

2011 EPA Natural Gas STAR Program Accomplishments

Introduction

Established in 1993, the Natural Gas STAR Program is a flexible, voluntary partnership that encourages oil and natural gas companies—both in the United States and internationally—to adopt proven, cost-effective technologies and practices that improve operational efficiency and reduce methane emissions. Given that methane is the primary component of natural gas and is a potent greenhouse gas—21 times more powerful than carbon dioxide (CO₂) in trapping heat in the atmosphere over a 100-year period—reducing methane emissions can result in environmental, economic, and operational benefits.

Natural Gas STAR partners have operations in all of the major industry sectors (production, gathering and processing, transmission, and distribution) that deliver natural gas to end users. Program partners represent 60 percent of the natural gas industry in the United States. Since the inception of the program, these domestic partners have eliminated more than 1 trillion cubic feet (TCF) of methane emissions by implementing approximately 150 cost-effective technologies and practices.

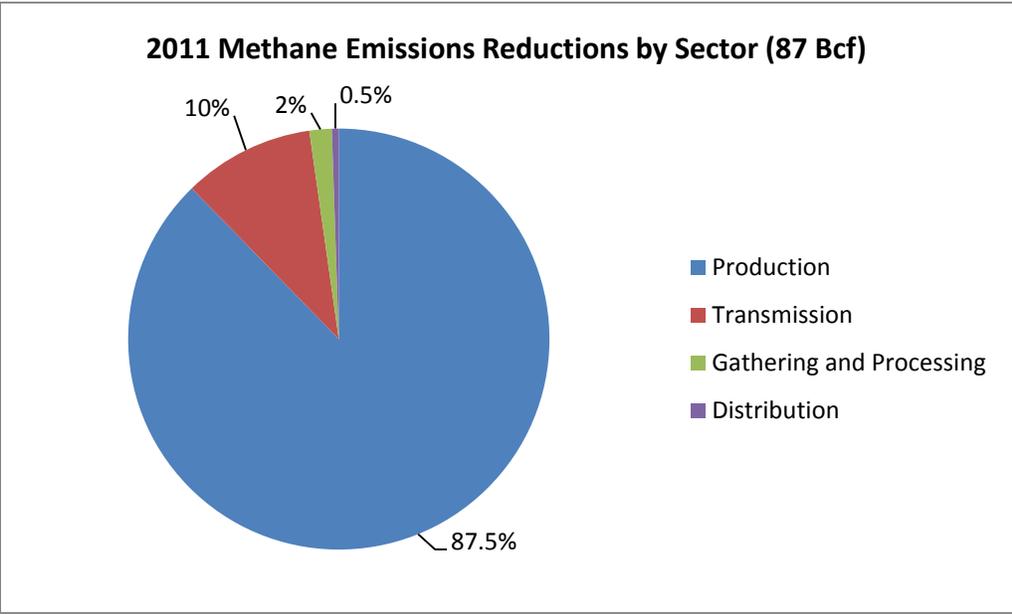
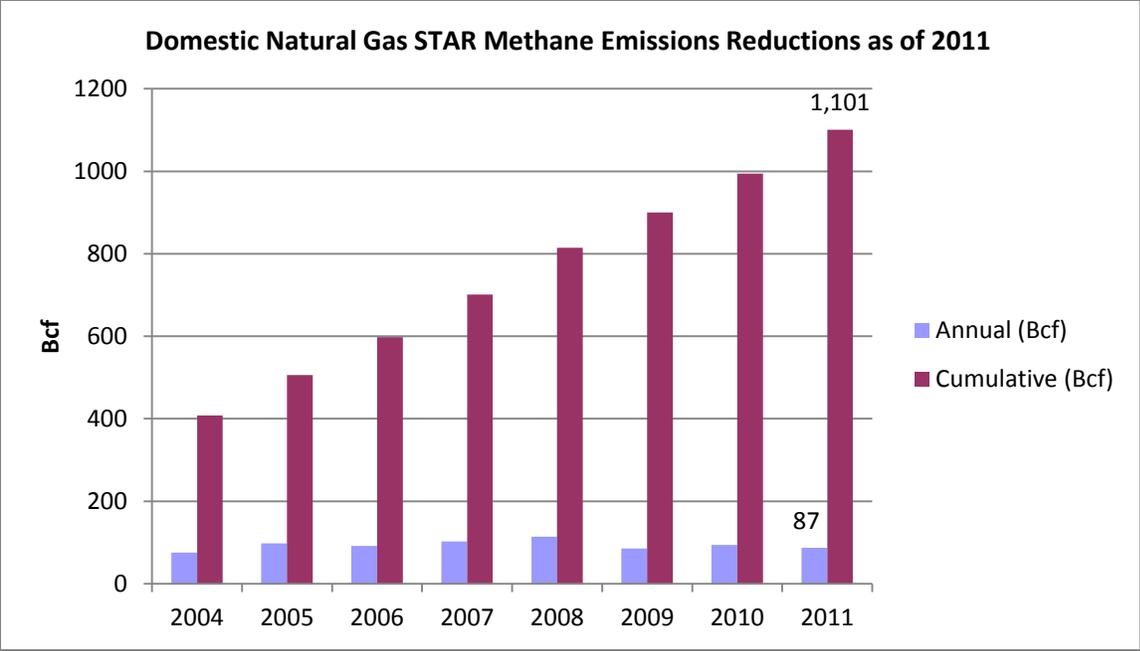
With the launch of Natural Gas STAR International in 2006, the Program has expanded to include companies worldwide, significantly increasing opportunities to reduce methane emissions from oil and natural gas operations. Natural Gas STAR International builds off of the framework of the Global Methane Initiative (GMI), an international public-private partnership that advances the cost-effective, voluntary recovery of methane for use as a clean energy source. To date, international partners have reduced methane emissions by 85.2 Bcf.

Together, Natural Gas STAR and Natural Gas STAR International have nearly 140 partner companies—16 of which are international partners. This document highlights the methane emissions reductions that both domestic and international partners have achieved, as well as the variety of technologies and practices they have implemented to reduce methane emissions.

Ongoing Success in the U.S.

During calendar year 2012, 65 percent of U.S. partners submitted an annual report detailing their efforts to reduce methane emissions from their operations. These voluntary activities consisted of nearly 100 technologies and practices and resulted in domestic emissions reductions of 87 Bcf for the year. These methane emissions reductions have cross-cutting benefits on domestic energy supply, industrial efficiency, revenue generation, and greenhouse gas emissions reductions. The 2011 U.S. emission reductions are equivalent to:

- The additional revenue of more than \$348 million in natural gas sales (assumes an average natural gas price of \$4.00 per thousand cubic feet).
- The avoidance of 35.2 million tonnes CO₂ equivalent.
- The carbon sequestered annually by 7.5 million acres of pine or fir forests.
- The annual greenhouse gas emissions from nearly 6.7 million passenger vehicles.



Domestic Emissions Reductions by Sector

The following section illustrates the major sources of methane emissions from each industry sector and the technologies and practices implemented by partners to reduce emissions. The information showing the breakdown of emissions sources was taken from the *EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010*, dated April 2012, and the information showing Natural Gas STAR partner activities was taken from partner reports and Natural Gas STAR historical data. The following diagram shows some of the top methane emissions reduction opportunities for each sector:

Oil Production

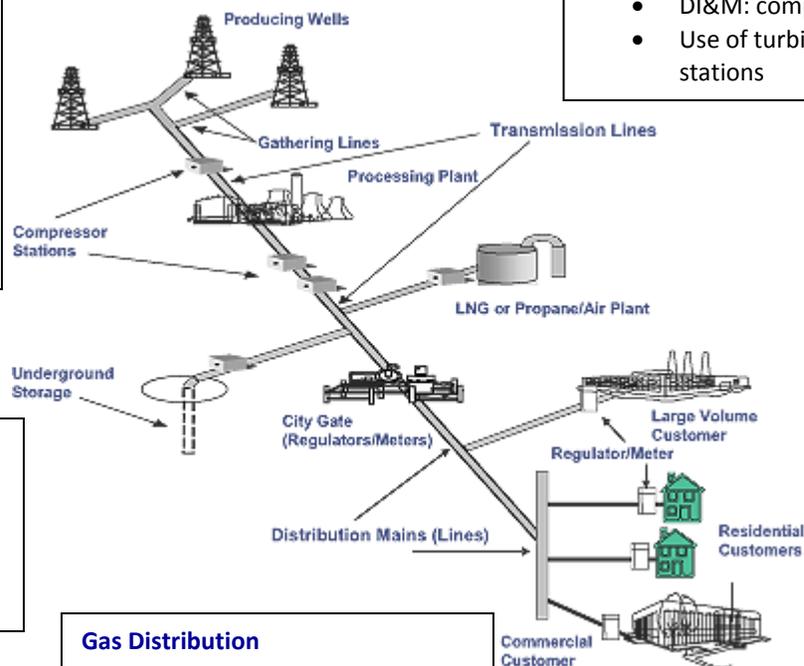
- Perform reduced emissions completions
- Artificial lift: install plunger lifts
- Install vapor recovery units (VRUs)

Gas Production & Processing

- DI&M: aerial leak detection
- Nitrogen rejection unit optimization
- Eliminate unnecessary equipment and/or systems

Gas Transmission

- Use pipeline pumpdown techniques to lower pressure
- DI&M: compressor stations
- Use of turbines at compressor stations



Gas Storage

- Convert to instrument air systems
- Replace compressor rod packing systems

Gas Distribution

- Identify and rehabilitate leaky distribution pipe
- DI&M: surface facilities
- DI&M: survey and repair leaks

[TEXT BOX] 2012 Capacity Building

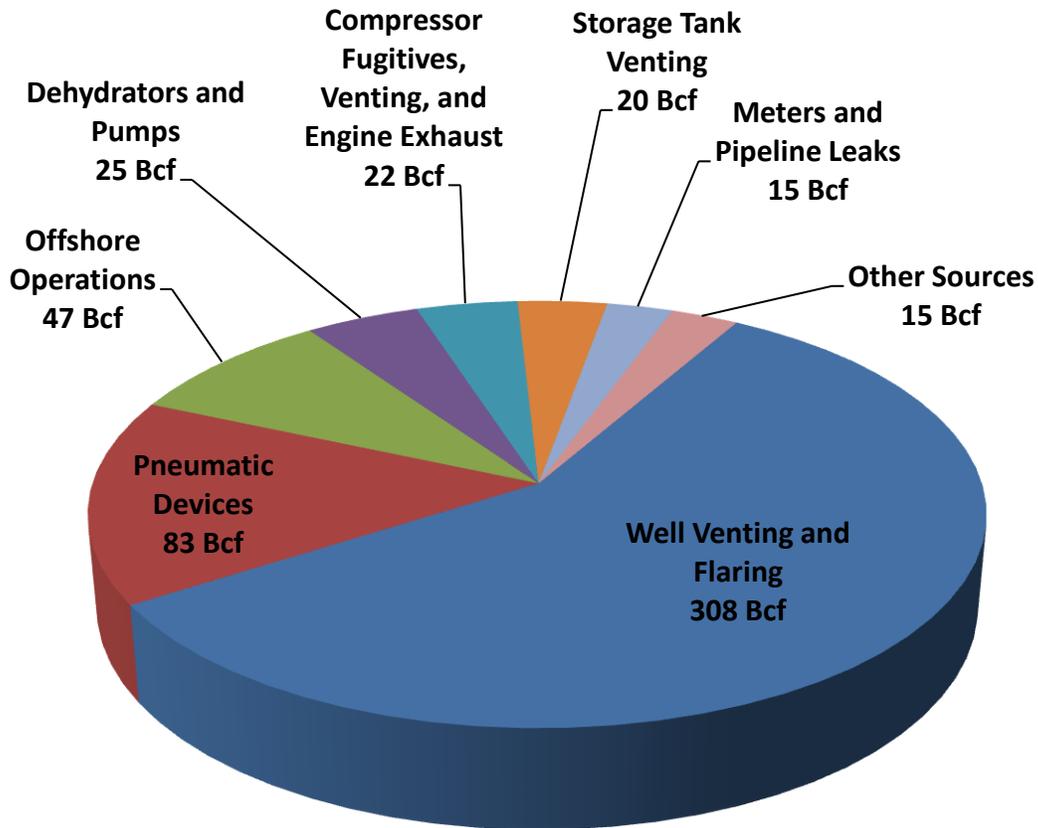
Many methane emission reduction technologies and practices promoted by Natural Gas STAR have become widely implemented as a result of Program events and resources which allow partners to share their experiences across the industry. This outreach and partner exchange occurs through the development of technical documents and articles, tools, Program sponsored workshops, meetings and study tours. Recent noteworthy events in included:

- The 18th Annual Implementation Workshop was held in conjunction with the Global Methane Initiative's (GMI) Oil & Gas Subcommittee meeting from April 10-12, 2012 in Denver, Colorado, United States. This unique event included a tour of nearby oil and natural gas operations and technical sessions. It provided an opportunity for attendees to learn how Natural Gas STAR and GMI work collaboratively to encourage implementation of projects that reduce methane emissions, increase safety, and enhance operational efficiency globally.
- Natural Gas STAR and GMI hosted a Study Tour pairing Natural Gas STAR International Partners with their U.S.-based peers to tour facilities and exchange ideas for accelerating methane capture and use and project implementation.

More information on these and all Natural Gas STAR sponsored events can be found at epa.gov/gasstar/workshops/index.html.

Production Sector Accomplishments

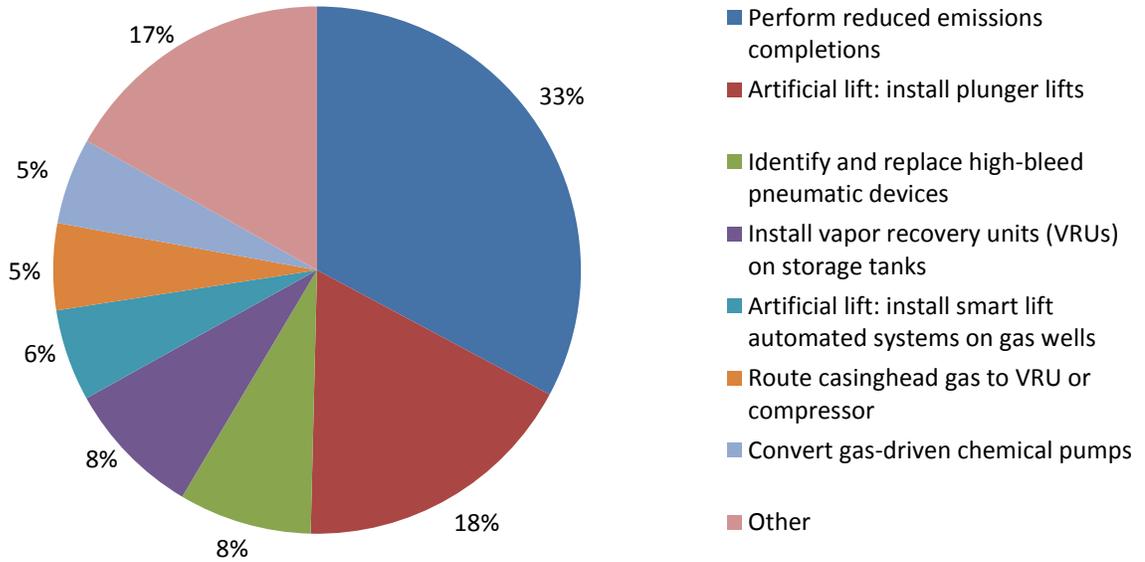
2010 Production Sector Methane Emissions



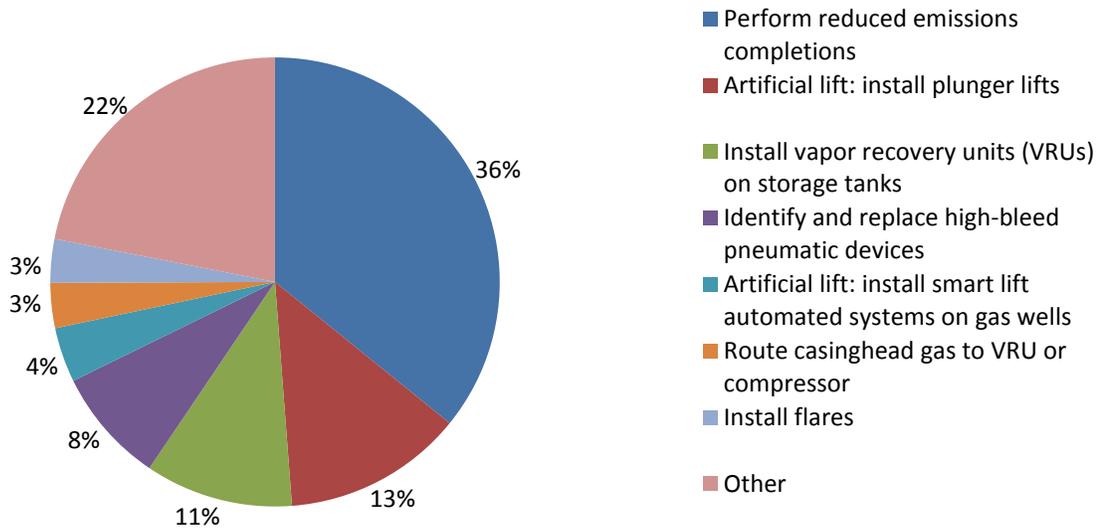
EPA Inventory of U.S. Greenhouse Emissions and Sinks: 1990 – 2010, April 2012. Available at: epa.gov/climatechange/ghgemissions/usinventoryreport.html.

Production sector partners reported 75.5 Bcf of methane emissions reductions in 2011—and a total of 764.9 Bcf since 1990. The top technologies and practices employed by production sector partners are displayed in the charts below.

Top Technologies in 2011
 Total Sector Reductions in 2011 = 75.5 Bcf

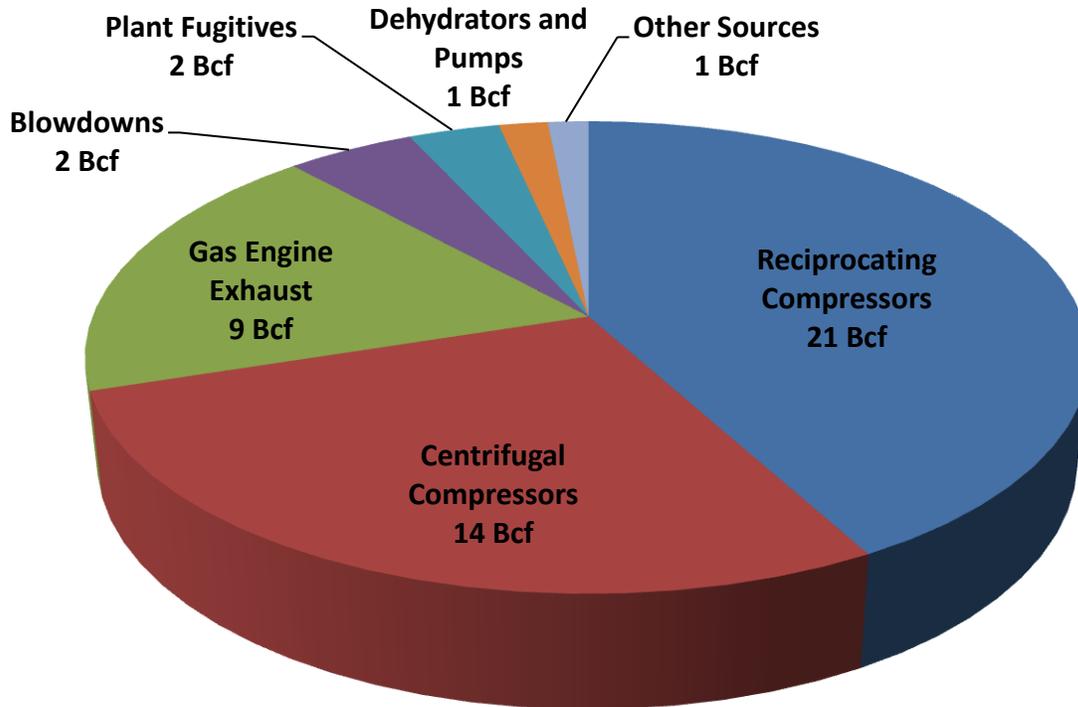


Top Technologies Since 1990
 Cumulative Sector Reductions = 764.9 Bcf



Gathering and Processing Sector Accomplishments

2010 Gathering and Processing Sector Methane Emissions

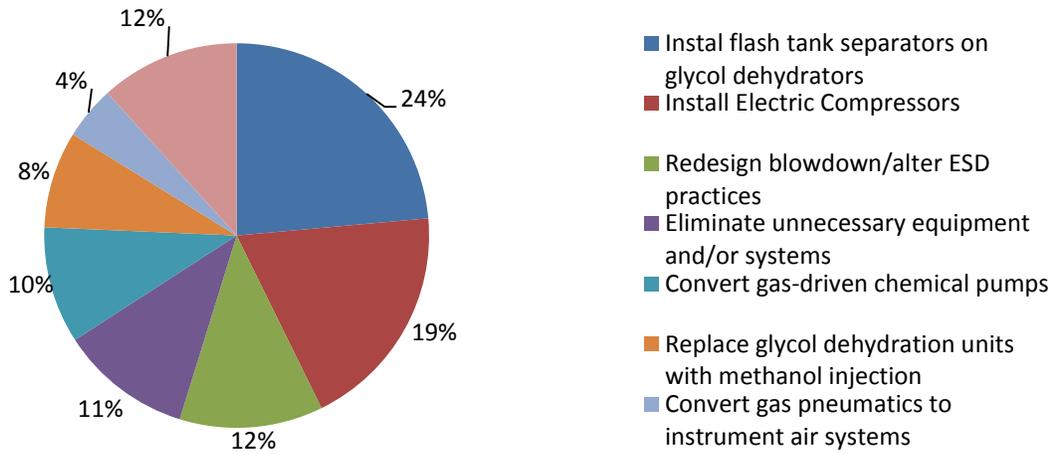


EPA Inventory of U.S. Greenhouse Emissions and Sinks: 1990 – 2010, April 2012. Available at: epa.gov/climatechange/ghgemissions/usinventoryreport.html.

Gathering and processing sector partners reported 1.5 Bcf of methane emissions reductions in 2011—and a total of 46.8 Bcf since 1990. The top technologies and practices employed by gathering and processing sector partners are displayed in the charts below.

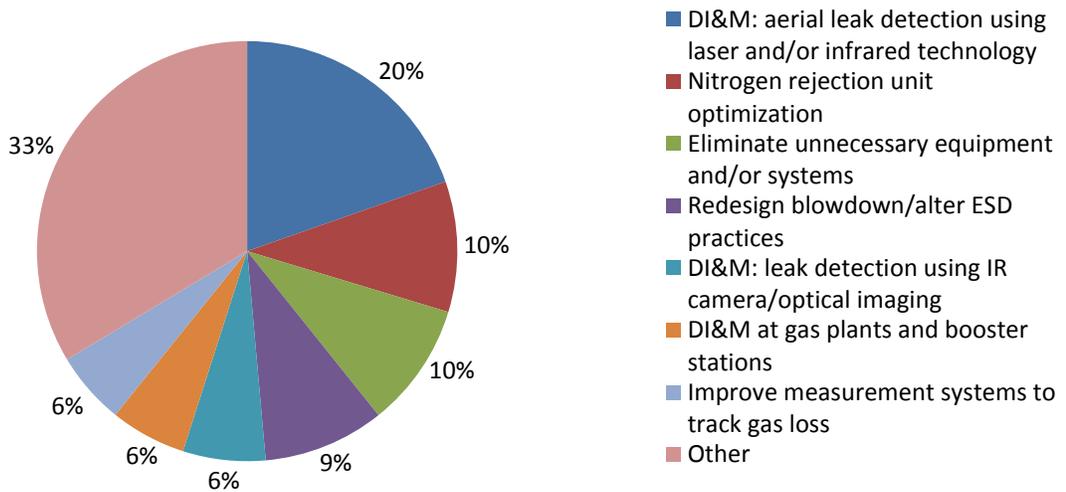
Top Technologies in 2011

Total Sector Reductions in 2011 = 1.5 Bcf



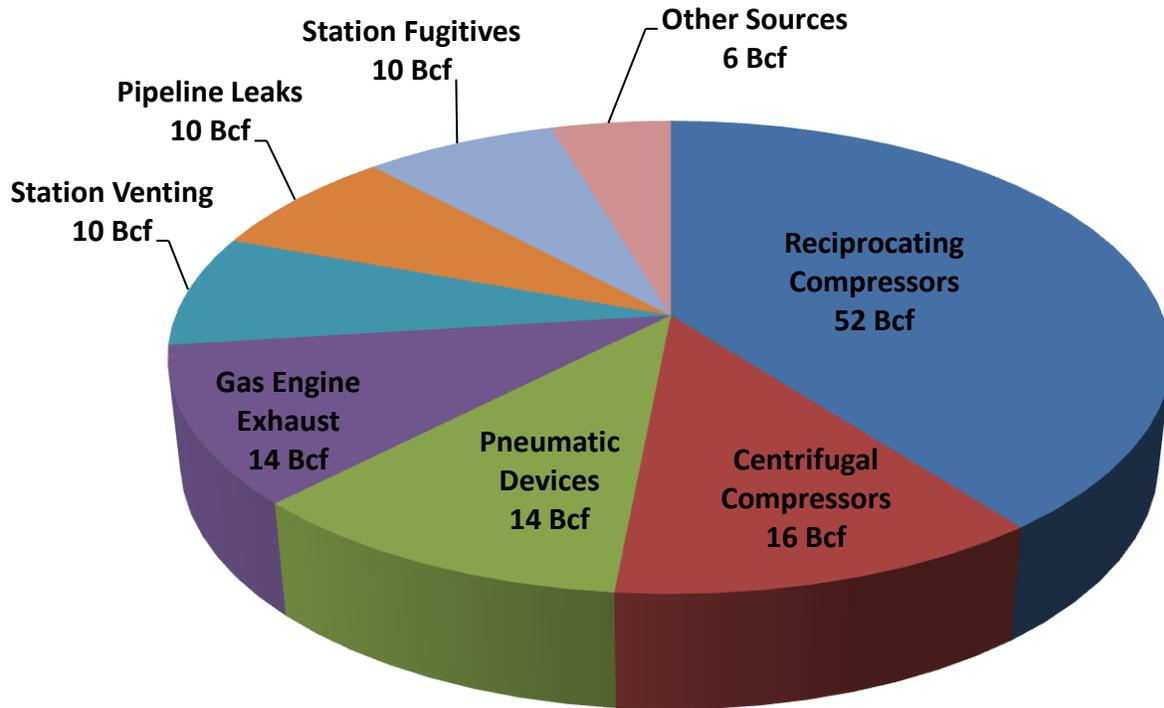
Top Technologies Since 1990

Cumulative Sector Reductions = 46.8 Bcf



Transmission Sector Accomplishments

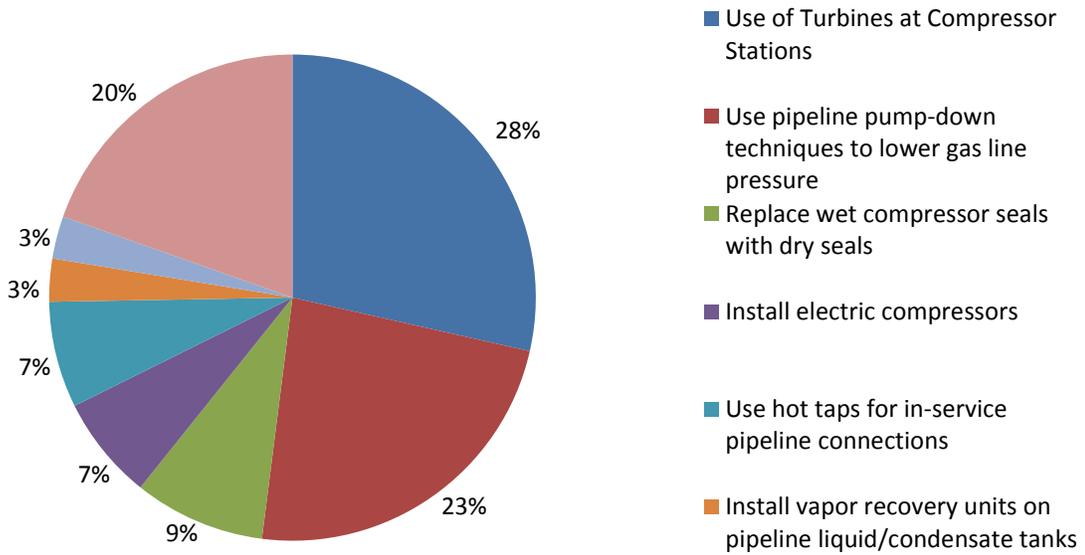
2010 Transmission Sector Methane Emissions



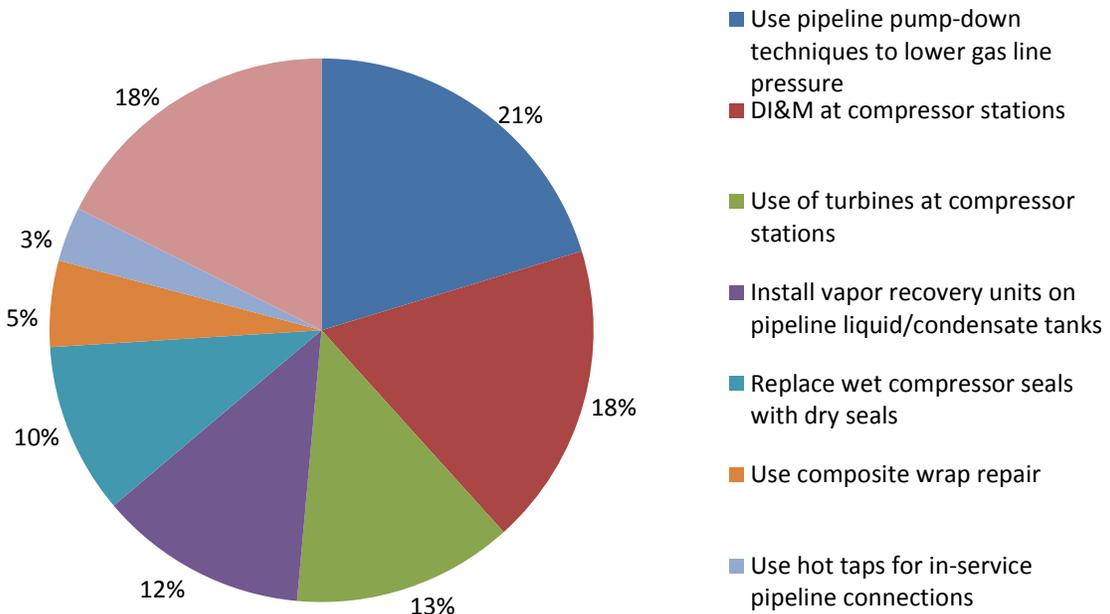
EPA Inventory of U.S. Greenhouse Emissions and Sinks: 1990 – 2010, April 2012. Available at: epa.gov/climatechange/ghgemissions/usinventoryreport.html.

Transmission sector partners reported 8.7 Bcf of methane emissions reductions in 2011—and a total of 245.1 Bcf since 1993. The top technologies and practices employed by transmission sector partners are displayed in the charts below.

Top Technologies in 2011
Total Sector Reductions in 2011 = 8.7 Bcf

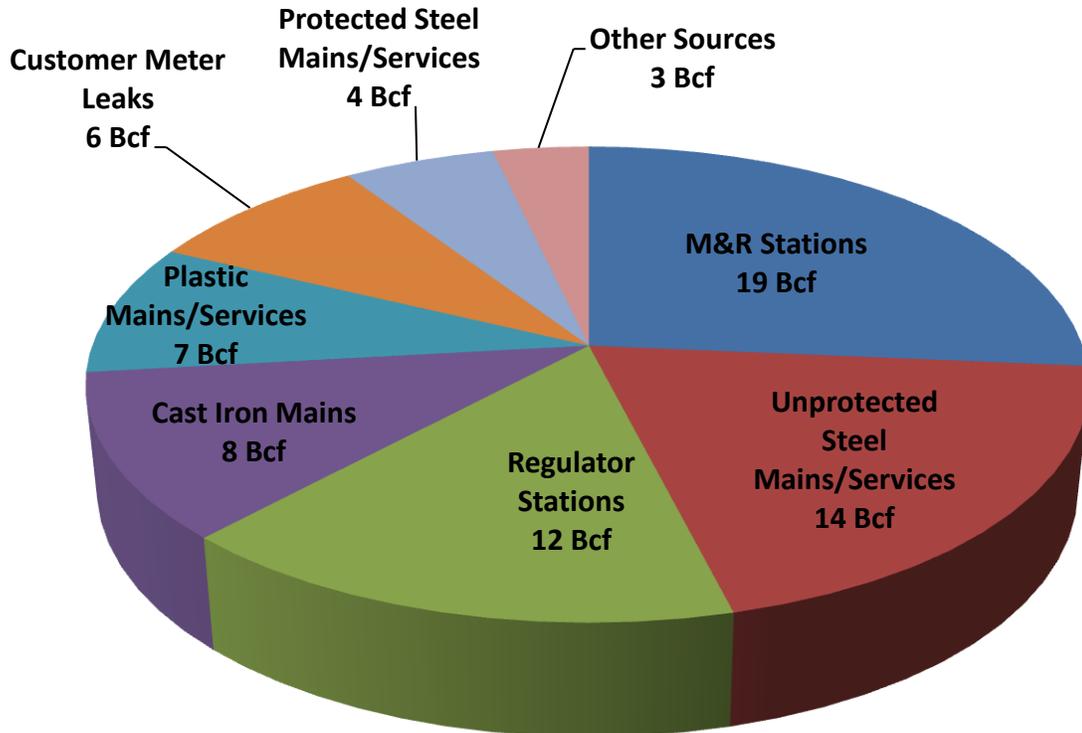


Top Technologies Since 1993
Cumulative Sector Reductions = 245.1 Bcf



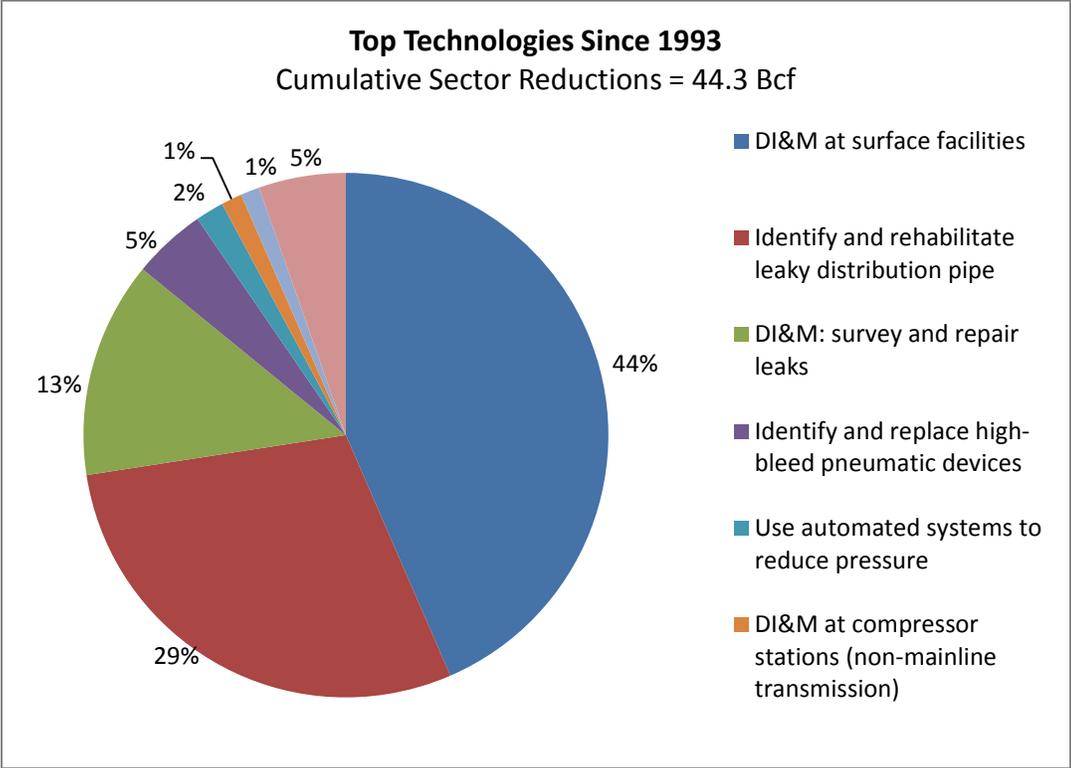
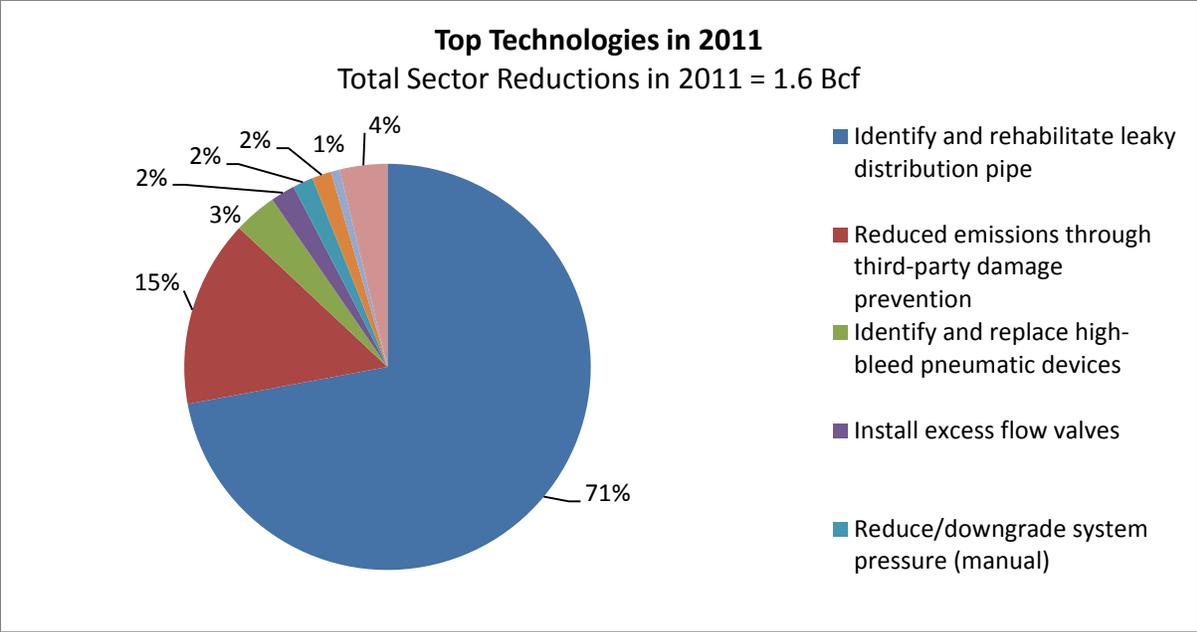
Distribution Sector Accomplishments

2010 Distribution Sector Methane Emissions



EPA Inventory of U.S. Greenhouse Emissions and Sinks: 1990 – 2010, April 2012. Available at: epa.gov/climatechange/ghgemissions/usinventoryreport.html.

Distribution sector partners reported 1.6 Bcf of methane emissions reductions in 2011—and a total of 44.3 Bcf since 1993. The top technologies and practices employed by distribution sector partners are displayed in the charts below.



Natural Gas STAR International

In addition to the success reported under the domestic Program, progress is also being made in reducing global methane emissions through Natural Gas STAR International. International partners reported 7.3 Bcf in methane emissions reductions for a total of 85.2 Bcf since the inception of Natural Gas STAR International Program. To date, international partners have undertaken methane emission reduction activities in Argentina, Brazil, Canada, Chile, Equatorial Guinea, India, Nigeria, and Poland. For 2011, these companies reported methane emissions reductions from the implementation of 23 technologies and practices.

The 2011 voluntary international methane emissions reductions are equivalent to:

- The additional revenue of more than \$29.6 million in natural gas sales (assumes an average natural gas price of \$4.00 per thousand cubic feet).
- The avoidance of 3.0 million tonnes CO₂ equivalent.
- The carbon sequestered annually by nearly 638,000 acres of pine or fir forests.
- The annual greenhouse gas emissions from more than 572,000 passenger vehicles.

