
The United States' Experience with Energy-Based Tax Incentives: The Evidence Supporting Tax Incentives for Renewable Energy

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Developing sustainable markets for renewable energy technologies presents complex challenges—financial, institutional and informational obstacles impede their advancement. Policy makers have often utilized tax incentives in dealing with challenges like these.¹ For almost ninety years, the United States has granted tax incentives, direct subsidies, and other support to the energy industry in an effort to enhance U.S. energy supplies. Historically, these incentives targeted only the fossil fuel industries—oil, gas, and coal. Since the late 1970s, however, Congress has also enacted incentives to encourage investment in the development and production of alternative and renewable energy sources. In fact, tax incentives dominated energy policy legislation in 2005.² Studies evaluating the effectiveness of these tax incentives, both for conventional energy sources and alternative energy technologies, vary in their conclusions.³ This paper draws upon those studies and appraises the use of tax incentives to stimulate alternative fuel sources, renewable and nonrenewable, ultimately concluding that policy makers should use criteria developed to assist in designing tax incentives to

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1. Incentives are typically used (1) to promote a new technology during the early stages of development and (2) to pay the differential between the value of an activity to the private sector and its value to the public sector. See BRUCE W. CONE ET AL., AN ANALYSIS OF FEDERAL INCENTIVES USED TO STIMULATE ENERGY PRODUCTION, at EXECUTIVE SUMMARY 7 (1978); SALVATORE LAZZARI, CRS REPORT FOR CONGRESS, ENERGY TAX POLICY: AN ECONOMIC ANALYSIS, at Summary (2005) [hereinafter LAZZARI, ECONOMIC ANALYSIS].

2. See Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (2005) (codified as amended in scattered sections of 26 U.S.C.). This legislation is the most significant energy policy legislation since 1992 and took many years to accomplish.

3. As an economic good, fossil fuels differ from other commodities in three ways which may call for government intervention in the market: (1) fossil fuels are a depletable resource; (2) fossil fuel consumption produces adverse environmental impacts; and (3) energy is a major factor in our economy such that disruptions to the energy market have macroeconomic impacts. See LAZZARI, ECONOMIC ANALYSIS, *supra* note 1, at 6.

promote the development of renewable fuel sources and reduce the United States' dependence on fossil fuels.

Early empirical studies of the impact of oil and gas tax incentives on resource allocation consistently concluded that these special provisions allowed the petroleum industry to maintain a higher level of private investment than it would have absent these policies.⁴ However, early cost-benefit analyses of these tax incentives were inconclusive. The earliest studies focused on the petroleum industry's rate of return on investment as compared to other industries. They reveal that tax incentives substantially increased the petroleum industry's rate of return, but they provide little information regarding the correlation between such incentives and the level of investment in oil and gas.⁵ A later study by the United States Treasury Department concluded that the annual cost of the percentage depletion deduction, \$1 billion per year for the fossil fuel industries,⁶ far exceeded the annual additions to oil and gas reserves (\$150 million) during the 1960s.⁷

Moreover, these incentives have not resulted in conservation of the oil and gas reserve, nor have they decreased U.S. security concerns associated with foreign imports, two of the chief justifications advanced for such incentives. The General Accounting Office stated that "developing alternative fuels, increasing fuel efficiency in transportation, and continuing development of the Strategic Petroleum Reserve" would likely increase U.S. energy security more than additional oil and gas tax incentives.⁸ Despite this spotty data, the United States continues its questionable practice of investing billions of

4. See James C. Cox & Arthur W. Wright, *The Cost-effectiveness of Federal Tax Subsidies for Petroleum Reserves: Some Empirical Results and Their Implications*, in *STUDIES IN ENERGY TAX POLICY* 177, 192 (Gerard Brannon ed., 1975) (finding that special tax provisions induced the petroleum industry to maintain larger investments in proved reserves).

5. See HAROLD F. WILLIAMSON, ARNOLD R. DAUM & GILBERT C. KLOSE, *THE AMERICAN PETROLEUM INDUSTRY: THE AGE OF ENERGY 1899-1959*, at 334-35 (1963) (outlining an FTC study that calculated the rate of return for oil companies between 1922-1926).

6. See *infra* Part I.A (explaining the function of the percentage depletion deduction and its effects on the petroleum industry).

7. RICHARD B. MANCKE, *THE FAILURE OF U.S. ENERGY POLICY* 87 (1974). Volumes of crude oil placed in underground storage are not considered proved reserves. However, the Strategic Petroleum Reserve (SPR) includes such underground reserves, and was created to diminish the impact of disruptions in petroleum supplies. In 1975, Congress authorized the SPR of up to one billion barrels of petroleum supplies. These petroleum stocks are to be maintained by the federal government for use during periods of major supply interruptions. See also ENERGY INFO. ADMIN., *PETROLEUM DATA, REPORTS, ANALYSIS, SURVEYS*, http://eia.doe.gov/oil_gas/petroleum/info_glance/petroleum.html (last visited Aug. 6, 2006).

8. U.S. GEN. ACCOUNTING OFFICE, *GAO/GGD-90-75, TAX POLICY: ADDITIONAL PETROLEUM PRODUCTION TAX INCENTIVES ARE OF QUESTIONABLE MERIT 4* (1990) [hereinafter GAO, QUESTIONABLE MERIT].

dollars to facilitate exploration and production of fossil fuels. At a minimum, the government's investment in the fossil fuel industries must be reconceived as a transitional tool to be combined with increased investment in new energy sources.

Studies evaluating the effectiveness of tax incentives in stimulating the alternative fuel technology industry confirm that such incentives, or equivalent measures, are necessary to the industry's development. Entering into the current energy industry with its deeply entrenched fossil fuel infrastructure presents potential investors in alternative and renewable fuels with difficult barriers. Without federal tax incentives, which make prices competitive with conventional fuels, no markets would exist for alternative energy sources like alcohol fuels, and the result is no capital.⁹

Alternative energy sources have the potential to reduce petroleum consumption, reduce greenhouse gas emissions, and produce significant energy savings. To date, however, their limited use has not had a significant impact on the environment. Even with increasing purchases of alternative fuel vehicles by federal agencies, state governments, and private consumers, "alternative fuel use in the transportation sector remains very small."¹⁰ Nor have alternative energy sources been effective in increasing the supply of oil reserves or reducing dependence on foreign imports. As long as fossil fuels remain relatively inexpensive, alternative energy industries will not be competitive. The United States must eliminate fossil fuel subsidies and invest in renewable energy before any real gains will be realized.

Tax incentives, if properly structured, can play a valuable role in moving the United States toward a sustainable energy future. A detailed analysis of the effectiveness of energy tax incentives reveals a number of guiding principles that should be used in formulating tax incentives to promote alternative energy sources. For example, tax incentives should stimulate the commercialization of advanced technologies. Such incentives must be substantial enough in the initial stages of the subsidy to overcome barriers to entry into the market. Concomitantly, tax incentives should target technologies where the initial equipment cost to either the supplier or the consumer presents the major barrier.¹¹ Governments also must remain flexible in terms of

9. See U.S. GEN. ACCOUNTING OFFICE, GAO/GGD-97-41, TAX POLICY: EFFECTS OF THE ALCOHOL FUELS TAX INCENTIVES 10 (1997) [hereinafter GAO, ALCOHOL FUELS TAX].

10. See U.S. GEN. ACCOUNTING OFFICE, GAO-01-957T, ALTERNATIVE MOTOR FUELS AND VEHICLES: IMPACT ON THE TRANSPORTATION SECTOR 1 (2001) [hereinafter GAO, IMPACT].

11. S. GOUCHOE, V. EVERETTE & R. HAYNES, CASE STUDIES ON THE EFFECTIVENESS OF STATE FINANCIAL INCENTIVES FOR RENEWABLE ENERGY at x (NREL, Sept. 2002) (NREL/SR-

which industry players receive incentives and should allow adequate time before phasing out such incentives. Finally, tax incentives must form part of a mix of policy initiatives and work in complementary fashion with other strategies.

Part I of this paper considers the use of tax incentives to promote the fossil fuel industry in its early stages of development. Because many of the same tax incentives are still in effect today, their continued efficacy is likewise discussed, as is the impact of newer tax incentives designed to stimulate fossil fuel production at the margins. Part II describes the use of “environmentally friendly” tax incentives. This part discusses existing, proposed, and expired tax incentives that target renewable and alternative energy sources. Part III considers lessons to be learned from the U.S. government’s long history with energy tax incentives. The analysis focuses on the effectiveness of various tax incentives and identifies features that correlate positively with the goals of stimulating technology, encouraging investment, and increasing public acceptance of energy subsidies. The United States’ experience in subsidizing the fossil fuel industries provides the background for considering options in the shift to renewable energy technologies. In addition, this part critiques the interplay between incentives supporting fossil fuels and incentives encouraging alternative energy sources. Finally, Part IV concludes with a set of standards for facilitating the development of tax incentives and providing cost-effective alternative and renewable fuels with the greatest return on the government’s investment. Given that fossil fuels provide more than eighty-six percent of the United States’ energy supply, this process is essential.¹²

I. THE USE OF TAX INCENTIVES TO ENCOURAGE THE DEVELOPMENT OF THE FOSSIL FUEL INDUSTRY

The federal government has used tax incentives to effect social, economic, and political goals since the inception of the income tax. The use of such targeted tax incentives violates principles of tax neutrality when they deviate from the generally accepted structure of an income tax.¹³ In essence, such tax incentives implement government policy

620-32819).

12. ENERGY INFO. ADMIN., 2004 ANN. ENERGY REV. REP., DOE/EIA-0384, at Table 1.1 [hereinafter 2004 ANNUAL ENERGY REVIEW].

13. For example, the matching principle used in financial accounting is a starting point for the determination of net income for tax purposes. The matching principle requires that net income be measured by offsetting revenues with those expenses that generated that revenue. Therefore, the immediate write-off of a capital expenditure that is expected to generate revenue over a number of financial periods would violate the matching principle. See Charles O. Galvin, *The “Ought”*

apart from any revenue-raising impact, which is the purported function of the tax system. The advent of the tax expenditure budget in the 1970s forced policy makers to quantify these “tax subsidies,” thereby increasing their transparency.¹⁴

Since the early stages of the fossil fuel industry’s development, the federal government has implemented tax incentives to promote the industry. Federal incentives targeting the energy industry have been justified on several grounds: (1) to encourage oil and gas production and exploration during the initial stages of development; (2) to compensate for the value differential of an activity between the private sector and the public sector;¹⁵ and (3) to overcome the risks and hazards associated with producing oil and gas.¹⁶

At the turn of the twentieth century, when the exploration and development of fossil fuels was in its infancy, policy makers began to realize the amazing possibilities that fossil fuel energy afforded. Petroleum, in particular, seemed to be the perfect fuel. The federal government soon began investing in technologies designed to exploit this burgeoning energy source. Since the early 1900s, federal tax incentives have constituted part of that investment.

As American dependence on fossil fuel-based technologies, such as cars and electricity, increased, so too did Congress’s use of tax incentives to encourage exploration and development in the oil and gas industry. Arguing that the United States must do all it can to encourage the search for more oil, including more tax incentives, one 1958 government article, written by an official at the Pure Oil Company in Chicago, stated, “A large part of the credit for the high standard of living in the United States may be attributed to a healthy oil industry. It not only provides employment to millions of people directly, but it is one of the largest customers of . . . other industries which employ additional millions merely to keep the oil industry supplied.”¹⁷

By the early 1970s, the federal government realized that the domestic supply of oil was fixed and relatively determined while the nation’s increasing demand for oil showed no signs of slowing. The justification for continued fossil fuel tax incentives had changed from support for a

and “Is” of Oil-And-Gas Taxation, 73 HARV. L. REV. 1441, 1443–44 (1960). See also LAZZARI, ECONOMIC ANALYSIS, *supra* note 1, at 6–7 (discussing the neutral income tax system).

14. Stanley S. Surrey, *Tax Incentives as a Device for Implementing Government Policy: A Comparison with Direct Government Expenditures*, 83 HARV. L. REV. 705, 730 (1970).

15. CONE ET AL., *supra* note 1; LAZZARI, ECONOMIC ANALYSIS, *supra* note 1, at 8.

16. F. J. Blaise, *What Every Tax Man Should Know About Percentage Depletion*, TAXES, June 1958, at 395, 397; LAZZARI, ECONOMIC ANALYSIS, *supra* note 1, at 12.

17. Blaise, *supra* note 16, at 399.

fledgling industry to price support for American fuel demands.¹⁸ The next two sections discuss those tax incentives used to promote the energy industry, their justifications, and their effectiveness.

A. The Percentage Depletion Allowance and Intangible Drilling Costs

For almost 100 years, two very important tax incentives have been available for businesses that explore for and produce oil and gas: (1) the percentage depletion allowance and (2) the deduction for intangible drilling costs. Similar to depreciation of a tangible asset, the depletion allowance provides for cost recovery of an owner's mineral investment.¹⁹ Such cost recovery recognizes the wasting nature of the mineral deposit as it is extracted from the ground. Typically, the purchase price of the property, discovery costs, and development costs are included in the capital costs of the mineral investment. Two methods of depletion are allowable: cost depletion and percentage depletion.

A taxpayer using cost depletion recovers the actual costs of his or her mineral investment over the deposit's producing life based on the amount of the mineral extracted each year.²⁰ Cumulatively, cost depletion deductions cannot exceed the original capital investment. Congress adopted percentage depletion²¹ to encourage exploration and production activities. Under percentage depletion, taxpayers are permitted to deduct a fixed percentage of the gross value of annual production.²² Percentage depletion is computed without regard to the taxpayer's actual investment in the property. As a result, cumulative percentage depletion deductions can exceed the original investment costs. If the value of the mineral deposit exceeds the original cost of the investment, percentage depletion affords the investor a bigger tax deduction, and thus a

18. A 1978 report analyzing such incentives concluded that subsidies for the fossil fuel industry fell under the second rationale. See CONE ET AL., *supra* note 1 (summarizing rationales behind energy incentives).

19. See U.S. GEN. ACCOUNTING OFFICE, PETROLEUM AND ETHANOL FUELS: TAX INCENTIVES AND RELATED GAO WORK 5 (2000) [hereinafter GAO, REPORT 2000].

20. See *id.* See also STEPHEN L. McDONALD, FEDERAL TAX TREATMENT OF INCOME FROM OIL AND GAS 9 (1963) (demonstrating the cost depletion mechanism).

21. Percentage depletion replaced discovery value depletion because of the difficulty in determining discovery value of wells. Congress believed that percentage depletion, intended to approximate discovery value depletion, would be more administratively feasible. McDONALD, *supra* note 20, at 15. See JOINT COMMITTEE ON INTERNAL REVENUE TAXATION, PRELIMINARY REPORT ON DEPLETION 4 (1929), reprinted in 117 UNITED STATES REVENUE ACTS OF THE U.S. 1909-1950, THE LAWS, LEGISLATIVE HISTORIES, LAW & ADMINISTRATIVE DOCUMENTS Vol. 1, pt. 8, at 3 (ed. Bernard Reams, 1979).

22. Treas. Reg. § 1.613-1 (amended 1992).

significantly reduced tax rate based on successful production.²³ Moreover, taxpayers taking percentage depletion deductions may also take additional deductions from gross income of nearly all of the actual exploration and development costs.

In addition to percentage depletion, taxpayers may immediately deduct their intangible drilling and development costs (IDCs).²⁴ IDCs typically include labor, fuel, hauling, power, materials, supplies, tool rentals, drilling equipment repairs, and other items incident to and necessary for drilling and equipping productive wells.²⁵ Unlike similar costs in other businesses, these costs do not have to be capitalized. In addition, the costs associated with a nonproductive well or “dry hole” (which make up about eighty percent of all wells drilled) are also deductible when incurred and can offset other sources of income.²⁶ If the taxpayer chooses to capitalize these costs, they can be recovered through depletion or depreciation deductions.²⁷ The percentage depletion allowance and the intangible drilling cost deduction account for the most significant federal investment in the fossil fuel industry.

B. Other Tax Incentives for the Oil and Gas Industry

As the United States began to deplete its oil reserves, fossil fuel incentives necessarily targeted technologies developed to extract petroleum under harsher conditions. Since the 1970s, Congress has added new tax incentives to foster exploration and development of more marginal oil resources, while scaling back on the percentage depletion and IDC deductions. Large revenue losses associated with percentage depletion and IDC deductions made them harder to justify in light of budget deficits and longstanding economic arguments against them.²⁸

The provisions described in this section subsidize the cost of producing petroleum that is more difficult to extract. Though the effect of these provisions has been more limited, they demonstrate the federal

23. See MCDONALD, *supra* note 20, at 12–13 (documenting 1926 legislation that led to this result).

24. I.R.C. § 263(c); MCDONALD, *supra* note 20, at 15.

25. Treas. Reg. § 1.612-4(a) (1965).

26. Treas. Reg. § 1.612-4(b)(4) (1965); see SALVATORE LAZZARI, CRS ISSUE BRIEF FOR CONGRESS: ENERGY TAX POLICY, at CRS-3 (2005) [hereinafter LAZZARI, CRS].

27. Treas. Reg. § 1.612-4(b); GAO, REPORT 2000, *supra* note 19, at 8; MCDONALD, *supra* note 20, at 10.

28. See LAZZARI, CRS, *supra* note 26, at 2. For example, the current tax treatment of oil and gas producers, which permits many special tax deductions and credits, departs from neutral tax treatment because of the subsidy effect of the tax incentives. See LAZZARI, ECONOMIC ANALYSIS, *supra* note 1, at 6–7 (comparing tax treatment of mineral producers to other industries).

government's continued policy in favor of fossil fuels, and they undercut the effect of scaling back percentage depletion and IDC deductions.

1. Tax Credits for Nonconventional Fuels and Enhanced Oil Recovery Costs

As part of the Crude Oil Windfall Profit Tax Act of 1980,²⁹ Congress authorized producers of certain qualifying fuels from nonconventional sources, including some oil and gas, to claim a tax credit equal to \$3.00 (in 1979 dollars) per barrel or Btu oil barrel equivalent.³⁰ Qualifying fuels include: (1) oil produced from shale and tar sands; (2) gas produced from geopressured brine, Devonian shale, coal seams, a tight formation, or biomass;³¹ and (3) liquid, gaseous, or solid synthetic fuels produced from coal.³² To qualify for the credit, the fuel must be produced domestically from wells, mines, or plants placed in service prior to July 1, 1998 (for coal and biomass), or December 31, 1992 (for all other facilities and wells). For most fuels, the section 29 credit has expired, except for certain biomass gas and synthetic fuels sold before January 1, 2008. Adjusted for inflation, this credit was \$6.56 per barrel of liquid fuels in 2004.³³ As discussed below, Congress expanded and extended this credit in 2005.

Since 1990, taxpayers have been able to claim a credit for qualified tertiary oil recovery costs³⁴ incurred in the production of oil and gas on domestic projects.³⁵ Through this credit, Congress hoped to extend the lives of older wells with higher marginal production costs. Taxpayers are allowed to claim a general business credit equal to fifteen percent of

29. Crude Oil Windfall Profits Tax Act of 1980, Pub. L. No. 96-223.

30. See GAO, REPORT 2000, *supra* note 19, at 10. See also I.R.C. § 45K(d)(2)(B) (2006); Crude Oil Windfall Profits Tax Act.

31. See GAO, REPORT 2000, *supra* note 19, at 10. Biomass is any organic material other than oil, natural gas, coal, or any product of these fuels. *Id.* Biomass is a renewable fuel and is considered again in Part II.

32. I.R.C. § 29(c) (2000) redesignated to § 45K in 2005.

33. Conferees' Agreement on H.R. 6, Energy Policy Act of 2005, Energy Tax Incentives Act of 2005, Title XIII, S-40 n.11 (July 28, 2005); LAZZARI, CRS, *supra* note 26, at 1. The credit must be offset by benefits from government grants, subsidized or tax-exempt financing, energy credits, and the enhanced oil recovery credit. I.R.C. § 29. See GAO, REPORT 2000, *supra* note 19, at 10. See also LAZZARI, CRS, *supra* note 26, at 4.

34. See I.R.C. § 193(b) (outlining tertiary recovery credits). Tertiary oil recovery costs include expenses paid for any tertiary injectant (such as steam, carbon dioxide, or chemicals), which is used as part of a tertiary recovery method to increase oil production. *Id.*

35. I.R.C. § 43(c)(2)(A)(ii); Congress expanded the credit in 2004 to include the costs of constructing gas treatment plants located in Alaska. See I.R.C. § 43(c)(1)(D)(ii) (allowing credit for amounts paid or incurred to construct a gas treatment plant that carries Alaska gas through certain Btu pipelines).

costs attributable to enhanced oil recovery (EOR) projects.³⁶ Qualified costs include tertiary injectant expenses, IDCs on a qualified EOR project, and amounts incurred for tangible depreciable property.³⁷ A qualified EOR project must be located in the United States and involve the application of tertiary recovery methods that will likely result in “more than an insignificant increase” in the amount of recoverable oil.³⁸ The credit amount is reduced if the average price of crude oil exceeds \$28.00 per barrel (adjusted for inflation) and is phased out ratably over a \$6.00 phase-out range.³⁹ In 2004, for example, the credit did not phase out based on the reference price for oil that year.⁴⁰

2. Energy Tax Incentives Act of 2005

Congress passed the Energy Tax Incentives Act in August 2005. As the most significant energy legislation in many years, the Act contains tax incentives for both the fossil fuel industry and its infrastructure, as well as the alternative and renewable fuel industries.⁴¹ Tax breaks for domestic fossil fuels constituted well over half of the government expenditure mandated by the legislation over a ten-year period.⁴²

As part of this Act, Congress added to the nonconventional fuels credit a production credit for qualified facilities producing coke or coke gas. The \$3.00 credit is available for up to 4,000 barrels of oil equivalent. The credit for these fuels extends until January 1, 2010. In addition, this credit is now part of the general business credit, thus making carry back and carry forward of unused credits available.⁴³

36. I.R.C. § 43(a).

37. GAO, REPORT 2000, *supra* note 19, at 13; I.R.C. § 43(c). To the extent that a credit is allowed for such costs, the taxpayer must reduce the amount of otherwise deductible or capitalizable and recoverable costs. I.R.C. § 43(d)(1).

38. *See* GAO, REPORT 2000, *supra* note 19, at 13. *See also* JOINT COMMITTEE ON TAXATION, PRESENT LAW AND DESCRIPTION OF PROPOSALS RELATING TO FEDERAL INCOME TAX PROVISIONS THAT IMPACT ENERGY, FUEL, AND LAND USE CONSERVATION AND PRESERVATION, JCX-84-00, at 3 (July 24, 2000). Congress made no changes to this provision in the 2005 Energy Act. Description and Technical Explanation for Energy Tax Incentives Act of 2005, Title XIII of Energy Policy Act of 2005 (H.R. 6), as Agreed by Conferees, BNA Daily Tax Report, S-58 (July 28, 2005) [hereinafter Explanation of the Energy Tax Incentives Act].

39. I.R.C. § 43(b).

40. *See* Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-58.

41. The Energy Tax Incentives Act provides \$14.5 billion in tax incentives over a ten-year period. The new law includes tax incentives to increase domestic energy production, improve conservation efforts, and expand the use of alternative energy sources. *See* JOINT COMMITTEE ON TAXATION, ESTIMATED BUDGET EFFECTS OF ENERGY TAX INCENTIVES ACT OF 2005, JCX-59-05 (July 28, 2005) [hereinafter Estimated Budget Effects] (outlining incentive provisions for fiscal years 2005–2015).

42. Estimated Budget Effects, *supra* note 41, at S-95.

43. Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-40.

The Act also included several other incentives to stimulate oil and gas production. First, the new law increases the number of oil and gas producers that will be able to claim percentage depletion by qualifying as independent producers or royalty owners. Percentage depletion may only be used by independent producers or royalty owners who are not “refiners.” Under the old law, to avoid being classified as a “refiner,” a producer could not engage in refining operations in which production exceeded 50,000 barrels on any day during the taxable year. The law now allows producers to refine up to 75,000 barrels based on average daily production and still qualify for percentage depletion.⁴⁴

In addition, the Act made certain natural gas distribution lines and electricity transmission property depreciable over fifteen years rather than thirty years, and natural gas gathering lines depreciable over seven years rather than fifteen years.⁴⁵ Geological and geophysical costs are now amortizable over a two-year period rather than capitalized as part of the cost of the oil and gas property.⁴⁶ Congress also provided a temporary option to claim qualified oil refinery property as an expense. A taxpayer may also expense fifty percent of qualified refinery property used in the refining of liquid fuels for property if the property has a binding construction contract prior to January 1, 2008; is placed in service before January 1, 2012; and meets increased capacity requirements.⁴⁷ Ordinarily, petroleum refining assets are recovered over a ten-year period.

Congress also included two new credits for investment in certain clean coal technologies. A twenty percent investment tax credit is provided for property associated with gasification of coal, including any coal handling and gas separation equipment. Additionally, a fifteen percent tax credit is now available for other advanced coal-based projects, and a twenty percent credit is available for certain certified gasification projects as well.⁴⁸

The Act also provides significant additional government investment into the existing nonrenewable energy infrastructure. Though several of

44. *Id.* at S-44.

45. *Id.* at S-38, S-39.

46. *Id.* at S-62, S-63. The law had previously been unsettled with respect to whether or not these costs were amortizable and over what time period. *See* Rev. Rul. 77-188, 1977-1 C.B. 76, *as amplified by* Rev. Rul. 83-105, 1983-2 C.B. 51. On May 17, 2006, Congress again amended the amortization period for geological and geophysical costs by extending it from 24 months to 5 years for major integrated oil companies. *See* Tax Increase Prevention and Reconciliation Act of 2005, Pub. L. No. 109-222, § 503, 120 Stat. 345, 354 (2006) (adding new Code section 167(h)(5)).

47. Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-56, S-57.

48. *Id.* at S-54.

these provisions are designed to encourage more efficient use of fossil fuels, a number of these incentives target exploration and development of petroleum. However, most of the available studies suggest that these tax incentives are not cost effective and have little or no impact on energy production.⁴⁹ One recent study evaluating many of the Act's tax incentives found that the estimated federal revenue loss from enacting the incentives would not be offset by revenues generated from increased oil and gas supplies stimulated by those tax incentives.⁵⁰

II. TAX INCENTIVES THAT PROMOTE RENEWABLE AND ALTERNATIVE ENERGY SOURCES

America's over-reliance on petroleum has led the federal government to invest in energy efficiency programs and the development of alternative fuel sources. Complacency during the 1980s and 1990s, the terrorist attack of 2001, the Iraq war, environmental problems associated with global climate change, and the recent devastation to the Louisiana coast have led to heightened concerns for energy security, a vulnerable energy infrastructure, and the need to develop alternatives.⁵¹ This section discusses existing, proposed, and expired tax incentives that target renewable and alternative energy sources.

A. Tax Incentives for Alternative Fuel Technologies

Since the early 1900s, when American petroleum consumption began in earnest, demand for petroleum has grown rapidly. The nation's demand for oil has yet to peak and is extremely price resilient, despite recent gasoline price increases. However, crude oil production from the lower forty-eight states reached its peak in 1970 when oil and gas accounted for 71.1% of total U.S. energy production.⁵² Oil production in Alaska delayed the decline in overall domestic oil production until

49. See ENERGY INFO. ADMIN., ANALYSIS OF FIVE SELECTED TAX PROVISIONS OF THE CONFERENCE ENERGY BILL OF 2003, at 2 (2004). This study considered provisions that were not enacted until 2004–2005, including section 45: Credit for Electricity Produced from Certain Sources, Credit for Electricity Produced from Advanced Nuclear Power Facilities, Amortization of Geological and Geophysical Expenditures Over 2 Years, Extension and Modification of Section 29 for Producing Fuel from Nonconventional Sources, and Enhanced Oil Recovery Tax Credits. *Id.* at 1.

50. *Id.* at 2–3.

51. See FRED SISSINE, CRS ISSUE BRIEF FOR CONGRESS: ENERGY EFFICIENCY: BUDGET, OIL CONSERVATION, AND ELECTRICITY CONSERVATION ISSUES, at Summary (2005) (noting the 2001 terrorist attack, Iraq war, power shortages in California, and 2003 Northeast-Midwest blackout brought a renewed emphasis on energy security, efficiency, and demand).

52. LAZZARI, CRS, *supra* note 26, at CRS-2.

1988 when Alaska's oil production peaked.⁵³ By 1994, the United States imported more oil than it produced, and by 2004, net foreign imports accounted for fifty-eight percent of the country's petroleum supply.⁵⁴

Since the 1970s, policy makers have employed energy taxes and subsidies to help alleviate a host of problems: declines in production, increases in demand, oil embargoes, oil price and supply shocks, wide petroleum price variations and price spikes, rising oil import dependence, and increased evidence of the seriousness of environmental problems associated with fossil fuels.⁵⁵ The Energy Tax Act of 1978 was Congress's first attempt to encourage energy conservation and development of alternative fuels through tax provisions.⁵⁶

Although the government's new environmental legislation and its regulations on pollutants enacted during the 1970s were groundbreaking, these "environmentally friendly" tax incentives are inconsequential when compared with the federal investment targeted at fossil fuel exploitation. The overwhelming majority of energy tax incentives continue to support businesses that extract, produce, and transport non-renewable resources. Although federal support is slowly increasing, industries involved in developing renewable energy do not receive the government assistance and commitment that the fossil fuel industries have enjoyed.

The earliest environmental tax incentives included credits for investing in energy conservation products, such as insulation, as well as solar and wind energy equipment installed in homes or businesses.⁵⁷ The residential energy income tax credit provided a credit of thirty percent for the first \$2,000 and twenty percent of the next \$8,000 of

53. See ENERGY INFO. ADMIN., ENERGY IN THE UNITED STATES: 1635-2000, <http://www.eia.doe.gov/emeu/aer/eh/petro.html> (last visited Aug. 5, 2006) (explaining that "a surge in Alaskan oil output at Prudhoe Bay beginning in the late 1970s helped postpone the decline in overall U.S. production . . .").

54. See 2004 ANNUAL ENERGY REVIEW, *supra* note 12, at 127. See also 2005 ANNUAL ENERGY REVIEW, <http://eia.doe.gov/emeu/aer/> (follow link to "Annual Energy Review") (demonstrating that in 2004, net imports in barrels per day equaled 11,851 and petroleum products supplied equaled 20,517).

55. See LAZZARI, CRS, *supra* note 26, at CRS-1 (explaining that since the 1970s, recurrent energy-related problems have caused policy makers to consider energy taxes and subsidies with greater frequency).

56. Energy Tax Act of 1978, Pub. L. No. 95-618, § 301(a)(1), 92 Stat. 3174 (codified as amended in scattered sections of 26 U.S.C.).

57. LAZZARI, CRS, *supra* note 26, at CRS-4; see I.R.C. § 46 (stating that for general business credits, the amount of investment credit determined for any taxable year takes energy credits into account).

solar and wind energy equipment costs.⁵⁸ Investments in conservation or alternative fuel technologies, such as solar, wind, geothermal, and ocean thermal technologies were eligible for a ten percent business energy tax credit.⁵⁹ In addition, Congress authorized the percentage depletion deduction for geothermal deposits.⁶⁰

In 1980, Congress increased the residential energy tax credit to forty percent of the first \$10,000 of equipment expenses, and the business energy tax credit to fifteen percent for solar, wind, geothermal, and ocean thermal technologies.⁶¹ Congress also added biomass to the list of technologies eligible for the credit.⁶² Set to expire by December 31, 1985,⁶³ the Tax Reform Act of 1986 (P.L. 99-514) extended the business tax credit for solar, geothermal, and ocean thermal property through 1988; the tax credit for biomass property was extended through 1987.⁶⁴

All that remains from these early energy tax credits is a ten percent investment tax credit for business use of solar and geothermal energy.⁶⁵ The other credits have been phased out since 1992. The remaining credit applies to the cost of new equipment that: (1) uses solar energy to generate electricity, heat or cool a structure, or provide solar process heat;⁶⁶ or (2) produces, distributes, or uses energy derived from a geothermal deposit, but only, in the case of electricity generated by geothermal power, up to the electric transmission stage.⁶⁷ In 2005, Congress increased the amount of the credit to thirty percent, but only through December 31, 2007.⁶⁸ Congress also added equipment that

58. Energy Tax Act § 101(a); Energy Info. Admin., Legislation Affecting the Renewable Energy Marketplace, <http://www.eia.doe.gov/cneaf/solar.renewables/page/legislation/impact.html> (last visited Jun. 30, 2004); LAZZARI, CRS, *supra* note 26, at CRS-4.

59. Energy Tax Act § 301(a)(2)(B); Legislation Affecting the Renewable Energy Marketplace, *supra* note 58.

60. Energy Tax Act § 403(a); Legislation Affecting the Renewable Energy Marketplace, *supra* note 58; LAZZARI, CRS, *supra* note 26, at CRS-4. The applicable rate began at twenty-two percent and was phased down to fifteen percent by 1983. LAZZARI, CRS, *supra* note 26 at CRS-4.

61. Crude Oil Windfall Profits Tax Act of 1980, Pub. L. No. 96-223, § 202, 94 Stat. 229 (codified as amended in scattered sections of 26 U.S.C.); Legislation Affecting the Renewable Energy Marketplace, *supra* note 58.

62. Legislation Affecting the Renewable Energy Marketplace, *supra* note 58.

63. *Id.*

64. *Id.* The tax credit for wind systems was not extended.

65. See I.R.C. § 48 (removing reforestation, for example).

66. I.R.C. § 48(a)(3)(A)(i).

67. I.R.C. § 48(a)(3)(A)(iii).

68. See Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-60, S-61.

uses fiber-optic–distributed sunlight to illuminate the inside of a structure as eligible property, but again only through the end of 2007.⁶⁹

In 1992, Congress also enacted the renewable electricity production credit (PTC) for electricity generated from qualified energy resources (QER).⁷⁰ QERs originally included wind energy, “closed-loop” biomass, and poultry waste facilities.⁷¹ In 2004, Congress expanded QERs to include: geothermal energy, solar energy, small irrigation power, municipal solid waste, and refined coal.⁷² In 2005, Congress again expanded the QERs to include qualifying hydroelectric power facilities and qualified Indian coal facilities.⁷³ QERs must also be produced at qualified facilities.⁷⁴ For certain QERs, taxpayers may take the credit during the first ten years of production at a rate of 1.9 cents per kilowatt-hour in 2005.⁷⁵ For other QERs, the credit is reduced by half to 0.95 cents per kilowatt-hour and the credit period is reduced to five years.⁷⁶ To be eligible to claim the credit, the property must be placed in service prior to January 1, 2008.⁷⁷

69. I.R.C. § 48 (a)(3)(A)(i). The rules also state that any property used to heat a swimming pool is not eligible for the credit. *Id.*

70. *See* I.R.C. § 45(a)(2)(A)(i) and § 45(b)(2) (defining renewable electric production credit for any taxable year as the product of 1.5 cents (adjusted for inflation) multiplied by kilowatt hours of electric production from qualified sources).

71. *See* I.R.C. § 45(c). Closed-loop biomass is plant matter, where the plants are grown for the sole purpose of being used to generate electricity. It does not include waste materials. Poultry waste means poultry manure and litter, including wood shavings, straw, rice hulls, and other bedding materials for the disposition of manure. *Id.*

72. *See* I.R.C. § 45(c). Poultry waste is now included in a category called “open-loop biomass” which broadened the category to include other agricultural livestock waste. I.R.C. § 45 (c)(3).

73. Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-48. “Indian coal” means coal which is produced from coal reserves that, on June 14, 2005, were owned by an Indian tribe or were held by the United States for the benefit of an Indian tribe or its members. I.R.C. § 45 (b)(9)(A).

74. *See* I.R.C. § 45(d) (describing the facilities that qualify for the purposes of the tax credit as expanded in 2004).

75. Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-44; Notice 2004-29, 2004-17 I.R.B. 828; I.R.C. § 45(a); I.R.C. § 45(b)(2); Notice 2005-37, 2005-1 C.B. 1049. The credit is reduced for grants, tax-exempt bonds, subsidized energy financing, and other credits. I.R.C. § 45(b)(3).

76. Open-loop biomass facilities, small irrigation power facilities, landfill gas facilities, and trash combustion facilities are only eligible for half of the 1.9-cent (adjusted for inflation) credit. *See* I.R.C. § 45(b)(4)(A). These same facilities plus the geothermal or solar energy facilities may only claim the credit for the first five years of production. *See* I.R.C. § 45(b)(4)(B).

77. I.R.C. § 45(c)(3), *amended by* The Working Families Tax Relief Act of 2004, Pub. L. No. 108-311, 118 Stat. 1166 (2004) (codified as amended in scattered sections of 26 U.S.C.) [hereinafter Working Families Tax Relief Act]. Under the Energy Tax Incentives Act of 2005, I.R.C. § 45 was amended again to extend the placed-in-service date to December 31, 2007; however, the placed-in-service date for solar facilities is December 31, 2005, and the placed-in-

Another early attempt at environmentally friendly regulation included the “gas guzzler tax,” a federal excise tax enacted in 1978 to encourage gasoline conservation, which applies to the sale of cars with a fuel economy rating below statutory standards.⁷⁸ Though not an incentive promoting alternative fuel technologies, the tax does encourage energy efficiency through technological innovations in gasoline-powered engines. Under the statute, both the excise tax and the fuel economy standards increased for each model year from 1980 through 1986. Between 1987 and 1990, Congress failed to adjust either the fuel efficiency or the fuel economy standards.⁷⁹ Congress finally updated these standards in 1990, but has not adjusted them since.⁸⁰ For cars that do not meet the minimum fuel economy standard set by the Environmental Protection Agency, the amount of tax imposed depends on how far below EPA standards the fuel efficiency falls.⁸¹ For vehicles with fuel economy of at least 22.5 miles per gallon, no excise tax is imposed. The excise tax begins at \$1,000 for vehicles with a fuel economy of less than 22.5 miles per gallon, and increases to \$7,700 for vehicles with a fuel economy of less than 12.5 miles per gallon.⁸² Unfortunately, vehicles that weigh over 6,000 pounds, which are often the biggest polluters, are exempt from the gas guzzler tax. Currently, over fifty-five different models of luxury automobiles (and SUVs) are exempt from this excise tax.⁸³

The federal government also invested in alternative fuels through two 1978 tax incentives for ethanol and methane derived from renewable sources. These “alcohol fuels credits” included a partial exemption from the federal excise tax on motor fuels⁸⁴ and three income tax credits for renewable alcohol-based motor fuels.⁸⁵ Proponents had hoped that

service date for refined coal facilities is December 31, 2008. Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-47, S-48; I.R.C. § 45(d).

78. See I.R.C. § 4064 (imposing a tax on the sale of all cars by manufacturers determined by fuel economy).

79. See JOINT COMM. ON TAXATION, 101ST CONG., PRESENT LAW AND BACKGROUND RELATING TO FED. ENVTL. TAX POLICY 9 (1990) [hereinafter FED. ENVTL. TAX POLICY].

80. See I.R.C. § 4064(a) (demonstrating that fuel economy tax on manufacturers has not changed since 1990).

81. See FED. ENVTL. TAX POLICY, *supra* note 79, at 10.

82. I.R.C. § 4064(a).

83. See GREEN SCISSORS, GREEN SCISSORS 2004: CUTTING WASTEFUL AND ENVIRONMENTALLY HARMFUL SPENDING 13 (2004), <http://www.greenseissors.org/publications/gs2004.pdf> (explaining that light trucks, including the Lincoln Navigator, Cadillac Escalade, and Hummer H2, qualify for this deduction).

84. GAO, REPORT 2000, *supra* note 19, at 15. This tax is earmarked for the Highway Trust Fund. GAO, ALCOHOL FUELS TAX, *supra* note 9 at 2.

85. GAO, REPORT 2000, *supra* note 19, at 16; see I.R.C. §§ 38, 40 and 87 (allowing a small

the tax incentives for alcohol fuels would reduce U.S. dependence on imported fuel and provide much-needed support for farm incomes by finding another market for agricultural products, such as corn, from which alcohol can be produced.⁸⁶ Using alcohol fuels as additives to fossil-based fuels to reduce urban air pollution also made these initiatives attractive. Of the two tax incentives, the partial exemption from the excise tax had been the most significant based on benefits claimed.⁸⁷ In 2004, however, Congress repealed the excise tax exemption, replacing it with two excise tax credits.⁸⁸

The two new excise tax credits are the alcohol fuel mixture credit and the biodiesel mixture credit. These credits can be claimed against the excise tax imposed on certain removals, entries, and sales of taxable fuels.⁸⁹ An alcohol fuel mixture is any mixture of alcohol and a taxable fuel that is used or sold by the producer to any person for use as a fuel.⁹⁰ The credit amount varies depending on how much and what type of alcohol is contained in each gallon of fuel. For most fuel blends, the credit equates to fifty-one cents per gallon of alcohol used. A credit of sixty cents per gallon of alcohol is available for alcohol fuel blends that do not contain ethanol.⁹¹ Alcohol derived from fossil fuels does not qualify for the exemption, and the alcohol used must be at least 190-proof.⁹²

The biodiesel mixture is any blend of a biodiesel and diesel fuel that is used by the producer or sold by the producer to any person for use as a fuel.⁹³ The credit amount varies depending on how much and what type of biodiesel is contained in each gallon of fuel. The credit for all of the biodiesel blends equates to fifty cents per gallon of biodiesel used. A credit of \$1.00 per gallon of biodiesel is available for fuel

ethanol producer credit and 2 other alcohol fuel credits).

86. GAO, ALCOHOL FUELS TAX, *supra* note 9 at 1.

87. *Id.* at 2. Through 2000, the Treasury Department estimated the revenue loss for stemming from the excise tax exemption to be \$11,183,000,000, and the Joint Committee estimated it to be \$7,523,000,000. The revenue loss associated with the three income tax credits was approximated at \$478,000,000 (Treasury) and \$198,000,000 (Joint Committee). See GAO, REPORT 2000, *supra* note 19, at 17, 19.

88. I.R.C. § 6426, added by the American Jobs Creation Act of 2004, Section 301(a) (allowing for the alcohol fuel mixture and biodiesel mixture credits).

89. I.R.C. § 6426(a).

90. I.R.C. § 6426(b)(3).

91. I.R.C. § 6426(b)(2)(B). The credit is available until December 31, 2010. I.R.C. § 6426(b)(5).

92. I.R.C. § 6426(b)(4).

93. I.R.C. § 6426(c)(3). This credit is available until December 31, 2008. Explanation of the Energy Tax Incentives Act, *supra* note 38 at S-70. Biodiesel refers to a fuel blend made from vegetable oils and animal fats, combined with diesel. I.R.C. § 40A(d)(1).

blends that are considered agri-biodiesel.⁹⁴ These credits must be coordinated with the income tax credits described below.

The alcohol mixtures credit, the pure alcohol fuel credit, and the small ethanol producers' credit are aimed at distinct lines of business.⁹⁵ The alcohol mixtures, or blender's, credit is fifty-one cents per gallon of ethanol.⁹⁶ The blender's credit is primarily available to petroleum refiners, distributors, or marketers who mix ethanol with gasoline. The alcohol contained in any of these blends, referred to as gasohol, must also be at least 190-proof.⁹⁷ Fuel retailers who sell pure ethanol as vehicle fuel or use it themselves in their business may take the pure alcohol fuel credit,⁹⁸ also at a rate of fifty-one cents per gallon of ethanol.⁹⁹ Finally, a ten-cents-per-gallon credit is available for small producers whose production does not exceed fifteen million gallons per year and whose production capacity does not exceed sixty million gallons per year.¹⁰⁰ These credits are scheduled to expire after December 31, 2010, and must be coordinated with the alcohol fuel mixture excise tax credit.¹⁰¹

Congress added the biodiesel fuels credit in 2004, which consists of two combined credits, the biodiesel mixture credit and the biodiesel credit.¹⁰² The biodiesel mixture credit is fifty cents per gallon of biodiesel used to produce a qualified biodiesel mixture as described under the excise tax credit.¹⁰³ The biodiesel credit is fifty cents for each gallon of biodiesel that is not mixed with diesel fuel and is used by the producer or sold by the producer at retail to any person for use as a fuel.¹⁰⁴ Both credits increase to one dollar if agri-biodiesel is used.¹⁰⁵

94. I.R.C. § 6426(c)(2). Agri-biodiesel is derived solely from virgin oils, corn, soybeans, sunflower seeds, cottonseeds, canola, crambe, rapeseeds, safflowers, flaxseeds, rice bran and mustard seeds, and animal fats. I.R.C. § 40A(d)(2).

95. See generally I.R.C. §§ 38(b)(3), 40(b), and 87 (defining gross income as it pertains to fuel credits); GAO, REPORT 2000, *supra* note 19, at 18.

96. I.R.C. § 40(h).

97. GAO, ALCOHOL FUELS TAX, *supra* note 9, at 35.

98. See I.R.C. § 40(b)(2). If the alcohol proof is less than 190 but greater than 150, a reduced credit of forty-five cents applies. I.R.C. § 40(b)(3).

99. I.R.C. § 40(b); I.R.C. § 40(h).

100. See I.R.C. § 40(b)(4), amended by Energy Tax Act of 2005; see Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-78.

101. I.R.C. § 40(e)(1)(a).

102. I.R.C. § 40A (added by the American Jobs Creation Act of 2004, Pub. L. No. 108-35, 118 Stat. 1463, § 302(a) (2004)).

103. I.R.C. § 40A(b)(1). The biodiesel mixture is any blend of a biodiesel and diesel fuel (determined without regard to any use of kerosene) that is used by the producer or sold by the producer to any person for use as a fuel. *Id.*

104. I.R.C. § 40A(b)(2).

Biodiesel has gained popularity in recent years as less polluting than regular diesel fuels.

In 2005, Congress once again introduced a new income tax credit and an excise tax credit for renewable diesel.¹⁰⁶ Renewable diesel is diesel fuel derived from biomass, excluding petroleum oil, natural gas, or coal, using a thermal depolymerization process. The credit amount is one dollar per gallon, and producers of renewable diesel must register with the U.S. Secretary of the Treasury. Congress also added a new small agri-biodiesel producer credit.¹⁰⁷ A ten-cents-per-gallon credit is available for small agri-biodiesel producers up to fifteen million gallons of production per year¹⁰⁸ and whose production capacity does not exceed sixty million gallons per year.¹⁰⁹ This credit is scheduled to expire after December 31, 2010.

B. Tax Credits for Electric and Clean-Fuel Vehicles

Congress considered tax measures to encourage the use of electric or alternative fuel vehicles on a number of occasions during the 1970s.¹¹⁰ During the 1975 legislative session, in reaction to the 1973–74 oil price shocks, Congress proposed a twenty-five percent tax credit for persons who purchased a qualified electric highway vehicle costing less than \$3,000.¹¹¹ Later, in response to the 1979 oil price increases, the Senate passed a provision authorizing a ten percent tax credit for purchasing a qualified electric vehicle or converting an internal combustion engine to electric power.¹¹² Both the 1975 and the 1979 efforts stalled, and Congress failed to enact any electric vehicle credit. Thirteen years later, in 1992, responding to the Persian Gulf War and Operation Desert

105. I.R.C. § 40A(b)(3).

106. Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-70 (discussing amendments of I.R.C. §§ 40A, 6426, and 6427).

107. *Id.*

108. I.R.C. § 40(b)(4), *amended by* Energy Tax Act of 2005; *see* Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-78. The agri-biodiesel must (1) be sold by such producer to another person (a) for use by such other person in the production of a qualified biodiesel mixture in such person's trade or business or (b) for use by such other person as a fuel in a trade or business or (c) who sells such agri-biodiesel at retail to another person and places such ethanol in the fuel tank of such other person; or (2) used by the producer for any of these listed purposes. I.R.C. § 40(b)(4).

109. I.R.C. § 40(g)(1).

110. Between 1996 and 2002, alone, at least twenty-seven different tax proposals were introduced in Congress to subsidize alternative vehicles. *See* Martin A. Sullivan, *The Car Credit: How a Tax Break for Engineering Got Engineered*, TAX NOTES, Mar. 11, 2002, at 1248.

111. *Id.* at 1246; Energy Policy and Conservation Act, Pub. L. No. 94-163, 89 Stat. 871 (1975).

112. Sullivan, *supra* note 110, at 1246.

Storm, Congress enacted a wide range of tax and nontax provisions to encourage domestic oil production, develop alternative fuels, and promote conservation.¹¹³ The legislation included both the tax credit for electric vehicles powered by either rechargeable batteries or fuel cells, and immediate expensing of a portion of the costs of “qualified clean-fuel vehicle property” and “qualified clean-fuel vehicle refueling property.”¹¹⁴

Under current law, both electric and fuel cell vehicles are eligible for a ten percent tax credit, up to a maximum of \$4,000.¹¹⁵ A qualified electric vehicle must be powered primarily by an electric motor drawing current from rechargeable batteries, fuel cells, or other portable sources of electrical current.¹¹⁶ The credit was reduced by seventy-five percent in 2006, and it will be completely eliminated by 2007.¹¹⁷ Taxpayers can also deduct the costs of certain clean-fuel vehicle property and clean-fuel refueling property.¹¹⁸ Qualified clean-fuel vehicle property includes motor vehicles that use certain clean-burning fuels.¹¹⁹ The maximum deduction is \$50,000 for large trucks, vans, or buses.¹²⁰ For mid-sized vehicles, the maximum deduction is \$5,000.¹²¹ And for all other motor vehicles, the maximum deduction is \$2,000.¹²² The deduction was reduced by seventy-five percent in 2006, and it will be eliminated after December 31, 2006.¹²³

Purchasers of clean-fuel vehicle refueling property may also deduct up to \$100,000 of the purchase costs.¹²⁴ Clean-fuel vehicle refueling

113. Energy Policy Act of 1992, Pub. L. No. 102-486, § 1913(b)(1), 106 Stat. 2776 (1992).

114. See *infra* text accompanying notes 116–21 for definitions of “qualified clean-fuel vehicle property” and “qualified clean-fuel refueling property.”

115. I.R.C. §§ 30(a), 30(b). The credit is only available to the original property owner.

116. See I.R.C. § 30(c).

117. See I.R.C. § 30(b)(2); Working Families Tax Relief Act, *supra* note 77, § 318(b); Sullivan, *supra* note 110, at 1246. Originally scheduled to phase out in 2004, the Working Families Tax Relief Act of 2004 again extended the provision through 2006. Despite the efforts of several groups, the IRS refused to extend the credit to include hybrid vehicles or existing cars retrofitted with electric engines. Sullivan, *supra* note 110, at 1246.

118. I.R.C. § 179A. The deduction is available for the year the property is placed in service. *Id.*

119. I.R.C. § 179A(e). Clean-burning fuels include natural gas, liquefied natural gas, liquefied petroleum gas, hydrogen, electricity and any other fuel containing at least eighty-five percent methanol, ethanol, any other alcohol or ether. *Id.*

120. I.R.C. § 179A(b)(1)(A). Trucks or vans with a gross vehicle weight over 26,000 pounds and buses with at least a twenty-person seating capacity. *Id.*

121. *Id.* A truck or van with a gross vehicle weight between 10,000 and 26,000 pounds. *Id.*

122. *Id.*

123. I.R.C. § 179A(b)(1)(B), amended by Working Families Tax Relief Act, *supra* note 76, § 319(b).

124. I.R.C. § 179A(b)(2). The deduction is available for the year the property is placed in

property includes property for the storage or dispensing of a clean-burning fuel or property for the on-site recharging of electric vehicles.¹²⁵ The deduction for refueling property is one of the first incentives to address the need to support the infrastructure associated with these new technologies.

The 2005 Energy Tax Incentives Act added Alternative Technology Vehicle credits that will replace the current qualified clean-fuel vehicle deduction after it expires.¹²⁶ Under the Act, qualified fuel cell vehicles, alternative fuel vehicles, qualified hybrid vehicles, advanced lean-burn technology motor vehicles, and alternative fuel refueling property can qualify for a tax credit. A qualifying fuel cell vehicle is a motor vehicle propelled by power derived from one or more cells that convert chemical energy directly into electricity through the use of a fuel cell. The amount of the credit is based on the vehicle's weight class and fuel economy.¹²⁷

Qualifying alternative fuel vehicles are those that operate only on compressed natural gas, liquefied natural gas, liquefied petroleum gas, hydrogen, or any liquid that is at least eighty-five percent methanol. The credit for such vehicles is fifty percent of the incremental cost of the vehicle, plus an additional thirty percent if the vehicle meets certain emissions standards.¹²⁸

A qualifying hybrid vehicle draws propulsion energy from onboard sources of stored energy that includes both an internal combustion engine or heat engine using combustible fuel and a rechargeable energy storage system.¹²⁹ The amount of the credit depends on the vehicle's weight, fuel economy, and lifetime fuel savings.

An advanced lean-burn technology vehicle incorporates direct injection, and must achieve at least 125% of the EPA's 2002 model year city fuel economy and meet other EPA standards. The credit is based on a combination of the fuel economy of the vehicle and the lifetime fuel savings of the vehicle.¹³⁰ These credits are scheduled to sunset on various dates between January 1, 2010, and January 1, 2015.

service. *Id.* The deduction expires in 2006 and is replaced by a credit for thirty percent of the cost of the property. I.R.C. § 30C. This new credit is available through December 31, 2007. *Id.*

125. *See* I.R.C. § 179A(d) (defining property for § 179A purposes). The storage or dispensing must occur where the fuel is delivered into the vehicle fuel tank.

126. *See* Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-63 to S-67 (discussing Senate amendments allowing for alternate motor vehicle credits).

127. *See id.* (discussing the addition of I.R.C. § 30B).

128. *Id.*

129. *Id.*

130. *Id.*

C. Energy Efficiency: The 2005 Energy Tax Incentives Act

The 2005 Energy Tax Incentives Act also created a number of tax incentives directed at energy efficient property. Businesses can take advantage of two new credits and a new deduction. The first credit, the Energy Credit, permits businesses to take a thirty percent credit for the purchase of qualified fuel cell power plants and a ten percent credit for the purchase of qualifying stationary micro-turbine power plants.¹³¹ The Energy Credit is nonrefundable and must reduce the taxpayer's basis in the property. The credit expires after December 31, 2007.¹³²

The second credit created by the 2005 Act, the New Energy Efficient Home Credit, allows eligible contractors to take a tax credit for the construction of qualified new energy-efficient homes.¹³³ To qualify, the home must be located in the United States, completed after the date of enactment, and certified under certain standards that result in either a thirty or fifty percent reduction in energy use. The credit is \$1,000 for manufactured homes that meet the thirty percent test, and \$2,000 for all new homes that meet the fifty percent test.¹³⁴ This credit expires after December 31, 2007.

The 2005 Act also enables businesses to deduct up to \$1.80 per square foot of property for which energy-efficient commercial building property expenditures are made. Such expenditures include property installed on or in any building located in the United States that meets certain defined standards, which is installed as part of the interior lighting, heating, cooling, ventilation, or hot water systems, and which is certified as being installed as part of a plan to reduce energy and power costs based on certain standards. The provision expires on December 31, 2007.¹³⁵

For the first time since 1978, energy efficiency tax incentives are now available to individuals. Under the 2005 Act, two new tax credits are available for individuals who invest in energy-efficient property or energy-efficient improvements for existing homes. A taxpayer may take a ten percent credit for the purchase of qualified energy efficiency improvements for an existing home.¹³⁶ Qualified improvements include

131. See I.R.C. § 48 (discussing and defining percentages).

132. See Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-60 (amending I.R.C. § 48).

133. I.R.C. § 45L.

134. See Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-73, S-74 (discussing addition of I.R.C. § 45L).

135. See *id.* at S-71, S-72 (discussing addition of I.R.C. § 179D).

136. See *id.* at S-70, S-71 (discussing addition of I.R.C. § 25C).

insulation materials or systems, exterior windows and doors, and metal roofs, all of which are specifically designed to reduce heat loss or gain for a dwelling. The credit is also available for the purchase of an advanced main air circulating fan; a qualified natural gas, propane, or oil furnace or hot water boiler; or other qualified energy-efficient property. The credit is limited to \$500 in total across all taxable years, and no more than \$200 of the credit may be for the cost of windows. The credit expires after December 31, 2007.¹³⁷

Finally, the 2005 Act also allows a taxpayer to take a thirty percent tax credit for the purchase of qualified photovoltaic property¹³⁸ and qualified solar water heating property that is used exclusively for purposes other than heating swimming pools and hot tubs.¹³⁹ The maximum credit for each of these systems is \$2,000. An additional thirty percent credit is available for the purchase of qualified fuel cell power plants. The maximum credit for any fuel cell may not exceed \$500 for each 0.5 kilowatt of capacity. Expenditures for labor costs for on-site preparation, assembly, or original installation are eligible expenses for the credit. This credit also expires on December 31, 2007.¹⁴⁰

III. THE U.S. EXPERIENCE WITH ENERGY TAX INCENTIVES

With the explosion in environmentally friendly tax incentives, an evaluation of their effectiveness is necessary to determine whether the government's investment in these resources is justified. Therefore, this section discusses the effectiveness of various energy tax incentives beginning with the early tax incentives used to encourage fossil fuel exploration and development. These early and long-standing tax incentives provide valuable insight into structuring tax measures that can accomplish their goal, as well as lessons to be learned from those that have failed to achieve their desired result.

A. The Effect of Tax Benefits on the Fossil Fuel Industry in the United States

The federal government's huge investment in the petroleum industry, through both tax and other government subsidies, influenced how

137. *Id.*

138. Qualified photovoltaic property uses solar energy to generate electricity for the taxpayer's residence; for example, solar heating panels. I.R.C. § 25D(d)(2).

139. See Explanation of the Energy Tax Incentives Act, *supra* note 38, at S-66 (discussing the addition of I.R.C. § 25D).

140. *Id.*

quickly and dramatically the United States developed into a fossil fuel-driven society. Investment spurred development and consumption, resulting in exhaustion of the resource more quickly than might otherwise have occurred. In addition, other energy resources have not developed because of the inability to compete with the heavily subsidized petroleum fuel industry. This section discusses the impact and effectiveness of energy-based tax incentives for the petroleum industry over a fairly long time period, and it considers ways to use similar incentives to stimulate alternative fuels.

For over ninety years, the combination of percentage depletion and the deduction for intangible drilling costs, along with more recently enacted tax incentives, has significantly lowered the effective tax rate for, and attracted substantial resources to, companies in the oil and gas industry. Deductions for the costs of exploration and production in the petroleum industry are superaccelerated as compared to other types of capital investments because amounts in excess of original cost are deducted and most other costs associated with the investment are not only recoverable, but immediately deductible.¹⁴¹ These generous tax incentives were designed to defer tax liability and to encourage oil and gas prospecting and drilling along with the development of U.S. petroleum reserves.¹⁴² Since their inception, however, the combination of percentage depletion and intangible drilling costs deductions has resulted in little or no income tax for much of the petroleum industry.¹⁴³ A mere nine years after Congress enacted percentage depletion in 1925, critics begin to characterize these deductions as tax “loopholes.”¹⁴⁴ In 1937 President Franklin Roosevelt declared that percentage depletion was “perhaps the most glaring loophole in our present revenue law.”¹⁴⁵

An early Treasury Department study indicated that percentage depletion reduced the taxable gross income of the petroleum industry as a whole by approximately 25.3%, even taking into account the 50% net income limitation in place prior to 1990.¹⁴⁶ The study also revealed that percentage depletion exceeded cost depletion by approximately 95.7%

141. See MCDONALD, *supra* note 20, at 15–16 (explaining deductions).

142. LAZZARI, CRS, *supra* note 26, at 2.

143. See *id.* at 2 (discussing deductions in excess of capital investment); GAO, QUESTIONABLE MERIT, *supra* note 8, at 51.

144. Blaise, *supra* note 16, at 395.

145. *Id.* at 396.

146. MCDONALD, *supra* note 20, at 17–18; see John H. Shows, *The Oil and Gas Industry and Its Present Tax Treatment*, 45 MISS. L. REV. 1125, 1127–28 (1974) (referencing a provision in the Internal Revenue Act of 1926 that allowed a deduction for percentage depletion not to exceed fifty percent of net income).

of the total depletion allowable.¹⁴⁷ Other studies show that intangible drilling costs account for seventy-five to ninety percent of the costs of drilling.¹⁴⁸ A nationwide survey taken between 1948 and 1955 indicated that IDCs averaged slightly less than seventy percent of total gross income from production.¹⁴⁹ Therefore, the IDC deduction alone appears to have had the effect of reducing the marginal tax rate by more than half. Another tax return study using samples from leading corporations in selected industries for the period between 1938 and 1961 indicated that oil and gas producers earned higher rates of return than integrated petroleum companies, manufacturing companies, mining companies, and all other industry, with a rate of return for oil and gas producers ranging from three to twenty-two percentage points higher.¹⁵⁰ After 1969, when Congress reduced the percentage depletion rate to twenty-two percent, one report estimated that the combination of the percentage depletion and IDC deductions reduced the total tax liability for petroleum and oil producers by approximately forty-six percent, 6.5 times higher than the maximum rate applicable to the general business credit available at the time.¹⁵¹ Throughout the 1980s and 1990s, tax rates for oil and gas producers continued to be lower than rates for other industries.¹⁵²

147. MCDONALD, *supra* note 20, at 17.

148. GAO, QUESTIONABLE MERIT, *supra* note 8, at 24; ANDREW KIMBRELL ET AL., INT'L CTR. FOR TECH. ASSESSMENT, THE REAL PRICE OF GASOLINE: ANALYSIS OF THE HIDDEN EXTERNAL COSTS CONSUMERS PAY TO FUEL THEIR AUTOMOBILES 6 (1998) [hereinafter CTA REPORT].

149. MCDONALD, *supra* note 20, at 18 n.16 (citing data from MID-CONTINENT OIL AND GAS ASSOCIATION, PERCENTAGE DEPLETION, ECONOMIC PROGRESS, AND NATIONAL SECURITY 34 (1961)).

150. *See id.* at 142 (citing data compiled by the First National City Bank of New York). In another sample of corporate tax returns for the years 1949–51 and 1953–56, the average rate of return on stockholders' equity for oil and gas producers was 24.2% versus 12% for manufacturing corporations. *Id.* at 143–44 (citing data compiled in Stephen L. McDonald, *Percentage Depletion and the Allocation of Resources: The Case of Oil and Gas*, 14 NAT'L TAX J. 323, 333–36 (December 1961)).

151. Gerard M. Brannon, *Existing Tax Differentials and Subsidies Relating to the Energy Industries*, in STUDIES IN ENERGY TAX POL'Y, 3, 11 (Gerard Brannon ed., 1975). The percentage depletion deduction resulted in an exemption of about fifteen percent of gross income or the equivalent of thirty-three percent tax reduction. The same report estimated that the IDC deduction shaved off another fifteen to eighteen percent of the total tax liability. *Id.* at 8.

152. In the mid-1980s, the GAO reported that the marginal tax rate for independent oil and gas producers ranged from eight to nine percent and for integrated oil and gas from seven to twenty-four percent. For most other industries the marginal tax rate ranged from thirty-one to thirty-two percent. GAO, QUESTIONABLE MERIT, *supra* note 8, at 56. More recent data, from 1994, indicates that the tax rate differential persists despite reductions in both percentage depletion and, in some cases, IDCs. *See* JENNY B. WAHL, INSTITUTE FOR LOCAL SELF-RELIANCE, OIL SLICKERS: HOW PETROLEUM BENEFITS AT THE TAXPAYER'S EXPENSE (1996), <http://www.ilsr.org./carbo/costs/truercostoc.html> (stating the effective tax rate on oil and gas

The increased profitability and reduced marginal tax rates of the petroleum industry reduced production costs, increased investments in petroleum exploration, accelerated oil and gas extraction, and caused rapid depletion of energy resources.¹⁵³ Specifically, “relatively low oil prices encouraged petroleum consumption (as opposed to conservation) and inhibited the development of alternatives to fossil fuels, such as unconventional fuels and renewable forms of energy.”¹⁵⁴ One early study analyzing resource allocation from 1959 to 1971 concluded that federal tax policies significantly affected investment in crude petroleum reserves.¹⁵⁵

The same study also indicated that the percentage depletion allowance was not cost-effective in increasing reserves when compared to the alternative policy of having the government purchase additional oil reserves directly.¹⁵⁶ The effect of these tax benefits can be directly related to increased consumption. Several recent reports have quantified the tax benefits to the petroleum industry as reflected through lower gasoline prices to consumers.¹⁵⁷ These estimates conclude that tax subsidies reduce the price of gasoline by 1.5 to 7 cents per gallon.¹⁵⁸ Lower prices translate into additional consumption, rather than conservation, of gasoline by consumers. Because energy policy is made in a political setting, it rarely comports with principles of economic or public finance theory, and “more often than not, energy tax policy may compound existing distortions, rather than correct them.”¹⁵⁹ In 1920, oil and gas production comprised sixteen percent of total U.S. energy production. By 1970, the nation’s peak production year, petroleum

extraction income at eleven percent and the statutory rate at thirty-five percent, while the percentage depletion rate lowered to fifteen percent). The Congressional Research Service found an effective tax rate on oil and gas extraction income of 11 percent, as compared to the statutory rate for corporations of 35 percent. JANE G. GRAVELLE, *ECONOMIC EFFECTS OF TAXING CAPITAL INCOME* 54–55 (1994). In a 1995 report, the Union of Concerned Scientists also calculated the effective tax rate for the oil and gas industry at eleven percent as compared to an effective rate for non-oil industry companies of eighteen percent. CTA REPORT, *supra* note 148, at 5; ROLAND HWANG, *MONEY DOWN THE PIPELINE: UNCOVERING THE HIDDEN SUBSIDIES TO THE OIL INDUSTRY*, at Executive Summary 1 (1995).

153. LAZZARI, CRS, *supra* note 26, at 2.

154. *Id.*

155. Cox & Wright, *supra* note 4, at 186, 192.

156. *Id.* at 192.

157. CTA REPORT, *supra* note 148, at 34–35; *see* WAHL, *supra* note 152 (explaining that due to oil and gas subsidies, process for oil and gas products are artificially low).

158. *See* WAHL, *supra* note 152 (discussing ILSR estimates).

159. LAZZARI, CRS, *supra* note 26, at 1.

production constituted seventy-one percent of total U.S. energy production.¹⁶⁰

Policy makers have justified the differential tax treatment of the petroleum industry on several grounds: (1) to adjust for the high risk associated with the oil and gas industry and encourage investors to provide the significant up-front capital needed to develop this valuable commodity; (2) to encourage conservation of the oil and gas reserves and prevent waste of our limited oil reserves; and (3) to maintain our productive capacity in oil reserves for national defense purposes.¹⁶¹ While other reasons for preferential tax treatment are also advanced, these three reasons are the most commonly used to justify percentage depletion and the IDC deductions.¹⁶²

Preferential tax treatment is often provided to risky industries.¹⁶³ According to proponents' rationale, without a subsidy, the tax system may discourage investment in activities that involve both high risk and the possibility of substantial losses.¹⁶⁴ In certain circumstances, "lower income tax rates for the more risky industries may be consistent with an optimum allocation of productive resources."¹⁶⁵ Moreover, investors in high-risk activities require higher investment returns, and taxes can make that harder to achieve.¹⁶⁶ Because of the social benefits of inexpensive petroleum, ignoring other costs such as pollution, the government has provided tax incentives that reduce or eliminate the effect of taxation on the oil and gas industry.¹⁶⁷ Furthermore, one commentator noted that tax incentives for oil and gas also indicate the government's approval of the industry and its daring and self-reliant image.¹⁶⁸

160. *Id.* at 2.

161. See MCDONALD *supra* note 20, at 2 (listing issues raised by federal tax treatment).

162. See *id.* (listing issues raised by federal tax treatment).

163. See GAO, QUESTIONABLE MERIT, *supra* note 8, at 44 (stating that some advocates of petroleum tax incentives suggest subsidizing activities such as petroleum exploration because of the inherent risk).

164. Michael Livingston, *Risky Business: Economics, Culture and the Taxation of High Risk Activities*, 48 TAX L. REV. 163, 171 (1993).

165. MCDONALD, *supra* note 20, at 49.

166. Livingston, *supra* note 164, at 171.

167. See GAO, QUESTIONABLE MERIT, *supra* note 8, at 5 (discussing low marginal rates for petroleum investments).

168. See Livingston, *supra* note 164, at 185 (evaluating the effect of cultural factors on tax policy and the "tendency to favor activities that convey an image of individual daring and self reliance . . ."). Because of the technology involved in the industry, it also is viewed as scientific—another image to which Americans are drawn. *Id.* at 186.

During the 1950s and 1960s, a number of prominent tax economists studied the impact of risk in the oil and gas industry and analyzed whether federal tax incentives were necessary to adjust for the risk associated with the petroleum industry relative to other industries.¹⁶⁹ Several of these economists concluded that the percentage depletion and IDC deductions resulted in a misallocation of resources toward the petroleum industry.¹⁷⁰ Others contended that in some situations preferential tax treatment was necessary to overcome the inordinate risk associated with petroleum exploration and development.¹⁷¹ Unfortunately, because of the difficulty in breaking down the factual data and determining the incidence of the corporate tax, these studies could not provide definitive conclusions. In a more recent report, the Congressional Research Service concluded that stabilizing oil prices, perhaps with a variable oil import tax, would address market risk more effectively than tax subsidies.¹⁷² Thus, when risk is evaluated, studies indicate that the benefit of oil and gas tax incentives is not clear.¹⁷³

In one recent example, Congress enacted a nonconventional fuels tax credit to encourage production of fossil fuel from marginal sources.¹⁷⁴ A recent study indicated that the primary impact of this credit would be increased gas production from qualified sources.¹⁷⁵ Though gas production is expected to increase due to the credit, the study concluded

169. ARNOLD C. HARBERGER, JOINT COMM. ON THE ECON. REPORT, 84TH CONG., FED. TAX POL'Y FOR ECON. GROWTH AND STABILITY, 439-49 (Comm. Print. 1955) [hereinafter JOINT COMM. ON THE ECON. REPORT] (evaluating the value of percentage depletion in light of the nature of the petroleum industry); PETER O. STEINER, COMM. ON WAYS AND MEANS, 86TH CONG., PERCENTAGE DEPLETION AND RESOURCE ALLOCATION, TAX REVISION COMPENDIUM 949-66 (Comm. Print 1959) (discussing proposals for revising depletion provisions); McDONALD, *supra* note 20, at 2-3, 27-64 (analyzing different types of risk involved in the petroleum industry); McDonald, *supra* note 20, at 329-36 (discussing study to consider effects of percentage depletion); Richard A. Musgrave, *Another Look at Depletion*, 15 NAT'L TAX J. 205, 205-08 (1962) (criticizing a study on percentage depletion).

170. See ARNOLD C. HARBERGER, COMM. ON WAYS AND MEANS, 86TH CONG., THE CORPORATE INCOME TAX: AN EMPIRICAL APPRAISAL, TAX REVISION COMPENDIUM, 231-35 (Comm. Print 1959); JOINT COMM ON THE ECON. REPORT, *supra* note 169, at 439-49 (describing tax incentives in mineral industry as a waste of resources); Musgrave, *supra* note 169, at 208.

171. See McDONALD, *supra* note 20, at 64 (explaining that the analysis used in the author's study indicates that differential tax treatment is needed due to the relative riskiness of the industry).

172. See LAZZARI, ECONOMIC ANALYSIS, *supra* note 1, at 13.

173. McDONALD, *supra* note 20, at 64; Brannon, *supra* note 151, at xvi, 66-71; see generally Livingston, *supra* note 164, at 185 (discussing the economics of risk and the effect of incentives on high-risk activities).

174. Originally enacted as I.R.C. § 29, the credit was codified at I.R.C. § 45K in 2005. See *supra* text accompanying notes 30-33 and 43 for a more detailed explanation of the nonconventional fuels tax credit.

175. See ENERGY INFO. ADMIN., *supra* note 49, at 2.

that the impact on petroleum production and petroleum imports would be negligible.¹⁷⁶ The credit will likely have little or no impact on reducing our dependence on fossil fuels or foreign imports because total energy consumption continues to rise at a pace that far exceeds any energy production increases.

In another example, Congress suspended the 100% net income limitation for taxpayers, deducting percentage depletion on marginal oil and gas production beginning in 1998.¹⁷⁷ Prior to this change, the percentage depletion deduction could not exceed 100% of the net income from the oil and gas property.¹⁷⁸ Congress originally suspended the limitation to prevent owners from plugging wells when the price of oil dropped to unexpectedly low levels—at that time, oil averaged only \$10.87 per barrel.¹⁷⁹ The impact of this suspension is to permit taxpayers to use percentage depletion deductions to offset taxable income unrelated to oil and gas production.¹⁸⁰ However, in light of the price of oil today, this incentive is completely unjustified.

Additionally, neither percentage depletion nor the IDC deduction has succeeded in their purported goal of encouraging conservation of the oil and gas reserve.¹⁸¹ Petroleum is a nonrenewable wasting asset; thus, its conservation depends on the rate of use of known mineral reserves and the rate of discovering new reserves. Lowering the costs of consuming petroleum through tax incentives has made it easier to consume, encouraging waste rather than promoting conservation.¹⁸²

These incentives have also failed with respect to their other justification, improved national security. This justification rests on the argument that domestic production of petroleum increases national security by reducing importation of foreign petroleum, which leaves the United States vulnerable to foreign governments. Domestic production contributes to the creation and maintenance of a domestic reserve in times of energy shortages and produces reserves sufficient to allow a large volume of petroleum to be diverted for military use and war

176. *See id.* at 2.

177. STAFF OF JOINT COMM. ON TAXATION, 109TH CONG., DESCRIPTION AND ANALYSIS OF CERTAIN FEDERAL TAX PROVISIONS EXPIRING IN 2005 AND 2006, 62–63 (Comm. Print. 2005) [hereinafter JOINT COMM., DESCRIPTION AND ANALYSIS].

178. I.R.C. § 613(a) (creating the net income limitation); § 613A(c)(6)(H) (suspending the net income limitation of § 613(a) through December 31, 2005).

179. JOINT COMM., DESCRIPTION AND ANALYSIS, *supra* note 177 at 64 (citing S. Rpt. No. 105-33, at 114 (1997)). This same rationale was cited in the 1999 extension of this provision. *See* S. Rpt. 106-201, at 12 (1999).

180. *See* JOINT COMM., DESCRIPTION AND ANALYSIS, *supra* note 177, at 65.

181. *See* GAO, QUESTIONABLE MERIT, *supra* note 8, at 39.

182. *See* McDonald, *supra* note 20, at 323.

production without creating a civilian energy crisis.¹⁸³ However, because domestic oil consumption continues to outstrip production, conservation of petroleum reserves and decreased dependence on oil imports remains impossible. The GAO concluded that “developing alternatives, increasing fuel efficiency in transportation, and continuing the development of the Strategic Petroleum Reserve” would likely increase U.S. energy security more than additional oil and gas tax incentives.¹⁸⁴ Alternative and renewable fuels have the potential to increase petroleum conservation and alleviate national security concerns, but because of their limited use to date, they have done little to increase the supply of oil reserves or to reduce dependence on foreign imports.¹⁸⁵

Since the inception of the percentage depletion allowance and the IDC deduction, the United States has spent between \$370 and \$391 billion in tax subsidies for fossil fuels,¹⁸⁶ an average expenditure of approximately \$4.5 billion every year for the last eighty-seven years.¹⁸⁷ Moreover, these amounts represent the tax expenditure figure only, and do not include subsidies that directly and indirectly benefit the oil and gas industry or other externalities that are more difficult to measure. Taxpayers also support government subsidies for transportation

183. *See id.* at 323.

184. GAO, QUESTIONABLE MERIT, *supra* note 8, at 4.

185. *See* GAO, ALCOHOL FUELS TAX, *supra* note 9, at 6–7 (discussing the limited effect of a tax incentive for ethanol on petroleum imports).

186. Calculation of cumulative tax subsidies for fossil fuels on file with author. This figure was estimated using several different sources including the annual Joint Committee of Taxation Estimates of Federal Tax Expenditures, early estimates of oil and gas percentage depletion and intangible drilling cost deductions, early corporate tax return data, and oil consumption/revenue estimates for the United States. A number of other studies have come up with similar results for the annual amount, but no other study has estimated the cumulative investment amount.

187. *See id.* *See also* Doug Koplow & John Dernbach, *Federal Fossil Fuel Subsidies and Greenhouse Gas Emissions: A Case Study of Increasing Transparency for Fiscal Policy*, 26 ANN. REV. ENERGY & ENV'T 361, 366–67 (2001). The following reports, listed in Table 2 of the Koplow & Dernbach article, calculated annual expenditures on fossil fuel tax subsidies: EIA Report (1999–2000) estimated \$2.6–\$2.9 billion per year, MISI Report (1998) estimated \$6.81 billion per year, ICTA (1998) estimated \$8.4–\$15.8 billion per year, Koplow/Martin (1998) estimated \$3.9–\$6.8 billion per year, and Wahl (1996) estimated \$3.5–\$11.4 billion per year. Hwang Report (1995) estimated \$3.6–\$4.1 billion per year. Koplow Report (1993) estimated \$14.3–\$23.8 billion per year. EIA Report (1992) estimated \$3.7–\$4.3 billion per year. Heede Report estimated \$38.8 billion per year. Pacific Northwest Laboratories (1993, for Department of Energy) estimated \$8.0 billion per year. *Id.* The dollar amounts listed in each of these reports are in 1999 dollars. (The estimates for the tables in this article come from the Joint Committee Report, GAO estimates, the Pacific Northwest Laboratories Report (PNL), and from figures derived using the methodology established in the PNL report for fossil fuel incentive from 1918–1949.) The assessments were performed for both governmental and nongovernmental organizations, as well as consulting firms. The results were subject to review by an external peer review panel to reduce potential bias.

infrastructure, energy security costs, research and development subsidies, and Strategic Petroleum Reserve maintenance costs.¹⁸⁸ Furthermore, these figures do not take into account externalities that flow from fossil fuel use, such as localized pollution, agricultural crop losses and loss of visibility, planetwide environmental costs such as global warming, water pollution costs such as oil spills, noise pollution, the environmental impact of sprawl, and travel delays and subsidized parking, all of which cost Americans both money and quality of life.¹⁸⁹

The measurable impact of reforms is substantially higher when taking into account other programs that confer benefits on fossil fuels.¹⁹⁰ One report states that these other nontax programs contributed nearly thirty percent of the total subsidy-related costs.¹⁹¹ All the while, environmental concerns are multiplying. Perpetuating the fossil fuel lifestyle—and fossil fuel subsidies—is not the answer; fossil fuel use at the current rate is not sustainable over the long term and must not be encouraged via tax or other incentives.

B. Effect of Tax Benefits on the Alternative/Renewable Fuel Industry

The U.S. government could encourage taxpayers to decrease their dependence on fossil fuels by facilitating the development of alternative and renewable fuels and by encouraging greater efficiency when nonrenewable energy sources are used.¹⁹² Individually these strategies cannot significantly reduce fossil fuel use. Together, however, they can be effective. Increased commercial availability and reduced cost are necessary for widespread use and acceptance of renewable and alternative fuels to take hold. This section considers the role of tax incentives in achieving this goal.

Until renewable fuels are more commercially viable, alternative fuels that combine fossil fuels with renewable fuel are a technologically feasible option. Unfortunately, these alternative fuels still incorporate the use of fossil fuels. As a result, these “environmentally friendly” tax subsidies for alternative fuels still encourage continued dependence on

188. KIMBRELL ET AL., *supra* note 148, at 11.

189. *Id.*

190. See Koplou & Dernbach, *supra* note 187, at 373 (“Programs benefiting energy . . . contributed reductions of 34.7 million metric tons of carbon per year by 2035.”).

191. *Id.* at 373 n.3 (“These programs . . . include tax exempt municipal bonds . . . , subsidies to federal power marketing administrations . . . , Rural Utility Service subsidies, energy share of full user fee financing of water infrastructure . . . , and user fee financing for the Strategic Petroleum Reserve”)

192. Kenneth Gillingham et al., *The Effectiveness and Cost of Energy Efficiency Programs*, 155 RESOURCES 22, 22 (Fall 2004).

fossil fuels. In the long run, alternative fuels should therefore be phased out as renewable fuels become more viable.

The most significant alternative fuel tax provision, the credit or deduction for alcohol fuels, which constitutes over ninety-four percent of alternative tax incentives directed at reducing gasoline use,¹⁹³ grants a subsidy to fossil fuels mixed with an alternative fuel, typically alcohol or ethanol.¹⁹⁴ Although the incentive ostensibly encourages more efficient fossil fuel consumption, alternative fuel use has not resulted in lower fossil fuel consumption or reduced our dependence on cars.¹⁹⁵ In fact, both consumption and car use have increased despite these provisions. Since 1978, when Congress enacted most of the alternative fuel provisions, the United States has invested between \$30 and \$33 billion in alternatives through tax subsidies. During this same period, despite decreases in oil and gas incentives, the United States invested approximately \$106 billion in fossil fuels—three times what it spent on alternative fuels.¹⁹⁶ This kind of differential, not surprisingly, undercuts the likelihood of achieving successful results for alternative fuel technologies. To date, the tax subsidies for alternative fuels are too small, and they fail to target the real problem: fossil fuel dependence.

Alternative fuels have the potential to reduce petroleum consumption, reduce greenhouse gas emissions, and produce significant energy savings. Therefore, under a long-term strategy, moving to alternative fuels represents an intermediate step in the right direction. Unfortunately, several recent studies indicate that even with increasing purchases of alternative fuel vehicles by federal agencies, state governments, and private consumers, “alternative fuel use in the transportation sector remains very small.”¹⁹⁷

These reports also conclude that several critical factors hinder the public’s acquisition of alternative fuel vehicles and the use of alternative fuels. First, gasoline and crude oil prices remain relatively low.¹⁹⁸ The price of gasoline has simply not been high enough to

193. JOINT COMM., DESCRIPTION AND ANALYSIS, *supra* note 177, at 63. Estimates of the federal excise tax exemption for alcohol fuels are included in these figures, but no offset is provided for the “gas guzzler” tax.

194. See *supra* text accompanying notes 83–107 (detailing the various tax provisions).

195. See GAO, ALCOHOL FUELS TAX, *supra* note 9, at 6 (comparing petroleum imports and consumption from 1978 with those of today in light of increased ethanol incentives).

196. See Appendix for total CPI adjusted fossil fuel expenditures. This figure is the sum for 1979–2004.

197. GAO, IMPACT, *supra* note 10, at 1.

198. The average price of gasoline is \$2.79. See Douglas Stanglin, *Cheaper gas may juice Labor Day travel*, USA TODAY, Sept. 9, 2006, http://www.usatoday.com/travel/news/2006-09-01-laborday-travel_x.htm?csp=34. The price of U.S. crude oil is currently \$63.53 per barrel.

convince Americans to give up their conventional fuel vehicles in favor of alternatives. In addition, the United States has developed a massive refueling infrastructure and car-manufacturing system dedicated to gasoline-powered cars.¹⁹⁹ Compared to the refueling infrastructure developed around the gas-powered car, the limited number of refueling stations for alternative fuels makes their use extremely inconvenient for the average consumer.²⁰⁰ In 1999, a little over 6,000 refueling stations provided alternative fuels in the United States compared to over 180,000 conventional gas stations.²⁰¹ As a result, even if the price of gasoline rises substantially, many car owners will be reluctant to switch technologies because of the added inconvenience. One report states the “lack of adequate refueling infrastructure represents the biggest impediment to using alternative fuel vehicles.”²⁰²

Finally, alternative fuel vehicles are, on average, more expensive than conventional cars. Even hybrid vehicles, which are currently available, tend to cost \$2,500 to \$3,000 more than similar vehicles.²⁰³ The high cost reduces consumer demand. It is not surprising that the GAO concluded in one study that a very large tax incentive would be needed to result in any significant increase in the use of alternative fuel vehicles.²⁰⁴

Just as market-entry risk was used to justify tax incentives for the fledgling petroleum industry, the significant risks involved with entry

Reuters, *Oil's Rout Deepest in 16 Years*, N.Y. TIMES, Sept. 13, 2006, <http://www.nytimes.com/reuters/news/news-markets-oil-fall.html>.

199. See GAO, IMPACT, *supra* note 10, at 4 (providing rationale for Americans' failure to switch to alternative fuel vehicles). Since 1992, the Code offers taxpayers acquiring clean fuel refueling property a deduction up to \$100,000 of the cost of the property. I.R.C. § 179A(b)(2). This deduction will be replaced in 2005 with a tax credit equal to thirty percent of the cost of the property. I.R.C. § 30C. This type of provision helps in the development of the infrastructure supporting alternative fuel technologies.

200. See GAO, IMPACT, *supra* note 10, at 4 (highlighting the problem of limited refueling stations).

201. *Id.*

202. *Id.*

203. *Id.* at 4–5. Tara Baukus Mello, *The Real Costs of Owning a Hybrid*, EDMUNDS.COM, Mar. 28, 2006, <http://www.edmunds.com/advice/fueleconomy/articles/103708/article.html>. Several hybrids are currently available to consumers: the Chevrolet Silverado; the GMC Sierra; the Honda Accord, Civic, and Insight; the Lexus GS 450h and RX 400h; the Toyota Camry, Prius, and Highlander; the Ford Escape; and the Mercury Mariner. HybridCars.com, <http://www.hybridcars.com/cars.html> (last visited Sept. 12, 2006). See also DAVID L. GREENE & ANDREAS SCHAFER, PEW CENTER ON GLOBAL CLIMATE CHANGE, REDUCING GREENHOUSE GAS EMISSIONS FROM U.S. TRANSPORTATION 17 (2003), <http://www.pewclimate.org/docUploads/ustransp%2Epdf>.

204. See GAO, IMPACT, *supra* note 10, at 4 (“EIA estimated that doubling the price for crude oil . . . would not significantly increase the market share for alternative fuel vehicles.”).

into the alternative fuel market justify similar tax incentives. Studies evaluating the effectiveness of tax incentives for alternative or renewable fuel technologies indicate that subsidies are necessary to the development of this industry. The energy industry's entrenched infrastructure is nearly impossible to compete with absent federal tax incentives. Such incentives were instrumental in overcoming the risk factor and establishing the current petroleum industry,²⁰⁵ and they are as necessary now for the alternative fuel businesses as they were 100 years ago to overcome high initial start-up costs, minimize the risk associated with new industries, and signal to taxpayers support for these industries.

In 1978, when Congress enacted the first tax incentives designed to encourage environmental activities, it included wind power and solar power among those technologies it wanted to encourage.²⁰⁶ Then, in 1992, Congress enacted the production tax credit (PTC) to further encourage the production of electricity from wind. At the time of enactment, Congress indicated that the credit was "intended to enhance the development of technology to utilize the specified renewable energy sources and to promote competition between renewable energy sources and conventional energy sources."²⁰⁷ After enactment, the wind industry took off and the United States quickly became the world leader in the development of wind technologies.²⁰⁸ In large part due to Congress's failure to make the production tax credit permanent and to adopt renewable production standards,²⁰⁹ the United States has since

205. See GREENE & SCHAFER, *supra* note 203, at 48 ("Alternative fuels can only be successfully introduced with strong government involvement.").

206. See TONY DITZIK & ROB SARGENT, *ACHIEVING A NEW ENERGY FUTURE, HOW STATES CAN LEAD AMERICA TO A CLEAN, SUSTAINABLE ECONOMY 9-10 (2005)*, available at <http://ripirg.org/reports/achievinganewenergyfuture.pdf> (stating that wind capacity in the United States has already tripled in the last six years, and could double in the next five).

207. STAFF OF JOINT COMM. ON TAXATION, 109TH CONG., *PRESENT LAW AND BACKGROUND RELATING TO TAX CREDITS FOR ELECTRICITY PRODUCTION FROM RENEWABLE SOURCES*, at 7 (Comm. Print 2005) [hereinafter *TAX CREDITS FOR ELECTRICITY PRODUCTION*].

208. See *TAX CREDITS FOR ELECTRICITY PRODUCTION*, *supra* note 207, at 14. Since 1993, annual electricity production from wind has more than quadrupled.

209. Union of Concerned Scientists, *Renewing America's Economy* (July 2005), http://www.ucsusa.org/clean_energy/renewable_energy_basics/renewing-americas-economy.html. Many groups interested in increasing renewable energy use in the United States have advocated the adoption of a national renewable energy standard. In 2005, the Senate version of the Energy Policy Act of 2005 included a provision that would have required "all large electric utilities to gradually increase their use of wind, solar, and other renewable energy sources to at least ten percent by 2020." This provision was modeled after similar standards that already exist in twenty states. According to a number of studies, the provision would have reduced natural gas and electricity prices and provided significant economic and environmental benefits. Unfortunately, the Conference Committee dropped the provision. Another study compared the cost effectiveness of both the RPS and the PTC, finding that although both were effective in increasing the share of renewable electricity, the RPS was more cost effective and produced a

fallen behind while other countries have recognized the immense benefits from this renewable energy source. The American Wind Energy Association noted that:

The PTC, a key incentive, helps level the economic playing field for wind projects in energy markets where other forms of energy are also subsidized [H]owever, . . . the current “on-again, off-again” status of the credit is hobbling project development and the industry as a whole One major developer stated that a five year extension of the PTC would provide enough long-term certainty to squeeze an additional 25 percent out of vendor costs.²¹⁰

Unfortunately, Congress only extended the provision for two years in the 2005 legislation.²¹¹

Since the Reagan era, all of the energy tax legislation enacted by Congress has continued to provide tax relief for the oil and gas industry, with only modest incentives for conservation and alternative fuels.²¹² For example, in the most recent 2005 Energy Tax Act legislation, fossil fuel subsidies accounted for more than two-thirds of the total tax expenditures provisions for energy.²¹³ The various tax incentives available for conservation and renewable technologies represent a small fraction when compared with the country’s enormous investment in fossil fuels and its infrastructure.

Yet the potential for improved energy efficiency in the United States is immense.²¹⁴ One report states that with existing cost-effective energy efficiency improvements, electricity demand could be reduced by eleven to twenty-three percent below projected levels for 2010, and possibly up to thirty-five percent by 2020.²¹⁵ In fact, data on energy

greater environmental benefit. See Karen Palmer & Dallas Burtraw, *Electricity, Renewables, and Climate Change: Searching For a Cost Effective Policy* 6 (May 2004), RESOURCES FOR THE FUTURE, <http://www.rff.org/documents/RFF-RPT-Renewables.pdf>.

210. American Wind Energy Association, *The Economics of Wind* 4 (February 2005), <http://www.awea.org/pubs/factsheets/EconomicsofWind-Feb2005.pdf> (last visited Sept. 2, 2006).

211. In addition to the uncertainty connected to the sunset of this credit, the Joint Committee on Taxation notes the lack of uniformity in the value of the credit depending on the geographic location of the facility. The Committee notes, “[w]ith the tax credit equal for all taxpayers and because qualifying renewable energy sources are not uniformly available at equal cost, the credit is more valuable to investors in certain facilities in certain geographic locations, than for investors with similar facilities in other geographic locations.” As a result, the credit operates inefficiently by providing an equal credit to all facilities regardless of profitability (in the absence of the subsidy). TAX CREDITS FOR ELECTRICITY PRODUCTION, *supra* note 207, at 17.

212. See LAZZARI, ECONOMIC ANALYSIS, *supra* note 1, at 7.

213. See *id.* at 16.

214. Energy efficiency goes up when car engines or household appliances, for example, are redesigned in a way that enables them to provide the same use with less energy. See SISSINE, *supra* note 51, at 1.

215. DITZIK & SARGENT, *supra* note 206, at 9.

efficiency and conservation activities from 1973 through 1991 revealed an eighteen percent reduction in energy use from previous projections, saving about \$150 billion annually in total domestic energy expenditures.²¹⁶ In terms of environmental quality, one study estimated that by implementing a number of recently proposed conservation programs, annual carbon emissions would be reduced by about 3.5% and nontransportation energy consumption would be reduced by about 6%.²¹⁷ Energy efficiency policies, which address the demand side of the energy equation, are an inexpensive means to address the environmental and national security problems associated with fossil fuel use. The energy savings alone typically cover the cost associated with the policy change.

Tax incentives can help increase the market for new energy efficient products by reducing their cost and lowering the risk of production for manufacturers.²¹⁸ As a result of tax incentives, the public benefits from lower energy use, environmental quality improvements, and enhanced energy security.²¹⁹ One study estimated that tax incentives for new energy efficient homes, energy efficient upgrades to existing homes, and energy efficient upgrades to new and existing commercial buildings could save eleven quadrillion Btus of energy through 2025, ultimately saving consumers over \$88 billion during the same period.²²⁰

On the positive side, the government's cost to implement the tax incentives included in the 2005 Energy Tax Incentive Act is far less than it will realize from the energy efficiency improvements, not including the cost savings from environmental quality improvements.²²¹ Moreover, tax deductions and credit for energy conservation could significantly increase the likelihood that individuals and businesses will invest in alternative fuel technologies.²²² To the extent that policy

216. SISSINE, *supra* note 51, at 3.

217. Gillingham et al., *supra* note 192, at 24.

218. Alliance to Save Energy, *Fact Sheet: Energy Efficiency Tax Incentives* (May 2005), www.ase.org/files/2862_file_Tax_Incentive_Extension_FACT_SHEET.pdf [hereinafter *Alliance to Save Energy, Fact Sheet*]. The estimates are based on information from the American Council for an Energy Efficient Economy.

219. Gillingham et al., *supra* note 192, at 22.

220. *Alliance to Save Energy, Fact Sheet, supra* note 218. Total annual national energy consumption is 100 quadrillion Btu's. The information provided in the report does not, however, provide enough information to determine whether the new tax incentives contained all of the features advocated by the Alliance to Save Energy.

221. Patrick Quinlan et al., *Tax Incentives for Innovative Energy-Efficient Technologies (Updated)*, ix-x (October 2001), available at <http://www.aceee.org>.

222. See Kenneth Gillingham et al., *Retrospective Examination of Demand-Side Energy Efficiency Policies*, RESOURCES FOR THE FUTURE 35 (June 2004, revised Sept. 2004) (referring to a study by Hassett and Metcalfe).

makers are able to identify incentives that encourage environmentally sound behavior and result in both environmental and monetary savings, Congress must be more proactive in adopting such incentives.

IV. DEVELOPMENT OF COST-EFFECTIVE TAX INCENTIVES FOR THE EMERGING U.S. ALTERNATIVE ENERGY MARKET

Despite rhetoric claiming a commitment to the development and implementation of alternative and renewable energy and to overcoming our devastating oil habit, the numbers tell the truth: to date, Americans have only dabbled in alternatives. Tax incentives enacted to encourage alternative fuels are too small and do little to change the infrastructure that supports nonrenewable fuels. Put simply, the incentives are insignificant and fail to address the real problem—dependence on fossil fuels. On the other hand, the same tax incentives that subsidized fossil fuels fifty years ago still do so today. This combination of provisions, by and large, has been ineffective in solving any of the problems associated with fossil fuel dependence. Though Congress has limited fossil fuel subsidies somewhat over the years and enacted a few “environmentally friendly” tax subsidies since the 1970s, policy makers, hampered by politics, are slow in formulating a long-range plan for dealing with fossil fuel dependence through tax policy or elsewhere. Policy makers must focus on identifying features of the various tax incentives that correlate positively with their goals: stimulating alternative fuel technology, promoting investment in and public acceptance of renewable energy sources, conserving energy, and increasing efficiency of traditional energy technologies.

Carefully crafted tax incentives are a vital tool that can assist policy makers in moving the nation toward a sustainable energy future. The effectiveness of energy tax incentives used to develop the petroleum industry reveals a number of important lessons that should be considered when formulating incentives to develop alternative energy sources.²²³ Promoting the commercialization of advanced technologies and assisting their establishment in the marketplace can be facilitated through tax incentives.²²⁴ Policy makers should prioritize developing those technologies that will have the most significant impact in reducing energy use and greenhouse gas emissions. To be most effective, incentives should be substantial enough to overcome barriers to market entry and target technologies where the primary obstacle to development is the initial cost. Governments also need to be flexible in

223. See Quinlan et al., *supra* note 221, at 2.

224. *Id.*

terms of who receives incentives and must allow adequate time before eliminating them. Finally, tax incentives need to be incorporated into a comprehensive mix of policy instruments, operating in harmony with other initiatives.

The Energy Tax Incentives Act of 2005 has both succeeded and disappointed based on these criteria. First, the vast majority of its tax incentives will expire at the end of 2008.²²⁵ To be most effective, the incentives should be left in place for at least a ten-year period.²²⁶ Because these new incentives will expire within a short time, individuals and businesses that might have utilized the credits may not even know they are available before the credits are phased out. Even taxpayers interested in investing in new technologies subject to the incentives may have difficulty finding those technologies in the market.

Additionally, some of the most cost-efficient and energy-efficient tax credit proposals were not enacted. For example, a ten-percent credit for Combined Heat and Power Systems, which has an estimated benefit-to-cost ratio of 3:1, was not enacted.²²⁷ On the other hand, the \$2 billion the government is spending on energy efficiency tax incentives will save 2.5 quadrillion Btu, or about two percent of projected energy use in 2020, will reduce energy bills by more than \$20 billion, and will reduce carbon dioxide by about fifteen million metric tons,²²⁸ making it apparent that energy-saving tax measures can produce significant cost savings and contribute to environmental improvements.

CONCLUSION

In conclusion, despite the federal government's acknowledgement of the serious problems created by fossil fuel use, and the inescapable reality that domestic supplies are insufficient to meet our ever-growing needs, the national response to this looming crisis has largely failed to provide a comprehensive strategy for battling the nation's dependence on oil. For many decades now, America's leaders have understood the sobering realities that stem from our reliance on fossil fuels. Because domestic supplies are insufficient to keep up with domestic demand, our insufficient oil reserves leave us vulnerable in times of war. Also, relying on foreign sources of oil leaves the United States financially

225. See Steven Nadel, *The Federal Energy Policy Act of 2005 and Its Implications for Energy Efficiency Program Efforts*, AMERICAN COUNCIL FOR AN ENERGY EFFICIENT ECONOMY ii (Sept. 2005).

226. Quinlan et al., *supra* note 221, at 3.

227. *Id.* at 27–28.

228. Nadel, *supra* note 225, at 15.

vulnerable to foreign governments.²²⁹ Fossil fuel use also degrades the environment and contributes to related health and social problems.

America has poured trillions of dollars into increasing the domestic oil supply. Despite some fuel efficiency improvements, however, oil consumption and importation continue to rise.²³⁰

The United States' experience in subsidizing the development of the fossil fuel industry can provide valuable lessons when evaluating options for shifting to renewable energy technologies. Congress must formulate a strategy to eliminate fossil fuel subsidies in favor of alternatives. Tax incentives can play an important role in achieving that goal.

229. See U.S. GEN. ACCOUNTING OFFICE, GAO/RCED-97-6, ENERGY SECURITY: EVALUATING U.S. VULNERABILITY TO OIL SUPPLY DISRUPTIONS AND OPTIONS FOR MITIGATING THEIR EFFECTS 2 (1996); See also 2004 ANNUAL ENERGY REVIEW, *supra* note 12, at 164, fig. 5.17 (graphing crude oil imports for SPR).

230. American imports of oil constitute over sixty percent of consumption. LAZZARI, ECONOMIC ANALYSIS, *supra* note 1, at 10.