ANNEX 5 Assessment of the Sources and Sinks of Greenhouse Gas Emissions Not Included

Although this report is intended to be a comprehensive assessment of anthropogenic[116] sources and sinks of greenhouse gas emissions for the United States, certain sources have been identified but not included in the estimates presented for various reasons. Before discussing these sources and sinks, it is important to note that processes or activities that are not *anthropogenic in origin* or do not result in a *net source or sink* of greenhouse gas emissions are intentionally excluded from a national inventory of anthropogenic greenhouse gas emissions, in line with guidance from the IPCC in their guidelines for national inventories.

The anthropogenic source and sink category of greenhouse gas emissions described in this annex are not included in the United States national inventory estimates. The reasons for not including that source in the national greenhouse gas Inventory include one or more of the following:

- Emissions are not likely to occur within the United States.
- A methodology for estimating emissions from a source does not currently exist.
- Though an estimating method has been developed, adequate data are not available to estimate emissions.
- Emissions are determined to be insignificant in terms of overall national emissions, as defined per UNFCCC reporting guidelines, based on available data or a preliminary assessment of significance. Further, data collection to estimate emissions would require disproportionate amount of effort (e.g., dependent on additional resources and impacting improvements to key categories, etc.).

In general, data availability remains the main constraint for estimating and including the emissions and removals from source and sink categories discussed below. Methods to estimate emissions and removals from these categories were introduced with *2006 IPCC Guidelines*. Also, many of the categories discussed are determined to be insignificant in terms of overall national emissions based on qualitative information on activity levels per national circumstances, expert judgment, and available proxy information, and not including them introduces a very minor bias.

Reporting of inventories to the UNFCCC under Decision 24/CP.19 states that "Where methodological or data gaps in inventories exist, information on these gaps should be presented in a transparent manner." Furthermore, these reporting guidelines allow a country to indicate if a disproportionate amount of effort would be required to collect data for a gas from a specific category that would be insignificant in terms of the overall level and trend in national emissions.[117] Specifically, where the notation key "NE," meaning not estimated, is used in the Common Reporting Format (CRF)[118] tables that accompany this Inventory report submission to the UNFCCC, countries are required to further describe why such emissions or removals have not been estimated (UNFCCC 2013).

Based on the latest UNFCCC reporting guidance, the United States is providing more information on the significance of these excluded categories below and aims to update information on the significance to the extent feasible during each annual compilation cycle. Data availability may impact the feasibility of undertaking a quantitative significance assessment. The United States is continually working to improve the understanding of such sources or sinks and seeking to find the data required to estimate related emissions, prioritizing efforts and resources for significant categories. As such improvements are implemented, new emission and removal categories will be quantified and included in the Inventory to enhance completeness of the Inventory.

The full list of sources and sink categories not estimated, along with explanations for their exclusion, is provided in Table 9 of the CRF submission. Information on coverage of activities within the United States and its territories is provided within the sectoral chapters and category-specific estimate discussions and will be updated further in this Annex in the next Inventory (i.e., 2020 submission).

[116] The term "anthropogenic," in this context, refers to greenhouse gas emissions and removals that are a direct result of human activities or are the result of natural processes that have been affected by human activities (*2006 IPCC Guidelines for National Greenhouse Gas Inventories*).

[117] Paragraph 37(b) of Decision 24/CP.19 "Revision of the UNFCCC reporting guidelines on annual inventories for Parties included in Annex I to the Convention." See <http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf>.

[118] See <http://unfccc.int/national_reports/annex_i_ghg_inventories/reporting_requirements/items/2759.php>.

Source and Sink Categories Not Estimated

The following section is arranged by sector and source or sink category, providing additional information on the reasons the category was not estimated. Per 37(b) of the UNFCCC Reporting Guidelines Decision 24/CP.19, considering overall level and trend of U.S. emissions, the threshold for significance for estimating emissions from a specific category is 500 kt CO_2.

Energy

CRF Category 1.A.3: CH_4 and N_2O Emissions from Transport Fuel Combustion—Biomass

Emissions from biomass fuel use in domestic aviation (1.A.3.a), motorcycles (1.A.3.b.iv), railways (1.A.3.c), and domestic navigation (1.A.3.d) are not currently estimated. EPA has determined that the use of biodiesel in rail and navigation was likely insignificant.

Emissions from ethanol mixed with gasoline in low blends are included in the on-road gasoline emissions for motorcycles. If there is any use of high blend ethanol fuel in motorcycles, it is likely insignificant.

Prior to 2011, no biobased jet fuel was assumed to be used for domestic aviation. Between 2011 and 2015, 22 airlines have performed over 2,500 commercial passenger flights with blends of up to 50 percent biojet fuel. Furthermore, several airlines have concluded long-term offtake agreements with biofuel suppliers.[119] An analysis was conducted based on the total annual volumes of fuels specified in the long-term agreements. Emissions of N_2O were estimated based on the factors for jet fuel combustion, and as for jet fuel use in commercial aircraft, contributions of methane (CH_4) emissions are reported as zero. It was determined that annual non-CO_2 greenhouse gas emissions from the volume of fuel used would be 16.4 kt CO_2 Eq. per year, so considered insignificant for the purposes of inventory reporting under the UNFCCC.

CRF Category 1.A.3.d: CO_2 Emissions from Domestic Navigation—Gaseous Fuels

Emissions from gaseous fuels use in domestic navigation are not currently estimated. Gaseous fuels are used in liquid natural gas (LNG) tankers and are being demonstrated in a small number of other ships. Data are not available to characterize these uses currently.

CRF Category 1.A.3.e.i: CO_2, CH_4, and N_2O Emissions from Liquid Fuels and CH_4 and N_2O Emissions from Gaseous Fuels in Other Transportation—Pipeline Transport

Use of liquid fuels to power pipeline pumps is uncommon, but has occurred. Data for fuel used in various activities including pipelines are based on survey data conducted by the U.S. Energy Information Association (EIA). From January 1983 through December 2009, EIA Survey data including information on liquid fuel used to power pipelines, it was reported in terms of crude oil product supplied. Reporting of crude oil used for this purpose was discontinued after December 2009. Beginning with data for January 2010, product supplied for pipeline fuel is assumed to equal zero. 1997 was the last year of data reported on pipeline fuel. Taking the data reported for 1997 of 797,000 barrels of crude oil and using conversion factors of 5.8 MMBtu/bbl and 20.21 MMT C/Qbtu results in emissions of 342.6 kt CO_2.

CO_2 emissions from gaseous fuels used as pipeline transport fuel are estimated in the Inventory, however CH_4 and N_2O emissions from gaseous pipeline fuel use have not been estimated. The CO_2 / non-CO_2 emissions split for other natural gas combustion can be used to estimate emissions. Based on that analysis, non-CO_2 emissions represent approximately 0.43 percent of CO_2 emissions from natural gas combustion. If that percentage is applied to CO_2 emissions from natural gas use as pipeline fuel, it results in an emissions estimate of 179.6 kt CO_2 Eq. in 2017.

CRF Category 1.A.3.e.ii: CH_4 and N_2O Emissions from Biomass in Other Transportation—Non-Transportation Mobile

Biomass based fuels used in non-transportation mobile applications are currently not estimated. The use of biofuels in non-transportation mobile applications is insignificant and there are no readily available data sources to estimate it.

CRF Category 1.A.5.a: CO_2 Emissions from Medical Waste Incineration

Waste incineration of the municipal waste stream and hazardous waste incineration of fossil fuel-derived materials are reported in two sections of the Energy chapter of the Inventory, specifically in the section on CO_2 emissions from waste incineration, and in the calculation of emissions and storage from non-energy uses of fossil fuels.

[119] See : <https://www.iata.org/pressroom/facts_figures/fact_sheets/Documents/fact-sheet-alternative-fuels.pdf>.

In the calculation of emissions and storage from non-energy uses of fossil fuels, there is an energy recovery component that includes emissions from waste gas; waste oils, tars, and related materials from the industrial sector. While this is not a comprehensive inclusion of hazardous industrial waste, it does capture a subset.

Furthermore, a conservative analysis was conducted based on a study of hospital/medical/infectious waste incinerator (HMIWI) facilities in the United States[120] showing that medical waste incineration emissions could be considered insignificant. The analysis was based on assuming the total amount of annual waste throughput was of fossil origin and an assumption of 68.9 percent carbon composition of the waste. It was determined that annual greenhouse gas emissions for medical waste incineration are approximately 333 kt CO_2 Eq. per year, so considered insignificant for the purposes of inventory reporting under the UNFCCC.[121]

CRF Category 1.A.5.a: CH_4 and N_2O Emissions from Stationary Fuel Combustion—Biomass in U.S. Territories

Data are not available to estimate emissions from biomass in U.S. Territories. However, biomass consumption is likely small in comparison with other fuel types. An estimate of non-CO_2 emissions from biomass fuels used in Territories can be made based on assuming the same ratio of domestic biomass non-CO_2 emissions to fossil fuel CO_2 emissions. Non-Territories data indicate that biomass non-CO_2 emissions represents 0.2 percent of fossil fuel combustion CO_2 emissions. Appling this same percentage to U.S. Territories fossil fuel combustion CO_2 emissions results in 74.8 kt CO_2 Eq. emissions from biomass in U.S. Territories.

CRF Category 1.B.1.a.1.i and 1.B.1.a.1.ii: CO_2 from Fugitive Emissions from Underground Coal Mining Activities and Post-Mining Activities

A preliminary analysis by EPA determined that CO_2 emissions for active underground coal mining activities are negligible. Applying a CO_2 emission rate as a percentage of CH_4 emissions for active coal mines results in a national emission estimate below 500 kt CO_2 Eq. per year or 0.05 percent of national emissions. Future inventories may quantify these emissions, if it is deemed it will not require a disproportionate amount of effort.

CRF Category 1.B.1.a.1.iii: CO_2 from Fugitive Emissions from Abandoned Underground Coal Mines

A preliminary analysis by EPA determined that CO_2 emissions for abandoned underground coal mining activities are negligible. Applying a CO_2 emission rate as a percentage of CH_4 emissions for abandoned coal mines results in a national emission estimate below 500 kt CO_2 Eq. per year or 0.05 percent of national emissions. Future inventories may quantify these emissions, if it is deemed it will not require a disproportionate amount of effort.

CRF Category 1.B.1.a.2.i and 1.B.1.a.2.ii: CO_2 from Fugitive Emissions from Surface Coal Mining Activities and Post-Mining Activities

A preliminary analysis by EPA determined that CO_2 emissions for active surface coal mining activities are negligible. Applying a CO_2 emission rate as a percentage of CH_4 emissions for active coal mines results in a national emission estimate below 500 kt CO_2 Eq. per year or 0.05 percent of national emissions. Future inventories may quantify these emissions, if it is deemed it will not require a disproportionate amount of effort.

CRF Category 1.B.2.a.5: CO_2 and CH_4 from Fugitive Emissions from the Distribution of Oil

Emissions from the distribution of oil products are not currently estimated due to lack of available emission factors.

Industrial Processes and Product Use

CRF Category 2.A.4.a: CO_2 Emissions from Process Uses of Carbonates–Ceramics

Data are not currently available to estimate emissions from this source. During the Expert Review process, EPA sought expert solicitation on data for carbonate consumption in the ceramics industry but has yet to identify data sources to apply Tier 1 methods.

[120] RTI 2009. Updated Hospital/Medical/Infectious Waste Incinerator (HMIWI) Inventory Database.

[121] Paragraph 37(b) of Decision 24/CP.19 "Revision of the UNFCCC reporting guidelines on annual inventories for Parties included in Annex I to the Convention." See <http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf>.

CRF Category 2.A.4.c: CO_2 Emissions from Process Uses of Carbonates–Non-metallurgical Magnesium Production

Data are not currently available to estimate emissions from this source. During the Expert Review process, EPA sought expert solicitation on data for non-metallurgical magnesium production but has yet to identify data sources to apply Tier 1 methods.

CRF Category 2.B.4.b: CO_2 and N_2O Emissions from Glyoxal Production

Glyoxal production data are not readily available to estimate emissions from this source to apply Tier 1 methods. EPA continues to conduct basic outreach to relevant trade associations and reviewing potential databases that can be purchased and contain the necessary data. Progress on outreach will be included in next Inventory (i.e., 1990 through 2018 report).

CRF Category 2.B.4.c: CO_2 and N_2O Emissions from Glyoxylic Acid Production

Glyoxylic acid production data are currently not available to estimate emissions from this source to apply Tier 1 methods. EPA is conducting basic outreach to relevant trade associations reviewing potential databases that can be purchased and contain the necessary data. Progress on outreach will be included in next Inventory (i.e., 1990 through 2018 report).

CRF Category 2.C.1.c: CH_4 Emissions from Direct Reduced Iron (DRI) Production

Data on fuel consumption used in the production of DRI are not readily available to apply the IPCC default Tier 1 CH_4 emission factor or develop any proxy analysis. The emissions are assumed to be insignificant but this analysis will be updated in future Inventory submissions to quantitatively justify emissions reporting as "not estimated." Neither the emissions or underlying activity data are reported to EPA through the facility-level mandatory Greenhouse Gas Reporting Program (GHGRP).

CRF Category 2.E.1: HFC-32, HFC-41, HFC-134, HFC-134a, HFC-152, and HFC-152a Emissions from Electronics Industry–Semiconductor Manufacture

The combined emissions of HFC-32, HFC-41 and HFC-134a reported by facilities manufacturing semiconductors ranged from 0.00037 to 0.00088 MMT CO_2 Eq. from 2011 to 2017; they were equivalent to 0.00001 percent to 0.00003 percent of U.S. total emissions in 2011 to 2017. These emissions could be estimated for the full time series (including prior to the GHGRP); however, at this time the contribution to total emissions is not significant enough to warrant the development of the methodologies that would be necessary to backcast these emissions to 1990 and estimate emissions for non-reporters for 2011 through 2017. Emissions of HFC-134, HFC-152, and HFC-152a are only reported as emissions from use as heat transfer fluids, which are accounted for under CRF Category 2.E.4 Heat Transfer Fluid.

CRF Category 2.E.2, 2.E.3, and 2.E.5: Fluorinated Gas Emissions from Electronics Industry—TFT Flat Panel Displays, Photovoltaics, and Micro-Electro-Mechanical Devices

In addition to requiring reporting of emissions from semiconductor manufacturing, EPA's GHGRP requires the reporting of emissions from other types of electronics manufacturing, including micro-electro-mechanical systems (MEMs), flat panel displays, and photovoltaic cells. There currently are three MEMs manufacturers (that report emissions for semiconductor and MEMs manufacturing separately), and no flat panel displays manufacturing facilities reporting to EPA's GHGRP. One photovoltaic cell manufacturer previously reported to the GHGRP. Emissions from MEMs and photovoltaic cell manufacturing could be included in totals in future Inventory reports–currently they are not represented in Inventory emissions totals for electronics manufacturing. These emissions could be estimated for the full time series (including prior to the GHGRP) and for MEMS and photovoltaic cell manufacturers that are not reporting to the GHGRP; however, at this time the contribution to total emissions is not significant enough to warrant the development of the methodologies that would be necessary to backcast these emissions to 1990 and estimate emissions for non-reporters for 2011 through 2017. The emissions reported by facilities manufacturing MEMs ranged from 0.0038 to 0.0171 MMT CO_2 Eq. from 2011 to 2017; they were equivalent to 0.0001 percent to 0.0003 percent of U.S. total emissions in 2011 to 2017. Similarly, emissions from manufacturing of photovoltaic cells were equivalent to only 0.0001 percent and 0.0002 percent of U.S. total emissions in 2015 and 2016, respectively. No emission from manufacturing of photovoltaic cells were reported to EPA's GHGRP in 2017. The available data and estimates indicate these emissions are well below the significance threshold.

CRF Category 2.G: SF_6 and PFC Emissions from Other Product Use

Emissions of SF_6 occur from particle accelerators and military applications. Emissions from some particle accelerators and from military applications are reported by the U.S. government to the Federal Energy Management Program

along with emissions of other fluorinated greenhouse gases (e.g., HFCs from mobile and stationary air conditioning) as a single total under the category "Fugitive Fluorinated Gases and Other Fugitive Emissions." EPA is reviewing reported emissions and methods used by reporters for consistency with IPCC guidelines, but a preliminary review indicates that in 2017, the total for this category was 1.8 million metric tons of CO_2 Eq. (or 1,800 kt CO_2 Eq.) suggesting this source may be significant. If this total consisted exclusively of SF_6, which is known not to be the case, it would represent approximately 25 percent of total U.S. SF_6 emissions. EPA is planning to investigate these emissions further to determine the fraction of them that actually consist of SF_6.

Agriculture

CRF Category 3.A.4: CH_4 Emissions from Enteric Fermentation—Camels

Enteric fermentation emissions from camels are not estimated because there is no significant population of camels in the United States. Due to limited data availability (no population data are available from the Agricultural Census), the estimates are based on use of IPCC defaults and population data from Baum, Doug (2010).[122] Based on this paper, a Tier 1 estimate of enteric fermentation CH_4 emissions from camels results in a value of approximately 2.8 kt CO_2 Eq. per year from 1990 to 2017. Given insignificance of these emissions in terms of the overall level and trend in national emissions, there are no immediate improvement plans to include this emission category.

CRF Category 3.A.4: CH_4 Emissions from Enteric Fermentation—Poultry

No IPCC method has been developed for determining enteric fermentation CH_4 emissions from poultry. Based on expert input, developing of a country-specific method would require a disproportionate amount of resources given the magnitude of this source category.

CRF Category 3.B.1.4 and 3.B.2: CH_4 and N_2O Emissions from Manure Management—Camels

Manure management emissions from camels are not estimated because there is no significant population of camels in the United States.[123] Due to limited data availability and disproportionate effort to collect [time-series] data (i.e., no population data is available from the Agricultural Census), this estimate is based on population data from Baum, Doug (2010).[124] Based on this paper, a Tier 1 estimate of manure management CH_4 and N_2O emissions from camels results in values between approximately 0.14 kt CO_2 Eq. per year from 1990 to 2016. Given insignificance of these emissions in terms of the overall level and trend in national emissions, there are no immediate improvement plans to include this emission category.

CRF Category 3.F.1.4 and 3.F.4: CH_4 and N_2O Emissions from Field Burning of Agricultural Residues—Rye and Sugarcane

Remote sensing data were used in combination with a resource survey to estimate non-CO_2 emissions from agricultural residue burning. These data did not allow identification of burning of sugarcane or rye. This potential gap in the activity data will be re-evaluated in a future inventory using other datasets.

Land Use, Land-Use Change, and Forestry

CRF Category 4.A(II): Emissions from Rewetted Organic and Mineral Soils in Forest Land

Emissions from this source will be estimated in future Inventories when data necessary for classifying the area of rewetted organic and mineral soils become available. Work is underway to assemble these data in collaboration with the U.S. Geological Survey, which has developed a surface water layer remote sensing product spanning the inventory time series and that may be useful in identifying areas where organic and mineral soils have been drained and then rewetted.

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[122] *The status of the camel in the United States and America*. Available online at: <https://www.soas.ac.uk/camelconference2011/file84331.pdf>.

[123] Paragraph 37(b) of Decision 24/CP.19 "Revision of the UNFCCC reporting guidelines on annual inventories for Parties included in Annex I to the Convention." See <http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf>.

[124] *The status of the camel in the United States and America*. Available online at: <https://www.soas.ac.uk/camelconference2011/file84331.pdf>.

CRF Category 4.A(III): Direct N_2O Emissions from N mineralization/immobilization in *Forest Land Remaining Forest Land*

Direct N_2O emissions from N mineralization/immobilization associated with loss or gain of soil organic matter resulting from change of land use or management of mineral soils will be estimated in a future Inventory. They are not estimated currently because resources have limited EPA's ability to use the available data on soil carbon stock changes on forest lands to estimate these emissions.

CRF Category 4.B(II): CO_2, CH_4, and N_2O Emissions and Removals from Drainage and Rewetting and Other Management of Organic and Mineral Soils in Cropland

Emissions of CO_2 and CH_4 from rewetting on mineral or organic cropland soils are not currently estimated due to lack of activity data on rewetting, except for CH_4 emissions from drainage and rewetting for rice cultivation. Work is underway to assemble these data in collaboration with the U.S. Geological Survey, which has developed a surface water layer remote sensing product spanning the inventory time series that may be useful in identifying areas where organic and mineral soils have been drained and then rewetted.

CRF Category 4.B.1: Carbon Stock Change in Living Biomass in *Cropland Remaining Cropland*

Carbon stock change in living biomass is not estimated because data are currently not available. The impact of management on biomass C is currently under investigation for agroforestry management and will be included in a future Inventory if stock changes are significant and activity data can be compiled for this source.

CRF Category 4.B.1(V): CO_2 Emissions from Biomass Burning in *Cropland Remaining Cropland*— Wildfires and Controlled Burning

The CO_2 emissions for from controlled burning of crop biomass are not estimated as they are part of the annual cycle of C and not considered net emissions. Methane and N_2O emissions are included under 3.F Field Burning of Agricultural Residues. Emissions from wildfires are not estimated because the activity data on fire area and fuel load, particularly for perennial vegetation, are not available.

CRF Category 4.B.2: Carbon Stock Change in Living Biomass in *Grassland Converted to Cropland*

Carbon stock change in living biomass is not estimated because data are currently not available. Similar to CRF Category 4.B.1, the changes in biomass C are under investigation for agroforestry and will be included in a future Inventory if the necessary activity data can be compiled.

CRF Category 4.B.2(V): CO_2, CH_4, and N_2O Emissions from Biomass Burning in *Land Converted to Cropland*— Wildfires and Controlled Burning

Methane and N_2O emissions from controlled burning of crop biomass on land converted to cropland are included under 3.F Field Burning of Agricultural Residues. Carbon dioxide emissions from the burning of crop biomass are not estimated as they are part of the annual cycle of C and not considered net emissions. Emissions from wildfires are not estimated because the activity data on fire area and fuel, particularly for perennial vegetation, are not available.

CRF Category 4.C(II): CO_2, CH_4, and N_2O Emissions and Removals from Drainage and Rewetting and Other Management of Organic and Mineral Soils in Grassland

Emissions of CO_2 and CH_4 from rewetting on mineral or organic Grassland soils are not currently estimated due to lack of activity data on rewetting. Work is underway to assemble these data in collaboration with the U.S. Geological Survey, which has developed a surface water layer remote sensing product spanning the inventory time series that may be useful in identifying areas where organic and mineral soils have been drained and then rewetted.

CRF Category 4.C.1: Carbon Stock Change in Living Biomass in *Grassland Remaining Grassland*

Carbon stock change in living biomass is not estimated because data are currently not available. Woodlands occur in grasslands because these woodland areas do not meet the definition of forest lands. A method is under development to estimate the C stock changes for these areas, particularly in the Western United States, and will be include in a future Inventory (see Planned Improvements of Section 6.6 of *Grassland Remaining Grassland* and Box 6-6).

CRF Category 4.C.1(V) and 4.C.2(V): CO_2, CH_4, and N_2O Emissions from Biomass Burning in *Grassland Remaining Grassland* and *Land Converted to Grassland*—Wildfires and Controlled Burning

Due to lack of data on perennial biomass on grasslands, carbon dioxide emissions from biomass burning in *Grassland Remaining Grassland* are not estimated with the Tier 1 method since only annual, not perennial, vegetation is included in the estimate. Methane and N_2O emissions from wildfires are reported under 4.C.1 4(V) Grassland Remaining Grassland Biomass Burning.

CRF Category 4.D(II): CO_2, CH_4, and N_2O Emissions and Removals from Drainage and Rewetting and Other Management of Organic and Mineral Soils in Wetlands—Flooded Lands and Peat Extraction Lands

Data are currently not available to estimate emissions.

CRF Category 4.D.1(V) and 4.D.2(V): CO_2, CH_4, and N_2O Emissions from Biomass Burning in *Wetlands Remaining Wetlands* and *Land Converted to Wetlands* —Wildfires and Controlled Burning

Data are not currently available to estimate emissions.

CRF Category 4.D.1.2: Carbon Stock Change in *Flooded Land Remaining Flooded Land*

Carbon stock changes in flooded land remaining flooded land are not estimated due to lack of activity data, other than for peatlands and coastal wetlands. See the Wetlands Chapter in the Inventory Report.

CRF Category 4.E: CO_2, CH_4, and N_2O Emissions from Biomass Burning in Settlements

Data are currently not available to estimate emissions.

CRF Category 4.E.1: Direct N_2O Emissions from Nitrogen Mineralization/Immobilization in *Settlements Remaining Settlements*

Activity data not available on N_2O emissions from nitrogen mineralization/immobilization in settlements as a result of soil organic carbon stock losses from land use conversion and management.

CRF Category 4.E.2: Direct N_2O Emissions from Nitrogen Mineralization/Immobilization in *Land Converted to Settlements*

Data are not available on N_2O emissions from nitrogen mineralization/immobilization in Land Converted to Settlements as a result of soil organic carbon stock losses from land use conversion and management.

CRF Category 4.F: CO_2, CH_4, and N_2O Emissions from Biomass Burning in Other Land

Data are currently not available to estimate emissions.

Waste

CRF Category 5.A.1.a: CH_4 and N_2O Emissions from Solid Waste Disposal/Managed Waste Disposal Sites-Anaerobic

The amount of CH_4 flared and the amount of CH_4 for energy recovery is not estimated for the years 2005 through 2017 in the time series. The amount of CH_4 flared and recovered for 2005 and each subsequent Inventory year, i.e. through 2017, is included in the net CH_4 emissions estimates. A methodological change was made for 2005 to the current Inventory year to use the directly reported net CH_4 emissions from the EPA's GHGRP versus estimate CH_4 generation and recovery. See the Methodology explanation in Section 7.1.

CRF Category 5.B.1.a: CH_4 and N_2O Emissions from Biological Treatment of Solid Waste/Composting – Municipal Solid Waste

The amount of CH_4 flared at composting sites is not estimated due to a lack of activity data.

CRF Category 5.B.2.a: CH_4 and N_2O Emissions from Biological Treatment of Solid Waste – Anaerobic Digestion at Biogas Facilities – Municipal Solid Waste and Other

Methane and N_2O emissions from anaerobic digestion of municipal solid waste at biogas facilities are not currently estimated. Basic research was initiated that indicate some activity for this category is occurring in the United

States, but EPA needs to conduct further research on available multi-year activity data to create a time series. Initial data for 2015 indicates emissions of 7.8 kt of CH_4. Pending additional resources, EPA will continue researching availability of activity data and feasibility to report these emissions and report on progress in future Inventory submissions.

CRF Category 5.D.2: N_2O Emissions from Wastewater Treatment and Discharge—Industrial Wastewater

Nitrous oxide emissions from stand-alone industrial wastewater treatment are not currently estimated. Per section 6.3.4 of *2006 IPCC Guidelines*: "The methodology does not include N_2O emissions from industrial sources, except for industrial wastewater that is co-discharged with domestic wastewater into the sewer system. The N_2O emissions from industrial sources are believed to be insignificant compared to emissions from domestic wastewater."

In addition, the amount of CH_4 flared and the amount for energy recovery were not estimated due to a lack of available activity data.

Assessment of Aggregated Not Estimated Emission Sources and Sinks

A summary of these exclusions, including the estimated level of emissions where feasible, is included in Table A-247. Collectively, per paragraph 37(b) of the UNFCCC Reporting Guidelines noted above, these exclusions should not exceed 0.1 percent of gross emissions, or 64.6 MMT CO_2 Eq. (64,567 kt CO_2 Eq).

Table A-247: Summary of Sources and Sinks Not Included in the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2017

CRF Category Number	Source/Sink Category	Sub-Category	Gas(es)	Estimated 2017 Emissions (kt CO_2 Eq.)	Reason for Exclusion
Energy					
1.A Fossil Fuel Combustion					
1.A.3.a	Transport	Domestic Aviation-Biomass	N_2O	+	Data availability
1.A.3.b.iv	Transport	Motorcycles-Biomass	CH_4 and N_2O	NA	Data availability
1.A.3.c	Transport	Railways-Biomass	CH_4 and N_2O	NA	Data availability
1.A.3.d	Transport	Domestic Navigation-Biomass	CH_4 and N_2O	NA	Data availability
1.A.3.d	Transport	Domestic Navigation—Gaseous Fuels	CO_2	NA	Data availability
1.A.3.e.i	Other Transportation	Pipeline Transport—Liquid Fuels	CO_2, CH_4 and N_2O	343	Data availability
1.A.3.e.i	Other Transportation	Pipeline Transport—Gaseous Fuels	CO_2, CH_4 and N_2O	180	Data availability
1.A.3.e.ii	Other Transportation	Non-Transportation Mobile-Biomass	CH_4 and N_2O	NA	Data availability
1.A.5.a	Incineration of Waste	Medical Waste Incineration	CO_2	333	Data availability
1.A.5.a	Stationary Fuel Combustion	Biomass in U.S. Territories	CH_4 and N_2O	75	Data availability
1.B Fugitive Emissions from Fuels					
1.B.1.a.1.i, 1.B.1.a.1.ii	Underground Mines	Fugitive Emissions from Underground Coal Mining Activities and Post-Mining Activities	CO_2	NA	Emissions negligible
1.B.1.a.1.iii	Abandoned Underground Coal Mines	Fugitive Emissions from Abandoned Underground Coal Mines	CO_2	NA	Emissions negligible
1.B.1.a.2	Surface Mines	Fugitive Emissions from Surface Coal Mining Activities and Post-Mining Activities	CO_2	NA	Emissions negligible
1.B.2.a.5	Oil	Distribution of Oil Products	CO_2 and CH_4	NA	Lack of emission factor data
Industrial Processes and Product Use					
2.A Mineral Industry					
2.A.4.a	Other Process Uses of Carbonates	Ceramics	CO_2	NA	Data availability
2.A.4.c	Other Process Uses of Carbonates	Non-metallurgical Magnesium Production	CO_2	NA	Data availability
2.B. Chemical Industry					
2.B.4.b	Glyoxal Production		CO_2 and N_2O	NA	Data availability
2.B.4.c	Glyoxylic Acid Production		CO_2 and N_2O	NA	Data availability
2.C. Metal Industry					
2.C.1.c	Iron and Steel Production	Direct Reduced Iron (DRI) Production	CH_4	NA	Data availability
2.E Electronics Industry					
2.E.1	Fluorinated Gas Emissions from Electronics Industry	Semiconductor Manufacture	HFC -32, HFC-41, HFC-134, HFC-134a, HFC-152, and HFC-152a	1	Data availability

2.E.2	Fluorinated Gas Emissions from Electronics Industry	TFT Flat Panel Displays	HFCs, PFCs, SF_6, and NF_3	NA	Data availability
2.E.3	Fluorinated Gas Emissions from Electronics Industry	Photovoltaics	HFCs, PFCs, SF_6, and NF_3	NA	Data availability
2.E.5	Fluorinated Gas Emissions from Electronics Industry	MEMs	HFCs, PFCs, SF_6, and NF_3	17	Data availability
2.G Other					
2.G.2	Other Product Manufacture and Use	SF_6 and PFCs from Other Product Use	SF_6	1,800	Data availability
Agriculture					
3.A Livestock					
3.A.4	Enteric Fermentation	Camels	CH_4	3	No significant camel population in U.S.
3.A.4	Enteric Fermentation	Poultry	CH_4	No method	*2006 IPCC Guidelines do not provide a method.*
3.B.1.4, 3.B.2	Manure Management	Camels	CH_4 and N_2O	+	No significant camel population in U.S.
3.F Field Burning of Agricultural Residues					
3.F.1.4, 3.F.4	Field Burning of Agricultural Residues	Rye, Sugarcane	CH_4 and N_2O	NA	Insignificant burning of rye along with data availability issues for both rye and sugarcane
Land Use, Land-Use Change, and Forestry					
4.A Forest Land					
4.A(II)	Forest Land	Emissions and Removals from Drainage and Rewetting and Other Management of Organic and Mineral Soils	CO_2, CH_4, and N_2O	NA	Data availability
4.A.1	Forest Land Remaining Forest Land	N mineralization/immobilization	N_2O	NA	Data availability
4.B Cropland					
4.B(II)	Cropland	Emissions and Removals from Drainage and Rewetting and Other Management of Organic and Mineral Soils	CO_2, CH_4, and N_2O	NA	Data availability
4.B.1	Cropland Remaining Cropland	Carbon Stock Change in Living Biomass	CO_2	NA	Data availability
4.B.1(V)	Cropland Remaining Cropland	Biomass Burning—Controlled Burning	CO_2	NA	Data availability
4.B.1(V)	Cropland Remaining Cropland	Biomass Burning—Wildfires	CO_2, CH_4, and N_2O		Data availability
4.B.2	Grassland Converted to Cropland	Carbon Stock Change in Living Biomass	CO_2	NA	Data availability

4.B.2(V)	Land Converted to Cropland	Biomass Burning—Wildfires and Controlled Burning	CO_2, CH_4, and N_2O	NA	Data availability
4.C Grassland					
4.C(II)	Grassland	Emissions and Removals from Drainage and Rewetting and Other Management of Organic and Mineral Soils	CO_2, CH_4, and N_2O	NA	Data availability
4.C.1	Grassland Remaining Grassland	Carbon Stock Change in Living Biomass	CO_2	NA	Data availability
4.C.1(V)	Grassland Remaining Grassland	Biomass Burning: Controlled Burning, Wildfires	CO_2	NA	Data availability
4.C.2(V)	Land Converted to Grassland	Biomass Burning: Controlled Burning, Wildfires	CO_2	NA	Data availability
4.D Wetlands					
4.D(II)	Wetlands—Flooded Lands and Peat Extraction Lands	Emissions and Removals from Drainage and Rewetting and Other Management of Organic and Mineral Soils	CO_2, CH_4, and N_2O	NA	Data availability
4.D.1(V)	Wetlands Remaining Wetlands	Biomass Burning: Controlled Burning, Wildfires	CO_2, CH_4, and N_2O	NA	Data availability
4.D.1.2	Flooded Land Remaining Flooded Land	Carbon Stock Change	CO_2	NA	Data availability
4.D.2(V)	Land Converted to Wetlands	Biomass Burning: Controlled Burning, Wildfires	CO_2, CH_4, and N_2O	NA	Data availability
4.E Settlements					
4.E(V)	Settlements	Biomass Burning Settlements	CO_2, CH_4, and N_2O	NA	Data availability
4.E.1	Settlements	Settlements Remaining Settlements	CH_4	NA	Data availability
4.E.1	Settlements Remaining Settlements	Direct N_2O Emissions from N Mineralization/Immobilization (Mineral Soils)	N_2O	NA	Data availability
4.E.2	Land Converted to Settlements	Direct N_2O Emissions from N Mineralization/Immobilization	N_2O	NA	Data availability
4.F Other Land					
4.F(V)	Biomass Burning	Other Land	CO_2, CH_4, and N_2O	NA	Data availability
Waste					
5.D Wastewater Treatment					
5.B.2.a and b	Biological Treatment of Solid Waste	Anaerobic Digestion at Biogas Facilities—Municipal Solid Waste and Other	CH_4 and N_2O	8	Data availability
5.D.2	Wastewater Treatment and Discharge	Industrial Wastewater	N_2O	No method	*2006 IPCC Guidelines* do not provide a method.

NA (Estimate Not Available)
- Not Applicable
+ Less than 0.5 kt CO_2 Eq.