CONGRESSIONAL BUDGET OFFICE
COST ESTIMATE

December 16, 2009

S. 1733
Clean Energy Jobs and American Power Act

As ordered reported by the Senate Committee on Environment and Public Works on November 5, 2009

SUMMARY

S. 1733 would make a number of changes in energy and environmental policies largely aimed at reducing emissions of gases that contribute to global warming. The bill would limit or cap the quantity of certain greenhouse gases (GHGs) emitted from facilities that generate electricity and from other industrial activities beginning in 2012. The Environmental Protection Agency (EPA) would establish two separate regulatory initiatives known as cap-and-trade programs—one covering emissions of most types of GHGs and one covering hydrofluorocarbons (HFCs). EPA would issue allowances to emit those gases under the cap-and-trade programs. Some of those allowances would be auctioned by the federal government, and the remainder would be distributed at no charge.

The legislation also would authorize the establishment of a Carbon Storage Research Corporation to support research and development of carbon capture and sequestration (CCS) technology. Funding for the corporation would largely be derived from assessments on utilities enforced by the federal government.

CBO and the Joint Committee on Taxation (JCT) estimate that over the 2010-2019 period enacting this legislation would:

- Increase federal revenues by about $854 billion; and
- Increase direct spending by about $833 billion.

In total, those changes would reduce budget deficits (or increase future surpluses) by about $21 billion over the 2010-2019 period. (All estimated effects would be on-budget.) In years after 2019, direct spending would be less than the net revenues attributable to the legislation in each of the 10-year periods following 2019. Therefore, CBO estimates that enacting S. 1733 would not increase the deficit in any of the four 10-year periods following 2019.

The legislation also would authorize appropriations for various programs under EPA, the Department of Energy (DOE), and other agencies. Assuming appropriation of the necessary amounts, CBO estimates that implementing S. 1733 would increase discretionary spending by about $29 billion over the 2010-2019 period. Most of that funding would stem from spending auction proceeds associated with the HFC cap-and-trade program.

S. 1733 contains intergovernmental and private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA). Several of those mandates would require utilities, manufacturers, and other entities to reduce greenhouse gas emissions through cap-and-trade programs and performance standards. CBO estimates that the cost of mandates in the bill would significantly exceed the annual thresholds established in UMRA for intergovernmental and private-sector mandates ($69 million and $139 million in 2009, respectively, adjusted annually for inflation).

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Common Abbreviations Used in the Cost Estimate

CCS = Carbon capture and sequestration
CO_2 = Carbon dioxide
CFC = Chlorofluorocarbon
$mtCO_2e$ = Metric ton of carbon dioxide equivalent
GHG = Greenhouse gas
HFC = Hydrofluorocarbon
MWh = Megawatt hour

MAJOR PROVISIONS

The major provisions of S. 1733 are described in the following sections.

Cap-and-Trade Programs for Greenhouse Gases

This legislation would designate as GHGs: carbon dioxide (CO_2), methane, nitrous oxide, sulfur hexafluoride, perfluorocarbons, nitrogen trifluoride, and HFCs from a chemical manufacturing process at a stationary industrial source. EPA would be required to establish two cap-and-trade programs aimed at reducing the emission of GHGs in the United States. One program would cover emissions of GHGs other than HFCs. A second program would cover the production and importation of HFCs and the importation of products containing HFCs. (Although HFCs are considered to be greenhouse gases, this cost estimate will subsequently refer to the larger program as the GHG cap-and-trade program and the smaller program specific to HFCs as the HFC cap-and-trade program.)

A cap-and-trade program is a regulatory policy aimed at controlling pollution emissions from specific sources. The legislation would set a limit on total emissions for each year and would require regulated entities to hold rights, or allowances, to the emissions permitted under that cap. Each allowance would entitle companies to emit the equivalent of one metric ton of carbon dioxide equivalent ($mtCO_2e$).[1]

Entities Covered By Cap-and-Trade Programs

Based on information from EPA, CBO estimates that about 7,400 facilities would be affected by the cap-and-trade programs established by the bill. The specific details regarding coverage, attribution of emissions to covered entities, and the timing of implementation vary by type of entity and sector of the economy:

- Beginning in 2012, all electricity generators would be required to submit allowances for all GHG emissions from their sites, with the exception of emissions from the combustion of liquid fuels, petroleum coke, and renewable biomass;

- Also beginning in 2012, any facility or entity that produces or imports petroleum- or coal-based liquids, petroleum coke, or natural gas liquids would be required to submit allowances for the GHG emissions that would result from the combustion of those fuels, if combustion of the fuel resulted in the emission of more than 25,000 $mtCO_2e$ per year. Similarly, all facilities or entities that produce or import GHGs for direct use would be required to submit allowances for the emissions that

1. A carbon dioxide equivalent is defined for each GHG as the quantity of that gas that makes the same contribution to global warming as one metric ton of carbon dioxide, as determined by EPA.

would result when those gases were released into the atmosphere. Emissions from sites that geologically sequester CO_2 also would be covered beginning in 2012;

- Beginning in 2014, industrial facilities that manufacture a wide variety of products or that burn fossil fuels would be required to submit allowances for all GHG emissions from their sites—with the exception of emissions from the combustion of various types of liquid fuels, petroleum coke, and renewable biomass—if their activities result in more than 25,000 $mtCO_2e$ of emissions. Small refineries eligible for the tax credit on low-sulphur diesel-fuel production would need to submit allowances for GHG emissions from their sites beginning in 2015;

- Beginning in 2016, natural gas distributors that deliver at least 460 million cubic feet of natural gas per year to customers that are not covered by the cap-and-trade provisions of the bill would need to submit allowances for the GHG emissions that would result from the combustion of the gas delivered to those customers; and

- Under a separate cap, beginning in 2012, producers and importers of HFCs, and importers of products containing HFCs, would be required to submit allowances for each $mtCO_2e$ of HFC they produce or import.

According to CBO's estimates, the programs would cover about 72 percent of U.S. emissions of GHGs in 2012, about 78 percent in 2015, and about 86 percent in 2020.

Operation of the GHG Cap-and-Trade Program

The cap for the GHG cap-and-trade program would take effect in 2012, and emission allowances would be either auctioned or distributed free of charge to covered entities, states, and other specified recipients, who could then retire, sell, or use such allowances to meet the annual obligation for their own emissions.

S. 1733 would not restrict the types of entities or individuals who could purchase, hold, exchange, or retire emission allowances under the GHG cap-and-trade program. An unlimited number of allowances obtained in one year could be saved or "banked" by market participants indefinitely to be used or sold in future years. Limited borrowing of allowances (that is, the use in one year of an allowance that has been established for use in a future year) also would be permitted. The program would create 4,627 million $mtCO_2e$ allowances in 2012—about 97 percent of the amount of such emissions by covered entities in 2005. The number of allowances would increase to as high as 5,482 million $mtCO_2e$ in 2016 to account for certain covered entities that would not begin compliance until that time, and then decline by about 100 million to 200 million $mtCO_2e$ per year—falling to 1,035 million $mtCO_2e$ in 2050 and thereafter, about 14 percent of

projected emissions from covered entities in the absence of legislation to regulate such emissions.[2]

Two-Part Distribution Scheme for Allowances. The legislation specifies the percentage of emission allowances that would be freely allocated (that is, distributed at no charge) to certain entities and what percentage of emission allowances would be auctioned by vintage year (that is, the calendar year for which an allowance is established). The distribution scheme for each year has two separate parts: the first part, referred to in the bill as the "initial reservation," would allocate a specified portion of the allowances created by the GHG cap-and-trade program. A second distribution would be made following this initial reservation (see Table 1). Some of the allowances allocated as part of the initial reservation would be auctioned while others would be distributed at no charge for a variety of purposes, such as support for trade-exposed industries, investments in energy efficiency and renewable energy, and reducing GHGs in the transportation sector. Some of the proceeds from the allowances that would be auctioned would be deposited in the Treasury and would not be available for spending—thus, reducing the budget deficit.

The initial reservation of allowances includes about 3.5 billion allowances that would accumulate in a market stability fund over the 2012-2050 period. Under the bill, EPA could auction allowances in the market stability fund if the market price of allowances rose to unexpectedly high levels. CBO's estimate assumes that sales from the market stability fund would not be triggered. However, because of the uncertainty inherent in this process, such sales could occur.

After the first distributions were completed each year, the remaining allowances would be auctioned or freely allocated, as specified in the legislation, in a second round of allocations. Including auctions stemming from the initial reservation, 27 percent to 30 percent of allowances would be auctioned over the 2012-2019 period (see Table 1). The percentage of all allowances auctioned would increase to about 28 percent by 2025 and gradually increase to about 80 percent in 2035 and remain at that level through 2050. Table 1 includes additional details concerning the percentage of emission allowances dedicated to auction and allocated free of charge.

Use of Offsets in Lieu of Allowances. A portion of an entity's compliance obligation under the bill could be met by purchasing domestic or international "offsets" in lieu of purchasing an allowance. An offset would be created by certified activities that are not directly related to the emissions of the facilities covered under the bill, but would reduce GHG emissions or increase the amount of such gases that are captured from the atmosphere and stored (this process is referred to as sequestration). Examples of such

[2] In April 2009, EPA proposed a finding that GHGs contribute to air pollution and, consequently, may endanger public health or welfare. CBO's current baseline for GHG emissions does not take into consideration any regulations under the Clean Air Act that may result from this finding.

offset activities include reducing emissions of methane gas from solid waste landfills, sequestering GHGs on agricultural lands, rangelands, and forests, and reducing the use of nitrogen fertilizer. Under the bill, such offsets could occur domestically or in a developing country if the United States is a party to a bilateral or multilateral agreement or arrangement with the relevant country. Those international agreements or arrangements would specify the types of qualifying projects and methods for verifying the validity of offset activities. Covered entities could also purchase GHG emission allowances established by other countries or international organizations if approved by EPA.

TABLE 1. GHG ALLOWANCES AUCTIONED AND FREELY ALLOCATED UNDER S. 1733

	By Vintage Year							
	2012	2013	2014	2015	2016	2017	2018	2019
Quantity of Emission Allowances (In Millions of Metric Tons)								
Total	4,627	4,544	5,053	5,003	5,482	5,261	5,132	5,002
Initial Reservation of Allowances								
Auctioned	555	545	606	600	658	631	616	600
Freely Allocated	81	80	88	88	96	92	90	88
Market Stability Fund	93	91	101	100	110	105	103	100
Subtotal	729	716	796	788	863	829	808	788
Second Distribution of Remaining Allowances								
Auctioned	853	838	792	784	841	795	754	735
Freely Allocated	3,045	2,990	3,465	3,431	3,778	3,637	3,570	3,479
Memorandum—Disposition of Allowances Under S. 1733								
(In percentage of total emission allowances)								
Auctioned	30.4	30.4	27.7	27.7	27.3	27.1	26.7	26.7
Freely Allocated	67.6	67.6	70.3	70.3	70.7	70.9	71.3	71.3
Market Stability Fund	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Note: Vintage year is the calendar year for which an allowance is established. Components may not sum to totals because of rounding.

Operation of the HFC Cap-and-Trade Program

Beginning in 2012, producers and importers of HFCs as well as importers of products containing HFCs would be required to submit to EPA a consumption allowance or a destruction offset credit for $mtCO_2e$ of HFC. EPA would be authorized to issue destruction offset credits to producers and importers of HFCs if those entities perform or

arrange for the recovery and destruction of chlorofluorocarbons (CFCs) from products or equipment already in use in the United States. The allowances available would steadily decline from 90 percent of the baseline use of HFCs (defined in the legislation as the average annual consumption of HFCs plus the average annual quantity of HFCs contained in imported products over the 2004-2006 period) to 15 percent of that baseline after 2032. Destruction offset credits could be used by producers and importers to satisfy a portion of the requirement to submit consumption allowances.

The bill would allow entities to bank an unlimited number of HFC allowances for future use. In contrast to the GHG cap-and-trade program, only those entities that produce and import HFCs or import products containing HFCs would be permitted to purchase an allowance directly from EPA, although EPA would have the authority to make certain exceptions. (The legislation, however, would not restrict which entities could hold, sell, transfer, exchange, or retire consumption allowances in any secondary market for HFC allowances.)

All of the consumption allowances established for the HFC cap-and-trade program would be either auctioned or offered through a fixed-price sale to producers and importers of HFCs and products containing HFCs. The legislation specifies how the HFC allowance price would be calculated for certain auctions and for all fixed-price sales.

Carbon Storage Research Corporation

The legislation would authorize utilities that distribute electricity generated from fossil fuels to establish, subject to approval in a referendum by members of the electricity distribution industry, a Carbon Storage Research Corporation. The corporation would levy annual assessments on distribution utilities based on certain electricity deliveries to retail consumers. Assessments would total between $1.0 billion and $1.1 billion annually and would be used to support research and development of technologies related to CCS. Although formation of the corporation would be voluntary, once it was created, assessments would be compulsory, enforced by the federal government's sovereign authority. Therefore, CBO believes the corporation should be considered governmental in nature and the funds it collects and spends should be included in the federal budget.

ESTIMATED COST TO THE FEDERAL GOVERNMENT

The estimated budgetary impact of S. 1733 is shown in Table 2. The costs of this legislation fall within budget functions 270 (energy), 300 (natural resources and environment), 350 (agriculture), 370 (commerce and housing credit), 400 (transportation), 500 (education, training, employment, and social services), 550 (health), and 600 (income security). For this estimate, CBO assumes that S. 1733 will be enacted in fiscal year 2010, that the amounts necessary to implement the bill will be appropriated each year, and that outlays will follow historical spending patterns for similar programs.

TABLE 2. ESTIMATED BUDGETARY IMPACT OF S. 1733

	By Fiscal Year, in Billions of Dollars											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010-2014	2010-2019
CHANGES IN REVENUES												
Total Estimated Revenues	0	10.0	70.2	78.6	95.0	105.3	111.6	122.0	128.2	133.3	253.9	854.2
CHANGES IN DIRECT SPENDING												
Estimated Budget Authority	0	9.0	72.3	80.4	96.2	106.3	112.6	123.6	129.6	135.4	257.9	865.4
Estimated Outlays	0	0.6	61.1	76.7	93.9	104.0	110.7	122.8	128.6	134.4	232.4	832.8
NET CHANGE IN THE BUDGET DEFICIT FROM CHANGES IN REVENUES AND DIRECT SPENDING												
Impact on Deficit[a]	0	9.3	9.1	1.9	1.1	1.3	0.9	-0.8	-0.4	-1.1	21.4	21.4
CHANGES IN SPENDING SUBJECT TO APPROPRIATION												
Estimated Authorization Level	1.1	1.1	1.9	2.2	2.5	4.1	4.5	4.8	6.2	6.3	8.9	34.8
Estimated Outlays	0.1	0.6	1.3	1.8	2.3	3.1	4.0	4.5	5.2	6.0	6.1	28.9

Note: Components may not sum to totals because of rounding.

a. Positive numbers indicate decreases in deficits; negative numbers indicate increases in deficits.

BASIS OF ESTIMATE

CBO estimates that implementing this legislation would result in additional revenues, net of income and payroll tax offsets, of $254 billion over the 2010-2014 period and $854 billion over the 2010-2019 period. We estimate that direct spending would increase by $232 billion and $833 billion over the same periods, respectively. Those changes in revenues and direct spending would mainly stem from the process of auctioning and freely distributing allowances under the cap-and-trade programs established under this legislation. In addition, CBO estimates that implementing this legislation would increase discretionary federal spending by $29 billion over the 2010-2019 period, assuming appropriation of the amounts estimated to be necessary.

Budgetary Treatment of Allowances

Efforts to control GHG emissions in this legislation would be enforced through the federal government's sovereign powers and would alter the use of scarce economic resources. While similar in some ways to command-and-control approaches for regulating economic activities, the cap-and-trade system that would be established by the

bill for GHG and HFC emissions is fundamentally different because it would create cash-like assets (allowances) whose supply and distribution would be determined by the federal government. As such, CBO believes it is appropriate to include all transactions involving GHG and HFC allowances (including those distributed at no cost) in the budget.

Under S. 1733, both firms and individuals would be eligible to trade GHG and HFC allowances acquired from the federal government in a secondary market that would exceed $80 billion in value in 2012, CBO estimates. Within such a large and liquid market, allowances could be easily and immediately traded for cash. In addition, the legislation would allow the federal government to determine the supply of allowances by defining the scope of covered emissions and limiting the number of allowances to be issued. Under those circumstances, the free distribution of allowances by the federal government would be essentially equivalent to the distribution of cash grants, so CBO believes that such transactions should be treated as additional outlays. At the same time, those allowances would be valuable financial instruments, so CBO thinks that the creation of allowances by the federal government should be recorded as an increase in revenues.

That logic does not hinge on whether the federal government sells or, instead, gives away the allowances. Allowances would have significant value even if given away because the recipients could sell them or, in the case of a covered entity, use them to avoid incurring the cost of compliance. In either case, the recipient receives an asset of equivalent value with no estimated change in the policy effect (i.e., total GHG emissions). For example, either the government could raise $100 by selling allowances and then give that amount in cash to an entity, or it could simply give $100 worth of allowances to that same entity, which could immediately and easily transform the allowances into cash through the secondary market. Sound budgeting requires that the budget treat equivalent transactions in the same way, in CBO's view. Therefore, this estimate treats the creation of allowances and their disposition as budgetary transactions, regardless of whether the allowances would be sold or distributed at no cost.

Revenues Resulting From Cap-and-Trade Programs

The impact of S. 1733 on net federal revenues would largely be determined by the value of allowances created by the bill less the resulting reductions in receipts from income and payroll taxes. Penalties for noncompliance and fees collected to administer the legislation would add a small amount to total revenues, and tax credits available for renewable energy production would reduce federal revenues. The following sections discuss how CBO estimated the allowance prices for GHG and HFC cap-and-trade programs and detail other revenue impacts of the bill.

Estimating the Prices for Emission Allowances. CBO estimates that the price of GHG allowances would rise from about $17 per $mtCO_2e$ of emissions in 2011 to about $30 per $mtCO_2e$ in 2019. Table 3 provides CBO's estimate of annual allowance prices for the separate GHG and HFC cap-and-trade programs that would be created by the bill.

TABLE 3. CBO ESTIMATES OF ALLOWANCE PRICES UNDER S. 1733

	By Fiscal Year, In Dollars								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
Estimated GHG Allowance Price	17	18	20	21	23	25	26	28	30
Estimated HFC Allowance Price [a]	n.a.	2	3	4	10	11	13	18	19

Note: n.a. = not applicable.

a. Prices equal the weighted average of the estimated auction prices and fixed-price sales required under the legislation.

To estimate the marginal cost of reducing GHG emissions—which ultimately would determine the price of allowances—CBO took several steps:

- First, CBO constructed a base case that includes projections of future GHG emissions in the absence of any federal policies to control them, as well as projections of future prices of fossil fuels, electricity, and other products and services closely associated with such emissions;

- Next, we developed estimates of how firms and households would respond to increases in prices for fossil fuels and other sources of GHG emissions;

- Finally, CBO assessed the impact of provisions of the legislation that would influence the market price of allowances. Such other provisions include regulations that would influence GHG emissions and electricity consumption, subsidies for various GHG emission-reducing activities, opportunities for firms to bank allowances in one year and use them in another, and the availability of domestic or international offsets.[3]

3. For a more detailed discussion of the methods CBO used to estimate the price for carbon allowances for similar legislation, see *How CBO Estimates the Costs of Reducing Greenhouse-Gas Emissions*, CBO Background Paper (April 2009).

Base Case Emission Projections. For its base case of GHG emissions, CBO relied primarily on projections of energy use, fossil fuel prices, and GHG emissions from the April 2009 update of the *Annual Energy Outlook 2009* (AEO 2009) published by the Energy Information Administration (EIA). EIA's inventory of emissions is based on a slightly different methodology than used by EPA, whose inventory is considered the official U.S. estimate for purposes of international negotiations and agreements.[4] CBO adjusted the EIA data to align with EPA estimates for the most recent year where actual data is published, while retaining EIA's projected growth rates. CBO assumes that GHG emissions per dollar of the nation's gross domestic product (GDP) will grow (or decline) at the same rate beyond 2030 as they are projected to grow in the preceding decade.[5]

Response by Firms and Households. A key factor in determining the price of an allowance is how quickly and cheaply firms and households can decrease CO_2 emissions by reducing their use of fossil fuels (either directly or indirectly via the goods and services that they consume). The easier it is for firms and households to cut their emissions, the lower the allowance price would need to be to reach a given cap. Available economic models differ considerably in their estimates of how much emissions would decrease for a given allowance price (and its implied effect on fossil fuel prices) because they make different assumptions about the long-run ability of businesses to substitute low-carbon fuels and more efficient technology for high-carbon fuels; the long-run sensitivity of energy usage to higher energy prices; and the speed at which those responses unfold. CBO generated a "middle of the road" response to allowance prices by examining available peer-reviewed models and calculating an average response, measured across multiple models and across different types of end users (such as households, electric utilities, and manufacturers).[6]

Using those models, CBO concludes that the response to price increases (that is the decrease in emissions that would result from any given allowance price) would rise substantially over time as firms and households replace existing vehicles, equipment, structures, and electricity-generating capacity with newer items that use less energy or emit smaller quantities of carbon emissions.[7] CBO's approach provides an estimate of the

4. See U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007* (EPA 430-R-09-004, April 2009). CBO also used information provided by EPA to project the consumption of HFCs.

5. EIA reports projections of GHG emissions in the AEO 2009 only through 2030.

6. The models analyzed include the EIA's National Energy Modeling System (NEMS), the Emissions Prediction and Policy Analysis (EPPA) model used by climate researchers at the Massachusetts Institute of Technology, the Applied Dynamic Analysis of the Global Economy (ADAGE) model developed at RTI International and used by EPA, the Second Generation Model (SGM) and MiniCAM models developed and used by the Joint Global Change Research Institute, the Model for Evaluating the Regional and Global Effects of GHG Reduction Policies (MERGE) developed by Stanford University and the Electric Power Research Institute, and the Multi-region National-North American Electricity and Environment (MRN-NEEM) model developed and used by CRA International.

7. For a more detailed discussion of the techniques CBO used to develop this assessment, see Mark Lasky, *The Economic Costs of Reducing Emissions of Greenhouse Gases: A Survey of Economic Models*, CBO Technical Paper (May 2003). See also *How CBO Estimates the Costs of Reducing Greenhouse-Gas Emissions*, CBO Background Paper (April 2009).

quantity of emission reductions that would occur at various allowance prices but does not specify how they would occur. That is, it does not provide detail about the timing or magnitude of the adoption of specific technologies, such as nuclear power or CCS, or the quantity of reductions in specific parts of the economy, such as the transportation sector.

Response to Opportunities for Banking of Emission Allowances. If entities covered by the legislation were required to use emission allowances only in the designated vintage year, the price of allowances would rise at a rate that reflected the increasing stringency of the cap as emissions. Such a requirement would yield an inflation-adjusted allowance price growing at a rate much greater than the rate of return that CBO estimates firms could obtain on alternative investments.

Under S. 1733, firms would be allowed to bank unlimited numbers of allowances. CBO expects that the profit-maximizing behavior of firms would cause the price of an allowance to increase at the same rate as the return that firms might receive on alternative investments. Specifically, firms would have an incentive to exceed their emission reduction requirements in the initial years of the program (when the cost of meeting the annual caps would be relatively low) and to bank their excess allowances to use in future years (when the cost of meeting the cap would be much higher). Because banking would increase the demand for allowances in the early years (pushing up the allowance price) and increase the supply of allowances in later years (pushing down the allowance price), it would reduce the rate of increase in the price of allowances.

CBO therefore expects that firms would continue to bank allowances up to the point where the rate of increase in the price of allowances equaled the rate of return that they might receive by making alternative investments. CBO believes that the appropriate rate of return that reflects investments of comparable riskiness is the after-tax, long-run, inflation-adjusted rate of return to capital in the U.S. nonfinancial corporate sector, which CBO projects to be 5.6 percent.

In the early years of the cap-and-trade program, the banking provision included in the bill would have a significant impact on the amount of emissions reductions, and thus on the allowance price. CBO estimates that by 2019, covered entities would undertake significantly more mitigation than necessary to meet their annual emission caps, banking about 2.5 billion $mtCO_2e$ of allowances and raising the allowance price in 2019 by about 5 percent, compared with a policy that prohibited banking.

Response to Offset Credits. S. 1733 would allow entities covered by the legislation to meet their GHG reduction obligations by substituting offset credits in lieu of up to two billion GHG allowances each year. CBO expects that covered entities would take advantage of this provision whenever the cost of doing so is less than other methods of compliance. CBO estimates that this provision would have a significant effect on

allowance prices. As discussed below, by reducing the cost of complying with the cap, offsets would probably lower the price of allowances by a substantial amount.[8]

Under the bill, domestic offset credits could be used in lieu of up to 1.5 billion allowances per year. Based on EPA data on the available supply of domestic offsets at different prices, CBO estimates that covered entities would use domestic offsets to substitute for about 300 million allowances in 2012 and nearly 400 million allowances by 2020.

Covered entities could also use international offsets in lieu of at least 500 million allowances per year. If domestic offsets were not used to the maximum level, international offsets could substitute for up to 1.25 billion allowances a year. In no case could domestic and international offsets substitute for more than two billion allowances per year. CBO estimates that covered entities would use international offsets in lieu of about 200 million allowances in 2012 and in lieu of about 300 million allowances in 2020.

To calculate the supply of offsets from international sources, CBO adjusted information from EPA on the supply of international offsets at different prices to account for certain provisions in the legislation, expected demand for offsets from other countries, and an estimate of the cost of verifying offsets and marketing them to potential users. Based on information from the Department of State, EPA, and outside experts, CBO expects that agreements with certain countries that would be necessary for them to supply valid offsets would take significant time to negotiate. CBO expects that the number of agreements and the scope of their coverage would increase as participants gained more experience with the program. CBO also anticipates that other developed countries (for example, those in the European Union) would seek offsets for their own emissions reduction programs, thereby pushing up the price of international offsets available to U.S. entities.

Response to Emissions Allowances from Other Programs. S. 1733 also would allow covered entities to submit an unlimited number of emissions allowances obtained from international programs of "comparable stringency" in lieu of GHG allowances issued by EPA. For this estimate, CBO assumed that a program of "comparable stringency" would essentially be equivalent to a cap-and-trade market where allowances sell for a comparable price. Therefore, we expect that this provision would have no effect on the prices of allowances for GHG emissions in the United States.

Sensitivity of Estimated Allowance Prices and Budget Impact to Changes in Assumptions. In cap-and-trade systems such as the one established by this legislation, the most important assumptions affecting the allowance price involve: the responsiveness of

[8] For additional discussion of offset use in a cap-and-trade program for reducing GHG emissions see CBO (2009) *The Use of Offsets to Reduce Greenhouse Gases.* Economic and Budget Issue Brief (August 3).

households and firms to changes in the prices associated with emissions; the discount rate that allowance holders apply to decisions about whether to bank allowances; and the availability of qualified offset credits from domestic and international sources. Differences in those assumptions can dramatically affect the estimated allowance price and the subsequent impact on the budget.

For example, if the response of households and firms to allowance prices were 10 percent stronger (or weaker), on average, allowance prices would be roughly 9 percent lower or 9 percent higher. If firms are more focused on present costs (by employing a higher discount rate than CBO estimated), they would be more likely to put off expenses associated with reducing emissions and bank fewer allowances. Use of a 6 percent discount rate would decrease CBO's estimate of prices on 2012 by 8 percent and increase projected prices in 2050 by 7 percent. Conversely, firms could be more concerned about the future (by employing a lower discount rate that CBO estimated) and choose to reduce more emissions in the short term, resulting in fewer necessary reductions in the future. Use of a 5 percent rate would increase CBO's estimate of initial-year prices by about 10 percent and decrease projected prices in 2050 by about 10 percent. Finally, allowance prices would be nearly three times higher if no offsets were made available to regulated entities. If either domestic or international offsets (but not both) were not available, allowance prices would be about 40 percent higher.

Depending on the actual price of allowances, the budget impact of this legislation also would vary. For example, if the price of allowances were $1 higher beginning in 2012, the effect on the budget would be an additional surplus of $1.2 billion over the 2012-2019 period. If instead, allowance prices were $1 lower beginning in 2012, the net gain over that same period would decrease by $1.1 billion.

Estimating the Price of Consumption Allowances for HFCs. CBO estimates that the average price of consumption allowances for HFCs would be in the vicinity of $2 beginning in 2012 and would rise to approximately $19 by 2019. The cap would reduce HFC emissions by about 50 percent by 2020 from about 500 million $mtCO_2e$ to about 250 million $mtCO_2e$.

For this estimate, CBO constructed a base-case projection of HFC consumption through 2025 similar to a base case produced by EPA. After consulting with industry sources, CBO concluded that the growth in HFC consumption after 2025 would be equal to the rate of population growth in the United States, an assumption similar to that made by the International Panel on Climate Change. Using engineering cost data for HFC alternatives provided by EPA, CBO estimated the supply of HFC reductions as a function of price and year. From this data, CBO concluded that the ability to replace HFCs with lower-cost chemical alternatives would increase over time.

As prices for HFC allowances increase, firms would find it more profitable to recycle those chemicals and develop alternatives to these products. To the extent those changes occur, the price of HFC allowances would be different than would otherwise occur.

Net Revenue Calculation. CBO estimates that gross receipts to the federal government from the auction and free allocation of allowances under the bill would total $291 billion over the 2010-2014 period and $984 billion over the 2010-2019 period. This estimate is based on the projected prices of allowances for both the GHG and HFC cap-and-trade programs.

However, the cost of purchasing allowances, whether from the government or from other entities that would receive allowances under the bill, would become an additional business expense for companies that would have to comply with that cap on emissions. Those additional expenses would result in a decrease in taxable income, resulting in a loss of government revenue from income and payroll taxes referred to as a "revenue offset." The amount of this revenue offset would be equal to 25 percent—an approximate marginal tax rate on overall economic activity—of the gross receipts from the auction and free allocation of allowances.[9]

Depending on the manner in which the proceeds or allowances are used by the government or conveyed to private entities, this reduction in taxable income (the revenue offset) might be accompanied by a matching increase in taxable income elsewhere in the economy. In such cases, CBO views the distribution of allowances or allowance proceeds as offsetting the revenue offset—that is, compensating for the initial loss of tax revenues associated with the acquisition of the allowances. In those cases, the distribution and use of the allowances or the auction proceeds would be budget neutral. For this estimate, CBO applied this offsetting offset to some of the revenues arising from the distribution of allowances, depending on who would receive those allowances (or auction proceeds) and what they would be used for.

In general, allowances provided under section 111 of division B to businesses (merchant coal generators, generators with long-term power purchase agreements, petroleum refiners), and some of the allowances provided to natural gas distributors would fit in the category of transactions that would be budget neutral because they would generate taxable income. In contrast, allowances provided to nonbusiness entities—such as states to support specific activities, or to other countries to support efforts to reduce greenhouse gases—would not be budget neutral because they would not generate taxable income.

CBO estimates that the auction of GHG and HFC allowances would generate revenues, net of income and payroll tax offsets, of about $76 billion over the 2010-2014 period and

9. Two previous letters on this subject can be found on CBO's Web site at: http://www.cbo.gov/ftpdocs/102xx/doc10236/BartonCapnTradeLtr.pdf and http://www.cbo.gov/ftpdocs/102xx/doc10232/5-15-WaxmanLetter.pdf

about $235 billion over the next 10 years. We also estimate that the distribution of GHG allowances at no cost would generate revenues, net of income and payroll tax offsets, of about $175 billion over the 2012-2014 period and about $625 billion over the 2012-2019 period (see memorandum to Table 4).

Other Revenues

Increased Use of Accelerated Tax Depreciation and Business Tax Credits. By encouraging electricity production using renewable resources, enacting S. 1733 would result in an increase in the use of certain federal tax incentives. Those incentives include both accelerated depreciation of certain assets and tax credits available to firms that invest in specific forms of renewable energy. When calculating taxable profits, businesses depreciate (that is, deduct over time) the cost of acquiring fixed investment property—namely, plant and equipment. For tax purposes, businesses are generally allowed a greater degree of accelerated depreciation—earlier deductions than would occur if they measured the actual wearing out of the property—for certain types of fixed investments used to produce electricity from renewable resources, such as wind and solar equipment, than they are allowed for investments to produce electricity from fossil fuels. By bringing about faster growth in the amount of electricity produced from renewable resources, S. 1733 would result in increased business tax deductions and reduced tax receipts.

In addition, S. 1733 would result in firms claiming a greater amount of business tax credits for the renewable electricity production credit (section 45 of the Internal Revenue Code) and the energy credit that applies primarily to investments in solar and geothermal energy production (section 48 of the Internal Revenue Code). JCT estimates that the increased use of accelerated depreciation and business tax credits would reduce revenues by about $14 billion over the 2010-2019 period.

Carbon Storage Research Corporation. Section 125 would authorize utilities that distribute fossil fuels to establish, by a referendum involving members of the electricity distribution industry, a Carbon Storage Research Corporation. The corporation would levy annual assessments on distribution utilities based on the volume of certain electricity deliveries to retail consumers. While formation of the corporation would be voluntary, once it was created, assessments would be compulsory, enforced by the federal government's sovereign authority. As such, CBO believes the corporation should be considered governmental in nature, amounts collected from the assessments should be recorded in the budget as revenues, and subsequent expenditures should be considered direct spending.

TABLE 4. ESTIMATED CHANGES IN REVENUES AND DIRECT SPENDING UNDER S. 1733

	By Fiscal Year, in Billions of Dollars											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010-2014	2010-2019
CHANGES IN REVENUES												
Net Revenues Resulting from Cap-and-Trade Programs [a]	0	9.1	69.3	78.0	94.7	105.4	112.4	123.5	130.6	136.5	251.1	859.5
Increased Use of Accelerated Tax Depreciation and Business Tax Credits	0	0	-0.1	-0.3	-0.7	-1.2	-1.8	-2.5	-3.4	-4.2	-1.1	-14.1
Carbon Storage Research Corporation	0	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.8	8.6
Penalties and Other Revenue Changes	0	0	*	*	*	*	*	*	*	*	0.1	0.2
Total Changes in Revenues	0	10.0	70.2	78.6	95.0	105.3	111.6	122.0	128.2	133.3	253.9	854.2
CHANGES IN DIRECT SPENDING												
Spending of Auction Proceeds [b]												
Estimated Budget Authority	0	7.9	17.5	18.4	19.4	21.5	23.3	23.8	24.7	25.7	63.3	182.2
Estimated Outlays	0	0.3	6.7	14.8	17.2	19.2	21.3	23.0	23.7	24.6	39.1	150.9
Outlays Associated with Emission Allowances Freely Allocated												
Estimated Budget Authority	0	0	53.7	60.9	75.7	83.6	88.2	98.7	103.7	108.6	190.2	673.0
Estimated Outlays	0	0	53.7	60.9	75.7	83.6	88.2	98.7	103.7	108.6	190.2	673.0
Carbon Storage Research Corporation												
Estimated Budget Authority	0	1.0	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	4.4	10.2
Estimated Outlays	0	0.3	0.7	1.0	1.1	1.2	1.2	1.2	1.2	1.2	3.1	8.9
Total Changes in Direct Spending												
Estimated Budget Authority	0	9.0	72.3	80.4	96.2	106.3	112.6	123.6	129.6	135.4	257.9	865.4
Estimated Outlays	0	0.6	61.1	76.7	93.9	104.0	110.7	122.8	128.6	134.4	232.4	832.8
NET CHANGE IN THE BUDGET DEFICIT FROM CHANGES IN REVENUES AND DIRECT SPENDING												
Impact on Deficit [c]	0	9.3	9.1	1.9	1.1	1.3	0.9	-0.8	-0.4	-1.1	21.4	21.4

Continued

TABLE 4. Continued

	By Fiscal Year, in Billions of Dollars											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010-2014	2010-2019
Memorandum—Details on Auction Revenues:												
Gross Revenues from Auctioned Allowances	0	12.1	27.3	29.5	32.0	37.2	40.5	41.8	44.6	46.4	100.9	311.4
Net Revenues from Auctioned Allowances	0	9.1	20.6	22.3	24.1	28.1	30.5	31.4	33.5	34.9	76.1	234.5
Gross Revenues from Allowances Freely Allocated	0	0	53.7	60.9	75.7	83.6	88.2	98.7	103.7	108.6	190.2	673.0
Net Revenues from Allowances Freely Allocated	0	0	48.7	55.7	70.5	77.4	81.9	92.1	97.1	101.6	175.0	625.0

Notes: * = between -$50 million and $50 million.
Numbers may not sum to totals because of rounding.

a. Revenues are net of income and payroll tax offsets.

b. Includes $0.1 billion savings in unemployment benefits over the 2010-2019 period.

c. Positive numbers indicate decreases in deficits; negative numbers indicate increases in deficits.

For this estimate, CBO assumes that the corporation would be created and would collect assessments totaling about $1.0 billion (the minimum allowed under the bill) in 2011 and $1.1 billion (the maximum allowed under the bill) each year thereafter. Authority to levy assessments and conduct operations would terminate 10 years and 6 months after enactment.

The cost of those assessments would become an additional business expense for utilities, resulting in a loss of other federal tax revenue (primarily income and payroll taxes). The amount of this revenue loss would be equal to about 25 percent of the assessments. However, half of the funds collected by the corporation would go back to electric utilities in the form of grants to subsidize the operations of existing electricity generation units that use integrated CCS or conversion. Those grants would generate new taxable income which would increase federal revenues. Consequently, the net loss in tax revenue would equal about one-eighth of the income from the assessments, resulting in an overall increase in revenues from this provision of $3.8 billion over the 2010-2014 period and $8.6 billion over the next 10 years.

Penalties. Under S. 1733, civil penalties would be assessed on those owners and operators who fail to meet their compliance obligation on time. The penalty would equal the volume of emissions generated by an entity in excess of the allowances it held

multiplied by twice the fair market value of an emission allowance in the relevant year. In addition, the covered entities would be required to submit, in the following year or other time period determined by EPA, emission allowances to cover excess emissions from the previous year. The legislation also would establish penalties for those entities that violate any of the rules associated with the regulation of the allowance market. Such penalties could be as high $1 million per day under certain circumstances. This legislation also includes various other penalties, including penalties for nonpayment of allowances and for fraud.

Because many of the penalties could be substantial, CBO expects most firms would comply with the requirements of the bill. However, the number of entities covered by this legislation is large, and thus it is likely that some entities would not comply. Penalties collected on emissions of sulfur dioxide and nitrogen oxides in excess of submitted allowances under EPA's Acid Rain Program, a similar program, are usually small, though there have been two large collections over the past few years totaling about $4 million. Based on that information, CBO estimates that penalty collections under S. 1733 would total between $25 million and $50 million annually, beginning in 2012.

Effect on Unemployment Compensation. The bill would create a program to compensate workers who lose their jobs as a result of the bill's provisions. That program would provide cash benefits, job training, and a subsidy for health care costs. Individuals who collect benefits under that program would not be eligible to receive unemployment compensation; consequently, outlays of that program would be reduced. Because such outlays are financed by state employment taxes, CBO estimates that states would reduce their taxes (which are recorded as revenues on the federal budget) accordingly. Over the 2012-2019 period, CBO estimates that the reduction in tax revenues would be less than $100 million.

Direct Spending

CBO estimates that enacting this legislation would increase direct spending by $833 billion over the 2010-2019 period. Outlays would primarily stem from spending of auction proceeds and giving GHG allowances to states and other entities free of charge.

Spending of Auction Proceeds. Revenues from the auction of emission allowances for the GHG cap-and-trade program would be deposited into 10 new funds established by the legislation. Spending from those funds would not require any further appropriation action. CBO's estimate of direct spending by funds over the 2010-2019 period includes:

- The Energy Refund Account (outlays of $112 billion) would provide financial assistance to low- and moderate-income households and is intended to offset the impact of the bill on energy prices;

- The Climate Change Transportation Fund (outlays of $16 billion) would enable the Department of Transportation (DOT) to provide grants to states to support activities that would reduce GHG emissions;

- The Supplemental Agriculture, Abandoned Mine Land, Renewable Energy, and Forestry Fund (outlays of $9 billion) would enable the Department of Agriculture and the Department of the Interior (DOI) to establish programs supporting agricultural and forestry projects that reduce or sequester GHGs;

- The Worker Transition Fund (outlays of $4 billion) would enable the Department of Labor (DOL) to provide assistance to workers who lose their jobs as a result of the measures their employers take to comply with the provisions of the bill;

- The Natural Resources Climate Change Adaptation Account (outlays of $4 billion) would enable DOI and other federal agencies to support state adaptation activities, including activities to protect fish and wildlife, reduce the risk of wildfires, and maintain and restore coastal habitats and ecosystems;

- The Clean Vehicle Technology Fund (outlays of $3 billion) would enable EPA to provide grants to manufacturers and component suppliers to refurbish or expand existing manufacturing facilities to produce advanced technology vehicles and to support engineering integration of certain vehicles and components, and to enable DOE to provide support for a national transportation low-emission energy plan;

- The Energy Efficiency and Renewable Energy Worker Training Fund (outlays of $1 billion) would enable DOE to provide funding for grants to support training for jobs in the energy-efficiency industry and a national research program;

- The Nuclear Worker Training Fund (outlays of $1 billion) would enable DOE and DOL to provide grants and other support for workforce development and training related to nuclear energy;

- The Climate Change Health Protection and Promotion Fund (outlays of $1 billion) would enable the Department of Health and Human Services (HHS) to implement a national strategic action plan to respond to the impact of climate change on health; and

- The Consumer Rebate Fund (deposits would be made to this fund beginning in 2026) would provide financial relief to consumers affected by the bill's provisions.

Outlays Associated with Emission Allowances Freely Allocated. CBO estimates that direct spending would increase by $673 billion over the 2010-2019 period when the government distributes emission allowances free of charge to various recipients. Most of this distribution would begin in 2012. Recipients, such as states, natural gas distributers, and federal agencies, would use the allowances to fund programs to encourage energy efficiency and other types of government initiatives.

Carbon Storage Research Corporation. As previously discussed in the section on revenues, S. 1733 would authorize a governmental corporation to levy and spend assessments on distribution utilities totaling between $1.0 billion and $1.1 billion a year over the 2010-2019 period. Under the bill, the corporation could invest those assessments in interest-bearing securities, thereby generating additional funding for its activities. As a result, collections would total $10.2 billion over the 2010-2019 period. Expenditures of assessments and interest, which would be considered direct spending, would support research and development of technologies related to CCS. Based on historical spending patterns for similar activities, CBO estimates that expenditures by the proposed corporation would total $8.9 billion over the 2010-2019 period.

Spending Subject to Appropriation

Assuming appropriation of the necessary amounts, CBO estimates that implementing this legislation would increase discretionary spending by about $29 billion over the 2010-2019 period (see Table 5). Most of that amount would stem from spending of revenues from the HFC auction of consumption allowances. Additional spending would result from spending to support federal agencies' costs to administer programs established under the bill and to support various grant programs and other activities related to energy efficiency and clean energy technologies.

Stratospheric Ozone and Climate Protection Fund. Under the legislation, about $22.9 billion in revenues from the auction of consumption allowances over the 2012-2019 period would be credited to the Stratospheric Ozone and Climate Protection Fund. CBO estimates that outlays from this fund would total about $19 billion over the 2012-2019 period. Those proceeds would be used to support DOE's best-in-class appliances deployment program, an EPA program to encourage the recovery, recycling, and reclamation of HFCs, and any multilateral agreement related to HFCs that includes the United States.

TABLE 5. ESTIMATED SPENDING SUBJECT TO APPROPRIATION UNDER S. 1733

	By Fiscal Year, In Billions of Dollars											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010-2014	2010-2019
CHANGES IN SPENDING SUBJECT TO APPROPRIATION												
Spending of Proceeds from Stratospheric Ozone and Climate Protection Fund												
Estimated Authorization Level	0	0	0.6	1.0	1.3	3.0	3.3	3.6	5.0	5.0	2.9	22.9
Estimated Outlays	0	0	0.2	0.7	1.1	2.0	2.9	3.4	4.1	4.8	2.0	19.1
Administrative Costs to Federal Agencies												
Estimated Authorization Level	0.5	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	2.5	5.4
Estimate Outlays	0.1	0.3	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	1.9	4.7
Clean Energy and Energy-Efficiency Programs												
Estimated Authorization Level	0.6	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.7	3.4	6.5
Estimated Outlays	0.1	0.4	0.6	0.6	0.7	0.6	0.5	0.5	0.6	0.6	2.3	5.1
Total Changes												
Estimated Authorization Level	1.1	1.1	1.9	2.2	2.5	4.1	4.5	4.8	6.2	6.3	8.9	34.8
Estimated Outlays	0.1	0.6	1.3	1.8	2.3	3.1	4.0	4.5	5.2	6.0	6.1	28.9

Note: Numbers may not sum to totals because of rounding.

Administrative Costs of Federal Agencies. Several federal agencies, including EPA, DOL, DOE, and others would be responsible for administering programs under S. 1733. In total, CBO estimates that fully funding administrative costs of federal agencies would require appropriations totaling about $500 million in 2010 and $5.4 billion over the 2010-2019 period. A significant portion of the estimated costs would be incurred by EPA to administer the proposed GHG cap-and-trade program, including roughly a 5 percent increase in personnel. Such personnel would be responsible for developing regulations, preparing rulemakings, assessments, and studies, distributing proceeds generated from the auctions, and other activities related to the cap-and-trade program. Other agencies would be responsible for supporting various programs and activities funded by the distribution of revenues from the auction of allowances and the freely allocated allowances. Those programs include advanced energy research, international clean-energy programs, and worker transition assistance. The agencies supporting those types of programs would incur costs for additional personnel, contractors, and information technology. Those cost estimates are primarily based on information from EPA and other

federal agencies and on historical information about how large regulatory programs have been implemented. CBO estimates that spending for administrative costs would total about $5 billion over the 2010-2019 period.

Clean Energy and Energy-Efficiency Programs. S. 1733 would establish new programs and requirements aimed at promoting clean energy and supporting energy efficiency. CBO estimates that fully funding those activities, which would be implemented primarily by EPA would require appropriations totaling $6.5 billion over the 2010-2019 period. That amount includes:

- $2.0 billion to support grants for reducing emissions of black carbon;
- $500 million to fund grants for research and development efforts and production of biofuels;
- $1.7 billion to support water-efficient products, buildings, landscapes, and processes; and
- $2.3 billion for various studies and grant programs related to climate change and renewable energy.

Assuming appropriation of the necessary amounts, CBO estimates that implementing clean energy and energy-efficiency programs under S. 1733 would cost about $5 billion over the 2010-2019 period, with additional spending occurring in later years.

Budgetary Impacts After 2019

Under this legislation, both cap-and-trade programs would be permanent. The cap for the HFC cap-and-trade program would level off beginning in 2032, and that for the GHG cap-and-trade program would level off beginning in 2050. Most federal spending associated with the GHG cap-and-trade program would begin in the early years of the program and end by 2050 or earlier. Although spending from the energy refund account would be permanent, spending from the consumer rebate fund would begin in 2027 and end in 2050.

INTERGOVERNMENTAL AND PRIVATE-SECTOR IMPACT

S. 1733 contains intergovernmental and private-sector mandates as defined in the Unfunded Mandates Reform Act. Several of those mandates would require utilities, manufacturers, and other entities to reduce greenhouse gas emissions through cap-and-trade programs and performance standards. CBO estimates that the aggregate cost of mandates in the bill would significantly exceed the annual thresholds established in

UMRA for intergovernmental and private-sector mandates ($69 million and $139 million in 2009, respectively, adjusted annually for inflation).

Mandates That Apply to Both Public and Private Entities

Cap-and-Trade Program for Greenhouse Gases. The cap-and-trade program for GHG emissions (excluding HFCs) would require covered facilities to submit one allowance per metric ton of carbon dioxide equivalent emitted beginning in 2012. The compliance costs for covered facilities would be the expenditures made in acquiring allowances, the cost of purchasing offset credits, and the cost of directly reducing their emissions of GHGs. Based on estimates of those costs and accounting for the initial allocation of free allowances, CBO estimates that the annual cost of this requirement would amount to tens of billions of dollars for private-sector entities and hundreds of millions of dollars for public entities.

Although not available to cover the mandate costs of the cap-and-trade requirements, at least $60 billion in allowances would be provided to states over the 2012-2016 period for specific purposes, including programs for improving energy efficiency, implementing regulations, and supporting other climate change programs (see additional discussion under "Other Impacts on State and Local Governments" below).

Reporting Requirements. Public and private entities also would be required to report information on greenhouse gases to a federal registry. Most public entities and some private entities will be required to report similar information under current law, and therefore the public sector would incur minimal additional costs. However, more private-sector entities would be required to report information on greenhouse gases to the registry under the bill. Based on information about compliance costs from EPA's impact analysis of the current reporting requirement, CBO estimates that the cost for private entities could increase by about $30 million per year.

The bill also would impose reporting requirements on public and private entities to assist with implementing the cap-and-trade program. CBO estimates that the cost to comply with those mandates would be small.

Carbon Capture and Sequestration Assessments. The bill would authorize the Carbon Storage Research Corporation to levy annual assessments on public and private utilities following a referendum by the affected utilities. The funds collected, along with an allocation of emission allowances, would be used to support the development of technologies related to CCS. The bill also would require state regulatory authorities to indicate whether they support or oppose the creation of the corporation. If the referendum is approved, all utilities would be required to pay the assessments. The assessments would be based on the amount of electricity delivered to retail customers, and would

generate between $1.0 billion and $1.1 billion annually. CBO estimates the annual cost would total $150 million for public utilities and $850 million for private utilities in the first year the mandate is in effect. CBO estimates that the annual cost of the assessments would increase to a total of $175 million for public utilities and $925 million for private utilities in subsequent years. The cost of the requirement to regulatory authorities would be small.

Performance Standards for Coal-fueled Power Plants. The bill would establish performance standards for new sources of power from coal power plants. Those requirements would compel owners and operators of new units of electric generation (EGUs) to reduce annual CO_2 emissions and would apply to both public and private power plants. EGUs would be required to reduce annual emissions of CO_2 by 50 percent or 65 percent, depending on when the EGU received a preconstruction permit. Because CBO cannot determine how EGUs would comply with the mandate, CBO has no basis to estimate the cost.

Energy Building Codes. The bill would give EPA the authority to issue new energy efficiency standards for state and local codes relating to residential and commercial buildings. If EPA were to issue such regulations, those requirements would be mandates on both public entities that would have to implement and enforce the new standards and private entities that would have to comply. Because most states already have processes to review and update their building codes, the costs of the new requirements are not expected to be large. Furthermore, the bill would provide about $2 billion in allowances to states over the first five years for implementing building codes. Because the stringency of the building codes would depend on future regulatory action, CBO has no basis for estimating the costs to the private sector of complying with this mandate.

Other Mandates. The bill contains additional mandates that would affect both public and private entities. Those mandates include requirements governing the repair of air conditioners in motor vehicles and requirements for the geological storage of CO_2. CBO estimates that the costs of those mandates would not be significant during the first five years the mandates are in effect. The bill would authorize EPA to propose regulations to reduce emissions of black carbon or to publish a finding that existing regulations adequately control such emissions. Because the costs to comply with the new standards would depend on future regulatory action, CBO has no basis for estimating the cost of the mandates.

Mandates That Apply to Public Entities Only

Preemptions of State and Local Authority. S. 1733 contains preemptions of state and local authority. Because preemptions limit the authority of state and local governments, they are considered intergovernmental mandates under UMRA.

- Section 861 would preempt state authority to enforce a cap-and-trade program that covers any capped emissions during the years 2012 through 2017. The Regional Greenhouse Gas Initiative (RGGI) and the State of California plan to conduct allowance auctions during those years. Based on previous RGGI auction revenues, CBO estimates the cost of this preemption to be several hundred million dollars annually. Depending on the design of the California program, however, the cost of this preemption could be significantly higher.

- Section 619 would preempt state laws relating to the production and import of certain hydrofluorocarbons. CBO estimates the cost of this preemption to be small.

Procurement of Water-Efficient Products. The bill would require the District of Columbia to purchase certain products and services designated to be water efficient by EPA or DOE. Because the District of Columbia is the only jurisdiction required to procure such products and the cost associated with the mandate would be the additional cost of the water-efficient products relative to the cost of the products already being purchased, CBO estimates the cost of the mandate to be small.

Other Impacts on State and Local Governments

The bill would provide allowances to state, local, and tribal governments for a number of specific purposes. The largest such allocation could be used for energy efficiency programs, retrofits for commercial and residential buildings, programs to deploy renewable energy facilities, constructing new electricity transmission lines, weatherization projects, and smart grid projects. Other allowance allocations would be available for natural resource and domestic adaptation, infrastructure improvements, transportation planning, worker training programs, building code adoption, and programs to benefit low-income consumers of home heating oil or propane. CBO estimates that the allowances would total at least $60 billion through 2016.

In addition, the bill would authorize several grant programs for renewable energy production, workforce training, research initiatives, and energy efficiency. Those grant programs would benefit participating state, local, and tribal governments, and any costs would be incurred voluntarily as a condition of receiving federal assistance.

Mandates That Apply to Private Entities Only

Hydrofluorocarbon Restrictions. The cap-and-trade program for HFCs would require any entity that produces or imports HFCs, or imports a product containing HFCs, to submit one consumption allowance or destruction offset credit per $mtCO_2e$ of HFC beginning in 2012. The direct cost would be equal to the cost of purchasing allowances and offset credits, and the cost of reducing the use of HFCs. The bill also would impose

several other requirements for the use of HFCs, including restrictions on HFCs used in refrigeration and labeling and reporting requirements.

Based on the price of consumption allowances established in the bill, CBO estimates that the cost of purchasing allowances would amount to about $600 million in the first year the mandates are in effect and more in subsequent years.

Mobile Emissions Standards. The bill would direct EPA to establish standards for greenhouse gas emissions from new heavy-duty vehicles and engines by December 31, 2010. The bill also would direct EPA to establish standards for classes of new nonroad vehicles and engines with significant emissions of greenhouse gases by December 31, 2012. The bill would direct EPA to issue standards that reflect the best available technology. Because the stringency of the standards would depend on future regulatory action, the costs of the mandates are uncertain.

PREVIOUS CBO ESTIMATES

On June 5, 2009, CBO transmitted a cost estimate for H.R. 2454, the American Clean Energy and Security Act of 2009, as ordered reported by the House Committee on Energy and Commerce on May 21, 2009. H.R. 2454 also would establish cap-and-trade programs for GHGs and HFCs. CBO and JCT estimate that over the 2010-2019 period enacting that version of H.R. 2454 would increase federal revenues by about $846 billion and increase direct spending by about $821 billion, reducing the budget deficits over that period by about $24 billion. In addition, assuming appropriation of the necessary amounts, CBO estimates that implementing H.R. 2454 would increase discretionary spending by about $50 billion over the 2010-2019 period.

In addition, on June 26, 2009, CBO transmitted a cost estimate for H.R. 2454 as passed by the House of Representatives on the same day. CBO and JCT estimate that over the 2010-2019 period, that version of the legislation would increase federal revenues by about $873 billion and increase direct spending by about $864 billion, reducing budget deficits over that period by about $9 billion. For that version of the legislation, CBO did not complete an estimate of the legislation's estimated impact on discretionary spending.

H.R. 2454, as passed by the House, is similar to S.1733; however, there are some significant differences that result in the lower estimates of revenues and direct spending under S. 1733. In addition, differences between the two versions of the legislation account for higher allowance prices under S. 1733. Significant differences between the pieces of legislation are addressed below.

Estimate of Revenues

Under H.R. 2454 as passed by the House, advance auctions of future emission allowances would occur beginning in 2014. Those auctions would result in the collection of additional revenues over the 2012-2019 period. S. 1733 does not include such advance auctions.

Estimate of Direct Spending

Several energy-related provisions in H.R. 2454, as passed by the House, that CBO estimated would increase direct spending (such as the renewable-electricity standard and the establishment of a Clean Energy Deployment Administration) are not included in S. 1733. Also contributing to lower spending under the Senate bill are the different amounts of proceeds from allowance auctions that are not spent. Under S. 1733, over the 2010-2019 period, 10 percent of the allowances are auctioned annually as part of the initial reservation and proceeds stemming from those sales are deposited in the Treasury and are not available for spending. Under H.R. 2454, as passed by the House, auction proceeds from more than 10 percent of the allowances available in each of the first two years of the program could not be spent. In the following eight years, however, the amount of allowance auction proceeds that could not be spent would drop to less than 1 percent.

Allowance Prices

CBO estimates that prices for emission allowances would be about 15 percent higher under S. 1733 than under H.R. 2454, as passed by the House, because S. 1733:

- Contains a more stringent emissions cap in 2014 and between 2017 and 2029;
- Contains different allocations for distributing emission allowances and auction revenues; and
- Places greater restrictions on the amount of international offsets that can be used towards an entity's compliance obligation.

Emissions Cap. For most years, S. 1733 and H.R. 2454, as passed by the House, include identical emissions caps and generally cover the same entities. However, in 2014 and between 2017 and 2029, S. 1733 has a more stringent cap that is between 1 percent and 4 percent lower than the cap under the other legislation. Beginning in 2030, both versions of the legislation include the same cap on emissions. The tighter cap under S. 1733 would result in a slightly higher allowance price.

Allocation of Emissions Allowances and Auction Revenues. Both H.R. 2454, as passed by the House, and S. 1733 would allocate allowances and auction revenue to support various programs. Although many of those programs and recipients of allowances are the same in each piece of legislation, the amounts of those allocations are in some cases larger or smaller. Under S. 1733, more allowances are set aside for a reserve fund in the event that allowance prices become volatile, which effectively tightens the cap further. Also, fewer allowances are dedicated to energy efficiency under S. 1733, resulting in a slightly higher allowance price. In addition, the number of allowances allocated for CCS bonuses would be smaller, which slightly increases projected allowance prices under S. 1733.

Offsets. The offset provisions in S. 1733 are different from those in H.R. 2454, as passed by the House. In both bills, offsets may substitute for 2 billion allowances. However, the use of international offsets would be more limited in S. 1733 than in H.R. 2454. In S. 1733, international offsets could substitute for between 500 million and 1.25 billion of allowances per year depending on the use of domestic offsets. That difference raises projected allowance prices under S. 1733 by about 10 percent above those under H.R. 2454.

Mandates

H.R. 2454 would impose intergovernmental and private-sector mandates similar to those contained in S. 1733 by requiring utilities, manufacturers, and other entities to reduce greenhouse gas emissions through cap-and-trade programs and performance standards. H.R. 2454 also contains standards related to energy efficiency and renewable energy that are not contained in S. 1733. CBO estimates that the aggregate cost of mandates in both bills would significantly exceed the annual thresholds established in UMRA for intergovernmental and private-sector mandates ($69 million and $139 million in 2009, respectively, adjusted annually for inflation).

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