United States General Accounting Office

GAO

Report to the Committee on the Year 2000 Technology Problem, U.S. Senate

April 1999

YEAR 2000 COMPUTING CRISIS

Readiness of the Electric Power Industry

GAO/AIMD-99-114

GAO

United States
General Accounting Office
Washington, D.C. 20548

Accounting and Information
Management Division

B-280845

April 6, 1999

The Honorable Robert F. Bennett
Chairman
The Honorable Christopher Dodd
Vice Chairman
Special Committee on the
Year 2000 Technology Problem
United States Senate

A continuous, adequate supply of electric power as we move into the next century is critical for our national economy and the safety and well being of the public. At your request, we identified the electric power industry's vulnerability to Year 2000 problems and the reported status of Year 2000 readiness. On February 22, 1999, we briefed your office on the results of our work. The briefing slides are included in appendix I.

This report provides a high-level summary of the information presented at that briefing, including background information, the Year 2000 vulnerabilities, and the reported readiness status of the electric power industry. This report also presents the suggestions we made to the Department of Energy and the Nuclear Regulatory Commission concerning actions to (1) reduce the risk that a number of entities generating, transmitting, or distributing electric power will not meet the June 1999 industry Year 2000 readiness milestone and to (2) ensure that utility customers have adequate information about the risks of power outages in their service area.

Result in Brief

All phases of operations in the electric power industry--from generation to distribution--use control systems and equipment that are subject to Year 2000 failures. While the electric power industry has reported that it has made substantial progress in making its equipment and systems ready to continue operations into the Year 2000, significant risks remain. In response to a November 1998 industry-wide survey, the nation's electric power utilities reported that, on average, they were 44 percent complete with remediation and testing. However, almost half of the reporting organizations said that they did not expect to be Year 2000 ready within the June 1999 industry target date, and about one sixth of the respondents indicated they would not be ready until the last 3 months of 1999—leaving little time margin for resolving unexpected problems.

Background

The United States electric power industry comprises about 3,200 electric utilities, with about 700 of the utilities operating power generation facilities.[1] Some utilities are exclusively transmission or distribution entities--utilities that purchase wholesale power from others to distribute, over their own transmission and distribution lines, to individual customers.

In North America, there are 136 control areas[2] responsible for coordinating the generating, transmission, and distribution activity within their specific geographic areas. A control area is the basic operating unit of the electric power industry. Each control area manages its generation to meet electricity demand and fulfill exchange obligations. They must be in direct control of their transmission systems and generators to continuously balance power supply with demand in order to meet customer needs and prevent damage to equipment.

The control areas in the continental United States, Canada, and a small area in northern Mexico are part of three interconnected grids. For these grids, the North American Electric Reliability Council (NERC) sets the operating and engineering standards for reliability.

Electric Industry Is Vulnerable to Year 2000 Failures

The industry is dependent on computer control systems and embedded systems that are susceptible to Year 2000 failures. The industry's analysis of its embedded systems has shown that the Year 2000 problem places the nation's electric power systems at risk. Because of the high voltages used in the transmission of electric power, and the speed at which an electrical disturbance can cascade through the system, the security[3] of the system is maintained through an extensive network of automatic protection devices. These devices, including circuit breakers and relays, are usually centrally monitored and controlled by computer systems generally known as supervisory control and data acquisition (SCADA) systems.

[1]This excludes nonutilities--privately owned entities that generate power for their own use and/or for sale to utilities and others.

[2]In addition to the 136 control, areas there are about 64 operating centers sharing responsibility for the monitoring and control of the bulk electric power systems in the North America.

[3]System security is defined as the ability of the electric system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system elements.

Virtually all of the SCADA systems and many of the devices use embedded microprocessors and systems that may have, or are known to have, Year 2000 problems. All phases of operations--from generation to distribution--use control systems and equipment that are subject to Year 2000 failures.

Resolution of Year 2000 problems in control systems and equipment used in the electric power industry is essential for a dependable supply of electricity necessary for transportation, industrial operations, home heating, and other activities that affect our daily lives. The President's Council on Year 2000 Conversion--working with the Department of Energy and with industry associations led by NERC--is assessing industry's progress in addressing Year 2000 issues. This is consistent with recommendations that we made to the President's Council in April 1998 to institute a sector based approach with needed public/private partnerships and to make assessments of industry readiness.[4]

Progress in Year 2000 Readiness But Risks Remain

The electric power industry has made substantial progress in making its equipment and systems ready to continue operations into the Year 2000, but significant risks remain. In January 1999, NERC reported the findings of its November 1998 survey, with about 98 percent of the electricity supply and delivery organizations participating in the assessment process. The survey respondents reported that on average they were 44 percent complete with remediation and testing. About half of the reporting organizations said that they expected to be Year 2000 ready within the June 1999 industry target date.

About 46 percent of the bulk power entities reported to NERC that they expect to miss the industry Year 2000 readiness target date of June 1999. This 46 percent includes 16 percent that are not expected to be ready until the 4th quarter of 1999. In addition, 20 nuclear power plants reported that they would not meet the industry Year 2000 readiness milestone of June 1999.

NERC, concerned about the slow pace of the Year 2000 effort, plans to more closely monitor the status of those facilities that may be at risk of failure and increase its supervisory activities. In addition, its regional

[4]Year 2000 Computing Crisis: Potential for Widespread Disruption Calls for Strong Leadership and Partnerships (GAO/AIMD-98-85, April 30, 1998).

councils plan to coordinate drills to ensure that personnel and systems are ready for operations during the Year 2000 transition.

Federal organizations engaged in power production and transmission reported similar Year 2000 status for their facilities. Energy's power marketing administrations reported that they will be Year 2000 ready within the industry target date; the Corps of Engineers in the 3rd quarter of 1999; and the Bureau of Reclamation and the Tennessee Valley Authority in the 4th quarter of 1999.

Suggested Actions

As discussed in the briefing, in order to reduce the risk that a number of entities generating, transmitting, or distributing electric power will not meet the June 1999 Year 2000 readiness milestone, and to ensure that utility customers have adequate information about the risk of power outages in their service areas, on February 19, 1999, we met with Department of Energy officials and suggested that they:

- Work with the Electric Power Working Group to ensure that remediation activities are accelerated for the utilities that expect to miss the June 1999 deadline for achieving Year 2000 readiness. This would include revising outage schedules to perform renovations prior to the industry target date, where feasible, and adding resources if necessary to accelerate progress.
- Encourage state regulatory utility commissions to require a full public disclosure of Year 2000 readiness status of entities transmitting and distributing electric power-- including 136 control areas and the 3,000 entities operating North America's distribution systems. Such disclosure should include the current readiness status, the projected date that readiness will be achieved, descriptions of the probable and worst case scenarios, and a public version of contingency plans.

In response to our suggestions, an Energy official said that the department agrees with the suggested actions in general. However, he noted that the department would probably not pursue the acceleration of schedules for those organizations whose systems are substantially ready except for a small amount of work. Concerning the dissemination of readiness status information, he said that Energy plans to coordinate the issue of public disclosure with state regulatory agencies.

As discussed in the briefing, to help ensure that all licensed nuclear power plants will identify and rectify any Year 2000 problems with their computer

systems well before January 1, 2000, and that the public and the electric power industry is given adequate information about the Year 2000 readiness status of individual nuclear power plants, on February 12, 1999, we suggested that Nuclear Regulatory Commission (NRC):

- In cooperation with the Nuclear Energy Institute, work with the nuclear power plant licensees to accelerate the Year 2000 remediation efforts among the nuclear power plants that expect to miss the June 1999 deadline for achieving Year 2000 readiness. This would include revising outage schedules to perform renovations prior to the industry target date.
- Publicly disclose the Year 2000 readiness status of each of the nation's operational nuclear reactors. The disclosure should include the date when each nuclear power plant is expected to be Year 2000 ready.

NRC officials stated that nuclear power licensees are required to report their Year 2000 readiness status on July 1, 1999. NRC plans to focus its efforts on nuclear power plants that may miss the July 1, 1999 milestone. NRC officials told us that NRC would release the information on the Year 2000 readiness of individual nuclear power plants in July 1999.

Objectives, Scope, and Methodology

As requested, our objectives were to identify the electric power industry's vulnerability to Year 2000 problems and the reported status of Year 2000 readiness. To identify Year 2000 vulnerabilities in the industry, we reviewed federal agency and industry associations' publications on the structure of the industry, and the use of date dependent embedded systems in the technical infrastructure. We also visited selected electric utilities and federal power generating and marketing agencies to obtain information about the extent of embedded systems vulnerabilities.

To identify the reported status of Year 2000 readiness, we reviewed and analyzed industry survey data collected by the electric power subgroup of the President's Council on Year 2000 Conversion. Because of the large volume of the survey respondents and our limited access to source data, we did not validate the accuracy of reported information. We conducted our work at the Departments of Energy, the Interior, and Defense; the Federal Energy Regulatory Commission; the Nuclear Regulatory Commission; the Tennessee Valley Authority; selected electric utilities; and five electric power industry associations that conducted surveys for the electric power subgroup of the President's Council. We performed our

work from August 1998 through February 1999, in accordance with generally accepted government auditing standards.

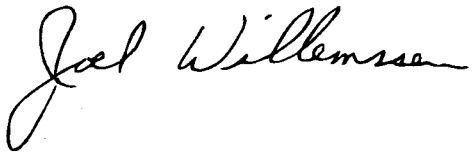
We provided a copy of our briefing materials, which were used in preparing this report, to the Department of Energy officials representing the electric power working group of the President's Council on Year 2000 Conversion. The Director, Office of Economic, Electricity, and Natural Gas Analysis of the Department of Energy gave us oral comments on the briefing. We have incorporated them as appropriate throughout this report. We have also provided copies of industry-wide findings to NERC, and copies of agency-related findings to key officials at Bureau of Reclamation, Army Corps of Engineers, Tennessee Valley Authority, Bonneville Power Administration, Southeastern Power Administration, Southwestern Power Administration, and Western Area Power Administration. We responded to their questions on these materials.

As agreed with your office, unless you publicly announce the contents of this report earlier, we will not distribute it until 30 days from its date. At that time, we will send copies to John Koskinen, Chairman of the President's Council on Year 2000 Conversion; The Honorable Bruce Babbitt, Secretary of the Interior, The Honorable Bill Richardson, Secretary of Energy; Lt. Gen. Joe N. Ballard, Chief of Engineers and Commander, Army Corps of Engineers; Judi Johansen, Administrator, Bonneville Power Administration; The Honorable Shirley Jackson, Chairman, Nuclear Regulatory Commission; Craven Crowell, Chairman, Tennessee Valley Authority; The Honorable Jacob J. Lew, Director, Office of Management and Budget; and other interested parties. Copies will also be made available to others upon request.

We appreciate the help and cooperation extended to our audit team by leading industry associations--the North American Electric Reliability Council; the Edison Electric Institute; the American Public Power Association; and the National Rural Electric Cooperative Association. We would also like to express our appreciation to the following electric power companies: the Consolidated Edison Company of New York, New York; Easton Utilities, Easton, Maryland; Virginia Power, Surrey Power Station, Virginia; and the Los Angeles Department of Water and Power, Los Angeles, California.

If you have any questions on matters discussed in this letter, please call me at (202) 512-6253, or Mirko J. Dolak, Technical Assistant Director, at (202)

512-6362; or James R. Hamilton, Assistant Director, at (202) 512-6271. Other major contributors to this report are listed in appendix II.



Joel C. Willemssen
Director, Civil Agencies Information Systems

Briefing on Electric Power Industry Year 2000 Readiness

GAO Year 2000 Readiness

Briefing for Senate Special Committee on the Year 2000 Technology Problem on Electric Power Industry

GAO Purpose

Purpose of briefing is to provide the results of our review of the Year 2000 readiness of the electric power industry. We will present

- Objectives, scope, and methodology
- Background
- Year 2000 vulnerability
- Federal and industry efforts to assess Year 2000 status
- Year 2000 readiness of electric power industry
- Year 2000 readiness of federal electric power organizations
- Suggested actions

2

GAO Objectives

The review objectives were to identify

- Year 2000 vulnerabilities in the electric power industry and
- the status of Year 2000 Readiness.

3

GAO Scope and Methodology

In assessing the domestic electric power industry's vulnerability to Year 2000 problems, we surveyed an extensive body of technical literature and industry journals, searched and reviewed related documents from the Internet, reviewed federal agency and industry publications on the structure of the industry, and visited selected federal and private sector organizations that generate, transmit, and distribute electric power.

To identify the status of Year 2000 readiness, we reviewed and analyzed industry survey data collected by the electric power subgroup of the President's Council on Year 2000 Conversion, and Year 2000 program status data provided by federal organizations generating or marketing electric power.

Because of the large volume of the survey respondents and our limited access to private sector source data, we did not validate the accuracy of reported information.

4

GAO Scope and Methodology (cont'd)

In the federal sector we conducted our work at

- Department of Energy;
- Department of the Interior;
- Department of Defense;
- Federal Energy Regulatory Commission;
- Nuclear Regulatory Commission;
- Tennessee Valley Authority, Chattanooga, Tennessee;
- Bonneville Power Administration, Portland, Oregon;
- Western Area Power Administration, Denver, Colorado; and
- Army Corps of Engineers, Washington DC and Portland, Oregon;

5

GAO Scope and Methodology (cont'd)

In the private sector, we conducted our work at

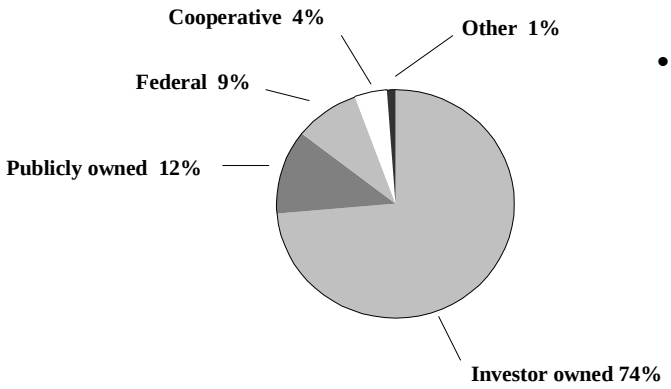
- North American Electric Reliability Council;
- Edison Electric Institute;
- American Public Power Association;
- National Rural Electric Cooperative Association;
- Nuclear Energy Institute;
- Consolidated Edison Company of New York, New York;
- Easton Utilities, Easton, Maryland;
- Virginia Power, Surry Power Station, Virginia; and
- Los Angeles Water and Power, Los Angeles, California.

We performed our work from August 1998 through February 1999, in accordance with generally accepted government auditing standards.

6

GAO Background - Ownership of Electric Utilities

Existing Generating Capacity by Type of Utility, 1997



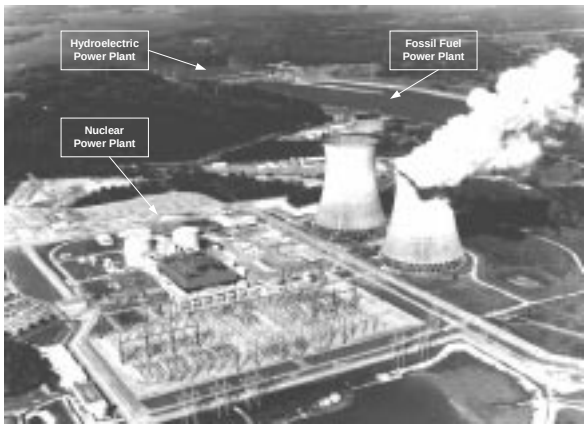
Source: Energy Information Administration, Department of Energy

- The United States electric power industry is comprised of about 3,200 electric utilities, with about 700 utilities operating power generation facilities.
- There are four types of utilities:
  - 244 investor-owned,
  - 7 federal,
  - 2,014 publicly-owned, and
  - 931 cooperatives.

7

GAO Background - Primary Energy Sources

Nuclear, coal-fired, and hydroelectric power plants Tennessee Valley Authority



Source: Tennessee Valley Authority

- In 1997, the reported capacity of U.S. utilities totaled about 710,000 megawatts.
- Primary energy sources:
  - 43% Coal-fired
  - 19% Gas-fired
  - 14% Nuclear
  - 13% Hydroelectric
  - 10% Petroleum
  - 1% Other

8

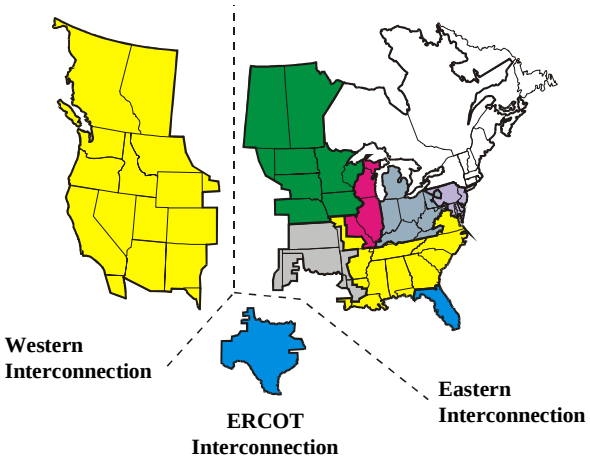
GAO Background - Electric Grid Structure

- The North American Electric Reliability Council (NERC) sets the operating and engineering standards for the reliability of electric systems in North America
- NERC is a voluntary not-for-profit organization made up of 10 Regional Reliability Councils. NERC and its regions account for nearly every bulk electric supply and delivery organization in the three Interconnections of North America

9

GAO Background - Electric Grid Structure (cont'd)

The Three NERC Interconnections in North America



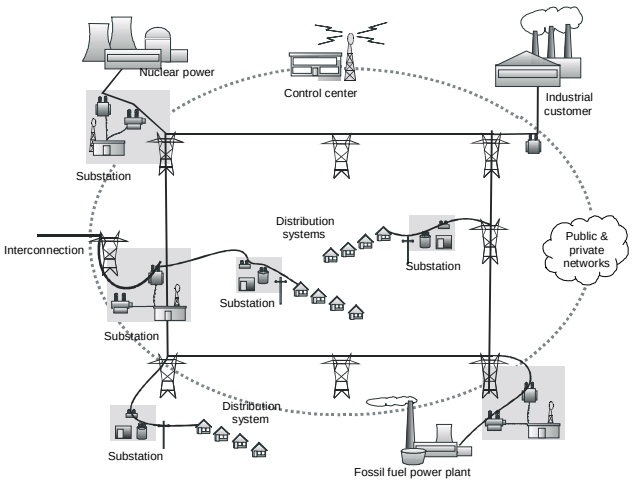
Source: NERC.

- The electric systems in North America are connected into three major grids or Interconnections.
- Each Interconnection contains a number of control areas. There are 136 control areas in North America.

10

GAO Background - Electric Grid Structure (cont'd)

A Simple Control Area



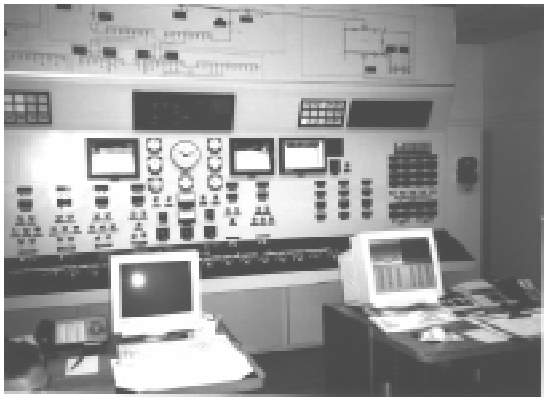
Adapted from: Electric Power Wheeling and Dealing, Office of Technology Assessment, May 1989.

- In North America, the coordination of generating, transmission, and distribution activity within a specific geographic area is implemented through the 136 control areas.
- Each control area must be in direct control of its transmission systems and generators to continuously balance power supply with demand.

11

GAO Year 2000 Vulnerability

Utility Control Center with SCADA Displays and Mapboard



The industry is dependent on computer control systems and embedded systems that are subject to Year 2000 failures.

Control systems include:

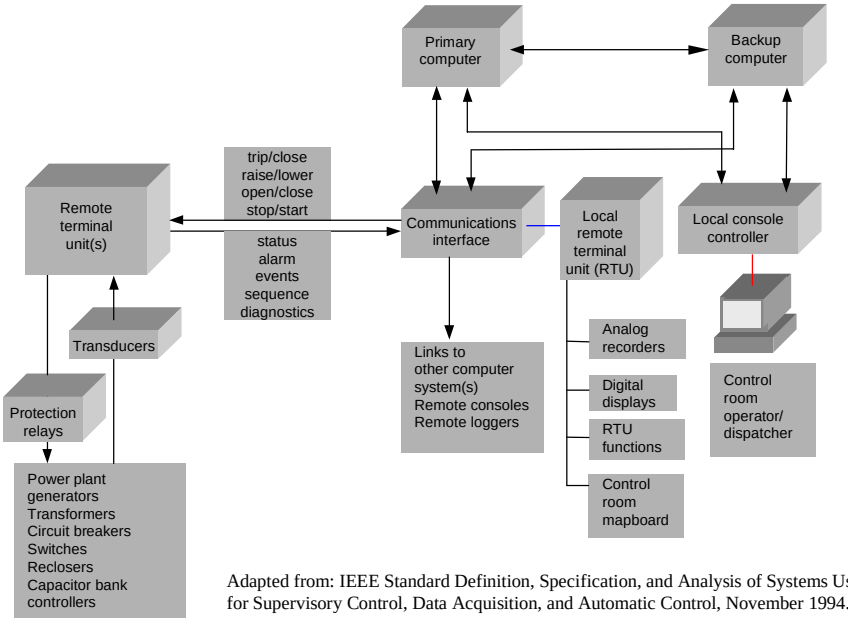
- Supervisory Control and Data Acquisition (SCADA),
- Automatic Generation Control (AGC), and
- Energy Management Systems (include SCADA & AGC systems).

The control systems manage the grid and its protective devices, including those with embedded systems.

12

GAO Year 2000 Vulnerability - SCADA Systems

A simple SCADA System

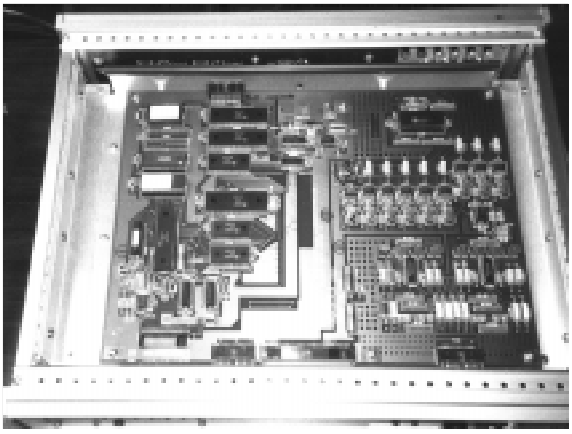


Adapted from: IEEE Standard Definition, Specification, and Analysis of Systems Used for Supervisory Control, Data Acquisition, and Automatic Control, November 1994.

13

GAO Year 2000 Vulnerability - Embedded Systems

Embedded Microprocessors in Protection Relay

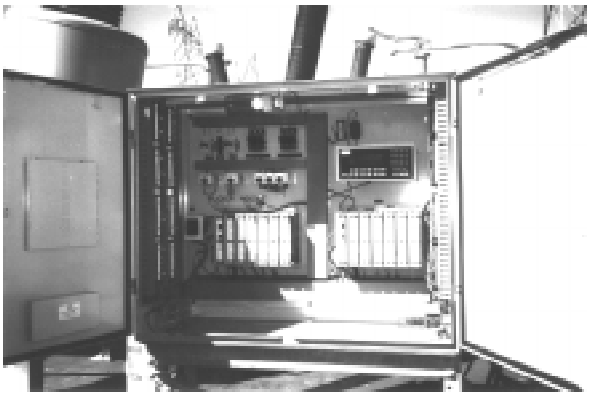


- Embedded systems are computers used to monitor or control the operation of devices, machines, or plants.
- In some instances, the embedded systems contain microprocessors providing timing and calendar functions. These “real time clocks” allow the system to manage timed control sequences, keep track of equipment maintenance events, or time-stamp system events.
- Systems containing “real time clocks” may malfunction or experience a total failure.

14

GAO Year 2000 Vulnerability - Embedded Systems (cont'd)

Programmable Logic Controllers in 500,000 Volt Circuit Breaker



The electric power industry uses a wide range of embedded devices, including remote terminal units, protection relays, and programmable logic controllers.

The embedded devices monitor and control generators, circuit breakers, switches, and other key elements of the electric grid.

The embedded devices are supervised or controlled by EMS or SCADA systems.

15

GAO Year 2000 Vulnerability - Potential Impacts

NERC has identified a large number of Year 2000-related risk factors that may impact the operation of electric power systems. The internal risk factors include generator outages, constrained operation of nuclear power plants, partial loss of EMS/SCADA systems, loss of portions of company-owned data and voice communications, and a failure of environmental control systems. According to the assumptions suggested by NERC for contingency planning purposes

- a probable scenario may include 10% to 15% loss of generation, the loss of wire-based voice and data communications, and the partial loss of EMS/SCADA systems.
- a credible worst case scenario might result in area blackout caused by the long-term loss of generating and control facilities, and the loss of fuel supplies.

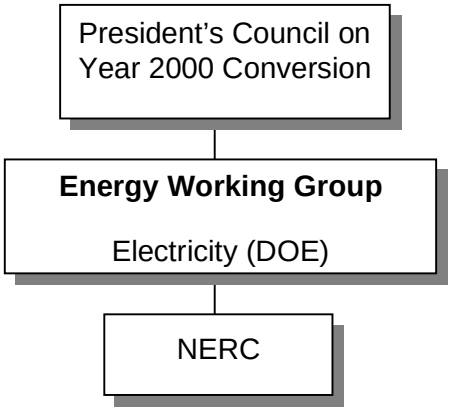
16

GAO Federal and Industry Efforts to Assess Year 2000 Status

- The President's Council on Year 2000 Conversion is assessing the Year 2000 readiness of the nation's infrastructure.
- The President's Council has established an Electric Power Working Group, led by the Department of Energy, to assess the readiness of the electric power industry.
- Energy has asked the North American Electric Reliability Council to assess whether the nation's electric industry is adequately prepared to address the Year 2000 problem.

17

GAO Federal and Industry Efforts to Assess Year 2000 Status (cont'd)



- Edison Electric Institute (EEI)
- American Public Power Association (APPA)
- National Rural Electric Cooperative Association (NRECA)
- Nuclear Energy Institute (NEI)
- Canadian Electric Association (CEA)

NERC and industry associations are surveying their members' Y2K assessment programs.

- NERC - Control Areas and bulk power entities
- EEI - Investor-owned utilities
- APPA - municipal utilities
- NRECA - Rural cooperatives
- NEI - Nuclear power industry
- CEA - Canadian utilities

18

GAO Year 2000 Readiness of Electric Power Industry

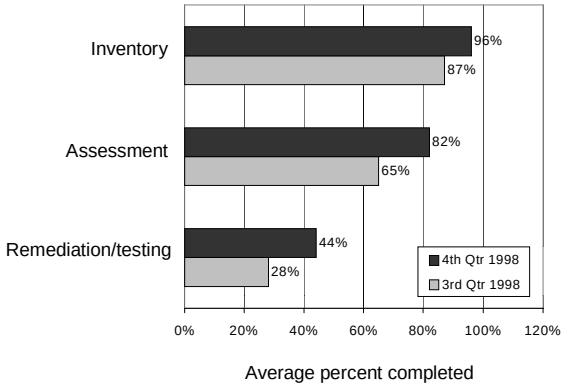
While the electric power industry has made substantial progress in making its equipment and systems ready to continue operations into the Year 2000, significant risks remain. According to NERC's survey, the industry Year 2000 readiness target date of June 1999 is expected to be missed by

- 46 percent of the reporting bulk power entities,
- 20 of 66 nuclear power plants,
- 26 percent of municipal distributors, and
- 10 percent of cooperative distributors.

19

GAO Reported Year 2000 Readiness of Electric Power Industry - Control Areas and Bulk Power Utilities

Reported Control Area and Bulk Power Utilities Readiness Status, November 1998



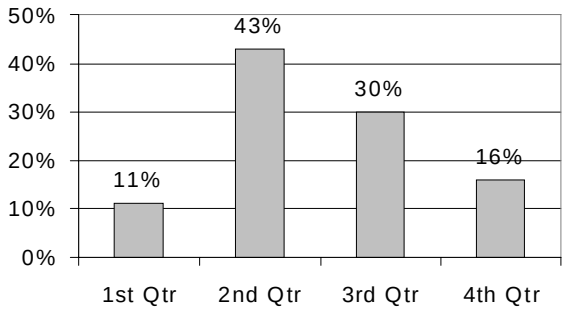
Within the overall 44% completion of remediation and testing reported in November 1998, the control areas and bulk power systems reported completing remediation and testing for average of

- 42% for nonnuclear generation facilities,
- 48% for energy management and telecommunications systems, and
- 53% for substation controls and system protective equipment.

20

GAO Year 2000 Readiness of Electric Power Industry - Control Areas and Bulk Power Utilities (cont'd)

Control Areas and Bulk Power Utilities' Projected Readiness by 1999 Quarter



The reasons utilities gave to NERC for missing the target date included

- renovations would be performed at the next scheduled outage (plant shutdown for maintenance and repairs)
- remediation can not be completed until vendor supplied equipment or systems are received

21

GAO Year 2000 Readiness of Electric Power Industry - Nuclear Power Plants

NEI reported similar reasons as to why 20 of the 66 nuclear power plants would not achieve readiness until after the industry target date:

- renovations would be performed at the next scheduled outage,
- remediation can not be completed until vendor supplied equipment or systems are received, and
- “the scope of work involved.”

22

GAO Year 2000 Readiness of Electric Power Industry - Power Distributors

In 4th quarter of 1998, distributors reported to APPA and NRECA that the industry target date for readiness will be missed by

- 23 percent of the municipal distributors and
- 10 percent of the cooperative distributors.

The readiness of a large percent of the distributors is uncertain because about 73 percent of the municipal and about 23 percent of the cooperative distributors did not report their status.

23

GAO Planned Industry and Regulatory Actions

NERC plans to more closely monitor the status of those facilities that may be at risk of failure and increase its supervision of their Year 2000 activities, including contacting their chief executives.

In addition, NERC Regional Reliability Councils will coordinate drills to ensure that personnel and systems are ready for operations during the Year 2000 transition. The first drill, focused on communications, will be held in April 1999. The second drill, scheduled for September 1999, will rehearse the Year 2000 rollover.

NEI did not plan to take any specific actions concerning the nuclear plants that do not expect to meet the June 1999 industry target date for readiness.

APPA and NRECA did not specify in their reports any actions they plan to take concerning the power distributors that do not expect to meet the June 1999 industry target date for readiness.

24

GAO Federal Electric Power Facilities - Power Generation

Federal organizations operate power generation and transmission across most of the United States. The Army Corps of Engineers and the Bureau of Reclamation operate hydroelectric plants. The Tennessee Valley Authority (TVA) operates hydroelectric, fossil fuel, combustion turbine, and nuclear power plants. The numbers of power plants operated by these federal organizations are:

Organization	Percent of U.S. power	Facilities
Corps of Engineers	2.8%	75 hydroelectric plants
Bureau of Reclamation	1.5%	59 hydroelectric plants
TVA	4.4%	30 hydroelectric plants 11 fossil fuel plants 4 combustion turbine plants 3 nuclear plants

25

GAO Federal Electric Power Facilities - Transmission

The Department of Energy's Power Marketing Administrations (PMAs) market and transmit the power produced by the Corps of Engineers and the Bureau of Reclamation. TVA also markets and transmits the power it produces. The transmission function involves the operation of control area and the maintenance of transmission lines. The facilities operated by these organizations include:

Organization	Facilities
Bonneville PMA	15,000 miles of transmission lines, 363 substations
Southeastern PMA	Leases transmission lines
Southwestern PMA	1,380 miles of transmission lines, 24 substations
Western PMA	16,800 miles of transmission lines, 258 substations
TVA	17,000 miles of transmission lines, 535 substations

26

GAO Year 2000 Readiness of Federal Electric Power Facilities

The federal organizations engaged in power production and transmission participated in the November 1998 NERC survey. While the industry average was reported to be 44% for remediation and testing, the federal organizations generally reported a higher level of completion, as follows:

Organization	Percent complete November 1998
• Corps of Engineers	66%
• Bureau of Reclamation	50%
• TVA	68%
• Bonneville PMA	37%
• Southeastern PMA	80%
• Southwestern PMA	10%
• Western PMA	60%

27

GAO Year 2000 Readiness of Federal Electric Power Facilities (cont'd)

Most of the Federal organizations did not expect to achieve readiness by the June 30, 1999, industry target date, according to their November 1998 responses to the NERC survey.

Organization	Projected Readiness
Corps of Engineers	3rd quarter 1999
Bureau of Reclamation	4th quarter 1999
TVA	4th quarter 1999
Bonneville PMA	2nd quarter 1999
Southeastern PMA	3rd quarter 1999
Southwestern PMA	4th quarter 1999
Western PMA	2nd quarter 1999

In January 1999, Southeastern and Southwestern PMAs told us they had accelerated their schedules and expect to achieve readiness in the 2nd quarter of 1999. Thus, the four DOE PMAs plan to meet the July 1, 1999, readiness milestone. TVA also revised its schedule for power plants and expects to achieve readiness in the 2nd quarter 1999 for all but one of its fossil fuel plants.

28

GAO Reasons Federal Facilities Readiness Will Miss Industry Target Date

The reasons given to us by the Federal organizations for not meeting the industry target date for readiness varied:

Corps of Engineers

The Corps reported that power plants in four of its districts would not achieve readiness until the last half of 1999. The Corps' Year 2000 program officials explained that the remediation and testing at these facilities would be complete by the June 1999 industry target date, but test documentation and contingency plans are not expected to be completed until the last half of the year.

29

GAO Reasons Federal Facilities Readiness Will Miss Industry Target Date (cont'd)

Bureau of Reclamation

The Bureau of Reclamation projects that 7 of its 59 power generation facilities will not be Year 2000 ready until the last half 1999. Reclamation officials explained that the SCADA systems are being replaced in these facilities and the work is not scheduled to completed until the last half of 1999. They further explained that these SCADA systems are part of a large modernization effort that encompasses remote and local control systems for many types of major equipment at the dams, including gates, outlet valves, and monitoring systems for flood control and water quality.

GAO Reasons Federal Facilities Readiness Will Miss Industry Target Date (cont'd)

TVA

TVA officials explained that five fossil plants will not meet the industry target date for readiness because they will not make the Year 2000 renovations at these plants until the next scheduled outages for maintenance and repair in November and December 1999. Because these fossil fuel facilities represent about 26 percent of TVA's electricity capacity, Year 2000 failures could have had a significant impact. In response to our concern with the risks associated with this schedule, TVA officials examined the incremental costs of rescheduling the outages for these plants and decided to move the scheduled outage to June 1999 for three plants, including two with the highest generation capacity.

31

GAO Suggested Actions

Department of Energy

In order to reduce the risk that a number of entities generating, transmitting, or distributing electric power will not meet the June 1999 Year 2000 readiness milestone, and to ensure that utility customers have adequate information about the risk of power outages in their service area, we suggest that the Department of Energy take the following actions:

- Work with the Electric Power Working Group to ensure that remediation activities are accelerated for the utilities that expect to miss the June 1999 deadline for achieving Year 2000 readiness, including revising outage schedules to perform renovations prior to the industry target date, where feasible, and adding resources if necessary to accelerate progress.

32

GAO Suggested Actions (Cont'd)

- Encourage state regulatory utility commissions to require a full public disclosure of Year 2000 readiness status of entities transmitting and distributing electric power-- including 136 control areas and the 3,000 entities operating North America's distribution systems. Such disclosure should include the current readiness status, the projected date that readiness will be achieved, the descriptions of the probable and worst case scenarios, and a public version of contingency plans.

  In response to our suggestions, an Energy official said that the department agrees with the suggested actions in general. However, he noted that the department will probably not pursue the acceleration of schedules for those organizations whose systems are substantially ready except for a small amount of work. Concerning the public disclosure of readiness status, he said that Energy plans to coordinate the issue of public disclosure with state regulatory agencies.

33

GAO Suggested Actions (Cont'd)

Nuclear Regulatory Commission

To help ensure that all licensed nuclear power plants will identify and rectify any Year 2000 problems with their computer systems well before January 1, 2000, and that the public and the electric power industry is given adequate information about the Year 2000 readiness status of individual nuclear power plants, we suggest that NRC take the following actions:

- In cooperation with the NEI, work with the nuclear power plant licensees to accelerate the Year 2000 remediation efforts among the nuclear power plants that expect to miss the June 1999 deadline for achieving Year 2000 readiness, including revising outage schedules to perform renovations prior to the industry target date.

34

GAO Suggested Actions (Cont'd)

- Publicly disclose the Year 2000 readiness status of each of the nation's operational nuclear reactors. The disclosure should include the date when each nuclear power plant is expected to be Year 2000 ready.

  NRC officials stated that nuclear power licensees are required to report their Year 2000 readiness status on July 1, 1999. NRC plans to focus its efforts on nuclear power plants that may miss the July 1, 1999, milestone. NRC has completed audits of 12 nuclear power plants and is currently in the process of determining whether or not to conduct 32 additional audits. NRC official told us that NRC will release the information on the Year 2000 readiness of individual nuclear power plants in July 1999.

35

Major Contributors to This Report

Accounting and Information Management Division, Washington, D.C.

Keith A. Rhodes, Technical Director
William N. Isrin, Operations Research Analyst
Anh Q. Le, Senior ADP/Telecommunications Analyst
Daniel K. Wexler, Senior Information Systems Analyst
Michael A. Tovares, Senior Information Systems Analyst

Ordering Information

The first copy of each GAO report and testimony is free. Additional copies are $2 each. Orders should be sent to the following address, accompanied by a check or money order made out to the Superintendent of Documents, when necessary, VISA and MasterCard credit cards are accepted, also.

Orders for 100 or more copies to be mailed to a single address are discounted 25 percent.

Orders by mail:

U.S. General Accounting Office
P.O. Box 37050
Washington, DC 20013

or visit:

Room 1100
700 4th St. NW (corner of 4th and G Sts. NW)
U.S. General Accounting Office
Washington, DC

Orders may also be placed by calling (202) 512-6000 or by using fax number (202) 512-6061, or TDD (202) 512-2537.

Each day, GAO issues a list of newly available reports and testimony. To receive facsimile copies of the daily list or any list from the past 30 days, please call (202) 512-6000 using a touchtone phone. A recorded menu will provide information on how to obtain these lists.

For information on how to access GAO reports on the INTERNET, send an e-mail message with "info" in the body to:

info@www.gao.gov

or visit GAO's World Wide Web Home Page at:

http://www.gao.gov

PRINTED ON RECYCLED PAPER

United States
General Accounting Office
Washington, D.C. 20548-0001

Official Business
Penalty for Private Use $300

Address Correction Requested

Bulk Rate
Postage & Fees Paid
GAO
Permit No. GI00