Tax Reforms to Advance Energy Efficiency

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ABSTRACT

This election season, "tax reform" is becoming one of the key catchphrases. Both Democrats and Republicans are supporting tax reform, and actual work on legislation is likely to take place in 2013. Key elements of reform may include simplifying the tax code in some respects and reducing marginal tax rates by eliminating many credits and deductions. Tax reform provides us with an opportunity to remove barriers to efficiency investments that are imbedded in the current tax code, and to use the tax code as a tool to support energy efficiency in the future more than current provisions do. In this paper, we suggest policies in five areas that could be used to encourage energy efficiency: treatment of expenses in business taxes, depreciation, repayable incentives, ending or reducing subsidies for fossil fuels, and fees on emissions. We propose several policy options designed to encourage investment in energy efficiency that may be used as a starting point for future discussions on tax policy.

Introduction

This election season, "tax reform" is becoming one of the key catchphrases. All of the presidential candidates that have been in the race put forward plans, from Herman Cain's "9-9-9" plan to Gingrich's 15% flat tax to President Obama's "Buffett Rule" for preventing high-income earners from taking undue advantage of special tax preferences such as low capital gains tax rates. Both Democrats and Republicans agree that some kind of reform is needed, and tend to agree that the tax code should be simplified, and that marginal tax rates reduced by eliminating many credits and deductions.

Politicians on both sides of the aisle may disagree on how to implement these key elements and what they might look like in an ideal tax code. The important lesson to take away from all the rhetoric is that some kind of meaningful tax reform is likely to happen in the next few years. It is likely that Congress will begin to tackle tax reform in earnest in 2013. And these reforms might include some radical changes to the way the tax code currently operates.

Cost-effective energy-efficiency investments are among the actions we would like to encourage, and not discourage. There is an enormous potential for individuals and 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 52-69% in the residential sector, 45-62% in the commercial sector and 36-51% in the industrial sector (Laitner et al. 2012). Realization of these energy savings will help make American businesses more productive, improve their competitive position relative to foreign firms, and reduce the security, cost and environmental impacts of high energy use.

Tax reform provides us with an opportunity to remove current barriers to efficiency investments and to use the tax code as a tool to support future energy efficiency. The challenge is in proposing policies that encourage energy efficiency while still keeping with a key goal of tax reform -- simplifying the tax code. We searched available literature and could find very little written on this subject, which motivated us to undertake this research. Much was written around a century ago when the income tax was first begun in the 1890s, refined following approval of the 16th amendment authorizing a federal tax on property in 1913 and then tuned in the 1920s (see Gordon 2011) but in recent years surprisingly little has been written that we could find. In this paper, we suggest tax policies in five areas that could be used to encourage energy efficiency: treatment of business expenses, depreciation, repayable incentives, ending or reducing subsidies for fossil fuels, and fees on emissions. Several of these proposals began as an ACEEE working paper, for which we solicited review (Nadel and Farley 2012a, Nadel and Farley 2012b, Sachs et al. 2012). This summary paper incorporates the many suggestions and comments that we have received in the past several months since we published the first of the working papers.

Treatment of Expenses in Business Taxes

One focus of tax reform should be on business taxes, and in particular on how businesses account for energy costs when computing their taxes. About half of the primary energy in the United States is consumed by commercial and industrial facilities, plus a portion of transportation energy is also used by business (EIA 2010).

The Current Tax Code

Under the current tax code, individuals pay taxes on their income, and most expenses are not deductible. Exceptions may include interest on home mortgages and high medical expenses, but not energy expenses. Business taxes work differently. Businesses are taxed on their profits and virtually all expenses are deductible, including energy costs. Capital expenses must be depreciated, meaning they are recovered over the a multiyear period – as much as 39 years in the case of commercial buildings and equipment installed in these buildings. As a result, the current tax code creates three disincentives to energy-efficiency investments:

1. Since energy bills count as a business expense, and are subtracted from the total amount of taxable income, effectively, the federal government is effectively "paying" 25% of business energy costs (based on the average effective business tax rate of about 25% -- Markle and Shackelford 2011)) and sometimes as much as 35% of a business's energy costs (the maximum business tax rate). Subsidizing energy costs enables higher energy consumption.
2. When businesses do invest in energy efficiency, a portion of the energy savings go to the federal government in the form of higher taxes (e.g. 25% for a business with the typical effective rate of 25%). When the full value of the savings does not accrue to the firm, the incentive to make investments goes down. This is the flip-side of the first disincentive.
3. When a firm makes capital investments, the values of the new assets are depreciated over time, and therefore the positive impact on earnings by decreasing taxable income is spread out over time. Long depreciation periods can reduce the incentive to make investments.

These three disincentives are illustrated in Table 1, showing the after tax profits and cash flow of the hypothetical widget manufacturer, Acme Corporation[1]:

Table 1. Effects of Energy Costs and Energy-Efficiency Investments on Acme Corporation Taxes Under Current Tax Code.

		Efficiency Investment	
	Baseline	**Before Depreciation**	**With Depreciation**
Annual Sales	$10,000,000	$10,000,000	$10,000,000
Investment in Energy Efficiency	-	$120,000	$120,000
Energy Expenses	$200,000	$160,000	$160,000
Other Expenses	$8,800,000	$8,800,000	$8,800,000
Depreciation of Energy Efficiency	-	$0	$8,000
Profit for Tax Purposes	$1,000,000	$1,040,000	$1,032,000
Federal Tax Rate	25%	25%	25%
Federal Taxes	$250,000	$260,000	$258,000
Profits after Taxes	$750,000	$780,000	$774,000
Net Cash Flow	$750,000	$660,000	$662,000

Notes: Energy efficiency investment saves 20%, has a 3-year simple payback, and is depreciated over 15 years. Net cash flow is profits minus taxes and investments. In this and subsequent tables we use average tax rates since data on average marginal tax rates is hard to come by. Business tax rates range from 15-35%, but due to many tax incentives, marginal tax rates for most businesses are significantly less than 35%.

Alternatives

We propose two possible new ways to treat business energy costs in the tax code. One is simple but radical – it would shift business taxes to focus on revenue, not expenses, so that it more closely resembles the individual income tax. The second is more surgical in that it would just apply to energy costs and would reduce incentives for energy waste. At this point we are not advocating for either of these options, but instead propose that they be subject to serious examination and discussion.

We note that potential tax changes need to be reviewed from the perspective of the average firm, but also from the perspective of firms with high energy costs, particularly those that need to compete internationally. These latter firms might need special attention so that we don't undercut American firms in international competition. A good discussion of some of these issues can be found in a 2009 Interagency report (Interagency Report 2009) as well as articles by Resources for the Future (Morgenstern 2010).

A radical idea. It is a matter of significant debate among historians as to why policy makers in the 1890s and 1910s set up two separate tax systems—one for corporations, one for individuals—with the former based on profits and the latter based on income. As a consequence, according to Gordon (2011), "there has since been a sort of evolutionary arms race, as tax lawyers and accountants came up with ever new ways to game the system ('playing the two

[1] With apologies to Road Runner, Wile E. Coyote, and any real company named Acme.

systems against each other'), and Congress endlessly added to the tax code to forbid or regulate the new strategies." Switching the corporate tax to be based on revenue instead of profits could reduce this gaming, simplify the tax code, dramatically reduce marginal tax rates, and remove the current distortions with regards to energy-efficiency investments.

Table 2. Effects of Energy Costs and Energy-Efficiency Investments on Acme Corporation Taxes Under a Tax System Where No Costs are Deductible

	Baseline	**Efficiency Investment**
Annual Sales	$10,000,000	$10,000,000
Investment in Energy Efficiency	-	$120,000
Energy Expenses	$200,000	$160,000
Other Expenses	$8,800,000	$8,800,000
Depreciation of Energy Efficiency	NA	NA
Profit for Tax Purposes*	$10,000,000	$10,000,000
Federal Tax Rate	3.25%	3.25%
Gross Federal Taxes	$325,000	$325,000
Credit for taxes in purchased goods and services	$75,000	$75,000
Net Federal Taxes	$250,000	$250,000
Profits After Taxes	$750,000	$790,000
Net Cashflow	$750,000	$670,000

*Nothing is deductible

Note: To prevent cascading of taxes, we provide a credit for prior taxes included in goods and services purchased by the firm. The 3.25% tax rate is designed to for simplicity and to permit comparison with Table 1 and is based on a rough guess that 30% of an average firm's costs might be from goods and services subject to a prior federal tax.

A business tax that was based on only revenue would be far simpler, as the many pages of law and regulations related to expenses and how to account for them would no longer be needed. It could allow marginal tax rates to be decreased to around 2.3% as it would increase the tax base by about an order of magnitude. Such an approach would provide incentives to reduce all costs, not just energy costs, improving economic efficiency.

As with any change to the tax code, there would be winners and losers. Most obviously, this approach would reduce taxes on firms with above-average profit margins while increasing taxes on firms with low profit margins. The government would no longer share in gains or losses. Firms with very-low profit margins (e.g. grocery stores) might raise prices to pay for the higher taxes. On the other hand, lower taxes on high-profit firms could reduce the prices they charge.

A tax on just revenues could benefit integrated firms that produce parts as well as final products. They would pay taxes on just their selling price. Firms that buy parts from others would have taxes included in the price of the parts they purchase. To address this, the amount of taxes included in the cost of goods purchased could be credited against a firm's tax bill. Many other developed countries have value-added taxes that only tax the incremental value added, showing how such costs and taxes could be tracked. As a rough estimate, as shown in Table 2, if such a credit were provided, the marginal tax rate might increase to 3.25%. Alternatively, perhaps the cost of components could be ignored, since the marginal tax rate is so low.

From an energy efficiency point of view, such an approach would eliminate many of the disincentives for energy-efficiency investments discussed above. Taxes would not change as energy use goes up or down and taxes would not change with energy-efficiency investments. After tax profits with efficiency investments go up relative to the example in Table 1. Net cash flow goes down due to the energy efficiency investment, but not as much as in the example in Table 1. These trends are illustrated in Table 2, which uses all of the same assumptions as in Table 1, except for the tax treatment. Acme's Federal taxes are identical in Tables 1 and 2, but now they have simpler taxes and more incentive to reduce energy (and other) expenses.

To further increase incentives to make investments, a modest investment tax credit on the order of 10% or so could be considered. We have not included this option in our analysis.

A more surgical approach addressing just energy costs. One more limited way to address the fact that all tax payers share in high business energy costs is to reduce the amount of energy costs that can be deducted. For example, the tax code could be amended to not allow businesses to deduct energy costs from revenues except the portion of energy costs that exceed 4% of revenues, and even then, to only deduct 80% of energy costs. The 4% threshold misses most businesses, which would have to include energy expenditures as a part of taxable income. However, it allows energy intensive industries to receive some deduction. Energy intensive industries include trucking, chemicals, primary metal manufacturing, electric utilities, mining and many types of agriculture. This is similar to how health care costs can only be deducted on personal income taxes when they exceed 7.5% of adjusted gross income (rising to 10% in Jan. 1, 2013). The 80% figure is based on a typical U.S. corporate effective tax rate of about 25% (Markle and Shackelford 2011) minus the roughly 5% reduction in the tax rate that this proposal would allow. By allowing only 80% of energy costs to be deducted, we allow for the fact that the other 20% is effectively subsidized through the tax code. However, while this approach makes energy efficiency investments more attractive, it does not simplify the tax code.

Scaling back deductions for business energy costs would increase corporate tax receipts unless other adjustments were made. Most likely corporate tax rates would be lowered – an example is provided below. A second option would be to use at least some of the revenue to fund popular tax credits such as the credit for Research and Development (R&D) investments that Congress keeps extending each year and/or improvements in depreciation schedules for energy-consuming equipment as discussed later in this paper.

Table 3 illustrates how this change might affect the Acme Corporation. Acme has modest energy costs so the reduction in the tax rate to 20% more than compensates for the fact that energy costs are not deductible. Furthermore, unlike with the present system, reductions in energy costs fully flow through to Acme's bottom line and their federal taxes do not go up with the energy efficiency investment. The efficiency investment increases their after-tax profits relative to the current system (see Table 1). On the other hand, since depreciation rules remain in place, their taxes go down slightly when depreciation is included but their net cashflow, while moderately improved relative to Table 1, is still affected by the capital investment in energy efficiency investments.

Table 3. Effects of Energy Costs and Energy-Efficiency Investments on Acme Corporation Taxes Under a Tax System Where Energy Costs are Not Deductible

	Current	New	Efficiency Investment	
	Baseline	*Base Case*	*Before Depreciation*	*With Depreciation*
Annual Sales	$10,000,000	$10,000,000	$10,000,000	$10,000,000
Investment in EE	-	-	$120,000	$120,000
Energy expenses	$200,000	$200,000	$160,000	$160,000
Other expenses	$8,800,000	$8,800,000	$8,800,000	$8,800,000
Depreciation of EE	-	-	0	$8,000
Profit for tax purposes	$1,000,000	$1,200,000	$1,200,000	$1,192,000
Federal Tax Rate	25%	20%	20%	20%
Federal Taxes	$250,000	$240,000	$240,000	$238,400
Profits After Taxes	$750,000	$760,000	$800,000	$801,600
Net Cashflow	$750,000	$760,000	$680,000	$681,000

Table 4. Effects of Energy Costs and Energy-Efficiency Investments on Intensive Chemical Taxes Under a Tax System Where Energy Costs are Only Partially Deductible

	Current	New	Efficiency Investment	
	Baseline	*Base Case*	*Before Depreciation*	*With Depreciation*
Annual Sales	$10,000,000	$10,000,000	$10,000,000	$10,000,000
Investment in EE	-	-	$420,000	$420,000
Energy expenses	$700,000	$700,000	$560,000	$560,000
Deductible energy (80% of costs above 4% of revenues)	$700,000	$240,000	$128,000	$128,000
Other expenses	$8,300,000	$8,300,000	$8,300,000	$8,300,000
Depreciation of EE	-	-	0	$28,000
Profit for tax purposes	$1,000,000	$1,460,000	$1,572,000	$1,544,000
Federal Tax Rate	25%	20%	20%	20%
Federal Taxes	$250,000	$292,000	$314,400	$308,800
Profits after Taxes	$750,000	$708,000	$825,600	$831,200
Net Cashflow	$750,000	$708,000	$405,600	$411,200

An example for an energy-intensive industry is also useful. Consider Intensive Chemical, a small chemical firm with the same annual revenues and profit margin as the Acme Corporation, but paying 7% of revenues for energy and 83% for other expenses. Their situation is illustrated in Table 4. For Intensive Chemical, because they have high energy costs that are only partially deductible, their taxes go up $42,000 per year. Essentially, if taxes go down for average companies such as Acme Corporation, then the lost revenue is made up elsewhere – in this case by energy-intensive firms. Taxes also go up with an investment in energy efficiency since we've retained a deduction for high energy costs. On the other hand, with the efficiency investment, profits after taxes are up since the large reduction in energy costs flows through to their bottom line. Net cash flow with the efficiency investment is down in year one due to the high capital investment. However, beginning in year 2, cash flow will improve substantially due to the large energy savings.

Of course these are simple examples meant to illustrate concepts. While they are based on typical data, individual tax payers will vary.

Impacts of Depreciation on Investments in Energy Efficiency[2]

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 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. However, depreciation rules sometimes fail to reflect the actual service lives of such equipment, with consequences for business investment in newer, more efficient assets. Depreciation periods can also vary with who owns the equipment, thereby incentivizing some owners and not others to invest in new assets. 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.

Observations

The fundamental premise of depreciation is to properly “spread” the economic cost recovery of assets over their number of years in operation. While this 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 generation 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 heating-ventilating-air conditioning (HVAC) equipment are all assigned a 39-year recovery period.
- Technologies may evolve more rapidly that 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

[2] This section draws heavily from the ACEEE white paper “Depreciation: Impacts of Tax Policy” by Sachs et al (2012). We would like to thank Harvey Sachs, Christopher Russell, and Ethan Rogers for their contribution to the depreciation section of this paper.

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.

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. Table 6 provides data on service life for many types of HVAC equipment.

Table 6. 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 2012. Data for all units that have already been replaced, so may not be representative of equipment purchased recently.

Furthermore, in some cases depreciation periods can vary for the same or similar type of equipment depending on where the equipment is used. It does not make sense to depreciate the same equipment for as little as five years in industrial applications while commercial applications of the same or similar equipment are depreciated over 39 years.

Reforming Depreciation

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. 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. Therefore, we present two recommendations for changes to depreciation rules as a part of tax reform:

1. Refine cost recovery periods to reflect the true service life of assets. Recovery periods should approximate service life and certainly should be no longer than service life. Shorter cost recovery periods will discourage the continued operation of obsolete assets and at the same time accelerate 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-efficient assets.

2. Reduce the number of asset classes, combining similar categories. There should be fewer asset "lives" or periods over which a given asset is depreciated. This will also reduce the likelihood that the depreciation period will depend on the industry or use of an asset and the amount of effort companies must expend to determine tax liability. For example, CHP equipment should have one depreciation period (perhaps around 15 years) and not the five different periods shown in Table 7.

Table 7. 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)

These recommendations could be adopted in one of two ways. First, Congress could legislate them. Second, Congress could authorize or direct the Treasury Department to make such changes. The latter may be preferable so that future refinements can be made without requiring an act of Congress.

National competitiveness is connected to the ability of U.S. manufacturers to produce products more efficiently than those abroad. Much as was observed in the 1970s and 1980s, US 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 assets rationally improves their competitiveness. By extension, this collectively results in a reduction in the amount of energy consumed per GDP and propagates environmental and economic benefits throughout society.

Repayable Incentives

While the proposals discussed above will help end current disincentives for energy-efficiency investments, the benefits of promoting energy efficiency investments (e.g. reduced energy costs, direct and indirect jobs, a stronger economy, reduced health and environmental impacts, and reduced dependence on energy imports from unstable regions in the world) arguably call for proactively *encouraging* energy-efficiency investments through tax incentives. The current tax code includes some energy efficiency incentives, most established in the Energy Policy Act of 2005 but modified since then. These include:

- Commercial building tax deduction – Incentive of up to $1.80 per square foot for new and renovated commercial buildings that use half the energy of a building built to model codes;
- Plug-in electric drive vehicles – A credit of $2500-$7500 per vehicle weighing less than 14,000 pounds gross capacity, with the incentive varying by battery capacity;
- Combined heat and power (CHP) systems – investment tax credit of 10% of cost for eligible systems;
- Ground source heat pumps – credit of 30% of cost;
- Fuel cells – credit of 30% of cost up to a maximum of $3000 per kW of power that can be produced;
- Microturbines – credit of 10% of cost up to a maximum of $200 per kW of power that can be produced.

Additional incentives were provided over the 2005-2011 period for the following:

- Residential insulation, windows, heating and cooling systems and water heaters
- New homes that use half the energy of a home building to model codes
- High-efficiency refrigerators, clothes washers and dishwashers
- Hybrid and advanced diesel passenger and commercial vehicles.

Given the federal budget deficit, most existing tax incentives are likely to be left to expire when current authorizations end. Chances of renewal following tax reform are small due to the cost of the incentives and a desire to simplify the tax code.

However, one option would be to provide a tax credit when investments are made, but then have the taxpayer gradually repay the investment on subsequent-year taxes. For example, if a business receives an initial tax credit of $100,000 on a combined heat and power system the year the system was placed into service, they might repay the federal credit at the rate of $20,000 per year over the next five years. The initial credit encourages the original investment, and the subsequent repayments channel the value of some of the energy bill savings back to the federal government, so that the long-term cost to the federal government is very low. Essentially this would be a zero-interest loan.

Under current federal procedures for "scoring" the cost of tax expenditures, costs and income are estimated for each year, as well as a simple total, without any discounting. Thus a $100,000 expense followed by five years of $20,000 repayments would be scored as zero over the life of the program. However, there would still be some very small cost to the Treasury as a small percentage of businesses or individuals could go bankrupt before they fully repaid their obligation.

Such a repayable tax incentive would be easier to implement for businesses than for individuals, since businesses already depreciate capital investments over many years and thus need to track past investments and depreciation from year to year when compiling their annual taxes. Tracking repayments would be very similar. Likewise, this system could work well for individuals who use the federal long-form, as this form already includes such items as capital gains and losses relative to expenditures in previous years. But for short-form individual tax payers, this would be something new.

Such a repayable incentive should probably be limited to fairly large investments, such as an individual credit of $1000 or more. Having to go through the extra tracking and paperwork for small investments probably would not make sense. For example, Senators Snowe, Bingaman and Feinstein recently introduced a bill that would provide $2000-$5000 tax incentives to homeowners who reduced the energy use of their homes by at least 20% (Cut Energy Bills at Home Act, S. 1914). The same Senators are working on a somewhat similar bill for commercial building retrofits. These incentives are large enough that adding a repayment provision might be feasible.

This idea has already begun to circulate in Congress. In 2011 Senator Shaheen from New Hampshire circulated a draft bill that would provide a repayable tax incentive for Combined Heat and Power (CHP) systems. Under the proposal an incentive is given to electric utilities who finance CHP systems. The amount of the incentive is then repaid to the Treasury through an annual installment payment paid by the customer who owns the CHP system equal to the amount of the subsidy divided by an installment period, specified in years. In this case, the installment period is 3 years (e.g. the customer repays the subsidy over 3 years) but payments don't begin until the third year after the subsidy is paid (i.e. the customer repays nothing for the first two years, then repays 1/3 of the subsidy each year for the next three years). However, this particular proposal is complicated by the fact that the electric utility receives the tax incentive, but a business that hosted the CHP system would make the repayment, resulting in some tricky legal issues. These issues would be much more limited if the same firm received the credit and then made the repayments.

Subsidies for Traditional Energy Sources

One way to advance energy-efficiency is to reduce subsidies for competing traditional energy sources such as fossil fuels and nuclear power. As shown by a 2011 study by the Organization for Economic Cooperation and Development (OECD 2011), fossil fuel subsidies have averaged about $13 billion annually over the 2008-2010 period. The biggest subsidies include the Low-Income Home Energy Assistance Program [LIHEAP] (average of $2.8 billion per year), fossil fuel research and development ($1.9 billion), the Strategic Petroleum Reserve ($1.3 billion), expensing of exploration and development costs ($1.2 billion), severance tax exemptions ($1.2 billion), fuel tax exemptions for farmers ($1 billion), depletion allowances ($0.8 billion), and temporary expensing of equipment for refining ($0.6 billion). ACEEE has not researched this issue in depth, but no discussion of tax reform is complete without at least mentioning that subsidies for traditional energy sources "tilt the playing field" towards increased use of traditional fuels, at the expense of energy efficiency. For example, this $13 billion is about 1.3% of consumer expenditures on fossil fuels in 2010 (EIA 2011). While we are not advocating for ending the LIHEAP program, ending the other subsidies might make sense.

Emissions Fees

Our final proposal attempts to address energy efficiency on a fundamental level, by creating a strong, economically-efficient disincentive for emissions. Our present tax system largely taxes things that result from productive economic activity—wages, non-wage income, and corporate profits. An alternative is to collect revenue from things that produce negative economic effects, such as cigarettes, alcohol, and as proposed here, pollution. This is not a new suggestion. The idea that taxes can be used to discourage activities that produce negative externalities was originally suggested in 1920 by the economist Arthur Pigou, then the head of the economics department at the University of Cambridge in England. In the economics literature, these are now commonly known as Pigovian taxes. Many prominent economists and politicians have spoken in favor of using Pigovian taxes to regulate pollution. As the economist Milton Friedman noted in a 2005 interview: “There is a role for government and the question is what are the means that you use. And the answers of a free market environmentalist is you use market mechanisms. Instead of setting quantitative limits on pollution, you impose a tax” (Friedman 2005).

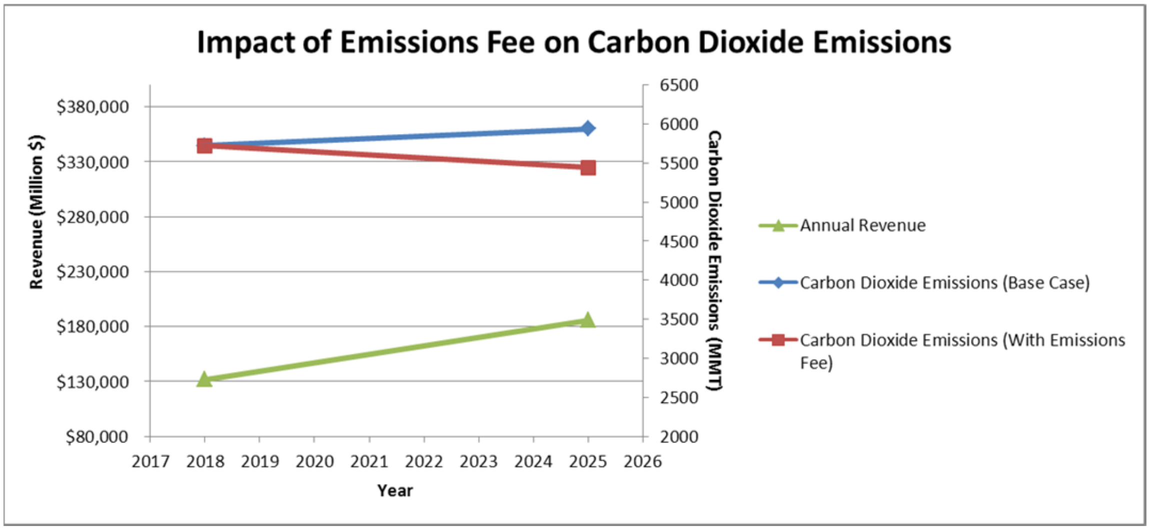
We are not suggesting that all revenues be collected from Pigovian taxes, but instead that a greater portion of the current tax burden come from these taxes. We start from a proposal examined by the Bipartisan Policy Center Debt Reduction Task Force (BPC 2010) and look at further details, such as how much tax rates could be lowered, and the impacts of the pollution fees on emissions and investments in low-emissions technologies.

Pollution Fees—The Bipartisan Policy Center Proposal and Related Concepts

The Bipartisan Policy Center convened a Debt Reduction Taskforce chaired by former Senate Budget Committee Chairman Pete Domenici and Dr. Alice Rivlin, a former Director of the Congressional Budget Office and of the Office of Management and Budget as well as Vice Chair of the Federal Reserve Bank. Their final report, released in November, 2010, calls for simplifying the tax system, eliminating or reducing many current tax incentives and establishing a new system with two tax rates—15% and 27%. To help reduce the debt, they call for a “debt reduction sales tax” (DRST). This was ultimately chosen over a carbon tax because it would bring in greater revenue and thereby more effectively reduce the federal debt. However, there was also significant support on the Task Force for a tax on carbon dioxide. This option would have introduced a tax of $23 per ton of CO2 emissions beginning in 2018, increasing at 5.8% annually. As shown in Figure 1, this option was estimated to raise about $1.1 billion by 2025 (BPC 2010).

A tax on CO2 emissions has a number of desirable attributes. Unlike taxes on income, payroll, or consumption, which penalize work effort by reducing real wages without any corresponding economic benefit (other than the revenue raised), a CO2 tax could actually increase economic efficiency. By establishing a price for CO2 emissions—which have a social cost—the tax would shift production and consumption toward less carbon-intensive goods, reducing CO2 emissions in the process. In addition, by providing certainty regarding the cost of CO2 emissions going forward, the tax would relieve the uncertainty that has delayed necessary capital investments in the energy sector, while also encouraging research and development in cleaner energy technologies. A CO_2 tax would increase energy prices, however, raising concerns about impacts on energy intensive industries and regressive impacts on households. While the Task Force plan did not include a tax on CO_2 emissions, many members believed it warrants further consideration as the nation works to address America's long-term debt.

Figure 1: An Emissions Fee Reduces Carbon Dioxide while Raising Revenue that Could Be Used to Address the Federal Debt



A somewhat similar proposal was introduced in the 111th Congress by Representatives Inglis (R-SC), Lipinski (D-IL), and Flake (R-AZ) as H.R. 2380, the "Raise Wages, Cut Carbon Act of 2009." Under this bill, the fee for carbon dioxide emissions from fossil fuels would start at $15 per ton and gradually rise to $100 per ton in 2040, with any revenue matched dollar for dollar with a reduction in the social security tax on wages. In addition, a border adjustment fee would be placed on imported goods, so foreign manufacturers pay the same fee per ton of carbon dioxide as domestic manufacturers (Inglis 2009).

Lowering Tax Rates

The Bipartisan Policy Center estimated that its CO_2 tax proposal would collect about $1.1 trillion in revenue cumulatively over the 2018-2025 period. A 2011 analysis by the Congressional Budget Office of a similar proposal covering the 2012-2021 period was estimated to raise $1.2 trillion (CBO 2011). This income could be used to reduce taxes on wages (e.g., the social security tax), as Rep. Inglis, Lipinski, and Flake proposed, or it could be used to reduce income taxes. $1.2 trillion would be about enough to do one of the following:

- Simplify the tax code but with lower tax rates. For example, the Bipartisan Policy Center (BPC 2010) estimates a 2-tier 15-27% income tax rate would cost the Treasury $1.3 trillion over the 2012-2021 period relative to a modified base forecast that includes extension of the "Bush tax cuts."
- Extend the "Bush tax cuts" for those earning more than $250,000. President Obama has endorsed continuing the tax cuts for those making less than this amount; continuing the

cuts for those with higher incomes over the 2013-2021 period (2012 is covered by current law) would cost an additional $0.9 trillion (Pew Fiscal Analysis Initiative 2010).

Many politicians believe that lower tax rates, including those with higher incomes, would help boost the economy by encouraging investment in businesses, thereby creating jobs.

Further Work

More research is needed before many of the ideas expressed here can become realistic policy options. Much more work is needed to develop the business tax schemes proposed in this paper. For example, in order to implement the radical change that would tax revenues instead of profits, additional work is needed to decide how to handle taxes incorporated in the cost of purchased materials and to consider an investment tax credit. Regarding depreciation, further work is needed to collect available data on equipment lives in the field and develop and analyze a workable number of depreciation categories with associated definitions. Regarding repayable tax credits, further work is needed to clarify and refine how to handle and track needed repayments. All of these ideas involve substantial changes in the tax code, which will have both winners and losers. Losers will tend to fight hard to retain the current system, and hence substantial political effort will be needed to enact any significant reform.

Conclusion

Discussions about tax reform are just beginning and given the complexities and the many political issues involved, it may take a few years before any reform is enacted. We recommend that policymakers consider the following reforms in a revised tax code:

- Remove disincentives to energy efficiency investment from the business tax code
- Refine depreciation periods to more accurately reflect the realities of energy efficiency investments
- Create repayable tax incentives to encourage energy efficiency in a fiscally responsible manner
- Eliminate or reduce subsidies that target the fossil fuel industry
- Add a price on emissions (e.g., CO_2).

If enacted, these reforms could reduce barriers to cost-effective energy efficiency investments and contribute toward increase investments in efficiency. With careful attention to details, the tax code can be an enabler to efficiency investments and not a barrier.

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