Federal Tax Incentives for Energy-Efficient Technologies

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ABSTRACT

As part of his National Energy Policy Report (NEP), President Bush proposed tax credits to stimulate the commercialization and sale of several innovative energy efficiency and renewable energy technologies. Since then, the U.S. House of Representatives passed H.R. 4 in July 2001, a multi-faceted energy bill that includes tax credits for a somewhat longer list of efficiency technologies. The Senate voted out its own energy bill in April 2001, containing tax incentives that differ in some ways from the House bill.

This paper, based on a larger ACEEE study (Quinlan, Geller, and Nadel 2001), reviews previous experience with tax credits for energy efficiency measures and outlines principles to follow when designing new tax credits. The paper also provides comments on the energy efficiency tax credits proposed by the Bush Administration and Congress and estimates potential energy, economic, and environmental benefits that could result from Administration and Congressional proposals. Complete details can be found in the full report.

Review of Previous Energy Efficiency Tax Incentives

Tax incentives to stimulate adoption of both residential and business energy efficiency measures were first enacted during the 1970s. The Energy Tax Act of 1978 included a 15 percent tax credit up to a maximum of $300 for residential conservation and renewable energy measures including insulation, storm windows and doors, weather-stripping, and furnace modifications. From 1978 through 1985, there were about 30 million claims for the residential tax credit, amounting to nearly $5 billion in lost revenue. Studies indicate that most of the energy efficiency measures probably would have been installed even without incentives, resulting in a high free rider level.

The Energy Tax Act of 1978 also included a 10 percent tax credit for specified energy efficiency measures installed by businesses. The measures included heat recovery equipment, waste heat boilers, energy control systems, and economizers. The act was amended in 1980 to add cogeneration equipment. This credit cost the Treasury approximately $5 billion for the period 1978 through 1982. Due primarily to the small amount of the credit, the legislation had little effect on corporate decision-making (ASE 1983; GAO 1985). Both the residential and business tax credits applied to conventional efficiency measures and therefore did not strongly encourage technological innovation.

Principles for New Energy Efficiency Tax Incentives

Federal income tax incentives can stimulate investment in key technologies that need incentives to make an impact in the marketplace. There is a tension between targeting proven products, which may be favored by their well-established producers, and less-mature technologies that need more support but also risk negative outcomes such as propping up non-viable businesses or deploying technologies that do not perform consistently. One way to resolve this tension is to set performance levels for end-use technologies that permit multiple products and system designs to qualify for incentives. However, there is no guarantee that a given technology or product will not fail in the market. To minimize this risk, tax incentive legislation often spreads incentives across multiple technologies and markets, limiting the total subsidy in a given area.

The following principles are suggested for crafting new energy efficiency tax incentives. These principles are meant to yield the greatest return on public investment, assuming that the funds available for tax credits are limited. To be effective, tax incentives should:

- stimulate commercialization of advanced technologies;
- establish performance criteria and pay for results;
- pay substantial incentives;
- choose technologies where first cost is a major barrier;
- be flexible in terms of who receives the credit;
- complement other policy initiatives;
- select priorities but 'hedge bets;" and
- allow adequate time before phasing out the incentives.

Review of Administration and Congressional Energy Efficiency Tax Incentive Proposals

The Bush Administration, through the NEP, proposed tax credits for several technologies, including combined heat and power (CHP) systems and hybrid and fuel cell vehicles. The NEP also encouraged "market-based" incentives for additional technologies and programs (NEP 2001). In the same timeframe, both houses of Congress passed energy bills that include tax incentives. In the House of Representatives, an omnibus bill, the "Securing America's Future Energy (SAFE) Act of 2001" (H.R. 4), passed in July and contains tax incentives for energy-efficient appliances, fuel cell vehicles, hybrid and electric vehicles, and efficient commercial buildings and homes. The Senate bill that passed in April 2002 contains provisions in these areas, plus incentives for residential heating, cooling, and hot water equipment. The following sections summarize ACEEE's analysis of these technologies and review congressional bill provisions.

Vehicles

Cars and light trucks are an obvious target for tax credits since innovative, fuel-efficient vehicles are under active development worldwide. Hybrid vehicles combine a small energy storage system, such as a battery, and an internal combustion engine, thereby overcoming the range problem inherent in all-electric vehicles. Tax credits for hybrid vehicles should include minimum fuel economy thresholds reflecting significant efficiency improvements relative to typical vehicles in any size class plus requirements that criteria emissions at least meet the prevailing standards for gasoline-fueled cars in the same model year.

Manufacturers have announced plans to introduce these vehicles but market acceptance is uncertain and first cost is a barrier. The NEP recommended the creation of an income tax credit for the purchase of hybrid and fuel cell vehicles. Working from language developed in a collaborative effort involving public-interest organizations (including ACEEE) and the automakers Honda, Toyota, and Ford, Senator Hatch (R-UT) introduced the ‘‘Clean Efficient Automobiles Resulting from Advanced Car Technologies (CLEAR) Act of 2001” (S. 760). The CLEAR Act was later introduced in the House of Representatives by Representative Dave Camp (R-MI). These identical bills set tax credits for efficient fuel cell, hybrid, electric, and alternative fuel vehicles, as well as alternative fuel supplies and infrastructure.

An amended version of the CLEAR Act was included in H.R. 4. The new language is seriously flawed due to industry-requested changes that aim to qualify low-efficiency cars and light trucks for sizeable federal incentives and that also eliminate emissions requirements from the qualification criteria. One provision, entitled a “conservation credit,” perversely credits the very lowest mileage vehicles. These changes should be rejected, and policy-makers should stay with the original CLEAR Act instead. The Senate bill includes similar auto efficiency credits but stays much closer to the CLEAR Act provisions.

Buildings

H.R. 4 includes tax credits for the cost of upgrading new homes (up to $2,000 per home) that reduce energy use at least 30 percent relative to the International Energy Conservation Code (IECC), a widely used model building code. The Senate bill offers credits for the actual costs up to $1,250 for a 30 percent improvement and up to $2,000 for a 50 percent improvement. By contrast, the House bill is overly generous—the $2,000 tax credit for 30 percent savings is in some cases higher than the incremental cost needed to qualify and would thus tend to inflate cost estimates. The multi-tier approach is preferable because it would encourage and reward higher levels of energy performance, and the Senate bill would achieve its results at lower fiscal impact.

Commercial buildings have been recognized for years as a significant source of untapped energy efficiency potential. H.R. 4 authorizes a deduction (rather than a credit, because the deduction is more useful to real estate investors) of $2.25 per square foot for commercial buildings that reduce energy use at least 50 percent relative to ASHRAE Standard 90.1. The Senate bill contains a very similar provision. This incentive would be a useful inducement for a new generation of high-efficiency buildings.

H.R. 4 also includes a tax credit for saving energy in existing homes of 20 percent of the cost of envelope improvements, up to a limit of $2,000. The credit would go to homes that reduce energy use using conventional insulation and window improvements, with criteria based on the IECC. These “tried and true” efficiency measures are well developed in the market and hence tax credits would primarily serve to promote additional sales of these products, but probably would not contribute to long-term market development. For this reason, an existing homes tax credit defined as broadly as H.R. 4’s, while it would save some energy, may not be as good an investment of federal funds as many of the other credits discussed in this paper. The Senate bill reduces the percentage of the credit to 10 percent and the maximum credit to $300, and permits homes that reduce their heating and cooling use by

30 percent or more to qualify. Both bills fail to include cost-effective measures like framing air sealing and air duct sealing for existing homes.

Building Equipment

Several federal programs and policies currently promote the adoption of energy efficiency measures in residential and commercial buildings, including state and local building codes, appliance and equipment efficiency standards, and labeling and promotion efforts such as the U.S. Environmental Protection Agency/Department of Energy's (EPA/DOE) ENERGY STAR® labeling program. Federal tax credits for building equipment should complement rather than duplicate these important efforts. The credits should be available to both individuals and businesses, and should include central air conditioners and electric heat pumps, furnaces, advanced water heaters, natural gas heat pumps, and building fuel cells. Energy efficiency tax incentives were introduced for building equipment in several bills, including S. 596 introduced by Senator Bingaman (D-NM), H.R. 2392 introduced by Representative Inslee (D-WA), and S. 207 introduced by Senator Bob Smith (R-NH). In H.R. 4, fuel cells for buildings are included but other promising technologies are not listed. No tax credits for high-efficiency building equipment have been proposed by the Bush Administration.

The Senate bill includes tax credits for energy-efficient air conditioners and heat pumps, proposing a credit of $250 for central air conditioners and heat pumps with a seasonal energy efficiency rating (SEER) of at least 15 and an energy efficiency ratio (EER) of at least 12.5. The tax credits would help to increase the market share and reduce the first cost premium for high-end units that now have only about a 1 percent market share. The bill also includes credits of $250 for ground-source heat pumps with an EER of 21 or higher.

Furnaces and furnace fan motors are significant sources of potential savings due to continuing advances in furnace and blower-motor design. In particular, improvements in motors used to distribute conditioned air are attractive opportunities for significant homeowner savings. Moreover, since most furnace fans are also used to distribute air from central air conditioning systems, efficiency improvements would also reduce peak power demand, lessening the stress on utilities. The House bill offers no incentives for furnaces; the Senate bill includes credits of $250 for advanced natural gas furnaces that achieve a 95 percent annual fuel utilization efficiency (AFUE). A possible conference compromise, developed by a bipartisan group of Senators, may reduce the furnace-only credit to $125 and add a credit for high-efficiency aid distribution fans.

Heat pump water heaters are two to three times more efficient for heating water than conventional electric resistance water heaters. Heat pump water heaters have been produced on a limited basis for many years but have never caught on due to high first cost, limited availability, and technical problems. Several new units are about to enter the market, making this a good time to stimulate production of and demand for this promising technology. While there is no House provision for this technology, the Senate bill contains credits for heat pump water heaters of $75 for units with energy factors (EFs) of 1.7 or higher.

The average gas water heater sold today has an EF of approximately 0.56; very few units are sold with an EF of 0.65 or greater. New efficiency standards recently set by DOE take effect in January 2004 and raise the average EF for gas water heaters to 0.58–0.61 depending on storage capacity. Incentives for high-efficiency gas water heaters with an EF of

0.80 or higher, and possibly lower incentives for units at 0.65 and above, could generate significant energy savings. In addition, combined water heating/space heating systems should be eligible for the same credit, provided that their water heating efficiency meets the 0.65 or 0.80 levels. The House bill contains no water heater incentives; the Senate bill offers $75 for units with an EF of 0.80 or higher. A possible conference compromise, developed by the bipartisan group of Senators, may create $150 credits for units at 0.80 and above and $50 for units at 0.65 and above.

Fuel cells are a very promising distributed generation technology offering the potential to cogenerate electricity and useful thermal energy with very low emissions and high electrical conversion efficiencies. All types of fuel cells are still burdened with high capital costs. Phosphoric acid fuel cell systems cost about $3,000 per kilowatt (kW), similar to the expected market entry cost for other types of fuel cells. H.R. 4 includes a 10 percent credit up to a maximum of $1,000/kW for fuel cell systems installed in buildings. The Senate bill raises the percentage of the credit to 30 percent but keeps the maximum at $1,000/kW.

Microturbines are beginning to enter the commercial building market. However, their energy conversion efficiency is typically low (less than 30 percent). Thus, unless they are designed as CHP systems, microturbines can be less efficient than the combined-cycle central generation systems that are now widely sold (with typically above 50 percent conversion efficiency). The House bill does not provide incentives for microturbines, but a last-minute amendment in the Senate bill created an investment tax credit of 10 percent up to $200/kW for an system with an efficiency level of 26 percent or greater.

Distribution transformers are used to reduce electricity voltage from the high-voltage levels used for distribution down to the levels used by consumers. Higher-efficiency transformers are now commercially available that reduce losses by about 30 percent on average. However, further efficiency levels are possible through use of improved core materials. Tax credits for very efficient transformers would help spur the commercialization and sale of transformers that significantly exceed the performance level of the ENERGY STAR transformer program. Neither bill in Congress offers incentives for transformers.

Appliances

Among the various household appliances, two types stand out as candidates for tax credits—refrigerators and clothes washers. In both cases, large energy savings are technically feasible and cost-effective on a life-cycle cost basis. In the case of refrigerators, a new federal refrigerator efficiency standard went into effect in July 2001 that brings the average energy use of new refrigerators down to 500 kilowatt-hour (kWh) per year. Still, substantial additional efficiency improvements are possible, with some studies estimating that annual energy use could ultimately be reduced to under 300 kWh. ACEEE recommends that credits be offered for products that exceed the new federal standard by 10–15 percent (as contained in S. 686 by Senator Lincoln [D-AR] and H.R. 1316 by Congressman Nussle [R-IA]) and that credits also be considered for higher levels of efficiency improvement. Similarly, new clothes washer standards have just been set, with the more stringent standard taking effect in 2007. Tax credits in the Lincoln and Nussle bills would promote these efficiency levels prior to 2007 and would also include higher credits for units that exceed these new standards. The Lincoln and Nussle bills' provisions have been included in both H.R. 4 and the Senate bill.

Combined Heat and Power Systems

A wide range of advanced CHP technologies is under development for supplying electricity and useful heat in buildings applications. These technologies include engine-based, gas turbine-based, and fuel cell-based systems, operating on natural gas or other clean fuels. Tax credits would assist CHP in overcoming several barriers, including technology cost, bureaucratic and regulatory burdens, and interconnection costs. If these challenges are addressed, CHP has the potential to provide an estimated 50,000 megawatts (MW) of power capacity to U.S. electric grids by 2010—more than 5 percent of current U.S installed capacity.

In the NEP, the Administration proposed either investment tax credits or shorter depreciation periods for qualifying CHP systems. Following the release of the NEP, several bills were introduced in Congress that proposed a 10 percent investment tax credit for qualifying CHP systems. H.R. 4 includes a 10 percent investment tax credit for qualifying CHP systems installed by businesses, coupled with a longer 22-year depreciation schedule for many systems earning the credit. This longer depreciation period offsets the value of the credit for many new CHP systems, and this provision should thus be removed. The House bill also limits the tax credit to systems over 50 kW; this provision should be changed to remove the 50 kW floor and to add a cap of 15 MW, since incentives are more important for small systems than for large systems. The Senate bill includes the same provisions as H.R. 4, although an amendment to correct the two problems discussed above may be offered in conference.

Under all of the bills, a qualifying system would need to produce at least 20 percent of its useful energy as electrical or mechanical power and at least 20 percent as thermal energy, with an overall efficiency of at least 60 percent (up to 70 percent for larger systems).

Potential Impacts

Over the past several years, members of Congress have drafted a host of bills containing various energy efficiency tax credits and depreciation modifications. In order to be able to judge the merits of these bills, Congress and the Administration have requested estimates of the revenue effects. The Treasury and the Congressional Joint Committee on Taxation (JCT) have provided revenue impact estimates or "scoring" for a variety of measures. There is considerable variation in the scoring estimates, reflecting differences in assumptions and methods but also the difficulty in long-term forecasting of participation levels and other associated inputs to the estimates. In July 2001, JCT provided Congress with the estimated revenue effects of both the energy efficiency and supply-side provisions of H.R. 4 (JCT 2001). The total estimated revenue impact of the efficiency-related provisions was estimated to be approximately $5.4 billion, with the advanced vehicles and existing homes provisions accounting for three-quarters of the total impact. In September 2001, JCT submitted revenue impact estimates for selected provisions in S. 596, and energy efficiency measures were estimated to have an approximately $4.5 billion impact. However, this estimate does not include vehicles, an item that JCT estimated would cost approximately $2.7 billion.

In 1999, the Treasury estimated that energy efficiency tax credits similar to those described in this paper would cost the federal government $8.3 billion during 2000–2009.

Over the lifetime of products qualifying for the credits, carbon emissions would be reduced by 100–150 million metric tons (MMT) (DOT 1999). The Treasury also estimated that due to the credits, consumers and businesses would realize energy savings worth $22–33 billion. Around the same time, DOE's Energy Information Administration (EIA) estimated that a similar package of energy efficiency tax credits would only cut carbon emissions by 1.6 MMT in 2010 (EIA 1999). The large difference between these estimates stems from the fact that EIA attributed very small savings to many of the credits, an approach that has earned EIA substantial criticism.

The JCT, Treasury, and EIA analyses considered only the direct effects of the tax credits—impacts from measures actually receiving credits. But economies of scale, technology learning, and market development are very likely to lead to indirect impacts many times greater than the direct impacts, as the Treasury and DOE acknowledge. While somewhat speculative, we present below estimates of plausible indirect effects assuming that the credits discussed above (along with research and development [R&D] and related deployment efforts) are successful in stimulating commercialization and sale of the various advanced energy-efficient technologies. JCT is expected to re-score both the House and Senate energy tax incentive provisions prior to the bill conference.

Energy Savings

ACEEE estimated annual energy savings for each of the proposed tax credits from 2002 through 2020. Annual energy savings potential from the listed tax incentives are impressive: 0.6 Quads in 2006; 1.1 Quads in 2010; 2.1 Quads in 2015; and 3.2 Quads in 2020 (the United States used about 100 Quads in 2000). Energy savings continue to increase after expiration of tax credits due to indirect impacts—i.e., sales of the products after the incentives expire. These sales result from increased purchaser knowledge about, and interest in, the efficient products as well as lower product prices engendered by the impact of tax credits on product development and sales. Of the cumulative savings achieved, about 40 percent are achieved by CHP systems, with new commercial buildings accounting for 25 percent and new homes, fuel cell cogeneration, and hybrid vehicles each accounting for 4–9 percent. Other measures accounting for at least 2 percent of the savings are gas furnaces, heat pump water heaters, energy-efficient appliances, and gas furnaces. These results are summarized in Table 1.

Table 1. ACEEE Estimates of Direct Costs, Cumulative Energy Savings, and Energy Savings per Dollar of Federal Spending from Selected Tax Credits

Tax Credit	Direct Cost ($million)	Lifetime Energy (Quads)	Energy per Dollar (mBtu/$)	Rank (Energy per Dollar)
Fuel cell cogeneration	100	4.2	42	1
Combined heat & power	1,000	29	29	2
Commercial buildings	1,400	18	13	3
Heat pump water heaters	250	2.2	8.9	4
Gas heat pumps	120	0.9	7.5	5
New homes	940	6.3	6.8	6
Hybrid vehicles	760	3.1	4.1	7
Transformers	290	0.9	3.1	8
Gas furnaces	750	2.3	3.1	9
Appliances	440	0.8	1.8	10
Central air/heat pumps	1,000	1.5	1.5	11
Electric/fuel cell vehicles	290	0.4	1.3	12
TOTAL	7,300	70	9.6	

Notes: Direct costs are the cost to the Treasury. Energy savings are lifetime savings for measures installed through 2020. A Quad is 10^{15} British thermal units (Btus).

Economic Impacts

ACEEE estimates that the total cost to the Treasury, over the lifetime of the tax incentives listed in Table 1, will be $7.3 billion. Revenue losses for each of the specific tax credits are also listed in Table 1. Overall, our estimate of costs is similar to those of JCT and the Treasury, although estimates for individual measures do differ.

In addition to costs, we estimated the benefits of each of the measures. The energy savings in each year were monetized for measures installed from 2002 through 2020, resulting in total present value energy savings of about $200 billion. Comparing this estimate for the present value of lifetime energy savings with the present value of federal costs yields a benefit-cost ratio of about 30 to 1. Similarly, the present value of total costs associated with the credits (federal costs plus consumer costs) is estimated by ACEEE to be approximately $87 billion through 2020. Comparing the present value of lifetime costs to lifetime benefits yields an overall benefit-cost ratio of about 2.3 to 1. Net benefits (value of energy savings minus costs) are about $190 billion from the federal perspective and $110 billion overall. Table 2 lists the benefit-cost ratios for each measure from both the federal and overall perspectives.

Table 2. Benefit-Cost Ratios for Tax Credit Measures from Both Federal and Overall Perspectives

Tax Credit	Overall Benefit-Cost Ratio	Federal Benefit-Cost Ratio
Commercial buildings	5.4	30
Transformers	3.9	8
Combined heat & power	3.1	100
Heat pump water heaters	2.5	32
New homes	1.6	15
Gas heat pumps	1.6	26
Central air/heat pumps	1.4	7.1
Gas furnaces	1.4	10
Hybrid vehicles	1.3	23
Appliances	1.2	7.4
Fuel cell cogeneration	1.2	130
Electric/fuel cell vehicles	0.5	7.5
OVERALL	2.3	30

Emissions

Emissions of selected criteria pollutants would also be reduced by tax credits. Emission reductions for sulfur dioxide (SO_2), nitrogen oxides (NOx), and carbon were estimated using factors relating emission rates to fossil fuel energy use. By 2020, the tax incentives would reduce annual NOx emissions by approximately 370,000 metric tons per year and annual SO_2 emissions by approximately 120,000 metric tons per year.

Regarding carbon emissions, we estimate that all equipment directly qualifying for the energy efficiency tax credits would reduce carbon emissions by about 12 MMT in the year 2006. With growing adoption of the advanced technologies following the phase-out of the credits, avoided carbon emissions could reach around 22 MMT per year by 2010 and 60 MMT per year by 2020. The cumulative reduction during 2000–2020 could be over 500 MMT. This is equivalent to about 4 months of U.S. carbon emissions at the current emissions rate.

Tax incentives would help to establish technologies that would have a modest but non-trivial impact on U.S. emissions of carbon and criteria pollutants within a decade. In addition, avoided emissions should continue to increase as market penetration grows, even after the incentives phase out.

Ranking the Credits

In recognition of federal budgetary uncertainties and the possibility that there might not be sufficient money to fund all the tax credits discussed in this paper, we ranked the credits on several criteria (summarized in Table 3). First, the different tax credits were compared in terms of energy savings per dollar of federal spending. The five measures with the highest savings per federal dollar are fuel cell cogeneration, CHP systems, new commercial buildings, heat pump water heaters, and gas heat pumps. The five measures with the lowest savings per federal dollar are electric and fuel cell vehicles, residential central air conditioners and heat pumps, appliances, gas furnaces, and transformers. On the other hand, even for the lower-ranked measures, tax credits could lay the groundwork for stronger minimum-efficiency requirements, which would dramatically increase the energy savings achieved (all five of these products are covered by existing or pending federal standards).

Table 3. Ranking the Different Tax Credits Based on Three Criteria

Tax Credit	Overall Benefit-Cost Ratio	Rank	Total Savings (Quads)	Rank	Energy per Federal Dollar (mBtu/$)	Rank	Average Rank	Rank
Combined heat & power	3.1	3	29	1	29	2	2.00	1*
Commercial buildings	5.4	1	18	2	13	3	2.00	1*
New homes	1.6	5	6.3	3	6.8	6	4.67	3
Heat pump water heaters	2.5	4	2.2	7	8.9	4	5.00	4
Fuel cell cogeneration	1.2	11	4	4	42	1	5.33	5
Gas heat pumps	1.6	6	0.9	10	7.5	5	7.00	6*
Transformers	3.9	2	0.9	11	3.1	8	7.00	6*
Hybrid vehicles	1.3	9	3.1	5	4.1	7	7.00	8
Gas furnaces	1.4	8	2.3	6	3.1	9	7.67	9
Central air/heat pumps	1.4	7	1.5	9	1.5	11	9.00	10
Appliances	1.2	10	0.8	8	1.8	10	9.33	11
Electric/fuel cell vehicles	0.5	12	0.4	12	1.3	12	12.00	12
OVERALL	2.3		70		9.6			

* Tied with other credits.

Second, we ranked the different tax credits on the basis of overall benefit-cost ratio. The five measures with the best (highest) benefit-cost ratios are commercial buildings, transformers, CHP systems, heat pump water heaters, and new homes. Measures that rank highly under this set of criteria overlap heavily with measures that rank highly under the previous criteria, although there are differences. Measures with the lowest benefit-cost ratios are electric and fuel cell vehicles, fuel cell cogeneration, appliances, hybrid vehicles, and gas furnaces. The lower-ranked measures involve either cutting-edge technologies such as fuel cells for which time is needed for costs to decline and sales to increase or technologies such as appliances and furnaces where substantial energy savings have already been achieved and remaining savings are more expensive.

Third, we compared measures on total energy savings, since an objective of a federal energy bill is to reduce national energy use and thus measures with high savings should be favored. By this measure, the highest-ranked measures are CHP systems, commercial buildings, new homes, fuel cell cogeneration, and hybrid vehicles.

Across the three sets of rankings, several measures are consistently high on the list, such as CHP systems and commercial buildings (top 5 on all three measures). Other measures are ranked high on some criteria and low on others. To help show overall trends, in the final column of Table 3 we calculate average rank across all three criteria. Using this overall average, the top five measures are CHP systems, commercial buildings, new homes, heat pump water heaters, and fuel cell cogeneration. Of course there are other ways to rank measures and thus these results should be considered indicative rather than definitive.

Congressional Update

The House and Senate bills were awaiting conference at publication time for this paper. Table 4 summarizes ACEEE's projections as of May 2002 of the energy savings from the House and Senate bills. It should be noted that the credit levels in these bills are generally lower than those ACEEE had recommended; thus the energy savings estimates in Table 4 are generally lower than in our original analysis. The table shows total energy savings from the Senate tax incentives as higher than those in the House bill (15 Quads through 2020 versus 14.3). However, the House efficiency tax credit provisions were scored in May 2002 by JCT at about $6.5 billion, about double that of the Senate provisions at about $3.2 billion. While earlier scoring, performed for different bills at different times, found the overall scores of the House and Senate versions to be fairly close, we find this most recent scoring generally consistent with our analysis, which indicates that the Senate credits are more cost-effective overall.

Table 4. Comparison of Energy Savings from House and Senate Bills (Cumulative Quads for 2003–2020)

Tax Credit	House Bill	Senate Bill
Fuel cells	2.0	2.0
Combined heat & power	4.8	4.8
Commercial buildings	3.5	3.5
Gas water heaters	–	0.1
Heat pump water heaters	–	0.06
New homes	0.7	0.95
Existing homes	0.6	0.3
Hybrid vehicles	1.9	1.7
Gas furnaces	–	0.2
Appliances	0.6	0.6
Central air/heat pumps	–	0.6
Electric/fuel cell vehicles	0.2	0.2
TOTAL	14.3	15.0

Conclusion

Tax incentives, if properly structured, play a valuable role in accelerating market penetration of important energy efficiency technologies. The House energy bill has adopted several energy efficiency tax proposals but has also overburdened many of them with costly incentives that are not the most efficient uses of federal funds. The Senate tax bill is overall more effective in targeting the most appropriate technologies with appropriate incentives. Should the improvements in the Senate bill be adopted in conference, the cost-effectiveness of the credits could be significantly improved.

Acknowledgments

The authors want to acknowledge the Pew Charitable Trusts and the Hewlitt, Joyce, and Turner Foundations for their support of the analysis in the underlying ACEEE report and the preparation of this paper. We also thank Pat Quinlan and Howard Geller for their work on the underlying report.

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