Partnering to Advance Clean Energy Development & Climate Protection: The Global Methane Initiative

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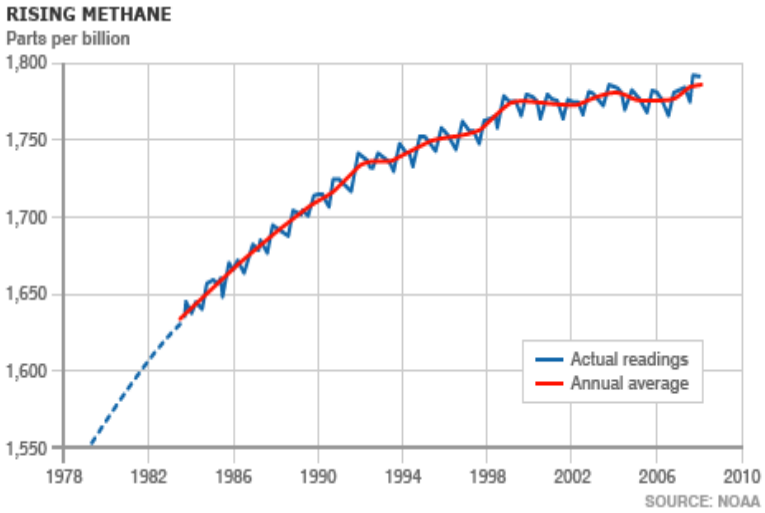
Presentation Outline

- Global Methane Initiative (GMI) Introduction & Update
- Oil & Gas Sector Cooperation via Natural Gas STAR International (NGSI)
- Recent US Actions
  - GHG Reporting Program (Subpart W – Oil and Gas)
  - NSPS and Air Toxics Standards
- Conclusion

Why Methane (CH_4)?

- Potent greenhouse gas
  - 100-year GWP = 25
  - Lifetime = 12 years
  - Most important short-lived forcer—based on emissions, accounts for >1/3 of current anthropogenic forcing
- Ozone precursor
  - Effects background ozone levels
- Clean energy source - primary component of natural gas
- Many emission sources
  - energy, agriculture & waste sectors
  - 50 - 70% of are anthropogenic
- Concentration of methane in the atmosphere has increased by 150% in the last 260 years



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Methane Projects Deliver Significant Co-Benefits

- New Sources of Clean Energy
  - Emission capture makes methane available for local energy generation
- Air Quality Improvement
  - Decrease in background ground-level ozone – a 20% reduction in global methane emissions could avoid large Northern Hemisphere mortality (140,000 – 400,000 lives in 2030)
  - Reduction of local emissions of VOCs and HAPs from landfills, agriculture, and oil and gas systems
  - Odor reductions in the landfill and agriculture sectors
- Water Quality Benefits
  - Local water quality improvements due to improved management of agricultural wastes and leachate in landfills
- Industrial Safety
  - Methane is explosive - improved worker safety in the coal mining and oil & gas sectors

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Scientific Imperative: Avoiding Critical Temperature Thresholds

- US supports focused initiative on near-term climate change
  - Short Lived Climate Forcers – BC, HFCs, CH_4
  - Need to reduce is clear and urgent
  - Mitigation options available – accelerate deployment via coordinated actions

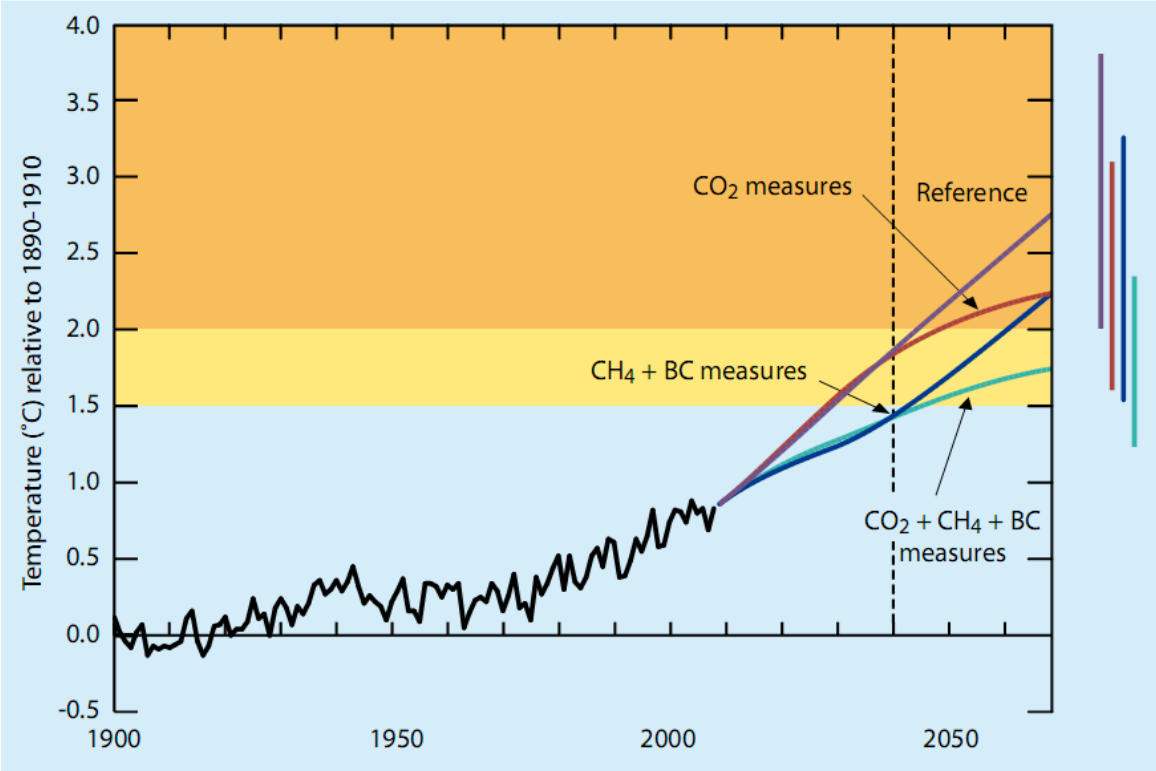

Figure 3. Observed deviation of temperature to 2009 and projections under various scenarios. Immediate implementation of the identified BC and CH_4 measures, together with measures to reduce CO_2 emissions, would greatly improve the chances of keeping Earth's temperature increase to less than 2°C relative to pre-industrial levels. The bulk of the benefits of CH_4 and BC measure are realized by 2040 (dashed line).

Source: UNEP & WMO, 2011.

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Global Methane Initiative (GMI)

- **Mission:**

  GMI is a voluntary, multilateral partnership that aims to reduce methane emissions and to advance the abatement, recovery and use as a clean energy source

  - Began in 2004 (as Methane to Markets)
  - Targets Five Sector-Specific Areas for Methane Reduction
    - Agriculture, Coal Mines, Landfills, Municipal Wastewater, and Oil & Gas Systems
  - Complements UNFCCC & supports development of sector emission inventories and NAMAs

- **Impact:**

  Participants cover nearly **70% of total global methane emissions**

  - Since 2004, GMI has helped facilitate projects that have now **reduced 151 MMTCO2e of methane**

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GMI Global Participation

- Membership:
  - 41 Partner countries
    - Norway joined in Oct. 2011
  - Multilateral Institutions including the ADB and IDB
  - 1000 + public and private organizations
- Impact:
  - Since 2004, GMI has facilitated project development at more than 600 sites around the globe

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Farms and Landfills—Providing Renewable Energy

Animal Waste
to Cooking Fuel
in Vietnam

Landfill Gas to
an Infrared Heater
in Ukraine

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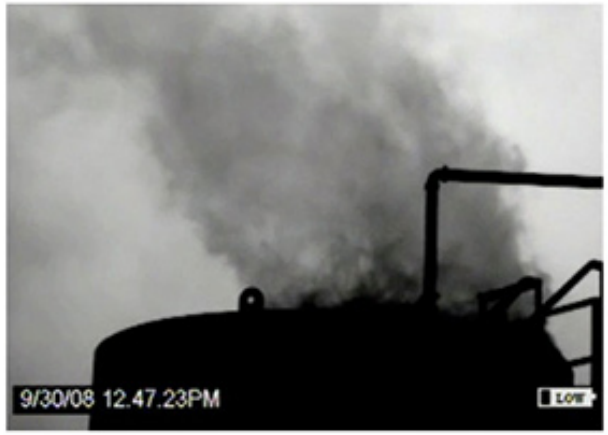
Oil, Natural Gas and Coal Mining—Environment and Energy Solutions



Reducing Leaks and Losses from Natural Gas and Oil Operations—More Energy to Markets and less VOCs and HAPs

Capturing Methane from Gassy Mines—Clean Energy and Mine Safety

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Importance of Methane Emissions from Oil & Gas Sector

ECONOMIC LOSS OF A VALUABLE PRODUCT

Over 100 billion m^3 of natural gas* lost annually by global oil and gas industry equates to:

- **US$12 to $20 billion** lost revenues
- Over 3% of worldwide net dry gas consumption

SIGNIFICANT ENVIRONMENTAL IMPACT

18% of global anthropogenic methane emissions from oil and natural gas operations

Climate change impact of worldwide vented gas (**1,165 $MtCO_2e$**) is almost three times as much as that of the flared gas (400 MtCO2e)

Emissions can include VOC and HAPs in addition to methane

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*Methane is the primary component of natural gas

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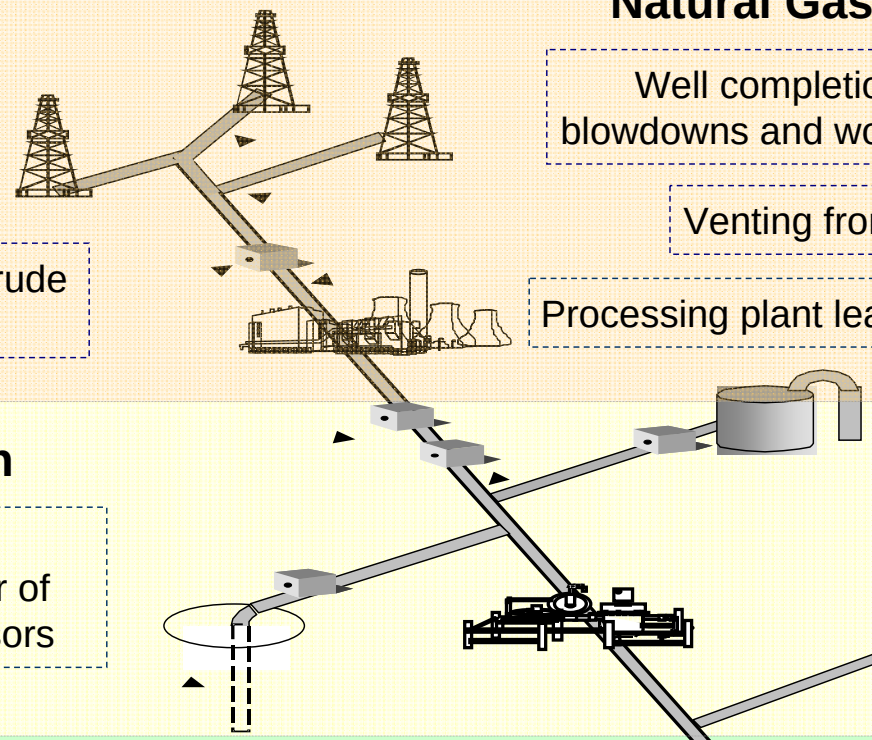
Sources of Methane Emissions from Oil and Gas Operations

Oil Production

- Venting of casinghead gas
- Flash emissions from crude oil storage tanks

Natural Gas Production & Processing

- Well completions, blowdowns and workovers
- Reciprocating compressor rod packing
- Venting from glycol reboilers on dehydrators
- Processing plant leaks
- Gas-driven pneumatic devices

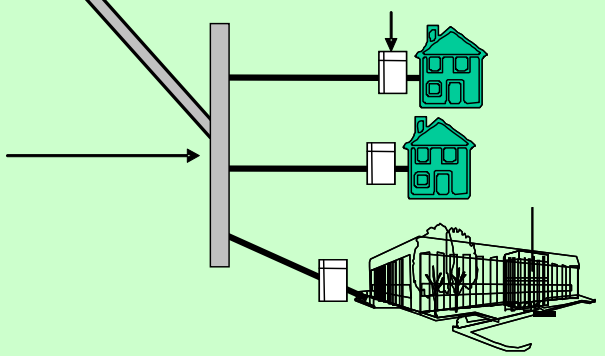


Gas Transmission

- Venting of gas for maintenance or repair of pipelines or compressors
- Leaks from pipelines, compressor stations
- Centrifugal compressor seal oil de-gassing

Gas Distribution

- Leaks from unprotected steel mains and service lines
- Leaks at metering and regulating stations
- Pipeline blowdowns



Picture courtesy of American Gas Association

14 Gas STAR International Partners

How Do Companies Participate?

- Joining Natural Gas STAR International:
  - Sign a voluntary one page Memorandum of Understanding (MOU)
  - Evaluate and implement current and future voluntary activities to reduce methane emissions
  - Submit an Implementation Plan within one year of joining and report activities to EPA on an annual basis
- Benefits include:
  - Partner companies are automatically eligible for all Natural Gas STAR services
  - Join strong and growing “Peer Learning Network”
  - Flexible participation and reporting formats; companies can participate at the level they choose, evaluating company-wide, site-specific or pilot projects

Natural Gas STAR Resources

- Resources to advance cost-effective oil & gas sector methane emission reductions:
- General technology transfer, training, and capacity building:
  - Technical documents and research outlining over 80 mitigation options, including analyses of economic, environmental and operational benefits
  - Workshops and conferences
  - Study tours

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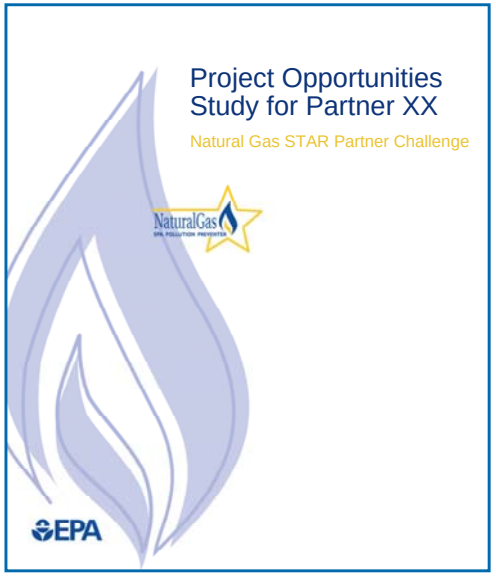
Natural Gas STAR Resources, cont.

- Individual technical assistance to help companies identify and assess cost-effective methane emission reduction opportunities
  - Analysis of estimated methane emission sources and corresponding project opportunities
  - Pre-feasibility and feasibility studies
  - Leak detection and measurement studies



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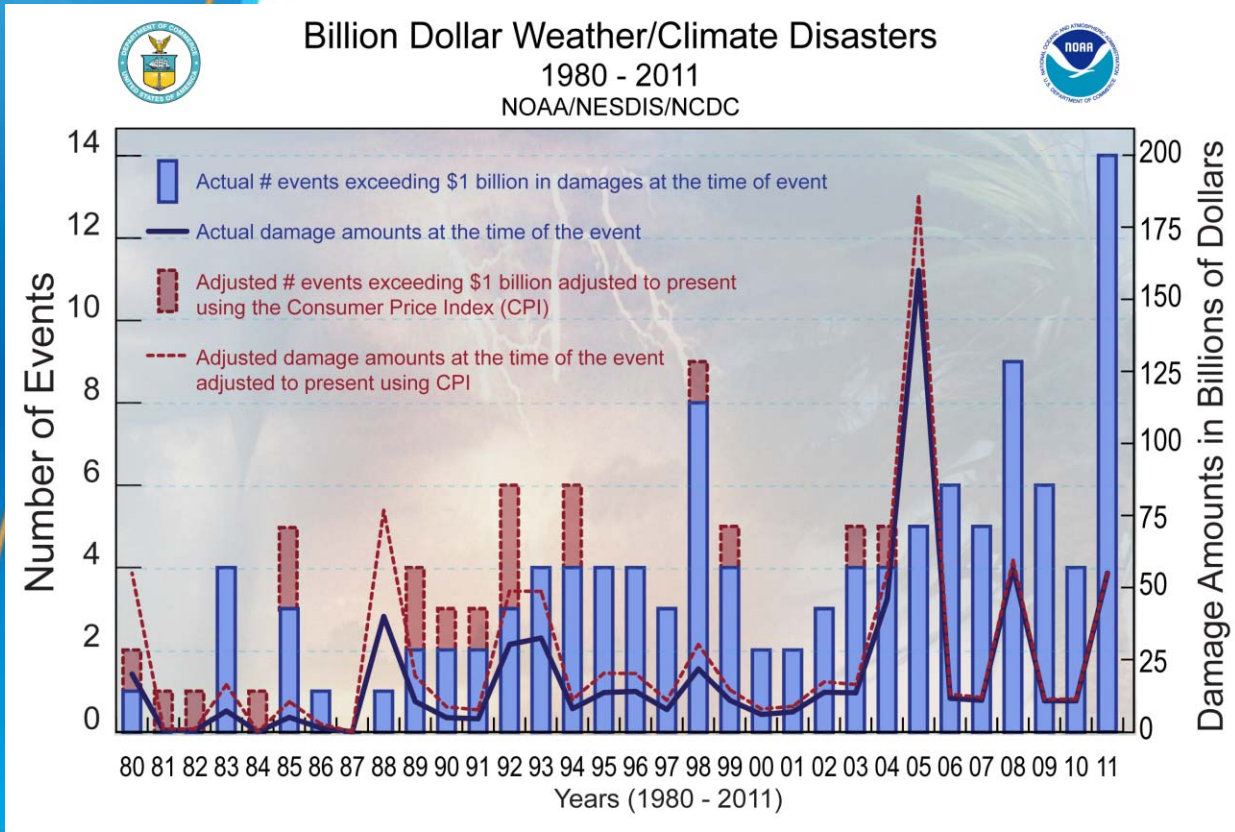
2011 Record-Setting US Damages



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GHG Reporting Program

- Direct emitters of GHGs with emissions equal to or greater than 25,000 metric tons CO_2 eq./year
- Covers roughly 90% of total US emissions
- 25 Source categories
  - **Petroleum & Natural Gas Systems** (Subpart W)
  - Estimated to cover 2,800 US facilities
    - Onshore petroleum and natural gas production
    - Offshore petroleum and natural gas production
    - Natural gas processing
    - Natural gas transmission compressor stations
    - Underground natural gas storage
    - Liquefied natural gas (LNG) storage
    - LNG import and export terminals, and
    - Natural gas distribution
  - Begin reporting for 2011
- "Can not manage what you do not measure"

http://www.epa.gov/climatechange/emissions/subpart/w.html

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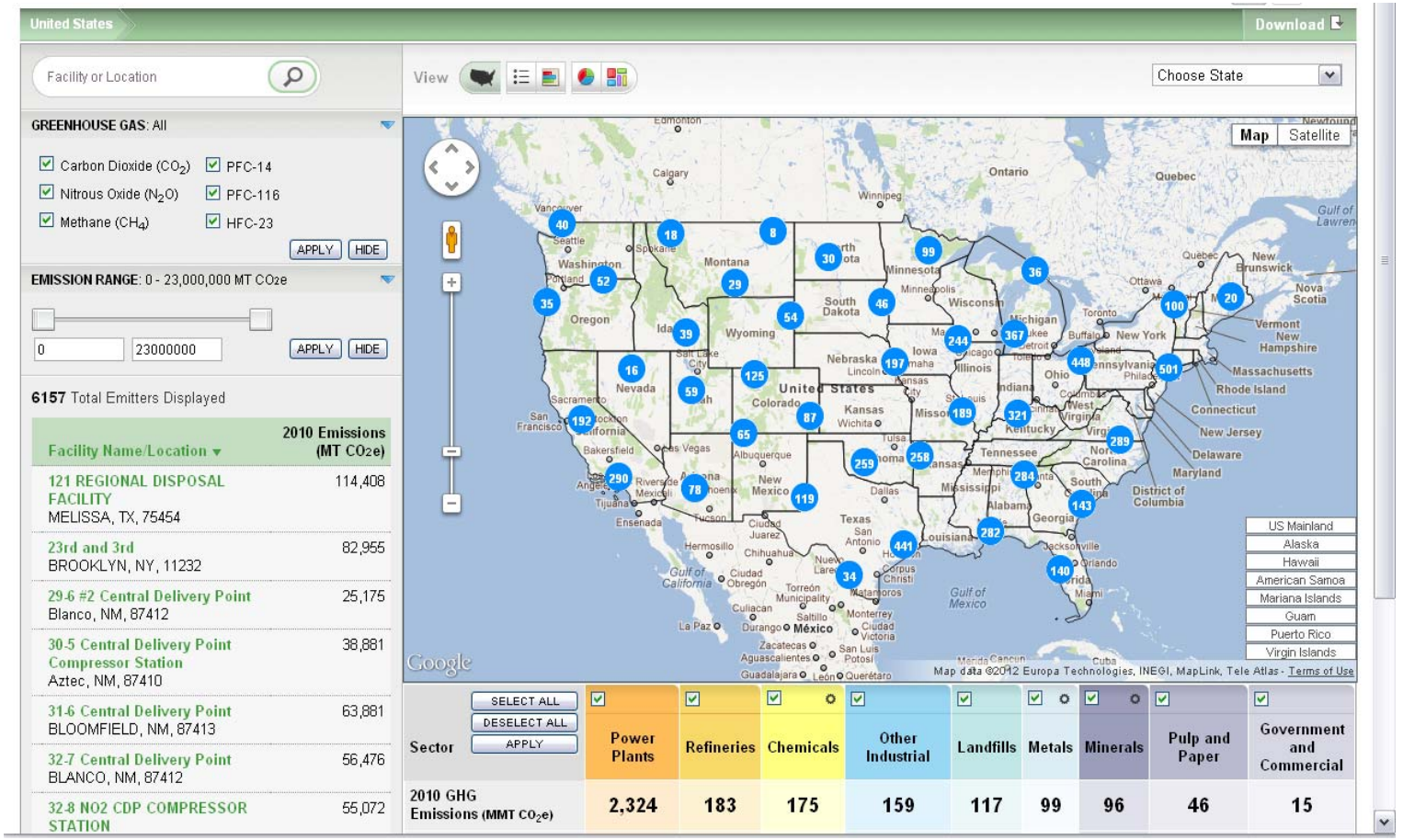
U.S. GHG Emissions Data by Facility



http://epa.gov/climatechange/emissions/ghgdata

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Mandatory Air Pollution Control

- EPA proposed **New Source Performance Standards (NSPS)** and **National Emission Standards for Hazardous Air Pollutants (NESHAP)** for the oil and natural gas industry on August 23, 2011
- Includes the first federal air standards for hydraulically fractured wells
- Standards would:
  - Reduce emissions of smog-forming volatile organic compounds (VOCs), and air toxics including the carcinogen benzene.
  - Significant environmental co-benefit by reducing methane emissions from new and modified wells
- Updated standards based on existing, cost-effective technology
  - Will institutionalize best practices already in place in some states and in use by several companies
- Technologies will allow US operators to save nearly $30 million/year even as they cut emissions of benzene and other air toxics, as well as volatile organic compounds – pollutants that form ground-level ozone (smog), which can cause asthma

http://www.epa.gov/airquality/oilandgas

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Significant Air Quality Benefits (and Climate Co-benefits)

Pollutant	Emissions (tpy) (includes engines and boilers)
VOCs	2.2 million
Air Toxics	130,000
GHG (Methane)	16 million ($300\ MMTCO_2e$)

- 1.1 million producing oil and gas wells
  - 500,000 producing gas wells
  - 11,400 new fractured gas wells completed per year
  - 14,000 existing gas wells re-fractured and completed per year
- 600 gas processing plants
- 3,000 gas transmission compression stations (there are thousands more gathering and boosting stations not included in this number)
- 1.5 million miles of gas pipelines

Note: The Oil and Natural Gas Sector accounts for **40%** of all U.S. methane emissions – roughly **4%** of all US GHG emissions

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EPA Seeks to Expand Collaborations in 2012

- Enormous economic opportunity to reduce methane losses from oil & gas operations
  - **US$12 to $20 Billion** in potential new revenue
  - **Increases energy security**
  - **Improves air quality and industrial safety**
  - **Contributes to climate protection / national commitments**
- Cost of Inaction is significant
  - **Stern Review on the Economics of Climate Change**
  - **Losses = 5 to 20% GDP**
- Collaboration expedites information sharing and reduces total mitigation costs

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http://www.epa.gov/gasstar/international/index.html

http://www.epa.gov/gasstar/tools/recommended.html