CH ₄ Emissions from Wastewater Treatment	CH_4	15.9	16.3	< 0.01	< 0.001	0.1	99
CH ₄ Emissions from Composting	CH_4	0.3	1.6	< 0.01	< 0.001	0.1	99
Non-CO ₂ Emissions from Stationary Combustion - Industrial	N ₂ O	3.3	2.8	< 0.01	< 0.001	0.1	99
CO ₂ Emissions from Soda Ash Production and Consumption	CO_2	4.1	3.7	< 0.01	< 0.001	0.1	99
CH ₄ Emissions from Rice Cultivation	CH_4	7.1	8.6	< 0.01	< 0.001	0.1	99
CO ₂ Emissions from Ferroalloy Production	CO_2	2.2	1.7	< 0.01	< 0.001	0.1	99
CO ₂ Emissions from Phosphoric Acid	CO_2	1.5	1.0	< 0.01	< 0.001	< 0.1	99
Production CO ₂ Emissions from Mobile Combustion:	CO_2	73.3	81.5	<0.01	<0.001	<0.1	100
Other	002	, , ,	01.0	10.01	10.001	1012	100
CO ₂ Emissions from Carbon Dioxide Consumption	CO_2	1.4	2.2	< 0.01	< 0.001	< 0.1	100
CO ₂ Emissions from Titanium Dioxide Production	CO_2	1.2	1.9	< 0.01	< 0.001	< 0.1	100
N ₂ O Emissions from Mobile Combustion: Aviation	N_2O	1.7	1.3	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	$\mathrm{CH_4}$	1.0	0.5	< 0.01	< 0.001	< 0.1	100
N ₂ O Emissions from Mobile Combustion: Other	N_2O	1.3	1.9	< 0.01	< 0.001	< 0.1	100
N ₂ O Emissions from Product Uses	N_2O	4.4	4.4	< 0.01	< 0.001	< 0.1	100
CO ₂ Emissions from Zinc Production	CO_2	0.6	1.2	< 0.01	< 0.001	<0.1	100
	_				< 0.001	<0.1	100
CO ₂ Emissions from Lime Production	CO_2 CH_4	11.5 1.6	13.2 1.4	<0.01 <0.01	< 0.001	<0.1 <0.1	100
Non-CO ₂ Emissions from Stationary Combustion - Industrial							
Non-CO ₂ Emissions from Stationary Combustion - Residential	N_2O	1.1	0.9	< 0.01	< 0.001	< 0.1	100
CO ₂ Emissions from Petrochemical Production	CO_2	3.3	3.3	< 0.01	< 0.001	<0.1	100
CO ₂ Emissions from Silicon Carbide Production and Consumption	CO_2	0.4	0.2	< 0.01	< 0.001	<0.1	100

CO ₂ Emissions from Urea Consumption for Non-Ag Purposes	CO_2	3.8	4.4	< 0.01	< 0.001	<0.1	100
N ₂ O Emissions from Incineration of Waste	N_2O	0.5	0.4	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Mobile Combustion: Other	$\widetilde{\mathrm{CH}_{4}}$	0.3	0.4	< 0.01	< 0.001	< 0.1	100
CO ₂ Emissions from Petroleum Systems	CO_2	0.4	0.3	< 0.01	< 0.001	< 0.1	100
Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	CH_4	0.3	0.5	< 0.01	< 0.001	< 0.1	100
Non-CO ₂ Emissions from Stationary Combustion - Commercial	N_2O	0.4	0.3	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Mobile Combustion: Aviation	CH_4	0.2	0.1	< 0.01	< 0.001	< 0.1	100
Non-CO ₂ Emissions from Stationary Combustion - Commercial	CH_4	0.9	0.9	< 0.01	< 0.001	< 0.1	100
N ₂ O Emissions from Mobile Combustion: Marine	N_2O	0.6	0.6	< 0.01	< 0.001	< 0.1	100
CO ₂ Emissions from Stationary Combustion - Geothermal Energy	CO_2	0.4	0.4	< 0.01	< 0.001	< 0.1	100
Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	N_2O	0.1	0.1	< 0.01	< 0.001	<0.1	100
CH ₄ Emissions from Petrochemical Production	CH_4	0.9	0.9	< 0.01	< 0.001	< 0.1	100
CO ₂ Emissions from Lead Production	CO_2	0.5	0.5	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Silicon Carbide Production and Consumption	CH_4	+	+	< 0.01	< 0.001	< 0.1	100
Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	CH_4	+	0.1	< 0.01	< 0.001	< 0.1	100
N ₂ O Emissions from Field Burning of Agricultural Residues	N_2O	0.1	0.1	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Ferroalloy Production	CH_4	+	+	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.2	0.2	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Incineration of Waste	CH_4	+	+	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Mobile Combustion: Marine	CH ₄	+	+	< 0.01	< 0.001	< 0.1	100
Note: I III LICE sources and sinks are not included in	this analysis						

Note: LULUCF sources and sinks are not included in this analysis.

Table A-9: 1990-2010 Key Source Category Tier 1 and 2 Analysis—Trend Assessment, with LULUCF

		1990	2010				
		Estimate	Estimate			Percent	Cumulative
	Direct	(Tg CO ₂	(Tg CO ₂	Tier 1 Trend	Tier 2 Trend	Contribution	Contribution to
IPCC Source Categories	GHG	Eq.)	Eq.)	Assessment	Assessment	to Trend (%)	Trend (%)
CO ₂ Emissions from Stationary Combustion - Gas - Electricity Generation	CO ₂	175.3	399.4	0.02	0.001	12.6	13
CO ₂ Emissions from Mobile Combustion: Road	CO ₂	1,188.9	1,478.9	0.02	0.001	9.1	22
CO ₂ Emissions from Changes in Forest Carbon Stocks	CO ₂	701.4	921.8	0.02	0.002	8.4	30
Emissions from Substitutes for Ozone Depleting Substances	Several	0.3	114.6	0.01	0.001	7.1	37
CO ₂ Emissions from Stationary Combustion - Coal - Electricity Generation	CO ₂	1,547.6	1,827.3	0.01	0.001	5.8	43
CO ₂ Emissions from Stationary Combustion - Oil - Electricity Generation	CO ₂	97.5	31.3	0.01	0.001	4.8	48
CO ₂ Emissions from Stationary Combustion - Coal - Industrial	CO ₂	155.3	96.2	0.01	0.001	4.8	53
CO ₂ Emissions from Stationary Combustion - Gas - Industrial	CO_2	409.9	394.2	0.01	0.001	4.0	57

⁺ Does not exceed 0.05 Tg $CO_2\;$ Eq.

CO ₂ Emissions from Mobile Combustion:	CO_2	179.3	142.4	0.01	0.001	3.6	60
Aviation	CH	1 47 7	107.0	0.01	0.002	2.6	C1
CH ₄ Emissions from Landfills	CH ₄	147.7	107.8 54.3	0.01	0.003	3.6	64 67
CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO_2	99.6	34.3	0.01	0.001	3.5	07
CO ₂ Emissions from Grassland Remaining Grassland	CO ₂	52.2	8.3	0.01	0.002	3.1	71
CO ₂ Emissions from Urban Trees	CO_2	57.1	98.0	< 0.01	0.001	2.1	73
HFC-23 Emissions from HCFC-22 Production	HFCs	36.4	8.1	< 0.01	< 0.001	2.0	75
N ₂ O Emissions from Mobile Combustion:	N_2O	40.3	16.7	< 0.01	0.001	1.8	76
Road	-						
CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO ₂	97.4	80.7	< 0.01	< 0.001	1.8	78
CO ₂ Emissions from Stationary Combustion - Oil - Industrial	CO ₂	281.2	287.4	< 0.01	0.001	1.7	80
CO ₂ Emissions from Stationary Combustion - Oil - Commercial	CO ₂	64.9	51.1	< 0.01	< 0.001	1.3	81
Fugitive Emissions from Coal Mining	CH_4	84.1	72.6	< 0.01	< 0.001	1.3	83
PFC Emissions from Aluminum Production	PFCs	18.4	1.6	< 0.01	0.001	1.2	84
SF ₆ Emissions from Electrical Transmission	SF_6	26.7	11.8	< 0.01	< 0.001	1.1	85
and Distribution							
CO ₂ Emissions from Cropland Remaining Cropland	CO_2	29.4	15.6	< 0.01	0.004	1.1	86
CH ₄ Emissions from Manure Management	CH_4	31.7	52.0	< 0.01	< 0.001	1.0	87
N ₂ O Emissions from Adipic Acid Production	N_2O	15.8	2.8	< 0.01	< 0.001	0.9	88
CO ₂ Emissions from Landfilled Yard Trimmings and Food Scraps	CO_2	24.2	13.3	< 0.01	0.001	0.9	89
Direct N ₂ O Emissions from Agricultural Soil Management	N_2O	155.8	162.3	< 0.01	0.001	0.8	90
Non-CO ₂ Emissions from Stationary	N ₂ O	7.4	18.5	< 0.01	0.002	0.6	90
Combustion - Electricity Generation							
CO ₂ Emissions from Natural Gas Systems	CO_2	37.6	32.3	< 0.01	< 0.001	0.6	91
CO ₂ Emissions from Non-Energy Use of Fuels	CO_2	119.6	125.1	< 0.01	< 0.001	0.5	91
CH ₄ Emissions from Enteric Fermentation	CH_4	133.8	141.3	< 0.01	< 0.001	0.5	92
CO ₂ Emissions from Stationary Combustion -	CO_2	142.1	167.7	< 0.01	< 0.001	0.5	92
Gas - Commercial							
Fugitive Emissions from Petroleum Systems	CH ₄	35.2	31.0	< 0.01	0.001	0.5	93
CO ₂ Emissions from Stationary Combustion -	CO_2	12.0	5.5	< 0.01	< 0.001	0.5	93
Coal - Commercial	CO	229.0	250.0	-0.01	-0.001	0.5	0.4
CO ₂ Emissions from Stationary Combustion - Gas - Residential	CO_2	238.0	258.8	< 0.01	< 0.001	0.5	94
CO ₂ Emissions from Mobile Combustion: Marine	CO ₂	44.5	42.6	< 0.01	< 0.001	0.4	94
CO ₂ Emissions from Cement Production	CO_2	33.3	30.5	< 0.01	< 0.001	0.4	95
CO ₂ Emissions from Stationary Combustion -	CO_2	27.2	36.7	< 0.01	< 0.001	0.4	95
Oil - U.S. Territories	202	27.2	2017	(0.01	10.001	···	76
CO ₂ Emissions from Ammonia Production	CO_2	13.0	8.7	< 0.01	< 0.001	0.4	96
SF ₆ Emissions from Magnesium Production	SF_6^2	5.4	1.3	< 0.01	< 0.001	0.3	96
and Processing	Ü						
CO ₂ Emissions from Aluminum Production	CO_2	6.8	3.0	< 0.01	< 0.001	0.3	96
CO ₂ Emissions from Limestone and Dolomite Use	CO_2	5.1	10.0	< 0.01	< 0.001	0.3	96
Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	44.1	45.5	< 0.01	0.001	0.2	97
CO ₂ Emissions from Land Converted to Cropland	CO_2	2.2	5.9	< 0.01	< 0.001	0.2	97
CH ₄ Emissions from Mobile Combustion: Road	$\mathrm{CH_4}$	4.2	1.4	< 0.01	< 0.001	0.2	97
CO ₂ Emissions from Incineration of Waste	CO_2	8.0	12.1	< 0.01	< 0.001	0.2	97
Fugitive Emissions from Natural Gas Systems	CH ₄	189.6	215.4	< 0.01	< 0.001	0.2	97
N ₂ O Emissions from Nitric Acid Production	N_2O	17.6	16.7	< 0.01	< 0.001	0.2	98

	~~	0 4	a =	0.04	0.004		
CO ₂ Emissions from Stationary Combustion - Coal - U.S. Territories	CO_2	0.6	3.5	< 0.01	< 0.001	0.2	98
CO ₂ Emissions from Stationary Combustion -	CO_2	3.0	0.7	< 0.01	< 0.001	0.2	98
Coal - Residential	-						
PFC, HFC, and SF ₆ Emissions from	Several	2.9	5.4	< 0.01	< 0.001	0.1	98
Semiconductor Manufacture							
CH ₄ Emissions from Forest Fires	CH_4	2.5	4.8	< 0.01	< 0.001	0.1	98
Fugitive Emissions from Abandoned	CH_4	6.0	5.0	< 0.01	< 0.001	0.1	98
Underground Coal Mines							
N ₂ O Emissions from Manure Management	N_2O	14.8	18.3	< 0.01	< 0.001	0.1	98
N ₂ O Emissions from Forest Fires	N_2O	2.1	4.0	< 0.01	< 0.001	0.1	99
Non-CO ₂ Emissions from Stationary	CH_4	4.6	3.5	< 0.01	< 0.001	0.1	99
Combustion - Residential							
CH ₄ Emissions from Wastewater Treatment	$\mathrm{CH_4}$	15.9	16.3	< 0.01	< 0.001	0.1	99
CO ₂ Emissions from Stationary Combustion -	CO_2	+	1.5	< 0.01	< 0.001	0.1	99
Gas - U.S. Territories							
CO ₂ Emissions from Urea Fertilization	CO_2	2.4	4.1	< 0.01	< 0.001	0.1	99
CO ₂ Emissions from Land Converted to	CO_2	19.8	23.6	< 0.01	< 0.001	0.1	99
Grassland							
N ₂ O Emissions from Composting	N_2O	0.4	1.7	< 0.01	< 0.001	0.1	99
CO ₂ Emissions from Liming of Agricultural	CO_2	4.7	3.9	< 0.01	< 0.001	0.1	99
Soils							
CH ₄ Emissions from Composting	$\mathrm{CH_4}$	0.3	1.6	< 0.01	< 0.001	0.1	99
N ₂ O Emissions from Wastewater Treatment	N_2O	3.5	5.0	< 0.01	< 0.001	0.1	99
Non-CO ₂ Emissions from Stationary	N_2O	3.3	2.8	< 0.01	< 0.001	0.1	99
Combustion - Industrial							
CO ₂ Emissions from Soda Ash Production and	CO_2	4.1	3.7	< 0.01	< 0.001	0.1	99
Consumption							
CO ₂ Emissions from Ferroalloy Production	CO_2	2.2	1.7	< 0.01	< 0.001	< 0.1	99
CO ₂ Emissions from Phosphoric Acid	CO_2	1.5	1.0	< 0.01	< 0.001	< 0.1	99
Production							
CH ₄ Emissions from Rice Cultivation	CH_4	7.1	8.6	< 0.01	< 0.001	< 0.1	100
CO ₂ Emissions from Carbon Dioxide	CO_2	1.4	2.2	< 0.01	< 0.001	< 0.1	100
Consumption							
N ₂ O Emissions from Mobile Combustion:	N_2O	1.7	1.3	< 0.01	< 0.001	< 0.1	100
Aviation							
CH ₄ Emissions from Iron and Steel Production	CH_4	1.0	0.5	< 0.01	< 0.001	< 0.1	100
& Metallurgical Coke Production							
N ₂ O Emissions from Product Uses	N_2O	4.4	4.4	< 0.01	< 0.001	< 0.1	100
CO ₂ Emissions from Titanium Dioxide	CO_2	1.2	1.9	< 0.01	< 0.001	< 0.1	100
Production							
CO ₂ Emissions from Mobile Combustion:	CO_2	73.3	81.5	< 0.01	< 0.001	< 0.1	100
Other							
N ₂ O Emissions from Mobile Combustion:	N_2O	1.3	1.9	< 0.01	< 0.001	< 0.1	100
Other							
CO ₂ Emissions from Zinc Production	CO_2	0.6	1.2	< 0.01	< 0.001	< 0.1	100
Non-CO ₂ Emissions from Stationary	CH_4	1.6	1.4	< 0.01	< 0.001	< 0.1	100
Combustion - Industrial							
CO ₂ Emissions from Petrochemical	CO_2	3.3	3.3	< 0.01	< 0.001	< 0.1	100
Production							
Non-CO ₂ Emissions from Stationary	N_2O	1.1	0.9	< 0.01	< 0.001	< 0.1	100
Combustion - Residential							
N ₂ O Emissions from Settlement Soils	N_2O	1.0	1.4	< 0.01	< 0.001	< 0.1	100
N ₂ O Emissions from Forest Soils	N_2O	0.1	0.4	< 0.01	< 0.001	< 0.1	100
CO ₂ Emissions from Silicon Carbide	$\widetilde{\text{CO}}_2$	0.4	0.2	< 0.01	< 0.001	< 0.1	100
Production and Consumption							
CO ₂ Emissions from Lime Production	CO_2	11.5	13.2	< 0.01	< 0.001	< 0.1	100
CO ₂ Emissions from Wetlands Remaining	CO_2	1.0	1.0	< 0.01	< 0.001	< 0.1	100
Wetlands	-						
N ₂ O Emissions from Incineration of Waste	N_2O	0.5	0.4	< 0.01	< 0.001	< 0.1	100

CO ₂ Emissions from Urea Consumption for Non-Ag Purposes	CO_2	3.8	4.4	< 0.01	< 0.001	<0.1	100
CO ₂ Emissions from Petroleum Systems	CO_2	0.4	0.3	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Mobile Combustion: Other	CH_4	0.3	0.4	< 0.01	< 0.001	< 0.1	100
Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	CH_4	0.3	0.5	< 0.01	< 0.001	< 0.1	100
Non-CO ₂ Emissions from Stationary Combustion - Commercial	N_2O	0.4	0.3	< 0.01	< 0.001	< 0.1	100
Non-CO ₂ Emissions from Stationary Combustion - Commercial	CH_4	0.9	0.9	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Mobile Combustion: Aviation	CH_4	0.2	0.1	< 0.01	< 0.001	< 0.1	100
N ₂ O Emissions from Mobile Combustion: Marine	N_2O	0.6	0.6	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Petrochemical Production	CH_4	0.9	0.9	< 0.01	< 0.001	<0.1	100
CO ₂ Emissions from Stationary Combustion - Geothermal Energy	CO_2	0.4	0.4	< 0.01	< 0.001	<0.1	100
CO ₂ Emissions from Lead Production	CO_2	0.5	0.5	< 0.01	< 0.001	< 0.1	100
Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	N_2O	0.1	0.1	< 0.01	< 0.001	<0.1	100
CH ₄ Emissions from Silicon Carbide Production and Consumption	CH_4	+	+	< 0.01	< 0.001	< 0.1	100
Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	CH_4	+	0.1	< 0.01	< 0.001	< 0.1	100
N ₂ O Emissions from Field Burning of Agricultural Residues	N_2O	0.1	0.1	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Ferroalloy Production	CH_4	+	+	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Field Burning of Agricultural Residues	CH_4	0.2	0.2	< 0.01	< 0.001	< 0.1	100
N ₂ O Emissions from Wetlands Remaining Wetlands	N_2O	+	+	< 0.01	< 0.001	< 0.1	100
CH ₄ Emissions from Mobile Combustion: Marine	$\mathrm{CH_4}$	+	+	< 0.01	< 0.001	<0.1	100
CH ₄ Emissions from Incineration of Waste	CH_4	+	+	< 0.01	< 0.001	< 0.1	100
Does not exceed 0.05 Tg CO. Eg							

⁺ Does not exceed 0.05 Tg CO₂ Eq.

References

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