EPA
United States
Environmental Protection
Agency

U.S. Environmental Protection Agency Overview & Perspectives



PHMSA Hydrogen and Emerging Fuels R&D Public Meeting and Forum

November 30, 2021

EPA Overview

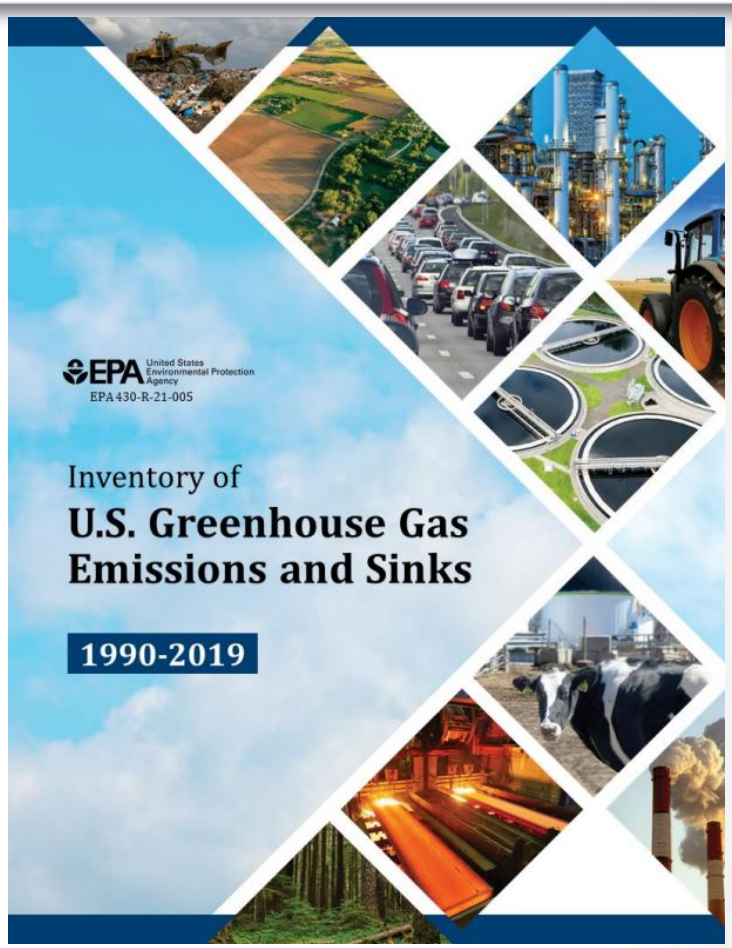
- **The mission of EPA is to protect human health and the environment.**
- **To accomplish this mission, we:**
  - Develop and enforce regulations
  - Give grants
  - Study environmental issues
  - Sponsor partnerships
  - Teach people about the environment
  - Publish information
- **Four main regulatory Offices, 10 Regional Offices**
  - Office of Research and Development (ORD) is one of several support Offices
- **EPA total: 14,000 FTE, $9.2B in FY21**
  - ORD total: ~$500M, 1500 FTE in FY20

Primary Activities

- **Emission reduction regulations**
  - Proposed rule to reduce methane emissions from oil and gas operations
- **Groundwater protection regulations**
  - Covers underground injection of carbon dioxide (CO_2)
- **Quantifying air pollutant emissions**
  - Development of national air pollutant emissions inventories from all sources
- **Emission reduction partnership programs**
  - Energy STAR, Green Power Partnership, Heat Island Reduction Program, SmartWay Transport Partnership, many others
- **Research on emissions and impacts**
  - Emissions measurement methods development and evaluation
  - Evaluating impacts of emissions

National GHG Inventory

- EPA is responsible for developing and submitting the U.S. National Inventory of GHG emissions to the UN Framework Convention on Climate Change
- CO_2 and methane (CH_4) are the two largest emissions by mass and climate impact



- https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks

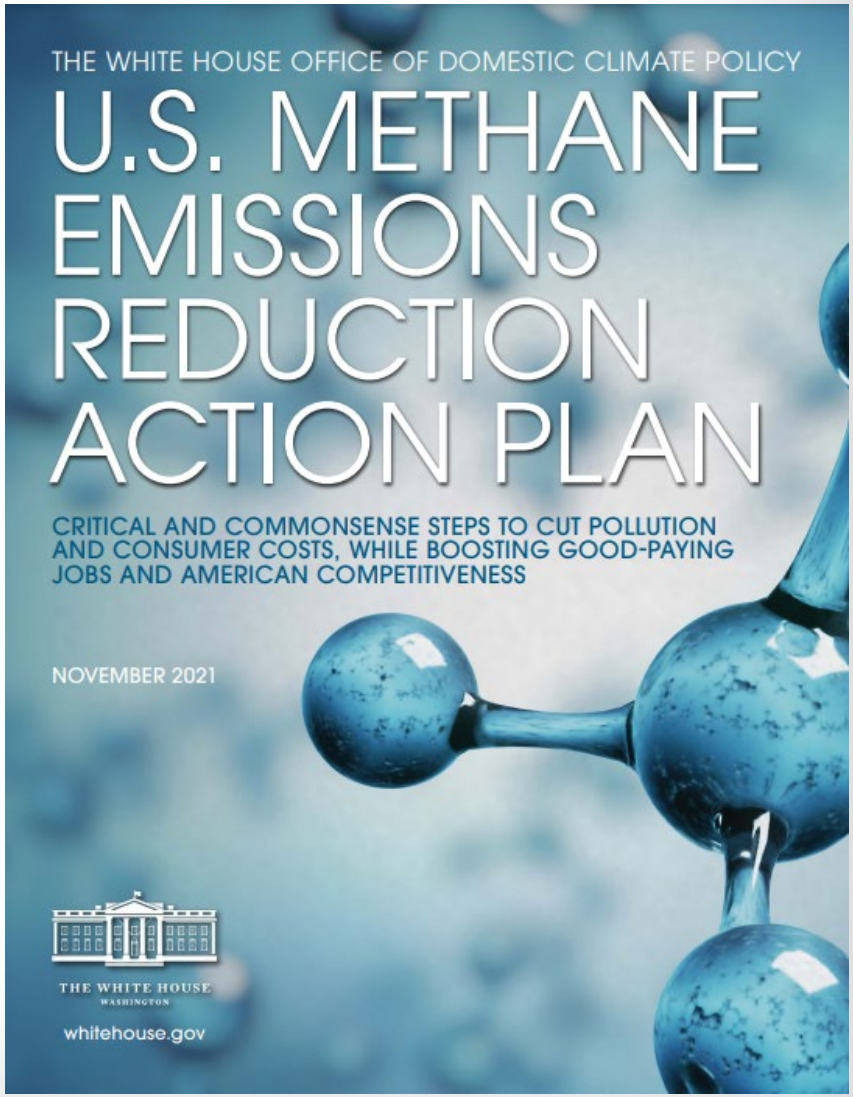
Voluntary Partnership Programs

- **Methane emission reduction partnership programs**
  - AgSTAR
  - Coalbed Methane Outreach Program
  - Global Methane Initiative
  - Landfill Methane Outreach Program
  - Voluntary Methane Programs for the Oil and Natural Gas Industry

For more information: https://www.epa.gov/natural-gas-star-program

Methane

- **Continuing emphasis on reducing CH_4 emissions**
  - Oil and gas: Compressors, fugitive emissions, pneumatic controllers, storage vessels
  - Concerns about leaks and major events (e.g., Aliso Canyon)
  - Landfill emissions
  - Interest in co-pollutants (e.g., VOCs, hazardous air pollutants)



CO_2

- **Increasing emphasis on CO_2 direct removal from the atmosphere and use of carbon capture and storage**
  - Need better information on emissions from pipeline transport
  - Need for improved monitoring and verification at injection sites

- **Both CH_4 and CO_2 need better measurement and monitoring technologies and practices**
  - Improved capabilities for remote sensing, especially at low concentrations
  - Improved capabilities for quantification
  - Improved emissions mitigation strategies (oil and gas and landfills)

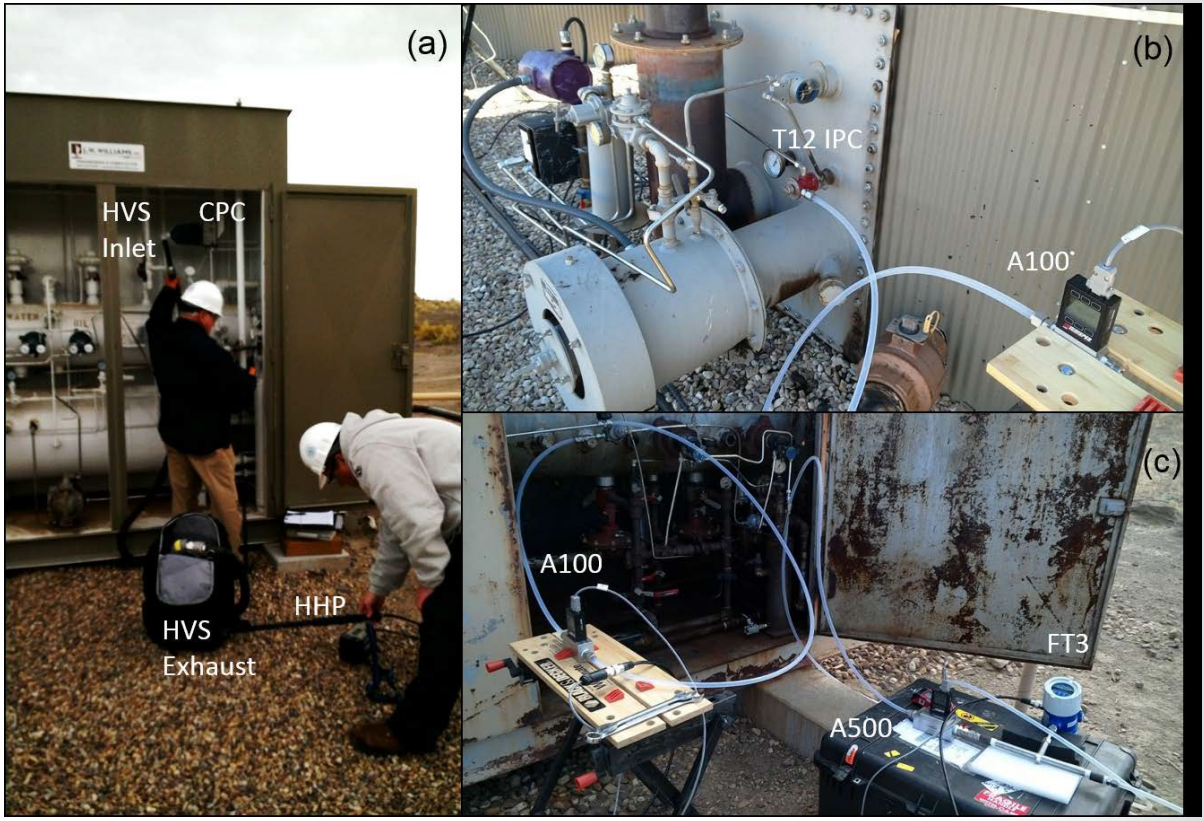
Hydrogen

- **Growing interest in hydrogen, especially for transportation**
- **Considerable uncertainty about impacts at significant deployment scales**
- **Increased atmospheric H_2 is likely to affect atmospheric chemistry**
  - Could affect tropospheric ozone chemistry
  - Thought to reduce recovery rate of stratospheric ozone
  - Thought to facilitate higher atmospheric methane levels
- **Climate impacts are currently considered to be small,[1] but work is still needed**

1. Derwent, R.G. Hydrogen for Heating: Atmospheric Impacts – A Literature Review. BEIS Research Paper Number 21. Department for Business, Energy and Industrial Strategy, London, UK (2018).

Measurement Research

- **EPA research efforts**
  - Generally focused on internal research at modest levels
  - Strong interest in partnering and collaboration
- **Focus on field studies**
  - Photo shows measurements on well pad in Uinta Basin



Thoma, E.D., et al. (2017) Assessment of Uinta Basin Oil and Natural Gas Well Pad Pneumatic Controller Emissions. *Journal of Environmental Protection*, 8, 394-415. https://doi.org/10.4236/jep.2017.84029

Collaboration

- **Considerations for collaboration and coordination:**
  - Quantifying emissions, especially at lower levels
  - Detecting (and mitigating) emissions from high emitter malfunctioning processes
  - Evaluating pipeline systems, including gathering networks, compressors, processing
  - Taking advantage of synergies between leak monitoring for safety and monitoring for emissions, especially for CH_4
  - Looking ahead to understand trends related to CO_2, H_2

Closing Perspectives

- **Measurement needs are increasing rapidly:**
  - Higher-resolution data in both time and space
  - Quantification at lower emission and concentration levels
  - Changing measurement targets (e.g., CO_2, H_2)
- **Measurement capabilities are also increasing rapidly**
  - Ubiquitous sensors and drones becoming widely available
- **Greatest need may be how to effectively evaluate and use all the data**

Andy Miller
USEPA Office of Research and Development
miller.andy@epa.gov