La Capra Associates

ADDENDUM TO

A PLAN FOR ENERGY MANAGEMENT IN STATE FACILITIES

PLAN PREPARED BY

CONNECTICUT OFFICE OF POLICY AND MANAGEMENT

REVIEWED ON BEHALF OF

CONNECTICUT ENERGY ADVISORY BOARD

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Executive Summary

This report is an addendum to the Connecticut Office of Policy and Management, Policy Development and Planning Division, Energy Management Unit (OPM) document, *A Plan for Energy Management at State Facilities*, which was submitted to the Connecticut Energy Advisory Board (CEAB) pursuant to Section 101 of Public Act 07-242, "An Act Concerning Electricity and Energy Efficiency."

The legislation requires the CEAB to conduct a review of the strategic plan prepared by OPM and either approve, or modify and approve, the OPM Plan. The CEAB contracted La Capra Associates and GDS Associates, Inc. (La Capra Team) to conduct a review and technical analysis of the OPM Plan and to make recommendations for future plans. The agency staff working group (ASWG), which supports CEAB board members, provided oversight and direction for review of the OPM Plan to the La Capra Team.

The La Capra Team reviewed OPM's September 4, 2007 Draft Plan, held several discussions with OPM staff and offered suggestions for revisions. The OPM revised its draft and re-issued the Plan on November 27, 2007 (the OPM Plan). In its review of the draft and the final report, the La Capra Team kept two significant factors in mind. First, the OPM had a very short time period, less than three months, in which to complete the first draft of their report and could not reasonably have been expected to complete all aspects of the planning as described by the legislation. The comments and recommendations recognize the OPM Plan is the first step in a multi-year effort to plan for improvement in the energy management of Connecticut's State facilities.

Second, Section 101 of Public Act 07-242(b) requires that CEAB "measure the success of the implementation of said plan and determine any actual financial benefits that have been derived by the overall electric system." The recommendations are, therefore, focused on the development of a robust planning process for future planning cycles and on ensuring that CEAB is able to carry out its responsibilities to measure results from actions identified in those plans.

Key Observations from the Review

The OPM Plan is a sound start and will form the foundation of planning information for future actionable strategic plans for energy management at state facilities. The strengths of the report include:

- Identifying the long-term goal for State facilities of reducing energy consumption and peak electric demand 20% by 2020, in keeping with the Governor's goal for the State.
- Discussing the information requirements for effective planning.
- Implementing a successful procurement of electric generation service for State facilities saving an estimated $7 million dollars over the next year.
- Inventorying the existing programs, state energy plans, and technology development projects that may result in increased energy efficiency and reduced State facility costs for electricity.
- Recommending the establishment of an interagency working group to facilitate information sharing, joint projects, funding sources and other actions similar to the recently completed development of a master contract for the State's participation in Connecticut Energy Efficiency Fund programs.

Key Recommendations

As the OPM develops this planning process over the coming annual planning cycles, we recommend that the following enhancements be incorporated:

- An operational definition of the 2020 goal should be established, including identification of the base year peak load and energy starting point and the basis for determining the 2020 energy and peak demand target in terms of MWh and MW.
- Associated with the operational definition of the goal, the existing programs and measures should be categorized so it is possible to determine which measures and savings were in place in the baseline energy and capacity values and which measures contribute to the reductions targeted in the 2020 goal.
- Once these parameters of the goal are determined, short-term and interim goals and targets should be established in the OPM Plan so that progress toward the 2020 goal can be measured on an annual basis and reported in future plans.
- Future OPM Plans would be an excellent venue for OPM to establish a viewpoint on future fuel and electricity prices. These estimates would then be used in the cost-benefit analyses of investment in new equipment assuring that they are evaluated on a consistent basis.

- Future OPM Plans need to develop "a detailed description of the manner in which initiatives in energy efficiency, demand and load response, distributed generation, renewable energy and combined heat and power will be implemented" for State government facilities, as required by the legislation.
- Year-by-year financial requirements for implementing the Plan should be specified in it, along with potential sources of the funding, whether they are Connecticut Energy Efficiency Fund, other in-state funds or federal program funding or require additional state government budgetary allocations.

As OPM is able to broaden, refine and develop its energy plan in future annual planning cycles, the La Capra Team is confident that Connecticut will be better positioned to achieve its important energy and environmental goals for State facilities and the state as a whole.

I. INTRODUCTION

A. Background

This report is an addendum to the Connecticut Office of Policy and Management, Policy Development and Planning Division, Energy Management Unit (OPM) document, *A Plan for Energy Management at State Facilities*, which was submitted to the Connecticut Energy Advisory Board (CEAB) pursuant to Section 101 of Public Act 07-242, "An Act Concerning Electricity and Energy Efficiency." The Act requires the Office of Policy and Management (OPM) to develop and submit to the CEAB an annual strategic plan to improve the management of energy use in state facilities, including detailed descriptions of implementation plans, integrated energy purchasing options and estimates of near-term savings targets. The legislation requires the CEAB to conduct a review of the strategic plan prepared by OPM and either approve, or modify and approve, the strategic plan.

B. Review Process

The CEAB retained La Capra Associates and GDS Associates, Inc. (La Capra Team) to conduct a review and technical analysis of the OPM Plan and to make recommendations for future plans. The CEAB's Agency Staff Working Group (ASWG) provided oversight and direction to the La Capra Team during the review of the OPM Plan.

The process followed by the La Capra Team was interactive and collaborative. The La Capra Team reviewed OPM's September 4, 2007 Draft Plan, held several discussions with OPM staff and offered suggestions for revisions. The OPM revised its draft and re-issued the Plan on November 27, 2007 (The OPM Plan). A discussion of the findings was held with the ASWG and a presentation was prepared for the December 7, 2007 meeting of the CEAB. This Addendum report represents the final step in the review process for the consultants.

The La Capra Team recognizes that the OPM had a very short time period, less than three months, in which to complete the first draft of their plan. We understand that this initial OPM Plan is a starting point for a multi-year effort designed to better manage the State facilities' energy use. The La Capra Team placed an emphasis in its review on issues that affect the CEAB's ability to carry out its responsibilities under Section 101 of Public Act 07-242(b). This section of the Act requires the CEAB to "measure the success of the implementation of said plan

and determine any actual financial benefits that have been derived by the overall electric system." Section II of this Addendum is the La Capra Team's specific findings in our review of the OPM Plan. Section III of this Addendum contains recommendations for future planning, including the information, measurement and reporting that would be necessary for the CEAB to fulfill this obligation, as well as helping the State create a clear, actionable plan that will help Connecticut achieve its environmental, economic, security and energy goals as they relate to the management of energy in State facilities.

II. REVIEW OF 2007 OPM PLAN

In this first annual OPM Plan, OPM stated the focus was on identifying and inventorying the current and planned State efforts with regard to energy management, specifically with regard to the following:

1. Energy procurement
2. Energy efficiency and conservation, and
3. Investment in new alternative and renewable technologies.

The La Capra Team reviewed the Plan and is offering comments in this Addendum on the OPM Plan in several areas.

A. Goal for State Facilities

In Section II of its Plan, OPM appropriately ties its goals and activities to prior State Government policies, energy related legislation, the *Connecticut Climate Change Action Plan 2005 (CCAP),* and most definitively to *Connecticut's Energy Vision* by Governor Rell [OPM Plan November 27, 2007 revision, p. 8-10]. Specifically, the OPM Plan proposes that the energy reduction goals articulated in the 2006 *Connecticut's Energy Vision Plan*[1] be applied to State facilities. The establishment of clear goals is an important starting point for an effective planning process and this linkage to State goals is an important feature of the OPM Plan.

In the Recommendations in Section III, we suggest that the next Plan state the goals explicitly (i.e. numerically, as they apply to State facilities). Further, in order to measure progress and to know what savings and reductions can be attributed to the progress towards the goals, it is necessary to have a clearly defined start date for calculating energy savings.

[1] CT Energy Vision for a Cleaner and Greener State issued by Governor Rell, September 18, 2006. http://www.ct.gov/governorrell/cwp/view.asp?a=1809&Q=320142

B. Effective Planning and Data Needs

In Section IV of the OPM Plan, OPM discusses the current programs that are being implemented in the areas of energy management. The energy management activities in place today are listed on page 15 of the OPM Plan [November 27, 2007 revision] and in Table 1 [p. 29-30].

Among the planned projects is software to reduce personal computer (PC) energy usage, new technologies such as the Lite Trough being sponsored at the "research and development " program level, and even small scale solar photovoltaic (PV) projects [OPM Plan November 27, 2007 revision, p. 19-22]. It should be noted that these projects will not be enough in aggregate to meet the ultimate savings goal. For example, there are eight current energy savings projects listed in Appendix C of the OPM Plan. The sum of the dollar savings for these projects is nearly $200,000. These savings, plus the estimated $500,000 annual savings from the PC project, will save in total only about $700,000 annually, or 0.6 percent of annual State of Connecticut spending on building energy use. It is apparent that the State needs to plan and implement many, many more energy savings projects to meet the long-term goals.

The State's participation in Demand Response programs dramatically reduces peak load (23.9 MW out of an estimated 112 MW of state facility peak demand) and provides savings of nearly $180,000 annually [OPM Plan November 27, 2007 revision, p. 18-19]. The La Capra Team applauds the strong involvement by the State facilities in these programs. Since the savings efforts began prior to the development of the OPM Plan, it is unclear whether they count towards the peak load reduction goal. In our Recommendations in Section III, we recommend that a determination be made on this question when the baseline for savings goals is established. This success does demonstrate that OPM's effort in managing Demand Response opportunities should be continued and other such opportunities explored.

The OPM Plan does not currently contain a detailed implementation plan for the programs identified. To comply with the legislation, OPM will need to expand the OPM Plan to include "a detailed description of the manner in which initiatives in energy efficiency, demand and load response, distributed generation, renewable energy and combined heat and power will be implemented" for State government facilities, as required by the legislation. An implementation plan is an important element of a successful plan. In our Recommendations in Section III, we discuss the need to develop the implementation planning aspects of the plan for future editions of the OPM Plan.

C. Procurement of Electric Generation Service

During the fall of 2007, OPM successfully concluded a near-term procurement on competitively priced generation service through the reverse auction process described in Section IV of the OPM Plan, saving an estimated $7 million annually while increasing the share of renewable energy supplied electricity [OPM Plan November 27, 2007 revision, p. 16-18]. This process, especially when utilizing experienced firms to conduct the auction, is a good way to secure power at competitive prices, saving a substantial amount of money for State facilities.

This first solicitation resulted in new generation service supply for six agencies or government branches[2] [OPM presentation to CEAB October 5, 2007, Slide 4]. Based on the experience gained in this process, OPM is considering expanding this process to additional State facilities, municipalities, low income customers and to natural gas purchases. We concur with this direction and address this further in our Recommendations in Section III.

D. Interagency Working Group

The OPM Plan calls for the creation of an agency working group to study the administrative processes affecting energy management and to make recommendations for improvements. This will serve to strengthen State agencies' ability to facilitate information sharing, participate jointly in projects, identify funding sources and other actions similar to the recently completed development of a master contract for the state's participation in Connecticut Energy Efficiency Fund programs [OPM Plan November 27, 2007 revision, p. 24-26]. This type of working group enables the development of coordinated implementation plans similar to the one developed for State facilities to use BioHeat®, as well as establishing benchmarks for State facility energy usage.

The La Capra Team agrees an interagency group will provide needed focus and coordination of energy management activities. The La Capra Team believes that a well functioning working group is a fundamental precursor to a successful plan, as it would be necessary for the implementing agencies to be involved in the development of a workable plan.

[2] Executive Branch (including Community Colleges), Judicial, Connecticut State University System, University of Connecticut (excluding the Storrs campus), UConn Health Center, and Streetlighting.

E. State Facilities Defined

The decision as to which facilities are to be included in the OPM Plan was made by OPM. In subsequent discussions OPM staff articulated its interpretation of 'facilities' in the following manner.

> "Per [OPM's] understanding and a recent discussion [they] have had with the Budget Analyst at OPM responsible for DOT, Metro North and Connecticut Transit are not considered to be state agencies. The state subsidizes Metro North and transit districts receive funding from appropriations to DOT, however, these are independent entities and are not operated by the state. [OPM] does not believe OPM/Energy's statutory authority for energy management in state facilities extends to these entities. In the same fashion, [OPM] did not include energy consumption for the CT Housing Finance Authority, CT Innovations, Capitol City Economic Development Authority, Connecticut Development Authority, Connecticut Brownfield Redevelopment Authority or the Connecticut Resources Recovery Authority, that also receive state funding, but are independent entities not managed by the state."

The La Capra Team recognizes the logic of the interpretation above, but still recommends that future OPM Plans address expanding the scope of the facilities incorporated when practicable.

Overall, the La Capra Team believes the activities contained within the OPM Plan provide a good foundation. In order to fully comply with the legislation, these activities must be shaped into both short-term and long-term plans to secure the articulated energy savings goals.

III. RECOMMENDATIONS

The OPM Plan provides a good inventory of the diverse array of programs and current activities in various stages of implementation, research, pilot testing and planning that will create or lead to energy savings at state facilities. This is the first step in any planning process. With an understanding of what is in place or planned, the La Capra Team makes the following recommendations to meet the requirements of Section 101 of Public Act 07-242 and ensure State facilities help meet Connecticut's energy, economic, security and environmental goals.

A. Set Goals and Targets

An operational definition of the 2020 goal should be established, including identification of the base year peak load and the basis for determining the 2020 energy and peak demand target in terms of MWh and MW.

B. Establish Starting Point

Associated with the operational definition of the goal, the existing programs and measures should be categorized such that it can be determined which measures and savings were in place in the baseline energy and capacity values and which measures contribute to the reductions targeted in the 2020 goal.

C. Create Short-Term Goals and Target

Once specific parameters of the goal are determined, short-term and interim goals and targets should be established in the OPM Plan and include a means to track progress going forward. This will allow progress toward the 2020 goal to be measured on an annual basis. Goals can be enumerated for clear targets and to enable the measured achievement of the goals. CEAB recommends that tables be created to show energy savings targets by fuel type by the year 2020, and for intermediate years as well (such as 2010 and 2015).

It would be useful to develop similar representations each year to show prior year progress versus the prior year's short term goals. Such metrics would either demonstrate the likelihood of accomplishing long term goals or demonstrate the need to identify and implement additional programs at state facilities.

D. Develop Estimates for Future Electric Costs

The OPM Plan would be an excellent venue for OPM to establish a viewpoint on future fuel and electricity prices. These estimates would then be used in the cost-benefit analyses of investment in new equipment assuring that they are evaluated on a consistent basis. This would combine with estimates of future energy usage and energy costs in State facilities. This would be useful to demonstrate to decision-makers and legislators the implications for greater energy usage and higher cost in State facilities if energy efficiency projects are not sufficiently funded.

E. Detailed Implementation Plan

The La Capra Team recommends that OPM include the following in its future annual plans.

- The energy consumption baseline for state facilities for the starting point date.
- The reduction in energy use and demand based, expressed in units of energy, needed to meet the 2020 goals.
- Preparing a baseline forecast of energy consumption in State buildings (by fuel type) for the period 2008 to 2020.
- Reviewing Connecticut Energy Efficiency Fund demand-side management program plans and plans of other states to ensure that the projected savings are achievable.
- Publishing the starting point, past annual goals and near-term goals in the annual plan.

F. Expand Procurement Efforts

The La Capra Team recommends that OPM continue to lead the combined energy procurement actions for State facilities. It is important for OPM to use a procurement process that is highly likely of yielding a price reasonably close to the lowest possible market-based price. The process of the reverse auction appears to have accomplished that objective but other financial mechanisms, such as issuing Requests for Proposals, should continue to be investigated as they evolve. The La Capra Team recommends that OPM proceed with the application of this auction process to natural gas procurement when OPM believes it is appropriate. Also future electric generation service procurement should be expanded, if possible, to include more facilities and perhaps even purchasing for municipalities and low income customers that OPM discusses in Section IV of the OPM Plan [OPM Plan November 27, 2007 revision, p. 18, OPM presentation to CEAB October 5, 2007, slide 10].

G. Defined Funding Requirements

Year by year financial requirements for implementing the Plan should be specified, along with potential sources of the funding, whether they are Connecticut Energy efficiency Fund, other state programs or federal program funding or require additional state government budgetary allocations.

H. Measuring Progress

To both guide OPM in its planning process and to enable CEAB to carry out its obligation to measure progress, the La Capra Team recommends that the list of proposed energy efficiency projects, such as those provided in Appendix C, also include all proposed energy savings projects for State facilities and be expanded to include the following elements:

- Total energy savings as a percent of the 2020 energy savings goal, if these specific projects are implemented
- Potential near term budgetary savings for the proposed energy efficiency projects in the column titled "Estimated Annual Savings"
- Identification of energy type
- Estimates of the environmental impacts associated with each project
- For projects that save electricity, projected annual kWh savings, coincident peak kW savings, and projected emissions savings should be provided for each project, to the extent practicable

V. SHORT-TERM ACTIVITIES TO ACHIEVE REAL SAVINGS

This section provides our findings and recommendations on how the *OPM Plan for Energy Management in State Facilities* could be enhanced to ensure that real energy savings will be attained in the near term.

A. Energy and Peak Demand Savings

Future OPM Plans should provide an enhanced table similar to that in Section IV (or in Appendix C) that outlines the energy efficiency projects planned for State facilities by fuel type for 2009, the costs of each project, the projected energy and electric demand savings, the projected dollar savings, and a calculation showing the percent of the 2020 savings goal (by fuel type) that these projects represent.

For example, OPM approached the Department of Information Technology (DoIT) to expand statewide an energy savings program to save energy for the state's thousands of personal computers. DoIT awarded a contract in June 2007 to make similar software available to all state agencies and municipalities. OPM and DoIT will coordinate to make other agencies aware of this capability, install the software, and provide training to system administrators. The OPM Plan [OPM Plan, November 27, 2007, page 24] states that "Full program implementation, which may take several years, envisions installation on an estimated 20,000 PCs state-wide with annual savings of approximately $500,000." The La Capra Team suggests that OPM set 2008 and 2009 targets for installation of this software and quantify the kWh and kW savings expected from this energy efficiency project. Such information on kWh and kW savings expected from this project is not currently included in the OPM Plan.

B. Coordinated Energy Management at State Facilities

The OPM Plan correctly identifies that another important aspect of the operational context for managing energy use in state government is the administrative processes involved in decision-making and project implementation. The La Capra Team recommends that future OPM Plans continue to include recommendations on increasing coordination among State agencies. The State can implement administrative procedures that will facilitate program implementation helping create significant energy savings. The current procedures are discussed in the OPM Plan in Section IV [OPM Plan, November 27, 2007, pages 27-28]. In addition to the Inter-agency Working Group chaired by OPM discussed earlier, an excellent example was the development of

a master contract with utilities to facilitate state agency participation in ratepayer funded conservation programs

It is very important that the OPM begin to quantify the energy savings that could be achieved by the implementation of new administrative procedures, and that the OPM add this information to the future OPM Plans. Establishing the cost outlook for State facilities by combining the market price projections with consumption estimates is crucial if policy makers are to sustain and expand energy management efforts. This is where the integration of procurement and investment and consumption decisions is imperative.

C. Research and Pilot Program with Potential for 2009

Section IV of the OPM Plan [OPM Plan, November 27, 2007, page 26] describes how OPM is working with Lite Trough and interested state agencies to identify appropriate sites for this solar water heating technology. Lite Trough expects to have production units ready for OPM to facilitate identifying four to six sites for installation of these units in 2008. The OPM Plan states that this technology could have application wherever quantities of hot water are used for cooking, laundry, and showers (e.g., schools, prisons, group homes, etc.), transferring these energy loads from traditional sources to solar power. Once installed in state facilities, the performance of these units will be monitored by OPM to determine their effectiveness and estimate cost savings for hot water heating. This information will be used to determine the cost effectiveness of this technology, return on investment, and the best application of this technology on a widespread basis. Once the energy savings performance data is available and energy savings are known, an implementation plan with target dates and savings estimates should be added to the next edition of the OPM Plan in September, 2008.

The OPM Plan notes that supporting new technology demonstration projects can show what is technically possible. Replicating successful projects more broadly can improve overall economics and increase the benefits the State will obtain from the technology. It will be important for OPM to prepare detailed estimates of the energy savings potential in all State facilities once the results of technology demonstration projects are available.

D. Identify Further Savings Opportunities

The OPM Plan notes that, in 2005, OPM implemented an energy benchmarking program for state facilities under a memorandum of agreement with the Institute for Sustainable Energy ("The Institute") [OPM Plan, November 27, 2007, page 46]. Since 2005, The Institute has

benchmarked over 110 buildings. This includes all of the buildings under the custody and control of the Department of Public Safety, the Judicial Branch, the Vocational-Technical High Schools, and many dormitories and laboratory facilities at the state universities. The Institute is currently working on benchmarking all buildings under the custody and control of the Department of Correction. This benchmarking provides valuable information for establishing which investments should be made at a particular facility as well as for determining the level of 'real' savings.

Benchmarking is used to compare buildings with similar structures (construction type and use) to determine how well a building is performing and target limited resources to those buildings that are under-performing. This comparison can then be used to identify and target those buildings where energy management systems, or new technologies and more traditional conservation and efficiency, can best be applied, obtaining the best possible return on state funds. The La Capra Team recommends that subsequent versions of the OPM Plan be expanded to report the results of the benchmarking of the 110 buildings, and to identify any energy savings opportunities that remain in these 110 buildings. This energy benchmarking database provides a wealth of information on energy use in State buildings, and this database should be mined extensively in order to develop more detailed plans for capturing energy savings opportunities identified through the benchmarking process.

While it is important to first benchmark buildings that are occupied for the longest time periods (i.e., dormitories and prisons as opposed to office buildings), OPM should eventually expand the benchmarking program for state facilities to all State owned and operated facilities. While the Institute is currently working on benchmarking all buildings of the Department of Correction, energy efficiency opportunities at other State facilities remain to be tapped.

The La Capra Team recommends that each building that has not received a thorough assessment of energy savings opportunities in the past three years should be targeted for an energy audit. Priority should be given to older buildings, those with higher energy use and those that serve essential government functions. This would include those utilized for public safety operations.

E. Develop a Detailed Action Plan to Implement Options

The La Capra Team recommends that future editions of the OPM Plan include a detailed Action Plan to identify, evaluate and implement energy savings projects. Such an Action Plan has three important elements:

1. Selecting appropriate energy savings measures;
2. Building partnerships across state agencies to implement these measures; and
3. Exploring financing opportunities.

One way to set priorities among several energy savings measures is to compare them on the basis of their cost-effectiveness as well as on how they will affect each other. For example, installing new energy-efficient lighting in a building reduces the heating load, which in turn allows the purchase of a smaller cooling system or the use of a combined heat and power system if doing so is technically and economically feasible.

To help finance projects, the Action Plan should explore financing alternatives such as Connecticut Energy Efficiency Fund incentive programs and energy savings performance contracts (ESPCs). The US Department of Energy Federal Energy Management Program (FEMP) has developed streamlined regional and technology-specific contracts known as "Super ESPCs" to help finance Federal energy and water projects. Department of Homeland Security funds should also be explored for buildings critical to public safety. OPM should examine processes that other States use to finance energy savings projects to see if they could be suitable for use in Connecticut.

VI. CONCLUSIONS

This Addendum provides a review of findings and makes recommendations regarding the OPM Plan for Energy Management in State Facilities. This first of many annual plans is a good first start and will form the foundation of planning information for future actionable strategic plans for energy management at state facilities.

Clearly, the positive aspects of the OPM Plan are helpful today and should remain a part of future energy management plans. Principally, these include the comprehensive discussion of the issues from the information requirements for effective planning, the successful procurement of electric generation service for state facilities saving an estimated $7 million dollars over the next year, the technologies that can increase efficiency and reduce state costs for electricity, and a proposal addressing the institutional administrative processes that need to change to fully capitalize on the funding available for energy efficiency. Yet more work remains over the next couple of years.

Future OPM Plans will need to incorporate the information regarding the energy consumption at these facilities combined with the cost and funding of the implementation of the energy management programs. This will enable OPM to establish short-term goals for energy savings and estimate near-term budgetary savings. By fully understanding those program fundamentals, and establishing clear numerical value for the goals of energy, peak demand, emissions and most importantly cost savings on a year-by-year basis, the OPM Plans will play a vital role in helping Connecticut achieve its important energy and environmental goals for State facilities and the state as a whole.