

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.”¹ 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) and IPCC's *Good Practice Guidance for Land Use, Land-Use Change, and Forestry* (IPCC 2003), 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 2007. 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 (1990-2007)

IPCC Source Categories	Gas	Tier 1				Tier 2				Qual ^a	2007 Emissions (Tg CO ₂ Eq.)
		Level Without LULUCF	Trend Without LULUCF	Level With LULUCF	Trend With LULUCF	Level Without LULUCF	Trend Without LULUCF	Level With LULUCF	Trend With LULUCF		
Energy											
CO ₂ Emissions from Stationary Combustion - Coal	CO ₂	•	•	•	•	•	•	•	•		2,086.5
Mobile Combustion: Road & Other	CO ₂	•	•	•	•	•	•	•	•		1,649.1
CO ₂ Emissions from Stationary Combustion - Gas	CO ₂	•	•	•	•	•	•	•	•		1,181.1
CO ₂ Emissions from Stationary Combustion - Oil	CO ₂	•	•	•	•	•	•	•	•		580.4
Mobile Combustion: Aviation	CO ₂	•	•	•	•	•	•	•	•		187.5
CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	•	•	•	•	•	•	•	•		133.9
Mobile Combustion: Marine	CO ₂	•	•	•	•	•	•	•	•		50.8
CO ₂ Emissions from Natural Gas Systems	CO ₂	•	•	•	•	•	•	•	•		28.7
CO ₂ Emissions from Waste Incineration	CO ₂	•	•	•	•	•	•	•	•		20.8
Fugitive Emissions from Natural Gas Systems	CH ₄	•	•	•	•	•	•	•	•		104.7
Fugitive Emissions from Coal Mining	CH ₄	•	•	•	•	•	•	•	•		57.6
Fugitive Emissions from Petroleum Systems	CH ₄	•	•	•	•	•	•	•	•		28.8
Non-CO ₂ Emissions from Stationary Combustion	CH ₄						•				6.6
Mobile Combustion: Road & Other	N ₂ O	•	•	•	•		•		•		27.9
Non-CO ₂ Emissions from Stationary Combustion	N ₂ O					•		•			14.7
International Bunker Fuels ^b	Several									•	109.9
Industrial Processes											
CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	•	•	•	•	•	•	•	•		77.4
CO ₂ Emissions from Cement Production	CO ₂	•	•	•	•						44.5
CO ₂ Emissions from Ammonia Production and Urea Consumption	CO ₂		•		•						13.8
N ₂ O Emissions from Adipic Acid Production	N ₂ O		•		•						5.9
Emissions from Substitutes for Ozone Depleting Substances	Several	•	•	•	•		•		•		108.3
HFC-23 Emissions from HCFC-22 Production	HFCs	•	•	•	•		•				17.0
SF ₆ Emissions from Electrical Transmission and Distribution	SF ₆		•		•		•		•		12.7
PFC Emissions from Aluminum Production	PFCs		•		•						3.8
Agriculture											
CH ₄ Emissions from Enteric Fermentation	CH ₄	•	•	•	•	•	•	•	•		139.0
CH ₄ Emissions from Manure Management	CH ₄	•	•	•	•						44.0
CH ₄ Emissions from Rice Cultivation	CH ₄						•		•		6.2
Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	•	•	•	•	•	•	•	•		172.0
Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	•	•	•	•	•	•	•	•		35.9
Waste											
CH ₄ Emissions from Landfills	CH ₄	•	•	•	•	•	•	•	•		132.9
CH ₄ Emissions from Wastewater Treatment	CH ₄							•			24.4
Land Use, Land Use Change, and Forestry											
CO ₂ from Changes in Forest Carbon Stocks	CO ₂			•	•			•	•		-910.1
CO ₂ Emissions from Urban Trees	CO ₂			•	•			•	•		-97.6

IPCC Source Categories	Gas	Tier 1				Tier 2				Qual ^a	2007 Emissions (Tg CO2 Eq.)
		Level Without LULUCF	Trend Without LULUCF	Level With LULUCF	Trend With LULUCF	Level Without LULUCF	Trend Without LULUCF	Level With LULUCF	Trend With LULUCF		
CO ₂ Emissions from Cropland Remaining Cropland	CO ₂				•			•	•		-11.6
CO ₂ Emissions from Landfilled Yard Trimmings and Food Scraps	CO ₂				•			•	•		-9.8
CO ₂ Emissions from Grassland Remaining Grassland	CO ₂			•	•			•	•		-4.7
CH ₄ Emissions from Forest Fires	CH ₄			•	•			•	•		29.0
N ₂ O Emissions from Forest Fires	N ₂ O								•		2.9
Subtotal Without LULUCF											6,972.3
Total Emissions Without LULUCF											7,107.2
Percent of Total Without LULUCF											98%
Subtotal With LULUCF											5,991.9
Total Emissions With LULUCF											6,087.5
Percent of Total With LULUCF											98%

^aQualitative criteria.

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

^cEmissions from this source not included in totals.

Table A-2 provides a complete listing of source categories by IPCC sector, along with comments 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 comments on the criteria used in identifying key categories, including LULUCF sources and sinks. The comments refer specifically to the year(s) over the course of the entire inventory time series (i.e., 1990 to 2007) in which each source category reached the threshold for being a key source based on either a Tier 1 or Tier 2 level assessment.

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 either 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

IPCC Source Categories	Direct GHG	2007	Key Category?	ID Criteria	Level in which year(s)?
		Emissions (Tg CO ₂ Eq.)			
Energy					
CO ₂ Emissions from Stationary Combustion - Coal	CO ₂	2,086.5	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
Mobile Combustion: Road & Other	CO ₂	1,649.1	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
CO ₂ Emissions from Stationary Combustion - Gas	CO ₂	1,181.1	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
CO ₂ Emissions from Stationary Combustion - Oil	CO ₂	580.4	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
Mobile Combustion: Aviation	CO ₂	187.5	•	L ₁ T ₁ L ₂	1990, 2007
CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	133.9	•	L ₁ L ₂	1990, 2007
Mobile Combustion: Marine	CO ₂	50.8	•	L ₁	1990, 2007
CO ₂ Emissions from Natural Gas Systems	CO ₂	28.7	•	L ₁ T ₁ L ₂ T ₂	1990 ₁ ; 1990 ₂ , 2007 ₂
CO ₂ Emissions from Waste Incineration	CO ₂	20.8	•	T ₁	
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	104.7	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
Fugitive Emissions from Coal Mining	CH ₄	57.6	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
Fugitive Emissions from Petroleum Systems	CH ₄	28.8	•	L ₁ T ₁ L ₂ T ₂	1990 ₁ ; 1990 ₂ , 2007 ₂
Non-CO ₂ Emissions from Stationary Combustion	CH ₄	6.6	•	T ₂	
Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	5.7			
Mobile Combustion: Road & Other	CH ₄	2.0			
Mobile Combustion: Aviation	CH ₄	0.1			
Mobile Combustion: Marine	CH ₄	0.1			
Mobile Combustion: Road & Other	N ₂ O	27.9	•	L ₁ T ₁ T ₂	1990
Non-CO ₂ Emissions from Stationary Combustion	N ₂ O	14.7	•	L ₂	1990, 2007
Mobile Combustion: Aviation	N ₂ O	1.8			
N ₂ O Emissions from Waste Incineration	N ₂ O	0.4			
Mobile Combustion: Marine	N ₂ O	0.4			
International Bunker Fuels ^a	Several	109.9	•	Q	
Industrial Processes					
CO ₂ Emissions from Iron and Steel Production & Metallurgical					
Coke Production	CO ₂	77.4	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
CO ₂ Emissions from Cement Production	CO ₂	44.5	•	L ₁	1990, 2007
CO ₂ Emissions from Lime Production	CO ₂	14.6			
CO ₂ Emissions from Ammonia Production and Urea					
Consumption	CO ₂	13.8	•	T ₁	
CO ₂ Emissions from Limestone and Dolomite Use	CO ₂	6.2			
CO ₂ Emissions from Aluminum Production	CO ₂	4.3			
CO ₂ Emissions from Soda Ash Production and Consumption	CO ₂	4.1			
CO ₂ Emissions from Petrochemical Production	CO ₂	2.6			
CO ₂ Emissions from Titanium Dioxide Production	CO ₂	1.9			
CO ₂ Emissions from CO ₂ Consumption	CO ₂	1.9			

IPCC Source Categories	Direct GHG	2007	Key Category?	ID Criteria	Level in which year(s)?
		Emissions (Tg CO ₂ Eq.)			
CO ₂ Emissions from Ferroalloy Production	CO ₂	1.6			
CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.2			
CO ₂ Emissions from Zinc Production	CO ₂	0.5			
CO ₂ Emissions from Lead Production	CO ₂	0.3			
CO ₂ Emissions from Silicon Carbide Production and Consumption	CO ₂	0.2			
CH ₄ Emissions from Petrochemical Production	CH ₄	1.0			
CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	CH ₄	0.7			
CH ₄ Emissions from Ferroalloy Production	CH ₄	+			
CH ₄ Emissions from Silicon Carbide Production and Consumption	CH ₄	+			
N ₂ O Emissions from Nitric Acid Production	N ₂ O	21.7			
N ₂ O Emissions from Adipic Acid Production	N ₂ O	5.9	•	T ₁	
N ₂ O Emissions from N ₂ O Product Uses	N ₂ O	4.4			
Emissions from Substitutes for Ozone Depleting Substances	HiGWP	108.3	•	L ₁ T ₁ T ₂	2007
HFC-23 Emissions from HCFC-22 Production	HiGWP	17.0	•	L ₁ T ₁ T ₂	1990
SF ₆ Emissions from Electrical Transmission and Distribution	HiGWP	12.7	•	T ₁ T ₂	
PFC, HFC, and SF ₆ Emissions from Semiconductor Manufacture	HiGWP	4.7			
PFC Emissions from Aluminum Production	HiGWP	3.8	•	T ₁	
SF ₆ Emissions from Magnesium Production and Processing	HiGWP	3.0			
Agriculture					
CH ₄ Emissions from Enteric Fermentation	CH ₄	139.0	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
CH ₄ Emissions from Manure Management	CH ₄	44.0	•	L ₁ T ₁	2007
CH ₄ Emissions from Rice Cultivation	CH ₄	6.2	•	T ₂	
CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.9			
Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	172.0	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	35.9	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
N ₂ O Emissions from Manure Management	N ₂ O	14.7			
N ₂ O Emissions from Field Burning of Agricultural Residues	N ₂ O	0.5			
Waste					
CH ₄ Emissions from Landfills	CH ₄	132.9	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
CH ₄ Emissions from Wastewater Treatment	CH ₄	24.4			
CH ₄ Emissions from Composting	CH ₄	1.7			
N ₂ O Emissions from Wastewater Treatment	N ₂ O	4.9			
N ₂ O Emissions from Composting	N ₂ O	1.8			

^aEmissions from these sources not included in totals.

+ Does not exceed 0.05 Tg CO₂ Eq.

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

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

IPCC Source Categories	Gas	2007	Key Category?	ID Criteria	Level in which year(s)?
		Emissions (Tg CO ₂ Eq.)			
Energy					
CO ₂ Emissions from Stationary Combustion - Coal	CO ₂	2,086.5	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
Mobile Combustion: Road & Other	CO ₂	1,649.1	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
CO ₂ Emissions from Stationary Combustion - Gas	CO ₂	1,181.1	•	L ₁ T ₁ L ₂	1990, 2007
CO ₂ Emissions from Stationary Combustion - Oil	CO ₂	580.4	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
Mobile Combustion: Aviation	CO ₂	187.5	•	L ₁ T ₁ L ₂	1990, 2007
CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	133.9	•	L ₁ L ₂	1990, 2007
Mobile Combustion: Marine	CO ₂	50.8	•	L ₁	1990, 2007
CO ₂ Emissions from Natural Gas Systems	CO ₂	28.7	•	L ₁ T ₁ L ₂ T ₂	1990 ₁ ; 1990 ₂ , 2007 ₂
CO ₂ Emissions from Waste Incineration	CO ₂	20.8	•	T ₁	
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	104.7	•	L ₁ T ₁ L ₂ T ₂	1990, 2007

IPCC Source Categories	Gas	2007	Key Category?	ID Criteria	Level in which year(s)?
		Emissions (Tg CO ₂ Eq.)			
Fugitive Emissions from Coal Mining	CH ₄	57.6	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
Fugitive Emissions from Petroleum Systems	CH ₄	28.8	•	L ₁ T ₁ L ₂ T ₂	1990 ₁ ; 1990 ₂ , 2007 ₂
Non-CO ₂ Emissions from Stationary Combustion	CH ₄	6.6			
Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	5.7			
Mobile Combustion: Road & Other	CH ₄	2.0			
Mobile Combustion: Aviation	CH ₄	0.1			
Mobile Combustion: Marine	CH ₄	0.1			
Mobile Combustion: Road & Other	N ₂ O	27.9	•	L ₁ T ₁ T ₂	1990
Non-CO ₂ Emissions from Stationary Combustion	N ₂ O	14.7	•	L ₂	1990, 2007
Mobile Combustion: Aviation	N ₂ O	1.8			
N ₂ O Emissions from Waste Incineration	N ₂ O	0.4			
Mobile Combustion: Marine	N ₂ O	0.4			
International Bunker Fuels ^a	Several	109.9	•	Q	
Industrial Processes					
CO ₂ Emissions from Iron and Steel Production & Metallurgical					
Coke Production	CO ₂	77.4	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
CO ₂ Emissions from Cement Production	CO ₂	44.5	•	L ₁	1990, 2007
CO ₂ Emissions from Lime Production	CO ₂	14.6			
CO ₂ Emissions from Ammonia Production and Urea Consumption	CO ₂	13.8	•	T ₁	
CO ₂ Emissions from Limestone and Dolomite Use	CO ₂	6.2			
CO ₂ Emissions from Aluminum Production	CO ₂	4.3			
CO ₂ Emissions from Soda Ash Production and Consumption	CO ₂	4.1			
CO ₂ Emissions from Petrochemical Production	CO ₂	2.6			
CO ₂ Emissions from Titanium Dioxide Production	CO ₂	1.9			
CO ₂ Emissions from CO ₂ Consumption	CO ₂	1.9			
CO ₂ Emissions from Ferroalloy Production	CO ₂	1.6			
CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.2			
CO ₂ Emissions from Zinc Production	CO ₂	0.5			
CO ₂ Emissions from Lead Production	CO ₂	0.3			
CO ₂ Emissions from Silicon Carbide Production and Consumption	CO ₂	0.2			
CH ₄ Emissions from Petrochemical Production	CH ₄	1.0			
CH ₄ Emissions from Iron and Steel Production & Metallurgical					
Coke Production	CH ₄	0.7			
CH ₄ Emissions from Ferroalloy Production	CH ₄	+			
CH ₄ Emissions from Silicon Carbide Production and Consumption	CH ₄	+			
N ₂ O Emissions from Nitric Acid Production	N ₂ O	21.7			
N ₂ O Emissions from Adipic Acid Production	N ₂ O	5.9	•	T ₁	
N ₂ O Emissions from N ₂ O Product Uses	N ₂ O	4.4			
Emissions from Substitutes for Ozone Depleting Substances	HiGWP	108.3	•	L ₁ T ₁ T ₂	2007
HFC-23 Emissions from HCFC-22 Production	HiGWP	17.0	•	L ₁ T ₁	1990
SF ₆ Emissions from Electrical Transmission and Distribution	HiGWP	12.7	•	T ₁ T ₂	
PFC, HFC, and SF ₆ Emissions from Semiconductor					
Manufacture	HiGWP	4.7			
PFC Emissions from Aluminum Production	HiGWP	3.8	•	T ₁	
SF ₆ Emissions from Magnesium Production and Processing	HiGWP	3.0			
Agriculture					
CH ₄ Emissions from Enteric Fermentation	CH ₄	139.0	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
CH ₄ Emissions from Manure Management	CH ₄	44.0	•	L ₁ T ₁	1990, 2007
CH ₄ Emissions from Rice Cultivation	CH ₄	6.2	•	T ₂	
CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.9			
Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	172.0	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	35.9	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
N ₂ O Emissions from Manure Management	N ₂ O	14.7			
N ₂ O Emissions from Field Burning of Agricultural Residues	N ₂ O	0.5			
Waste					
CH ₄ Emissions from Landfills	CH ₄	132.9	•	L ₁ T ₁ L ₂ T ₂	1990, 2007

IPCC Source Categories	Gas	2007	Key Category?	ID Criteria	Level in which year(s)?
		Emissions (Tg CO ₂ Eq.)			
CH ₄ Emissions from Wastewater Treatment	CH ₄	24.4	•	L ₂	2007
CH ₄ Emissions from Composting	CH ₄	1.7			
N ₂ O Emissions from Wastewater Treatment	N ₂ O	4.9			
N ₂ O Emissions from Composting	N ₂ O	1.8			
Land Use, Land Use Change, and Forestry					
CO ₂ from Changes in Forest Carbon Stocks	CO ₂	(910.1)	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
CO ₂ Emissions from Urban Trees	CO ₂	(97.6)	•	L ₁ T ₁ L ₂ T ₂	1990, 2007
CO ₂ Emissions from Land Converted to Grassland	CO ₂	(26.7)			
CO ₂ Emissions from Cropland Remaining Cropland	CO ₂	(11.6)	•	T ₁ L ₂ T ₂	1990
CO ₂ Emissions from Landfilled Yard Trimmings and Food Scraps	CO ₂	(9.8)	•	T ₁ L ₂ T ₂	1990
CO ₂ Emissions from Grassland Remaining Grassland	CO ₂	(4.7)	•	L ₁ T ₁ L ₂ T ₂	1990
CO ₂ Emissions from Land Converted to Cropland	CO ₂	5.9			
CO ₂ Emissions from Wetlands Remaining Wetlands	CO ₂	1.0			
CH ₄ Emissions from Forest Fires	CH ₄	29.0	•	L ₁ T ₁ L ₂ T ₂	2007
N ₂ O Emissions from Forest Fires	N ₂ O	2.9	•	T ₂	
N ₂ O Emissions from Soils	N ₂ O	1.9			
N ₂ O Emissions from Wetlands Remaining Wetlands	N ₂ O	+			

^aEmissions from these sources not included in totals.

+ Does not exceed 0.05 Tg CO₂ Eq.

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 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 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 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 2007 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 – 2007 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

IPCC Source Categories	Direct GHG	1990 Estimate (Tg CO ₂ Eq.)	Tier 1 Level Assessment	Cumulative Total	Uncertainty ^a	Tier 2 Level Assessment
CO ₂ Emissions from Stationary Combustion - Coal	CO ₂	1,695.9	0.28	0.28	9%	0.026
Mobile Combustion: Road & Other	CO ₂	1,258.7	0.21	0.49	8%	0.016
CO ₂ Emissions from Stationary Combustion - Gas	CO ₂	965.5	0.16	0.64	7%	0.010
CO ₂ Emissions from Stationary Combustion - Oil	CO ₂	562.7	0.09	0.74	6%	0.006
Mobile Combustion: Aviation	CO ₂	179.4	0.03	0.77	8%	0.002
Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	158.9	0.03	0.79	54%	0.014
CH ₄ Emissions from Landfills	CH ₄	149.2	0.02	0.82	39%	0.010
CH ₄ Emissions from Enteric Fermentation	CH ₄	133.2	0.02	0.84	18%	0.004
Fugitive Emissions from Natural Gas Systems	CH ₄	129.6	0.02	0.86	43%	0.009
CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	117.0	0.02	0.88	20%	0.004
CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	109.8	0.02	0.90	22%	0.004
Fugitive Emissions from Coal Mining	CH ₄	84.1	0.01	0.91	24%	0.003
Mobile Combustion: Marine	CO ₂	46.5	0.01	0.92	8%	0.001
Mobile Combustion: Road & Other	N ₂ O	41.6	0.01	0.93	19%	0.001
Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	41.5	0.01	0.93	136%	0.009
HFC-23 Emissions from HCFC-22 Production	HFCs	36.4	0.01	0.94	10%	0.001
Fugitive Emissions from Petroleum Systems	CH ₄	33.9	0.01	0.94	144%	0.008
CO ₂ Emissions from Natural Gas Systems	CO ₂	33.7	0.01	0.95	43%	0.002
CO ₂ Emissions from Cement Production	CO ₂	33.3	0.01	0.95	13%	0.001
CH ₄ Emissions from Manure Management	CH ₄	30.4	<0.01	0.96	20%	0.001
SF ₆ Emissions from Electrical Transmission and Distribution	SF ₆	26.8	<0.01	0.96	22%	0.001
CH ₄ Emissions from Wastewater Treatment	CH ₄	23.5	<0.01	0.97	49%	0.002
N ₂ O Emissions from Nitric Acid Production	N ₂ O	20.0	<0.01	0.97	44%	0.001
PFC Emissions from Aluminum Production	PFCs	18.5	<0.01	0.97	11%	<0.001
CO ₂ Emissions from Ammonia Production and Urea Consumption	CO ₂	16.8	<0.01	0.98	12%	<0.001
N ₂ O Emissions from Adipic Acid Production	N ₂ O	15.3	<0.01	0.98	20%	<0.001
Non-CO ₂ Emissions from Stationary Combustion	N ₂ O	12.8	<0.01	0.98	187%	0.004
N ₂ O Emissions from Manure Management	N ₂ O	12.1	<0.01	0.98	24%	<0.001
CO ₂ Emissions from Lime Production	CO ₂	11.5	<0.01	0.99	9%	<0.001
CO ₂ Emissions from Waste Incineration	CO ₂	10.9	<0.01	0.99	27%	<0.001
Non-CO ₂ Emissions from Stationary Combustion	CH ₄	7.4	<0.01	0.99	128%	0.002

IPCC Source Categories	Direct GHG	1990 Estimate (Tg CO ₂ Eq.)	Tier 1 Level Assessment	Cumulative Total	Uncertainty ^a	Tier 2 Level Assessment
CH ₄ Emissions from Rice Cultivation	CH ₄	7.1	<0.01	0.99	164%	0.002
CO ₂ Emissions from Aluminum Production	CO ₂	6.8	<0.01	0.99	4%	<0.001
Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	6.0	<0.01	0.99	23%	<0.001
SF ₆ Emissions from Magnesium Production and Processing	SF ₆	5.4	<0.01	0.99	13%	<0.001
CO ₂ Emissions from Limestone and Dolomite Use	CO ₂	5.1	<0.01	0.99	16%	<0.001
Mobile Combustion: Road & Other	CH ₄	4.5	<0.01	0.99	8%	<0.001
N ₂ O Emissions from N ₂ O Product Uses	N ₂ O	4.4	<0.01	1.00	2%	<0.001
CO ₂ Emissions from Soda Ash Production and Consumption	CO ₂	4.1	<0.01	1.00	7%	<0.001
N ₂ O Emissions from Wastewater Treatment	N ₂ O	3.7	<0.01	1.00	94%	0.001
PFC, HFC, and SF ₆ Emissions from Semiconductor Manufacture	Several	2.9	<0.01	1.00	9%	<0.001
CO ₂ Emissions from Petrochemical Production	CO ₂	2.2	<0.01	1.00	40%	<0.001
CO ₂ Emissions from Ferroalloy Production	CO ₂	2.2	<0.01	1.00	12%	<0.001
Mobile Combustion: Aviation	N ₂ O	1.7	<0.01	1.00	19%	<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	22%	<0.001
CO ₂ Emissions from Titanium Dioxide Production	CO ₂	1.2	<0.01	1.00	13%	<0.001
CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	CH ₄	1.0	<0.01	1.00	8%	<0.001
CO ₂ Emissions from Zinc Production	CO ₂	0.9	<0.01	1.00	25%	<0.001
CH ₄ Emissions from Petrochemical Production	CH ₄	0.9	<0.01	1.00	31%	<0.001
CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.7	<0.01	1.00	94%	<0.001
N ₂ O Emissions from Waste Incineration	N ₂ O	0.5	<0.01	1.00	191%	<0.001
CO ₂ Emissions from Stationary Combustion - Geothermal Energy	CO ₂	0.4	<0.01	1.00	5%	<0.001
CO ₂ Emissions from Petroleum Systems	CO ₂	0.4	<0.01	1.00	144%	<0.001
Mobile Combustion: Marine	N ₂ O	0.4	<0.01	1.00	19%	<0.001
CO ₂ Emissions from Silicon Carbide Production and Consumption	CO ₂	0.4	<0.01	1.00	10%	<0.001
N ₂ O Emissions from Field Burning of Agricultural Residues	N ₂ O	0.4	<0.01	1.00	85%	<0.001
N ₂ O Emission from Composting	N ₂ O	0.4	<0.01	1.00	50%	<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
CO ₂ Emissions from Lead Production	CO ₂	0.3	<0.01	1.00	17%	<0.001
Mobile Combustion: Aviation	CH ₄	0.2	<0.01	1.00	8%	<0.001
Mobile Combustion: Marine	CH ₄	0.1	<0.01	1.00	8%	<0.001
CH ₄ Emissions from Silicon Carbide Production and Consumption	CH ₄	+	<0.01	1.00	10%	<0.001
CH ₄ Emissions from Ferroalloy Production	CH ₄	+	<0.01	1.00	12%	<0.001

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

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

+ Does not exceed 0.05 Tg CO₂ Eq.

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

IPCC Source Categories	Direct GHG	1990 Estimate (Tg CO ₂ Eq.)	Tier 1 Level Assessment	Cumulative Total	Uncertainty ^a	Tier 2 Level Assessment
CO ₂ Emissions from Stationary Combustion - Coal	CO ₂	1,695.9	0.24	0.245	9%	0.023
Mobile Combustion: Road & Other	CO ₂	1,258.7	0.18	0.426	8%	0.014
CO ₂ Emissions from Stationary Combustion - Gas	CO ₂	965.5	0.14	0.566	7%	0.009
CO ₂ from Changes in Forest Carbon Stocks	CO ₂	661.1	0.10	0.661	19%	0.018
CO ₂ Emissions from Stationary Combustion - Oil	CO ₂	562.7	0.08	0.742	6%	0.005
Mobile Combustion: Aviation	CO ₂	179.4	0.03	0.768	8%	0.002
Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	158.9	0.02	0.791	54%	0.012
CH ₄ Emissions from Landfills	CH ₄	149.2	0.02	0.813	39%	0.008
CH ₄ Emissions from Enteric Fermentation	CH ₄	133.2	0.02	0.832	18%	0.003
Fugitive Emissions from Natural Gas Systems	CH ₄	129.6	0.02	0.850	43%	0.008

IPCC Source Categories	Direct GHG	1990 Estimate (Tg CO ₂ Eq.)	Tier 1 Level Assessment	Cumulative		Tier 2 Level Assessment
				Total	Uncertainty ^a	
CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	117.0	0.02	0.867	20%	0.003
CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	109.8	0.02	0.883	22%	0.004
Fugitive Emissions from Coal Mining	CH ₄	84.1	0.01	0.895	24%	0.003
CO ₂ Emissions from Urban Trees	CO ₂	60.6	0.01	0.904	21%	0.002
CO ₂ Emissions from Grassland Remaining Grassland	CO ₂	46.7	0.01	0.911	54%	0.004
Mobile Combustion: Marine	CO ₂	46.5	0.01	0.918	8%	0.001
Mobile Combustion: Road & Other	N ₂ O	41.6	0.01	0.924	19%	0.001
Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	41.5	0.01	0.930	136%	0.008
HFC-23 Emissions from HCFC-22 Production	HFCs	36.4	0.01	0.935	10%	0.001
Fugitive Emissions from Petroleum Systems	CH ₄	33.9	<0.01	0.940	144%	0.007
CO ₂ Emissions from Natural Gas Systems	CO ₂	33.7	<0.01	0.945	43%	0.002
CO ₂ Emissions from Cement Production	CO ₂	33.3	<0.01	0.949	13%	0.001
CH ₄ Emissions from Manure Management	CH ₄	30.4	<0.01	0.954	20%	0.001
SF ₆ Emissions from Electrical Transmission and Distribution	SF ₆	26.8	<0.01	0.958	22%	0.001
CH ₄ Emissions from Wastewater Treatment	CH ₄	23.5	<0.01	0.961	49%	0.002
CO ₂ Emissions from Landfilled Yard Trimmings and Food Scraps	CO ₂	23.5	<0.01	0.964	84%	0.003
CO ₂ Emissions from Cropland Remaining Cropland	CO ₂	22.3	<0.01	0.968	56%	0.002
CO ₂ Emissions from Land Converted to Grassland	CO ₂	22.3	<0.01	0.971	9%	<0.001
N ₂ O Emissions from Nitric Acid Production	N ₂ O	20.0	<0.01	0.974	44%	0.001
PFC Emissions from Aluminum Production	PFCs	18.5	<0.01	0.976	11%	<0.001
CO ₂ Emissions from Ammonia Production and Urea Consumption	CO ₂	16.8	<0.01	0.979	12%	<0.001
N ₂ O Emissions from Adipic Acid Production	N ₂ O	15.3	<0.01	0.981	20%	<0.001
Non-CO ₂ Emissions from Stationary Combustion	N ₂ O	12.8	<0.01	0.983	187%	0.003
N ₂ O Emissions from Manure Management	N ₂ O	12.1	<0.01	0.985	24%	<0.001
CO ₂ Emissions from Lime Production	CO ₂	11.5	<0.01	0.986	9%	<0.001
CO ₂ Emissions from Waste Incineration	CO ₂	10.9	<0.01	0.988	27%	<0.001
Non-CO ₂ Emissions from Stationary Combustion	CH ₄	7.4	<0.01	0.989	128%	0.001
CH ₄ Emissions from Rice Cultivation	CH ₄	7.1	<0.01	0.990	164%	0.002
CO ₂ Emissions from Aluminum Production	CO ₂	6.8	<0.01	0.991	4%	<0.001
Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	6.0	<0.01	0.992	23%	<0.001
SF ₆ Emissions from Magnesium Production and Processing	SF ₆	5.4	<0.01	0.993	13%	<0.001
CO ₂ Emissions from Limestone and Dolomite Use	CO ₂	5.1	<0.01	0.993	16%	<0.001
CH ₄ Emissions from Forest Fires	CH ₄	4.6	<0.01	0.994	155%	0.001
Mobile Combustion: Road & Other	CH ₄	4.5	<0.01	0.995	8%	<0.001
N ₂ O Emissions from N ₂ O Product Uses	N ₂ O	4.4	<0.01	0.995	2%	<0.001
CO ₂ Emissions from Soda Ash Production and Consumption	CO ₂	4.1	<0.01	0.996	7%	<0.001
N ₂ O Emissions from Wastewater Treatment	N ₂ O	3.7	<0.01	0.996	94%	<0.001
PFC, HFC, and SF ₆ Emissions from Semiconductor Manufacture	Several	2.9	<0.01	0.997	9%	<0.001
CO ₂ Emissions from Petrochemical Production	CO ₂	2.2	<0.01	0.997	40%	<0.001
CO ₂ Emissions from Ferroalloy Production	CO ₂	2.2	<0.01	0.997	12%	<0.001
CO ₂ Emissions from Land Converted to Cropland	CO ₂	2.2	<0.01	0.998	40%	<0.001
Mobile Combustion: Aviation	N ₂ O	1.7	<0.01	0.998	19%	<0.001
CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.5	<0.01	0.998	18%	<0.001
CO ₂ Emissions from Carbon Dioxide Consumption	CO ₂	1.4	<0.01	0.998	22%	<0.001
CO ₂ Emissions from Titanium Dioxide Production	CO ₂	1.2	<0.01	0.999	13%	<0.001
N ₂ O Emissions from Soils	N ₂ O	1.0	<0.01	0.999	211%	<0.001
CO ₂ Emissions from Wetlands Remaining Wetlands	CO ₂	1.0	<0.01	0.999	31%	<0.001
CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	CH ₄	1.0	<0.01	0.999	8%	<0.001
CO ₂ Emissions from Zinc Production	CO ₂	0.9	<0.01	0.999	25%	<0.001
CH ₄ Emissions from Petrochemical Production	CH ₄	0.9	<0.01	0.999	31%	<0.001
CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.7	<0.01	0.999	94%	<0.001

IPCC Source Categories	Direct GHG	1990 Estimate (Tg CO ₂ Eq.)	Tier 1 Level Assessment	Cumulative		Tier 2 Level Assessment
				Total	Uncertainty ^a	
N ₂ O Emissions from Waste Incineration	N ₂ O	0.5	<0.01	0.999	191%	<0.001
N ₂ O Emissions from Forest Fires	N ₂ O	0.5	<0.01	1.000	152%	<0.001
CO ₂ Emissions from Stationary Combustion - Geothermal Energy	CO ₂	0.4	<0.01	1.000	5%	<0.001
CO ₂ Emissions from Petroleum Systems	CO ₂	0.4	<0.01	1.000	144%	<0.001
Mobile Combustion: Marine	N ₂ O	0.4	<0.01	1.000	19%	<0.001
CO ₂ Emissions from Silicon Carbide Production and Consumption	CO ₂	0.4	<0.01	1.000	10%	<0.001
N ₂ O Emissions from Field Burning of Agricultural Residues	N ₂ O	0.4	<0.01	1.000	85%	<0.001
N ₂ O Emission from Composting	N ₂ O	0.4	<0.01	1.000	50%	<0.001
Emissions from Substitutes for Ozone Depleting Substances	Several	0.3	<0.01	1.000	9%	<0.001
CH ₄ Emissions from Composting	CH ₄	0.3	<0.01	1.000	50%	<0.001
CO ₂ Emissions from Lead Production	CO ₂	0.3	<0.01	1.000	17%	<0.001
Mobile Combustion: Aviation	CH ₄	0.2	<0.01	1.000	8%	<0.001
Mobile Combustion: Marine	CH ₄	0.1	<0.01	1.000	8%	<0.001
CH ₄ Emissions from Silicon Carbide Production and Consumption	CH ₄	+	<0.01	1.000	10%	<0.001
CH ₄ Emissions from Ferroalloy Production	CH ₄	+	<0.01	1.000	12%	<0.001
N ₂ O Emissions from Wetlands Remaining Wetlands	N ₂ O	+	<0.01	1.000	73%	<0.001

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

+ Does not exceed 0.05 Tg CO₂ Eq.

Table A- 6: 2007 Key Source Category Tier 1 and Tier 2 Analysis—Level Assessment, without LULUCF

IPCC Source Categories	Direct GHG	2007 Estimate (Tg CO ₂ Eq.)	Tier 1 Level Assessment	Cumulative		Tier 2 Level Assessment
				Total	Uncertainty ^a	
CO ₂ Emissions from Stationary Combustion - Coal	CO ₂	2,086.5	0.29	0.29	9%	0.028
Mobile Combustion: Road & Other	CO ₂	1,649.1	0.23	0.53	8%	0.018
CO ₂ Emissions from Stationary Combustion - Gas	CO ₂	1,181.1	0.17	0.69	7%	0.011
CO ₂ Emissions from Stationary Combustion - Oil	CO ₂	580.4	0.08	0.77	6%	0.005
Mobile Combustion: Aviation	CO ₂	187.5	0.03	0.80	8%	0.002
Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	172.0	0.02	0.82	54%	0.013
CH ₄ Emissions from Enteric Fermentation	CH ₄	139.0	0.02	0.84	18%	0.004
CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	133.9	0.02	0.86	20%	0.004
CH ₄ Emissions from Landfills	CH ₄	132.9	0.02	0.88	39%	0.007
Emissions from Substitutes for Ozone Depleting Substances	Several	108.3	0.02	0.90	9%	0.001
Fugitive Emissions from Natural Gas Systems	CH ₄	104.7	0.01	0.91	43%	0.006
CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	77.4	0.01	0.92	22%	0.002
Fugitive Emissions from Coal Mining	CH ₄	57.6	0.01	0.93	24%	0.002
Mobile Combustion: Marine	CO ₂	50.8	0.01	0.94	8%	0.001
CO ₂ Emissions from Cement Production	CO ₂	44.5	0.01	0.94	13%	0.001
CH ₄ Emissions from Manure Management	CH ₄	44.0	0.01	0.95	20%	0.001
Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	35.9	0.01	0.95	136%	0.007
Fugitive Emissions from Petroleum Systems	CH ₄	28.8	<0.01	0.96	144%	0.006
CO ₂ Emissions from Natural Gas Systems	CO ₂	28.7	<0.01	0.96	43%	0.002
Mobile Combustion: Road & Other	N ₂ O	27.9	<0.01	0.97	19%	0.001
CH ₄ Emissions from Wastewater Treatment	CH ₄	24.4	<0.01	0.97	49%	0.002
N ₂ O Emissions from Nitric Acid Production	N ₂ O	21.7	<0.01	0.97	44%	0.001
CO ₂ Emissions from Waste Incineration	CO ₂	20.8	<0.01	0.98	27%	0.001
HFC-23 Emissions from HCFC-22 Production	HFCs	17.0	<0.01	0.98	10%	<0.001
N ₂ O Emissions from Manure Management	N ₂ O	14.7	<0.01	0.98	24%	<0.001
Non-CO ₂ Emissions from Stationary Combustion	N ₂ O	14.7	<0.01	0.98	187%	0.004
CO ₂ Emissions from Lime Production	CO ₂	14.6	<0.01	0.98	9%	<0.001
CO ₂ Emissions from Ammonia Production and Urea Consumption	CO ₂	13.8	<0.01	0.99	12%	<0.001
SF ₆ Emissions from Electrical Transmission and Distribution	SF ₆	12.7	<0.01	0.99	22%	<0.001

IPCC Source Categories	Direct GHG	2007 Estimate (Tg CO ₂ Eq.)	Tier 1 Level Assessment	Cumulative Total	Uncertainty ^a	Tier 2 Level Assessment
Non-CO ₂ Emissions from Stationary Combustion	CH ₄	6.6	<0.01	0.99	128%	0.001
CO ₂ Emissions from Limestone and Dolomite Use	CO ₂	6.2	<0.01	0.99	16%	<0.001
CH ₄ Emissions from Rice Cultivation	CH ₄	6.2	<0.01	0.99	164%	0.001
N ₂ O Emissions from Adipic Acid Production	N ₂ O	5.9	<0.01	0.99	20%	<0.001
Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	5.7	<0.01	0.99	23%	<0.001
N ₂ O Emissions from Wastewater Treatment	N ₂ O	4.9	<0.01	0.99	94%	0.001
PFC, HFC, and SF ₆ Emissions from Semiconductor Manufacture	Several	4.7	<0.01	0.99	9%	<0.001
N ₂ O Emissions from N ₂ O Product Uses	N ₂ O	4.4	<0.01	0.99	2%	<0.001
CO ₂ Emissions from Aluminum Production	CO ₂	4.3	<0.01	1.00	4%	<0.001
CO ₂ Emissions from Soda Ash Production and Consumption	CO ₂	4.1	<0.01	1.00	7%	<0.001
PFC Emissions from Aluminum Production	PFCs	3.8	<0.01	1.00	11%	<0.001
SF ₆ Emissions from Magnesium Production and Processing	SF ₆	3.0	<0.01	1.00	13%	<0.001
CO ₂ Emissions from Petrochemical Production	CO ₂	2.6	<0.01	1.00	40%	<0.001
Mobile Combustion: Road & Other	CH ₄	2.0	<0.01	1.00	8%	<0.001
CO ₂ Emissions from Titanium Dioxide Production	CO ₂	1.9	<0.01	1.00	13%	<0.001
CO ₂ Emissions from Carbon Dioxide Consumption	CO ₂	1.9	<0.01	1.00	22%	<0.001
N ₂ O Emission from Composting	N ₂ O	1.8	<0.01	1.00	50%	<0.001
Mobile Combustion: Aviation	N ₂ O	1.8	<0.01	1.00	19%	<0.001
CH ₄ Emissions from Composting	CH ₄	1.7	<0.01	1.00	50%	<0.001
CO ₂ Emissions from Ferroalloy Production	CO ₂	1.6	<0.01	1.00	12%	<0.001
CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.2	<0.01	1.00	18%	<0.001
CH ₄ Emissions from Petrochemical Production	CH ₄	1.0	<0.01	1.00	31%	<0.001
CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.9	<0.01	1.00	94%	<0.001
CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	CH ₄	0.7	<0.01	1.00	8%	<0.001
CO ₂ Emissions from Zinc Production	CO ₂	0.5	<0.01	1.00	25%	<0.001
N ₂ O Emissions from Field Burning of Agricultural Residues	N ₂ O	0.5	<0.01	1.00	85%	<0.001
Mobile Combustion: Marine	N ₂ O	0.4	<0.01	1.00	19%	<0.001
N ₂ O Emissions from Waste Incineration	N ₂ O	0.4	<0.01	1.00	191%	<0.001
CO ₂ Emissions from Stationary Combustion - Geothermal Energy	CO ₂	0.4	<0.01	1.00	5%	<0.001
CO ₂ Emissions from Petroleum Systems	CO ₂	0.3	<0.01	1.00	144%	<0.001
CO ₂ Emissions from Lead Production	CO ₂	0.3	<0.01	1.00	17%	<0.001
CO ₂ Emissions from Silicon Carbide Production and Consumption	CO ₂	0.2	<0.01	1.00	10%	<0.001
Mobile Combustion: Aviation	CH ₄	0.1	<0.01	1.00	8%	<0.001
Mobile Combustion: Marine	CH ₄	0.1	<0.01	1.00	8%	<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	10%	<0.001

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

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

+ Does not exceed 0.05 Tg CO₂ Eq.

Table A-7: 2007 Key Source Category Tier 1 and Tier 2 Analysis—Level Assessment with LULUCF

IPCC Source Categories	Direct GHG	2007 Estimate (Tg CO ₂ Eq.)	Tier 1 Level Assessment	Cumulative Total	Uncertainty ^a	Tier 2 Level Assessment
CO ₂ Emissions from Stationary Combustion - Coal	CO ₂	2,086.5	0.25	0.25	9%	0.024
Mobile Combustion: Road & Other	CO ₂	1,649.1	0.20	0.46	8%	0.015
CO ₂ Emissions from Stationary Combustion - Gas	CO ₂	1,181.1	0.14	0.60	7%	0.009
CO ₂ from Changes in Forest Carbon Stocks	CO ₂	910.1	0.11	0.71	19%	0.021
CO ₂ Emissions from Stationary Combustion - Oil	CO ₂	580.4	0.07	0.78	6%	0.004
Mobile Combustion: Aviation	CO ₂	187.5	0.02	0.80	8%	0.002
Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	172.0	0.02	0.82	54%	0.011
CH ₄ Emissions from Enteric Fermentation	CH ₄	139.0	0.02	0.84	18%	0.003

CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	133.9	0.02	0.86	20%	0.003
CH ₄ Emissions from Landfills	CH ₄	132.9	0.02	0.87	39%	0.006
Emissions from Substitutes for Ozone Depleting Substances	Several	108.3	0.01	0.89	9%	0.001
Fugitive Emissions from Natural Gas Systems	CH ₄	104.7	0.01	0.90	43%	0.006
CO ₂ Emissions from Urban Trees	CO ₂	97.6	0.01	0.91	21%	0.002
CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	77.4	0.01	0.92	22%	0.002
Fugitive Emissions from Coal Mining	CH ₄	57.6	0.01	0.93	24%	0.002
Mobile Combustion: Marine	CO ₂	50.8	0.01	0.93	8%	<0.001
CO ₂ Emissions from Cement Production	CO ₂	44.5	0.01	0.94	13%	0.001
CH ₄ Emissions from Manure Management	CH ₄	44.0	0.01	0.95	20%	0.001
Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	35.9	<0.01	0.95	136%	0.006
CH ₄ Emissions from Forest Fires	CH ₄	29.0	<0.01	0.95	155%	0.005
Fugitive Emissions from Petroleum Systems	CH ₄	28.8	<0.01	0.96	144%	0.005
CO ₂ Emissions from Natural Gas Systems	CO ₂	28.7	<0.01	0.96	43%	0.002
Mobile Combustion: Road & Other	N ₂ O	27.9	<0.01	0.96	19%	0.001
CO ₂ Emissions from Land Converted to Grassland	CO ₂	26.7	<0.01	0.97	9%	<0.001
CH ₄ Emissions from Wastewater Treatment	CH ₄	24.4	<0.01	0.97	49%	0.001
N ₂ O Emissions from Nitric Acid Production	N ₂ O	21.7	<0.01	0.97	44%	0.001
CO ₂ Emissions from Waste Incineration	CO ₂	20.8	<0.01	0.97	27%	0.001
HFC-23 Emissions from HCFC-22 Production	HFCs	17.0	<0.01	0.98	10%	<0.001
N ₂ O Emissions from Manure Management	N ₂ O	14.7	<0.01	0.98	24%	<0.001
Non-CO ₂ Emissions from Stationary Combustion	N ₂ O	14.7	<0.01	0.98	187%	0.003
CO ₂ Emissions from Lime Production	CO ₂	14.6	<0.01	0.98	9%	<0.001
CO ₂ Emissions from Ammonia Production and Urea Consumption	CO ₂	13.8	<0.01	0.98	12%	<0.001
SF ₆ Emissions from Electrical Transmission and Distribution	SF ₆	12.7	<0.01	0.99	22%	<0.001
CO ₂ Emissions from Cropland Remaining Cropland	CO ₂	11.6	<0.01	0.99	56%	0.001
CO ₂ Emissions from Landfilled Yard Trimmings and Food Scraps	CO ₂	9.8	<0.01	0.99	84%	0.001
Non-CO ₂ Emissions from Stationary Combustion	CH ₄	6.6	<0.01	0.99	128%	0.001
CO ₂ Emissions from Limestone and Dolomite Use	CO ₂	6.2	<0.01	0.99	16%	<0.001
CH ₄ Emissions from Rice Cultivation	CH ₄	6.2	<0.01	0.99	164%	0.001
CO ₂ Emissions from Land Converted to Cropland	CO ₂	5.9	<0.01	0.99	40%	<0.001
N ₂ O Emissions from Adipic Acid Production	N ₂ O	5.9	<0.01	0.99	20%	<0.001
Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	5.7	<0.01	0.99	23%	<0.001
N ₂ O Emissions from Wastewater Treatment	N ₂ O	4.9	<0.01	0.99	94%	0.001
PFC, HFC, and SF ₆ Emissions from Semiconductor Manufacture	Several	4.7	<0.01	0.99	9%	<0.001
CO ₂ Emissions from Grassland Remaining Grassland	CO ₂	4.7	<0.01	0.99	54%	<0.001
N ₂ O Emissions from N ₂ O Product Uses	N ₂ O	4.4	<0.01	0.99	2%	<0.001
CO ₂ Emissions from Aluminum Production	CO ₂	4.3	<0.01	1.00	4%	<0.001
CO ₂ Emissions from Soda Ash Production and Consumption	CO ₂	4.1	<0.01	1.00	7%	<0.001
PFC Emissions from Aluminum Production	PFCs	3.8	<0.01	1.00	11%	<0.001
SF ₆ Emissions from Magnesium Production and Processing	SF ₆	3.0	<0.01	1.00	13%	<0.001
N ₂ O Emissions from Forest Fires	N ₂ O	2.9	<0.01	1.00	152%	0.001
CO ₂ Emissions from Petrochemical Production	CO ₂	2.6	<0.01	1.00	40%	<0.001
Mobile Combustion: Road & Other	CH ₄	2.0	<0.01	1.00	8%	<0.001
N ₂ O Emissions from Soils	N ₂ O	1.9	<0.01	1.00	211%	<0.001
CO ₂ Emissions from Titanium Dioxide Production	CO ₂	1.9	<0.01	1.00	13%	<0.001
CO ₂ Emissions from Carbon Dioxide Consumption	CO ₂	1.9	<0.01	1.00	22%	<0.001
N ₂ O Emission from Composting	N ₂ O	1.8	<0.01	1.00	50%	<0.001
Mobile Combustion: Aviation	N ₂ O	1.8	<0.01	1.00	19%	<0.001
CH ₄ Emissions from Composting	CH ₄	1.7	<0.01	1.00	50%	<0.001
CO ₂ Emissions from Ferroalloy Production	CO ₂	1.6	<0.01	1.00	12%	<0.001
CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.2	<0.01	1.00	18%	<0.001

CH ₄ Emissions from Petrochemical Production	CH ₄	1.0	<0.01	1.00	31%	<0.001
CO ₂ Emissions from Wetlands Remaining Wetlands	CO ₂	1.0	<0.01	1.00	31%	<0.001
CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.9	<0.01	1.00	94%	<0.001
CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	CH ₄	0.7	<0.01	1.00	8%	<0.001
CO ₂ Emissions from Zinc Production	CO ₂	0.5	<0.01	1.00	25%	<0.001
N ₂ O Emissions from Field Burning of Agricultural Residues	N ₂ O	0.5	<0.01	1.00	85%	<0.001
Mobile Combustion: Marine	N ₂ O	0.4	<0.01	1.00	19%	<0.001
N ₂ O Emissions from Waste Incineration	N ₂ O	0.4	<0.01	1.00	191%	<0.001
CO ₂ Emissions from Stationary Combustion - Geothermal Energy	CO ₂	0.4	<0.01	1.00	5%	<0.001
CO ₂ Emissions from Petroleum Systems	CO ₂	0.3	<0.01	1.00	144%	<0.001
CO ₂ Emissions from Lead Production	CO ₂	0.3	<0.01	1.00	17%	<0.001
CO ₂ Emissions from Silicon Carbide Production and Consumption	CO ₂	0.2	<0.01	1.00	10%	<0.001
Mobile Combustion: Aviation	CH ₄	0.1	<0.01	1.00	8%	<0.001
Mobile Combustion: Marine	CH ₄	0.1	<0.01	1.00	8%	<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	10%	<0.001
N ₂ O Emissions from Wetlands Remaining Wetlands	N ₂ O	+	<0.01	1.00	73%	<0.001

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

+ Does not exceed 0.05 Tg CO₂ Eq.

Table A- 8: 1990-2007 Key Source Category Tier 1 Analysis—Trend Assessment, without LULUCF

IPCC Source Categories	Direct GHG	1990 Estimate (Tg CO ₂ Eq.)	2007 Estimate (Tg CO ₂ Eq.)	Tier 1 Trend Assessment	Tier 2 Trend Assessment	Percent Contribution to Trend (%)	Cumulative Contribution to Trend (%)
Mobile Combustion: Road & Other	CO ₂	1258.7	1649.1	0.02	0.002	18.8	19
Emissions from Substitutes for Ozone Depleting Substances	Several	0.3	108.3	0.01	0.001	11.4	30
CO ₂ Emissions from Stationary Combustion - Coal	CO ₂	1695.9	2086.5	0.01	0.001	11.1	41
CO ₂ Emissions from Stationary Combustion - Oil	CO ₂	562.7	580.4	0.01	0.001	8.1	49
CO ₂ Emissions from Stationary Combustion - Gas	CO ₂	965.5	1181.1	0.01	<0.001	5.6	55
CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	109.8	77.4	0.01	0.001	5.3	60
Fugitive Emissions from Natural Gas Systems	CH ₄	129.6	104.7	0.01	0.002	4.9	65
CH ₄ Emissions from Landfills	CH ₄	149.2	132.9	<0.01	0.002	4.4	70
Fugitive Emissions from Coal Mining	CH ₄	84.1	57.6	<0.01	0.001	4.3	74
HFC-23 Emissions from HCFC-22 Production	HFCs	36.4	17.0	<0.01	<0.001	2.7	77
Mobile Combustion: Aviation	CO ₂	179.4	187.5	<0.01	<0.001	2.3	79
Mobile Combustion: Road & Other	N ₂ O	41.6	27.9	<0.01	<0.001	2.2	81
SF ₆ Emissions from Electrical Transmission and Distribution	SF ₆	26.8	12.7	<0.01	0.001	2.0	83
PFC Emissions from Aluminum Production	PFCs	18.5	3.8	<0.01	<0.001	1.9	85
CH ₄ Emissions from Enteric Fermentation	CH ₄	133.2	139.0	<0.01	<0.001	1.7	87
Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	158.9	172.0	<0.01	0.001	1.4	88
Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	41.5	35.9	<0.01	0.002	1.3	89
N ₂ O Emissions from Adipic Acid Production	N ₂ O	15.3	5.9	<0.01	<0.001	1.3	91
Fugitive Emissions from Petroleum Systems	CH ₄	33.9	28.8	<0.01	0.002	1.1	92
CO ₂ Emissions from Natural Gas Systems	CO ₂	33.7	28.7	<0.01	0.001	1.1	93
CH ₄ Emissions from Manure Management	CH ₄	30.4	44.0	<0.01	<0.001	0.9	94
CO ₂ Emissions from Waste Incineration	CO ₂	10.9	20.8	<0.01	<0.001	0.8	95
CO ₂ Emissions from Ammonia Production and Urea Consumption	CO ₂	16.8	13.8	<0.01	<0.001	0.6	95
CO ₂ Emissions from Cement Production	CO ₂	33.3	44.5	<0.01	<0.001	0.6	96
CO ₂ Emissions from Aluminum Production	CO ₂	6.8	4.3	<0.01	<0.001	0.4	96
Mobile Combustion: Marine	CO ₂	46.5	50.8	<0.01	<0.001	0.4	97

IPCC Source Categories	Direct GHG	1990 Estimate (Tg CO ₂ Eq.)	2007 Estimate (Tg CO ₂ Eq.)	Tier 1 Trend Assessment	Tier 2 Trend Assessment	Percent Contribution to Trend (%)	Cumulative Contribution to Trend (%)
SF ₆ Emissions from Magnesium Production and Processing	SF ₆	5.4	3.0	<0.01	<0.001	0.4	97
Mobile Combustion: Road & Other	CH ₄	4.5	2.0	<0.01	<0.001	0.3	97
CH ₄ Emissions from Wastewater Treatment	CH ₄	23.5	24.4	<0.01	<0.001	0.3	98
CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	117.0	133.9	<0.01	<0.001	0.3	98
CH ₄ Emissions from Rice Cultivation	CH ₄	7.1	6.2	<0.01	<0.001	0.2	98
Non-CO ₂ Emissions from Stationary Combustion	CH ₄	7.4	6.6	<0.01	<0.001	0.2	98
N ₂ O Emissions from Nitric Acid Production	N ₂ O	20.0	21.7	<0.01	<0.001	0.2	99
N ₂ O Emission from Composting	N ₂ O	0.4	1.8	<0.01	<0.001	0.1	99
Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	6.0	5.7	<0.01	<0.001	0.1	99
PFC, HFC, and SF ₆ Emissions from Semiconductor Manufacture	Several	2.9	4.7	<0.01	<0.001	0.1	99
CH ₄ Emissions from Composting	CH ₄	0.3	1.7	<0.01	<0.001	0.1	99
CO ₂ Emissions from Lime Production	CO ₂	11.5	14.6	<0.01	<0.001	0.1	99
CO ₂ Emissions from Ferroalloy Production	CO ₂	2.2	1.6	<0.01	<0.001	0.1	99
N ₂ O Emissions from N ₂ O Product Uses	N ₂ O	4.4	4.4	<0.01	<0.001	0.1	99
CO ₂ Emissions from Soda Ash Production and Consumption	CO ₂	4.1	4.1	<0.01	<0.001	0.1	99
CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.5	1.2	<0.01	<0.001	0.1	100
N ₂ O Emissions from Manure Management	N ₂ O	12.1	14.7	<0.01	<0.001	0.1	100
CO ₂ Emissions from Zinc Production	CO ₂	0.9	0.5	<0.01	<0.001	0.1	100
N ₂ O Emissions from Wastewater Treatment	N ₂ O	3.7	4.9	<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
CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	CH ₄	1.0	0.7	<0.01	<0.001	<0.1	100
Non-CO ₂ Emissions from Stationary Combustion	N ₂ O	12.8	14.7	<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 Carbon Dioxide Consumption	CO ₂	1.4	1.9	<0.01	<0.001	<0.1	100
Mobile Combustion: Aviation	N ₂ O	1.7	1.8	<0.01	<0.001	<0.1	100
CO ₂ Emissions from Limestone and Dolomite Use	CO ₂	5.1	6.2	<0.01	<0.001	<0.1	100
N ₂ O Emissions from Waste Incineration	N ₂ O	0.5	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
CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.7	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	0.3	0.3	<0.01	<0.001	<0.1	100
N ₂ O Emissions from Field Burning of Agricultural Residues	N ₂ O	0.4	0.5	<0.01	<0.001	<0.1	100
CO ₂ Emissions from Petrochemical Production	CO ₂	2.2	2.6	<0.01	<0.001	<0.1	100
Mobile Combustion: Aviation	CH ₄	0.2	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
CH ₄ Emissions from Petrochemical Production	CH ₄	0.9	1.0	<0.01	<0.001	<0.1	100
Mobile Combustion: Marine	N ₂ O	0.4	0.4	<0.01	<0.001	<0.1	100
CH ₄ Emissions from Ferroalloy Production	CH ₄	+	+	<0.01	<0.001	<0.1	100
Mobile Combustion: Marine	CH ₄	0.1	0.1	<0.01	<0.001	<0.1	100

Note: LULUCF sources and sinks are not included in this analysis.
+ Does not exceed 0.05 Tg CO₂ Eq.

Table A-9: 1990-2007 Key Source Category Tier 1 Analysis—Trend Assessment, with LULUCF

IPCC Source Categories	Direct GHG	1990 Estimate (Tg CO ₂ Eq.)	2007 Estimate (Tg CO ₂ Eq.)	Tier 1 Trend Assessment	Tier 2 Trend Assessment	Percent Contribution to Trend (%)	Cumulative Contribution to Trend (%)
Mobile Combustion: Road & Other	CO ₂	1258.7	1649.1	0.02	0.001	13.4	13
CO ₂ from Changes in Forest Carbon Stocks	CO ₂	661.1	910.1	0.01	0.003	10.7	24

IPCC Source Categories	Direct GHG	1990	2007 Estimate (Tg CO ₂ Eq.)	Tier 1 Trend Assessment	Tier 2 Trend Assessment	Percent Contribution to Trend (%)	Cumulative Contribution to Trend (%)
		Estimate (Tg CO ₂ Eq.)					
Emissions from Substitutes for Ozone Depleting Substances	Several	0.3	108.3	0.01	0.001	9.1	33
CO ₂ Emissions from Stationary Combustion - Oil	CO ₂	562.7	580.4	0.01	0.001	7.3	40
CO ₂ Emissions from Stationary Combustion - Coal	CO ₂	1695.9	2086.5	0.01	0.001	6.6	47
CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	109.8	77.4	0.01	0.001	4.4	51
CO ₂ Emissions from Grassland Remaining Grassland	CO ₂	46.7	4.7	0.01	0.003	4.3	56
Fugitive Emissions from Natural Gas Systems	CH ₄	129.6	104.7	0.01	0.002	4.1	60
CH ₄ Emissions from Landfills	CH ₄	149.2	132.9	<0.01	0.002	3.7	64
Fugitive Emissions from Coal Mining	CH ₄	84.1	57.6	<0.01	0.001	3.5	67
CO ₂ Emissions from Stationary Combustion - Gas	CO ₂	965.5	1181.1	<0.01	<0.001	3.2	70
HFC-23 Emissions from HCFC-22 Production	HFCs	36.4	17.0	<0.01	<0.001	2.2	72
CO ₂ Emissions from Urban Trees	CO ₂	60.6	97.6	<0.01	0.001	2.2	75
Mobile Combustion: Aviation	CO ₂	179.4	187.5	<0.01	<0.001	2.1	77
CH ₄ Emissions from Forest Fires	CH ₄	4.6	29.0	<0.01	0.004	2.0	79
Mobile Combustion: Road & Other	N ₂ O	41.6	27.9	<0.01	<0.001	1.8	81
SF ₆ Emissions from Electrical Transmission and Distribution	SF ₆	26.8	12.7	<0.01	<0.001	1.6	82
CH ₄ Emissions from Enteric Fermentation	CH ₄	133.2	139.0	<0.01	<0.001	1.6	84
PFC Emissions from Aluminum Production	PFCs	18.5	3.8	<0.01	<0.001	1.5	85
CO ₂ Emissions from Landfilled Yard Trimmings and Food Scraps	CO ₂	23.5	9.8	<0.01	0.002	1.5	87
Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	158.9	172.0	<0.01	0.001	1.4	88
CO ₂ Emissions from Cropland Remaining Cropland	CO ₂	22.3	11.6	<0.01	0.001	1.2	89
Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	41.5	35.9	<0.01	0.002	1.1	91
N ₂ O Emissions from Adipic Acid Production	N ₂ O	15.3	5.9	<0.01	<0.001	1.0	92
Fugitive Emissions from Petroleum Systems	CH ₄	33.9	28.8	<0.01	0.002	1.0	93
CO ₂ Emissions from Natural Gas Systems	CO ₂	33.7	28.7	<0.01	0.001	1.0	93
CH ₄ Emissions from Manure Management	CH ₄	30.4	44.0	<0.01	<0.001	0.7	94
CO ₂ Emissions from Waste Incineration	CO ₂	10.9	20.8	<0.01	<0.001	0.7	95
CO ₂ Emissions from Ammonia Production and Urea Consumption	CO ₂	16.8	13.8	<0.01	<0.001	0.5	95
CO ₂ Emissions from Cement Production	CO ₂	33.3	44.5	<0.01	<0.001	0.4	96
CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	117.0	133.9	<0.01	<0.001	0.4	96
Mobile Combustion: Marine	CO ₂	46.5	50.8	<0.01	<0.001	0.4	97
CO ₂ Emissions from Aluminum Production	CO ₂	6.8	4.3	<0.01	<0.001	0.3	97
CH ₄ Emissions from Wastewater Treatment	CH ₄	23.5	24.4	<0.01	<0.001	0.3	97
SF ₆ Emissions from Magnesium Production and Processing	SF ₆	5.4	3.0	<0.01	<0.001	0.3	97
CO ₂ Emissions from Land Converted to Cropland	CO ₂	2.2	5.9	<0.01	<0.001	0.3	98
Mobile Combustion: Road & Other	CH ₄	4.5	2.0	<0.01	<0.001	0.3	98
N ₂ O Emissions from Forest Fires	N ₂ O	0.5	2.9	<0.01	<0.001	0.2	98
CH ₄ Emissions from Rice Cultivation	CH ₄	7.1	6.2	<0.01	<0.001	0.2	98
Non-CO ₂ Emissions from Stationary Combustion	CH ₄	7.4	6.6	<0.01	<0.001	0.2	99
N ₂ O Emissions from Nitric Acid Production	N ₂ O	20.0	21.7	<0.01	<0.001	0.2	99
Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	6.0	5.7	<0.01	<0.001	0.1	99
N ₂ O Emission from Composting	N ₂ O	0.4	1.8	<0.01	<0.001	0.1	99
CH ₄ Emissions from Composting	CH ₄	0.3	1.7	<0.01	<0.001	0.1	99
PFC, HFC, and SF ₆ Emissions from Semiconductor Manufacture	Several	2.9	4.7	<0.01	<0.001	0.1	99
CO ₂ Emissions from Ferroalloy Production	CO ₂	2.2	1.6	<0.01	<0.001	0.1	99
CO ₂ Emissions from Lime Production	CO ₂	11.5	14.6	<0.01	<0.001	0.1	99
N ₂ O Emissions from N ₂ O Product Uses	N ₂ O	4.4	4.4	<0.01	<0.001	0.1	99
CO ₂ Emissions from Soda Ash Production and Consumption	CO ₂	4.1	4.1	<0.01	<0.001	0.1	99
N ₂ O Emissions from Soils	N ₂ O	1.0	1.9	<0.01	<0.001	0.1	100
CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.5	1.2	<0.01	<0.001	0.1	100
CO ₂ Emissions from Zinc Production	CO ₂	0.9	0.5	<0.01	<0.001	0.1	100

IPCC Source Categories	Direct GHG	1990		Tier 1 Trend Assessment	Tier 2 Trend Assessment	Percent Contribution to Trend (%)	Cumulative Contribution to Trend (%)
		Estimate (Tg CO ₂ Eq.)	2007 Estimate (Tg CO ₂ Eq.)				
N ₂ O Emissions from Wastewater Treatment	N ₂ O	3.7	4.9	<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
Non-CO ₂ Emissions from Stationary Combustion	N ₂ O	12.8	14.7	<0.01	<0.001	<0.1	100
CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	CH ₄	1.0	0.7	<0.01	<0.001	<0.1	100
N ₂ O Emissions from Manure Management	N ₂ O	12.1	14.7	<0.01	<0.001	<0.1	100
CO ₂ Emissions from Land Converted to Grassland	CO ₂	22.3	26.7	<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
Mobile Combustion: Aviation	N ₂ O	1.7	1.8	<0.01	<0.001	<0.1	100
CO ₂ Emissions from Wetlands Remaining Wetlands	CO ₂	1.0	1.0	<0.01	<0.001	<0.1	100
CO ₂ Emissions from Carbon Dioxide Consumption	CO ₂	1.4	1.9	<0.01	<0.001	<0.1	100
N ₂ O Emissions from Waste Incineration	N ₂ O	0.5	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
CO ₂ Emissions from Limestone and Dolomite Use	CO ₂	5.1	6.2	<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
CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.7	0.9	<0.01	<0.001	<0.1	100
CO ₂ Emissions from Lead Production	CO ₂	0.3	0.3	<0.01	<0.001	<0.1	100
N ₂ O Emissions from Field Burning of Agricultural Residues	N ₂ O	0.4	0.5	<0.01	<0.001	<0.1	100
Mobile Combustion: Aviation	CH ₄	0.2	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
Mobile Combustion: Marine	N ₂ O	0.4	0.4	<0.01	<0.001	<0.1	100
CH ₄ Emissions from Ferroalloy Production	CH ₄	+	+	<0.01	<0.001	<0.1	100
CO ₂ Emissions from Petrochemical Production	CO ₂	2.2	2.6	<0.01	<0.001	<0.1	100
CH ₄ Emissions from Petrochemical Production	CH ₄	0.9	1.0	<0.01	<0.001	<0.1	100
Mobile Combustion: Marine	CH ₄	0.1	0.1	<0.01	<0.001	<0.1	100
N ₂ O Emissions from Wetlands Remaining Wetlands	N ₂ O	+	+	<0.01	<0.001	<0.1	100

+ Does not exceed 0.05 Tg CO₂ Eq.

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