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Smart Energy Design Assistance Center

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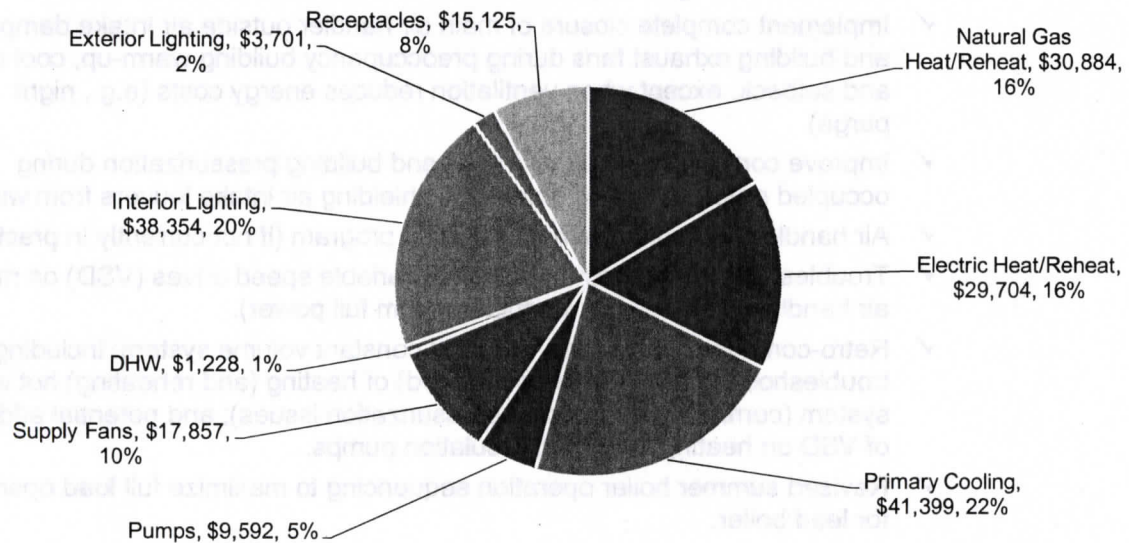
RE: **REVISED** Preliminary List of Energy Cost Reduction Measures *To Be Evaluated*

Dear Mr. Tipton:

Thank you so much for taking the time to meet with us and guide us through the Decatur Public Library facility during our site visit on July 18, 2011, and again on August 25, 2011.

We have continued our analysis of the energy usage in the facility, including *refinement* of the preliminary building energy simulation model (using the energy analysis program Trane TRACE 700™). We also *reviewed* our analysis of the utility bills provided and found the annual energy costs for the year analyzed (June 2010 through May 2011) total nearly \$188,000 (\$158,025 for electrical and \$29,819 for natural gas).¹

The pie chart below shows a *revised preliminary* energy usage breakdown based on our energy simulation model of the existing building and systems:



¹ Based on utility bills provided for the facility including two electrical accounts with Ameren delivery and Integrys supply costs, and Ameren natural gas supply and delivery costs. A portion of the natural gas costs appears to be covered by a municipal agreement, however for our analysis we utilize the full cost that would be charged for energy exclusive of franchise or other agreements.

The estimated usage breakdown gives an indication that the greatest opportunities for possible improvement are to be found in the reduction of heating loads, reheat, cooling loads, and interior lighting loads.

We understand that there are potentially very limited funds available for implementation in this facility. Therefore, our analysis will include energy cost reduction measures (ECRMs) that reduce these loads for the lowest possible capital investment wherever possible. This means that we will analyze measures that are related to the maintenance and operations of the existing equipment, in addition to measures that involve replacement of equipment and controls. The ECRMs focus on operating and controlling systems to provide optimal space comfort conditions and appropriate lighting levels when spaces are occupied, while meeting minimum conditioning requirements to protect stored materials and equipment during unoccupied periods.

Based on information gathered during our site visits, our review of the facility remodel construction drawings (dated August 17, 1998), and our energy modeling efforts to date, we have compiled a revised list of energy cost reduction measures that we will be analyzing for the facility at 130 North Franklin Street—which houses both the Decatur Public Library and the rental spaces located in the same building.

This is the revised preliminary list of measures we will be evaluating for potential recommendation:

HVAC

- Existing system maintenance and operations measures - pending future funding for more expensive air handler and control upgrades:
 - ✓ Expand manual system control for unoccupied periods (Friday reduced schedule, Sunday closure during the summer, holidays), including a program of optimal start/stop.
 - ✓ Install low leakage dampers for main air handler outside air intake.
 - ✓ Implement complete closure of main air handler outside air intake dampers and building exhaust fans during preoccupancy building warm-up, cool down, and setback, except when ventilation reduces energy costs (e.g., night purge).
 - ✓ Improve control of outside air intake and building pressurization during occupied mode, including potentially shielding air intake louvers from wind.
 - ✓ Air handler cooling coil annual cleaning program (if not currently in practice).
 - ✓ Troubleshoot (and repair as required) variable speed drives (VSD) on main air handler (currently not modulating from full power).
 - ✓ Retro-commissioning of the VAV and constant volume system: including troubleshooting (and repair as required) of heating (and reheating) hot water system (currently experiencing pressurization issues); and potential addition of VSD on heating hot water circulation pumps.
 - ✓ Revised summer boiler operation sequencing to maximize full load operation for lead boiler.
 - ✓ VSD control for chilled water supply pump.
 - ✓ Field verification of VAV damper operation and reset/repair as required.
- Upgrade main air handler and zone distribution, with the addition of VAV terminal boxes to create additional zones as appropriate for zone level temperature and ventilation control (see occupancy-based ventilation below).

- Upgrade the direct digital controls (DDC) coupled with an upgrade of the building automation system (BAS) to achieve increased system controllability and implementation of the following measures:
 - ✓ Expand implementation of schedule-based temperature control.
 - ✓ Implement air-side economizer control (outside air is supplied directly to a conditioned space when temperatures and humidity levels are right).
 - ✓ Expand thermostatic deadband control.
 - ✓ Implement optimum start/stop system controls.
 - ✓ Implement occupancy-based ventilation (demand control ventilation or DCV)
- Reduce (or eliminate) shoulder season and cooling season reheat.
- Remove rental spaces from current tie-in to central air handler for ventilation with electric resistance duct heating at the space; replace with new gas-fired split systems (interior furnace with rooftop DX cooling) or packaged rooftop units.
- Install NEMA premium efficiency motors for all motors over 1 HP with run hours >2000hrs/yr.

Building Envelope

- Replace original single pane windows with new thermally broken frames and double pane glazing.
- Implement comprehensive air sealing program—including weather stripping for all exterior doors and windows, and air sealing all building envelope material joints and penetrations.

Lighting

- Install bi-level stairwell lighting controlled by occupancy sensor.
- Phase-in replacement lamps with reduced wattage lamps (high efficiency 25- or 28-watt T8's to replace 32-watt T8's) for all linear fluorescent fixtures.
- Add occupancy sensor lighting control in restrooms, meeting rooms, storage rooms, and other spaces as appropriate.
- Replace metal halide fixtures in the Children's Story room on the second floor with high efficiency fluorescent fixtures, lamps and ballasts.
- Upgrade the exterior canopy lighting to induction or LED.

Plug Loads

- Replace CRT computer monitors with LCD computer monitors (will reduce cooling load as well as plug load).
- Implement system-wide computer energy management—an alternative to separately setting individual computers and monitors to sleep when not in use.
- Implement vending energy management.
- ENERGY STAR® equipment purchase for replacement equipment, staff refrigerators, etc.
- Staff and patron training and awareness program.

We may well find additional measures to consider as we look more closely at the construction documents and equipment. If there are any additional measures the Library would like us to evaluate, please feel free to let us know.

Our final report will include estimated annual energy savings and estimated budgetary costs of implementing the recommended measures, as well as applicable incentives from the Illinois Department of Commerce and Economic Opportunity (DCEO) Public Sector Energy Efficiency Program (PSEEP) incentive program (program Guidelines and Application attached).

Again thank you for all of your help. If you can think of any other information/criteria that would be useful in your decision making process, please let me know.

Best Regards,

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