Statement of Joseph E. Aldy
Associate Professor of Public Policy, Harvard Kennedy School
Visiting Fellow, Resources for the Future
Faculty Research Fellow, National Bureau of Economic Research
Senior Adviser, Center for Strategic and International Studies

To be presented to:

United States House Committee on Energy and Commerce, Subcommittee on Energy, hearing on
"Federal Energy Related Tax Policy and Its Effects on Markets, Prices, and Consumers"

March 29, 2017

Thank you Chairman Upton and Ranking Member Rush and members of the Subcommittee on Energy for inviting me to speak today.

My name is Joe Aldy, and I am an Associate Professor of Public Policy at the Harvard Kennedy School. My research and teaching focus on the rationale for, design, and evaluation of energy and environmental policy.

The Federal tax code has subsidized energy through tax expenditures for more than a century. The focus, scale, and design of energy tax expenditures have evolved over time. Nonetheless, the federal tax code today includes an array of energy- and technology-specific provisions intended to subsidize the investment and production of energy as well as investment in energy-efficient equipment. These subsidies have influenced energy and power markets, energy prices and energy innovation, and air pollution and other environmental outcomes in the United States. They also could play an important role in enabling comprehensive tax reform in which tax expenditures favoring specific interests and activities are exchanged for lower tax rates on personal and business income.

Policy Principles

Before considering the impacts of subsidizing energy through the tax code, let me offer three public policy principles for assessing the merits of energy tax provisions.

Correct Market Failures: Well-functioning markets do not need government interventions. Indeed, government interventions in markets operating efficiently risk introducing inefficiencies that reduce social welfare; i.e., they are government failures. If a market is suffering from a market failure, then a policy intervention could be merited. For example, if energy firms fail to account for the social costs of their pollution—such as emissions of fine particulates that increase premature mortality or carbon dioxide that contributes to climate change—then an energy tax instrument could address the market failure and increase social welfare. Or, if businesses underinvest in innovative activity in energy markets, because they may not be able to fully appropriate all of the benefits of innovation (the so-called public good problem in innovation), then an energy tax instrument could also address the market failure and improve social welfare.

Promote Cost-Effectiveness: A market failure is not sufficient to justify government intervention. An energy tax instrument should also be well-designed to mitigate the market failure. If the policy targets the market failure effectively, then it can make society better off. Given various options for the design of tax instruments, the most cost-effective instrument for correcting a market failure should be pursued. Since tax expenditures represent foregone revenues that must be made up by taxes elsewhere in the economy, cost-effective design ensures that the American taxpayer gets the biggest possible social return for a given tax expenditure.

Review and Reform: Understanding the impacts of tax instruments—on revenues but also on social outcomes of interest—can inform the design and potential reform of energy tax policy. Beyond estimating foregone revenues, it is uncommon for the government to estimate the impacts of energy tax provisions on externalities, innovation, or measures of economic activity (such as energy production, economic output, or employment). While energy tax policy could be an alternative to regulatory policy in correcting market failures, they differ considerably in terms of their evaluation. Under regulatory policy, detailed benefit-cost analyses are the norm for rules with economic impacts in excess of $100 million annually. Many energy tax instruments have foregone revenues well in excess of this standard, but they have been subject to little analysis beyond their revenue estimates.

These principles are intended to guide the design and implementation of policy to maximize social welfare. In other words to make the entirety of the American population better off. There may be other important policy objectives, such as stimulating economic activity during periods of deep recession or redistributing resources to help the needy. I would suggest that economic stimulus is not highly effective during this current time with the unemployment rate below 5% nationally and, if it were, there are reasons why subsidizing investment in a capital-intensive industry may not deliver the biggest bang for your stimulus buck. And in terms of assisting the needy, I would suggest that other policies—such as the Low Income Home Energy Assistance Program—can target those most in need more effectively than subsidies for producing energy.

To illustrate these three policy principles for energy tax policy in practice, I will focus on an array of tax expenditures that subsidize oil, natural gas, and coal production as a case study.[1] Let me first describe these instruments and their impacts on production before turning to the questions of whether they correct market failures, promote cost-effectiveness, or facilitate review and reform.

Description of Fossil Fuel Tax Expenditures

As far back as 1913—the year a constitutional amendment legalized the income tax—fossil fuel extraction companies have received tax breaks that subsidize their activities. Most of these tax code provisions lower the cost of investing in oil, gas, and coal development projects, and they all lower in a preferential manner the corporate tax rate on a specific source of income (i.e. picking winners through the tax code). Historically, the three largest tax expenditures are the expensing of intangible drilling costs, percentage depletion for oil and gas wells, and the domestic manufacturing tax deduction for oil and gas. The eligibility and generosity of these programs differ between integrated companies – those that produce and refine oil and market petroleum products – and independent companies – those that only operate upstream in the extraction of oil and gas. Thus, supermajors such as ExxonMobil, BP,

[1] This case study draws from my previously published work in Aldy (2013, 2014, 2017b).

Chevron, and Royal Dutch Shell, that extract, refine, and retail oil can claim fewer subsidies per barrel of oil extraction than independent (and especially small independent) oil companies.

In the US tax code, a firm investing in a capital project—say a new factory or office computers—typically depreciates the investment costs over the useful life of the capital. In contrast, oil and gas firms expense all or most of their drilling-related expenditures that do not have salvage value, referred to as intangible drilling costs that typically include geological surveying, wages, fuel, repairs, and supplies associated with well development, in lieu of depreciating them over the economic life of a well. As a result, the provision effectively lowers the tax rate on income from such projects relative to capital investments elsewhere in the economy, distorting investment decisions. This has led to inefficiently low investment outside of the oil and gas sector and inefficiently high investment within the oil and gas sector.

The provision specifically allows independent oil companies to expense all of their intangible drilling costs, while integrated oil companies can expense up to 70 percent of these costs and must depreciate the balance over five years. This skews investment in oil and gas development away from integrated oil firms and toward independent oil companies, although there is no public policy rationale for orienting development to one type of oil firm over another.

Since 1926, firms have had the choice of using cost depletion—writing off the initial costs of acquiring an oil and gas field over that field's production lifetime—or percentage depletion—deducting a percentage of revenues from oil and gas sales—to reduce their tax liabilities. While the former is consistent with standard depreciation practices for other industries, the latter may have little to no relationship to actual project costs because revenues reflect crude oil prices, which are driven by the oil market. When firms choose percentage depletion—which is more generous to oil and gas producers when oil prices are high, due to higher revenues—they enjoy a subsidy relative to standard tax depreciation rules.

The percentage depletion tax provision also disproportionately benefits smaller firms. The oil and gas firms producing less than 1,000 barrels per day may deduct a percentage of their revenues, while firms with larger volumes must deduct the capital cost of the wells. Indeed, with high oil prices, small firms may be able to claim deductions through percentage depletion over the life of a well that significantly exceed the capital cost of the well. In contrast to some oil tax expenditures that phase out with higher oil prices, such as the credit for enhanced oil recovery projects, the effective subsidy from percentage depletion increases as oil prices rise. This also lowers the effective tax rate on these projects and skews investment away from non-oil and gas capital projects and oil and gas development by larger and integrated firms.

In 2002, a World Trade Organization ruling found that US tax law effectively subsidized manufacturing exports and thus violated the international agreement regarding trade and subsidies. As a result, Congress struck the WTO-illegal tax provision and replaced it with a domestic manufacturing tax deduction. While oil and gas development are not part of the manufacturing sector nor was the United States a meaningful exporter of either oil or gas at the time, Congress determined that these activities could also claim the manufacturing tax deduction. This provision permits oil and gas producers to claim a 6 percent deduction and a related provision allows coal producers to claim a 9 percent deduction of taxable income. Like the other subsidies, this provision provides a lower rate on a favored source of income.

The enhanced oil recovery tax credit increases revenues from production that uses carbon dioxide or other tertiary methods to recover crude oil and natural gas from older, more depleted oil and gas fields. In contrast to percentage depletion, this subsidy becomes less generous—and declines to zero—under high oil prices because the credit phases down as prices increase. With lower oil prices now forecast going forward, the foregone revenue score for this tax expenditure is larger than in past year's Treasury forecasts. These four provisions represent more than 90 percent of fossil fuel tax expenditures, as summarized in Table 1.

Table 1. Provisions of the U.S. Tax Code that Subsidize Fossil Fuel Extraction

Tax Provision	10-Year Revenue Score (billions)
Expensing intangible drilling costs	$10.0
Domestic manufacturing tax deduction for oil and gas	$9.1
Enhanced oil recovery credit	$8.8
Percentage depletion for oil and gas wells	$5.0
Increase geological and geophysical expenditure amortization for independents	$1.5
Percentage depletion for hard mineral fossil fuels	$1.1
Capital gains treatment for royalties	$0.5
Expensing of coal exploration and development costs	$0.3
Domestic manufacturing tax deduction for coal	$0.2
Deduction for tertiary injectants	$0.1
Exception for passive loss limitations for working interests in oil and gas properties	$0.1
Credit for oil and gas produced from marginal wells	$0
Total	$36.7

Notes: The last provision in this table is not expected to have a revenue impact because it phases out at oil prices below the levels expected over the 10-year scoring window.
Source: Summary Tables S-9, FY2017 Administration Budget, Office of Management and Budget.

Do Fossil Fuel Tax Expenditures Promote Fossil Fuel Production?

Empirical evidence on the effect of tax expenditures on oil and gas production is limited. Economic theory suggests that tax expenditures to subsidize investment lower the user cost of capital for firms. This implies higher usage of capital in equilibrium and accelerated net investment at the time of a tax change. Changes in investment (i.e., drilling) can then result in changes to future production (e.g., Anderson et al. 2014). To understand how firms' investments could change if these tax expenditures are

repealed, it is important quantify how a firm's investment incentive varies with the subsidies. For example, Metcalf (2010) calculates the effective tax rates for firms in the energy sector. For oil drilling firms, he shows that the effective tax rate for non-integrated firms is -13.5%, and 15.2% for integrated firms. He finds that removing the intangible drilling costs expensing and the percentage depletion deduction provisions, then their effective tax rates rise to the statutory rate that combines both Federal and (average) state corporate taxes of 39.9%. Whether such large changes in the effective tax rate substantially impact firms' drilling decisions is an empirical question.

While there has been very little research published in the peer reviewed literature on the empirical impacts of reforming oil and gas tax expenditures, there are several papers and reports that have received considerable attention in this policy debate. For example, as Chief Economist of the Department of the Treasury, Alan Krueger testified before Congress on the impacts of eliminating fossil fuel tax expenditures in 2009. Krueger (2009) stated that the Treasury Department estimated a less than 0.5 percent decline in domestic oil production (and comparable effect on oil and gas extraction employment) as a result of phasing out these subsidies. He noted that it would have an insignificant impact on oil prices. Krueger pointed out that since small independent firms are the main beneficiaries from these tax expenditures, eliminating these tax expenditures could shift production from independent drilling companies to the large integrated firms that also engage in refining and marketing petroleum products (Krueger 2009).

A Bloomberg Government report (Costello 2009) estimated that a repeal of all oil and tax expenditures would not affect larger integrated producers but would reduce drilling by independents. On net, total domestic drilling would fall 3.7% in this study. A Wood Mackenzie (2013) report commissioned by the American Petroleum Institute, the oil and gas industry's trade association, estimated that repealing intangible drilling costs expensing would result in 3,300 fewer wells drilled each year (approximately 20% of drilling activity in 2012). In neither study are the methods and data sufficiently transparent to permit a replication or proper description here.

Several studies, including Allaire and Brown (2009, 2012) and National Research Council (2013) employed the U.S. Energy Information Administration's National Energy Modeling System (NEMS) to estimate the impacts of eliminating oil and gas tax expenditures. Allaire and Brown estimated a reduction in domestic production of 26,000 barrels per day (about 0.3% of 2016 production). The NRC focused on the impacts of eliminating percentage depletion for domestic natural gas production, and found that in doing so domestic extraction of natural gas would fall by about 0.5%.

Some more recent studies suggest the impacts on hydrocarbon production could be modestly larger. For example Metcalf (2016) develops and calibrates a model that indicates that long-term US oil production would be about 5% lower than it would be otherwise. This would still be well above our post-World War II trough in domestic production realized in 2008. As in other studies, the impact on oil prices estimated in Metcalf (2016) would be negligible – a change of ½ to 1 percent, which at today's oil prices would translate to about 1 penny per gallon of gasoline.

Do Fossil Fuel Tax Expenditures Correct Market Failures?

The subsidies listed in Table 1 do not focus on innovative or pollution-reducing activities. In other words, they neither address externalities nor the public good nature of innovation. They indiscriminately lower the cost of investing in another oil and gas field or another coal seam. These tax expenditures distort

and subsequently lower the return on investment across the US economy. In addition, by reducing tax revenues from resource extraction, these subsidies must be effectively financed by taxes elsewhere in the economy, which may further reduce non-fossil fuel investment. By distorting investment decisions in the economy, such tax expenditures are a government failure.

Moreover, subsidizing fossil fuels—to the extent that they could increase the production of fossil fuel based energy—could exacerbate market failures. If these tax expenditures increase oil and coal production, then emissions of fine particulates that contribute to premature mortality and of carbon dioxide that contribute to climate change could increase (Erickson et al. 2017). Potentially increasing socially-harmful externalities would illustrate how fossil fuel tax expenditures are a government failure on a second dimension.

Removing tax instruments that represent a government failure would make American society better off. In addition, taxpayers' returns to eliminating these subsidies could be much larger when considering how such efforts could leverage reforms of fuel pricing in countries around the world. At the 2009 Pittsburgh G-20 summit, the United States spearheaded an agreement among the leaders of the twenty largest developed and developing economies to phase out fossil fuel subsidies. While this agreement continues to receive attention at G-20 meetings, including formal peer review processes, the progress in delivering on this objective has been mixed. This includes the fact that Congress has failed to act on proposals to eliminate fossil fuel tax expenditures since 2009. Leadership via the action of eliminating these subsidies would empower the United States to encourage other large developed and developing economies to reduce their subsidies (Aldy 2015).

Eliminating fossil fuel subsidies in the developing world – which typically support consumption through lower-than-market prices – would yield significant economic, energy, and environmental benefits. Global oil consumption could fall more than 4 million barrels per day, which would lower crude oil prices and benefit consumers in the United States and countries around the world. Global carbon dioxide emissions contributing to climate change could fall by 10 percent through a policy that would, on net, increase economic output by removing costly distortions in developing economies (Aldy 2014, 2015). Let me emphasize these results: if we demonstrate our leadership and engage with our economic partners around the world to remove fossil fuel subsidies, then *American consumers would enjoy lower gasoline, diesel, and heating oil prices and the world would enjoy lower carbon pollution*. This would clearly be a policy winner.

Let me close by noting that a well-designed fossil fuel tax expenditure could help address a market failure and increase social welfare. Some subsidies may target novel technologies and facilitate innovative activity. For example, the now-expired unconventional natural gas production tax credit provided support for nascent shale gas exploration technologies in the 1980s and 1990s. One could imagine that a tax credit for investment in emerging carbon capture and storage technology for fossil fuel-fired power plants could also be justified on social welfare grounds. This could be integrated in the reform of the enhanced oil recovery tax credit, in which the tax credit is based on the amount of carbon dioxide stored underground as opposed to barrels of oil production.

Are Fossil Fuel Tax Expenditures Cost-Effective?

Since these tax expenditures do not remedy market failures, by definition they cannot be a cost-effective approach to correcting market failures. In addition, given the very small impacts on production,

they would appear to be a costly way to increase production. Between 2008 and 2016, U.S. oil production increased more than 75 percent. This is not because of any changes in these tax expenditures (there were no changes to these tax provisions during this time), but is a result of the innovation in the industry driving down extraction costs and higher oil prices than what we experienced in the 1990s and 2000s. Based on the Allaire and Brown analysis, the government may be spending billions of dollars per year for about 26,000 barrels per day. If an oil company spent that much money for such a small amount of production, it would go out of business.

Are There Opportunities for Review and Reform of Fossil Fuel Tax Expenditures?

In contrast to many energy tax provisions, these fossil fuel tax expenditures do not have a sunset provision. They are a part of the tax code until Congress takes action to change them. Sunset provisions create milestones that can motivate evaluation of the effectiveness of policy. These provisions leverage the democratic process so that the case can be made for continuing, reforming, or eliminating the policy intervention. A modest reform would be to include sunset provisions on these tax expenditures in order to motivate such a debate over their merits.

As noted previously, there is much less rigorous review of the impacts of tax provisions intended to address market failures than for regulatory interventions in the federal government. Given the expertise in the Federal government, for example at the Congressional Budget Office and the Energy Information Administration, it would benefit the public debate about energy tax policy to task these experts to evaluate the impacts of these fossil fuel tax expenditures. For that matter, this analysis could address all energy tax policy. Such an analysis could address an array of important questions: What are the incremental impacts of a given tax instrument on production? What are the incremental impacts of multiple, overlapping tax expenditures? What impacts do these tax expenditures have on energy prices? What are the distributional impacts of energy tax expenditures? What effects do these instruments have on innovation and the production of knowledge? What are the impacts of the tax expenditures on air pollution, such as fine particulate matter and carbon dioxide? How do tax expenditures interact with other policy instruments, such as spending and regulations, to affect markets, consumers, and pollution? Rigorous, independent analysis of these questions could substantially improve the policy debate about energy tax policy and inform potential reform of energy tax expenditures and comprehensive tax reform more generally.

Conclusions

In light of this analysis, I have previously proposed eliminating fossil fuel tax expenditures on several occasions (Aldy 2013, 2014, 2017b). I recognize that the political economy of reforming these subsidies is more complicated than evident in an analysis of how they reduce social welfare. As the University of Chicago economist George Stigler noted in his seminal paper on how industry captures the benefits of government intervention: “The most obvious contribution that a group may seek of the government is a direct subsidy of money” (Stigler 1971, p. 4). Once firms have secured such subsidies, especially those narrowly tailored to their activities, then they have a strong vested interest in the continuation of these subsidies.

Some recipients of these subsidies may dispute that they are in fact subsidies. While this cannot be squared with how the tax code preferentially favors investment in fossil fuel projects relative to other

industries, there is an active debate about the definition of fossil fuel subsidies. For example, the International Monetary Fund employs two definitions of fossil fuel subsidies. The first definition is in line with what I have described above. The second definition, however, includes the fact that we fail to fully account for the adverse impacts of pollution from fossil fuel combustion on premature mortality and climate change. On this measure, the U.S. fossil fuel subsidies are several orders of magnitude larger than what is reported in Table 1 and represent the largest fossil fuel subsidies of any country in the world (IMF 2015; Aldy 2015). Such an approach would be consistent with a general policy objective – regardless of whether it is implemented through a tax instrument or regulation or alternative policy approach – to appropriately price the external costs of energy production and use (Greenstone and Looney 2012).

This highlights the fact that U.S. energy tax policy subsidizes technology- and energy-specific investment. It is still second-best to using the tax code to price the externalities in our production and consumption of energy. As my colleague in the Harvard economics department Dale Jorgenson (2012) has noted, doing so could deliver very large social gains through improving environmental quality and increasing the efficiency of the tax code. Pricing pollution in the tax code could generate the revenues that would enable more ambitious lowering of tax rates on families and businesses (Morris 2013; Taylor 2015; Aldy 2016). Such policies could be implemented in a way that clearly corrects an externality, does so cost-effectively, and could enable review and reform over time (Aldy 2017a). This would represent a significant improvement over a status quo in which we spend money on tax expenditures that do not increase social welfare and impose real opportunity costs on society by requiring higher taxes elsewhere in the economy. Evidence-based reform of energy tax policy could increase returns to the American taxpayer and make the whole of American society better off.

References

Aldy, Joseph E. 2013. Eliminating Fossil Fuel Subsidies. In: *15 Ways to Rethink the Federal Budget*, Michael Greenstone, Max Harris, Karen Li, Adam Looney, and Jeremy Patashnik, eds. Washington, DC: The Hamilton Project, Brookings Institution.

Aldy, Joseph E. 2014. Money for Nothing: The Case for Eliminating U.S. Fossil Fuel Subsidies. *Resources* 186: 32-37. http://www.rff.org/research/publications/money-nothing-case-eliminating-us-fossil-fuel-subsidies

Aldy, Joseph E. 2015. Policy Surveillance in the G20 Fossil Fuel Subsidies Agreement: Lessons for Climate Policy. *Climatic Change* doi:10.1007/s10584-015-1505-0.

Aldy, Joseph E. 2016. Long-term Climate Policy: The Great Swap. Report prepared for the Progressive Policy Institute. Washington, DC: Progressive Policy Institute. http://www.progressivepolicy.org/wp-content/uploads/2016/11/The-Great-Swap.pdf

Aldy, Joseph E. 2017a. Designing and Updating a U.S. Carbon Tax in an Uncertain World. RFF Discussion Paper 17-01. Washington, DC: Resources for the Future. http://www.rff.org/files/document/file/RFF-DP-17-01.pdf

Aldy, Joseph E. 2017b. How the United States Could Benefit from Eliminating Ineffective Fossil Fuel Subsidies. Scholars Strategy Network Brief, March 2017. http://www.scholarsstrategynetwork.org/brief/how-united-states-could-benefit-eliminating-ineffective-fossil-fuel-subsidies

Allaire, Maura, and Stephen Brown. 2009. Eliminating Subsidies for Fossil Fuel Production: Implications for U.S. Oil and Natural Gas Markets. Issue Brief 09-10. Resources for the Future, Washington, DC.

Allaire, Maura, and Stephen Brown. 2012. U.S. Energy Subsidies: Effects on Energy Markets and Carbon Dioxide Emissions. Prepared for The Pew Charitable Trusts, Philadelphia.

Anderson, Soren, Ryan Kellogg, and Steve Salant. 2014. Hotelling under Pressure. NBER Working Paper 20280. Cambridge, MA: National Bureau of Economic Research.

Costello, Tony. 2011. Eliminating Oil and Gas Company Tax Breaks: Independent Producers Face a Funding Gap. Bloomberg Government Study, June 10.

Erickson, Peter, Adrian Down, and Michael Lazarus. 2017. Effect of Government Subsidies for Upstream Oil Infrastructure on U.S. Oil Production and Global CO2 Emissions. Stockholm Environment Institute Working paper 2017-02. Seattle, WA: SEI.

Greenstone, Michael and Adam Looney. 2012. Paying Too Much for Energy? The True Costs of our Energy Sources. Daedalus 141(2): 10-30.

International Monetary Fund. 2015. Counting the Cost of Energy Subsidies. Washington, DC: IMF. http://www.imf.org/external/pubs/ft/survey/so/2015/new070215a.htm

Jorgenson, Dale W. 2012. Comprehensive Tax Reform and U.S. Energy Policy. Testimony before the U.S. Senate Finance Committee. http://scholar.harvard.edu/files/jorgenson/files/34_senatefinancecommittee4_6-12-2012.pdf

Krueger, Alan B. 2009. Statement of Alan Krueger, Assistant Secretary for Economic Policy, Department of the Treasury, Senate Subcommittee on Energy, Natural Resources, and Infrastructure.

Metcalf, Gilbert. 2010. Investment in Energy Infrastructure and the Tax Code. In: Tax Policy and the Economy, Volume 24. University of Chicago Press.

Metcalf, Gilbert. 2016. The Impact of Removing Tax Preferences for U.S. Oil and Natural Gas Production: Measuring Tax Subsidies by an Equivalent Price Impact Approach. NBER Working Paper 22537. Cambridge, MA: National Bureau of Economic Research.

Morris, Adele. 2013. The Many Benefits of a Carbon Tax. In: *15 Ways to Rethink the Federal Budget*, Michael Greenstone, Max Harris, Karen Li, Adam Looney, and Jeremy Patashnik, eds. Washington, DC: The Hamilton Project, Brookings Institution.

National Research Council. 2013. Effects of U.S. Tax Policy on Greenhouse Gas Emissions. Report of the Committee on Effects of Provisions in the Internal Revenue Code on Greenhouse Gas Emissions. Washington: National Academies Press.

Office of Management and Budget. 2016. Fiscal Year 2017 Analytical Perspectives of the U.S. Government. Washington, DC: The White House.

Stigler, George. 1971. The Theory of Regulation. Bell Journal of Economics and Management Science 2(1): 3-21.

Taylor, Jerry. 2015. The Conservative Case for a Carbon Tax. Niskanen Center Working Paper, March 23. https://niskanencenter.org/wp-content/uploads/2015/03/The-Conservative-Case-for-a-Carbon-Tax1.pdf

Wood Mackenzie. 2013. Impacts of Delaying IDC Deductibility (2014-2025). Prepared for API. www.api.org/~/media/Files/Policy/Taxes/13-July/API-US-IDC-Delay-Impacts-Release-7-11-13.pdf.