Inventory of US Greenhouse Gas Emissions and Sinks

Background, Process, and Update

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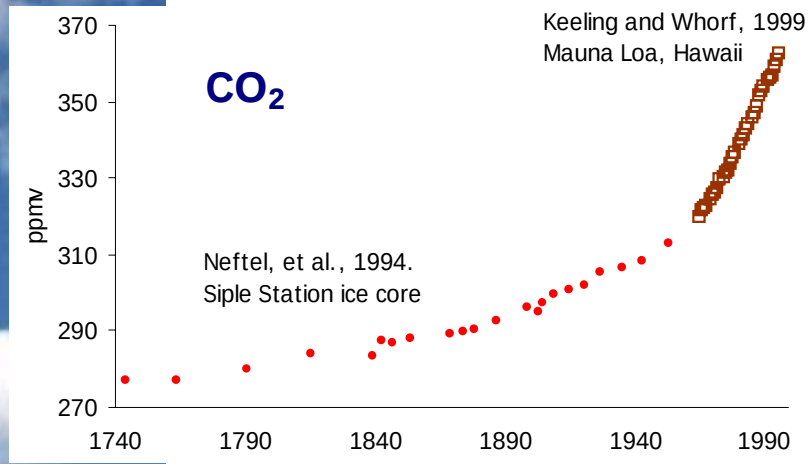
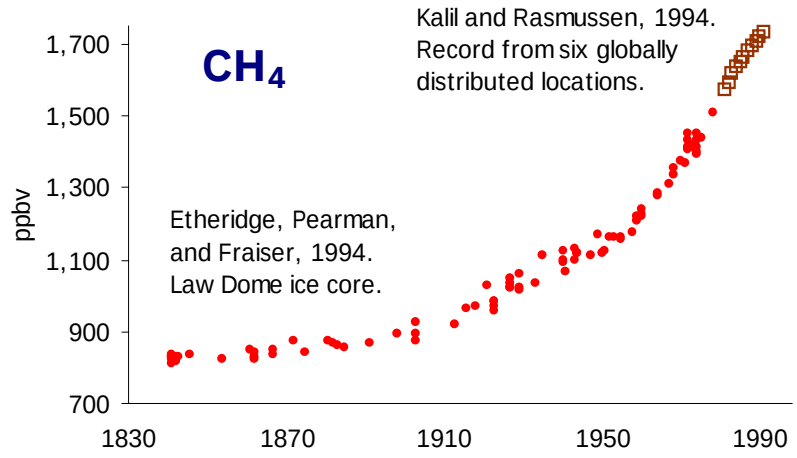
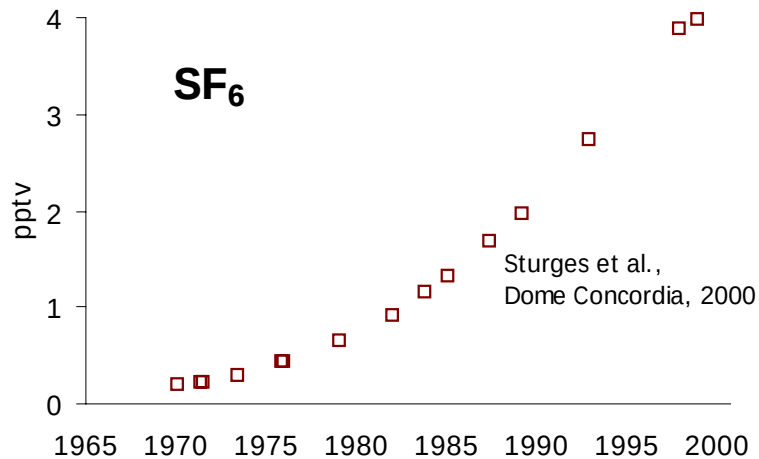
Atmospheric Concentrations







Source: CDIAC

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Summary

- Background
- Findings and Trends in US Emissions
- Inventory Development Process
- Quality Assurance, Quality Control, and Uncertainty Analysis
- Some Key Improvements to This Year's Inventory
- Conclusion

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Background

- Parties to the UNFCCC committed to develop inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol
- Inventories are national and are submitted annually
- US Inventory is an interagency effort led by EPA

Background (2)

- US Inventory covers anthropogenic emissions of CO_2, N_2O, CH_4, HFCs, PFCs, SF_6, ozone precursors (CO, NO_x, NMVOCs), SO_2, and removals of CO_2
- IPCC has assigned a global warming potential (GWP) to each gas; normalized emissions are measured in units of Tg CO_2 Eq.
- Source categories include emissions from Energy, Industrial Processes, Solvent Use, Agriculture, and Waste, plus CO_2 flux from Land-Use Change and Forestry

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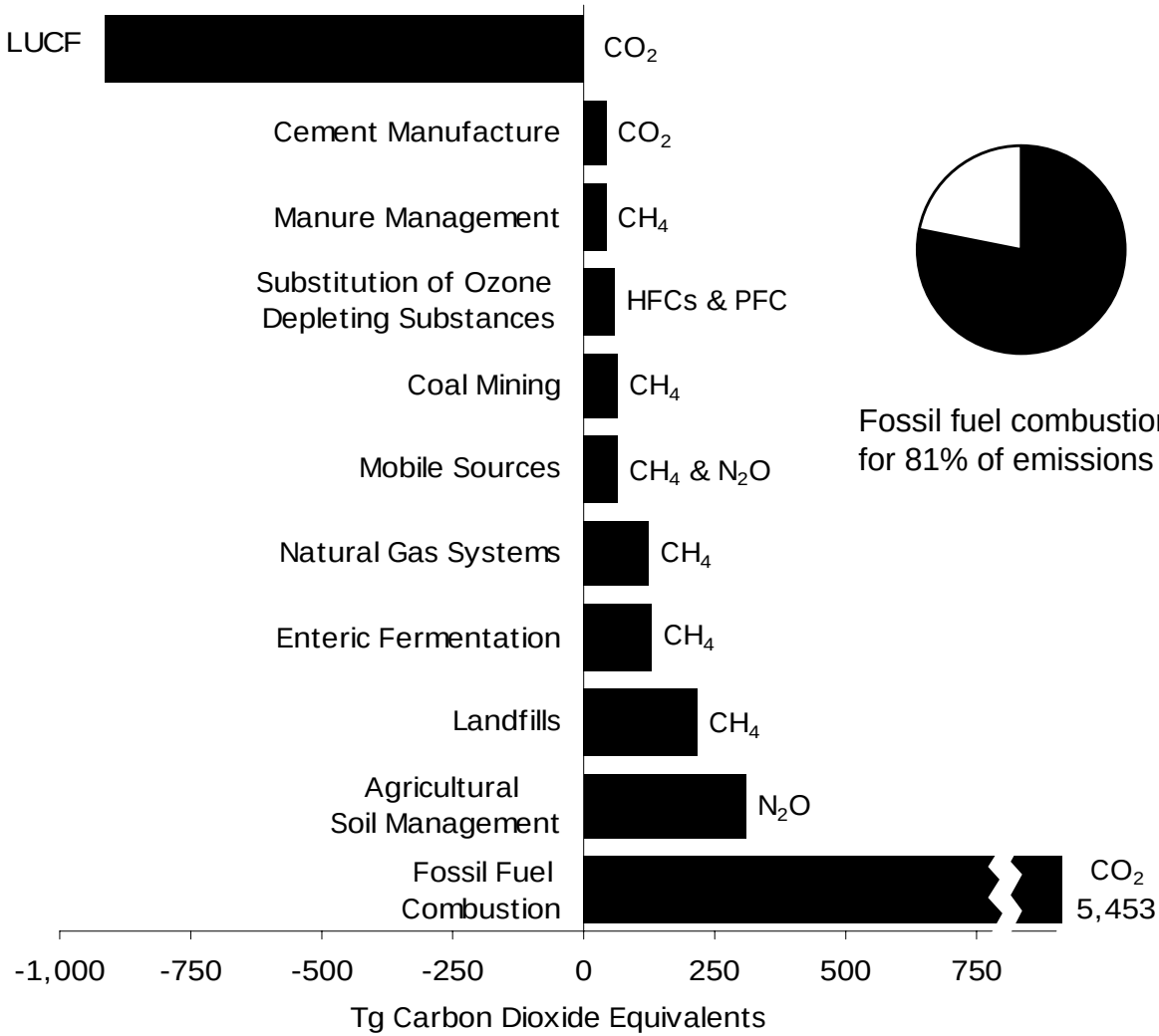
1999 Top US GHG Emission Sources and Sinks



Fossil fuel combustion accounts for 81% of emissions

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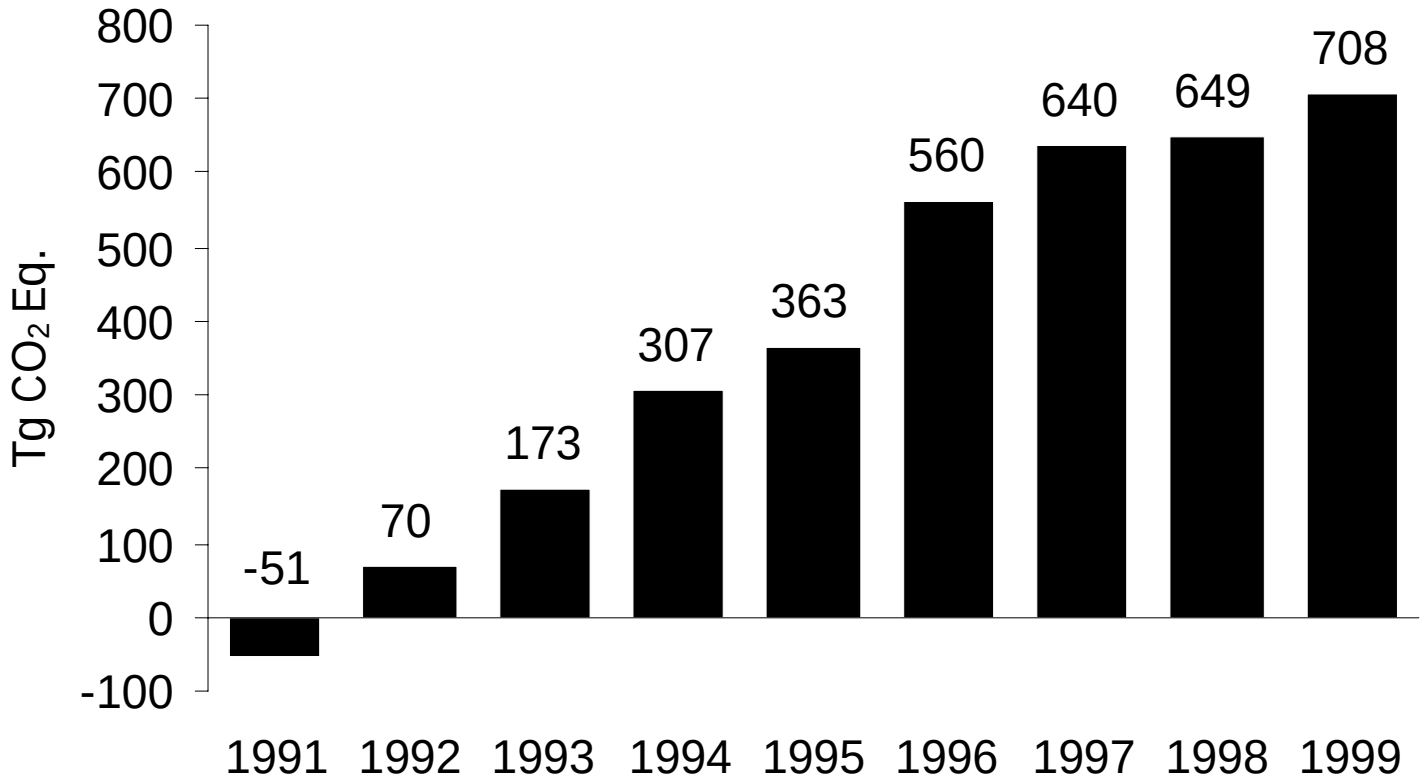
Change in Total US Emissions Since 1990



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Trends in US Emissions

- Dominant gas emitted is CO_2, mostly from fossil fuel combustion
- Total GHG emissions have risen 11.7 percent since 1990 (0.9 percent since 1998), mainly due to a robust economy and low fuel prices
- Methane emissions decreased by 4 percent since 1990
- Nitrous oxide emissions increased by 9 percent since 1990
- HFC, PFC, and SF_6 emissions have been growing rapidly

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Preparation of Inventory Estimates

- Follow IPCC Guidelines using default methodologies or, where applicable, more detailed analysis
- Emissions calculated by summing products of activity data and emission factors for each sector based on
  - data from external sources
  - emission models for a variety of sources

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Quality Assurance/Quality Control

- Quality assurance (QA) process
  - already in place, meets IPCC QA standards
  - consists of expert review of estimates and text, as well as public review and comment period
- Quality control (QC) process
  - currently informal
  - defined as procedures to improve, control, or check the quality of the emission estimates and the underlying data

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Uncertainty Analysis

- Stand-alone effort to understand the accuracy of inventory estimates
- US program currently evaluates uncertainty of source-category estimates and ranks them as low, medium, and high through qualitative analysis
- In process of designing Monte Carlo model and developing uncertainty estimates for as many sources as practicable

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Several Key Improvements to This Year's Inventory

- Electric power industry
- Carbon storage in non-energy end-uses
- Land-use change and forestry
- Good Practice Guidance

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Electric Power Industry

- Emissions from electricity generation have historically accounted for greatest fraction of total GHG emissions (34% of total GHGs, 41% of CO_2 in 1999)
- Electric utilities--mainly CO_2 from coal combustion
- Emissions from nonutilites growing due to recent deregulation activities--mainly CO_2 from natural gas

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Carbon Storage in Non-energy End-uses

- In addition to being combusted for energy, fossil fuels can be used for *non-energy* end-uses. Applications include synthesis of plastic, rubber, and fibers; solvent use; asphalt paving; fertilizer production

- Fuel-specific storage factors determine amount carbon is stored in non-energy products. Historically, these factors were taken from the literature

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Carbon Storage in Non-energy End-uses (2)

- Storage factors for asphalt, petrochemical feedstocks, natural gas, liquefied petroleum gas (LPG), and lubricants were revised this year based on data on carbon flows
- Non-energy carbon storage embodies a large pool of carbon, 275-360 Tg CO_2; Revisions increased overall storage nearly 10 percent
- Storage factors for other fuels will be updated in future inventories

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Land-use Change and Forestry

- U.S. CO_2 removals from land-use change and forestry constitute a substantial net sink
- Data are based on USFS and NREL models which output projections every five years
- 1998 Inventory used projections from 1992; a substantial update to this year's Inventory is the use of 1997 forest and natural resource surveys
- Improvements in forest (especially forest soil component) and soil models

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Good Practice Guidelines

- IPCC released Good Practice Guidance to provide direction to improve accuracy and reduce uncertainty in emission estimates
- Designed to complement the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*.
- Establishes guidelines to ensure:
  - Choice of appropriate estimation method
  - Quality control and quality assurance, including proper assessment and documentation of data and information
  - Uncertainties quantification and tracking

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For More Information...

- Hard copies of the US Inventory of Greenhouse Gas Emissions and Sinks (1990-1998)
  - call NCEPI at (800) 490-9198
- 1999 Inventory is on the Internet in draft form
  - download electronically at www.epa.gov/globalwarming/emissions/national

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