ACEEE Testimony

American Council for an Energy-Efficient Economy

Submission of Steven Nadel,
Executive Director
American Council for an Energy-Efficient Economy (ACEEE)

To the Senate Finance Committee
Subcommittee on Energy, Natural Resources and Infrastructure

Hearing on: Tax Reform and Federal Energy Policy:
Incentives to Promote Energy Efficiency

Date: December 12, 2012

529 14th Street NW, Suite 600 Washington, DC 20045 P 202.507.4000 F 202.429.2248 www.aceee.org

Summary

Congress enacted energy efficiency tax incentives in 1978 and again in 2005. Some of these incentives have proven very effective, while others have not. In July of this year, the American Council for an Energy-Efficient Economy (ACEEE) published a paper on tax incentives that included a review of this experience. We found that the tax incentives of the 1980s were not very effective in spurring substantial energy savings as these credits promoted tried-and-true energy efficiency measures that many consumers and businesses were already installing on their own. Furthermore, the amount of the tax credit was too small to spur many additional installations.

Tax incentives enacted as part of the *Energy Policy Act of 2005* were more targeted, emphasizing advanced technologies and paying higher incentives. Our review found that the tax incentives for new homes and appliances were particularly effective in growing the market share for qualifying homes and appliances and that the incentives for residential heating and cooling equipment and hybrid heavy-duty vehicles were also successful in encouraging purchases of the most energy-efficient products. On the other hand, we found that the tax credit for energy-efficient windows suffered from the same problems as the 1980s credits with too many products qualifying for the incentive, increasing its cost while moderating its impact.

Based on these experiences, we have concluded that the most useful tax incentives target long-term structural changes in the market, using temporary federal assistance to build the market for energy-efficient products so tax incentives can be phased out. The market will continue to grow on its own, supported by other energy efficiency programs and policies. In this way, federal tax incentives can have a large "multiplier effect," helping to leverage future market growth. Using such a "market transformation" approach, we should target advanced technologies and practices that currently have a low market share, but with federal support over a defined period of time (e.g., five years), their market share can grow and they can better prosper on their own after the tax incentives end. By focusing on products with efficiency levels that currently have a very small market share, we can keep costs down and minimize the number of "free riders" (customers who would have installed the same equipment, even if there were no incentives).

Targeted federal tax incentives are needed because the federal government brings unique attributes that other market players (including states, utilities and product manufacturers) do not have. It will be much harder to transform markets without federal involvement. Specifically, the federal government can provide consistent incentives nationwide, rather than a patchwork where some states have incentives, others do not, and incentive levels vary from place to place. Furthermore, the federal government can set uniform national qualifying criteria, providing manufacturers a consistent target for their development efforts and increasing the likelihood that they will devote the necessary resources to develop qualifying products. Finally, the federal government has a long-term perspective and can therefore target advanced technologies that will take multiple years to develop. Other market actors, on the other hand, often tend to have a shorter-term perspective, e.g., "what can we do to meet next year's savings or profit goals?"

ACEEE analyzed the costs and savings of a five-year federal tax credit for several high-efficiency products and services. We found that all of the targeted energy efficiency tax incentives we analyzed are highly cost-effective.

The average cost to the Treasury of these credits over the 15 years analyzed is only $0.28 per million Btu saved[1]—more than an order of magnitude less than the cost of the energy resources they save. We found that the most cost-effective options include tax incentives for commercial buildings (both energy-efficient new construction and energy-saving retrofits), energy-efficient new homes, heating and cooling equipment, appliances, and combined heat and power systems. Whole-house energy-saving retrofits and replacing old chillers are also very cost-effective. Many of these items are in the bills before us today or in provisions now on the books. We recommend some changes and updates to many of these provisions.

Based on this analysis, as part of any tax reform legislation, we recommend that a limited amount of funding be set aside for the provisions with the largest energy savings per federal dollar invested. These are provisions that have a large multiplier effect and where incentives can be ended or revised after about five years. As a specific budget is established, we would be happy to work with you to develop a set of incentives that provides the most "bang per buck."

In my testimony I also discuss some problems with how equipment in commercial buildings and combined heat and power systems are depreciated. We recommend that Congress revise these depreciation periods so they are based on the average service life of this equipment.

Adoption of these recommendations will result in substantial energy savings, large energy bill reductions, and stronger U.S. manufacturers and businesses.

[1] A British Thermal Unit (BTU) is the standard unit of energy measurement in the United States. A 100 W light bulb burning for 2900 hours consumes about a million Btu's.

Introduction

My name is Steven Nadel and I am the Executive Director of the American Council for an Energy-Efficient Economy (ACEEE). ACEEE is a nonprofit research organization founded in 1980 that focuses on technologies, programs, and policies to reduce energy waste and increase the energy efficiency of the U.S. economy. Further information on our organization can be found at www.aceee.org.

We appreciate this Subcommittee's interest in exploring how energy efficiency tax incentives fit into tax reform. The United States has improved its energy efficiency enormously in recent decades, but there are large remaining energy efficiency opportunities. For example, in an ACEEE study published earlier this year, we estimated that energy efficiency could reduce overall U.S. energy use by 42% to 59% by 2050.[2] We estimate that under the high-efficiency scenarios examined in this study, an additional 1.3 to 1.9 million jobs would be generated in 2050, relative to a business-as usual-scenario.[3]

The majority of the investment needed to capture these efficiency opportunities will come from the private market, since the private market has the most capital and because it is the market, in the form of consumers and businesses, that benefits from energy efficiency savings. Additional investments will be driven by utility energy efficiency incentives and a variety of federal, state, and local policies. But as I will discuss in a few minutes, federal tax incentives have an important role to play that cannot be filled by private capital or other policies. Limited federal incentives can have a catalyzing effect, spurring large energy and cost savings and thereby helping our economy to grow.

ACEEE is a pragmatic organization and we recognize that serious tax reform will include efforts to broaden the base by reducing or eliminating many tax expenditures. In my testimony today I will discuss how Congress can continue to promote energy efficiency improvements in the United States within the confines of a constrained budget for tax expenditures. We believe some tax incentives should be preserved as part of tax reform, but that they should be modest, targeted, of proven effectiveness, and have scheduled sunset dates. The very limited funds available for tax incentives should maximize the "bang per buck" of federal expenditures.

Lessons from Prior Energy Efficiency Tax Incentives

Congress enacted energy efficiency tax incentives in 1978 and again in 2005. Some of these incentives have proven very effective, while others have not. In July of this year ACEEE published a paper on tax incentives that included a review of this experience.[4]

---

[2] These savings are estimated relative to a business-as-usual scenario based on an extrapolation of the Energy Information Administration's *Annual Energy Outlook* reference case.

[3] John A. "Skip" Laitner, Steven Nadel, R. Neal Elliott, Harvey Sachs, and A. Siddiq Khan. 2012. *The Long-Term Energy Efficiency Potential: What the Evidence Suggests.* http://aceee.org/research-report/e121. Washington, DC: American Council for an Energy-Efficient Economy.

[4] Nadel, Steven. 2012. *Energy Efficiency Tax Incentives in the Context of Tax Reform.* https://www.aceee.org/files/pdf/white-paper/energy-efficiency-tax-incentives.pdf. Washington, DC: American Council for an Energy-Efficient Economy.

The 1978 legislation provided a credit of 10% of the cost of a moderately long list of eligible consumer and business equipment. Evaluations in the 1980s found that these were not very effective in spurring substantial energy savings, as these credits promoted tried-and-true energy efficiency measures that many consumers and businesses were installing on their own. These credits primarily went to "free riders"—consumers and businesses who would have installed the efficiency measures even without a tax credit. Furthermore, these evaluations found that the value of the tax credit was too small to spur many additional installations.

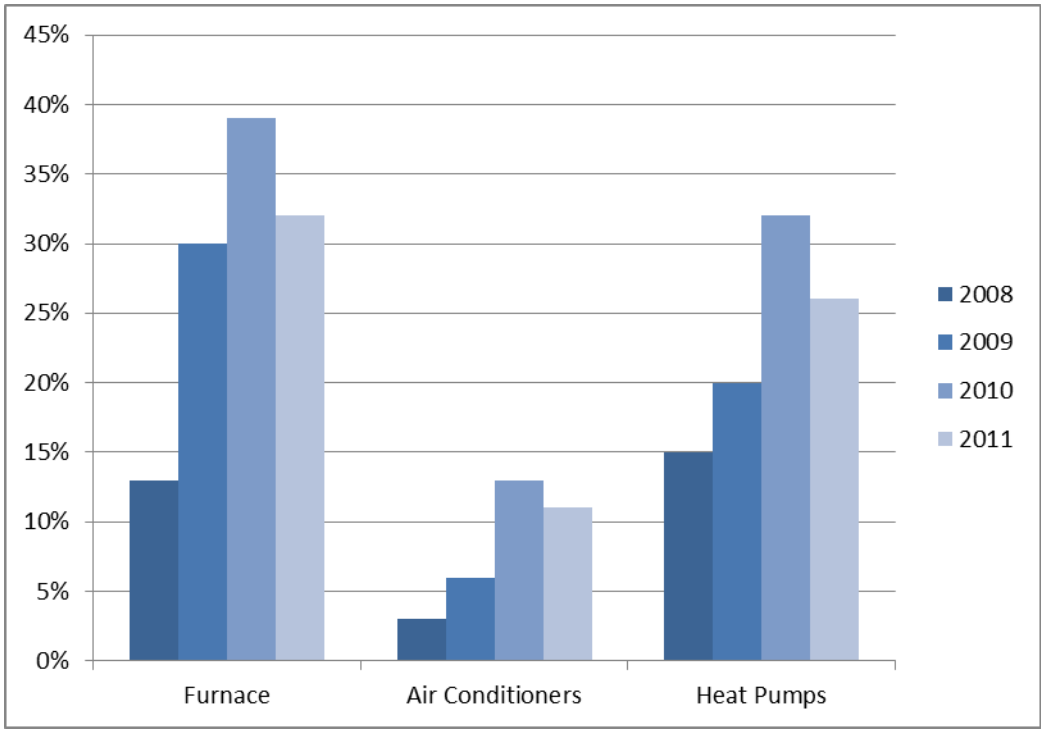
Tax incentives enacted as part of the *Energy Policy Act of 2005* were more targeted, emphasizing advanced technologies and paying higher incentives. Our review found that the new homes and appliance tax incentives were particularly effective in growing the market share for qualifying homes and appliances.

In the case of appliances, tax credits have permanently transformed the market, which is the ideal outcome. For example, for refrigerators, clothes washers, and dishwashers, the tax credits spurred manufacturers to develop, introduce, and broadly market new high-efficiency products. As these products gained in market share, the EPA/DOE ENERGY STAR® program adopted the same qualification levels, further growing the market for these products. Ultimately manufacturers agreed to make these levels the basis of new minimum-efficiency standards. At the same time, the energy efficiency levels needed to qualify for these tax incentives have been increased twice, so that the tax incentives only apply to the very highest energy-efficient products available in the market.

In the case of the new homes tax credit, qualifying homes accounted for less than 1% of new homes in 2006, but increased dramatically to about 11% in 2011, spurred by the availability of the credits.

Our review of the 2005 tax incentives also found that credits for furnaces, air conditioners, and heat pumps have been effective in spurring new product introductions and increased market share, as seen in the figure below. Likewise, the credit for heavy-duty hybrid vehicles had a significant impact on the products manufacturers brought to market, helping to establish a market for these products.

Percentage of Air-Conditioner, Heat Pump, and Furnace Shipments Qualifying for Federal Tax Incentives by Year



Note: Tax incentive was 10 percent of cost in 2008 and 2011 and 30 percent of cost in 2009 and 2010. This likely explains lower penetration in 2011.

On the other hand, we found that the energy-efficient windows tax credit had too many free riders, making its cost high and its impact less significant. Some of the other energy efficiency tax credits had low participation rates, resulting in lower than hoped market impacts, but also low costs.

From this analysis, we find that the most effective tax incentive strategy is one that effectively creates a market for more efficient products that can then be leveraged by other policies (such as utility efficiency programs, building codes, and product standards) to expand the savings. Based on these experiences, we recommend that future energy tax incentives:

- Target efficiency levels and new energy sources that currently have a very small market share, which keeps the cost of tax incentives down and minimizes the number of "free riders";
- Provide a substantial incentive to motivate significant additional sales;
- Be in place for long enough so manufacturers and other market players find it worth making investments to develop and market eligible products (e.g., about five years); and
- Should either be phased out or eligibility levels increased after that period, starting the transformation cycle again.

The Market Transformation Approach to Tax Incentives

Building on the success of the appliance and new home tax incentives discussed above, we recommend that the most useful approach to tax incentives is to target long-term structural changes in the market, using temporary federal assistance to build the market so tax incentives can be phased out and the market will continue to grow on its own, supported by other energy efficiency programs and policies. In this way, federal tax incentives can have a large "multiplier effect," helping to leverage future market growth.

While we focus on the market transformation approach to energy efficiency, this approach may apply to other energy incentives as well. An example might be the wind energy production tax credit, which helped to establish a major U.S. wind energy industry. There is now general agreement that this credit can now be phased out, although disagreement exists on the period of the phase-out. Similarly, the market transformation approach could be used to support the development of new modular nuclear power plants or the development of new advanced drilling techniques rather than using limited federal funds to support well-established technologies and practices.

Not all technologies and practices lend themselves to a market transformation approach. A market transformation approach makes sense where increased production and market share can lead to economies of scale in product development and production. This approach also applies to markets where a shortage of experienced contractors exists. In this latter case, the tax incentives can encourage additional contractors to get the training and skills needed to enter the market, helping to increase the availability of these skills and inducing more competition in these markets.

Since we assume that money for federal tax incentives will be very limited, we recommend only targeting measures where the market transformation approach can apply, in order to maximize the benefits achieved per federal dollar invested. For example, in the energy efficiency field, some useful targets for federal tax incentives include:

1. Continuing the current appliance tax credit, but updating the qualifying levels so only the most efficient products qualify. The current efficiency tiers were designed to run through 2013, so these qualifying levels will need updating for 2014 and beyond.

2. Continuing the current new home tax incentive, but introducing a new higher savings tier, phasing out the current savings tier in a few years.

3. Improving the current commercial buildings tax deduction for new buildings (specifics discussed below) so that the market share of complying new buildings can grow to sustainable levels and ultimately these levels can be considered for inclusion in state and local building codes.

4. Adding comprehensive retrofits for existing buildings to the commercial building tax deduction in order to increase the energy savings per building retrofit from today's modest levels, expand the number of experienced contractors who can serve this market, and provide more experience on the most cost-efficient methods for conducting comprehensive retrofits. By "comprehensive" we mean retrofits that combine lighting, space heating/cooling, and building shell measures, rather than just focusing on single components.

5. Promoting higher efficiency levels and practices for residential furnaces, boilers, stoves, water heaters, air conditioners, and heat pumps, building on the success of the recently expired incentives. However, relative to the recently expired incentives for these products, qualification levels should be tightened, including requiring furnaces to also contain high-efficiency supply-air fans, specifying a test procedure and increasing the efficiency levels for biomass heating equipment, and requiring installation in accordance with the Air Conditioning Contractors of America ACCA-QI quality installation specification (or equivalent specifications).

In summary, we suggest that ripe targets for market transformation be selected and incentives customized for those markets. Others might argue that incentives should be very broad, such as a specified payment per Btu saved, in order to encourage all potential technologies to compete, rather than "picking winners and losers." We do not think this alternative is a good idea, because the technologies that are likely to get most of the money will be tried and true technologies that are likely to be purchased without any tax incentives (e.g., "free riders"). Providing incentives in this way will primarily just pay some people and businesses for things they would do anyway, without contributing significantly to transforming markets. Instead, we should concentrate on market segments where a medium-term "nudge" can help long-term markets to prosper. We do, however, recommend that within specific tax incentives (e.g., commercial building retrofits), a technology-neutral approach be used that bases tax incentive eligibility on performance metrics. For example, for commercial building retrofits, we recommend a criterion of 20% energy savings relative to current consumption, leaving it to contractors to choose which measures to employ to reach 20% savings. Likewise, for appliances, efficiency levels should be chosen, as measured using standard test procedures, leaving it to manufacturers to decide which technologies to employ to reach these levels (e.g., insulation, controls, or better motors).

The Unique Role Federal Tax Incentives Can Play

Using a market transformation approach, federal tax incentives can play a unique role, helping to complement energy efficiency efforts by states, utilities, and the private marketplace. It will be much harder to transform markets without federal involvement. The federal government brings unique attributes that other players do not have:

- The federal government can provide consistent incentives nationwide, rather than a patchwork where some states have incentives, others do not, and incentive levels vary from place to place.

- The federal government can set uniform national qualifying criteria, providing manufacturers a consistent target for their development efforts and increasing the likelihood that they will devote the necessary resources to develop qualifying products. A variety of utilities and states have set their own criteria, creating a challenging market for manufacturers.

- The federal government has a long-term perspective and can therefore target advanced technologies that will take multiple years to develop. Other market actors (such as utilities and equipment manufacturers) often have a shorter-term perspective, e.g., "what can we do to meet next year's savings or profit goals?" Furthermore, some firms prefer to be "followers" rather than "leaders," learning from the successes and failures of the leaders. But if incentives are provided to the leaders for just a few years, then more firms will be encouraged to lead.

Maximizing Benefits per Dollar of Federal Investment

ACEEE's July 2012 white paper [5] analyzed the costs and savings of a five-year federal tax credit for several high-efficiency products and services to help guide targeting of energy efficiency tax incentives. We analyzed the costs and savings of a five-year federal tax credit for high-efficiency products and services, including estimated effects on the market for these products and services over the following decade. Results of this analysis are summarized in the table below:

	Five-Year								
	Cost to	Electricity Savings			Fuel Savings			Federal $/	
	Treasury	5th Year	15th Year	Lifetime	5th Year	15th Year	Lifetime	Lifetime	
Item	($millions)	(GWh)	(GWh)	(GWh)	(TBtu)	(TBtu)	(TBtu)	mBtu	Rank
Increasing commercial building deduction to $3/sf	$52	552	2,636	158,139	2	10	599	$0.02	1
New homes -- extend current credit	1,076	2,590	14,608	876,505	10	96	5,785	0.07	2
Commercial building retrofits (20%+ savings)	843	14,349	34,678	520,164	40	106	1,596	0.12	3
Water heaters -- heat pump and advanced gas	1,308	3,841	32,035	416,459	7	95	1,229	0.24	4
CHP -- remove size cap but limit to 25 MW/system	270	0	0	0	38	64	956	0.28	5
A/C & HP SEER 16 installed per ACCA-QI	2,426	8,162	35,262	634,707	13	94	1,698	0.30	6
Residential appliances -- extend and update	1,148	2,624	18,371	275,562	3	41	612	0.34	7
Furnaces (95% AFUE + efficient fan)	901	897	3,545	63,808	13	105	1,886	0.36	8
Advanced windows (DOE U .22 spec)	504	538	2,984	59,674	3	16	328	0.54	9
New homes -- 50% whole home savings	646	1,203	3,488	69,758	7	21	411	0.58	10
Whole house retrofits (20%+ savings)	1,875	1,269	3,808	68,544	13	40	722	1.33	11
Replace CFC industrial & commercial chillers	236	1,665	0	16,646	0	0	0	1.42	12
Insulation and sealing for homes per 25C	2,022	1,540	1,586	31,717	22	27	549	2.33	13
Totals	$13,300	39,200	153,000	3,191,700	170	720	16,400	$0.28	

Note: "Lifetime" means cumulative energy savings over the 15-year period analyzed.

Two key points emerge from this analysis:

- All of the energy efficiency tax incentives analyzed are highly cost-effective. The average cost to the Treasury of these credits over the 15 years analyzed is only $0.28 per million Btu saved—more than an order of magnitude less than the cost of the energy resources they save.[6] All of the options analyzed had lifetime costs under $2.50 per million Btu.

- The most cost-effective options analyzed include commercial buildings (both energy-efficient new construction and energy-saving retrofits), energy-efficient new homes, heating and cooling equipment, appliances, and combined heat and power systems. Whole-house energy-saving retrofits and replacing old chillers are also very cost-effective. Many of these items are in the bills before us today.

[5] See Footnote #4.

[6] For example, the Energy Information Administration, in their just-released *2013 Annual Energy Outlook,* estimates that natural gas will average $7.83 per Btu over the 2012-2040 period. See http://www.eia.gov/forecasts/aeo/er/pdf/0383er%282013%29.pdf.

The Bills Before Us Today

Three bills are before us today:

- S. 3591, Commercial Building Modernization Act
- S. 1914, Cut Energy Bills at Home Act
- S. 3352, Expanding Industrial Energy and Water Efficiency Incentives Act

I discuss each in turn.

Commercial Building Modernization Act

This bill will make the Section 179D commercial building tax deduction now on the books more workable and adds a new Section 179F to specifically promote retrofits to existing commercial buildings. We support this bill.

The current 179D provision has had limited participation because the incentives are low relative to the costs involved, qualifying for envelope and heating/cooling incentives is very difficult, and some property owners are effectively not eligible. This bill corrects these problems. Another problem not addressed by this bill is that the energy modeling requirements to qualify for incentives can be difficult and hence expensive. We recommend that a provision be added to direct the Treasury and Energy Departments to research this issue and to develop simplified approaches within one year of enactment.

The current 179D provision rarely addresses building retrofits since it is very difficult to meet the 50% savings threshold in an existing building. This bill addresses this issue by adding a new incentive for savings of 20% or more in existing buildings, with the incentive increasing as savings increase.

This market is ripe for development but there are contractors qualified to do these retrofits in only a few regions at present. An incentive like this will help contractors become established to perform comprehensive building retrofits. Also, many retrofits today focus on single systems (e.g., lighting) and as a result have only modest savings. By promoting retrofits that address multiple systems simultaneously and in synergistic ways, we can increase savings substantially.

I would note that in our analysis of prospective tax incentives discussed previously, the 179D and 179F provisions were the first and third most cost-effective, making this bill a very high priority.

Cut Energy Bills at Home Act

This bill would provide a performance incentive for reducing energy use in existing homes by 20% or more. This bill will promote comprehensive retrofits to homes—retrofits that combine multiple measures such as insulation, improved heating and cooling systems, and sealing homes and ducts to reduce air leaks. This bill builds on the EPA/DOE Home Performance with Energy Star program that has helped to develop whole-home retrofit procedures and train and certify contractors in these procedures, working with the Building Performance Institute and others.

Whole-home retrofits save more energy than individual weatherization measures. Furthermore, with a whole-home retrofit, measures can be designed as a complementary package, reducing costs relative to individual

measures. For example, if insulation is installed and home and duct sealing performed, often a smaller heating and cooling system can be installed, reducing the cost of a new system.

The intent of this bill is to help grow this nascent home performance industry. Since not many whole home retrofits are currently performed, costs should be modest and free rider levels low. This bill will be much lower cost than the window and insulation credits that it replaces. In our analysis we estimate an average cost of about $375 million per year (lower in the early years, higher in years four and five). By comparison, the prior home weatherization incentive, the 25C program, was found by GAO to cost the Treasury $5.3 billion in 2009, the last year for which data are available.[7]

Many states started home performance programs under ARRA, but these were short-term efforts that have now generally ended. This bill would build on these prior efforts and help bring the home performance industry to the next level. Our analysis found that this bill would save energy at an average federal cost of $1.33 per million Btu saved. We support this bill due to this low cost, and to the fact that it will support development of the home performance industry so it can better prosper and serve homeowners in the future.

Expanding Industrial Energy and Water Efficiency Incentives Act

This bill includes four provisions addressing water reuse, advanced motors, replacement of old inefficient chillers, and expanding existing incentives for combined heat and power (CHP). In our analysis we examined both the CHP and chiller provisions.

The CHP provision expands the incentive that Congress enacted in 2008 to include larger equipment, but in ways that keeps the cost to the Treasury modest. CHP systems generate both heat and electricity together, substantially reducing energy use relative to using a generating plant to produce electricity and a separate boiler to produce heat. CHP systems often make sense in facilities with significant heat loads such as factories, universities, and hospitals. Under the current credit, incentives are available for systems up to 25 MW in size, but the incentive only covers the first 15 MW. S. 3352 eliminates the cap on overall system size, allowing large systems to qualify, but caps the incentive at 25 MW per system, helping to keep costs in check. CHP systems tend to become more cost-effective as their size increases, so the change provides the greatest incentive to smaller systems without eliminating some incentive for systems above 25 MW. By providing some incentive for larger systems we eliminate the current distortion that a system of 25 MW qualifies for a credit while a 26 MW system receives none. With this new provision, both of these systems, as well as a 100 MW system, would receive the same incentive. This incentive will spur greater use of CHP systems, providing more examples of installations that others can learn from. In our analysis this provision was highly cost-effective, with a federal cost of only $0.28 per million Btu saved.

The chiller provision would provide a credit to encourage replacement of old inefficient chillers with CFC refrigerants. CFCs harm the ozone layer and have not been permitted in new chillers for many years. However, some of the old chillers remain, leaking CFCs and using excessive amounts of energy. Building owners are reluctant to replace these chillers due to the upfront costs. The proposed incentive would cover part of these costs,

[7] U.S. General Accounting Office. 2012. *Factors to Consider in the Design of the Nonbusiness Energy Property Credit*. GAO-12-318. Washington, DC: U.S. General Accounting Office.

but would be available for only three years. Building owners would have a limited window to take advantage of the incentive. The bill also includes innovative provisions to require an energy audit to look for opportunities to reduce cooling loads and provides further incentives if the chiller is downsized. These provisions will encourage engineers to develop expertise in system downsizing, which will be useful after the incentives expire. Qualifying chillers are required to meet chiller efficiency levels established by the American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) in 2007. ASHRAE is now finalizing an update to its chiller efficiency standards and we recommend that this bill be updated to refer to the revised ASHRAE standard. We estimate this incentive will have a federal cost of $1.42 per million Btu saved.

We did not examine the water reuse and advanced motor provisions in our analysis due to difficulties in obtaining data. We support both provisions, but as lower priorities than the CHP and chiller provisions. In the case of the advanced motor provision, the major barrier to including these motors in equipment is the cost to reengineer and retool the equipment to accommodate the advanced motor. The credit goes to the equipment manufacturer to offset this non-recurring cost of redesigning their product, so that once the redesigned product is introduced the manufacturer will be motivated to continue to offer the equipment without the need for incentives.

Regarding water reuse, U.S. manufacturers are facing increasing challenges due to limited water resources in many locations. If these firms are to remain competitive, they will need to deploy new technologies that reduce the sourcing of water from public resources. Deploying technologies that require less water or are able to reuse water are critical. These technologies are not in common use today, so the tax credit is intended to build awareness and experience deploying them, reducing the perceived risk to manufacturers.

Additional Energy Efficiency Issues to Consider as Part of Tax Reform

I want to raise two additional issues for the Committee's consideration relating to depreciation periods and the option of repayable tax incentives.

Depreciation Periods

Under current law, the depreciation period for many types of equipment is written into the law, and some of these depreciation periods bear little relationship to typical service lives in the field. Particularly egregious are the depreciation periods for equipment in commercial buildings, including heating and cooling systems, lighting fixtures and controls, and roofing systems. Currently, this equipment is depreciated over 39 years, the same depreciation period as is used for a new commercial building. However, lighting, cooling and heating equipment, and roof systems typically have lives of 15-25 years, not 39 years. The 39-year depreciation period acts as a barrier to energy efficiency as many businesses will choose to repair equipment when it fails so as to avoid having to write-off the un-depreciated value. Since equipment has been steadily increasing in efficiency, encouraging equipment replacement will save energy and also create sales and jobs for equipment manufacturers.

Our preferred choice is to delegate the choice of depreciation period to the IRS, with instructions to use depreciation periods that match the average service life of equipment. In this way Congress gets out of the weeds and also allows for the fact that technology changes much more quickly than the law can change. If this is not possible, we suggest resetting depreciation periods based on the best data on service lives currently available. For example, the table below provides average service lives from an ongoing study by ASHRAE.

Service Life Estimates for Some Commercial HVAC Equipment

Equipment Type	Median Service Life, Years
Chillers, air-cooled rotary & screw	23
Cooling tower, metal	17.5
Controls, electronic	18
Boilers, hot-water, steel forced draft	25
Packaged DX unit, air-cooled	22
Split DX system	17
Domestic hot water heater, electric	12
Domestic hot water heater, gas	15

Source: ASHRAE[8]

Likewise, in the case of CHP systems, the depreciation period varies as a function of who owns the equipment and how it is used, even though often the same equipment is used by a variety of owners and for a variety of applications. This variation is illustrated in the table below. We recommend that a single service life be selected for all owners, perhaps 15 years.

[8] ASHRAE. 2012. "Owning and Operating Cost Database." http://xp20.ashrae.org/publicdatabase/service_life.asp. Accessed March 1. Atlanta, Ga.: ASHRAE.

Summary of Current Federal Depreciation Treatment for CHP Assets

Asset Category	MACRS Tax Life (years)
Utility	
Steam production or distribution	20
Steam turbine power plant	20
Combined cycle power plant	20
Combustion turbine power plant	15
Industrial	
For power capacity > 500 kW or steam capacity > 12.5 Mlbs/hour:	
Steam production or distribution	15
Power generation	15
For power capacity < 500 kW or steam capacity < 12.5 Mlbs/hour:	
Steam production or distribution	5–10 years depending on industry classification
Power generation	5–10 years depending on industry classification
Commercial	39
Residential	27.5

Note: Mlbs = thousand pounds. Source: Marc Spurr, Kattner FVB, 2001, personal communication.

Repayable Tax Incentives

For some energy efficiency measures that are expensive and for which quick market transformation is not possible, such as comprehensive home and commercial building energy efficiency retrofits, we recommend five-year tax incentives as discussed above, helping to grow these markets to levels that are more sustainable. Still, even after five years, we think additional support would be useful but recognize that the federal budget may not be able to support such an extension. In these cases Congress should consider transitioning to repayable incentives after the initial five-year incentive ends.

Repayable tax incentives are a way to limit long-term costs to the Treasury by requiring recipients to repay the incentive over time as benefits are realized. The initial credit helps reduce the upfront cost of the investment, and the latter payments reduce the cost to the Treasury. For example, if a business receives an initial tax credit of $100,000 on a combined heat and power system the year the system was placed into service, they might repay the federal credit at the rate of $20,000 per year over the next five years. The initial credit encourages the investment, and the subsequent repayments channel the value of some of the energy bill savings back to the federal government. The result is that the long-term cost to the federal government is very low—just defaults plus interest costs. Essentially this would be a zero-interest loan.

This idea has already begun to circulate in Congress. In 2011, Senator Shaheen (New Hampshire) circulated a draft bill that would provide a repayable tax incentive for CHP systems and industrial energy efficiency improvements. Under the proposal, an incentive is given to electric utilities that finance CHP systems. The amount of the incentive is then repaid to the Treasury through an annual installment payment paid by the customer who owns the CHP system equal to the amount of the subsidy divided by an installment period, specified in years. In the draft Shaheen bill, the installment period is three years (e.g., the customer repays the subsidy over three years) but payments don't begin until the third year after the subsidy is paid (i.e., the customer repays nothing for the first two years, then repays one-third of the subsidy each year for the next three years).

Such a repayable tax incentive would be easier to implement for businesses than for individuals, since businesses already depreciate capital investments over many years and thus need to track past investments and depreciation from year to year when compiling their annual taxes. Tracking repayments would be very similar. Likewise, this system could work well for individuals who use the federal long form as this form already includes such items as capital gains and losses relative to expenditures in previous years. Such a repayable incentive should probably be limited to fairly large investments, such as an individual credit of $1,000 or more. Having to go through the extra tracking and paperwork for small investments probably would not make sense. The incentives in S. 1914 are large enough to meet this threshold.

Conclusion

ACEEE strongly feels that well-targeted energy efficiency tax incentives can help to transform markets so that efficiency markets prosper, even after incentives end. Such transformations result in large and long-term energy savings, creating jobs and otherwise benefiting our economy. Federal tax incentives play a unique role in that they apply across the country and have uniform qualification levels, complementing the patchwork of state and utility incentives. When this Committee considers tax reform legislation, we recommend it include:

1. Limited funds for energy efficiency tax incentives targeted at long-term market transformation in ways that maximize the savings per federal dollar invested. Such incentives should continue for about five years before they are sunset or revised. Particular provisions should address:

    a. New commercial buildings and commercial building retrofits, along the lines of S. 3591;

    b. Whole-home retrofits, along the lines of S. 1914;

    c. New homes, building on but updating the current section 45L;

    d. High-efficiency appliances, building on but updating the current section 45M;

    e. High-efficiency residential furnaces, boilers, stoves, air conditioners, heat pumps, and water heaters, updating provisions from the recently expired section 25C; and

    f. CHP, chillers, and other industrial opportunities, drawing from S. 3352.

2. Reforming tax depreciation schedules so they are based on the average service lives of covered equipment. Equipment installed in commercial buildings and CHP systems need particular attention.

In addition we recommend that the Committee consider including repayable tax incentives among the energy efficiency tax credits.

In recent years, targeted energy efficiency tax incentives have successfully helped to transform appliance, new home, heating/cooling equipment, and hybrid vehicle markets. We should continue such efforts at a modest level to spur development of advanced high-efficiency products and grow contractor expertise, providing a large multiplier effect on the federal investment. The end result will be substantial energy savings, large energy bill reductions, and stronger U.S. manufacturers and businesses.