Executive Summary


Introduction


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**Stationary Combustion (excluding CO₂)**


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**Incineration of Waste**


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Petroleum Systems


Natural Gas Systems


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**Wood Biomass and Biofuel Consumption**


**Energy Sources of Precursor Greenhouse Gases**


**Industrial Processes and Product Use**


**Cement Production**


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**Lime Production**


Glass Production


Other Process Uses of Carbonates


### Ammonia Production


Urea Consumption for Non-Agricultural Purposes


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**Soda Ash Production**

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### Carbon Dioxide Consumption


### Phosphoric Acid Production


Iron and Steel Production and Metallurgical Coke Production


**Ferroalloy Production**


Aluminum Production


Magnesium Production and Processing


### Lead Production


### Zinc Production


**Electronics Industry**


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Electrical Transmission and Distribution


**Nitrous Oxide from Product Use**


**Industrial Processes and Product Use Sources of Precursor Greenhouse Gases**

Agriculture

Enteric Fermentation


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### Land Use, Land-Use Change, and Forestry


### Representation of the U.S. Land Base


**Forest Land Remaining Forest Land: Changes in Forest Carbon Stocks**


**Forest Land Remaining Forest Land: Non-CO₂ Emissions from Forest Fires**


**Forest Land Remaining Forest Land: N₂O Emissions from Soils**


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**Forest Land Remaining Forest Land: Drained Organic Soils**


Land Converted to Forest Land


**Cropland Remaining Cropland**


**Land Converted to Cropland**


Grassland Remaining Grassland: Soil Carbon Stock Changes


Grassland Remaining Grassland: Non-CO₂ Emissions from Grassland Fires


Land Converted to Grassland


**Wetlands Remaining Wetlands: CO₂, CH₄, and N₂O Emissions from Peatlands Remaining Peatlands**


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**Wetlands Remaining Wetlands: Flooded Land Remaining Flooded Land**


Land Converted to Wetlands: Emissions and Removals from Land Converted to Vegetated Coastal Wetlands


**Land Converted to Wetlands: Land Converted to Flooded Land**


**Settlements Remaining Settlements: Soil Carbon Stock Changes**


**Settlements Remaining Settlements: Changes in Carbon Stocks in Settlement Trees**


Settlements Remaining Settlements: \( \text{N}_2\text{O} \) Emissions from Soils


Settlements Remaining Settlements: Changes in Yard Trimments and Food Scrap Carbon Stocks in Landfills


**Land Converted to Settlements**


Waste

Landfills


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**Composting**


### Anaerobic Digestion at Biogas Facilities


**Waste Incineration**


**Waste Sources of Precursor Greenhouse Gas Emissions**


**Recalculations and Improvements**


ERG (2021b) Updated Other Animal Population Distribution Methodology. ERG, Lexington, MA.


### Abbreviations

<table>
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<th>Description</th>
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<td>ABS</td>
<td>Acrylonitrile butadiene styrene</td>
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<td>AC</td>
<td>Air conditioner</td>
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<td>ACC</td>
<td>American Chemistry Council</td>
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<td>FAA Aviation Environmental Design Tool</td>
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<td>AEO</td>
<td>Annual Energy Outlook</td>
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<td>All-electric range</td>
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<td>Atmospheric and Health Effect Framework</td>
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<td>Biochemical oxygen demand over a 5-day period</td>
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<td>BOF</td>
<td>Basic oxygen furnace</td>
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<td>Btu</td>
<td>British thermal unit</td>
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<td>CaO</td>
<td>Calcium oxide</td>
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<td>Canadian Association of Petroleum Producers</td>
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<td>Chemical Data Access Tool</td>
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<td>USDA-NRCS Conservation Effects Assessment Program</td>
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<td>Continuous emission monitoring system</td>
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<td>CFC</td>
<td>Chlorofluorocarbon</td>
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<td>CFR</td>
<td>Code of Federal Regulations</td>
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<td>CGA</td>
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<td>CH₂</td>
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<td>CIGRE</td>
<td>International Council on Large Electric Systems</td>
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<td>Acronym</td>
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<td>CKD</td>
<td>Cement kiln dust</td>
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<td>CLE</td>
<td>Crown Light Exposure</td>
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<td>CMA</td>
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<td>d.b.h.</td>
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<td>Defense Energy Support Center-DoD’s Defense Logistics Agency</td>
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<td>GHG</td>
<td>Greenhouse gas</td>
</tr>
<tr>
<td>GHGRP</td>
<td>EPA’s Greenhouse Gas Reporting Program</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information Systems</td>
</tr>
<tr>
<td>GJ</td>
<td>Gigajoule</td>
</tr>
<tr>
<td>GOADS</td>
<td>Gulf Offshore Activity Data System</td>
</tr>
<tr>
<td>GOM</td>
<td>Gulf of Mexico</td>
</tr>
<tr>
<td>GPG</td>
<td>Good Practice Guidance</td>
</tr>
<tr>
<td>GRI</td>
<td>Gas Research Institute</td>
</tr>
<tr>
<td>GSAM</td>
<td>Gas Systems Analysis Model</td>
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<tr>
<td>GTI</td>
<td>Gas Technology Institute</td>
</tr>
<tr>
<td>GWP</td>
<td>Global warming potential</td>
</tr>
<tr>
<td>ha</td>
<td>Hectare</td>
</tr>
<tr>
<td>HBFC</td>
<td>Hydrobromofluorocarbon</td>
</tr>
<tr>
<td>HC</td>
<td>Hydrocarbon</td>
</tr>
<tr>
<td>HCFC</td>
<td>Hydrochlorofluorocarbon</td>
</tr>
<tr>
<td>HCF0</td>
<td>Hydrochlorofluoroolefin</td>
</tr>
<tr>
<td>HDDV</td>
<td>Heavy duty diesel vehicle</td>
</tr>
<tr>
<td>HDGV</td>
<td>Heavy duty gas vehicle</td>
</tr>
<tr>
<td>HDPE</td>
<td>High density polyethylene</td>
</tr>
<tr>
<td>HFC</td>
<td>Hydrofluorocarbon</td>
</tr>
<tr>
<td>HFO</td>
<td>Hydrofluoroolefin</td>
</tr>
<tr>
<td>HFE</td>
<td>Hydrofluoroether</td>
</tr>
<tr>
<td>HHV</td>
<td>Higher Heating Value</td>
</tr>
<tr>
<td>HMA</td>
<td>Hot Mix Asphalt</td>
</tr>
<tr>
<td>HMIWI</td>
<td>Hospital/medical/infectious waste incinerator</td>
</tr>
<tr>
<td>HTF</td>
<td>Heat Transfer Fluid</td>
</tr>
<tr>
<td>HTS</td>
<td>Harmonized Tariff Schedule</td>
</tr>
<tr>
<td>HVAE</td>
<td>High Voltage Anode Effects</td>
</tr>
<tr>
<td>HWP</td>
<td>Harvested wood product</td>
</tr>
<tr>
<td>IBF</td>
<td>International bunker fuels</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>--------------</td>
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</tr>
<tr>
<td>IC</td>
<td>Integrated Circuit</td>
</tr>
<tr>
<td>ICAO</td>
<td>International Civil Aviation Organization</td>
</tr>
<tr>
<td>ICBA</td>
<td>International Carbon Black Association</td>
</tr>
<tr>
<td>ICE</td>
<td>Internal combustion engine</td>
</tr>
<tr>
<td>ICR</td>
<td>Information Collection Request</td>
</tr>
<tr>
<td>IEA</td>
<td>International Energy Agency</td>
</tr>
<tr>
<td>IFO</td>
<td>Intermediate Fuel Oil</td>
</tr>
<tr>
<td>IGES</td>
<td>Institute of Global Environmental Strategies</td>
</tr>
<tr>
<td>IISRP</td>
<td>International Institute of Synthetic Rubber Products</td>
</tr>
<tr>
<td>ILENR</td>
<td>Illinois Department of Energy and Natural Resources</td>
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<tr>
<td>IMO</td>
<td>International Maritime Organization</td>
</tr>
<tr>
<td>IPAA</td>
<td>Independent Petroleum Association of America</td>
</tr>
<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
</tr>
<tr>
<td>IPU</td>
<td>Industrial Processes and Product Use</td>
</tr>
<tr>
<td>ITC</td>
<td>U.S. International Trade Commission</td>
</tr>
<tr>
<td>ITRS</td>
<td>International Technology Roadmap for Semiconductors</td>
</tr>
<tr>
<td>JWR</td>
<td>Jim Walters Resources</td>
</tr>
<tr>
<td>KCA</td>
<td>Key category analysis</td>
</tr>
<tr>
<td>kg</td>
<td>Kilogram</td>
</tr>
<tr>
<td>kt</td>
<td>Kiloton</td>
</tr>
<tr>
<td>kWh</td>
<td>Kilowatt hour</td>
</tr>
<tr>
<td>LDPE</td>
<td>Low density polyethylene</td>
</tr>
<tr>
<td>LDT</td>
<td>Light-duty truck</td>
</tr>
<tr>
<td>LDV</td>
<td>Light-duty vehicle</td>
</tr>
<tr>
<td>LEV</td>
<td>Low emission vehicles</td>
</tr>
<tr>
<td>LFG</td>
<td>Landfill gas</td>
</tr>
<tr>
<td>LFGTE</td>
<td>Landfill gas-to-energy</td>
</tr>
<tr>
<td>LHV</td>
<td>Lower Heating Value</td>
</tr>
<tr>
<td>LKD</td>
<td>Lime kiln dust</td>
</tr>
<tr>
<td>LLDPE</td>
<td>Linear low density polyethylene</td>
</tr>
<tr>
<td>LOPA</td>
<td>Liquefied petroleum gas(es)</td>
</tr>
<tr>
<td>LTO</td>
<td>Landing and take-off</td>
</tr>
<tr>
<td>LULUCF</td>
<td>Land Use, Land-Use Change, and Forestry</td>
</tr>
<tr>
<td>LVAE</td>
<td>Low Voltage Anode Effects</td>
</tr>
<tr>
<td>M&amp;R</td>
<td>Metering and regulating</td>
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<tr>
<td>MARPOL</td>
<td>International Convention for the Prevention of Pollution from Ships</td>
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<tr>
<td>MCF</td>
<td>Methane conversion factor</td>
</tr>
<tr>
<td>MCL</td>
<td>Maximum Contaminant Levels</td>
</tr>
<tr>
<td>MCFD</td>
<td>Thousand cubic feet per day</td>
</tr>
<tr>
<td>MDI</td>
<td>Metered dose inhalers</td>
</tr>
<tr>
<td>MDP</td>
<td>Management and design practices</td>
</tr>
<tr>
<td>MECS</td>
<td>EIA Manufacturer’s Energy Consumption Survey</td>
</tr>
<tr>
<td>MEMS</td>
<td>Micro-electromechanical systems</td>
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<tr>
<td>MER</td>
<td>Monthly Energy Review</td>
</tr>
<tr>
<td>MGO</td>
<td>Marine gas oil</td>
</tr>
<tr>
<td>MgO</td>
<td>Magnesium oxide</td>
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<tr>
<td>MJ</td>
<td>Megajoule</td>
</tr>
<tr>
<td>MLRA</td>
<td>Major Land Resource Area</td>
</tr>
<tr>
<td>mm</td>
<td>Millimeter</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>---------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>TEDB</td>
<td>Transportation Energy Data Book</td>
</tr>
<tr>
<td>TFI</td>
<td>The Fertilizer Institute</td>
</tr>
<tr>
<td>TIGER</td>
<td>Topologically Integrated Geographic Encoding and Referencing survey</td>
</tr>
<tr>
<td>TJ</td>
<td>Terajoule</td>
</tr>
<tr>
<td>TLEV</td>
<td>Traditional low emissions vehicle</td>
</tr>
<tr>
<td>TMLA</td>
<td>Total Manufactured Layer Area</td>
</tr>
<tr>
<td>TOW</td>
<td>Total organics in wastewater</td>
</tr>
<tr>
<td>TPO</td>
<td>Timber Product Output</td>
</tr>
<tr>
<td>TRI</td>
<td>Toxic Release Inventory</td>
</tr>
<tr>
<td>TSDF</td>
<td>Hazardous waste treatment, storage, and disposal facility</td>
</tr>
<tr>
<td>TTB</td>
<td>Tax and Trade Bureau</td>
</tr>
<tr>
<td>TVA</td>
<td>Tennessee Valley Authority</td>
</tr>
<tr>
<td>UAN</td>
<td>Urea ammonium nitrate</td>
</tr>
<tr>
<td>UDI</td>
<td>Utility Data Institute</td>
</tr>
<tr>
<td>UFORE</td>
<td>U.S. Forest Service’s Urban Forest Effects model</td>
</tr>
<tr>
<td>UG</td>
<td>Underground (coal mining)</td>
</tr>
<tr>
<td>U.S.</td>
<td>United States</td>
</tr>
<tr>
<td>U.S. ITC</td>
<td>United States International Trade Commission</td>
</tr>
<tr>
<td>UEP</td>
<td>United Egg Producers</td>
</tr>
<tr>
<td>ULEV</td>
<td>Ultra low emission vehicle</td>
</tr>
<tr>
<td>UNEP</td>
<td>United Nations Environmental Programme</td>
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<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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<tr>
<td>USAA</td>
<td>U.S. Aluminum Association</td>
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