Photo: U.S. Department of Energy

EPA
United States
Environmental Protection
Agency

Reducing Methane from the Oil and Natural Gas Source Category

NOVEMBER 2, 2021

EPA's Proposal for the Oil and Natural Gas Source Category

On November 2, 2021, EPA issued a proposed rule to reduce climate- and health-harming pollution from the oil and natural gas industry

EPA's proposal would:

- Secure major climate and health benefits for all Americans
- Expand and strengthen emissions reduction requirements for new, modified and reconstructed sources in the oil and natural gas industry
- Require states to minimize or eliminate pollution from hundreds of thousands of existing sources nationwide
- Encourage the use of innovative monitoring technologies and other cutting-edge solutions

Overview of Proposal Impacts

EPA's proposal would:

- Yield nearly **$4.5 billion in climate benefits a year**, totaling $48 to $49 billion from 2023 through 2035 – *after* factoring in costs
- **Increase recovery of natural gas** that otherwise would go to waste, valued at $690 million in 2030 alone
- By 2035, reduce approximately:
  - 41 million tons of **methane** emissions (equivalent to 920 million metric tons of CO_2)
  - 12 million tons of **smog-forming VOC** emissions
  - 480,000 tons of **air toxics** emissions

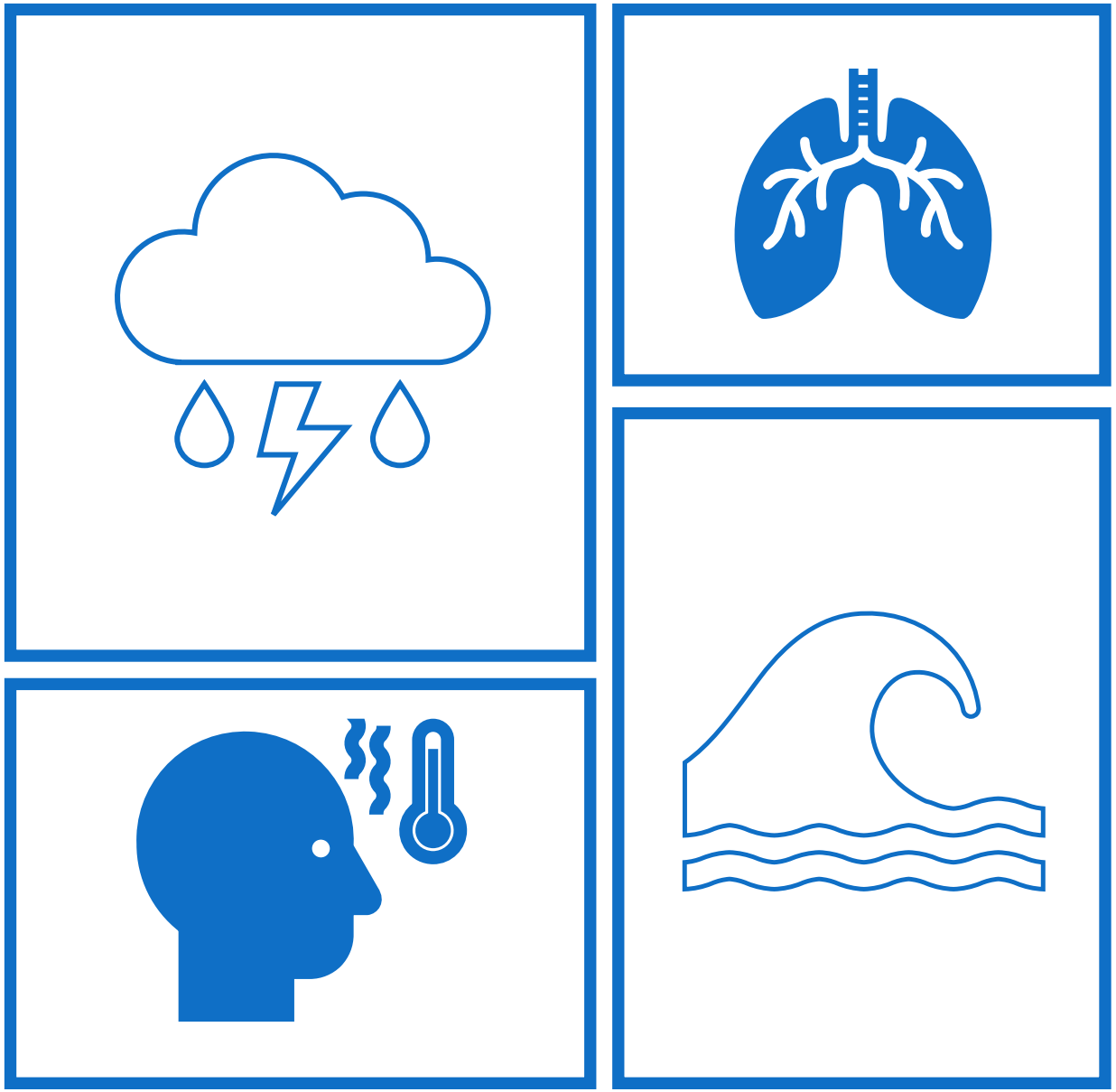
Greenhouse Gases

Greenhouse gases **trap heat** in the atmosphere

People have added greenhouse gases to the atmosphere by **burning fossil fuels** and other activities

The **Earth's climate is changing** because of increasing concentrations of greenhouse gases in the atmosphere

Methane is a **potent greenhouse gas**



Climate Change Affects Everyone

- **Climate change affects all Americans**, regardless of socioeconomic status, and many impacts are projected to worsen as temperatures and sea levels continue to rise, snow and rainfall patterns shift, and some extreme weather events become more common
- At the same time, climate change is projected to have **disproportionate and unequal risks** on communities that are least able to anticipate, cope with, and recover from adverse impacts

United States Environmental Protection Agency

Methane Emissions Accelerate Climate Change

Methane is a greenhouse gas that traps **at least 25 times as much heat** as carbon dioxide

+

Methane emissions are responsible for **about a third of the warming** due to human emissions of greenhouse gases

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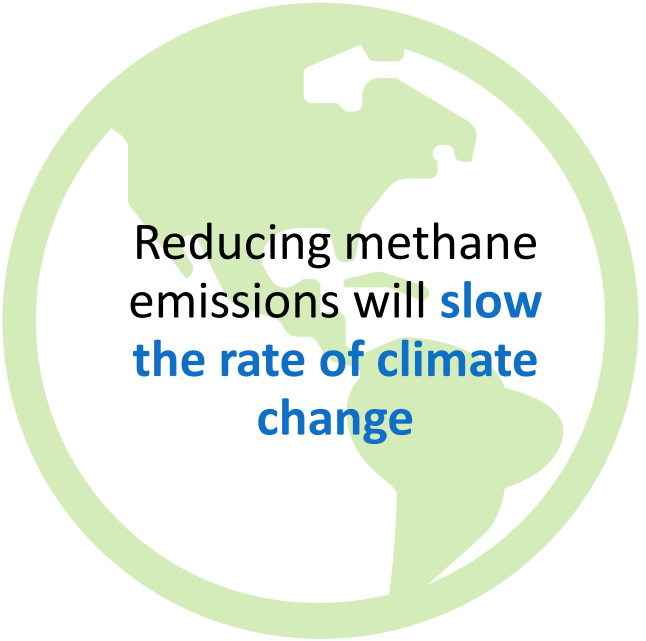
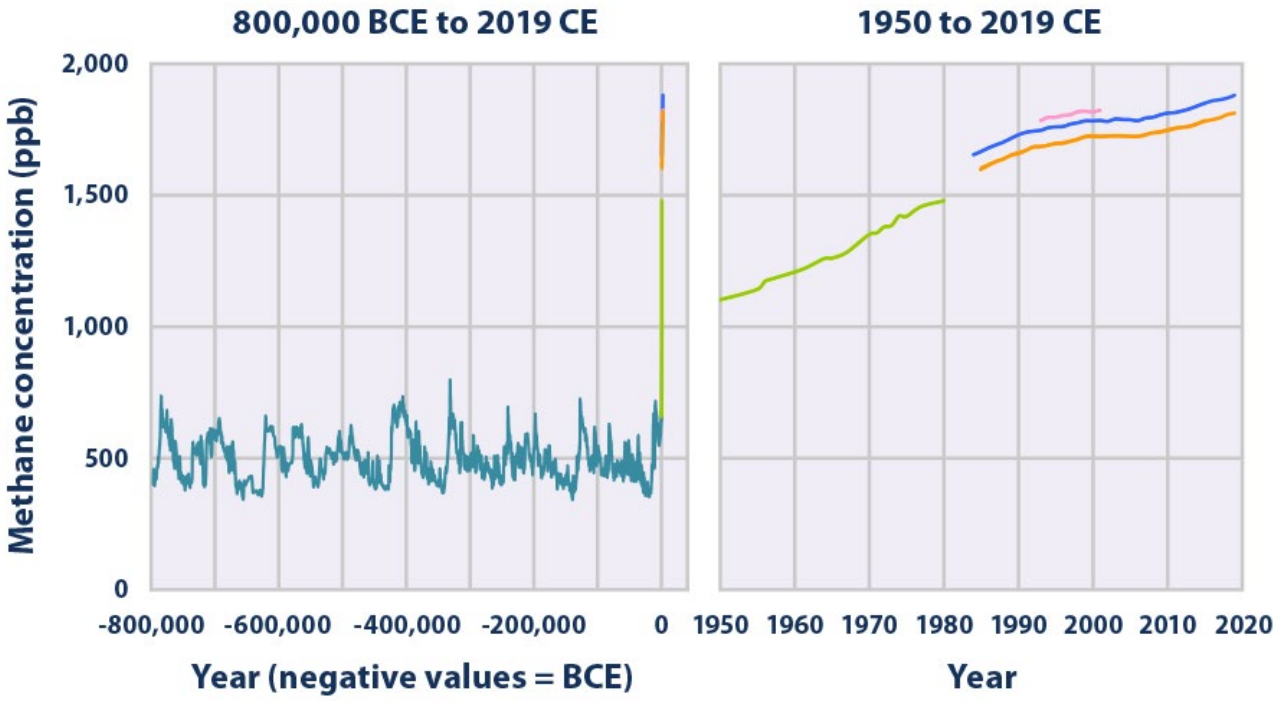


Reducing methane emissions will **slow the rate of climate change**



This figure shows concentrations of methane in the atmosphere from hundreds of thousands of years ago through 2019, measured in parts per billion (ppb). The data come from a variety of historical ice core studies and recent air monitoring sites around the world. Each line represents a different data source.

Data source: Compilation of five underlying datasets.

Global Atmospheric Concentrations of Methane Are Unprecedented

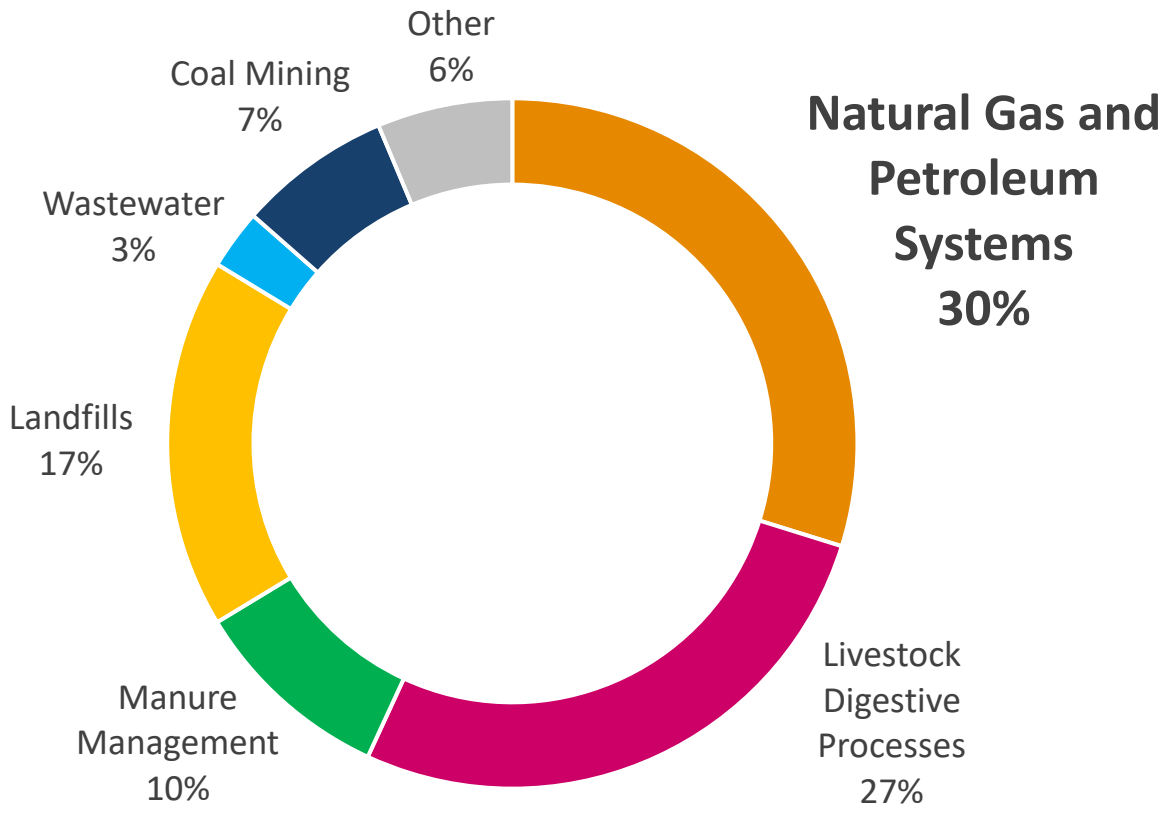
Global atmospheric concentrations of methane are **unprecedented** compared with the past 800,000 years

The concentration of methane in the atmosphere has more than doubled since pre-industrial times, mostly due to agriculture and fossil fuel use

Methane Emissions from the Oil and Gas Sector

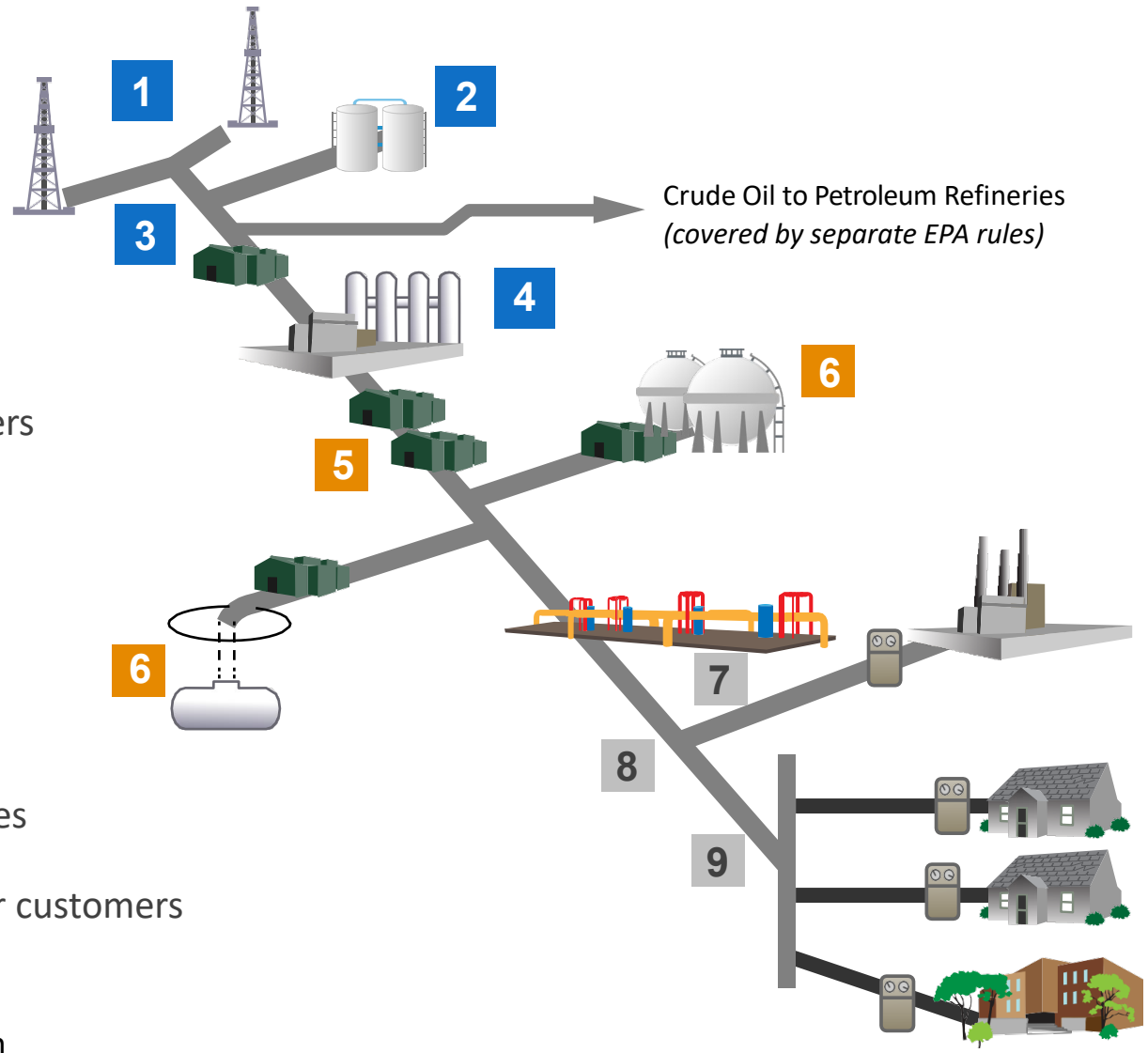
The oil and gas sector is the **largest industrial source of methane emissions** in the United States

The oil and gas sector also emits other harmful pollutants, like smog-forming volatile organic compounds, and toxic chemicals like benzene



Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019

Crude Oil and Natural Gas Industry: Where EPA's Proposed Methane Rules Would Apply



Production & Processing

EPA's methane proposal covers equipment & processes at:

1. Onshore well sites
2. Storage tank batteries
3. Gathering & boosting compressor stations
4. Natural gas processing plants

Natural Gas Transmission & Storage

EPA's methane proposal covers equipment & processes at:

5. Compressor stations
6. Storage tank batteries

Distribution

(not covered by EPA rules)

7. Distribution mains/services
8. City gate
9. Regulators and meters for customers

Figure: Adapted from American Gas Association and EPA Natural Gas STAR Program

Executive Order 13990:

Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis

EPA United States Environmental Protection Agency

To improve public health and protect our environment

To ensure access to clean air and water

To limit exposure to dangerous chemicals and pesticides

To hold polluters accountable, including those who disproportionately harm communities of color and low-income communities

To reduce greenhouse gas emissions

To bolster resilience to the impacts of climate change

To prioritize both environmental justice and the creation of the well-paying union jobs necessary to deliver on these goals

EPA's Charge for the Oil and Natural Gas Sector

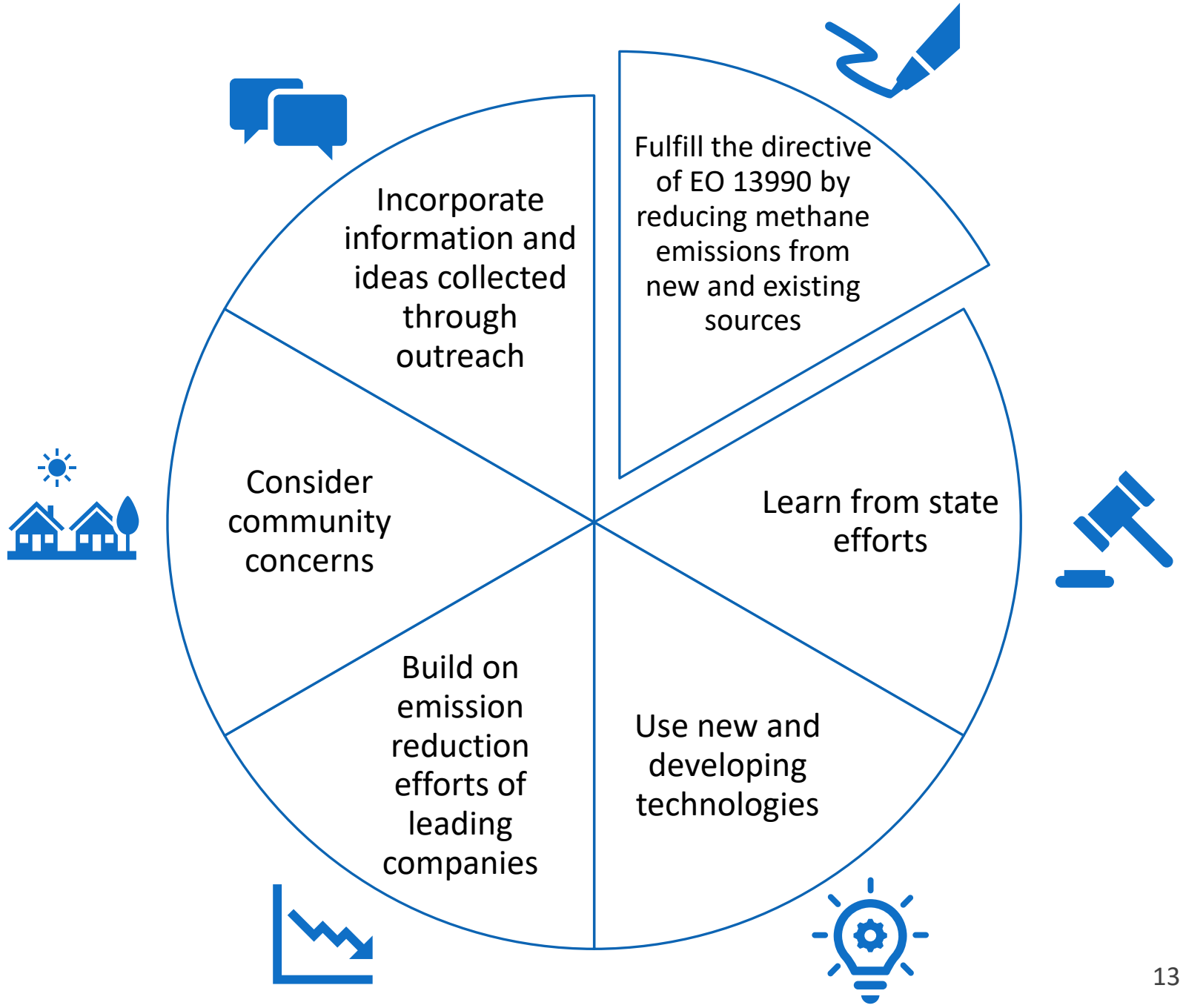
Develop or review standards or guidelines to reduce methane pollution for:

- New, modified, and reconstructed oil and natural gas facilities
- Existing oil and natural gas operations

United States Environmental Protection Agency

Pre-Proposal Outreach

Proposal Development



Clean Air Act Section 111

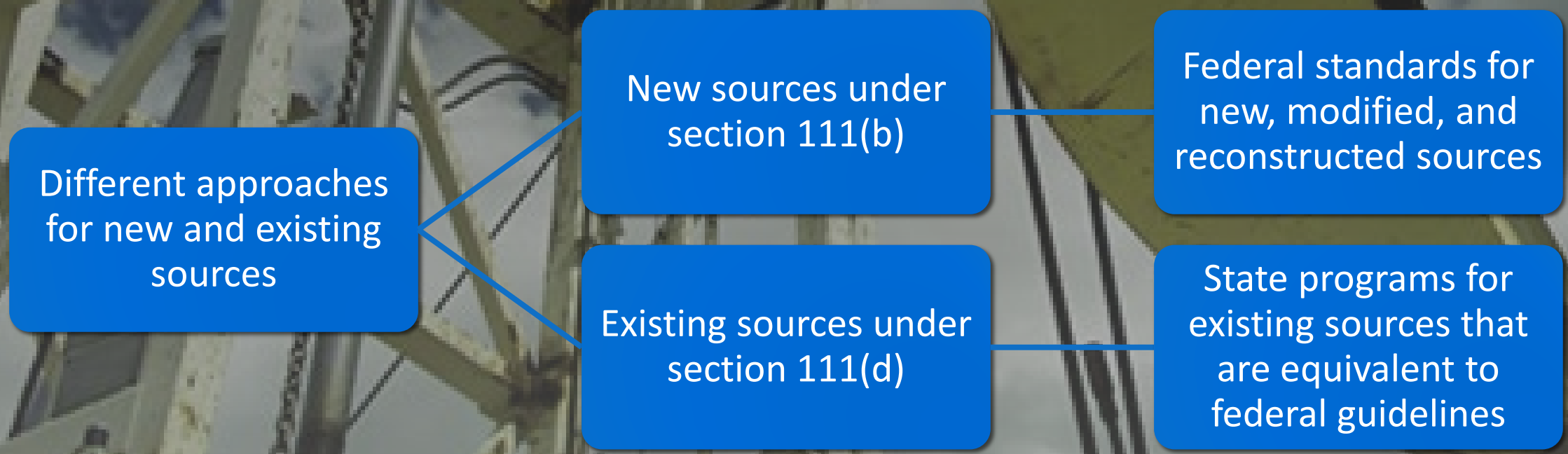
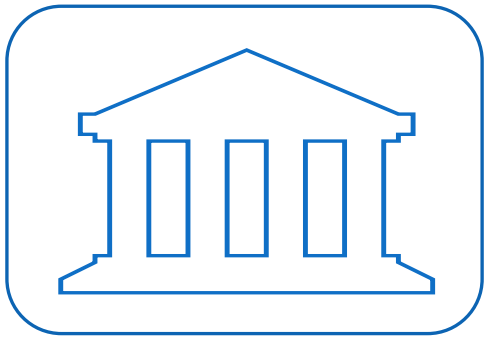


Photo: U.S. Department of Energy

Reducing Emissions at New, Modified, and Reconstructed Sources

EPA's standards for**new sources** reflects the degree of emission limitation achievable through the application of the **best system of emission reduction**

Standards are **reviewed at least every 8 years** and revised, if appropriate



Congress
Clean Air Act Section 111(b)

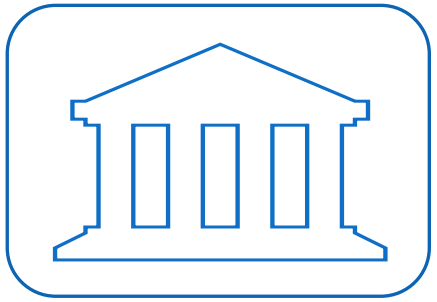
EPA
Sets new source performance standards

States
Issue state permits

Emissions Reductions

Reducing Emissions at Existing Sources

Congress recognized that **existing sources** do not have as much flexibility as new sources to build emission controls into their design



Congress
Clean Air Act
Section 111(d)

EPA
Sets emission guidelines

States
Develop state plans to submit to EPA

EPA
Reviews and approves state plans

If a state does not submit an approvable plan, EPA will issue a Federal Plan

Emissions Reductions

Proposed Emission Guidelines for Existing Sources

- EPA's proposal includes:

Proposed **best system of emission reduction** for existing sources

Presumptive standards based on the best system of emission reduction for existing sources (called "designated facilities")

  - Most presumptive standards mirror the standards EPA is proposing for new sources

- Once Emissions Guidelines are final, states may adopt the presumptive standards as part of their plans, or they may develop their own standards that generally are as strict
  - States have flexibility when applying the standard of performance in their plans to take into consideration, including the remaining useful life of the source, among other factors
- EPA expects to soon propose updates to the general provisions related to state requirements under Clean Air Act section 111
  - Will provide additional direction to states and tribes on related issues, such as timeframe to submit state plans and considering the remaining useful life of a source

Key Components of the Proposal

Finding and Repairing Methane Leaks at New and Existing Well Sites and Compressor Stations

- Focus monitoring efforts on sites and equipment that are **most likely to have large emissions**

Larger well sites (estimated emissions ≥ 3 tons per year): Must monitor for leaks **at least once every three months** and promptly repair any leaks found

Smaller well sites (estimated emissions < 3 tons per year): Must conduct a **one-time survey** to demonstrate no leaks or malfunctions; ongoing monitoring not required

EPA is co-proposing requirement that well sites with estimated emissions between 3 and 8 tons per year be monitored semi-annually, rather than quarterly

All new and existing **compressor stations** would monitor and repair leaks **at least once every three months**

Surveys must include inspections of equipment most **prone to large leaks and malfunctions**, including storage vessels and flares

Sources on the Alaska North Slope would have different monitoring schedules to account for weather

Encouraging Innovation by Incorporating Advanced Measurement Technologies

- **To find major leaks rapidly and at a lower cost**, many stakeholders have expressed strong support for the use of **advanced measurement technologies**
- EPA's proposal includes **an alternative to the proposed fugitive monitoring requirements**, allowing owners and operators to use these advanced technologies to detect leaks at all well sites and compressor stations (including well sites with estimated emissions < 3 tons per year)

Any technology capable of meeting a rigorous minimum detection threshold would be permitted	Leak surveys and follow-up repairs using these advanced technologies would be required at least once every two months	To ensure smaller leaks are detected, surveys must be supplemented by annual monitoring using optical gas imaging or EPA Method 21

- EPA is taking comment on whether this advanced measurement technology pathway is the best system of emission reduction and should be required for all well sites and compressor stations

Transitioning to Zero-Emitting Technologies for Pneumatic Controllers

- EPA proposes to:

Regulate emissions from **intermittent** vent pneumatic controllers for the first time

Require all new and existing pneumatic controllers in production, processing, and transmission and storage facilities to have **zero methane and VOC emissions**, with the exception of sites in Alaska that do not have power

- Natural gas-driven pneumatic controllers are currently used extensively in production, processing, and transmission and storage facilities
  - The vast majority of these emissions come from intermittent vent controllers that are currently unregulated under the Clean Air Act
  - Multiple zero-emitting alternatives to these pneumatic controllers exist, and several major oil and gas-producing states and Canadian provinces now require their use at new and existing facilities

Eliminating Venting of Associated Gas from Oil Wells

- EPA's proposal would:

Eliminate venting of associated gas from oil wells and requires at least a 95 percent reduction in methane and VOC emissions from associated gas that cannot be captured and sold

Ensure that flares are operating properly through recordkeeping and reporting requirements

- Oil wells frequently produce large amounts of associated natural gas
  - In many areas, there is no sales line for this associated gas, so producers vent or flare the gas
  - This venting, currently unregulated under the Clean Air Act, releases large amounts of methane into the air (nearly 40,000 tons in 2019 alone)

Strengthening Requirements for Storage Tanks

- EPA's proposal would add storage tank batteries (groups of tanks that are adjacent and receive fluids from the same source) to the definition of a storage tank covered by the rule

For **new, modified, and reconstructed storage tanks or tank batteries** with a potential to emit **6 or more tons of VOC per year**, owners/operators would have to reduce VOC and methane emissions by 95 percent

Under the proposed presumptive standard, **existing storage tanks or tank batteries** with a potential to emit of **20 tons of methane per year or greater**, owners/operators would have to control their emissions by 95 percent

Broadening the Type of Pneumatic Pumps Covered by the Rule

- The proposal **extends current requirements for new pneumatic pumps** to include all natural gas-driven diaphragm and piston pumps in the production segment of the industry, and diaphragm pumps in the transmission segment

  Standards require pneumatic pumps with access to an onsite control device to **reduce emissions by 95 percent**

  For existing sources, the presumptive methane standards for pneumatic pumps would mirror those proposed for the NSPS but exclude piston pumps

- EPA is seeking comment on **whether it is feasible to further strengthen** the proposed standard, including by requiring the use of zero-emitting pneumatic pumps at new and existing facilities with access to electric power

Reducing Additional Methane and VOC Emissions Through New and Stronger Requirements

Liquids Unloading

- Sets nationwide requirements to minimize methane and VOC emissions from liquids unloading for the first time

Natural Gas Processing Facilities

- Strengthens current leak detection and repair requirements for new natural gas processing facilities
- Adopts those requirements as presumptive standards for existing sources

Reciprocating Compressors

- Strengthens current standards for methane emissions from new reciprocating compressors
- Adopts those requirements as presumptive standards for existing sources

Centrifugal Compressors

- Adopts presumptive standards for existing centrifugal compressors that require 95 percent control of emissions from wet seal degassing
- Consistent with current standards for new sources

Considering Environmental Justice Concerns

EPA is proposing to **expand leak detection programs** for new sources to include known sources of large emission events and proposing to require **more frequent monitoring** at sites with more emissions

Proposing an additional requirement in the Emissions Guidelines to **require states to engage with the public in a meaningful way**, including with overburdened and underserved communities, during the development of state plans

Taking comment on **innovative mechanisms** to ensure compliance and minimize emissions

- Soliciting comment on a structure for communities to identify large emission events which owners or operators would then be required to investigate
- Potential mechanisms for the collection and public dissemination of this information

Responding to Small Business Advocacy Review Panel Recommendations

- EPA's proposal responds to several Small Business Advocacy Review Panel recommendations:
  - Focuses fugitive emissions monitoring requirements on larger emitters and imposes fewer requirements on sources that have lower emissions
  - Maintains the wellhead only exemption from fugitive emissions requirements
  - Allows EPA Method 21 as an alternative option for fugitive emissions monitoring and allows alternative screening technologies as compliance alternatives
  - Maintains the streamlined recordkeeping and reporting requirements from the 2020 Technical Rule
  - Excludes well sites with only a wellhead and small compressor from the definition of a "centralized production facility"
  - Maintains the flexibility for in-house engineers to complete certifications of technical infeasibility

Seeking Additional Information

- EPA intends to issue a supplemental proposal in 2022 that will provide proposed regulatory text, and may expand on or modify this proposal in response to public input
- EPA is seeking information about other pollution sources from the oil and natural gas sector that may help us further reduce methane and VOC emissions, including:

Abandoned and unplugged wells	Improving flare performance and minimizing malfunctions	Pipeline pigging operations	Tank truck loading operations

Seeking Additional Information

- EPA also is seeking comment on:

Proposed approach for **fugitive emissions monitoring** at well sites

- Baseline emission threshold and other criteria to determine ongoing monitoring requirements
- Methodology for calculating baseline methane emissions
- Ensuring emissions from wells owned by small businesses are addressed while recognizing the challenges specific to small businesses

Ensuring captured associated gas is collected for a **useful purpose** rather than flared

Feasibility of requiring broader use of **zero-emitting technology for pneumatic pumps**

Alternative measurement technologies

- Evaluate whether a change in the best system of emission reduction from the proposed quarterly optical gas imaging monitoring to a monitoring program using alternative measurement technologies is appropriate

Seeking Additional Information Related to Small Businesses

- EPA is seeking comment on several aspects of the proposal that would affect small businesses:
  - Whether it is appropriate for existing well sites, or a subcategory of sites, to have different emission profiles due to site characteristics or other factors
  - Regulatory alternatives for low-production well sites that accomplish Clean Air Act objectives and minimize significant economic impact to small businesses
  - Emissions from low-production well sites, along with information on any factors that may make certain well sites less likely to emit methane and VOCs
  - Information that would assist EPA in evaluating the cost burden on the smallest companies or individual well site owners
- The Agency is continuing to examine the impact that fugitive emissions monitoring requirements have on small businesses, particularly on businesses with very few employees

Highlights from Regulatory Impact Analysis

Analysis for 2023 – 2035

Total Emission Reductions

- 41 million short tons of methane
  (equivalent to 920 million metric tons of carbon dioxide)
- 12 million short tons of VOC
- 480,000 short tons of air toxics

Total Net Benefits (2019$)

- $48 to $49 billion in net benefits
  (3 percent and 7 percent discount rates, respectively)
  - Equivalent to more than $4 billion a year

Total Benefits (2019$)

- $55 billion in climate benefits
  - $5.2 billion in benefits a year

Total Costs

- $6.3 billion to $13 billion in costs
  - $680 million to $1.2 billion in costs a year

Rulemaking Process

Proposal
- November 2021

Comment Period
- 60 days

Supplemental Proposal and comment period
- 2022

Final Rule