Black & McDonald

Interior Health Authority

Facilities/Utilities, Energy Management Manual

First Draft

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Issued By:

Project Manager

AMENDMENT RECORD

This manual may contain only the pages issued by Black & McDonald Limited (B&M). The Project Manager will authorized changes, insert amended pages into official distribution copies, and see to it that obsolete pages are withdrawn and destroyed. The Master Copy of this Manual will be kept in the custody of the Project Manager who shall be the final authority as to amendment status for all sections in the manual.

Date	Section Page	Details	Signature

Prepared By		Issue Number	
Approved By		Issue Date	Dated ??

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1. Policy

At Company Name Here, the responsibility for achieving savings in the use of energy, rests with each individual. The job of co-ordinating this activity is assigned to the Supervisor, who will act as Manager of the Energy Management Control System.

B&M's Energy Conservation Program utilizes of a three phase approach.

Phase One includes the education of Company Name Here personnel in the opportunities for reducing energy consumption and its associated costs at Company Name Here.

This is done for example, through the use of posters, bulletins, reviews of this manual, distribution of ideas from other facilities, agencies and the industry at large, including lectures from municipal hydro demand side management experts and gas company representatives. During this phase, an Energy Management Committee will be established to generally introduce and develop the program.

Phase Two includes administrative controls, improved maintenance and elimination of wasteful uses of energy. Combined with Phase One, this is an ongoing program which includes the continuing motivation of personnel to shut off equipment and uses of energy when not needed, as well as properly maintaining equipment and buildings to reduce energy losses. Phase Two becomes a combined ongoing responsibility of the Energy Management Committee who communicate results to and seek input from Company Name Here and Facilities/Utilities personnel who perform the work, technical evaluate suggestions, provide technical advice to the committee, monitor results of the program and provide this information to the Energy Management Committee.

Phase Three is the manifestation of the efforts of the first two phases in the actual operation of the program.

Significant savings will manifest themselves in the, - "Efficient Use of Energy" phase through engineering improvements to processes and facilities.

These improvements will include but are not limited to:

- process changes
- heat recovery applications
- improved equipment control applications
- replacement of equipment with types that are with more energy efficient

Communication and idea exchange is the key to a successful program. Our initial communication tool is our Energy Management Manual. It describes opportunities for cost reduction and will eventually include such items as design standards and equipment specifications.

Case histories will be developed describing individual opportunities, costs to implement and associated energy savings.

1.1 Scope

This manual will eventually describe B&M's polices and requirements with respect to Energy Management at each Facility it manages. The polices will be drawn from codes and standards accepted by private industry and subject to change with the introduction of new cost saving measures. This manual will be updated to reflect the changes in the Energy Management Program.

1.2 Responsibilities

1.2.1 Facilities/Utilities

The Facilities/Utilities Section will be responsible for monitoring all personnel for adherence with B&M's Energy Conservation Policies. Individual supervisors are responsible to ensure that overall compliance with energy management policies is adhered to within their respective areas. For a conservation program to be effective, all personnel must actively participate to meet established conservation goals.

1.2.2 Energy Management Committee

The task of this Committee, initially, will be to:

- finalize and refine the Energy Management Program Manual
- develop the education phase
- communicate initiatives to all personnel at the Facility
- seek input into the program from all B&M personnel and review suggestions
- communicate results of the program to all Facility personnel

The Committee will be formed as a joint committee with both B&M and Client personnel sharing the chair.

1.3 Elements of the Program

a) The main equipment to monitor energy consumption and demand of the Facility will be the Building Automation System (BAS) if so equipped. The system shall be capable of recording equipment run times, energy metering, temperature logs.

b) The greatest savings will be made through education of the direct user on where cost reductions can be found. This will be an ongoing requirement.

c) Monthly monitoring of demand and consumption of electricity through the BAS or manual data collection process.

d) Monthly monitoring of the Facilities Energy Bills for Gas, Electricity, Steam, Domestic Water, Chilled Water, etc indicating trends in savings.

e) Formalization of a Facility Energy Conservation Program.

2. BAS System

2.1 General Description

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2.2 Cost of Electricity

Depending upon you local Utility your hydro bill may be based on two criteria:

1. The actual power consumed, based on kilowatt hours, plus,
2. Power demand, ie: peak amount of power used in any 15 minute interval between billing periods.

2.2.1 Actual Power Consumed

Actual power consumed is based on total kilowatt hours in a 30 day period. For example, if a 1000 watt baseboard heater ran for one hour, this would equal one kilowatt hour. If the utility charged 6 cents per kilowatt hour, that baseboard heater would cost 6 cents an hour to operate. Thirty (30) coffee makers at 850 watts each on for 2 hours a day for 365 days, would cost 30 x 850 / 1000 x 2 x 365 x .6 = $1,116.90. The above examples illustrate how easy it is for the cost of operating electrical equipment to escalate.

There are two ways to reduce costs on power consumption:

a) Replace existing equipment with items that will perform the same task with less power (energy).
b) Turn equipment off when not required.

Energy efficient equipment should be used whenever possible.

Lighting in a facility usually accounts for 30% of total energy consumed. A T8 fluorescent tube will operate on 32 watts as opposed to 40 watts for a T12. A PL lamps, found in the pot lights will operate at 25 watts as opposed to a 100 watt incandescent bulb.

The majority of the electric motors are energy efficient.

Consideration for gas heated hot water should be considered over electrically heated hot water. Attention to other details such as insulation, vapour barriers and thermal pane windows should also be considered.

The most effective method of saving energy is to TURN IT OFF. For a facility that pays for energy based upon consumption and demand billing, you will save twice; once with the power that would have been consumed and secondly by lowering the demand for power.

2.2.2 Power Demand (Where applicable)

Peak demand is based on a sustained demand for 15 minutes at any time during the month. For example, if the Facility normally ran at a demand load of 400 kilowatts and then, for one 15 minute period, the demand increased to 750 kilowatts the Facility would be charged based on the 750 kilowatts, and not the 400 kilowatts it would normally run at. Consider if the utility has established a cost of $6.45 per kilowatt to maintain a power distribution system you will be invoiced this cost for the entire month, for the peak kilowatt attained even if you only attained this rating for 15 minutes. The higher the demand by the consumer, the larger the distribution system required; therefore, with increased demand, the consumer is charged accordingly.

The utility may not charge for the first 50 kilowatts of demand, check with your utility to understand its billing practice. Using the above example of 400 kilowatts versus 750 kilowatts, we would incur a cost of $4,515.00 for 700 kilowatts instead of $2,257.50 for 350 kilowatts. Most BAS control systems are not designed to control equipment based on demand so you need to understand your billing contract and the capability of the systems controlling your equipment. The system may allow reprogramming so this can be achieved but you will need to check with your BAS controls company and consider the payback of such an upgrade.

2.3 BAS Programming to Reduce Electricity Costs

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2.4 Electrical/Mechanical Means of Control

To provide control on equipment that is not already being controlled by the BAS, two options are available:

1. Connect the equipment to the BAS panel (if available in the Facility/buildings)
2. Connect electrical or mechanical controls to assist in controlling the equipment

The first option of connecting to the BAS would allow the user to have more flexibility in controlling the equipment through the use of the computer i.e.: turning the equipment off

based on demand rather than by time of day. This method in most cases is not cost effective. The best time to implement this method of control is during the initial construction phase.

The second option of using electrical or mechanical means to control equipment is, in most cases, cost effective.

Some examples of the electrical means of control would be the use of time clocks, photo cells, dimmer switches, occupancy sensors, thermostats with night set back and interconnecting relays to name just a few.

Some examples of the mechanical means of control would be the use of shower restriction heads, spring operated faucets, low water volume toilets and spring wound timers.

The next section will deal with each of the buildings and proposed methods to conserve energy.

3. Building Equipment Description and Opportunities for Energy Conservation

3.1 General

It is recommended that an energy review of each building/facility be carried out. During this survey, describe the controls presently installed and the proposed additional controls, if required. Provide graphs of Consumption and Demand for a typical 24 hour period. Review all BAS set points that the system will try to maintain on the HVAC equipment.