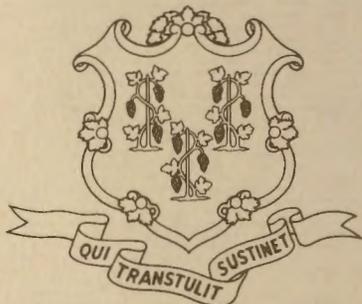


Energy Management In State Buildings

Connecticut
General Assembly



LEGISLATIVE
PROGRAM REVIEW
AND
INVESTIGATIONS
COMMITTEE

June 1981

CONNECTICUT GENERAL ASSEMBLY

LEGISLATIVE PROGRAM REVIEW AND INVESTIGATIONS COMMITTEE

The Legislative Program Review and Investigations Committee is a joint, bipartisan, statutory committee of the Connecticut General Assembly. It was established in 1972 as the Legislative Program Review Committee to evaluate the efficiency and effectiveness of selected state programs and to recommend improvements where indicated. In 1975 the General Assembly expanded the committee's function to include investigations and changed its name to the Legislative Program Review and Investigations Committee. During the 1977 session, the committee's mandate was again expanded by the Executive Reorganization Act to include "Sunset" performance reviews of nearly 100 agencies, boards, and commissions, commencing on January 1, 1979.

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EFFECTIVE ENERGY MANAGEMENT
IN STATE BUILDINGS:
A PROGRAM REVIEW

LEGISLATIVE PROGRAM REVIEW AND
INVESTIGATIONS COMMITTEE

JUNE 1981



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Acronyms and Public Act Citations

DAS	Connecticut Department of Administrative Services
BPW	Bureau of Public Works (of DAS)
EMD	Energy Management Division (of DAS-BPW)
EPUC	Legislative Energy and Public Utilities Committee
LPR&IC	Legislative Program Review and Investigations Committee
OPM	Connecticut Office of Policy and Management
P.A. 77-597	"An Act Concerning Energy Systems Life-Cycle Cost Analysis of State Funded Building Projects"
P.A. 79-462	"An Act Concerning the Use of Renewable Energy in New State Buildings and Establishing a Program to Maximize Efficiency of Energy Use in State-Owned and Leased Buildings"
P.A. 79-496	"An Act to Establish and Attain Energy Performance Goals in State Buildings"
P.A. 80-265	"An Act Expediting Energy Conservation Measures for State Institutions"
S.A. 77-47	"An Act Concerning the Authorization of Bonds of the State for Capital Improvements and Other Purposes" (Sec. 2(a)(3) authorizes up to \$5 million for modifications and renovations to state facilities for energy conservation)
S.A. 80-41	"An Act Concerning the Authorization of Bonds of the State for Capital Improvements and Other Purposes" (Sec. 2(a)(1) authorizes up to \$4 million for modifications and renovations to state facilities for energy conservation)

LEGISLATIVE PROGRAM REVIEW AND INVESTIGATIONS COMMITTEE

Effective Energy Management in State Buildings:
A Program Review

SUMMARY

An estimated \$55 million will be spent to heat, cool, light and provide hot water in state buildings during the current Connecticut fiscal year (FY 1980-81). State building energy costs have increased approximately \$10 million since last year and have doubled in the past five years. Like other energy consumers faced with increasing costs and diminishing resources, the state has taken steps to conserve energy use in its offices and other facilities. The serious budget problems facing the state provide even greater incentives to trim state spending through more efficient and effective management of energy use in existing and planned buildings.

Based on a request from the General Assembly's energy committee, the Legislative Program Review and Investigations Committee (LPR&IC) initiated a review of the efficiency and effectiveness of energy conservation activities for state buildings in November 1980. The LPR&IC also examined agency compliance with several recent legislative mandates concerning state building energy efficiency with the intent of reporting on conservation progress made to date.

The core of the state's program and the focus of the LPR&IC review is a \$9 million capital spending program for energy conservation renovations (retrofit) of state buildings and the performance goal, energy audit, maintenance and retrofit activities required by P.A. 79-496. Additional energy conservation activities include life-cycle cost analyses (which guide leasing and new construction decisions), federally funded programs and state statutes or policies concerning renewable energy resource use and energy efficient operating procedures. In studying the various state building energy conservation efforts, the committee concentrated on the following issue areas: unclear, inappropriate or conflicting administrative roles and responsibilities; unclear intent or duplication of effort; inadequate direction or authority to carry out responsibilities; and insufficient resources to accomplish activities as required by statute.

In essence, the LPR&IC found that the state's efforts to conserve energy in its buildings do not constitute a comprehensive program for effectively managing energy use. Responsibility for energy conservation in state buildings is split between

two agencies and among three divisions. The committee also identified an overall lack of coordination, comprehensive planning and systematic follow-up. Progress toward reducing state building energy costs and use has been seriously impeded as a result.

Recommendations to correct the numerous energy management deficiencies identified during the six-month study and to centralize energy conservation responsibility in one agency--the Office of Policy and Management--are contained in the committee report. The committee believes that adoption of its recommendations will strengthen accountability for meeting energy conservation mandates and improve state agency energy performance. In addition, LPR&IC recommendations should accelerate implementation of conservation measures and promote greater energy cost savings without significant funding increases or major organizational changes.

RECOMMENDATIONS

Centralizing Energy Management Responsibility

1. The committee believes that primary responsibility for energy conservation in state buildings should be placed within the state's top management and budget agency, the Office of Policy and Management. The secretary of OPM should be mandated to: prepare annual and long-range plans which include specific energy conservation goals and timetables; direct the implementation of the state energy conservation plans; coordinate activities and provide or arrange for technical assistance; monitor energy performance (cost, use, savings or increases, etc.); and report energy conservation efforts and results to the General Assembly at least annually. The statutes concerning the OPM secretary's duties should be amended to include these energy management functions. (See Appendix III, 1981 Energy Conservation Management Legislation.)
2. To carry out its energy management duties, particularly its performance monitoring function, OPM should establish a system to monitor state agency energy consumption on a monthly basis.
3. The legislature should appropriate at least \$50,000 to support a minimum of one professional staff person to coordinate the OPM energy conservation management program and the data processing costs associated with energy consumption monitoring.

4. The OPM secretary should be required to report actual and estimated annual expenditures on fuel and utilities for for each agency and major facility or building in the budget document presented to the General Assembly. Annual (current and projected) fuel and utility use data (e.g., gallons, kilowatt hours, etc.) for each agency and for major buildings and facilities should also be reported.
5. To carry out its recommended energy management responsibilities, OPM should consider adopting the committee's administrative model or a similar administrative structure. (See pp. 21-25.)
6. Each state agency and major facility should designate an energy coordinator to monitor its conservation activities, report results to the agency head and OPM, and distribute information internally.
7. In addition to making monthly progress reports to OPM, the agency energy coordinators should meet with OPM at least quarterly to exchange information and review progress toward agency and statewide energy conservation goals.

Energy Conservation Goals and Planning

8. The OPM annual and long-range energy conservation management plans (recommended earlier, p.16) should be based on the planning framework contained in P.A. 79-496. Furthermore, the plans should outline all activities to be undertaken each year and over a five year period to meet specific annual and long-range goals. These goals should be reductions in energy use for each agency and the state as a whole as well as the energy performance goals for different building types.
9. The activities outlined in the OPM plans should include energy efficient operations and maintenance procedures, energy auditing, conservation-related training and information programs, capital energy improvements and measures for monitoring progress and following-up on program results. Timetables for implementing proposed activities should be included in the plans. In particular, there should be schedules for implementing energy conservation capital projects on a prioritized basis.
10. The plans should also address the use of renewable energy sources and energy efficient design features in state buildings, whether newly constructed, existing or leased.

11. Repair and renovation projects to improve the energy efficiency of state buildings should be included in the state-wide facility and capital plan. In the future, the state's annual capital planning process and the resulting document should clearly address the mandates of P.A. 79-496 and P.A. 79-462 regarding, respectively, state building energy performance goals and renewable energy source utilization.

Energy Audits

12. Energy audit efforts should be a key factor in overall planning and audit results should be used, to the greatest extent possible, in retrofit project decision-making. In the future, audits should be scheduled and completed before capital energy conservation (retrofit) project designs are finalized.
13. Whenever possible, energy audits should be scheduled for state buildings targeted for a certain minimum amount of capital-funded general repairs or renovations. OPM should determine what capital project size would be appropriate as a "trigger" for an energy audit.
14. OPM, as part of its energy management program, should establish a system for following up on energy audit recommendations.
15. OPM should also periodically summarize and distribute the follow-up information to all state agencies and to the General Assembly. In its summary, OPM should, among other things, note which agencies did not implement audit recommendations and report on savings from recommendations that were adopted.
16. State funds should be provided to continue the audit activities of the DAS Energy Management Division during FY 1981-82 as recommended in the governor's budget.
17. As part of its energy management responsibilities, OPM should determine the most cost effective method of conducting energy audits of state buildings in the future, giving consideration to the following alternatives: expanding EMD or other "in-house" audit capabilities; training more state agency personnel to conduct audits; hiring consulting firms to do energy audits on state buildings; or some combination of these and other methods.
18. OPM, as part of its energy conservation management program, should oversee all audit activities and in particular, coordinate the SHLP (federal schools and hospital program) funded and other audit efforts.

Capital Expenditures for Energy Conservation--Retrofit Projects

19. Selection of retrofit projects should be linked to conservation goals and be based on agency or facility energy consumption patterns; whenever possible, audit information should be used to select and prioritize retrofit projects.
20. The future use of state buildings should also be considered, to the maximum extent possible, in selecting retrofit projects.
21. Future capital fund authorizations made by the General Assembly for improving energy conservation in state buildings should be clearly linked with the state's energy audit and building performance goal mandates (P.A. 79-496).
22. Agencies, facilities or buildings selected for capital energy conservation (retrofit) projects should be required to provide feedback on actual energy cost and use savings due to the capital improvements to OPM.
23. OPM, as part of its energy conservation management program, should centrally collect information regarding all possible funding sources for energy conservation retrofit measures in state buildings.
24. OPM should begin to identify minor capital funds, as well as maintenance and repair monies spent on measures which improve the energy efficiency of state buildings. A distinction between energy conservation projects and maintenance projects should also be developed by OPM and DAS.

Operations and Maintenance (O&M) to Improve Energy Efficiency

25. The program of annual fuel burner inspections and tune-ups for all state buildings, as required under P.A. 79-462, should be implemented immediately. OPM, as part of its energy conservation management program, should oversee and be responsible for ensuring implementation of this program.
26. OPM, as part of its energy conservation management responsibilities, should provide or arrange for technical assistance, training and/or information concerning energy efficient operations and maintenance for all state building supervisors and operators.
27. At a minimum, information about energy efficient operating and maintenance procedures should be provided periodically, and at least annually, to all state building supervisors and operators.

28. Agency and facility energy coordinators should be responsible for following up on the O&M recommendations contained in any energy audits done on their buildings. The coordinators should regularly report on the status of energy efficient operations and maintenance procedures to OPM, as part of the energy conservation management program.

Incentives to Conserve Energy

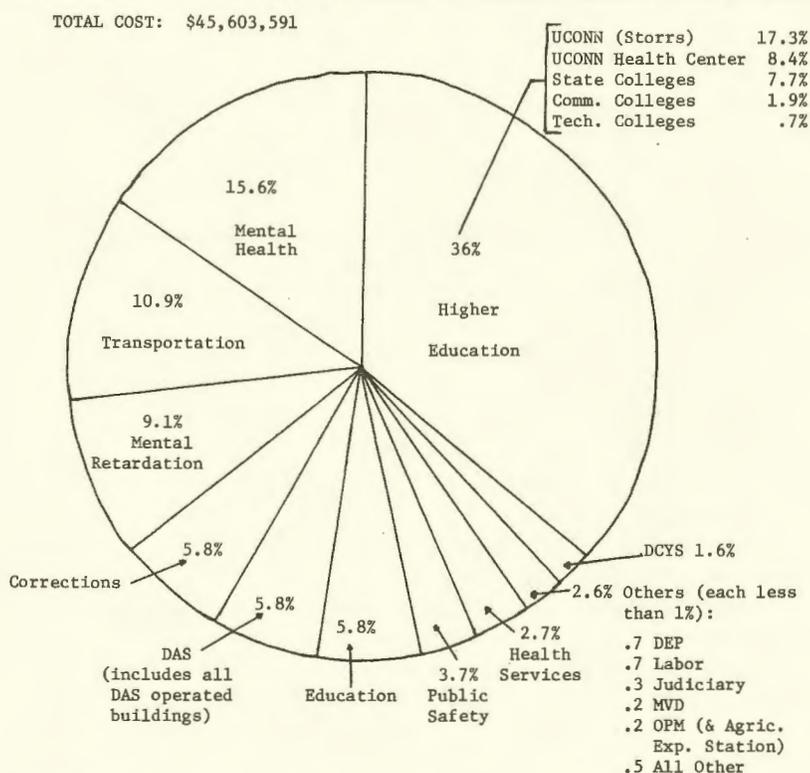
29. OPM, at a minimum, should distribute newsletters, memos and other publications to all employees urging their support for and participation in the state's conservation program. OPM should also publish and distribute conservation program results, noting results by agency. Seminars and training sessions concerning energy conservation should be held periodically for state employees, both within individual agencies and among different agencies.
30. OPM should establish an employee energy conservation awareness program.
31. In conjunction with other appropriate agencies (the Personnel Division, for example), OPM should consider setting aside some funds from the employees' suggestions award program specifically for energy conservation ideas or increasing the award amount for energy related suggestions.

CHAPTER I

INTRODUCTION

Heating, cooling, lighting and providing hot water in state buildings cost Connecticut taxpayers about \$46 million in FY 79-80, \$13 million more than in the previous fiscal year. The state's "energy bill" for the current fiscal year, while only two percent of the FY 80-81 General Fund budget, is expected to reach \$55 million, double the cost of five years ago. State building energy expenditures (FY 1979-80) are shown by agency in the following chart (Figure 1).

Figure 1. State Agency Energy Expenditures, FY 1979-80.*



* Annual agency expenditure to condition (heat, cool, light and provide hot water) its buildings.

Source: DAS Energy Management Division analysis of Comptroller account records for FY 1979-80.

Like other energy consumers faced with ever-increasing energy costs and shrinking spending power, the state has taken steps to conserve energy used in its offices and other facilities. The serious budget problems now facing the state provide even greater incentives to trim state spending through more efficient energy management in existing buildings and better planning for new state construction and leased space.

To date, the major efforts to reduce state building energy costs include a \$9 million capital spending program for energy conservation renovations and implementation of P.A. 79-496 which mandates state building energy performance goals and an energy audit, building maintenance and retrofit program to meet those goals.¹ These efforts are the core of the state's program to conserve energy in its buildings. In response to another statutory requirement (P.A. 77-597 as amended by P.A. 79-496), the state has adopted life cycle cost analysis standards to guide its leasing and new construction decisions. Additional activities include federal energy programs (such as grants for audits and the retrofit of schools and hospitals), state policies and statutes concerning renewable energy resource use and energy efficient maintenance in state buildings, and conservation measures initiated by the governor or state agencies themselves without legislative mandates. (An overview of the state's various energy conservation activities and the agencies responsible for implementing them is presented in Chapter II of this report.)

In November 1980, the Legislative Program Review and Investigations Committee (LPR&IC) initiated a review of energy conservation activities in state buildings, based on a request from the General Assembly's energy committee. The Energy and Public Utilities Committee (EPUC) had recommended evaluation of conservation programs related to three acts--S.A. 77-47 which authorized \$5 million for state building energy conservation renovations, P.A. 77-597 which required application of life cycle cost standards to new construction design and P.A. 79-496 which concerned establishing and attaining energy performance goals for state buildings. The EPUC hoped a review would determine "...why some of these programs have not been as effective as they might have been...and how they have been affected in terms of: sufficiency of funding, adequacy of direction and interagency relationships."² The LPR&IC

¹ S.A. 77-47 authorized \$5 million and S.A. 80-41 authorized another \$4 million for energy conservation modifications and renovations to state facilities.

² Letter from the Energy and Public Utilities Committee cochairman to the LPR&IC, January 14, 1980.

expanded the scope suggested by the energy committee to include two measures enacted during the 1980 session--S.A. 80-41 which provided an additional \$4 million for the state's energy conservation renovation program and P.A. 80-265 which permitted certain capital projects with significant energy-saving potential to be expedited ("fast-tracked").

In studying the implementation of these various statutes, the LPR&IC intended to address two related questions: has there been compliance (i.e., have mandated actions occurred as specified) and what progress has been achieved to date (i.e., what has been accomplished compared to expected results)? To ensure that findings and recommendations could be considered during the 1981 legislative session, the committee concentrated on examining the following issue areas: unclear, inappropriate or conflicting administrative roles and responsibilities; unclear intent or duplication of effort; inadequate direction or authority to carry out responsibilities; and insufficient resources to accomplish activities as required by statute.

The results of the committee's review of the key, legislatively mandated activities intended to reduce energy use in state buildings are contained in Chapter III. In essence, the committee found that the state's efforts to conserve energy do not constitute a comprehensive program for reaching specific goals. Progress toward reducing state building energy costs and use has been seriously impeded as a result.

The LPR&IC's specific recommendations for correcting the current lack of coordination and numerous energy management deficiencies identified by its review are also included in Chapter III. The committee believes that adoption of its recommendations will strengthen accountability for meeting energy conservation mandates and improve state agency energy performance. In addition, the recommendations presented in the committee report should accelerate implementation of energy conservation measures and promote greater energy cost savings without significant increases in conservation funding or major organizational changes.

Methodology

Information for this report was gathered from a number of sources and through a variety of methods. The implementation status of the statutes under review was initially determined at a public hearing held by the committee on December 15, 1980. State agencies responsible for implementation presented testimony concerning compliance with energy conservation mandates and were asked to identify problem areas as well as positive aspects of the state activities.

The LPR&IC staff conducted extensive interviews with the OPM and DAS staff in charge of energy audits, retrofit work, life-cycle cost analysis, energy consumption monitoring and federally funded state building conservation efforts. The committee staff also attended four OPM/DAS monthly energy meetings and reviewed the minutes from all such interagency meetings held through April 1981. In addition, the staff reviewed documents concerning agency energy consumption and capital spending for energy conservation as well as energy audit progress reports, memos, guidelines, plans and other agency materials related to energy conservation in state buildings. Several energy audit reports were examined in detail and the committee staff, accompanied by a DAS energy auditor, inspected one audited and partially retrofitted state building.

Once collected, the information was analyzed to determine what criteria, priorities and plans had been established for the state's conservation activities and the process for implementing each of the various activities. State energy conservation policies and procedures, rather than technical aspects of energy audits and retrofit work (e.g., the adequacy of the current audit format, the quality of retrofit measures and materials installed in state buildings, etc.), were the focus of the committee's evaluation.

Finally, to develop a comparative model for assessing the state's energy conservation efforts, the committee looked at activities and programs undertaken by other states, the federal government and the private sector. While federal and state government programs for managing energy use are still evolving, the committee identified several comprehensive energy conservation programs in the private sector. Two corporate programs operated by firms based in Connecticut, which have received national recognition, were selected as models for the committee review. Details on the private sector models were obtained through interviews with the corporate program directors and from company publications..

Acknowledgments

The LPR&IC and its staff wish to thank Deputy Commissioner Norman Cutts, DAS Bureau of Public Works, and Under Secretary Thomas Fitzpatrick, OPM Energy Division, for their cooperation during this study. The information and assistance provided by staff from the Energy Division and the Public Works Bureau, particularly the bureau's Energy Management Division personnel, is also greatly appreciated.

CHAPTER II

OVERVIEW OF ENERGY CONSERVATION ACTIVITIES AND AGENCIES

The agencies which have primary responsibility for conserving energy in state buildings are the Department of Administrative Services (DAS) and the Office of Policy and Management (OPM). In a number of areas, conservation responsibilities are shared by these agencies, due either to energy legislation that calls for joint roles or to the state's budget and capital construction processes. OPM and DAS energy conservation mandates are highlighted in the brief description of each agency's general functions related to state buildings presented below.

Department of Administrative Services

Responsibility for planning, design and construction of all state-funded capital improvements exceeding \$50,000 in cost (except highways and bridges) is centralized within the Public Works Bureau (BPW) of DAS.³ The department also handles purchase, lease and property acquisition arrangements for all state agencies. The State Properties Review Board, established in 1975, supervises the public works activities of the department (C.G.S. Chapter 47).

Approximately 40 state buildings in the Hartford area, as well as courthouses throughout the state, are operated and maintained by DAS; all other buildings and facilities are operated by the agencies which occupy them. Upon request, the Public Works Bureau's staff provides technical assistance and advice concerning capital projects and building operations to other agencies.

DAS also has a major role in long-range planning to meet the real estate needs of all state agencies. The department supplies the cost estimates and technical feasibility studies needed to develop the statutorily required statewide facility and capital plan. The plan, required since 1979, is intended to coordinate the leasing and capital construction requirements of all state agencies (C.G.S. Sec. 4-26b). OPM actually prepares the statewide facility plan and the proposed capital budget, which are submitted by the governor to the General Assembly each year. DAS, however, is responsible for implementing the approved statewide facility plan.

³ Under the 1977 Executive Reorganization Act (P.A. 77-614), the functions of the former Public Works Department and four other major service functions (purchases, information systems and data processing, collection services, and personnel and labor relations) were brought together in one agency, the Department of Administrative Services.

Recent legislation has incorporated energy conservation considerations in the state capital planning and implementation processes. Under P.A. 79-462, the annual statewide facility plan must provide for an increasing portion of total new planned floor space to be served by renewable energy sources. Beginning with five percent in the 1979 statewide facility plan, the required portion of planned floor area using some type of renewable energy (e.g., solar, wind, water, etc.) application for heating, cooling, hot water and similar purposes, increases by five percent each year until a goal of 50 percent of total newly constructed state building floor space served by renewable energy sources is reached.

Life-cycle cost analysis. Since 1977, life-cycle cost analyses have been required as part of the design plan for all major state-funded capital projects (P.A. 77-597). State agencies are prohibited from commencing a major construction or renovation project unless a life-cycle cost analysis, approved by DAS, has been prepared. Applications for state funding of major school building projects also must be accompanied by a DAS approved analysis in order to be processed. Standards for the life-cycle cost analyses, required by law, were developed by a consulting firm and established by DAS as of February 1, 1978.

Life-cycle cost is statutorily defined as the initial cost of constructing or renovating a facility, the cost of the energy consumed in the facility over its expected useful life and the energy-related operating and maintenance costs (C.G.S. Sec. 16a-38). The analysis process, in effect, formalizes consideration of energy-saving design elements which may increase initial construction or renovation costs but can significantly reduce the long term costs of operating state buildings. DAS, in reviewing proposals for a major state-funded capital project, selects the design alternative which minimizes life-cycle costs.

According to the DAS staff person responsible for administering the life-cycle cost analysis program, adoption of certain energy-saving design features, such as more efficient insulating materials, combination fuel furnaces, better positioning of windows, doors and entire buildings (to maximize exposure to the sun), has been promoted through the life-cycle approach. Renewable energy applications, such as solar heating systems have been incorporated in state buildings to a much lesser extent, although they are considered in accordance with the DAS life-cycle analysis standards. The significantly higher initial investment required for most alternative energy systems generally cannot be offset by potential cost savings, even under a life-cycle approach. As the renewable energy technologies become more cost-effective, DAS anticipates their use in state buildings will increase. In the meantime, other legislative mandates (e.g., P.A.

79-462, described above), exist to foster some state use of renewable energy resources.

Subsequent legislative action (P.A. 79-496) extended the life-cycle cost analysis approach to DAS leasing decisions and to all major capital projects involving 10,000 square feet or more, rather than the previous 25,000 square feet limit. P.A. 79-496 also modified the statutory criteria for analysis standards and mandated that OPM and DAS jointly establish the revised standards as well as energy performance goals for existing and new state-owned and leased buildings by June 30, 1980.

Energy performance goals. An energy performance goal is statutorily defined as the minimum rate of energy consumption determined on a life-cycle cost basis, that is practically achievable by modifying a building's structure or equipment, by utilizing renewable energy resources and by adjusting maintenance or operating procedures (C.G.S. Sec. 16a-38). The statutes also prohibit DAS from approving acquisition of a facility after June 30, 1980, which does not meet, to the maximum extent practicable, energy performance goals. In selecting buildings to lease for state use, the department is mandated to give preference to facilities which meet the established goals.

To date, DAS has applied the life-cycle cost process to all capital projects involving 10,000 square feet, although analysis standards have not been revised yet to take into account all required technical changes. According to DAS public hearing testimony presented to the LPR&IC in December 1980, department resources which might have been used to update the life-cycle cost analysis standards have been applied instead to the development of mandated energy performance goals with OPM.

Establishment of energy performance goals, a critical first step toward meeting the various mandates of P.A. 79-496, has proceeded slowly. Energy performance goals for newly constructed buildings were adopted by OPM and DAS in July 1980 and since then have been applied to new construction projects. Aspects of the new construction goals (materials standards, for example), have been applied to certain renovation projects, such as complete reroofing jobs or replacement of all exterior windows, while the remaining sets of goals were being developed. DAS has also required prospective lessors that propose to construct a building for lease to the state to: 1) follow the established new construction performance goals; and 2) prepare life-cycle cost analyses in terms of construction and operation/maintenance costs over the duration of the anticipated lease.

Performance goals for existing and leased facilities were not finalized by OPM and DAS until January 1981. The department

is now attempting to coordinate its life-cycle costing process and the newly established performance goals for application to all leasing activities as well as new construction and renovation projects.

Energy audits. The energy performance goals legislation also required DAS to establish an energy audit and retrofit program (discussed in more detail in the following chapter) which will enable all state-owned buildings to meet performance goals by June 30, 1991. The department is required to follow federal guidelines for doing energy audits, which are evaluations of the energy consumption of buildings and recommendations for improving energy efficiency.⁴ The audit identifies cost effective retrofit measures (modifications of a building's structure and energy systems) as well as changes in operating and maintenance procedures which will conserve energy. On the basis of audit results, DAS, by law, must select buildings for identified retrofit work; beginning no later than July 1, 1982, the agency must initiate work to retrofit at least 20 percent of the total existing state building floor space each fiscal year.

Energy audits have been conducted on a number of state buildings by the department's Energy Management Division (EMD) staff, nearly all of whom are retired, professional engineers who work for the state on a consulting basis. Due primarily to insufficient resources, the EMD has been unable to meet the statutory schedule of completing preliminary audits of all state buildings by July 1, 1980 and initiating, on a priority bases, more in-depth audits at a rate of at least 20 percent of total building floor space a year. (See "Energy Audit" findings, pp. 29-34.) To date, the EMD state building audit activities have been supported almost entirely with federal funds channeled through the

⁴ The federal guidelines (prepared by the U.S. Department of Energy under the provisions of the National Energy Conservation Policy Act, P.L. 95-619) call for a certain process and a set format for completing three types of energy audits. In general, the guidelines require completion of a preliminary energy audit (PES), a relatively simple survey of building conditions and energy use which takes about two days, prior to conducting the more detailed energy audit (EA), which takes about 15 days. An EA analyzes all energy aspects of a facility and contains estimates of cost savings from possible conservation improvements. While any trained energy auditor can conduct an EA, the third type of audit, the technical assistance audit (TA) which is required before major retrofit work is initiated, can only be prepared by a professional engineer. The TA, which requires three or more months, is basically a detailed engineering study, outlining the costs and savings of recommended energy conservation measures.

OPM Energy Division because state funds have not been provided to implement either the audit or retrofit mandates of P.A. 79-496.

Retrofit. Retrofit of state buildings is handled, like any major state-funded capital project, by the DAS public works staff. DAS has undertaken retrofit work in response to a 1977 special act (S.A. 77-47) which authorized \$5 million for "...modifications and renovations to state facilities for energy conservation...." However, a retrofit program based on the DAS energy audits and intended to achieve energy performance goals, as mandated by P.A. 79-496, has not been initiated since bond funds have not been authorized specifically for this purpose. While another \$4 million for energy conservation modifications and renovations on state facilities was authorized in 1980 (S.A. 80-41) after the performance goal legislation took effect, the legislature did not direct DAS to use these funds to implement the provisions of P.A. 79-496.

The 1977 bond funds have been used for a number of special energy conservation renovations as well as a "Quick Fix" program initiated by OPM at the governor's directive, in late 1979. Under the "Quick Fix" program, OPM Budget and Energy Division staff, working closely with DAS personnel, identified retrofit projects with immediate or short-term energy conservation benefits. Informally, the projects selected for "Quick Fix" were given high priority status in order to ensure their completion and realize energy cost savings in as short a time as possible. An analysis of the "Quick-Fix" and other retrofit projects funded under the 1977 authorization is included in the review of capital expenditures for energy conservation presented in the following chapter of the committee report. (See pp. 34-41.)

Fast-tracking. Legislation enacted in 1980 (P.A. 80-265) now permits DAS to formally designate certain energy saving capital projects as high priority and then expedite their implementation through a process commonly called "fast-tracking." As required, the department has adopted regulations to govern the "fast-track" process which should be effective by late summer 1981. According to the DAS fiscal impact analysis of the "fast-track" regulations, the expediting process could reduce capital project completion time by an average of 5.5 to 7.5 months, depending on the project. Lower construction costs and quicker implementation of conservation measures due to "fast-tracking" would produce an estimated annual savings of nearly \$2 million.

Energy efficient operations and maintenance. As noted earlier, DAS actually maintains only a small portion of the state's 5,000 or so buildings. Control over most state buildings

is centralized among individual building supervisors who are employed by the various state agencies. However, DAS, in consultation with OPM, is required under P.A. 79-496 to develop and publish guidelines for the energy-efficient maintenance of all state-owned buildings. A draft version of energy conservation operating and maintenance standards for state buildings was completed by DAS and OPM Energy Division staff in March 1981.

A final version of these standards is expected to go into effect later in 1981. In response to another legislative mandate (P.A. 79-462), DAS, in cooperation with OPM, is also required to establish a program "...to maximize the efficiency with which energy is utilized in state-owned and leased buildings." At a minimum, by law this program must include the annual inspection, testing and tuning of fuel burners. The state's activities to promote energy efficient operating and maintenance procedures in its buildings are discussed in more detail in the following chapter. (See pp. 41-44.)

Office of Policy and Management

Since executive reorganization, the Office of Policy and Management has been the state's lead agency for energy matters.⁵ Its Energy Division, which assumed the duties of the former state energy agency, is responsible for planning and providing for the energy needs of all sectors--residential, commercial, industrial and municipal as well as state government--in conjunction with the U.S. Department of Energy (DOE). As the previous section indicated, while OPM and DAS often share responsibility for developing programs, goals and standards for energy conservation in state buildings, most activities are actually conducted by DAS. The OPM Energy Division has concentrated its resources on programs and policies related to statewide energy matters.

OPM Energy Division. The Energy Division prepares the state's energy conservation plan (which covers all sectors of energy consumers) and administers the federal funds received to

⁵ The Office of Policy and Management, established in October 1977, assists the governor with planning, budgeting and other executive branch management functions transferred from five former agencies and offices under the Reorganization Act. OPM is organized into energy and five other divisions--comprehensive planning, budget and financial management, management and evaluation, employment and training, and intergovernmental relations.

implement the plan and other federal programs. About 80 percent of the Energy Division's operating costs are financed with federal funds. A number of OPM's state mandates concerning energy, such as emergency energy planning, energy policy coordination and the preparation of plans for balancing state energy supplies and demands, are partially supported by federal funds.

Due to recent changes at the federal level, it is uncertain whether this funding will continue to be available for these state-initiated activities. A number of federal programs currently administered by the OPM Energy Division may also be discontinued by the new federal administration. One program administered by the OPM Energy Division which affects state buildings, the federal emergency building temperature restrictions, has already been rescinded. The division had responsibility for enforcing the federal temperature restrictions in all public (including state) buildings as well as for providing technical assistance and advice on how to achieve compliance.

Federal funding for the division's state building consumption monitoring project has also run out and future federal financing of this effort is unlikely. While not mandated by federal or state law, since 1974 the Energy Division has attempted to establish a computerized system to monitor energy costs and use in state buildings. An operational system has been developed but additional resources are needed to refine and maintain it.

The OPM Energy Division presently administers a relatively new federal program for making energy conservation improvements in schools, hospitals, local government and public care institutions (SHLP). Certain state facilities are eligible for participation in the SHLP program which provides federal matching funds (50 percent) for energy audits and capital improvements. OPM, therefore, has temporarily exempted SHLP eligible buildings (about 65 percent of all state buildings), such as the state universities and colleges, and state health, mental health and mental retardation facilities, from the DAS audit and retrofit efforts.

Some of the funding that OPM Energy has channeled to the DAS Energy Management Division was provided through the federal schools and hospitals program grants. For example, OPM Energy contracted with EMD to train and certify municipal, state and nonprofit organization personnel as energy auditors under the provisions of the SHLP program. EMD, also under contracts with OPM Energy, conducted several technical assistance audits (TAs) of SHLP-eligible state buildings and recently completed content reviews of energy audits prepared by non-state organizations prior to their submission for SHLP funding approval.

OPM Budget Division. OPM's Budget and Financial Management Division assists the governor with formulation and execution of the state's operating and capital budgets. As a result, OPM can be considered directly responsible for developing and monitoring agency "energy budgets" and energy-related capital projects. The Budget Division develops recommendations for minor capital improvements, which often have energy conservation benefits, as well as the major renovation and construction project proposals acted upon by the state Bond Commission.

Although OPM Budget played a key role in the state's "Quick Fix" program (described above), energy costs are only one of many factors considered during the OPM budget review and planning processes. Energy conservation activities within state buildings, therefore, have not been a primary concern within the OPM Budget Division.

CHAPTER III

FINDINGS AND RECOMMENDATIONS

To develop a framework for evaluating the state's efforts to reduce energy use in its buildings, the Legislative Program Review and Investigations Committee examined the successful energy conservation management programs of two Connecticut corporations, United Technologies Corporation (UTC) and the Southern New England Telephone Company (SNET). The 1979 Connecticut Energy Advisory Board report singled out UTC and SNET as leaders in the development of corporate conservation programs. Both firms have nationally recognized, model energy management programs which have shown impressive results. (See Appendix II, "Profiles of Private Sector Programs.")

From a review of the UTC and SNET models, three essential ingredients for an effective energy conservation management program were identified:

- an energy management organization, which has top management support, responsible for directing and monitoring the program;
- a good system for reporting energy performance, particularly cost and consumption data on a monthly basis; and
- annual and long-range plans that include specific goals and timetables.

What makes these three basic elements critical to an effective energy management program is that they provide accountability and a sound base for decision-making. As the director of the UTC program observed, "A company can have the world's greatest five-year energy plan, but if no one is held accountable for implementing the required energy projects on schedule and within budget, corporate goals will probably not be met."⁶ Similarly, without regular energy cost and consumption data, it is difficult, perhaps impossible, to make cost effective investment decisions on retrofit projects or know the effect of implemented energy conservation measures.

⁶ "Why UTC is spending \$33 million on Energy Management," Jeff Forker, Energy Management, Spring 1979, p. 29.

When the state's program for conserving energy in its buildings is compared with the private sector models, serious deficiencies are found, particularly concerning the three essential ingredients. In addition to reviewing compliance with the intent of major state building energy conservation legislation (i.e., the provisions of P.A. 79-496 and bond authorizations for energy conservation renovations), the committee evaluated the state's conservation efforts in terms of these model energy management programs. The committee's findings and recommendations resulting from its review of agency compliance with conservation mandates and the comparison of the state's activities with model energy management programs are presented throughout this chapter.

Centralizing Energy Conservation Management Responsibility

Unlike the model energy management programs found in the private sector, control over the state's energy use and conservation activities is not centralized. Responsibility for key activities to reduce energy use in state buildings is split between two agencies--the Office of Policy and Management (OPM) and the Department of Administrative Services (DAS)--and among at least three divisions--OPM Budget, OPM Energy and the DAS Energy Management Division. No one person directs or coordinates the state's many conservation efforts; no single agency can be held accountable for implementing legislatively mandated energy conservation activities. As a result, the state's efforts to control its energy costs and use do not constitute an effective program to manage energy conservation.

In model energy management organizations, energy audits are used to identify conservation opportunities and to prioritize capital projects or other conservation measures. Conservation activities, including retrofit projects, are monitored to determine their cost effectiveness; progress toward specific conservation goals is regularly reviewed. Annual and long-range plans developed by a top management energy conservation organization are used to integrate and direct all efforts to reduce energy costs and use.

The committee review found that OPM and DAS are just beginning to develop criteria to prioritize future capital projects for energy conservation and to use audits to identify conservation opportunities. An operational monthly energy consumption monitoring system has only recently been developed by the OPM Energy Division; but neither this nor any other system is being used to provide an indication of agency energy performance to OPM Budget or DAS Public Works staff. Most aspects of the state's "program" to conserve energy are continuing in the absence of priorities, formal plans or coordinating mechanisms.

For example, little effort has been made to enforce or even promote energy-efficient operations and maintenance procedures statewide. A method for ensuring that agencies adopt low or no cost improvements recommended in audits has not been established. Implementation of cost effective energy improvements identified through an audit is left up to the audited agency without systematic follow-up by either OPM or DAS. Follow-up information on completed retrofit projects is also lacking. There is no provision for getting the feedback necessary to determine the cost effectiveness of the state's capital investments for energy conservation.

State building energy conservation case study. The following case study of one state building, 18-20 Trinity Street (Hartford) illustrates how various state conservation activities are now being implemented. This example points out the lack of effective energy management authority and an integrated state energy management program.

Located across from the State Capitol, 18-20 Trinity Street is operated by DAS and houses executive, legislative and judicial employees. An energy audit of the building completed in December 1980 by the DAS Energy Management Division noted it was a relatively high energy user; its total FY 1979-80 fuel and utility bill was \$91,366. The EMD audit identified over a dozen operations and maintenance changes that could result in annual energy cost savings of almost \$39,000.

In August 1979, more than a year before the energy audit, over \$196,000 in capital funds authorized under S.A. 77-47 was allocated for modifications of the building's heating system and installation of fire alarms. Some funds (about \$7,900) were also used for the design of a new building temperature control system.

During the spring and summer of 1980, two new boilers were installed at 18-20 Trinity Street. The boilers were operating in time for the 1980-81 heating season and other aspects of the \$196,000 project are expected to be completed by mid-1981. An additional \$149,000 was allocated by the Bond Commission in January 1981 for installation of the proposed temperature control system.

To date, the impact of these large capital investments on the building's energy consumption has not been analyzed, although DAS has monitored monthly energy use. The EMD energy audit did note that the new boilers are operating very efficiently. However, as the audit also pointed out, building temperatures cannot be controlled and the ventilating system is inefficiently utilized. The audit's estimated savings from improving the ventilation system and building heat controls (in order to permit temperature reductions at night and in different building zones) are sizeable.

The above case study demonstrates the need to centralize responsibility for state building energy conservation activities. The model, private sector energy conservation programs examined by the committee are directed and monitored by a top management organization which has overall responsibility for meeting specific program goals. Energy conservation, since it involves controlling costs and efficiently using resources, is considered a top management and budget function in these models. Based on its review findings, the committee believes that centralized management authority and responsibility, along with good monitoring and planning procedures, are critical for an effective energy conservation program.

OPM energy management duties. Currently, the secretary of the Office of Policy and Management is responsible for assisting the governor in planning and providing for effective and responsible management of state government. The scope of OPM functions includes: formulating and executing the state's operating and capital budgets; comprehensive planning; and evaluating state agency performance. While managing the state's use of energy is not specified as an OPM responsibility, the committee believes it is within the secretary's current management, budget and planning authority.

Therefore, the committee believes that primary responsibility for energy conservation in state buildings should be placed within the state's top management and budget agency, the Office of Policy and Management. It is recommended that the secretary of OPM be mandated to: prepare annual and long-range plans which include specific energy conservation goals and timetables; direct the implementation of the state energy conservation plans; coordinate activities and provide or arrange for technical assistance; monitor energy performance (cost, use, savings or increases, etc.); and report energy conservation efforts and results to the General Assembly at least annually. The statutes concerning

the OPM secretary's duties should be amended to include these energy management functions.⁷

Amending the statutes to centralize energy management authority and responsibility, as recommended above, should permit OPM to develop and implement a comprehensive program to reduce energy use and control energy costs in all state buildings. The committee, as part of its annual compliance review process, will be reporting on the progress made by OPM and other state agencies in implementing the recommendations contained in this report. However, since the LPR&IC recommendations, in effect, mandate a new state program, the committee feels that a more in-depth study of the energy conservation management program results should be conducted after several years of operation. Therefore, the LPR&IC intends to: 1) evaluate OPM's energy management program to insure that it is established as intended and that the resources devoted to energy conservation in state buildings are being used efficiently and effectively; and 2) report the results of its program compliance (follow-up) review, along with recommendations concerning continuation, termination or modification of the state energy conservation management program, to the General Assembly on January 1, 1984.

Energy performance monitoring critical. The committee believes the statutory changes to centralize energy conservation management responsibility in OPM will significantly improve accountability for state building energy performance. However, to carry out its energy management duties, particularly its performance monitoring function, the committee further recommends that OPM establish a system to monitor state agency energy consumption on a monthly basis. Monthly reporting of energy costs and use is essential for effective energy management and the lack of such a system is a major weakness of the state's current conservation efforts. It is the committee's opinion that OPM cannot meet its energy conservation management mandate until all state agencies are held accountable for their individual energy performance through a monthly consumption monitoring system.

⁷ In response to the LPR&IC's initial findings and recommendations, the Energy Committee raised a bill (SHB 6761) to accomplish these and other related statutory changes contained in this report during the 1981 legislative session. Since the bill required some new state funding, it was also considered by the Appropriations Committee which approved \$29,500 for implementation costs. A provision to statutorily require an LPR&IC compliance review was also added by the Appropriations Committee. This legislation was passed by both chambers of the General Assembly with only a minor technical amendment. (See Appendix III, energy conservation management legislation.)

Regular reporting of energy performance data provides accountability and identifies where conservation improvements are needed. The committee found the state's current energy use reports incomplete and unavailable on a regular (i.e., monthly) basis. Energy use within each state building or even within all major facilities is not being monitored, for a number of reasons, at the present time. It is difficult, therefore, to identify efforts which have reduced energy costs or to make agencies accountable for controlling their fuel and utility expenditures.

The Comptroller and OPM Budget staff do prepare reports on each agency's total annual energy use. The OPM Energy Division has been collecting monthly cost and consumption data from many state agencies. However, this existing information has not been centralized, consistently corrected (for degree days, buildings size, types of energy used, etc.), analyzed or reviewed for planning purposes. In addition, since energy costs are not separated from other agency operating costs in the budget document, the legislature's ability to monitor conservation performance is severely limited.

The OPM Energy Division, through a federally-funded energy consumption monitoring project, has recently developed an operational computer program which can assemble monthly energy consumption and cost reports from approximately 70 percent of all state buildings and facilities. Although some corrections and refinements are still necessary, the program can provide written reports showing total monthly and annual energy use for each facility (or group of facilities, depending on the metering system). Common indicators such as cost per BTU and BTU per square foot per year are also used in the reports.⁸

Federal financial support for the OPM Energy Division project has ended. According to an Energy Division staff estimate:

Funding required to permit continuation of the program and necessary development to meet increasingly sophisticated demands for information, is as follows:

⁸ BTU stands for British Thermal Unit, a standard measure of heat energy (see Glossary).

Planning Analyst II	
Salary	\$18,733
Fringe Benefits	6,181
Clerk	
Salary	10,839
Fringe Benefits	3,577
Travel	200
Equipment	300
Supplies	1,000
Contractual-data services	15,000
Overhead and Management (13%)	<u>8,573</u>
TOTAL COST	\$64,403 ⁹

The committee supports committing state resources to operate and expand the OPM consumption monitoring system. The two new staff positions included in this cost could be assigned other energy management duties (e.g., planning, report preparation, etc.), if full funding were provided for this purpose. The committee recommends that the legislature appropriate at least \$50,000 to support a minimum of one professional staff person to coordinate the OPM energy conservation management program and the data processing costs associated with energy consumption monitoring. The committee's previously described follow-up study can address, among other things, whether continued funding for these purposes is justified. For example, once the OPM program is operational, only part-time staffing or less-costly data processing services may be necessary to manage the state's energy use.¹⁰

Energy management program coordinator. The new OPM staff position--the energy management program coordinator--would have primary responsibility for: operating the monthly consumption monitoring system; analyzing cost and use data; preparing the annual and long-range conservation plans as well as the annual progress report to the legislature; and generally overseeing efforts to integrate activities and resources. In addition, the

⁹ Draft OPM Energy Division proposal for federal finding support of the state energy consumption monitoring program, January 1981.

¹⁰ As noted previously (p. 17), the Appropriations Committee has recommended only \$29,500 for energy conservation management functions during FY 1981-82. The LPR&IC believes this amount will be sufficient to get a program started. The Appropriations Committee also amended SHB 6761 to require an LPR&IC follow-up study, which will look at energy management funding needs (among other things), as suggested earlier.

OPM "energy manager" would follow-up on planned activities, arrange for training and technical assistance, schedule workshops and other informational programs, and hold regular meetings with state agency personnel to review conservation results.

The committee recognizes that one person cannot accomplish all of these functions without support from other agency staff. In particular, the OPM energy manager will require technical input and considerable assistance from the various OPM and DAS personnel involved with state building energy conservation activities. The committee's model administrative structure, discussed below (see pp. 21-25), outlines agency relationships and functions, including technical assistance and other support services for the OPM energy manager, which are necessary to implement a state energy conservation management program.

While it is difficult under the state's current budgetary restraints to find funds for new programs, the committee believes a strong energy consumption monitoring system will enable OPM to hold agencies accountable for their energy performance, thus promoting greater energy efficiency statewide. The state's energy bill now totals \$55 million. If consumption monitoring and follow-up by the OPM energy manager results in only a one percent reduction in the state's energy costs, the program will more than pay for itself. Another benefit to consumption monitoring is better identification of retrofit opportunities and results. The state has already committed \$9 million, and another \$5 million is proposed for energy conservation capital improvements, without establishing an adequate system to determine the cost-effectiveness of its investment decisions or a program to coordinate retrofit projects with other conservation efforts.

Energy information needs. If state funds are not provided for the computerized system described above, the OPM budget reviewers could be directed to collect monthly energy cost and use data from all agencies and concentrate monitoring efforts on the state's largest energy users. OPM budget staff already monitor agency costs and use to a limited extent when preparing annual budget requests. While collecting and analyzing monthly information would be an additional task, the committee believes that OPM cannot effectively manage the state's energy use until: 1) agencies are required to regularly report consumption data to OPM; and 2) OPM uses the data for planning and directing conservation efforts. Furthermore, the Legislative Program Review and Investigations Committee believes the OPM secretary should be required to report actual and estimated annual expenditures on fuel and utilities for each agency and major facility or building in the budget document presented to the General Assembly. Annual (current and projected) fuel and utility use data (e.g., gallons, kilowatt hours, etc.) for each agency and for major buildings and facilities should also be reported.

Agencies should be held accountable for their energy costs and use during the legislature's appropriations process. The General Assembly also needs to be more aware of the state's energy consumption patterns in order to target funding for conservation improvements. By including this information in the budget document, the General Assembly, particularly the Appropriations and Finance Committees, can better determine agency energy performance and the overall effectiveness of mandated conservation activities.

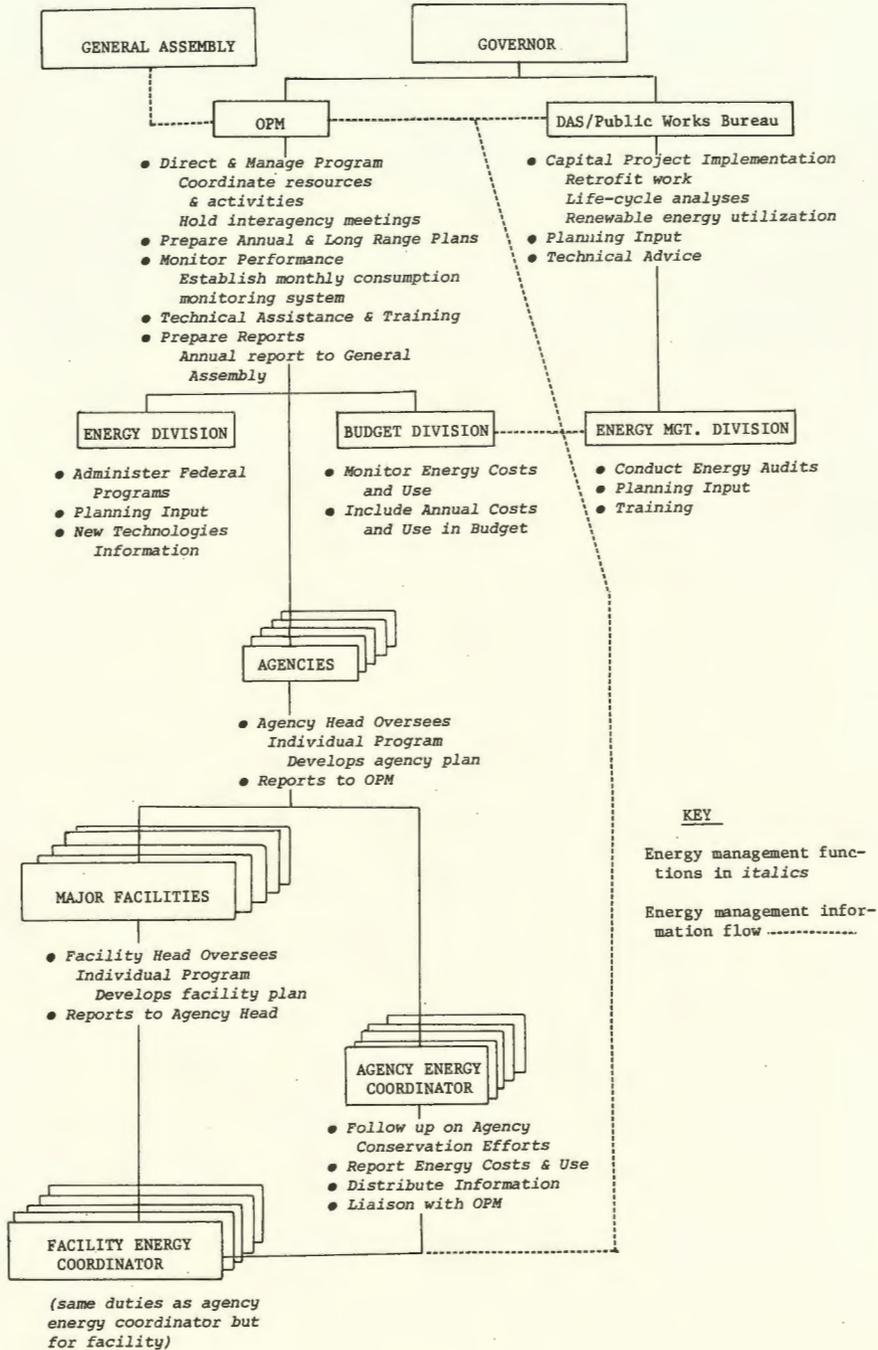
Energy management administrative needs. The committee believes that beyond new funding for consumption monitoring and an OPM energy management program coordinator position, few additional resources would be needed for OPM to develop and administer an effective energy management program. Some existing staff time within OPM may need to be diverted to energy management functions, but the committee feels that efforts to reduce the state's ever-increasing energy costs should be a priority of the top management and budget agency.

It is also possible to implement the program without establishing a new or complex administrative structure. At United Technologies Corporation (UTC) for example, two top management persons direct the entire corporate energy management program while energy coordinators in UTC's various plants and divisions are responsible for implementing conservation activities. The corporation's energy manager can also draw on the technical expertise of other UTC staff (e.g., company engineers to do audits, etc.) although consulting firms are sometimes used for highly sophisticated projects.

The UTC energy coordinators report to the corporate energy manager on a "dotted-line" basis, rather than through a formal chain of command. According to the UTC energy program manager, the relatively informal nature of the organization has proved successful for two reasons: 1) the energy management program has the support of top management; and 2) an effective energy data reporting system to regularly track performance is in place.

It is the committee's opinion that OPM can effectively manage the state's energy use by integrating the energy conservation activities and resources that currently exist. A model structure which outlines energy management functions and agency relationships is presented below. (See Figure 2 .) OPM should consider adopting this or a similar structure in order to carry out its recommended energy management responsibilities.

Figure 2. LPR&IC Model Energy Conservation Management Program Administrative Structure.



Committee administrative model. In general, the model presented in Figure 2 clarifies and integrates existing agency relationships and responsibilities. Only two new staff positions, both within OPM, would be included: a full-time analyst to direct the program and a part-time clerk to assist primarily with energy consumption monitoring. The agency/facility energy coordinators (described below) would be designated by all agencies and major facilities from within their current staff. These individuals would carry out their coordinator duties on a part-time basis.

Under the committee's recommendations, OPM would exercise its planning and management authority to coordinate the state's various energy conservation efforts and resources. Energy conservation plans, both annual and long-range (e.g., covering five years), which contain specific goals, outline the various activities to reach those goals and establish timetables for implementation would be prepared by OPM with input from DAS and the Energy Division staff.

Each state agency and major facility would also develop its own "action plan," under OPM supervision, for meeting its individual goals and would participate in the statewide planning process. These plans would be used to guide all conservation activities--from adopting energy efficient maintenance procedures to selecting retrofit projects and doing energy audits--and to measure progress toward energy goals at the end of each year.

In the committee administrative model, implementation responsibility would be decentralized, although each agency head would be held accountable for meeting its individual goals through OPM's cost and consumption monitoring system. However the OPM secretary would be ultimately responsible for meeting the goals and timetables established in the annual and long range energy conservation management plans.

Conservation results would be reported at least annually to the General Assembly by OPM. The annual report, recommended earlier as an OPM statutory responsibility, would specifically include: an analysis of energy costs and use, by agency; a summary of activities undertaken to achieve energy performance goals, noting actual progress made to date; and specific information about capital investments for energy conservation, such as the number and types of projects undertaken, the criteria for selecting projects, and the actual and/or estimated costs and benefits attributable to the retrofit measures.

Agency energy coordinators. To promote accountability and facilitate communication, the committee model also provides for energy coordinator positions within each agency and major facility. Many state agencies have energy coordinators who were appointed in response to earlier "energy crisis" programs initiated by the governor and the state energy agency. In the past, these coordinators, usually the agency business officer or chief physical plant supervisor, had served as informal contact persons for OPM Energy Division programs. However, their present role is generally limited to reporting monthly energy use data under the division's computerized consumption monitoring system project.

The committee believes it is important for each agency (and major facilities within an agency) to appoint someone to serve as liaison for the OPM energy conservation management program and follow-up on internal conservation efforts, at least on a part-time basis. Therefore, the committee recommends that each state agency and major facility designate an energy coordinator to monitor its conservation activities, report results to the agency head and OPM, and distribute information internally.

The energy coordinators would keep agency heads informed as to conservation progress and be responsible for overseeing implementation of the agency's various efforts to reduce energy use. The committee recommends that, in addition to making monthly progress reports to OPM, the agency energy coordinators meet with OPM at least quarterly to exchange information and review progress toward agency and statewide energy conservation goals. At these or other periodic interagency meetings held to review conservation progress, OPM could also determine what, if any, corrective action (i.e., measures to improve slipping performance) is necessary to achieve energy goals.

Technical assistance sources. As part of its planning function, described briefly above, OPM would evaluate and prioritize capital energy projects as well as establish goals and timetables. However, OPM would draw on the technical expertise of DAS personnel when planning and directing the state's energy management program. In the committee model, DAS would continue to play a major role in retrofit work and its energy management division staff would conduct energy audits and provide guidelines and training concerning efficient energy use. OPM would be responsible for seeing that these activities occur in accordance with its state energy management plan. A similar relationship exists between OPM and DAS in planning and implementing the state's

capital construction projects; OPM develops the statewide facility plans with DAS technical advice and oversees DAS implementation of these plans.

The committee considered placing energy management authority within the Department of Administrative Services but concluded that a continued technical assistance role is more appropriate. While DAS has responsibility for state capital construction projects, leasing arrangements, major purchases and related energy conservation duties, it does not review or enforce agency budgets. The DAS commissioner cannot, for example, order agencies to reduce their energy costs. The department can advise other agencies on efficient energy use, but only a small number of state buildings are operated and maintained by DAS personnel. Therefore, DAS, unlike OPM, cannot control energy use at most state facilities.

In the committee model, the OPM Energy Division staff would be another source of technical assistance, particularly concerning federal energy programs, for the energy management program coordinator. The division would continue to administer any federal programs which involve conservation in state buildings, collect information on new energy technologies and monitor energy activities at the federal level and in other states, but it would not have primary responsibility for managing the state's energy use.

While the OPM Energy Division is the state's lead agency for energy matters, state buildings are only one type of energy consumer that its varied programs serve. In addition, the Energy Division does not have jurisdiction over critical management and budget aspects of conserving energy in state facilities. The committee believes that the Energy Division should continue to concentrate on statewide energy matters, such as emergency energy planning and coordination state and federal policies. It would also be unwise, in the committee's opinion, for the Energy Division to undertake any major new activities at this time, given the uncertainty of its future federal funding levels and its possible restructuring after this fiscal year.

The energy management duties recommended for OPM and the committee's model structure are discussed more fully in the following sections of this report. A variety of specific administrative improvements concerning: goals and planning; energy auditing; capital spending for energy conservation; and energy efficient operating and maintenance procedures are also presented. The final section of the report contains committee findings and recommendations related to incentives for state agencies to conserve energy.

Energy Conservation Goals and Planning

The effective energy management programs reviewed by the committee are based on short and long range plans to meet specific conservation goals. Legislation (P.A. 79-496) called for OPM and DAS, by June 30, 1980, to establish energy performance goals for new, existing, and leased state buildings. Performance goals for new buildings were adopted in July 1980; standards for existing and leased buildings, drafted in January 1981, will be effective soon.

While P.A. 79-496 does not specifically mention development of any plans for meeting the state's building performance goals, it does provide a framework for gathering information, setting priorities and effectively using capital funds. Planning is implied in this legislation.

According to the act, DAS, after an initial survey (preliminary energy audit) of all state-owned and leased buildings, is to set priorities for in depth energy audits. The results of the energy audits are to be used to set priorities for retrofit projects which will enable all state owned buildings to meet the energy performance goals established by OPM and DAS. Finally, the act sets a timetable for the required procedures--initial survey completed by July 1, 1980, energy audits completed on at least 20 percent of total state-owned floor space each year beginning in 1981, retrofit work initiated on 20 percent of total owned floor space each year beginning in 1982--and an overall goal of retrofit of all state-owned buildings to meet performance goals by June 30, 1991. The DAS commissioner also is required to annually report progress toward achieving energy performance goals.

While the statutes provide a link between audits, retrofit work and goals, the audits and retrofit work conducted to date have not followed the statutory framework or timetable. (See also following sections--"Audits" and "Capital Spending.") In addition, a DAS report on progress made toward energy performance goals has not been submitted to the General Assembly.¹¹ Neither OPM nor DAS have developed a plan to guide or integrate the activities that have been undertaken, although both agencies are charged with taking "...such actions as may be necessary or appropriate to enable all state facilities to meet the energy performance goals...." (C.G.S. Sec. 16a-38b)

Some degree of coordination and planning has occurred through monthly interagency meetings, originally initiated to forward "Quick Fix" projects. In these meetings, staff from the DAS Public Works Bureau (including Energy Management Division personnel), OPM Energy Division and OPM Budget discuss their respective energy activities, identify problem areas and develop conservation strategies. However, the scope of the meetings has only recently expanded beyond "Quick Fix" considerations and long-range planning issues have not been addressed. These ad hoc interagency meetings appear to be the only instance of any central planning for managing energy use in the state's buildings.

Conservation goals. Among the energy conservation management duties recommended for OPM described in the previous section, is preparation of annual and long-range energy conservation management plans. The committee recommends that these plans be based on the planning framework contained in P.A. 79-496. Furthermore, the plans should outline all activities to be undertaken each year and over a five year period to meet specific annual and long-range goals. These goals should be reductions in energy use for each agency and the state as a whole as well as the energy performance goals for different building types. For example, a certain percentage reduction, perhaps five to ten percent each year for five years, would be set for each agency, depending on its ability to conserve. A longer range statewide goal could be zero energy growth, once an energy efficient

¹¹ The legislation enacted this session which implements the LPR&IC's energy management recommendations transfers annual conservation progress reporting responsibility from DAS to OPM. (See SHB 6761, Appendix III).

maintenance program and all reasonable retrofit measures have been undertaken.¹²

The committee believes that individual agency goals should vary since some agencies, such as those operating hospitals and care institutions, may have less flexibility in reducing their energy use. In addition, some agencies have significantly reduced their energy costs over the past several years through their own conservation efforts and therefore should not be expected to meet the same goals as agencies which have not attempted, to date, to conserve.

Scope of conservation plans. The activities outlined in the OPM plans should include energy efficient operations and maintenance procedures, energy auditing, conservation related training and information programs, capital energy improvements and measures for monitoring progress and following up on program results. Timetables for implementing proposed activities should be included in the plans. In particular, the committee believes there should be schedules for implementing energy conservation capital projects on a prioritized basis, as recommended earlier. The plans should also address the use of renewable energy sources and energy efficient design features in state buildings, whether newly constructed, existing or leased.

OPM, with assistance from DAS, already prepares a long-range capital needs plan, the statutorily mandated statewide facility and capital plan (C.G.S. Sec. 4-26b), which is revised each year. The introduction to the "1980-1985 Statewide Facility and Capital Plan" notes that it was prepared in consideration of statutory mandates concerning renewable energy use (P.A. 79-462) and energy performance goals for state buildings (P.A. 79-496). However, the scope of the plan does not extend to "repairs and/or renovations to state facilities which do not result in additional usable space...."

¹² The legislation enacted this session which implements the LPR&IC's energy management recommendations also sets a specific conservation goal--a five percent reduction in consumption by each state agency during FY 1982-83, unless an agency receives a waiver from OPM. To clarify the difference between goals of reduced energy consumption and energy performance goals for buildings, the bill (sHB 6761, see Appendix III) also changes the term "energy performance goal" to "energy performance standard."

Most capital expenditures for energy conservation improvements in state buildings, therefore, are not included in the state's long-range capital planning process or document. Furthermore, since energy performance goals have only recently been drafted, the capital planning process, to date, has not been directed toward attainment of these goals. The committee also noted that the use of renewable energy sources, as mandated under P.A. 79-462, is not satisfactorily addressed in the present plan.

The committee recommends that repair and renovation projects to improve the energy efficiency of state buildings be included in the statewide facility and capital plan. In the future, the state's annual capital planning process and the resulting document should clearly address the mandates of P.A. 79-496 and P.A. 79-462 regarding, respectively, state building energy performance goals and renewable energy source utilization. The OPM energy conservation management program coordinator should participate in the development of the energy related portions of the statewide facility and capital plan. Furthermore, as part of its energy management planning function, OPM should monitor new and developing energy conservation technologies to identify promising alternatives for use in state buildings. Energy Division staff, if available, could be helpful in monitoring alternatives and along with appropriate DAS staff, should assist in all aspects of energy management planning.

The committee emphasizes that improving the statewide facility and capital plan concerning energy conservation mandates should not be considered a substitute for an energy conservation management plan. Effective energy management involves coordinating all conservation efforts; retrofit, while a major program component, is only one of many ways to reduce energy costs and use. To guide an effective program, the state's energy management plan must address each program component and all aspects of conservation.

Energy Audits

In an effective energy management program, energy audits are the basis for capital investment decisions and a primary component of conservation planning. Each energy audit can be considered a conservation plan for the audited building. The audit identifies conservation opportunities available through modifications of building operations and maintenance as well as retrofit (capital improvements to make buildings more energy efficient).

The committee review found that energy audits, even preliminary energy audits, have not been conducted on the majority of state buildings and are lacking for many of the biggest energy

consuming facilities. As of April 30, 1981, the audit staff of DAS Energy Management Division had completed 370 preliminary audits (PEAs) and 81 detailed energy audits (EAs). (See Figure 3, "Summary of EMD Audit Activities".) Twelve technical assistance audits (TAs), which are in depth engineering studies for specific retrofit measures, also have been completed by the EMD professional engineers. EMD estimates that nearly 400 preliminary audits, about 400 energy audits and nearly 200 technical audits remain to be done, even if audit efforts are limited to major state buildings (the approximately 770 buildings over 10,000 square feet in size). At the division's present staffing level, it will take approximately eight and one half years each to complete remaining PEAs and EAs, while over twelve years will be required for the EMD staff to finish all technical audits.

Most of the EMD audits (over 40 percent) have been conducted on the buildings and courthouses operated by DAS. Almost none of the EMD audits have been done on the state buildings potentially eligible for federal school and hospitals energy conservation (SHLP) funding. The SHLP buildings account for approximately two-thirds of the state's total building space (39 million square feet) and about 70 percent of the state's energy bill for FY 1979-80. The OPM Energy Division reserved responsibility for obtaining audits on all SHLP-eligible buildings. Preliminary audits have been conducted for only 53 SHLP-eligible state buildings and SHLP-funded energy audits have been completed for about 40 buildings. As of February 1981, technical audits of seven state buildings had been conducted with SHLP funding. Four of these TAs were prepared by the EMD staff under contractual arrangements with OPM Energy Division.

One reason for the slow progress of SHLP audits, according to OPM Energy Division staff, is that state agencies are not applying to the program. Participation in SHLP, which is open to municipal, state and other nonprofit schools, hospitals and care institutions, is voluntary; state agencies, like other eligible parties, must apply. Few state facilities have taken advantage of the program even though OPM has set aside a special fund to cover a state agency's share (50 percent) of a SHLP program energy audit.¹³ To speed up the SHLP audit progress, the OPM Energy Division is considering using its audit matching funds, perhaps on a pilot basis, to hire a consultant to audit a number of SHLP-eligible state buildings.

¹³ However, OPM Energy Division staff note that the present level of SHLP funding would not be sufficient for audits of all eligible state buildings. An estimate of how many audits could be conducted was not available from OPM Energy. Furthermore, it is uncertain whether federal resources for this and other energy conservation programs will be continued.

Figure 3. Summary of Energy Management Division Audit Activities
(as of April 30, 1981).

AGENCY	Total # Buildings ¹	# Buildings Audit Eligible ²	# PEAs Completed	# EAs Completed
Admin. Services (DAS)*	96	56	43	31
Aging (DOA)	7	0	-	-
Agriculture	19	1	1	0
Consumer Prot. (DCP)	5	0	-	-
Corrections	296	35	34	4
Econ. Dev. (DED)	5	1	0	0
Environ. Prot. (DEP)	998	29	28	3
Human Resources (DHR)	5	0	-	-
Income Maint. (DIM)	35	1	0	0
Judicial**	140	10	2	1
Labor (DOL)	41	4	3	0
Motor Vehicles (DMV)	16	5	5	0
Policy & Mgt. (OPM)	7	10	10	1
Pub. Safety				
Military	232	85	85	13
State Police	57	37	37	8
Revenue Services (DRS)	6	2	0	0
Soldiers, Sailors & Marines	4	0	-	-
Transportation (DOT)	<u>946</u>	<u>78</u>	<u>66</u>	<u>20</u>
TOTAL (Non-SHLP)	3,006	354	322	81
<u>SHLP ELIGIBLE</u>				
Children & Youth Services (DCYS)	63	46	46	0
Health Services (DOHS)	80	NA	2	0
Education	96	NA	0	0
Higher Education	653	NA	0	0
UCONN	NA	NA		
UCONN-HC	NA	NA		
St. Colleges	NA	NA		
Tech. Colleges	NA	NA		
Comm. Colleges	NA	NA		
Mental Health (DMH)	350	NA	0	0
Mental Retardation (DMR)	<u>302</u>	<u>NA</u>	<u>0</u>	<u>0</u>
TOTAL (SHLP)	1,544	NA	48	0

¹ From DAS Inventory Document (BDP1211-3-31)

² Building heated or if leased, state pays energy costs

NA = Not available

* DAS includes courthouses throughout the state and state agencies buildings in the Greater Hartford Area such as agency offices in Wethersfield (e.g., DOT, DMV), the State Office Building, the DOHS main office (79 Elm St.), etc.

** Courthouses included in DAS.

Source: Ct. Department of Administrative Services, Energy Management Division April 1981 Progress Report, May 11, 1981.

In addition to the fact that a relatively small number of state buildings have been audited, the committee is concerned over the limited role of energy audits in state conservation activities. The results of completed audits are just beginning to be used to guide decisions on capital investments related to energy conservation. The committee recommends that energy audit efforts be a key factor in overall planning and that audit results be used, to the greatest extent possible, in retrofit project decision-making. In the future, audits should be scheduled and completed before capital energy conservation (retrofit) project designs are finalized.

Furthermore, energy audits, whenever possible, should be scheduled for state buildings targeted for a certain minimum amount of capital-funded general repairs or renovations. OPM should determine what capital project size would be appropriate as a "trigger" for an energy audit. For example, whenever a capital project involving \$100,000 or more is approved through the bond process, the DAS Energy Management Division would be notified and requested to conduct an energy audit of the building before any work plans are finalized. Depending on the auditing resources available, EMD would conduct an audit and the results could be considered and incorporated, if feasible, into the capital project's design.

Energy audits also contain information for improving a building's energy efficiency through operations and maintenance modifications. The committee found no evidence of systematic follow-up on these low or no cost audit recommendations by either OPM or DAS. (See also following section, "Operations and Maintenance".) Therefore, the committee recommends that OPM, as part of its energy management program, establish a system for following up on energy audit recommendations. OPM should also periodically summarize and distribute the follow-up information to all state agencies and to the General Assembly. In its summary, OPM should, among other things, note which agencies did not implement audit recommendations and report on savings from recommendations that were adopted.

It is generally estimated that energy costs can be reduced by as much as 25 percent without capital improvements by instituting energy efficient operations and maintenance (O&M) procedures, such as those included in energy audit reports. Some O & M procedures do involve new equipment or structural changes; however, an LPR&IC staff analysis of nine technical audit report summaries found that potential savings from O & M recommendations ranged from \$1,079 to \$27,807, while the costs to implement the O & M improvements ranged from zero to \$13,904. (See Appendix IV, "Audit Savings Summary".)

The need for greater emphasis on energy audits has been expressed in OPM/DAS interagency energy meetings. Staff of both agencies recognize that audits provide essential planning information and are the best way to identify conservation opportunities in state buildings. During the March 1981 interagency meeting, DAS advocated adopting a policy that future state retrofit funding decisions be based on technical assistance audit report results. However, more resources than are currently available in the Energy Management Division or through the SHLP program would have to be devoted to energy audits to gain information for retrofit and other essential energy conservation planning. Furthermore, a substantial increase in state support for audit efforts would be required to meet the audit timetable established by P.A. 79-496.

Under P.A. 79-496, DAS is required to conduct energy audits of all major state buildings and use the audit results to establish a retrofit program which will enable state buildings to meet performance goals, all in accordance with a strict statutory timetable. State funding has not been provided specifically to accomplish the purposes of this act. Instead, a variety of resources, primarily federal grants but including some state bond and general fund money, have supported state building audit efforts. EMD has estimated that at least two-thirds of its state building energy audit efforts are federally funded.

It is doubtful that federal funding for the Energy Management Division will continue at its current level. DAS has requested a state appropriation to continue the state building energy audit effort of its Energy Management Division at the present staffing level (i.e., eight professional engineers on a consulting basis) during FY 1981-82.¹⁴ It is unlikely that the state can maintain an "in-house" staff of energy conservation experts without committing some additional funds for this purpose. Therefore, the committee recommends that state funds be provided to continue the audit activities of the DAS Energy Management Division during FY 1981-82 as recommended in the governor's budget. It is also recommended that OPM, as part of its energy management responsibilities, determine the most cost-effective method of conducting

¹⁴ In the Governor's Budget 1981-82, DAS requested \$371,952 for "personnel services" and "other expenses" of its Energy Management Division; the governor recommended \$305,102, of which \$250,000 represented "other expenses", (i.e., the costs of the professional engineers who work for EMD on a full-time consulting basis--salaries but no fringe benefits).

energy audits of state buildings in the future, giving consideration to the following alternatives: expanding EMD or other "in-house" audit capabilities; training more state agency personnel to conduct audits; hiring consulting firms to do energy audits; hiring consulting firms to do energy audits on state buildings; or come combination of these and other methods. Finally, the committee recommends that OPM, as part of its energy conservation management program, oversee all audit activities and in particular, coordinate SHLP-funded and other audit efforts.

Capital Expenditures for Energy Conservation--Retrofit Projects

Retrofit projects--capital improvements to make existing buildings more energy efficient--include measures as simple as adding insulation and plugging air leaks or as complex as installing solar hot water systems and computerizing temperature and lighting controls. The payback periods of retrofit projects, even those requiring large capital investments, can be as short as one to three years while energy cost savings may be realized (or higher energy costs avoided) for much longer periods.

While the conservation benefits from retrofit work can be substantial, implementation costs also can be relatively high; retrofit needs tend to exceed the resources available for energy conservation capital improvements. In model energy management programs, retrofit projects are carefully chosen and prioritized, usually on the basis of energy audit results and consumption data, and then monitored to determine their actual cost effectiveness. This type of thorough planning is necessary to assure the most cost effective projects are selected and that limited capital funding for energy conservation is maximized.

To date, the legislature has authorized \$9 million for energy conservation capital improvements in state buildings. One purpose of the LPR&IC's review was to determine how these funds have been used; a description of the retrofit projects undertaken or planned is presented below. In addition, the committee evaluated the process for selecting, prioritizing and monitoring state building retrofit projects. Findings concerning the state's capital expenditures for energy conservation and recommendations to improve the retrofit process are also included in this section.

1977 retrofit funding. In 1977, the state legislature authorized \$5 million for "modifications and renovations to state facilities for energy conservation...." (S.A. 77-47, Sec. 2(a) (3)). According to the DAS Bureau of Public Works, this money has

Figure 4. Types of Energy Conservation Capital Projects Funded Under Special Act 77-47 (as of December 1980).

Type of Project	Number of Projects	Amount Allocated (\$)	Percent of Total Allocated Funds
Boilers, burners & heating Units: repair, replacement and conversion	30	\$1,374,420	27%
Controls: thermostat, heating, water temp. & zone	27	584,257	12
Double doors: UCONN Health Center	1	363,700	7
Windows: design, replacement & storm	16	515,650	10
Energy study: UCONN (Storrs)	1	200,000	4
Insulation: walls, roofs, pipes, doors, windows & weatherstripping	30	441,916	9
Roofs: repair & replacement	5	304,300	6
Electrical System: alterations & modifications	7	222,195	4
Valves: steamtrap, zone, etc.	20	162,008	3
Draperies	4	105,522	2
Lower ceilings	2	72,500	1
Individual electric meters	1	40,000	.8
Solar collectors & monitoring	2	32,500	.6
Lighting: replacement & controls	5	28,500	.6
Fuel storage tank	1	25,500	.5
Electric timers	4	23,100	.4
Other (includes projects not clearly identified)	*	446,840	9
TOTAL	*	\$4,942,908	96.9%

* Due to inconsistencies in recordkeeping, unable to identify accurately the number of projects in "other" category.

Source: LPR&IC staff analysis of data supplied by CT Department of Administrative Services, Bureau of Public Works.

been committed to approximately 208 individual projects. Between October 1977 and August 1980, almost \$1.9 million was allocated for 14 special energy renovation projects, most of which had been targeted on the basis of known maintenance needs. The remaining funds were used for the two-phase "Quick Fix" program. As noted in the previous chapter, "Quick Fix" was initiated in late 1979 by OPM and DAS at the governor's direction.

In January 1980, under "Quick Fix" Phase I, over \$1.5 million was allocated for 92 projects having an estimated payback period of 1.4 years. Beginning in May 1980, another \$1.5 million was allocated for Phase II of the "Quick Fix" program. Phase II involves 102 projects with longer average payback periods (2.3 years).

While the \$5 million was authorized prior to enactment of energy audit and performance goal legislation, some audit results were available by the time the "Quick Fix" program was underway. DAS and OPM reported that preliminary energy audits, along with recommendations from state building operators, were used to develop lists of "Quick Fix" projects. The criteria OPM and DAS used to select projects included: immediate to quick (about one year) payback, short time needed to implement improvements, and work is minor (can be done by the agency or accomplished without going through the public works contract process).

The projects funded under the 1977 authorization, categorized by type in Figure 4, include a wide variety of basic retrofit measures. About half of the funding was allocated for: 1) boilers, burners and heating units; 2) controls; and 3) windows. A large number of projects (30) involved insulation, another generally cost effective conservation improvement. Only one project--the \$200,000 energy study of the University of Connecticut (Storrs)--is neither a repair or a renovation; however, the study results (expected in spring 1981) will be used to plan and design extensive retrofit work needed at that facility.

Although data to determine the impact of the projects funded under the 1977 authorization, in terms of actual reductions in energy costs and use, are unavailable, the committee believes that these types of projects can improve a building's energy efficiency. However, the committee's comparison of these capital expenditures for energy conservation with state agency energy costs raised questions as to how and why certain projects were chosen. Caution must be used in making such comparisons (due to the inadequacies of available energy cost and consumption data), but the committee's analysis indicates there was little relationship between the amount of money spent on projects to reduce agency energy costs and the amount of money the agency spent to condition its buildings. (See Figure 5.)

Figure 5. Comparison of State Agency Energy Expenditures and Retrofit Capital Investments (authorized under S.A. 77-47).

AGENCY	Agency Expenditures to Condition State Buildings (Energy Costs) ¹					S.A. 77-47 Retrofit Investments (\$5 million authorization) ²	
	FY 77-78 Energy Costs	FY 78-79 Energy Costs	FY 79-80 Energy Costs	% Total 79-80 State Energy Costs	% Change FY-78-79 vs. FY 79-80	Amount Allocated	% of Total Authorization
Admin. Services*	\$1,471,603	\$2,342,572	\$2,652,942	5.8	+13.2%	\$879,732	18%
Pub. Safety/St. Police	246,335	315,025	403,954	.9	+28.2	45,310	.9
Military	681,400	1,005,622	1,291,365	2.8	+28.4	250,000	5
Health Services	795,357	970,746	1,259,522	2.7	+29.7	86,270	1.3
Mental Retardation	2,395,155	2,685,910	4,136,677	9.1	+54.0	215,783	4.5
Mental Health	3,698,123	4,125,681	7,117,981	15.6	+72.5	454,563	9
Transportation	3,655,058	3,999,195	5,000,765	10.9	+25.0	528,600	11
UCONN Health Center	2,911,612	3,066,691	3,836,168	8.4	+25.1	918,700	19
UCONN	4,683,263	5,629,750	7,905,712	17.3	+40.4	200,000	4
Technical Colleges	294,047	254,329	341,938	.7	+34.4	82,500	1.7
Community Colleges	654,216	612,515	881,214	1.9	+43.8	163,300	3.4
State Colleges	2,435,344	2,763,986	3,521,283	7.7	+27.4	350,000	7.3
Corrections	1,624,122	1,754,582	2,645,419	5.8	+50.8	232,190	4.8
Judicial**	62,511	69,570	126,583	.3	+81.9	150,000	3
Child & Youth Services	508,937	538,988	734,880	1.6	+36.3	45,963	.9
Education (includes state libraries)	1,602,010	1,625,633	2,660,436	5.8	+63.6	133,650	3.8
Environ. Protection	228,669	306,401	324,674	.7	+ 5.9	9,100	.2
Motor Vehicles	77,007	82,297	108,306	.2	+31.6	0	0
Labor	237,915	222,605	318,454	.7	+43.0	0	0
OPM (includes Agr. Exp. Station)	60,382	67,952	94,232	.2	+39.4	0	0
Others	<u>376,148</u>	<u>299,238</u>	<u>241,085</u>	<u>.5</u>	<u>-19.4</u>	<u>-</u>	<u>-</u>
TOTALS	\$28,699,214	\$32,738,928	\$45,603,591	100.0%	+43.9%	\$4,796,161	96%

* Includes courthouses throughout the state and DAS-operated state buildings in the Greater Hartford Area.

** Courthouses included in DAS.

¹ Energy costs to condition (heat, light, cool, provide hot water) state buildings compiled by DAS Energy Management Division from State Comptroller account records (FY 1977-78 through FY 1979-80).

² LPR&IC staff analysis of DAS data on S.A. 77-47 energy conservation capital projects (as of December 1980); unallocated (contingency) funds = \$203,839 (4%).

Source: LPR&IC staff analysis of data supplied by CT. Department of Administrative Services.

For example, while DAS accounted for only 5.8 percent of the state's total energy budget, the buildings it operates received 18 percent of the capital funds for energy projects. On the other hand, Mental Health spends 15.6 percent of the state's energy budget, but received only 9 percent of the funds for building retrofit. In the case of the Judicial Department, more was spent on retrofit projects than was spent for agency energy costs in FY 1979-80. However, in light of its 81.9 percent increase in energy costs for FY 80, the retrofit money may have a significant future impact.

1980 retrofit funding. In the 1980 session, an additional \$4 million (S.A. 80-41) was authorized for state building energy conservation improvements. About three-quarters of this funding, according to DAS, will be used to cover the state's share (50 percent) of retrofit costs at three facilities approved for federal schools and hospitals program (SHLP) grants (i.e., the UCONN Health Center--about \$2.4 million; Fairfield Hills Hospital--\$253,584; and Greater Bridgeport Mental Health Center--\$275,504). The remaining S.A. 80-41 funding is tentatively scheduled for a variety of projects including: major retrofit work at three DAS operated facilities and the Waterbury Regional Center; and smaller retrofit jobs totaling \$660,000 at a number of other state buildings. The tentative projects were selected by DAS from a list prepared by its Energy Management Division on the basis of completed energy audits.

Proposed retrofit funding. Since the LPR&IC began its study, DAS has developed general criteria for selecting capital energy projects which emphasize energy audit results. A March 1981 memo prepared by the DAS Deputy Commissioner for Public Works outlined the following guidelines: "...facility is a sizable energy user, specific work based upon detailed technical energy audits/studies and project will result in a significant reduction in energy use (payback on investment of 2½ to 3½ years)." Using these criteria, DAS has suggested that a \$5 million state building retrofit bond authorization recommended in the FY 1981-82 proposed capital budget, be allocated as follows:¹⁵

¹⁵ The facilities suggested by DAS are large energy users and technical energy audits have been completed for Eastern Connecticut and Fairfield Hills. Specific work at UCONN-Storrs will be defined during a major energy study (funded under S.A. 77-47) expected to be completed by April 1981.

Eastern Conn. State College	\$ 225,000
Fairfield Hills Hospital	1,500,000
UCONN (Storrs)	2,500,000 to 3,275,000
Other (to be determined on basis of audits completed during calendar 1981)	(to be determined)
TOTAL	<u>\$5,000,000</u>

Despite some improvements in the process for selecting retrofit projects since the committee review began, a formal policy and plan for energy conservation capital investments has yet to be developed. Until recently, there has been little relationship between energy audits, which should be used to identify retrofit opportunities, and capital spending for energy conservation. Even the legislation which authorizes bond funds for state building retrofit does not contain any specific criteria for selecting projects or require consideration of state energy conservation goals.

The committee is also concerned that the actual amount of energy and cost savings resulting from retrofit work is seldom documented, due in part to the lack of an adequate consumption monitoring system. Data on energy use after a retrofit project is completed is not systematically collected and analyzed. A few agencies have voluntarily provided feedback to DAS on "Quick Fix" project results. (See Appendix V.) Decreased energy use in some DAS operated buildings which have been retrofited can also be identified since the department has manually collected monthly energy data from its buildings for three years. While funding has been allocated for work which should improve energy efficiency, the cost effectiveness of the state's multi-million dollar investment in energy conservation improvements is uncertain.

The LPR&IC's findings concerning the state's capital expenditures for energy conservation provides further evidence of the need for centralized energy management responsibility and better coordination of energy conservation activities. In summary, the committee found:

1. Capital funds have been committed without establishing priorities for projects; while priorities are being developed, funds continue to be allocated in the absence of an overall energy conservation plan.
2. Capital investments in energy conservation projects have occurred without the use of information (e.g., consumption data, energy audit results, etc.) that would help to identify potential benefits.

3. An adequate energy consumption monitoring system which could provide planning data and retrofit feedback is not in operation.
4. There is no mechanism for systematically gathering energy consumption data after a retrofit project has been completed; agencies are not required to provide feedback on energy improvements.
5. Although more emphasis is being placed on audit information, a formal link between energy audits and capital expenditures on energy conservation projects has not been established; retrofit bond authorizations do not refer to energy conservation statutory mandates.
6. Some of the capital energy projects examined appear to be deferred maintenance projects (e.g., roof repairs) rather than strictly energy conservation renovations; a distinction between maintenance work and retrofit work has not been developed.

On the basis of its findings, the committee recommended earlier that future capital energy conservation (retrofit) projects be prioritized during the annual and long-range planning process. The committee further recommends that selection of retrofit projects be linked to conservation goals and be based on agency or facility energy consumption patterns; whenever possible, audit information should be used to select and prioritize retrofit projects. The future use of state buildings should also be considered, to the maximum extent possible, in selecting retrofit projects. For example, major energy conservation renovations should not be initiated in a facility which is scheduled to close within the project's estimated payback period. It is also recommended that future capital fund authorizations made by the General Assembly for improving energy conservation in state buildings be clearly linked with the state's energy audit and building performance goal mandates (P.A. 79-496). Finally, the committee recommends that agencies, facilities or buildings selected for capital energy conservation (retrofit) projects be required to provide feedback on actual energy cost and use savings due to the capital improvements to OPM.

Other funding sources for building retrofit. In addition to the state bond-funded projects for energy conservation renovations, three state facilities have received nearly one million dollars in federal schools and hospitals (SHLP) program retrofit grants. SHLP matching funds (50 percent of total cost) were

awarded to: the UCONN Health Center (\$394,110 for three minor and three major energy conservation measures); the Greater Bridgeport Community Mental Health Center (\$275,503); and the Fairfield Hills Hospital (\$253,583). Whether additional federal SHLP funds will be provided to other state facilities is not certain. In any event, state matching funds would have to be available for future SHLP retrofit projects.

Other sources of funding for energy conservation improvements in state buildings include state minor capital project funding and General Fund appropriations for maintenance and operations within state buildings. However, it is difficult to identify what portion of these funds is used to improve the energy efficiency of state buildings, either directly or indirectly.

For example, certain routine maintenance procedures--cleaning fuel burners or air conditioner filters--have energy conservation benefits. However, expenditures for maintenance are not clearly identified in state agency budgets. In addition, to determine whether maintenance supply purchases included conservation items such as weatherstripping and caulking, the LPR&IC found that the files of each agency's purchase orders would have to be examined. For similar reasons, the DAS Public Works Bureau was also unable to supply an estimate of how much of its maintenance costs could be considered energy conservation-related.

The committee believes that OPM, as part of its energy conservation management program, should centrally collect information regarding all possible funding sources for energy conservation retrofit measures in state buildings. It is also recommended that OPM begin to identify minor capital funds, as well as maintenance and repair monies spent on measures which improve the energy efficiency of state buildings. A distinction between energy conservation projects and maintenance projects should also be developed by OPM and DAS.

Operations and Maintenance (O&M) to Improve Energy Efficiency

Legislation requires OPM and DAS to establish and publish guidelines for an energy-efficiency maintenance program for all state-owned buildings (P.A. 79-496). The cooperation of all state agencies in implementing this program is also mandated. Guidelines for maintenance as well as operations were recently developed by OPM and DAS staff and should be finalized soon. The committee believes adoption and distribution of these guidelines to all state agencies, as soon as possible, should be a priority of OPM and DAS.

Another statute calls for DAS, in cooperation with OPM, to establish a comprehensive program to maximize the efficiency of energy use in state-owned and leased buildings, including, at a minimum, annual fuel burner inspections and tuning (P.A. 79-462). The LPR&IC could find no evidence of a comprehensive energy efficiency maintenance program. Furthermore, it appears that the only fuel burners known to be routinely checked are those in DAS operated state buildings. The committee recommends that the program of annual fuel burner inspections and tune-ups for all state buildings, as required under P.A. 79-462, be implemented immediately. OPM, as part of its energy conservation management program, should oversee and be responsible for ensuring implementation of this program.

Part of the problem in implementing energy efficient operations and maintenance statewide is the decentralized management system for state buildings. As noted earlier, state agencies outside the Hartford area operate their buildings and employ their own building personnel without DAS involvement. As far as the Legislative Program Review and Investigations Committee could determine, there has been no effort to make energy efficient operations and maintenance (O&M) a priority among all agencies and their building operators.

Some state building operators and other state agency personnel have participated in energy training programs conducted by the DAS Energy Management Division. EMD staff, however, were not aware of an O&M training program ever being held specifically for all state building operators. Furthermore, participation in the EMD energy conservation/auditing training sessions has been voluntary; in most cases agencies did not require their personnel to attend the EMD programs and OPM did not encourage state agency participation although federal funding for the programs came through its Energy Division.

The committee recommends that OPM, as part of its energy conservation management responsibilities, provide or arrange for technical assistance, training and/or information concerning energy efficient operations and maintenance for all state building supervisors and operators. Federal funding for the EMD training programs is no longer available, but if such programs are offered in the future, OPM should encourage state agency personnel to participate. At a minimum, information about energy efficient operating and maintenance procedures should be provided periodically, and at least annually, to all state building supervisors and operators. If state or federal funds are available, training programs in energy efficient O&M procedures, including burner inspections and tune-ups should be provided periodically to state

building supervisors and operators. All state building supervisors and operators should be required to participate in at least one energy-efficiency training program per year, depending on funding available for such programs.

EMD energy audits are another source of energy efficient operations and maintenance information for state agencies. While the audits contain cost effective O&M recommendations, there has been no method for ensuring the audited agency adopts them. Implementation is left up to the agency since neither OPM nor DAS follow-up on audit results. The committee recommended earlier that OPM establish a mechanism to follow-up on implementation of audit recommendations. It is further recommended that agency and facility energy coordinators be responsible for following up on the O&M recommendations contained in any energy audits done on their buildings. The coordinators should regularly report on the status of energy efficient operations and maintenance procedures to OPM, as part of the energy conservation management program.

One of the simplest and least expensive ways to reduce energy costs and use is by controlling building temperatures. In the average home, turning the thermostat back one degree is estimated to reduce fuel use by one percent. In state buildings, significant cost savings can be achieved by energy efficient operating procedures such as keeping the building at 65°, lowering the temperature further at night and over weekends, and turning off unused lighting. The LPR&IC was unable to determine the extent to which state agencies are employing energy efficient operating practices.

The OPM Energy Division was responsible for enforcing the federal emergency building temperature restrictions, rescinded by President Reagan on January 17, 1981, but few of its resources were devoted to this purpose. Neither OPM nor DAS could report on how many state buildings met the federal temperature restrictions. The O&M guidelines recently drafted by OPM and DAS include similar building temperature standards which will apply to state buildings. Lighting efficiency standards, which DAS and OPM developed as regulations in response to 1978 legislation (P.A. 78-269) and certain federal funding requirements, have been in effect for all public buildings since November 1979. DAS is charged with monitoring compliance with the energy efficiency lighting regulations.

Temperature and lighting use standards are two significant energy conservation policies. From its review, the committee believes that compliance with these policies has not been made a priority by state agency heads and other top managers. It should be noted that compliance with these policies can be

difficult to achieve, particularly in buildings which lack central temperature controls and "zoning" capabilities or have "chain lighting." Capital investments may be necessary to permit control over heating, cooling and lighting systems for energy conservation purposes. However, projects to improve operations and maintenance generally pay for themselves in one year or less.

In addition, many O&M improvements, such as those recommended in energy audits, require little or no cost to implement. What is needed is awareness, training and incentives to reduce energy costs and use through improved operations and maintenance. The state's current energy conservation activities have not provided these necessary elements. Given the substantial cost savings which can result from energy efficient operations and maintenance, improvements are imperative. The committee is convinced that the comprehensive energy management program recommended in this report will result in greater efforts to comply with existing standards for energy efficient operations and maintenance.

Incentives to Conserve Energy

In the private sector, the profit motive provides a strong incentive to conserve energy. Efficient energy use can reduce the operating costs (and sometimes increase the profits) of business and industry. Many companies also have established awards and bonus programs to motivate employees to conserve energy. At United Technologies Corporation, for example, the year-end bonus of each operating unit president depends, in part, on the energy performance of his or her division. In addition, cash awards for energy saving suggestions, energy seminars, and newsletters and other publications are also used by UTC to increase employee interest and participation in the firm's conservation program.

Conservation incentives are not as strong within state government for several reasons. The state's budget process does not promote conservation by agencies and facilities. In general, agencies will receive the fuel and utility appropriation level they request regardless of their energy performance. Part of the problem in providing budget sanctions for agency energy performance is the lack of a consumption monitoring system. Fluctuations in agency energy expenditures may be due to changes in the size or use of their facilities, the condition of buildings or even the weather. Cost and use data that take these factors into account are not available for all agencies. It is difficult, therefore, to reward agencies that have reduced energy costs through conservation efforts or to hold agencies accountable for increased fuel and utility expenditures.

Many of the same problems exist for capital project decision-making. Retrofit capital funding often goes to agencies with the highest energy costs and/or critical building repair needs. Agencies and facilities with less obvious retrofit needs, and those that have cut their energy costs through conservation, generally are given lower priority for capital improvement funding. Poor energy performance (and a lack of conservation efforts), therefore, may improve the chances that an agency's requested retrofit project will be approved.

However, the state encourages energy conservation, to some extent, in other ways. The state employees' suggestion award program, for example, provides some incentive for developing ways to cut costs through energy conservation. Administrators of the "Quick Fix" building retrofit program note that they have tried to encourage agencies to participate in this effort by: 1) using funds allocated to an agency for cancelled "Quick Fix" projects for other retrofit measures in the same agency; or 2) turning back unused ("left over") portions of a project allocation to the same agency for additional "Quick Fix" energy improvements. In the past (after the first "energy crisis" in 1973 and later, through the 1976 "energy crisis management program"), executive orders, publications, memos and training sessions were used by the governor and agency administrators to promote energy conservation throughout state government. At the present time, these types of activities occur rarely and with little coordination.

The committee believes there are a number of simple ways to motivate agencies to conserve energy. It is recommended that OPM, at a minimum, distribute newsletters, memos and other publications to all employees urging their support for and participation in the state's conservation program. OPM should also publish and distribute conservation program results, noting results by agency. Seminars and training sessions concerning energy conservation should be held periodically for state employees, both within individual agencies and among different agencies.

The committee also recommends that OPM establish an employee energy conservation awareness program. One way to promote interest in energy conservation is to recognize employee efforts to conserve. In addition to distributing information, as described above, OPM could begin an "energy coordinator of the month" program which would recognize the coordinators whose agencies meet or exceed their conservation goals. OPM should also consider, in conjunction with other appropriate agencies

(the Personnel Division, for example), setting aside some funds from the employees' suggestions award program specifically for energy conservation ideas or increasing the award amount for energy-related suggestions.

Fiscal incentives. The committee feels that the existence of an effective consumption monitoring system, along with establishing annual energy performance goals, may provide another incentive for agencies to make greater efforts to reduce their fuel and utility use. The fact that agency energy expenditures and progress toward goals will be contained in a report and reviewed by the legislature, should have an impact on conservation performance. Furthermore, if at some point a state consumption monitoring system is developed that can accurately identify cost-savings due to agency conservation activities and retrofit projects, several types of fiscal incentive programs would be possible.

For example, specific conservation goals (such as a 5 percent reduction in BTUs used, a certain percent reduction in gallons, kilowatt hours, etc. used, or a certain dollar amount reduction in energy expenditures) could be set for each agency each year. Agencies that meet or exceed their goals would receive a "bonus" appropriation, perhaps a certain percentage of their proven energy cost-savings. Other possible fiscal incentives are:

- Energy cost-savings from all agencies' budgets could be "pooled" and used to fund a bonus or awards program;
- Energy cost savings (or a certain percentage) could be "turned back" to agencies and used for certain limited purposes (such as new staff positions, research projects, travel or training programs, etc.) or at the commissioner's discretion;
- Agencies that meet or exceed their conservation goals (have good energy performance records) would be given priority for some set amount of available retrofit funding (e.g., 10 percent of any energy conservation capital funding would be reserved for projects within agencies with good energy performance records); and

- An "energy savings fund" could be established and used to finance cost effective minor capital energy projects or "Quick Fix" energy improvements in agencies with good performance records.

As noted above, all of these alternatives are dependent upon a sophisticated consumption monitoring system. While the committee believes that OPM should consider these and other types of fiscal incentives for energy conservation, they are only suggestions for the future. Immediate attention should be given to the relatively simple activities recommended earlier in this section and operation of the consumption monitoring system discussed earlier in this report.

APPENDICES



APPENDIX I

GLOSSARY

BPW - The Bureau of Public Works of the Connecticut Department of Administrative Services.

BTU - British Thermal Unit. The standard unit of measurement for amount of heat energy. One BTU is about equal to the amount of heat released by a burning wooden match. Amounts of various types of fuels (e.g. gallons of oil kilowatt hours of electricity, etc.) can be converted into BTUs to permit comparisons of energy usage.

Budget Division - The Budget and Financial Management Division of the Connecticut Office of Policy and Management.

chain lighting - A row of lighting fixtures which are controlled by one switch. As a result, individual lights cannot be turned off when not in use.

DAS - The Connecticut Department of Administrative Services.

degree days - A measure of the severity of an entire heating or cooling season which takes into account differences in weather conditions when energy usage is compared. Degree days are directly proportional to fuel consumption. The cooling degree day value for any given day is the difference between the mean daily temperature and 65°F. The heating degree day value for any given day is the difference between 65 and the mean daily temperature.

EA - Energy audit (see below)

EMD - The Energy Management Division of the Bureau of Public Works, Connecticut Department of Administrative Services.

energy audit - A systematic inspection of a building or facility designed to identify opportunities for energy savings. Federal guidelines provide for three types of energy audits:

preliminary energy audit (PEA) - A simple survey of building conditions and consumption patterns.

energy audit (EA) - A more in depth inspection of building energy systems which includes an analysis of energy saving options.

technical assistance audit (TA) - A detailed engineering study of building energy systems which includes an analysis of costs and savings due to identified energy conservation improvements

Energy Division - The Energy Division of the Connecticut Office of Policy and Management.

energy performance goal - An energy efficiency standard for a certain type of building, statutorily defined as the minimum rate of energy consumption that could be practically achieved, on a life-cycle cost basis, by modifying a building's structure or equipment, by utilizing renewable energy resources and by adjusting maintenance or operating procedures (C.G.S. Sec. 16a-38).

EPUC - The Energy and Public Utilities Committee of the Connecticut General Assembly.

fast-track - A process for expediting decisions concerning state funded capital projects which have designated priority because of their energy savings potential (mandated under P.A. 80-265).

HVAC - Heating, ventilating and air conditioning. The system that provides heating, ventilating and/or air conditioning within or associated with a building. HVAC systems usually represent the greatest single usage of energy in a building/facility.

life-cycle cost - In general, the total cost of new equipment for a life time period including anticipated operating and maintenance costs. According to C.G.S. Sec. 16a-38, life-cycle cost (when applied to a building) is the initial construction or renovation cost plus the cost of energy consumed and energy-related operating and maintenance costs over the buildings expected useful life (or if leased, over the term of the lease).

LPR&IC - The Legislative Program Review and Investigations Committee of the Connecticut General Assembly.

O&M - Operations and maintenance. An O&M option in an energy audit generally is a simple low or no-cost opportunity to reduce energy consumption by modifying scheduling and/or increasing the efficiency of a building's energy systems.

OPM - The Connecticut Office of Policy and Management.

PEA - Preliminary energy audit (see energy audit).

"Quick Fix" - The energy conservation capital improvement program initiated by OPM and DAS which involves retrofit projects having immediate or quick payback periods. In general, quick fix refers to low or no-cost, simple-to-install energy conservation measures.

renewable energy resource - A constantly or cyclically replenished energy source including direct solar energy and indirect sources such as biomass (living matter, plant or animal, in any form) and wind power. According to C.G.S. Sec. 16a-38, renewable source of energy means direct solar radiation, wind, water, geothermal sources, wood and other forms of biomass.

retrofit - Capital improvement of existing buildings to make them more energy efficient. In general, the changes made in building equipment and/or structure to improve thermal and lighting efficiency.

SHLP - Schools, hospitals, local government, and public care institutions program. A federal program (established by the 1978 National Energy Conservation Policy Act--P.L. 95-619) which, among other things, provides financial assistance for energy audits and retrofit of eligible buildings (e.g., public or nonprofit schools and hospitals, local government offices, etc.).

TA - Technical assistance audit (see energy audit).

zoning capability - Separate control over heating, cooling and ventilating in different portions (zones) of a building/facility is possible. For example, in the winter unused rooms can be kept at lower temperatures than occupied space.

Note: Definitions were compiled from a number of sources including Making Cents of Your Energy Dollar, Volume 2, U.S. Department of Energy (revised for use in Connecticut by the Department of Administrative Services, Energy Management Division, December 18, 1979).

APPENDIX II

Profiles of Private Sector Energy Management Programs*

Southern New England Telephone Company (SNET)

SNET's energy conservation program actually is an outgrowth of Project Guardian, the company's ongoing effort to address environmental concerns. Initiated in 1972, Project Guardian is the responsibility of the executive level Committee on Ecological Policy.

SNET has reduced the energy used to heat and cool its 260 buildings by 55 percent since 1972. Despite a workload increase of 21 percent in the same time period, the firm has maintained zero energy growth in its overall consumption. Reductions in SNET's energy bill--which totaled over \$1 million for building fuels and \$6.5 million for electricity in 1979--are attributed to the company's "BEMARR" (Building Energy Management and Redesign Retrofit) Project and the adoption of a variety of innovative technologies.

The "BEMARR" project, which already has pinpointed and surveyed 196 buildings, redesigned systems in nearly half and completed work in 53, is expected to result in additional energy cost savings of \$5 million over the next two years. SNET also has the largest concentration of solar applications (10) in the state, ranging from a solar furnace to photovoltaic cells, and has made extensive use of heat pumps and microcomputers. The microcomputers, which automatically control building energy needs, not only allow for more efficient operation of buildings but provide precise energy consumption data.

United Technologies Corporation (UTC)

The 22 divisions of UTC cut energy costs 20 percent from 1972 to 1976 through obvious operating and maintenance changes and minimal investment, retrofit projects. Recognizing that further reductions of UTC's energy bill--over \$80 million in 1977--would become increasingly difficult to achieve and require larger capital investments, UTC formalized its conservation

* Summarized from LPR&IC staff interviews with UTC and SNET personnel and company publications.

program and centralized energy management responsibility at the corporate level in late 1977.

By 1978, UTC had reduced its energy use 28 percent (per unit of output) from 1972 levels, exceeding a federal goal of 16 percent by 1980 for firms in its corporate classification. Although in relative terms, UTC is not an energy intensive company (UTC energy costs were about 1.3 percent of total sales in 1978, compared to 5 to 6 percent for firms that use large amounts of energy to produce products), another 30 percent reduction in "product production BTUs" is targeted between 1977 and 1982. UTC's "blueprint" for successful corporate energy conservation activities follows.

UTC's "blueprint" for effective energy management. The critical elements of a successful energy management program, based on UTC's experience, have been outlined by its program director. To begin with, top management must be committed to the program and an effective organization which includes an energy manager in the corporate office and energy coordinators in each division (reporting at least on a "dotted-line" basis to the manager) must be in place. These key personnel must have adequate time to devote to the program and possess both technical and managerial skills. Capital and operating expense funding must be available specifically for conservation projects. An operational energy data reporting system is another basic requirement for effective energy management.

With the necessary organization and resources in place, the following operations are essential:

- establish specific goals, expressed where possible, in dollars and BTUs;
- prepare an annual action plan and an annual energy budget, detail strategies, identify key personnel, list key projects and establish implementation schedules;
- continue energy audits (by qualified engineers) and identify conservation opportunities;
- improve the energy reporting system, require monthly reports on performance (in dollars and BTUs), regularly track performance and set up regular meetings to review progress;
- initiate corrective action whenever energy budget(s) are exceeded;

- prepare five-year plans;
- implement and monitor progress of energy projects;
- motivate employees to save energy and provide them with conservation information;
- monitor supply and demand factors to assure that a correct energy resource mix is achieved; and
- monitor new technologies and identify promising cost effective alternatives and innovations.

APPENDIX III

1981 Energy Conservation Management Legislation (sHB 6761)

File No. 882
(Reprint of File No. 772)

Substitute House Bill No. 6761
As Amended by House Amendment
Schedule "A"

The legislation (sHB 6761) which contains the LPR&IC's recommended statutory changes to improve energy conservation in state buildings passed the House of Representatives (136 Yes, 3 No, 12 Absent/Not voting) with some minor/technical changes (House Amendment A) on May 21, 1981. On May 28, 1981, the Senate passed sHB 6761, as amended, on its consent calendar. The bill (as amended) is reprinted here. A brief summary is presented below.

Summary of Major Provisions of sHB 6761 (as amended)

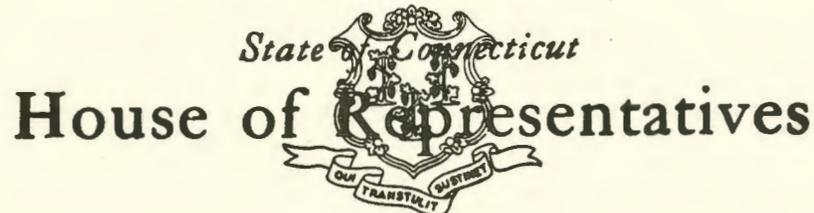
Section 1(a): centralizes energy conservation management responsibility in OPM; requires OPM to establish a program to maximize energy efficiency in state buildings; and specifies OPM's duties, e.g., prepare and implement plans, coordinate resources and activities, monitor costs and use, report progress each year (by Oct. 1), and report cost and use data in budget document.

Section 1(b): establishes FY 1982-83 as a "test year" for the OPM program by requiring a 5 percent reduction in agency energy use.

Sections 2-6 and 8: amends existing statutes to conform with new energy conservation management authority and responsibilities; clarifies existing roles, duties and terms (e.g., changes "energy performance goals" to "energy performance standards"); and consolidates some present statute sections.

Section 7: requires DAS and OPM to study the state's fuel oil purchasing policies and to report findings and recommendations to the Energy Committee by January 1, 1982.

Section 9: Appropriates \$29,500 for the OPM energy conservation management program and \$500 (to DAS) for the fuel oil purchasing study.



Approved by the Legislative Commissioner

AN ACT CONCERNING ENERGY USE IN STATE BUILDINGS AND THE METHOD THE STATE USES TO PURCHASE FUEL OIL.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

1 Section 1. (NEW) (a) The secretary of the
2 office of policy and management shall be
3 responsible for planning and managing energy use
4 in state-owned and leased buildings and shall
5 establish a program to maximize the efficiency
6 with which energy is utilized in such buildings.
7 He shall exercise this authority by (1) preparing
8 and implementing annual and long range plans, with
9 timetables, establishing goals for reducing state
10 energy consumption and, based on energy audits,
11 specific objectives for state agencies to meet the
12 performance standards adopted under section 16a-38
13 of the general statutes, as amended by section 2
14 of this act; (2) coordinating federal and state
15 energy conservation resources and activities,
16 including but not limited to, those required to be
17 performed by other state agencies under chapter
18 298 of the general statutes; (3) monitoring energy
19 use and costs by budgeted state agencies on a
20 monthly basis; (4) reporting energy conservation
21 efforts and results not later than October first
22 annually to the governor and the general assembly,

23 and (5) determining, for each budgeted state
24 agency and each state educational, medical,
25 welfare and correctional institution, the amount
26 of and expenditures for energy used during the
27 last-completed fiscal year, an estimate of the
28 amount of and expenditures for energy use for the
29 fiscal year in progress and a projection of the
30 amount of and expenditures for energy use for the
31 next fiscal year. The information gathered under
32 subdivision (5) of this section shall be included
33 in the budget document submitted by the governor
34 to the general assembly under section 4-71 of the
35 general statutes.

36 (b) Each budgeted state agency shall, for the
37 fiscal year ending on June 30, 1983, consume at
38 least five per cent fewer BTUs per square foot of
39 gross building space in state-owned and leased
40 buildings, adjusted for degree days, than during
41 the fiscal year ending on June 30, 1982. The
42 secretary of the office of policy and management
43 may, upon application by any such state agency,
44 waive this requirement for the agency, if all of
45 the following conditions are met: (1) All
46 operational and maintenance changes proposed in
47 energy audits of the agency's buildings have been
48 implemented; (2) no energy is being consumed in
49 any such buildings which raises the room
50 temperature in the buildings above sixty-five
51 degrees Fahrenheit during the heating season or
52 lowers the room temperature in the buildings below
53 seventy-eight degrees Fahrenheit during the
54 cooling season; and (3) significant capital
55 expenditures are needed to comply with the
56 requirement and funds for the expenditures are not
57 available. In the event of a waiver of this
58 requirement, the secretary shall require a
59 reduction in energy consumption for the agency of
60 not less than two per cent for the fiscal year
61 ending on June 30, 1983. No building which is
62 closed, new building which is opened or any area
63 of a building housing library print and audio-
64 visual collections shall be considered in
65 computing the reduction in consumption under this
66 section.

67 Sec. 2. Section 16a-38 of the general
68 statutes is repealed and the following is
69 substituted in lieu thereof:

70 (a) As used in this section, subsection (e)
71 of section 4-26b, sections 16a-38a and 16a-38b,
72 unless the context otherwise requires: (1) "Major
73 capital project" means the construction or
74 renovation of a major facility; (2) "major
75 facility" means any building owned by the state or
76 constructed or renovated wholly or partly with
77 state funds, including a state-financed housing
78 project, which is used or intended to be used as a
79 school or which has ten thousand or more gross
80 square feet, or any other building so owned,
81 constructed or renovated which is designated a
82 major facility by the commissioner of
83 administrative services; (3) "renovation" means
84 additions, alterations or repairs to a major
85 facility which the commissioner of administrative
86 services finds will have a substantial effect upon
87 the energy consumption of the facility; (4) "life-
88 cycle cost" means the cost of a major facility
89 including the initial cost of its construction or
90 renovation, the cost of the energy consumed by the
91 facility over its expected useful life or, in the
92 case of a leased facility, over the remaining term
93 of the lease, and the cost of operating and
94 maintaining the facility as such cost affects
95 energy consumption; (5) "energy performance [goal]
96 STANDARD" means a rate of energy consumption which
97 is the minimum practically achievable, on a life-
98 cycle cost basis, by adjusting maintenance or
99 operating procedures, modifying a building's
100 equipment or structure and utilizing renewable
101 sources of energy; (6) "energy audit" means an
102 evaluation of, recommendations for and
103 improvements of the energy consumption
104 characteristics of all passive, active and
105 operational energy systems and components by
106 demand and type of energy used including the
107 internal energy load imposed on a building by its
108 occupants, equipment and components, and the
109 external energy load imposed on a building by the
110 climatic conditions at its location; (7)
111 "renewable sources of energy" means energy from
112 direct solar radiation, wind, water, geothermal
113 sources, wood and other forms of biomass; and (8)
114 "state agency" means any department, board,
115 commission, institution, or other agency of this
116 state.

117 (b) Except as provided in subsection (g), the
 118 commissioner of administrative services and the
 119 secretary of the office of policy and management,
 120 not later than June 30, 1980, shall jointly: (1)
 121 Establish and publish energy performance [goals]
 122 STANDARDS for existing and new state-owned and
 123 leased buildings, [. Such energy performance
 124 goals] WHICH shall encourage maximum efficiency in
 125 energy use and maximum practicable use of
 126 renewable sources of energy in all state-owned and
 127 leased buildings; AND (2) establish standards for
 128 life-cycle cost analyses required by this section
 129 for state-owned and leased buildings, [. Said
 130 standards] WHICH shall include consideration of
 131 the following elements: (A) The coordination,
 132 positioning and solar orientation of the project
 133 on its situs; (B) the amount of glass, degree of
 134 sun shading and direction of exposure; (C) the
 135 amount of insulation incorporated into the design;
 136 (D) the variable occupancy and operating
 137 conditions of the facility; (E) all architectural
 138 features which affect energy consumption; and (F)
 139 the energy consumption of all energy-consuming
 140 systems in the project, including, but not limited
 141 to, heating, lighting, ventilating, air
 142 conditioning and hot water supplies. Such life-
 143 cycle cost analyses for buildings shall provide,
 144 but shall not be limited to, information on the
 145 estimated initial cost of each energy-consuming
 146 system being compared and evaluated, the estimated
 147 annual debt service cost and operating and
 148 maintenance costs of all energy-consuming systems
 149 over the useful life of the building and the
 150 estimated replacement cost for each energy-
 151 consuming system expressed in annual terms for the
 152 useful life of the building. For the purpose of
 153 determining life-cycle cost estimates, locations
 154 and orientation of proposed buildings shall
 155 maximize exposure to the sun for a solar energy
 156 system.

157 (c) No state agency shall commence a major
 158 capital project unless such agency has prepared a
 159 life-cycle cost analysis for such project and the
 160 commissioner of administrative services has
 161 determined that such analysis complies with the
 162 standards established pursuant to SUBDIVISION (2)
 163 OF subsection (b) OF THIS SECTION. Such analysis
 164 shall be part of the design plan of the project.

165 This subsection shall not apply to projects which
 166 have been finally approved prior to October 1,
 167 1977.

168 (d) All design proposals for major capital
 169 projects shall include at least two differing
 170 energy systems for heating, cooling and hot water,
 171 and at least one of the differing systems shall be
 172 supplied by renewable sources of energy. Such
 173 proposals may include computer or other analytical
 174 modeling or simulation but shall not be construed
 175 to require the development of architectural or
 176 mechanical design plans for each such system. All
 177 cost evaluations of the competing energy systems
 178 shall be based on life-cycle costs. A life-cycle
 179 cost analysis for each competing energy system
 180 determined by the commissioner of administrative
 181 services to meet the standards of subsection (b)
 182 of this section, shall be included as part of the
 183 design proposal for all projects. No major capital
 184 project shall be approved by the commissioner of
 185 administrative services or by the state properties
 186 review board pursuant to section 4-26b, after June
 187 30, 1980, unless the proposed project achieves to
 188 the maximum extent practicable the energy
 189 performance [goals] STANDARDS established in
 190 accordance with subsection (b) or (g) of this
 191 section.

192 (e) All applications for state funding of
 193 major capital projects shall be accompanied by a
 194 life-cycle cost analysis which the commissioner of
 195 administrative services has determined complies
 196 with the standards established pursuant to
 197 SUBDIVISION (2) OF subsection (b) OF THIS SECTION.

198 (f) Not later than sixty days after
 199 submission of a life-cycle cost analysis for a
 200 major capital project to the commissioner of
 201 administrative services, said commissioner shall
 202 issue a report indicating whether or not such
 203 life-cycle cost analysis complies with the
 204 standards established under SUBDIVISION (2) OF
 205 subsection (b) of this section and if the
 206 commissioner indicates that such life-cycle cost
 207 analysis does not comply with such standards he
 208 shall report any deficiency or deficiencies. If
 209 the commissioner fails to issue such a report, the
 210 life-cycle cost analysis shall be deemed to be in
 211 compliance with such standards.

56

212 (g) The commissioner of housing and the
213 secretary of the office of policy and management
214 shall establish and publish energy performance
215 [goals] STANDARDS for state-owned and state-
216 financed housing projects and establish standards
217 for life-cycle cost analyses for such projects,
218 subject to the criteria set forth in SUBDIVISION
219 (2) OF subsection (b) OF THIS SECTION.

220 (h) Notwithstanding any provision in this
221 section concerning the review of life-cycle cost
222 analyses by the commissioner of administrative
223 services, a life-cycle cost analysis of a major
224 capital project prepared for the department of
225 housing shall be reviewed by the commissioner of
226 housing to determine if such analysis is in
227 compliance WITH THE LIFE-CYCLE COST ANALYSES
228 standards established for such project under
229 subsection (g) OF THIS SECTION.

230 Sec. 3. Section 16a-38a of the general
231 statutes is repealed and the following is
232 substituted in lieu thereof:

233 (a) The commissioner of administrative
234 services shall conduct an energy audit of all
235 buildings owned by the state to determine the
236 energy conservation and energy consumption
237 characteristics of such buildings. Such energy
238 audits shall be conducted in cooperation with the
239 state department, agency, board or commission
240 occupying such building. Such energy audits shall
241 be conducted in accordance with guidelines
242 established under the "National Energy
243 Conservation Policy Act", Public Law 95-619, 92
244 Stat. 3206 (1978), as amended from time to time,
245 and with the following schedule: (1) Preliminary
246 energy audits of all buildings owned or leased by
247 the state shall be completed within one year after
248 July 1, 1979. The results from such preliminary
249 audits shall be used to set priorities for
250 subsequent audits. (2) Subsequent energy audits
251 based on the priorities established in accordance
252 with subdivision (1) of this subsection, shall be
253 initiated at a rate of at least twenty per cent of
254 total building floor space per year. Each audit
255 procedure shall be completed within two years of
256 its initiation.

257 (b) (1) The commissioner of administrative
258 services shall review and evaluate the energy
259 audits completed in accordance with this section

260 and shall, within six months, [select] RECOMMEND
261 TO THE SECRETARY OF THE OFFICE OF POLICY AND
262 MANAGEMENT buildings for cost effective retrofit
263 measures to enable such buildings to attain THE
264 energy performance [goals] STANDARDS ESTABLISHED
265 UNDER SUBDIVISION (1) OF SUBSECTION (b) OF SECTION
266 16a-38, AS AMENDED BY SECTION 2 OF THIS ACT. (2)
267 It shall be a goal that beginning not later than
268 July 1, 1982, work to retrofit at least twenty per
269 cent of the total floor area of existing state-
270 owned buildings for energy conservation shall be
271 commenced in each fiscal year. Where technically
272 feasible, renewable sources of energy shall be
273 used for space heating and cooling, domestic hot
274 water and other applications. (3) It shall be a
275 goal that not later than June 30, 1991, all state-
276 owned buildings be the subject of such energy
277 conservation and renewable energy retrofit
278 measures as will enable them to meet the energy
279 performance [goals] STANDARDS established in
280 accordance with subdivision (1) of subsection (b)
281 of section 16a-38, AS AMENDED BY SECTION 2 OF THIS
282 ACT.

283 (c) In selecting buildings to lease for state
284 use, the commissioner of administrative services
285 shall give preference to buildings which meet
286 energy performance [goals] STANDARDS established
287 in accordance with subdivision (1) of subsection
288 (b) of section 16a-38, AS AMENDED BY SECTION 2 OF
289 THIS ACT, including buildings which use solar
290 heating and cooling equipment or other renewable
291 energy sources and which otherwise minimize life-
292 cycle costs.

293 (d) The commissioner of administrative
294 services [, in consultation with] AND the
295 secretary of the office of policy and management
296 [,] shall JOINTLY develop and publish guidelines
297 applicable to all state agencies for an energy
298 efficiency maintenance program for all state-owned
299 buildings. THE PROGRAM SHALL INCLUDE, BUT NOT BE
300 LIMITED TO, ANNUALLY INSPECTING, TESTING AND
301 TUNING FOSSIL FUEL BURNING EQUIPMENT UTILIZED FOR
302 SPACE HEATING OR THE PRODUCTION OF STEAM OR HOT
303 WATER FOR PROCESS USES. All agencies shall
304 cooperate in implementing such maintenance
305 program.

306 Sec. 4. Section 16a-38b of the general
 307 statutes is repealed and the following is
 308 substituted in lieu thereof:

309 The commissioner of administrative services
 310 and the secretary of the office of policy and
 311 management shall take such actions as may be
 312 necessary or appropriate to enable all state
 313 facilities to meet the energy performance [goals]
 314 STANDARDS established in accordance with
 315 subdivision (1) of subsection (b) of section 16a-
 316 38, AS AMENDED BY SECTION 2 OF THIS ACT. [The
 317 commissioner shall annually, on or before October
 318 first, report to the governor and the general
 319 assembly on the activities and progress made
 320 during the preceding fiscal year toward achieving
 321 said energy performance goals.]

322 Sec. 5. Subsection (a) of section 4-26b of
 323 the general statutes is repealed and the following
 324 is substituted in lieu thereof:

325 (a) All agencies and departments of the state
 326 shall be required to notify the secretary of the
 327 office of policy and management of their facility
 328 and real estate needs including, but not limited
 329 to, space and geographical location. Each of said
 330 agencies and departments shall continue long range
 331 planning for facilities and realty needs and shall
 332 establish a plan for its long range capital needs
 333 and submit such plan to the secretary of the
 334 office of policy and management and the
 335 commissioner of administrative services on or
 336 before August 1, 1978, and annually thereafter.
 337 The secretary of the office of policy and
 338 management shall conduct a review of each such
 339 plan and shall coordinate all such plans and
 340 prepare an integrated statewide plan which meets
 341 the aggregate needs of the state. Such plan shall
 342 be accompanied by a capital development impact
 343 statement as required by section 4-66b. Such long
 344 range plan shall include projected requirements
 345 for a minimum of five years. Each human services
 346 agency shall include in its long range plan a co-
 347 location statement as required by subsection (e)
 348 of section 4-27b. THE SECRETARY SHALL REVIEW THE
 349 COST EFFECTIVE RETROFIT MEASURES RECOMMENDED TO
 350 HIM BY THE COMMISSIONER OF ADMINISTRATIVE SERVICES
 351 UNDER SUBSECTION (b) OF SECTION 16a-38a, AS
 352 AMENDED BY SECTION 3 OF THIS ACT, AND INCLUDE IN
 353 THE PLAN THOSE MEASURES WHICH WOULD BEST ATTAIN

354 THE ENERGY PERFORMANCE STANDARDS ESTABLISHED UNDER
 355 SUBDIVISION (1) OF SUBSECTION (b) OF SECTION 16a-
 356 38, AS AMENDED BY SECTION 2 OF THIS ACT.

357 Sec. 6. Section 4-73 of the general statutes
 358 is repealed and the following is substituted in
 359 lieu thereof:

360 Part II of the budget document shall present
 361 in detail for the ensuing fiscal year the
 362 governor's recommendation for appropriations to
 363 meet the expenditure needs of the state from the
 364 general fund and from all special and agency funds
 365 classified by budgeted agencies and showing for
 366 each budgeted agency and its subdivisions: (1) A
 367 summary of permanent full-time positions by fund,
 368 setting forth the number filled and the number
 369 vacant as of the end of the last-completed fiscal
 370 year, the total number intended to be funded by
 371 appropriations without reduction for turnover for
 372 the fiscal year in progress, the total number
 373 requested and the total number recommended for the
 374 year to which the budget relates; (2) the
 375 appropriations recommended for meeting the cost of
 376 each major function and activity, project or
 377 program to be achieved in the budgeted year.
 378 Detailed statements shall be prepared which shall
 379 show in proper terms the work to be accomplished,
 380 expressed in work units to be done, services to be
 381 rendered, caseload to be carried or other
 382 descriptive terms or combination thereof. In
 383 addition, functions and activities and projects or
 384 programs shall be supported by: (1) A summary of
 385 permanent full-time positions by fund, setting
 386 forth the number filled and the number vacant as
 387 of the end of the last-completed fiscal year, the
 388 total number intended to be funded by
 389 appropriations without reduction for turnover for
 390 the fiscal year in progress, the total number
 391 requested and the total number recommended for the
 392 year to which the budget relates; (2) a detail of
 393 the cost of (a) personal services, (b) contractual
 394 services, (c) commodities, (d) revenue refunds,
 395 (e) sundry charges, (f) debt service, (g) state
 396 aid grants, [and] (h) equipment, AND (i) THE
 397 INFORMATION GATHERED UNDER SUBDIVISION (5) OF
 398 SECTION 1 OF THIS ACT, showing the actual and
 399 estimated expenditures and requested and
 400 recommended appropriations, classified by objects
 401 according to a standard plan of classification. It

58

402 shall also set forth the budget recommendations
403 for the capital program, to be supported by
404 statements listing the agency's requests and the
405 governor's recommendations with the statements
406 required by section 4-78. All federal funds
407 received for any purpose shall be accounted for in
408 the budget. The document, or a subsidiary
409 document, shall set forth a description citing the
410 federal program, amount and purpose for which such
411 federal funds shall be received classified by
412 function or grant program in each budgeted agency
413 but shall not include research grants made to
414 educational institutions.

415 Sec. 7. The commissioner of the department
416 of administrative services shall, in conjunction
417 with the secretary of the office of policy and
418 management, study the state's policies regarding
419 the purchasing of fuel oil for state facilities.
420 The study shall consider the following: (1)
421 Whether the "early purchase" method of contracting
422 for fuel oil could reduce state expenditures for
423 fuel oil; (2) whether the state could reduce those
424 expenditures through bypassing major suppliers and
425 purchasing fuel oil directly from foreign
426 governments; (3) whether the state purchases its
427 fuel oil from companies which, because of their
428 close affiliations with major suppliers, are the
429 leaders in price increases and, if so, whether the
430 state could reduce its fuel oil expenditures by
431 purchasing from companies not so affiliated; (4)
432 the effects of the state's current fuel oil
433 purchasing policies on small oil dealers in the
434 state and the likely effects of proposed changes
435 in the policies on the dealers, and (5) any other
436 approaches, as agreed upon by the commissioner and
437 the secretary, to achieving the most cost-
438 effective purchase of fuel oil by the state. The
439 department shall report its findings and
440 recommendations, in writing, to the joint standing
441 committee of the general assembly on energy and
442 public utilities not later than January 1, 1982.

443 Sec. 8. Section 16a-38c of the general
444 statutes is repealed.

445 Sec. 9. The legislative program review and
446 investigations committee shall conduct a program
447 compliance review of the energy management program
448 authorized under section 1 of this act. The
449 review shall determine whether the office of

450 policy and management is carrying out the
451 legislative intent of the program and that
452 resources devoted to energy conservation in state
453 buildings are being used efficiently and
454 effectively. The committee shall report its
455 findings, along with recommendations for
456 continuation, termination or modification of the
457 program, to the general assembly not later than
458 January 1, 1984.

459 Sec. 10. The sum of twenty-nine thousand
460 five hundred dollars is appropriated to the office
461 of policy and management and the sum of five
462 hundred dollars is appropriated to the department
463 of administrative services, for the fiscal year
464 ending June 30, 1982, from the sum appropriated to
465 the finance advisory committee under section 1 of
466 substitute house bill 7132 of the current session,
467 for 1981 acts without appropriations, for the
468 purposes of this act.

469 Sec. 11. This act shall take effect from its
470 passage, except that section 10 of this act shall
471 take effect July 1, 1981.

APPENDIX IV

Energy Management Division State Building Audit Results: Summary of Projected Costs and Savings*

The following summary, prepared by the DAS Energy Management Division (EMD), shows projected costs and savings associated with recommendations contained in each energy audit (EA) and technical assistance energy audit (TA) the division had completed through December 30, 1980. Costs and savings from recommended operations and maintenance (O&M) improvements and costs and savings from proposed retrofit measures are presented separately.

It should be noted that the savings from EA recommendations are only approximations since they are based on a simplified calculation method. Energy audits, unlike TAs, are meant to help identify high priority energy conservation options, particularly non-capital improvements; EAs are not intended to be as accurate as or replace professional engineering studies (TAs).

For similar reasons, the costs to implement recommendations are not calculated in the EA process. The EA costs included below were estimated by the EMD staff for the purposes of the division's progress report. Technical audit costs and savings are developed through more sophisticated calculation methods and based on more detailed engineering information. Therefore, the TA estimates are more reflective of actual implementation costs and potential energy savings associated with audit recommendations.

* Source: Connecticut Administrative Services, Energy Management Division Progress Report for December 1980, January 9, 1981.

APPENDIX IV

I. Savings/Costs Estimate from EA's

<u>Agency</u>	<u>O & M</u>		<u>Retrofit</u>	
	<u>Savings</u>	<u>Cost</u>	<u>Savings</u>	<u>Cost</u>
A. <u>Corrections</u>				
1. CCC, Brooklyn	1,806	903	4,956	17,346
2. CCI, N. Cell, Cheshire	565	283	34,632	121,212
3. N. Building, Bridgeport	<u>2,185</u>	<u>1,093</u>	<u>1,393</u>	<u>4,876</u>
Total	\$4,556	\$2,279	\$40,981	\$143,434

B. DAS (Responsible)

1. UConn, 1280 Asylum, Bldg 1, Htfd.	3,639	1,820	2,018	7,063
2. " " " " 2, "	1,517	759	1,849	6,472
3. " " " " 3, "	443	222	416	1,456
4. " " " " 4, "	464	232	357	1,250
5. Grounds Maint. Bldg. 309 Buckingham, Hartford	1,629	815	370	1,295
6. 340 Capitol Avenue, Htfd. (leased)	10,254	5,127	21,113	73,896
7. Superior Court(old) 121 Elm, NHaven	12,740	6,370	4,363	15,271
8. Superior Court 95 Washington, Htfd.	14,623	7,312	10,428	36,498
9. Tax, 92 Farmington, Hartford	46,585	23,293	12,250	42,875
10/11. Labor, 200 Folly Brook, Weth.2bldg.	11,975	5,988	9,970	34,895
12. Superior Court 72 Golden Hill, Bridgeport	8,501	4,291	17,653	61,786
13. Superior Court 300 Grand, Waterbury	34,153	17,077	2,925	10,238
14. Superior Court, Hoyt St.Stamford	5,985	2,993	2,246	7,860
15/16. Car Pool, 190 Huyshope, Htfd.2bldg.	10,287	5,144	2,912	10,192
17. Superior Court, 71 Main, Danbury	1,039	520	963	3,371
18. Superior Court 1061 Main, Bridgeport	12,642	6,321	14,962	52,367
19. Gov. Res. 990 Prospect, EA 1 Htfd.	989	495	798	2,793
20/21. Bd.of Ed/Blind, 170 Ridge,Weth.2bldg	3,056	1,528	5,720	20,020
22. 30 Trinity, Hartford	11,576	5,788	3,708	12,978
23. 122 Washington, Hartford, (leased)	4,966	2,483	8,846	39,961
24. MVD - Wethersfield	34,617	17,084	9,692	33,922
25. Superior Court(new)235 Church St. New Haven	23,323	11,662	25,235	88,323
26. 18-20 Trinity Street	38,780	19,390	7,875	27,913
Total	\$294,185	\$147,044	\$167,815	\$587,693

C. DOT

1. Administrative, Wethersfield	26,495	13,248	20,216	70,756
2. Dist. 2 Admin.	9,736	4,868	4,507	15,775
3. Dist. 3 Admin.	4,545	2,273	1,979	6,927
4. Garage, East Haven	9,086	4,543	--	--
5. Garage 1, Haddam	3,346	1,673	2,988	10,458
6. " 2, "	4,401	2,201	2,387	8,355
7. " 3, Lisbon	4,718	2,359	1,746	6,111
8. " 4, Milford	748	374	13,477	47,170

Rev. 11/28/80
12/4/80
1/4/81

	<u>O&M</u>		<u>Retrofit</u>	
	<u>Savings</u>	<u>Cost</u>	<u>Savings</u>	<u>Cost</u>
9. Garage 5, Old Saybrook	118	59	5,922	20,727
10. " 6, Orange	1,942	971	2,905	10,168
11. " 7, Portland	1,832	916	2,832	9,912
12. " 8, Wethersfield	13,710	6,855	18,700	65,450
13. HoJo, Milford	20,810	10,405	6,737	23,580
14. Research Lab, Rocky Hill	9,736	4,868	4,507	15,775
Total	\$111,223	\$55,612	\$88,903	\$311,161

D. JUDICIAL

1. CT Juvenile Court, 129 Elm, New Haven	\$822	\$411	\$640	\$2,240
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E. OPM/AGRICULTURE

1. Jenkins Lab, New Haven	\$3,699	\$1,850	\$3,122	\$10,927
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F. PUBLIC SAFETY

1. Armory, Enfield	11,903	5,547	5,629	19,702
2. " Naugatuck	6,789	3,395	4,820	16,870
3. " (OMS 1)Naugatuck	2,915	1,458	3,576	12,516
4. " New Haven	3,550	2,775	8,160	28,650
5. " Norwalk	2,915	1,458	3,576	12,516
6. " (OMS 5)Norwalk				
7. " Rockville	3,805	1,903	4,564	15,974
8. " Westbrook	4,840	2,420	6,325	22,138
9. Police Barracks, Montville	1,060	530	1,731	6,059
10. " Garage, Montville				
11. " Barracks, Stafford Springs	1,651	825	818	2,863
12. " Garage, Stafford Springs				
13. " Barracks, Westbrook	2,240	1,120	8,253	28,886
14. " Garage, Westbrook				
15. Armory - Norwich	1,792	896	449	1,572
Total	\$43,333	\$21,667	\$45,059	\$157,707

EA GRAND TOTAL \$457,818 \$228,863 \$346,520 \$1,213,162

NOTE: Because EA's contain no cost information, O & M costs were assumed to reflect 0.5 year payback and retrofit costs were assumed to reflect 3.5 years payback.

11/28/80
Rev. 12/4/80
1/5/81

II. Savings/Costs Estimate from TA's

<u>Agency</u>	<u>O & M</u>		<u>Retrofit</u>	
	<u>Savings</u>	<u>Cost</u>	<u>Savings</u>	<u>Cost</u>
A. <u>Higher Education*</u>				
1. ECSC, Smith Lab.	\$ 1,079	\$1,079	\$ 6,968	\$ 59,523
2. " Sports Center	19,615	2,750	12,974	154,500
3. " Winthrop Hall	<u>3,721</u>	<u>4,586</u>	<u>2,562</u>	<u>9,143</u>
Total	\$24,415	\$8,415	\$22,504	\$223,166
B. <u>Mental Health*,**</u>				
1. Greater Bridgeport	\$ 3,309	--	\$160,212	\$563,730
C. <u>DAS</u>				
1. 122 Washington	13,532	1,800	14,860	76,014
2. 340 Capitol Avenue	8,501	0	173,706	802,871
3. Gov. Residence	1,880	990	545	1,908
4/5. (2bldgs)Labor, Follybrook Blvd. Wethersfield	27,807	13,904	2,290	8,015
6/7. DAS Carpool, 190 Huyshope 2 buildings, Garage & Office	<u>14,738</u>	<u>4,050</u>	<u>7,401</u>	<u>36,149</u>
Total	\$66,458	\$20,744	\$198,802	\$924,957
<u>TA GRAND TOTAL</u>	\$94,182	\$29,159	\$381,518	\$1,711,853

*Done with SHLP Support.

**Retrofit Program totaling \$551,000 now underway, supported in part (50%)
by Federal funds.

APPENDIX V

Examples of "Quick Fix" Project Feedback

Memos on energy savings due to "Quick Fix" projects submitted to the DAS Bureau of Public Works by Manchester Community College (MCC) and Eastern Connecticut State College (ECSC) are attached. The Quick Fix project at Manchester Community College which involved installation of thermostat set back devices, cost about \$3,500. The devices were estimated to save over \$1,500 in the college's electricity costs during a one month period (December 10, 1980 to January 12, 1981). Based on this experience, MCC officials anticipate the project's payback period will be well under six months.

Installation of gas burners and combination gas and oil burners in four areas at Eastern Connecticut State College, another "Quick Fix" project, was estimated by college officials to save over \$4,700 in fuel costs. This project cost about \$31,000 but produced an approximate 11 percent payback in three months.

While these examples indicate that "Quick Fix" projects can be cost effective, they also point out that state agencies can monitor their energy consumption, analyze performance and provide useful feedback without additional resources or special equipment, forms or procedures.

APPENDIX V

★ EARN an Award for your Problem - Solving Idea! ★
 Send your suggestion to: *Employees' Suggestion Awards Program, 165 Capitol Ave., Hartford, 06115.*

Interdepartment Message

STO-201 REV. 7-79 STATE OF CONNECTICUT
 (Stock No. 693R-051-01)

SAVE TIME: *Handwritten messages are acceptable.*

Use carbon if you really need a copy. If typewritten, ignore faint lines.

To	NAME Mr. G. Clementino	TITLE Chief, Special Projects	DATE February 5, 1981
	AGENCY DAS - Bureau of Public Works	ADDRESS 165 Capitol Avenue, Hartford, CT 06115	
From	NAME H. Bandes	TITLE Dean, Administrative Affairs	TELEPHONE 646-4900 X 267
	AGENCY Manchester Community College	ADDRESS	
SUBJECT Project BI-RCO-136 (Quick Fix): Savings Due to			

I estimate that the thermostat set-back devices we installed under the subject project saved Manchester Community College about \$1500 during the period December 10 - January 12 last.

The figures were arrived at by calculating our total electrical consumption during the same period for 1977/78 and 1978/79* and dividing by the degree days for the period to get an average of 341 kwh/degree day. During the comparable period that just ended our consumption rate was 319 kwh/degree day, for a saving of 22 kwh/degree day. Since our actual electricity cost was \$0.0564/kwh, we find our savings in this period:

$$\$0.0564/\text{kwh} \times 22 \text{ kwh/degree day} \times 1246 \text{ deg. days} = \$1546 \text{ saved}$$

Since our electricity bill totaled \$22,375, our actual savings was 6.9%. When our Student Center is equipped with the set back devices, our savings should increase by the ratio of square footage so equipped, i.e., by $\frac{77,747}{64,567} = 120\%$. Therefore, the dollar saving for the period 12/10/80-1/12/81 would have been $\$1546 \times 1.20 = \1855 or 8.3%.

At the expiration of the present heating season, I will calculate savings realized and compute a pay back rate based only on material costs since the installation was made by College Buildings and Grounds staff. However, it is clear from experience to date that our payback period will be well under six months.

H. Bandes

 H. Bandes

HB:DK
 Enc.
 cc: Dr. Vincent
 Mr. Bidstrup w/enc.
 Mr. Mancarella

*Data for 79/80 are not typical since our Student Center had not been rebuilt then.

S/P FEB 9 1981

SAVE TIME: *If convenient, handwrite reply to sender on this same sheet.*

Interdepartment Message

STD-201 REV 7-79 STATE OF CONNECTICUT
Form No. 6918-051-011

SAVE TIME: *Handwritten messages are acceptable* *H. Clementino*
Use carbon if you really need a copy. If typewritten, ignore faint lines.

To	NAME Management Staff	TITLE	DATE February 5, 1981
	AGENCY Manchester Community College	ADDRESS	
From	NAME H. Bandes	TITLE	TELEPHONE X 267
	AGENCY Manchester Community College	ADDRESS	
SUBJECT Energy Consumption and Costs			

The table that follows gives pertinent statistics relative to electricity used for heating and lighting the College for December of the indicated years.

The patterns of use (number of semester break days, intersession classroom usage, etc.) vary from year to year. Further, the Student Center was under construction in December 1979 and contractors' use of electric power was nominal.

I expect the decrease in kilowatt hours per degree day noted for December 1980 relative to years prior to 1979 reflects the recent completion of the automatic thermostat set-back system. Nevertheless, as power rates continue to increase, our heating costs will - lowering the thermostat control points even further is about the only recourse left, short of reducing the hours the College is open, to reduce our energy consumption.

**Electricity Consumption
Main Campus**

Item	Period			
	1977/78 12/2-1/4	1978/79 12/2-1/2	1979/80 12/10-1/10	1980/81 12/10-1/12
KWH Used	394,254	369,900	240,300	396,900
Total Cost, \$	13,205	12,061	11,472	22,375
Cost/KWH, \$	0.0335	0.0326	0.0477	0.0564
Degree Days	1141	1102	965	1246
KWH/Deg. Days	346	336	249	319
Cost/Deg. Day, \$	11.57	10.94	11.89	17.96

H. Bandes

H. Bandes

HB:DK

cc: W. Shorey

• A SPECIAL AWARD will go to the author of Suggestion No. 10,000. •
Send your suggestion to: Employees' Suggestion Awards Program, 165 Capitol Ave., Hartford, 06115.

Interdepartment Message

SAVE TIME: *Handwritten messages are acceptable.*

TO-201 REV. 7/78 STATE OF CONNECTICUT
Stock No. 6938-051-01)

Use carbon if you really need a copy. If typewritten, ignore faint lines.

To	NAME George L. Clementino	TITLE Chief, Special Projects	DATE 1/26/81
	AGENCY DAS, Bureau of Public Works	ADDRESS State Office Building, Hartford, CT 06115	
From	NAME Ronald V. Stephens <i>R.V.S.</i>	TITLE Director, Plant Planning Operations and Maintenance	TELEPHONE 456 2231, X 348
	AGENCY Eastern Conn. State College	ADDRESS 83 Windham Street, Willimantic, CT 06226	

SUBJECT
Quick Fix Projects - BI-RW-60-(QF)

We have installed gas burners in the following areas at Eastern Connecticut State College: combination gas and oil burners in the Old Heating Plant; Economite gas burners in Beckert Hall, Knight House and Keelor Hall.

Below is a listing of costs and savings for these areas. Calculations are based on the amount of fuel used from the installation date up to January 20, 1981.

OLD HEATING PLANT - INSTALLATION DATE 11/14/80

Natural Gas - Equal to - #4 Fuel Oil

Amount - 52,799 ccf	37,446 Gallons
Cost - \$.5595 per ccf	\$.090 Per Gallon
\$29,541.04	\$34,038.41

(Savings of \$4,497.37 over #4 Fuel Oil)

BECKERT HALL AND KNIGHT HOUSE - INSTALLATION DATE 10/1/80

KEELOR HALL - INSTALLATION DATE 1/19/81

Natural Gas - Equal to - #2 Fuel Oil

Amount - 2,448 ccf	1,786.8 Gallons
Cost - \$.6425 per ccf	\$ 1.011 Per Gallon
\$ 1,572.84	\$ 1,806.46

(Savings of \$233.62 over #2 Fuel Oil)

TOTAL OVERALL SAVINGS = \$4,730.99

RVS:kw
cc: Dr. R. Merolli

*Cost of fuel 31,000 for 24
3 mo. after 11% payback*

S/P JAN 29 1981

APPENDIX VI

Agency Responses

It is the policy of the Legislative Program Review and Investigations Committee to submit a final draft of its reports (or relevant sections) to appropriate agencies for comment. Written or verbal comments or technical corrections received from agencies may then be incorporated in the final report.

The draft copy of this report was reviewed by the Office of Policy and Management (OPM) and the Department of Administrative Services (DAS). The formal responses received from the Secretary of OPM and the Commissioner of DAS are reprinted here.



STATE OF CONNECTICUT

OFFICE OF POLICY AND MANAGEMENT

May 12, 1981

Mr. Michael L. Nauer, Director
Legislative Program Review and
Investigations Committee
Connecticut General Assembly
Legislative Office Building
18-20 Trinity Street
Hartford, Connecticut 06115

Dear Mr. Nauer:

Thank you for this opportunity to respond to your committee's draft report on energy conservation in state facilities. Attached you will find specific comments on the draft report which we have addressed in two parts: (1) COMMITTEE'S FACTUAL DESCRIPTION and (2) COMMITTEE'S RECOMMENDATIONS.

As I indicated at a meeting we had several weeks ago, energy consumption in state facilities is an ever increasing concern to me. While I do not agree with all aspects of the draft report, I do thank you for your comprehensive and thoughtful effort. I was particularly interested in the chapter on "Incentives to Conserve." I have asked my staff to look into these suggestions in greater detail.

It is useful to have an objective viewpoint and I can assure you that the concerns expressed in the report will not go unaddressed.

Sincerely,

Anthony V. Milano, Secretary
Office of Policy and Management

AVM/s1
attachment

69

Phone

80 Washington Street — Hartford, Ct. 06115

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COMMITTEE'S FACTUAL DESCRIPTION

OPM and DAS are presently in the process of integrating consideration of major energy projects into the existing State Facilities and Capital Plan's review process and in developing administrative procedures for the more systematic identification and review of proposed energy projects. In areas determined to be significant in terms of their direct impact on costs, the state has not limited its activities to those required by statute, but has taken additional initiatives such as the development of the consumption monitoring program for tracking energy use in state facilities. This program has the added advantages of maintaining agency contacts and demonstrating to agencies OPM's continuing interest in their levels of energy consumption.

The LPRIC report asserts that there has been a lack of coordination of energy conservation activities, together with various management deficiencies. The report overstates and oversimplifies the situation in these areas. Substantial progress has been made, and cooperation improved, between DAS and OPM Energy Division within the past several years. With regard to several of the report's specific criticisms, the following points should be made in reply:

- Building Energy Performance Goals: These goals were completed by June 30, 1980. It took some time to develop an implementation plan, but the time was well spent in order to ensure that the plan was thought out completely. This is particularly important in the development of effective goals for existing buildings. It may be noted that the legislation which required such goals provided no additional funds for this purpose.
- Efforts are presently under way to more effectively integrate budgetary, capital, and energy planning, i.e. FASCAP, FASTTRACK. While this is a complex undertaking, the Committee is correct that it is an essential component of both fiscal and energy policy and as such should be vigorously pursued.
- Establishment of priorities: At a number of points the report states that priorities for various energy activities and projects have not been established. This criticism does not take into account the fact that a number of priorities have indeed been developed, some albeit on an informal basis, which govern various aspects of the state's energy conservation programs for state facilities. These priorities include:
 - * development of a system for establishing priorities for energy projects, which successively utilizes preliminary energy audits, energy audits, and technical assistance analyses. This system covers buildings eligible for federal matching grants under the Schools, Hospitals, and Local Government Program (SHLP), but is employed to assess potential conservation measures in other facilities as well;
 - * establishment of priorities for the implementation of energy conservation measures based on the SHLP analyses described above, and the expansion of this system to other buildings;

- * Building Energy Performance Goals - several building types were involved and thus a priority was assigned to implement plans for new and renovated buildings with plans for existing buildings to follow.
- * employment of priorities under the "quick fix" program based on criteria developed under that program; and
- * an overall decision to concentrate initial program emphasis on capital improvements, in order to effectively utilize federal SHLP funding and state bond funds provided for this purpose, rather than operating and maintenance related activities.¹

With regard to future prospects, the LPRIC's recommendations do not appear to fully take into account the effect on state energy programs of likely reductions in federal funding.² Such reductions may result in the elimination of virtually all federal funding for state energy conservation programs. Under these circumstances, it will be very difficult to maintain some semblance of present energy program activities, much less to expand such activities, even in those areas of highest priority to the state.

COMMITTEE'S RECOMMENDATIONS

Given the number of state buildings and the complexity involved in developing and implementing energy conservation programs in each, it is necessary to provide for a somewhat decentralized approach to energy planning than apparently is envisaged by the LPRIC.³ Specifically, the only workable approach to statewide planning for energy conservation in state government is to place initial responsibility for such planning with the individual agencies and institutions which operate the buildings and facilities involved. OPM would establish the general format and methodology for such plans and provide fiscal and energy policy guidance for agencies to employ in the planning process. DAS would provide technical assistance and other appropriate support. DAS would be further responsible for technically evaluating agencies' plans.

Finally, OPM would be responsible for the development of a statewide plan which would consist of a systematized compilation and prioritization of agencies' plans and recommendations, taking into account the availability of federal and state fiscal resources. In this capacity, OPM would have final responsibility for the overall efficiency and results of the state's energy conservation program, while individual agencies would be responsible for implementing their own conservation programs with the resources made available to them for this purpose. It is only through such agency involvement and participation that conservation measures and practices can be effective on a practical level and sustained basis. However, an effective statewide energy conservation plan cannot be directly carried out in a centralized manner with the "few additional resources" alluded to in the Committee's report (p. 27). As indicated to LPRIC staff, it would take over \$50,000 merely to continue to operate the consumption monitoring system itself.

(LPR&IC Notes)

- ¹ Both the draft and final committee reports acknowledged the improved coordination and progress made by DAS and OPM. Establishment of priorities, even informal priorities was also recognized. The LPR&IC maintained its position concerning management deficiencies and did not alter its findings or recommendations as presented in the draft report.
- ² The effect of possible federal funding reductions was addressed by the LPR&IC in its draft and final reports. State funding for consumption monitoring functions and energy audit staffing was recommended. In most cases, the committee recommendations dealt with areas unaffected by federal cutbacks or activities that should be possible to accomplish with existing resources.
- ³ The LPR&IC recommendations are intended to centralize energy management responsibility in OPM to improve accountability and accelerate conservation progress. The committee's recommended administrative model provides for decentralized implementation responsibility and takes into account the concerns expressed by OPM.



STATE OF CONNECTICUT
DEPARTMENT OF ADMINISTRATIVE SERVICES

May 6, 1981

Mr. Michael L. Nauer, Director
Legislative Program Review and Investigations Committee
Legislative Office Building
18 Trinity Street
Hartford, CT 06115

Dear Mr. Nauer:

Thank you for the brief opportunity to comment on the draft staff study of energy conservation in state facilities prepared for the Legislative Program Review and Investigations Committee.

At least since the mid 1970's, general relationship of OPM and DAS/BPW in energy matters has not materially changed. OPM is charged with policy and devising the overall state-wide program; DAS/BPW provides technical assistance to OPM and is generally responsible for the technical implementation aspects (such as technical studies or audits, design and construction). Through the executive decentralized system, agency heads are responsible for the operation and maintenance of facilities assigned to them, subject to both legislative mandates and OPM policy guidance with DAS technical assistance as resources permit. The staff recommendations seem to be consistent within this framework.

Attached are a series of specific comments not necessarily complete or comprehensive. To a large degree, the staff study recommendations touch on four principal aspects of the State government or any other complex organization:

- a) Centralized vs decentralized authority and control.
- b) A clear need for efficient and effective management information.
- c) Integration of capital and operational programs in the budget process; perhaps indicative of a need for an integrated multi-fund, multi-year program budget in lieu of the existing line item approach.
- d) Provision for adequate resources in a timely manner so as to enable the undertaking of new mandated programs.

The staff study identifies these aspects and reasonably suggests some resolutions. I further suggest, however, that the role of the Secretary of OPM vis a vis agency heads at least in the areas of specific program goal setting, "decentralized implementation" and "centralized enforcement" be reviewed further. I have felt for some time that the mechanism for carrying out physical energy improvements of a capital nature should be the facility

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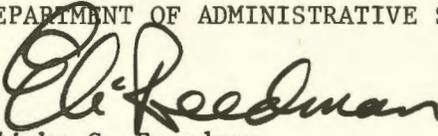
May 6, 1981

and capital planning process which involves the operating departments, DAS and OPM, in a relationship more suitable for the attainment of results. However, there would be one proviso and that is: the procedures for execution require considerable speed-up.

I would further suggest that some sort of continued staff interchange might be fruitful. Energy management is a complex subject and to some extent, touches on all aspects of State government.

Sincerely,

DEPARTMENT OF ADMINISTRATIVE SERVICES



Elisha C. Freedman
Commissioner

ECF/nec/ld

Attachments (3)

cc: Secretary Milano, OPM
Under Secretary Fitzpatrick, OPM/Energy
Deputy Commissioner Cutts, BPW
Ms. Vernon, BPW
Mr. Keating, BPW
Admin.

(Attachment to DAS response)

Page 3¹ No mention is made of the Federal Emergency Building Temperature Restriction

(2)

Program mandated by Federal Law and implementing regulations. These established a broad range of building operational parameters in the summer 1979 that affected all public facilities. Although these restrictions were lifted by President Reagan in early 1981 they are still used by State operating agencies and form the basis for State facility energy operating and maintenance standards drafted by the Bureau of Public Works in early 1981 and currently pending Office of Policy and Management review.

The draft report here seems to emphasize relatively recent State legislative actions and capital retrofit programs. Temperature and other interim operational standards adopted for State facilities as early as 1974 and reaffirmed by Governor's directives in 1977 and Federal mandates in 1979 are the basis for nearly all of the energy use avoidance (reduction) achieved by State facilities during the period 1973-1980. Examples: use of 55 mph speed limit, affecting vehicle fuels; use of coupon rationing programs for State vehicles, establishment of winter and summer building temperature standards, et-al.²

Page 11 While not specifically directed, DAS/BPW has used and intends to use the \$4,000,000.
(9)

(four million) authorized by S.A. 80-41 in further implementation of P.A. 79-496. S.A. 80-41 funds are being used for projects based upon technical audits and in keeping with the adopted energy performance goals for existing facilities.

Page 13 Annual inspection, testing and tuning of fuel burners requires substantial resources
(10) neither currently available to all agencies nor provided by cited or subsequent legislation.

_____ (LPR&IC Notes)

¹ Page numbers cited refer to the committee draft report; corresponding pages of the final report are noted in (#).

² The purpose of the LPR&IC review was to evaluate energy conservation efforts within state buildings, specifically those mandated by recent legislation concerning goals, standards and retrofit. The scope of the committee study did not include activities undertaken to reduce other types of state energy use (e.g. vehicle fuel conservation, etc.).

Page 19
(14) Specific criteria for undertaking technical audits and follow-on capital projects was developed by DAS/BPW and adopted by OPM in September 1980. These criteria are based upon a variety of sources and approaches but principally upon data gained through performing a large number of preliminary energy audits (PEA's) and operational energy audits (EA's). Essentially the criteria adopted is the same as that used in the winter of 1979-1980 to determine relative priority of a large number of projects under the Quick Fix program but is more refined.

OPM-Energy Division initiated a system and for the past four years collected energy consumption data from all agencies monthly. This program was undertaken by that office based in part at least upon a Federally funded grant which included one professional position. Unfortunately it has not evolved into a useful management information tool, apparently due to a lack of adequate resources (personnel and computer assistance). Please also see related comments regarding report page number 24 and 25.

Page 20
(15) Comments here are apparently related only to operational energy audit and not technical audits. It is certainly accurate that without an effective centralized management information energy consumption system, central enforcement of energy audit recommendations (how to improve system operation) is at best difficult. Technical audit information has been the basis for undertaking capital projects since at least early summer 1980.

Page 21
(16) Comments regarding monitoring energy use in the building located at 18-20 Trinity Street are not entirely correct. In the absence of a more sophisticated monitoring system, energy consumption data for all major DAS/BPW operated buildings is manually collected monthly and summarized each year. Data for three years is available which shows a steady decrease in energy use per square foot for that facility. Data for FY 80-81 will be added at the end of the reporting period.

Comments as to the need to modify this building's heating and ventilation controls are incomplete. Following an extensive design program and January 1981 bonding, a contract to accomplish this work was awarded for some \$145,000.00 in March 1981. This would seem to illustrate that the technical audit-follow-on

retrofit program may be functioning as intended.

pgs 24 & 25
(18&19)

Sometime ago, at the request of OPM-Energy, DAS/BPW calculated that resources for a computer based consumption reporting system with written agency/field input would cost about \$180,000.00 the first year and about \$130,000.00 each succeeding year. Moreover, the one staff member assigned over the past recent years by OPM energy division has been unable to cope with the volume of raw data and inherent problems associated with developing a viable management information-energy consumption control system. It is respectfully suggested that the resources identified in the LPRIC report for this essential program may well be inadequate for the task identified. Two related observations seem pertinent: a) duties and functions described in paragraph 2 Pg. 25, in addition to developing and operating the basic information system are quite numerous and diversified b) the pay scale identified is less than one half that for the equivalent position at UTCA who has available, adequate clerical and other support and an existing plant-wide, sophisticated information system.

Page 34
(27)

Progress has been reported in summary form to the Governor by means of the DAS Commissioner's annual report. Detailed monthly and quarterly audit and construction project reports are widely circulated within DAS & OPM. A lengthy overall program status was reported in writing and orally in December 1980 to the LPRI Committee.

At least to some extent long range planning aspects were addressed in joint meetings through the fall and winter of 1980 including the updating of a draft for a multi-year (5-7 year) State Energy Capital spending Program tied to energy audit needs to comply with current statutes.



