**Guidelines for**
**Implementing Total Management Planning**

# Asset Management

## ENERGY MANAGEMENT
## Implementation Guide

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## LIST OF ACRONYMS

| | |
|---|---|
| KPI | key performance indicator |
| O&M | operation and maintenance |
| SWOT | strengths, weaknesses, opportunities, threats |
| TMP | Total Management Plan |
| WSP | Water Service Provider |

# 1 PURPOSE

This guide is intended to provide guidance for water service provider (WSP) practitioners and their consultants on the processes involved in establishing and implementing effective energy management strategies and procedures and developing associated documentation.

# 2 INTRODUCTION

## Outcomes

The outcomes from implementing an energy management strategy include:

- minimisation of energy costs; and
- minimisation of 'greenhouse gas' emissions.

## Outputs

Outputs from the energy management process include:

- Energy Management Plan (TMP sub-plan); and
- specific energy management investigation audit reports.

# 3 THE ENERGY MANAGEMENT PROCESS

The energy management process is illustrated in Figure 1.

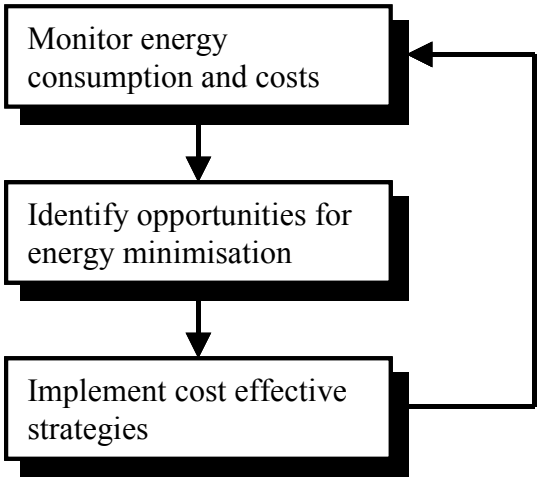


**FIGURE 1: The energy management process**

Each WSP should be aware of the relative energy costs associated with facilities (e.g. pump stations) under its control and energy costs in relation to O&M costs. This information will determine the relative importance that the WSP should assign to energy management.

Every WSP should have a system in place for monitoring and analysing energy usage and costs at its major energy-consuming facilities. Appropriate performance indicators include kilowatt-hours per megalitre (kW.h/ML) and cost per megalitre (cost/ML). Energy management is an ongoing process and opportunities existing for minimising energy consumption right through the asset life cycle. These are summarised in Table 1.

**TABLE 1: Opportunities to minimise energy consumption through the asset life cycle**

| Energy management strategies / Asset life cycle | Planning | Procurement | Operation | Maintenance | Renewal |
|---|---|---|---|---|---|
| Purchase electricity within a deregulated electricity market. | | | ✓ | | |
| Minimise water and wastewater pumping. | ✓ | | ✓ | | |
| Use appropriate pumping equipment and pipework design. | | ✓ | | | ✓ |
| Maximise the usage of off-peak tariffs by pump scheduling based on network modelling. | ✓ | | ✓ | | ✓ |
| Optimise distribution system layout/component sizing. | ✓ | ✓ | | | ✓ |
| Refine process control at wastewater treatment plants. | ✓ | ✓ | ✓ | | ✓ |
| Select electrical/mechanical equipment based on lifecycle costs. | ✓ | ✓ | | | ✓ |
| Use variable speed pump control. | ✓ | ✓ | ✓ | | ✓ |
| Carry out planned maintenance (preventive or condition-based) of:<br>▪ electrical/mechanical equipment; and<br>▪ pumping mains. | | | | ✓ | |
| Monitor energy consumption/costs, with triggers for action (e.g. maintenance). | | | ✓ | ✓ | |
| Reduce infiltration/inflow. | ✓ | | | ✓ | ✓ |

Effective demand management strategies are among the most cost-effective means of reducing energy consumption.

WSPs should evaluate the relative cost-effectiveness of the various energy management strategies available and implement the strategies that are most cost-effective.

The deregulation of the Queensland electricity industry not only provides opportunities for reduced energy costs but also allows WSPs to contract for the purchase of 'green' electricity produced by hydro power or wind generators, rather than coal-generated electricity. This will depend on the WSP's environmental strategies. This deregulated environment may also provide opportunities for WSPs to generate and sell energy using alternative sources such as hydropower or methane.

## 4 RISK ISSUES

Potential risks associated with energy management include:

- implementation of sub-optimal strategies;
- inappropriate supply agreements/tariffs; and
- energy management being a once-off event rather than a continuous process.

## 5 TMP REQUIREMENTS

Each WSP's Total Management Plan (TMP) should include an outline of key issues and identified strategies addressing these issues for the WSP's services in respect of energy management. Appendix A provides indicative content and appropriate TMP development level for this sub-plan.

A hierarchy has been established to define the level to which a WSP should develop its plan under total management planning. This is discussed in more detail in the TMP Development Guide. The development level depends on the size of the WSP (in terms of the replacement cost of its assets).

## REFERENCES AND FURTHER READING

*Total Management Planning – Urban Water-related Services: Management Issues*, Department of Primary Industries (Water Resources), Brisbane, 1994.

## APPENDIX A: Content and development level of sub-plan

**TABLE A1: Indicative sub-plan content**

| Sub-plan features | Energy Management Plan content |
|---|---|
| Issues covered in sub-plan | ▪ Competitive electricity pricing.<br>▪ Energy audits.<br>▪ Alternative tariffs.<br>▪ Minimising energy usage.<br>▪ Back-selling of electricity.<br>NOTE: Energy management will normally, but not necessarily, be confined to electrical energy. |
| Purpose of plan | ▪ To provide an overview of the WSP's current energy management practices.<br>▪ To outline future objectives and initiatives in energy management. |
| Policies that may be required | ▪ Minimising electricity consumption.<br>▪ Negotiating supply contracts.<br>▪ Back-selling of WSP-generated electricity. |
| Other Total Management Plan elements that are intimately linked to this sub-plan | ▪ Operations Management Plan: provides for optimising operating procedures.<br>▪ Water Demand Management Plan: provides for reducing volume of water pumped.<br>▪ Water Loss Management Plan: provides for reducing volume of water pumped.<br>▪ Sewer Infiltration/Inflow Management Plan: provides for reducing volume of sewage pumped. |
| External issues contributing to the current operating environment that need to be considered | ▪ Deregulation of electricity supply in Queensland and increasing contestability of supply pricing.<br>▪ Availability of off-peak and other alternative tariffs.<br>▪ Availability of energy-efficient pumping equipment. |
| Issues that need to be considered in summarising the status of current operations | ▪ Details of major electrical installations and relative significance of electricity costs.<br>▪ Detail of tariffs utilised and scope for more advantageous tariffs.<br>▪ Status of energy audits.<br>▪ Initiatives for upgrading energy-efficiency of electrical equipment.<br>▪ Broad SWOT analysis of relevant operations. |
| Strategic basis of the plan | The strategic elements forming the basis of the plan should include:<br>▪ goal for asset management;<br>▪ objectives for energy management;<br>▪ adopted KPIs; and<br>▪ management strategies and performance targets.<br>The management strategies developed will be based on the identified key strategic issues and SWOT findings, including risk assessment, in respect of energy management, and on the required TMP development level[1]<br>Many WSPs are likely to require strategies for performing energy audits; maximising supply-cost benefits of electricity industry regulation; and optimising system operation to minimise energy consumption.<br>The strategies should be supported by detailed action plans covering a period of up to 3 years. |
| Suggested performance measures | **Outcome**: percentage of energy supplied under off-peak tariffs<br>**Output**: energy cost/ML<br>energy in kW.h/ML |
| Supporting documentation | This will depend on the WSP, but typically would include:<br>▪ energy audit reports; and<br>▪ power consumption/distribution reports. |

**TABLE A2: Required sub-plan development level**

| Development level[1] | Target management mechanisms of Energy Management Plan |
|---|---|
| 3 | ▪ Energy consumption and costs monitored and analysed.<br>▪ Energy consumption targets trigger actions (e.g. planned maintenance).<br>▪ Energy purchased at competitive prices.<br>▪ Appropriate tariffs in place. |
| 2 | ▪ Energy consumption and costs monitored and analysed.<br>▪ Energy purchased at competitive prices.<br>▪ Appropriate tariffs in place. |
| 1 | ▪ Energy consumption and costs monitored and analysed.<br>▪ Appropriate tariffs in place. |

[1] Defined in Section 4.2 of TMP Development Guide.