Depreciation: Impacts of Tax Policy

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ACEEE TAX REFORM WORKING PAPERS

This is the third in a series of working papers on tax reform issues related to energy efficiency that ACEEE is preparing in 2012. We welcome feedback on this working paper. Send comments to taxreform@aceee.org. We also welcome suggestions on other topics to cover.

UPDATE: A summary report on this and the other working papers was published in February 2013 and is available at http://aceee.org/research-report/e132.

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ABSTRACT

Many business investment decisions are affected by their anticipated tax consequences. A key component of tax treatment is depreciation. The U.S. Internal Revenue Service (IRS) defines *depreciation* as "an income tax deduction that allows a taxpayer to recover the cost or other basis of certain property. It is an annual allowance for the wear and tear, deterioration, or obsolescence of the property" (IRS 2011). In effect, depreciation "spreads" the cost of a durable asset across the years that the asset will be utilized. This paper outlines the consequences for business investment in newer, more efficient assets when depreciation rules fail to reflect the actual service lives of such equipment. We focus this discussion on the tax treatment of three types of systems: heating, ventilating and air-conditioning (HVAC); manufacturing process equipment; and combined heat & power (CHP) systems. The bottom line is that current depreciation periods are often longer than useful equipment lives, providing a strong disincentive for equipment replacement. In addition, depreciation periods can vary with who owns the equipment, thereby incentivizing some owners and not others. As part of tax reform it is important that depreciation periods be rationalized so that reasonable investments can proceed. In addition, the energy efficiency of many equipment classes has increased greatly in the last two decades. Leaving undepreciated and inefficient equipment in place affects competitiveness and the environment.

INTRODUCTION

There is growing bipartisan interest in tax reform. Our tax code is widely criticized as being too complicated, and it has been more than 20 years since the tax code has had a major overhaul. Many proposals call for fewer tax brackets and eliminating many current tax breaks, creating a simpler code with lower tax rates.

Both individual and business taxes are slated for reform. In this paper we examine the energy-related capital investment consequences of depreciation as applied by businesses. We focus on heating, ventilation, and air conditioning systems (HVAC); industrial process equipment; and combined heat and power (CHP) assets. Because of the intricacies involved in the discussion of depreciation and cost segregation, some background and definitions are offered in Appendix A.

The fundamental premise of depreciation is to properly "spread" the economic cost recovery of assets over their number of years in operation. While the intent of this concept is straightforward, practical application is not. Evolutionary change and business complexities pose challenges to this fundamental premise:

- Long recovery periods assigned to earlier generations of assets may delay their replacement in favor of newer, more efficient alternatives. As currently written, the tax code still poses some impractical recovery periods for energy-related assets. For example, overhead lighting, steam boilers, and core HVAC equipment are all assigned a 39-year recovery period.
- Technologies may evolve more rapidly than the tax code. Recovery periods established with 1970s technologies in mind do not always reflect the true service life of modern replacements.
- Innovations in industrial system design may blur the distinction between structural versus non-structural asset classifications, and accordingly, the manner in which the assets are to be depreciated. In other words, certain components are increasingly flexible in their siting and configuration. Equipment that is a permanent or "structural" asset in one configuration may be perceived as "personal property" in another.
- Investors' time horizons for decision-making may be wholly disconnected from the depreciation recovery periods prescribed for their production assets. While some business asset costs are recovered over as many as 39 years, corporate planning horizons are much shorter, often no more than five years. Opportunities for faster cost recovery are highly valued for this reason.

When considering tax reform, it is important to examine how the current code, and potential changes to the code, provide incentives or disincentives for desirable actions. Ideally the code should encourage societally useful actions; at a minimum it should not discourage such actions. For example, the tax code includes incentives for home ownership (e.g., home interest costs are deductible) and there have been various reforms and proposed reforms to eliminate disincentives to marriage (e.g., removing the "marriage penalty"). Among the actions we would like to encourage, and not discourage, are cost-effective energy efficiency investments. About half of the primary energy in the United States is consumed by commercial and industrial entities, not including energy used for transportation (EIA 2011). There is enormous potential for businesses to reduce energy consumption through currently-available energy efficiency measures, as well as innovative technologies in the future. For example, a January 2012 ACEEE study on long-term efficiency opportunities estimated available energy savings average about 45-62 percent in the commercial sector and 36-51 percent in the industrial sector (Laitner et al. 2012). Realization of these energy savings will help make American businesses more productive; will improve their competitive position relative to foreign firms; and will improve the security, cost, and environmental impacts of high energy use.

The tax code and its depreciation provisions are no more effective than their application. The gap between the existing code's intent and its practical application is addressed by two activities: cost segregation and bonus depreciation.

Cost segregation is the process by which the assignment of building assets is refined for depreciation purposes. In general, this activity seeks to reclassify equipment as *personal assets* instead of *real property* asset classes (see Appendix A). The benefits of this approach are two-fold. First, this leads to a shorter recovery period, so the equipment's value is divided by a smaller number of years. Therefore, the value of its annual tax shield is larger. Second, personal property classifications are also eligible for bonus depreciation.

Bonus depreciation is derived from legislation that provides episodic relief to businesses from the rigid provisions of depreciation tax code. Bonus depreciation incentives (i.e., depreciation allowances in addition to existing tax code) are temporal provisions that minimize the tax cost of asset ownership (see Appendix A). For example, federal law in 2008 provided bonus depreciation of 50 percent of acquisition cost for certain personal assets. This provision has been retained for subsequent years and was even boosted to 100 percent during 2011 to counteract poor economic conditions. The pursuit of broad economic benefit—a desirable policy outcome accruing beyond asset owners—is a precedent that establishes the rationale for encouraging investment in energy efficiency assets through depreciation incentives.

Readers are also encouraged to read the other papers in this series, particularly a companion paper on how energy costs are treated in business taxes (Nadel and Farley 2012). This paper on depreciation is the third in a multi-part series of working papers by ACEEE on tax reform. We plan to issue a revised version in late 2012. We welcome any comments or feedback, which may be sent to Kate Farley at taxreform@aceee.org.

Goal of the Paper

Our goal is to identify rational policy options for the depreciation of business assets—policies that are fair and that match depreciation periods to the typical economic lives of such assets. If depreciation periods are too long, it discourages commercial and industrial investments that would otherwise be cost-effective. An argument can be made that many of these assets are subject to retirement or replacement in less than the 39 years currently ascribed to them for depreciation purposes. Correcting the alignment of depreciation with actual service life would remove what may be a substantial impediment to investment in energy efficiency technologies.

There are at least two options for rationalizing depreciation periods. First, the IRS tax code could be amended as part of tax reform. Second, the U.S. Treasury Department could amend its regulations. In addition, increased use of cost segregation, which blends accounting and engineering principles to render a more precise evaluation of asset types and (by extension) depreciation results within current tax code interpretation, could be useful. Separate from tax code and regulations is the concept of bonus depreciation, which has great potential to be shaped by policy into a wide variety of investment incentives.

Observations

Ignoring for now all objections to the concept of corporate taxation, controversy still surrounds the application of tax principles. Depreciation, due to the complexity of its interpretation and consequences of its application, is arguably the most hotly contested aspect of tax accounting.

For businesses, the annual accounting allowance for depreciation is a benefit that reduces taxable income and concomitantly the amount of annual tax payment obligations. Corporate accountants, tasked with protecting shareholder value, are limited by their ability to navigate accounting rules and sometimes a lack of knowledge that leads to misplaced priorities. Depreciation rules cannot anticipate all future interpretations, so the resulting lack of precision in regulations leads to constant legal challenge. The interpretations emerging from those challenges become the most practical guideline for interpreting depreciation.

A general typology of depreciation reform would include:

- Policy initiatives. Seek tax reform to rationalize depreciation periods. Where depreciation periods are in excess of the useful economic life of equipment, they discourage investment and need to be revised.

- Legal challenge to existing code interpretation. Individual corporate entities are sometimes motivated to challenge the tax code's classification of assets. Other corporate observers closely follow these cases to inform their own asset management strategies.

In lieu of any change to the existing tax code, the applied accounting strategy is to reclassify assets from longer to shorter recovery periods where possible. This usually involves reclassification of *real assets* (especially components within buildings) to *personal property* asset classes. This is the object of cost segregation (see Appendix A).

With all else being equal, businesses are discouraged from investing in assets with higher tax costs. Longer depreciation periods effectively generate higher tax costs for any given asset, thus discouraging investment in that type of asset. Consequently, distortion of asset depreciation schedules relative to their true economic lives discourages upgrades that would otherwise be cost-effective, stimulate job creation, and reduce the pollution that is a byproduct of energy production.

STATUTORY VS. CONCEPTUAL FOUNDATION

The tax code's relatively static interpretation of depreciation fails to accommodate dynamic advances in technology and asset management practices. In lieu of changing the tax code, practitioners are left with interpreting existing rules. Accordingly, the greatest opportunities for tax savings are frequently related to asset classification. Simply put, this boils down to the distinction between real property and personal property.

The challenge for tax accounting, then, is to distinguish between structural components that are integral to a building's overall functionality (real assets) versus those components installed for the sole purpose of serving a specialized activity housed in the structure (personal property assets). For example, there is a distinction to be made between an HVAC system that provides overall occupant comfort as opposed to an auxiliary system that's *sole justification* is to provide closely-controlled space conditioning to a production environment. The air conditioning system dedicated to a data processing center may be an example of the latter.

Asset Life Considerations

The United States Internal Revenue Code considers the effective life of a building used for business purposes to be 39 years. In general, 39 years is also considered to be the effective life of major building components, such as HVAC equipment. In the industrial sector of the economy, and especially in manufacturing, a wide range of mechanical systems are similarly evaluated for economic life. The cost recovery schedule for manufacturing equipment and CHP components ranges from 1 to 20 years.

Available data suggests that most HVAC and production equipment wears out and is replaced after periods of time much shorter than 39 years—although the service life expected varies with equipment type. In other instances, improvements in technology make some manufacturing processes, or components of them, obsolete before they are fully depreciated.

Some equipment classes have shown great efficiency improvements over the past few decades. New equipment is expected to be much more reliable than legacy "iron." In addition, older air conditioning equipment, such as chillers, uses ozone-depleting refrigerants. Not only do older chiller technologies consume more energy, they are more prone to refrigerant leaks as compared to modern equipment. Examples of outdated mechanical systems are still found in industrial facilities of all types and sizes. In many facilities, the scarcity of time and capital yields a plant engineering culture that is reluctant to "fix what's not broken." Continual refinement of production technologies ensures that those facilities remaining dependent upon older, inefficient technologies will increasingly lag the competitiveness of updated facilities.

Of course, replacing a piece of equipment that is not fully depreciated has implications for shareholder wealth. Asset management decisions like this are evaluated in part for their tax consequences. However, tax consequences can be balanced against positive increases to a company's operating income, and subsequently, retained earnings and market share values. A failure to account for effects on both tax and operating income may be an important barrier to investment in efficiency.

Accounting practices become a hurdle for the implementation of more efficient assets. Companies are reluctant to remove an asset from service if it is not fully depreciated. Doing so would instigate a write-off of the residual (undepreciated) capital value. A write-off is a capital loss, and it reduces the firm's total value of capitalized assets. If the real (book value) of shares is diminished, the market value of those shares will drop accordingly. The firm's ability to raise capital for growth drops with its share value.

Cost Segregation

Particularly in the industrial sector, a myriad of hardware types and configurations test the consistency of "structural" versus "personal property" definitions. Energy-consuming assets—when broken down into their prime and auxiliary components—are particularly susceptible to inconsistent tax interpretation.

Changing technologies and asset management strategies may render certain assets less permanent. Consider, for example, the use of cubicle partitions instead of fixed walls in office space. Concurrent to this is the configuration of lighting systems installed in drop ceilings. The inherent flexibility of these assets would arguably substantiate their classification as personal property. The concept of asset "permanence" may vary across and within industries; seasonal and locational attributes of assets may also play a role. Asset owners rely on cost segregation studies to develop a depreciation strategy that is suitable to their unique business situation.

In practice, distinctions between real and personal property classifications are refined through cost segregation studies, which influence owners to reclassify assets to personal property classes whenever possible. Energy-consuming assets are frequently on the frontier between real and personal property classifications. The cost segregation debate is often a question of asset permanence. In other words, the building components that are considered more permanent, durable, and consistent in use over time are more likely to be classified as real property and thus subject to longer recovery periods.

Accelerated Depreciation

Distinct from the concept of shorter recovery periods is accelerated depreciation, which maintains the number of years for cost recovery by asset class, but shifts the timing of depreciation charges so that a preponderance of value is captured in the near term. Accelerated depreciation results in a tax benefit because of the time-value of the money benefit of taking a deduction earlier (rather than later) in the life of the asset (Guey-Lee 1998). Adjustments to the depreciation schedule are often made to better relate capital recovery with the actual economic change in the market value of an asset (EIA 1992) or to rectify inequities in the current schedule (Casten 1998). Note also the distinction between accelerated depreciation (a relatively permanent provision) compared to the episodic availability of bonus depreciation.

SERVICE LIFE & DEPRECIATION SCHEDULES OF COMMERCIAL EQUIPMENT

"Service life" is the expected interval during which it makes sense to use equipment and continue maintaining and investing in it. "Median Service Life" is an estimate of the time until 50 percent of units of a given type have been replaced and is perhaps the most useful measure of service life available. Unfortunately, the available data are sparse, in terms of the number of equipment types for which enough information are available to even make estimates.

HVAC

Table 1 summarizes the state of the art for HVAC equipment. It is based on *survivorship curves* (Hiller 2000).

Table 1. 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 Owning and Operating Cost Database, http://xp20.ashrae.org/publicdatabase/service_life.asp, accessed March 1, 2012
Note: The data is for all units that have already been replaced, so may not be representative of equipment purchased recently.

These data, like the earlier Abramson et al. (2005) and Akalin (1978) studies, strongly suggest that the actual service lives of HVAC equipment are substantially less than the 39 years assumed for tax depreciation. This applies from the simplest equipment (electric hot water heaters) to the most complex for which data are adequate (centrifugal chillers).

Industrial Equipment

The industrial sector is significant for the vast number, variety, and magnitude of assets subject to depreciation. An attempt to enumerate these many assets types would be prohibitive in the scope of this paper. However, a useful discussion can be developed using electric motors to illustrate an asset class that is both fairly ubiquitous across industry and sufficiently varied in design and application in ways that defy a one-size-fits-all depreciation treatment. Motors convert electricity into mechanical motion to support innumerable manufacturing tasks. Electric motors are at the heart of conveyors, fans, pumps, compressors, drills, presses, and other equipment.

Typically rated for their horsepower (volume of work produced), motors range in size from small, fractional horsepower units to many-thousand horsepower units. Some motors run intermittently while others run constantly, depending on their application. Consequently, the range of annual electricity costs for motor operation can vary from a few hundred dollars to hundreds of thousands of dollars.

Motors are subject to replacement or overhaul depending on their operating environment. For example, the deterioration rate of motor components tends to vary directly with the humidity level of their operating environment. Accordingly, the IRS assigns motors and related systems to asset classes that are specific to the manufacturing industries that employ them.

Table 2. Sample Variation in Depreciation Class Life Across Industries

Asset Class	Description of Asset	Class Life (years)	Recovery Period (GDS/MACRS)	Recovery Period (ADS)
20.1	Manufacture of Grain and Grain Mill Products	17	10	17
20.2	Manufacture of Sugar and Sugar Products	18	10	18
20.3	Manufacture of Vegetable Oils and Vegetable Oil Products	18	10	18
20.4	Manufacture of Other Food and Kindred Products	12	7	12
22.2	Manufacture of Yarn, Thread, and Woven Fabric	11	7	11
26.1	Manufacture of Pulp and Paper	13	7	13
26.2	Manufacture of Converted Paper, Paperboard and Pulp Products	10	7	10
30.2	Manufacture of Finished Plastic Products	11	7	11
34.0	Manufacture of Fabricated Metal Products	12	7	12

Several issues become apparent in Table 2's industry comparisons:

- Delineation of industry asset class sub-categories seems to be inconsistent across major industry groups. An example is the distinction between grain versus sugar products. Why should the class life for these industries' assets be 17 and 18 years respectively? Compare this to the rather broad industry definition for "food and other kindred products," to which a 12-year class life is assigned. When considering the many opportunities to reconfigure one facility (and its assets) for multiple food product lines, the logic for assigning a single class life to all production assets by industry type becomes tenuous.
- Any of the processes in the table above will require similar motors operating under similar conditions for the asset life expectancies to remain consistent. Operating conditions within a specific industry may vary by facility location (due to climate), by seasonal variation in facility use, or countless other conditions.
- In practice, motors may be retained as surrounding system components are replaced, perhaps with a concurrent change in purpose and workload. The life expectancy of the motor drive changes accordingly.

Not evident in Table 2 is another consideration related to asset management. To illustrate, consider two different facilities, equivalent in every way except for their asset management strategy. Both facilities employ redundant motor systems. In one facility, production loads are routinely shifted between the two motor systems, therefore prolonging the motor's operational lives and placing commensurate wear and tear on both systems. Meanwhile, the other facility operates one motor system primarily, leaving the redundant system for emergency back-up purposes only. These different strategies have different implications for the service life of motor systems, and consequently, their true rates of depreciation.

In sum, the situational differences that contribute to actual equipment deterioration lend an undesirable level of complexity to asset cost accounting. This argues against fine-tuning depreciation recovery periods for specific assets. Instead, it would be useful to have consistent treatment of most industrial equipment across most industrial processes (there will be some appropriate exceptions).

CHP Equipment

CHP assets currently fall under various depreciation schedules ranging from 5 to 39 years depending primarily upon their industry application (see Table 3). Many CHP proponents feel that these asset lives are no longer appropriate for modern CHP systems. The shift from boiler/steam turbine-based systems to modern engine and turbine systems have reduced system costs, but also increased the cost of maintenance for the equipment. Thus, the typical useful life of the investment is substantially shorter than it was in 1986 when the current schedules were established, and many current applications were not even envisioned at that time (Elliott and Spurr 1999).

Table 3. 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: Spurr (2001)

Contrasts with Other Equipment

It is interesting to compare the 39-year depreciation for heating and air conditioning equipment, the same as for the building's structure, with that of other relatively long-lived equipment. Table 4 shows that 39 years is unusually long.

Table 4. IRS Depreciation Periods for Other Equipment

Asset Class	Description	Class Life (years)	MACRS (years)
00.11	Office furniture, fixtures, and equipment	10	7
00.40	Industrial steam and electric generation and/or distribution systems	22	15
30.2	Manufacture of finished plastic products	11	7
33.3	Manufacture of foundry products	14	7
36.1	Any semiconductor manufacturing equipment	5	5
37.11	Manufacture of motor vehicles	12	7
48.121	Telephone central office switching, computer-based	9.5	5
49.11	Electric generation, etc.	50	20
49.12	Electric utility nuclear production plant	20	15
49.13	Electric utility steam production (CC, boilers, etc.)	28	20
49.14	Electric utility transmission and distribution plant	30	20
49.15	Electric utility combustion turbine production plant	20	15
49.4	Central steam utility production and distribution	28	20
49.5	Waste reduction and resource recovery plants	10	7

Note: Extracted from IRS Publication 946 (2010), Table B-2, Table of Class Lives and Recovery Periods. MACRS is the predominant U.S. tax depreciation method.

How Bad Is Old Equipment?

One public policy reason to use shorter depreciation periods would be to encourage earlier adoption of more efficient (currently available) equipment. How quickly has equipment efficiency improved? There are several ways to approach this question. For HVAC systems, we have chosen to look at changes in minimum energy efficiency standards, so we are comparing the least efficient chiller or water heater today with the least efficient that was available in the past. For many or most equipment classes, manufacturers usually suggest that sales are dominated by less efficient units, so this allows comparing like with like.

Table 5 illustrates the minimum efficiency allowed under ASHRAE 90.1 for a few classes of commercial HVAC equipment.[1] The table is incomplete, because the coverage of equipment classes has grown through time and because not all equipment types were included in each iteration.

Table 5. Selected HVAC Efficiency Changes since 1970s

Equipment Type	Improvement
Commercial AC, 65k - 130k Btu/h	65%
Commercial AC, 135k - 230k Btu/h	62%
Large liquid chillers, >600 tons	63%
Packaged terminal AC, 6000 Btuh	25%
Gas hot water boilers, >300,000 Btuh	19%
Water heaters, storage	Low

Based on ASHRAE 90.1 standards that become the basis for federal and state energy codes.

[1] Table based on much more extensive historical compilation by Dick Lord, Carrier Corporation. For illustrative purposes, we report basic metrics and ignore important but additional measures such as part load (IEER, etc.) and standby losses (SL).

Many equipment classes have shown remarkable efficiency changes. In some cases these reflect substantial changes in technology. Water heaters lag because they have not yet required major technology shifts to heat pump (electric) and condensing (gas) technologies.

The appropriate depreciation schedules would encourage upgrading to newer equipment that uses much less energy and thus costs much less to operate.

Implications

Depreciation has real ramifications for a taxpaying building owner. Consider the following example. Assume the purchase of a large chiller that fails after 26 years. For illustrative purposes, use straight-line depreciation. At the end of 26 years (2/3 of its tax life), it has a residual value of 1/3 of its installed price, or $300,000.

Simplified depreciation example	
26 years	actual service life
39 years	depreciation life
33%	"book value" as fraction of purchase price, at end of life
$900,000	purchase price
$300,000	remaining "book" value at end of life

The critical question is how that $300,000 residual value is treated for tax purposes. It appears that this is a loss for tax purposes, deducted from tax obligations in the year it happens.[2] This reduces one's tax liability in that year, but also the reported earnings. As important, if a prudent business has established a tracking account or similar vehicle to cover the cost of replacing the equipment at the end of its service life, that account is unlikely to have sufficient funds to replace equipment that fails before being depreciated.

Together, these effects are unlikely to encourage building owners to retire equipment before it is depreciated, even if it is functionally obsolete. This is particularly true because "repairs" to that equipment can be written off as expenses in the year they are incurred, while replacements cannot be.

Some classes of equipment, such as centrifugal chillers, have remarkably higher minimum performance today (see Table 4). For others, such as gas water heaters and boilers, improvements have been more modest. Thus, for some classes of regulated equipment, it is likely that early retirement would save enough energy to be cost-effective, even accounting for the actual and tax losses from discarding equipment before it suffers a terminal breakdown.

If we compare generally available but obsolete equipment still in use with "best-in-class" equipment today, a more compelling case can be made for early retirement (DeKleine 2010), and thus a better case can be made that the depreciation aspects of the Internal Revenue Code actually impede energy efficiency. We note two cases: residential air conditioners and centrifugal chillers. Here there are both economic benefits (lower energy bills) and other benefits. The direct benefits include removal and recovery of refrigerants that harm the ozone layer; indirect benefits include reduced carbon dioxide emissions by equipment that uses less fossil fuel electricity.

[2] See, for example, the dialogue at http://www.taxalmanac.org/index.php/Discussion:Depreciation_of_HVAC. This suggests that tax professionals do not agree on many aspects of HVAC depreciation, but writing off the residual value seems to be the appropriate action.

What Is the Score (Lost Tax Revenue)?

"Score," or foregone tax revenue, is calculated by Congress' Joint Committee on Taxation. A Score was calculated for the provisions of H.R. 1241 in the 109th Congress, a bill introduced by Representative Pete Hoekstra (R-MI), the Cool and Efficient Buildings Act, which proposed changing the HVAC depreciation from 39 to 20 years for certain equipment (Hoekstra 2005). Equipment included roof-top unitary air conditioners (RTUs), the workhorses of light commercial buildings; chillers, which are the most expensive components of large systems; and refrigeration equipment. Table 6 shows the static scores calculated for the Hoekstra bill.

Table 6. Scoring Results ($ in millions)

Scenario	2006–2010 Total
1. Base proposal	-741
2. Limit to replacement	-431
3. Sunset after 2 years	-279
4. Sunset after 1 year	-146
5. Exclude Refrigeration	-128

Source: Hoekstra (2005), Appendix B

The five-year static score (2006–2010) would be $741 million for the whole package, but only $128 million for HVAC without refrigeration.

An analysis by ACEEE in 2001 (Elliott 2001) scored several proposed CHP incentives for their potential impact on revenues.

Table 7. Estimates of Tax Policy Costs

Policy	Cost (10-year basis)
7-year depreciation	$1,800 million
10-year depreciation	$1,300 million
15-year depreciation	$900 million

Do the Savings Justify the Score (Lost Tax Revenue)?

The estimated cost of extending the Section 179 and Bonus Depreciation tax breaks has been projected to cost the Treasury $5 billion over ten years and have a value to businesses of $85 billion next year (Dodge 2012). While this is a wholesale, across-the-board incentive, a more targeted treatment to HVAC, manufacturing, and generation assets could produce a similarly positive ratio.

For example, an analysis by Taub (2007) on the impacts of investments in wind power in 2007 is indicative of how favorable tax treatment in the short term can have ripple effects across the country and in local economies:

- $1.9 B in net present value (NPV) of taxes on project income (inclusive of 5 year MACRS)
- $540 M in NPV of income tax on individuals' wages
- $280 M in NPV of income tax on vendors' profits
- $30 M in NPV of income tax on lease payments and royalties to landowners
- $2.75 B total, which is $250 million greater than the $2.5 billion total cost of the production tax credits (PTCs)

A favorable treatment of CHP might produce similar investments by utilities as they replace aging generation assets.

RECOMMENDATIONS

As the country approaches tax reform, simplifying and rationalizing the treatment of depreciation is in order. This is compatible with the many proposals that call for fewer tax brackets and eliminating tax breaks. Businesses function best when able to make decisions independent of tax implications. Depreciation schedules that distort the carrying cost of an asset discourage investment in new, more efficient systems. This is most apparent in the treatment of HVAC systems, equipment that is treated as part of a building but that cannot realistically be expected to last as long or be effective for the life of the building. There are several potential strategies for depreciation reform:

Refine Cost Recovery Periods to Reflect the True Service Life of Assets

This is consistent with the fundamental purpose of depreciation: to accurately spread the cost of ownership of the functional life of an asset. Current recovery periods are overly long and encourage the continued operation of obsolete assets and at the same time discourage the adoption of newer, more efficient assets. With all else being equal, shorter cost recovery periods reduce the tax cost of asset ownership, therefore removing a significant barrier to investment in energy efficiency assets.

The tax code should encourage investment by using accelerated depreciation schedules where possible and most advantageous. Accelerated depreciation allows recovery of substantial capital costs in early years, thereby encouraging investment. While there are costs to accelerated cost recovery, the benefits in terms of more efficient equipment with lower operating costs can be substantial. Such lower operating costs can improve the competiveness of U.S. firms. Priorities for accelerated depreciation are equipment types that have seen particularly large improvements in efficiency, such as commercial packaged air conditioners and large chillers (see Table 5).

Likewise, investments in CHP can be encouraged through preferable tax treatment, such as use of a standard 10- or 15-year depreciation period, regardless of who owns the CHP system. As described in this paper and many other publications, CHP has a net societal benefit, maximizing the use of energy resources and reducing costs to end-users. An accelerated depreciation schedule for key components of such systems can help mitigate the many market barriers to these investments.

Expand the Creative Use of Bonus Depreciation Provisions

Bonus depreciation provisions can be an effective way to address industrial sector energy efficiency investment for several reasons. One is that the concept of bonus depreciation has substantial precedent as a policy tool; familiarity begets replication. Legislators may craft bonus provisions for limited periods of time to stimulate investment within specific industries and/or targeted locations. The “sunset” that looms over such provisions may accelerate the pace of investment. Because of their temporary nature, bonus provisions are a relatively easy way to stimulate investment activity without inviting the contention that usually comes with altering fundamental tax code. Given the disparity of economic conditions across regions, bonus depreciation can be tailored to boost investment where needed. Policymakers can appreciate the flexibility to enter and withdraw bonus provisions in response to rapidly evolving technology markets. Energy technologies are ideal candidates for bonus depreciation for all of these reasons (Tax Policy Center 2010).

Encourage Cost Segregation

Tax reform legislation cannot keep pace with the evolution of technology and asset management practices. The objective here is to work within the existing tax code and simply reclassify real assets as personal property whenever practical. Personal property classes offer shorter cost recovery periods and are eligible for bonus depreciation provisions that do not apply to real property. In the absence of tax reform, practical guidance for tax accounting comes from precedent (both applied and legal) resulting from the ongoing conduct of cost segregation.

National competitiveness is connected to the ability of U.S. businesses to produce products more efficiently than those abroad. Much as was observed in the 1970s and 1980s, U.S. plants with old and outdated systems were eclipsed by manufacturers with newer and more efficient plants in Europe and Asia. A tax code that enables businesses to treat the depreciation of these business assets rationally improves their competitiveness. By extension, this collectively results in a reduction in the amount of energy consumed per gross domestic product and propagates environmental and economic benefits throughout society.

BILBIOGRAPHY

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APPENDIX A: DEPRECIATION QUESTIONS AND ANSWERS

What is depreciation?

Depreciation is an annual cost allowance that "spreads" the cost of a large asset over a number of years that reflects the length of time that the asset is used. Depreciation spreads the tax obligations of asset ownership over a similar number of years, called the "recovery period."

Why depreciation?

Businesses are assessed for taxes both on the value of their property assets and as a percentage of their income. Corporate accountants seek to minimize all taxes. Depreciation strategies—including the classification of assets and the recovery period of each class—are therefore central to the reduction of tax impacts on shareholder wealth. Note that business income tax is based on its earnings. The earnings subject to tax are the revenues that remain after deducting all legitimate costs of doing business. Depreciation charges are among those costs. Depreciation is a "tax shield" as it contributes to the reduction of a business' tax expense.

How is depreciation calculated and applied?

Depreciation applies to discrete, tangible assets. The first step is to assign an asset to a property class with the appropriate recovery period. Assets subject to depreciation can be divided into two broad property classes: (1) "real property," which according to Section 1250 of the tax code includes land, buildings, and fixtures and equipment that are considered permanent components to buildings; and (2) "tangible personal property," defined by Section 1245 to include any fixtures contained in and not durably attached to a building.

How does one distinguish asset classes for depreciation?

Depreciation classes are distinguished by their recovery period. For instance, a basic building structure consisting of a floor, roof, and walls is considered durable and immobile, and is therefore classified "real property." Because of its durability, these long-lived assets are assigned the longest recovery periods (39 years). Note that all real property (other than land) is eligible for depreciation. Building contents such as desks and window treatment are less durable and subject to more frequent replacement. These are considered "personal property" and can be assigned to shorter recovery periods (typically 5 or 7 years).

What are the guidelines for determining depreciation?

Tax codes provide legal guidance for depreciation accounting. Businesses may choose the most advantageous from a variety of depreciation formulas. First, the asset is declared to fit a specific depreciation class, i.e., its recovery period is anything from 3 to 39 years. Then, the annual depreciation costs are charged as an expense during each year of the recovery period provided by that class.

What are the strategies for depreciation?

The Internal Revenue Service recognizes several ways to calculate business depreciation. In some cases, taxpayers can select the most beneficial from listed alternatives.

- Straightline depreciation divides the acquisition value by the recovery period for that class. The result of that division is applied as an expense ("depreciation charge") to each subsequent year in the recovery period. For example, a 5-year asset acquired for $10,000 would provide a depreciation charge of $2,000 for each of the five years.

- Modified Accelerated Cost Recovery System (MACRS), when compared to the straightline method, provides larger depreciation charges during the early recovery period and smaller charges in final years. The total lifetime depreciation remains the same. However, by skewing the magnitude of charges to the earlier years, businesses enjoy the benefit of a greater tax shield during the early years of asset life. This is especially useful to offset the risk that the business may not survive to apply depreciation charges in later years.
- Instant depreciation can be claimed for assets assigned to the Section 179 class, so named for the enabling rule provided by the IRS code. Section 179 assets are certain personal property items that may be expensed at 100 percent of their total acquisition cost in the year that they are purchased. While this is intended to encourage more investment by small businesses, large companies can make occasional use of this provision. Note that the IRS places upper limits on the deduction amounts that can be claimed for any single asset. In 2012, that limit was $139,000.
- Bonus depreciation is another provision that encourages more business investment. Special legislation makes bonus depreciation available for a limited time. Bonus depreciation is provided as a percentage of the asset's acquisition cost, and the one-time charge is applied in the same tax year that the acquisition is made. Bonus depreciation allows investors to immediately claim a large portion of depreciation expenses that would otherwise be applied over a number of years. Bonus depreciation effectively converts tax expense into cash flow to the investor. As such, bonus depreciation is deployed as a policy tool for stimulating business investment.

Note that several classes of depreciation can be applied to a single asset. For the example of straightline depreciation applied to a 10-year asset purchased for $200,000, the following apply:

ACQUISITION COST:	$200,000
SECTION 179 CHARGE: $139,000 maximum in 2012	$139,000
50% BONUS DEPRECIATION $200k - $139k = $61k x 50%	$30,500
NORMAL FIRST-YEAR DEPRECIATION 10% (one year out of 10) of the remaining asset value, or ($200,000 - $139,000 - $30,500) x 10%	$3,050
TOTAL FIRST YEAR DEDUCTION $139,000 + $30,500 + $3,050	$172,550
CORPORATE TAX RATE	35%
TAX SAVINGS $172,550 x 35%	$60,393
AFTER-TAX EQUIPMENT COST $200,000 - $60,393	$139,607

SOURCE: http://www.section179.org/section_179_deduction.html

What is the definition and role of cost segregation?

Cost segregation is the study of a subject property that seeks to reclassify real property assets to personal property classifications. It arises from the fact that (1) many building components are removed from service or replaced before the overall structure that houses them, and (2) applied accounting practices often oversimplify the distinction between real and personal property, resulting in reduced tax shields. A cost segregation report will influence the owner's depreciation strategy, thus reducing tax payment obligations.