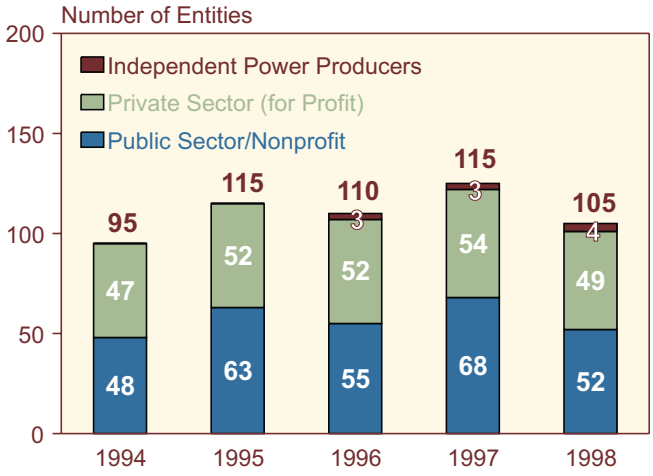
2. Electric Power Sector

Who Reported?

One hundred and five organizations from the electric power sector submitted reports for the 1998 data year—a decline of 10 entities from last year's reporting cycle. About half (52) of the reporters were public sector or nonprofit organizations, including electric cooperatives, municipal utilities, and other public-sector entities such as the Tennessee Valley Authority (TVA). Forty-nine of the remaining entities were private sector utilities—mostly investor-owned utilities (IOUs)—and four were independent power producers (IPPs) (Figure 2).

Private-sector utilities were responsible for 763 (67 percent) of the projects reported and 72 percent of the emission reductions and sequestration achievements reported by the electric power sector. Public-sector or nonprofit utilities reported 367 projects, and IPPs reported 17 projects. Seven new electric power sector entities submitted reports for 1998; three—US Gen New England, Inc., Hawaiian Electric Company, Inc., and PECO Energy Company—were new reporters, and four were products of mergers involving previous reporters.

Figure 2. Number of Electric Power Reporters by Entity Type, Data Years 1994-1998



Source: Energy Information Administration, Form EIA-1605.

What Was Reported?

Overview

A total of 101 electric power organizations reported at the project level, and 35 also provided information on entity-level emissions or reductions. Four reporters chose to report at the entity level only. The 1,147 projects reported by the electric power sector for 1998 included projects undertaken in all 10 reporting categories (Table 9). Combined, these projects lowered emissions by a reported 161 million metric tons carbon dioxide equivalent.

Electricity supply, which includes electricity generation, cogeneration, transmission, and distribution projects, was the most common type of project reported by the electric power sector, accounting for 36 percent of all electric power sector projects reported and 68 percent of total emission reductions and sequestration reported by the sector for 1998.

Energy end use and carbon sequestration projects represented the next largest project categories, with 254 and 237 projects, respectively; however, the average reduction for projects in these categories was significantly smaller than the average for electricity supply projects (Figure 3). The average emission reduction for energy end use projects was 84,282 metric tons carbon dioxide equivalent. The average carbon sequestration achieved was 43,649 metric tons of carbon dioxide. Waste treatment and cogeneration activities were less numerous but had higher average reductions. Also reported were 63 transportation projects, 19 halogenated substances projects, 12 oil and natural gas and coal mining projects, 4 agriculture projects, and 82 projects categorized as other emission reduction projects.

Electricity Supply Projects

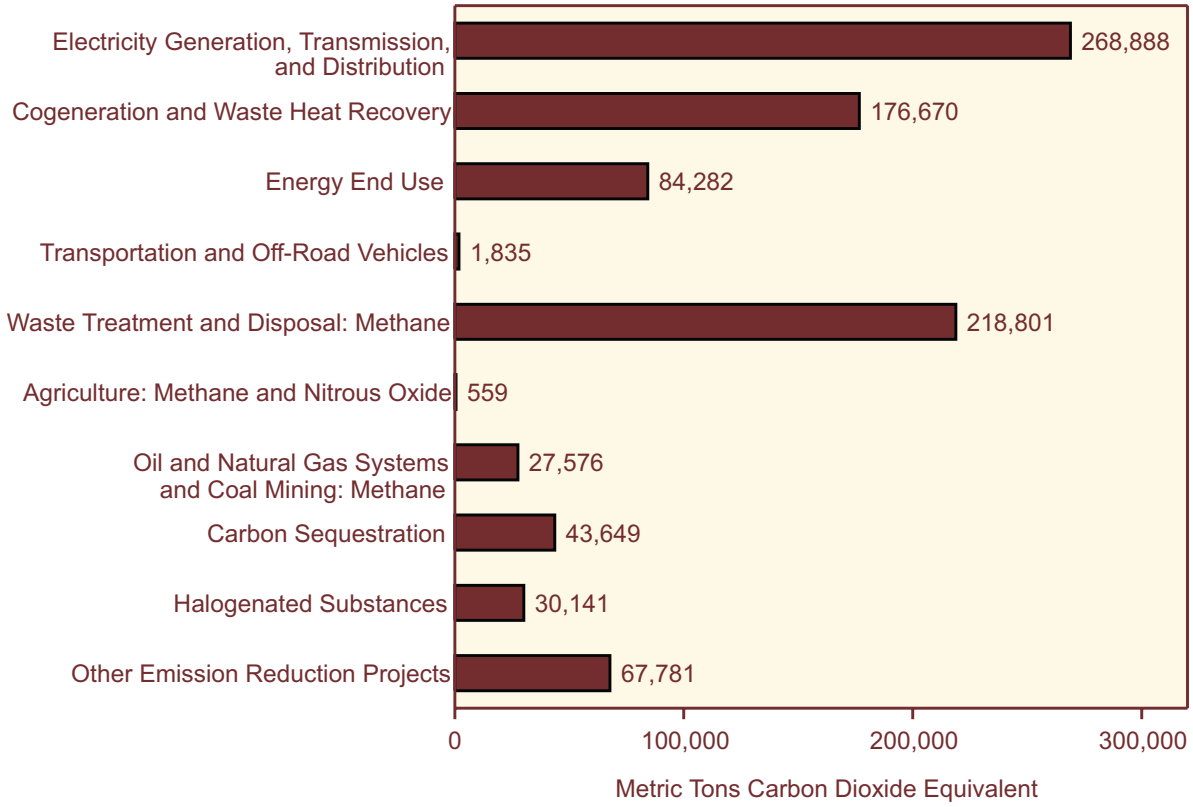
A total of 430 electricity supply projects were reported by 86 electric power entities for 1998, accounting for total emission reductions of 112 million metric tons carbon dioxide equivalent. Of these projects, 22 were reported to have begun in 1998. On average, electricity supply projects were the largest in terms of emission reductions reported per project. Ninety-eight of the 115 electric power sector projects with reported reductions exceeding 1 million metric tons carbon dioxide equivalent were electricity supply projects. Heat rate improvements were the most common type of electricity supply

Table 9. Number of Projects and Emission Reduction and Sequestration Reported by Electric Power Sector Reporters by Project Type, Data Year 1998

Project Type	Number of Projects Reported	Emission Reduction and Carbon Sequestration Reported for 1998 (Metric Tons of Carbon Dioxide Equivalent)				
		Carbon Dioxide	Methane	Nitrous Oxide	Halogenated Substances	Total
Electricity Generation, Transmission, and Distribution	413	109,043,982	88,645	38,307	—	**109,170,933**
Cogeneration and Waste Heat Recovery	17	3,003,398	—	—	—	**3,003,398**
Energy End Use	254	21,320,058	859	86,650	—	**21,407,566**
Transportation and Off-Road Vehicles	63	114,968	361	261	—	**115,590**
Waste Treatment and Disposal: Methane	46	188,547	9,869,851	6,468	—	**10,064,866**
Agriculture: Methane and Nitrous Oxide	4	0	2,235	—	—	**2,235**
Oil and Natural Gas Systems and Coal Mining: Methane	12	939	329,967	—	—	**330,906**
Carbon Sequestration	237	10,344,700	—	—	—	**10,344,700**
Halogenated Substances	19	—	—	—	572,683	**572,683**
Other Emission Reduction Projects	82	5,500,986	50,497	—	6,536	**5,558,020**
Total	**1,147**	**149,517,578**	**10,342,413**	**131,685**	**579,219**	**160,570,896**

Source: Energy Information Administration, Forms EIA-1605.

Figure 3. Average Reported Emission Reductions by Project Category, Data Year 1998



Source: Energy Information Administration, Forms EIA-1605.

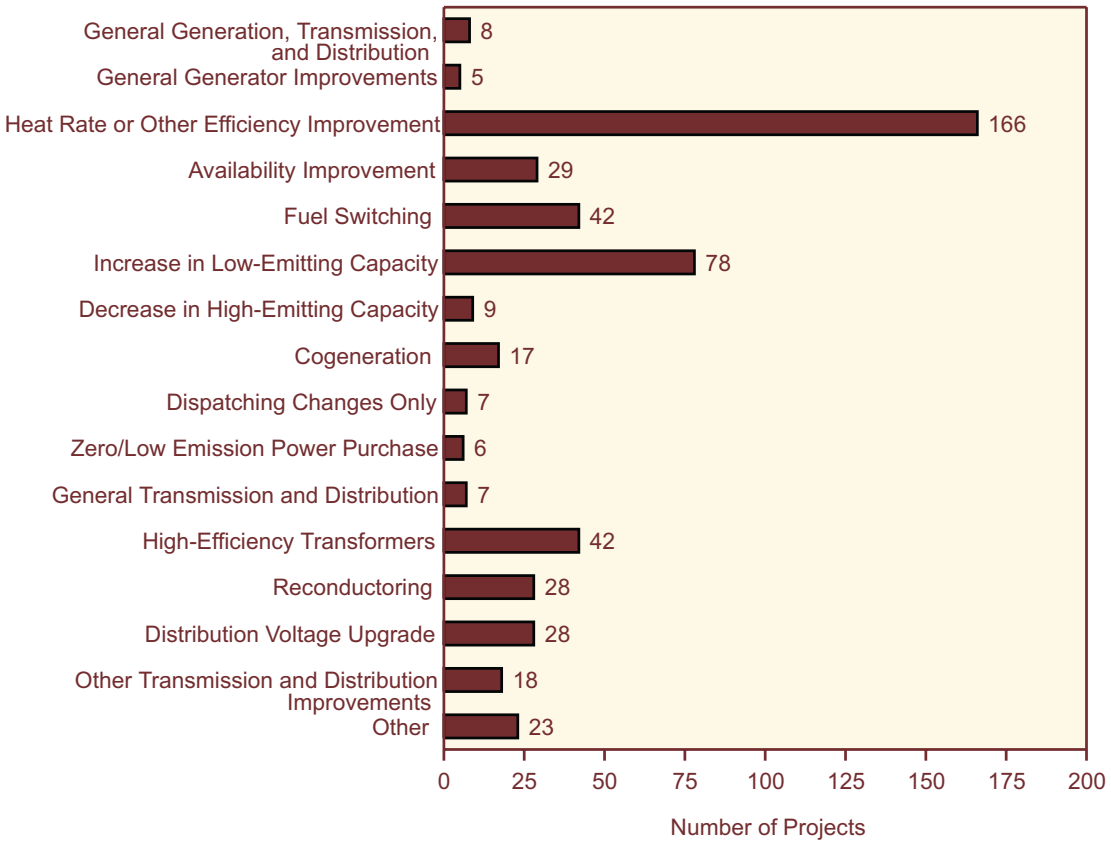
projects reported (Figure 4).[12] A total of 166 such projects were reported for 1998, and more than half of the electricity supply projects initiated in 1998 were of this type.

With an average emission reduction rate of 1.6 million metric tons of carbon dioxide equivalent, the emission reductions for availability improvement projects were among the highest reported. Nineteen of the 29 availability improvement projects took place at nuclear power plants. The 9 projects decreasing high-emitting capacity reported average emission reductions of 2.2 million metric tons carbon dioxide equivalent. This high average was mainly due to the inclusion of one nuclear generation capacity uprating and availability improvement project reported by TXU, which by itself resulted in a reported emission reduction of 18.1 million metric tons of carbon dioxide. Other commonly reported types of electricity supply projects included increases in low-emitting capacity, fuel switching, high-efficiency transformers, distribution voltage upgrades, and reconductoring.

A total of 17 cogeneration and waste heat recovery projects were reported by electric power sector entities for 1998, ending the trend of increasing cogeneration activities. The number of reported cogeneration projects remained constant from 1997 to 1998, and the estimated total emission reductions resulting from cogeneration projects increased by less than 1 percent. All but one of the cogeneration projects reported for 1998 were undertaken by private sector companies.

A new type of electricity supply project—the purchase of low- or zero-emitting electricity to replace carbon-intensive power—was introduced for 1998. Baltimore Gas & Electric Company (BG&E) reported a project to purchase surplus generation from a municipal waste-to-energy plant, displacing generation from BG&E's fossil-fuel plants. PP&L Resources reported on five projects involving the purchase of electricity generated from landfill gas or biogas. Together, these projects resulted in reported carbon dioxide emission reductions of 334,680 metric tons.

Figure 4. Reported Electricity Supply Projects by Type, Data Year 1998



Note: The sum of projects in each project category exceeds the total number of projects reported, because more than one project type may be assigned to a single project.

Source: Energy Information Administration, Form EIA-1605.

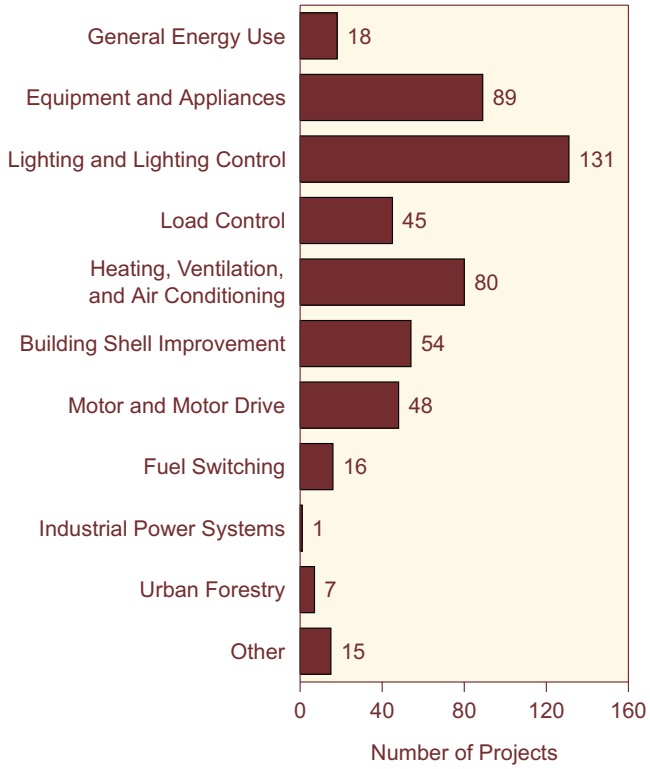
[12] Note that more than one project type may be assigned to a single project; therefore, the sum of projects in each project type category exceeds the total number of projects reported.

Energy End-Use Projects

The 254 energy end-use projects reported by the electric power sector fir 1998 accounted for emission reductions of 21.4 million metric tons carbon dioxide equivalent. The most frequently targeted types of energy end-use projects were lighting and lighting control; equipment and appliances; heating, ventilation, and air conditioning; and building shell improvements (Figure 5). Most of the reported energy end-use projects include more than one type of end-use activity.

Seven new energy end-use projects were reported for the 1998 data year. Six were projects initiated before 1998 but reported by a new reporter, Hawaiian Electric Company, Inc. They included three residential hot water efficiency programs and three commercial/industrial energy efficiency and construction projects, which together accounted for reported reductions of 44,920 metric tons of carbon dioxide. Only one energy end-use project, submitted by American Municipal Power—Ohio, was reported to have begun in 1998. This continued the downward trend in the number of new energy end-use projects reported to the program (Figure 6), probably a result of moves to deregulate the electric power industry, which have led many utilities to deemphasize or discontinue their demand-side management (DSM) programs.

Figure 5. Reported Energy End-use Projects by Type, Data Year 1998



Note: The sum of projects in each project category exceeds the total number of projects reported, because more than one project type may be assigned to a single project.

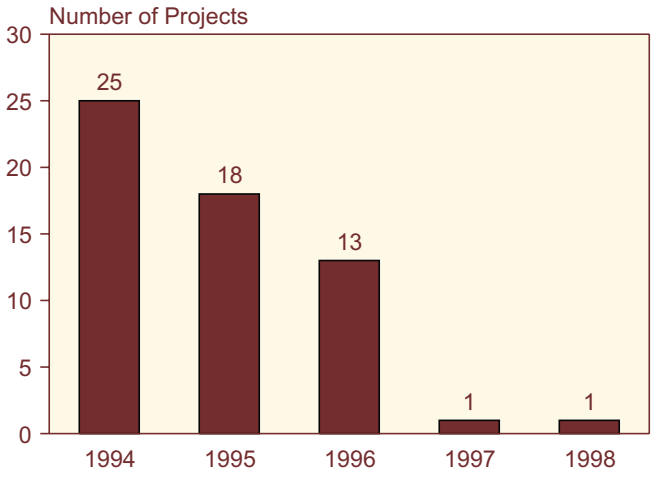
Source: Energy Information Administration, Form EIA-1605.

Entity-Level Reports

The electric power sector accounted for 39 of the 65 entity-level reporters for 1998 and claimed emission reductions equivalent to 132 million metric tons of carbon dioxide, or 74 percent of total emission reductions reported at the entity level. Ten entities estimated reductions from stationary combustion using basic reference cases, where the reduction is calculated as the difference between current emissions and actual historic baseline emissions (usually emissions in 1990 or an average of 1987 to 1990 emissions). The total reductions in carbon dioxide emissions from stationary combustion reported by these entities have declined in recent years, from 27 million metric tons in 1996 to 8.7 million metric tons in 1998 (Figure 7). All but two of the entities using basic reference cases reported that their stationary combustion reductions declined in 1998 compared with 1997, and three reported that their 1998 emissions had actually increased over their baseline emissions. The overall growth in demand for electricity is forcing utilities to increase generation, making it increasingly difficult to make absolute reductions in their emissions.

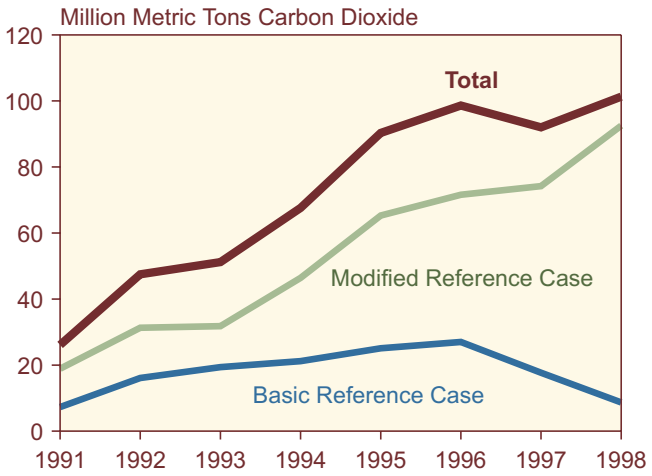
Twenty-one electric power sector organizations reported carbon dioxide reductions from stationary combustion using a modified or hypothetical reference case, where current emissions are compared with estimates of what emissions would have been had no actions to reduce emissions been undertaken. The reported reductions estimated in this manner totaled 93 million metric tons.

Figure 6. New Energy End-Use Projects Initiated by Data Year, 1994-1998



Source: Energy Information Administration, Form EIA-1605.

Figure 7. Entity-Level Reductions in Carbon Dioxide Emissions from Stationary Combustion Reported by Electric Utilities for 1998 by Reference Case Used, 1991-1998



Source: Energy Information Administration, Form EIA-1605.

Mergers and Acquisitions

With competition in the electric power sector increasing as a result of deregulation activities, the number of mergers, acquisitions, joint ventures, and strategic alliances among industry members has increased, leading to a decline in the overall number of electric power companies in the market. The increased activity may stem from a general industry assumption that a certain market size is necessary to gain economies of scale and compete effectively in a deregulated market. As part of this trend, companies are diversifying geographically to take advantage of seasonal and/or climate-related differences, and to benefit from particular variations in peak and baseload characteristics among electricity markets. The mergers may also be undertaken to gain fuel-specific market dominance. For example, the merger between UNICOM and PECO Energy Company has left one company in control of 20 percent of U.S. commercial nuclear power capacity.

Convergence is another trend that has been observed in the deregulated electric power sector. To create a market niche, larger companies in particular are entering into mergers that cut across traditionally separated industries, for example, by combining natural gas production with electricity generation. In 1998, the total value of mergers, alliances, and joint ventures in the electric power sector was estimated at $63 billion.[13]

Mergers and acquisitions in the electric power sector contributed to the decrease in the number of electric utilities reporting for the 1998 data year. Two reporting entities were lost through the mergers of Union Electric Company and Central Illinois Public Service Company to form Ameren Corporation and of Centerior Energy Corporation and Ohio Edison Company to form FirstEnergy Corporation. Three other mergers and acquisitions did not affect the total number of reporters, because each involved only one entity that reported for the 1997 data year: Wisconsin Power & Light (which merged with IES Utilities Inc. to form Alliant Energy); Long Island Lighting Company (which merged with Brooklyn Union Gas Company to form Keyspan Energy); and Houston Lighting & Power Company (now part of Reliant Energy). The divestiture of the generating facilities of the New England Electric System (NEES) Company to USGen New England, Inc. did not affect overall participation, because USGen submitted a report for 1998 on the projects it acquired, and NEES chose not to report on its remaining demand-side activities. Other reporters have merged, or are in the process of merging, but submitted reports for 1998 as subsidiaries of the new corporate entities. These included Atlantic Energy, Inc., and Delmarva Power (Conectiv) and Cooperative Power Association and United Power Association (Great River Energy).

[13]Personal communication with Bill Keene, Science Applications International Corporation, December 14, 1999.

Electric Power Sector Highlights

Carbon Sequestration Activities Dominated by Private Entities

Sixty-five electric power organizations reported on 237 carbon sequestration projects, reporting sequestration of 10.3 million metric tons of carbon dioxide in 1998. Private-sector utilities were responsible for a majority (185 projects) of the carbon sequestration activities reported. Public-sector or nonprofit entities reported on 44 projects, and IPPs were responsible for 8 projects. The most common types of projects were afforestation (92 projects), forest preservation (41 projects), forest management (41 projects), and urban forestry (36 projects).

- **UtiliTree Carbon Company.** The UtiliTree Carbon Company is a partnership of 40 IOUs that promotes investment in carbon sequestration activities. Each participating entity is entitled to report its share in the sequestration achieved by the activities of the partnership. To date, UtiliTree has sponsored four projects: the Rio Bravo Carbon Sequestration Pilot Project in Belize, the Reduced Impact Logging Project in Malaysia, the Western Oregon Carbon Sequestration Project, and the Mississippi Valley Bottomland Hardwood Restoration Project. The combined sequestration reported for the four projects by member utilities totaled 836,670 metric tons of carbon dioxide for 1998.

- **AES Shady Point and OXFAM America Amazon Project.** The largest single carbon sequestration project was reported by AES Shady Point, a subsidiary of AES Cooperation. In cooperation with OXFAM America, AES Shady Point is supporting indigenous groups from Peru, Ecuador, and Bolivia in gaining control over their lands in the Amazon and developing sustainable forest resource extraction plans. AES reports that over a 10-year period, beginning in 1993, its activities will preserve 1.2 million acres of pristine rain forest and prevent the release of 64 million metric tons of carbon dioxide to the atmosphere. In 1998, AES Shady Point reported that the project avoided the release of 4.2 million metric tons of carbon dioxide.

- **American Electric Power, Inc.** American Electric Power, Inc. (AEP) reported on 30 afforestation, forest preservation, and modified forest management projects, which were estimated to sequester 1.1 million metric tons carbon dioxide equivalent in 1998.

Emission Reduction Opportunities Provided by Sulfur Hexafluoride

Increasingly, electric power sector reporters are recognizing that sulfur hexafluoride offers opportunities for reducing emissions. Electric utilities use sulfur hexafluoride as an insulator for circuit breakers, switch gear, and other electrical equipment. Even small reductions in emissions of sulfur hexafluoride, which has a global warming potential (GWP) of 23,900, can lead to substantial carbon dioxide equivalent reductions. As compared with only two sulfur hexafluoride reduction projects reported for 1996, eight entities reported nine projects for 1998, which reduced sulfur hexafluoride emissions by 24 metric tons, equivalent to about 574,000 metric tons of carbon dioxide.

- **Allegheny Power Service Corporation.** Allegheny reported the largest single sulfur hexafluoride reduction project, which involved modifying its 500-kilovolt breaker replacement program to include recovery of sulfur hexafluoride gas that previously was vented to the atmosphere. The project resulted in sulfur hexafluoride emission reductions of 8.75 metric tons, equivalent to 209,229 metric tons of carbon dioxide.

- **Baltimore Gas & Electric Company and Entergy Services, Inc.** Two sulfur hexafluoride reduction projects were reported to have been initiated in 1998. Baltimore Gas & Electric Company introduced sulfur hexafluoride recovery and recycling measures during routine and forced maintenance of its electric distribution equipment. Entergy Services Inc. identified procedures to seal leaks from substation breakers that use sulfur hexafluoride as an insulating gas. Together, these activities resulted in emission reductions equivalent to 9,636 metric tons of carbon dioxide.

Two New Wind Energy Projects Reported in 1998

In 1998, two new wind energy projects were reported by Portland General Electric Company and Platte River Power Authority together with four owner cities, reducing carbon dioxide emissions by an estimated 15,492 metric tons.

- **Fort Collins Wind Power Pilot Project.** In a joint effort with Fort Collins Utilities, Platte River Power Authority offers customers in Fort Collins the option of purchasing wind-generated electricity for

(continued on page 19)

Electric Power Sector Highlights (Continued)

an additional cost of $0.02 per kilowatthour. By the end of 1998, 520 residential customers and 12 commercial customers had signed up to purchase all their electricity from the Medicine Bow Wind Project in Wyoming, which is owned by Platte River. The pilot effort was reported to avoid 1,894 metric tons of carbon dioxide emissions in 1998.

- **Vansycle Ridge Wind Generation.** Portland General Electric Company (PGE) reported on emission reductions achieved from 38 wind turbines built by FLP Energy at Vansycle Ridge. Through a 30-year arrangement with FLP Energy, the turbines generate electricity exclusively for PGE customers, and PGE may claim all emission credits associated with the project. In 1998, PGE reported that the project avoided the purchase of 19,872 megawatthours of electricity from fossil sources, reducing its carbon dioxide emissions by 13.6 thousand metric tons.

Methane Emissions from Waste Treatment and Disposal Reduced

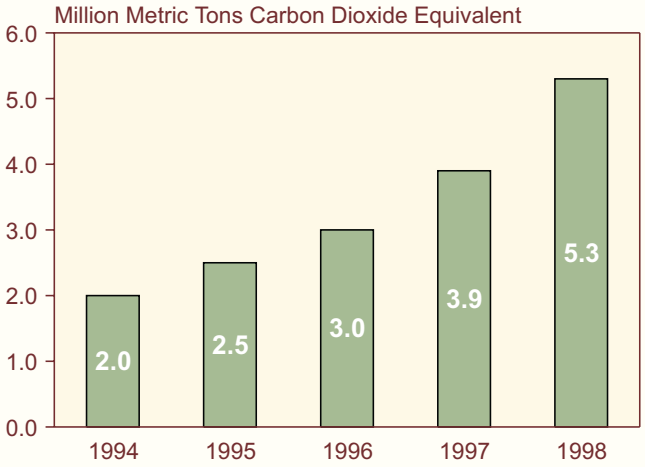
An average reduction of 218,801 metric tons carbon dioxide equivalent was reported for the electric power sector's 46 waste treatment and disposal projects for 1998. Most of the projects reduced methane emissions by capturing and recovering landfill gas for energy use.

- **Landfill Methane Recovery and Energy Purchases.** Two large projects significantly raised the overall average reduction for projects in this category. UNICOM reported the purchase of electric power generated from methane gas recovery activities at 14 landfill sites, and DTE Energy reported on 21 landfill gas recovery partnerships. Together, these activities lowered methane and carbon dioxide emissions by a reported 6.1 million metric tons carbon dioxide equivalent.
- **Montenay Waste-to-Energy Power Plant.** A new waste-to-energy project was reported by Florida Power & Light Company (FPLE) in 1998. FPLE has a 40-percent ownership share in the Montenay waste-to-energy plant, which generates electric power from municipal solid waste. A total of 370,729 metric tons of waste was processed at the plant in 1998. FPLE reported emission reductions of 1,345 metric tons carbon dioxide equivalent as a result of avoided landfill waste disposal.

Largest Reported Increase for Coal Ash Reuse Projects Since 1994

Coal ash, a byproduct of coal combustion, continues to be a marketable commodity for the electric power sector. Emission reduction projects, based on the reuse of coal ash, are increasingly being reported to the Voluntary Reporting Program. For 1998, 41 entities reported on 42 coal ash reuse projects, accounting for emission reductions equal to 5.3 million metric tons carbon dioxide equivalent. Estimated emission reductions from coal ash recycling increased by 1.4 million metric tons of carbon dioxide over those reported for 1997, representing the largest annual increase in reported reductions since 1994. The largest reductions were reported by TXU (549,725 metric tons carbon dioxide) and American Electric Power, Inc. (382,984 metric tons carbon dioxide).

Reported Reductions from Coal Ash Reuse Projects, Data Years 1994-1998



Source: Energy Information Administration, Form EIA-1605.

Increased Emission Reductions from Nuclear Energy Usage in 1998

Unlike plants using fossil fuels, nuclear power plants do not produce greenhouse gas emissions. Electric utilities therefore report emission reductions from projects that increase nuclear energy generation and displace the use of higher-emitting fossil fuels. Emission reductions from nuclear energy usage reported by

(continued on page 20)

Electric Power Sector Highlights (Continued)

the electric power sector increased by 43 percent, from an estimated 70 million metric tons carbon dioxide equivalent for 1997 to 100 million metric tons carbon dioxide equivalent for 1998.

Although two previous nuclear power project reporters did not report for 1998, four organizations—Baltimore Gas & Electric Company, Delmarva Power, PECO Energy Company, and Salt River Project—reported new nuclear energy projects. Reported emission reductions from the four new projects totaled 12.5 million metric tons of carbon dioxide for 1998.

Existing projects accounted for most of the increase in emission reductions from nuclear power projects. For example, Duke Energy Corporation reported an increase of 4.7 million metric tons in carbon dioxide emission reductions for 1998 from an availability improvement project at the McGuire Nuclear Station. Increased nuclear generation from the plant replaced electricity production from Duke Power's coal-fired power plants, avoiding carbon dioxide emissions associated with coal combustion. The total emission reduction in 1998 reported for the project was 7 million metric tons of carbon dioxide, up from 2.3 million metric tons in 1997.