



## CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

June 11, 2007

### **S. 1321**

### **Energy Savings Act of 2007**

*As reported by the Senate Committee on Energy and Natural Resources on May 7, 2007*

#### **SUMMARY**

S. 1321 would amend current law and authorize new activities related to renewable energy and energy efficiency. Title I would increase the current mandate for the production of renewable fuels, authorize appropriations for related federal activities, and modify an existing loan guarantee program administered by the Department of Energy (DOE). Title II would authorize funds for activities to improve energy efficiency, require the federal government to increase its consumption of renewable electricity, and expand and extend federal agencies' authority to use energy savings performance contracts (ESPCs). Title III would authorize funds for research and development related to capturing and sequestering carbon emissions.

CBO estimates that enacting S. 1321 would increase net direct spending by \$1.8 billion over the 2008-2012 period and \$2.5 billion over the 2008-2017 period. We also estimate the bill would reduce net revenues by \$327 million over the 2008-2012 period, but increase revenues by \$461 million over the 2008-2017 period. In addition, we estimate that implementing the legislation would increase discretionary spending by \$6.9 billion over the 2008-2012 period, assuming appropriation of amounts specified and estimated to be necessary.

Pursuant to section 203 of S. Con. Res. 21, the Concurrent Resolution on the Budget for Fiscal Year 2008, CBO estimates that changes in direct spending and revenues from enacting S. 1321 would not cause an increase in the on-budget deficit greater than \$5 billion in any of the 10-year periods between 2018 and 2057.

S. 1321 contains intergovernmental mandates as defined in the Unfunded Mandates Reform Act (UMRA). CBO estimates, however, that the total costs of complying with the intergovernmental mandates would not be significant and well below the threshold established in UMRA (\$66 million in 2007, adjusted annually for inflation).

S. 1321 contains several private-sector mandates as defined in UMRA. While the aggregate cost of all the private-sector mandates contained in the bill is uncertain, CBO expects that the total cost of those mandates would be well in excess of the annual threshold established in UMRA (\$131 million in 2007, adjusted annually for inflation). That conclusion is based primarily upon our analysis of the new standards for renewable fuels which would impose substantial costs on the motor fuels industry.

## ESTIMATED COST TO THE FEDERAL GOVERNMENT

The estimated budgetary impact of S. 1321 is summarized in Table 1. The costs of this legislation fall within budget functions 050 (national defense), 270 (energy), 350 (agriculture), and 400 (transportation).

**TABLE 1. ESTIMATED BUDGETARY EFFECTS OF S. 1321**

	By Fiscal Year, in Millions of Dollars				
	2008	2009	2010	2011	2012
<b>CHANGES IN SPENDING SUBJECT TO APPROPRIATION</b>					
Estimated Authorization Level	1,402	1,778	1,764	1,732	1,723
Estimated Outlays	456	1,254	1,685	1,805	1,766
<b>CHANGES IN DIRECT SPENDING <sup>a</sup></b>					
Estimated Budget Authority	443	484	469	440	398
Estimated Outlays	150	337	461	457	433
<b>CHANGES IN REVENUES <sup>a</sup></b>					
Estimated Revenues	0	-104	-243	-40	60

a. Changes in direct spending and revenues through 2017 are shown in Table 2.

## BASIS OF ESTIMATE

CBO estimates that enacting S. 1321 would increase net direct spending by \$1.8 billion over the 2008-2012 period and by \$2.5 billion over the 2008-2017 period. We estimate that enacting S. 1321 would reduce net revenues by \$327 million over the 2009-2012 period, but would increase them by \$461 million over the 2009-2017 period (with no effect in 2008).

Finally, we estimate that implementing the bill would increase discretionary spending by \$456 million in 2008 and \$6.9 billion over the 2008-2012 period, assuming appropriation of amounts specified and estimated to be necessary. For this estimate, we assume S. 1321 will be enacted near the start of fiscal year 2008.

## **Direct Spending**

CBO estimates that enacting S. 1321 would increase net direct spending by \$150 million in 2008, \$1.8 billion over the 2008-2012 period, and \$2.5 billion over the 2008-2017 period (see Table 2). Those amounts include the effects of provisions that would authorize federal investments in new facilities that generate electricity from renewable energy sources; extend and expand federal agencies' authority to enter into ESPCs, make changes to an existing loan guarantee program administered by DOE, and increase existing mandates related to the use of renewable motor fuels. In addition, we estimate that changes to the renewable motor fuels mandate would affect revenues, and subsequently change levels of funding for federal highway programs.

**Federal Investments in Renewable Electricity Facilities.** S. 1321 would require federal agencies to increase their use of electricity that is generated from renewable sources such as wind (renewable electricity). Under current law, by 2013, 3.75 percent of agencies' electricity must be generated from facilities that use renewable sources and were constructed after 1998. S. 1321 would increase that target to 10 percent of federal agencies' energy use by 2010 and 15 percent by 2015.

Under the bill, CBO expects that roughly three-fourths of that increase would come from increased purchases of renewable electricity from the private sector (which would be subject to appropriation). We expect federal agencies would invest in newly constructed facilities to produce the remaining requirements. To support investments in such facilities, S. 1321 would authorize federal agencies to use long-term contracts and borrowed funds (known as third-party financing) to pay for their costs.

**TABLE 2. ESTIMATED DIRECT SPENDING AND REVENUE EFFECTS OF S. 1321**

	By Fiscal Year, in Millions of Dollars										2008-	2008-
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2012	2017
<b>CHANGES IN DIRECT SPENDING</b>												
Federal Investments in New Renewable Electricity Facilities												
Estimated Budget Authority	414	392	372	351	310	0	0	0	0	0	1,839	1,839
Estimated Outlays	125	283	392	372	345	229	93	0	0	0	1,517	1,839
Energy Savings Performance Contracts												
Estimated Budget Authority	30	32	33	33	34	35	36	37	38	400	162	708
Estimated Outlays	25	31	32	33	34	35	35	37	38	350	155	650
Changes to DOE Loan Guarantee Program <sup>a</sup>												
Estimated Budget Authority	0	52	58	59	60	61	62	73	74	75	229	574
Estimated Outlays	0	24	40	55	60	60	60	65	70	70	179	504
Renewable Fuels Requirement and Agricultural Support Programs												
Estimated Budget Authority	0	-1	-3	-3	-6	-12	-39	-62	-151	-192	-13	-469
Estimated Outlays	0	-1	-3	-3	-6	-12	-39	-62	-151	-192	-13	-469
Increase Funding for Federal Highway Programs <sup>b</sup>												
Estimated Budget Authority	0	9	9	0	0	0	0	0	0	0	18	18
Estimated Outlays	0	0	0	0	0	0	0	0	0	0	0	0
Total Changes												
Estimated Budget Authority	444	484	469	440	398	84	59	48	-39	283	2,235	2,670
Estimated Outlays	150	337	461	457	433	312	149	40	-43	228	1,838	2,524
<b>CHANGES IN REVENUES</b>												
Estimated Revenues	0	-104	-243	-40	60	89	122	157	202	218	-327	461

a. Under S. 1321, some of the potential loan guarantees could be funded by future appropriation action.

b. Changes to contract authority for federal highway programs are mandatory. Outlays, which are controlled by obligation limitations specified in annual appropriation acts, are discretionary.

Specifically, under S. 1321, federal agencies could use two types of long-term contracts that enable nonfederal entities to finance federal capital project costs. The bill would amend current law to permit agencies to enter into energy savings performance contracts, a specific type of long-term contract, for the installation of renewable energy systems on federal land.

The bill also would authorize agencies to enter into long-term contracts—up to 50 years—to secure renewable energy production from certain utilities. (Under current law, such contracts are limited to 10 years.) Under either type of contract, the government becomes obligated, upon signing, to make payments in the future. To the extent that agencies use such contracts to finance new facilities intended to produce electricity for federal consumption, CBO considers that spending for those facilities would be a governmental expenditure. Thus, consistent with government-wide accounting principles, the budget should record those commitments as new obligations at the time the government enters into such contracts.

Based on information from DOE about current levels of renewable electricity consumed by federal agencies, including information on how much of that energy is self-generated or purchased from the market, CBO estimates that federal agencies will use ESPCs or long-term contracts with utilities to build new facilities capable of producing nearly 600 megawatts of electricity. (That estimate assumes that the portion of electricity self-generated by federal agencies under S. 1321 remains in line with current levels—about one-fifth of the total.) Based on information from the Energy Information Administration about the cost of building such facilities, we estimate that costs per megawatt of capacity would average \$3.2 million. That amount reflects a weighted average of capital costs for various types of renewable facilities—particularly wind and solar photovoltaic—and includes anticipated financing costs. For this estimate, we expect that most spending to build new capacity would occur over the 2008-2012 period with facilities coming on line within three years of when construction begins.

In total, we estimate that increased direct spending for contracts related to new renewable electricity generation facilities under S. 1321 would total \$125 million in 2008, \$1.5 billion over the 2008-2012 period, and \$1.8 billion over the next 10 years. (Those amounts do not reflect the increased use of ESPCs we expect would result from other provisions of S. 1321, as described in the following section. They also exclude additional discretionary costs for increased market purchases of renewable electricity, which are described later in this estimate.)

**Energy Savings Performance Contracts.** S. 1321 would permanently extend agencies' authority to use ESPCs; that authority currently expires at the end of fiscal year 2016. It also would make several changes to the definition of energy savings under that authority, particularly to include the increase in the efficiency of existing energy sources that can be achieved by installing cogeneration or heat recovery systems. (Cogeneration is the use of a fuel or power source to simultaneously generate electricity and useful heat.) Those changes would allow federal agencies to continue using ESPCs in 2017 and thereafter, and would authorize the use of ESPCs to acquire cogeneration equipment.

ESPCs enable federal agencies to enter into long-term contracts with an energy savings company (ESCO), for the acquisition of energy-efficient equipment, such as new windows, lighting, and heating, ventilation, and air conditioning systems. Using such equipment can reduce the energy costs for a facility. The statute authorizing ESPCs allows the government to pay for the equipment over time on the basis of the estimated reduction in annual utilities payments. Once the equipment is paid for, savings may accrue to the government if the useful life of the equipment exceeds the payback period. Those savings would be reflected in the budget at the time they are realized if future appropriations are reduced accordingly.

Because the government does not pay for the equipment at the time it is acquired, the ESCO borrows money from a nonfederal lender to finance the acquisition and installation of the equipment. When it signs the ESPC, the government commits to paying for the full cost of the equipment, as well as the interest costs on the ESCO's borrowing for the project. Since the ESCO faces higher borrowing costs than the U.S. Treasury, total interest payments for the equipment acquisition will be higher than if the government financed the acquisition of the equipment directly with appropriated funds.

The obligation to make payments for the equipment and the financing costs is incurred when the government signs the ESPC. Under the current authority, agencies can use ESPCs to acquire new equipment, paying over a period of up to 25 years, without an appropriation for the full amount of the purchase price. Thus, consistent with government-wide accounting principles, the budget should reflect that commitment as new obligations at the time that an ESPC is signed, and the authority to enter into such a contract without budget authority for the full amount of the purchase price constitutes direct spending in CBO's judgment.

According to DOE, federal agencies currently use such contracts to acquire approximately \$300 million in energy-conserving equipment and improvements each year. Additional spending through ESPCs as a result of expanding the definition of energy savings to include cogeneration could vary widely from year to year, depending on the magnitude of investments. Federal agencies have acquired cogeneration equipment costing from several million dollars to over \$100 million. CBO estimates that agencies would increase their use of ESPCs by an average of \$30 million a year over the 2008-2016 period, particularly to acquire cogeneration equipment. That annual funding would finance the acquisition of several small cogeneration systems of about 5 megawatts each or one medium-sized system of about 15 megawatts. A large cogeneration system of greater than 30 megawatts could cost \$100 million.

By permanently extending the authority for ESPCs, federal agencies could continue to enter into ESPCs in 2017 and thereafter. In total, CBO estimates that the ESPC expansion in S. 1321 would increase direct spending by about \$25 million in 2008 and \$650 million over the 2008-2017 period. (Those amounts do not include increased costs from using ESPCs to

install new renewable electricity facilities, which are discussed in the preceding section. Also, as noted above, some of the direct spending costs could be offset by reduced appropriations in future years.)

**Amendments to DOE Loan Guarantee Program.** S. 1321 would modify the terms of DOE's loan guarantee program for advanced energy technologies, which was established under title XVII of the Energy Policy Act of 2005. CBO estimates that enacting those changes would increase direct spending by about \$500 million over the 2008-2017 period, largely because of provisions that would allow DOE to spend administrative fees without further appropriation and exempt certain guaranteed loans from provisions in the Federal Credit Reform Act that make credit assistance contingent on limitations in appropriation laws. The estimate also reflects the cost of implementing provisions in the bill that would expand the scope of projects eligible for guarantees and make other changes to the terms of guarantees.

*Direct Spending for Loan Guarantee Subsidies.* CBO estimates that implementing this bill would increase direct spending for credit subsidies by \$360 million over the next 10 years. CBO estimates that the premiums charged to borrowers to cover the future subsidy cost of the guarantees would be at least 1 percent lower than will be necessary to offset the long-term cost to the government. For this estimate, we assume that DOE will guarantee about \$43 billion in loans over the 2008-2017 period. That total assumes that the volume of loans will continue at the level specified in the 2007 appropriation act, adjusted for inflation, plus roughly \$2 billion for the new types of guarantees authorized by S. 1321. Given the complexity of the analysis and contracts necessary for borrower-financed loan guarantees, CBO expects that projects will not begin paying fees or borrowing funds until fiscal year 2009.

Change in Spending Authority. Under current policy, DOE's authority to guarantee loans under this program is contingent on appropriation acts that provide the budget authority necessary to cover the projected subsidy costs (measured as the net present value of the anticipated cost of defaults, net of recoveries) and impose other limits on the use of funds (such as limits on the volume of loans guaranteed). S. 1321 would exempt such loan guarantees from the provisions in the Federal Credit Reform Act that require appropriation action if the borrower pays a fee equal to the estimated subsidy cost. That change would give DOE permanent authority to guarantee loans without further legislative action when such fees are paid. Any resulting costs resulting from borrower-financed guarantees would therefore affect direct spending. For this estimate, CBO assumes that the subsidy cost of the loans guaranteed under the program would be paid by the borrowers; however nothing in the bill would prohibit the use of appropriated funds to pay for the loan guarantee subsidy costs.

Estimated Subsidy Cost of Borrower-Financed Guarantees. The Energy Policy Act directs DOE to guarantee debt for projects that employ new or significantly improved technologies to produce energy without significant greenhouse gas emissions. DOE's loan guarantee portfolio is expected to include advanced nuclear, fossil fuel, and renewable energy facilities, some of which could cost \$3 billion each. Such projects, by their nature, pose significant technical and market risks. CBO expects that the challenges and constraints involved in estimating the subsidy costs for such innovative projects make it more likely that DOE will underestimate than overestimate the fees paid by borrowers.

It is difficult for private companies or DOE to set a "price" for insuring against the credit risks posed by innovative projects because of the large degree of uncertainty about their cost and performance. Studies of the accuracy of cost estimates for pioneering technologies have found that estimates are consistently too low for several reasons, including lack of practical experience with novel processes or settings, limits on the quality of information and project definition, and organizational incentives for sponsors to project costs that turn out to be too low.<sup>1</sup> Estimating errors often stem from unanticipated changes in a plant's operating performance, as well as cost overrun construction costs. Partly for those reasons, private firms that provide credit insurance generally do not insure debt with significant technology risk.

Financial constraints add to the challenge of setting premiums high enough to compensate for that estimating uncertainty. Recent assessments by Standard and Poors and the Energy Information Administration suggest that many low-carbon energy sources—nuclear power, solar generation, and coal gasification or liquefaction plants capable of carbon capture or sequestration—are unlikely to be economically viable in the near term without federal subsidies or favorable treatment by state regulators.<sup>2</sup> Having a federal loan guarantee would lower the cost of capital and improve a project's viability if the credit risk is shifted to the federal government. However, requiring the borrower to pay the subsidy fee shifts most of that risk and cost back to the project, leaving its creditworthiness largely unchanged. Because such projects are either uneconomic or marginally so without the guarantee, there is a practical limit to how large the subsidy fee can be without jeopardizing the project's financial prospects. In addition, prospective borrowers will have imperfect information about the risk associated with their proposals and may turn down a guarantee if they believe DOE's fee is

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1. *Understanding Cost Growth and Performance Shortfalls in Pioneer Process Plants*, Rand Corporation, R-2569-DOE, September 1981. See also, *Historical Cost Growth of Complicated Weapon System Programs*, RAND Corporation, 2006; and *Department of Energy: Major Construction Projects Need a Consistent Approach for Assessing Technology Readiness to Help Avoid Cost Increases and Delays*, Government Accountability Office, March 2007.
  2. *The Credit Impact of Climate Change*, Standard and Poors, Credit Week, May 23, 2007; *Annual Energy Outlook*, Energy Information Administration, February 2007.



too high but go forward if they consider to low. This also makes it more likely that DOE's loan guarantee portfolio will have more projects where the subsidy fee has been underestimated than overestimated.

Based on publicly available information about alternative energy investments, CBO estimates that the premiums charged to borrowers under current law and this bill would, on average, be at least 1 percent lower than the likely cost of the guarantees. The shortfall could be higher than 1 percent, but the actual amounts will depend on the underlying risk and cost structure of the projects approved by DOE.

*Direct Spending of Administrative Costs.* Under current law, DOE must levy fees sufficient to cover the costs of administering the title XVII loan guarantee program and may spend those funds subject to conditions in appropriation acts. S. 1321 would amend existing law to allow DOE to spend those collections without further appropriation action. Based on historical trends in the cost of administering such programs, CBO estimates that implementing this provision would increase direct spending by \$140 million over the 2008-2017 period.

**Renewable Fuels Requirement and Agricultural Support Programs.** Title I of S. 1321 would require that motor fuels sold by a refiner, blender, distributor, or importer include more renewable fuel than is required under current law. Such requirements would affect direct spending to the extent that they affect the market price or production of agricultural commodities such as corn and soybeans eligible for federal price supports. CBO estimates that implementing the renewable fuel requirements in title I would reduce direct spending for crop programs by \$469 million over the next 10 years. (The renewable fuels provision also would affect certain revenues that would subsequently increase funding for federal highway programs. Those effects are discussed in the following two sections.)

Under current law, suppliers are required to purchase 5.4 billion gallons of renewable motor fuels in 2008, escalating to 7.5 billion gallons by 2012. This bill would raise those targets to 8.5 billion gallons in 2008, increasing to 36 billion gallons by 2022. The bill would require 21 billion gallons of renewable fuel use in 2017, the last year covered by this estimate. The bill also would require a growing portion to be derived from advanced biofuels, which are defined as ethanol derived from cellulosic biomass (including crop residue, waste material, etc.), as well as diesel-equivalent fuel, biogas, and butanol or higher alcohols produced from renewable biomass. These requirements could be waived at the request of a state if the President determines that compliance would pose certain hardships or supplies are insufficient due to extreme or unusual circumstances. Firms that fail to comply with the mandates would be subject to penalties.

CBO estimates that implementing this bill would increase production of conventional ethanol (defined in the bill as ethanol derived from corn starch) relative to the amounts expected under current law. Because corn-based ethanol can be produced at prices competitive under today's market and tax conditions, CBO anticipates that producers would increase capacity sufficient to meet the bill's goal of 15 billion gallons a year for 2015 and beyond. CBO expects that corn prices would increase significantly over the 2008-2017 period in response to the demand resulting from that increase. Accordingly, we estimate that the costs of federal programs to support farm prices and provide income support to agricultural producers would fall over the 2008-2017 period. CBO estimates that spending for farm price and income supports would decline by \$469 million over the 2008-2017 period.

**Increased Funding for Highway Programs.** As explained in the following section, CBO estimates that enacting the bill's renewable fuels requirements would increase certain revenues which, under current law, are credited to the Highway Trust Fund. As a result, CBO estimates S. 1321 would increase contract authority (a mandatory form of budget authority) known as Revenue-Aligned Budget Authority (RABA). RABA adjusts the total level of contract authority available to the Federal-Aid Highways program based on receipts to the highway account of the Highway Trust Fund and in comparison to levels set in the current authorization law for highway programs (Public Law 109-59), which expires in 2009.

Because the bill would increase receipts to the Highway Trust Fund by \$18 million in 2009, CBO estimates that the bill would increase contract authority by \$9 million in both 2009 and 2010 because the RABA provisions spread any adjustment to revenues evenly over a period of two years.

Under current law, most spending from contract authority provided for the Federal-Aid Highways program is considered discretionary because it is controlled by annual limitations on obligations set in appropriation acts. Therefore, estimates of outlays that would result from additional RABA are included in our estimates of spending subject to appropriation.

## **Revenues**

Changes in revenues under S. 1321 stem from provisions that would require refiners, blenders, distributors, or importers to increase their use of renewable fuels. Mandating the use of renewable fuel would affect federal revenues in two ways. First, tax law provides a credit of 51 cents per gallon—payable from the Treasury's general fund to manufacturers of alcohol fuels, which include some renewable fuels such as ethanol. That credit is scheduled to expire at the end of calendar year 2010. The second effect arises because ethanol produces less energy per gallon than gasoline does: substituting ethanol for gasoline increases the total amount of fuel used, and thus increases revenue from the 18.4 cent per gallon excise tax on

gasoline and gasoline-ethanol blends. This second effect would partially offset the loss in government revenue while the ethanol credit is in effect and would increase revenue after the credit expires.

For a constant number of miles driven in the entire economy in any given year, an additional gallon of ethanol can replace only two-thirds of a gallon of gasoline in the national fuel supply. This is because ethanol produces roughly one-third less energy when burned than an equal volume of gasoline. Therefore, to drive a motor vehicle the distance made possible by the energy in a gallon of gasoline, one would need to use the equivalent of one gallon of ethanol *and* one-third of a gallon of gasoline. This results in a one-third of a gallon increase in total fuel use for every gallon of ethanol added to the fuel supply.

CBO estimates that enacting the bill would not affect revenues in 2008, but would reduce revenues overall between fiscal years 2009 and 2011 by almost \$387 million, when the tax credit is in effect. That amount is net of increases in income and payroll taxes. The ethanol tax credit is not in effect from 2011 through 2017, and CBO estimates that net revenues would increase by \$848 million as a result of additions to motor fuel volume. In total, over the 2009-2012 period, revenues would decline by \$327 million, and over the 2009-2017 period revenues would increase by about \$461 million, net of changes to income and payroll taxes. (That effect from additions to motor fuel volume would change to a loss of receipts if the current ethanol credit of 51 cents a gallon is extended, instead of being allowed to expire as scheduled.)

Those estimates assume that, relative to current law, implementing the bill would increase the use of conventional ethanol by about 400 million gallons in fiscal year 2009, 800 million gallons in 2010, 900 million gallons in 2011, and by steadily growing amounts that would reach about 5 billion gallons before leveling off in 2016.

Although the bill establishes goals for the use of advanced biofuels, CBO expects that those specific mandates would not have a significant effect on revenues through 2017. Based on information from financial analysts, CBO assumes that a renewable fuel standard would not, by itself, materially change the creditworthiness of private-sector investments in plants that produce advanced biofuels. Instead, we expect that increased output of cellulosic ethanol will depend on breakthroughs resulting from future investments in research, development, and demonstration projects, which typically are funded by federal appropriations and venture capital firms. Assessments by DOE suggest that even with such research, cellulosic ethanol is unlikely to be produced in significant commercial quantities until some time after 2015. Thus, we anticipate that implementing this portion of the renewable fuel standard in S. 1321 would not significantly increase the volume of such fuels sold through 2017.

## **Spending Subject to Appropriation: Overview**

S. 1321 would specifically authorize appropriations totaling almost \$8 billion over the 2008-2012 period for energy-related programs. CBO also estimates that implementing other provisions of S. 1321 would require additional appropriations totaling \$500 million over the 2008-2012 period. In total, CBO estimates that implementing the bill would increase discretionary spending by \$456 million in 2008 and \$6.9 billion over the 2008-2012 period, assuming the appropriation of amounts specified and estimated to be necessary (see Table 3). That total excludes any possible discretionary spending for appropriated loan guarantee subsidy costs. Such costs could amount hundreds of millions of dollars over the 2008-2012 period, however CBO assumes that these costs will not be provided in appropriations acts, but will result in increases in direct spending as discussed above.

## **Spending Subject to Appropriation: Specified Authorizations**

S. 1321 would specifically authorize appropriations totaling almost \$8 billion over the 2008-2012 period for DOE research and development activities related to increasing energy efficiency, reducing carbon emissions, and advancing biofuels, including:

- \$3.1 billion for grants to states to help low-income individuals improve their homes' energy efficiency;
- \$1.3 billion to research and develop technologies to capture and store carbon emissions;
- \$1.2 billion for research on energy storage technologies for use in transportation and electricity distribution;
- \$980 million for a program to improve the energy efficiency of certain industrial and commercial processes;
- \$750 million for competitive grants to support efforts to develop vehicles that use certain type of advanced technologies;
- \$300 million for research on the use of lightweight materials in constructing motor vehicles;
- \$284 million for research, development and technical assistance related to biofuels, including grants to support the development of certain infrastructure;
- \$60 million for other activities.

**TABLE 3. ESTIMATED EFFECTS OF S. 1321 ON SPENDING SUBJECT TO APPROPRIATION**

	By Fiscal Year, in Millions of Dollars				
	2008	2009	2010	2011	2012
<b>CHANGES IN SPENDING SUBJECT TO APPROPRIATION</b>					
Specified Authorization Level	1,102	1,718	1,724	1,682	1,673
Estimated Outlays	388	1,095	1,553	1,699	1,713
Estimated Authorizations:					
Grants to institutions of higher education for energy-efficiency activities					
Estimated Authorization Level	225	0	0	0	0
Estimated Outlays	25	75	75	50	0
Federal purchase of renewable electricity					
Estimated Authorization Level	10	30	30	40	40
Estimated Outlays	10	30	30	40	40
Increased Spending for Federal Highway Programs <sup>a</sup>					
Estimated Authorization Level	0	0	0	0	0
Estimated Outlays	0	3	6	6	3
Other activities					
Estimated Authorization Level	65	30	10	10	10
Estimated Outlays	33	51	21	10	10
Subtotal, Estimated Authorizations					
Estimated Authorization Level	300	60	40	50	50
Estimated Outlays	68	159	132	106	53
Total Proposed Changes					
Estimated Authorization Level	1,402	1,778	1,764	1,732	1,723
Estimated Outlays	456	1,254	1,685	1,805	1,766

a. Changes to contract authority for federal highway programs are mandatory. Outlays, which are controlled by obligation limitations specified in annual appropriation acts, are discretionary.

Assuming appropriation of the specified amounts, CBO estimates fully funding those activities would cost \$388 million in 2008 and \$6.4 billion over the 2008-2012 period, with additional spending occurring after 2012. That estimate is based on historical spending patterns for existing and similar activities.

## **Spending Subject to Appropriation: Estimated Authorizations**

CBO estimates that implementing other provisions of S. 1321 would require additional appropriations totaling \$500 million over the 2008-2012 period. Assuming appropriation of the necessary amounts, we estimate fully funding those activities would increase discretionary spending by \$68 million in 2008 and \$517 million over the 2008-2012 period. Details of that estimate are described below.

**Grants to Improve the Energy Efficiency of Institutions of Higher Education.** The bill would authorize DOE to provide grants to institutions of higher education for activities to improve energy efficiency. Under the bill, the agency could provide up to 100 grants of not more than \$1 million for projects to improve energy efficiency on campus grounds and facilities. DOE also could provide up to 250 grants of up to \$500,000 for innovative projects to test emerging energy-efficient technologies. Assuming appropriation of amounts necessary to provide the maximum amount for grants under the provision and based on historical spending patterns for similar activities, CBO estimates such grants would cost \$25 million in 2008 and \$225 million over the 2008-2012 period.

**Federal Purchases of Renewable Electricity.** As described previously, S. 1321 would require federal agencies to increase their consumption of renewable electricity generated from facilities brought into service after 1998. In addition to investing in new facilities to produce some of that electricity, CBO expects agencies would purchase additional amounts—about 1 million megawatt hours in 2008, increasing to roughly 3.6 million megawatt hours by 2012 and 3.9 million megawatt hours by 2015—from the market for renewable electricity.

Because of its renewable attributes, renewable electricity can be sold at a higher price than electricity generated from conventional sources. Based on information from DOE and industry experts, CBO expects that agencies would pay a premium of about \$10 per megawatt hour of additional renewable energy purchased as a result of the requirements in S. 1321. We estimate that increased spending under the bill would total \$10 million in 2008 and \$150 million over the 2008-2012 period, assuming appropriation of the necessary amounts.

**Increased Spending for Federal Highway Programs.** Under current law, most spending from contract authority provided for the Federal-Aid Highways program is considered discretionary because it is controlled by annual limitations on obligations set in appropriation acts. Therefore, estimates of outlays that would result from additional RABA are included in our estimates of spending subject to appropriation. CBO expects that programs eligible for contract authority provided by an increase in RABA would continue to be controlled by such limitations. Based on CBO estimates of increases in receipts to the Highway Trust

Fund under S. 1321, CBO estimates that an increase in RABA would result in additional discretionary spending of \$18 million over the 2008-2012 period.

**Appropriation for DOE Loan Guarantees.** S. 1321 would expand the credit assistance program under title XVII of the Energy Policy Act of 2005 to include projects that manufacture certain fuel efficient vehicles or parts of those vehicles. In addition, the bill would make advanced biofuels projects eligible for guarantees under the terms and conditions of the title XVII program, which differ from those for existing program authorized by title XV of EPACT for cellulosic biomass projects. The bill would specifically direct DOE to guarantee 100 percent of the debt for advanced biofuels projects and to act on those applications within 90 days after they are submitted.

Current law provides two sources of funding for the subsidy cost of guarantees made under the title XVII program, appropriations or up-front fees paid by borrowers. CBO expects that DOE will rely on borrower financing of the subsidy costs as long as there is a reasonable expectation that a project can pay the fee and remain economically viable. Thus far, the Administration has not requested appropriations for this program. As a result, CBO assumes that DOE would only request appropriations in cases where a project's viability would depend on the subsidy cost being paid in full by the federal government.

Because the terms of assistance for advanced biofuels projects are more favorable to borrowers under S. 1321 than under current law, sponsors may be more likely to apply for guarantees under the amended program. Based on assessments of cellulosic ethanol plants or other advanced biofuels projects, CBO expects that such projects will require federal subsidies until after such technologies have progressed beyond the pilot and demonstration phase. Depending on the project's characteristics, the subsidy cost for such debt could range from more than 20 percent to 80 percent of the loan principal, suggesting that providing such subsidies could cost hundreds of millions of dollars, assuming funds are provided in future appropriation acts. CBO has not estimated specific sums for this authorization because it is unclear whether DOE would provide such credit support.

**Other Provisions.** CBO estimates that implementing other provisions of S. 1321 would cost \$33 million in 2008 and \$125 million over the 2008-2012 period, assuming appropriation of the necessary amounts. That estimate is based on historical funding levels and spending patterns for existing and similar activities and includes the cost of provisions that would:

- Authorize various activities, studies, and reports related to renewable fuels;

- Direct DOE to provide financial incentives and awards to promote the development of advanced lighting technologies, high-efficiency consumer products, and vehicles that use advanced technologies,
- Create a grant program to support the construction of certain types of renewable energy facilities;
- Establish a consortium with representatives from federal, state, and local governments and industry groups with the objective of enhancing the energy efficiency of commercial buildings; and
- Authorize DOE to provide grants to states for use in developing conservation plans and promoting energy-efficient community development.

### **ESTIMATED IMPACT ON STATE, LOCAL, AND TRIBAL GOVERNMENTS**

S. 1321 contains intergovernmental mandates as defined in UMRA. CBO estimates that the total costs of complying with the intergovernmental mandates would not be significant and well below the threshold established in UMRA (\$66 million in 2007, adjusted annually for inflation).

Section 130 of the bill would require the federal government to establish regulations that provide for the uniform labeling of biodiesel blends certified to meet American Society for Testing and Materials standards. Based on discussion with Federal Trade Commission (FTC) and state officials, those federal regulations would likely preempt state laws that require labeling of fuel pumps that dispense biodiesel. Section 212 would amend the Energy Policy and Conservation Act to expand the types of incandescent reflector lamps that must meet federal standards for energy efficiency. At least eight states have laws that prescribe standards for energy efficiency of the lamps referenced in the bill; those laws would be preempted. These preemptions would be intergovernmental mandates as defined in UMRA. While the provisions would limit the application of state law, they would impose no duty on states that would result in additional spending.

Section 273 would require state authorities that regulate electric and gas utilities to review standards that establish rates and resource plans that encourage energy efficiency. The requirement to review those standards would increase states' responsibilities under existing mandates in the Public Utilities Regulatory Policies Act. CBO estimates, however, that the costs to comply with the review would not be significant.



Grants authorized in the bill would benefit participating state and local governments by assisting with researching and implementing strategies to improve energy efficiency. In addition, several grant programs authorized in the bill would promote the development of renewable energy infrastructure. Any costs that state and local governments might incur, including matching funds, would be incurred voluntarily.

## **ESTIMATED IMPACT ON THE PRIVATE SECTOR**

S. 1321 contains several private-sector mandates as defined in UMRA. CBO expects that the total costs of complying with the private-sector mandates in the bill would be well in excess of the annual threshold established in UMRA (\$131 million in 2007, adjusted annually for inflation).

The bill would impose several new requirements related to renewable fuels and energy efficiency. Requirements in the bill would include but not be limited to:

- Increasing the renewable fuels standard;
- Increasing the energy-efficiency standards for various commercial and residential appliances and products; and
- Issuing new energy efficiency and motor fuel labeling requirements.

### **Renewable Fuel Standard**

Section 111 would require domestic refiners, blenders, distributors and importers of oil-based fuel products to increase, under the current renewable fuels program, the scheduled number of gallons of renewable fuels sold or dispensed to consumers in the contiguous United States. The required volume of renewable fuel would start at 8.5 billion gallons in 2008 (3.1 billion gallons more than currently required) and increase to 13.2 billion gallons by 2012 (5.7 billion gallons above what is currently required). CBO expects the industry to meet the scheduled volume increase in 2008 without increasing renewable fuel use. The industry would begin to experience additional costs in 2009 as it would have to begin to blend or purchase greater amounts of gasoline containing renewable fuels than it would in the absence of the higher standard. Based on DOE estimates of the price of renewable fuels, CBO estimates that the direct costs of meeting the volume requirements would amount to at least \$1 billion starting in year 2009, well exceeding UMRA's annual threshold for private-sector mandates. Those costs would increase in subsequent years as the volume requirement for renewable fuel rises.

Section 111 would impose additional requirements on the production and sale of renewable fuel products. It would require the industry to include, of the amounts of renewable fuels sold, 3 billion gallons of advanced biofuels not derived from corn starch in the year 2016. The advanced biofuels volume requirement would increase annually and rise to 21 billion gallons in 2022. (This requirement may be waived at the request of a state if the President determines that compliance would pose some economic or environmental harm or that supplies are not adequate due to extreme or unusual circumstances.) The section would further require that biofuels facilities built after the date of enactment achieve at least a 20 percent reduction in life cycle greenhouse gas emissions, compared to gasoline.

## **Energy Efficiency**

In general, the bill would amend the Energy Policy and Conservation Act to increase the energy-efficiency standards for various commercial and residential appliances and products.

**Incandescent Reflector Lamps.** Section 212 would expand the types of incandescent reflector lamps that must meet federal standards for energy efficiency. According to DOE, the standard being adopted in the bill would require the affected lamps to incorporate a more energy-efficient design option. Data from DOE imply that for most of the newly included models of incandescent reflector lamps, the incremental cost associated with incorporating a more energy-efficient design would be about \$2 per lamp. Based on those data, the direct costs to the industry to comply with this mandate would be no more than about \$30 million beginning in 2008.

**Boilers.** Section 227 would increase the energy-efficiency standards for residential boilers fueled by gas, oil or electricity. According to DOE, manufacturers of gas-fired boilers could improve the heat transfer of the boiler heat exchanger and add an electronic ignition to meet the energy efficiency requirements of the bill. DOE estimates that the incremental costs of retrofitting those boilers to be about \$40 per unit. DOE estimates that the incremental costs of retrofitting oil-fired boilers to be about \$15 per unit. Based on those data the direct costs associated with this mandate for gas and oil boilers would be about \$25 million in 2012, including capital costs and no more than \$15 million in subsequent years.

**Electric Motors.** Section 229 would increase the minimum energy-efficiency standards for three categories of electric motors, effective three years after enactment. According to DOE and industry sources, manufacturers of those motors already produce high-end motors that meet the higher standards in the bill. According to those sources, the costs associated with any minor factory retooling or the redesigning of certain motors would be small because the industry already has the technology to produce the higher-rated motors. The costs could, however, vary greatly for each manufacturer.

**Household Appliances.** Section 230 would increase the efficiency standards and water conservation standards for residential clothes washers and dishwashers; and implement a new standard for residential dehumidifiers. The bill also would set efficiency standards for residential refrigerators and freezers by 2011.

Under the bill, all residential clothes washers manufactured in 2011 or later would be required to meet certain energy efficiency and water conservation standards. The provision also would require DOE to review those standards and publish a final rule for clothes washers no later than 2015. According to DOE, about 6.5 million residential clothes washers sold annually would not currently meet the standards outlined by the bill. Although CBO does not have sufficient data to determine what the incremental cost per unit would be to comply with the mandate, the direct costs incurred by the industry could be substantial due to the large number of clothes washers that are not currently in compliance with the standards outlined in the bill.

Residential dishwashers also would be subject to more stringent energy-efficiency and water conservation standards under the bill beginning in 2010. CBO was unable to gather data on either the number of dishwashers that would be affected by the mandate or the incremental cost per unit that would be incurred by manufacturers because of the mandate, and thus, we cannot determine the cost of this mandate.

The bill also would increase the energy efficiency standard for dehumidifiers starting in 2012. According to DOE, manufacturers of more than one million dehumidifiers of various models would be required to make model changes to meet those standards. DOE estimates that the incremental costs for retrofitting those models would range from about \$10 to \$35 per unit, depending on the model. CBO estimates that the costs to comply with the new standards would cost no more than \$30 million in year 2012.

Section 230 also would direct DOE to publish, no later than 2010, a final rule determining whether to amend the current energy efficiency standards for all refrigerators, refrigerator-freezers, and freezers. The bill would not require DOE to change the current energy efficiency standards. If DOE made more-stringent standards for such appliances, the incremental difference in those standards would constitute a mandate. Due to uncertainty regarding any future regulations the DOE may develop, CBO cannot estimate the costs of this mandate.

## **Labeling Requirements**

**Fuel Tank Cap Labeling.** Section 129 would require vehicle manufacturers, starting in 2010, to clearly label the fuel tank cap of each alternative-fueled vehicle sold in the United

States to inform consumers that the vehicle can operate on alternative fuels. Based on data from DOE and industry sources, such labels could cost between about 25 cents and 50 cents per label. Those same industry sources project that about 17 million alternative fuel vehicles would be manufactured and sold in 2010, and that those sales would probably remain relatively constant during the first five years of the mandate. Based on those data, CBO estimates that the direct costs to the industry would be no more than \$10 million a year.

**Biodiesel Labeling.** Section 130 would require federal regulations that provide for the uniform labeling of biodiesel fuel blends that are certified to meet applicable standards published by the American Society for Testing and Materials. This section would constitute a private-sector mandate because it would require approximately 1,500 biodeisel fuel pumps located in the United States to be labeled using the uniform labeling requirements of the bill. Since the actual design and cost of such labels would hinge on future regulations, CBO is unable to estimate the cost of the labeling mandate. However, due to the small number of labels that would be required, CBO expects the cost to comply with the mandate to be minimal.

**Energy Guide Labeling for Consumer Products.** Section 226 would direct the FTC, in consultation with DOE and the Environmental Protection Agency's Energy Star program, to develop regulations that would add personal computers, computer monitors, televisions, set-top boxes and digital video recorder devices to the Energy Guide labeling program. This provision would require manufacturers of such products to disclose specific energy consumption information at the point of sale in the form of an Energy Guide label and include such information in sales catalogs. Although the number of such products that would be affected is unknown, the FTC expects the aggregate costs of producing and displaying such labels would be small.

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