

Saskatchewan Energy Management Task Forces

A Guide to Setting up an Energy Management Program

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Steps and Key Issues in Developing an Energy Management Program

The rationale for energy management

As energy costs continue to rise and operating budgets are restricted, it is important to look at all opportunities for saving costs. Planned, systematic energy management programs provide such opportunities. A typical commercial facility spends approximately 40 percent of its annual operation and maintenance budget on energy. Through energy management, up to 25 percent of energy costs can often be saved some with paybacks of less than two years. The savings derived from energy management can be used to maximize client services.

What to expect from this module

This Guide is intended for a varied audience. It will be useful for those involved in the implementation of the facility's energy management course, those involved in the administrative aspects of the program and anyone on maintenance staff who will play a significant technical role in the installation and operation of energy consuming equipment.. It is important for each reader to understand the individual's role in an energy management program and how each one will fit into the overall strategy. Therefore, this Guide presents the steps in implementing an Energy Management Program.

The process for implementing energy management in your facility is straightforward but each step in the process deserves attention to ensure a successful outcome. This module presents a comprehensive outline of energy management steps. In subsequent modules, each step is reviewed in detail, highlighting key issues in developing an energy management program.

Information sources used to develop this module

The sources of information used for the development of this module are derived from the experiences of energy management professionals in the public and private sectors in Saskatchewan, and selections from other training materials deemed relevant to Saskatchewan health facilities. (Please see the end of this module for a bibliography of information sources.)

Procedure for Developing an Energy Management Program

The steps in developing an energy management program are listed below. These are guidelines and not intended to be followed rigidly in linear fashion but to be considered as you move through the energy management planning process. In fact, flexibility is preferred as each situation will evolve differently. The important point to remember is that planning energy management activities in this way allows each facility manager to consider many options and to anticipate events so that surprise and disappointment can be avoided.

Four Phases in the Development of an Energy Management Program

1. Situation Assessment Phase

- Conduct a survey of staff, e.g. CEO, administration, finance/accounting, facilities management, maintenance in the facility who have an impact on energy management. What do they know about energy costs, what are their beliefs regarding opportunities for saving costs, what will it take to convince them of the opportunities, what level of skills already exist among staff, what skills are required.
- Conduct a walk-through audit of the facility (identify, quantify, and verify opportunities).
- Obtain energy billing information (three year history is adequate, be cognizant of changes to operations, occupancy, equipment retrofits, weather, etc. to be able to account for discontinuities in energy use/costs from year to year).
- Obtain technology information and specifications related to energy requirements and efficiency
- Analyze data looking for barriers and opportunities -- both people and energy systems/equipment
- Examine financial options available to your facility
- Develop options and recommendations

2. Project Organization Phase

- Obtain commitment and approval from senior staff to proceed with the implementation of an energy management plan.
- Establish an energy management team or committee (made up of management/administrative, finance, facilities/operations/maintenance) and appoint a coordinator.
 - foster and develop a team approach;
 - build staff support (technical and communications);
 - develop and/or obtain expertise (in-house, energy engineers from utilities, consulting engineers, etc.);
 - train / educate staff re: audits and housekeeping methods; and
 - develop a communications plan to let people know what you are doing and why.
- Develop the scope of the program including:
 - technology/equipment and operational opportunities for change;
 - establish capital and installation costs and annual savings;
 - identify resources / skills needed and preliminary budget requirements;
 - determine criteria for selection; and
 - establish a preliminary schedule.
- Decide on an implementation strategy determined by staff analysis, financial options, energy management opportunities, and timing /scheduling needs

3. Implementation Phase

- As a team, arrange for a detailed audit of plant.
 - Analyze and review options.
 - Examine financial options and financial implications of each.
 - Determine strategy for your facility based on:
 - staff survey, (skills, project leadership, commitment etc.); and
 - facility audit, and identified opportunities (technical and operational options and costs).
- Select financing methodology
 - Determine whether strategy will be implemented in-house or externally. Will the audit be supported with engineering consultants, ESCo, or manufacturer financed.
- Final selection of technologies
- Develop the Implementation Plan
 - define goals and objectives,
 - establish priorities;

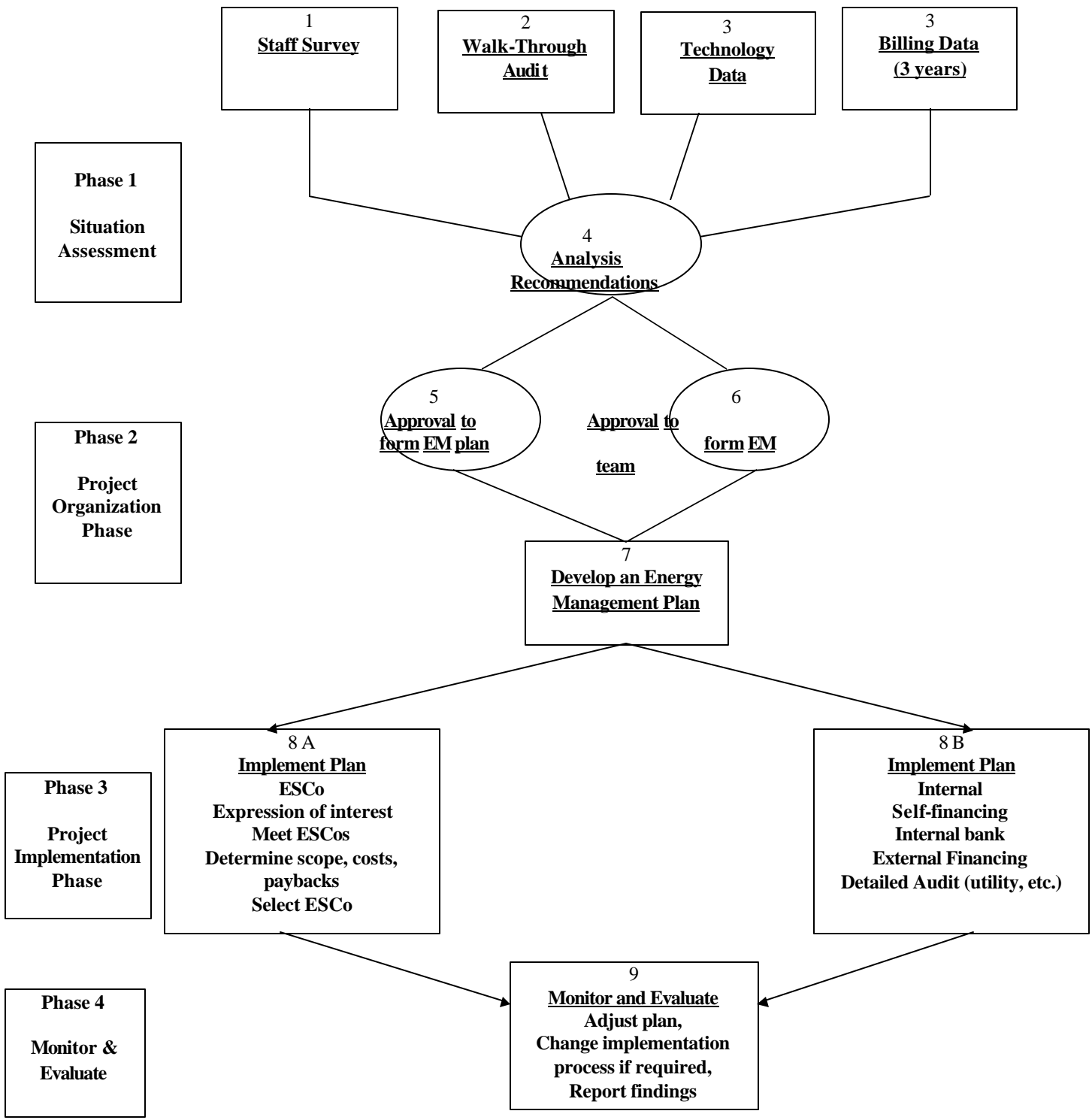
- develop strategies;
 - specify resourcing needs;
 - obtain training for staff;
 - statement of financing requirements, and rationale for selected financing method, and
 - obtain consensus and approval to proceed.
- Implement plan
 - If ESCo route is selected,
 - prepare “expression of interest” to potential bidders;
 - arrange for meeting with ESCo to determine scope of project, estimated costs, financial and technical expertise, extent of performance guarantee, payback issues, negotiating points.
 - If in-house approach is selected,
 - ensure adequate training;
 - identify tasks and assign responsibility, and
 - obtain quotes.

4. Monitoring and Evaluation Phase

- Impact Evaluation (energy and retrofit costs versus savings)
 - analysis of audit data, , billing data, technical specifications, log of changes to operations & equipment retrofits, weather data, occupancy levels, etc.
- Process Evaluation (effectiveness of implementation process)
 - conduct satisfaction survey; redo staff survey; and
 - analysis of staff survey data staff satisfaction
- Adjust plan and report results.

Figure 1 provides an illustration of the development process of an energy management program.

Figure 1: Steps in Developing an Energy Management Plan



Phase 1: Situation Assessment, Steps 1, 2, 3, and 4

The first step is an examination of the social and structural business environment of the facility. Study and analysis of the following topics are most important:

- staff,
- physical plant / facility,
- energy use (bills),
- technology information and end-uses, and
- community services and capabilities.

Staff Surveys

Energy management is more than just a report sitting on shelf gathering dust, more than pieces of paper describing consumption and energy costs. Energy management is a set of on-going activities, energized by dedicated, enthusiastic and committed staff. “Buy-in” to this process is required from staff at all levels. Accordingly, we ask that you begin your energy management activities by understanding the people issues. To do this, you will need to conduct surveys, either informal or formal.

Generally, there are three key areas of investigation:

1. Knowledge levels associated with energy management practices.
2. Attitudes toward energy issues (costs, benefits, supportive/adversarial, etc.).
3. Practices or behavior (actions taken re energy management).
4. Skills and training levels

Conduct an internal review of key staff and identify their position on energy usage and costs, attitudes, beliefs, practices and skills regarding energy costs and uses as they contribute to operating and maintenance costs. Staff includes management, administrative, financial and facility operations/maintenance. Examine staff perceptions of energy costs and opportunities for savings. Does the staff believe that there is an opportunity for saving such costs? If there is agreement that there are savings opportunities that should be pursued, a major hurdle has been crossed. In most cases, there will be a lot of optimism and some skepticism about the opportunities. Attitudes, beliefs, knowledge and skills may need to be changed or enhanced -- this is accomplished through communication, demonstration and training.

The three key people that must be committed to energy management are the CEO, the financial officer and the facilities or maintenance manager. These three can often have different perspectives and priorities related to energy, facilities and resources. All three must share a **common** vision and understanding of what needs to be accomplished and must agree on a method or plan for achieving the goals and objectives in order for effective implementation of energy management.

Walk-Through Audit

Conduct a walk-through audit of the facility. (In subsequent modules, the elements of a walk-through audit are explained in detail.) An audit investigates several components of the building:

- Building envelope
- Water and space heating
- Lighting
- Space cooling
- Refrigeration, Cooking, Washing
- HVAC systems
- Control systems

The walk-through audit is in part an inventory of energy using equipment or systems and descriptions of the equipment (nameplate data, hours of use, age of equipment, etc.) or building structure. In addition, the audit examines operational and maintenance practices, noting the opportunities for low cost, no-cost improvement opportunities. SECDAs has other publications that explain the auditing procedure in greater detail. The principle resource is a good audit form.

In addition, electric and gas utilities and government energy agencies are external sources of support to help you with a walk-through audit.

Billing Data

Obtain a three-year history of billing data for all major energy sources (electricity, natural gas, propane, oil) used in the facility. Do a monthly bill comparison (reconciliation) for the three years, ensuring that the time period being compared is the same, e.g., there must be the same number of days in January 1998, January 1999, and 2000. Estimate the energy requirement per square meters of space, per occupant, etc. This analysis provides the baseline energy consumption for the facility.

Technology Information (Equipment Inventory & End-Use Data)

Energy consumption for each major technology / equipment is calculated to provide an assessment of the relative size of each end-use (percent of total energy consumption) as in the table below. Information on new energy efficient technologies must also be collected. This information is then matched with energy efficient technologies and the costs and benefits are compared. In this way, an estimate of the potential energy savings is derived as well as the potential cost of conversion.

Analysis and Recommendations

Analysis of staff skills, billing, audit, and technology provides an initial assessment of the energy management opportunity. At this point, a preliminary decision can be made regarding the best approach to energy management -- external support vs. internally managed.

Phase 2: Project Organization, Steps 5, 6, and 7

Obtaining Commitment and Approval

Senior management (CEO, Officers, Directors, Managers) must be fully supportive and committed to the energy management plan. It would be very useful to develop a policy communicating their position and responsibility towards energy management. The most senior person needs to communicate to the entire staff the enthusiasm about and pledge of support for energy management. This message should be reinforced frequently to sustain employee interest.

The energy management team should be composed of senior staff, administrative staff, and maintenance or operations staff. Senior staff provide directives and have final responsibility for the financing decisions, administrative staff manage budgets and purchase decisions, recommend financing options, report results and manage communications. Maintenance or facilities staffs (through an energy coordinator) are responsible for the day-to-day operational decisions, recommendations, and implementation of operational or equipment changes and also monitors the impact of changes.

Developing a Directional Implementation Plan

The team works together to develop the implementation plan considering in-house skills and expertise, timing needs technical and operational opportunities and financing alternatives. Based on this information, the team has some conception of the best approach to pursue - either to develop an in-house plan or to seek external resources (ESCO)

or a hybrid program that is managed internally but also relies on special skills/resources from the outside for certain applications.

The plan is directional, not conclusive at this point. It is reviewed by the team and taken to senior management for approval to proceed to the next phase. The planning process is iterative, requiring adjustment and change before final approvals are given.

Phase 3: Implementation Phase, Step 8

Detailed Audit

Once approval has been given, the team should arrange for a comprehensive engineering audit. The recommendations arising from the audit will identify costs and benefits for each option. Consider the options individually and as a package or bundle. If an internal approach is selected, individual low cost, no-cost measures may be implemented first to gain experience and confidence in the plan and to justify expenditures for capital cost changes. However, a packaged approach, one that incorporates both low cost and higher cost options will result in long term commitment to energy management, allowing energy management to become part of the organizational culture, and will also maximize the energy savings benefits.

Upon completion of this audit, options and financing implications will be reviewed again prior to final recommendations.

The Implementation Plan

The plan itself will contain specific and measurable goals and objectives. The strategy and tactics for implementing the plan will be explicit as to timing, required resources (human and financial) and the selected financing option. This plan will require executive approval.

If an externally supported energy management plan (ESCO) is approved, ESCo's prefer to receive an "expression of interest" at the outset rather than a Request for Proposal. With the plan in hand the team should meet with the ESCo to discuss the scope of the project and estimated costs, the financial, technical and project management expertise of the ESCo. In addition, the team should be apprised of the extent of the performance guarantee, payback issues and opportunities for negotiations.

If an in-house approach is approved, the team must identify staff training requirements and arrange for training. Both technical and project management training may be required. Colleges supported by utilities and energy agencies offer programs in this area. The training can often be tailored to suit the specific needs of the group.

Each task in the plan needs to have someone accountable for its implementation. Ensure that staff are aware of the timing and implementation issues for each task.

Often, there are external resources that can be called upon to provide expertise and support to your project with minimum (or no) costs. Electric and gas utilities and provincial energy agencies have customer service and/or energy management staff that can provide assistance with audits, billing analysis, technology information, supplier information, etc.

Obtain quotes from several sources for equipment changes, and ensure that you are getting the most efficient technologies available on the market for the application. If it is not available locally, ask your contractor or supplier to bring it in for you. In this way, the facility and the community benefit, as there is spillover to other users.

Phase 4: Monitoring and Evaluation, Step 9

The monitoring and evaluation phase closes the loop with the first phase, the situation assessment. The data and analysis completed for the situation assessment form the baseline information required at the monitoring and evaluation stage. All changes arising from the energy management program are evaluated against the baseline measures. Evaluation of the program is necessary to fulfill the following requirements:

- To demonstrate conclusively that demand management measures are performing as expected.
- To facilitate accountability to public and health boards.
- To demonstrate credibility with senior management.
- To use as a decision tool for allocation of scarce resources.
- To provide feedback on program elements to improve/enhance program design, delivery, or impact.
- To provide an assessment of how well recommendations/measures were implemented.
- To fully understand the impact on energy consumption costs and benefits.

Monitoring

Bills are monitored for changes in energy usage and costs. In some circumstances, specific equipment may need to be metered to better understand the savings potential from installing new energy efficient equipment. Logs are maintained of equipment changes (additions or deletions), operational and occupancy/usage changes, and degree-day data. All this is necessary to be able to reconcile changes in the energy bills. Generally, monitoring is conducted to support the evaluation of the energy management program.

Evaluation

There are two major types of evaluation: impact and process. The impact evaluation reports have on the costs and benefits (savings) of the program. The process evaluation reports on how well the program has been managed from design to implementation.

The monitored data described above contributes to the impact evaluation, while survey data contributes to the process evaluation. The process evaluation examines all of the important deliverables from the program, including staff training, communications impact, and staff, occupant and supplier satisfaction levels with the program.

In addition, impact on the community may be evaluated. For example, has there been a change in the type and efficiency of equipment being stocked locally; have skills been developed in the private sector to deliver or support energy management programs; how much of an impact did your energy management program have on environmental improvements?

These are all-important aspects the of monitoring and evaluation phase; the extent to which an organization evaluates depends on available resources. There are organizations such as utilities and government energy agencies that can provide guidance and assistance with this phase.

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