TESTIMONY

Statement of
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Reforming America's Outdated Energy Tax Code

before the
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Chairman Wyden, Senator Hatch, and Members of the Committee, thank you for the invitation to testify this morning on reforming the treatment of energy in the tax system. I make the following points in my testimony today.

- Energy policy is shaped in important ways by the federal tax system. While taxes on fuels are one instrument of tax policy, subsidies in the form of accelerated depreciation, percentage depletion, production and investment tax credits plan an equally if not more important role.
- Economic efficiency is best achieved by setting tax rates to align the private and social costs of producing and using energy. In the context of energy, taxes should be levied on energy sources based on the negative externalities associated with their production or consumption.
- A well-designed carbon tax would align the private and social costs of burning fossil fuels. It could also raise significant revenue that could help finance equity and efficiency improving tax reforms.
- With a well-designed carbon tax, there would be no need for tax-based energy subsidies of any kind. In addition to eliminating tax expenditures on the oil and gas industry, tax expenditures for renewable sources could also be eliminated.
- In the absence of carbon pricing, a second-best technological neutrality can be achieved through the use of subsidies. The technology-neutral tax credit sketched out in the December 2013 Senate Finance Committee Staff Discussion Draft takes important steps in the right direction towards a balanced tax code that supports social efficiency in energy production.

I. Background

The tax code has long been an important instrument for energy policy. Accelerated depreciation, percentage depletion, deductions, and tax credits are all tax-based tools for reducing the cost of producing energy. The Energy Information Administration's most recent analysis of federal financial interventions in energy markets notes that expenditures through the tax system account for 43 percent of all federal support (see Table 1 below).[1] This is lower than the share in 2007 when tax expenditures accounted for nearly two-thirds of total federal support and reflects, in large measure, the importance of the 1603 cash grant program for renewable electricity production through the American Reinvestment and Recovery Act (ARRA).

Subsidies through the tax code play an especially important role in supporting fossil fuel and renewable energy production. They play a smaller role in supporting nuclear power production though this could change over the next decade. Production tax credits for new nuclear power production put in place in the Energy Policy Act of 2005 could significantly increase federal tax expenditures for this source of electricity. Support for renewable energy through tax expenditures has risen with its share in FY 2010 exceeding one-half of the energy related tax expenditures in the tax code. Finally,

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[1] Energy Information Administration. 2011. *Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2010*. Washington, DC: EIA. A tax expenditure is a reduction in tax revenue arising from a special provision for some type of economic activity.

EIA documents that total federal subsidies and support for energy have more than doubled between 2007 and 2010 (in year 2010 dollars). Energy related tax expenditures have grown more slowly, rising by 41 percent over this period.[2]

Table 1. Federal Support for Energy: FY 2010 ($ Millions)				
Fuel	Tax Expenditures	Total Support	Share of Total Support	ARRA Related
Coal	561	1,358	41%	97
Natural Gas and Petroleum Liquids	2,690	2,820	95%	0
Nuclear	908	2,499	36%	147
Renewable Energy	8,168	14,674	56%	6,193
Electricity (not fuel specific)	58	971	6%	495
End Use and Conservation	3899	14,838	26%	7,854
Total	16,284	37,160	44%	14,786

Source: Table ES-2, Energy Information Administration. 2011. *Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2010*. Washington, DC: EIA.

As of 2013 there were 42 tax preferences related to energy production and consumption.[3] The number of incentives in the tax code makes it difficult to assess their relative effectiveness and the extent to which they favor certain types of fuels over other fuels. I turn to this issue next.

II. Rationale and Guiding Principles for Energy Tax Reform

Let me begin by discussing *why* the federal tax system should intervene in energy markets through either taxes or subsidies. Economic theory provides clear prescriptions for situations where interventions through the tax code can improve social welfare. Externalities provide the most relevant rationale for the energy sector.[4] If the production or consumption of energy has as a by-product the creation of an externality (e.g. pollution) then social welfare can be improved through government intervention. One way to do this is by taxing the externality. Thus a tax on the sulfur content of fossil fuels,

[2] In contrast, total support for energy doubled in real dollars between 1999 and 2007 while tax expenditures more than tripled. See Energy Information Administration. 2008. *Federal Financial Interventions and Subsidies in Energy Markets 2007*. Washington, DC: EIA SR/CNEAF/2008-01.

[3] *Summary of Staff Discussion Draft: Energy Tax Reform*, Chairman Max Baucus, U.S. Senate Committee on Finance, December 18, 2013.

[4] Another reason for federal involvement in energy markets is an energy security concern related to the heavy reliance of our transportation sector on petroleum. Over ninety percent of primary energy consumption in the transportation sector comes from petroleum based fuels. (EIA data at http://www.eia.gov/energyexplained/). Supply diversification is a reasonable risk management strategy in light of this heavy reliance in transportation on oil (see Gilbert E. Metcalf, "The Economics of Energy Security," *Annual Review of Resource Economics*, forthcoming). I do not pursue this issue here but note that carbon pricing is likely to contribute to fuel supply diversification in transportation.

for example, would be an efficient response to acid rain damages arising from fossil fuel consumption for electricity generation. This is an example of a Pigouvian tax.[5] It "internalizes the externality" by forcing firms to take into account the social costs of pollution by raising their private costs by the value of the social damages that are generated by the pollutant. This approach implicitly makes clear that pollution generating activities have social benefits as well as costs. Optimal policy must balance those costs against the benefits; the tax is an efficient means of effecting that balance.

Rather than taxing activities that create negative externalities, we can provide subsidies to activities that are substitutes for externality generating activities. Put simply, if fuel X generates pollution damages while fuel Y does not, we can raise the price of fuel X relative to fuel Y to reflect the social damages from burning fuel X or we can reduce the price of fuel Y. Either approach encourages firms to use less of fuel X and more of fuel Y. This is the essential approach taken through federal energy tax policy. In large measure, we subsidize energy activities that we would like to encourage rather than tax activities that we would like to discourage.

What are the externalities that are of significant concern that drive federal tax policy towards energy? The externality of primary concern is greenhouse gas emissions that add to the growing concentration of greenhouse gases in the atmosphere. Fossil fuel combustion in the United States was responsible for over three-quarters of domestic greenhouse gas emissions in 2012.[6] Any policy to reduce U.S. greenhouse gas emissions must have as a key element incentives to shift from fossil to renewable fuels consumption.

Energy production and consumption are associated with negative externalities in addition to climate change. I do not focus on those here because many of these negative externalities are currently addressed through regulatory means. For example, the Acid Rain Program run by the Environmental Protection Agency has been a highly cost-effective response to the damages from releasing sulfur dioxide in fossil fuel electric generation units. Moreover the current set of energy subsidies is arguably focused to a large extent on reducing greenhouse gas emissions. For the purposes of this testimony I will take as given that, going forward, tax policy will be predominantly concerned with greenhouse gas emissions and that any assessment of energy tax policy must consider, among other things, the degree to which policy reduces emissions.

In terms of policy design, key principles include stability and clarity in policy, cost effectiveness, and adverse interactions among existing policies. Stability and clarity are important given the long-lived nature of most major energy capital investments. The

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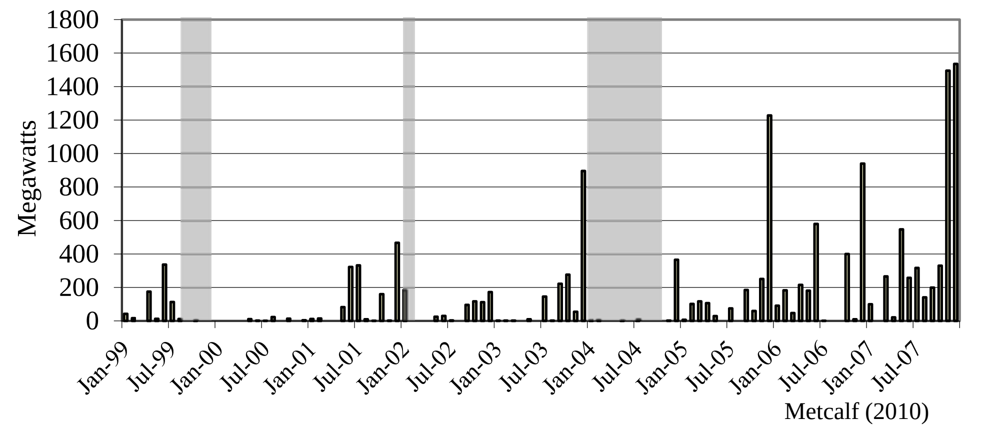
[5] Named for the economist Arthur C. Pigou, an early proponent of this policy instrument in Arthur C. Pigou, 1938. *The Economics of Welfare*. London: Weidenfeld and Nicolson. A comparable approach – and the one taken to address acid rain – is to create a cap-and-trade system for SO_2. Either approach puts a price on emissions of SO_2 and provides the appropriate price signal to electric utilities to reduce emissions.

[6] See Environmental Protection Agency. 2004. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2012*. Washington, DC: Environmental Protection Agency, EPA 430-R-14-003.

historic pattern of two-year authorization cycles for renewable electricity production tax credits has created great uncertainty in the wind industry and led to boom and bust cycles that raise the cost of renewable energy investment. Figure 1 below is from an analysis I did of wind capacity investments in the United States. It illustrates the fall-off in investment during periods in which the section 45 production tax credit lapsed.[7] Greater certainty over the production tax credit would smooth out investment and reduce bottlenecks in turbine and other equipment manufacture that delay projects and raise costs.

Figure 1. Wind Capacity Additions



Energy tax policies are more cost effective to the degree that any tax benefits are closely linked to new and additional projects that would not have been developed in the absence of the tax initiative. More precisely, subsidies should be designed to benefit marginal projects as much as possible. A recent example where this principle was violated was the $.50 per gallon alternative fuels mixture credit. This credit was intended to encourage the addition of biodiesel and other biomass based fuels to petroleum to reduce petroleum use. It became clear that many paper firms were taking the credit for mixing diesel fuel with black liquor, a biomass by-product of paper making that historically has been used by the industry as a fuel source for their boilers. Controversy arose over whether paper firms were adding diesel fuel to black liquor purely for the purpose of claiming the tax credit biodiesel mixture tax credit.[8] This was troubling on two levels. First, a tax credit's cost effectiveness is driven down as credits are taken for inframarginal activities. This is a common problem with any subsidy. We want to provide the incentive to firms that would not have undertaken the desirable activity in the

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[7] Gilbert E. Metcalf, 2010, "Investment in Energy Infrastructure and the Tax Code," *Tax Policy and the Economy*, 24: 1 – 33. In all cases the credit was retroactively reauthorized though this was not known with certainty beforehand. Based on a statistical analysis I undertook in that paper, the elasticity of investment with respect to the user cost of capital (which takes into account the production tax credit) exceeds 1 in absolute value. Tax policy is a powerful driver of investment.

[8] See Jan Mouawad and Clifford Krauss. 2009. Lawmakers May Limit Paper Mills' Windfall. *New York Times*, April 18, 2009.

absence of the subsidy. But we don't want to provide the subsidy to firms that would have undertaken the activity regardless of the subsidy. But the example from the paper industry was troubling beyond the inframarginal nature of the subsidy. To the extent that the tax credit raised the demand for diesel fuel in order to make the biofuel eligible for the credit, then it had the perverse effect of raising rather than lowering demand for petroleum products.[9]

III. Carbon Tax as First Best Energy Policy

The most efficient way to reduce greenhouse gas emissions is to put a price on those emissions to align the private and social costs of using greenhouse gas emitting fuel sources. Since energy related carbon dioxide emissions account for the vast bulk of emissions, a carbon tax on fossil fuels would be a cost effective and administratively straightforward way to reduce those emissions. It is a textbook example of a Pigouvian tax. I have written at length on the mechanics of how the U.S. government could design a carbon tax.[10] The message from that research is that it is administratively straightforward to implement a carbon tax in a way that balances equity and efficiency concerns. In a recent paper I carried out an analysis of a $20 per ton carbon tax and estimate that it would raise roughly $100 billion annually in the initial years. This would provide sufficient revenue to lower the payroll tax by roughly 1.5 percentage points (combining cuts to employer and employee rates) or to finance nearly an 8 percentage point reduction in the corporate income tax.[11] Whether the carbon tax revenue is used to lower personal and/or corporate income tax rates, is used to finance investment incentives, is given back to households in some lump sum fashion, or in some combination, what is clear is that the revenue provides the fiscal flexibility to contribute to a comprehensive tax reform package while maintaining overall budget neutrality for the federal government.

If a carbon tax were put in place, it would have an additional revenue benefit as there would no longer be a need for the section 45 and 48 renewable energy tax credits, and various other credits designed to encourage reduced emissions in the energy sector. At the same time other energy related tax credits could be eliminated including expensing for exploration and development costs of oil and gas, replacing percentage depletion with cost depletion, and the accelerated amortization of geological and geophysical expenses in oil and gas. Eliminating all these subsidies would reduce tax losses by more than $30 billion over the FY 2015 – 2019 budget window.

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[9] The perverse impact of policy is not limited to the biodiesel mixing tax credit. Research by Holland, Hughes, and Knittel suggest that low carbon fuel standards may have the perverse effect of increasing net carbon emissions. See Stephen P. Holland, Jonathan E. Hughes, and Christopher R. Knittel. 2009. Greenhouse Gas Reductions under Low Carbon Fuel Standards? *The American Economic Journal: Economic Policy* 1 (1):106-146.

[10] See Gilbert E. Metcalf and David Weisbach, "The Design of a Carbon Tax," *Harvard Environmental Law Review*, 33:2(2009): 499 – 556. Also see Gilbert E. Metcalf, "Paying for Greenhouse Gas Reductions: What Role for Fairness?" *Lewis & Clark Law Review*, 15:2 (2011): 393 - 415.

[11] These estimates include any revenue loss in taxes that must be made up with revenue from the carbon tax. Gilbert E. Metcalf, "Using the Tax System to Address Competition Issues with a Carbon Tax," *National Tax Journal*, forthcoming.

Finally, a stable carbon tax with a tax rate set roughly equal to the social cost of carbon would make the EPA's Clean Power Plan redundant. In addition to avoiding the administrative cost of designing state implementation plans in each state, efficiency would be enhanced to the extent that state plans are not designed to equalize the marginal cost of abatement across the country.[12]

IV. Myths About a Carbon Tax

There are a number of myths about a carbon tax that it is important to dispel.

Myth: A carbon tax is an economy killer. The EIA Annual Energy Outlook 2014 modeled a $25 per ton CO_2 tax rising at five percent through 2040 and estimated near term job losses between 0.4 and 0.8 percent as the economy transitions toward a lower carbon economy. Longer term job losses are much lower. By 2025, employment impacts have become negligible or positive.

The AEO analysis recycles the revenue in a lump sum fashion. Were the revenues to be recycled through reductions in corporate or personal income tax rates, any economic losses including job losses would be reduced due to the reductions in tax distortions arising from lower tax rates.[13] In general studies find modest economic losses from a well-designed carbon tax. These are losses relative to a "business as usual" (BAU) benchmark in which there is no carbon tax. The BAU benchmark shows long-run economic growth so any economic loss from a carbon tax simply means slightly slower growth than in the absence of the tax. In other words, the economy continues to grow in the presence of a carbon tax and our emissions are reduced.

Myth: A carbon tax will be ineffective at reducing global emissions. This is not so much a myth as it is a red herring. The United States is currently the second largest emitter of greenhouse gases globally behind China. Going forward, emissions from developing countries will exceed those from developed nations by a substantial amount. Greenhouse gases are a global pollutant and a global externality. As such, it will require significant effort by all major emitting nations. While a domestic carbon tax by itself will have a modest impact on global emissions, it is an important element in a global strategy to reduce emissions. While there is no guarantee that unilateral action by the United States to reduce emissions will affect policies in China and other major developing countries, it is absolutely guaranteed that failure to act by the United States will mean other major countries will not take action. Any action taken by the United States should include provisions to address failure to act by other major emitting countries. This could include

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[12] If different states have different marginal costs of abatement in equilibrium, there would be potential gains from trade in which low cost states increase their abatement and high cost states reduce their abatement. These gains, however, would not necessarily be realized. A national carbon tax brings about this equilibration across states automatically.

[13] See, for example, Lawrence Goulder and Marc Hafstead, 2013, "Tax Reform and Environmental Policy," RFF Discussion Paper 13-31. While this paper does not measure employment impacts directly, it notes that the loss in GDP (relative to a growing baseline) is reduced by 40 to 60 percent if the revenues are used to cut personal or corporate income tax rates.

border tax adjustments on imports from countries not pricing emissions or carbon tax credits for energy intensive and trade exposed sectors competing with those countries.

Myth: The social cost of carbon cannot be estimated with any precision and therefore cannot serve as the basis for federal policy. Estimating the social marginal damages from greenhouse gas emissions is an immensely complex task and all integrated assessment models (IAMs) that undertake that challenging task make clear that considerable uncertainty exists with respect to estimates. While there is great uncertainty over point estimates of damages at any point in time, there is no reason to believe that the correct estimate of damages is zero. Most criticisms of IAMs complain that the models ignore important non-linear impacts that while low probability would be catastrophic.[14] In other words, the social cost of greenhouse gas emissions is likely biased towards zero. Even MIT economist Robert Pindyck, who has written perhaps the most scathing criticism of IAMs and their use in carbon policy, does not believe the correct carbon price is zero:

> "My criticism of IAMs should *not* be taken to imply that, because we know so little, nothing should be done about climate change right now, and instead we should wait until we learn more. Quite the contrary. One can think of a GHG abatement policy as a form of insurance: society would be paying for a guarantee that a low-probability catastrophe will not occur (or is less likely). As I have argued elsewhere, even though we don't have a good estimate of the SCC, it would make sense to take the Interagency Working Group's $21 (or updated $33) number as a rough and politically acceptable starting point and impose a carbon tax (or equivalent policy) of that amount."[15] (p. 872)

V. Technology Neutral Energy Subsidy Policy

While carbon pricing would be an economically efficient approach to addressing the problem of climate change, the political difficulties associated with implementing a carbon price mean it is likely we will continue to rely on the subsidies through the tax code to provide the appropriate price signals. Subsidies are a mirror of taxes and as such can be used to align prices between clean and dirty fuels to reflect the social marginal damages from burning dirty fuels. A tax on dirty goods raises their price relative to that of clean goods. Similarly a subsidy to clean goods raises the price of dirty goods relative to that of clean goods. There are drawbacks from relying on subsidies rather than taxes as I have discussed elsewhere. But if carbon pricing is not politically feasible, clean energy subsidies can still contribute to economic efficiency.[16]

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[14] See, for example, the issues identified in William Nordhaus, 2014, "Estimates of the Social Cost of Carbon: Concepts and Results from the DICE-2013R Model and Alternative Approaches," Yale University.

[15] Robert Pindyck, 2013, "Climate Change Policy: What Do the Models Tell Us?", *Journal of Economic Literature*, 51(30): 860-872.

[16] I have analyzed the difficulties with using subsidies in Gilbert E. Metcalf, "Tax Policies for Low-Carbon Technologies" *National Tax Journal* LXII.3 (2009): 519-533. See also my testimony before the Senate Committee on Finance on April 23, 2009, available at http://www.finance.senate.gov/imo/media/doc/042309gmtest.pdf.

There are two elements to a cost effective subsidy-based approach to reducing greenhouse gas emissions through the tax code. First, the tax preferences for coal, oil, and gas should be repealed. In particular, expensing intangible drilling costs as well as exploration and development costs of oil and gas wells treat investments in these fossil fuel properties differently than other investments in which up-front costs lead to streams of revenue over time. The standard tax treatment for such costs is to allocate the costs over the life of the well thereby providing an accurate measure of net income under our income tax system. Similarly, independent oil and gas producers should be required to apply cost depletion to their reserves instead of percentage depletion. Again, this is in accordance with standard income tax treatment of asset reserves and levels the playing field between oil and gas assets and other physical assets. My 2010 analysis on the effect of the tax code on energy infrastructure investment found that the expensing of intangible drilling costs and the use of percentage depletion by independent oil drillers led to a negative effective tax rate on capital investment and a thirty percentage point differential between the effective tax rate on firm able to expense IDC's and utilize percentage depletion and those that could not.[17] This contributes to the inefficient allocation of capital across and within industries.

Second, an efficient energy policy should not favor one energy source over another after taking into account any positive or negative externalities associated with its production or consumption. This is the concept of technology neutrality. With our focus on global warming due to anthropogenic greenhouse gas emissions, a technology neutral policy would raise the relative price of dirty to clean fuels by the same amount based on the carbon content of fuels and not based on specific technologies. A tax credit based on the percentage reduction in carbon content per unit of energy of different fuels could be designed to be technologically neutral. The Senate Committee on Finance Chairman's Staff Discussion Draft to Reform Certain Energy Tax Provisions (December 18, 2013) addresses several problems with the existing mix of tax incentives. Specifically the reform proposal in the Staff Discussion Draft:

- reduces the number of incentives and consolidates them into incentives that focus on measuring results rather than rewarding particular technologies (technological neutrality);
- eliminates the policy uncertainty that results from the need to reauthorize tax preferences regularly while ensuring that clear and transparent benchmarks are set so that the policies may phase out as they are no longer needed; and
- makes tax benefits available to all technologies that reduce carbon emissions per unit of energy relative to a benchmark level of carbon intensity.

Such an approach as is sketched out in the Staff Discussion Draft would provide greater clarity and rationality to the current tax code and would be a major improvement over the current system. While an improvement, it is not a first-best policy. By subsidizing clean energy, the overall cost of energy is reduced thereby encouraging

[17] Gilbert E. Metcalf, 2010, "Investment in Energy Infrastructure and the Tax Code," *Tax Policy and the Economy*, 24: 1 – 33.

greater energy use and so giving up one of the channels by which energy-related pollution is reduced. It also is less cost effective to the degree inframarginal investments receive subsidies. Given that we are operating in a second-best world, however, where the political climate is not yet ready for carbon pricing, The Staff Discussion Draft approach would likely provide significant gains in low and no-carbon energy provision at a cost-effective price.

VI. Conclusion

Current energy tax policy can perhaps be best viewed as a transitional policy until policies such as carbon pricing (whether through a carbon tax or a cap-and-trade system) are put in place. A carbon tax would provide the correct signal to the economy about the social cost of energy production and consumption and so improve economic efficiency. It would raise significant revenue that could be used to lower other taxes and so further increase economic efficiency and fairness in the tax system. Finally, it would allow Congress to repeal a large number of energy tax subsidies that would no longer be necessary once carbon pricing is put in place. This further strengthens the federal fiscal position allowing non-energy tax rates to be lowered even further.

Until carbon pricing is politically feasible, there is much Congress can do to modify existing subsidies in the tax system to achieve technology neutrality and stability in energy policy that incentivizes long-lived clean energy investments. Policies should provide a level playing field in the sense that the subsidy per unit of externality avoided should be comparable across technologies. They should also consider the extent to which true reductions in the externality occur and avoid unintended consequences. This is all very easy to say but difficult to do. But so long as our energy policy is built around providing subsidies for activities we wish to support as opposed to taxing those activities we wish to discourage, we will always face difficult design problems that complicate our efforts to achieve efficient and cost effective outcomes. Having said that, streamlining renewable energy tax preferences, making them technologically neutral, and phasing out fossil fuel tax preferences would be a major improvement over the current tax code.

Thank you for the opportunity to testify today.

Gilbert E. Metcalf is a Professor of Economics at Tufts University and a Research Associate at the National Bureau of Economic Research. He is also a Research Associate at MIT's Joint Program on the Science and Policy of Global Change and an Associate Scholar in Harvard's Environmental Economics Program. Metcalf has also taught at Princeton University, Harvard University, and MIT.

In 2011 – 2012, Metcalf served as the Deputy Assistant Secretary for Environment and Energy at the U.S. Department of the Treasury where he oversaw Treasury's activities in international climate and energy finance. While at Treasury, Metcalf served as the first U.S. Board member of the Green Climate Fund. Metcalf has served as a consultant to numerous organizations including, among others, the U.S. Department of the Treasury, the U.S. Department of Energy, and Argonne National Laboratory. In 2009-2010 he served as a member of the National Academy of Sciences Committee on Health, Environmental, and Other External Costs and Benefits of Energy Production and Consumption that produced the *Hidden Costs of Energy*.

Metcalf's primary research area is applied public finance with particular interests in taxation, energy, and environmental economics. His current research focuses on policy evaluation and design in the area of energy and climate change. He has published papers in numerous academic journals, has edited several books, and has contributed chapters to books on tax and energy policy. Metcalf received a B.A. in Mathematics from Amherst College, an M.S. in Agricultural and Resource Economics from the University of Massachusetts Amherst, and a Ph.D. in Economics from Harvard University.