

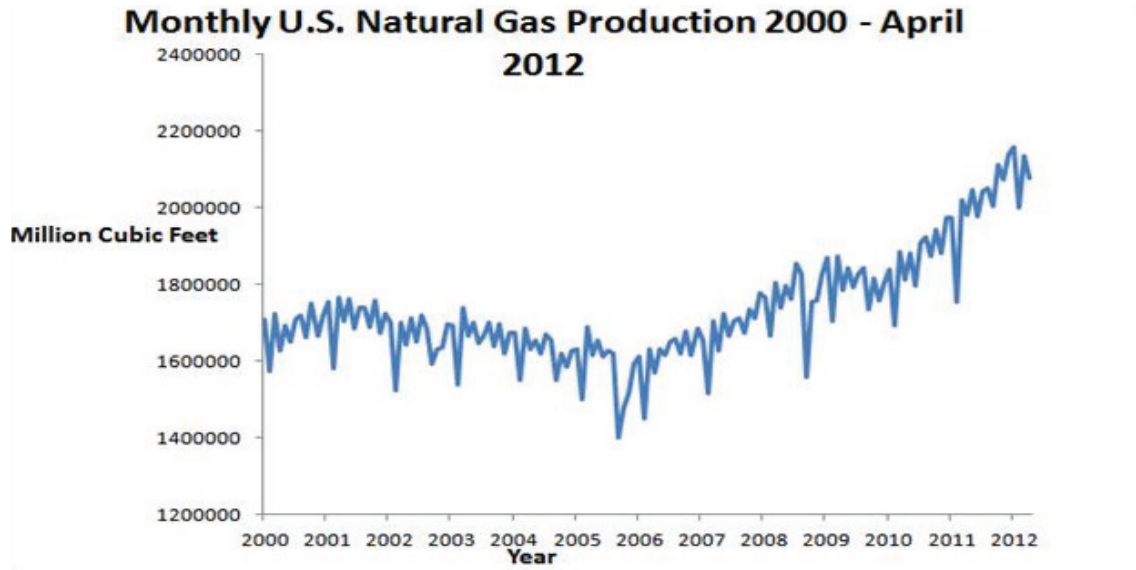
# A New Discourse: Climate Change in the Face of a Shifting U.S. Energy Portfolio

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Technology to extract gas from shale has revolutionized American energy production.

Since 2000, U.S. natural gas production has risen 19.7% reaching over 24 trillion cubic feet in 2011.

This development has important implications for the future of the American energy portfolio and climate security.<sup>1</sup>



*Source: U.S. Energy Information Agency*

Technological advancements in hydraulic fracturing have opened vast reserves to production. Hydraulic fracturing (fracking) is the practice of injecting chemically infused water into horizontal wells at high pressure to open small fractures in hydrocarbon-bearing geologic formations that can extend hundreds of feet away from the well.<sup>2</sup>

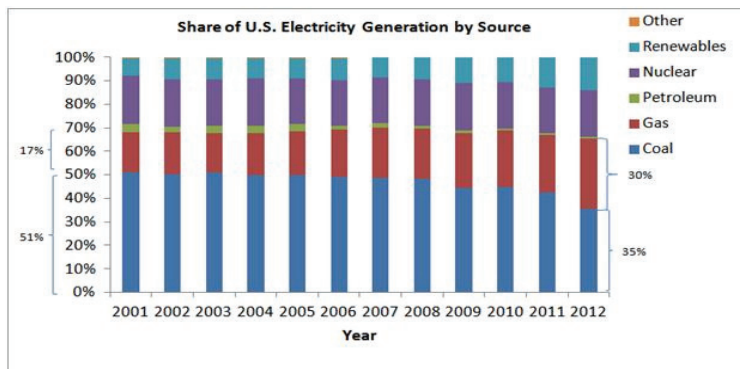
Fracking has enabled companies to access previously unrecoverable oil and gas located in shale formations.<sup>3</sup>

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## Natural gas has replaced a portion of coal's share of U.S. electricity generation.

In 2001, coal and natural gas made up 51 and 17 percent of U.S. electricity generation, respectively. Thus far in 2012, coal has accounted for 35 percent of electricity generation while natural gas's share has risen to 30 percent.<sup>4</sup>

Natural gas has become a cheaper, more competitive source of power than coal due to an influx of supplies leading to lower fuel costs, lower plant construction costs, and new federal emissions regulations on sulfur dioxide and nitrogen dioxide on coal-fired power plants.<sup>5</sup>

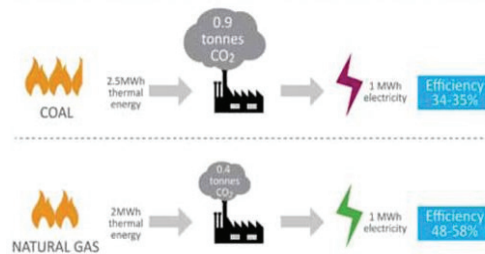


Sources U.S. Energy Information Agency

## In the short-term, shifting to natural gas can substantially lower carbon emissions, but will not solve the greenhouse gas threat.

Energy production from natural gas is cleaner and more efficient than production from coal: carbon dioxide emissions from coal (0.9 tonnes/MWh) are roughly twice those of natural gas (0.4 tonnes/MWh).<sup>6</sup>

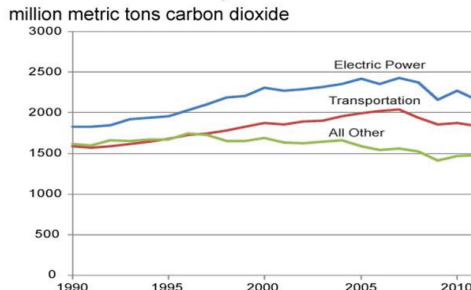
Since 2006 carbon dioxide emissions have decreased across sectors. Increased power generation from natural gas has been a contributing factor to emissions reductions in the electric power sector.<sup>7</sup>



Source: "Natural Gas, part of an efficient sustainable energy future", Gasline, February 2010. Data from Gas Terra

However, methane, the principle constituent of natural gas, is over 20 times as proficient in trapping heat as carbon dioxide. If some of it is released (not burned) directly into the atmosphere, it undermines the environmental rationale for preferring gas to coal.<sup>8</sup>

### U.S. Energy-Related CO<sub>2</sub> Emissions for Selected Sectors, 1990-2011



Source: U.S. Energy Information Administration, *Monthly Energy Review*, Tables 12.1-12.6 (May 2012), preliminary 2011 data.

## **Over the longer-term, natural gas has a promising role in a transition to a low emission economy.**

Renewable energy sources like solar and wind offer sustainable and clean power generation, and will play an important role in helping us meet future energy needs. However, they suffer from variability when the sun does not shine or the wind does not blow.<sup>9</sup>

New gas-fired turbines can be turned on quickly, and reach 100%- load four times as fast as coal-fired plants. This flexibility makes gas plants an economical option for providing backup power to variable generation from renewables.<sup>10</sup>

Gas-fired plants are currently a source of greenhouse gas emissions (albeit less than coal and oil plants). But, as carbon capture and storage (CCS) technology matures and becomes more efficient, natural gas plants could be retrofitted, and capture carbon for a lower cost per kWh than CCS at a coal or oil-fired plant.<sup>11</sup>

## **Natural Gas can be a bridge fuel to a clean energy economy, but should not be perceived as a solution.**

If all of the world's coal-fired plants were replaced by zero-emission renewable generators, increases in the global mean surface temperature would be reduced 57-81% in a century, given current electricity demand. On the other hand, if all coal-fired plants were replaced by gas plants, global mean surface temperature would only be reduced 17-25% in a century.<sup>12</sup>

The current abundance of cheap natural gas in some areas could reduce renewable sources' competitiveness, slowing a transition.<sup>13</sup>

## **Meeting Climate Targets**

**The U.S. has made several domestic and international commitments towards lowering emissions. According to estimates, 2°C represents the upper bound of global average temperature warming beyond which adaptive capacity is severely limited, and irreversible effects take hold.**<sup>14</sup>

In 2008, President Obama agreed with G8 leaders to reduce emissions 80 percent by 2050 in order to achieve the 2°C target.<sup>15</sup>

As a G20 member, the U.S. is committed to phasing out inefficient fossil fuel subsidies from 2011-2020 according to the "G20 Toronto Summit Declaration." Phasing out the subsidies would send a price signal to utilize more efficient energy and transition from fossil fuels.<sup>16</sup>

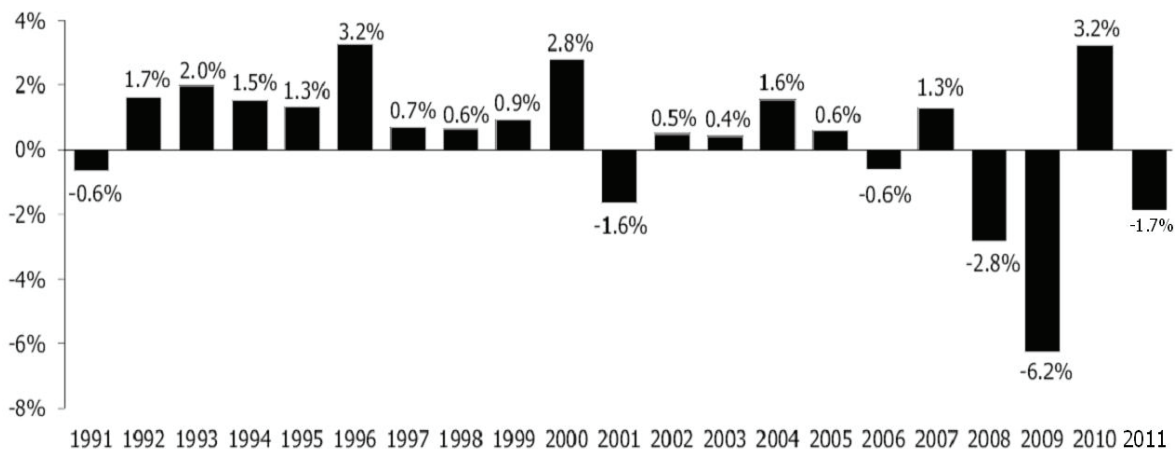
Under the Copenhagen Accords, in 2010 the U.S. made a commitment to reduce emissions to 17 percent below 2005 levels by 2020.<sup>17</sup>

The U.S. Environmental Protection Agency is authorized under the Clean Air Act to regulate and set air quality standards for common air pollutants including carbon dioxide. In March 2012, the EPA proposed a standard to limit carbon emissions from new fossil fuel plants.<sup>18</sup>

The U.S. Department of Energy requires new Federal commercial and multi-family high-rise residential buildings to have 30 percent greater energy efficiency than the baseline standard established in 2007.<sup>19</sup>

**U.S. commitments are bringing emissions down, but the current trajectory of emission reductions will not meet the scientifically necessary 80 percent goal.**

G8 nations must decrease emissions on average by two percent annually to achieve an 80 percent reduction by 2050. Last year, although the U.S. fell shy of its target reductions, it showed the fastest reduction in emissions of any industrialized country reducing total emissions by 1.7 percent. Emission cuts will be easiest in early years as inexpensive strategies are used up.<sup>20</sup>



\*2011 Figure based off IEA estimates  
 Source: EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010

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Source: EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010

If all commitments are realized, the Copenhagen Accord would reduce emissions by 70% of what’s needed by 2020 to reach the 2°C target.<sup>21</sup>

The G20 subsidy commitment, if fully executed, would reduce emissions by about 30 percent of what is needed to be on track for the 2°C target by 2020.<sup>22</sup>

**Switching to natural gas and staying true to commitments will reduce U.S. emissions, but is only a step in the direction toward the level that is scientifically necessary to avoid severe and potentially irreversible climatic impacts.**

Fuel switching from coal to natural gas has started the process of decarbonizing the economy, leading to record short-term reductions in emissions.

However, fuel switching will only take the U.S. part of the way. Carbon regulation, a more rapid expansion of renewable energy, higher efficiency standards, the development of new ‘game changing’ technologies like carbon capture and storage or fusion energy, and firmer international agreements, will be necessary to enable the U.S. to make the emission reductions needed to meet the 80 percent target.

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## **Building a New American Arsenal**

The American Security Project (ASP) is a non-partisan initiative to educate the American public about the changing nature of national security in the 21st century.

Gone are the days when a nation's strength could be measured by bombers and battleships. Security in this new era requires a New American Arsenal harnessing all of America's strengths: the force of our diplomacy; the might of our military; the vigor of our economy; and the power of our ideals.

We believe that America must lead other nations in the pursuit of our common goals and shared security. We must confront international challenges with all the tools at our disposal. We must address emerging problems before they become security crises. And to do this, we must forge a new bipartisan consensus at home.

ASP brings together prominent American leaders, current and former members of Congress, retired military officers, and former government officials. Staff direct research on a broad range of issues and engages and empowers the American public by taking its findings directly to them.

We live in a time when the threats to our security are as complex and diverse as terrorism, the spread of weapons of mass destruction, climate change, failed and failing states, disease, and pandemics. The same-old solutions and partisan bickering won't do. America needs an honest dialogue about security that is as robust as it is realistic.

ASP exists to promote that dialogue, to forge consensus, and to spur constructive action so that America meets the challenges to its security while seizing the opportunities the new century offers.



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