Summary of Natural Gas Council's Analysis of the Lieberman-Warner Climate Regulation Bill (S. 3036)

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In October 2007, U.S. Senators Joseph I. Lieberman (Independent-CT) and John W. Warner (Republican-VA), chairman and ranking member of the Senate Subcommittee on Private Sector and Consumer Solutions to Global Warming and Wildlife Protection, introduced S. 2191, America's Climate Security Act of 2007. Following action by the Committee on Environment and Public Works, the modified legislation was later introduced as S. 3036, the Lieberman-Warner Climate Security Act of 2008. In response to the introduction of global climate legislation, the Natural Gas Council (NGC) undertook a study to review the potential impact on natural gas. Our model runs were being completed just as Sen. Barbara Boxer (Democrat-CA) introduced her substitute amendment to S. 3036, but they are consistent with the offsets outlined in her proposed changes.

Using 2005 as a baseline, S. 3036 would seek to reduce greenhouse gas emissions in the United States by approximately 20 percent by 2020 and over 60 percent by 2050. Our analysis demonstrates the goals of the legislation can be met through 2030 if the technology and offsets are available, but there will be significant costs.

Natural Gas Council's Major Findings

Using realistic assumptions about technology costs and growth rates of various fuels from 2008 through 2030, NGC's study found that under S. 3036, demand for natural gas increases by approximately 7 percent when offsets of 30 percent are allowed and are available, but demand for natural gas increases by 30 percent when offsets are limited (Figure 1). Our analysis is one of the few to consider the potential benefits of applying carbon capture and sequestration (CCS) technology to natural gas.

COMPARISON OF 2030 ENERGY CONSUMPTION STUDIES

(Figure 1)

TOTAL ENERGY CONSUMPTION BY SOURCE IN 2030	QUADRILLION BTU			
	EIA 2008 Current Projection	EIA S. 2191 (now S. 3036) Core Case	NGC with 30 Percent Offsets	NGC with 15 Percent Offsets
Nuclear	8.34	30	10.18	10.20
Coal	22.73	7.79	13.64	3.07
Natural Gas	23.79	19.37	25.44	31.35
Renewables	6.28	11.46	14.55	14.16
Liquid Fuels	40.28	42.01	41.89	40.68
TOTAL	**101.43**	**110.64**	**105.7**	**99.46**

About Our Analysis

The analysis was conducted by Science Applications International Corporation (SAIC[1]) using the National Energy Modeling System (NEMS) created by the federal government. Referred to as the NEMS-NGC version, it uses more recent electricity generation construction cost data and applies input assumptions provided by NGC as further described below. NGC's analysis, unlike many other studies of the legislation, includes the impacts of H.R. 6, the Energy Independence and Security Act of 2007, signed into law on December 19, 2007.

NGC's methodology in analyzing S. 3036 is consistent with the Energy Information Administration's (EIA) S. 2191 core case methodology and NGC's analysis of S. 280, the Climate Stewardship and Innovation Act of 2007, a bill similar in many ways to S. 3036. EIA identified the key variables in its side case runs of S. 2191, and in many cases EIA's side cases coincide with our findings last year when we modeled the impact of S. 280. However, we feel that a combination of EIA's side analyses more accurately reflects what may happen in the future, as opposed to EIA's core case analysis.

NGC's model is one of the few studies to consider the impact CCS technology is likely to have on natural gas-fired power generation. While other models have shown the powerful policy impact carbon sequestration technology would have on coal-fired power plants, most of those same models have not examined the impact CCS technology would have on natural gas use. The good news omitted in these other studies is that sequestration technology can be used with gas-fired electric generation, thus combining the benefits of sequestration with the lower emissions from using natural gas. When the technology is applied to natural gas generation, our modeling shows demand for natural gas would grow substantially, starting around 2019 (a year after 2018, the year we estimate the technology will be commercially deployed).

How Our Study is Unique

Four government agencies and nearly a dozen major organizations have issued reports on S. 3036 in the past few months.[2] We have examined their conclusions and learned from their work.

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[1] SAIC is a leading provider of scientific, engineering, systems integration and technical services and solutions to all branches of the U.S. military, agencies of the Department of Defense, the intelligence community, the Department of Homeland Security, the Department of Energy and other U.S. government civil agencies, as well as customers in selected commercial markets. SAIC is a policy-neutral organization. SAIC executed the NEMS-NGC model in this project using input assumptions provided by NGC. Analysis provided in this report is based on the output from the NEMS-NGC model as a result of NGC input assumptions. The input assumptions, opinions and recommendations in this report are those of NGC, and do not necessarily represent the views of SAIC. .

[2] The four government studies were conducted by the Congressional Budget Office, Congressional Research Service, Energy Information Administration and Environmental Protection Agency. Other studies have been conducted by the American Exploration and Production Council, American Petroleum Institute, American Public Power Association, Clean Air Task Force, Edison Electric Institute, Environmental Defense Fund, Heritage Center for Data Analysis, Massachusetts Institute of Technology,

Natural gas

Some studies have concluded that natural gas use will drop dramatically in coming years as vast amounts of nuclear power and renewable energy sources come on line. Those estimates are not realistic. Natural gas will continue to be a major part of America's energy mix because the technology is proven, natural gas-fired power generation units are relatively inexpensive to build, public acceptance of natural gas electrical generation is high, and emissions from natural gas are relatively low. Our analysis shows that if only 15 percent of the offsets are available, the demand for natural gas could increase by 30 percent to 31.35 quadrillion BTU by 2030. Given the new fields being developed in the deep off-shore areas in the Gulf of Mexico and what are known as unconventional natural gas resources, such as the Barnett shale field in Texas and the Marcellus shale field which stretches from New York to West Virginia, natural gas can continue to be price competitive.

Nuclear Power

Nuclear power plays a significant role in current U.S. electricity supply, providing approximately the same percentage as natural gas produced electricity to the nation's electrical grid – 20 percent. Our analysis indicates that nuclear power will continue to be a strong supplier of electricity into the future. NGC believes it is reasonable to assume the United States will build approximately 17 nuclear power plants (at 1.25 gigawatts per plant) in the next 20 years, and our analysis of S. 3036 reflects that number. Some studies have explored what would happen if nuclear plants were used to meet carbon-reduction goals, including EIA's core case where approximately 286 GW would be built in the next 22 years (roughly 229 nuclear power plants at 1.25 GW). Other studies have indicated that the United States could build as many as 100 nuclear power plants by 2030. While useful as a point of reference, those numbers are highly unlikely given the time frame involved, high capital costs, specialized labor needs, and continued difficulties with public acceptance.

Coal

Electricity generated from coal-fired power plants accounts for more than 50 percent of the electrical energy used in the United States. Like other analyses, our report indicates coal use will decline significantly in coming years as coal has the highest CO_2 of all fossil fuels but, like natural gas, will rebound as CCS technology comes on line after our estimated availability date of 2018. In our study, coal demand is expected to drop significantly (Figure 2).

Wind and Other Renewable Energy

Wind energy currently provides approximately 0.8 percent of U.S. electricity needs, but wind power is intermittent and will need to be supplemented by natural gas generation for

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National Association of Manufacturers and American Council for Capital Formation, National Mining Association, and the Natural Resources Defense Council.

times when the wind stops blowing. In our 15 percent offset case, wind grows by approximately 400 percent from 2008 to 2030 (Figure 2). Other studies have also indicated a dramatic build-up of wind power and other renewable sources of energy, with one non-government report[3] indicating that renewables could grow to 50 - 60 percent of supply by 2050. While wind and other renewables are likely to make a meaningful contribution in electric generation, we believe there are realistic limitations on their growth. For example, wind power will be constrained in the future due to the large footprint of wind farms and public concerns about visual impacts; our study reflects that reality, and limits the growth rate of wind and other renewables. (For example, we assumed a continuation of wind's current aggressive growth rate at 5.244 GW a year for the next 22 years.)

CUMULATIVE NET CAPACITY ADDITIONS FOR POWER GENERATION

(Figure 2)

TECHNOLOGY TYPE	GW			
	2008 Current Installed	EIA Core Case	NGC with 30 Percent Offsets	NGC with 15 Percent Offsets
Natural Gas	185.9	219.5	304.4	417.9
Coal	310.7	175.1	250.3	72
Nuclear	100.5	366.1	122.2	122.6
Solar	0.59	1.26	1.37	1.34
Wind	20.2	82.2	113.2	99.9
Biomass	2.2	22.8	27.9	37.8

Technology Advancements

Other analyses of S. 3036 have expectations regarding the timing of technological advancements we believe are unlikely. For example, some studies indicate that carbon capture and sequestration technology will be available by as soon as 2012. CCS is an undeveloped technology that would capture carbon dioxide (CO_2) from fossil fuel power plants and store it underground instead of releasing it into the atmosphere. Our study assumes that CCS will be commercially deployed beginning in 2018, because it will take time to prove the technology, and develop the pipelines and fields to transport and store the captured carbon. We note also that the federal CCS validation program is expected to be completed in 2018.

[3] http://docs.nrdc.org/globalwarming/glo_08051401A.pdf -- page 12

Offsets

Offsets allow an entity to emit carbon into the air when other carbon is sequestered by planting trees or by other efforts that remove carbon from the air in equal amounts. An offset provision in S. 3036 (and in the Boxer substitute) allows an entity to meet up to 15 percent of its compliance obligations with specified domestic offsets. It also allows another 15 percent of offsets from other parts of the world which have strong government oversight, such as Europe. Because of the importance of offsets, NGC study ran two cases, one with 30 percent offsets, and a second assuming that only 15 percent of the offsets are available in the United States given the expected competing demand for offsets in those foreign markets.

Banking

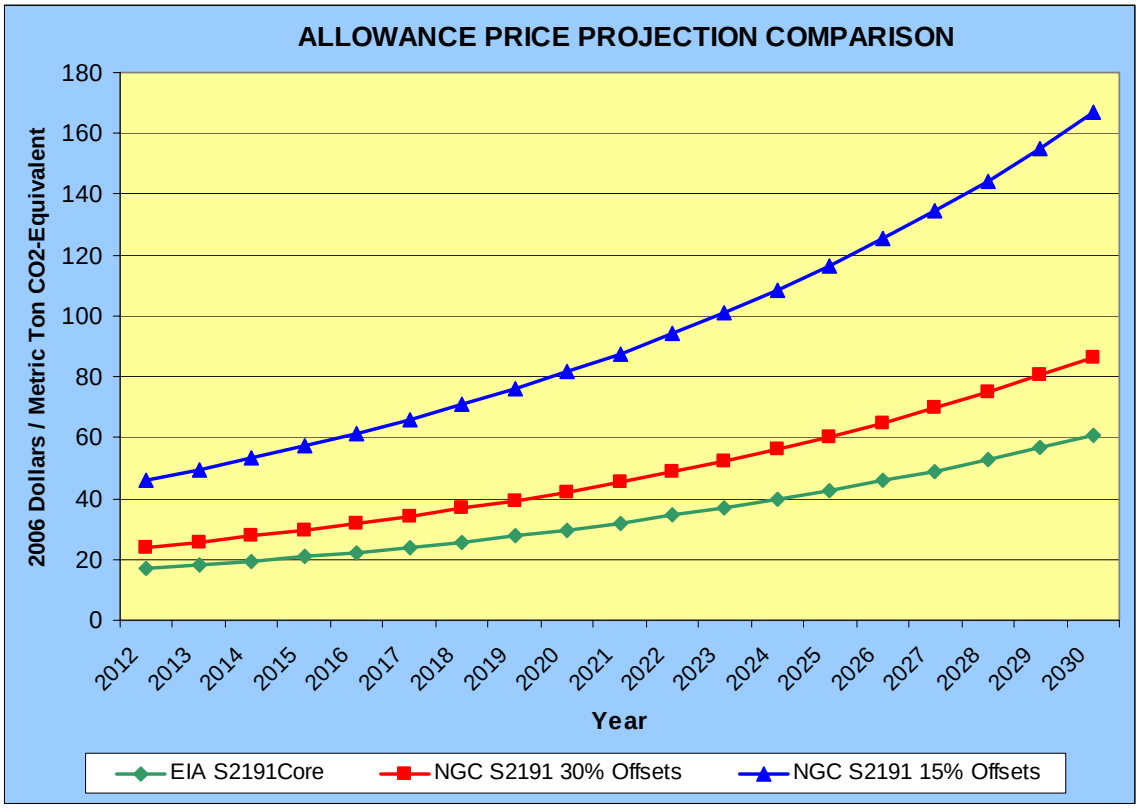
The amount of pollution allowed to be released into the atmosphere will be continually reduced under the terms of S. 3036, and meeting those targets will become increasingly difficult and more costly as years go by. To help business and industry deal with those expenses, S. 3036 allows emitters to "bank" early efforts to clean up the environment for credit later, especially beyond 2030, when costs are expected to be much higher. We applied an approximate 5-billion-metric-ton-equivalent ($MTCO_2$-E) balance assumption to our model through 2030, similar to EIA's S. 2191 core case analysis.

Allowance Prices

S. 3036 provides for an emission allowance program to reduce CO_2 emissions. The amount of emission offsets allowed, in addition to the cost of offsets and the availability of low carbon technologies, has a significant impact on allowance prices. Allowance prices in the 30 percent offsets case range from approximately $24 in 2012 to $86 in 2030 (in 2006 $/$MTCO_2$-E) and increase to over $46 in 2012 to $167 in 2030 (in 2006 $/$MTCO_2$-E) in the 15 percent offsets case. (Figure 3)

ALLOWANCE PRICE PROJECTION COMPARISON

(Figure 3)



Conclusion

NGC believes that advanced carbon sequestration capacity and other CO_2 emission reduction technologies and internationally available offsets will not be widely available in sufficient quantities through 2030 to reduce the nation's need for fossil fuels. The analysis indicates that the nation will need all of its fuels and technologies to reach the carbon goals outlined in S. 3036, including natural gas, nuclear, hydroelectric, wind, biomass, oil, solar, and coal.

After reviewing the other studies and running our own analysis, we determined that the most likely scenario under S. 3036 is a combination of tight offset markets, escalated construction costs for all energy sources, technology constraints and limits due to social and political concerns. With those constraints, natural gas will be the most reliable source of energy that satisfies the goals of the U.S. economy and the carbon emission reduction targets under the Lieberman-Warner bill.

Finally, we believe any climate-change legislation must consider the supply of natural gas because of the critical role natural gas plays in a carbon-constrained world.

About us

The Natural Gas Council members include the American Gas Association, the Independent Petroleum Association of America, the Interstate Natural Gas Association of America, and the Natural Gas Supply Association. Our four associations collectively represent nearly all firms that produce, transport and distribute natural gas consumed in the United States.

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