

An hourglass-shaped graphic with a globe in the top bulb and another globe in the bottom bulb. The top bulb is dark blue, and the bottom bulb is light blue. The hourglass is light gray. The globe in the top bulb is dark blue, and the globe in the bottom bulb is light blue. The hourglass is centered on the page.

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February 2, 2009

Congressional Research Service

Report RS20935

*Energy Efficiency in Congressional Buildings*

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Updated July 3, 2001

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# CRS Report for Congress

Received through the CRS Web

## Energy Efficiency in Congressional Buildings

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### Summary

This report describes energy efficiency requirements applicable to congressional buildings and the energy saving activities being undertaken in the Capitol complex. The Architect of the Capitol (AOC) has the authority and responsibility to provide energy services and implement energy efficiency measures in congressional buildings. Congress has used legislative appropriations bills to establish energy efficiency measures under AOC. In the early 1990s, Congress funded an energy efficient lighting initiative for congressional buildings. In 1998, Congress set a goal for 2005 to improve energy efficiency by 20%. A brief comparison with the 30% energy efficiency goal of the executive branch suggests that the current goal for AOC is lower in absolute percentage, but calls for a higher rate of improvement. Also, AOC does not currently have access to the funding and staff resources that the Department of Energy's Federal Energy Management Program provides for executive branch agencies.

### Authority

By law, the Architect of the Capitol (AOC) operates and maintains the Capitol complex's buildings and grounds.<sup>1</sup> Specifically:

The Architect is charged with the operation, maintenance, and improvement of the U.S. Capitol and adjacent buildings and grounds – some 285 acres that include the Capitol Building, the House and Senate office buildings, the three Library of Congress buildings, the Supreme Court, the Thurgood Marshall Federal Judiciary Building, the Capitol power plant, the Capitol Police headquarters, and the Robert A. Taft Memorial.<sup>2</sup>

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<sup>1</sup> The legal responsibilities of the AOC appear in several titles of the United States Code. For more details, see: CRS Report RS20189. Architect of the Capitol: Appointment, Duties, and Operations, by Mildred Amer and Paul Rundquist.

<sup>2</sup> CRS Report RS20189, p. 2.

Responsibility for the Capitol power plant is subject to direction by the House Office Building Commission. The plant provides heating and cooling services to the buildings listed above as well as to Union Station, Folger Shakespeare Library, Government Printing Office, and former District of Columbia Main Post Office (now called Postal Square).<sup>3</sup> However, many buildings in the Capitol campus receive heating and cooling services from other sources. For example, the Ford House Office Building receives steam for heating from the General Services Administration (GSA) and chilled water for cooling from the Food and Drug Administration.<sup>4</sup> Further, the AOC's maintenance and energy service responsibilities will be extended to include the \$265 million Capitol visitors' center, scheduled to be completed in 2005.<sup>5</sup>

AOC funding comes primarily from annual Legislative Branch and Judiciary Appropriations Acts. In addition to funding through the Appropriations Committees, statutory authorization for the AOC's work comes primarily from four congressional standing committees: House Administration, House Transportation and Infrastructure, Senate Environment and Public Works, and Senate Rules and Administration.<sup>6</sup>

## Energy Use and Energy Efficiency Measures

In FY2000, AOC's total energy use was about two trillion British thermal units (Btu) or, alternatively, about 600 million kilowatt-hours (kwh). This is equivalent to the output of a 110-MW (million-watt) power plant. Energy input to the Capitol power plant accounted for about 390 billion Btu, which is about 20% of the total energy use.<sup>7</sup> Thus, most of the energy used in the Capitol complex is obtained from utility companies and commercial sources.

**Energy Management System (P.L. 100-458).** In 1988, the Legislative Branch Appropriations Act for FY1989 (P.L. 100-458) appropriated nearly \$1 million for the AOC to develop a systemwide energy management and control system (EMCS).<sup>8</sup> This system monitors indoor and outdoor air temperatures and provides centralized control of air conditioning systems throughout the Capitol complex. By reducing mechanically-produced cooling energy, the EMCS has saved more than \$2.0 million in utility air

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<sup>3</sup> At one time the Capitol power plant did produce electricity ("power"), but since the mid 1950s it has only produced steam for heating and domestic hot water and chilled water for cooling buildings.

<sup>4</sup> Personal Communication with Mr. Scott Birkhead, AOC, May 29, 2001.

<sup>5</sup> CRS Report 98-920 GOV. The Capitol Visitors' Center: An Overview, by Stephen Stathis.

<sup>6</sup> CRS Report RS20189, p. 6.

<sup>7</sup> AOC. Personal communication with Mr. Rick Khan. June 22, 2001. Of the total use, electricity provided about 51%, natural gas provided 49%, and coal and oil provided less than 1%. The Capitol power plant only provides steam for heating and chilled water for cooling. It is supplied almost exclusively by electricity, aided by tiny amounts of natural gas, coal, and oil.

<sup>8</sup> AOC. Personal communication with Mr. Rick Khan. The provision was contained in House Report 100-621, which accompanied H.R. 4587.

conditioning costs since 1990.<sup>9</sup> Also, AOC has used several utility incentive programs, including customer rebates and incentives for new building design and curtailable load.

**Energy Efficient Lighting Initiative (P.L. 102-486).** Section 168 of the Energy Policy Act of 1992 (EPACT, P.L. 102-486) directed the AOC to undertake an analysis and retrofit program for the Capitol and its grounds and the House and Senate office buildings, including a lighting efficiency program and a report on other potential energy efficiency measures.<sup>10</sup> EPACT specified that the House Committee on Public Works and Transportation and the Senate Committee on Rules and Administration were to review and approve the identified measures before AOC implemented them. The law also encouraged AOC to seek utility incentive programs and directed that cost savings from such incentives be applied to additional energy and water conservation measures. EPACT authorized such sums as might be necessary to carry out the program.

The lighting retrofit program was allocated \$4.0 million through three public laws: P.L. 102-90 appropriated \$1.0 million for FY1992, P.L. 102-392 appropriated \$1.0 million for FY1993, and P.L. 103-69 appropriated \$2.0 million for FY1994. Congressional intent was clearly to achieve both energy savings and cost savings. The House Report (H. Rept. 103-117) for the Legislative Branch Appropriations Act for FY1994 (P.L. 103-69) directed the AOC to show how these goals would be achieved:

... the Architect is directed not to obligate these funds until he has forwarded an analysis and recommendation to the Committees on Appropriations regarding the proposals received from energy service companies who are experts in this field and which may enable the savings of the original Federal investment. Also, the Committee believes the pilot test report does not fully explain how the Architect intends to dispose of those installations which indicate negative present values (an indication of a non-cost-effective investment), and how that will affect total estimated project costs. That will need to be clarified before proceeding. The funds provided, subject to their release, will enable Phase I (emergency, corridor, 24-hour lighting) retrofits to be made throughout the Capitol complex, and sufficient funding is available to comply with the first year requirement of the 4-year proposed plan.<sup>11</sup>

However, the Conference Report (H. Rept. 103-424) for the Emergency Supplemental Appropriations Act for FY1994 (P.L. 103-211) reprogrammed \$3 million of the appropriations for the lighting initiative and instead provided authority for AOC to seek private sector services to conduct the project. The Report says

The conference agreement does not include a rescission of \$3,000,000, as included in the House bill, of funds made available to the Architect of the Capitol for energy efficient lighting retrofitting in the Capitol complex. The Senate deleted this rescission and directed the Architect of the Capitol to use these funds for converting and

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<sup>9</sup> AOC, CECMP, p. 7-9.

<sup>10</sup> For each building, the report was to cover heating, ventilation, and air conditioning equipment, insulation, windows, domestic hot water, food service equipment, and automatic control equipment. For each of these measures, the report was to include projected installation cost, energy and cost savings, and payback period.

<sup>11</sup> U.S. Congress. House. Legislative Branch Appropriations Bill, 1994. Report to accompany H.R. 2348. June 8, 1993. p. 19-20.

maintaining property and facilities at Fort Meade for long-term storage needs. The conferees agree with this directive. The energy efficient lighting funds are not needed because the conference agreement provides authority for the Architect of the Capitol to use the services of energy services companies to underwrite the cost of the retrofit program.<sup>12</sup>

Another \$100,000 of the original \$4.0 million in appropriations was also reprogrammed to other non-energy uses. The remaining \$900,000 was used to survey the opportunities for a lighting retrofit project in congressional buildings. The survey results formed the basis for issuing a request for proposal. The selected contractor was to be paid from the energy cost savings over the eight to 10 years following installation.<sup>13</sup>

The energy service company (ESCO) engaged by AOC completed the lighting project in 1998. Across the Capitol complex, more than 160,000 energy-saving fixtures with fluorescent lamps were installed along with motion sensor light switches in public bathrooms. As a result, electricity use dropped from 329 million kwh in FY1990 to 298 million kwh in FY2000. That represents an annual savings of nearly 31 million kwh, a 10% decrease in use of electricity in a decade.<sup>14</sup>

## Energy Plan and Goal

**Comprehensive Energy Conservation and Management Plan (P.L. 105-275).** Section 310 of the Legislative Branch Appropriations Act for FY1999 directs the AOC to undertake several energy efficiency measures for buildings in the Capitol complex.<sup>15</sup> AOC completed the *Plan* in July 2000. It describes AOC's current and planned energy efficiency activities. To prepare for the *Plan's* execution, AOC is compiling baseline energy use information starting with 1991.<sup>16</sup> As its first step in executing the *Plan*, AOC will conduct surveys to identify energy saving opportunities through building retrofit projects.<sup>17</sup> To comprehensively address the opportunities in the Capitol complex, the surveys must include 16 major buildings, 14 million square feet of floorspace, and a number of challenges arising from older buildings and historic preservation concerns.<sup>18</sup> Another significant challenge is that most organizations in the complex are not under AOC control.<sup>19</sup>

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<sup>12</sup> U.S. Congress. House. Committee on Appropriations. Making Emergency Supplemental Appropriations for FY1994 [To accompany H.R. 3759]. Report 103-424. February 11, 1994. p. 74.

<sup>13</sup> AOC. Personal Communication with Mr. Jack Boertlein and Mr. Scott Birkhead, May 29, 2001.

<sup>14</sup> AOC This Week. May 21, 2001. p. 1.

<sup>15</sup> Also known as the "Gutierrez Amendment." The provisions of §310 appear in Appendix 1.

<sup>16</sup> AOC, CECMP, p. 31. As of July 2000, AOC had compiled electricity data and was in the process of collecting data for natural gas, water, oil, and coal.

<sup>17</sup> AOC, CECMP, p. 1,17, 27.

<sup>18</sup> AOC, CECMP, p. 10. Eight of the 16 major buildings are more than 60 years old. Many of their mechanical and electrical systems have exceeded normal lifetimes.

<sup>19</sup> AOC, CECMP, p. 26.

As part of the survey effort, AOC requested that DOE perform an energy audit of the Capitol complex.<sup>20</sup> Also, AOC has a number of individual building projects and studies underway. This included, as of July 2000, a renovation design underway for the Botanic Garden; a project funded to upgrade electricity and air conditioning equipment in the Capitol; a study underway to improve the heating, ventilation, and air conditioning (HVAC) system in the Cannon House Office Building (HOB); a plan for replacing mechanical, electrical, and plumbing equipment in the Supreme Court; and a proposal to study the mechanical system of the Rayburn HOB.<sup>21</sup> Further, AOC reports that the EMCS has become obsolete and that a consultant has been retained to study needs and propose a plan for a new system.<sup>22</sup>

AOC also has programs related to vehicle fuel efficiency, substitution, and conservation. Employees are encouraged to use mass transit and car/van pools, and AOC actively promotes the acquisition of alternative-fueled and fuel-efficient vehicles. AOC states that it plans to continue these programs and indicates that it will assist other legislative branch entities, such as the Capitol police, with developing programs to acquire such vehicles and to promote use of mass transit and car/van pools.<sup>23</sup>

AOC indicates that it is presently understaffed for energy responsibilities, causing “numerous slippages” in energy management activities and “loss” of some energy efficiency opportunities. To ensure compliance with the law and effective implementation of the *Plan*, AOC proposes to create a new Energy Management and Conservation Branch under its Mechanical Engineering Division. This Branch would require additional staff resources, including three to seven energy managers, and additional office space.<sup>24</sup> Further, AOC intends to use DOE technical assistance and utility incentive programs to support surveys and projects. After exhausting free assistance from DOE and certain service contracting opportunities with local utilities, AOC indicates that it would then seek direct appropriations from Congress to meet the requirements of P.L. 105-275 and the objectives of the *Plan*.<sup>25</sup> Anticipating that DOE will not be able to perform all building surveys at no cost to AOC, the *Plan* says that AOC anticipates the need for appropriations in FY2002 to hire a consultant to help with the survey requirements of P.L. 105-275.<sup>26</sup> Also, in compliance with the law, AOC says it will submit annual reports to Congress that describe energy use and expenditures for each facility, energy management and conservation projects, and future priorities

**Energy Efficiency Goal for 2005.** For buildings of the Capitol complex, a major provision in P.L. 105-275 required AOC to set a goal to reduce energy use per square foot relative to 1991 by 20% in 2005. AOC expects that completed, ongoing, and planned

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<sup>20</sup> AOC, CECMP, p. 17. As of January 2000, DOE had committed to audit the Capitol Building, but its own resource limits may preclude it from committing to do any others in the complex.

<sup>21</sup> AOC, CECMP, p. 10-11.

<sup>22</sup> AOC, CECMP, p. 19.

<sup>23</sup> AOC, CECMP, p. 25-26.

<sup>24</sup> AOC, CECMP, p. 15.

<sup>25</sup> AOC, CECMP, p. 28-30.

<sup>26</sup> AOC, CECMP, p. 18.

initiatives (many of which were underway before the legislation was enacted) should enable it to meet that goal.

AOC says a project to replace aging and outdated chillers is the best example of what its future efficiency efforts will achieve. These devices provide chilled water to cool the buildings on the Capitol campus. At the Capitol power plant, new equipment in the West Refrigeration Plant Expansion will replace vintage 1950s chillers in the East Refrigeration Plant. The new equipment will include high efficiency chillers, steam-driven chillers used in a combined heat and power (CHP) arrangement, and “free” cooling that employs outside cold air to chill water.<sup>27</sup> If the project keeps to its schedule, AOC estimates a 20% electric energy savings by 2005 and a 35% savings by project completion in 2016.<sup>28</sup> AOC says the estimated investment of \$5.6 million will avoid other capital costs of \$2.5 million and provide annual electricity savings worth \$700,000 to \$800,000 per year, yielding a simple payback in about 4.5 years.<sup>29</sup>

**Energy Savings Goal Comparison.** Parallel to the AOC goal, Executive Order 13123 directs executive branch agencies to employ energy efficiency measures to achieve goals for reducing building energy use relative to 1985 levels by 30 percent in 2005 and by 35 percent in 2010. The Federal Energy Management Program (FEMP) at the Department of Energy has the primary responsibility for implementing the Order. The table below compares these goals with that for buildings under the AOC.

Directive	Reference Year	Progress Measure	Target Year	Energy Savings Goal
AOC/Congress P.L. 105-275, October 1998	1991	Electricity use down 10% in 2001	2005	20%
Federal Agencies E.O. 13123, June 1999	1985	Energy use down 18.7% in 1998*	2005 2010	30% 35%
* DOE. FEMP. Annual Report for 1998.				

The executive branch agencies have been subject to energy efficiency goals for a longer period of time than the AOC.<sup>30</sup> Further, EO13123 contains more detailed requirements than P.L. 105-275. This includes requirements to employ Energy Star equipment and to find uses for renewable energy. However, these agencies also enjoy an advantage of technical assistance and support from extensive staff resources funded at FEMP.<sup>31</sup>

<sup>27</sup> Personal communication with Mr. Scott Birkhead, AOC, May 29, 2001.

<sup>28</sup> AOC This Week. May 21, 2001. p. 1.

<sup>29</sup> AOC. Comprehensive Energy Conservation and Management Plan. July 2000. p. 12.

<sup>30</sup> In 1994, Executive Order 12902 had previously set a goal for reducing energy use relative to 1985 levels by 20 percent in 2000.

<sup>31</sup> AOC, CECMP, p. 31.