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## **Greening State Capitols** *Securing a Clean Energy Future Initiative*

**NEBRASKA CAPITOL AND OFFICE BUILDINGS**  
**(State Capitol, Nebraska State Office Building, Omaha State Office Building)**  
**Lincoln and Omaha, NE**

**Wal-Mart and the National Governors Association**

In addition to Wal-Mart's grassroots efforts to increase awareness among our customers and suppliers about sustainable products, we're working with political leaders to share our experience in regards to energy efficiency within our facilities. This year and next, Wal-Mart is conducting energy audits on 19 state capitol complexes through a new partnership with the National Governors Association (NGA) called Greening State Capitols. The goal: to help states cut their energy use through cost-effective improvements.

As 2008 chair of the NGA, Minnesota Governor Tim Pawlenty made "Securing a Clean Energy Future" his key initiative, with a focus on energy efficiency. The energy audits conducted at state complexes mirror Wal-Mart's existing Supplier Energy Efficiency Program, or SEEP, which is an effort of Wal-Mart's Energy Division. Through SEEP, Wal-Mart shares knowledge with suppliers, helping them to cut costs and reduce emissions. Systems used in Wal-Mart's energy-efficient facilities are applied to the distribution and manufacturing centers throughout the supply chain. SEEP has helped participating suppliers decrease energy use by 20 to 50 percent. Through this NGA partnership, these same principles are applied to state government complexes.

The NGA selected 19 participants based on energy usage and cost data provided by the states. It will be up to each state to determine what, if any, improvements are implemented as a result of the audits. Each state has agreed to submit a report to the NGA's Center for Best Practices to describe any changes made and details of their savings as a result. This information will be distributed to other states in an effort to make these opportunities available to state governments across the country.

**The State of Nebraska Capitol and Office Buildings**

The audit of the Nebraska capitol and two office buildings took place during one week in August 2008. A team of engineers examined the facilities' lighting, HVAC (heating, ventilation, and air conditioning), and building envelope. The audit engineers are employed by Applied Energy Solutions, an Oklahoma-based company, and accompanied by Wal-Mart associates from the company's Energy Department. The audit consists of a recommendation for lighting improvements and estimated costs. Additionally, we have provided a sense of how much energy can be saved, amount of emissions that can be reduced, and how much money can be saved by implementing the recommendation.

We recognize that state governments have competing annual budget priorities. It is not uncommon to see capital expenditures deferred, forcing facilities staff to prioritize the resources provided to them. In the case of the Nebraska Capitol Complex, however, we were pleased to find that the State of Nebraska has already made significant progress in reducing energy consumption in most of its densely occupied buildings. While the audit did reveal some opportunities for additional energy savings, the primary finding here is that Nebraska should be held up as an example to other states about how to implement an energy savings initiative.

In the spirit of the agreement between the NGA and Wal-Mart, this report will spend more time highlighting the "309 Task Force for Building Renewal" as it is a good example of an existing program that could be submitted to the NGA as a Best Practice for distribution to all states. In a capital constrained environment, it provides a unique funding mechanism for appropriations to be obtained to implement energy efficiency projects.

### **309 Task Force**

The Task Force for Building Renewal (also known as the “309 Task Force”) is a division of the Department of Administrative Services (DAS), and was established in 1977 following a special legislative review of the condition of state buildings. The unique way in which the 309 Task Force came about provides for a unique type of oversight and authority over the division. Besides being under the direct control of the Governor through DAS, oversight of the division is also provided by a permanent legislative committee called the “Committee on Building Maintenance.” The Committee is made up of the Appropriations Committee Chair, plus five other state senators. This unique arrangement is intended to get both the Executive and Legislative branches of state government working together to address the state’s deferred building renewal needs.

The concept behind the creation of the 309 Task Force was to have an entity that would evaluate deferred building renewal needs on a case by case basis, and then utilize experience, unbiased professional judgment, and good common sense in determining the highest priority projects to receive allocated funds. From the beginning the intention was to address “deferred” building renewal needs, which typically includes larger repairs and projects that cannot be funded with ordinary building maintenance budgets. Thus, the Task Force is not intended to take the place of preventive or day-to-day maintenance.

The types of projects eligible for 309 Task Force funding are specifically defined in state statutes as belonging to four categories:

**Deferred Repair:** This category includes all elements of the building envelope such as roofs, doors, walls, and windows. It also includes the building infrastructure such as heating, ventilating and air conditioning systems, electrical and plumbing.

**Fire & Life Safety:** All types of building upgrades necessary to bring the facility up to life safety codes, including alarms, fire sprinkler systems, and proper egress, as well as other code related issues.

**Americans with Disabilities Act (ADA):** This category addresses projects and upgrades to make buildings comply with the ADA act which became law in 1990.

**Energy Conservation:** Includes all types of upgrades intended to improve energy efficiency of buildings and help reduce overall energy consumption in the long term.

By law, the 309 Task Force cannot build new construction, but can only address existing buildings and utility systems. All agencies are eligible for Task Force funding with the statutory exception of the Nebraska Department of Roads. The process for making a request to the 309 Task Force for Building Renewal starts with the biennial budget request made every September of even years. Agencies submit their requests to 309 in the biennial submission, and then the Task Force starts the tedious process of evaluating the requests. It is possible, however, for agencies to make requests for *true* emergencies as they arise.

While the 309 Task Force started small, both in terms of staff and appropriations, state officials over the last decade have made a commitment to adequately funding the division. Current appropriations come from three different revenue streams that total over twenty million dollars per year for projects. This is in contrast to the less than five million dollars per year appropriated in the first two decades of the division’s existence. Despite this significant change in the last decade, the division staff remains small, with only three full-time positions besides the Administrator, plus three part-time consultants to review all agency requests and oversee the several hundred individual projects funded at any given time.

**Opportunities Identified**

- Lighting & Lighting Controls
- HVAC Upgrades

**Overview**

The State of Nebraska enjoys some of the lowest energy rates in the nation. While the facilities have several energy-saving opportunities in the areas of lighting and HVAC systems, the low cost of energy makes it difficult to identify specific technologies that meet the guidelines of a five year return on investment.

**The State should continue their lighting retrofit program that focuses on eliminating T12 fluorescent lamps and implement a lighting control system.** Lighting upgrades are relatively inexpensive and tend to offer a faster payback on capital investment. Old and inefficient lighting causes a double penalty of excessive power draw and requires greater HVAC load.

Certain components of the existing HVAC equipment in the Nebraska and Omaha State Office Buildings are at the end of useful life and must be replaced. A detailed analysis of the new cooling requirements (similar to the study conducted by Alvine Engineering) along with a forecast of future load will allow procurement of properly sized replacement components.

**Lighting & Lighting Controls**

We based the lighting assessment on the operating hours provided for each location.

- **Projected reduction in electrical lighting costs** **30%**
  
- **Projected annual electrical energy cost and replacement savings** **\$28,349**
  
- **Projected simple payback (years)** **10**
  
- **Projected annual reduction in CO2 emissions (tons)** **332.1**
  
- **Projected annual reduction in methane emissions (pounds)** **10.3**
  
- **Projected annual reduction in nitrous oxide emissions (pounds)** **11.3**

Annual cost savings recurs every year after the project is completed. The savings will fluctuate in relation to electrical energy rates.

<b>Lighting</b>	
<b>Energy Savings</b>	
Existing Annual kWh	1,253,616
Proposed Annual kWh	886,704
<b>Annual kWh Savings</b>	<b>366,912</b>
<b>Cost Savings</b>	
Existing Annual Energy Cost	\$29,728
Proposed Annual Energy Cost	\$21,028
<b>Total Annual Energy Cost Savings</b>	<b>\$8,701</b>
<b>Total Project Turn-Key Cost *</b>	<b>\$280,271</b>
<b>Additional Replacement Savings</b>	<b>\$19,648</b>
<b>Total Annual Energy Cost Savings</b>	<b>\$28,349</b>
<b>Final Project Payback (years)</b>	<b>10</b>

\* Assumes use of customer dumpster for disposal of nonhazardous materials

**ALL LAMPS, BALLASTS, SOCKETS, ETC... REMOVED WILL BE 100% RECYCLED**

**General Observations & Work Description – Lighting**

Due to the historical preservation policies in effect at the State Capitol building, many of the lighting fixtures could not be altered; however, we identified a potential energy savings opportunity in the office areas. These areas contain 4' fluorescent strip fixtures, approximately 4,200 on floors 1 – 3, utilizing T12 technology. We recommend converting these to modern T8 technology in order to realize a 30% per fixture reduction in energy consumption and a tremendous improvement in the quality of light. Further savings can be achieved by the utilization of occupancy sensors.

The Omaha State Office Building has already converted approximately 75% of its older T12 fixtures to T8. We recommend the balance of these fixtures, approximately 700, to be converted in order to reduce energy consumption 30% per fixture. The use of occupancy sensors should be implemented in this facility as well.

The older technologies are not energy efficient and carry incremental maintenance costs compared to newer technologies. The replacement fixtures or retrofit kits should provide the best solution (lowest energy use) that is practical for a specific area. In other words, "one size does not fit all" and each area should be analyzed and the best solution should be implemented. Second, occupancy sensors can be installed to turn lights on when someone enters a room or hallway. The simple action of adding sensors may reduce energy consumption, but the correct solution is an engineered control strategy that optimizes the combination of sensors and fixtures. An engineered solution eliminates nuisance switching and maximizes return on investment. Most areas in the Complex do not require full lighting when unoccupied. T8 fluorescent lighting systems should replace the existing T12 systems throughout the Complex. Compact fluorescent lamps should replace all incandescent lamps where it does not conflict with historical preservation policies.

A typical T8 lamp / ballast system lasts three times longer than a T12 system. These T12 lamps would have to be replaced at some future time. Neither the unavoidable future lamp replacement cost nor the longer lamp life (resulting in maintenance savings) has been included in the cost savings analysis.

The United States Department of Energy has mandated that T12 ballasts may not be manufactured after June 30, 2010. Sometime in the near future, Nebraska must face the cost of replacing these lighting systems.

**General Observations - HVAC Equipment**

Due to the diligence of the maintenance staff in the Nebraska State Office Building, the original HVAC systems are still operational. However, they have reached the end of their useful life and reliability will become an increasing concern. In 2008, an HVAC System Study was conducted on this building by Alvine Engineering. Upon our review, we concur with their recommendation of upgrading to a central station air handler with single duct system.

Part of the implementation of the aforementioned upgrade will require the removal of the existing ceiling in order to modify the duct work and install the new VAVs.

Due to the age of the existing equipment in the Omaha State Office Building, we recommend that further studies be done in regard to the HVAC system to determine the most energy efficient options available.

**Conclusion**

The State of Nebraska deserves commendation for their hard work and dedication to the maintenance of the Capitol, Nebraska State Office Building and Omaha State Office Building. There is obviously awareness and action, showing an appreciation for energy conservation. More importantly, through the leadership of the Department of Administrative Services, Nebraska has demonstrated the ability to implement energy efficiency projects in their facilities which has allowed the state to realize both the financial and environmental attributes of their efforts.