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Thank you for the opportunity to discuss the role of tax incentives in U.S. energy policy. This testimony discusses how tax incentives fit into an overall energy strategy, identifies some results of previous incentives, and provides a checklist of major issues affecting new tax policies for energy.

From 1993 to 2000, I headed the Energy Information Administration at the U.S. Department of Energy. At that time, I testified on many occasions before congressional committees on energy issues, including tax policies. Today, I am speaking as a private individual and certainly not on behalf of any past or current employers.

Current General Energy Policy

The major leg of our nation's energy strategy is allowing fuel selection, allocation, and pricing to be determined in competitive markets. This policy evolved in reaction to counterproductive attempts by the U.S. government to control the pricing and allocation of oil and gas during the 1970's and as part of a general trend around the world to less regulated markets. Utilization of market forces has been a corner stone of our energy policy with bipartisan support. President Carter and the Congress started the painful process of decontrolling oil prices in the late 1970's. President Reagan accelerated and expanded the effort. In recent years, changes in state and federal policy have expanded the role of markets in the electric industry.

Using the market to make decisions about energy doesn't, in many respects, look like a policy, because government plays a reduced role. In a pure market system, government doesn't set prices or pick "winners and losers." Despite a general commitment to market forces, however, many people ranging from energy producers to energy consumers still want the government to "do something" when prices get unusually low or unusually high or to show preferential treatment for a particular industry or technology.

As a second leg of energy policy, the U.S. sets environmental standards for energy producers and consumers. Most notably, stringent air pollution standards govern the activities of electric generators, automobiles, and oil refineries. Another part of the current energy policy includes restrictions on the areas where exploration and production of fuel are allowed in order to protect natural areas.

The energy crises of the 70's also stimulated several auxiliary policies, including the

- Strategic Petroleum Reserve,
- Research and development for new technologies,
- Efficiency standards for cars and appliances,
- Low-Income Energy Assistance,

- Weatherization of low-income housing,
- Better data systems to track energy trends, and
- Tax incentives.

The rationale for these programs was often based on considerations of national security, the environment, education of the public and disproportionate impacts of high prices on low-income people – factors often not fully reflected in market pricing. All of these policies continue in some form today, but have fallen short of their authors' goals. When energy appeared to be less of a problem over the past two decades, support for all of these auxiliary programs lagged.

In general, U.S. energy policy has worked well. Most of the time, U.S. prices are low by international and historic standards. Supplies have generally been ample. Many advocates now seem to assume the country suffers from chronic high fuel prices. The record suggests the opposite, however, witness the oversupply of oil and gas just a few years ago. With existing U.S. energy policy, we have also reduced the environmental Impacts from energy. Not every deadline of the Clean Air Acts has been met. Nonetheless, we removed lead from gasoline and reduced many forms of air pollution. Oil tankers are now double-hulled. These achievements have had costs but generally proven compatible with a low price environment.

Problems in Current Energy Policy

To say that existing energy policy works most of the time is not to say it works all of the time or in every respect. Attempts to improve U.S. policy must be based on clear diagnoses of what problems need attention. Three major shortcomings in current U.S. energy policy stand out.

Oil Imports

There are several ways to measure dependence on foreign oil. The U.S. imports over half its oil from foreign sources, and these levels are projected to reach 60 percent in the coming years. Imports were roughly a third of oil supplied when the 1973 oil embargo crippled our national economy. From this perspective, current and projected levels of imports are clearly serious issues, but major reductions in the levels of imports would still leave us vulnerable to the vagaries of the international oil market. If a goal of American energy policy has been to stop the growth in oil imports or achieve "energy independence," that goal has clearly not been achieved. Moreover, it would be extremely expensive to make a serious attempt to achieve it.

Oil imports are not exactly the same thing as vulnerability to supply interruptions, although the two are closely related. Increased U.S. oil production and reduced oil demand from more efficient automobiles would limit the economic damage from a cut off in delivery of foreign oil. However, neither would provide would provide the tools to rebalance oil markets quickly in the event of an unexpected interruption of supply. Rapid response to an interruption in oil supply is more likely to come from a petroleum reserve, some other source of "surge capacity," or the ability to make a sharp but temporary cut in demand.

Global Climate Change

Pursuant to the Rio Treaty of 1992, the United States adopted a policy of attempting to limit emissions of greenhouse gases -- most of which come from energy use – to 1990 levels. The Treaty and the Energy Policy Act of 1992 attempted to meet this goal through voluntary actions. This approach has produced some results but has generally failed to stem the growth in U.S. emissions, which actually accelerated in the 1990's. Based on current policies and economic trends, the Energy Information Administration projects emission levels in 2010 will be about 30 percent higher than in 1990. If the U.S. electricity demand justifies 1,900 new electric plants by 2020 rather than the 1,300 projected by EIA, the growth in greenhouse gases will also be

substantially higher than EIA estimates. Current U.S. energy policy does not attach a cost to the emission of greenhouse gases.

Price Volatility

In 1998, energy users enjoyed oil and gas prices well below the expected norm. Unfortunately for consumers, those low prices planted the seeds for today's high prices. In response to low prices,

- Some small producers found it uneconomic to continue operations,
- Drilling for new supplies of oil and gas slowed significantly across the world,
- An increasingly disciplined Organization of Petroleum Exporting Countries cut back on production to force prices to higher levels, and
- Economic incentives to use energy efficiently were reduced.

Together, these trends led from conditions of over supply (a buyer's market) to under supply (a seller's market) in world and domestic markets.

Recent high prices have already led to some market corrections and could even lead to a sharp fall in prices at some future point. Natural gas markets have produced the most striking signs of turnaround. American consumers and producers have substantial experience over the years with wild swings in oil prices. Such volatility is like to become more evident for natural gas and electricity, as those industries become less regulated.

Volatility in energy costs has serious ramifications. Small producers on thin margins find it difficult to secure financing to get through the rocky periods of low prices. On the other side, consumers can't budget accurately for energy costs during price spikes. During periods of high prices and low inventories, energy markets can be thrown into turmoil by otherwise solvable problems like breakdowns in refineries or transportation systems. Californians faced interruptions in electric service when national gas prices soared nationally, pipeline problems further aggravated gas supplies for the state, reduced precipitation limited supplies of hydropower, and a regulatory scheme allowed wholesale prices to exceed retail prices.

Although prices fluctuate greatly for most commodities, cyclical swings can be more serious for energy. Energy users have limited options for short-term substitutions. That is, if oil prices jump, motorists can't suddenly put coal in their tanks. Most energy producers cannot bring on new supply quickly, given the lag times between investments, drilling, and production. Moreover, it's reasonable to suspect than growing affluence increases the severity of price swings. As personal disposable incomes rise, it likely takes larger price signals to trigger a demand response to low supplies of energy. Addressing these problems could involve providing incentives for counter cyclical behavior in energy markets.

New initiatives in energy policy should focus on dealing with identified weaknesses in current policy. These would include continued vulnerability to interruptions in foreign oil supplies, lack of progress in limiting emissions of greenhouse gases, and wild swings in energy inventories and prices. In creating or adapting energy policies, care should be taken to avoid cures that are worse than the disease.

Role of Tax Incentives

Tax incentives have been part of previous energy programs, and the current energy debate has produced proposals for many new ones. Given the difficulties of forecasting, it's often difficult to know in advance what the actual impacts of these proposals would be in the market.

One way of evaluating such proposals is to use government modeling systems, such as those found at the Treasury Department and the Department of Energy's Energy Information Administration (EIA). There is an ample public record of EIA's analyses of previous tax proposals. Moreover, EIA can do special studies at the request of congressional committees. While economic models have many limitations, they can provide better guidance than speculation or the pleadings of advocates.

Another way of looking at tax proposals is to examine the historical record of energy tax incentives. Since the energy crises of the 1970's, the Congress has established numerous tax incentives for energy supply and consumption. The track record of these efforts provides some guidance on how future incentives might work.

Over time, many tax incentives have had little or no impact on energy markets. In most cases, the economic and technical forces at work in the energy system have too much momentum to be influenced greatly by government tax incentives, unless the latter are particularly large or well designed.

Several tax incentive programs, however, have had clear impacts. Examples include:

- U.S. reserves of coal-bed methane roughly tripled from 1989 to 1999, by which time these reserves accounted for 8 percent of all U.S. dry natural gas reserves. The Alternative Fuel Production Credit applied to a number of "nonconventional" fuels. Coal-bed methane, however, has been the major beneficiary of the program, has helped the U.S. meet rising demand for gas, and stands as a major example of a successful incentive program.
- The Federal tax code contains four overlapping tax incentives for the use of ethanol as transportation fuel, including its use as a blending fuel in gasohol. With the help of these incentives and various other state and federal policies, U.S. ethanol production, with corn as the primary feedstock, reached 1.5 billion gallons in 1999. Even at this level of production, ethanol constitutes only about 1 percent of U.S. consumption of transportation fuels.
- The Deep Water Royalty Relief Act (1995) provided incentives for exploration and development of the deep waters of the Gulf of Mexico. After the start of the royalty relief program, leasing in the deepwater Gulf increased dramatically, more than tripling between 1995 and 1997. It is less clear whether this effort helped slow the overall decline in domestic production somewhat or simply attracted oil investments away from other projects.

Others examples could be given of tax incentives that have made a difference in energy markets and those than haven't. On the whole, tax incentives have not been a dominant force in U.S. energy policy, but they have had some influence.

Using Incentives to Spur New Technology

An argument often made is that tax incentives are needed to promote new technologies with promise but unable to compete against established technologies. A review of the historical record and modeling exercises suggest a number of issues that should be kept in mind during debates about specific tax proposals.

Cost. The costs of tax incentive programs can be significant, out of necessity to achieve the objective or because of poor planning. The $1 billion Alternative Fuel Production Credit was the largest energy-related tax credit in 1999 on an outlay equivalent basis. This tax expenditure reached that level because the credit was utilized to build a strong coal-bed methane industry. Costs can sometimes exceed estimates, as illustrated by Arizona's 30 percent rebate of the purchase price of a vehicle that could run on alternative fuel. Passed in April of last year with an estimated price tag of $3 million to $10 million, costs grew to about $600 million by November, when the state stopped the program.

U.S. energy systems constitute a large part of the national economy and generally cannot be changed with small programs. Trying to deal with major energy issues like oil imports or emissions of greenhouse gases with tax incentives would be very expensive indeed.

Designing programs with low costs has different hazards. Low costs often result, because people don't find incentives sufficient to change behavior, leaving them unutilized. In these cases, programs have little impact. In recent years, most proposals for tax incentives have been modest compared to, for instance, the solar tax credit of 40 percent in place from 1978 to 1985.

Duration. To limit budget impacts in out years, it has become popular to propose tax incentives that are temporary. The periods specified are often unrealistically short. For many new technologies, it takes several years to make new products available to take advantage of new tax programs. By the time suppliers and consumers are prepared to deal with the new program, it may be reaching its scheduled termination. Legislators may intend to extend incentives, but this intent may not be sufficient for those who finance projects.

Free Riders. Analysis of previous proposals suggests some incentives wouldn't be sufficient to stimulate many new purchases of energy efficient equipment. They would, however, provide substantial payments to people who would have bought the equipment anyway. This happens most frequently when certain states already mandate alternative fuels for electric generation or transportation. The major impact of such "incentives" is to pay people for what they are going to do anyway.

Credibility. The Tax Reform Act of 1986 and occasional delays in renewing tax incentives has undermined the credibility of federal attempts to change energy markets with tax policy, since that policy is always subject to change. Introducing new energy technologies involves large and sustained capital investments. Since the reliability of the federal government's retaining announced incentives remains in question, long-term investments based on tax policy will always carry extra risk.

Market Readiness. The success of tax incentives depends how close the new technologies are to being market ready, a judgment on which experts often differ. As the coal-bed methane story shows, sometimes, markets are ripe for taking a new direction. However, many other technologies have not met the optimistic estimates of their advocates. On the other hand, technologies that are "too ready" can create free riders or the runaway Arizona program for alternative fuels.

Picking Winners and Losers. Some people argue that once the government has set environmental and other parameters, it shouldn't try to select the winning and losing technologies. Others argue that certain technologies have special strategic importance or potential and deserve extra support.

Complexity. Incentives aimed at individual consumers may suffer from the difficulty of becoming aware of what's available and making the calculations to claim them. There can also be ambiguities about whether new technologies are covered under previously passed legislation. As a result, many incentives need periodic updating and public education programs to be clear and effective.

Relevance. Some burden of proof could apply to proposed tax incentives for energy to show they'd likely help alleviate the problems not well addressed by current energy policy -- dependence on foreign oil, greenhouse gas emissions, or price volatility for oil, gas, and electricity. It is difficult, for instance, to see much connection between many proposed tax incentives and efforts to reduce the volatility of energy prices – the direct reason for most of the current energy discussion. One exception may be the proposal to base Section 613A language for small refineries on average production rather than production on a single day. Putting a single day cap on refineries would seem to discourage the surge production needed when supplies are tight.

Tax Incentives for Fuel Cell and Hybrid Vehicles?

The Administration's energy strategy released in May contained a proposal to provide temporary income tax credits for the purchase of new hybrid or fuel-cell vehicles, one of the major specific proposals for reducing energy demand. In the absence of a comprehensive analysis of all the incentives proposed, a look at this one shows some of the potential and the hazards in using tax incentives to achieve the goals of energy policy.

Vehicles powered by fuel cells are unlikely to become available in significant numbers soon enough to take advantage of this proposal. However, electric-hybrid cars obtaining power from batteries and small internal combustion engines have already entered the market. Honda and Toyota are currently selling hybrids called Insight and Prius. Unlike all-electric cars, hybrids are easily used within the current energy Infrastructure, because they don't need external recharging. With efficiency gains from advances like regenerative braking, they have ranges between fueling far exceeding those of traditional cars and combine substantial fuel savings with good performance. This appears to be an area where tax incentives could accelerate penetration of an emerging technology and help meet strategic and environmental goals by reducing the consumption of gasoline.

The Bush proposal is similar to one initiated by President Clinton in his 1999 Climate Change Technology Initiative in 1999 and modified in his budget submission for FY2001. In April of 1999, I testified before the House Science Subcommittee on Energy and Environment on likely impacts of the first version of the Initiative. At the request of the House Committee on Government Reform, EIA analyzed the revised proposal in a report released in April of 2000. This previous work by EIA furnishes some existing estimates on possible impacts of several proposals for tax incentives for energy technologies, including those for hybrid cars.

In its April, 2000 report, EIA estimated that with the tax incentives the sale of hybrid vehicles would reach 315,000 by 2005, as opposed to 239,000 without the credits. In 2010 (by which time the credits would have terminated), sales would reach 768,000, compared to 627,000 in the base case. Acknowledging that such projections are only estimates, it still seems clear that such incentives would encourage the purchase of some additional hybrid vehicles and, because of the detailed specifications in the proposal, would probably encourage the fleet of hybrids to be even more fuel efficient. However, benefits would also go to cars that would have come on

the market anyway, and the overall impacts on the total consumption of gasoline would be modest.

Why isn't there a bigger effect on consumer decisions?

- First, current makers of hybrids sell them a sizeable loss, which masks the fact they cost substantially more to make than equivalent traditional vehicles. Even though the cost differences will narrow over time, the incentives provided in the package analyzed by EIA were probably not big or long enough to have a great impact on consumer choice.
- Second, although hybrids can in most respects equal and in some cases exceed the performance of traditional vehicles, they also require some compromises, such as the need to find space for the battery.
- Third, the vehicle fleet turns over slowly, so it takes a sustained effort over a substantial period to affect the characteristics of the overall stock of vehicles.

There is perhaps a bigger concern than any discussed in the EIA report – unintended consequences if manufacturers continue to use the Corporate Average Fuel Efficiency (CAFE) standards as a ceiling as well as a floor. If manufacturers offset increased sales of high-mileage hybrids with sales of low-mileage vehicles, they can continue meeting current mileage standards for new car sales. As a result, the net impact of hybrids on reducing the consumption of gasoline is unknown and could prove minimal. Historical precedents suggest this concern may be well founded. During the 1990's, a number of advanced technologies, including advanced aerodynamics and four-valve per cylinder engines, made new vehicle fleets more efficient. Yet average vehicle mileage did not improve, because efficiencies were used to increase vehicle weight and acceleration, not to improve fuel consumption.

If the intent of the vehicle tax credits is to reduce dependence on foreign oil or cut back on the growth in greenhouse gas emissions, the results could be limited and the "free riders" could be numerous. Such credits may be more effective as a way of helping manufacturers meet higher mileage standards resulting from an updating of CAFE than as a stand-alone policy.

The EIA report also covers proposed tax incentives for energy-efficient building equipment, energy-efficient new homes, rooftop solar equipment, distributed power property and renewable electricity generation. This analysis should be considered in the Committee's current deliberations, with the understanding that all forecasts are subject to revision and that proposals with different levels and durations would produce different results.

Summary

It is always difficult to project the future impacts of proposed tax incentives for energy. If the guidance of history and various energy models is correct, some will have the desired effects, and many will not. As proposals come forward, it's important to subject all of them to vigorous analysis, no matter how good they sound, and to examine how they relate to other strategies that might be adopted. Such an effort increases chances for success and reduces the likelihood of unintended consequences.