ANNEX 1 Key Category Analysis

The United States has identified national key categories based on the estimates presented in this report. The 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (IPCC 2006) 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 greenhouse gases in terms of the absolute level, the trend, or the uncertainty in emissions and removals." 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. A qualitative review of the key categories, along with non-key categories has not identified additional categories to consider as key.

The methodology for conducting a key category analysis, as defined by the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006), includes:

- Approach 1 (including both level and trend assessments);
- Approach 2 (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 Land Use, Land-Use Change and Forestry LULUCF); discusses Approach 1, Approach 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 (GWP)-weighted emissions in 2017. The table also indicates the criteria used in identifying these categories (i.e., level, trend, Approach 1, Approach 2, and/or qualitative assessments).

Table A-1: Key Source Categories for the United States (1990 and 2017)

Table A-1. Rey coulde categories for the				oach 1			Appro	oach 2			2017
CRF Source/Sink Categories	Greenhouse Gas	Level Without LULUCF	Trend Without LULUCF	Level With LULUCF	Trend With LULUCF	Level Without LULUCF	Trend Without LULUCF	Level With LULUCF	Trend With LULUCF	Quala	Emissions (MMT CO ₂ Eq.)
Energy		•									
1.A.3.b CO ₂ Emissions from Mobile Combustion: Road	CO ₂	•	•	•	•	•	•	•	•		1,504.1
1.A.1 CO ₂ Emissions from Stationary Combustion - Coal - Electricity Generation	CO ₂	•	•	•	•	•	•	•	•		1,207.1
1.A.1 CO ₂ Emissions from Stationary Combustion - Gas - Electricity Generation	CO ₂	•	•	•	•	•	•	•	•		505.6
1.A.2 CO ₂ Emissions from Stationary Combustion - Gas - Industrial	CO ₂	•	•	•	•	•	•	•	•		484.7
1.A.2 CO ₂ Emissions from Stationary Combustion - Oil - Industrial	CO ₂	•	•	•	•	•	•	•	•		271.5
1.A.4.b CO ₂ Emissions from Stationary Combustion - Gas - Residential	CO ₂	•		•		•		•			241.5
1.A.3.a CO ₂ Emissions from Mobile Combustion: Aviation	CO ₂	•	•	•	•	•		•			173.2
1.A.4.a CO ₂ Emissions from Stationary Combustion - Gas - Commercial	CO ₂	•	•	•	•	•	•	•			173.2
1.A.5 CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	•		•		•		•			123.2
1.A.3.e CO ₂ Emissions from Mobile Combustion: Other	CO ₂	•	•	•	•						83.0
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Commercial	CO ₂	•	•	•	•						57.7
1.A.2 CO ₂ Emissions from Stationary Combustion - Coal - Industrial	CO ₂	•	•	•	•	•	•	•	•		54.4
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO ₂	•	•	•	•	•	•				53.0
1.A.3.d CO ₂ Emissions from Mobile Combustion: Marine	CO ₂	•	•	•	•						40.3
1.A.5 CO ₂ Emissions from Stationary Combustion - Oil - U.S. Territories	CO ₂	•	•	•	•						34.3
1.B.2 CO ₂ Emissions from Natural Gas Systems	CO ₂	•		•							26.3
1.B.2 CO ₂ Emissions from Petroleum Systems	CO ₂		•		•	•	•		•		23.3
1.A.1 CO ₂ Emissions from Stationary Combustion - Oil - Electricity Generation	CO ₂	•	•	•	•	•	•		•		18.9
1.A.5 CO ₂ Emissions from Stationary Combustion - Gas - U.S. Territories	CO ₂						•				3.0

1.A.4.a CO ₂ Emissions from Stationary Combustion - Coal - Commercial	CO ₂		•		•					2.0
1.A.4.b CO ₂ Emissions from Stationary Combustion - Coal - Residential	CO ₂						•		•	0.0
1.B.2 CH ₄ Emissions from Natural Gas Systems	CH ₄	•	•	•	•	•	•	•	•	165.6
1.B.1 Fugitive Emissions from Coal Mining	CH ₄	•	•	•	•	•	•	•	•	55.7
1.B.2 CH ₄ Emissions from Petroleum Systems	CH₄	•		•		•	•	•		37.7
1.B.2 CH ₄ Emissions from Abandoned Oil and Gas Wells	CH ₄					•		•		6.9
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential	CH ₄					•	•	•	•	3.8
1.A.3.e CH ₄ Emissions from Mobile Combustion: Other	CH ₄						•		•	1.9
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	N ₂ O					•				24.8
1.A.3.b N₂O Emissions from Mobile Combustion: Road	N ₂ O	•	•	•	•		•		•	12.0
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	N ₂ O					•				2.7
Industrial Processes and Product Use										
2.C.1 CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	•	•	•	•	•	•	•	•	41.8
2.A.1 CO ₂ Emissions from Cement Production	CO ₂	•		•	•					40.3
2.B.8 CO ₂ Emissions from Petrochemical Production	CO ₂	•		•	•					28.2
2.B.3 N ₂ O Emissions from Adipic Acid Production	N ₂ O		•		•					7.4
2.F Emissions from Substitutes for Ozone Depleting Substances	HiGWP	•	•	•	•	•	•	•	•	152.7
2.B.9 HFC-23 Emissions from HCFC-22 Production	HiGWP	•	•	•	•		•		•	5.2
2.G.1 SF ₆ Emissions from Electrical Transmission and Distribution	HiGWP	•	•		•		•		•	4.3
2.C.3 PFC Emissions from Aluminum Production	HiGWP		•		•		•			1.1
Agriculture										
3.G CO ₂ Emissions from Liming	CO ₂						•			3.2
3.A CH ₄ Emissions from Enteric Fermentation	CH ₄	•	•	•	•	•		•		175.4

3.B CH ₄ Emissions from Manure Management	CH ₄	•	•	•	•	•	•	•	•		61.7
3.C CH ₄ Emissions from Rice Cultivation	CH ₄					•	•				11.3
3.D.1 Direct N₂O Emissions from Agricultural Soil Management	N ₂ O	•	•	•	•	•	•	•	•		227.7
3.D.2 Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	•		•		•		•			38.8
Waste											
5.A CH ₄ Emissions from Landfills	CH ₄	•	•	•	•	•	•	•	•		107.7
Land Use, Land Use Change, and Forestry	,										
4.E.2 Net CO ₂ Emissions from Land Converted to Settlements	CO ₂			•	•			•	•		86.2
4.B.2 Net CO ₂ Emissions from Land Converted to Cropland	CO ₂			•	•			•	•		66.9
4.C.2 Net CO ₂ Emissions from Land Converted to Grassland	CO ₂							•			8.3
4.B.1 Net CO ₂ Emissions from Cropland Remaining Cropland	CO ₂			•	•			•	•		(10.3)
4.A.2 Net CO ₂ Emissions from Land Converted to Forest Land	CO ₂			•				•			(120.6)
4.E.1 Net CO ₂ Emissions from Settlements Remaining Settlements	CO ₂			•	•			•	•		(134.5)
4.A.1 Net CO ₂ Emissions from Forest Land Remaining Forest Land	CO ₂			•	•			•	•		(621.1)
Subtotal Without LULUCF											6,298.2
Total Emissions Without LULUCF											6,456.7
Percent of Total Without LULUCF											98%
Subtotal With LULUCF									5,528.2		
Total Emissions With LULUCF											5,742.6
Percent of Total With LULUCF											96%

^a Qualitative criteria.

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 2017) in which each source or sink category reached the threshold for being a key category based on either a Tier 1 or Tier 2 level assessment.

In addition to conducting Approach 1 and 2 level and trend assessments, a qualitative assessment of the source categories, as described in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006), was conducted to capture any key categories that were not identified by either quantitative method. For this Inventory, no additional categories were identified using criteria recommend by IPCC, but EPA continues to update its qualitative assessment on an annual basis.

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

	Direct				
	Greenhouse	2017 Emissions	Key	ID	Level in which
CRF Source Categories	Gas	(MMT CO ₂ Eq.)	Category?	Criteria ^a	year(s)?b
Energy					
1.A.3.b CO ₂ Emissions from Mobile Combustion: Road	CO ₂	1,504.1	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
1.A.1 CO ₂ Emissions from Stationary Combustion -	CO_2	1,207.1	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
Coal - Electricity Generation					
1.A.1 CO ₂ Emissions from Stationary Combustion -	CO_2	505.6	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
Gas - Electricity Generation					
1.A.2 CO ₂ Emissions from Stationary Combustion -	CO_2	484.7	•	$L_1 \; T_1 \; L_2 \; T_2$	1990, 2017
Gas - Industrial		0-1-			4000 004-
1.A.2 CO ₂ Emissions from Stationary Combustion - Oil	CO_2	271.5	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
- Industrial	00	044.5			4000 0047
1.A.4.b CO ₂ Emissions from Stationary Combustion -	CO_2	241.5	•	$L_1 L_2$	1990, 2017
Gas - Residential 1.A.3.a CO ₂ Emissions from Mobile Combustion:	CO_2	173.2		L ₁ T ₁ L ₂	1990, 2017
Aviation	CO_2	173.2	•	L1 I1 L2	1990, 2017
1.A.4.a CO ₂ Emissions from Stationary Combustion -	CO_2	173.2	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
Gas - Commercial	002	170.2		L 1 L2 12	1000, 2017
1.A.5 CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	123.2	•	L ₁ L ₂	1990, 2017
1.A.3.e CO ₂ Emissions from Mobile Combustion: Other	CO ₂	83.0	•	L ₁ T ₁	1990 ₁ , 2017 ₁
1.A.4.b CO ₂ Emissions from Stationary Combustion -	CO ₂	57.7		L ₁ T ₁	1990 ₁ , 2017 ₁
Oil - Commercial	002	31.1	·	L1 11	19901, 20171
1.A.2 CO ₂ Emissions from Stationary Combustion -	CO_2	54.4	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
Coal - Industrial	002	01.1		L 1 L2 12	1000, 2017
1.A.4.b CO ₂ Emissions from Stationary Combustion -	CO ₂	53.0	•	L ₁ T ₁ L ₂ T ₂	1990, 2017 ₁
Oil - Residential					,
1.A.3.d CO ₂ Emissions from Mobile Combustion:	CO_2	40.3	•	L ₁ T ₁	1990 ₁ , 2017 ₁
Marine					
1.A.5 CO ₂ Emissions from Stationary Combustion - Oil	CO_2	34.3	•	$L_1 T_1$	1990 ₁ , 2017 ₁
- U.S. Territories					
1.B.2 CO ₂ Emissions from Natural Gas Systems	CO_2	26.3	•	L ₁	19901
1.B.2 CO ₂ Emissions from Petroleum Systems	CO ₂	23.3	•	$T_1 L_2 T_2$	20172
1.A.1 CO ₂ Emissions from Stationary Combustion - Oil	CO_2	18.9	•	L ₁ T ₁ L ₂ T ₂	1990
- Electricity Generation					
1.A.5 CO ₂ Emissions from Incineration of Waste	CO_2	10.8			
1.A.5 CO ₂ Emissions from Stationary Combustion -	CO ₂	4.0			
Coal - U.S. Territories					
1.A.5 CO ₂ Emissions from Stationary Combustion -	CO ₂	3.0	•	T ₂	
Gas - U.S. Territories				_	
1.A.4.a CO ₂ Emissions from Stationary Combustion -	CO_2	2.0	•	T ₁	
Coal - Commercial	00	0.4			
1.A.1 CO ₂ Emissions from Stationary Combustion -	CO ₂	0.4			
Geothermal Energy 1.B.2 CO ₂ Emissions from Abandoned Oil and Gas	CO_2	,i			
Wells	UU2	+			
AAGIIO					

1.A.4.b CO ₂ Emissions from Stationary Combustion - Coal - Residential	CO ₂	0.0	•	T ₂	
1.B.2 CH ₄ Emissions from Natural Gas Systems	CH ₄	165.6	•	$L_1 T_1 L_2 T_2$	1990, 2017
1.B.1 Fugitive Emissions from Coal Mining	CH ₄	55.7	•	$L_1 T_1 L_2 T_2$	1990, 2017
1.B.2 CH ₄ Emissions from Petroleum Systems	CH ₄	37.7	•	$L_1 L_2 T_2$	1990, 2017
1.B.2 CH ₄ Emissions from Abandoned Oil and Gas	CH ₄	6.9	•	L ₂	1990 ₂ , 2017 ₂
Wells	O1 14	0.0		L 2	10002, 20112
1.B.1 Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	6.4			
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential	CH ₄	3.8	•	L ₂ T ₂	19902, 20172
1.A.3.e CH ₄ Emissions from Mobile Combustion: Other	CH ₄	1.9	•	T_2	
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	CH ₄	1.6			
1.A.4.a Non-CO₂ Emissions from Stationary Combustion - Commercial	CH ₄	1.2			
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	CH ₄	1.1			
1.A.3.b CH ₄ Emissions from Mobile Combustion: Road	CH ₄	1.0			
1.A.3.d CH ₄ Emissions from Mobile Combustion:	CH ₄	0.3			
Marine					
1.A.5 Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	CH ₄	0.1			
1.A.3.a CH ₄ Emissions from Mobile Combustion: Aviation	CH ₄	+			
1.A.5 CH ₄ Emissions from Incineration of Waste	CH ₄	+			
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	N_2O	24.8	•	L_2	1990 ₂ , 2017 ₂
1.A.3.b N₂O Emissions from Mobile Combustion: Road	N_2O	12.0	•	$L_1 T_1 T_2$	1990₁
1.A.3.e N ₂ O Emissions from Mobile Combustion: Other	N_2O	2.7			
1.A.2 Non- CO ₂ Emissions from Stationary Combustion Industrial	N_2O	2.7	•	L_2	19902
1.3.A.a N ₂ O Emissions from Mobile Combustion: Aviation	N_2O	1.6			
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential	N_2O	0.8			
1.A.3.d N₂O Emissions from Mobile Combustion: Marine	N_2O	0.5			
1.A.4.a Non-CO ₂ Emissions from Stationary Combustion - Commercial	N_2O	0.3			
1.A.5 N₂O Emissions from Incineration of Waste	N_2O	0.3			
1.A.5 Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	N_2O	0.1			
1.B.2 N₂O Emissions from Petroleum Systems	N_2O	+			
1.B.2 N ₂ O Emissions from Natural Gas Systems	N_2O	+			
1.D.1 International Bunker Fuels	Several	121.2			
Industrial Processes and Product Use					
2.C.1 CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	41.8	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
2.A.1 CO2 Emissions from Cement Production	CO_2	40.3	•	L ₁	19901, 20171
2.B.8 CO ₂ Emissions from Petrochemical Production	CO ₂	28.2	•	L ₁ T ₁	2017 ₁
· · · · ·	CO ₂	13.2		E(I I	20111
2.B.1 CO ₂ Emissions from Ammonia Production	CO ₂	13.2			
2.A.2 CO ₂ Emissions from Lime Production					
2.A.4 CO ₂ Emissions from Other Process Uses of Carbonates	CO ₂	10.1			
2.B.10 CO ₂ Emissions from Urea Consumption for Non-Ag Purposes	CO ₂	5.0			
2.B.10 CO ₂ Emissions from Carbon Dioxide Consumption	CO ₂	4.5			

2.C.2 CO ₂ Emissions from Ferroalloy Production	CO_2	2.0			
2.B.7 CO ₂ Emissions from Soda Ash Production	CO_2	1.8			
2.B.6 CO ₂ Emissions from Titanium Dioxide Production	CO_2	1.7			
2.A.3 CO ₂ Emissions from Glass Production	CO_2	1.3			
2.C.3 CO ₂ Emissions from Aluminum Production	CO_2	1.2			
2.B.10 CO ₂ Emissions from Phosphoric Acid	CO_2	1.0			
Production					
2.C.6 CO ₂ Emissions from Zinc Production	CO_2	1.0			
2.C.5 CO ₂ Emissions from Lead Production	CO ₂	0.5			
2.B.5 CO ₂ Emissions from Silicon Carbide Production	CO_2	0.2			
and Consumption	_				
2.C.4 CO ₂ Emissions from Magnesium Production and	CO_2	+			
Processing					
2.B.8 CH ₄ Emissions from Petrochemical Production	CH₄	0.3			
2.C.2 CH ₄ Emissions from Ferroalloy Production	CH ₄	+			
2.B.5 CH ₄ Emissions from Silicon Carbide Production	CH ₄	+			
and Consumption					
2.C.1 CH ₄ Emissions from Iron and Steel Production &	CH ₄	+			
Metallurgical Coke Production					
2.B.2 N ₂ O Emissions from Nitric Acid Production	N ₂ O	9.3			
2.B.3 N ₂ O Emissions from Adipic Acid Production	N_2O	7.4	•	T ₁	
2.G.3 N ₂ O Emissions from Product Uses	N_2O	4.2			
2.B.4 N ₂ O Emissions from Caprolactam, Glyoxal, and	N_2O	1.4			
Glyoxylic Acid Production					
2.H.1 N ₂ O Emissions from Semiconductor Manufacture	N_2O	0.2			
2.F Emissions from Substitutes for Ozone Depleting	HiGWP	152.7	•	$L_1 T_1 L_2 T_2$	2017
Substances		_			
2.B.9 HFC-23 Emissions from HCFC-22 Production	HiGWP	5.2	•	L ₁ T ₁ T ₂	1990₁
2.E PFC, HFC, SF ₆ , and NF ₃ Emissions from	HiGWP	4.7			
Semiconductor Manufacture	I I:OM/D	4.0			1000
2.G.1 SF ₆ Emissions from Electrical Transmission and	HiGWP	4.3	•	L ₁ T ₁ T ₂	1990₁
Distribution	HiGWP	1.1		T ₁ T ₂	
2.C.3 PFC Emissions from Aluminum Production			•	11 12	
2.C.4 SF ₆ Emissions from Magnesium Production and Processing	HiGWP	1.1			
2.C.4 HFC-134a Emissions from Magnesium	HiGWP	0.1			
Production and Processing	TIIOVVI	0.1			
Agriculture					
3.H CO ₂ Emissions from Urea Fertilization	CO ₂	5.1			
	CO ₂	3.2	•	T_2	
3.G CO ₂ Emissions from Liming	CH ₄	175.4		L ₁ T ₁ L ₂	1990, 2017
3.A CH ₄ Emissions from Enteric Fermentation	CH ₄	61.7			
3.B CH ₄ Emissions from Manure Management			•	L ₁ T ₁ L ₂ T ₂	1990, 2017
3.C CH ₄ Emissions from Rice Cultivation	CH ₄	11.3	•	$L_2 T_2$	1990 ₂
3.F CH ₄ Emissions from Field Burning of Agricultural	CH₄	0.2			
Residues	N.O	227.7	_		1990, 2017
3.D.1 Direct N ₂ O Emissions from Agricultural Soil	N ₂ O	227.7	•	$L_1 T_1 L_2 T_2$	1990, 2017
Management	N_2O	38.8	•	L ₁ L ₂	1990, 2017
3.D.2 Indirect N₂O Emissions from Applied Nitrogen	N ₂ O	18.7		L L2	1000, 2011
3.B N ₂ O Emissions from Manure Management					
3.F N ₂ O Emissions from Field Burning of Agricultural Residues	N_2O	0.1			
Waste	CH ₄	107.7	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
5.A CH ₄ Emissions from Landfills 5.D CH ₄ Emissions from Wastewater Treatment	CH ₄	14.2	-	L1 11 L2 12	1000, 2017
	CH ₄	2.2			
5.B CH ₄ Emissions from Composting	N ₂ O	5.0			
5.D N ₂ O Emissions from Wastewater Treatment					
5.B N ₂ O Emissions from Composting	N ₂ O	1.9			

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

	Direct				
CRF Source/Sink Categories	Greenhouse Gas	2017 Emissions (MMT CO ₂ Eq.)	Key Category?	ID Criteriaª	Level in which year(s)? ^b
Energy	Ous	(181111 002 Eq.)	Outegory :	Officia	year(3):
1.A.3.b CO ₂ Emissions from Mobile Combustion:	CO ₂	1,504.1	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
Road		,			, ,
1.A.1 CO ₂ Emissions from Stationary Combustion - Coal - Electricity Generation	CO ₂	1,207.1	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
1.A.1 CO ₂ Emissions from Stationary Combustion - Gas - Electricity Generation	CO ₂	505.6	•	L ₁ T ₁ L ₂ T ₂	19901, 2017
1.A.2 CO ₂ Emissions from Stationary Combustion - Gas - Industrial	CO ₂	484.7	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
1.A.2 CO ₂ Emissions from Stationary Combustion - Oil - Industrial	CO ₂	271.5	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
1.A.4.b CO ₂ Emissions from Stationary Combustion - Gas - Residential	CO ₂	241.5	•	L ₁ L ₂	1990, 2017
1.A.3.a CO ₂ Emissions from Mobile Combustion: Aviation	CO ₂	173.2	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
1.A.4.a CO ₂ Emissions from Stationary Combustion - Gas - Commercial	CO ₂	173.2	•	L ₁ T ₁ L ₂ T ₂	19901, 2017
1.A.5 CO ₂ Emissions from Non-Energy Use of Fuels	CO_2	123.2	•	L ₁ L ₂	1990, 2017
1.A.3.e CO ₂ Emissions from Mobile Combustion: Other	CO ₂	83.0	•	L ₁ T ₁	19901, 20171
1.A.4.b CO ₂ Emissions from Stationary Combustion Oil - Commercial	CO ₂	57.7	•	$L_1 T_1$	1990 ₁ , 2017 ₁
1.A.2 CO ₂ Emissions from Stationary Combustion - Coal - Industrial	CO ₂	54.4	•	$L_1 \; T_1 \; L_2 \; T_2$	1990, 2017 ₁
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO ₂	53.0	•	L ₁ T ₁	1990 ₁ , 2017 ₁
1.A.3.d CO ₂ Emissions from Mobile Combustion: Marine	CO ₂	40.3	•	L ₁ T ₁	1990 ₁ , 2017 ₁
1.A.5 CO ₂ Emissions from Stationary Combustion - Oil - U.S. Territories	CO ₂	34.3	•	L ₁ T ₁	1990 ₁ , 2017 ₁
1.B.2 CO ₂ Emissions from Natural Gas Systems	CO_2	26.3	•	L_1	1990 ₁
1.B.2 CO ₂ Emissions from Petroleum Systems	CO_2	23.3	•	T_1T_2	
1.A.1 CO ₂ Emissions from Stationary Combustion - Oil - Electricity Generation	CO ₂	18.9	•	$L_1T_1T_2$	1990 ₁
1.A.5 CO ₂ Emissions from Incineration of Waste	CO_2	10.8			
CO ₂ Emissions from Stationary Combustion - Coal - U.S. Territories	CO ₂	4.0			
1.A.5 CO ₂ Emissions from Stationary Combustion - Gas - U.S. Territories	CO ₂	3.0			
1.A.4.a CO ₂ Emissions from Stationary Combustion - Coal - Commercial	CO ₂	2.0	•	T ₁	
1.A.1 CO ₂ Emissions from Stationary Combustion - Geothermal Energy	CO ₂	0.4			
1.B.2 CO ₂ Emissions from Abandoned Oil and Gas Wells	CO ₂	+			
1.A.4.b CO ₂ Emissions from Stationary Combustion - Coal - Residential	CO ₂	0.0	•	T ₂	

⁺ Does not exceed 0.05 MMT CO₂ Eq.

^a For the ID criteria, Q refers to "Qualitative", 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 an Approach 1 or Approach 2 assessment (e.g., L₂ designates a source is a key category for an Approach 2 level assessment).

^b If the source is a key category for both L₁ and L₂ (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., 1990₂ designates a source is a key category for the Approach 2 assessment only in 1990).

^o Emissions from these sources not included in emission totals.

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

1.B.2 CH ₄ Emissions from Natural Gas Systems	CH ₄	165.6	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
1.B.1 Fugitive Emissions from Coal Mining	CH₄	55.7	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
1.B.2 CH ₄ Emissions from Petroleum Systems	CH₄	37.7	•	L ₁ L ₂	1990, 2017
1.B.2 CH ₄ Emissions from Abandoned Oil and Gas Wells	CH₄	6.9	•	L ₂	1990 ₂ , 2017 ₂
1.B.1 Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	6.4			
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential	CH ₄	3.8	•	L ₂ T ₂	19902
1.A.3.e CH ₄ Emissions from Mobile Combustion: Other	CH ₄	1.9	•	T ₂	
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	CH ₄	1.6			
Non- CO ₂ Emissions from Stationary Combustion - Commercial	CH ₄	1.2			
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	CH ₄	1.1			
1.A.3.b CH ₄ Emissions from Mobile Combustion: Road	CH ₄	1.0			
1.A.3.d CH ₄ Emissions from Mobile Combustion: Marine	CH ₄	0.3			
1.A.5 Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	CH ₄	0.1			
1.A.3.a CH ₄ Emissions from Mobile Combustion: Aviation	CH ₄	+			
1.A.5 CH ₄ Emissions from Incineration of Waste	CH ₄	+			
1.A.1 Non-CO ₂ Emissions from Stationary	N_2O	24.8			
Combustion - Electricity Generation 1.A.3.b N₂O Emissions from Mobile Combustion: Road	N ₂ O	12.0	•	L ₁ T ₁ T ₂	1990 ₁
1.A.3.e N₂O Emissions from Mobile Combustion: Other	N ₂ O	2.7			
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	N ₂ O	2.7			
1.3.A.a № C Emissions from Mobile Combustion: Aviation	N ₂ O	1.6			
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential	N ₂ O	0.8			
1.A.3.d N₂O Emissions from Mobile Combustion: Marine	N ₂ O	0.5			
1.A.4.a Non-CO ₂ Emissions from Stationary Combustion - Commercial	N ₂ O	0.3			
1.A.5 N₂O Emissions from Incineration of Waste	N_2O	0.3			
1.A.5 Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	N ₂ O	0.1			
1.B.2 N₂O Emissions from Petroleum Systems	N ₂ O	+			
1.B.2 N₂O Emissions from Natural Gas Systems	N ₂ O	+			
1.D.1 International Bunker Fuels ^c	Several	121.2			
Industrial Processes					
2.C.1 CO₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	41.8	•	L ₁ T ₁ L ₂ T ₂	1990, 2017 ₁
2.A.1 CO ₂ Emissions from Cement Production	CO ₂	40.3	•	L ₁ T ₁	1990 ₁ , 2017 ₁
2.B.8 CO ₂ Emissions from Petrochemical Production	CO ₂	28.2	•	L ₁ T ₁	2017 ₁
2.B.1 CO ₂ Emissions from Ammonia Production	CO ₂	13.2			
2.A.2 CO ₂ Emissions from Lime Production	CO ₂	13.1			
2.A.4 CO ₂ Emissions from Other Process Uses of Carbonates	CO ₂	10.1			
2.B.10 CO ₂ Emissions from Urea Consumption for Non-Ag Purposes	CO ₂	5.0			

2.B.10 CO ₂ Emissions from Carbon Dioxide Consumption	CO ₂	4.5			
2.C.2 CO ₂ Emissions from Ferroalloy Production	CO_2	2.0			
2.B.7 CO ₂ Emissions from Soda Ash Production	CO_2	1.8			
2.B.6 CO ₂ Emissions from Titanium Dioxide Production	CO ₂	1.7			
2.A.3 CO ₂ Emissions from Glass Production	CO_2	1.3			
2.C.3 CO ₂ Emissions from Aluminum Production	CO ₂	1.2			
2.B.10 CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.0			
2.C.6 CO ₂ Emissions from Zinc Production	CO ₂	1.0			
2.C.5 CO ₂ Emissions from Lead Production	CO_2	0.5			
2.B.5 CO ₂ Emissions from Silicon Carbide Production and Consumption	CO ₂	0.2			
2.C.4 CO ₂ Emissions from Magnesium Production and Processing	CO ₂	+			
2.B.8 CH ₄ Emissions from Petrochemical Production	CH ₄	0.3			
2.C.2 CH ₄ Emissions from Ferroalloy Production	CH ₄	+			
2.B.5 CH ₄ Emissions from Silicon Carbide Production and Consumption	CH ₄	+			
2.C.1 CH ₄ Emissions from Iron and Steel Production	CH ₄	+			
& Metallurgical Coke Production	N ₂ O	9.3			
2.B.2 N ₂ O Emissions from Nitric Acid Production	N ₂ O	7.4	•	T ₁	
2.B.3 N ₂ O Emissions from Adipic Acid Production	N ₂ O	4.2		11	
2.G.3 N₂O Emissions from Product Uses 2.B.4 N₂O Emissions from Caprolactam, Glyoxal,	N ₂ O	1.4			
and Glyoxylic Acid Production	1420	1.4			
2.H.1 N ₂ O Emissions from Semiconductor Manufacture	N_2O	0.2			
Emissions from Substitutes for Ozone Depleting Substances	HiGWP	152.7	•	L ₁ T ₁ L ₂ T ₂	2017
2.B.9 HFC-23 Emissions from HCFC-22 Production	HiGWP	5.2	•	L ₁ T ₁ T ₂	1990 ₁
2.E PFC, HFC, SF ₆ , and NF ₃ Emissions from Semiconductor Manufacture	HiGWP	4.7		· · -	
2.G.1 SF ₆ Emissions from Electrical Transmission and Distribution	HiGWP	4.3	•	T_1T_2	
2.C.3 PFC Emissions from Aluminum Production	HiGWP	1.1	•	T ₁	
2.C.4 SF ₆ Emissions from Magnesium Production	HiGWP	1.1		.,	
and Processing	•				
2.C.4 HFC-134a Emissions from Magnesium Production and Processing	HiGWP	0.1			
Agriculture					
3.H CO ₂ Emissions from Urea Fertilization	CO ₂	5.1			
3.G CO ₂ Emissions from Liming	CO ₂	3.2			
3.A CH ₄ Emissions from Enteric Fermentation	CH ₄	175.4	•	L ₁ T ₁ L ₂	1990, 2017
3.B CH ₄ Emissions from Manure Management	CH ₄	61.7	•	L ₁ T ₁ L ₂ T ₂	1990 ₁ , 2017
3.C CH ₄ Emissions from Rice Cultivation	CH ₄	11.3			,
3.F CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.2			
3.D.1 Direct N ₂ O Emissions from Agricultural Soil Management	N_2O	227.7	•	$L_1 \; T_1 \; L_2 \; T_2$	1990, 2017
3.D.2 Indirect N ₂ O Emissions from Applied Nitrogen	N_2O	38.8	•	L ₁ L ₂	1990, 2017
3.B N ₂ O Emissions from Manure Management	N ₂ O	18.7			, -
3.F N ₂ O Emissions from Field Burning of Agricultural	N ₂ O	0.1			
Residues					
Waste					
5.A CH ₄ Emissions from Landfills	CH ₄	107.7	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
5.D CH ₄ Emissions from Wastewater Treatment	CH ₄	14.2			

5.B CH ₄ Emissions from Composting	CH ₄	2.2			
5.D N ₂ O Emissions from Wastewater Treatment	N_2O	5.0			
5.B N ₂ O Emissions from Composting	N_2O	1.9			
Land Use, Land Use Change, and Forestry					-
4.E.2 Net CO ₂ Emissions from Land Converted to	CO ₂	86.2	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
Settlements					
4.B.2 Net CO ₂ Emissions from Land Converted to	CO ₂	66.9	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
Cropland	00	0.0			1000 0017
4.C.2 Net CO ₂ Emissions from Land Converted to	CO_2	8.3	•	L_2	1990 ₂ , 2017 ₂
Grassland 4.D.2 Net CO ₂ Emissions from Land Converted to	CO ₂	(0.0)			
Wetlands	CO_2	(0.0)			
4.C.1 Net CO ₂ Emissions from Grassland Remaining	CO ₂	(0.1)			
Grassland ^d	332	(0.1)			
4.D.1 Net CO ₂ Emissions from Coastal Wetlands	CO ₂	(4.4)			
Remaining Coastal Wetlands		,			
4.B.1 Net CO ₂ Emissions from Cropland Remaining	CO ₂	(10.3)	•	$L_1 T_1 L_2 T_2$	1990, 20172
Cropland					
4.A.2 Net CO ₂ Emissions from Land Converted to	CO ₂	(120.6)	•	L ₁ L ₂	1990, 2017
Forest Land	00	(40.4.5)			1000 0017
4.E.1 Net CO ₂ Emissions from Settlements Remaining Settlements	CO ₂	(134.5)	•	L ₁ T ₁ L ₂ T ₂	1990, 2017
4.A.1 Net CO ₂ Emissions from Forest Land	CO ₂	(621.1)		L ₁ T ₁ L ₂ T ₂	1990, 2017
Remaining Forest Land	002	(021.1)		L 1 L2 12	1550, 2017
4.A.1 CH ₄ Emissions from Forest Fires	CH ₄	4.9			
4.D.4 CH ₄ Emissions from Coastal Wetlands	CH ₄	3.6			
Remaining Coastal Wetlands	J	0.0			
4.C.1 CH ₄ Emissions from Grass Fires	CH ₄	0.3			
4.D.4 CH ₄ Emissions from Land Converted to	CH ₄	+			
Coastal Wetlands					
4.A.4 CH ₄ Emissions from Drained Organic Soils	CH ₄	+			
4.D.4 CH ₄ Emissions from Peatlands Remaining	CH ₄	+			
Peatlands					
4.A.1 N₂O Emissions from Forest Fires	N ₂ O	3.2			
4.E.1 N ₂ O Emissions from Settlement Soils	N_2O	2.5			
4.A.1 N ₂ O Emissions from Forest Soils	N_2O	0.5			
4.C.1 N ₂ O Emissions from Grass Fires	N_2O	0.3			
4.D.1 N ₂ O Emissions from Coastal Wetlands	N_2O	0.1			
Remaining Coastal Wetlands					
4.A.4 N ₂ O Emissions from Drained Organic Soils	N_2O	0.1			
4.D.4 N ₂ O Emissions from Peatlands Remaining	N_2O	+			
Peatlands					_

⁺ Does not exceed 0.05 MMT CO₂ Eq.

Evaluation of Key Categories

Level Assessment

When using an Approach 1 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 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006) was designed to establish a general level where the key category analysis covers approximately 75 to 92 percent of inventory uncertainty.

^a For the ID criteria, Q refers to "Qualitative," 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 an Approach 1 or Approach 2 assessment (e.g., L₂ designates a source is a key category for an Approach 2 level assessment).

^b If the source is a key category for both L₁ and L₂ (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., 1990₂ designates a source is a key category for the Approach 2 assessment only in 1990).

^c Emissions from these sources not included in emission totals.

^d This source category was excluded from the analysis.

Note: Parentheses indicate negative values (or sequestration).

Including the Approach 2 provides additional insight into why certain source categories are considered key, and how to prioritize inventory improvements. In the Approach 2, the level assessment for each category from the Approach 1 is multiplied by its percent relative uncertainty. If the uncertainty reported is asymmetrical, the absolute value of the larger uncertainty is used. 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 emission estimate. No uncertainty was associated with CH₄ emissions from waste incineration because emissions are less than 0.05 kt 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 Approach 2 level assessment may differ from those identified by the Approach 1 assessment. The final set of key categories includes all source and sink categories identified as key by either the Approach 1 or the Approach 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 or sink 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 or sink category. The United States has attempted to define source and sink categories by the conventions that 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 2017 level assessments for both with and without LULUCF sources and sinks, and contain further detail on where each source falls within the analysis. Approach 1 key categories are shaded dark gray. Additional key categories identified by the Approach 2 assessment are shaded light gray.

Trend Assessment

Approach 1 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 Approach 2, the trend assessment for each category from Approach 1 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 Approach 2 trend assessment may differ from those identified by the Approach 1 assessment. The final set of key categories includes all source and sink categories identified as key by either the Approach 1 or the Approach 2 assessment, keeping in mind that the two assessments are not mutually exclusive.

Table A-8 and Table A-9 contain the 1990 through 2017 trend assessment for both with and without LULUCF sources and sinks, and contain further detail on where each source falls within the analysis. Approach 1 key categories are shaded dark gray. Additional key categories identified by the Approach 2 assessment are shaded light gray.

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

	Direct		Approach 1			Approach 2
	Greenhouse	1990 Estimate	Level	Cumulative		Level
CRF Source Categories	Gas	(MMT CO ₂ Eq.)	Assessment	Total	Uncertainty ^a	Assessment
1.A.1 CO ₂ Emissions from Stationary Combustion - Coal - Electricity Generation	CO ₂	1,546.5	0.24	0.24	10%	0.023

1.A.3.b CO ₂ Emissions from Mobile	CO ₂	1,162.2	0.18	0.43	6%	0.011
Combustion: Road 1.A.2 CO ₂ Emissions from Stationary	CO ₂	408.5	0.06	0.49	7%	0.005
Combustion - Gas - Industrial 1.A.2 CO ₂ Emissions from Stationary	CO ₂	293.7	0.05	0.54	21%	0.010
Combustion - Oil - Industrial 1.A.4.b CO ₂ Emissions from Stationary	CO ₂	237.8	0.04	0.57	7%	0.003
Combustion - Gas - Residential 3.D.1 Direct № Emissions from Agricultural	N ₂ O	212.7	0.03	0.61	19%	0.006
Soil Management 1.B.2 CH ₄ Emissions from Natural Gas	CH ₄	193.1	0.03	0.64	17%	0.005
Systems 1.A.3.a CO ₂ Emissions from Mobile	CO ₂	187.4	0.03	0.67	6%	0.002
Combustion: Aviation 5.A CH ₄ Emissions from Landfills	CH ₄	179.6	0.03	0.69	40%	0.011
1.A.1 CO ₂ Emissions from Stationary Combustion - Gas - Electricity Generation	CO ₂	175.4	0.03	0.72	5%	0.001
3.A CH ₄ Emissions from Enteric Fermentation	CH ₄	164.2	0.03	0.75	18%	0.005
1.A.2 CO ₂ Emissions from Stationary Combustion - Coal - Industrial	CO ₂	155.2	0.02	0.77	16%	0.004
1.A.4.a CO ₂ Emissions from Stationary Combustion - Gas - Commercial	CO ₂	142.0	0.02	0.79	7%	0.002
1.A.5 CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	119.6	0.02	0.81	37%	0.007
2.C.1 CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	101.6	0.02	0.83	18%	0.003
1.A.1 CO ₂ Emissions from Stationary Combustion - Oil - Electricity Generation	CO ₂	97.5	0.02	0.84	9%	0.001
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO ₂	97.4	0.02	0.86	6%	0.001
1.B.1 Fugitive Emissions from Coal Mining	CH ₄	96.5	0.02	0.87	19%	0.003
1.A.3.e CO ₂ Emissions from Mobile Combustion: Other	CO ₂	73.2	0.01	0.89	6%	0.001
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Commercial	CO ₂	72.6	0.01	0.90	6%	0.001
1.A.3.d CO ₂ Emissions from Mobile Combustion: Marine	CO ₂	46.3	0.01	0.90	6%	<0.001
2.B.9 HFC-23 Emissions from HCFC-22 Production	HFCs	46.1	0.01	0.91	10%	0.001
1.B.2 CH ₄ Emissions from Petroleum Systems	CH ₄	42.1	0.01	0.92	34%	0.002
3.D.2 Indirect N₂O Emissions from Applied Nitrogen	N ₂ O	39.0	0.01	0.92	144%	0.009
1.A.3.b N₂O Emissions from Mobile Combustion: Road	N ₂ O	37.6	0.01	0.93	14%	0.001
3.B CH ₄ Emissions from Manure Management	CH ₄	37.1	0.01	0.94	20%	0.001
2.A.1 CO ₂ Emissions from Cement Production	CO ₂	33.5	0.01	0.94	6%	<0.001
1.B.2 CO ₂ Emissions from Natural Gas Systems	CO ₂	30.0	<0.01	0.95	17%	0.001
1.A.5 CO ₂ Emissions from Stationary Combustion - Oil - U.S. Territories	CO ₂	26.9	<0.01	0.95	11%	<0.001
2.G.1 SF ₆ Emissions from Electrical Transmission and Distribution	SF ₆	23.1	<0.01	0.95	17%	0.001
2.C.3 PFC Emissions from Aluminum Production	PFCs	21.5	<0.01	0.96	9%	<0.001
2.B.8 CO ₂ Emissions from Petrochemical Production	CO ₂	21.2	<0.01	0.96	5%	<0.001
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	N ₂ O	20.5	<0.01	0.96	42%	0.001
3.C CH ₄ Emissions from Rice Cultivation	CH ₄	16.0	<0.01	0.97	49%	0.001
5.D CH ₄ Emissions from Wastewater Treatment	CH₄	15.3	<0.01	0.97	28%	0.001

2.B.3 N ₂ O Emissions from Adipic Acid Production	N_2O	15.2	<0.01	0.97	5%	<0.001
3.B N₂O Emissions from Manure Management	N_2O	14.0	< 0.01	0.97	24%	0.001
2.B.1 CO ₂ Emissions from Ammonia	CO ₂	13.0	<0.01	0.98	5%	< 0.001
Production 2.B.2 N ₂ O Emissions from Nitric Acid	N ₂ O	12.1	<0.01	0.98	5%	<0.001
Production 1.A.4.a CO ₂ Emissions from Stationary	CO ₂	12.0	<0.01	0.98	15%	<0.001
Combustion - Coal - Commercial	002	12.0	١٠.٥١	0.50		10.001
2.A.2 CO ₂ Emissions from Lime Production	CO_2	11.7	<0.01	0.98	2%	<0.001
1.B.2 CO ₂ Emissions from Petroleum Systems	CO_2	9.0	<0.01	0.98	34%	< 0.001
1.A.5 CO ₂ Emissions from Incineration of	CO ₂	8.0	< 0.01	0.98	15%	< 0.001
Waste						
1.B.1 Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	7.2	<0.01	0.98	21%	<0.001
1.A.3.e CH ₄ Emissions from Mobile Combustion: Other	CH ₄	7.1	<0.01	0.99	52%	0.001
2.C.3 CO ₂ Emissions from Aluminum Production	CO ₂	6.8	<0.01	0.99	3%	<0.001
1.B.2 CH ₄ Emissions from Abandoned Oil and	CH ₄	6.6	<0.01	0.99	215%	0.002
Gas Wells						
2.A.4 CO ₂ Emissions from Other Process Uses of Carbonates	CO ₂	6.3	<0.01	0.99	15%	<0.001
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential	CH ₄	5.2	<0.01	0.99	231%	0.002
1.A.3.b CH ₄ Emissions from Mobile	CH ₄	5.2	<0.01	0.99	27%	<0.001
Combustion: Road 2.C.4 SF ₆ Emissions from Magnesium Production and Processing	SF ₆	5.2	<0.01	0.99	10%	<0.001
3.G CO ₂ Emissions from Liming	CO ₂	4.7	<0.01	0.99	111%	0.001
2.G.3 N ₂ O Emissions from Product Uses	N ₂ O	4.2	<0.01	0.99	24%	<0.001
2.B.10 CO ₂ Emissions from Urea Consumption	CO ₂	3.8	<0.01	0.99	12%	<0.001
for Non-Ag Purposes	332			0.00		
2.E PFC, HFC, SF ₆ , and NF ₃ Emissions from Semiconductor Manufacture	Several	3.6	<0.01	0.99	6%	<0.001
5.D N ₂ O Emissions from Wastewater Treatment	N ₂ O	3.4	<0.01	0.99	108%	0.001
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	N ₂ O	3.1	<0.01	1.00	199%	0.001
1.A.4.b CO₂ Emissions from Stationary Combustion - Coal - Residential	CO ₂	3.0	<0.01	1.00	NE	<0.001
3.H CO ₂ Emissions from Urea Fertilization	CO ₂	2.4	<0.01	1.00	43%	<0.001
2.C.2 CO ₂ Emissions from Ferroalloy	CO ₂	2.2	<0.01	1.00	12%	<0.001
Production						
1.A.3.e N ₂ O Emissions from Mobile Combustion: Other	N ₂ O	2.1	<0.01	1.00	61%	<0.001
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	CH ₄	1.8	<0.01	1.00	48%	<0.001
1.3.A.a N₂O Emissions from Mobile Combustion: Aviation	N_2O	1.7	<0.01	1.00	66%	<0.001
2.B.4 N₂O Emissions from Caprolactam, Glyoxal, and Glyoxylic Acid Production	N ₂ O	1.7	<0.01	1.00	32%	<0.001
2.A.3 CO ₂ Emissions from Glass Production	CO_2	1.5	<0.01	1.00	5%	<0.001
2.B.10 CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.5	<0.01	1.00	21%	<0.001
2.B.10 CO ₂ Emissions from Carbon Dioxide	CO ₂	1.5	<0.01	1.00	5%	<0.001
Consumption 2.B.7 CO ₂ Emissions from Soda Ash	CO ₂	1.4	<0.01	1.00	9%	<0.001
Production 2.B.6 CO ₂ Emissions from Titanium Dioxide	CO ₂	1.2	<0.01	1.00	13%	<0.001
Production	OO2	1.2	\U.U1	1.00	1370	~ U.UU1

1.A.4.a Non-CO₂ Emissions from Stationary Combustion - Commercial	CH ₄	1.1	<0.01	1.00	146%	<0.001
1.A.4.b Non-CO₂ Emissions from Stationary Combustion - Residential	N_2O	1.0	<0.01	1.00	218%	<0.001
1.A.5 CO ₂ Emissions from Stationary Combustion - Coal - U.S. Territories	CO ₂	0.6	<0.01	1.00	19%	<0.001
2.C.6 CO ₂ Emissions from Zinc Production	CO ₂	0.6	<0.01	1.00	16%	< 0.001
1.A.3.d N ₂ O Emissions from Mobile Combustion: Marine	N_2O	0.6	<0.01	1.00	44%	<0.001
1.A.3.d CH ₄ Emissions from Mobile Combustion: Marine	CH ₄	0.6	<0.01	1.00	85%	<0.001
1.A.1 CO ₂ Emissions from Stationary Combustion - Geothermal Energy	CO ₂	0.5	<0.01	1.00	NA	<0.001
2.C.5 CO ₂ Emissions from Lead Production	CO_2	0.5	< 0.01	1.00	15%	< 0.001
1.A.5 N ₂ O Emissions from Incineration of Waste	N_2O	0.5	<0.01	1.00	301%	<0.001
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	CH ₄	0.4	<0.01	1.00	3%	<0.001
1.A.4.a Non-CO ₂ Emissions from Stationary Combustion - Commercial	N_2O	0.4	<0.01	1.00	177%	<0.001
5.B CH ₄ Emissions from Composting	CH ₄	0.4	<0.01	1.00	50%	< 0.001
2.B.5 CO ₂ Emissions from Silicon Carbide Production and Consumption	CO_2	0.4	<0.01	1.00	9%	<0.001
5.B N ₂ O Emissions from Composting	N_2O	0.3	< 0.01	1.00	50%	< 0.001
Emissions from Substitutes for Ozone Depleting Substances	Several	0.3	<0.01	1.00	12%	<0.001
2.B.8 CH ₄ Emissions from Petrochemical Production	CH ₄	0.2	<0.01	1.00	57%	<0.001
3.F CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.1	<0.01	1.00	51%	<0.001
1.A.5 Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	N_2O	0.1	<0.01	1.00	197%	<0.001
1.A.3.a CH ₄ Emissions from Mobile Combustion: Aviation	CH ₄	0.1	<0.01	1.00	87%	<0.001
1.A.5 Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	CH ₄	+	<0.01	1.00	55%	<0.001
3.F N ₂ O Emissions from Field Burning of Agricultural Residues	N ₂ O	+	<0.01	1.00	47%	<0.001
2.H.1 N₂O Emissions from Semiconductor Manufacture	N_2O	+	<0.01	1.00	12%	<0.001
2.B.5 CH ₄ Emissions from Silicon Carbide Production and Consumption	CH ₄	+	<0.01	1.00	8%	<0.001
2.C.1 CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	CH ₄	+	<0.01	1.00	19%	<0.001
2.C.2 CH ₄ Emissions from Ferroalloy Production	CH ₄	+	<0.01	1.00	12%	<0.001
1.B.2 N ₂ O Emissions from Petroleum Systems	N_2O	+	< 0.01	1.00	34%	< 0.001
1.B.2 CO ₂ Emissions from Abandoned Oil and Gas Wells	CO ₂	+	<0.01	1.00	215%	<0.001
2.C.4 CO ₂ Emissions from Magnesium Production and Processing	CO ₂	+	<0.01	1.00	8%	<0.001
1.B.2 N₂O Emissions from Natural Gas Systems	N_2O	+	<0.01	1.00	17%	<0.001
1.A.5 CH₄ Emissions from Incineration of Waste	CH ₄	+	<0.01	1.00	NE	<0.001
1.A.5 CO ₂ Emissions from Stationary Combustion - Gas - U.S. Territories	CO ₂	0.0	<0.01	1.00	17%	<0.001
2.C.4 HFC-134a Emissions from Magnesium Production and Processing	HFCs	0.0	<0.01	1.00	26%	<0.001
+ Doos not exceed 0.05 MMT COo Eq.						

⁺ Does not exceed 0.05 MMT CO₂ Eq. NE (Not Estimated)

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

iubio A G. 1330 Roy Goul Go Gutogol y Applicaci	Direct		Approach 1	,		Approach 2
	Greenhouse	1990 Estimate	Level	Cumulative		Level
CRF Source/Sink Categories	Gas	(MMT CO ₂ Eq.)	Assessment	Total	Uncertaintya	Assessment
1.A.1 CO ₂ Emissions from Stationary Combustion -	CO ₂	1,546.5	0.21	0.21	10%	0.020
Coal - Electricity Generation 1.A.3.b CO ₂ Emissions from Mobile Combustion: Road	CO ₂	1,162.2	0.16	0.36	6%	0.010
4.A.1 Net CO ₂ Emissions from Forest Land Remaining Forest Land	CO ₂	671.6	0.09	0.45	45%	0.040
1.A.2 CO ₂ Emissions from Stationary Combustion - Gas - Industrial	CO ₂	408.5	0.05	0.51	7%	0.004
1.A.2 CO ₂ Emissions from Stationary Combustion - Oil - Industrial	CO ₂	293.7	0.04	0.55	21%	0.008
1.A.4.b CO ₂ Emissions from Stationary Combustion - Gas - Residential	CO ₂	237.8	0.03	0.58	7%	0.002
3.D.1 Direct N₂O Emissions from Agricultural Soil Management	N ₂ O	212.7	0.03	0.61	19%	0.005
1.B.2 CH ₄ Emissions from Natural Gas Systems	CH ₄	193.1	0.03	0.63	17%	0.004
1.A.3.a CO ₂ Emissions from Mobile Combustion: Aviation	CO ₂	187.4	0.03	0.66	6%	0.002
5.A CH ₄ Emissions from Landfills	CH ₄	179.6	0.02	0.68	40%	0.010
1.A.1 CO ₂ Emissions from Stationary Combustion - Gas - Electricity Generation	CO ₂	175.4	0.02	0.70	5%	0.001
3.A CH ₄ Emissions from Enteric Fermentation	CH ₄	164.2	0.02	0.73	18%	0.004
1.A.2 CO ₂ Emissions from Stationary Combustion - Coal - Industrial	CO ₂	155.2	0.02	0.75	16%	0.003
1.A.4.a CO ₂ Emissions from Stationary Combustion - Gas - Commercial	CO ₂	142.0	0.02	0.77	7%	0.001
4.E.1 Net CO ₂ Emissions from Settlements Remaining Settlements	CO ₂	122.1	0.02	0.78	86%	0.014
1.A.5 CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	119.6	0.02	0.80	37%	0.006
4.A.2 Net CO ₂ Emissions from Land Converted to Forest Land	CO ₂	119.1	0.02	0.81	9%	0.001
2.C.1 CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	101.6	0.01	0.83	18%	0.002
1.A.1 CO ₂ Emissions from Stationary Combustion - Oil - Electricity Generation	CO ₂	97.5	0.01	0.84	9%	0.001
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO ₂	97.4	0.01	0.85	6%	0.001
1.B.1 Fugitive Emissions from Coal Mining	CH ₄	96.5	0.01	0.87	19%	0.002
4.B.2 Net CO ₂ Emissions from Land Converted to Cropland	CO ₂	75.6	0.01	0.88	60%	0.006
1.A.3.e CO ₂ Emissions from Mobile Combustion: Other	CO ₂	73.2	0.01	0.89	6%	0.001
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Commercial	CO ₂	72.6	0.01	0.90	6%	0.001
4.E.2 Net CO ₂ Emissions from Land Converted to Settlements	CO ₂	62.9	0.01	0.90	29%	0.002
1.A.3.d CO ₂ Emissions from Mobile Combustion: Marine	CO ₂	46.3	0.01	0.91	6%	<0.001
2.B.9 HFC-23 Emissions from HCFC-22 Production	HFCs	46.1	0.01	0.92	10%	0.001
1.B.2 CH ₄ Emissions from Petroleum Systems	CH ₄	42.1	0.01	0.92	34%	0.002
4.B.1 Net CO ₂ Emissions from Cropland Remaining Cropland	CO ₂	40.9	0.01	0.93	423%	0.023

NA (Not Available)
^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.

	NO	00.0	0.04	0.00	4.440/	0.000
3.D.2 Indirect N₂O Emissions from Applied Nitrogen	N ₂ O	39.0	0.01	0.93	144%	0.008
1.A.3.b N ₂ O Emissions from Mobile Combustion:	N ₂ O	37.6	0.01	0.94	14%	0.001
Road						
3.B CH ₄ Emissions from Manure Management	CH ₄	37.1	<0.01	0.94	20%	0.001
2.A.1 CO ₂ Emissions from Cement Production	CO ₂	33.5	<0.01	0.95	6%	<0.001
1.B.2 CO ₂ Emissions from Natural Gas Systems	CO ₂	30.0	<0.01	0.95	17%	0.001
1.A.5 CO ₂ Emissions from Stationary Combustion -	CO ₂	26.9	<0.01	0.95	11%	<0.001
Oil - U.S. Territories						
2.G.1 SF ₆ Emissions from Electrical Transmission and Distribution	SF ₆	23.1	<0.01	0.96	17%	0.001
2.C.3 PFC Emissions from Aluminum Production	PFCs	21.5	<0.01	0.96	9%	<0.001
2.B.8 CO ₂ Emissions from Petrochemical Production	CO ₂	21.2	<0.01	0.96	5%	<0.001
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	N ₂ O	20.5	<0.01	0.97	42%	0.001
3.C CH ₄ Emissions from Rice Cultivation	CH₄	16.0	<0.01	0.97	49%	0.001
5.D CH ₄ Emissions from Wastewater Treatment	CH₄	15.3	<0.01	0.97	28%	0.001
2.B.3 N ₂ O Emissions from Adipic Acid Production	N_2O	15.2	<0.01	0.97	5%	<0.001
3.B N ₂ O Emissions from Manure Management	N_2O	14.0	<0.01	0.97	24%	<0.001
2.B.1 CO ₂ Emissions from Ammonia Production	CO_2	13.0	<0.01	0.98	5%	<0.001
2.B.2 N ₂ O Emissions from Nitric Acid Production	N_2O	12.1	< 0.01	0.98	5%	<0.001
1.A.4.a CO ₂ Emissions from Stationary	CO ₂	12.0	<0.01	0.98	15%	<0.001
Combustion - Coal - Commercial						
2.A.2 CO ₂ Emissions from Lime Production	CO ₂	11.7	<0.01	0.98	2%	<0.001
1.B.2 CO ₂ Emissions from Petroleum Systems	CO_2	9.0	<0.01	0.98	34%	<0.001
4.C.2 Net CO ₂ Emissions from Land Converted to Grassland	CO ₂	8.7	<0.01	0.98	214%	0.002
1.A.5 CO ₂ Emissions from Incineration of Waste	CO ₂	8.0	<0.01	0.98	15%	<0.001
1.B.1 Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	7.2	<0.01	0.99	21%	<0.001
1.A.3.e CH ₄ Emissions from Mobile Combustion: Other	CH ₄	7.1	<0.01	0.99	52%	<0.001
2.C.3 CO ₂ Emissions from Aluminum Production	CO_2	6.8	<0.01	0.99	3%	<0.001
1.B.2 CH ₄ Emissions from Abandoned Oil and Gas Wells	CH ₄	6.6	<0.01	0.99	215%	0.002
2.A.4 CO ₂ Emissions from Other Process Uses of Carbonates	CO ₂	6.3	<0.01	0.99	15%	<0.001
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential	CH ₄	5.2	<0.01	0.99	231%	0.002
1.A.3.b CH ₄ Emissions from Mobile Combustion: Road	CH ₄	5.2	<0.01	0.99	27%	<0.001
2.C.4 SF ₆ Emissions from Magnesium Production and Processing	SF ₆	5.2	<0.01	0.99	10%	<0.001
3.G CO ₂ Emissions from Liming	CO ₂	4.7	<0.01	0.99	111%	0.001
2.G.3 N ₂ O Emissions from Product Uses	N ₂ O	4.2	<0.01	0.99	24%	<0.001
4.D.1 Net CO ₂ Emissions from Coastal Wetlands Remaining Coastal Wetlands	CO ₂	4.0	<0.01	0.99	66%	<0.001
2.B.10 CO ₂ Emissions from Urea Consumption for Non-Ag Purposes	CO ₂	3.8	<0.01	0.99	12%	<0.001
2.E PFC, HFC, SF ₆ , and NF ₃ Emissions from Semiconductor Manufacture	Several	3.6	<0.01	0.99	6%	<0.001
4.D.4 CH ₄ Emissions from Coastal Wetlands Remaining Coastal Wetlands	CH ₄	3.4	<0.01	0.99	30%	<0.001
5.D N ₂ O Emissions from Wastewater Treatment	N_2O	3.4	<0.01	0.99	108%	<0.001
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	N_2O	3.1	<0.01	0.99	199%	0.001
1.A.4.b CO ₂ Emissions from Stationary Combustion - Coal - Residential	CO ₂	3.0	<0.01	1.00	NE	<0.001

3.H CO ₂ Emissions from Urea Fertilization	CO_2	2.4	<0.01	1.00	43%	<0.001
2.C.2 CO ₂ Emissions from Ferroalloy Production	CO_2	2.2	<0.01	1.00	12%	<0.001
1.A.3.e N ₂ O Emissions from Mobile Combustion: Other	N ₂ O	2.1	<0.01	1.00	61%	<0.001
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	CH ₄	1.8	<0.01	1.00	48%	<0.001
1.3.A.a N ₂ O Emissions from Mobile Combustion: Aviation	N ₂ O	1.7	<0.01	1.00	66%	<0.001
2.B.4 N ₂ O Emissions from Caprolactam, Glyoxal, and Glyoxylic Acid Production	N ₂ O	1.7	<0.01	1.00	32%	<0.001
2.A.3 CO ₂ Emissions from Glass Production	CO_2	1.5	<0.01	1.00	5%	< 0.001
2.B.10 CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.5	<0.01	1.00	21%	<0.001
2.B.10 CO ₂ Emissions from Carbon Dioxide Consumption	CO ₂	1.5	<0.01	1.00	5%	<0.001
4.A.1 CH ₄ Emissions from Forest Fires	CH ₄	1.5	<0.01	1.00	17%	< 0.001
2.B.7 CO ₂ Emissions from Soda Ash Production	CO_2	1.4	<0.01	1.00	9%	< 0.001
4.E.1 N ₂ O Emissions from Settlement Soils	N_2O	1.4	<0.01	1.00	48%	< 0.001
2.B.6 CO ₂ Emissions from Titanium Dioxide Production	CO ₂	1.2	<0.01	1.00	13%	<0.001
1.A.4.a Non-CO ₂ Emissions from Stationary Combustion - Commercial	CH ₄	1.1	<0.01	1.00	146%	<0.001
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential	N ₂ O	1.0	<0.01	1.00	218%	<0.001
4.A.1 N ₂ O Emissions from Forest Fires	N ₂ O	1.0	<0.01	1.00	14%	< 0.001
1.A.5 CO ₂ Emissions from Stationary Combustion - Coal - U.S. Territories	CO ₂	0.6	<0.01	1.00	19%	<0.001
2.C.6 CO ₂ Emissions from Zinc Production	CO_2	0.6	<0.01	1.00	16%	< 0.001
1.A.3.d N ₂ O Emissions from Mobile Combustion: Marine	N ₂ O	0.6	<0.01	1.00	44%	<0.001
1.A.3.d CH ₄ Emissions from Mobile Combustion: Marine	CH ₄	0.6	<0.01	1.00	85%	<0.001
1.A.1 CO ₂ Emissions from Stationary Combustion - Geothermal Energy	CO ₂	0.5	<0.01	1.00	NA	<0.001
2.C.5 CO ₂ Emissions from Lead Production	CO_2	0.5	<0.01	1.00	15%	< 0.001
1.A.5 N ₂ O Emissions from Incineration of Waste	N ₂ O	0.5	<0.01	1.00	301%	< 0.001
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	CH ₄	0.4	<0.01	1.00	3%	<0.001
1.A.4.a Non-CO ₂ Emissions from Stationary Combustion - Commercial	N ₂ O	0.4	<0.01	1.00	177%	<0.001
5.B CH ₄ Emissions from Composting	CH ₄	0.4	<0.01	1.00	50%	<0.001
2.B.5 CO ₂ Emissions from Silicon Carbide Production and Consumption	CO ₂	0.4	<0.01	1.00	9%	<0.001
'	N_2O	0.3	<0.01	1.00	50%	<0.001
5.B N ₂ O Emissions from Composting 2.F Emissions from Substitutes for Ozone	Several	0.3	<0.01	1.00	12%	<0.001
Depleting Substances 2.B.8 CH ₄ Emissions from Petrochemical Production	CH ₄	0.2	<0.01	1.00	57%	<0.001
4.D.1 N ₂ O Emissions from Coastal Wetlands Remaining Coastal Wetlands	N ₂ O	0.1	<0.01	1.00	116%	<0.001
3.F CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.1	<0.01	1.00	51%	<0.001
4.A.4 N ₂ O Emissions from Drained Organic Soils	N ₂ O	0.1	<0.01	1.00	124%	< 0.001
4.A.1 N ₂ O Emissions from Forest Soils	N_2O	0.1	<0.01	1.00	318%	<0.001
	N ₂ O	0.1	<0.01	1.00	140%	<0.001
4.C.1 N ₂ O Emissions from Grass Fires	CH ₄	0.1	<0.01	1.00	139%	<0.001
4.C.1 CH ₄ Emissions from Grass Fires 1.A.5 Non-CO ₂ Emissions from Stationary	N ₂ O	0.1	<0.01	1.00	197%	<0.001
Combustion - U.S. Territories	INZO	0.1	~U.U1	1.00	137 /0	~U.UU1

1.A.3.a CH ₄ Emissions from Mobile Combustion: Aviation	CH ₄	0.1	<0.01	1.00	87%	<0.001
1.A.5 Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	CH ₄	+	<0.01	1.00	55%	<0.001
3.F N ₂ O Emissions from Field Burning of Agricultural Residues	N ₂ O	+	<0.01	1.00	47%	<0.001
4.D.2 Net CO ₂ Emissions from Land Converted to Wetlands	CO ₂	+	<0.01	1.00	34%	<0.001
2.H.1 N₂O Emissions from Semiconductor Manufacture	N ₂ O	+	<0.01	1.00	12%	<0.001
2.B.5 CH ₄ Emissions from Silicon Carbide Production and Consumption	CH ₄	+	<0.01	1.00	8%	<0.001
2.C.1 CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	CH ₄	+	<0.01	1.00	19%	<0.001
2.C.2 CH ₄ Emissions from Ferroalloy Production	CH ₄	+	<0.01	1.00	12%	< 0.001
4.D.4 CH ₄ Emissions from Land Converted to Coastal Wetlands	CH ₄	+	<0.01	1.00	30%	<0.001
4.A.4 CH ₄ Emissions from Drained Organic Soils	CH ₄	+	<0.01	1.00	76%	< 0.001
1.B.2 N ₂ O Emissions from Natural Gas Systems	N ₂ O	+	<0.01	1.00	17%	< 0.001
1.B.2 CO ₂ Emissions from Abandoned Oil and Gas Wells	CO ₂	+	<0.01	1.00	215%	<0.001
4.D.4 CH ₄ Emissions from Peatlands Remaining Peatlands	CH ₄	+	<0.01	1.00	79%	<0.001
2.C.4 CO ₂ Emissions from Magnesium Production and Processing	CO ₂	+	<0.01	1.00	8%	<0.001
1.B.2 N ₂ O Emissions from Petroleum Systems	N_2O	+	<0.01	1.00	34%	< 0.001
4.D.4 N ₂ O Emissions from Peatlands Remaining Peatlands	N ₂ O	+	<0.01	1.00	54%	<0.001
1.A.5 CH ₄ Emissions from Incineration of Waste	CH ₄	+	<0.01	1.00	NE	< 0.001
1.A.5 CO ₂ Emissions from Stationary Combustion - Gas - U.S. Territories	CO ₂	0.0	<0.01	1.00	17%	<0.001
2.C.4 HFC-134a Emissions from Magnesium Production and Processing	HFCs	0.0	<0.01	1.00	26%	<0.001
Production and Processing Does not exceed 0.05 MMT CO ₂ Eq. NE (Not Estimated) NA (Not Available) Percent relative uncertainty. If the corresponding uncertainty.	/ is asymmetrical,	the uncertainty gi	ven here is the large	r and always pos	sitive.	

Table A-6: 2017 Key Source Category Approach 1 and Approach 2 Analysis—Level Assessment, without LULUCF

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	Direct		Approach 1			Approach 2	
	Greenhouse	2017 Estimate	Level	Cumulative		Level	
CRF Source Categories	Gas	(MMT CO ₂ Eq.)	Assessment	Total	Uncertainty ^a	Assessment	
1.A.3.b CO ₂ Emissions from Mobile	CO ₂	1,504.1	0.23	0.23	6%	0.015	
Combustion: Road							
1.A.1 CO ₂ Emissions from Stationary	CO ₂	1,207.1	0.19	0.42	10%	0.018	
Combustion - Coal - Electricity Generation							
1.A.1 CO ₂ Emissions from Stationary	CO ₂	505.6	0.08	0.50	5%	0.004	
Combustion - Gas - Electricity Generation							
1.A.2 CO ₂ Emissions from Stationary	CO ₂	484.7	0.08	0.57	7%	0.005	
Combustion - Gas - Industrial							
1.A.2 CO ₂ Emissions from Stationary	CO ₂	271.5	0.04	0.62	21%	0.009	
Combustion - Oil - Industrial							
1.A.4.b CO ₂ Emissions from Stationary	CO ₂	241.5	0.04	0.65	7%	0.003	
Combustion - Gas - Residential							
3.D.1 Direct N₂O Emissions from Agricultural	N_2O	227.7	0.04	0.69	19%	0.007	
Soil Management							
3.A CH ₄ Emissions from Enteric Fermentation	CH ₄	175.4	0.03	0.72	18%	0.005	
1.A.3.a CO ₂ Emissions from Mobile	CO ₂	173.2	0.03	0.74	6%	0.002	
Combustion: Aviation							
1.A.4.a CO ₂ Emissions from Stationary	CO ₂	173.2	0.03	0.77	7%	0.002	
Combustion - Gas - Commercial							
Compustion - Gas - Commercial							

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1.B.2 CH ₄ Emissions from Natural Gas Systems	CH ₄	165.6	0.03	0.79	17%	0.004
2.F Emissions from Substitutes for Ozone	Several	152.7	0.02	0.82	12%	0.003
Depleting Substances	00	102.0	0.00	0.04	270/	0.007
1.A.5 CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	123.2	0.02	0.84	37%	0.007
5.A CH ₄ Emissions from Landfills	CH ₄	107.7	0.02	0.85	40%	0.007
1.A.3.e CO ₂ Emissions from Mobile Combustion: Other	CO ₂	83.0	0.01	0.87	6%	0.001
3.B CH ₄ Emissions from Manure Management	CH ₄	61.7	0.01	0.88	20%	0.002
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Commercial	CO ₂	57.7	0.01	0.89	6%	0.001
1.B.1 Fugitive Emissions from Coal Mining	CH ₄	55.7	0.01	0.89	19%	0.002
1.A.2 CO ₂ Emissions from Stationary Combustion - Coal - Industrial	CO ₂	54.4	0.01	0.90	16%	0.001
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO ₂	53.0	0.01	0.91	6%	<0.001
2.C.1 CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	41.8	0.01	0.92	18%	0.001
2.A.1 CO ₂ Emissions from Cement Production	CO ₂	40.3	0.01	0.92	6%	<0.001
1.A.3.d CO ₂ Emissions from Mobile Combustion: Marine	CO ₂	40.3	0.01	0.93	6%	<0.001
3.D.2 Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	38.8	0.01	0.94	144%	0.009
1.B.2 CH ₄ Emissions from Petroleum Systems	CH ₄	37.7	0.01	0.94	34%	0.002
1.A.5 CO ₂ Emissions from Stationary	CO ₂	34.3	0.01	0.95	11%	0.001
Combustion - Oil - U.S. Territories 2.B.8 CO ₂ Emissions from Petrochemical	CO ₂	28.2	<0.01	0.95	5%	<0.001
Production		20.2		0.00	3 70	0.001
1.B.2 CO ₂ Emissions from Natural Gas Systems	CO ₂	26.3	<0.01	0.96	17%	0.001
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	N ₂ O	24.8	<0.01	0.96	42%	0.002
1.B.2 CO ₂ Emissions from Petroleum Systems	CO ₂	23.3	<0.01	0.96	34%	0.001
1.A.1 CO ₂ Emissions from Stationary Combustion - Oil - Electricity Generation	CO ₂	18.9	<0.01	0.97	9%	<0.001
3.B N ₂ O Emissions from Manure Management	N_2O	18.7	<0.01	0.97	24%	0.001
5.D CH ₄ Emissions from Wastewater Treatment	CH₄	14.2	<0.01	0.97	28%	0.001
2.B.1 CO ₂ Emissions from Ammonia Production	CO ₂	13.2	<0.01	0.97	5%	<0.001
2.A.2 CO ₂ Emissions from Lime Production	CO ₂	13.1	<0.01	0.97	2%	<0.001
1.A.3.b N ₂ O Emissions from Mobile Combustion: Road	N ₂ O	12.0	<0.01	0.98	14%	<0.001
3.C CH ₄ Emissions from Rice Cultivation	CH ₄	11.3	< 0.01	0.98	49%	0.001
1.A.5 CO ₂ Emissions from Incineration of Waste	CO₂	10.8 10.1	<0.01	0.98	15% 15%	<0.001 <0.001
2.A.4 CO ₂ Emissions from Other Process Uses of Carbonates	CO ₂		<0.01	0.98		
2.B.2 N ₂ O Emissions from Nitric Acid Production	N ₂ O	9.3	<0.01	0.98	5%	<0.001
2.B.3 N₂O Emissions from Adipic Acid Production	N ₂ O	7.4	<0.01	0.98	5%	<0.001
1.B.2 CH ₄ Emissions from Abandoned Oil and Gas Wells	CH ₄	6.9	<0.01	0.99	215%	0.002
1.B.1 Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	6.4	<0.01	0.99	21%	<0.001
2.B.9 HFC-23 Emissions from HCFC-22 Production	HFCs	5.2	<0.01	0.99	10%	<0.001
3.H CO ₂ Emissions from Urea Fertilization	CO_2	5.1	<0.01	0.99	43%	<0.001
2.B.10 CO ₂ Emissions from Urea Consumption for Non-Ag Purposes	CO ₂	5.0	<0.01	0.99	12%	<0.001
5.D N ₂ O Emissions from Wastewater Treatment	N_2O	5.0	<0.01	0.99	108%	0.001
2.E PFC, HFC, SF ₆ , and NF ₃ Emissions from Semiconductor Manufacture	Several	4.7	<0.01	0.99	6%	<0.001

2.B.10 CO ₂ Emissions from Carbon Dioxide Consumption	CO ₂	4.5	<0.01	0.99	5%	<0.001
2.G.1 SF ₆ Emissions from Electrical Transmission and Distribution	SF ₆	4.3	<0.01	0.99	17%	<0.001
2.G.3 N ₂ O Emissions from Product Uses	N ₂ O	4.2	<0.01	0.99	24%	< 0.001
1.A.5 CO ₂ Emissions from Stationary Combustion - Coal - U.S. Territories	CO ₂	4.0	<0.01	0.99	19%	<0.001
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential	CH ₄	3.8	<0.01	0.99	231%	0.001
3.G CO ₂ Emissions from Liming	CO ₂	3.2	<0.01	0.99	111%	0.001
1.A.5 CO ₂ Emissions from Stationary Combustion - Gas - U.S. Territories	CO ₂	3.0	<0.01	0.99	17%	<0.001
1.A.3.e N ₂ O Emissions from Mobile Combustion: Other	N ₂ O	2.7	<0.01	0.99	61%	<0.001
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	N ₂ O	2.7	<0.01	0.99	199%	0.001
5.B CH ₄ Emissions from Composting	CH ₄	2.2	<0.01	1.00	50%	< 0.001
1.A.4.a CO ₂ Emissions from Stationary Combustion - Coal - Commercial	CO ₂	2.0	<0.01	1.00	15%	<0.001
2.C.2 CO ₂ Emissions from Ferroalloy Production	CO_2	2.0	<0.01	1.00	12%	< 0.001
5.B N ₂ O Emissions from Composting	N_2O	1.9	<0.01	1.00	50%	<0.001
1.A.3.e CH ₄ Emissions from Mobile Combustion: Other	CH ₄	1.9	<0.01	1.00	52%	<0.001
2.B.7 CO ₂ Emissions from Soda Ash Production	CO ₂	1.8	<0.01	1.00	9%	< 0.001
2.B.6 CO ₂ Emissions from Titanium Dioxide Production	CO ₂	1.7	<0.01	1.00	13%	<0.001
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	CH ₄	1.6	<0.01	1.00	48%	<0.001
1.3.A.a N ₂ O Emissions from Mobile Combustion: Aviation	N ₂ O	1.6	<0.01	1.00	66%	<0.001
2.B.4 N ₂ O Emissions from Caprolactam, Glyoxal, and Glyoxylic Acid Production	N ₂ O	1.4	<0.01	1.00	32%	<0.001
2.A.3 CO ₂ Emissions from Glass Production	CO_2	1.3	<0.01	1.00	5%	< 0.001
2.C.3 CO ₂ Emissions from Aluminum Production	CO ₂	1.2	<0.01	1.00	3%	< 0.001
1.A.4.a Non-CO ₂ Emissions from Stationary Combustion - Commercial	CH ₄	1.2	<0.01	1.00	146%	<0.001
2.C.3 PFC Emissions from Aluminum Production	PFCs	1.1	<0.01	1.00	9%	<0.001
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	CH ₄	1.1	<0.01	1.00	3%	<0.001
2.C.4 SF ₆ Emissions from Magnesium Production and Processing	SF ₆	1.1	<0.01	1.00	10%	<0.001
2.B.10 CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.0	<0.01	1.00	21%	<0.001
2.C.6 CO ₂ Emissions from Zinc Production	CO_2	1.0	<0.01	1.00	16%	<0.001
1.A.3.b CH ₄ Emissions from Mobile Combustion: Road	CH ₄	1.0	<0.01	1.00	27%	<0.001
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential	N ₂ O	0.8	<0.01	1.00	218%	<0.001
1.A.3.d N ₂ O Emissions from Mobile Combustion: Marine	N ₂ O	0.5	<0.01	1.00	44%	<0.001
2.C.5 CO ₂ Emissions from Lead Production	CO_2	0.5	<0.01	1.00	15%	< 0.001
1.A.1 CO ₂ Emissions from Stationary Combustion - Geothermal Energy	CO_2	0.4	<0.01	1.00	NA	<0.001
1.A.4.a Non-CO ₂ Emissions from Stationary Combustion - Commercial	N ₂ O	0.3	<0.01	1.00	177%	<0.001
1.A.3.d CH ₄ Emissions from Mobile Combustion: Marine	CH ₄	0.3	<0.01	1.00	85%	<0.001
1.A.5 N $_2$ O Emissions from Incineration of Waste	N ₂ O	0.3	<0.01	1.00	301%	<0.001

2.B.8 CH ₄ Emissions from Petrochemical Production	CH ₄	0.3	<0.01	1.00	57%	<0.001
2.H.1 N ₂ O Emissions from Semiconductor Manufacture	N_2O	0.2	<0.01	1.00	12%	<0.001
3.F CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.2	<0.01	1.00	51%	<0.001
2.B.5 CO ₂ Emissions from Silicon Carbide Production and Consumption	CO_2	0.2	<0.01	1.00	9%	<0.001
1.A.5 Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	N ₂ O	0.1	<0.01	1.00	197%	<0.001
2.C.4 HFC-134a Emissions from Magnesium Production and Processing	HFCs	0.1	<0.01	1.00	26%	<0.001
3.F N ₂ O Emissions from Field Burning of Agricultural Residues	N ₂ O	0.1	<0.01	1.00	47%	<0.001
1.A.5 Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	CH ₄	0.1	<0.01	1.00	55%	<0.001
1.A.3.a CH ₄ Emissions from Mobile Combustion: Aviation	CH ₄	+	<0.01	1.00	87%	<0.001
1.B.2 N ₂ O Emissions from Petroleum Systems	N_2O	+	<0.01	1.00	34%	< 0.001
2.C.2 CH ₄ Emissions from Ferroalloy Production	CH ₄	+	< 0.01	1.00	12%	< 0.001
2.B.5 CH ₄ Emissions from Silicon Carbide Production and Consumption	CH ₄	+	<0.01	1.00	8%	<0.001
2.C.1 CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	CH ₄	+	<0.01	1.00	19%	<0.001
1.B.2 CO ₂ Emissions from Abandoned Oil and Gas Wells	CO ₂	+	<0.01	1.00	215%	<0.001
1.B.2 N ₂ O Emissions from Natural Gas Systems	N_2O	+	<0.01	1.00	17%	< 0.001
2.C.4 CO ₂ Emissions from Magnesium Production and Processing	CO ₂	+	<0.01	1.00	8%	<0.001
1.A.5 CH ₄ Emissions from Incineration of Waste	CH ₄	+	< 0.01	1.00	NE	< 0.001
1.A.4.b CO ₂ Emissions from Stationary Combustion - Coal - Residential	CO ₂	0.0	<0.01	1.00	NE	<0.001

⁺ Does not exceed 0.05 MMT CO₂ Eq. NE (Not Estimated)

Table A-7: 2017 Key Source Category Approach 1 and Approach 2 Analysis—Level Assessment with LULUCF

	Direct		Approach 1			Approach 2
	Greenhouse	2017 Estimate	Level	Cumulative		Level
CRF Source/Sink Categories	Gas	(MMT CO ₂ Eq.)	Assessment	Total	Uncertainty ^a	Assessment
1.A.3.b CO ₂ Emissions from Mobile Combustion: Road	CO ₂	1,504.1	0.20	0.20	6%	0.013
1.A.1 CO ₂ Emissions from Stationary	CO ₂	1,207.1	0.16	0.36	10%	0.015
Combustion - Coal - Electricity Generation						
4.A.1 Net CO ₂ Emissions from Forest Land	CO ₂	621.1	0.08	0.44	45%	0.037
Remaining Forest Land						
1.A.1 CO ₂ Emissions from Stationary	CO ₂	505.6	0.07	0.51	5%	0.003
Combustion - Gas - Electricity Generation						
1.A.2 CO ₂ Emissions from Stationary	CO ₂	484.7	0.06	0.57	7%	0.005
Combustion - Gas - Industrial						
1.A.2 CO ₂ Emissions from Stationary	CO ₂	271.5	0.04	0.61	21%	0.007
Combustion - Oil - Industrial						
1.A.4.b CO ₂ Emissions from Stationary	CO ₂	241.5	0.03	0.64	7%	0.002
Combustion - Gas - Residential						
3.D.1 Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	227.7	0.03	0.67	19%	0.006
3.A CH ₄ Emissions from Enteric Fermentation	CH ₄	175.4	0.02	0.70	18%	0.004

NA (Not Available)

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.

1.A.3.a CO ₂ Emissions from Mobile	CO_2	173.2	0.02	0.72	6%	0.001
Combustion: Aviation	002	170.2	0.02	0.72	070	0.001
1.A.4.a CO ₂ Emissions from Stationary Combustion - Gas - Commercial	CO ₂	173.2	0.02	0.74	7%	0.002
1.B.2 CH ₄ Emissions from Natural Gas Systems	CH ₄	165.6	0.02	0.76	17%	0.004
Emissions from Substitutes for Ozone Depleting Substances	Several	152.7	0.02	0.78	12%	0.003
4.E.1 Net CO ₂ Emissions from Settlements Remaining Settlements	CO ₂	134.5	0.02	0.80	86%	0.015
1.A.5 CO ₂ Emissions from Non-Energy Use of Fuels	CO ₂	123.2	0.02	0.82	37%	0.006
4.A.2 Net CO ₂ Emissions from Land Converted to Forest Land	CO ₂	120.6	0.02	0.83	9%	0.002
5.A CH ₄ Emissions from Landfills	CH ₄	107.7	0.01	0.85	40%	0.006
4.E.2 Net CO ₂ Emissions from Land Converted	CO ₂	86.2	0.01	0.86	29%	0.003
to Settlements 1.A.3.e CO ₂ Emissions from Mobile	CO ₂	83.0	0.01	0.87	6%	0.001
Combustion: Other	002	00.0	0.01	0.07	0 70	0.001
4.B.2 Net CO ₂ Emissions from Land Converted to Cropland	CO ₂	66.9	0.01	0.88	60%	0.005
3.B CH ₄ Emissions from Manure Management	CH ₄	61.7	0.01	0.89	20%	0.002
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Commercial	CO ₂	57.7	0.01	0.90	6%	<0.001
1.B.1 Fugitive Emissions from Coal Mining	CH ₄	55.7	0.01	0.90	19%	0.001
1.A.2 CO ₂ Emissions from Stationary Combustion - Coal - Industrial	CO ₂	54.4	0.01	0.91	16%	0.001
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO ₂	53.0	0.01	0.92	6%	<0.001
2.C.1 CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	41.8	0.01	0.92	18%	0.001
2.A.1 CO ₂ Emissions from Cement Production	CO ₂	40.3	0.01	0.93	6%	<0.001
1.A.3.d CO ₂ Emissions from Mobile Combustion: Marine	CO ₂	40.3	0.01	0.93	6%	<0.001
3.D.2 Indirect N₂O Emissions from Applied Nitrogen	N ₂ O	38.8	0.01	0.94	144%	0.007
1.B.2 CH ₄ Emissions from Petroleum Systems	CH ₄	37.7	0.01	0.94	34%	0.002
1.A.5 CO ₂ Emissions from Stationary Combustion - Oil - U.S. Territories	CO ₂	34.3	<0.01	0.95	11%	<0.001
2.B.8 CO ₂ Emissions from Petrochemical Production	CO ₂	28.2	<0.01	0.95	5%	<0.001
1.B.2 CO ₂ Emissions from Natural Gas Systems	CO ₂	26.3	< 0.01	0.96	17%	0.001
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	N ₂ O	24.8	<0.01	0.96	42%	0.001
1.B.2 CO ₂ Emissions from Petroleum Systems	CO ₂	23.3	< 0.01	0.96	34%	0.001
1.A.1 CO₂ Emissions from Stationary Combustion - Oil - Electricity Generation	CO_2	18.9	<0.01	0.97	9%	<0.001
3.B N ₂ O Emissions from Manure Management	N_2O	18.7	<0.01	0.97	24%	0.001
5.D CH ₄ Emissions from Wastewater Treatment	CH ₄	14.2	< 0.01	0.97	28%	0.001
2.B.1 CO ₂ Emissions from Ammonia Production	CO_2	13.2	< 0.01	0.97	5%	<0.001
2.A.2 CO ₂ Emissions from Lime Production	CO_2	13.1	<0.01	0.97	2%	<0.001
1.A.3.b N₂O Emissions from Mobile Combustion: Road	N ₂ O	12.0	<0.01	0.97	14%	<0.001
3.C CH ₄ Emissions from Rice Cultivation	CH ₄	11.3	<0.01	0.98	49%	0.001
1.A.5 CO ₂ Emissions from Incineration of Waste	CO ₂	10.8	<0.01	0.98	15%	<0.001
4.B.1 Net CO ₂ Emissions from Cropland Remaining Cropland	CO ₂	10.3	<0.01	0.98	423%	0.006
2.A.4 CO₂ Emissions from Other Process Uses of Carbonates	CO ₂	10.1	<0.01	0.98	15%	<0.001
$2.B.2\;N_2O\;Emissions\;from\;Nitric\;Acid\;Production$	N_2O	9.3	<0.01	0.98	5%	<0.001

	8.3	<0.01			0.002
N ₂ O	7.4	<0.01	0.98	5%	<0.001
CH ₄	6.9	<0.01	0.98	215%	0.002
CH ₄	6.4	<0.01	0.99	21%	<0.001
HFCs	5.2	<0.01	0.99	10%	<0.001
CO_2	5.1	< 0.01	0.99	43%	<0.001
CO ₂	5.0	<0.01	0.99	12%	<0.001
N ₂ O	5.0	< 0.01	0.99	108%	0.001
CH₄		< 0.01	0.99	17%	< 0.001
Several	4.7	<0.01	0.99	6%	<0.001
CO ₂	4.5	<0.01	0.99	5%	<0.001
CO ₂	4.4	<0.01	0.99	66%	<0.001
SF ₆	4.3	<0.01	0.99	17%	<0.001
N ₂ O	4.2	< 0.01	0.99	24%	< 0.001
CO ₂	4.0	<0.01	0.99	19%	<0.001
CH ₄	3.8	<0.01	0.99	231%	0.001
CH ₄	3.6	<0.01	0.99	30%	<0.001
N ₂ O	3.2	< 0.01	0.99	14%	<0.001
					<0.001
CO ₂	3.0	<0.01	0.99	17%	<0.001
N ₂ O	2.7	<0.01	0.99	61%	<0.001
N ₂ O	2.7	<0.01	1.00	199%	0.001
N_2O	2.5	<0.01	1.00	48%	<0.001
CH ₄	2.2	< 0.01	1.00	50%	< 0.001
CO ₂	2.0	<0.01	1.00	15%	<0.001
CO_2	2.0	<0.01	1.00	12%	<0.001
N ₂ O	1.9	< 0.01	1.00	50%	< 0.001
CH ₄	1.9	<0.01	1.00	52%	<0.001
CO ₂	1.8	< 0.01	1.00	9%	<0.001
CO ₂	1.7	<0.01	1.00	13%	<0.001
CH ₄	1.6	<0.01	1.00	48%	<0.001
N ₂ O	1.6	<0.01	1.00	66%	<0.001
N_2O	1.4	<0.01	1.00	32%	<0.001
CO ₂	1.3	<0.01	1.00	5%	<0.001
					<0.001
CH ₄	1.2	<0.01	1.00	146%	<0.001
	CH4 HFCs CO2 CO2 N2O CH4 Several CO2 SF6 N2O CO2 CH4 CH4 N2O CO2 CO2 CO2 N2O N2O N2O CH4 CO2 CO2 CO2	N₂O 7.4 CH4 6.9 CH4 6.4 HFCs 5.2 CO₂ 5.1 CO₂ 5.0 N₂O 5.0 CH4 4.9 Several 4.7 CO₂ 4.4 SF6 4.3 N₂O 4.2 CO₂ 4.0 CH4 3.8 CH4 3.6 N₂O 3.2 CO₂ 3.2 CO₂ 3.2 CO₂ 3.2 CO₂ 3.0 N₂O 2.7 N₂O 2.5 CH4 2.2 CO₂ 2.0 N₂O 1.9 CH4 1.9 CO₂ 1.8 CO₂ 1.7 CH4 1.6 N₂O 1.6 N₂O 1.4 CO₂ 1.3 CO₂ 1.3 CO₂ 1.2	N₂O 7.4 <0.01 CH4 6.9 <0.01 CH4 6.4 <0.01 HFCs 5.2 <0.01 CO2 5.1 <0.01 CO2 5.0 <0.01 CO2 5.0 <0.01 CH4 4.9 <0.01 Several 4.7 <0.01 CO2 4.5 <0.01 CO2 4.4 <0.01 SF6 4.3 <0.01 N2O 4.2 <0.01 CO2 4.0 <0.01 CH4 3.8 <0.01 CH4 3.6 <0.01 N2O 3.2 <0.01 CO2 3.2 <0.01 CO2 3.2 <0.01 CO2 3.2 <0.01 N2O 2.7 <0.01 N2O 2.7 <0.01 N2O 2.5 <0.01 N2O 2.5 <0.01 N2O 1.9 <0.01 CO2 1.8 <0.01	N₂O 7.4 <0.01 0.98 CH4 6.9 <0.01 0.98 CH4 6.4 <0.01 0.99 HFCs 5.2 <0.01 0.99 CO₂ 5.1 <0.01 0.99 CO₂ 5.0 <0.01 0.99 N₂O 5.0 <0.01 0.99 CH4 4.9 <0.01 0.99 Several 4.7 <0.01 0.99 CO₂ 4.5 <0.01 0.99 CO₂ 4.4 <0.01 0.99 SF6 4.3 <0.01 0.99 CO₂ 4.0 <0.01 0.99 CH4 3.6 <0.01 0.99 CH4 3.6 <0.01 0.99 CH4 3.6 <0.01 0.99 CO₂ 3.2 <0.01 0.99 CO₂ 3.2 <0.01 0.99 N₂O 2.7 <0.01 0.99 N₂O	N₂O 7.4 <0.01 0.98 5% CH4 6.9 <0.01 0.98 215% CH4 6.4 <0.01 0.99 21% HFCs 5.2 <0.01 0.99 10% CO2 5.1 <0.01 0.99 43% CO2 5.0 <0.01 0.99 12% N₂O 5.0 <0.01 0.99 108% CH4 4.9 <0.01 0.99 17% Several 4.7 <0.01 0.99 17% CO2 4.5 <0.01 0.99 5% CO2 4.4 <0.01 0.99 5% CO2 4.4 <0.01 0.99 5% CO2 4.4 <0.01 0.99 17% N₂O 4.2 <0.01 0.99 17% CH4 3.8 <0.01 0.99 13% CH4 3.6 <0.01 0.99 14%

2.C.3 PFC Emissions from Aluminum Production	PFCs	1.1	<0.01	1.00	9%	<0.001
1.A.1 Non-CO ₂ Emissions from Stationary	CH ₄	1.1	<0.01	1.00	3%	<0.001
Combustion - Electricity Generation 2.C.4 SF ₆ Emissions from Magnesium	SF ₆	1.1	<0.01	1.00	10%	<0.001
Production and Processing 2.B.10 CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.0	<0.01	1.00	21%	<0.001
	CO ₂	1.0	<0.01	1.00	16%	<0.001
2.C.6 CO ₂ Emissions from Zinc Production	CH ₄	1.0	<0.01	1.00	27%	<0.001
1.A.3.b CH ₄ Emissions from Mobile Combustion: Road	CH4	1.0	<0.01	1.00	21%	<0.001
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential	N ₂ O	0.8	<0.01	1.00	218%	<0.001
1.A.3.d N ₂ O Emissions from Mobile	N_2O	0.5	<0.01	1.00	44%	<0.001
Combustion: Marine	20	0.0	•.•		,0	0.00
4.A.1 N ₂ O Emissions from Forest Soils	N_2O	0.5	<0.01	1.00	318%	< 0.001
• • • • • • • • • • • • • • • • • • • •	CO_2	0.5	<0.01	1.00	15%	< 0.001
2.C.5 CO ₂ Emissions from Lead Production						
1.A.1 CO ₂ Emissions from Stationary	CO ₂	0.4	<0.01	1.00	NA	<0.001
Combustion - Geothermal Energy	N_2O	0.3	<0.01	1.00	177%	<0.001
1.A.4.a Non-CO ₂ Emissions from Stationary Combustion - Commercial	IN2O	0.3	<0.01	1.00	17770	<0.001
	N_2O	0.3	<0.01	1.00	140%	<0.001
4.C.1 N ₂ O Emissions from Grass Fires						
1.A.3.d CH ₄ Emissions from Mobile	CH ₄	0.3	<0.01	1.00	85%	<0.001
Combustion: Marine	N O	0.2	-0.01	1.00	2040/	-0.001
1.A.5 N ₂ O Emissions from Incineration of Waste	N_2O	0.3	<0.01	1.00	301%	<0.001
4.C.1 CH ₄ Emissions from Grass Fires	CH ₄	0.3	<0.01	1.00	139%	<0.001
2.B.8 CH ₄ Emissions from Petrochemical Production	CH ₄	0.3	<0.01	1.00	57%	<0.001
2.H.1 N ₂ O Emissions from Semiconductor Manufacture	N_2O	0.2	<0.01	1.00	12%	<0.001
3.F CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.2	<0.01	1.00	51%	<0.001
2.B.5 CO ₂ Emissions from Silicon Carbide Production and Consumption	CO ₂	0.2	<0.01	1.00	9%	<0.001
4.D.1 N ₂ O Emissions from Coastal Wetlands Remaining Coastal Wetlands	N ₂ O	0.1	<0.01	1.00	116%	<0.001
1.A.5 Non-CO ₂ Emissions from Stationary	N ₂ O	0.1	<0.01	1.00	197%	<0.001
Combustion - U.S. Territories 2.C.4 HFC-134a Emissions from Magnesium	HFCs	0.1	<0.01	1.00	26%	<0.001
Production and Processing						
4.A.4 N ₂ O Emissions from Drained Organic Soils	N ₂ O	0.1	<0.01	1.00	124%	<0.001
3.F N₂O Emissions from Field Burning of Agricultural Residues	N ₂ O	0.1	<0.01	1.00	47%	<0.001
1.A.5 Non-CO ₂ Emissions from Stationary Combustion - U.S. Territories	CH ₄	0.1	<0.01	1.00	55%	<0.001
4.D.2 Net CO ₂ Emissions from Land Converted to Wetlands	CO ₂	+	<0.01	1.00	34%	<0.001
1.A.3.a CH ₄ Emissions from Mobile Combustion: Aviation	CH ₄	+	<0.01	1.00	87%	<0.001
1.B.2 N₂O Emissions from Natural Gas Systems	N_2O	+	<0.01	1.00	17%	< 0.001
4.D.4 CH ₄ Emissions from Land Converted to	CH ₄	+	<0.01	1.00	30%	< 0.001
Coastal Wetlands	0114		0.01	1.00	0070	0.001
4.A.4 CH ₄ Emissions from Drained Organic Soils	CH ₄	+	<0.01	1.00	76%	<0.001
2.C.2 CH ₄ Emissions from Ferroalloy Production	CH ₄	+	<0.01	1.00	12%	< 0.001
2.B.5 CH ₄ Emissions from Silicon Carbide	CH ₄	+	<0.01	1.00	8%	<0.001
Production and Consumption 2.C.1 CH ₄ Emissions from Iron and Steel	CH ₄	+	<0.01	1.00	19%	<0.001
Production & Metallurgical Coke Production	OI 14	т	\U.U1	1.00	13/0	\ U.UU1

1.B.2 CO ₂ Emissions from Abandoned Oil and Gas Wells	CO ₂	+	<0.01	1.00	215%	<0.001
1.B.2 N ₂ O Emissions from Petroleum Systems	N_2O	+	<0.01	1.00	34%	< 0.001
4.D.4 CH ₄ Emissions from Peatlands Remaining	CH ₄	+	<0.01	1.00	79%	<0.001
Peatlands 2.C.4 CO ₂ Emissions from Magnesium	CO ₂	+	<0.01	1.00	8%	<0.001
Production and Processing	002	·	10.01	1.00	070	10.001
4.D.4 N ₂ O Emissions from Peatlands Remaining	N_2O	+	<0.01	1.00	54%	<0.001
Peatlands						
1.A.5 CH ₄ Emissions from Incineration of Waste	CH ₄	+	<0.01	1.00	NE	<0.001
1.A.4.b CO ₂ Emissions from Stationary	CO_2	0.0	<0.01	1.00	NE	< 0.001
Combustion - Coal - Residential						

⁺ Does not exceed 0.05 MMT CO₂ Eq. NE (Not Estimated)
NA (Not Available)

Table A-8: 1990-2017 Key Source Category Approach 1 and 2 Analysis—Trend Assessment, without LULUCF

	Direct			Approach 1	Approach 2	%	
	Greenhouse	1990 Estimate			Trend	Contribution	Cumulative
CRF Source Categories	Gas	(MMT CO ₂ Eq.)		Assessment	Assessment		Total
1.A.1 CO ₂ Emissions from Stationary Combustion - Coal - Electricity Generation	CO ₂	1,546.5	1,207.1	0.06	0.005	17.4	17
1.A.1 CO ₂ Emissions from Stationary Combustion - Gas - Electricity Generation	CO ₂	175.4	505.6	0.05	0.003	15.8	33
1.A.3.b CO ₂ Emissions from Mobile Combustion: Road	CO ₂	1,162.2	1,504.1	0.05	0.003	15.7	49
2.F Emissions from Substitutes for Ozone Depleting Substances	Several	0.3	152.7	0.02	0.003	7.4	56
1.A.2 CO ₂ Emissions from Stationary Combustion - Coal - Industrial	CO ₂	155.2	54.4	0.02	0.003	5.0	61
1.A.1 CO ₂ Emissions from Stationary Combustion - Oil - Electricity Generation	CO ₂	97.5	18.9	0.01	0.001	3.9	65
5.A CH ₄ Emissions from Landfills	CH ₄	179.6	107.7	0.01	0.005	3.6	69
1.A.2 CO ₂ Emissions from Stationary Combustion - Gas - Industrial	CO ₂	408.5	484.7	0.01	0.001	3.4	72
2.C.1 CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	101.6	41.8	0.01	0.002	3.0	75
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO ₂	97.4	53.0	0.01	<0.001	2.2	77
1.B.1 Fugitive Emissions from Coal Mining	CH ₄	96.5	55.7	0.01	0.001	2.0	79
2.B.9 HFC-23 Emissions from HCFC-22 Production	HFCs	46.1	5.2	0.01	0.001	2.0	81
1.B.2 CH ₄ Emissions from Natural Gas Systems	CH ₄	193.1	165.6	<0.01	0.001	1.5	83
1.A.4.a CO ₂ Emissions from Stationary Combustion - Gas - Commercial	CO ₂	142.0	173.2	<0.01	<0.001	1.4	84
1.A.2 CO ₂ Emissions from Stationary Combustion - Oil - Industrial	CO ₂	293.7	271.5	<0.01	0.001	1.3	85
1.A.3.b N ₂ O Emissions from Mobile Combustion: Road	N ₂ O	37.6	12.0	<0.01	0.001	1.3	87
3.B CH ₄ Emissions from Manure Management	CH ₄	37.1	61.7	<0.01	0.001	1.2	88
2.C.3 PFC Emissions from Aluminum Production	PFCs	21.5	1.1	<0.01	<0.001	1.0	89

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

2.G.1 SF ₆ Emissions from Electrical Transmission and Distribution	SF ₆	23.1	4.3	<0.01	<0.001	0.9	90
1.A.3.a CO ₂ Emissions from Mobile	CO ₂	187.4	173.2	<0.01	<0.001	0.8	91
Combustion: Aviation 1.A.4.b CO ₂ Emissions from Stationary	CO ₂	72.6	57.7	<0.01	<0.001	0.8	91
Combustion - Oil - Commercial 1.B.2 CO ₂ Emissions from Petroleum	CO ₂	9.0	23.3	<0.01	0.001	0.7	92
Systems 3.D.1 Direct N ₂ O Emissions from	N ₂ O	212.7	227.7	<0.01	<0.001	0.6	93
Agricultural Soil Management 1.A.4.a CO ₂ Emissions from Stationary Combustion - Coal - Commercial	CO ₂	12.0	2.0	<0.01	<0.001	0.5	93
3.A CH ₄ Emissions from Enteric Fermentation	CH ₄	164.2	175.4	<0.01	<0.001	0.4	94
1.A.3.e CO ₂ Emissions from Mobile Combustion: Other	CO ₂	73.2	83.0	<0.01	<0.001	0.4	94
2.B.3 N ₂ O Emissions from Adipic Acid Production	N ₂ O	15.2	7.4	<0.01	<0.001	0.4	94
1.A.5 CO ₂ Emissions from Stationary Combustion - Oil - U.S. Territories	CO ₂	26.9	34.3	<0.01	<0.001	0.3	95
2.B.8 CO ₂ Emissions from Petrochemical Production	CO ₂	21.2	28.2	<0.01	<0.001	0.3	95
1.A.3.d CO ₂ Emissions from Mobile Combustion: Marine	CO ₂	46.3	40.3	<0.01	<0.001	0.3	95
2.A.1 CO ₂ Emissions from Cement Production	CO ₂	33.5	40.3	<0.01	<0.001	0.3	96
2.C.3 CO ₂ Emissions from Aluminum Production	CO ₂	6.8	1.2	<0.01	<0.001	0.3	96
1.A.3.e CH ₄ Emissions from Mobile Combustion: Other	CH ₄	7.1	1.9	<0.01	<0.001	0.3	96
1.B.2 CH ₄ Emissions from Petroleum Systems	CH ₄	42.1	37.7	<0.01	<0.001	0.2	96
3.C CH ₄ Emissions from Rice Cultivation	CH ₄	16.0	11.3	<0.01	<0.001	0.2	97
3.B N ₂ O Emissions from Manure Management	N ₂ O	14.0	18.7	<0.01	<0.001	0.2	97
1.A.3.b CH ₄ Emissions from Mobile Combustion: Road	CH ₄	5.2	1.0	<0.01	<0.001	0.2	97
2.C.4 SF ₆ Emissions from Magnesium Production and Processing	SF ₆	5.2	1.1	<0.01	<0.001	0.2	97
1.B.2 CO ₂ Emissions from Natural Gas Systems	CO ₂	30.0	26.3	<0.01	<0.001	0.2	97
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	N ₂ O	20.5	24.8	<0.01	<0.001	0.2	98
2.A.4 CO ₂ Emissions from Other Process Uses of Carbonates	CO ₂	6.3	10.1	<0.01	<0.001	0.2	98
1.A.5 CO ₂ Emissions from Stationary Combustion - Coal - U.S. Territories	CO ₂	0.6	4.0	<0.01	<0.001	0.2	98
1.A.4.b CO ₂ Emissions from Stationary Combustion - Coal - Residential	CO ₂	3.0	0.0	<0.01	<0.001	0.1	98
1.A.5 CO ₂ Emissions from Stationary Combustion - Gas - U.S. Territories	CO ₂	0.0	3.0	<0.01	<0.001	0.1	98
2.B.10 CO ₂ Emissions from Carbon Dioxide Consumption	CO ₂	1.5	4.5	<0.01	<0.001	0.1	98
2.B.2 N₂O Emissions from Nitric Acid Production	N_2O	12.1	9.3	<0.01	<0.001	0.1	99
1.A.5 CO ₂ Emissions from Incineration of Waste	CO_2	8.0	10.8	<0.01	<0.001	0.1	99
3.H CO ₂ Emissions from Urea Fertilization	CO ₂	2.4	5.1	<0.01	<0.001	0.1	99

1.A.5 CO₂ Emissions from Non-Energy Use of Fuels	CO ₂	119.6	123.2	<0.01	<0.001	0.1	99
5.B CH ₄ Emissions from Composting	CH_4	0.4	2.2	< 0.01	< 0.001	0.1	99
5.B N ₂ O Emissions from Composting	N_2O	0.3	1.9	<0.01	<0.001	0.1	99
3.G CO ₂ Emissions from Liming	CO ₂	4.7	3.2	<0.01	<0.001	0.1	99
5.D N₂O Emissions from Wastewater Treatment	N ₂ O	3.4	5.0	<0.01	<0.001	0.1	99
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential	CH ₄	5.2	3.8	<0.01	0.001	0.1	99
2.A.2 CO ₂ Emissions from Lime Production	CO ₂	11.7	13.1	<0.01	<0.001	0.1	99
5.D CH ₄ Emissions from Wastewater Treatment	CH₄	15.3	14.2	<0.01	<0.001	0.1	99
2.B.10 CO ₂ Emissions from Urea Consumption for Non-Ag Purposes	CO ₂	3.8	5.0	<0.01	<0.001	0.1	100
2.E PFC, HFC, SF ₆ , and NF ₃ Emissions from Semiconductor Manufacture	Several	3.6	4.7	<0.01	<0.001	0.1	100
1.B.1 Fugitive Emissions from Abandoned Underground Coal Mines	CH₄	7.2	6.4	<0.01	<0.001	<0.1	100
3.D.2 Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	39.0	38.8	<0.01	<0.001	<0.1	100
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	CH ₄	0.4	1.1	<0.01	<0.001	<0.1	100
1.A.3.e N ₂ O Emissions from Mobile Combustion: Other	N ₂ O	2.1	2.7	<0.01	<0.001	<0.1	100
2.B.10 CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.5	1.0	<0.01	<0.001	<0.1	100
1.A.4.b CO ₂ Emissions from Stationary Combustion - Gas - Residential	CO ₂	237.8	241.5	<0.01	<0.001	<0.1	100
2.B.6 CO ₂ Emissions from Titanium Dioxide Production	CO ₂	1.2	1.7	<0.01	<0.001	<0.1	100
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	N₂O	3.1	2.7	<0.01	<0.001	<0.1	100
2.C.6 CO₂ Emissions from Zinc Production	CO ₂	0.6	1.0	<0.01	<0.001	<0.1	100
2.B.7 CO ₂ Emissions from Soda Ash Production	CO ₂	1.4 1.0	1.8 0.8	<0.01	<0.001 <0.001	<0.1 <0.1	100 100
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential 2.B.4 N ₂ O Emissions from Caprolactam,	N₂O N₂O	1.0	1.4	<0.01 <0.01	<0.001	<0.1	100
Glyoxal, and Glyoxylic Acid Production							
1.B.2 CH ₄ Emissions from Abandoned Oil and Gas Wells	CH₄	6.6	6.9	<0.01	<0.001	<0.1	100
1.A.3.d CH ₄ Emissions from Mobile Combustion: Marine	CH₄	0.6	0.3	<0.01	<0.001	<0.1	100
2.A.3 CO ₂ Emissions from Glass Production	CO ₂	1.5	1.3	<0.01	<0.001	<0.1	100
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	CH₄	1.8	1.6	<0.01	<0.001	<0.1	100
2.H.1 N ₂ O Emissions from Semiconductor Manufacture	N ₂ O	+	0.2	<0.01	<0.001	<0.1	100
2.C.2 CO ₂ Emissions from Ferroalloy Production	CO ₂	2.2	2.0	<0.01	<0.001	<0.1	100
2.B.5 CO ₂ Emissions from Silicon Carbide Production and Consumption	CO ₂	0.4	0.2	<0.01	<0.001	<0.1	100
1.3.A.a N ₂ O Emissions from Mobile Combustion: Aviation	N ₂ O	1.7	1.6	<0.01	<0.001	<0.1	100
1.A.5 N ₂ O Emissions from Incineration of Waste	N ₂ O	0.5	0.3	<0.01	<0.001	<0.1	100

1.A.1 CO ₂ Emissions from Stationary	CO_2	0.5	0.4	<0.01	<0.001	<0.1	100
Combustion - Geothermal Energy 1.A.4.a Non-CO ₂ Emissions from	CH₄	1.1	1.2	<0.01	<0.001	<0.1	100
Stationary Combustion - Commercial	O1 14	1.1	1.2	\0.01	10.001	٦٥.١	100
2.C.4 HFC-134a Emissions from	HFCs	0.0	0.1	< 0.01	< 0.001	<0.1	100
Magnesium Production and							
Processing							
3.F CH ₄ Emissions from Field Burning	CH ₄	0.1	0.2	<0.01	<0.001	<0.1	100
of Agricultural Residues	N O	4.0	4.0	-0.01	-0.001	-0.1	100
2.G.3 N ₂ O Emissions from Product Uses	N_2O	4.2	4.2	<0.01	<0.001	<0.1	100
2.C.5 CO ₂ Emissions from Lead	CO_2	0.5	0.5	<0.01	<0.001	<0.1	100
Production	002	0.0	0.0	10.01	10.001	٠٠.١	100
1.A.4.a Non-CO ₂ Emissions from	N_2O	0.4	0.3	< 0.01	< 0.001	<0.1	100
Stationary Combustion - Commercial							
1.A.3.a CH ₄ Emissions from Mobile	CH ₄	0.1	+	<0.01	<0.001	<0.1	100
Combustion: Aviation							
1.A.5 Non-CO ₂ Emissions from	N_2O	0.1	0.1	<0.01	<0.001	<0.1	100
Stationary Combustion - U.S. Territories							
3.F N ₂ O Emissions from Field Burning	N_2O	+	0.1	<0.01	<0.001	<0.1	100
of Agricultural Residues	1120	·	0.1	-0.01	10.001	-0.1	100
1.A.3.d N ₂ O Emissions from Mobile	N_2O	0.6	0.5	< 0.01	< 0.001	<0.1	100
Combustion: Marine							
2.B.8 CH ₄ Emissions from	CH ₄	0.2	0.3	<0.01	<0.001	<0.1	100
Petrochemical Production							
2.B.5 CH ₄ Emissions from Silicon	CH ₄	+	+	<0.01	<0.001	<0.1	100
Carbide Production and Consumption	CLI			-0.01	-0.001	-0.1	100
2.C.1 CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke	CH ₄	+	+	<0.01	<0.001	<0.1	100
Production							
1.A.5 Non-CO ₂ Emissions from	CH ₄	+	0.1	< 0.01	< 0.001	<0.1	100
Stationary Combustion - U.S.							
Territories							
1.B.2 N ₂ O Emissions from Petroleum	N_2O	+	+	<0.01	<0.001	<0.1	100
Systems		10.0	40.0	2.21	2.224	•	400
2.B.1 CO ₂ Emissions from Ammonia	CO_2	13.0	13.2	<0.01	<0.001	<0.1	100
Production 1.B.2 N ₂ O Emissions from Natural Gas	N ₂ O	+	+	<0.01	<0.001	<0.1	100
Systems	N2O	т	T	\0.01	\0.001	\0.1	100
2.C.2 CH ₄ Emissions from Ferroalloy	CH ₄	+	+	< 0.01	< 0.001	<0.1	100
Production							
2.C.4 CO ₂ Emissions from Magnesium	CO_2	+	+	<0.01	<0.001	<0.1	100
Production and Processing							
1.B.2 CO ₂ Emissions from Abandoned	CO_2	+	+	<0.01	<0.001	<0.1	100
Oil and Gas Wells	CH ₄			<0.01	<0.001	<0.1	100
1.A.5 CH ₄ Emissions from Incineration of Waste	UП4	+	+	~ U.U1	<0.001	~ U. I	100
+ Does not exceed 0.05 MMT CO2 Fa							

+ Does not exceed 0.05 MMT CO₂ Eq.

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

Table A-9: 1990-2017 Key Source Category Approach 1 and 2 Analysis—Trend Assessment, with LULUCF

CRF Source/Sink Categories	Direct Greenhouse Gas	1990 Estimate (MMT CO ₂ Eq.)	2017 Estimate (MMT CO ₂ Eq.)	Approach 1 Trend Assessment	Approach 2 Trend Assessment	% Contribution to Trend	Cumulative Total
1.A.1 CO ₂ Emissions from Stationary Combustion - Coal - Electricity Generation	CO ₂	1,546.5	1,207.1	0.05	0.004	15.7	16
1.A.3.b CO ₂ Emissions from Mobile Combustion: Road	CO ₂	1,162.2	1,504.1	0.04	0.003	15.2	31

1.A.1 CO ₂ Emissions from Stationary Combustion - Gas - Electricity	CO ₂	175.4	505.6	0.04	0.002	14.9	46
Generation 2.F Emissions from Substitutes for	Several	0.3	152.7	0.02	0.003	6.9	53
Ozone Depleting Substances	Ocverai	0.0	102.1	0.02	0.003	0.5	33
1.A.2 CO ₂ Emissions from Stationary Combustion - Coal - Industrial	CO ₂	155.2	54.4	0.01	0.002	4.6	57
1.A.1 CO ₂ Emissions from Stationary Combustion - Oil - Electricity Generation	CO ₂	97.5	18.9	0.01	0.001	3.6	61
1.A.2 CO ₂ Emissions from Stationary Combustion - Gas - Industrial	CO ₂	408.5	484.7	0.01	0.001	3.4	64
5.A CH ₄ Emissions from Landfills	CH ₄	179.6	107.7	0.01	0.004	3.3	68
2.C.1 CO ₂ Emissions from Iron and Steel Production & Metallurgical Coke Production	CO ₂	101.6	41.8	0.01	0.001	2.7	70
4.A.1 Net CO ₂ Emissions from Forest Land Remaining Forest Land	CO ₂	671.6	621.1	0.01	0.003	2.4	73
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Residential	CO ₂	97.4	53.0	0.01	<0.001	2.0	75
1.B.1 Fugitive Emissions from Coal Mining	CH ₄	96.5	55.7	0.01	0.001	1.9	77
2.B.9 HFC-23 Emissions from HCFC-22 Production	HFCs	46.1	5.2	0.01	0.001	1.9	79
4.B.1 Net CO ₂ Emissions from Cropland Remaining Cropland	CO ₂	40.9	10.3	<0.01	0.017	1.4	80
1.A.4.a CO ₂ Emissions from Stationary Combustion - Gas - Commercial	CO ₂	142.0	173.2	<0.01	<0.001	1.4	81
1.B.2 CH ₄ Emissions from Natural Gas Systems	CH ₄	193.1	165.6	<0.01	0.001	1.3	83
1.A.3.b N ₂ O Emissions from Mobile Combustion: Road	N ₂ O	37.6	12.0	<0.01	<0.001	1.2	84
3.B CH ₄ Emissions from Manure Management	CH ₄	37.1	61.7	<0.01	0.001	1.1	85
1.A.2 CO ₂ Emissions from Stationary Combustion - Oil - Industrial	CO ₂	293.7	271.5	<0.01	0.001	1.1	86
4.E.2 Net CO ₂ Emissions from Land Converted to Settlements	CO ₂	62.9	86.2	<0.01	0.001	1.0	87
2.C.3 PFC Emissions from Aluminum Production	PFCs	21.5	1.1	<0.01	<0.001	0.9	88
2.G.1 SF ₆ Emissions from Electrical Transmission and Distribution	SF ₆	23.1	4.3	<0.01	<0.001	0.9	89
1.A.4.b CO ₂ Emissions from Stationary Combustion - Oil - Commercial	CO ₂	72.6	57.7	<0.01	<0.001	0.7	90
1.A.3.a CO ₂ Emissions from Mobile Combustion: Aviation	CO ₂	187.4	173.2	<0.01	<0.001	0.7	90
1.B.2 CO ₂ Emissions from Petroleum Systems	CO ₂	9.0	23.3	<0.01	0.001	0.7	91
3.D.1 Direct N ₂ O Emissions from Agricultural Soil Management	N ₂ O	212.7	227.7	<0.01	<0.001	0.6	92
4.E.1 Net CO ₂ Emissions from Settlements Remaining Settlements	CO ₂	122.1	134.5	<0.01	0.001	0.5	92
3.A CH ₄ Emissions from Enteric Fermentation	CH ₄	164.2	175.4	<0.01	<0.001	0.5	93
1.A.4.a CO ₂ Emissions from Stationary Combustion - Coal - Commercial	CO ₂	12.0	2.0	<0.01	<0.001	0.5	93
1.A.3.e CO ₂ Emissions from Mobile Combustion: Other	CO ₂	73.2	83.0	<0.01	<0.001	0.4	93
4.B.2 Net CO ₂ Emissions from Land Converted to Cropland	CO ₂	75.6	66.9	<0.01	0.001	0.4	94
2.B.3 N ₂ O Emissions from Adipic Acid Production	N ₂ O	15.2	7.4	<0.01	<0.001	0.4	94

1.A.5 CO ₂ Emissions from Stationary	CO ₂	26.9	34.3	<0.01	<0.001	0.3	94
Combustion - Oil - U.S. Territories				0.0.			
2.B.8 CO ₂ Emissions from	CO ₂	21.2	28.2	<0.01	<0.001	0.3	95
Petrochemical Production 2.A.1 CO ₂ Emissions from Cement	CO ₂	33.5	40.3	<0.01	<0.001	0.3	95
Production	002	00.0	10.0	10.01	-0.001	0.0	00
1.A.3.d CO ₂ Emissions from Mobile	CO ₂	46.3	40.3	<0.01	<0.001	0.3	95
Combustion: Marine 2.C.3 CO ₂ Emissions from Aluminum	CO ₂	6.8	1.2	<0.01	<0.001	0.3	96
Production	002	0.0	1.2	\0.01	\0.001	0.5	30
1.A.3.e CH ₄ Emissions from Mobile	CH ₄	7.1	1.9	<0.01	<0.001	0.2	96
Combustion: Other 3.C CH ₄ Emissions from Rice	CH ₄	16.0	11.3	<0.01	<0.001	0.2	96
Cultivation	0114	10.0	11.0	40.01	10.001	0.2	30
3.B N ₂ O Emissions from Manure	N_2O	14.0	18.7	<0.01	<0.001	0.2	96
Management 1.B.2 CH ₄ Emissions from Petroleum	CH ₄	42.1	37.7	<0.01	<0.001	0.2	97
Systems	OI 14	42.1	31.1	\0.01	\0.001	0.2	31
1.A.3.b CH ₄ Emissions from Mobile	CH ₄	5.2	1.0	<0.01	<0.001	0.2	97
Combustion: Road	C.E.	F 0	4.4	٠٥.01	-0.001	0.0	07
2.C.4 SF ₆ Emissions from Magnesium Production and Processing	SF ₆	5.2	1.1	<0.01	<0.001	0.2	97
1.A.1 Non-CO ₂ Emissions from	N_2O	20.5	24.8	<0.01	<0.001	0.2	97
Stationary Combustion - Electricity							
Generation 1.B.2 CO ₂ Emissions from Natural Gas	CO ₂	30.0	26.3	<0.01	<0.001	0.2	97
Systems	002	30.0	20.5	\0.01	\0.001	0.2	31
2.A.4 CO ₂ Emissions from Other	CO_2	6.3	10.1	<0.01	<0.001	0.2	97
Process Uses of Carbonates	00	0.6	4.0	٠٥.01	-0.001	0.0	00
1.A.5 CO ₂ Emissions from Stationary Combustion - Coal - U.S. Territories	CO_2	0.6	4.0	<0.01	<0.001	0.2	98
4.A.1 CH ₄ Emissions from Forest Fires	CH ₄	1.5	4.9	<0.01	<0.001	0.2	98
1.A.5 CO ₂ Emissions from Non-Energy	CO_2	119.6	123.2	<0.01	<0.001	0.1	98
Use of Fuels	00	0.0	2.0	٠٥.01	-0.001	0.4	00
1.A.5 CO ₂ Emissions from Stationary Combustion - Gas - U.S. Territories	CO ₂	0.0	3.0	<0.01	<0.001	0.1	98
1.A.4.b CO ₂ Emissions from Stationary	CO ₂	3.0	0.0	<0.01	<0.001	0.1	98
Combustion - Coal - Residential	20	4.5	4.5	0.04	0.004	0.4	20
2.B.10 CO ₂ Emissions from Carbon Dioxide Consumption	CO_2	1.5	4.5	<0.01	<0.001	0.1	98
2.B.2 N ₂ O Emissions from Nitric Acid	N_2O	12.1	9.3	<0.01	<0.001	0.1	98
Production							
1.A.5 CO ₂ Emissions from Incineration	CO_2	8.0	10.8	<0.01	<0.001	0.1	99
of Waste 3.H CO ₂ Emissions from Urea	CO ₂	2.4	5.1	<0.01	<0.001	0.1	99
Fertilization				0.01			
1.A.4.b CO ₂ Emissions from Stationary	CO_2	237.8	241.5	<0.01	<0.001	0.1	99
Combustion - Gas - Residential 4.A.1 N ₂ O Emissions from Forest Fires	N ₂ O	1.0	3.2	<0.01	<0.001	0.1	99
5.B CH ₄ Emissions from Composting	CH ₄	0.4	2.2	<0.01	<0.001	0.1	99
5.B N ₂ O Emissions from Composting	N ₂ O	0.3	1.9	<0.01	<0.001	0.1	99
5.D N ₂ O Emissions from Wastewater	N ₂ O	3.4	5.0	<0.01	<0.001	0.1	99
Treatment	1120	0.1	0.0	0.01	0.001	0.1	00
3.G CO ₂ Emissions from Liming	CO_2	4.7	3.2	<0.01	<0.001	0.1	99
1.A.4.b Non-CO ₂ Emissions from	CH ₄	5.2	3.8	<0.01	<0.001	0.1	99
Stationary Combustion - Residential 2.A.2 CO ₂ Emissions from Lime	CO ₂	11.7	13.1	<0.01	<0.001	0.1	99
Production	OO2	11.7	13.1	~ U.U1	~ 0.001	0.1	33
2.B.10 CO ₂ Emissions from Urea	CO_2	3.8	5.0	<0.01	<0.001	0.1	99
Consumption for Non-Ag Purposes							

5.D CH ₄ Emissions from Wastewater	CH ₄	15.3	14.2	<0.01	<0.001	0.1	99
Treatment 2.E PFC, HFC, SF ₆ , and NF ₃ Emissions from Somiopoductor Manufacture	Several	3.6	4.7	<0.01	<0.001	0.1	99
from Semiconductor Manufacture 4.E.1 N ₂ O Emissions from Settlement Soils	N ₂ O	1.4	2.5	<0.01	<0.001	<0.1	100
4.A.2 Net CO ₂ Emissions from Land Converted to Forest Land	CO ₂	119.1	120.6	<0.01	<0.001	<0.1	100
1.B.1 Fugitive Emissions from Abandoned Underground Coal Mines	CH ₄	7.2	6.4	<0.01	<0.001	<0.1	100
1.A.1 Non-CO ₂ Emissions from Stationary Combustion - Electricity Generation	CH₄	0.4	1.1	<0.01	<0.001	<0.1	100
1.A.3.e N ₂ O Emissions from Mobile Combustion: Other	N_2O	2.1	2.7	<0.01	<0.001	<0.1	100
2.B.10 CO ₂ Emissions from Phosphoric Acid Production	CO ₂	1.5	1.0	<0.01	<0.001	<0.1	100
2.B.6 CO ₂ Emissions from Titanium Dioxide Production	CO ₂	1.2	1.7	<0.01	<0.001	<0.1	100
4.C.2 Net CO ₂ Emissions from Land Converted to Grassland	CO ₂	8.7	8.3	<0.01	<0.001	<0.1	100
3.D.2 Indirect N ₂ O Emissions from Applied Nitrogen	N ₂ O	39.0	38.8	<0.01	<0.001	<0.1	100
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	N ₂ O	3.1	2.7	<0.01	<0.001	<0.1	100
2.C.6 CO ₂ Emissions from Zinc Production	CO ₂	0.6	1.0	<0.01	<0.001	<0.1	100
4.A.1 N ₂ O Emissions from Forest Soils 1.B.2 CH ₄ Emissions from Abandoned	N ₂ O CH ₄	0.1 6.6	0.5 6.9	<0.01 <0.01	<0.001 <0.001	<0.1 <0.1	100 100
Oil and Gas Wells							
4.D.1 Net CO ₂ Emissions from Coastal Wetlands Remaining Coastal Wetlands	CO ₂	4.0	4.4	<0.01	<0.001	<0.1	100
2.B.7 CO ₂ Emissions from Soda Ash Production	CO ₂	1.4	1.8	<0.01	<0.001	<0.1	100
1.A.4.b Non-CO ₂ Emissions from Stationary Combustion - Residential	N ₂ O	1.0	0.8	<0.01	<0.001	<0.1	100
2.B.4 N ₂ O Emissions from Caprolactam, Glyoxal, and Glyoxylic Acid Production	N ₂ O	1.7	1.4	<0.01	<0.001	<0.1	100
4.C.1 N ₂ O Emissions from Grass Fires	N_2O	0.1	0.3	<0.01	<0.001	<0.1	100
1.A.3.d CH ₄ Emissions from Mobile Combustion: Marine	CH ₄	0.6	0.3	<0.01	<0.001	<0.1	100
4.C.1 CH ₄ Emissions from Grass Fires	CH₄	0.1	0.3	<0.01	<0.001	<0.1	100
2.A.3 CO ₂ Emissions from Glass Production	CO ₂	1.5	1.3	<0.01	<0.001	<0.1	100
2.H.1 N₂O Emissions from Semiconductor Manufacture	N ₂ O	+	0.2	<0.01	<0.001	<0.1	100
1.A.2 Non-CO ₂ Emissions from Stationary Combustion - Industrial	CH ₄	1.8	1.6	<0.01	<0.001	<0.1	100
2.B.5 CO ₂ Emissions from Silicon Carbide Production and Consumption	CO ₂	0.4	0.2	<0.01	<0.001	<0.1	100
2.C.2 CO ₂ Emissions from Ferroalloy Production	CO ₂	2.2	2.0	<0.01	<0.001	<0.1	100
4.D.4 CH ₄ Emissions from Coastal Wetlands Remaining Coastal	CH ₄	3.4	3.6	<0.01	<0.001	<0.1	100
Wetlands 1.3.A.a N ₂ O Emissions from Mobile Combustion: Aviation	N ₂ O	1.7	1.6	<0.01	<0.001	<0.1	100
1.A.5 N ₂ O Emissions from Incineration of Waste	N ₂ O	0.5	0.3	<0.01	<0.001	<0.1	100

1.A.1 CO ₂ Emissions from Stationary	CO_2	0.5	0.4	<0.01	<0.001	<0.1	100
Combustion - Geothermal Energy 1.A.4.a Non-CO ₂ Emissions from	CH ₄	1.1	1.2	<0.01	<0.001	<0.1	100
Stationary Combustion - Commercial							
2.B.1 CO ₂ Emissions from Ammonia Production	CO ₂	13.0	13.2	<0.01	<0.001	<0.1	100
2.C.4 HFC-134a Emissions from Magnesium Production and	HFCs	0.0	0.1	<0.01	<0.001	<0.1	100
Processing	OU	0.4	0.0	-0.04	-0.004	-0.4	400
3.F CH ₄ Emissions from Field Burning of Agricultural Residues	CH ₄	0.1	0.2	<0.01	<0.001	<0.1	100
2.C.5 CO ₂ Emissions from Lead Production	CO ₂	0.5	0.5	<0.01	<0.001	<0.1	100
1.A.4.a Non-CO ₂ Emissions from	N_2O	0.4	0.3	<0.01	<0.001	<0.1	100
Stationary Combustion - Commercial 2.G.3 N ₂ O Emissions from Product Uses	N_2O	4.2	4.2	<0.01	<0.001	<0.1	100
1.A.5 Non-CO ₂ Emissions from Stationary Combustion - U.S.	N ₂ O	0.1	0.1	<0.01	<0.001	<0.1	100
Territories 1.A.3.a CH ₄ Emissions from Mobile	CH ₄	0.1	+	<0.01	<0.001	<0.1	100
Combustion: Aviation	O1 14	0.1	,	٧٥.٥١	\0.001	٧٠.١	100
3.F N ₂ O Emissions from Field Burning	N_2O	+	0.1	<0.01	<0.001	<0.1	100
of Agricultural Residues 2.B.8 CH ₄ Emissions from	CH ₄	0.2	0.3	<0.01	<0.001	<0.1	100
Petrochemical Production				0.01	0.001	0. 1	100
1.A.3.d N ₂ O Emissions from Mobile Combustion: Marine	N_2O	0.6	0.5	<0.01	<0.001	<0.1	100
2.B.5 CH ₄ Emissions from Silicon	CH ₄	+	+	<0.01	<0.001	<0.1	100
Carbide Production and Consumption 1.A.5 Non-CO ₂ Emissions from	CH ₄		0.1	<0.01	<0.001	<0.1	100
Stationary Combustion - U.S. Territories	CH4	+	0.1	<0.01	<0.001	<0.1	100
2.C.1 CH ₄ Emissions from Iron and Steel Production & Metallurgical Coke Production	CH ₄	+	+	<0.01	<0.001	<0.1	100
4.D.1 N ₂ O Emissions from Coastal Wetlands Remaining Coastal	N ₂ O	0.1	0.1	<0.01	<0.001	<0.1	100
Wetlands 1.B.2 N ₂ O Emissions from Natural Gas Systems	N_2O	+	+	<0.01	<0.001	<0.1	100
1.B.2 N₂O Emissions from Petroleum	N ₂ O	+	+	<0.01	<0.001	<0.1	100
Systems 2.C.2 CH ₄ Emissions from Ferroalloy	CH ₄	+	+	<0.01	<0.001	<0.1	100
Production	CH ₄			<0.01	<0.001	<0.1	100
4.D.4 CH ₄ Emissions from Peatlands Remaining Peatlands	СП4	+	+				100
2.C.4 CO ₂ Emissions from Magnesium Production and Processing	CO ₂	+	+	<0.01	<0.001	<0.1	100
1.B.2 CO ₂ Emissions from Abandoned Oil and Gas Wells	CO ₂	+	+	<0.01	<0.001	<0.1	100
4.A.4 N ₂ O Emissions from Drained	N_2O	0.1	0.1	<0.01	<0.001	<0.1	100
Organic Soils 4.D.4 N ₂ O Emissions from Peatlands Remaining Peatlands	N_2O	+	+	<0.01	<0.001	<0.1	100
4.D.2 Net CO ₂ Emissions from Land	CO_2	+	+	<0.01	<0.001	<0.1	100
Converted to Wetlands 4.D.4 CH ₄ Emissions from Land	CH ₄	+	+	<0.01	<0.001	<0.1	100
Converted to Coastal Wetlands				-0.04	-0.004	.O. 4	400
4.A.4 CH ₄ Emissions from Drained Organic Soils	CH ₄	+	+	<0.01	<0.001	<0.1	100

1.A.5 CH ₄ Emissions from Incineration	CH ₄	+	+	< 0.01	< 0.001	<0.1	100
of Wasto							

⁺ Does not exceed 0.05 MMT CO₂ Eq.

References

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