

Voluntary Reporting of Greenhouse Gases 2000 Summary

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Preface

Title XVI, Section 1605(b) of the Energy Policy Act of 1992 (EPACT) directed the Energy Information Administration (EIA) to establish a mechanism for “the voluntary collection and reporting of information on . . . annual reductions of greenhouse gas emissions and carbon fixation achieved through any measures, including fuel switching, forest management practices, tree planting, use of renewable energy, manufacture or use of vehicles with reduced greenhouse gas emissions, appliance efficiency, methane recovery, cogeneration, chlorofluorocarbon capture and replacement, and power plant heat rate improvement”

The legislation further instructed EIA to create forms for the reporting of greenhouse gas emissions and reductions, and to establish a database of the information voluntarily reported under this subsection of EPACT. The reporting Forms EIA-1605 and EIA-1605EZ, “Voluntary Reporting of Greenhouse Gases,” were first made available to the public in July 1995, providing a vehicle for voluntary reporting on activities that occurred before and during 1994. This publication summarizes data reported for 2000, the seventh year of data collection for the Voluntary Reporting of Greenhouse Gases Program.

The data reported to the Program are available through several media. All nonconfidential reports received by the Program are compiled into a Public Use Database, available on CD-ROM, on a set of diskettes, or by download from the Internet. The software is interactive and modular by design, allowing the user to select, view, or

print the reports filed by the voluntary reporters, for each year of their participation. The user can also connect to and query the database with Microsoft Access 97 (or later versions) or other software that supports 32-bit open database connectivity (ODBC).

The Public Use Database and the current reporting software are also available at the Program’s FTP (File Transfer Protocol) site on the Internet at <http://www.eia.doe.gov/oiaf/1605/database.html>. Interested parties are encouraged to visit the Program’s home page at <http://www.eia.doe.gov/oiaf/1605/frntvrvg.html> for more information and background on the Program. Software, additional copies of this report, paper reporting forms, and technical support information can be downloaded from that web site or obtained from the Voluntary Reporting of Greenhouse Gases Communications Center by e-mail at infohgh@eia.doe.gov, toll-free at 1-800-803-5182, or locally at 202-586-0688.

This report was prepared under the guidance of Mary J. Hutzler, Director of EIA’s Office of Integrated Analysis and Forecasting. Significant contributions to the Program, the current software, and the preparation of this report have been made by Paul McArdle, Harry Alverson, Stephen Calopedis, Nancy Checklick, Laura Gehlin, William LaPerch, Michael Mondshine, Dick Richards, Charles L. Smith, and Peggy Wells.

EIA would like to express special thanks to the voluntary reporters, without whom this program would not be possible.

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Summary

Introduction

The Voluntary Reporting of Greenhouse Gases Program, required by Section 1605(b) of the Energy Policy Act of 1992, records the results of voluntary measures to reduce, avoid, or sequester greenhouse gas emissions. A total of 222 U.S. companies and other organizations reported to the Energy Information Administration (EIA) that, during 2000, they had undertaken 1,882 projects to reduce or sequester greenhouse gases. The reported greenhouse gas emission reductions for the projects reported included 187 million metric tons carbon dioxide equivalent of direct project-level reductions, 61 million metric tons of indirect project-level reductions, 9 million metric tons of reductions from carbon sequestration, and 12 million metric tons of unspecified project-level reductions (Table S1).

For definitional purposes, direct reductions are emission reductions from sources owned or leased by the reporting entity, indirect reductions are emission reductions from sources not owned or leased by the reporting entity but that occur as a result of the entity's activities, carbon sequestration reductions represent the removal of atmospheric carbon to a carbon sink, and unspecified reductions represent emission reductions reported on Form EIA-1605EZ for which the reporting entity did not specify whether the emission reduction was a direct or indirect reduction.

To calculate reported emission reductions, reporters are allowed to use a "basic reference case" (what emissions were in a particular year) or a "modified reference case" (what emissions would have been in the absence of emission reduction efforts). Generally, as illustrated in Table S1, most reductions are reported relative to a modified reference case. For example, in 2000, 153 million metric tons, or 81 percent, of the total 187 million metric tons carbon dioxide equivalent of reported direct reductions are based on modified reference cases. Similarly, for reported indirect reductions, 56 million metric tons,

or 92 percent, of the total 61 million metric tons carbon dioxide equivalent of reported reductions are based on modified reference cases.

The 222 entities reporting to the Voluntary Reporting Program for the 2000 reporting cycle represent a 7-percent increase from the 207 entities reporting in 1999 (Table S1). Since 1994, the number of entities reporting to the program has grown by 106 percent (from 108 entities reporting in 1994). The number of projects reported has grown at a more rapid rate, because reporting levels have increased and the number of projects reported by repeat reporters has increased. The total number of projects reported in 2000 (1,882) is 9 percent higher than the number reported in 1999 (1,721) and 197 percent higher than the number reported in 1994 (634). One hundred of the organizations reporting for 2000 provided estimates of emissions and/or emission reductions for the entire organization—21 percent more than in 1999, when 83 entities reported entity-level emissions. Sixty-five of the reporters for 2000 recorded commitments to take action to reduce emissions in future years, mostly during the 2000 to 2005 time frame.

Of the 100 organizations reporting at the entity level, 96 calculated their 2000 entity-wide greenhouse gas emissions. These entities reported direct greenhouse gas emissions of 1,036 million metric tons carbon dioxide equivalent, equal to about 15 percent of total U.S. greenhouse gas emissions in 2000. Also reported by these organizations were 107 million metric tons carbon dioxide equivalent of indirect emissions, equal to 2 percent of total U.S. greenhouse gas emissions in 2000. Ninety-two entity-level reporters also reported emission reductions, including 164.1 million metric tons carbon dioxide equivalent of direct emission reductions, 27.8 million metric tons carbon dioxide equivalent of indirect emission reductions, and 7.5 million metric tons carbon dioxide equivalent of emission reductions resulting from carbon sequestration projects.

Summary

The Voluntary Reporting of Greenhouse Gases Program is used as a registry by several U.S. Government-sponsored voluntary programs to limit greenhouse gas emissions.¹ In the first year of the program (data year 1994), the 95 submissions from electric power producers represented 88 percent of the 108 reports received. In recent years, two factors have combined to lower the

proportion of electric utilities among the reporters. First, the program has seen an influx of new participants from outside the electric power sector. Second, ongoing restructuring of the electric power industry has produced several mergers and acquisitions involving reporters to the program. As a result, the electric power sector now represents 46 percent of all the organizations

Table S1. Reporting Indicators for the Voluntary Reporting of Greenhouse Gases Program, Data Years 1994-2000

Indicator	1994 ^(R)	1995 ^(R)	1996	1997	1998 ^(R)	1999 ^(R)	2000
Number of Entities Reporting	108	142	150	162	207	207	222
Number of Projects Reported	634	960	1,040	1,288	1,549	1,721	1,882
Number of Entity-Level (Organization-Wide) Reports Received	40	51	56	60	76	83	100
Project-Level Reductions Reported (Million Metric Tons Carbon Dioxide Equivalent)							
Direct ^a	63	88	90	95	148	155	187
Modified Reference Case ^b	59	76	75	88	127	126	153
Basic Reference Case ^c	4	13	15	7	21	29	35
Indirect ^d	5	52	53	38	43	57	61
Modified Reference Case ^b	5	52	51	36	38	51	56
Basic Reference Case ^c	0	1	3	2	5	6	5
Sequestration ^e	1	1	9	10	12	10	9
Unspecified ^f	4	6	6	9	19	13	12

^a"Direct" emission reductions are reductions in releases of greenhouse gases "on site." For the purpose of completing Form EIA-1605, "on site" is defined as any source owned (wholly or in part) or leased by the reporting entity.

^bIn a "modified reference case," actual emissions are compared to an estimate of what emissions or sequestration would have been in the absence of the project.

^cIn a "basic reference case," actual emissions are compared with an estimate of historical emissions or sequestration in a particular base year.

^d"Indirect" emission reductions are reductions in emissions from sources not owned or leased by the reporting entity but that occur, wholly or in part, as a result of the entity's activities (for example, an automobile manufacturer's investment in increased automotive fuel economy can result in decreased emissions from vehicles owned by individuals or managed fleets).

^e"Sequestration" is the fixation of atmospheric carbon dioxide in a carbon sink through biological or physical processes, such as photosynthesis.

^f"Unspecified" emission reductions represent quantities reported on the short form (Form EIA-1605EZ) for which the reporting entity did not specify whether the emission reduction was direct or indirect.

(R) = revised.

Notes: 1999 data have been revised upward to include 1999 reports that were submitted after the filing deadline. It is expected that the 2000 data will also be revised upward in next year's report with the inclusion of late 2000 reports. Totals for direct and indirect reductions may not equal sum of components due to independent rounding.

Source: Energy Information Administration, Forms EIA-1605 and EIA-1605EZ.

¹These programs include the U.S. Department of Energy (DOE) Climate Challenge program for electric utilities and the U.S. Environmental Protection Agency (EPA) Climate Wise program for manufacturers, Landfill Methane Outreach Program, Coalbed Methane Outreach Program, and Green Lights program, as well as the U.S. Initiative on Joint Implementation.

reporting to the program. Participants from outside the electric power sector, representing a diverse set of industries,² made up 54 percent of all the organizations reporting to the program for 2000. Each reporting cycle normally has an influx of new reporters to the program.³

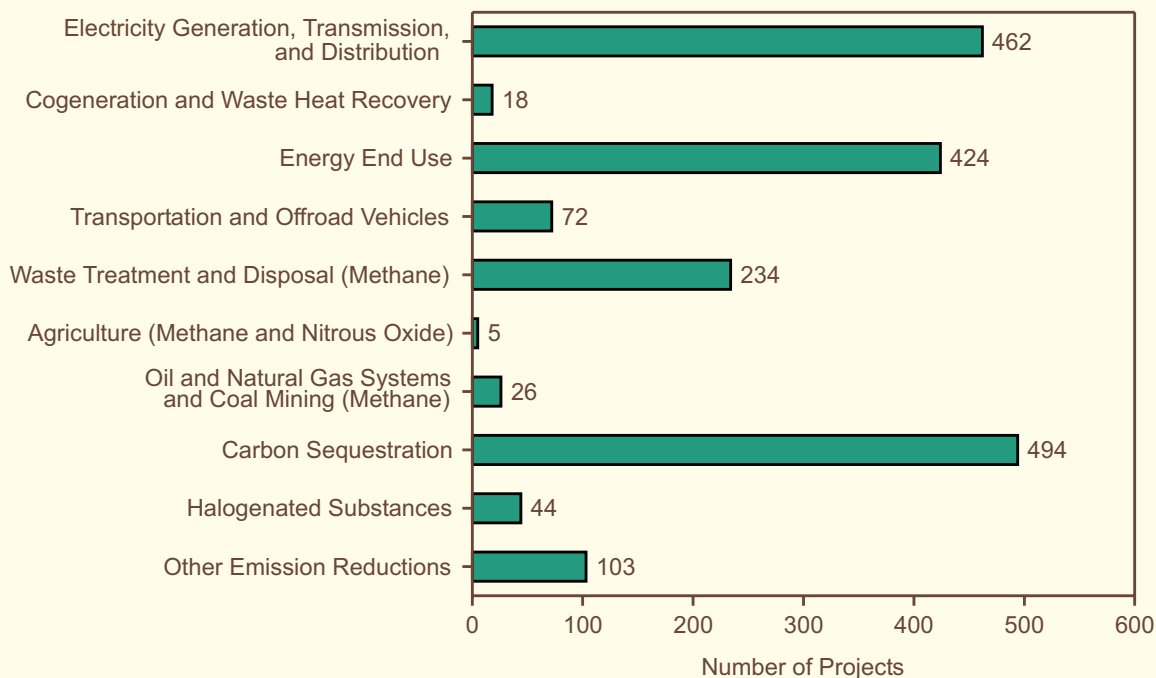
Projects Reported

Electric power sector reporters (including independent power producers) accounted for 1,287 (68 percent) of the projects reported. Also reporting were industrial concerns (206 projects), agriculture and forestry organizations (174 projects), and alternative energy providers (203 projects). Organizations in other sectors

(government, commercial, and residential) submitted reports on 12 projects.

Most of the projects reported for 2000 affected energy supply or use in some way. Some 462 of the projects were related to the generation, transmission, or distribution of electricity, almost all of which were reported by electric power sector reporters (Figure S1). Another 424 were related to energy end use, 18 were cogeneration projects, and 72 were transportation projects. Another 260 projects reduced emissions of methane from waste disposal facilities (234 projects) and from oil and natural gas systems and coal mines (26 projects), many of which included the displacement of fossil fuels through the use of methane as a fuel. Other projects included the reuse of

Figure S1. Number of Projects Reported to the Voluntary Reporting of Greenhouse Gases Program by Project Type, Data Year 2000



Source: Energy Information Administration, Forms EIA-1605 and EIA-1605EZ.

²Reporters outside the electric power industry include manufacturers such as Bethlehem Steel, General Motors, IBM, Johnson & Johnson; facilities such as Alcan's Sebree aluminum plant, Motorola's Austin, TX, integrated circuit fabrication plant, and two California Portland Cement Company plants; a number of operators and developers of landfill methane recovery projects; a trade association (Integrated Waste Services Association); and private voluntary organizations, such as American Forests.

³New reporters for 2000 that are outside the electric power industry include Bristol-Meyers Squibb, Cargill, Danaher Controls, L'ORÉAL USA, Lafarge, Miller Brewing, Texaco, and Unocal.

fly ash in concrete (46 projects) and materials recycling (35 projects), which reduce emissions in part by reducing energy consumption. The largest reductions were reported for projects that improved the performance of nuclear power plants. The non-energy-related projects reported fell into two major categories: sequestration of carbon, usually in forests (494 projects), and the recycling, reuse, or destruction of halogenated substances such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (44 projects).

Reported Reductions by Project Type

Electric Power

In 2000, total reported emission reductions from electric power projects included 132.7 million metric tons carbon dioxide equivalent from direct sources, 8.6 million metric tons from indirect sources, and 7.8 million metric tons from unspecified sources.⁴ Two hundred forty-nine projects were reported in the “decreasing carbon content” category, which includes projects that reduce the carbon content of fuels used to generate electricity. Emission reductions reported for this category totaled 120.4 million metric tons carbon dioxide equivalent from direct sources, 6.9 million metric tons from indirect sources, and 6.8 from unspecified sources. Reported emission reductions for projects increasing energy efficiency in generation, transmission, and distribution included 15.6 million metric tons carbon dioxide equivalent from direct sources, 1.7 million metric tons from indirect sources, and 1.0 million metric tons from unspecified sources.

Energy End Use and Transportation

Reported reductions for energy end-use applications included 19.7 million metric tons carbon dioxide equivalent from direct sources, 8.3 million metric tons from indirect sources, and 0.4 million metric tons from unspecified sources. Nearly all (99 percent) of the reductions were reported for stationary source applications, including lighting control, appliance improvement or

replacement, and heating, ventilation and air conditioning (HVAC) improvements. Much smaller reductions were reported for transportation applications, including 0.02 million metric tons carbon dioxide equivalent from direct sources, 0.1 million metric tons from indirect sources, and 0.002 million metric tons from unspecified sources.

Carbon Sequestration

Reductions of 9.0 million metric tons carbon dioxide equivalent were reported for carbon sequestration projects in 2000. Most of the reported reductions resulted from afforestation, reforestation, urban forestry, forest management, and forest preservation efforts.

Methane Emissions

In 2000, emission reductions reported for methane abatement projects included 29.5 million tons carbon dioxide equivalent from direct sources, 37.1 million metric tons from indirect sources, and 3.1 million metric tons from unspecified sources. The three key sources of methane reductions are landfill methane recapture, wastewater treatment, and waste combustion. The recapture of methane at landfills is the predominant reported source of methane emission reductions for the 2000 data year, including 27.6 million metric tons carbon dioxide equivalent in direct reductions, 14.1 million metric tons carbon dioxide equivalent in indirect reductions, and 3.1 million metric tons carbon dioxide equivalent in unspecified reductions. Waste combustion, recycling, and source reduction, through the avoidance of methane formation at landfills, is also a significant reported source of indirect reductions in methane emissions (6.3 million metric tons carbon dioxide equivalent reported for 2000).

HFCs, PFCs, and Sulfur Hexafluoride

Reductions reported for projects reducing emissions of HFCs, PFCs, and sulfur hexafluoride in 2000 included 4.6 million metric tons carbon dioxide equivalent from direct sources, 81 metric tons from indirect sources, and 0.02 million metric tons from unspecified sources. The key reported reductions were direct reductions in

⁴Unspecified reductions represent quantities reported on Form-1605EZ, which does not distinguish between direct and indirect emission reductions.

perfluoromethane (2.7 million metric tons carbon dioxide equivalent), sulfur hexafluoride (1.4 million metric tons carbon dioxide equivalent), and perfluoroethane (0.6 million metric tons carbon dioxide equivalent).

Who Reported?

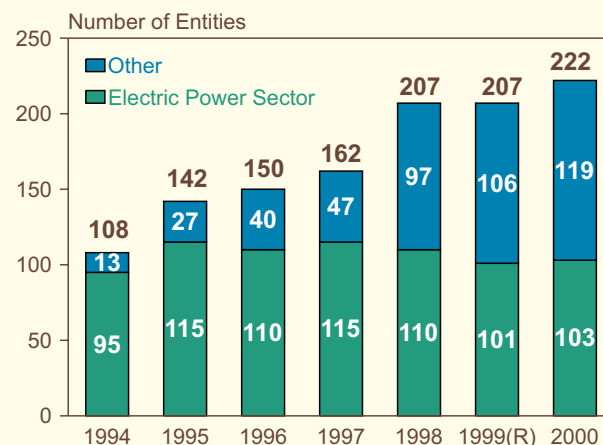
Reports for the 2000 data year were received from 222 participants in 29 different industries or services, representing a continuing increase in both the number and diversity of participants. In comparison, reports for the 1994 data year—the first year of the program—were received from 108 participants in 9 different industries or services (Table S2).

The diversity of the participants in the Voluntary Reporting Program continued to increase in the 2000 data year. In the early years of the program, reporting was dominated by the electric power sector. In the first reporting year (data year 1994), the 95 submissions from electric power producers represented 88 percent of the 108 reports received (Figure S2). Since then, the program has seen an influx of new participants from outside the electric power sector, representing a diverse set of other industries. In addition, the ongoing restructuring of the electric power industry has been accompanied by several mergers and acquisitions involving reporters to the program, reducing the number of reports received from electricity producers. As a result, only 46 percent of the organizations reporting to the program for data year 2000 were from the electric power sector.

Although the number of reporters from other individual industries remained relatively small, in many cases, reports were received from key companies in those other industries: for example, General Motors in the automotive products industry; Noranda and an operating division of Alcan in the metals industry; BP, Sunoco, Inc., and Texaco, Inc., in the petroleum industry; DuPont, Johnson & Johnson, and The Dow Chemical Company in the chemicals industry; Rolls Royce in the aerospace industry; Pharmacia & Upjohn Caribe, Inc., in the pharmaceuticals industry; IBM and Motorola Austin in the electronic equipment industry; and a division of L'ORÉAL USA in the consumer products industry.⁵

Most reporters indicated that their projects were affiliated with one or more government-sponsored voluntary programs. Of the 1,882 projects reported for 2000, 1,034 were affiliated with the Climate Challenge Program, 162 with the Landfill Methane Outreach Program, 122 with the Climate Wise Recognition Program, 41 with the U.S. Initiative on Joint Implementation, 31 with various Energy Star programs (including Energy Star Buildings, Energy Star Computers, and Energy Star Transformers), 19 with the Green Lights Program, 8 with the Natural Gas STAR Program, 6 with the Sulfur Hexafluoride Emissions Reduction Partnership, 4 with the Coalbed Methane Outreach Program, and 3 with WasteWise. Other voluntary programs cited included the Voluntary Aluminum Industrial Partnership, Motor Challenge, the Compressed Air Challenge, and Rebuild America. Not

Figure S2. Electric Power Sector and Other Entities Submitting Reports to the Voluntary Reporting of Greenhouse Gases Program, Data Years 1994-2000



(R) = revised.

Notes: Electric power sector includes electric utilities and independent power producers. 1999 data year includes six late reports that were not included in the totals presented in last year's annual report and database.

Source: Energy Information Administration, Forms EIA-1605 and EIA-1605EZ.

⁵A complete listing of all 2000 reporters is provided in Appendix B, Table B1, of the full report, *Voluntary Reporting of Greenhouse Gases 2000*, which is available from web site <http://www.eia.doe.gov/oiaf/1605/vrrpt/index.html>.

Summary

Table S2. Forms Filed by Standard Industrial Classification, Data Years 1994-2000
(Number of Reports)

SIC Code ^a	Description	Data Year						
		1994	1995	1996	1997	1998	1999 ^(R)	2000
01	Agricultural Production: Crops	0	0	0	0	1	0	0
08	Forestry	1	2	1	1	3	3	1
12	Coal Mining	1	2	2	1	4	3	4
14	Nonmetallic Minerals, except fuels	0	0	0	0	1	1	0
20	Food and Kindred Products	0	0	0	0	1	2	6
22	Textile Mill Products	0	0	0	0	0	1	5
23	Apparel and Other Textile Products	0	0	0	0	0	0	1
24	Lumber and Wood Products	0	0	0	0	0	0	1
25	Furniture and Fixtures	0	0	0	0	0	0	1
26	Paper and Allied Products	0	0	0	0	0	1	1
27	Printing and Publishing	0	1	0	1	0	1	1
28	Chemical and Allied Products	1	3	2	3	8	5	10
29	Petroleum Refining and Other Related Industries	0	0	2	3	8	9	6
30	Rubber and Miscellaneous Plastic Products	0	0	0	0	0	0	2
32	Stone, Clay, Glass, and Concrete Products	0	0	1	4	12	13	7
33	Primary Metals	2	2	4	4	5	5	5
34	Fabricated Metal Products, Except Machinery and Transportation Equipment	0	2	1	1	3	1	1
35	Industrial and Commercial Equipment and Components	0	0	0	0	0	0	1
36	Electronic Equipment	1	1	2	4	4	4	7
37	Transportation Equipment	1	1	1	2	3	5	4
38	Instruments and Related Products	0	0	0	0	2	0	1
39	Miscellaneous Manufacturing Industries	0	1	1	0	2	2	1
48	Communications	0	0	0	0	0	1	0
49	Electric, Gas, and Sanitary Services	95	121	125	129	138	135	145
57	Furniture and Home Furnishings Stores	0	0	0	0	2	1	1
65	Real Estate	0	1	1	1	1	1	1
67	Holding and Other Investment Offices	0	0	1	1	1	1	1
72	Personal Services	0	0	0	0	0	0	1
80	Health Services	0	0	0	0	1	0	0
82	Educational Services	1	2	2	2	0	2	0
86	Membership Organizations	0	0	0	1	1	1	1
87	Engineering and Management Services	0	0	2	2	2	1	0
88	Private Households	2	1	1	1	1	1	1
89	Services Not Elsewhere Classified	0	0	0	1	1	3	2
91	Executive, Legislative, and General	0	0	0	0	1	2	2
Total Number of Reporters^c		108	142	150	162	207	207^b	222^b
Number of 2-Digit SIC Codes Represented		9	13	16	18	24	26^b	29^b

(R) = Revised.

^aThe Voluntary Reporting of Greenhouse Gases database was designed in 1994-1995, when the Standard Industrial Classification (SIC) system was still in use. For the 2002 data year reporting cycle, EIA intends to modify the database to use the North American Industry Classification System (NAICS), which was introduced in 1997 by the United States, Canada, and Mexico to provide comparability in statistics about business activity across North America.

^bIncludes six late reports for the 1999 data year. The 2000 total will also be revised upward in next year's report with the inclusion of late 2000 reports. As of December 21, 2001, EIA had received 12 late 2000 reports, which are not included in this report's 2000 database.

^cTotals are greater than the sum of reporters in each SIC code, because confidential reporters are excluded from the latter.

Source: Energy Information Administration, Forms EIA-1605 and EIA-1605EZ.

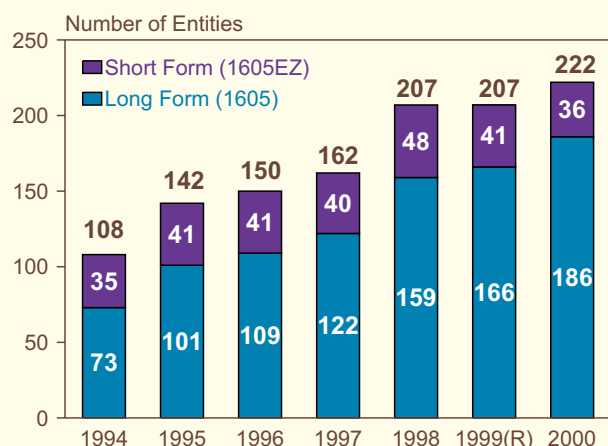
all participants in the various voluntary programs provided information to the Voluntary Reporting Program.

What Was Reported?

The Voluntary Reporting Program permits three distinct types of reporting:

- Project-level emissions and reductions, defined as the emission reduction consequences of a particular action
- Entity-level emissions and reductions, defined as the emissions and reductions of an entire organization, usually defined as a corporation
- Commitments to take action to reduce emissions in the future.

Figure S3. Number of Reports Received by Form Type, Data Years 1994-2000



(R) = revised.

Note: 1999 data year includes six late reports that were not included in the totals presented in last year's annual report and database.

Source: Energy Information Administration, Forms EIA-1605 and EIA-1605EZ.

Of the 222 reports received, 186 (84 percent) were submitted on Form EIA-1605 (Figure S3). The remainder were submitted on Form EIA-1605EZ (the short form), which permits reporting on project-level reductions and sequestration only. The proportion of reporters using the short form has declined from 32 percent in the first year of the program (1994 data year) to 16 percent in the 2000 data reporting cycle. EIA believes that reporters are choosing the long form in order to document their emission reductions more thoroughly. Also, for the same reason, several voluntary programs such as Climate Wise and the Landfill Methane Outreach Program require or encourage participants to use the long form.

Most reporters (183 or 82 percent) reported project-level reductions, and 100 reported entity-level emissions and/or reductions. As these numbers imply, most (62) of the reporters that reported entity-level emissions or reductions also reported at the project level. One hundred twenty-two organizations submitted only project-level reports, whereas 38 reported only entity-level information. Sixty-five reporters provided information on their commitments to reduce emissions or increase sequestration in the future.

Sources of greenhouse gas emissions and emission reductions reported to the Voluntary Reporting of Greenhouse Gases Program are characterized as direct, indirect, or unspecified. The unspecified category includes carbon sequestration reported on the long form and all reductions and sequestration reported on the short form. Because of concern about possible double counting, EIA does not aggregate reported emissions or emission reductions across the three categories.

Project Level

Reporters provided information on a total of 1,882 projects for 2000 (Table S3). The total number of projects reported increased by 160, or 9 percent, compared with the previous reporting cycle.⁶ Most of the 1,882 projects reported for 2000 were also among the 1,722 projects reported for 1999, because they continued to yield emission reductions. Projects often yield emission reductions

⁶The number of projects reported for 1999 has increased from the 1,722 to 1,731 due to the receipt of several additional reports after, and revision of reports that had not been accepted by, the time the database used to prepare the annual report and Public Use Database for 1999 was finalized. See note to Table 3.

Summary

over an extended period of time; for example, an availability improvement project at a nuclear power plant typically involves the adoption of new maintenance and refueling programs that, once in place, are followed over a multi-year period. A project may even involve no new activity. The reforestation of an area in one year can result in the sequestration of carbon in many subsequent years, even if no additional trees are planted. Reporters continue to report the annual emission reductions and carbon sequestration achieved by such long-lived projects on a yearly basis.

Most projects involve actions within the United States; however, some are conducted in foreign countries, designed to test various concepts of joint implementation with other nations (Table S4). Sixty-six of the 97 foreign projects represent shares in two forestry programs in Belize and Malaysia sponsored by the electric utility industry.

The principal objective of the majority of projects reported for 2000 was to reduce carbon dioxide emissions (Table S3). Most of these projects reduced carbon dioxide either by reducing fossil fuel consumption or by switching to lower emitting sources of energy. Many

also achieved small reductions in emissions of other gases. A total of 976 projects involved either efficiency improvements and switching to lower emitting energy sources in the electric power industry or energy end use measures affecting stationary or mobile combustion sources. Projects that also primarily reduced carbon dioxide emissions included the 103 “other” emission reduction projects, most of which involved either the reuse of fly ash as a cement substitute in concrete or the recycling of waste materials.

Projects that primarily affected carbon dioxide emissions accounted for reported direct reductions of 153 million tons carbon dioxide equivalent, representing 82 percent of the total direct reductions reported for 2000 on a carbon dioxide equivalent basis. In addition, indirect reductions totaling 24 million metric tons carbon dioxide equivalent were also reported for the projects that reduced carbon dioxide emissions. A further 9 million metric tons carbon dioxide equivalent of unspecified reductions were reported on the short form (Form EIA-1605EZ), where the reporter is not asked to specify whether reductions or sequestration are direct or indirect.

Table S3. Distribution of Projects by Reduction Objective and Project Type, Data Year 2000

Reduction Objective and Project Type	Number of Projects	Number of Reporters
Reducing Carbon Dioxide Emissions	976	125
Electricity Generation, Transmission, and Distribution	462	93
Cogeneration and Waste Heat Recovery	18	13
Energy End Use	424	92
Transportation and Offroad Vehicles	72	41
Reducing Methane and Nitrous Oxide Emissions	265	78
Waste Treatment and Disposal (Methane)	234	59
Agriculture (Methane and Nitrous Oxide)	5	4
Oil and Natural Gas Systems and Coal Mining (Methane)	26	19
Carbon Sequestration	494	66
Halogenated Substances	44	29
Other Emission Reduction Projects	103	57
Entity-Level Reporting Only (No Projects)	0	38
Commitment Reporting Only (No Projects or Entity-Level Data)	0	0
Total	1,882	222

Note: The total number of reporters is smaller than the sum of the number of reporters for each project type, because most reporters provided information on more than one project.

Source: Energy Information Administration, Forms EIA-1605 and EIA-1605EZ.

Almost all of the 494 carbon sequestration projects reported on either the long form or the short form increased the amount of carbon stored in sinks through various forestry measures, including afforestation, reforestation, urban forestry, forest preservation, and modified forest management techniques. These activities accounted for 26 percent of the projects reported for 2000; however, 180 of the reported carbon sequestration projects represented shares in six projects conducted by the UtiliTree Carbon Company reported by 30 participating electric utilities. The sequestration reported for carbon sequestration projects for 2000 totaled 9 million tons of carbon dioxide on the long form and 5,000 metric tons of carbon dioxide on the short form. Direct emission reductions totaling 1,041 metric tons of carbon dioxide were also reported for a few projects where changes in forest management practices reduced fuel consumption.

A variety of efforts to reduce emissions of gases with high global warming potentials (GWPs) were also reported. Two hundred sixty-five of the reported projects (14 percent) reduced methane and nitrous oxide emissions from waste management systems, animal husbandry operations, oil and gas systems, or coal mines. The 39 million metric tons carbon dioxide equivalent of direct methane reductions reported were offset by reported increases in carbon dioxide and nitrous

oxide emissions totaling 10 million metric tons carbon dioxide equivalent. The carbon dioxide equivalent of the net reduction in direct emissions for projects that reduced methane and nitrous oxide emissions was 29 million metric tons, which represents 16 percent of the total direct reductions reported for 2000. Indirect reductions reported for projects that reduced methane and nitrous oxide emissions totaled 37 million metric tons carbon dioxide equivalent, and unspecified reductions and sequestration reported on the short form contributed emission reductions equal to another 3 million metric tons carbon dioxide equivalent.

Forty-four projects reduced emissions of halogenated substances, including perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆). Unlike previous years, no offsetting increases in emissions of hydrofluorocarbons (HFCs)—which are used as substitutes for chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) being phased out under the Montreal Protocol—were reported for 2000. Direct reductions of PFC and SF₆ emissions totaled 5 million metric tons carbon dioxide equivalent, representing almost all the PFC and SF₆ emission reductions reported for 2000. Reductions of other gases, including carbon monoxide (CO), nonmethane volatile organic compounds (NMVOCs), chlorofluorocarbons (CFCs), and hydrochlorofluorocarbons

Table S4. Geographic Scope of Reports Received and Location of Emission Reduction Projects, Data Years 1994-2000

Year	Reports Received				Projects Reported		
	U.S. Only	Foreign Only	Both U.S. and Foreign	Total ^a	U.S. Only	Foreign Only	Total ^a
1994	99	2	4	108	625	9	645
1995	122	2	16	142	924	36	967
1996	124	1	24	150	1,007	33	1,040
1997	130	1	31	162	1,216	72	1,288
1998	165	1	40	207	1,464	85	1,557
1999 ^(R)	164	4	37	207	1,635	87	1,731
2000	177	1	43	222	1,785	97	1,883

^aTotals are greater than the sum of the components because the latter exclude information from confidential reports.

(R) = revised

Note: The number of reports received for 1999 was revised to reflect the receipt of 6 reports after the finalization of the Public Use Database for last year's annual report. For 1999, additional reports were received from Atlas Paper Mills, County Sanitation Districts of Los Angeles County, Florida Transport 82, Consol Coal Group, Sherry Manufacturing, and Pine Mountain Oil and Gas, Inc. The number of projects reported for 1999 has also been revised to reflect the projects included in those reports.

Source: Energy Information Administration, Forms EIA-1605 and EIA-1605EZ.

Summary

(HCFCs), were reported, but these gases do not have reliable GWPs and are not included the carbon dioxide equivalent data presented in this report.

Direct emission reductions reported for 2000 increased by 21 percent over the reductions reported for 1999, to 187 million metric tons carbon dioxide equivalent, and have tripled since the first year of the program (data year 1994). Reported direct reductions of carbon dioxide emissions increased by 24 percent, to 143 million metric tons carbon dioxide equivalent. Large increases in direct reductions of SF₆ and nitrous oxide were also reported. Reported reductions of SF₆ and nitrous oxide increased by 136 percent and 84 percent, respectively, over the levels reported for 1999. Reported reductions of indirect emissions increased by 8 percent, to 61 million metric tons carbon dioxide equivalent. The sequestration reported peaked at 12 million metric tons for 1998 and has fallen below 10 million metric tons carbon dioxide for the two following years. This decline was caused by the decline in, or nonrecurrence of, sequestration reported for several large forest preservation initiatives. These projects avoided carbon releases associated with logging over the time period that the forests would have been harvested, which were reported as increased carbon sequestration over the same time period.

Unspecified reductions, which include reductions and sequestration reported on the short form (where reporters are not asked to specify whether reported reductions or sequestration quantities are direct or indirect), declined for the second straight year, falling to 12 million metric tons carbon dioxide equivalent in 2000. The primary reason for the large decline between 1998 and 1999 was that the PECO Energy Company, which reported reductions totaling 7.7 million metric tons on the short form in 1998, moved its report to the long form for 1999 and 2000.

Project-Level Reference Cases

For the first time in this report series, EIA has broken out project-level data by the reference case employed in calculating project-specific reported emission reductions. A “reference case” is an emissions or sequestration level against which actual emissions are compared to estimate emission reductions. In a “basic” reference case, actual historical emissions (or sequestration) in a specific year, or an average of a range of years, are used as the

reference case. In a “modified” reference case, an estimate is made of what emissions or sequestration would have been in the absence of the project, and that estimate serves as the reference case.

The use of modified reference cases was reported for estimating reductions for 78 percent of the projects reported for 2000 on Form EIA-1605 (Table S5). A modified reference case is generally preferred for project-level analysis, because this approach attempts to isolate the effect of the action taken by the reporter from other factors that may have affected the reporter’s emissions since the action was taken. The reported use of basic reference cases for 2000 was greatest for projects that reported carbon sequestration (40 percent) and halogenated substances (48 percent), because the techniques for evaluating reductions and sequestration for projects of those types are particularly suited to the use of basic reference cases. For forestry projects, carbon sequestration before and after the project is often assessed by sampling techniques to estimate the carbon stored in trees and soil within a defined area. For halogenated substances, emissions are determined using inventory management data, with emissions of a particular substance being equal to the amount purchased during the year to replace quantities emitted. Reductions can be calculated by subtracting the emissions in the years after emission abatement measures have been instituted from the emissions in the year before the measures were instituted.

In terms of emission reductions and sequestration reported for 2000, 153 million metric tons carbon dioxide equivalent of direct emissions (81 percent of total direct reductions), 56 million metric tons carbon dioxide equivalent of indirect emissions (92 percent of total indirect reductions), and 8 million metric tons carbon dioxide equivalent of sequestration (93 percent of total sequestration reductions) were reported as having been estimated using modified reference cases (Table S6). The project type categories where significant proportions of the reported direct reductions were estimated using basic reference cases were halogenated substances (97 percent) and transportation (76 percent).

Although modified reference cases, in terms of total projects and reported reductions, predominate, basic reference cases are still employed for a number of large projects. A basic reference case was used for estimating the 138,552 metric tons carbon dioxide equivalent

indirect reduction reported by a single oil and natural gas system and coal mining project. The remaining eight projects in this category that reported reductions in indirect emissions together reported a net increase in indirect emissions. More than one-third (37 percent) of the reported indirect reductions for electricity generation transmission and distribution projects were calculated using basic reference cases. This was because several electric utilities reported nuclear-power-related projects that resulted in large reductions in power purchases and calculated the associated reductions in indirect emissions using basic reference cases.

Modified reference cases were used to estimate most (93 percent) of the sequestration reported for 2000, despite the fact that 40 percent of the projects reported using basic reference cases to estimate sequestration. The largest projects in terms of sequestration reported were forest preservation projects, for which basic reference cases cannot be used, because actual sequestration must be compared with a hypothetical scenario assuming that the forest has been harvested.

Entity Level

Most of the 100 reporters providing entity-level information included data on emissions as well as emission reductions or sequestration. Eight reporters provided entity-level data on emissions only, and another four reporters provided entity-level data on emission reductions or sequestration only.

Total entity-level direct emissions of carbon dioxide reported for 2000 were 1,008 million metric tons, which represents a 7-percent increase over the 946 million metric tons reported for 1999. Reported direct emissions of other gases, including methane, nitrous oxide, HFCs, PFCs, and SF₆, totaled 28.1 million metric tons carbon dioxide equivalent for 2000. Total entity-level direct emissions of these gases reported for 2000 were 27 percent lower than those reported for 1999. Total direct and indirect emissions reported at the entity level for each data year from 1994-2000 are summarized in Table S7.

Table S5. Number of Projects Reported on Form EIA-1605 by Reduction Objective and Project Type and Reference Case Employed, Data Year 2000
(Number of Projects)

Reduction Objective and Project Type	Modified		Basic		Total Number of Projects
	Number of Projects	Percent	Number of Projects	Percent	
Reducing Carbon Dioxide Emissions	719	84	132	16	851
Electricity Generation, Transmission, and Distribution	367	90	41	10	408
Cogeneration and Waste Heat Recovery	15	83	3	17	18
Energy End Use	281	77	83	23	364
Transportation and Offroad Vehicles	56	92	5	8	61
Reducing Methane and Nitrous Oxide Emissions	212	96	9	4	221
Waste Treatment and Disposal (Methane)	187	98	4	2	191
Agriculture (Methane and Nitrous Oxide)	5	100	0	0	5
Oil and Natural Gas Systems and Coal Mining (Methane)	20	80	5	20	25
Carbon Sequestration	277	60	184	40	461
Halogenated Substances	22	52	20	48	42
Other Emission Reduction Projects	69	84	13	16	82
Total	1,299	78	358	22	1,657

Note: Excludes projects reported on the short form (Form EIA-1605EZ), which does not collect information on the reference case employed. Excludes two projects reported on the long form (Form EIA-1605) for which no reference case was specified because reductions were not estimated.

Source: Energy Information Administration, Forms EIA-1605.

Summary

Table S6. Reported Emission Reductions and Sequestration for Projects Reported on Form EIA-1605 by Reduction Objective, Project Type, Source, and Reference Case Employed, Data Year 2000
(Metric Tons Carbon Dioxide Equivalent)

Reduction Objective and Project Type	Direct Reductions		Indirect Reductions		Sequestration	
	Modified	Basic	Modified	Basic	Modified	Basic
Reducing Carbon Dioxide Emissions	122,375,491	29,944,159	14,010,056	2,847,281	0	0
Electricity Generation, Transmission, and Distribution	101,191,908	29,355,807	4,667,071	2,726,011	0	0
Cogeneration and Waste Heat Recovery . . .	2,116,344	0	1,205,170	6,138	0	0
Energy End Use	19,061,936	571,744	8,024,072	113,018	0	0
Transportation and Offroad Vehicles	5,302	16,609	113,743	2,114	0	0
Reducing Methane and Nitrous Oxide Emissions	29,194,016	284,939	35,563,298	1,508,609	0	0
Waste Treatment and Disposal (Methane) . .	18,437,782	269,352	35,540,811	1,370,057	0	0
Agriculture (Methane and Nitrous Oxide) . . .	269	0	23,993	0	0	0
Oil and Natural Gas Systems and Coal Mining (Methane)	10,755,965	15,587	-1,506	138,552	0	0
Carbon Sequestration	1,041	0	0	0	8,421,864	588,158
Halogenated Substances	125,605	4,512,304	81	0	0	0
Other Emission Reduction Projects	900,175	0	6,377,558	691,721	0	0
Total	152,596,328	34,741,402	55,950,993	5,047,610	8,421,864	588,158

Note: Excludes reductions and sequestration for projects reported on the short form (Form EIA-1605EZ), which does not collect information on the reference case employed.

Source: Energy Information Administration, Form EIA-1605.

Table S7. Number of Entities Reporting at the Entity Level and Reported Emissions, Emission Reductions by Source and Reference Case Employed, and Sequestration, Data Years 1994-2000
(Million Metric Tons Carbon Dioxide Equivalent)

Year	Number of Entities Reporting	Emissions		Emission Reductions by Type of Reference Case						Sequestration
		Direct	Indirect	Direct			Indirect			
				Modified	Basic	Total	Modified	Basic	Total	
1994	39	754.3	495.5	38.3	22.6	60.9	1.7	1.2	2.9	0.5
1995	50	878.2	501.0	56.1	39.3	95.4	46.1	2.7	48.7	0.8
1996	55	1,183.5	461.5	65.4	44.6	110.0	42.9	5.7	48.6	7.9
1997	60	1,006.6	525.8	73.7	20.3	94.0	24.8	3.4	28.2	7.1
1998	76	1,110.7	473.5	105.8	22.6	128.4	28.3	13.2	41.6	11.2
1999	83 ^(R)	967.9	481.0	114.7	35.3	150.0	30.3	8.4	38.7	8.4
2000	100	1,036.1	107.1	122.4	41.7	164.1	34.6	-6.8	27.8	7.5

(R) = revised.

Note: 1999 data year includes one late report that was not included in the number of entities submitting 1999 data reports presented in last year's annual report and database.

Source: Energy Information Administration, Form EIA-1605.

Total direct emission reductions reported at the entity level have increased by 9 percent this year, from 150.0 million metric tons carbon dioxide equivalent for 1999 to 164.1 million metric tons carbon dioxide equivalent for 2000. In 2000, 122.4 million metric tons carbon dioxide equivalent (75 percent) of the reported direct reductions were estimated using modified reference cases, and 25 percent were estimated with basic reference cases.

Reported entity-level indirect emission reductions for 2000 totaled 27.8 million metric tons carbon dioxide equivalent. Reported indirect reductions of 34.6 million metric tons carbon dioxide equivalent calculated with modified reference cases were offset by -6.8 million metric tons carbon dioxide equivalent indirect reductions (i.e., net emission increase) calculated with basic reference cases. This represents a significant change from the previous reporting cycle, when indirect reductions estimated for 1999 using basic reference cases totaled 8.4 million metric tons carbon dioxide equivalent. This change was due primarily to the correction of 2000 data in two reports, which in the previous year had included indirect reductions totaling 14 million metric tons carbon dioxide equivalent that had been erroneously reported to have been estimated using basic reference cases.

Entity-level sequestration reported for 2000 decreased to 7.5 million metric tons carbon dioxide equivalent (11 percent) from the 8.4 million metric tons carbon dioxide equivalent reported for 1999.

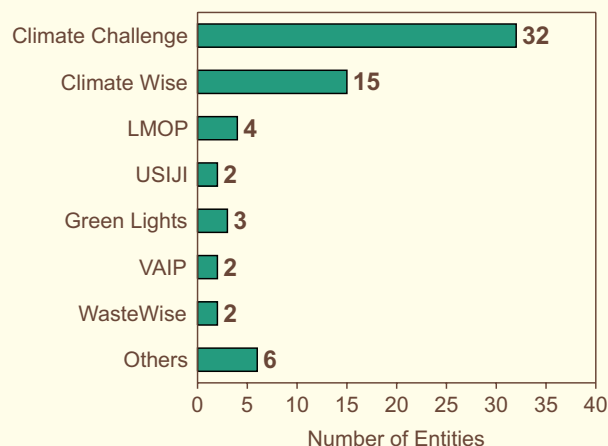
Commitments

Sixty-five entities reported formal commitments to reduce future emissions, to take action to reduce emissions in the future, or to provide financial support for activities related to greenhouse gas reductions.⁷ Almost one-half (49 percent) of these entities are electricity generators participating in the Climate Challenge Program (Figure S4). Thirty-three non-Climate Challenge reporters also reported commitments. Other voluntary programs represented among the commitments reported for 2000 included Climate Wise, the Voluntary Aluminum Industrial Program, the U.S. Initiative on Joint Implementation, the Green Lights Program, the Landfill

Methane Outreach Program, the Coalbed Methane Outreach Program, Cool Communities, Motor Challenge, the Sulfur Hexafluoride Emissions Reduction Partnership for Electric Power Systems, and WasteWise.

There are three forms of future commitment in the Voluntary Reporting Program: entity commitments, financial commitments, and project commitments. Entity and project commitments roughly parallel the entity and project aspects of emissions reporting; an entity commitment is a commitment to reduce the emissions of an entire organization; a project commitment is a commitment to take a particular action that will have the effect

Figure S4. Number of Entities Reporting Commitments Associated with Voluntary Programs in Data Year 2000 by Program



Notes: LMOP = Landfill Methane Outreach Program, USIJI = United States Initiative on Joint Implementation, VAIP = Voluntary Aluminum Industry Partnership. Others include Coalbed Methane Outreach Program, Cool Communities Program, Motor Challenge Program, and Sulfur Hexafluoride Emissions Reduction Partnership for Electric Power Systems. The sum of entities reporting commitments associated with each program exceeds the total number of entities reporting commitments because several entities reported commitments associated with more than one program.

Source: Energy Information Administration, Form EIA-1605.

⁷Fifty-nine companies reported formal commitments in one or more of the entity-level, project-level, or financial categories accommodated by Form EIA-1605. Six companies provided descriptions of future activities only in the Additional Information section of Schedule IV.

Summary

of reducing the reporter's emissions through a specific project. A financial commitment is a pledge to spend a particular sum of money on activities related to emission reductions, without a specific promise as to the emissions consequences of the expenditure.

Twenty-nine firms made 44 specific promises to reduce, avoid, or sequester future emissions at the entity level. Some of these entity-level commitments were to reduce emissions below a specific baseline, others to limit the growth of emissions per unit of output, and others to limit emissions by a specific amount relative to a baseline emissions growth trend. In their reports for 2000, companies committed to reducing future entity-level emissions by a total of 98.4 million metric tons carbon dioxide equivalent. More than one-third (39 percent) of entity-level emission reduction commitments were for the year 2000, with an additional 22 percent falling within the 2001 to 2005 time horizon.

Thirty-one companies reported on commitments to undertake 193 individual emission reductions projects.

Some of the commitments were linked to future results from projects already underway and forming part of the reporters' submissions. Others were for projects not yet begun. Reporters indicated that the projects were expected to reduce future emissions by 160 million metric tons carbon dioxide equivalent, most of which (106 million metric tons carbon dioxide equivalent, or 66 percent) would be reductions of methane. This large increase in future project-level reductions of methane emissions is the result of a single commitment reported by Fidelity Exploration & Production Company, which expects that its gas recovery operations from yet-to-be-mined surface coal deposits in Montana and Wyoming will avoid methane emissions totaling more than 87 million metric tons carbon dioxide equivalent over the next 10 years.

Twenty-two firms made financial commitments. The total amount of funds promised was \$18.6 million, of which \$3.6 million was reported to have been expended in 2000.