Energy Efficiency Tax Incentives, 2005–2011: How Have They Performed?

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INTRODUCTION

EPAct 2005 established energy efficiency tax incentives in the residential, commercial, and transportation sectors with the purpose of increasing the market share of advanced energy efficiency products and encouraging home- and business-owners to undertake energy efficiency improvements. For the most part, these tax incentives were designed to cover the very highest levels of efficiency sold in 2005 (e.g., equipment and practices with less than a 5% market share), in order to keep costs to the Federal Treasury down and to minimize "free riders" (tax credit participants who would have purchased eligible products even if the tax credits weren't available).

Congress instituted a federal tax credit for residential energy-efficient equipment from 1978 through 1983, worth 15% of "conservation expenditures" up to $2,000 spent. This was claimed on an average of 4 million tax returns per year, and the total cost of the credits was $2.3 billion (Hirst et al. 1986). In general, the incentives were too low, and there were a lot of "free riders." As a result, when the set of tax incentives included in EPAct 2005 was originally proposed, the focus was on increasing the market share of the most energy-efficient equipment.

These tax credits have been largely successful. The new homes and appliances manufacturing incentives have transformed the market for clothes washers, dishwashers, and refrigerators, and new

homes. These incentives have been extended and the levels of efficiency improved twice. Similarly, the now-expired hybrid vehicles tax incentives helped to expand domestic car manufacturers' participation in the hybrid market. In addition, the residential insulation and HVAC tax credits were largely successful, although in general, consumer incentives are typically more difficult to implement and take longer to ramp up than manufacturer or builder incentives. The window incentives have helped to sell a lot of windows but suffer from high levels of "free riders."

The commercial buildings deduction in EPAct 2005 was successful for lighting, but less so for whole building retrofits. Those differences can be attributed to a number of factors, including the lack of simple paths for building shells and HVAC measures, the fact that large savings needed to be achieved in a single systems (lighting, HVAC, *or* building shell) to achieve a credit, and the fact that DOE and IRS never implemented the regulations required in the legislation to make documentation of savings simple and reproducible.

The two tax incentives that were less successful were for two products that were not commercially available or ready for adoption—residential fuel cell cogeneration and heavy duty hybrids. The residential fuel cell cogeneration credit helped spur new products and demonstrations, but did not create appreciable market share for these products. The heavy duty hybrids credit expired too soon to appreciably increase market share.

TAX INCENTIVES

Commercial Buildings

This provision provided a deduction per square foot for owners and tenants of new and existing commercial buildings that reduce energy use by 50% relative to ASHRAE standard 90.1-2001. This includes new buildings and retrofit projects. The 50% energy savings is for HVAC and interior lighting. While no specific data are available, in conversations with many people who work on energy efficiency in commercial buildings, the consensus is that few whole building deductions were taken in the period from 2005–2010. This is due in part to delays at DOE in releasing advice and at IRS in releasing guidance and software approval, but in larger part due to the fact that the guidance that was eventually released did not comply with the requirements of the legislation. We have heard complaints about the complexity of the process to claim the credits, which is a result of the fact that the generation of the reference building that meets ASHRAE 90.1 has to be done manually by the applicant rather than included automatically in the software as required by the law. The failure of DOE and IRS to do this caused problems for the USGBC's LEED program as well. This is one reason why the Energy Foundation coordinated funding of a private sector initiative to develop a standard for software to use for Section 179, as well as LEED, ENERGY STAR® target finder, and ASHRAE 90.1 and 189. This standard, which was written to comply with EPACT, can be found at COMNET.org. Participation in this credit was also low because of a requirement that building owners receive third-party certification, but DOE and IRS failed to establish, as the law required, standards for qualification of individuals and a national registry of eligible contractors, making it difficult to find an eligible certifier (Goldstein 2011).

In addition, partial deductions were available for building envelope, lighting, and heating, ventilation, and air conditioning (HVAC) systems. Deductions for commercial building envelope and HVAC improvements were relatively rare, again due to the fact that the guidance issued for envelope and HVAC failed to meet EPAct's criteria; in the case of envelope the required savings to qualify in the initial guidance documented was higher than the entire energy use associated with the envelope! Commercial lighting deductions provided the vast majority of the incentives used because the regulations for demonstrating compliance were written into the law. Anecdotal evidence suggests that the lighting deductions were more common for a number of reasons: an interim lighting provision that

allowed a prescriptive approach while energy audit software was being finalized, the ability to gain credit for lighting improvements on a sliding scale, and a significant educational campaign organized by the lighting industry. As a result, this credit was more successful in increasing the market share of advanced commercial lighting products, but less successful at increasing the number of whole building, HVAC, and building envelope improvements (Pitsor 2010).

This tax deduction was extended in the *Emergency Economic Stabilization Act of 2008* (the same 2008 law that established the Troubled Assets Relief Program) until December 31, 2013. In general, these tax incentives should be implemented with a longer lead time. The original provision was effective immediately after enactment and provided the deduction until January 1, 2008. Because of the time necessary for DOE to issue advice and for IRS to create rules, and the time required to conduct an education campaign, only the last two years have had high levels of participation in the credit (Pitsor 2010).

We anticipate greater use of the deduction in the future if DOE and IRS adopt the COMNET guidelines, which they appear to be preparing to do (Goldstein 2011).

New Homes

This provision provides a credit of $2,000 for builders of homes that use 50% less energy for space heating and cooling than homes built according to the 2004 supplement to the International Energy Conservation Code (IECC) for 2006–2008. It was extended in the *Emergency Economic Stabilization Act of 2008* until December 31, 2009. The credit lapsed in 2010, but was renewed to cover new homes built in 2010 and 2011 as a part of the *Middle Class Tax Relief Act of 2010*.

The tax credit has been successful in transforming the new homes market toward more energy-efficient homes. As shown in Table 1, the number of homes participating in the credit grew four-fold between 2006 and 2009. In addition, energy-efficient homes gained a greater market share, as the number of homes certified as complying with the tax credit rose to 10% of new homes sold in 2009, although due to the recession the number of new homes declined substantially (Baden 2010).

Table 1. Number of New Homes Certified as Complying with the Federal Tax Credit

Year	Number of Homes Certified as Complying with the Credit	Total US Homes	% of Market
2006	8,141	1,051,000	0.8%
2007	23,702	776,000	3.1%
2008	21,939	485,000	4.5%
2009	37,506	375,000	10%

Source: Baden 2010; RESNET 2010; Census 2010

The provision also includes a $1,000 tax credit to the builder of a new manufactured home achieving 30% energy savings for heating and cooling over the 2004 IECC and supplements (at least 1/3 of the savings had to come from building envelope improvements), or a manufactured home meeting the ENERGY STAR requirements. Table 2 illustrates the number of new Manufactured Homes labeled as ENERGY STAR, which show a slightly increasing market share over time. Although this does not represent the actual number of tax incentives used by consumers, this industry is highly sensitive to costs, and consumers tend not to demand high performance homes. As a result, the growing market share is probably largely attributable to the manufactured homes tax incentive. In addition, this credit has helped utilities gain market share with ENERGY STAR-based rebate programs (Levy 2011).

Table 2. Number of New Manufactured Homes labeled as ENERGY STAR

Year	ENERGY STAR Homes	Homes Shipped	ENERGY STAR % of Total
2006	9,804	117,510	8.3%
2007	6,332	95,769	6.6%
2008	8,091	81,889	9.9%
2009	4,748	49,789	9.5%
2010	4,823*	50,000*	9.6%

*Estimated figures Source: Levy 2011

Nonbusiness Energy Property Existing Home Improvements (Building Envelope and HVAC)

This section provides tax credits for energy-efficient new central air conditioners, heat pumps, and water heaters in existing homes. In addition, there are tax credits for upgrading building envelope components in existing homes, like windows, insulation, ENERGY STAR metal roofs, and others.

These provisions were originally for equipment put in place in 2006 and 2007. They were extended with some changes in eligibility levels as a part of the *Emergency Economic Stabilization Act of 2008*, covering improvements installed in 2009, but not 2008. ARRA extended these through December 2010, and increased the incentive to 30% of equipment cost (had been 10%) and increased the cap on incentives from $500 to $1500 per household. They were extended to 2011, but with the original level of incentives and $500 limit as a part of the *Middle Class Tax Relief Act of 2010*.

A preliminary GAO report on the "25C tax credits" found that most of the total reported spending by consumers in 2006 could be accounted for by three of the available types of improvements: windows, insulation, and exterior doors. Metal roofs, 'energy-efficient building property,' furnaces, hot water boilers, and circulating furnace fans each made up a small portion of consumers spending (GAO 2010a). In 2007, windows, insulation, and exterior doors dominated consumer spending, with a noticeable increase in energy-efficient exterior windows purchases in particular (GAO 2010b). A more robust GAO report is due out in July 2011, which, when available, will provide more information about the extent to which these credits were used in 2009 and maybe 2010.

Table 3. Total Spending on Improvements on 25C Tax Credits in 2006 and 2007

	Total Spending on Eligible Improvements (in millions)	
Type of Improvements	**2006**	**2007**
Insulation	$2,492	$2,276
Exterior Windows	$2,913	$4,102
Exterior Doors	$1,848	$1,816
Metal Roof	$324	$508
Energy-Efficient Building Property	$197	$288

Source: GAO 2010a, 2010b

Furnaces Case Study

Although a full data set for the country is not available for all of the 25C-eligible products, a case study from CenterPoint Energy's furnace and boiler rebate program in its Minnesota territory demonstrates the market transformational effect of these tax incentives. The data set in Table 4 shows a number of key trends, most prominently the shift in the make-up of furnace rebates from a majority in the 92% efficiency range to a majority in the 94% plus efficiency range (the tax credits

were for 95%+ efficient units). The tax credits didn't affect the total heating system rebates, but they did improve the efficiency levels receiving the credit (Kline 2011). CenterPoint Energy's market research asked customers why they chose the high efficiency equipment, and 37% of respondents indicated that the tax credit affected their decision on the level of efficiency of the equipment (Kline 2011).

Table 4. Participation in CenterPoint Energy's Furnace and Boiler Rebate Program, 2004–2010

Program Year	> 92% AFUE Furnace Participation	>94% AFUE Furnace Participation	>96% AFUE Furnace Participation	>85% AFUE Boiler Participation	>88% AFUE Boiler Participation	>88% CAE Integrated Appliance	Total Heating System Rebates
2004	9,738		-	61	-	19	9,818
2005	7,815	2,971	-	67	-	27	10,880
2006	6,648	3,949	-	71	-	18	10,686
2007	4,334	4,862	-	147	-	-	9,343
2008	3,714	5,533	-	635	-	-	9,882
2009	2,363	10,879	-	845		-	14,087
2010 (1)	2,424	8,752	749	-	238	-	12,163

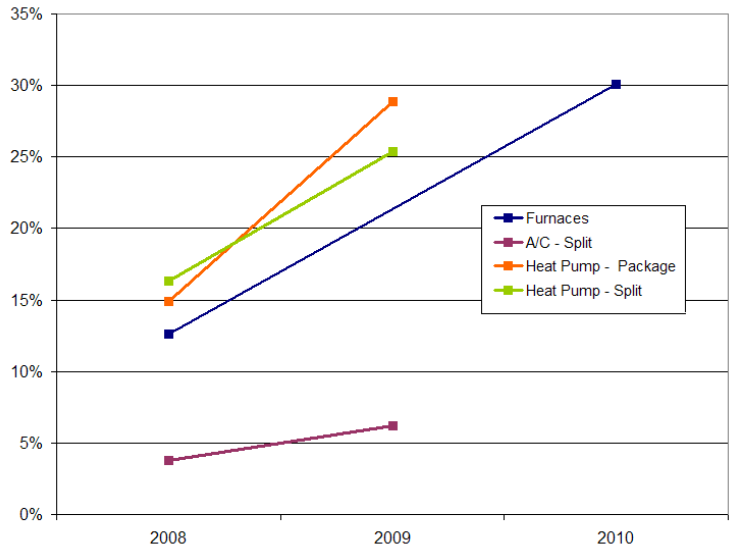
Source: Kline 2011

Note (1): 2010 participation was artificially capped by an expenditure limitation; staff indicate that there were at least 5,000 furnaces that were installed in 2010 that will be included in the 2011 program goals and most are in the 94–95% range of efficiency. They also stated that if we [CenterPoint] would have been more aggressively promoting the availability of rebates in the 4th quarter of 2010, that we [CenterPoint] likely would have exceeded 20,000 furnace rebates for the year.

In addition, there was a shift in the availability of these products from manufacturers during this time period—in 2008, there were only two manufacturers that had products that qualified for the tax incentives for the 95% efficient furnace, and by the end of 2009, all of the primary manufacturers of furnaces had a unit that qualified for the tax credit for 95% efficient furnaces. In 2010, CenterPoint Energy added another tier of rebates for 96% efficient furnaces.

The market transformation effect of the HVAC 25C incentives is further established by market share data from some of the major HVAC equipment categories eligible for the tax incentive. Figure 1 below shows the percentage of manufacturer shipments eligible for the tax credit for 2008, 2009, and 2010. It demonstrates that the market share went up significantly between 2008, a year with no tax 25C tax incentives, and 2009/2010, when the tax incentive had been renewed by ARRA.

Figure 1. Market Share of Energy-Efficient Furnaces, Air Conditioners, and Heat Pumps

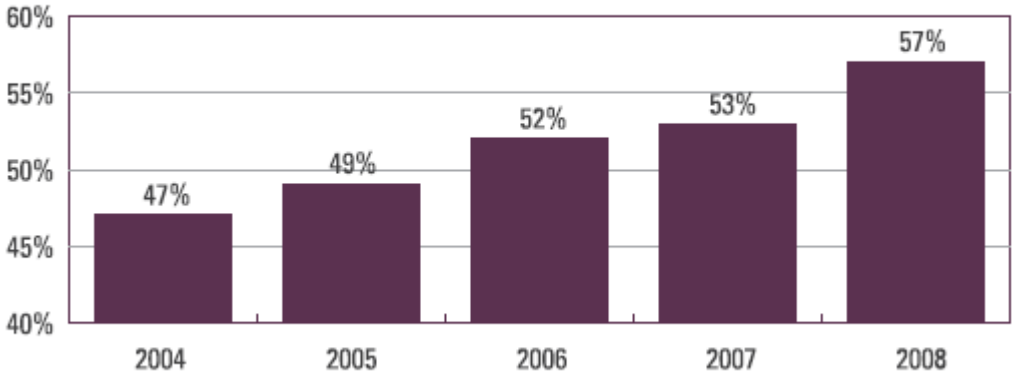


Source: AHRI 2011

Windows Case Study

Recent research on the market share of ENERGY STAR windows demonstrates the market transformation as a result of ENERGY STAR and the 25C incentives. When the tax incentive was put in place in 2005, nationwide ENERGY STAR windows market share was 49%. At the time, the incentive was $200 for windows that met ENERGY STAR requirements. As of June 2009, only products with a U-factor and SHGC of less than or equal to 0.30 qualified for the tax credit, but the incentive was increased to $1500. For 2011, the qualifying level became ENERGY STAR windows again, although with the original incentive amount, $200.

Figure 2. ENERGY STAR Market Share, 2004-2008



Source: ENERGY STAR 2009a

In 2010, most ENERGY STAR windows qualified for federal tax incentives, and in 2011, the eligibility levels for 25C were relaxed so that all ENERGY STAR windows qualify for incentives. The results, which are summarized in Table 5, found that 93% of windows were ENERGY STAR for all locations in 2010, with a slight decline in the market share of ENERGY STAR windows to 89% in 2011, due primarily to the much lower tax credit.

Table 5. ENERGY STAR Windows Market Share, 2010 and 2011

ENERGY STAR Windows Region	Metro Area	2010 % ENERGY STAR	2011 % ENERGY STAR
North (East)	Milwaukee/Madison, WI	98%	99%
North (West)	Portland, OR	89%	81%
North-Central (East)	Washington DC	95%	91%
North-Central (West)	San Francisco, CA	85%	76%
South-Central (East)	Atlanta, GA	96%	93%
South-Central (West)	Tulsa, OK	93%	91%
South (East)	Jacksonville, FL	87%	80%
South (West)	Houston, TX	99%	98%
Average		**93%**	**89%**

Appliances

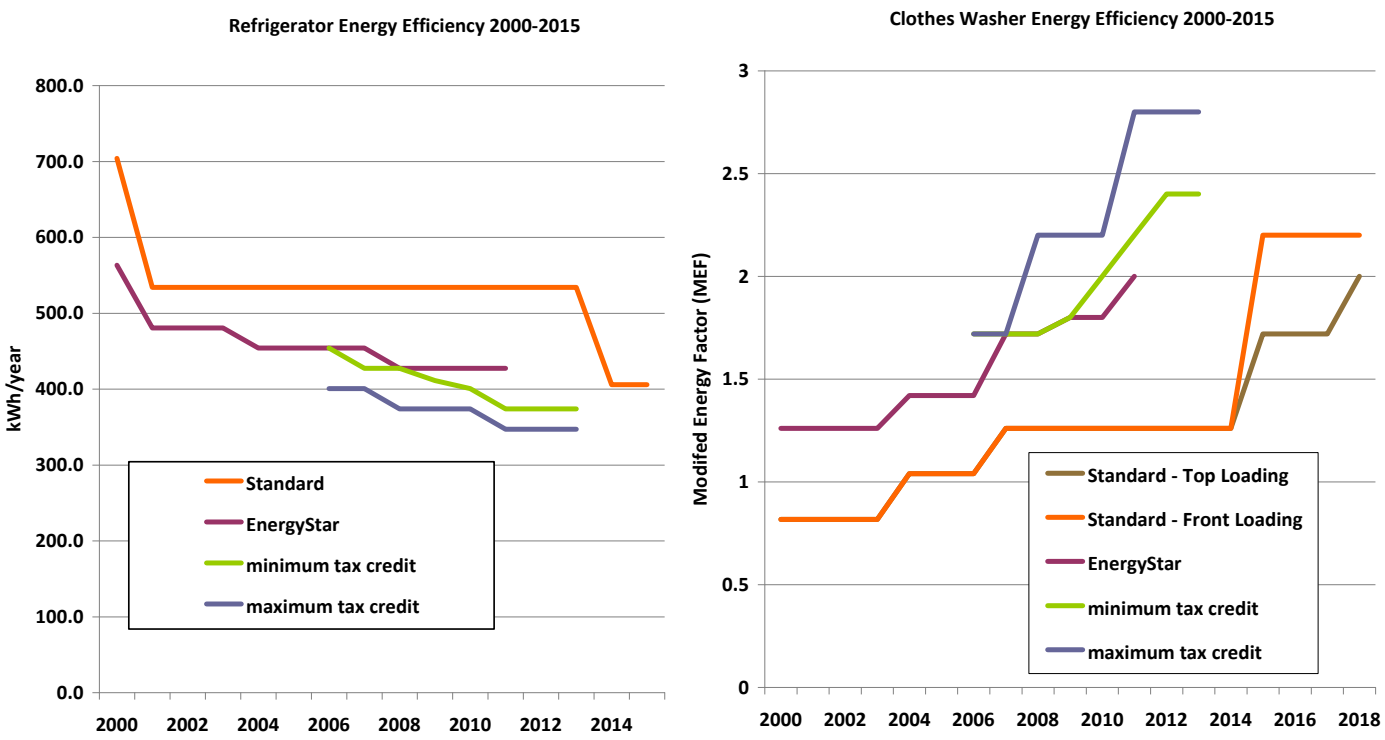
This provision provided per-unit credits to manufacturers for the production of the most efficient refrigerators, clothes washers, and dishwasher. The incentives only applied to appliances produced in the United States during 2006 and 2007, and had a total cap of $75 million per manufacturer.

These tax credits were extended to cover 2008–2010 and incentive levels were made more stringent as a part of the *Emergency Economic Stabilization Act of 2008*. They were extended again in 2011 as a part of the *Middle Class Tax Relief Act of 2010*, with incentive levels adjusted to focus on even more efficient products.

Figure 3 shows the market transformation of refrigerators and clothes washers that has occurred in recent years, spurred in part by the tax incentives. The tax incentives encouraged manufacturers to produce more of their highest efficiency products on the market and to offer related discounts and promotions on these units. As these products gained greater market share, the ENERGY STAR specifications were tightened, and the next phase of the tax incentives was adjusted to increase tax credit qualification levels.

Of the ENERGY STAR clothes washers available in 2005 before the tax credit began, only 153 of 258 products (or 59%) had an efficiency level more than 1.72 MEF, the minimum tax incentive level (Karney 2011). By 2007, this was the minimum ENERGY STAR level, so 100% of the qualified ENERGY STAR products available were at 1.72 MEF. In 2005, ENERGY STAR products had a total market share of 36%, which increased to 42% in 2007 (ENERGY STAR 2009b). As a result, we can estimate that the tax credit-eligible models' overall market share went from about 21% of the total market to about 42% of the total market, doubling their market share.

Figure 3. Market Transformation of Refrigerators and Clothes Washers, 2000–2015



Market data from the Association of Home Appliance Manufacturers in Table 6 reveals that the appliance manufacturing industry has responded to the tax credits by producing more eligible products over time. Between 2008 and 2009, when this tax incentive was extended again, the total potential units eligible for the tax credit went up by 120%.

Table 6. Units Eligible for Appliance Manufacturers Tax Credit, 2008–2009

	Total Potential Units Ineligible for Tax Credit		Unit Decrease (2008 to 2009)	Total Potential Units Eligible for Tax Credit		Unit Increase (2008 to 2009)	Energy Saved in 2009 (GWh/yr)
	2008	2009		2008	2009		
Dishwashers	4,645,291	1,684,282	(2,961,009)	1,349,709	3,718,718	2,369,009	131
Clothes Washers	7,091,331	4,920,450	(2,170,881)	1,200,669	2,944,550	1,743,881	978
Refrigerators	7,793,740	6,092,173	(1,701,567)	1,516,260	2,304,827	788,567	280
Total	19,530,362	12,696,905	(6,833,457)	4,066,638	8,968,095	4,901,457	1,390

Source: AHAM 2010

Residential Energy Efficiency Property—Fuel Cell Cogeneration

The residential fuel cell cogeneration tax credit, which provided individual tax credits of 30% for stationary fuel cell power plants up to $1,000/kW, has been rarely used according to experts we consulted (Schafer 2010). The products available at the time of enactment were still at the demonstration stage, and although some companies have created more commercial products in the years since 2005, few are inexpensive and scalable enough for the tax credit to be widely used. These were extended to 2016 as a part of the *Emergency Economic Stabilization Act of 2008*. Products are just starting to become commercially viable and available.

Commercial installation of Fuel Cells and Microturbine Power Plants

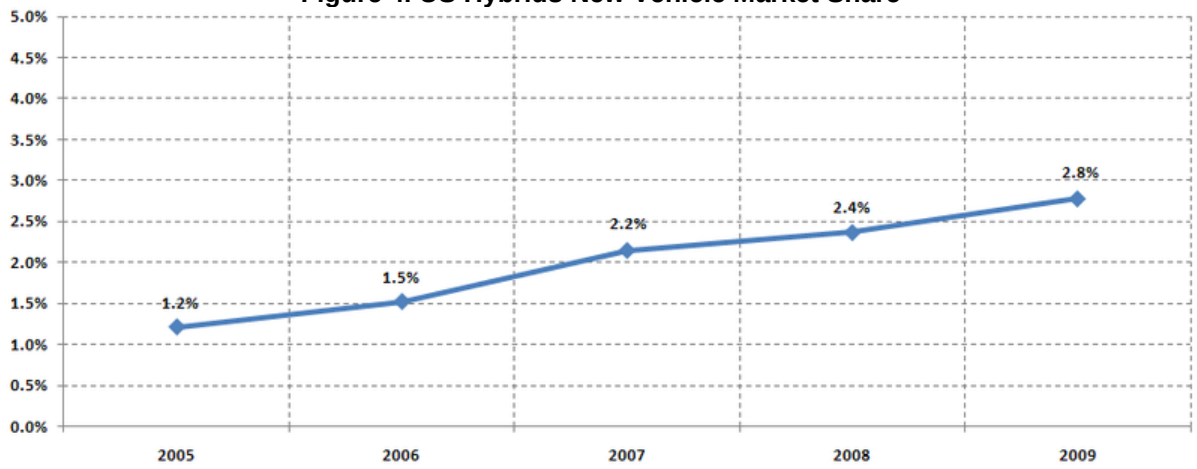
The commercial fuel cell credit has been utilized more widely, especially in applications like backup power for telecommunications, industrial vehicles (fork trucks), and large cells for power generation, and in large buildings for combined heat and power. Data from the U.S. Fuel Cell Councils' 2007 Industry Survey indicated that sales increased 10% from 2005 to 2006, but no later data was available (USFCC 2007).The cap for commercial fuel cells was increased in the ARRA stimulus bill, but the cap was not increased for residential fuel cells in that bill. The *Emergency Economic Stabilization Act of 2008* extended these credits to 2016. According to one expert, the cap increase has been instrumental in moving markets towards high efficiency fuel cell installations (Schafer 2010).

Alternative Motor Vehicle Credit

Light duty hybrid and lean-burn (diesel) vehicles less than 8,500 lbs. were eligible for a tax credit from 2005 through 2010 based upon fuel economy improvement relative to average fuel economy for similar vehicles in 2002 and fuel savings relative to the 2002 fuel economy baseline. The credit ramps down for a given manufacturer after it has sold 60,000 vehicles, and as of October 2010, Toyota, Honda, and Ford are the only manufacturers that have reached that level of sales.

The market share of hybrid vehicles went from 1.2% to 2.8% as shown in Figure 4. While this represents a more than doubling of market share, it is still a small portion of total auto sales. In addition, the tax credit did not change the leader in the hybrid market—Toyota already had a clear vision of how to create a global market for hybrid vehicles before the credit, and reached the 60,000 vehicle sales threshold in the first year of the credit. Honda and Ford subsequently reached the threshold as well, and the availability of the credit likely greatly increased the participation of Ford and GM in the hybrid market. Ford, which had launched the Escape hybrid at the time EPAct's passage, has gone on to produce additional successful hybrid models. GM has been less successful in hybrid sales but has nonetheless produced several models and gained significant experience with the technology, which will likely be essential to further fuel economy improvements.

Figure 4. US Hybrids New Vehicle Market Share



Source: Green Car Congress 2010

This provision also provided a tax incentive for advanced lean burn, or diesel vehicles that met certain fuel economy and emissions levels. No diesel vehicles were sold under the tax credit before 2008, because there were none on the market that qualified for the credit. Model year 2009 was the first

time that light duty diesel vehicles could qualify for tax credits. That is because emissions control technologies now allow diesels to meet the requirements for emissions of NOx and particulate matter.

The provision is structured to allow less efficient diesel vehicles to receive the tax credit. The credit is based on the number of gallons of fuel saved (the miles per gallon), and because of diesel's higher energy content per gallon, diesel vehicles that are about 11% less efficient than eligible gasoline vehicles will qualify for the credit. Although this provision did not affect many vehicles because of low sales, the same diesel fuel loophole has been incorporated into legislation twice since EPAct 2005, in a provision providing large sums of money for retooling in both EISA (Section 136) and the *Emergency Economic Stabilization Act of 2008.*

Heavy Duty Hybrid Vehicles

EPAct 2005 also contained a tax credit for heavy duty hybrid vehicles. Notwithstanding the large fuel savings potential from hybridization of trucks used in urban applications, such as pick-up and delivery and refuse hauling, heavy duty hybrid development lags light duty by several years. Consequently, there were few heavy duty hybrids available in the early years of the credits. Use of the credit was also low because the dollar amount of the credits was too low given the high incremental cost of the heavy duty hybrid technology. Nonetheless, by the time the credit expired at the end of 2009, ten manufacturers had placed over 50 eligible hybrid vehicles on the market, and interest in hybrids is very high in the heavy duty market today. The California Hybrid Truck and Bus Voucher Incentive Project is a program that began partially as a result of the availability of this tax credit, and there have been repeated efforts to renew this credit at the federal level now that the market has shifted. The most recent proposal was the *Bauchus Job Creation and Tax Cuts Act* in the 111th Congress.

Fuel Cell Vehicles

The bill also provides tax credits for fuel cell vehicles, but these vehicles are not yet commercially available, and so no tax credits have been applied to them.

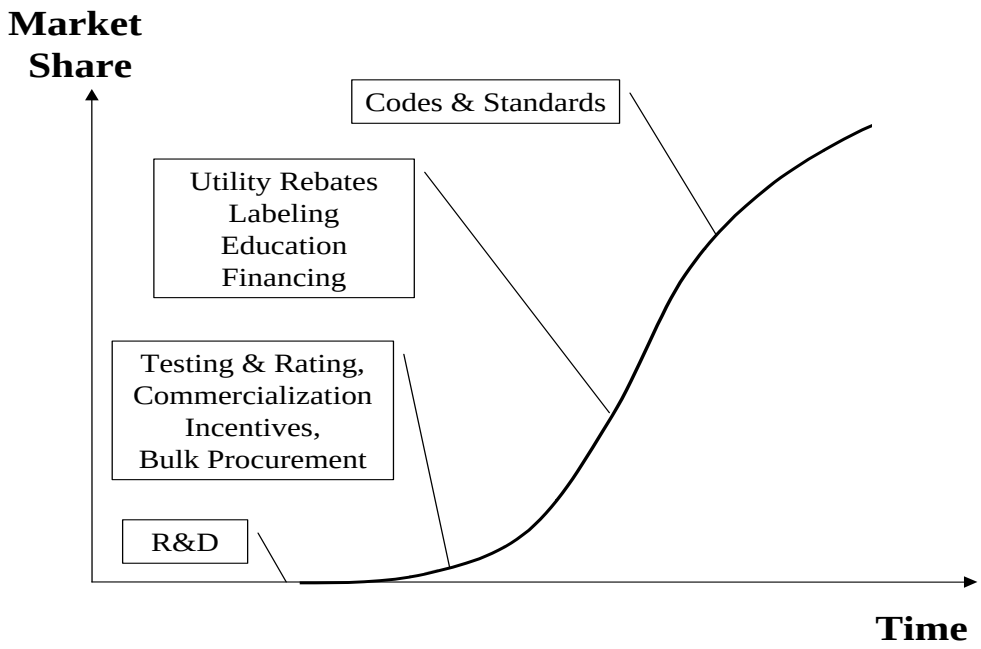
DISCUSSION: LESSONS LEARNED

In this section, we discuss the major lessons learned in this review of the existing federal energy efficiency tax incentives. These incentives have been generally successful in moving products and processes along the market transformation curve. The main lessons were the importance of education and stakeholder engagement, of "getting the details right", and of carefully considering market conditions and barriers to product acceptance in order to choose the best policy or actions to address them.

The Importance of Market Certainty

Energy efficiency policies like tax incentives are aimed at market transformation efforts—that is, strategically intervening in a market to create lasting change in market behavior by removing identified barriers or exploiting opportunities to accelerate the adoption of cost-effective energy efficiency. These energy efficiency tax incentives were aimed at removing barriers toward the beginning of a market transformation curve, to encourage greater adoption of technologies with low market share (see "commercialization incentives" in Figure 5).

Figure 5. Policies on a Market Transformation Curve.



Source: Nadel and Latham 1998

Market transformation efforts work best when they are systematically re-evaluated and updated throughout the lifetime of the effort. EPAct 2005 was the first in a series of energy legislation that has advanced market transformation for a number of key products. One of the best examples is the manufacturer incentives for appliances, specifically refrigerators. The *Energy Policy Act of 2005* set a minimum tax incentive level for $75- $175 per unit for 15–25% savings from the 2001 standard. These were revised to be more stringent in the TARP bill in 2008, with incentives of $50-$200 per unit for refrigerators savings 20–30% relative to the 2001 standard, and again in the *Middle Class Tax Relief Bill of 2010*, with incentives of $150–200 per unit for models saving 30–35% relative to the 2001 standard. The standard in 2014 is anticipated to be 405 kWh/year, or 24% lower than the 2001 standard (DOE 2010). In addition, ENERGY STAR updated its qualifying efficiency levels over time, further pushing the process forward. The tax incentives pushed the market for energy-efficient appliances forward, ensuring that the next standard would achieve higher levels of energy savings cost-effectively.

The appliance tax incentives were particularly successful for three main reasons—they were mostly uninterrupted, there was robust stakeholder involvement and education, and the incentive was well timed. Although there was an interruption of 10 months between the end of 2007 and October 2008, the TARP bill enabled manufacturers to take credits for the entirety of 2008, so there was no significant market interruption. In contrast, there were interruptions for the residential HVAC and building envelope tax incentives. Stakeholders like manufacturers and energy efficiency advocates were actively involved in the negotiations for the extensions of the appliance incentives and, as a result, were well-informed about how to use the incentives. That active engagement has helped move the incentives towards higher levels of efficiency in the intervening years. In contrast, some stakeholders were less involved in the negotiations about the commercial buildings tax deduction, and so there was unevenness in the treatment of HVAC and whole building improvements versus lighting in the bill. Also, only a few manufacturers were eligible for the appliance tax incentives, but for

large amounts of money, and as a result, they have paid close attention to these tax incentives. Consumer incentives are typically more difficult to implement and take longer to ramp up.

In addition, the incentives were designed for appliances that had a small market share, ideally less than 5%, but which were out of the demonstration phase. Some of the tax incentives in EPAct 2005, like residential fuel cells and fuel cell vehicles were for products that did not yet have appreciable availability to be able to take advantage of the credit. It is important that the right incentives are matched up with the right market barrier—for residential fuel cells, a different tool might have been more appropriate, like demonstration projects.

Tying Market Actor Education to Legislation

Education of consumers and key actors in the supply chain is essential for tax incentives. The commercial buildings tax incentive demonstrated the importance of education and informational programs designed in concert with legislation. The lighting industry, led by the National Electrical Manufacturer's Association (NEMA), designed http://lightingtaxdeduction.org/, a Web site with information about how to best take advantage of the tax credit. The HVAC and building envelope industries did not put together similar educational campaigns. Anecdotal evidence suggests that lighting accounted for a much greater proportion of these incentives than other products. Although education is one important factor that could have contributed to this difference, other factors likely played as much or more of a role, such as the lower savings threshold required for lighting measures relative to HVAC or building envelope improvements and the infrastructure for lighting retrofits resulting from years of utility, energy service provider, and contractors experience and promotions.

Get the Details Right

Although this 'lesson learned' seems obvious, it is clear that some of those tax incentives which were least successful were those where the new law contained some unanticipated loophole or problem. For example, the eligibility levels for the windows tax incentives were too easily met, and as result, there were a high number of free riders. These issues can often be preempted through good information and active engagement of all stakeholders, like the implementers of the provision, manufacturers, vendors, and energy efficiency advocates.

Conversely, if regulators, advocates, and manufacturers don't have accurate information about the use of incentives, it is difficult to track their efficacy. The new homes tax deduction has a form (IRS Form 8908) specifically designed to capture information about the number and type of homes taking the credit. Similarly, the residential existing home credits are divided by type of measure on IRS form 5695. As a result, there is good information about the impact of the provision on the marketplace. The commercial building tax deduction, on the other hand, requires no special forms for the deduction, and these incentives are combined with "other deductions" on the business tax forms. The IRS should develop a separate form, and collect the data about different types of qualifying measures installed (whole building, HVAC, building envelope, and lighting) for the commercial buildings tax deduction.

CONCLUSIONS

The tax incentives established as a part of the *Energy Policy Act of 2005* were the first major federal energy efficiency tax incentives in two decades. These tax incentives, established in the residential, commercial, and transportation sectors, were designed to increase the market share of advanced energy efficiency products and encourage home- and business-owners to undertake energy efficiency improvements.

These tax credits have been particularly successful in improving the energy efficiency of the residential sector through the appliance manufacturer and new home builder incentives. Home efficiency improvements were also advanced with moderate success though residential insulation and HVAC tax credits. The hybrid vehicles tax credit helped expand domestic car manufacturer's participation in the hybrid market. The efficiency of commercial buildings was improved through the commercial buildings tax deduction, which was much more successful for lighting improvements than for building envelope and HVAC measures. The window incentives have helped to sell a lot of windows but suffer from high levels of "free riders."

The two tax incentives that were the least successful were for two products that were not commercially available or ready for adoption—residential fuel cell cogeneration and heavy duty hybrids. The residential fuel cell cogeneration credit helped spur new products and demonstrations, but did not create appreciable market share for these products. The heavy duty hybrids credit expired too soon to appreciably increase market share.

There are billions of dollars of energy efficiency savings still left on the table, and some of these can be unlocked through carefully considered tax policy. For policymakers to maximize this resource in the 112th Congress and beyond, the focus should be on finding solutions to market barriers and creating the momentum for more action in the future.

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