

March 18, 2008

**Summary of Environmental Protection Agency (EPA)'s analysis of S.2191, the
Lieberman-Warner Climate Security Act of 2008.**

Senator Lieberman (I-CT) and Warner (R-VA) introduced the “Climate Security Act of 2007” (now the “Lieberman-Warner Climate Security Act of 2008”) on August 2, 2007.

At the request of the senators, the Environmental Protection Agency (EPA) conducted a technical and economic analysis of the bill and their report was published on March 14, 2008.¹ The following summarizes their analysis and the findings.

Salient Features of the Bill

S.2191 calls for a regulation of greenhouse gas (GHG) emissions through a market-driven system of tradable emission allowances. It also establishes a separate cap-and-trade system for the consumption of HFCs.

Allowance submission requirements for coal-related emissions apply directly to large coal-consuming facilities (those consuming more than 5,000 tons of coal per annum), while emissions related to other types of fuel are regulated upstream at petroleum refiners, natural gas processors, importers of refined oil products and natural gas, and producers and importers of non-CO₂ GHGs.

The bill restricts U.S. GHG emissions to 5,775 MtCO₂e in 2012, 4,924 MtCO₂e in 2020, 3,860 MtCO₂e in 2030, and 1,732 MtCO₂e in 2050, which is 70 percent below 2005 levels from covered facilities.

Initially, 73.5 percent of the allowances will be distributed for free. The remaining allowances are auctioned, with proceeds going to technology programs, climate adaptation programs, and low-income assistance programs.

S.2191 allows unlimited banking and trading of allowances. In addition, covered facilities may “borrow” allowances, which have to be paid back with interest, from the EPA to satisfy up to 15 percent of their compliance obligations. Domestic offsets and international credits may also be used to satisfy up to 30 percent (up to 15 percent under each category) of their annual compliance obligations.

The bill establishes a “Federal Reserve-style” market monitoring and intervening organization, which it calls the Carbon Market Efficiency Board, to ensure that the program does not unduly burden the economy.

Energy Independence and Security Act of 2007

EPA's analysis does not account for the Energy Independence and Security Act (EISA) of 2007. EISA is expected to have implications for the Business-As-Usual (BAU) scenario emissions of GHG. The inclusion of EISA will likely lessen the economic impacts of S.2191. EPA plans to rerun its analysis when Energy Information Administration's (EIA) revised Annual Energy Outlook 2008, which will include EISA, becomes available. The revised analysis is expected to be released in June 2008.

¹ The EPA analysis is available for download at http://www.epa.gov/climatechange/downloads/s2191_EPA_Analysis.pdf.

The EPA analysis

The EPA, in its analysis of the bill, considered ten different scenarios – two outlook scenarios, four main policy scenarios, and four sensitivity analysis scenarios. It used two separate computable general equilibrium (CGE) models for this analysis – IGEM and ADAGE. IGEM is a domestic model while ADAGE has the capability to represent regions outside the U.S. In this summary, the averages under these two models are used for scenarios (1, 2, 9, and 10) that were modeled under both IGEM and ADAGE. The electricity sector was modeled using the Integrated Planning Model (IPM).

Key characteristics and results for each scenario are highlighted in the table below.

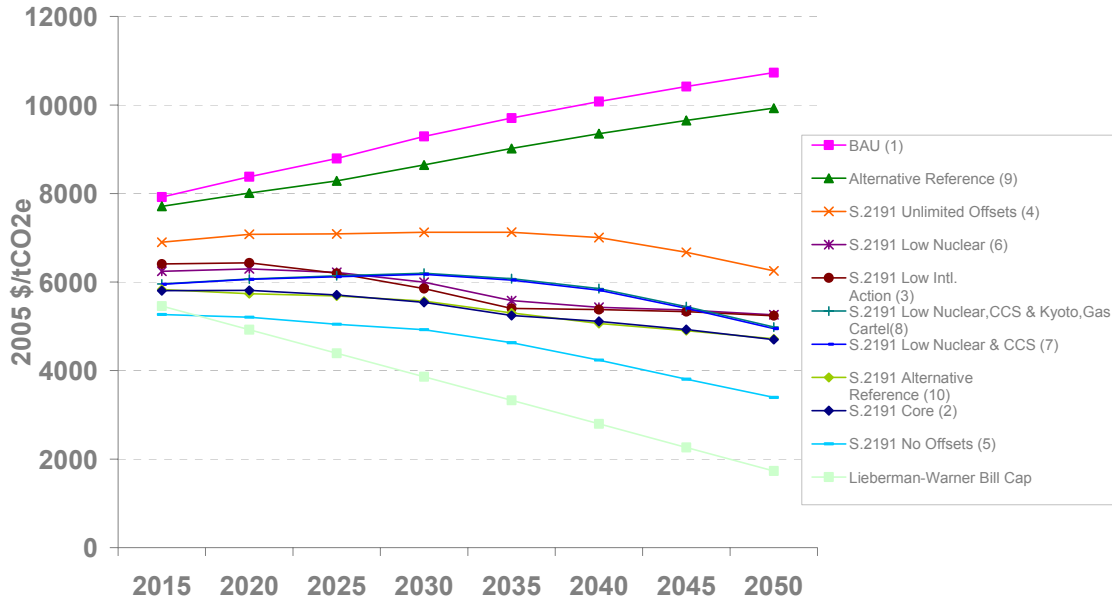
Scenario	Key Characteristics	Notable Results
Reference / Business-As-Usual (BAU) (1)	<ul style="list-style-type: none"> Based on AEO 2006 Does not include the Energy Independence & Security Act provisions 	<ul style="list-style-type: none"> No CCS.
Alternative Reference (9)	<ul style="list-style-type: none"> BAU Early availability of advanced technologies, lower costs, and better performance Likely to be similar to EIA's new AEO 2008 with the Energy Bill. 	<ul style="list-style-type: none"> No CCS, emissions growth slowed by efficiency improvements.
S.2191 Core (2)	<ul style="list-style-type: none"> Bill as written 	<ul style="list-style-type: none"> 44 GW of nuclear, 64 GW of renewable, and 80 GW of coal (w/ CCS) capacity constructed by 2025. Adv. Coal w/ CCS replaces almost all fossil-fired capacity by 2035
S.2191 Low International Action (3)	<ul style="list-style-type: none"> Bill as written Group 1 countries adhere to a Kyoto forever path Group 2 do nothing 	<ul style="list-style-type: none"> Emission leakage occurs at the rate of ~11% in 2030 and ~8% in 2050.
S.2191 Unlimited Offsets (4)	<ul style="list-style-type: none"> Bill as written Removes S.2191 offset constraints (for both domestic & international) that limit their usage to 15 percent of allowance submissions 	<ul style="list-style-type: none"> Allowance prices are more sensitive to the availability of offsets than they are to key enabling technologies
S.2191 No Offsets (5)	<ul style="list-style-type: none"> Bill as written No offsets and/or international credits allowed 	<ul style="list-style-type: none"> Allowance prices increase by 93% compared to bill as written
S.2191 Constrained Nuclear & Biomass (6)	<ul style="list-style-type: none"> Bill as written Nuclear power does not exceed BAU Biomass does not exceed BAU 	
S.2191 Constrained Nuclear, Biomass & CCS (7)	<ul style="list-style-type: none"> Bill as written Nuclear power and Biomass do not exceed BAU CCS not commercially available until 2030 	<ul style="list-style-type: none"> Without CCS and with limited nuclear and biomass, allowance prices increase by 80% in 2030.
S.2191 Constrained Nuclear, Biomass & CCS + Beyond Kyoto + Natural Gas Cartel (8)	<ul style="list-style-type: none"> Bill as written Nuclear power and Biomass do not exceed BAU CCS not commercially available until 2030 Beyond Kyoto² Natural Gas Cartel³ 	<ul style="list-style-type: none"> Natural gas cartel has minimal influence on allowance prices
S.2191 Alternative Reference (10)	<ul style="list-style-type: none"> Bill as written Based on Alternative Reference Scenario 	

² Group 1 countries implement GHG caps and reduce GHG levels to 20 percent below 1990 levels in 2020 and on a trajectory to 80 percent below 1990 levels in 2050; Group 2 countries adopt a policy beginning in 2025 that returns and holds them at year 2015 emissions levels through 2034, and then returns and maintains them at 2000 emissions levels from 2035 to 2050.

³ A functioning natural gas cartel that can extract natural gas prices equivalent to the energy content parity with Low Sulfur Light imported crude.

Figure 1 compares emissions trajectories, Figure 2 plots the allowance prices, and Figure 3 compares the resulting electricity generation fuel mixes for the different scenarios. Averages were used for scenarios (1, 2, 9, and 10) for which modeling was done under both IGEM and ADAGE.

Figure 1. Emissions Projections for S.2191 Under EPA Scenarios (MtCO₂e)



In Figure 1 shown above, projected emissions under the different scenarios include both capped and uncapped sources whereas the Lieberman-Warner bill cap includes only capped sources, which according to EPA’s analysis covers approximately 82 percent of total U.S. emissions. In addition, allowances available to HFCs, for which S.2191 establishes a separate cap-and-trade system, are not included in the Lieberman-Warner bill cap. Also, the scenarios vary in terms of the extent to which offsets (both domestic and international) are used for compliance purposes.

Figure 2. Projected Allowance Prices Under EPA Scenarios

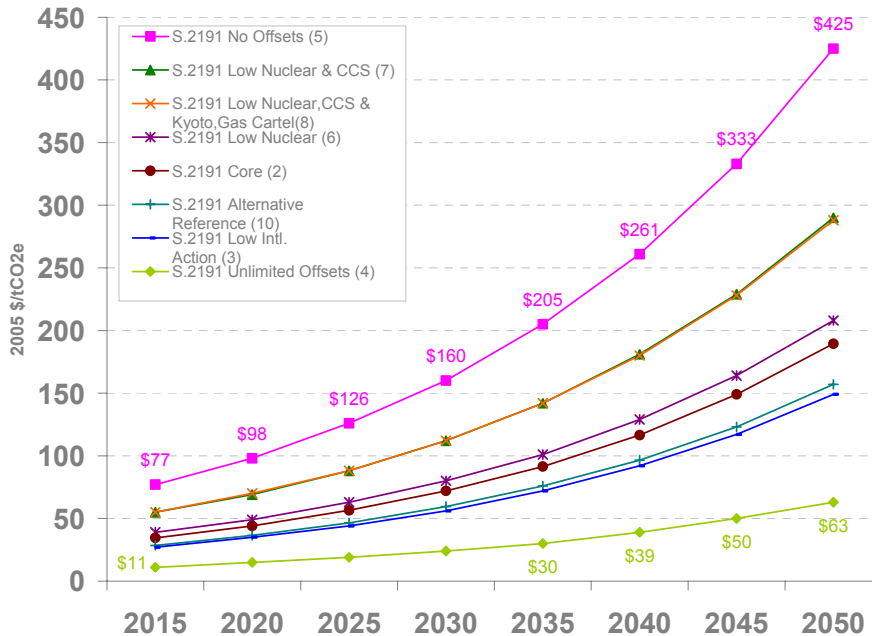
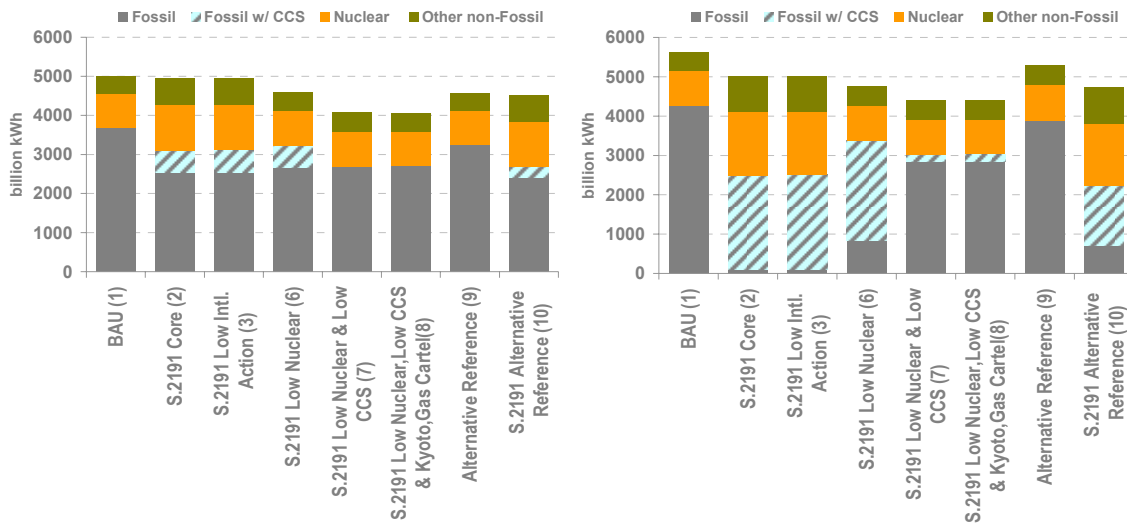


Figure 3. Projected Electricity Generation Fuel Mixes in 2025 & 2035 Under EPA Scenarios



Key Findings of the Analysis

- S.2191 reduces U.S. GHG emissions to approximately 40 percent (~3,749 million tons of CO₂) and 56 percent (~6,030 millions tons of CO₂) below BAU levels in 2030 and 2050 respectively. EPA’s analysis finds that S.2191 covers 82 percent of total U.S. GHG emissions.
- The greatest emission reduction occurs in the electricity generation sector: ~58 and 55 percent of total GHG abatement in 2030 and 2050, respectively. By contrast, the transportation sector is projected to be the source of less than 5 percent of GHG abatement in both 2030 and 2050.
- Key technologies are coal with CCS, nuclear, and renewable generating plants. Under the core S.2191 scenario, traditional fossil-fired generating plants not fitted with CCS almost completely disappear by 2035.
- Electricity prices are projected to increase 44 percent in 2030 and 26 percent in 2050 assuming the cost of allowances “...can partially be passed on to consumers”. In the analysis, EPA assumes that regulated electric utilities are allowed to pass on the cost of auctioned allowances to consumers, but are not allowed to pass on the cost of allocated allowances.
- Gasoline prices are projected to go up by 53 cents and \$1.40 per gallon in 2030 and 2050 respectively. However, they are not high enough to cause large changes in the demand for transportation or in usage patterns.
- The overall economic impacts as measured by changes in gross domestic product (GDP) and aggregate personal consumption are less than 3 percent on average. GDP is projected to be 0.9 and 3.8 percent lower (than BAU) in 2030 and between 2.4 and 6.9 percent lower in 2050. Consumption is projected to be between 0.9 and 1.4 percent lower in 2030 and between 2.1 and 3.3 percent lower in 2050.
- Allowance prices in the S.2191 core scenario range between \$61-83/tCO₂e in 2030, and \$159-220/tCO₂e in 2050. Usage of unlimited offsets would bring allowance prices down to \$24/tCO₂e in 2030 and \$63/tCO₂e in 2050, an average reduction of more than 65 percent over S.2191 core scenario prices.