METHANE EMISSIONS
By Wendy King, LWVLA Environmental Committee Chair

This is a basic description of methane (from About.com):
Methane is a very effective greenhouse gas, but with a shorter lifespan in the atmosphere than carbon dioxide. It comes from a variety of sources. Some sources are natural: methane escapes wetlands and oceans at a significant rate. Other sources are anthropogenic, which means man-made. The extraction, processing, and distribution of oil and natural gas all release methane. Raising livestock and rice farming are a major source of methane. The organic matter in landfills and waste-water treatment plants releases methane.

From Environment.about.com

What Is the Clean Power Plan?

Under the proposed Climate Action Plan, power plants using fossil fuels will need to increase their efficiency. click/morguefile

By Frederic Beaudry
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Updated November 20, 2015.

The Clean Power Plan is a set of guidelines aimed at reducing carbon dioxide emissions from electric power plants. In June 2014, the Environmental Protection Agency (EPA) proposed a rule to set limits for the first time on carbon emissions from power plants. The rule, dubbed Clean Power Plan, is part of President Obama's Climate Action Plan released in 2013 (on the heels of the country's hottest year ever recorded). The plan's broad goals are to cut carbon pollution, prepare for the effects of climate change, and provide international leadership in climate change matters. Targeting power plants is a logical choice: they produce one third of the nation's greenhouse gas emissions. For a long time now there have been limits on the emissions of arsenic, mercury, sulfur dioxide, and nitrogen oxides from power plants, but there never were any national limits on carbon pollution levels.

Here's what the Clean Power Plan is about:

- As part of the Clean Air Act, the plan has guidelines for individual states to reduce carbon dioxide emissions from fossil-fuel power plants. The overall reduction goal is 32% of the 2005 carbon dioxide emissions by the year 2030.

  As a co-benefit, by 2030 particle pollution, nitrogen oxides, and sulfur dioxide will be reduced by 25%.

- The estimated climate and health benefits from this plan are between $48 billion and $82 billion. By 2030, premature deaths should be reduced by 6,600, asthma attacks in children should be reduced by 140,000 to 150,000, and up to 490,000 missed school or work days will be avoided.
- These emission reductions can be achieved through four goals: 1) making coal-fired power plants more efficient, 2) using natural gas-fired plants more effectively, 3) increasing production of renewal energy such as wind and solar power, and finalizing the construction of low emissions nuclear power plants, and 4) reducing the demand for electricity through more efficient end-uses (appliances, heating and cooling, etc.).
- The plan will set specific emissions limits for each state, based on their current mix of electricity generation sources. The reduction goals vary widely: at the less demanding end of the spectrum Connecticut and Idaho would need to reduce their emissions by less than 10% by 2030 compared to a 2012 baseline. The biggest reduction burdens would be expected from Montana and North Dakota would need to cut emissions by at least 45%.
- The plan will also provide guidelines for each state to draft and implement a state plan addressing how it would achieve the new emission goals. States will have to submit their action plan by September 2016.
- The EPA will not dictate how the goals are reached, each state will have the flexibility to decide how to best navigate its own challenges and take advantage of its opportunities. This approach is the hallmark of the Clean Air Act, which has been a public health and environmental success for over 40 years.

Environmental groups (for example the National Resources Defense Council) are generally in support of the plan, though some see the proposal as too weak. Coal industry representatives and politicians representing coal regions project the loss of jobs if the new standards are applied. Some conservative politicians have expressed disagreement with categorizing carbon dioxide as pollution, since it's a natural component of air and is necessary for plant growth. In some parts of the country, the resistance to these standards is such that a dozen states are taking the federal government to court to avoid implementation of the plan.

A four-month public comments period was held to allow comments from anyone wishing to make their opinion known. Incredibly, over 4.3 million comments were received. The final details of the Plan were unveiled in August 2015.

Sources

Environmental Protection Agency, 2015. Clean Power Plan Proposal.

Environmental Protection Agency, 2014. News Release: EPA Proposes First Guidelines to Cut Carbon Pollution from Existing Power Plants.

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- The Clean Power Plan Means Fewer Deaths and Hospitalizations
- Six States Lagging Behind in Renewable Electricity Production
- These 8 States Produce the Most Renewable Energy
- New Rules Limit Methane Emissions from Oil and Gas Industry

From www3.EPA.gov:

EPA Releases First-Ever Standards to Cut Methane Emissions from the Oil and Gas Sector

Agency finalizes commonsense standards for new, modified and reconstructed sources and takes the first step on the path to regulate existing oil and gas operations

05/12/2016

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WASHINGTON – As a further step in the Obama Administration's commitment to take action on climate change and protect public health, the U.S. Environmental Protection Agency (EPA) is announcing comprehensive steps to address methane emissions from both new and existing sources in the oil and gas sector. For new, modified and reconstructed sources, EPA is finalizing a set of standards that will reduce methane, volatile organic compounds (VOCs) and toxic air emissions in the oil and natural gas industry. EPA is also starting the process to control emissions from existing sources by issuing for public comment an Information Collection Request (ICR) that requires companies to provide the information that will be necessary for EPA to reduce methane emissions from existing oil and gas sources.

"Today, we are underscoring the Administration's commitment to finding commonsense ways to cut methane—a potent greenhouse gas fueling climate change—and other harmful pollution from the oil and gas sector," said EPA Administrator Gina McCarthy. "Together these new actions will protect public health and reduce pollution linked to cancer and other serious health effects while allowing industry to continue to grow and provide a vital source of energy for Americans across the country."

Today's actions are part of the Administration's strategy under President Obama's Climate Action Plan to reduce methane emissions, and keeps the Administration on track to achieve its goal of cutting methane emissions from the oil and gas sector by 40 to 45 percent from 2012 levels by 2025.

Methane, the key constituent of natural gas, is a potent greenhouse gas (GHG) with a global warming potential more than 25 times greater than that of carbon dioxide. Methane is the second most prevalent GHG emitted in the United States from human activities, and nearly one-third of those emissions comes from oil production and the production, transmission and distribution of natural gas.

The final standards will significantly curb methane emissions from new, reconstructed and modified processes and equipment, along with reducing VOC emissions from sources not covered in the agency's 2012 rules. These sources include hydraulically fractured oil wells, some of which can contain a large amount of gas along with oil, and equipment used across the industry that was not regulated in the 2012 rules.

After reviewing the more than 900,000 comments received on its August 2015 proposal, EPA updated a number of aspects in the final rule that increase climate benefits, including removing an exemption for low production wells and requiring leak monitoring surveys twice as often at compressor stations, which have the potential for significant emissions. The final rule also provides companies a pathway to align the final standards with comparable state-specific requirements they may have.

The final standards for new and modified sources are expected to reduce 510,000 short tons of methane in 2025, the equivalent of reducing 11 million metric tons of carbon dioxide. Natural gas that is recovered as a result of the rule can be used on site or sold. EPA estimates the final rule will yield climate benefits of $690 million in 2025, which will outweigh estimated costs of $530 million in 2025. Reductions in VOCs and air toxics are also expected to yield benefits; however EPA was not able to quantify those benefits.

The standards also are expected to reduce 210,000 short tons of ozone-forming VOCs in 2025, along with 3,900 tons of air toxics, such as benzene, toluene, ethylbenzene and xylene. Ozone is linked to a variety of serious public health effects, including reduced lung function, asthma attacks, asthma development, emergency room visits and hospital admissions, and early death from respiratory and cardiovascular causes. Air toxics are known or suspected to cause cancer and other serious health effects.

Today's final actions also include two rules that clarify permitting requirements for the oil and natural gas industry: the Source Determination Rule and a final federal implementation plan for the Minor New Source Review Program in Indian Country.

Over the past year, new science and data have shown that methane emissions from existing oil and gas sources are substantially higher than was previously understood. To build on the agency's current knowledge, EPA is issuing an ICR that seeks a broad range of information, including the types of technologies that could be used to reduce emissions and their associated costs. The information the agency receives in response to the ICR will provide the foundation for developing regulations to reduce methane emissions from existing oil and gas sources.

EPA will collect the information through a general survey for all owners/operators of existing sources and a more detailed survey for specific facilities. EPA anticipates receiving data from the operator survey later this year and expects to conclude all aspects of the ICR in the first part of 2017. In addition, the agency is

announcing plans to issue a voluntary Request for Information to seek information on innovative strategies that can accurately and cost-effectively locate, measure and mitigate methane emissions.

Earlier this year, EPA launched the Methane Challenge Program, which provides a new way for U.S. oil and gas companies to achieve—and be recognized for—ambitious commitments to reduce methane emissions. This flexible program has the potential to foster significant cost-effective emission reductions across the oil and gas sector and to provide transparency on the progress partner companies are making to reduce emissions.

More information, including technical fact sheets, is available at https://www3.epa.gov/airquality/oilandgas/index.html

From the Energy Information Agency website www.eia.gov:

Emissions of Greenhouse Gases in the U. S.

Release Date: March 31, 2011 | **Next Release Date:** Report Discontinued | Report Number: DOE/EIA-0573(2009)

3. Methane Emissions

3.1. Total emissions

The major sources of U.S. methane emissions are energy production, distribution, and use; agriculture; and waste management (Figure 17). U.S. methane emissions in 2009 totaled 731 $MMTCO_2e$, 0.9 percent higher than the 2008 total of 724 $MMTCO_2e$ (Table 17).

Methane emissions declined steadily from 1990 to 2001, as emissions from coal mining and landfills fell, then rose from 2002 to 2009 as a result of moderate increases in emissions related to energy, agriculture, and waste management that more than offset a decline in industrial emissions of methane over the same period.

The energy sector—including coal mining, natural gas systems, petroleum systems, and stationary and mobile combustion—is the largest source of U.S. methane emissions, accounting for 303 $MMTCO_2e$ in 2009. Agricultural emissions (primarily from livestock management) and emissions from waste management (primarily landfills) also are large sources of U.S. methane emissions, contributing 216 and 208 $MMTCO_2e$, respectively, in 2009.

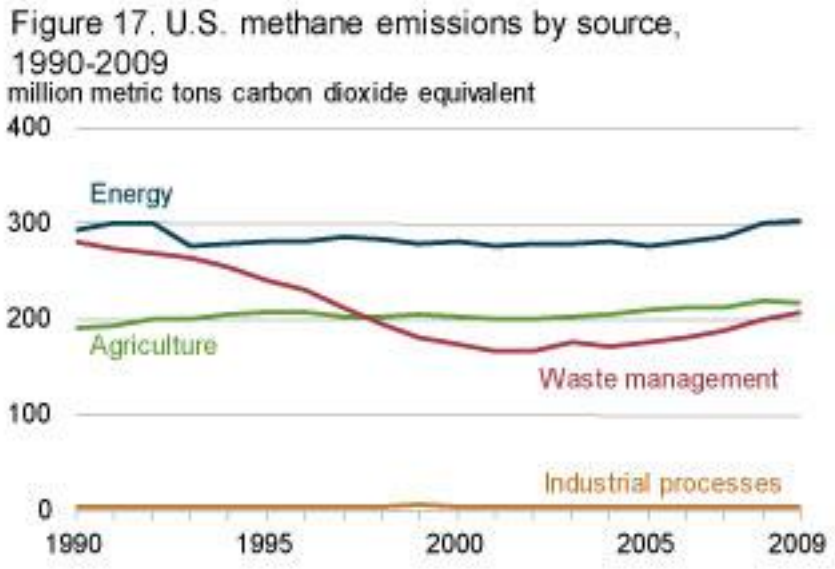

Figure Data

Total U.S. methane emissions, 1990, 2005, 2008, and 2009

	1990	2005	2008	2009
Estimated emissions (million metric tons CO_2e)	768.8	669.2	724.2	730.9
Change from 1990 (million metric tons CO_2e)		-99.6	-44.7	-37.9
(percent)		*-13.0%*	*-5.8%*	*-4.9%*
Average annual change from 1990 *(percent)*		*-0.9%*	*-0.3%*	*-0.3%*
Change from 2005 (million metric tons CO_2e)			54.9	61.7
(percent)			*8.2%*	*9.2%*
Change from 2008 (million metric tons CO_2e)				6.8
(percent)				*0.9%*

3.2. Energy sources

Natural gas systems and coal mines are the major sources of methane emissions in the energy sector (Figure 18 and Table 18). U.S. methane emissions from natural gas systems grew from 1990 to 2009 by 27 percent (39 $MMTCO_2e$), largely because of increases in natural gas consumption. Emissions from coal mines declined from 1990 to 2002 and remained nearly steady through 2007. In 2009, emissions from ventilation and degasification systems at underground mines increased by 9.2 percent, leading to a 4.8-percent increase in total net emissions from coal mining over the 2008 level, despite declines in emissions from both surface mining and post-mining activities.

With domestic oil production dropping by 28 percent from 1990 to 2009, methane emissions from petroleum exploration and production have declined by the same percentage.

Residential wood consumption accounted for just over 45 percent of U.S. methane emissions from stationary combustion in 2009.

Methane emissions from passenger cars fell by 77 percent from 1990 to 2009, as the use of catalytic converters increased. An 11-percent drop from 2001 to 2009 in annual miles traveled by passenger cars also contributed to the decrease in emissions.

Figure 18. U.S. methane emissions from energy sources, 1990-2009

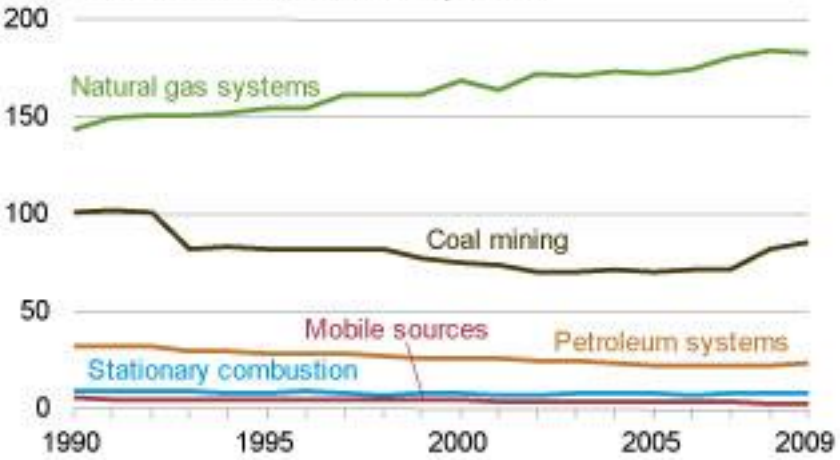

Figure Data

Methane emissions from energy sources, 1990, 2005, 2008, and 2009

	1990	2005	2008	2009
Estimated emissions (million metric tons CO_2e)	293.1	277.0	299.3	303.0
Change from 1990 (million metric tons CO_2e)		-16.1	6.2	9.9
(percent)		*-5.5%*	*2.1%*	*3.4%*
Average annual change from 1990 *(percent)*		*-0.4%*	*0.1%*	*0.2%*
Change from 2005 (million metric tons CO_2e)			22.3	26.0
(percent)			*8.0%*	*9.4%*
Change from 2008 (million metric tons CO_2e)				3.7
(percent)				*1.2%*

3.3. Agricultural sources

Livestock management—including emissions from enteric fermentation (67 percent) and management of animal waste (27 percent)—accounts for the largest share of U.S. methane emissions from agricultural activities (Figure 19 and Table 19). Since 1990, there has been a shift in livestock management to larger facilities that manage waste in liquid systems, increasing the amount of methane generated from livestock

waste. Increases in the U.S. swine population since 1990 have also contributed to the rise in methane emissions. Emissions of methane from animal waste fell by 1.7 percent from 2008 to 2009. Swine accounted for 42 percent (25 $MMTCO_2e$), and dairy cattle accounted for 49 percent (28 $MMTCO_2e$), of total methane emissions from livestock manure in 2009.

Enteric fermentation (food digestion) in ruminant animals also produces methane emissions, and digestion by cattle accounts for 96 percent of U.S. methane emissions from this source. With little change in the cattle population since 1990, the level of emissions from enteric fermentation has been relatively stable, with a small decrease of 3 $MMTCO_2e$ (2.2 percent) in 2009 from the 2008 level.

Methane emissions from rice cultivation in the United States increased by almost 4 percent (0.4 $MMTCO_2e$) from 2008 to 2009.

Emissions from crop residue burning increased by 4 percent from 2008 to 2009. Residue burning remains the smallest contributor to methane emissions from agriculture, representing less than 1 percent of total U.S. methane emissions from agriculture.

Figure 19. U.S. methane emissions from agriculture by source, 2009

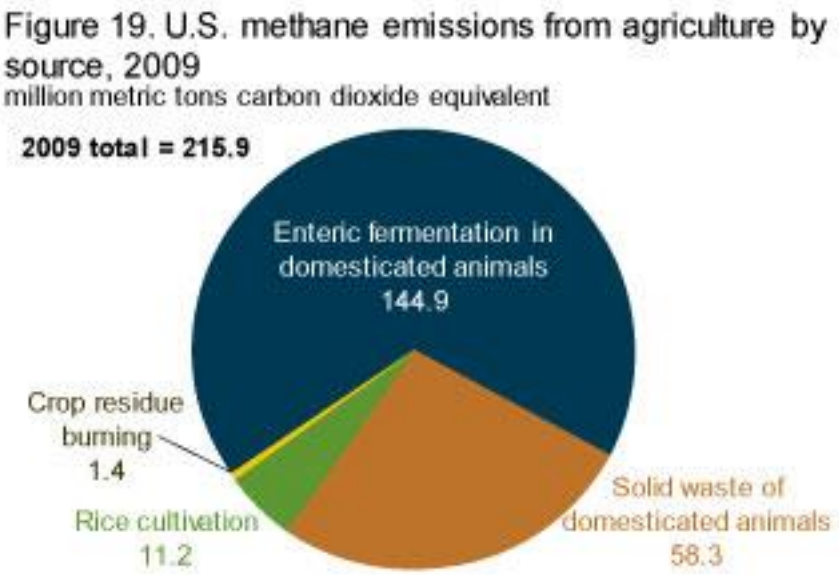

Figure Data

Methane emissions from agricultural sources, 1990, 2005, 2008, and 2009

	1990	2005	2008	2009
Estimated emissions (million metric tons CO_2e)	190.6	209.9	219.7	215.9
Change from 1990 (million metric tons CO_2e)		19.3	29.1	25.3
(percent)		*10.1%*	*15.3%*	*13.3%*
Average annual change from 1990 *(percent)*		*0.6%*	*0.8%*	*0.7%*
Change from 2005 (million metric tons CO_2e)			9.8	6.0
(percent)			*4.7%*	*2.9%*
Change from 2008 (million metric tons CO_2e)				-3.8
(percent)				*-1.7%*

3.4 Waste management sources

Methane emissions from waste management are dominated by the decomposition of solid waste in municipal and industrial landfills (Figure 20 and Table 20). Emissions from landfills declined substantially from 1990 to 2001 as a result of increases in recycling and in the recovery of landfill methane for energy; since 2001, increases in the total amount of waste deposited in landfills have resulted in annual increases in methane emissions. The rapid growth in methane recovery from landfills during the 1990s can be traced in part to the Federal Section 29 tax credit for alternative energy sources, which provided a subsidy of approximately 1 cent per kilowatthour for electricity generated from landfill gas before June 1998. The U.S. EPA's New Source Performance Standards and Emission Guidelines, which require large landfills to collect and burn landfill gas, have also played an important role in the growth of methane recovery. In addition, the American Recovery and Reinvestment Act of 2009 included a 2-year extension (through December 31, 2012) of the production tax credit for renewable energy, including waste-to-energy and landfill gas combustion.

Wastewater treatment, including both domestic wastewater (about two-thirds) and industrial wastewater (about one-third), is responsible for 14 percent (28 $MMTCO_2e$) of methane emissions from waste management. In 2009, emissions from wastewater treatment at pulp and paper manufacturing facilities accounted for 47 percent (5 $MMTCO_2e$) of total emissions from industrial wastewater, and emissions from meat and poultry packing facilities accounted for another 41 percent (4 $MMTCO_2e$).

Figure 20. U.S. methane emissions from waste management by source, 1990-2009

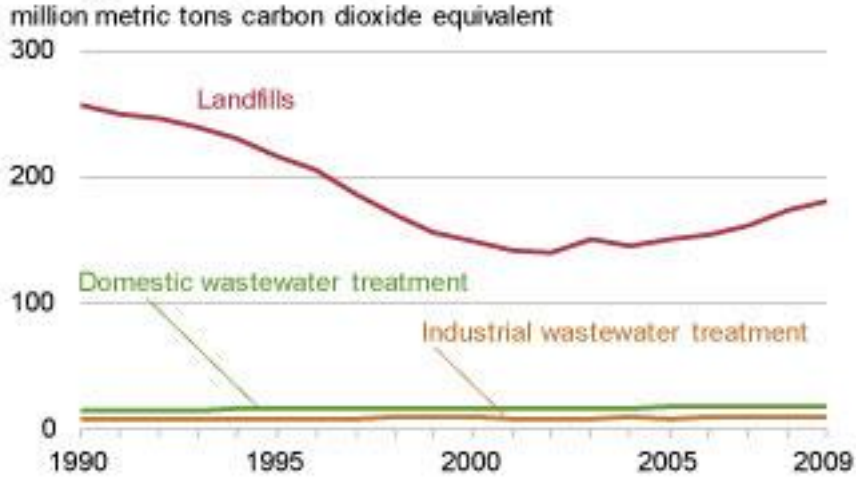

Figure Data

Methane emissions from waste management sources, 1990, 2005, 2008, and 2009

	1990	2005	2008	2009
Estimated emissions (million metric tons CO_2e)	280.6	177.3	200.6	207.9
Change from 1990 (million metric tons CO_2e)		-103.3	-80.0	-72.8
(percent)		-36.8%	-28.5%	-25.9%
Average annual change from 1990 *(percent)*		-3.0%	-1.8%	-1.6%
Change from 2005 (million metric tons CO_2e)			23.3	30.6
(percent)			*13.1%*	*17.2%*
Change from 2008 (million metric tons CO_2e)				7.3
(percent)				*3.6%*

3.5. Industrial process sources

Methane emissions are generated by industrial processes in the production of iron and steel and chemicals (Figure 21 and Table 21). Total methane emissions from industrial processes declined by a net 0.4 $MMTCO_2e$ (9 percent) from 2008 to 2009, as a result of declines in both chemical production and iron and steel production. Similarly, large decreases during 2009 in production of pig iron, coke, and sinter associated with iron and steel production caused methane emissions from this industrial source to drop by 43.6 percent (0.3 $MMTCO_2e$) from the 2008 level.

In 2009, methane emissions from industrial processes dropped below 1990 levels for the first time, resulting in a net decline of 0.3 $MMTCO_2e$ (7.2 percent) over the past two decades; however, the 2009 decline is associated with the impact of the recession on industrial production in 2009, and emissions from industrial processes can be expected to rebound as the U.S. economy recovers.

Figure 21. U.S. methane emissions from industrial processes by source, 1990-2009

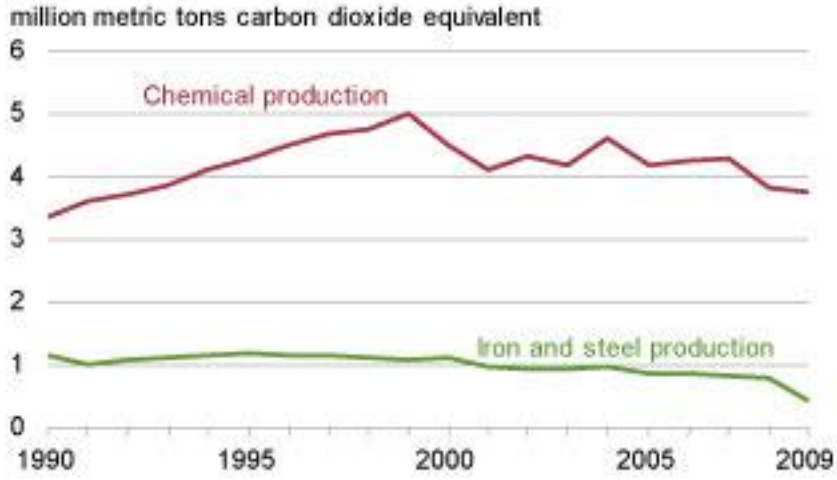

Figure Data

Methane emissions from industrial process sources, 1990, 2005, 2008, and 2009

	1990	2005	2008	2009
Estimated emissions (million metric tons CO_2e)	4.5	5.0	4.6	4.2
Change from 1990 (million metric tons CO_2e)		0.5	0.1	-0.3
(percent)		*11.7%*	*1.8%*	*-7.2%*
Average annual change from 1990 *(percent)*		*0.7%*	*0.1%*	*-0.4%*
Change from 2005 (million metric tons CO_2e)			-0.4	-0.8
(percent)			*-8.8%*	*-15.8%*
Change from 2008 (million metric tons CO_2e)				-0.4
(percent)				*-8.8%*