EMISSIONS REDUCTIONS UNDER POLLUTION REDUCTION PROPOSALS IN THE 111TH U.S. CONGRESS

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This analysis provides an assessment of net reductions in greenhouse gas (GHG) emissions relative to total U.S. emissions that could be achieved by pollution reduction proposals currently under consideration in the 111th Congress. This assessment is an update to a previous analysis WRI released on December 17, 2009, and includes an analysis of the American Power Act (APA), introduced as a discussion draft on May 12, 2010 by Senators Kerry and Lieberman. The APA draft is compared against S. 2877, the Carbon Limits and Energy for America's Renewal Act (CLEARA) as introduced by Senators Cantwell and Collins, and H.R. 2454, the American Clean Energy and Security Act (ACESA) sponsored by Representatives Waxman and Markey, as passed by the House of Representatives June 26, 2009.

To account for the effects of different design elements among the analyzed bills, GHG reduction estimates are divided into three scenarios, which are consistently applied as appropriate to all proposals examined in this analysis:

- Total emissions reductions achieved solely by the proposed emissions caps.
- Total emissions reductions achieved by proposed caps and all other complementary requirements, such as emissions performance standards for uncapped sources, allowances set-asides for cost containment, and required components of supplemental reduction programs, as applicable.
- A range of potential additional reductions that could be achieved through incentives and other measures, such as domestic supplemental reductions and requirements for the use of more than one offset for compliance, as applicable.

To summarize, this analysis depicts reductions within the cap and any additional measures that will achieve emissions reductions through the passage and implementation of each proposal. Reductions that would require additional congressional action to be realized are not included in the analysis.

Key findings:

- The emissions caps in the APA achieve net reductions of 14 percent relative to 2005 levels in 2020. By 2050, the APA achieves reductions of 72 percent relative to 2005 levels.
- The APA's later start year (2013) and delay of inclusion of some sources until 2016 yields slightly fewer reductions in the first five years of the program than the ACESA. The APA and the ACESA require greater net annual GHG reductions than the CLEARA.
- The APA contains complementary measures in addition to emissions caps that could achieve additional reductions. Specifically:
    - When all complementary requirements are considered in addition to the caps, net GHG emissions would be reduced 15 percent relative to 2005 levels by 2020 and 73 percent relative to 2005 levels by 2050.
    - When additional potential emissions reductions are considered, the APA could reduce emissions up to 19 percent relative to 2005 levels by 2020 and up to 77 percent relative to 2005 levels by 2050. The actual amount of additional reductions will depend on the quantity and quality of international offsets used for compliance.
    - While the APA creates programs similar to those in the ACESA that could yield additional GHG reductions in uncapped sectors as well as internationally, unlike the ACESA, APA's programs are not funded or are subject to additional congressional action. Thus they are not considered in this analysis.

Figure 1, "Net Estimates of Emissions Reductions Under Pollution Reduction Proposals in the 111th Congress, 2005-2050" (see page 2) graphically presents total net GHG reductions achieved by the APA, the CLEARA and the ACESA relative to U.S. historical and projected emissions under the three reduction scenarios. Table 1, "Estimates of Total Net GHG Emissions and Emissions Reductions Achieved by Pollution Reduction Proposals in the 111th Congress, 2005-2050" (see page 3) presents a table of total net GHG reductions that could be achieved by these proposals for selected years. A full description of the methods and assumptions behind this analysis can be found beginning on page 4.

Figure 1. Net Estimates of Emissions Reductions Under Pollution Reduction Proposals in the 111th U.S. Congress, 2005-2050

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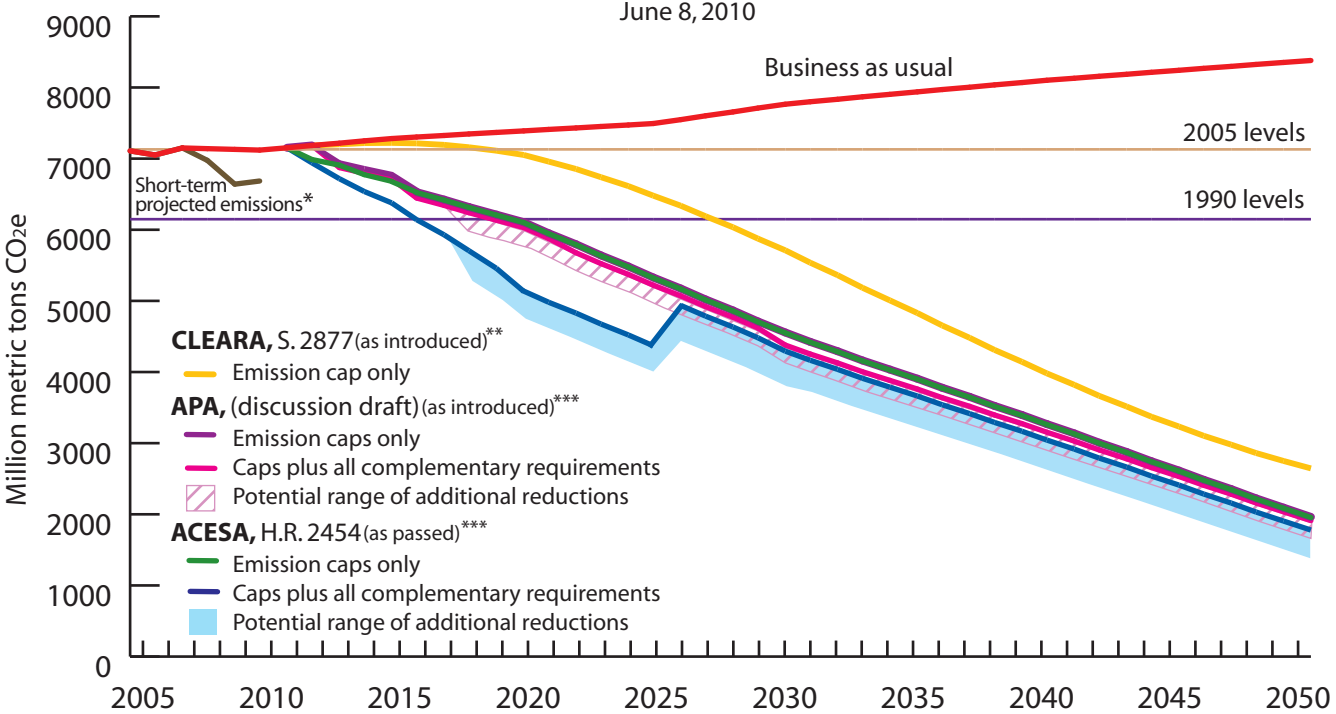

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For a full discussion of underlying methodology, assumptions and references, please see http://www.wri.org/usclimatetargets.

* "Business as usual" emission projections are from EPA's reference case for its analysis of the Waxman-Markey bill. "Short-term projected emissions" represent EIA's most recent estimates of emissions for 2008-2010.

** The CLEARA sets economy-wide reduction targets beginning with a 20 percent reduction from 2005 levels by 2020. However, additional action by Congress would be required before these targets could be met. Reduction estimates do not include emissions increases above the cap that could occur if the safety-valve is triggered.

*** The APA and the ACESA allow offsets from emission reduction activities outside the cap to be used for a portion of compliance. If these offsets are not real, additional, verifiable and permanent, net emissions reductions would decrease proportionately.

Table 1. Estimates of Total Net GHG Emissions & Emissions Reductions Achieved by Pollution Reduction Proposals in the 111th U.S. Congress

Absolute Emissions (Millions Metric Tons CO_2eq)						
	2010	**2012**	**2020**	**2030**	**2040**	**2050**
Business as usual emissions	7,120	7,185	7,390	7,765	8,102	8,379
Short-term projected emissions	6,685					
CLEARA (S. 2877) Emissions caps only		7,185	7,051	5,711	3,981	2,645
ACESA (H.R. 2454) Emissions caps only		6,993	6,106	4,556	3,268	1,963
ACESA (H.R. 2454) Caps plus all complementary requirements		6,946	5,132	4,292	3,043	1,779
ACESA (H.R. 2454) Potential range of additional reductions		6,946	4,757	3,814	2,623	1,383
APA Emissions Caps only		7,185	6,106	4,556	3,268	1,963
APA Caps plus all complementary requirements		7,185	6,030	4,379	3,154	1,911
APA Potential range of additional reductions		7,185	5,780	4,129	2,904	1,661
Percent change from 2005 emissions						
	2010	**2012**	**2020**	**2030**	**2040**	**2050**
Business as usual emissions	0	1	4	9	14	18
Short-term projected emissions	-6					
CLEARA (S. 2877) Emissions caps only		1	-1	-20	-44	-63
ACESA (H.R. 2454) Emissions caps only		-2	-14	-36	-54	-72
ACESA (H.R. 2454) Caps plus all complementary requirements		-2	-28	-40	-57	-75
ACESA (H.R. 2454) Potential range of additional reductions		-2	-33	-46	-63	-81
APA Emissions Caps only		1	-14	-36	-54	-72
APA Caps plus all complementary requirements		1	-15	-38	-56	-73
APA Potential range of additional reductions		1	-19	-42	-59	-77
Percent change from 1990 emissions						
	2010	**2012**	**2020**	**2030**	**2040**	**2050**
Business as usual emissions	17	18	21	27	33	37
Short-term projected emissions	10					
CLEARA (S. 2877) Emissions caps only		18	16	-6	-35	-57
ACESA (H.R. 2454) Emissions caps only		15	0	-25	-46	-68
ACESA (H.R. 2454) Caps plus all complementary requirements		14	-16	-30	-50	-71
ACESA (H.R. 2454) Potential range of additional reductions		14	-22	-37	-57	-77
APA Emissions Caps only		18	0	-25	-46	-68
APA Caps plus all complementary requirements		18	-1	-28	-48	-69
APA Potential range of additional reductions		18	-5	-32	-52	-73

Bills analyzed include the American Power Act (APA) introduced as a discussion draft by Senators Kerry and Lieberman and S. 2877, the Carbon Limits and Energy for America's Renewal Act (CLEARA) as introduced by Senators Cantwell and Collins, and H.R. 2454, the American Clean Energy and Security Act (ACESA) sponsored by Representatives Waxman and Markey, as passed by the House of Representatives on June 26, 2009. "Business as usual" emission projections are from EPA's reference case for its analysis of the ACESA. "Short-term projected emissions" represent EIA's most recent estimates of emissions for 2008-2010. CLEARA sets economy-wide reduction targets beginning with a 20 percent reduction from 2005 levels by 2020. However, additional action by Congress would be required before these targets could be met. Reduction estimates do not include emissions above the cap that could occur due to the safety valve. Reduction estimates assume all offsets are real, verifiable, additional and permanent. If they are not, emissions would be greater than the estimates provided here, depending on offset quality and the quantity used for compliance.

ASSUMPTIONS AND METHODOLOGY

WRI has made a number of assumptions to simplify this analysis; these should not be taken as statements of fact. In many situations, these assumptions highlight contentious issues that must be resolved to ensure the environmental integrity of a market-based approach to addressing the threat of climate change. WRI will update this analysis to reflect new legislation as well as new analyses of emissions or economic and technical considerations published by the Environmental Protection Agency, the Department of Energy, and/or other relevant organizations.

For this analysis of GHG emissions reductions, the following general assumptions and methods apply; methods and assumptions that apply to the entire analysis are included below followed by descriptions of specific information relevant to each proposal.

- All proposals are enacted in 2010. Where annual data are unavailable, years between targets or projections are interpolated using a simple linear formula.
- Only measures required by the proposal itself are considered. Instances where additional congressional action is required for a certain component to be realized, implemented, or funded are not considered in this analysis.
- Caps will impact only capped emissions.
    - Caps are calculated and applied according to the legislative language in each proposal.
    - Bills that define which sectors or entities will be capped are assumed to impact only covered sectors. Estimates of emissions coverage for each proposal are generated based on legislative language and the EPA inventory. Emissions from the rest of the economy are assumed to increase at annual rates derived from EPA's ADAGE reference case projections under the business-as-usual scenario.
    - This analysis does not take into account potential leakage of emissions from capped sources to uncapped sources either within or between sectors.
- A scenario that considers just the emissions caps without complementary policies is provided and labeled as “emissions caps only.” Some complementary policies that are required and/or funded under a proposal may achieve emissions reductions in non-covered sectors beyond what would result from the cap. Policies that have clear mandates for additional reductions are depicted in the “caps plus all complementary requirements” scenario, while policies with less clear requirements or less certain outcomes are depicted in the “potential range of additional reductions.”
    - Complementary policies aimed at reducing 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. These measures are not considered in this analysis.
    - Complementary policies aimed at reducing emissions from uncapped sectors and entities, such as performance standards for landfills, are included where reasonable, robust estimates can be calculated.
    - Emissions reduction programs funded through allowance allocations or unrestricted auction revenue that require a specific amount of emissions reduction be achieved are assumed to meet their requirements. Where no reduction requirements exist, this analysis assumes a tonne of GHG reductions is achieved for every tonne allocated.
    - Additional offset rules such as a requirement to turn in 5 offsets for every 4 tonnes of GHGs emitted are assumed to generate potential additional reductions.
- Offsets will be real, permanent, and additional.

    - This analysis assumes offsets represent a real reduction in total global GHG emissions. As a result, emissions under each bill are portrayed as total net emissions minus offsets. If the environmental integrity of offsets were not completely real, permanent, and additional then the emissions reduction estimates included in this analysis would be diminished proportionately.[1] Readers should take this into account when considering the estimates generated by this analysis.
- Price limits on emissions such as safety valves can potentially allow U.S. emissions to increase above the prescribed cap and yielding higher emissions and lower reductions than the estimates presented in this analysis.
- Borrowing and banking will not allow increases in cumulative U.S. GHG emissions.
    - Annual emissions may stray above or below the cap in any given year, but cumulative GHG emissions over the life of the program would be the same with or without borrowing or banking.
- Figures 1 and 2 in this analysis represent net annual emissions reductions achieved by legislative proposals relative to total U.S. emissions levels under business as usual, 2005 levels and 1990 levels. Emissions reductions are counted regardless of where in the world they take place (such as international offsets). As such, these figures do not differentiate between domestic and international abatement and only consider total emissions to the atmosphere and in turn total climate impact of each proposal.

Methodologies for Legislative Proposals

Business as Usual
Projections of total U.S. emissions under no federal action (referred to here as "business as usual") are sourced from EPA's economy-wide reference case projections from the ADAGE model as published in its economic analyses of H.R. 2454 released in 2009. This business-as-usual emissions projection underpins estimates of all proposals. This projection could be considered a slight overestimate of future emissions when compared to more recent projections released by the Energy Information Administration.

Historical Emissions
Historical emissions from 1990 through 2008 are sourced from the EPA's GHG Inventory of sources and sinks released in 2009.

Short-term Emissions Projection
Short-term projections of GHG emissions are derived from EIA's Short-term Energy and Winter Fuels Outlook. Projections from 2008 through 2010 of CO2 emissions from fossil fuels are coupled with EPA's estimates of non-fossil fuel GHG emissions for 2007.

Note: Estimates and the methodologies behind such estimates for legislative proposals put forward in the 111th Congress but not included here can be found in previous releases of this analysis. All previous releases are available at: http://www.wri.org/publication/usclimatetargets

Discussion draft, the American Power Act of 2010 (APA) (Introduced May 12, 2010 by Senators Kerry and Lieberman)

[1] For an overview of key elements of offset program design and how these elements could affect the environmental integrity of any pollution reduction program that incorporates offsets see: Broekhoff and Zyla, "Outside the Cap: Opportunities and Limitations of Greenhouse Gas Offsets" World Resources Institute Policy Brief, 2008. Available at: http://www.wri.org/publication/outside-the-cap.

Cap and coverage: The APA proposes the creation of two caps – one to phase down U.S. HFC consumption and another to reduce all other GHG emissions. These two caps combined represent the "emissions caps only" scenario.

- Coverage of non-HFC GHG emissions is phased in over the first four years of the program.
    - The initial 2013 cap, set at 4,722 million tonnes of emissions, is estimated to cover approximately 67 percent of total 2005 U.S. emissions.
    - In 2016, the cap is again expanded to include industrial emissions and emissions from natural gas sold by local distribution companies, increasing coverage to an estimated 85 percent of 2005 U.S. emissions.
    - The APA requires a one-time small adjustment to the size of the cap in the event that the bill's assumed estimates of coverage do not match EPA's final coverage estimates during implementation. WRI's estimates of coverage differ slightly compared to the assumptions contained in the bill and so this analysis incorporates the bill's prescribed cap adjustments.
- The HFC cap would go into effect in 2013, covering the production of specifically identified HFCs. These HFCs were responsible for approximately 2 percent of 2005 emissions.
- When combined with the HFC cap, the draft bill would cover up to 87 percent of 2005 U.S. emissions.
- The APA does authorize the EPA Administrator to remove perfluorocarbons and certain other substances from regulation under the cap and instead set emissions standards. Given that these substances account for less than 0.2 percent of total U.S. emissions this analysis assumes that regardless of the method of regulation no significant change in total reductions would result.

Growth of uncapped emissions: The remaining 13 percent of U.S. emissions not covered by the caps from 2016 onward are increased in line with EPA projections of business as usual for uncapped emissions under the proposal. These annual growth rates, while varying from year to year, average zero percent annually through 2050. Adjustments are made to these rates between 2013 and 2016 to account for varying degrees of emissions coverage as the cap is phased in.

Complementary requirements: In addition to the two caps outlined above, the draft includes a variety of policies that require additional reductions from uncapped sources both inside and outside of the United States. The combination of these provisions and the caps represent the "caps plus all complementary requirements" scenario and include:

- New Source Performance Standards: The APA prevents the EPA Administrator from setting New Source Performance Standards for uncapped emissions that qualify as offset project types under the cap and trade program until 2020. However, there is no mandate or directive to set such standards after 2020 other than existing statutory authority under the Clean Air Act. Given that there are no specific provisions in the APA mandating such standards, no additional emissions reductions from these provisions are included anywhere in our estimates.
- The cost containment reserve represents a fixed amount of reductions that will take place in addition to reductions made to meet the cap. If the strategic reserve trigger price is not reached, allowances in this reserve (3,915 million) will not be released – in effect tightening the cap. If the trigger price is reached, forest tonne offsets or domestic offsets are used to refill the reserve. This analysis assumes that these purchases are designed to maintain a constant level of credits that are fungible with normal allowances (either allowances or forest tonnes discounted at the rate outlined in the legislation), effectively yielding emissions reductions whether the reserve is tapped or not. This analysis distributes these reductions depending on the years in which the allowances are

withdrawn from the cap to fill the reserve (the analysis does not credit the reductions until the allowance withdrawals force abatement among covered sectors). Additional reductions could occur through the offset purchasing component of the reserve; these are not taken into account in this analysis.

- Under what would be a new Section 802 under the Clean Air Act, the APA does require studies of whether or not existing regulatory requirements for conventional pollutants from coal-fired power plants should be relaxed. If such requirements were relaxed GHG emissions reductions from these sources could be lower than if the standards were kept in place. However, the overall GHG cap is assumed to be the binding constraint for total capped GHG emissions thus such changes in emissions reductions are not considered in this analysis since the overall cap would be met.

Potential range of additional reductions: The lower bound of the range represents the "range of potential additional reductions" scenario and incorporates additional emissions reductions that may be achieved through the implementation of the proposal, but are not mandated. Such policies include:

- 1.25 offset requirement for international offsets: The APA requires 1.25 international offsets to be submitted for compliance for every tonne of regulated emissions beginning in 2018. This requirement would yield additional reductions contingent on the number offsets used. In addition, under certain circumstances the international offset limit may be increased from 0.5 billion tonnes to up to 1 billion tonnes. This extends the maximum potential emissions reductions of the 1.25 offset requirement if this limit is expanded. A range of additional emissions reductions in uncapped international emissions are included in this analysis to represent this provision. The range starts at zero and increases to 250 million tonnes per year.
- Supplemental greenhouse gas reduction program for international forestry: The APA requires the EPA administrator to implement a program to facilitate international forestry projects to achieve 720 million tonnes of additional emissions reductions in 2020 and a total of 6,000 million tonnes of reductions by 2025. Funding for this program is subject to congressional appropriations so it is not included in these estimates.
- Carbon conservation program for domestic agriculture and forestry: The APA requires the U.S. Departments of Agriculture and Interior to jointly create and implement a program to achieve additional GHG reductions and increases in sequestration in the agriculture and forestry sectors. Such reductions would not be eligible for offset credit and could yield additional GHG reductions beyond the emissions cap. Potential reductions from this program are not included in this analysis due to the fact that the program is not funded through the draft bill.

H.R. 2454, the American Clean Energy and Security Act of 2009 (ACESA) (Introduced May 15, 2009 by Representatives Waxman and Markey; passed by the House of Representatives June 26, 2009)

Cap and coverage: The ACESA proposes the creation of two caps – one to phase down U.S. HFC consumption and another to reduce all other GHG emissions. These two caps combined represent the "emissions caps only" scenario.

- Coverage of non-HFC GHG emissions is phased in over the first five years of the program.
    - The initial 2012 cap, set at 4,627 million tonnes of emissions, is estimated to cover approximately 67 percent of total 2005 U.S. emissions.
    - In 2014, the cap is expanded to include most industrial emissions, increasing coverage to an estimated 78 percent of 2005 U.S. emissions.

    - In 2016, the cap is again expanded to include emissions from natural gas sold by local distribution companies, increasing coverage to an estimated 85 percent of 2005 U.S. emissions.
    - The ACESA requires a one-time small adjustment to the size of the cap in the event that the bill's assumed estimates of coverage do not match EPA's final coverage estimates during implementation. WRI's estimates of coverage differ slightly compared to the assumptions contained in the bill and so this analysis incorporates the bill's prescribed cap adjustments.
- The HFC cap would go into effect in 2012, covering the production of specifically identified HFCs. These HFCs were responsible for approximately 2 percent of 2005 emissions.
- When combined with the HFC cap, the draft bill would cover up to 87 percent of 2005 U.S. emissions.

Growth of uncapped emissions: The remaining 13 percent of U.S. emissions not covered by the caps from 2016 onward are increased in line with EPA projections of business as usual for uncovered emissions under the proposal. These annual growth rates, while varying from year to year, average zero percent annually through 2050. Adjustments are made to these rates between 2012 and 2016 to account for varying degrees of emissions coverage as the cap is phased in.

Complementary requirements: In addition to the two caps outlined above, the draft includes a variety of policies that require additional reductions from uncapped sources both inside and outside of the United States. The combination of these provisions and the caps represent the "caps plus all complementary requirements" scenario and include:

- Supplemental greenhouse gas reduction program for international forestry: The ACESA requires the program administrator to use allowances from the cap to fund international forestry projects to achieve 720 million tonnes of additional emissions reductions in 2020 and a total of 6,000 million tonnes of reductions by 2025. To distribute these reductions among individual years, the analysis assumes an acceleration of the program between 2012 and 2020 to reach the required 720 million tonnes in 2020. After 2020, the analysis assumes a leveling off of reductions to achieve the required cumulative reduction between 2012 and 2025 of 6,000 million.
- New Source Performance Standards: The proposal phases in industrial performance standards between 2012 and 2019. EPA is instructed to cover 95 percent of total industrial emissions (including industrial process and F-gas emissions) with a combination of the cap and performance standards. WRI estimates that 84 percent of these emissions are covered under the cap, leaving 11 percent subject to standards. Since the structure of these standards is to be designed by the Administrator, it is unknown precisely how much mitigation the standards would achieve. This analysis assumes emissions subject to performance standards are reduced by 50 percent and then held constant from the effective year onward. Performance standards for other uncapped sources are assumed to achieve additional reductions of approximately 115 million tonnes CO_2e derived from estimates conducted by the EPA. These regulations are assumed to take effect in 2013. This estimate may be conservative as it does not take into account improvements in technology over time.
- The strategic reserve represents a fixed amount of reductions that will take place in addition to reductions made to meet the cap. If the strategic reserve trigger price is not reached, allowances in this reserve (2,726 million) will not be released – in effect tightening the cap. If the trigger price is reached, forest tonne offsets are used to refill the reserve. This analysis assumes that these purchases are designed to maintain a constant level of credits that are fungible with normal allowances (either allowances or forest tonnes discounted at the rate outlined in the legislation), effectively yielding emissions

reductions whether the reserve is tapped or not. This analysis distributes these reductions depending on the years in which the allowances are withdrawn from the cap to fill the reserve (the analysis does not credit the reductions until the allowance withdrawals force abatement among covered sectors). Additional reductions could occur through the forest tonne purchasing component of the reserve; these are not taken into account in this analysis.

- The majority of mandatory energy efficiency programs would further regulate capped emissions and thus not achieve additional reductions beyond the cap. However, some programs such as residential home efficiency standards would achieve reductions in natural gas consumption and resulting GHG emissions prior to the inclusion of residential natural gas usage in the cap in 2016. Due to a lack of data, these reductions were not quantified. Based on our analysis of the natural gas savings due to the EERS included in the Waxman-Markey Discussion Draft, it is likely that emissions reductions achieved by H.R. 2454 prior to 2016 would be negligible – roughly 10 million tonnes on average annually from 2012 through 2015.

Potential range of additional reductions: The lower bound of the range represents the "range of potential additional reductions" scenario and incorporates additional emissions reductions that may be achieved through the implementation of the proposal, but are not mandated. Such policies include:

- 1.25 offset requirement for international offsets: The ACESA requires 1.25 international offsets to be submitted for compliance for every tonne of regulated emissions beginning in 2018. This requirement would yield additional reductions contingent on the number offsets used. In addition, under certain circumstances the international offset limit may be increased from 1 billion tonnes to up to 1.5 billion tonnes. This extends the maximum potential emissions reductions of the 1.25 offset requirement if this limit is expanded. A range of additional emissions reductions in uncapped international emissions are included in this analysis to represent this provision. The range starts at zero and increases to 375 million tonnes per year.
- Supplemental greenhouse gas reduction program for international forestry: After 2025, the explicit reduction requirements as well as the authority to increase the amount of allocations dedicated to the program are dropped from the supplemental GHG reduction program. After this date, this analysis assumes that each tonne allocated has the potential to generate up to one tonne of forest reductions.
- Supplemental greenhouse gas reduction program for domestic agriculture and forestry: A small amount of allowances are dedicated to reductions in uncapped emissions and increases in carbon sequestration in domestic farms and forests as well as other activities. This analysis assumes that each tonne allocated to this program has the potential to generate up to one tonne of additional reductions.

S.2877, Carbon Limits and Energy for America's Renewal Act (CLEARA) (Introduced December 11, 2009 by Senators Cantwell and Collins)

Cap and coverage: The CLEARA proposes the creation of a cap on all emissions from the combustion of fossil fuels by regulating the carbon content of all fuel sold within the United States. This constitutes the "emissions caps only" scenario. The other two scenarios are not applicable because any additional reductions are contingent on additional action by Congress and are not achieved by this proposal alone, although there is a fund established which could be used to purchase or invest in additional reductions if instructed to do so by subsequent congressional appropriation.

- The proposal requires that a cap be put in place in 2012 set at expected emissions levels for that year as projected in 2011. This analysis sets that cap at an approximation of

projected 2012 levels of fossil fuel CO_2 from the business as usual scenario – specifically at 5,649 million tonnes of GHG emissions. The cap is estimated to cover approximately 81 percent of total 2005 U.S. emissions.

- If projected 2012 emissions are higher than the level calculated in this analysis, then total emissions reductions would be lower than reported here. If projected 2012 emissions are lower than the level calculated in this analysis, then total emissions reductions would be higher than reported here.
- From 2012 through 2014 the cap is held constant.
- In 2015 the cap is reduced by 0.25 percent from the previous year's levels, with subsequent caps set at the previous year's reduction rate plus an additional 0.25 percent. For example, the 2016 cap is set at 0.5 percent below the 2015 cap; the 2017 cap is set at 0.75 percent below the 2016 cap and so on.
- This formula yields reductions of 5 percent and 82 percent relative to the initial 2012 level by 2020 and 2050 respectively.
- The CLEARA includes a safety-valve mechanism that would allow capped emissions to increase above the cap established under the proposal at a set price point. Figures 1 and 2 in this analysis focus on quantity constraints on GHGs, not price constraints, thus the implications of the safety-valve mechanism is outside the scope of these estimates. If allowance prices rise above the safety-valve level, estimates of emissions could be greater and estimates of emissions reductions could be less than those presented in this analysis, depending upon the following factors:
    - the extent to which additional safety-valve allowances are issued (i.e., the amount of emissions allowed above the established cap);
    - the extent to which future Congresses appropriate funds from revenue generated by safety valve allowance sales for the purpose of emissions reductions outside the cap; and
    - the effectiveness and quality of emissions reduction projects funded by these appropriations.
- The bill provides two mechanisms to adjust the cap in future years. It is important to note that any tightening of the cap may increase the likelihood that the safety valve price is exceeded thus additional GHG reductions from such an action are not guaranteed. These mechanisms include:
    - The president may adjust the cap up or down to meet the reduction standards stated in the legislation or for other specified purposes. However, any adjustment must be approved by Congress and so this mechanism is not considered in this analysis.
    - The cap may be tightened proportionally to the amount of verified fossil carbon emissions reductions purchased voluntarily in any given year. This mechanism is not considered in this analysis for the following reasons:
        - The amount of voluntary purchases is impossible to know in advance
        - There are no requirements that these purchases represent real, additional, permanent emissions reductions
        - This mechanism may increase the likelihood that the safety valve price will be exceeded, potentially negating any additional reduction gains.

Growth of uncapped emissions: The remaining 19 percent of 2005 U.S. emissions not covered by the cap from 2012 onward increases in line with an approximation of business as usual projections for uncapped emissions under the proposal. The annual growth rate, while varying from year to year, averages 0.16 percent annually through 2050.

Complementary requirements: The CLEARA requires the president to set economy-wide emissions reduction standards of 20 percent below 2005 levels by 2020 downward to 83 percent

below 2005 levels by 2050. The proposal directs the president to meet these goals with a combination of the emissions cap and additional spending on emissions reductions outside the cap. These reductions are intended to be funded through a Clean Energy Reinvestment Trust Fund consisting of 25 percent of the allowance value under the program plus additional revenue from fees collected through the safety valve mechanism and border tax adjustments. The CLEARA provides direction to the president on how amounts from the fund should be spent, and includes two options that could achieve additional reductions outside the cap. However, any spending of amounts from this fund requires additional action by Congress through subsequent appropriations and not by the act itself or by any actions the president could take under any authority granted under this proposal independent of Congress. With this in mind, this analysis does not estimate any additional reductions since they could not be realized by this proposal alone.

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