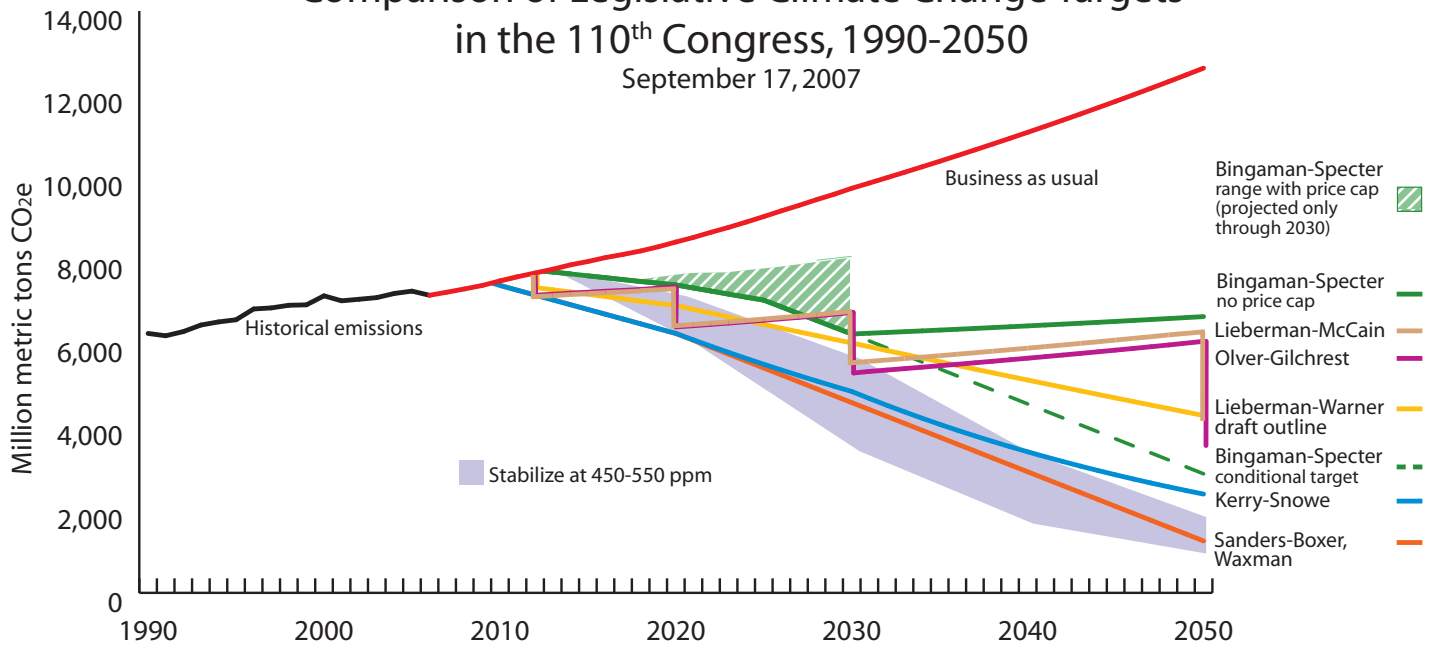


Comparison of Legislative Climate Change Targets in the 110th Congress, 1990-2050

September 17, 2007

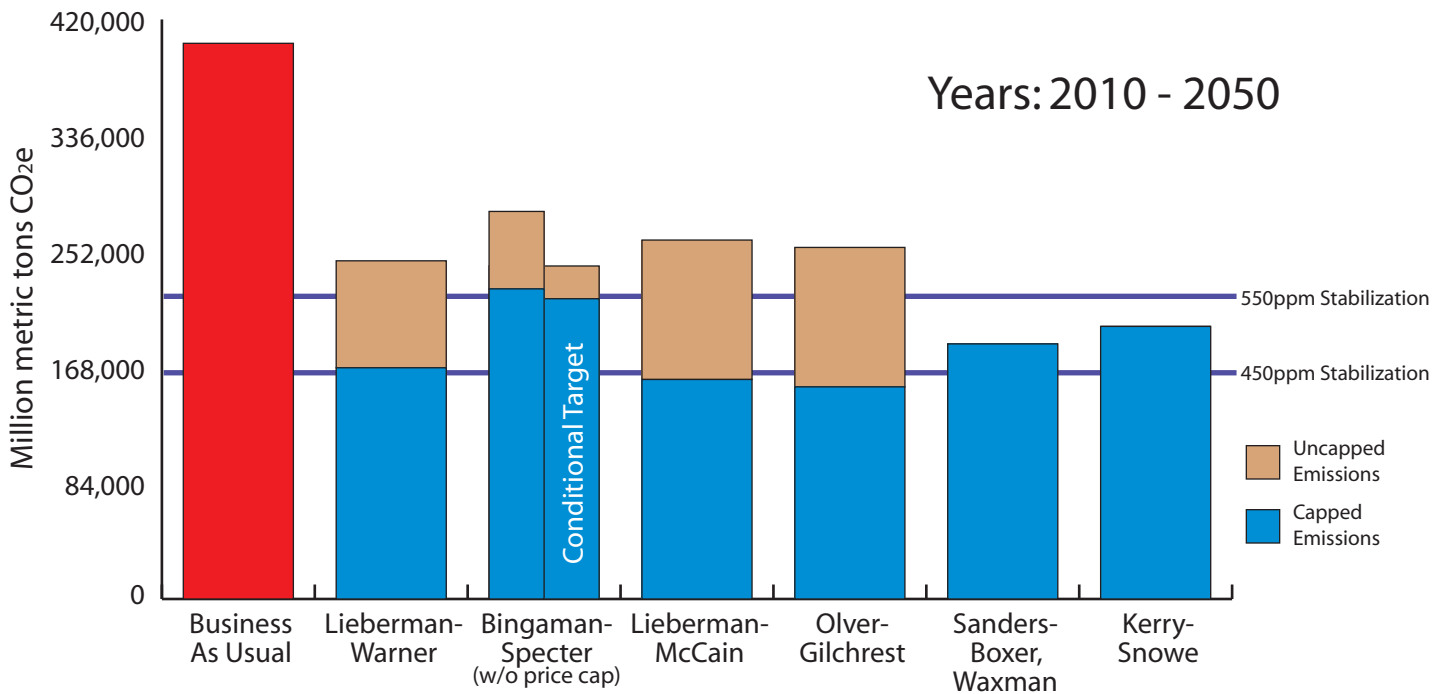
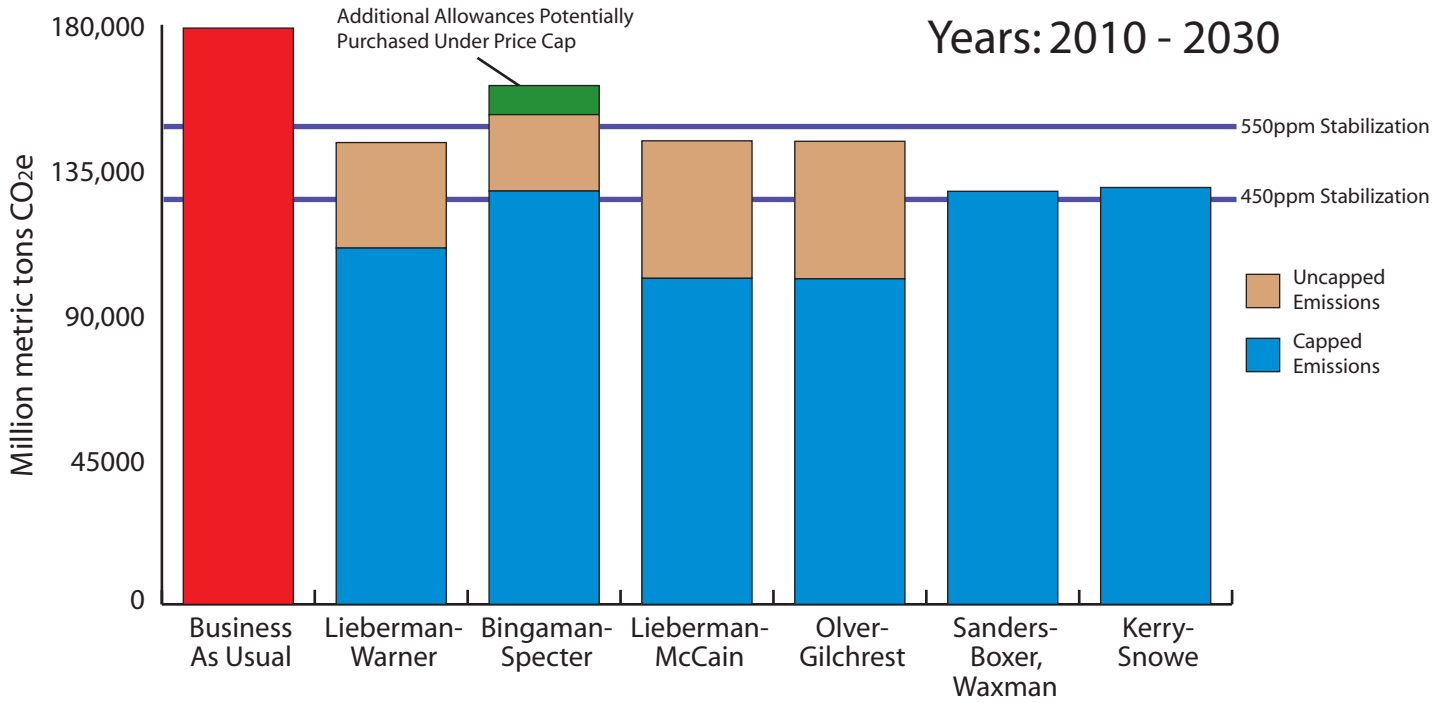


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For a full discussion of underlying methodology, assumptions and references, please see <http://www.wri.org/usclimatetargets>. WRI does not endorse any of these bills. This analysis is for comparative purposes only. Data post-2030 may be derived from extrapolation of EIA projections.

Comparison of Cumulative Emissions Budgets under Legislative Climate Change Targets in the 110th Congress

September 17, 2007



**ASSUMPTIONS AND METHODOLOGY OF
COMPARISON OF LEGISLATIVE CLIMATE CHANGE TARGETS
IN THE 110TH CONGRESS**

SEPTEMBER 17, 2007

For more information, go to www.wri.org/usclimatetargets.



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The World Resources Institute’s analysis of emissions targets and cumulative emissions budgets attempts to fairly and accurately represent explicit carbon caps in Congressional climate proposals. Emissions from regulated sectors are calculated based on the text of the respective draft legislation. For sectors that are not covered by the legislation, emissions are estimated to continue to grow. This analysis is not a projection of actual emissions under the various proposals nor is it an analysis of economic impacts resulting from the enactment of these policies.

“Comparison of Legislative Climate Change Targets in the 110th Congress” (Figure 1) compares targets for legislative proposals of mandatory cap and trade programs for greenhouse gas emissions. Although this chart is a revision of a similar analysis originally released during the 109th Congress and updated through May of this year, several significant changes have been made. Most importantly, new legislative proposals, introduced by Senators Bingaman and Specter, and Lieberman and Warner have been incorporated. Furthermore, the analysis has been expanded to reflect the varying levels of emissions coverage of the different proposals. Finally, all underlying historical and projected emissions data have been updated to the most recent data available.

Figure 1

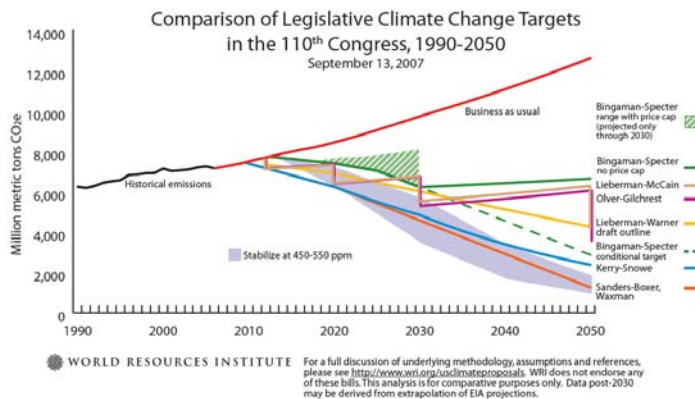
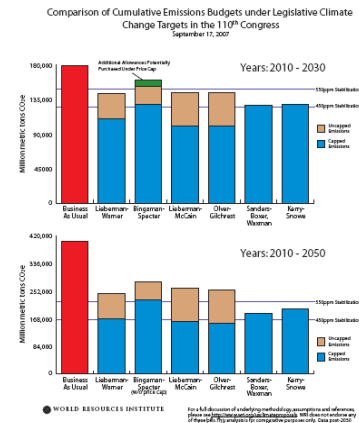


Figure 2



“Comparison of Cumulative Emissions Budgets under Legislative Climate Change Targets in the 110th Congress” (Figure 2) offers a different perspective on the same data. This chart depicts the cumulative greenhouse gas emissions budgets for the proposals over two different time periods. While the speed with which emissions reductions are implemented is an important determinant of the efficacy of climate change legislation, cumulative emissions reductions are an essential indicator of the environmental stringency of a policy proposal. Time periods of 2010-2030 and 2010-2050 were chosen to evaluate how ambitious the proposals are in both the short and long term.

General assumptions

Many assumptions have had to be made to undertake this analysis. Assumptions have been made to simplify the analysis and should not be taken as statements of fact. In many situations, these assumptions highlight contentious issues which must be resolved to ensure the environmental integrity of a market-based approach to addressing the real threat of climate change.

For this analysis, WRI assumes that:

- All proposals are enacted in 2007. Where annual data are unavailable, years between targets or projections are interpolated using a simple linear formula.

- Only explicit mandatory caps are met – complementary policies and financial incentives for additional greenhouse gas (GHG) reductions beyond mandatory caps do not reduce emissions.
 - Complementary policies aimed at reducing the emissions from capped sectors and entities, such as increased fuel economy standards or renewable electricity standards, may affect the price of emissions allowances but would not lower economy-wide GHG emissions below the mandated cap.
 - Complementary policies aimed at reducing the emissions of uncapped sectors and entities, such as financial incentives for biological sequestration, are not accounted for unless tied to explicit quantities of emissions reductions. As a result, this analysis could be considered conservative since some additional emission reductions would be expected from such policies.
- Bills will impact only capped sectors.
 - Bills with caps or reduction targets that explicitly apply to 100 percent of U.S. emissions are taken at face value.
 - Bills that define which sectors or entities will be capped are assumed to impact only covered sectors. Due to a lack of sufficiently detailed projection data by activity, emissions from the rest of the economy are assumed to increase at the Annual Energy Outlook (AEO) 2007 reference case business as usual (BAU) rate of emissions growth for the entire economy between 2006 and 2030. As a result, this analysis attempts to evaluate the impact of varying amounts of coverage, not the types of emissions covered. This should be considered a conservative estimate as many non-covered sectors currently are projected to grow at slower rates as compared with the overall economy.
- Offsets will be real, permanent and additional.
 - This representation assumes offsets represent a real reduction in total global GHG emissions and, as a result, GHG emissions would remain under the cap level. Thus, in this analysis, offsets have no impact on the visual representation of the cap-line.
- Borrowing and banking will not allow increases in cumulative GHG emissions.
 - Annual emissions may stray above or below the cap, but cumulative GHG emissions over the life of the program would be the same with or without borrowing or banking
 - Although borrowing and banking may allow actual emissions in a given year to differ from a bill's stated cap, this analysis assumes no changes to the cap.
- Price caps, while providing price certainty, potentially compromise a bill's environmental integrity and create uncertain emissions reductions.
 - This analysis shows the effects of the price cap under the proposal by Senators Bingaman and Specter
 - The upper bound of the range is informed by potential emissions reduction cost curves for the price cap as derived from the Energy Information Administration's (EIA) National Energy Modeling System (NEMS) model outputs
 - The lower bound of the range is determined by the caps identified in the text of the bill
 - If, independent of other complementary policies and assumptions, the upper-bound were to dip below the lower bound, it is assumed that the price cap would not take effect and the lower bound would continue to effectively represent the emissions cap. It is likely that such a situation would lead to overcompliance and banking of emissions allowances to be used in later years. However, as stated above, this analysis assumes no banking.

Bill methodology

- Kerry-Snowe
 - The bill language stipulates a declining cap, to cover 100 percent of U.S. emissions starting in 2010. The chart reflects the text of the language - annual reductions from 2010 through 2020 that bring economy-wide emissions down to 1990 levels by 2020,

then annual 2.5 percent reductions from 2021 through 2029 and 3.5 percent annual reductions from 2030 through 2050

- Sanders-Boxer and Waxman
 - Emissions are reduced linearly to reach 1990 levels by 2020. From there, emissions are reduced linearly to reach 80% below 1990 levels by 2050. Although the text of Representative Waxman's proposal is somewhat different from the Sanders-Boxer proposal, staff confirms that the cap is intended to follow an identical trajectory. According to our analysis this straight line trajectory is equal to an average annual reduction of approximately 5.2 percent.
- Lieberman-McCain and Gilchrest-Olver
 - The texts of both bills stipulate annual caps for covered sectors to be adjusted by:
 - Subtracting 2000 levels of emissions from exempted sources (unquantifiable emissions within covered sectors – 8.3 percent of economy emissions);
 - Subtracting the 2012, 2020, 2030 and 2050 estimated emissions from non-covered entities (entities from covered sectors that emit less than 10,000 mmt CO₂e – 5.2 percent of economy emissions) for each cap period following a cap-tightening.
 - This adjusted cap is applied to emissions from non-exempt, covered entities within covered sectors (73.9 percent of 2004 total US emissions).
 - The remaining 26.1 percent of emissions are allowed to grow at the AEO 2007 BAU rate of growth for GHG emissions (on average, 1.29 percent per year)
 - A thorough discussion of emissions coverage under the McCain-Lieberman proposal can be found in a memo from the EPA to the EIA dated 3/6/07 titled “Emissions that Fall under the Cap under S.280”
- Bingaman-Specter
 - Cap on covered sectors is derived from legislative language. The bill is calculated to cap 85.6 percent of 2004 total US emissions, based on model output data from a June 2007 run of NEMS conducted for the National Commission on Energy Policy.
 - The remaining 14.4 percent of economy emissions grow at the AEO BAU economy emissions annual growth rate (on average, 1.29 percent per year).
 - The text of the bill requires that, by 2030, if the five largest trading partners have enacted comparable policies, the President, based on findings from an interagency review, will recommend to Congress more stringent targets to reduce total (100 percent) U.S. emissions at least 60 percent below 2006 levels. This cap is shown on the chart as the conditional target
 - Without significant complementary policies, it is highly likely that the bill's price cap will be triggered, thus breaching the environmental integrity of the cap. As a result, a shaded region is used to represent the emissions reductions possible at the price cap value for carbon. This analysis is based on potential mitigation curves derived from the Energy Information Agency's January 2007 analysis, “Energy Market and Economic Impacts of a Proposal to Reduce Greenhouse Gas Intensity with a Cap and Trade System”
- Lieberman-Warner Draft
 - Cap on covered sectors for 2012, 2020, 2030, 2040 and 2050 is taken from the annotated table of contents released by the Senators in August 2007. Cap is assumed to follow a straight-line decrease between target years, as stated in discussions with Senate staff.
 - Covered sectors under the cap are assumed to be responsible for 80 percent total US emissions, based on the annotated table of contents. The remaining 20 percent of economy emissions grow at the AEO BAU economy emissions annual growth rate (on average, 1.29 percent per year).
 - A more detailed analysis will be released after the final text of the bill becomes available.

- Stabilization
 - Stabilization lines for atmospheric CO₂ equivalent concentrations of 450 and 550 parts per million are derived from van Vuuren and den Elzen *et al.* 2006. These curves represent reductions the U.S. would need to achieve in tandem with immediate and significant commitments from all industrialized countries and the eventual cooperation of all major developing country emitters to prevent atmospheric greenhouse gas concentrations from exceeding 450ppm or 550 ppm based on the multi-stage scenario used in this study.

Data sources:

- Historical emissions from 1990-2005 come from the EPA’s U.S. Inventory of Greenhouse Gas Emissions and Sinks 1990-2005.
- Emissions projections through 2030 come from the Energy Information Agency’s (EIA) Annual Energy Outlook 2007 (Table 15) and are extrapolated from that report for 2031-2050 at the average annual rate from 2005-2030 or 1.29%. BAU is economy-wide and contains all GHGs.
- Analysis of coverage of proposed caps is based on the EPA’s 2007 “Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005”, The National Commission on Energy Policy’s June 2007 “Economic Analysis of Updated Commission Recommendations” as well as an EPA memo to the EIA dated March 6, 2008 with the subject “Emissions that Fall under the Cap under S.280”
- Potential mitigation curves for specific prices are derived from the Energy Information Agency, “Energy Market and Economic Impacts of a Proposal to Reduce Greenhouse Gas Intensity with a Cap and Trade System”, January 2007.
- Stabilization curves are derived from van Vuuren and den Elzen et al, “Stabilising greenhouse gas concentrations at low levels: an assessment of options and costs,” Netherlands Environmental Assessment Agency, 2006. For a discussion of the multi-stage scenario and underlying assumptions see page 207.

This analysis was completed by John Larsen and Robert Heilmayr at the World Resources Institute. The authors would like to thank the offices of Representatives Gilchrest and Waxman and Senators Bingaman, Boxer, Kerry, Lieberman, Sanders and Warner as well as analysts at the World Resources Institute, the National Commission on Energy Policy, the Pew Center on Global Climate Change, Resources for the Future and the Union of Concerned Scientists for their help in reviewing this analysis.

Please contact John Larsen (202-729-7661) or Robert Heilmayr (202-729-7844) with any questions.

Table 1: Estimated emissions coverage of climate change proposals

	Coverage	Emissions from covered sectors (percent of all emissions, 2004)	Emissions from uncovered sources in covered sectors (percent of all emissions, 2004)	Emissions from exempted entities in covered sectors (percent of all emissions, 2004)
Kerry-Snowe	Does not define what sectors or entities will be regulated. EPA is required to achieve emissions reductions on par with reducing all U.S. GHG emissions in accordance with stated targets and timetables.	100	N/A	N/A
Sanders-Boxer	Does not define what sectors or entities will be regulated. EPA is required to achieve emissions reductions on par with reducing all U.S. GHG emissions in accordance with stated targets and timetables.	100	N/A	N/A
Lieberman-McCain	Emissions from the electric power, transportation, industrial and commercial sectors	87.4	5.2	8.3
Olver-Gilchrest	Emissions from the electric power, transportation, industrial and commercial sectors	87.4	5.2	8.3
Bingaman-Specter	Petroleum refineries, natural gas processors, facilities that use more than 5,000 tons of coal per year, aluminum smelters, manufacturers of adipic or nitric acid, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride or nitrous oxide	87.4	1.8	N/A
Lieberman-Warner	Emissions from the electric power, transportation and industrial sectors	80	N/A	N/A