



EPA United States
Environmental Protection
Agency
EPA 430-R-18-003

Inventory of U.S. Greenhouse Gas Emissions and Sinks

1990-2016

Front cover photo credit for cow and digester: Vanguard Renewables.

HOW TO OBTAIN COPIES

You can electronically download this document on the U.S. EPA's homepage at <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>.

All data tables of this document for the full time series 1990 through 2016, inclusive, will be made available for the final report published on April 12, 2018 at the internet site mentioned above.

FOR FURTHER INFORMATION

Contact Ms. Mausami Desai, Environmental Protection Agency, (202) 343-9381, desai.mausami@epa.gov,
or Mr. Vincent Camobreco, Environmental Protection Agency, (202) 564-9043, camobreco.vincent@epa.gov.

For more information regarding climate change and greenhouse gas emissions, see the EPA web site at <https://www.epa.gov/ghgemissions>.

Acknowledgments

The Environmental Protection Agency would like to acknowledge the many individual and organizational contributors to this document, without whose efforts this report would not be complete. Although the complete list of researchers, government employees, and consultants who have provided technical and editorial support is too long to list here, EPA would like to thank some key contributors and reviewers whose work has significantly improved this year's report.

Within EPA's Office of Atmospheric Programs, work on emissions from fuel combustion was led by Vincent Camobreco. Sarah Roberts and Justine Geidosch directed the work on mobile combustion and transportation. Work on fugitive methane emissions from the Energy sector was directed by Melissa Weitz, Chris Sherry, and Cate Hight. Calculations for the Waste sector were led by Rachel Schmeltz. Tom Wirth directed work on the Agriculture and the Land Use, Land-Use Change, and Forestry chapters, with support from John Steller. Work on Industrial Processes and Product Use (IPPU) CO₂, CH₄, and N₂O emissions was directed by John Steller. Work on emissions of HFCs, PFCs, SF₆, and NF₃ from the IPPU sector was directed by Deborah Ottinger and Dave Godwin. Cross-cutting work was directed by Mausami Desai.

Other EPA offices also contributed data, analysis, and technical review for this report. The Office of Transportation and Air Quality and the Office of Air Quality Planning and Standards provided analysis and review for several of the source categories addressed in this report. The Office of Land and Emergency Management and the Office of Research and Development also contributed analysis and research.

The Energy Information Administration and the Department of Energy contributed invaluable data and analysis on numerous energy-related topics. Other government agencies have contributed data as well, including the U.S. Geological Survey, the Federal Highway Administration, the Department of Transportation, the Bureau of Transportation Statistics, the Department of Commerce, the National Agricultural Statistics Service, the Federal Aviation Administration, and the Department of Defense.

We thank the U.S. Department of Agriculture's Forest Service (Grant Domke, Brian Walters, Jim Smith, Mike Nichols, and John Coulston) for compiling the inventories for CO₂, CH₄, and N₂O fluxes associated with forest land.

We thank the Department of Agriculture's Agricultural Research Service (Stephen Del Grosso) and the Natural Resource Ecology Laboratory at Colorado State University (Stephen Ogle, Keith Paustian, Bill Parton, F. Jay Breidt, Shannon Spencer, Kendrick Killian, Ram Gurung, Ernie Marx, Stephen Williams, Cody Alsaker, Amy Swan, and Chris Dorich) for compiling the inventories for CH₄ emissions, N₂O emissions, and CO₂ fluxes associated with soils in croplands, grasslands, and settlements.

We thank Silvestrum Climate Associates (Stephen Crooks, Lisa Schile Beers, Christine May), National Oceanic and Atmospheric Administration (Nate Herold, Ariana Sutton-Grier, Meredith Muth), the Smithsonian Environmental Research Center (J. Patrick Megonigal, Blanca Bernal, James Holmquist, Meng Lu) and Florida International University (Tiffany Troxler) and members of the U.S. Coastal Wetland Carbon Working Group for compiling inventories of land use change, soil carbon stocks and stock change, CH₄ emissions, and N₂O emissions from aquaculture in coastal wetlands.

We would also like to thank Marian Martin Van Pelt, Leslie Chinery, Alexander Lataille, Sabrina Andrews and the full Inventory team at ICF including Diana Pape, Robert Lanza, Lauren Marti, Mollie Averyt, Larry O'Rourke, Deborah Harris, Tommy Hendrickson, Rebecca Ferenchiak, Kasey Knoell, Cory Jemison, Emily Kent, Rani Murali,

Drew Stilson, Cara Blumenthal, Louise Huttinger, Helena Caswell, Charlotte Cherry, Katie O'Malley, Howard Marano, Neha Vaingankar, and Terrance Glover for synthesizing this report and preparing many of the individual analyses.

We thank Eastern Research Group for their significant analytical support. Deborah Bartram, Kara Edquist, and Amie Aguiar support the development of emissions estimates for wastewater. Cortney Itle, Amie Aguiar, Kara Edquist, Amber Allen, and Spencer Sauter support the inventories for Manure Management, Enteric Fermentation, *Wetlands Remaining Wetlands*, and Landfilled Yard Trimmings and Food Scraps (included in *Settlements Remaining Settlements*). Casey Pickering, Brandon Long, Gopi Manne, and Aylin Sertkaya develop estimates for Natural Gas and Petroleum Systems. Brian Guzzone supports the Coal Mining sector.

Finally, we thank the following teams for their significant analytical support: RTI International (Kate Bronstein, Meaghan McGrath, Michael Laney, Carson Moss, David Randall, Gabrielle Raymond, Jason Goldsmith, Karen Schaffner, Melissa Icenhour); Raven Ridge Resources, and Ruby Canyon Engineering Inc. (Michael Cote, Samantha Phillips, and Phillip Cunningham).

Preface

The United States Environmental Protection Agency (EPA) prepares the official U.S. Inventory of Greenhouse Gas Emissions and Sinks to comply with existing commitments under the United Nations Framework Convention on Climate Change (UNFCCC). Under decision 3/CP.5 of the UNFCCC Conference of the Parties, national inventories for UNFCCC Annex I parties should be provided to the UNFCCC Secretariat each year by April 15.

In an effort to engage the public and researchers across the country, the EPA has instituted an annual public review and comment process for this document. The availability of the draft document is announced via Federal Register Notice and is posted on the EPA web site. Copies are also emailed upon request. The public comment period is generally limited to 30 days; however, comments received after the closure of the public comment period are accepted and considered for the next edition of this annual report. Public review of this report occurred from February 7 to March 9, 2018, and comments received are posted to the EPA web site.