ACEEE Testimony
American Council for an Energy-Efficient Economy

Comments of the American Council for an Energy-Efficient Economy on Staff Discussion Draft: Cost Recovery and Accounting

January 17, 2014

We compliment the Senate Finance Committee for beginning an effort to clean up the tax code through tax reform. The American Council for an Energy-Efficient Economy is a research organization founded in 1980 that focuses on technologies, programs and policies that improve energy efficiency in the United States. For the past two years we have researched ways the current tax code impedes cost-effective investments in energy efficiency and ways to improve the tax code so it encourages energy efficiency investments with limited cost to the Federal Treasury. Our research is summarized in a February 2013 report.[1] In these comments we focus on cost recovery and depreciation, a subject at the center of the staff discussion draft on cost recovery and accounting. We also briefly comment on the Section 179D tax deduction for commercial buildings as it also is mentioned in the discussion draft.

Cost Recovery

The staff discussion draft seeks to simplify the many different depreciation periods now in use to just five pools, with the first four labeled pools 1-4 in the draft, plus a fifth category for property. Property is depreciated on a straight-line basis over 43 years. The other four pools use the declining balance method and cost recovery ranges from 5-38% of the remaining balance each year, depending on the pool. These pools correspond roughly to depreciation periods of 3-20 years.

The intent of cost recovery/depreciation is so that the costs of new assets can be recovered over a reasonable period based on their average service life. Unfortunately, the staff discussion draft perpetuates a problem in the current tax code under which any property that is connected to a commercial building is depreciated over the life of the building (43 years in the discussion draft) even though many assets have a much shorter service life. Particularly egregious are the depreciation periods for heating and cooling systems, lighting fixtures and controls, and roofing systems in commercial buildings. Lighting, cooling and heating equipment, and roof systems typically have lives of 15-20 years, not 43 years.

Besides unfairly treating certain businesses, the 43-year depreciation period acts as an important barrier to greater energy efficiency as it makes efficiency investments less financially attractive since many businesses will choose to repair equipment when it fails so as to avoid having to write off the un-depreciated value. Thus, use of a 43 year life is effectively "penalty depreciation". This should be ended and all depreciation periods based on actual typical service lives. Given the pool system the discussion draft proposes, we recommend that "qualified energy equipment or systems" be assigned to pool 4 with annual cost recovery of 5%. This change could potentially be expanded to some other equipment in buildings, but we do not have expertise in these areas and so limit our suggestions to our area of expertise. Furthermore, the legislation should authorize the IRS to modify cost recovery periods in response to technological or market changes with the guidance that cost recovery allowances should be based on actual average service lives in the field.

Attached find suggested language for "qualified energy equipment or systems" that we developed in consultation with industry trade associations and a sister energy-efficiency organization, the Alliance to

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[1] Nadel and Farley. 2013. *Tax Reforms to Advance Energy Efficiency.* Washington, DC: American Council for an Energy-Efficient Economy. http://aceee.org/research-report/e132 .

Save Energy. The intent here is to define equipment that typically has a service life of 15-20 years. While the primary goal in this suggestion is to fairly depreciate equipment, this change will also save a significant amount of energy. For most of the equipment covered, efficiency levels have been steadily improving and thus most new equipment will be more efficient than equipment purchased 15-20 years ago. In our February, 2013 report (cited in footnote 1), we estimate the impact of this change on energy use and energy bills. We estimate that this change will affect the energy efficiency of about 20% of qualified product purchases and as a result will reduce energy bills by an additional $140 million per year as the equipment stock is gradually replaced (i.e., $140 million saved in the first year, $280 million in the second year, etc. until about $2.1 billion is saved in the 15th year). A portion of these savings will show up in corporate profits and thereby provide some revenue to the Treasury.

To provide support for our estimate of a typical 15-20 service life for this equipment, we note the following references:

- The *2011 ASHRAE HVAC Applications Handbook* (ASHRAE is the American Society of Heating, Refrigerating and Air-conditioning Engineers) estimates median service lives of 10-20 years for a variety of heating, cooling and ventilating (HVAC) equipment. We attach their table to these comments.
- A study prepared by GDS Associates for a coalition of New England utilities estimates average lives for a variety of energy efficiency measures including lighting and HVAC measures. With the exception of light bulbs, the lives range from 7-20 years. Their summary table is attached to these comments.
- A 2012 paper published in the Journal of Architectural Engineering by Coffelt and Hendrickson includes service life estimates for various types of commercial roof systems, finding that sloped roofs have lives of 30-75 years (and hence a 43 year property life is reasonable) but that flat roofs have lives of 10-30 years. Their summary table is also attached to these comments (please note that our suggested definition of energy equipment or systems does not include sloped roofs).

Section 179D Deduction for Efficient Commercial Buildings

The Discussion Draft includes a recommendation that the Section 179D deduction for efficient buildings be eliminated. Our understanding from staff is that this was done to clean up the deduction part of the tax code and that any consideration of incentives should be a tax credit. Our analysis indicates that a program like the 179D program can make a big difference in improving the efficiency of commercial buildings in the U.S. and is one of the most cost-effective uses of federal incentive money. We will provide further comments on this in a few weeks when we comment on the Staff Discussion Draft: Energy Tax Reform.

Conclusion

As part of tax reform, Congress should include “qualifying energy equipment and systems” in pool 4 because that pool most closely approximates the average service life of this equipment and because doing so will end the current “penalty depreciation” situation we are now in that discourages building owners from upgrading their equipment and systems to save energy. Tax policy should not discourage desired societal goals such as saving energy.

We would be happy to discuss these ideas with Members or Staff.

Suggested definition of “qualified energy equipment or systems”

“QUALIFIED ENERGY EQUIPMENT OR SYSTEMS.—

“(A) IN GENERAL.—The term ‘qualified energy equipment or systems’ means property which is—

“(i) a heating, cooling, or ventilation system

“(ii) a water heating system

“(iii) an elevator or an escalator

“(ii) a commercial refrigeration system that is not part of cost recovery pools 1-3,

“(iii) qualified lighting,

“(iv) pipe or duct insulation,

“(v) a building energy management system,

“(vi) a qualified low-slope roof, or

“(vii) a combined heat and power system,

which is installed in or on a commercial property or residential rental property.

“(B) QUALIFIED LIGHTING.—For purposes of this paragraph, the term ‘qualified lighting’ means luminaires and ballasts, as well as controls that automatically reduce or shut off power to lighting systems for the purpose of energy savings.

“(C) BUILDING ENERGY MANAGEMENT SYSTEM.—For purposes of this paragraph, the term ‘building energy management system’ means a computer-based system, including software and hardware, that controls and monitors mechanical and electrical equipment in the building which must include three or more of the following: heating, cooling, ventilation, lighting, refrigeration or power.

“(D) QUALIFIED LOW-SLOPE ROOF.[2]—For purposes of this paragraph, the term ‘qualified low slope roof’ means new roofs in pre-existing buildings that:

(1) Have a slope of not more than 2 percent;
(2) Are above conditioned or semi-heated space;
(3) Include insulation which meets or exceeds the minimum prescriptive requirements in ASHRAE Standard 189.1-2011; and
(4) If in climate zones 1-5 (as specified in ASHRAE Standard 90.1-2013), have a cool roof surface or is a green roof.

“(E) COOL ROOF SURFACE.—The term ‘cool roof surface’ means a roof the exterior surface of which —

‘‘(i) has a 3-year-aged solar reflectance of at least 0.55 and a 3-year-aged thermal emittance of at least 0.75, as determined in accordance with the Cool Roof Rating Council CRRC–1 Product Rating Program, or

‘‘(ii) has a 3-year-aged solar reflectance index (SRI) of at least 64, as determined in accordance with ASTM Standard E1980, determined—

‘‘(I) using a medium-wind-speed convection coefficient of 12 W/m2·K, and

[2] The text on roofs draws extensively from language in S. 1575 in the last Congress, the “Energy-Efficient Cool Roofs Jobs Act” authored by Senators Cardin and Crapo.

‘‘(II) using the values for 3-year aged solar reflectance and 3-year-aged thermal emittance determined in accordance with the Cool Roof Rating Council CRRC–1 Product Rating Program.

“(F) Green roof. – The term ‘green roof’ means a roof of a building, the majority of which is covered with vegetation and a growing medium, planted over a waterproofing membrane.

“(G) COMBINED HEAT AND POWER SYSTEM.—For purposes of this paragraph, the term ‘combined heat and power system’ means a system as defined in section 48(c)(3) of the tax code except for the placed in service date. Such term shall not include property used to transport fuel to a generating facility and shall not include property that is otherwise classified in pools 1-3.”.

Summary Tables on Service Lives

Table 4 Comparison of Service Life Estimates

Equipment Item	Median Service Life, Years: Abramson et al. (2005)	Median Service Life, Years: Akalin (1978)	Equipment Item	Median Service Life, Years: Abramson et al. (2005)	Median Service Life, Years: Akalin (1978)	Equipment Item	Median Service Life, Years: Abramson et al. (2005)	Median Service Life, Years: Akalin (1978)
Air Conditioners			**Air Terminals**			**Condensers**		
Window unit	N/A*	10	Diffusers, grilles, and registers	N/A*	27	Air-cooled	N/A	20
Residential single or split package	N/A*	15	Induction and fan-coil units	N/A*	20	Evaporative	N/A*	20
Commercial through-the-wall	N/A*	15	VAV and double-duct boxes	N/A*	20	**Insulation**		
Water-cooled package	>24	15	**Air washers**	N/A*	17	Molded	N/A*	20
Heat pumps			**Ductwork**	N/A*	30	Blanket	N/A*	24
Residential air-to-air	N/A*	15[b]	**Dampers**	N/A*	20	**Pumps**		
Commercial air-to-air	N/A*	15	**Fans**	N/A*		Base-mounted	N/A*	20
Commercial water-to-air	>24	19	Centrifugal	N/A*	25	Pipe-mounted	N/A*	10
Roof-top air conditioners			Axial	N/A*	20	Sump and well	N/A*	10
Single-zone	N/A*	15	Propeller	N/A*	15	Condensate	N/A*	15
Multizone	N/A*	15	Ventilating roof-mounted	N/A*	20	**Reciprocating engines**	N/A*	20
Boilers, Hot-Water (Steam)			**Coils**			**Steam turbines**	N/A*	30
Steel water-tube	>22	24 (30)	DX, water, or steam	N/A*	20	**Electric motors**	N/A*	18
Steel fire-tube		25 (25)	Electric	N/A*	15	**Motor starters**	N/A*	17
Cast iron	N/A*	35 (30)	**Heat Exchangers**			**Electric transformers**	N/A*	30
Electric	N/A*	15	Shell-and-tube	N/A*	24	**Controls**		
Burners	N/A*	21	**Reciprocating compressors**	N/A*	20	Pneumatic	N/A*	20
Furnaces			**Packaged Chillers**			Electric	N/A*	16
Gas- or oil-fired	N/A*	18	Reciprocating	N/A*	20	Electronic	N/A*	15
Unit heaters			Centrifugal	>25	23	**Valve actuators**		
Gas or electric	N/A*	13	Absorption	N/A*	23	Hydraulic	N/A*	15
Hot-water or steam	N/A*	20	**Cooling Towers**			Pneumatic	N/A*	20
Radiant heaters			Galvanized metal	>22	20	Self-contained		10
Electric	N/A*	10	Wood	N/A*	20			
Hot-water or steam	N/A*	25	Ceramic	N/A*	34			

*N/A: Not enough data yet in Abramson et al. (2005). Note that data from Akalin (1978) for these categories may be outdated and not statistically relevant. Use these data with caution until enough updated data are accumulated in Abramson et al.

ASHRAE. 2011. *2011 ASHRAE Handbook: Heating, Ventilating, and Air-Conditioning Applications*: 37.3.

Table 2 - Commercial & Industrial Measures		
Measure*	Measure Life**	
	Retrofit	New
Lighting		
Bulb - CFL screw base [Note 1]	5 years [Note 2]	N/A
Fluorescent Fixture	13 years	15 years
Hardwired CFL	13 years	15 years
LED Exit Signs	13 years	15 years
HID (interior and exterior)	13 years	15 years
Lighting Controls		
Occupancy Sensors	9 years	10 years
Daylight Dimming	9 years	10 years
HVAC		
Packaged AC/HP	N/A	15 years
Chillers	N/A	23 years [Note 3]
Enthalpy Economizer	7 years [Note 4]	10 years
HVAC Controls		
Programmable Thermostat	8 years	N/A
Energy Management Systems (EMS)	10 years	15 years
Motors		
Motors	15 years	20 years

* Also applies for installation in common areas of multifamily buildings

** Primary Source: Measure Life Study, prepared for The Massachusetts Joint Utilities by ERS, 10/10/05

Note 1: Measure not included in the ERS 10/10/05 Measure Life Study

Note 2: Candidate for further research/study

Note 3: Value = 20 years in ERS 10/10/05 Measure Life Study

Note 4: Value = "N/A" in ERS 10/10/05 Measure Life Study

GDS Associates, Inc. 2007. *Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures: 1-4.*

Table 1. Carnegie Mellon Typical Roof Systems

Roof system	Description	Relative cost	Service life (years)	Use (%)	Comments
EPDM	Rubber (ethylene propylene diene terpolymer) membrane system held in place primarily through the use of ballast, fasteners, or adhesive.	0.75	15	20	2% min slope required and achieved in older structures with tapered insulation.
Membrane	Welded seam systems including polyvinyl chloride (PVC), thermoplastic polyolefin (TPO), etc., system held in place using adhesives or fasteners.	0.85	10–20	6.5	2% min slope required and achieved in older structures with tapered insulation.
Modified bitumen membrane	Waterproofing provided by an elastomeric modified bitumen in a fiberglass reinforced mat.	1.0	20–25	30	SBS or styrene butadiene styrene; APP or atactic polypropylene are common thermoplastic modifiers.
Modified Built-up	Includes elastomeric modified sheet, but primary waterproofing is through multiple asphalt/felt layers.	0.96	15–20		Elastomeric cap or base sheets are used. Asphalt applied built-up sheets are the primary waterproofing.
Conv. Built-Up	Asphalt applied fiberglass reinforced mat.	0.92	10–15	6.5	
Coal tar pitch	Mopped on coal tar pitch. Can be applied on 1% or less slope. Tapered insulation is not required.	0.96	20–30	<1	Steel roof decks and thicker insulation has reduced the service life of this product.
Slope systems	Metal, tile, slate, shingle, tin.	1.0–3.0	30–75	37	All systems with >2% slope.

Note: Low slopes are defined here as systems with 1/4 in. per foot (<2%) or less of slope. Costs are relative to a two-ply modified bitumen roof system specific to 2006 pricing in the Pittsburgh, Pa. market. Price factors related to materials are volatile due to the impact of oil prices on roofing materials such as asphalt and insulation. Insulation thickness is a primary influence on material cost. Figures represent R-20 or 3.5 in. Costs for tapered insulation are factored into cost estimates for all low-slope roof systems except coal tar pitch. Listed service lives are estimates based on the expected manufacturer's warranty for a typical installation. Figures can vary by system specifications and manufacturer. Actual experienced service life varies widely.

Coffelt, Donald, and Hendrickson, Chris. "Life-Cycle Costs of Commercial Roof Systems." *Journal of Architectural Engineering*, March 2010: 30