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ISSUE BRIEF

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TAXING CARBON TO FINANCE TAX REFORM

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SUMMARY

Reforming the federal tax code could advance economic growth as well as help the United States address a number of its environmental and energy challenges. A carbon tax, in particular, is an effective fiscal policy option that would simultaneously support federal tax reform initiatives, reduce carbon dioxide emissions, and promote sound energy policies.

- **A carbon tax is a consumption tax levied on the carbon content of oil, coal, and natural gas.** Taxing the carbon content of these fossil fuels is an efficient means of assigning costs to the carbon dioxide emissions they release when burned for energy.
- **A carbon tax would be relatively easy to administer.** It could be collected where fossil fuels enter the economy, such as ports, oil refineries, natural gas providers, and coal-processing plants. Applying the levy to as few as 2,000 entities could reach nearly all the fossil fuel consumed in the U.S. economy and would cover 82 percent of U.S. greenhouse gas emissions.
- **A carbon tax would generate significant revenue.** According to the Congressional Budget Office, a tax of $12 per metric ton of carbon that gradually rises to $17 per metric ton of carbon would generate $208 billion in revenue over a ten year period.
- **Revenue from a carbon tax could be used to finance other tax reform initiatives.** A carbon tax could be incorporated into a number of revenue-neutral tax reform packages, with the proceeds supporting reductions in inefficient existing taxes on productive labor and investment.
- **A carbon tax dovetails sound tax policy and sound climate change policy.** Climate change policy in the United States would be most effective if it were federal, economy-wide, and market based. A carbon tax meets all these criteria. A tax that starts at a modest rate and increases gradually and predictably over time would establish incentives throughout the economy to reduce carbon dioxide emissions with minimal disruption. Moreover, by encouraging a less carbon-intensive economy, a carbon tax could help improve the nation's long-term energy security.

I. A CARBON TAX AS PART OF TAX REFORM[1]

In early 2005, the Bush Administration announced its intention to reform the federal tax code to make it simpler, spread the burdens and benefits in an appropriately progressive manner, and promote economic growth.[2] In this and other tax reform initiatives, policymakers have been exploring strategies to shift some of the tax burden away from labor and investment and toward consumption. As they do this, policymakers should consider a type of consumption tax new to the United States—an initially modest but gradually increasing tax on the carbon content of fossil fuels—that could generate billions of dollars of revenue, which could be used to finance other reforms of the tax code.

Because the tax base for such a policy is quite large—all the carbon contained in fossil fuels sold in the United States[3]—even a modest carbon tax would generate significant revenue. Economic literature is replete with evidence to support both the cost-effectiveness of a carbon tax as a climate change policy and the potential benefits of using carbon tax revenue to offset reductions in distortional taxes, such as those on labor and investment.[4] Moreover, a carbon tax would serve other national policy goals, such as encouraging energy efficiency and conservation, reducing air pollution, and decreasing the nation's dependence on foreign sources of energy.

II. WHAT IS A CARBON TAX?

A carbon tax is an excise tax on the sale of fossil fuels—coal, petroleum products, and natural gas—based on their carbon content.[5] Fossil fuels are used for electricity generation, transportation, residential and commercial space heating, industrial processes, and other activities. As Table 1 shows, different types of fossil fuel contain different amounts of carbon per unit. Accordingly, a levy on carbon would place a higher tax on coal than on oil and a higher tax on oil than on natural gas because coal has a higher carbon content per

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Table 1 Carbon Content of Fossil Fuels

Fossil Fuel	Metric Tons of Carbon per Market Unit of Fuel	Million Metric Tons of Carbon per Quadrillion Btu
Coal (electric utility grade)	0.5187 / short ton	25.98
Oil (crude)	0.1177 / barrel	20.30
Natural gas (pipeline)	0.0149 / thousand cubic feet (mcf)	14.47

Source: Energy Information Administration, *Documentation for Emissions of Greenhouse Gases in the United States 2003,* and "Thermal Conversion Factors," in *Annual Energy Review* (Washington, DC: U.S. Department of Energy, 2005); available online at http://www.eia.doe.gov/oiaf/1605/ggrpt/documentation/pdf/0638(2003).pdf and http://www.eia.doe.gov/emeu/aer/append_a.html, respectively.

unit of thermal energy than oil does, which in turn has a higher carbon content than natural gas does.

A carbon tax as a sound climate change policy

Many people in the scientific community as well as in the private and public sectors are concerned that greenhouse gas emissions from human activities are influencing changes in the earth's climate. Potential climatic changes could have significant economic and environmental implications for coastal communities, public health, agricultural productivity, and ecosystems. Carbon dioxide (CO_2) from fossil fuel combustion is the most prevalent of these greenhouse gases from human activities in the United States (see Figure 1).[6] Consequently, to be successful, any climate change policy must address these emissions.

For several reasons, an initially modest but gradually increasing economy-wide carbon tax would be a cost-effective way of tackling CO_2 emissions and the challenge of climate change.[7] First, a carbon tax is a market-based policy, enabling the market to determine the most cost-effective means of reducing CO_2 emissions. It would encourage reductions of CO_2 emissions wherever and however such reductions could be achieved at a cost lower than the tax. A tax based on carbon content thus would create over time a financial incentive for firms and households to select lower carbon-content fuels, conserve energy, improve energy efficiency, and take other cost-effective steps to reduce the consumption of fossil fuels, thereby reducing CO_2 emissions.

Second, a carbon tax would address CO_2 emissions throughout the entire economy, not just a few of the emitting sectors. This strategy would minimize the cost of reducing emissions by creating an incentive for cost-effective reductions in all sectors. It also would distribute the costs of the policy widely, avoiding concentrated financial impact on selected sectors.[8]

Third, a carbon tax offers an administratively feasible means of reaching nearly all the economy's carbon dioxide-emitting activities. Directly regulating all sources of CO_2 emissions would be administratively difficult given the millions of individual fuel users, most of which lack the systems or the capability for measuring and monitoring emissions. But because CO_2 emissions from fossil fuel combustion are proportional to each fuel's carbon content, a carbon tax would be an indirect yet effective means of taxing them. Furthermore, the number of entities in the fossil fuel production and distribution chain is far smaller than the number of CO_2 emitters, and records of fuel sales are already being kept for commercial and other reasons.

Fourth, because a carbon tax sets a fixed cost per unit of CO_2 emissions, it provides certainty regarding the program's costs. Affected businesses and consumers would know that they could calculate the maximum amount they would have to pay from the carbon tax rate and that their actual costs could be lower if emissions abatement or avoidance strategies were available at a cost lower than the tax.

A carbon tax as a sound tax policy

A carbon tax would generate revenue that could be recycled back into the economy to finance reductions of other taxes. Consequently, it would offer an opportunity to shift taxation away from activities that are good for society, such as labor and investment, toward those that pose potential risks to society, such as activities that emit CO_2 and other greenhouse gases.

Some taxes influence behavior in ways that lead to economic distortions. For example, increasing the cost of a good or activity through a tax typically results in lowering the consumption of the good or participation in the activity. For this reason, some economists have criticized the reliance of the U.S. federal tax system on payroll and income taxes as a drag on two fundamental elements of the U.S. economy: labor

and investment.[9] Reducing the cost of labor and investment by lowering taxes on them could stimulate economic growth.

A properly designed carbon tax could help correct this economic distortion. That is, revenues generated by such a tax could be used to reduce economically distortional taxes on labor and investment currently in the tax code.

Collecting a carbon tax

A tax on the carbon content of fossil fuels could be collected at any of several different points in the fuel chain for each type of fuel. Most studies of carbon tax implementation emphasize the importance of selecting points of collection that (1) send a price signal to the broadest possible range of fuel users and (2) minimize the administrative costs. These criteria are likely best met by levying the tax "upstream," where fossil fuels are imported, produced, processed, or distributed by relatively few entities, rather than "downstream," where fossil fuels are burned by many millions of end users.

The results of one study suggest that a carbon tax applied to as few as 2,000 entities could reach virtually all the fossil fuel consumed in the U.S. economy.[10] Given this small number of collection points, an upstream tax would be relatively easy to administer and would cause fewer economic distortions than other approaches would.[11]

III. Using Carbon Tax Revenue to Finance Other Reform Initiatives

A carbon tax could raise significant revenue that could be used to finance other tax reform initiatives.

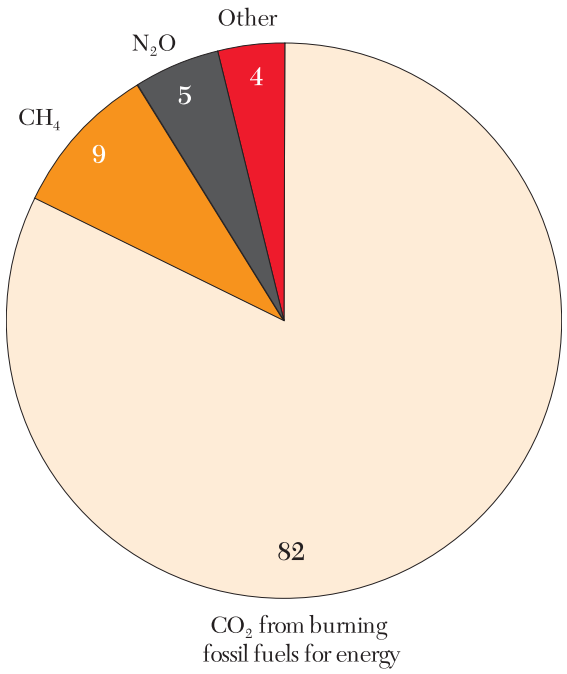
Revenue levels[12]

A carbon tax could generate a significant amount of revenue because it would have a substantial tax base: all the carbon in fossil fuels in the U.S. economy. In 2004, for example, the fossil fuels burned to generate energy for industry, utilities, homes, and vehicles contained approximately 1.6 billion metric tons of carbon (MTC), which were released into the atmosphere in the form of CO_2. At current fossil fuel consumption levels, therefore, each $10 in tax per MTC would generate approximately $16 billion in revenue per year.[13]

Many experts agree that a carbon tax should start at a modest rate and rise gradually over time. This approach would give businesses and households time to shift their investment and consumption patterns to more efficient technologies and lower carbon-content fuels, thereby reducing CO_2 emissions. It also would give policymakers flexibility over time to adjust the tax rate to balance economic and environmental impacts.

Figure 1 **Anthropogenic[a] U.S. Greenhouse Gas Emissions (2004)**

Percent, 100% = 7,122 million metric tons CO_2 equivalent



a. Man-made or of human origin

Source: Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2004*, figure ES1 and tables ES2 and ES3 (Washington, DC: U.S. Department of Energy, 2005); available online at ftp://ftp.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/ggrpt/057304.pdf.

The Congressional Budget Office has outlined a carbon tax plan that would begin at approximately $12 per MTC and rise to $17 over a ten-year period. It calculated that such a tax plan could generate approximately $208 billion over its first ten years while reducing the United States' CO_2 emissions from business-as-usual levels.[14]

Another recent carbon tax proposal[15] suggested a tax that would start at $5 per MTC and increase by $5 per MTC every other year. By the fifth year, the tax would be $15 per MTC and would generate approximately $26 billion, roughly equivalent to 1 percent of expected federal tax revenue. By

the fifteenth year, the levy would be $40 per MTC and would generate approximately $75 billion in annual revenue.

Use of revenue

Revenues from a carbon tax could finance reductions in the marginal rates of a variety of existing taxes by offsetting the revenue lost through these tax reductions. A number of recent economic analyses found that recycling revenues from a carbon tax to lower existing taxes on productive activities such as labor and investment could generate economic benefits that offset much of the cost of reducing greenhouse gas emissions.[16] For instance, a carbon tax could finance a decrease in the payroll tax, which could encourage the creation of more jobs and incentives to work.[17]

Another possible tax reform package would use a carbon levy to finance eliminating the "double taxation" of corporate dividends. Double taxation refers to the fact that shareholder dividends are effectively taxed twice, first by the corporate income tax and then by the shareholder's personal income tax. A carbon tax of approximately $13 per MTC[18] would be sufficient to offset the revenue lost by eliminating the personal income tax on dividends—while retaining the corporate tax—and would leave consumer prices relatively unaffected for the majority of industry sectors.[19]

Alternatively, a carbon tax could finance revisions to the alternative minimum tax (AMT). The $208 billion raised over ten years by the Congressional Budget Office's carbon tax plan could offset a third of the revenue that would be lost if the AMT were eliminated during the same time period. If the government instead opted to index AMT brackets and exemptions to inflation, the same carbon tax plan would offset nearly 55 percent of the forgone revenue.[20]

IV. Implementation Issues

Several issues are often raised regarding the implementation of a carbon tax: its economic impact, distributional effects, and relevance to those fossil fuels not used to generate energy. Policymakers could adopt a range of strategies to address these concerns.

Economic impact

Some observers have expressed concern about the impact that a carbon tax or any mandatory regulation of greenhouse gas emissions might have on the nation's economic growth. Policymakers could soften the impact of a carbon tax on the U.S. economy by introducing the tax gradually, an approach recommended by many economic experts.[21] In 2004 the National Commission on Energy Policy (NCEP) conducted an economic analysis of a climate change policy that effectively would set a price on carbon emissions from fossil fuel combustion at an initially modest but gradually rising rate. The NCEP concluded that this policy would cut the annual growth of the U.S. gross domestic product (GDP) by only one one-hundredth of 1 percent (0.01%) from 2010 through 2020.[22]

The U.S. Department of Energy's Energy Information Administration evaluated the NCEP's proposal and agreed that under the proposed policy, the economy's annual growth rate between 2003 and 2025 in terms of real GDP would not be materially affected.[23]

Furthermore, the impact on fuel prices of an initially modest carbon tax would not be significant in the near term. For instance, a levy of $10 per MTC would have only a small effect on oil and natural gas prices and a modest effect on the price of coal (see Table 2).[24] In regard to its impact on typical consumer energy expenditures, such a levy would raise the average retail price of gasoline by only two cents—less than the typical monthly fluctuation of market prices—and would increase the average price of electricity and home heating oil by only 2 percent in the program's initial years.

Using a carbon tax as a policy to reduce U.S. greenhouse gas emissions offers an opportunity to recycle revenues in order to lower inefficient taxes, thereby generating economic benefits that can offset much of the cost to the economy of reducing emissions.

Distributional impacts

Another issue regarding a carbon tax or any climate change policy that mandates reductions in greenhouse gas emissions is that the distribution of its effects would likely be uneven across industries and individuals, with some experiencing a greater impact than others. To be sure, an initially modest carbon tax would have minimal impacts in the near term. However, a carbon policy would have a relatively greater effect on individuals and families that rely on carbon-intensive industries for their livelihoods, such as coal miners and coal-mining communities. In addition, a carbon tax may be

Table 2 Impact on Energy Prices by Carbon Tax of $10 per Metric Ton of Carbon

	Direct Impact[a]			Indirect Impact		
	Oil	Natural Gas	Coal	Electricity	Gasoline	Heating Oil
Unit of fuel	barrel	thousand cubic feet (mcf)	short ton	kilowatt-hour (kWh)	gallon	gallon
Metric tons of carbon/ unit of fuel[b]	0.1177 / barrel	0.0149 / mcf	0.5187 / ton	0.00017 / kWh	0.0024 / gallon	0.0028 / gallon
Average U.S. price[c] (2004)	$36.77 / barrel	$10.74 / mcf	$27.30 / ton	$0.076 / kWh	$1.90 / gallon	$1.52 / gallon
$10/metric ton carbon levy:						
Absolute price increase	$1.18 / barrel	$0.15 / mcf	$5.19 / ton	$0.0017 / kWh	$0.024 / gallon	$0.028 / gallon
Percent price increase	3.2%	1.4%	19.0%	2.3%	1.3%	1.8%

a. Assumes that the carbon levy is directly applied to oil, natural gas, and coal used to generate energy. Tax credits could be given to fossil fuels used as feedstocks for products such as plastics. Electricity, gasoline, and heating oil would not be directly taxed; the price impacts on these would be a result of the upstream tax on primary fossil fuels.

b. For oil (crude), natural gas (pipeline), coal (electric utility grade), gasoline (all grades), and heating oil (No. 2 residential), see Energy Information Administration, *Documentation for Emissions of Greenhouse Gases in the United States 2003,* and "Thermal Conversion Factors," in *Annual Energy Review* (Washington, DC: U.S. Department of Energy, 2005); available online at http://www.eia.doe.gov/oiaf/1605/ggrpt/documentation/pdf/0638(2003).pdf and http://www.eia.doe.gov/emeu/aer/append_a.html, respectively. For electricity, see U.S. Environmental Protection Agency, "E-GRID database" (Washington, DC: U.S. Environmental Protection Agency, 2002); available online at http://www.epa.gov/cleanenergy/egrid/index.htm.

c. Energy Information Administration, U.S. Department of Energy. Coal (delivered price to electric utilities) available at http://www.eia.doe.gov/cneaf/coal/page/acr/acr_sum.html; natural gas (residential price) available at http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_nus_a.htm; oil (domestic first price) available at http://tonto.eia.doe.gov/dnav/pet/pet_pri_dfp1_k_a.htm; electricity (all end users) available at http://www.eia.doe.gov/cneaf/electricity/epa/epat7p4.html; gasoline (all grades) available at http://tonto.eia.doe.gov/dnav/pet/pet_pri_gnd_dcus_nus_a.htm; and heating oil (No. 2 fuel oil residential) available at http://tonto.eia.doe.gov/dnav/pet/pet_sum_mkt_dcu_SCT_a.htm.

regressive in that it would affect lower-income households proportionally more than higher-income households because the former spend a greater portion of their income on energy.[25]

A number of policy tools are available, however, to address such distributional impacts.[26] For instance, some of the revenue of a carbon tax could be used to compensate those industries or employees most affected by the tax. Compensation perhaps could take the form of tax adjustments for the most vulnerable sectors[27] or transitional unemployment assistance for workers in the most affected industries.[28]

To address regressive effects, some carbon tax revenue could finance an income tax credit equal to the first 1 or 2 percent of income devoted to purchasing energy. This policy could alleviate some of the initial impact of higher energy costs yet still preserve the incentive effect of the tax.[29] Alternatively, carbon tax revenues could be used to directly assist low-income households that might be adversely affected by a climate policy. For example, increasing the eligibility threshold for the Earned Income Tax Credit by 10 percent would cost approximately $46 billion over a ten-year period,[30] which is just under a quarter of the $208 billion raised by the Congressional Budget Office's carbon tax plan over the same time period.

Adjustments for nonfuel uses and carbon capture and storage

Another issue is that a carbon tax could unfairly penalize those uses of fossil fuels that do not emit CO_2 into the atmosphere. In some industries, fossil fuels are not combusted but are used as material inputs. For example, natural gas is often a feedstock for plastics and other chemicals. In addition, some energy companies are currently exploring methods to capture CO_2 emissions at power plants and sequester them underground. Such technologies would make it possible to use fossil fuels for electricity generation and still prevent emissions of CO_2 from entering the atmosphere.

Policymakers could design the carbon levy to avoid taxing such nonemitting uses of fossil fuel. For instance, the program could grant tax exemptions or offsetting credits for nonfuel uses of coal, oil, and natural gas. Similarly, authorities could provide tax credits for every ton of CO_2 sequestered through capture-and-storage techniques with adequate measurement and monitoring systems.[31] It is important to note, however, that any exemptions or credits may reduce the amount of revenue available for recycling.

V. Conclusions

An initially modest and gradually increasing economy-wide carbon tax could be an effective fiscal policy that simultaneously supports revenue-neutral federal tax reform initiatives, reduces CO_2 emissions over the long term, and promotes sound energy policies. A carbon tax would be relatively simple to administer and could generate very significant revenues. According to the Congressional Budget Office, a tax of $12 per MTC that gradually rises to $17 per MTC would generate $208 billion in revenue over a ten-year period. Such revenues could finance reductions in inefficient taxes on labor and investment. Furthermore, a carbon tax would dovetail sound tax policy with sound climate change policy. It would establish long term incentives throughout the United States to reduce carbon dioxide emissions with minimal disruption to the economy and could help improve the nation's long-term energy security.

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Notes

1. This paper is based on comments submitted by Duke Energy Corporation to the President's Federal Tax Reform Advisory Panel in April 2005. See Duke Energy Corporation, "Carbon Tax as an Element of Tax Reform Agenda," available at http://comments.taxreformpanel.gov/_files/ProposalforTaxReformDuke050429.doc. For an authoritative statement of Duke Energy's position on climate change policy, see http://www.duke-energy.com/company/ehs/policies/gcc/.
2. See http://www.taxreformpanel.gov/index.shtml.
3. The Energy Information Administration estimates that in 2004 the United States emitted 5.87 billion metric tons of carbon dioxide from fossil fuel combustion, indicating that the economy released 1.6 billion tons of carbon in fossil fuels. See Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2004* (Washington, DC: U.S. Department of Energy, 2005), figure ES1 and table ES3. Available online at ftp://ftp.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/ggrpt/057304.pdf.
4. For example, see Ian Parry, "Fiscal Interactions and the Case for Carbon Taxes over Grandfathered Carbon Permits," Resources for the Future Discussion Paper 03-46 (Washington, DC: Resources for the Future, 2003), available online at www.rff.org; L. A. Bovenberg and L. H. Goulder, "Neutralizing the Adverse Industry Impacts of CO_2 Abatement Policies: What Does It Cost?" in *Behavioral and Distributional Effects of Environmental Policy*, edited by C. Carraro and G. Metcalf (Medford, MA: Tufts University, 2002); M. Babiker, G. Metcalf, and J. Reilly, "Tax Distortions and Global Climate Policy," Report no. 85 (Cambridge, MA: MIT Joint Program on the Science and Policy Change, 2002); W. G. Gale and K. A. Hassett, *The Effects of Environmental Tax Shifting on U.S. Capital Formation* (Oakland, CA: Redefining Progress, 2000); J. M. Hammond et al., *Tax Waste Not Work: How Changing What We Tax Can Lead to a Stronger Economy and a Cleaner Environment* (Oakland, CA: Redefining Progress, 1997); Lawrence H. Goulder, "Environmental Taxation and the Double Dividend: A Reader's Guide," *International Tax and Public Finance* 157 (1996): 157–183; D. L. Jorgenson and P. J. Wilcoxen, "The Economic Effects of a Carbon Tax," in *Shaping National Response to Climate Change*, edited by Henry Lee (Washington, DC: Island Press, 1995); L. A. Bovenberg and R.A. De Mooij, "Environmental Levies and Distortionary Taxation," *American Economic Review* 84 (4) (1994): 1085–89.
5. For a primer on carbon taxes, see T. D. Dinan and R. Shackleton, *Limiting Carbon Dioxide Emissions: Prices vs Caps* (Washington, DC: Congressional Budget Office, 2005); R. Repetto et al., *Green Fees: How a Tax Shift Can Work for the Environment and the Economy* (Washington, DC: World Resources Institute, 1992). A carbon tax is different from a Btu tax, which was proposed by the Clinton Administration in 1993. The 1993 Btu tax would have applied to nearly all forms of energy (including nuclear and hydropower) based on the fuel's heat content, without regard to each energy source's different level of carbon and therefore without regard to its contribution, if any, to global climate change. In addition, the Btu tax was not designed to be revenue neutral; rather, it was intended to generate new revenues for deficit reduction.
6. Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2004.*
7. In 1997, 2,500 economists, including eight Nobel laureates, signed a statement calling for the application of market-based, mandatory broad-based policies to address global climate change. The statement reads in part: "The United States and other nations can most efficiently implement their climate

policies through market mechanisms, such as carbon taxes or the auction of emissions permits. The revenues generated from such policies can effectively be used to reduce the deficit or to lower existing taxes." See http://www.rprogress.org/publications/econstatement.html.

8. See Congressional Budget Office, *Budget Options* (Washington, DC: Congressional Budget Office, 2005). A carbon tax "would give the United States' entire economy an incentive to reduce carbon emissions" (338). It also would be possible to establish taxes for certain sources of the other greenhouse gases, including methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. For example, see Organisation for Economic Co-operation and Development (OECD), "The Potential for Using Tax Instruments to Address Non-CO_2 Greenhouse Gases: CH_4, N_2O, HFCs, PFCs, and SF_6" (Paris: OECD, 2000).
9. For example, see Hammond et al., *Tax Waste Not Work*; Ian Parry, "Revenue Recycling and the Costs of Reducing Carbon Emissions," *Resources for the Future, Climate Issues Brief no. 2* (Washington, DC: Resources for the Future, 1997), available online at www.rff.org; Congressional Budget Office, *Who Gains and Who Pays under Carbon-Allowance Trading? The Distributional Effects of Alternative Policy Designs* (Washington, DC: Congressional Budget Office, 2000); Congressional Budget Office, "Options to Cut Taxes," *CBO Memorandum* (Washington, DC: Congressional Budget Office, 2000); R. Repetto and D. Austin, *"The Costs of Climate Protection: A Guide for the Perplexed"* (Washington, DC: World Resources Institute, 1997).
10. Tim Hargrave, *U.S. Carbon Emissions Trading: Description of an Upstream Approach* (Washington, DC: Center for Clean Air Policy, 1998). Although this study examined a cap-and-trade program, its findings are generally applicable to a carbon tax. The study found that the regulation of 550 coal preparation plants plus 100 coal mines that do not use coal preparation plants would cover virtually all the coal used in the United States. The study also found that the regulation of 175 oil refineries and 200 refined product importers would cover virtually all the petroleum consumed in the United States. Finally, it found that the regulation of 150 natural gas pipelines and 725 processing plants (natural gas liquids) would cover virtually all the natural gas consumed in the United States.
11. Congressional Budget Office, *Budget Options* (Washington, DC: Congressional Budget Office, 2005).
12. References to particular proposed tax rates are offered for purposes of illustration only. Neither Duke Energy nor the World Resources Institute has taken a position on the most appropriate tax rates. Establishing appropriate carbon tax rate structures will require more policy dialogue with federal officials, analysts, and others.
13. This figure does not factor in possible reductions in fossil fuel consumption in response to the tax (i.e., the price elasticity of demand).
14. Congressional Budget Office, *Budget Options* (Washington, DC: Congressional Budget Office, 2005).
15. D. Burtraw and P. Portney, "A Carbon Tax to Reduce the Deficit," in *New Approaches on Energy and the Environment: Policy Advice for the President*, edited by R. Morgenstern and P. Portney (Washington, DC: Resources for the Future, 2004).
16. For example, see Parry, "Fiscal Interactions"; Bovenberg and Goulder, "Neutralizing the Adverse Industry Impacts of CO_2 Abatement Policies"; Babiker, Metcalf, and Reilly, "Tax Distortions and Global Climate Policy"; Gale and Hassett, *The Effects of Environmental Tax Shifting*; Hammond et al., *Tax Waste Not Work*; Goulder, "Environmental Taxation and the Double Dividend"; Jorgenson and Wilcoxen, "The Economic Effects of a Carbon Tax"; Bovenberg and De Mooij, "Environmental Levies and Distortionary Taxation."
17. Hammond et al., *Tax Waste Not Work*; Repetto et al., *Green Fees*.
18. G. Metcalf, "Tax Reform and Environmental Taxation," Working paper 11665 (Cambridge, MA: National Bureau of Economic Research, 2005). A carbon tax of $13 per metric ton is an estimate of the levy required to offset the forgone revenue of the "dividend exclusion prototype," or "DEP," approach to eliminating the double taxation of corporate dividends. Forgone revenue from the DEP in 2003 would have been $20.1 billion.
19. K. Hassett and G. Metcalf, *Environmental Taxes to Finance Capital Tax Reform* (Oakland, CA: Redefining Progress, 2001); Metcalf, "Tax Reform and Environmental Taxation."
20. The CBO estimates that eliminating the AMT would result in $582.5 billion of forgone revenue between 2006 and 2015 and that indexing AMT exemptions to inflation would cost $376 billion over the same time period. See Congressional Budget Office, *Budget Options* (Washington, DC: Congressional Budget Office, 2005).
21. For example, see Burtraw and Portney, "A Carbon Tax to Reduce the Deficit."
22. National Commission on Energy Policy, *Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges—Economic Analysis of the Commission Proposals* (Washington, DC: National Commission on Energy Policy, 2004).
23. Energy Information Administration, *Impacts of Modeled Recommendations of the National Commission on Energy Policy* (Washington, DC: Energy Information Administration, 2005).
24. The table is adapted from C. Hanson and D. Sandalow, *Greening the Tax Code* (Washington, DC: Brookings Institution and World Resources Institute, forthcoming).
25. Gilbert Metcalf, *A Distributional Analysis of an Environmental Tax Shift* (Oakland, CA: Redefining Progress, 1998). This distribution of impacts is shared by any broad-based climate policy, including a cap-and-trade program. See Congressional Budget Office, *Who Gains and Who Pays under Allowance Trading?*
26. James M. Poterba, "Tax Policy to Combat Global Warming: On Designing a Carbon Tax," in *Global Warming: Economic Policy Responses*, edited by R. Dornbusch and J. M. Poterba (Cambridge, MA: Massachusetts Institute of Technology, 1991). Poterba argues that "the distributional effects of the carbon tax do not appear insuperable. A combination of income tax and transfer policies could be used to neutralize the tax [impacts] for most households" (14).
27. Lawrence. H. Goulder, "Confronting the Adverse Industry Impacts of Carbon Dioxide Abatement Policies: What Does It Cost? *Resources for the Future, Climate Issues Brief no. 23* (Washington, DC: Resources for the Future, 2000), available online at www.rff.org.
28. J. Barret and J. A. Hoerner, *Clean Energy and Jobs: A Comprehensive Approach to Climate Change and Energy Policy* (Washington, DC: Economic Policy Institute, 2002); Goulder, "Confronting the Adverse Industry Impacts of Carbon Dioxide Abatement Policies."
29. Poterba, "Tax Policy to Combat Global Warming." This approach also is discussed in Goulder, "Confronting the Adverse Industry Impacts of Carbon Dioxide Abatement Policies."
30. Tax Policy Center, *Earned Income Tax Credit Options* (Washington, DC: Urban–Brookings Tax Policy Center, 2005), table T05-0241.
31. The tax system also could credit agricultural and forestry activities that sequester carbon dioxide.
32. Duke Energy supplies, delivers, and processes energy for customers in the Americas. Headquartered in Charlotte, NC, Duke Energy is a Fortune 500 company traded on the New York Stock Exchange under the symbol DUK. More information about the company is available online at http://www.duke-energy.com.

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The World Resources Institute is an environmental think tank that goes beyond research to find practical ways to protect the earth and improve people's lives. Our mission is to move human society to live in ways that protect Earth's environment and its capacity to provide for the needs and aspirations of current and future generations.

Our program meets global challenges by using knowledge to catalyze public and private action:

- *To reverse damage to ecosystems.* We protect the capacity of ecosystems to sustain life and prosperity.
- *To expand participation in environmental decisions.* We collaborate with partners worldwide to increase people's access to information and influence over decisions about natural resources.
- *To avert dangerous climate change.* We promote public and private action to ensure a safe climate and sound world economy.
- *To increase prosperity while improving the environment.* We challenge the private sector to grow by improving environmental and community well-being.

In all of its policy research and work with institutions, WRI tries to build bridges between ideas and actions, meshing the insights of scientific research, economic and institutional analyses, and practical experience with the need for open and participatory decision making.

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