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THE ROLE OF FEDERAL TAX INCENTIVES FOR EMERGING ENERGY TECHNOLOGIES

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The Environmental and Energy Study Institute hosted a Congressional briefing to examine the role and effectiveness of federal tax incentives in promoting emerging energy technologies. Tax policy plays an important role in shaping marketplace supply and demand, government priority setting, as well as private sector research and development investments. Traditionally, the U.S. tax structure has tended to support mature nonrenewable energy technologies while other nations have provided public sector support to enable fledgling renewable energy technologies to compete in the market, growing their nonrenewable energy sector significantly. While certain tax incentives and supports are already in place in the United States, the Clinton Administration's Climate Change Technology Initiative submitted for fiscal year 2001 builds on and expands these measures. The \$4 billion package would provide tax incentives to encourage the purchase of energy-efficient products and promote renewable energy while helping to reduce greenhouse gas emissions. The briefing evaluated the potential effectiveness of this particular proposal and also looked

at the measures included in the Energy Security Act, S.1833, introduced in the Senate in October 1999.

CLIMATE CHANGE TECHNOLOGY INITIATIVE

Leonard Burman introduced the tax incentives included in the Administration's proposed Climate Change Technology Initiative (CCTI) and discussed the changes from current policy. This is the second year that the Administration has proposed incentives to jump-start clean technologies. Burman explained that this year's package has been modified to incorporate feedback received from industry and Congress, "CCTI is central to the Administration's strategy to improve the environment and reduce energy consumption." The Administration feels strongly that increasing energy efficiency and expanding the fuel mix will serve multiple objectives, particularly helping the United States deal with the oil shortages being experienced now.

This briefing included discussion on six of the incentives included in the CCTI:

Energy Efficient Building Equipment

This year's initiative offers a 20 percent tax credit for energy-efficient building equipment, which includes credits of up to \$500 for fuel cells, up to \$500 for electric heat pump water heaters, and up to \$1,000 for natural gas heat pumps. Previously, there were no credits available for such purchases.

Energy Efficient New Homes

CCTI also includes a new tax credit for purchase of energy-efficient homes, which provides two levels

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- Leonard Burman, U.S. Treasury

PANELISTS

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of credit: 1) a \$1,000 tax credit for homes that are at least 30 percent more efficient than the standard, and 2) a \$2,000 credit for homes that are at least 50 percent more efficient than the standard. Burman pointed out that the "tax credits for energy efficient homes are very important because ... the bulk of U.S. greenhouse gases are associated with home heating and electricity consumption." Scott Sklar of Solar Energy Industries Association also emphasized that improving energy efficiency was of primary importance because the United States wastes the most energy in the world. Currently, there are no incentives in place to encourage the purchase of more energy-efficient homes.

Electric and Hybrid Vehicles

The package extends the tax credit currently available for electric vehicle purchases and adds a new tax credit for certain hybrid vehicle purchases. There is now a 10 percent tax credit available for qualified electric vehicles, up to a maximum of \$4,000, which begins to phase down in 2002 and is not available for vehicles placed in service after 2004. The proposed extension would make the credit available through 2006, without any phase down period. This year's initiative also includes a proposed credit of up to \$3,000 that would apply to purchases of qualified hybrid vehicles after December 31, 2002 and before January 2007. This credit includes a component that provides up to \$1,000 for vehicles with a regenerative braking system. Burman mentioned that both Toyota and Honda have introduced hybrid vehicles and it is anticipated that the tax incentives will encourage sales. He noted that these tax credits for clean vehicles are particularly crucial as cars, light trucks, SUVs, and minivans now account for 1/3 of greenhouse gas emissions in the United States, 20-40 percent of smog-forming emissions, and 40 percent of U.S. oil consumption.

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Electricity Generation from Wind and Biomass Sources

Current law allows taxpayers a 1.5 cent-per-kilowatt-hour credit for electricity produced from wind, "closed-loop" biomass, and poultry waste, for facilities placed in service before January 2002. The proposed credit would extend the deadline before which facilities must be in service in order to be eligible. It would also expand the definition of biomass sources open to the credit and modify the current policy to include a credit for facilities that co-fire coal and biomass. Burman explained that one of CCTI's main objectives this year is "to make biomass a viable competitor" in the energy market.

The "closed-loop" biomass covered under the current credit refers only to organic material from plants grown exclusively for producing electricity. Scott Sklar noted that no one has yet taken advantage of this credit because of the time it takes to grow plants specifically for this purpose. According to Sklar, by extending the credit to electricity produced by all organic matter, whether grown or waste material (which does not include unsegregated municipal solid waste or garbage), the proposal encourages the United States to take advantage of one of the most valuable renewable energy sources. He explained that the increased use of biomass would help to counter climate change by providing carbon sinks and keeping organic matter from biodegrading into methane. In addition, using dry forest undergrowth as a biomass fuel would help prevent forest fires, protect watersheds from organically-rich agricultural run-off, provide farmers with an alternative use for manure and keep landfills from reaching capacity by diverting waste. This year's package also helps landfills by extending a credit for electricity produced by the methane gas generated at landfills. Burman noted that landfills are the largest source of methane in the United States and explained that, as a greenhouse gas, methane is 21 times more powerful at trapping solar radiation and warming the earth than carbon dioxide. Sklar added that the provision extending a credit to co-firing plants that use at least 10 percent biomass in a coal biomass mix can be very beneficial by helping to build the infrastructure necessary to bring biomass into play on a larger scale.

Solar Energy Systems

This year's proposal modifies the current 10 percent credit available for commercial property owners on equipment that uses solar energy to generate electricity, to heat, cool, or provide hot water, or to provide direct solar process heat. The proposed change would offer a 15 percent credit for individuals and businesses for solar water heating systems and rooftop photovoltaic (PV) systems, providing up to \$1,000 for solar water heaters and \$2,000 for PV systems.

Distributed Power Property

CCTI, as proposed, would give distributed power property a 15-year depreciation recovery period and a 22-year class life. Distributed power property includes: 1) property used in generation of electricity for use in nonresidential real property or residential rental property used in the taxpayer's trade or business; and 2) property with total capacity in excess of 500 kilowatts used in generation of electricity in a taxpayer's industrial setting. Distributed power property may also be used to create thermal energy or mechanical power as part of the HVAC process.

COSTS AND BENEFITS

J. Andrew Hoerner, of the Center for a Sustainable Economy (CSE), offered a comprehensive assessment of these tax incentives based on a study he conducted with CSE colleague, Avery Gilbert. The original study, published in November 1999 to examine the first round of CCTI incentives, was revised in April to take the changes into account. Hoerner explained that the study was intended to help answer two questions: 1) are the proposed tax incentives a good use of taxpayer money, and 2) will they help achieve the goal of reducing carbon emissions and increasing energy efficiency.

The study used a "survey of experts" approach, incorporating feedback from 81 respondents, taken in equal part from government agencies, non-profit organizations, academia, and industry. The questionnaire asked respondents to project how price and quantity for the technologies targeted by the

proposed tax credits would be affected under three different scenarios: 1) if business continued as usual, without any particular supports; 2) if only a package of low-cost technology promotional policies were enacted; and 3) if both low-cost policies and the tax incentives were in place. The study concludes that for the tax credits to be effective, they must be part of "a larger policy effort to stimulate the targeted technologies." Therefore Hoerner and Gilbert did "not attempt to estimate the impact of the credit absent additional policies that help counter other types of barriers to the penetration of the technologies." Since there is not a specific package of promotional policies on the table, the questionnaire asked respondents to identify particular policy measures they felt would help support these technologies in the market. The most common recommendations were increased funding for research and development, elimination of fossil fuel subsidies, consumer education, and market transformation mechanisms.

Hoerner and Gilbert conducted cost/benefit analysis to determine whether the tax incentives would be a justified use of taxpayer money. While acknowledging that the analysis did not include all the benefits that increased use of the technologies might bring, they looked at a range of possible benefits, both environmental and non-environmental. In evaluating environmental factors, they weighed both benefits to the local environment from decreased air pollution and to the global environment through decreased carbon emissions. The non-environmental factors include immediate cost benefits generated by increasing consumer surplus for the products and technologies receiving the credit, as well as the longer-term "spill-over" benefits generated by overall efficiency improvements that "spill over" to raise the standards of other, closely related technologies and are enjoyed by producers or consumers who do not directly receive the credit. Hoerner noted that the spill-over benefits were particularly important in determining the potential impact of the credits since "energy efficiency improvement and benefits will not expire once the credits expire."

The costs used in the analysis included only the loss of public revenues. In the study, Hoerner and Gilbert point out that "a fuller cost accounting would include the cost, not only of the revenues themselves, but also of the economic distortion caused when those lost revenues are raised from other taxpayers."

The study concludes that overall, the CCTI can be justified on the basis of either the environmental or the non-environmental value alone. Further, that "for the package as a whole, and considering only direct effects, the benefit/cost ratio is nearly five to one. When spillover effects are included, that ratio climbs to seventeen to one." The non-environmental benefits actually exceeded the environmental benefits — in fact, all but the solar and wind/biomass credits, were found to be justified based solely on the associated non-environmental benefits. According to Hoerner, the non-environmental benefits that would accrue from 2000-2018 are eighteen times the cost of the credits. In terms of the environmental benefits, the study points out that the Climate Change Technology Initiative "is something of a misnomer" since its impact on reducing air pollution is actually greater. He also noted that the economic value of the local environmental benefits brought about by the credits was more than two times their cost. By enacting CCTI, the United States could reduce atmospheric carbon dioxide by up to 116 million metric tons by 2018 and by 523 million metric tons over the life of the equipment receiving the credit. The average cost per ton of carbon reduced through the tax credits is \$11, which is comparable to the \$14 – \$23 that the President's Council of Economic Advisors has estimated it will cost to reduce a ton of carbon-equivalent through international emissions trading.

Hoerner did acknowledge that the results are highly uncertain, especially given, as the study states, "that there is a wide range of policy conditions each technology could face and that these policy factors play a crucial role in determining the rapidity of market acceptance." He stressed the importance of taking into account the long-term benefits since most of the environmental and economic benefits accrue after the credits expire. Hoerner reiterated that other low-cost policies supporting the technologies must be enacted simultaneously in order to make the credits effective.

ROLE OF GOVERNMENT SUPPORT

Scott Sklar agreed that public policy support for emerging technologies is absolutely essential, especially if the United States wants to maintain a leadership role in these industries. He argued that "there is no such thing as a free market," explaining that currently, the United States spends billions of dollars supporting mature technologies in mature markets, while other countries pursue policy strategies that favor emerging technologies and ease their transition into the market. Japan spends \$1 billion every year on commercial incentives for use of photovoltaic cells as opposed to the U.S. commitment of \$92 million over 5 years. Germany spends \$600 million a year supporting PVs — this amount is spent on actual deployment of PV systems, not just for research and development. Sklar noted that the manufacturing of solar technology is currently a \$2 billion a year export industry in the United States, with 12 new manufacturers coming on-line in the last 3 years. But he argued that if these manufacturers do not find a growing domestic market, U.S. leadership will eventually erode. He warned that without adequate market supports for these

products, the United States could again fall victim to the "VCR-

syndrome" and end up importing the very technology it has created. He expressed hope that such tax incentives might help the United States sustain its currently growing wind technology. He concluded by saying that while the United States created and leads in most renewable energy technology development, whether or not it will commercialize these technologies will be largely a policy decision.

In order for tax credits to be effective they must be part of "a larger policy effort to stimulate the targeted technologies."

- J. Andrew Hoerner, Center for a Sustainable Economy

A CONGRESSIONAL PROPOSAL

Franz Wuerfmannsdobler provided the policymaker perspective, offering an overview of the measures included in the Energy Security Tax Act, S. 1833, introduced in the Senate last year. He emphasized that Members had worked on the legislation for a year and a half and that it was not just a response to the recent oil situation. They wanted to introduce a "comprehensive bill that addressed many different areas." The bill focuses on how energy is gathered, how it is developed, and how it is used at the endpoint. While many of the bill's provisions are similar to those in the Administration's proposal, Wuerfmannsdobler explained that S. 1833 seeks to incorporate a wider community to include a balance of end-users, producers, and distributors of energy resources. In addition to supporting the renewables sector, it offers incentives for coal-based stakeholders and the agricultural, steel, and oil and gas communities. For example, the bill includes an incentive for recovering and using the methane flared at coal-mines and for generating electricity from the steam produced as a by-product in steel-making.

The Act was introduced by Senators Daschle, Byrd, Baucus, Bingaman, Kerrey, and Inouye. Senator Bayh signed on to become an additional co-sponsor this past January. Wuerfmannsdobler said that these Members want to continue to educate the community on the importance of energy use and security. They want to get feedback and build support for the bill, and they intend to reintroduce it at the 107th Congress.

The briefing provided a comprehensive overview of the Climate Change Technology Initiative, the costs and benefits of such a proposal, and the role of public policy in supporting these emerging technologies. The United States has been a leader in research and development of energy efficient products and renewable energy sources, but has not been as successful in marketing and purchasing these technologies. As the panelists discussed, renewables and energy efficient products need public policy to provide incentives that will create a market for these emerging technologies and level the playing field with current fossil fuel energy technologies. The importance of public policy is three-fold: 1) to provide incentives to create a market for these technologies; 2) to inform the public of their benefits and costs and create demand for these technologies; and 3) to promote their importance in reducing greenhouse gas emissions. Regardless of whether climate change or CO₂ emissions is a real or relevant issue, it is important to incorporate renewables and energy efficient products into our energy policy and reduce our use of fossil fuels and their contributing emissions. Focusing on renewables and energy efficient technologies provides multiple benefits which are important to our present and future energy needs, including: reducing our dependence on foreign oil, improving our energy reliability, reducing energy consumption, reducing air emissions, and creating a better environment.

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