Research

Energy Tax Expenditures in the United States: What Are They Buying Us?

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INTRODUCTION

As tax reform, particularly corporate reform, rises as a necessity to bolster the private sector while limiting government spending, tax expenditures are coming center stage. The sheer number of incentives bundled into the tax code, in concert with direct expenditure and loan guarantee programs, complicates our ability to determine how federal policy shapes capital investment in energy markets, and makes it nearly impossible to ascertain the economic value of tax incentives relative to foregone revenue. Moreover, political realities are shifting: tax credits for renewable energies face increasingly tough opposition against legislative extensions, and calls for parity have put credits for oil and gas development on the chopping block.

QUANTIFYING TAX EXPENDITURES

Generally, tax expenditures reduce income tax liability for firms or individuals, and encourage the purchase or production of certain types of energy, energy technologies, or conservation technologies. While tax expenditures are not strictly characterized as government spending, they reduce government tax receipts and can exhibit a considerable budgetary impact. By changing the marginal costs of investment by which different energy sources or technologies compete, tax expenditures naturally pick market winners and losers.

There are several categories of expenditures. Tax credits directly reduce the income tax otherwise payable. Tax deductions reduce the taxable income on which the income tax is assessed. Tax deferral functions like an interest-free loan, allowing for payment of tax in a later year. Preferential tax rates treat certain forms of taxable income more favorably than others. Finally, tax exclusions exempt a portion of income from taxation.

Though not strictly a tax expenditure, the Volumetric Ethanol Excise Tax Credit (VEETC) is addressed in this paper. Rather than reducing income tax liability explicitly, the VEETC reduces liabilities to the federal fuel excise tax.

This paper will examine expenditures in tax years 2007, 2010, and 2012.[1] The American Recovery and Reinvestment Act, loaded with short-term provisions meant to spur investment following the financial crisis and ensuing recession, helped lift tax expenditures above $20 billion in 2010 from $11 billion in 2007. In fact, between 1999 and 2010, federal tax expenditures increased over 500 percent from $3.2 billion. Instead of returning to pre-recovery spending levels, however, tax expenditure levels persisted through 2012 at $19 billion.

Over tax years 2007, 2010, and 2012 there were 30 discrete energy-specific tax credits with non-zero values, which are listed in Table 1, below.[2] Some of these credits include additional outlays, which are addressed in the notes and included in table totals.

Table 1. Energy-Specific Tax Expenditures, FY 2007, 2010, 2012[3]

Tax Expenditures	Target	Type	Value ($M)		
			2007	2010	2012
Expensing of exploration and development costs, fuels[a]	Oil & Gas	TDF	530	400	470
Excess of percentage over cost depletion, fuels [a]	Oil & Gas	TDF	790	980	890
Exception from passive loss limitation for working interests in oil and gas properties	Oil & Gas	TDF	30	30	10
Tax credit and deduction for clean-fuel burning vehicles	Oil & Gas	TC/ TDD	260	250	100
Temporary 50% expensing for equipment used in the refining of liquid fuels	Oil & Gas	TDF	30	760	680
Natural gas distribution pipelines treated as 15-year property	Oil & Gas	TDF	60	120	110
Amortize all geological and geophysical expenditures over two years	Oil & Gas	TDF	50	150	90
Alternative fuel production credit	Coal	TC	2,920	170	20

Tax Expenditures	Target	Type	Value ($M)		
Capital gains treatment of royalties on coal	Coal	TR	180	50	90
Credit for investment in clean coal facilities	Coal	TC	30	240	380
Partial expensing for advanced mine safety equipment	Coal	TDD	10		
Exclusion of special benefits for disabled coal miners	Coal	TE	50	40	40
Energy production credit [b]	Renewables	TC		1,540	1,500
Energy investment credit [b]	Renewables	TC		130	1,040
New technology credit	Renewables	TC	410		
Alcohol fuel credits[c]	Renewables	TC	40	70	140
Biodiesel and small agri-biodiesel producer tax credits[d]	Renewables	TC	180	20	10
Credit for holding clean renewable energy bonds[e]	Renewables	TC	20	70	70
Credit for residential purchases/installations of solar and fuel cells	Renewables	TC	10		
Credit for business installation of qualified fuel cells and stationary microturbine power plants	Renewables	TC	80		

Tax Expenditures	Target	Type	Value ($M)		
Qualified energy conservation bonds[f]	Renewables	TC		0	20
Exclusion of utility conservation subsidies	End-Use	TE	120	220	270
Allowance of deduction for certain energy efficient commercial building property	End-Use	TDD	190	60	70
Credit for construction of new energy efficient homes	End-Use	TC	20	20	70
Credit for energy efficiency improvements to existing homes	End-Use	TC	380	3,190	780
Credit for energy efficient appliances	End-Use	TC	80	150	210
Credit for residential energy efficient property	End-Use	TC		220	910
Advanced energy property credit	Misc	TC		180	580
Deferral of gain from dispositions of transmission property to implement FERC restructuring policy	Misc	TDF	610	-50	-70
Exclusion of interest on energy facility bonds	Misc	TE	30	20	20
Totals (tax expenditures only)			7,710	9,930	9,500

Tax Expenditures	Target	Type	Value ($M)		
Totals (including accompanying outlays)			11,030	20,350	19,010

Tax Credit = TC; Tax Deduction = TDD; Tax Deferral = TDF; Tax Exclusions = TE; Preferential rates = TR

Notes:
a An undetermined amount of these provision goes to coal.
b Firms can take an energy grant in lieu of the energy production credit or the energy investment credit for facilities placed in service in 2009 and 2010 or whose construction commenced in those years. The effect of the grant in outlays (in millions of dollars) is as follows: 2010 $4,210; 2012 $5,080
c In addition, the provision results in a reduction in excise tax receipts (in millions of dollars) as follows: 2007 $3,320; 2010 $5,680; 2012 $3,540
d In addition, provision results in a reduction in excise tax receipts (in millions of dollars) as follows: 2010 $490; 2012 $800
e In addition, the provision has outlay effects (in millions of dollars) as follows: 2010 $10; 2012 $40
f In addition, the provision has outlay effects of (in millions of dollars) as follows: 2010 $30; 2012 $50

HOW TAX CREDITS DISTORT MARKETS

Tax expenditures that alter energy investment decisions are only justified as economically efficient when they correct market distortions. Many credits on the books are designed to promote energy sources that would reduce the negative carbon externality or promote the production of fuels from marginal wells that would otherwise be closed in, a positive externality. In order to function well, tax incentives should be generally agnostic about solutions to negative externalities, perfectly targeted to positive externalities, and set at such a level so as to appropriately internalize the externality.

When tax expenditures fail to meet these objectives, they generate inefficiencies in the market. As an example, tax credits for renewables originated to incentivize the production of low-carbon energy on the whole, rather than any particular alternative form of energy. However, these credits do not have mechanisms to either equalize the subsidy across renewable energy sources according to greenhouse gas reductions nor to avoid subsidizing inframarginal activities. In some cases, markets develop around tax expenditures on which they depend to stay afloat; the expiration of a tax credit can collapse an industry that would not otherwise be financially viable.

Examining the total tax expenditures dedicated to each source or use of energy might give us a sense of which sources or technologies are most favored by our tax system. Refer to Tax Expenditures by Use and Market Share (Table 2) for divided data from 2010. Biofuels were a big winner, with $6.3 billion in tax expenditures – nearly 40 percent of the total – followed distantly by natural gas and petroleum at $2.7 billion, wind power at $1.2 billion, and nuclear at $0.9 billion. These numbers suggest that biofuels curry the most favor of all energy sources, with a heavy emphasis on ethanol, which received $5.7 billion in expenditures from the VEETC in 2010 and an additional $3.5 billion in 2012.

We can also look at subsidies per market share for a rough view of how the tax code exerts preferences. Notably, in 2010 renewables account for just 10.7 percent of domestic electricity generation, but receive over 50 percent of all support from the tax code. Similarly, the VEETC promotes ethanol use, which constituted just over 4 percent of transportation fuels. Analogous market share data is not yet available for 2012, prohibiting an updated comparison.

Table 2. Tax Expenditures by Use and Market Share, FY 2010[4]				
Beneficiary		**Tax Expenditures ($M)**	**Market Share (%)**	
			Electricity	Transport
Coal		561	44.8	
Natural Gas & Petroleum Liquids		2,690	24.8	95.6
Nuclear		908	19.6	
Renewables		8,168		
	Biomass	523	1.4	
	Geothermal	1	0.4	
	Hydro	17	6.3	
	Solar	120	0.0	
	Wind	1,178	2.3	
	Other	0	0.3	
	Biofuels	6,330		4.4
Electricity – Smart Grid & Transmission		58	n/a	
Conservation		3,206	n/a	
End Use		693		

	LIHEAP	0	n/a		
	Other	693	n/a		
Total		**16,284**			

Examining the dollar value of subsidies is an intellectually accessible analysis and is often used in political debates. A better review of the actual impact that the tax code has on energy markets is the effective tax rate – the impact of the tax code on the next dollar of capital investment. Effective tax rates are detailed in Table 3.

The smaller the tax rate, the more the tax code favors investment in that sector; negative tax rates are effective tax subsidies. As we demonstrated earlier, wind and solar technologies receive significant support from the tax code relative to their share of the energy mix. An effective tax rate of -244 percent for solar thermal power and -163.8 for wind indicate large, positive subsidies on the margin. Nuclear power, despite receiving relatively small numerical support, also receives considerably favorable treatment under the tax code. Traditional coal and natural gas, which comprise nearly 70 percent of total generation, are treated least favorably, with substantial positive effective tax rates. Importantly, the favorable treatment under the tax code for solar and wind is dampened by the relatively high effective tax rates on electricity transmission and distribution lines. Renewable installations require build-out of significant new transmission capacity to deliver power to the market.[5]

Table 3. Effective Tax Rates, Tax Year 2009[6]	
Electric Utilities	(%)
Generation	
Nuclear	-99.5
Coal (Pulverized Coal)	38.9
Coal (Integrated Gasification Combined-Cycle)	-11.6
Gas	34.4
Wind	-163.8
Solar Thermal	-244.7
Transmission and Distribution	

Transmission Lines	34.0
Distribution Lines	38.5
Petroleum	
Oil Drilling (nonintegrated firms)	-13.5
Oil Drilling (integrated firms)	15.2
Refining	19.1
Natural Gas	
Gathering Pipelines	15.4
Other Pipelines	27.0

Note that though nuclear generation has a large negative effective tax rate, current tax expenditures for the industry are almost entirely related to decommissioning activities at inactive sites. Favorable tax treatment does not in all cases result in opportunities to take advantage of such treatment, particularly in cases, like nuclear, with considerable obstacles associated with the regulatory process and attracting capital. Further, though oil is a relatively uniform commodity, our tax code favors production by nonintegrated firms over integrated firms, or "Big Oil."

LIMITATIONS OF TAX INCENTIVES

Tax expenditures do not operate in a vacuum, and interaction with the broader energy environment produces an energy mix that quite departs from the preferences expressed in the tax code. Current investment patterns indicate that as tax policy interacts with market forces, competing and complimentary policies, and consumer demand, their impacts can differ widely across technologies. For example, while wind power and solar thermal are expanding their footprint with new installations, deeply negative effective tax rates for nuclear have not lead to installation of new capacity. Similarly, though effective tax rates for coal and natural gas generation are similar, natural gas-fired electricity capacity is expanding relative to coal as increased domestic gas production and regulatory activity promote it as an inexpensive, cleaner alternativ

Tax Appetite

Tax expenditures require individuals and firms to have sufficient positive tax liability to take advantage of the incentive. This limitation is particularly apparent in the current financial climate, notably among small and emerging companies in fossil and renewables production. Firms that are struggling financially or already have a small tax burden may not be able to see the full value of the incentive in order to financially justify the desired investment.

As a tool to encourage investors, the American Recovery and Reinvestment Act created a grant in-lieu of a credit for the renewable production tax credit. This enables firms to take a one-time up-front grant for the installation of renewable energy capacity, rather than a tax credit that requires a tax appetite and is redeemed over several years. Without special provisions like this, tax incentives are only effective when participants in the market express sufficient tax liability.

Interactions with Other Policies

Though the intent of preferential tax treatment is to encourage an activity that would not happen otherwise at a socially optimal level, some activities may happen regardless of the subsidy. This increases the cost of achieving a policy goal and is a loss to the taxpayer.

For example, the VEETC supported the blending of ethanol into gasoline by providing a credit against the gasoline excise tax; this credit cost the federal government $5.7 billion in 2010. Ethanol, however, is the beneficiary of both industry practices and a federal mandate. Ethanol is an effective gasoline oxygenate, and is blended with gasoline to promote optimal fuel burn as a matter of industry practice. Further, the 2007 Energy Independence and Security Act (EISA) placed a volume mandate on the blending of ethanol into fuel, escalating to 36 billion gallons by 2022. Though the VEETC expired in December of 2011, ethanol blending continues to increase according to a schedule established by the Environmental Protection Agency as part of the EISA authorization, indicating that the subsidy was ineffective at incentivizing ethanol use above the blend levels required by the mandate. The full value of the subsidy post-EISA was dedicated to inframarginal activities.

Ethanol also uniquely interacts with agricultural policy, as the cornstarch feedstock sees substantial crop price support from the Department of Agriculture. Through a series of payments and support programs, totaling $22.6 billion in the period 2007-2012,[7] the corn crop is tightly managed in quantity and price. This initially benefited the ethanol market by ensuring a steady supply, but has created considerable tension with the food products industry now competing for the same feedstock at a higher price point.

Conflicts with Other Policies

Favorable tax treatment can push capital towards certain energy investments, but may prove of little utility if there are other obstacles to executing the investment. In many cases, this may be a result of limited access to capital or stiff competition by established entrants in the market. In other cases, tax policy is working against headwinds generated by other policy choices.

New nuclear power, as noted above, has very favorable treatment, with an effective tax rate of -99.5 percent. Federal tax policy offers a production tax credit to the first 6,000 MW of new nuclear power and should drive investment into the space. The Department of Energy also implemented a loan guarantee program to help draw in private capital. However, the Nuclear Regulatory Commission, responsible for licensing reactors, took seven years to grant its first license since 1978 and is only slowly moving through the process for the 25 additional new facilities seeking approval. Private markets are wary of new nuclear investment; the considerable gap between applying for and receiving operating approval has created marked uncertainty in the cost and length of the process. Despite DOE programs and favorable tax treatment, the combination of a slow regulatory process and notable investment risk ensures nuclear power is still struggling to come to market.

Another example with significant ramifications for our energy infrastructure is the promotion of renewable power generation without simultaneous support for an advanced electric transmission grid that can handle this intermittent power source. While wind and solar have large, negative effective tax rates, transmission lines are among the most heavily taxed. As noted earlier, the lack of relative tax preference is playing a role in the slow development of new, appropriate grid capacity.

Value Predictability

Many tax expenditures are extended piecemeal over short periods of one or two years, often close to their expiration date; occasionally, these credits will lapse and be extended retroactively. Other credits are structured to provide value only to some specified quantity of early actors achieving the desired activity of the tax preference. This makes it difficult for private investors to predict the value of the investment and raise needed capital.

As has been noted in the literature, when the probability increases that a credit might be allowed to expire, firms speed up the investment timeline to take advantage of the credit.[8] Similarly, investors may be dissuaded from supporting a particular initiative if the tax credit will not be available when the investment comes on-line. Consider the recent layoffs and underwhelming capacity additions in the wind industry,[9] which were a direct result of confusion over whether the production tax credit would be extended for tax year 2013.

In some cases, it may be beneficial to favor early movers. For example, the tax credit to support energy efficiency upgrades in existing residential property helped drive dollars to the struggling construction industry in the wake of the financial crisis – a key aim of the provision. In other cases, concerns over predictability can cultivate boom-and-bust cycles that increase costs for the industry, discourage investment, and limit the marketability of emerging technologies.

Interactions with State Policy

Federal level policy is not alone in shaping energy-related investment decisions; in many cases state energy policies can emphasize or counteract priorities established through the tax code. At current, there is considerable interaction between the federal renewable energy production tax credit (or grant in-lieu of the credit) and state-level Renewable Portfolio Standards (RPS).

Thirty-seven states have policies calling for a certain percentage of electricity to come from renewable sources. These programs necessarily drive more renewable electricity onto the market, the same desired investment that federal tax credits support. However, firms developing power to meet the requirements of a state-level RPS can still take advantage of tax credits, funneling erstwhile government revenue into activities that would happen regardless, and creating considerable cost for taxpayers with no discernable benefit.

Efficiency

In the process of picking winners, tax expenditures lower the price of energy production and consumption. Artificially low prices undermine the consumer substitution effect,[10] which would otherwise promote the most efficient use of energy resources and maximize the utility of existing on-market energy supplies. Instead, lower energy prices cultivate a consumer demand response that increases energy use, creating waste not just in energy consumption, but also by dedicating taxpayer dollars to inefficient programs.

Consumer use of liquid motor fuels is a telling example. Corporate Average Fuel Economy (CAFE) standards from the National Highway Traffic Safety Administration and Environmental Protection Agency have increased the fuel economy of passenger vehicles and light-duty trucks. Between Model Years 2011 and 2025, fuel economy will double, driving down oil use. Increasing fuel economy, however, decreases the cost per vehicle mile traveled, resulting in a "rebound effect" whereby vehicle use actually increases. The magnitude of the rebound effect undermines the desired fuel savings and emission reductions that are established by the standard. [11]

This phenomenon can also be seen with federal tax expenditures designed to diminish electricity use through the promotion of efficient appliances and robust conservation measures. Lower operating costs for energy-consuming home appliances like HVAC systems encourage customers to use those appliances more frequently.

The consumer rebound effect also undermines an emerging marketable good in energy efficiency, popularly termed "negawatts." Increasing the efficiency of energy use is the cheapest and cleanest way to "generate" energy, and the market in this space is growing – expected to reach $170 billion annually by 2020.[12] With the potential to reduce non-transport energy use by roughly 23 percent through efficiency measures, eliminating $1.2 trillion in waste,[13] the private sector is stepping up to seize this market. There is tremendous potential in innovative funding solutions that reduce the up-front cost of energy efficiency investments, but their model is undermined by policies that artificially suppress energy costs. [14]

Technology Neutrality

Subsidy-based energy policies depend on specifying a subset of solutions, making it quite difficult to achieve technology neutrality. Consider the renewable production and investment tax credits. Their goal is not necessarily to install more of any one particular renewable technology, but rather to support alternatives to carbon-based power. Through design, however, the production tax credit offers different prices at the margins for the displacement of fossil power. This generates several issues for the tax expenditure.

First, the tax credit is inevitably dedicated to inframarginal activities, as was discussed in the section, "Interactions with other policies." Second, in some instances, paying the same amount for the same activity will not lead to the same level of socially preferred outcome; solar panels with equal capacity, receiving equal support through tax expenditures will not produce the same carbon-free power in Wisconsin as in Arizona.

Third, tax expenditures are only as broad as the imagination of and information available to government officials writing the tax code. Without subsidizing every desirable activity, inequalities arise. Obviously, technologies that have not yet been invented will face a tougher time coming to market without the explicit support of a tax preference. Existing technologies can see similar discrimination; federal tax preferences for the purchase of hybrid vehicles were designed to reduce oil use. Competing vehicles that relied on improvements to the internal combustion engine achieved similar fuel savings, but were not eligible for favorable tax status.

Technological Readiness

Finally, tax expenditures are only as effective as the solutions they select. Returning again to the renewable energy tax credits, the bulk of expenditures are dedicated to wind power. Though wind power capacity has increased dramatically over the last several years, it remains an intermittent power source that cannot substitute for baseload fossil power. Rather than decrease the need for fossil energy, more wind capacity leaves us dependent on fossil backup facilities for when wind turbines are unproductive. This is not to suggest that wind power or other intermittent sources will never replace fossil power; with significant advancements in predictive capabilities for power production and achievements in battery or other electricity storage technologies, inherently intermittent sources may eventually represent a significant, stable source of power. Currently, however, these tax expenditures are undermined by the effectiveness of the technologies they promote.

Non-specific Energy Tax Expenditures

This paper does not thoroughly address tax expenditures that apply to activities beyond energy because of difficulty in data collection and calculating their subsidy value to the energy industry. In some cases, these expenditures can be large and play a significant role in shaping capital investments in energy markets. These expenditures have been criticized for inappropriately including energy industry activities, leaving considerable corporate income untaxed, though modifying these provisions to exclude energy may be unacceptably punitive.

Section 199 Manufacturing Deduction

The domestic manufacturing deduction allows American manufacturers to reduce taxable income. The deduction uses a broad definition of manufacturing, capturing activities including engineering services, sound recordings, film production, and oil and gas production and refining. In 2012, the 199 deduction amounted to nearly $12 billion.[15]

Accelerated Depreciation

Many tax provisions enable accelerated depreciation schedules for capital assets. A subsidy arises when the accelerated depreciation schedule exceeds the actual wear and tear costs to the asset. We cannot approximate the subsidy for depreciation provisions beyond those that are energy-specific.

Tax-exempt Municipal Bonds

Available broadly to publicly-owned utilities, tax-exempt municipal bonds allow access to capital at lower interest rates than those available on the private market. These bonds are available to all public utilities, including water, sanitation, and telecommunications.

Foreign Tax Credit for Income Taxes Paid

Companies may take a tax credit for income taxes paid to foreign countries. Large energy companies benefit from this provision, as do other non-energy multinationals.

Special Treatment for Publicly-Traded Partnerships

Publicly-traded partnerships (PTP) are generally treated as corporations for federal income tax purposes. If 90 percent of the partnership income is passive – including natural resource sales – the PTP can instead claim pass-through status, excluding income from taxation. Again, this provision is non-specific to the energy sector.

CONCLUSION

The profile of existing tax preferences suggests that policies aim to account for externalities in the production or consumption of energy, mitigate risks to national or energy security resulting from an overwhelming reliance on petroleum fuels, or lower market barriers to entry for emerging or favored technologies. (In the wake of the financial crisis and recession, there is arguably a fourth goal – to encourage commercial activity. This was the aim of temporary credits framed around the construction and conservation industries.) Unfortunately, an intervention framed around tax credits is not well suited to tackling any of these policy challenges.[16]

Reducing the cost of energy cultivates waste in the consumption of electricity and vehicle fuels. This works against long-term efforts to limit emissions and limit the vulnerability inherent in petroleum dependence. Further, artificially low energy costs perpetuate a preference for least-cost sources, leaving new market entrants at a persistent disadvantage. This challenge only encourages additional tax preferences for emerging technologies.

Realistically, tax preferences are not designed to achieve a socially optimal fuel mix, but rather to insert political preferences into market decisions. Clumsily designed tax policy that picks discrete technology winners distorts the marginal cost of investment and encourages investments out of step with an efficiently operating energy sector.

Political changes can also make the value of certain tax preferences difficult to predict. Requirements that credits be renewed regularly or calls to terminate credits for industries that have fallen out of favor cloud decisions in the private sector and jeopardize investment planning. The variability of credits also undermines long-term market changes that may be necessary to building the energy mix as preferred in the code.

Finally, tax policy designed to address negative externalities presents important concerns. By dedicating taxpayer dollars to buying down carbon-pollution, the government suggests that it is more appropriate for the beneficiaries of pollution reduction to pay for that benefit than to hold polluters responsible for their emissions. In other words, tax subsidies assert that the right to pollute takes precedence over the right to clean air. Though a perfectly designed set of subsidies would be as economically efficient as a tax on the negative externality, buying clean air also comes with considerable administrative costs and a distinct sense of moral inconsistency.

Despite considerable obstacles to optimizing energy markets through the tax code, the political expediency of offering carrots rather than sticks has clearly established tax preferences as a preferred mechanism for pursuing policy aims. This may in part explain the high level of government tax expenditures we observed in post-recession 2012. As the debate around government expenditures continues, the limitations of tax expenditures may become more important and reshape how government promotes energy policy.

[1] Tax years 2007 and 2010 were explored in the wonderfully comprehensive 2011 Energy Information Administration report, *Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2010*, the inspiration for this report. Tax year 2012 is the most recent year with complete data.