

The Climate Risks of Natural Gas

An Infographic from the Union of Concerned Scientists

Methodology and Assumptions

February 2014

Data sources and assumptions for each of the three panels presented in the infographic [The Climate Risks of Natural Gas](#).

Panel 1

U.S. electricity mix data for 2008 and 2012 are based on data reported by the U.S. Energy Information Administration (EIA 2013a).

	2008		2012	
	Generation (thousand megawatt-hours)	Percent	Generation (thousand megawatt-hours)	Percent
Coal	1,985,801	48%	1,517,203	37%
Natural Gas	894,687	22%	1,241,920	31%
Nuclear	806,208	20%	769,331	19%
Renewable Energy	380,932	9%	495,322	12%
Other (Petroleum Liquids, Petroleum Coke)	58,046	1%	35,366	1%
TOTAL	4,119,388		4,054,485	

Projected U.S. electricity mix for 2050 is based on the Business as Usual Scenario from a UCS-led analysis using the National Renewable Energy Laboratory's Regional Energy Deployment System (ReEDS) model (Rogers et al. 2013).

	2050	
	Generation (thousand megawatt-hours)	Percent
Coal	983,157	19%
Natural Gas	2,942,054	56%
Nuclear	52,734	1%
Renewable Energy	1,244,276	24%
TOTAL	5,222,222	

Total electricity demand is projected to increase from 4,054,485 thousand megawatt-hours in 2012 to 5,222,222 thousand megawatt-hours in 2050, an increase of 29 percent.

Panel 2

Carbon dioxide (CO₂) emissions from electricity production in 2012 are based on EIA reported data (EIA 2013b).

	CO ₂ Emissions (Million Metric Tons)	Percent
Coal	1,512	74%
Natural Gas	493	24%
Other	30	2%
TOTAL	2,036	

Total CO₂ emissions from electricity production in 2050 are based on the Business as Usual Scenario from a UCS-led analysis using the National Renewable Energy Laboratory's Regional Energy Deployment System (ReEDS) model (Rogers et al. 2013). The share of CO₂ emissions from coal and natural gas have been calculated using the following emissions rates assumptions:

	2050		
	Average CO ₂ Emissions Rate Assumption (pounds per megawatt-hour)	CO ₂ Emissions (Million Metric Tons)	Percent
Coal	1,750	780	40%
Natural Gas	884	1,180	60%
Other		12	<1%
TOTAL		1,972	

Panel 3

The U.S. electricity mix projections for 2025 and 2050 are based on the Renewables and Efficiency Scenario from a UCS-led analysis using the National Renewable Energy Laboratory's Regional Energy Deployment System (ReEDS) model (Rogers et al. 2013). This scenario also includes an economy-wide carbon budget recommended by the National Research Council that would cut power sector emissions 90 percent from current levels by 2050 (NRC 2010).

Alternative scenarios include the development of natural gas and coal generators with carbon capture and storage (CCS) as potential ways to reduce carbon emissions, but these scenarios are considerably more expensive than the Renewables and Efficiency Scenario and assume CCS can be deployed at a large scale.

	2025		2050	
	Generation (million megawatt-hours)	Percent	Generation (million megawatt-hours)	Percent
Coal	334	9%	0	0%
Natural Gas	1,275	35%	602	17%
Nuclear	825	22%	64	2%
Renewable Energy	1,255	34%	2,911	81%
TOTAL	3,690		3,577	

Total electricity demand is projected to decrease from 4,054 million megawatt-hours in 2012 to 3,577 million megawatt-hours in 2050, a decline of 12 percent.

	2025			2050		
	Average CO ₂ Emissions Rate Assumption (pounds per megawatt-hour)	CO ₂ Emissions (Million Metric Tons)	Percent	Average CO ₂ Emissions Rate Assumption (pounds per megawatt-hour)	CO ₂ Emissions (Million Metric Tons)	Percent
Coal	2,200	333	36%	1,750	0	0%
Natural Gas	950	549	59%	645 (includes gas with carbon capture and sequestration)	176	100%
Other		44	5%		0	0%
TOTAL		927			176	

References

National Research Council. 2010. *Limiting the magnitude of future climate change*. Washington D.C.: National Academies Press.

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U.S. Energy Information Administration (EIA). 2013a. *Electric Power Monthly: Table 1.1. Net Generation by Energy Source: Total (All Sectors), 2003-November 2013*. Washington, DC. Online at http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_1_1.

U.S. Energy Information Administration (EIA). 2012b. *December 2013 Monthly Energy Review: Table 12.6 Carbon Dioxide Emissions From Energy Consumption: Electric Power Sector*. Washington, DC. Online at <http://www.eia.gov/totalenergy/data/annual/showtext.cfm?t=ptb1102e>.