HVAC BUILDING ENERGY AUDIT

REPORT OUTLINE

HVAC SYSTEM BASELINE INFORMATION AND AUDIT

The types of uses, spaces and associated HVAC systems vary significantly from Building to Building and therefore there will be significant variation in the equipment type, size, configuration and operation.

For this reason, the results and opportunities identified through the HVAC Building Energy Audit will also vary significantly from Building to Building. The final report is tailored to meet the circumstances specific to each site.

It is anticipated that the Audit and Report will be prepared by a Professional Engineer or Audit Firm with at least ten years of proven experience. Enbridge Gas Distribution (EGD) provides this Report Outline with the expectation that it will form the basis for the information and format of the Audit Report and that EGD may participate in the review of testing procedures, analysis and measure identification. EGD may, where applicable, provide guidance and suggestions for energy improvements and review the preliminary report and required.

For portfolios, these audits are intended to address the worst performing buildings and therefore, the building owners will need to demonstrate how their application is targeted to the higher energy intensity buildings.

REPORT OUTLINE

This is a summary of the contents of the HVAC Building Energy Audit report. This has been tailored to reflect the building operation and equipment, as well as the results of the Audit.

DISCLAIMER

This section identifies the inclusions and exclusions of the Audit, as well as the responsibilities and limitations associated with the Audit.

EXECUTIVE SUMMARY

A short summary of the building, the configuration of the HVAC Systems and major recommendations are provided. In addition, a table identifying all recommended measures with associated project type, the amounts saved (both energy units and dollars); the estimated capital cost of the project and the simple payback (ROI); building information must be provided (see attached Sample).

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March 2006
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REPORT OUTLINE

1.0 BUILDING BASELINE INFORMATION (a minimum of one year of data).

1.1 ANALYSIS OF ENERGY CONSUMPTIONS AND BUILDING OPERATION

- Annual Gas Consumption (m$^3$ and $).  
- Average Monthly/Daily Gas Consumption (m$^3$) 
- Cost of gas and comments on gas purchase contract. 
- Other Fuel Consumption, Oil, Coal 
- An estimate of the annual cost of electricity consumed (kWh and $)

1.2 BUILDING INFORMATION

- Identify the building type, age, construction, square footage, roof construction, roll-up doors, concrete slab, and wall construction. 
- Air tightness etc. Height of office areas, Height of shop areas. 
- R values.

1.3 BUILDING HVAC EQUIPMENT LISTING AND ASSESSMENT

- A list and description of all major HVAC equipment from nameplate data and equipment manuals. 
- A visual examination of the HVAC equipment, relying on operating and maintenance personnel to provide the historic information on the building's operation. 
- Comments on equipment age, condition and maintenance requirements.

1.4 CONTROL SYSTEMS

- Identify the types of control systems installed on all HVAC equipment. 
- Identify if a Building Management System (BMS) is installed. 
- Review the benefits of applying temperature re-sets, night/holiday setbacks, start/stop optimization and scheduling. 
- Review applicability and benefit of Demand Control Ventilation (DCV). 
- Review applicability and benefits of Load Shedding and/or Time-of-day programming for large loads and loads which can be shifted.
1.5 CHILLERS, COOLING TOWERS & PACKAGED A/C UNITS

- Review chiller operation, run-times and efficiencies.
- Review cooling tower operation, run-times and efficiencies.
- Evaluate use of Variable Frequency Drives (VFD) on both chiller motors and cooling tower fans.
- Review A/C units operation, controls, economizer use and scheduling.

1.6 LIGHTING

- Define how lighting is used
- Identify existing and required lighting levels
- Identify existing lamping
- Review applicability of motion detectors and/or reflectors.

1.7 ELECTRICAL DEMAND, POWER FACTOR AND LOAD FACTOR

- Identify demand charges; quantify peak occurrences and the cost of associated penalties.
- Identify power factor and any extra charges due to a low power factor.
- Analyze motor load factors and harmonics
- Review rate schedules, time-of-use rates and interruptible rates.

1.8 ADDITIONAL EQUIPMENT

- Identification of any other equipment that would contribute to energy savings (e.g. solar walls, air curtains, destratification units etc.).

1.9 HEAT LOSS/ HEAT GAIN CALCULATIONS

- Measurements of temperature gradients
- List building construction information.
- Calculate heating and cooling inputs.
1.10 VENTILATION BALANCE

- Tabular data of test results identifying all exhausts and ventilation.
- Calculation of air flows.
- Estimate of fan efficiency and total building efficiency.
- Analyses of results, estimate of losses and recommendations
- Review of Economizer applications
- Review of Demand Control Ventilation (DCV) applications
- Variable Frequency Drives

2.0 ENERGY CONSERVATION

2.1 ENERGY CONSERVATION MEASURES

- Include a detailed description of each of the energy savings projects.
- Identify the advantages and disadvantages of project implementation.
- Identify the timing, duration and disruptions associated with each project.

2.2 SAVINGS AND CAPITAL COST CALCULATIONS

- Energy savings, capital costs and Return on Investment (ROI) will be calculated for each project investigated and a summary table provided.
- Energy saving calculations will be shown for each measure identified.

3.0 OTHER ENERGY MANAGEMENT and ADD - LOAD OPPORTUNITIES

- Additional DSM opportunities (solar walls, reflective panels etc.).
- Cogeneration, Back-up Power, Peak Shaving, CSA C282
- Additional Add Load opportunities.

4.0 SAFETY ISSUES- Report on obvious safety defects:

- Dangerous levels of CO or CO2
- Other significant IAQ issues that are observed.
- Fuel leaks, steam leaks, exposed asbestos insulation
- Potential contamination due to areas of Negative Pressure

5.0 FULL BUILDING ENERGY BALANCE MODELING & ANALYSIS (OPTIONAL)

A Computerized model of building HVAC systems, identifying performance, efficiency and energy savings potential may be commissioned as an option.
APPENDIX

- Copies of all energy bills and utility bills
- All equipment information
- Ventilation Balance data, readings, results and calculations
- Building envelope calculations
- Heat Loss Calculations
- Stratification Test Results
- Pressure Distribution Test Results
- Data Logger info (CO, CO2, temperature, humidity, etc.)
- Savings Calculations for all projects discussed
- Cost estimates and payback calculations
- Engineer’s field notes, forms and hand calculations.
- Supplier Quotations and/or Literature