# Federal Financing of Green Energy: Developing Green Industry in a Changing Energy Marketplace

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## I. Introduction

The current U.S. energy crisis, i.e., the disrupted delivery of electricity to California and other western states, demonstrates the urgent need to obtain a more diverse supply of energy resources for power and fuel production. However, heightened public and scientific concern about global warming has generated even more concern that use of these sources does not create undesirable levels of greenhouse emissions.[1] The increased demand for power will require a balanced energy strategy that includes divergent sources and regional-specific solutions, including alternative energy and more efficient

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1. *See, e.g.*, NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMY OF SCIENCES, CLIMATE CHANGE SCIENCE: AN ANALYSIS OF SOME KEY QUESTIONS (June 2001), *available at* http://www.nap.edu.

energy-production technology. One of the ongoing goals of the U.S. Government has been to encourage the private sector's use of environmentally friendly green technologies in the energy marketplace.

Since its inception in 1977, the U.S. Department of Energy (DOE)[2] has helped various industries in the U.S. energy sector by providing financial assistance for the construction of energy facilities in order to achieve the goals of the National Energy Policy.[3] This Article discusses how DOE collaborates with industry to put new technologies into a changing energy marketplace. This Article also reviews the types of project financing—and their successes and failures—that have been used in the past as well as those currently available. Finally, this Article predicts the future kinds of project financing that will be needed to achieve the goals of the current national energy strategy. The demands of the changing energy marketplace and the potential rate of return on investment may well attract early participation by private-sector investors.

## II. Early Use of the Federal Loan Guarantee for Energy Projects

In the late 1970s, responding to the continuing dependence of the United States on foreign sources of energy and the unavailability of sources of capital financing for building alternative energy projects, Congress authorized loan guarantees for the construction of commercial energy projects that use alternative energy sources. These loan guarantees encouraged private capital markets to finance projects that were considered risky due to such factors as the volatile price of oil, the use of new technology associated with developing alternative energy sources, and the problems associated with increasing the size of pilot projects to commercially feasible levels.[4]

Congress selected the use of loan guarantees, rather than grants or direct loans, as a tool for the Federal Government to promote alternative energy projects because it wanted to encourage private-sector capital markets to participate in the energy sector.[5] The federal loan guarantee instrument generally fit well within the newly developing arena of nonrecourse energy

2. The U.S. Department of Energy was established by the DOE Organization Act, Pub. L. No. 92–91 (1977), 42 U.S.C. §§ 7301 et seq. DOE is the primary manager of the Federal Government's energy functions, which include implementing a national energy strategy and conducting a comprehensive energy research and development program. DOE has been primarily responsible for managing the various energy-financing programs enacted by Congress.

3. The Bush administration issued its energy policy in May 2001 in a document titled "National Energy Policy—Report of the National Energy Policy Development Group," dated May 16, 2001.

4. *See generally* Staff of the Task Force on Energy of the Committee on the Budget, 94th Cong., Report on Energy Financing 3–8 (Comm. Print 1976).

5. *Id.* at 4–5.

project financing[6] by allowing DOE to support projects through the well-established commercial due diligence procedures used by commercial banks and investment banking houses. It also allowed traditional private-sector financing markets to invest in what normally would be regarded as high-risk, new-technology ventures. Federal loan guarantees supported new energy production facilities that used synthetic fuel conversion from coal and oil shale, alcohol fuel production, and geothermal generation.[7] However, many project sponsors defaulted on the loans and abandoned their projects. In many cases, by the time the facilities were put into operation, the energy market had changed or the technology was not proven economical in the industry. By 1989, DOE no longer used the federal loan guarantee to support the financing of energy projects.

### A. *Synthetic Fuel Loan Guarantees*

In the late 1970s, Congress provided $2.2 billion to initiate a demonstration program to foster a domestic synthetic fuel capability.[8] These funds were to underwrite loan guarantees of up to 75 percent of the project cost of commercial, nonrecourse project debt financing for the construction and start-up costs of producing synthetic fuels from the conversion of coal, oil shale, and other fossil resources.[9]

One project that DOE guaranteed was the $2.2 billion Great Plains Coal Gasification Facility in North Dakota. After it was completed in 1985, the five partners of the Great Plains Gasification Associates defaulted on their $1.5 billion DOE loan and abandoned the plant to DOE. The department foreclosed on the plant, operated the facility for two years, and earned more than $100 million in profits (without the burden of paying debt service). In 1988, DOE sold the Great Plains facility to Dakota Gasification Company. Without having to account for the debt service on the project, Dakota Gas has posted a profit in the past twelve years of operation. Under the sale arrangements, DOE will share in revenues of the facility until 2010. Given

6. "Nonrecourse project financing" is a type of financing in capital-intensive industries in which a project's financial backing is based upon the ability of the project's potential cash flow to pay off project debt, rather than relying upon the creditworthiness of the project sponsors. Under this type of project financing, the debt, equity, and credit enhancement are combined for the construction and operation of a facility. The assets of the facility, including the long-term revenue-producing contracts, become the collateral for the lenders. *See generally* Scott L Hoffman, The Law and Business of International Project Finance 4–11 (1998).

7. *See generally* John G. Reed & Helena M. Tavares, *Governmental Energy Financing Programs, in* Energy Law and Transactions (David J. Muchow & William M. Mogal eds., 1997).

8. Department of Interior and Related Agencies Appropriations Act of FY 1980, Pub. L. No. 96–126, 93 Stat. 954, 970–3 (1979).

9. Federal Nonnuclear Energy Research and Development Act of 1974; Pub. L. No. 93–577, § 19, 88 Stat. 1878 (1974), *amended by* Pub. L. No. 95–238 (1977), 42 U.S.C. § 5919 (1977).

optimistic market projections for the plant, DOE's original investment in the facility should be recovered (in adjusted dollars) by 2007.

DOE provided guarantee commitments for two other projects under the synthetic fuel loan guarantee program. The $1.1 billion Tosco Oil Shale Project and the $800 million Union Oil Parachute Creek Oil Shale Project, both in Colorado, were eventually transferred to the now-defunct U.S. Synthetic Fuels Corporation.[10] The Tosco project was not completed and the government guarantee was never executed. The Union Oil project received a loan guarantee of $327 million for equipment modification and a price guarantee of $173 million from the Synthetic Fuels Corporation in 1987.

During its short life, the U.S. Synthetic Fuels Corporation provided financial commitments to five other projects, including the two synthetic fuel projects transferred from DOE. Three were completed: the Cool Water Coal Gasification Plant in the Mojave Desert ($120 million price guarantee), the Dow Chemical Coal Gasification Plant in Plaquemine, Louisiana ($620 million price guarantee), and the Wood County, Texas, heavy oil project ($60 million loan guarantee).

### B. *Alcohol Fuel Loan Guarantees*

Another DOE program issued loan guarantees to facilitate the construction of alcohol production facilities.[11] These guarantees underwrote up to 90 percent of the private project debt financing, which covered up to 90 percent of the total project costs.

Seven projects received conditional DOE commitments, but the department entered into only three loan guarantees that resulted in the construction of ethanol production facilities before the statutory authority expired in 1985.[12] Of the three, the $147 million New Energy Company ethanol facility in South Bend, Indiana, has been in operation since 1984. DOE paid out on the guarantee after New Energy defaulted in 1987. After several refinancings with DOE and under new ownership, New Energy has become a major ethanol producer in the Midwest.

The two other alcohol loan guarantees were less successful. DOE stopped construction of the $90 million Agrifuels plant in New Iberia, Louisiana, by withholding additional funding in 1987. DOE paid out $70 million on the guarantee and acquired the facility by foreclosure in 1987. The plant was

10. The U.S. Synthetic Fuels Corporation was a short-lived corporation owned by the U.S. Government and established in 1980 under Title I of the Energy Security Act, Pub. L. No. 96–294, 94 Stat. 611, 633 (1980), 42 U.S.C. §§ 8702 et seq. The corporation expired in 1986.

11. Biomass Energy and Alcohol Fuels Act of 1980, Title II of the Energy Security Act of 1980, Pub. L. No. 96–294, 94 Stat. 611, 683 (1980).

12. Comprehensive Omnibus Budget Reconciliation Act of 1986, Title VII, Subtitle E, § 7301, Pub. L. No. 99–272, 100 Stat. 82, 143 (1986).

sold for salvage value three years later. The $90 million Tennol Ethanol facility in Jasper, Tennessee, met a similar fate. In 1986, the completed facility could not reach operating levels without the infusion of more capital. The lender foreclosed on the property and DOE paid out on the $60 million guarantee. DOE took title to the reconverted plant in 1988 and sold the facility, which was then dismantled and reconfigured, in 1991.

### C. *Geothermal Loan Guarantees*

DOE entered into eight geothermal loan guarantees[13] that supported the development of various uses of geothermal power for a total commitment of nearly $300 million. These projects primarily used geothermal power to generate electrical energy. The loan guarantees backed project debt of up to 75 percent of total project costs. The authority for DOE to enter into geothermal loan guarantees has now expired.[14]

The geothermal loan guarantee program achieved mixed results. Although four project sponsors have fully repaid their loans, DOE has had to pay off on its guarantee on the other four. One major success story was Ormesa Geothermal, which used its DOE guarantee commitment to build a 30-megawatt, $75 million, electric generating facility that uses geothermal power in Imperial Valley, California. Ormesa paid off its loan within five years and used its experience with the Imperial Valley project to get financing through the private sector for four other generating facilities in southern California. Ormesa now is a major independent power generator in that region.

## III. Current DOE Project Financing Instruments

The use of the loan guarantee mechanism to finance new technologies for energy-production facilities was unsuccessful. By guaranteeing a substantial portion of each project's debt, the Government assumed responsibility for the project's risk instead of transferring it to the usual risk takers, i.e., developers, EPC contractors, and lenders. The nature of the Government's due-diligence practice did not take into account the market realities of the completed production facilities. The Government based its financing decisions on whether the technology was innovative and could solve current technological shortcomings in the industry, and failed to follow standard due-diligence practices that emphasize the financial viability of that technology in the marketplace and whether that technology would be adopted by in-

13. The Geothermal Energy Research and Development and Demonstration Act, Pub. L. No. 93–410, Title II, 88 Stat. 1086 (1974), *amended by* 30 U.S.C. §§ 1141 et seq., authorized DOE to enter into loan guarantees of up to 75 percent of project costs to encourage the private sector to develop geothermal resources.

14. 30 U.S.C. § 1143 (1980).

dustry. Once facilities were constructed, if the technology was not commercially viable, both the developer and investors could default on the loan and abandon the plant in a nonrecourse environment, leaving the Government to pay on the guarantee and to operate the facility or liquidate the assets. To encourage the development of commercially viable energy technologies, the Government had to rely on an industry risk analysis and require that the developer and debt participants share in the proportionate risks associated with deployment and commercialization.

Future federal loan guarantee programs in the energy sector should be based on technologies that have proven commercial viability and are on the verge of adoption by industry. Such programs should not develop and demonstrate new technologies, but rather should encourage long-term debt participation and other credit enhancements by the private sector in new, but proven, green technologies that are in the process of being adopted by industry.

By 1987, DOE began looking at risk sharing through the use of cooperative agreements. A cooperative agreement[15] is an instrument through which the Government provides financial assistance to a project sponsor, on a cost-sharing basis, without taking an equity or security interest in the venture. In return for this investment, the Government has a substantial involvement in the project to ensure that the technology is developed and demonstrated, and that public interest goals of commercialization are furthered.[16]

Although cooperative agreements are not traditional financing instruments in energy project financing, funds derived for this source can be treated by the project sponsor as equity. The agreements also provide confidence to other equity and debt participants of the project's technological merit and feasibility. In most instances, the involvement of DOE has attracted new financial support for the project from traditional project-financing sources.

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15. A "cooperative agreement" is an instrument authorized by the Federal Grant and Cooperative Agreement Act of 1977, Pub. L. No 95–223, 31 U.S.C. §§ 6301 et seq., and is similar to a grant in that the subject of the agreement is to fulfill a public purpose as established by statute. Like a grant, there is no legal requirement for a recipient to pay back the Government share or for the Government to recoup its investment from future profits. Unlike a grant, the Government retains a role of substantial involvement in the subject activity.

16. Rights to intellectual property developed under DOE cooperative agreements can be complex. *See* 10 C.F.R. § 600.27 (2000). As a general matter, the rights to intellectual property depend on the corporate nature of the entity that receives federal funds. If the entity is a small business or a not-for-profit corporation, title to inventions developed under the effort become property of the project sponsor. If it is a large corporate entity, title to inventions remains with the Government subject to a request for the Government to waive title. The Government almost always waives its title in favor of the private-sector participants, but it retains a nonexclusive license to use the invention for government use and for march-in rights if the invention is not commercialized. Data developed under the effort normally may be protected from disclosure for up to five years. *See* 42 U.S.C. § 13541(d) (1995).

### A. *Cost Sharing Cooperative Agreements*

#### 1. Clean Coal Technology Demonstration Projects

Coal, as an energy source, constitutes 23 percent of U.S. energy consumption[17] and is the most available resource in the United States. Consumption, however, is also a leading contributor to greenhouse gas emissions. Future use of U.S. coal reserves will necessitate the development of more efficient and cleaner utilization technologies. Congress authorized the DOE's Clean Coal Technology Demonstration Program in 1985 as the U.S. Government's major initiative for coal to reach its full potential as a source of energy (for both home and abroad) by encouraging the development of highly efficient, environmentally sound, and competitive coal utilization technologies. The project sponsor finances at least 50 percent of the total cost of the project under cooperative agreements negotiated with DOE. [18] The purpose of the program is to introduce these technologies to the marketplace through commercial demonstration at a scale large enough for the private sector to judge their commercial potential and readiness.[19]

The Government shares in the profits and revenues of a successful project to the extent that its contribution is fully paid back. DOE negotiates the basis of payback. Although the department receives no security interest in the facility, it retains monitoring and oversight authority, retains rights to ensure that the technology will be commercially available, and negotiates recoupment schedules.

In the fifteen years since the program's conception, DOE has contributed $1.8 billion in cost-share financing for thirty-eight projects, of which twenty-two have resulted in completed projects that have shown commercial feasibility. Sixteen are currently active, of which fifteen had sales of a fully demonstrated and commercialized clean coal technology. The financial commitment from project sponsors for these projects is $3.5 billion, resulting in an overall cost share for the program of 34 percent Government and 66 percent private sector.[20] Building on the success of the Clean Coal Technology Demonstration Program, the Bush administration currently is seeking a $150 million appropriation for FY 2002 as a down payment on a $2 billion, ten-year clean coal initiative.[21]

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17. Energy Information Administration, U.S. Department of Energy, Annual Report (2000).

18. The authorizing legislation for the Clean Coal Program is contained in the Department of Interior and Related Agencies Appropriation Act for FY1986, Pub. L. No. 99–190, and has continued in subsequent funding legislation.

19. *See generally* Assistant Secretary for Fossil Energy, U.S. Department of Energy, Clean Coal Technology Demonstration Program — Program Update 2000, *at* http://www.lanl.gov/projects/cctc/resources.pdfsprog/cctupdat/cct_pgm_2000_all.pdf.

20. U.S. Department of Energy, DOE Fossil Energy-Clean Coal Technology—President Bush's Comments, *at* http://www.fossil.energy.gov/coal_power/cct/cct_2000.shtml.

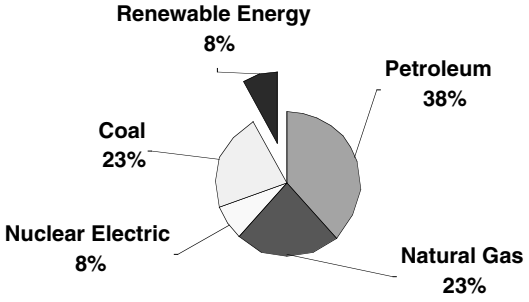
21. *Id.*

## 2. Alternative Energy Power Generation

Electric power outages in the western United States in 2000 and 2001 have brought home the undeniable reality that demand for power will outpace supply in the immediate future. New sources of electric generation must and will be tapped to supply the ever-increasing demand that the high-tech and consumer-oriented U.S. economy requires. Renewable energy consumption in the United States increased 3 percent between 1998 and 1999 to more than seven quadrillion British thermal units (Btu), accounting for almost 8 percent of total U.S. energy consumption (see Exhibit 1).[22]

A significant national goal is to meet future demand for electric power without compromising the nation's environmental standards. In tandem with that goal, the primary objective of the Federal Government's power technology development program[23] is to invest in a competitive diversity of new energy systems for power generation using such technologies as photovoltaic,[24] solar,[25]

*Exhibit 1*
*U.S. Energy Consumption by Choice, 1999*
*All Energy Sources*
*(94.4 Quatratrillion Btu)*



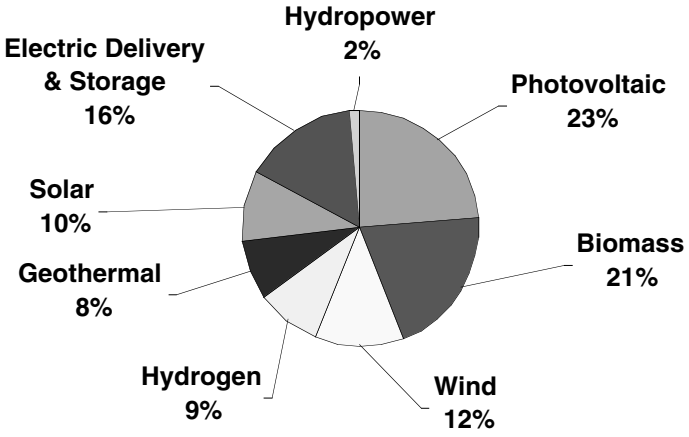

22. Energy Information Administration, U.S. Department of Energy, Renewable Energy Annual Report 2000 (Mar. 2001) (contains 1999 data), *available at* http://www.eia.doe.gov/cneaf/solar.renewables/page/rea_data/highlights.html.

23. *Energy and Water Development Appropriations for 2001: Hearings Before the Subcomm. on Energy and Water Dev., House Comm. on Appropriations,* 106th Cong. 1094 (2000).

24. *See Energy and Water Development Appropriations for 2002: Hearings Before the Subcomm. on Energy and Water Dev., House Comm. on Appropriations,* 107th Cong. 1591 (2001). Targeted for development are new high-efficiency devices and silicon crystal growth methods for thin film wafer silicon technologies for photovoltaic devices and overall reliability of the entire PV system, including balance-of-system components such as inverters. Among the objectives are in situ process diagnostics and intelligent processing for integrated module manufacturing scale-up.

25. *Id.* at 1590. Because of their inherent flexibility and scalability, solar technologies encompass a wide range of applications, including large-scale power production using concentrated solar power, onsite electric generation, and thermal energy for space heating and hot water. The goals of the development and demonstration efforts are to improve performance and reliability and reduce costs.

*Exhibit 2*
*U.S. Funding of Alternative Power Technologies*
*Total Funding FY 2001—$330 Million*




geothermal,[26] biomass, [27] wind, [28] and hydrogen fuel cells[29] in both distributive power transmission systems as well as on grid applications (and hybrids). In 2001, more than $330 million of federal funding was allocated for projects that involve research, development, and demonstration of these technologies. More than 50 percent of these funds are used for direct DOE financing of developmental and demonstration power and delivery projects through cost-sharing cooperative agreements.

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26. *Id.* at 1217. Technology improvements can reduce the costs of generating geothermal power to 3 cents per kilowatt-hour by 2010 (as compared to five cents to eight cents in 2000). Improved methods of exploration and drilling for deeper thermal resources need additional attention.

27. *Id.* at 1585. The Biomass Power Program develops technologies and processes that convert promising biomass feedstock into electric power through co-firing with coal or through gasification, which is then combusted to generate power through thermochemical conversion.

28. *Id.* at 1239. Wind has shown high promise for becoming a major supply of low-cost, clean energy in many parts of the United States. The next generation of wind turbines is targeted to achieve a cost of three cents per kilowatt-hour at class 6 (15 m.p.h. annual average) wind sites by 2004.

29. *Id.* at 1589. The promise of safe, cost-effective hydrogen technology as an energy carrier, which can power pollution-free, carbon-free cells, makes it a critical player in future energy portfolios. In the near term, technology will be developed to produce hydrogen from natural gas; in the long term, technologies will be developed that will produce hydrogen cost effectively from renewable sources. On January 9, 2002, the Bush administration announced a major new research and development (R&D) effort with the nation's automobile manufacturers to develop hydrogen fuel cells as the primary fuel for cars and trucks. This program, called Freedom CAR, will be the major public/private partnership for R&D in the American transportation sector in the next decade. *See* www.energy.gov/HQDocs/speeches/2002/janss/FreedomCAR.html.

Exhibit 2 outlines the current funding profile for federal financing of the various alternative power technologies for 2001.[30]

The level of federal cost sharing in technology projects under cooperative agreements depends on how far advanced the technology's development is. If the project technology is at the research or development phase, the federal cost share can rise to the level of 80 percent of project costs. However, if the power project is a commercial-scale demonstration project, the law limits the federal share to no more that 50 percent of total project costs.[31] Normally, projects are selected through a competitive process under a public solicitation for applications issued from the DOE Office of Power Technologies.[32] Negotiation of awards of the cooperative agreements normally takes two months after selection. All projects must undergo a federal environmental review before funds can be released. When a consortium of firms participate in a large demonstration project, as frequently happens, the primary project developer acts as an agent for the consortium and contracts with DOE. The primary developer must be a U.S.-owned corporation. Although the other participants may be foreign-owned entities, the overall project and the resulting intellectual property must be shown to benefit the domestic economy.[33]

### 3. Biofuels Energy Systems

One objective of the U.S. Government is to stimulate the creation and early adoption of technologies needed to make biobased products and bioenergy cost competitive in large national and international markets.[34] DOE regards partnering with entities from the agriculture and fuel development industries to be essential for establishing a bioethanol industry in the United States.[35] Looking at technologies that can convert a wide variety of agricultural feedstocks into ethanol, DOE will invest in commercial-scale demonstration projects through cooperative agreements that require at least 50 per-

30. Conference Report to the Energy and Water Development Appropriations Act for FY2001, H.R. Rep. No. 106–907, at 127, 128 (2000).

31. Energy Policy Act of 1992, Pub. L. No. 102–486, § 302(a), (b), 42 U.S.C. § 13542(a), (b) (1995). However, separate waivers of cost share provisions are contained in those subsections. Reduction of the private-sector cost share for research and development can be approved if the activity consists of basic or fundamental research. Reduction of cost share for demonstration and commercialization projects can be approved if the technological risks are high and the project is important to accomplish the goals of the program. *Id.*

32. *See* Golden Field Office, DOE, Business Opportunities *at* http://www.golden.doe.gov/businessopportunities.htlm, and Office of Energy Efficiency & Renewable Energy, DOE, Solicitation (for current solicitations) *at* http://www.eren.doe.gov/solicitation.html.

33. Energy Policy Act of 1992, Pub. L. No. 102–486, § 2306, 42 U.S.C. § 13525 (1995). The Office of the U.S. Trade Representative must concur with DOE determinations on whether a U.S. corporation that is owned by a foreign corporation meets the test of § 2306.

34. Exec. Order No. 13134, 64 Fed. Reg. 44,639 (1999).

35. Biomass Research and Development Act of 2000, Title III of the Agriculture Protection Act of 2000, Pub. L. No. 106–224, 114 Stat. 428 (2000).

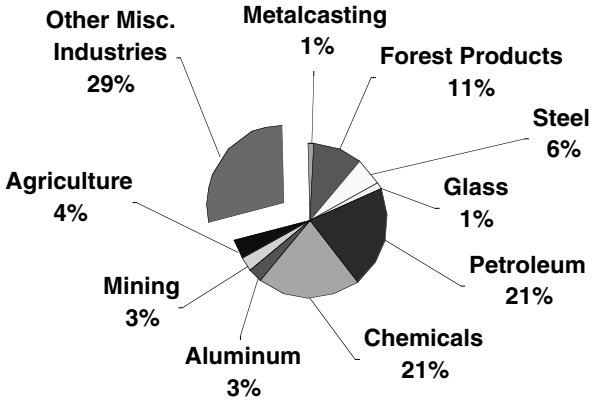
cent cost share. In 2001, Congress provided $46 million to continue this program.[36] DOE's approach is to highly leverage its available funding,[37] as demonstrated by it $6 million investment, which has generated project financing for a $120 million ethanol production plant in Louisiana.

## 4. Heavy Industry Energy Efficiency Projects

American manufacturing and extracting industries consume about 38 percent of all energy used in the United States.[38] More than 80 percent of the energy consumption in American manufacturing occurs in seven process industries: forest products, steel, aluminum, metal casting, glass, chemicals, and petroleum. Mining and agriculture are major energy users in the extraction industry. The seven industries, mining, and agriculture all require high levels of capitalization and face stiff international competition as well as considerable commercial risk associated with adopting new technologies. All of these factors limit corporate investment in advanced research and development for energy-efficient processes and pollution prevention.

DOE's Industries of the Future Program targets these nine industries (see Exhibit 3)[39] by entering into cost-sharing cooperative agreements for projects that develop and demonstrate industrial processes to reduce energy con-

*Exhibit 3*
*Energy Use by Industry*
*Industries of the Future*




36. H.R. Rep. No. 106–907, *supra* note 30, at 127.
37. *See* Golden Field Office, *supra* note 32.
38. *See Department of the Interior and Related Agencies Appropriations for 2001: Hearings Before the Subcomm. on Interior, House Comm. on Appropriations*, 106th Cong. 1057 (2000).
39. *Department of the Interior and Related Agencies Appropriations for 2002: Hearings Before the Subcomm. on Interior, House Comm. on Appropriations*, 107th Cong. 847 (2000) (source of Exhibit 3).

sumption and adverse environmental impacts.[40] These partnerships allow the industry participants to determine the developmental needs so that the technology is adopted by the industry after demonstration. More than 140 technologies have been successfully demonstrated and reached the marketplace under this program[41] with significant energy savings to industry and positive environmental impacts for the United States. These cooperative agreements are subject to the same 50 percent cost-sharing and domestic ownership restriction as discussed in section III.A.2. above. Approximately $175 million was funded for this program in 2001.[42]

### 5. International Power Projects

One DOE program supports deployment of U.S. energy efficiency and renewable energy technologies by countries with economies in transition and in the developing world.[43] The intent is to assist these countries in meeting energy development needs and in reducing greenhouse gas emissions by the export of U.S. green technologies. Current funding for this program is $5 million.[44] One goal is to cosponsor ten energy project developments in key regions in the developing world to enhance generating capacity by using U.S.-developed renewable energy technology.[45] This sponsorship is accomplished with financial support from the U.S. Initiative on Joint Implementation.[46] Projects are funded through the International Utility Efficiency Partnership (IUEP) based on competitively awarded projects that reduce carbon dioxide emissions using voluntary market-based mechanisms. Although selected projects do not involve cooperative agreements with DOE, they are subject to the DOE-approved requirements of the IUEP organization.

## B. *National Laboratory Participation in Projects*

The Federal Government spends over $20 billion a year on research and development at over 700 federal laboratories, which employ one-sixth of the

40. *See* Office of Industrial Technologies, U.S. Department of Energy, Solicitation *at* http://www.oit.doe.gov/news/solicitations.shtml.

41. *See* Office of Industrial Technologies, DOE: Summary of Program Results (Jan. 2001), *available at* http://www.oit.doe.gov.

42. Conference Report to the Interior and Related Agencies Appropriation Act for FY2001, H.R. Rep. No. 106–914, at 219 (2000).

43. The statutory basis for DOE's international renewable energy program is the Energy Policy Act of 1992, Pub. L. No. 102–486, § 1608, 42 U.S.C. § 13387 (1995), which requires program coordination between DOE and the U.S. Agency for International Development.

44. H.R. Rep. No. 106–907, *supra* note 30, at 103.

45. *See Hearings, Energy and Water Development Appropriations for 2002, supra* note 24, at 1210–16.

46. The U.S. Initiative on Joint Implementation (USIJI) is a U.S. interagency program led by DOE that supports the United Nations Framework Convention on Climate Change.

nation's scientists and research engineers.[47] Before the late 1980s, the private sector had little, if any, access to using the research conducted at these installations for commercial application because there was either no authority or no financial incentive to work with federal research institutions in cooperative research ventures. Beginning in the eighties, Congress enacted legislation to improve the transfer of commercially useful technologies from the federal labs to the private sector.[48] Congress encouraged federal labs to enter into cooperative research and development agreements (CRADAs) with private industry as a means of technology transfer to benefit both sides of the partnership.[49]

The DOE complex of government-owned, contractor-operated National Laboratories[50] is the largest and most extensive in the Federal Government. By 2000, approximately 700 active CRADAs were in place with private business to achieve both the objectives of its research and development programs, as well as to provide technology commercialization opportunities for business. Although CRADAs generally do not result in the construction of full-scale energy production facilities, industry has used the technology available under these CRADAs to foster energy-development projects. Moreover, in many instances, DOE encourages developers that receive project financing under DOE cooperative agreements to obtain technical assistance from DOE laboratories under concurrent CRADA instruments.

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47. *See* S. Rep. No. 99–283, 99th Cong., 2d Sess., at 1–2 (1986), *reprinted* in 1986 U.S.C.C.A.N. 3442.

48. *See, e.g.*, Federal Technology Transfer Act, Pub. L. No. 99–502, 100 Stat. 1785 (1986); Stevenson-Wydler Technology Innovation Act of 1980, Pub. L. No. 96–480, 94 Stat. 2318 (1980); National Competitive Technology Transfer Act of 1989, Pub. L. No. 99–502 (1989); National Technology Transfer and Advancement Act of 1995, Pub. L. No. 104–113 (1996). Under Cooperative Research and Development Agreements (CRADAs), the laboratory and the industrial partner share the intellectual property brought into and created through the CRADA activity. Technical data produced under the CRADA are protected from disclosure for five years after the CRADA is completed. The industrial partner has title to all patents resulting from its own efforts under the CRADA. The laboratory contractor retains rights to inventions developed by the laboratory under the CRADA, but the partner is guaranteed an option on an exclusive license in a negotiated field of use for royalties.

49. 15 U.S.C. § 3710a. DOE has approved the use of a standard modular CRADA that contains preapproved clauses that streamline the approval process. *See* U.S. Department of Energy, CRADA Manual at http://www.directives.doe.gov/pdfs/doe/doetext/neword/483/m4831–1.pdf 9 (modular CRADA agreement).

50. The DOE National Laboratories include Ames (Iowa), Argonne (Illinois), Brookhaven (New York), Fermi Accelerator (Illinois), Idaho Engineering and Environmental (Idaho), Lawrence Berkeley (California), Lawrence Livermore (California), Los Alamos (New Mexico), National Energy Technology (West Virginia), Renewable Energy (Colorado), Oak Ridge (Tennessee), Pacific Northwest (Washington), Princeton Plasma Physics (New Jersey), Sandia (New Mexico), Stanford Linear Accelerator (California), and Thomas Jefferson Accelerator (Virginia). *See generally* DOE, Technology Partnership Gateway, *at* http://www.energy.gov/business/partners/techpartnergate.html (a communications hub for accessing technology developed at the National Laboratories).

*Exhibit 4*
*Active Industry CRADAs with U.S.-Owned Laboratories*

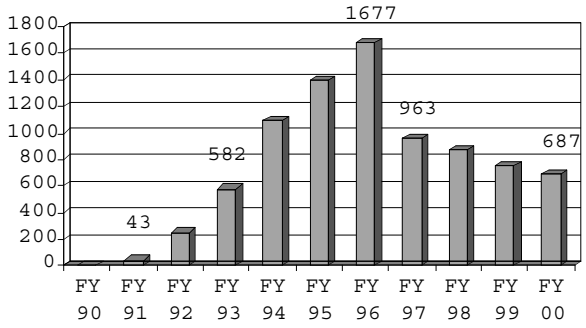


Exhibit 4 shows the amount of CRADA instruments that have been active in each year since 1990.

Further information concerning industry arrangements with DOE National Laboratories can be obtained in the DOE publication *Guide to Doing Business with the DOE Laboratories of the Laboratory Coordinating Council.*[51]

### C. *Support of Private-Sector Project Financing*

#### 1. Renewable Energy Production Incentives

Title 19 of the Energy Policy Act of 1992[52] provides for a production tax credit[53] for the private-sector production of electricity derived from certain renewable energy sources.[54] It also makes permanent the energy investment tax credit for private-sector solar and geothermal generating facilities.[55] These tax credits, however, are not available to local governmental entities or nonprofit electric cooperatives. To encourage generation from renewable energy sources, Title 12 of the Act provides a federal production incentive for state and local instrumentalities (usually public power electric utilities) and non-

51. Office of Industrial Technologies, DOE, Guide to Doing Business with the DOE Laboratories of the Laboratory Coordinating Council (Mar. 2001), *at* http://www.oit.doe.gov/lcc/doing_business.html.

52. Pub. L. No. 102–486, § 1914, 106 Stat. 3020 (adding a new section 45 to the Internal Revenue Code, 26 U.S.C. § 45 (2000)).

53. This production credit is 1.5 cents times the kilowatt-hours of electricity produced subject to a ten-year phaseout formula. 26 U.S.C. § 45(a), (b) (2000).

54. Section 45 of the Internal Revenue Code allows production incentives for electricity produced in the United States from the following sources of renewable energy: wind, closed-loop biomass, and poultry waste. 26 U.S.C. § 45(c) (1)(2000).

55. Pub. L. No. 102–486, § 1916, 106 Stat. 3024 (amending 26 U.S.C. § 48(a) (2000) (I.R.C. § z48(a))).

profit electric cooperatives to generate electricity from renewable energy sources.[56]

This production incentive consists of a 1.5 cent per kilowatt-hour payment from DOE to eligible public generators[57] for electricity generated from eligible facilities[58] whose energy is derived from certain renewable energy sources.[59] Unlike entitlement programs, all incentive payments are subject to the availability of federal funds. In 2001, approximately $4 million was available for this program. By 2004, the program expects electricity generation to increase to 1 billion kilowatts.[60] DOE regulations delineate the applicable eligibility requirements and outline the process for application for these payments.[61] In some project financing for these public facilities, private-sector participation is conditioned upon eligibility for this federal payment.

## 2. Energy Savings Performance Contracts

The Federal Government is the nation's largest consumer of energy with annual expenditures for energy consumption in excess of $3.5 billion. The Office of Technology Assessment found that federal agencies lagged far behind the private sector in taking advantage of energy conservation products and technology. To reduce federal energy-consumption costs, Congress has allowed the Federal Government to enter into long-term energy savings performance contracts (ESPCs).[62] This authority allows federal agencies to waive their standard requirements for up-front capital funding and one-year contracts and to enter into contracts for up to twenty-five years with energy service companies (ESCOs) for the purpose of saving energy-consumption costs at federal installations. The energy savings that result from the installation and use of the equipment by the private contractor can be shared between the Gov-

56. Pub. L. No. 102–486, § 1212, 106 Stat. 2969, 42 U.S.C. § 13317 (1992).

57. The public entity must fully own and hold legal title to the generating facility to be eligible. *See* 10 C.F.R. § 451.4 (2000).

58. A qualified facility is any generating facility owned by a public body that uses a defined renewable energy source and was first put into operation between October 1, 1993, and September 30, 2003, or converted from traditional sources during that period and the conversion represents 80 percent or more of the total market value of the facility. *See* 10 C.F.R. § 451.4 (2000).

59. The renewable energy sources eligible for the incentive payment are limited to solar heat, solar light, wind, geothermal energy, and biomass, but are not available for biomass from municipal solid waste. *See* 10 C.F.R. § 451.2 (2000).

60. *See Hearings, Energy and Water Development Appropriations for 2001, supra* note 23, at 1254.

61. 10 C.F.R. § 451.8–9 (2000).

62. Title VIII of the National Energy Conservation Policy Act, *amended by* Consolidated Omnibus Budget Reconciliation Act of 1985, Pub. L. No. 99–272, 100 Stat. 82, 142–143 (1986); Energy Policy Act of 1992, Pub. L. No. 102–486, § 155, 42 U.S.C. § 8287 (1992). Before the 1992 amendment, these contracts were called "shared energy savings contracts."

ernment and the contractor.[63] The U.S. Government is now firmly committed to improving energy efficiency in federal buildings by 35 percent and reducing greenhouse gas emissions by 30 percent by the year 2010.[64]

Typically under such contracts,[65] ESCOs risk their own capital or apply traditional private-sector, project-financing techniques to fabricate, install, and service their own equipment, or to provide major facility improvements, such as a cogeneration facility, at federal installations at no cost to the Government. The ESCO then shares in the energy savings generated by this product at a negotiated percentage. That percentage assures that the contractor's costs and debt service will be amortized over the life of the contract and provides the contractor with a profit. At the end of the contract term, the Government can take title to the improvements or exercise an option to purchase, depending upon the original contract terms.[66]

The Federal Government has begun to issue "regional super-ESPCs" that resemble conventional ESPCs, but instead of focusing on a specific site, address a large geographical territory. These super ESPCs are indefinite-delivery, indefinite-quantity-type contracts that allow agencies to negotiate site-specific delivery orders from an approved pool of ESCOs without having to reprocure the services at every site.[67]

The Federal Government has awarded forty-four super-ESPCs to seventeen ESCOs for six regions. These projects will be implemented with $38.7 million in private-sector project financing. It is estimated that these ESCOs will be paid up to $82.5 million in generated savings from their capital investment.[68] As a result of the Federal Government's increased emphasis on energy conservation at the agency level due to the recent electric disruption in California, the benefits of this unique form of government contracting, i.e., forging partnerships with the private sector, can only increase. For example, the prospect of energy savings through cogeneration[69] will encourage the use of ESPCs to build cogeneration facilities at federal reservations. Co-

63. *See* H.R. Rep. No. 99–453, 99th Cong. 1st Sess., at 442 (1986).

64. Exec. Order No. 13123, 64 Fed. Reg. 30,851 (June 3, 1999). The percentage reductions are based on a 1985 baseline and the reductions are now applicable to federal laboratory and industrial facilities.

65. In 1995, the DOE promulgated regulations governing the use of ESPCs, now codified at 10 C.F.R. §§ 436.30 et seq.

66. *See* 132 Cong. Rec. S2731 (daily ed. Mar. 14, 1986) (colloquy between Sen. McClure and Sen. Johnston). *See also* Christopher J. Alluotto, *Privatizing and Combining Electricity and Energy Conservation Requirements on Military Installations,* 30 Pub. Cont. L.J. 723, 743 (2001).

67. *See generally* Federal Energy Management Program: Financing Alternative, *available at* http://www.eren.doe.gov/femp/financealt.html.

68. *See Department of Interior and Related Agencies Appropriations for 2001: Hearings Before the Subcomm. on Interior, House Comm. on Appropriations,* 106th Cong. 552 (2000).

69. Cogeneration technologies use otherwise-wasted heat from industrial processes to produce electricity for either on-site use or transfer to the grid. "Cogeneration" is a term that refers to the production of electricity and a second form of useful energy, i.e., thermal heat. *See generally* Steven Ferry, Law of Independent Power § 2.01 (2000).

generation projects will save the Government power costs due to lower rates, and act as a buffer to absorb future rate increases from primary utility suppliers. The resulting revenue stream from the contractor's share of the energy savings will pay its debt service and provide a profit over the life of the long-term contract.

### 3. Private-Sector Project Finance Participation

DOE's Office of Environmental Management, faced with limited funding resources and the Herculean task of site restoration and cleanup of the U.S. nuclear defense program, is continuing to evaluate the use of the private sector. Private-sector participation is a term given to the creation of business relationships between the public and private sectors to provide the Government with access to private facilities, capital, and services that have been supplied traditionally by the Government for its own use.[70] DOE has undertaken a private-sector participation initiative to explore the use of private capital to design, construct, own, and operate facilities that will provide essential environmental services for DOE sites.

Although this type of public-private partnership is common for state and local governments,[71] it is new and still untested at the federal level. It is advantageous to the Government to enter into this arrangement because private-sector participation can provide considerable capital investment for service projects that require the construction of infrastructure. The service provider normally is unwilling to risk incurring a major capital investment without obtaining a long-term commitment from the Government to cover the amortization costs. Most federal agencies cannot make contractual commitments beyond the current funding year.[72] Therefore, agencies normally cannot make binding commitments to guarantee the contractor that its capital costs will be reimbursed. A few agencies, such as DOE, receive funds from Congress that are not limited to one year's needs. Moreover, DOE has special statutory authority in conducting its nuclear activities (including environmental remediation of atomic facilities) that exempts it from certain financial commitment limitations,[73] leasing constraints,[74] and indemnifications for nu-

70. These types of arrangements also have been called third-party financing and privatization. *See generally* General Accounting Office, Rept. No. GAO/GGD 99–71, Public Private Partnerships: Terms Related to Building and Facility Partnerships (Apr. 1999).

71. *See generally* Transportation and Utilities Finance Group, Price Waterhouse, Public-Private Partnerships in Infrastructure — A Primer (1990). *See also* Donald G. Featherston, D. Whitney Thorton II, & J. Gregory Correnti, *State and Local Privatization: An Evolving Process,* 30 Pub. Cont. L.J. 643 (2001).

72. This is based on the Antideficiency Act, now codified mainly at 31 U.S.C. § 1341 (1994).

73. Atomic Energy Act of 1954, § 161(u), *as amended by* Pub.L. No. 85–681, 42 U.S.C. § 2201(u) (1994).

74. Atomic Energy Act of 1954, § 161(g); 42 U.S.C. § 2201(g) (1994).

clear liability.[75] Under this framework, DOE can consider a private-sector participation initiative.

Given federal budgetary constraints, this form of partnership with the private sector, in which the contractor, in effect, funds the construction of infrastructure at a federal site with private capital by using a long-term government service contract as collateral, would seem to be a panacea for federal budgetary woes. Unfortunately, the U.S. Office of Management and Budget has discouraged this type of arrangement,[76] and it remains to be seen whether such arrangements will gain the support of the federal budget officials.[77] Moreover, private-sector lenders often find the federal contracting system and acquisition regulations difficult to navigate at best. The inability of the Government to commit to contractual forms that are common in the private sector only adds to the problem.

A proposed $4 billion project financing the construction and operation of a waste vitrification facility at DOE's Hanford, Washington, site did receive interest from the project finance community.[78] However, this privatization effort did not reach closure due to, among other issues, the failure of both sides to understand each other's culture of risk allocation. However, a new infrastructure modernization initiative at DOE's Oak Ridge, Tennessee, site has resurrected project financing at DOE. Under this initiative, DOE contractors are spearheading a privatization effort for financing, constructing, and operating eleven new facilities on DOE's Oak Ridge reservation to further DOE purposes.[79] Under ideal circumstances, this effort, which includes partnerships among federal, state, university, and industry entities, will be successful and provide a model for future DOE infrastructure development.

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75. Price-Anderson Act, Pub. L. No. 85–256, *amended by* 42 U.S.C. §§ 2012, 2014, 2039 (1994).

76. Memorandum from Thomas Palmari, Chief, Nuclear Energy Branch, to the Controller, DOE (Apr. 3, 1989); letter from W.M. Diefender, Deputy Dir., OMB, to Sen. Pete Domenici (Apr. 30, 1990) (copies available from author). This reluctance is based upon OMB's principles of "scorekeeping" as set out in OMB Circular A-11, that require agencies to record the full cost of the capital asset acquisition under lease-purchase arrangements as current budget authority. *See* Alex D. Tomaszczuk & Daniel S. Herzfeld, *The Government's New Model for the Acquisition of Leasehold and Other Interests in Real Property—Using Private Sector Financing for Public Sector Deals*, 30 Pub. Cont. L.J. 693, 701 (2001). This, in effect, would negate the benefits of private financing and require full funding of many of these types of transactions from current appropriations.

77. Congress, however, recently has been more receptive to this form of financing for DOE's capital improvements. The conferees to the FY 2002 Energy and Water Development Appropriation Act required the Secretary of Energy to "conduct a study of alternative financing approaches, to include third-party type methods, for infrastructure and facility construction projects across the Department." H.R. Rep. No. 107–258, at 109 (2001).

78. *See* Raymond A. DiPrinzio, *The U.S. Department of Energy and the Privatization of the Hanford Tank Waste Remediation System;* 6 J. Project Fin. 3, at 54 (2000).

79. DOE News Release: Energy Secretary Announces Plan to Modernize Oak Ridge National Laboratory (Sept. 12, 2000) (on file with author).

The chances of a successful project based on a public-private-sector partnership will depend in large part on whether the private partners share in the programmatic goals of the project and have a long-term stake in the future of the site development. If the private-sector participants are only involved for the potential rate of return, the likelihood of participation may be minimal. Any entity considering project financing of this type with DOE should take its willingness to commit to the long-term success of the project into its due-diligence deliberations. Those contractors that have a long-term business interest in the continuation of DOE programmatic activities at a particular site are likely to support a major privatization effort with DOE in the future.

## IV. Conclusion

Renewable energy constitutes only eight percent of the current mix of sources for energy consumption in the United States. These nongreenhouse gas sources, along with the use of natural gas, will only be increased in the future mix of energy sources in the United States. This percentage will even be greater in the developing world where delivery infrastructure still needs to be developed. Those companies that have developed the technologies to take advantage of these energy efficiencies will be at a competitive advantage in the changing energy marketplace. The U.S. companies that are now partnering with DOE through cost-sharing agreements may well be in the forefront of providing an increasing mix of energy services in the next decade and beyond. This nontraditional form of project financing will help attract project equity and thereby ensure that U.S.-developed technology plays a major role in these new markets. Once industry has adopted these technologies, other forms of federal financing, such as loan guarantees,[80] can be used to attract project finance lenders.

80. There have been recent legislative initiatives in Congress to resurrect energy loan guarantees. The Renewable Energy Loan Guarantee Act of 2001, H.R. 2774, 107th Cong., 1st Sess. (2001), would establish a Loan Guarantee Board made up of the Secretaries of Energy, Commerce, and the Treasury and the Chairman of the Board of Governors of the Federal Reserve System to issue loan guarantees of not more than $750 million per project for a "qualified renewable energy source facility." The Tribal Energy Self-Sufficiency Act, H.R. 2412, 107th Cong., 1st Sess. (2001), would establish a program in the Department of Energy for tribal corporations to develop electricity plants and transmission facilities on Indian lands through use of loan guarantees.