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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
AIR AND RADIATION

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The Honorable Joseph Lieberman
United States Senate
Washington, DC 20510

Dear Senator Lieberman:

I am pleased to present the Environmental Protection Agency's (EPA) economic analysis of the Lieberman-Warner Climate Security Act of 2008 (S. 2191). This analysis was conducted at your request and focuses on the economic and greenhouse gas (GHG) impacts of S. 2191. Specifically, this analysis covers the following key features:

- what technologies could be used to reduce GHG emissions given the emissions caps in the bill;
- how and when U.S. GHG emissions would be reduced; and
- how much such reductions would cost the U.S. economy as a whole as well as the impacts on consumption and energy prices.

As part of its analysis, EPA developed a set of scenarios in consultation with your staff to evaluate various provisions in the bill as well as gauge the importance of key enabling climate mitigation technologies. This set of scenarios describes a wide range of possibilities but does not represent an EPA assessment of which scenarios are more likely to occur. The analysis does not represent an agency position on the legislation.

All scenarios evaluate impacts relative to an EPA Reference Scenario, which assumes compliance with existing domestic and international climate policies and measures to reduce GHG emissions (including assumed international compliance with the Kyoto Protocol), but does not assume any additional domestic or international climate policies or measures after 2007. This analysis of S. 2191 was initiated before the signing of the Energy Independence and Security Act of 2007 (EISA). In order to deliver this analysis now, EPA used its current Reference Scenario without EISA. EPA plans to re-analyze S. 2191 using a new reference scenario based on the Energy Information Administration's (EIA) revised *Annual Energy Outlook 2008,* which includes EISA. EPA's revised S. 2191 analysis will not be available until late May or early June, 2008.

The S. 2191 scenario is defined as the case where: U.S. GHG emissions are capped as specified in the bill; domestic offsets and international credits are available but limited as specified in the bill; carbon capture and storage (CCS) technology is deployable at scale and across the U.S. electricity sector; and there is an increase in nuclear power generation of 150 percent between 2005 and 2050.

The S. 2191 scenario also assumes international compliance with the Kyoto Protocol. After 2012, the Kyoto countries, with the exception of Russia, follow an emissions path that falls gradually from simulated Kyoto levels in 2012 to 50 percent below 1990 in 2050. The rest of the world adopts a policy in 2025 that returns them and holds them at 2015 emissions levels through 2034 and returns and maintains them at 2000 emissions levels from 2035 to 2050.

This analysis does include an Alternative Reference Scenario, which has comparable emissions to EIA's early release of the *Annual Energy Outlook 2008.* The analysis of S. 2191 given the Alternative Reference Scenario provides – at least directionally– an indication of how allowance prices may change in EPA's revised S.2191 analysis. Other scenarios cover some of the most important uncertainties in this analysis, including what policies will be adopted by other countries, how much new nuclear and biomass power is built, whether CCS technology will be available at a large scale, and the level of emissions and technological advancement in the reference scenario.

Some of the key insights from this analysis include the following:

- Relative to the reference scenario, S. 2191 would reduce U.S. GHG emissions by about 40 percent in 2030 and by about 56 percent in 2050. Compared to historical emissions, emissions under S. 2191 would be approximately 11 percent lower than 1990 levels in 2030 and 25 percent lower than 1990 levels in 2050. In terms of cumulative U.S. GHG emissions between 2010 and 2050, S. 2191 would reduce cumulative emissions by about 35 percent from the reference case.

- The electricity sector provides the greatest source of emissions reductions, largely through an expansion of nuclear power and deployment of CCS. At present, CCS is not available at large scales and at the cost used in this analysis. The U.S. government is performing research pilots and working with industry to develop CCS at a commercial scale for the power sector. To help reduce the uncertainty in deployment of CCS, EPA is developing regulations to ensure consistency in permitting commercial scale sequestration projects and plans to propose regulations in the summer of 2008.

- Under S. 2191, if enabling technologies are widely available, the estimated cost of additional GHG reductions range between \$61 and \$83 per ton of CO_2 equivalent in 2030 and between \$159 and \$220 per ton of CO_2 equivalent in 2050. Under S. 2191 and using the Alternative Reference Scenario, the estimated cost of additional GHG reductions range between \$46 and \$73 per ton of CO_2 equivalent in 2030, and between \$121 and \$193 per ton of CO_2 equivalent in 2050.

- In other scenarios that limit the availability of enabling technologies, the estimated cost of additional GHG reductions increases by over 80 percent, resulting in a range between $112 and $152 per ton of CO_2 equivalent in 2030, and between $292 and $494 per ton of CO_2 equivalent in 2050. In scenarios that do not allow use of domestic offsets and international credits, costs increase by over 90 percent, resulting in a range between $118 and $160 per ton of CO_2 equivalent in 2030, and between $307 and $425 per ton of CO_2 equivalent in 2050.

- In the reference scenario, GDP is projected to increase by approximately 97 percent from 2007 levels by 2030 and 215 percent by 2050. Under S. 2191, if enabling technologies are widely available:

    - annual reductions in GDP would range between 0.9 percent ($238 billion) and 3.8 percent ($983 billion) in 2030 and between 2.4 percent ($1,012 billion) and 6.9 percent ($2,856 billion) in 2050;

    - per household average annual consumption would be approximately $1,375 lower and gasoline prices would increase approximately $0.53 per gallon in 2030; in 2050, per household average annual consumption would be approximately $4,377 lower and gasoline prices would increase approximately $1.40 per gallon;

    - the present value of the cumulative reduction in real consumption for the 2012-2030 period ranges from $624 billion to $787 billion (in 2005 dollars and discounted at 5 percent); the present value of the cumulative reduction in real consumption for the 2012-2050 period ranges from about $2.0 trillion to $2.7 trillion; and

    - electricity prices are projected to increase 44 percent in 2030 and 26 percent in 2050.

- The range of GHG reduction costs and impacts on GDP and consumption reflect different estimates from EPA's economy-wide models. Combined, these two models provide a more complete picture of possible impacts than can be provided from any single model. These models take different approaches to estimating technological development and macro-economic effects.

- The use of domestic offsets and international credits reduces GHG prices and total U.S. costs. The cost reduction needs to be weighed against the reliability of offset reductions and other approaches to increase incentives for U.S. technology development and deployment. Total payments for international credits are approximately $12 billion in 2030 and $22 billion in 2050. Total domestic offset payments are approximately $15 billion in 2030 and $11 billion in 2050.

- International emissions leakage may occur in the production of energy-intensive manufacturing goods given higher energy prices resulting from a domestic GHG policy and the relative stringency of GHG policies adopted internationally.

- If S. 2191 becomes law and the international climate policies assumed in the S. 2191 scenario are also implemented, there is no emissions leakage in 2030 since all countries have adopted GHG policies.

- If S. 2191 becomes law and the international climate policies assumed in the "alternative international action" scenario are also implemented, there would be emissions leakage to developing countries by approximately 350 $MtCO_2e$ in 2030 (compared to an estimated 3,237 $MtCO_2e$ reduction in U.S. emissions). The "alternative international action" scenario assumes that Kyoto countries, with the exception of Russia, follow a Kyoto forever path; and the rest of the world adopts no additional policies or measures.

My staff is available to you and your staff to answer questions you may have on the accompanying analytical package.

Sincerely,

Robert J. Meyers
Principal Deputy Assistant Administrator