

# Energy Management in Practice Manual

# Foreword

The purpose of this manual is to demonstrate how a company can improve resource (energy, water and waste) efficiency, save energy and money, and reduce greenhouse gas emissions by treating resources as a commodity that need to be managed.

Most importantly, the manual is a practical guide providing strategies for implementing an energy management program that meets your organisation's specific needs. The manual explains how to:

- assess your baseline data and key performance indicators
- track and monitor your energy use
- establish policies and management procedures, and
- develop a program of works

Resource management best practice is about continuous improvement. This Manual will help your business assess its current state of resource management. The Manual will also help you, as part of a continuous improvement process, to define where you are now and where you want to get to next.

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# Table of Contents

## Section One

Resource Management Best Practice	5
Introduction	6
Section 1 - Resource Management Best Practice	8
The Results of Resource Management Best Practice	10
Incorporating Resource Management Best Practice	12
A Continuous Improvement Process	15
Common Features of a Successful Resource Management Program	17
Summary	18

## Section Two

Communication and Motivation	19
Introduction	20
Company Culture and the Change Process	21
Involving Your Whole Company	23
Inform, Inspire and Motivate	24
Getting Everyone On-Side	25
Motivating or Demotivating?	27
Communicating Effectively	29
Resource Management Training	32
InfoSheet 1A	35
InfoSheet 1B	36
InfoSheet 1C	37
InfoSheet 2	39
InfoSheet 3A	40
InfoSheet 3B	41
InfoSheet 3C	42
InfoSheet 3D	43
InfoSheet 4	44
InfoSheet 5A	46
InfoSheet 5B	48

## Section Three

Gathering Data	49
Introduction	50
Tracking and Monitoring	51
Tracking Resource Use	53
Monitoring Resource Use	54
Establish Effective Monitoring - Load Profile	58
InfoSheet 6	61
InfoSheet 7	62
InfoSheet 8	63
InfoSheet 9	65
InfoSheet 10	67

## **Section Four**

Establishing policies & procedures	72
Introduction	73
The Role of the Resource Manager	74
Who is the Resource Manager	75
Implementation Team	78
Charting Resource Management	79
Resource Policy	81
Developing a Resource Policy	82
Policy Details	83
Summary	86
InfoSheet 11	87
InfoSheet 12	88
InfoSheet 13	89
InfoSheet 14	90
InfoSheet 15	91
InfoSheet 16	92

## **Section Five**

Assessing Opportunities	94
Introduction	95
Resource Management Action Plan	96
Identify Resource Saving Opportunities	97
Preparing an Action Plan	98
Presenting an Action Plan	99
Implementing the Action Plan	100
Summary	101
InfoSheet 17	102
InfoSheet 18	105
InfoSheet 19	106
InfoSheet 20	108
InfoSheet 21	109
InfoSheet 22	111
InfoSheet 23	112
InfoSheet 24	114
InfoSheet 25	118
InfoSheet 26	119
InfoSheet 27	120

## **Section Six**

Additional Water Efficiency Guide	122
Water	123

## **Section Seven**

Additional Waste Reduction Guide	128
Additional Waste Reduction Guide	129

Section One

# **Resource Management Best Practice**

# Introduction

The **Energy Management in Practice (EMIP) manual** was originally introduced by Sustainability Victoria to reduce Victoria's greenhouse gas emissions through energy management in business. With increased pressures on our water supplies and waste treatment and disposal facilities, the manual is being extended to cover these aspects as part of resource efficiency best practice.

The key to resource efficiency, reduced costs and protection of the environment is **resource management best practice**.

This manual will assist in:

- establishing a resource management program with reporting mechanisms for energy use, and identifying a person responsible for coordinating the resource management program
- developing a resource **policy** and **action plan** for improving energy efficiency

**As a consequence of best practice, companies can reduce their energy costs by 10–25%. Water use and waste generated can also be significantly reduced.**

**Resource management best practice is an integral part of the overall management activity of a company, linked to its corporate objectives.**

**The EMIP manual does cover all resources but energy and consequent greenhouse gas reductions are anticipated to give the greatest benefit.**

The Energy Management in Practice manual will take you through a sequence of steps that will steer your business in the direction of resource management best practice.

## **Gather data**

**Gain control over energy and resource use and related costs.**

This will allow you to manage energy in a similar manner to other operating resources.

### **Monitor energy and resource use**

so you will know where it is being used, changes over time and abnormalities in use.

Benchmarking can show whether resources are being used efficiently and can be used as a tool to become more efficient.

## **Establish policies and procedures**

**Develop a resource management policy.**

Prepare a brief policy 'vision' statement to guide your company towards resource efficiency.

### **Enlist the aid of other people.**

Involving employees can be a great asset in your endeavours to improve resource efficiency and reduce all aspects of energy and water waste.

### **Report simply, clearly and relevantly.**

Provide simple, clear reports on a regular basis. This will increase awareness of resource efficiency issues and will encourage ongoing commitment.

### **Communicate results as you make achievements.**

Communicate results, promote achievements and encourage others to contribute ideas and suggestions. Emphasising the results of resource efficiency will ensure that people get praise and credit for making energy savings.

## **Assess opportunities**

### **Do a resource self-assessment.**

Performing your own assessment of resource use will show areas for improvement.

### **Develop a list of options.**

Making a list of options after assessing your resource use will allow your company to develop a resource action plan.

## **Implement an action plan**

### **Carry out your action plan**

to improve resource efficiency.

### **Review your action plan annually**

to ensure relevance.

# Section 1 - Resource Management Best Practice

The key to energy efficiency is energy management is implementing best practice. The following statements characterise a company that is approaching best practice.

## **Systems and processes for monitoring and improving resource efficiency.**

The company recognises that what can be measured can be managed.

- It measures current resource use at the organisational and the production unit level.
- It has a solid historical awareness of resource usage patterns over time.
- It applies different forms of analysis, x-y scatter graphs, and statistical process control to review usage levels and to understand fully the effects of changes in its operations such as energy efficiency improvements.
- It uses technology, in the form of smart meters, building management systems and computer-based energy monitoring systems, to improve measurement.

The company also recognises that there may be a need to **benchmark** internally between different parts of the company. When a company benchmarks its resource use, it will have a good indication of its current level of efficiency and potential for improvement for each sector or division. These measurement tools can then be part of operational and strategic planning activities.

**Business improvement methodology (eg Six Sigma) to underpin planning, action and measurement.** Resource consumption is seen as an integral part of a company's business, subject to management and control. A resource management program requires an action plan, and implementation and evaluation of performance against set targets on an annual basis.

## **Process control tools and quality**

**management tools** are used in gathering and analysing data. There is an emphasis on data gathering before planning, and planning before action. Methodologies for monitoring and measuring the effectiveness of resource efficiency improvements are included in all projects. The company recognises that resource efficiency is not a one-off activity, but a process of ongoing management.

**Involvement of people** in shared commitment to reducing resource use and wastage. There is understanding and agreement among all employees about why resource efficiency is important. The company recognises that resource efficiency requires appropriate financing and staffing.

**Managers promote the benefits** of resource efficiency inside the company and to stakeholders. The company makes a link between resource efficiency and environmental responsibility as integral to being a 'Sustainable' business and effective environmental management as part of its corporate stewardship role.

In addition, being sustainable provides competitive advantage, makes the company more attractive to prospective employees and is an effective marketing tool. Communication about the results of initiatives is open and occurs at all levels of the company structure.

## **Successes are celebrated and promoted.**

Resource efficiency is seen as a change process, and is supported through employee involvement at every stage; supported by effective training, development and communication. People in all parts of the organisation are considered a vital part of the process and are actively encouraged to participate in the development of a resource efficiency program. This provides all employees with a sense of ownership of the program's objectives, and pride in its outcome.



**Investment and application of resource**

**efficient technology.** The company adopts a best-fit approach to technology implementation. It investigates leading-edge solutions and assesses them against the background of the company's current and future needs. Resource efficiency is included as a KPI for new plant and buildings

To gain the maximum benefit, the characteristics of resource management best practice are best implemented through a systematic and structured approach to managing energy performance.

# The Results of Resource Management Best Practice

Resource management best practice can bring valuable benefits to a company by:

- reducing overall operating costs
- improving productivity and profitability
- enhancing the competitiveness of the business.

## **Most businesses can save between 10–25% on energy costs alone.**

This translates to potential savings of more than \$500 million per year in Victoria's commercial and industrial sectors alone.

Cost savings from energy and resource efficiency can be redeployed within the company to other core activities. For example if a company has an energy bill of around \$500 000 annually, a 25% cost reduction = \$125 000 can be used for new equipment or extra staff.

**The impact of resource management best practice** can be felt in many areas of the business. Ask yourself if your business is:

- getting the best performance from existing buildings, plant and equipment
- purchasing the most appropriate type of energy at the lowest possible tariffs from the supplier of their choice
- receiving the best possible customer service from their energy supplier
- working effectively with its water service provider and waste management contractor
- using the most appropriate fuels as efficiently as possible
- regularly employing good housekeeping practices (e.g. turning off lights and equipment before going home).

**Resource efficiency practices not only have direct commercial benefits** but can also enhance working conditions. Management is often surprised to learn that energy efficient lighting, air conditioning, and other equipment can increase employee productivity, decrease absenteeism and improve the quality of work performed. Better waste management leads to a tidier workplace. Improved cleaning techniques can reduce water use and enable lost product to be recovered.

Resource management best practice does more than reduce costs and improve profitability.

**It can strengthen a company's profile** and reinforce good relations with its staff and the community. It also provides the company with competitive advantage and marketing edge.

**Resource efficiency improvements are good for the environment;** another important reason to implement best practice.

The responsible use of valuable and finite energy resources is critical to the well being of the environment. Every company can reduce the impact of climate change and help establish itself as one that cares for the environment.

**Consumers want green products.** International research shows that consumers worldwide share a major concern for environmental issues, and are factoring these concerns into their buying decisions.

The trend is clearly evident among Australian consumers as well. A recent report Green Australia: mapping the market (Prospect Media) found that 50% of the Australian urban population would welcome the opportunity to purchase environmentally friendly products, particularly if offered by brand names they know and trust. They are even prepared to pay a premium price providing they understand and recognise the environmental benefits.

This finding indicates that linking products with issues such as climate change, and the contribution energy efficient practices can make to reduce global warming, can provide a winning edge to Australian companies' marketing strategies.

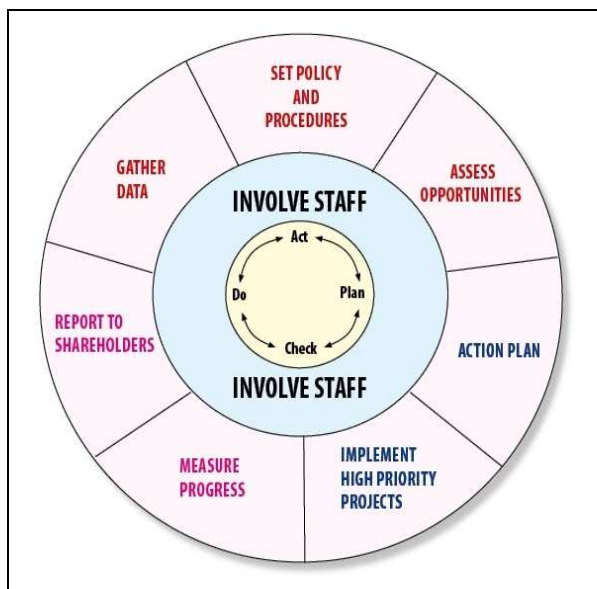
Companies with marketing strategies that trigger **green motivated purchases** will benefit in a number of ways.

The companies will:

- expect to see an increase in market share, sales and profits
- raise corporate profile, goodwill, and social responsibility for companies aligned with issues at the forefront of the media and consumers' minds
- create a marketplace perception that an environmentally concerned company offers practical and real solutions.

There is strong evidence that consumers are developing empathy for companies and brands providing answers to important community issues such as better resource management and the environment.

# Incorporating Resource Management Best Practice



## Energy management best practice: a business improvement process

To incorporate resource management best practice into your company, you need to implement a resource management program. This may not require a new system, but rather the integration or review of existing systems such as an environmental management system, possibly adding new strategies for resource use analysis, decision making and improvement planning.

Implementing a resource management program must be viewed as an ongoing improvement process, not a one-off event.

To achieve resource management best practice a company will need to implement a strategy made up of a set of well planned actions that are suited to its culture.

Suggested actions are outlined in the following pages.

## Gather data

### Consult with and involve employees

People should be involved from the very outset. They will be central to the effective gathering of information. Involving them at this crucial early stage will ensure their ownership of the program and sustained commitment to its success.

### Set up a resource use monitoring and tracking system

A system should be developed to collect, analyse and report on the company's resource costs and consumption. This is required to establish an overview of use and related costs. Set up a database to record historical and ongoing resource use and cost information. From this information data trends can be analysed. An effective resource management program will manage records in a way that users can access them easily when necessary.

### Conduct a resource use assessment

An assessment of resource use shows where and how resources are being used, and the potential for savings. By knowing the resource use of each production process, energy, water and waste flows can be determined. A resource assessment will also include recommendations for actions that will lead to resource and cost savings. Sustainability Victoria can assist you to assess your current resource use.

## **Set policy and procedures**

### **Organise management resources**

Once commitment from senior management is achieved, establish a clear accountability system for resource management with appropriate allocation of financial and staff resources.

A resource management system needs people, money, know-how, time, and status to be successful. It is important that senior management and all employees know what their roles and responsibilities are in relation to the resource management system. Relevant managers and employees should have resource objectives included in position description and annual performance objectives.

### **Prepare a corporate resource management policy which shows reduction targets**

A resource management policy statement includes aims, resource targets, timetables, budget and resource allocation. A written Resource Management Policy will serve to guide efforts to improve resource efficiency and represents a commitment to improvement. It is advisable to have a policy endorsed by management before implementing the program. It is recommended that an abbreviated version of the policy in the form of a Vision Statement be displayed publicly.

### **Establish reporting and communication procedures**

Report results/progress to all people on a regular basis. This will increase awareness of resource efficiency issues among employees and will encourage ongoing commitment to the program. Many companies collect information but do not complete the cycle by analysing, reviewing and providing feedback for decision making. Consequently, their programs are often short lived.

A key ingredient to the success of any resource management program is to maintain high-level awareness among interested parties both internal and external to the company. It is important to communicate the program's plans, report results and explain how resource efficiency improves the company's profit, enhances performance, increases market competitiveness, and improves productivity. Employees may need training in resource saving practices and efficient equipment use.

## **Assess opportunities**

### **Prepare a detailed project implementation plan**

Develop an action plan based on the projects identified in the assessment of resource use. The plan should include project implementation timelines and state any funding and resource requirements. Incorporate suggestions from people and indicate who has accepted roles of responsibility in the program, and outline their roles.

### **Set priorities**

Implement the projects in order of priority as set out in the action plan. The progress of individual projects will need to be closely monitored to ensure they stay within budget and achieve their goals within the specified time frame.

Getting early successes generates credibility and opportunities that can be quickly implemented should be given high priority.

### **Include annual review**

A resource management program will be more effective if its results are reviewed annually and the action plan revised. The review should detail actions undertaken during the year and projects and implementation plans for the next 12 months. The resource management program needs to be dynamic and capable of responding to both internal and external changes. This is the purpose of an annual resource management review.

## **Implement an action plan**

Once a company has developed its action plan it is an ideal time to expand upon the awareness and interest that has already been generated through consultation. This would be the time to make employees aware of any incentives or rewards you intend to offer achievers in the program, and the criteria for their allocation.

The strategy for implementing a company's resource management program can take many different forms, depending on the culture of the company and on the stage it has reached in resource management.

# **Environmental management system (EMS) and resource management**

## **Environmental aspect**

An element of a facility's activities products or services which can interact with the environment

## **Objective**

An overall environmental goal arising from the environmental policy that an organisation sets itself to achieve. Objectives should be quantified where practical.

## **Significant aspect**

Can result in a significant environmental impact and is therefore the most important to manage.

## **Target**

A detailed performance requirement that is set to achieve an objective within a specific timeframe.

## **Environmental impact**

A change that takes place to the environment, beneficial or adverse as a result of an aspect. Significant impacts must be addressed as a priority by the EMS.

## **Performance indicator**

Measures the progress made in achieving an objective and target.

# A Continuous Improvement Process

A resource management program is a process of continuous improvement and is consistent with ISO14001 principles. This is achieved by regularly evaluating the performance of the resource management program against the company's resource policy, objectives and targets.

## **ISO14001: an overview**

An Environmental Management System (EMS) is a tool that provides organisations with a method to systematically manage their environmental activities, products, and services. It helps an organisation achieve its environmental obligations and performance goals. An EMS follows a Plan-Do-Check-Act Cycle (PDCA) and is a model that can be used by a wide range of organisations from manufacturing facilities to service industries and government agencies. Many organisations have chosen to adopt an EMS based on the international voluntary standard ISO 14001.

An EMS does not establish additional environmental compliance requirements or any performance levels but instead provides the framework for a company to meet its environmental goals and objectives.

ISO14001 requires an Environmental Policy which is fully supported by senior management, and outlines the policies of the company, not only to the staff but to the public. The Policy needs to clarify compliance with Environmental Legislation that may affect the organisation and stress a commitment to continuous improvement. Emphasis has been placed on policy as this provides the direction for the remainder of the Management System.

Those companies who have witnessed ISO9000 Assessments will know that the policy is frequently discussed during the assessment. Many staff are asked if they understand or are aware of the policy and any problems associated with the policy are seldom serious. The Environmental Policy is different. It provides the initial foundation and direction for the

Management System and will be more stringently reviewed than a similar ISO9000 policy. The statement must be publicised in non-technical language so that it can be understood by the majority of readers. It should relate to the sites within the organisation encompassed by the Management System. It should provide an overview and description of the company's activities on the site.

The preparatory review and definition of the organisation's environmental effects is not part of an ISO14001 Assessment, however examination of this data will provide an external audit with information on the methods adopted by the company. The preparatory review itself should be comprehensive in consideration of input and output processes at the site. This review should be designed to identify all relevant environmental aspects that may arise from the company's existence on the site. These may relate to current operations, they may relate to future, perhaps even unplanned future activities, and they will certainly relate to the activities performed on site in the past (i.e. contamination of land).

The initial or preparatory review will also include a wide-ranging consideration of the legislation which may affect the site, whether it is currently being complied with, and perhaps even whether copies of the legislation are available. Many of the environmental assessments undertaken have already highlighted that companies are often unaware of ALL of the legislation that affects them and because of this often do not meet the requirements of that legislation.

The company will declare its primary environmental objectives, those that can have most environmental impact. In order to gain most benefit, these will become the primary areas of consideration within the improvement process and the company's environmental program. The program will be the plan to achieve specific goals or targets along the route to a specific goal, and describe the means to reach those objectives such that they are real and achievable.

The Environmental Management System provides further detail on the environmental program. It establishes procedures, work instructions and controls to ensure that implementation of the policy and achievement of the targets can become a reality. Communication is a vital factor enabling people in the organisation to be aware of their responsibilities and the objectives of the scheme, and to contribute to its success.

As with ISO9000, the EMS requires a planned comprehensive periodic audit to ensure that it is operation is effective, is meeting specified goals, and that the system continues to perform in accordance with relevant regulations and standards. The audits are designed to provide additional information in order to exercise effective management of the system, providing information on practices which differ to the current procedures or offer an opportunity for improvement.

In addition to the audit, there is a requirement for management review of the system to ensure that it is suitable (for the organisation and the objectives) and effective in operation. The management review is an ideal forum to make decisions on how to improve for the future.

The continuous resource management process should:

- identify all areas of opportunity for improved performance via detailed consultation with staff
- note those areas where improvements can be made in your next planning cycle
- develop and implement an action plan and reward achievers
- periodically check the effectiveness of the saving measures in place
- document any changes in procedures resulting from process improvement make comparisons with objectives and targets



# Common Features of a Successful Resource Management Program

The **ten commandments** of a successful resource management program:

1. Senior management commit to improve the current level of performance.
2. A process is set up to identify and understand the resource use of the company, which may include resource efficiency opportunity audits and assessments.
3. A consistent process is in place to make decisions on priorities for improvement through ongoing consultation with people.
4. Structured plans are prepared for improvement in performance; employees are motivated to implement measures; reward and recognition systems are in place to recognise achievement.
5. Adequate human, technical and financial resources are allocated to achieve plans.
6. Appropriately trained and experienced personnel are available to manage the program.
7. A communication system keeps everyone informed, rewarding and recognising achievers and ensuring openness is firmly in place.
8. A comprehensive reporting and recording system which provides objective evidence that a resource program has been established and circulates the good news to ALL stakeholders.
9. Monitoring and measuring systems to check on performance and measure improvements are used.
10. Annual management reviews are undertaken to ensure the program is dynamic and continuous.

Many of these features are common to other management systems such as business improvement/quality systems, environmental systems such as ISO14001 and OH&S systems. These features are outlined in more depth in the training program and workshops.

As with any picture, the goal is to make the total image clear. The same applies in a resource management program. All the elements must fit together to form an integrated system for managing resource use. The goal is to improve. The Program is the tool to get there.

# Summary

The benefits of resource management often extend well beyond just energy, water and waste. Ways of doing things are often improved, problems that have existed for many years are discovered and put right, and staff comfort levels are improved.

The Energy Management in Practice manual assist companies to take the first steps to establishing an ongoing program of resource management and to improve energy, water and waste efficiency.

**Not only will your company's costs be reduced and competitiveness increased, it will also be helping the environment.**

As long as you have successfully involved people at every level and they are receiving adequate recognition for their efforts, you will also notice a shift in morale whereby an enhanced level of enthusiasm will be circulating.

The company will be doing something that contributes to the greater good and employees will be proud to be associated and involved. Their sense of commitment to the company will grow resulting in enhanced productivity.

Section Two

# **Communication and Motivation**

# Introduction

The value of encouraging participation and cooperation by people in using energy & water wisely and minimising waste should not be underestimated.

**Many barriers to change in resource management are PEOPLE issues rather than technical ones.**

Ongoing motivation and communication are keys to the success of your resource management program. Keeping staff involved in resource management activities and raising individual awareness of greenhouse issues can generate real benefits:

- It **encourages participation and environmental responsibility**—the more support, the more effective your resource efficiency program will be.
- It **helps dispel misconception** that resource saving results in loss of amenity.
- It **boosts staff morale and pride**—as people feel part of a solution.

Improved cooperation and communication towards a common goal will help foster employee unity and harmonious workplace relations. In this section you will find background information as well as practical tips and strategies for generating enthusiasm and support internally, as well as spreading the word about your good efforts in the community.

## Aims of this section

By the end of this section you will understand the following:

- Company culture and the change process
- Involving your whole company
- Creating awareness
- Motivating or demotivating people
- Communicating effectively
- Resource management training

# Company Culture and the Change Process

Effectively implementing a resource management program may mean changing company processes. The successful implementation of change at this fundamental level of operations may catalyse a broader cultural change in the organisation. Whether or not everybody expects or wants this to eventuate, you might find it helpful to be aware that it can happen anyway.

'Change management' is a field of study in its own right. Many researchers have analysed effectively managed change processes and broken them down into identifiable stages. There are many publications on this topic, some of which may be of interest to you.

**If you're following the steps recommended in the workshops and in this manual, you're probably covering all the necessary ground for a successful transition.**

If at any time you'd like to reassure yourself that you've not missed anything, here is a sequence of stages in managing change processes which you might wish to use as a 'checklist'. Think creatively because you're likely to find any theoretical system of steps only loosely applicable to your own situation. (Nothing in real life is ever that tidy!).

The next couple of pages provide a brief overview of each step. It also looks at how you're likely to be addressing the issues in the context of your Resource Savings program and offers suggestions for anything else you might incorporate.

## Steps to managing the change process

### 1. Creating a vision

A 'vision' is an image of the future that is to be achieved, which also mentions of why it is a desirable outcome. It is an essential element of the change process, upon which everything else is based. The chapter in Section 4 on *Developing your resource policy* will guide you through this process.

It might also be useful to extract from your Resource Management Policy something short and sweet as a 'vision statement'. It just needs to state, very briefly and in simple terms, where you are heading and why you're going there. By having this in mind (and at hand for giving to others when appropriate) you'll be more readily able to communicate your vision to all those you'll be dealing with—from senior managers to staff and operators.

### 2. Involving and motivating people to make changes

This is a core issue underlying any initiative requiring people to alter their habits and make fundamental changes to their patterns of behaviour and attitudes.

*Pages 23+ cover many aspects of this crucial element in your program. You'll also find many practical tools and tips to help, such as:*

- Commitment Planning (Infosheet 1a)
- Force Field Analysis (Infosheet 1b)
- SWOT Analysis (Infosheet 1c)

### 3. Forming an implementation team

Obviously with a task as complex as this one with its potential to catalyse widespread culture change, a strong implementation team is needed to plan, implement and sustain the changes. Neither one strong key figure nor a weak team will achieve success. A dedicated, carefully chosen and effective team, wholly supported by senior management, is central.

### 4. Communicating the vision

The key to communicating in this change process is simplicity.

The simpler and more concise the communication, the more people will understand and participate. *See pages 29-31, Communicating Effectively.*

## 5. Empowering employees

Key elements in changing culture are creating a vision, raising awareness, building support, communicating effectively and empowerment. Participation and empowerment are integral to company culture change because planning and implementation become easier and more effective.

If following the recommendations in involving and motivating, you'll involve staff at every level—incorporating their suggestions for improvement, utilising them in roles of responsibility and communicating with them regularly.

You'll also reward and praise people. Employees will consequently feel a sense of ownership of the program, and pride in their association and achievements—all of which adds up to a sense of empowerment.

## 6. Achieving short-term wins (quick and easy wins)

As well as looking at longer-term goals in the change process, it is also important to focus on smaller, more immediate achievements. A short-term win is an achievement that boosts staff confidence in the change process (making their effort seem worthwhile), and gives the people responsible a chance to relax and enjoy their achievement. Short-term wins also relate the achievements back to the original vision (testing the accuracy of both), quiet the cynics and resisters, and ensure support from management.

There are usually quick and easy wins in any energy saving program obtained by improved housekeeping procedures. See the links to guides improving lighting and compressed air efficiency air in Section 5, as well as the chapter on load profile monitoring in Section 3.

**As soon as you have a result, celebrate! However ensure you publicise it widely and congratulate all concerned on having achieved the first step so painlessly. Register every success!**

## 7. Consolidating achievements and progressing

Whilst short-term wins should be celebrated, there is always the risk of being swept away in the achievement of a small feat, thereby losing the urgency of change and falling back into complacency. It is important that focus remains fixed on the long-term change vision; otherwise the change process will regress.

A clear policy statement will help keep the longer-term goal in focus. A good communication system will make sure that you always remain approachable and open to suggestions for further improvements—you'll need them!

## 8. Securing changes in the culture

Culture is "the way we do things around here". It is a very powerful factor influencing human behaviour. Changing culture is closing the gap between current and desired behaviour. Once it has been changed it is important to anchor it firmly into the company's values and norms.

To secure changes in the culture you need to:

- Do 100 small things consistent with the change, often and with intent, eg turn off lights, pick up litter, recycle waste.
- Give recognition.
- Use rituals, ceremonies, symbols and symbolic actions.
- Ensure company systems are congruent, eg performance management, monthly report.

You cannot go wrong by checking regularly that people still feel comfortable approaching you with feedback, problems or ideas. Also that you're remaining open-minded and personally open to change, and that you're maintaining a constant practice of **recognition** and **rewards**—one of the most effective new habits you can ever adopt for making sure your people remain committed.

Keep the energy saving message alive by reinforcing its broad environmental benefits and making people proud of their own efforts.

# Involving Your Whole Company

The resource manager does not and cannot work alone. You'll need to have: an implementation team to help; to involve others with a good communication strategy that motivates people; and suitable training for those who need to upgrade their skills. These areas are covered in the remainder of this chapter.

A successful resource management program that incorporates best practice flows from the involvement of the whole company, including:

- **CEOs, board and senior management** in endorsing policies and procedures and providing support
- **Line Managers** managing resource use for their section and supporting the resource manager's initiatives
- **Employees** providing ideas on how to improve resource efficiency and implement on-the-ground strategies

# Inform, Inspire and Motivate

By now we should all agree that **motivating** people at all levels to behave in a resource-conscious manner is the key to achieving savings. People's active involvement from the very beginning will translate into feelings of ownership, determination to make a difference and a sustained motivation to carry through with positive actions.

To obtain the best result for your efforts, you will need staff to adopt the program with **enthusiasm and commitment**. Let's look at motivation itself and what the experts say.

According to research, **an individual will be motivated to act if it leads to the attainment of goals and rewards valued by that person**. It's about individuals! As such, it seems there are no magic rules. This might be why some managers find it a daunting challenge—because it appears likely to be too hard to figure out.

But, take heart! According to the theorists, there are only two kinds of motivation—**intrinsic** (coming from the person's fundamental desire to do their best or from their commitment to the work itself) and **extrinsic** (an external source like a pay increase, promotion, fringe benefit or other reward). People are all motivated by combinations of the two.

Although there are many differences between individuals, there are also many patterns of common attitudes and values. Social research is not a science, but researchers are able to identify patterns and group people according to their principle social identities and related values. It's not black and white though. You may find some people fit into several different sub-groups, such as:

- *(Many)* People under 30, parents, women, middle-class, the tertiary educated and professionals tend to harbour an underlying **concern about environmental issues**.

- *(Many)* Secondary educated, manual workers, the financially less secure and/or from radically different cultural backgrounds are more likely to be **concerned with issues related to financial security**.
- *(Many)* Middle-aged people, executives, housewives, certain professions (educators, social workers, nurses, etc.), and people with strong religious affiliations tend to desire participation in **activities which contribute to the 'greater good'**.

Over the years, this type of research has shown that the social groups likely to be concerned for the environment have expanded dramatically, now incorporating many groups who were formerly quite disinterested.

One thing that can be said for certain is that research shows people today definitely want more than just monetary rewards from a working situation. Although financial security is certainly still important, these days people want more meaning and purpose in their lives. They value challenge, variety, opportunities to learn and grow, good working relationships, but above all a sense of achievement. With this in mind it will be easier for you to consider the nature of your own team and to reinforce their efforts with a positive sense of purpose.



# Getting Everyone On-Side

Cooperation commences with the shared understanding that there is a better way of doing things and a need to change. Good communication is the key to this. Consider the nature, character and values of your workforce and what you feel would best motivate them to support and participate.

## Tips and strategies

Here are a few general tips and strategies to help you approach the various stakeholders and work groups in your organisation.

### 1. Senior management—priorities

- **Financial performance** is one of senior managers' principal motivators. Fortunately, the resultant **cost savings** from this program are measurable and significant.
- **Future risk** is something senior managers are also very concerned about—future regulation; higher prices; carbon costs; supply security issues; water and waste treatment availability, etc. A wise manager will probably already realise that ignoring issues of resource management is foolish. It will therefore be gratifying to see the company operating at the **cutting edge**—one step ahead of potential legislative controls, financial penalties, increasing costs and insecurities of supply.
- **Competitive Advantage** through adopting a resource conscious strategy enhances the public image of the business whilst addressing its environmental obligations. There is an opportunity for the senior manager and the company to reap a considerable **public relations** benefit from playing this angle in the wider community.
- **There is also an internal PR pay-off.** The wise senior manager will also realise that employees need opportunities to contribute to the community and the environment. It can be a source of pride for staff to be associated with a responsible energy smart company. The initiative can also motivate staff to feel better about their workplace, thus enhancing their commitment and performance.

- **Succession Planning** as the emerging new generation of senior managers come from a different background, social context and values set. They will certainly be concerned with 'the bottom line' but are increasingly likely to personally value initiatives which enhance their **good corporate citizenship**.

### 2. Departmental managers—priorities

Departmental managers could become your greatest allies in helping to motivate their direct reports. As such, they may benefit from access to the information in this section. You might wish to consult them on the nature of their people and possible approaches for you both to obtain enthusiastic cooperation.

- These people can also be motivated by a desire to enhance their own **future career prospects**. They might relish the opportunity to be perceived by their senior management as cooperative, forward thinking, and efficient.
- However, these managers may also be of the emerging new generation which equally values participation towards the **greater good**. If so, this will be an excellent way to inspire cooperation from these people towards the best outcome.
- Make departmental budget holders responsible for controlling resource costs. It is essential they have adequate information to base control actions on. Ensure that there are no budgetary conflicts, eg maintenance activities not carried out due to maintenance manager wanting to reduce their costs. The resource energy manager must arrange to provide this information and support for control actions including technical, administration, and planning support.
- As with the senior managers, 'bottom line' financial performance issues can also motivate managers at this level, making the **cost savings** associated with saving resources their

primary motivator. They may be motivated to excel in the resource saving program simply because they realise it is an intelligent exercise for the company to undertake.

Strategies to motivate Departmental Managers include:

- Convincing senior management that the respective departmental budget holders, as an incentive to reduce resource consumption, should retain any resource savings in their budget.

***Ford Motor Company at Broadmeadows monitors energy consumption to disaggregate energy bills so area managers can understand their impact on site energy use. Area managers are encouraged to be accountable for energy use.***

- Propose to senior management that a reward system be implemented for departmental managers—a kind of **competition** to recognise the manager whose department achieves the largest reduction. A function might be organised whereby the competition winner is announced to the group and the individual is publicly **congratulated and thanked**. All staff should also be notified of the winning department and its manager. **Recognition is vital** for everyone involved. *Refer to page 44, Infosheet 4 on More rewards that motivate.*

### 3. Employees

All employees need to be motivated for a successful resource management program. Those that use the resources are often in the best position to identify improvement opportunities.

Highlight that resource management at home, at work and in their transport habits is the single largest contribution they can make to benefit the environment.

For many, environmental considerations will be as significant as saving money. Research consistently reveals that people essentially also want to feel they are contributing to some **greater good**.

To motivate employees, there are several approaches you can take to highlight the benefits of resource efficiency—not all of them necessarily involving much cost.

- You may decide to explain how resource savings can lead to an improved job security or better working conditions.
- Monetary benefits for employees could take the form of special incentive payments/ bonuses or through sharing the savings achieved.
- You might run a regular competition for employees for the best resource saving ideas. These ideas should then be implemented and the appropriate staff member acknowledged and rewarded.
- Others may be motivated by a general commitment to the company and its objectives.
- Some may benefit from receiving a kit of resource saving tips for home. By adopting a resource efficiency ethic and practising resource saving measures at home, people can be encouraged to share resource saving ideas in the workplace.
- Employees could nominate a charity to which the company might donate a proportion of resource savings.

Information on the environmental impact of energy use in particular use can make a deep impression upon employees. Calculate the impact of your energy saving in CO<sub>2</sub> and other greenhouse gas emissions.

Present this in terms of global warming and climate change. Employees are more likely to be motivated to save resource to benefit the environment, rather than to save their employer money. You may want to calculate CO<sub>2</sub> per employee and relate that to typical domestic figures so they can grasp the scale of the greenhouse contribution.

# Motivating or Demotivating?

You may be having difficulty motivating people , or you might be enjoying great success but not know what you're doing *right*—just *what it* is about how you operate that's causing the excellent result. **Reflect on what you are doing to ensure you are not actually demotivating people ....**

## How to de-motivate people

Let's identify some of the things that demotivate people:

### 1. Don't involve employees

- Don't convey to people the benefits of the program for them
- Neglect to invite people to propose their ideas for energy saving measures
- Don't allocate people with areas of responsibility
- Don't share information
- Don't recognise achievement
- Take all the credit yourself

**Risk**—*Fewer and less effective strategies generated; disinterest; lack of commitment = poor result*

### 2. Don't follow up on employees ideas

- Change people's proposals so they're more like what you thought
- Pay lip service to ideas but quietly drop them, instead of clarifying and refining with the originator and finding a way to incorporate

**Risk**—*People feel belittled and disheartened; stop contributing ideas; people stop caring and widespread cynicism develops; new measures poorly implemented = poor result*

### 3. Impose unrealistic demands or expectations

- Impose a higher target than people have nominated as achievable
- Impose a timeframe which could cause stress
- Imply the risk of sanctions if either are not met

**Risk**—*fear; resentment; potential subtle sabotage of the program's success; mistrust; lack of cooperation with the program = poor result*

### 4. Don't communicate effectively

- Don't spread good news about results
- Neglect to personally and privately congratulate and thank individual achievers
- Fail to clarify specific strategies and expectations for all staff
- Deem one person or another exempt from sharing the collective responsibility
- Fail to communicate with the appropriate individuals
- Do not include all stakeholders in communications and negotiations

**Risk**—*People feel their efforts were fruitless; individuals do not develop pride in their achievements; resentment towards the program and/or you; widespread fear and confusion; mistrust; insecurity; inaction = poor result*

### 5. Don't acknowledge/reward effort or achievement

- Don't have a system of rewarding or recognising achievers
- Don't communicate good news about achievements as soon as it is to hand
- Neglect to publicly identify and congratulate individual achievers in staff communications
- Fail to name all who've made a significant contribution

**Risk**—*People perceive no individual benefit for making the effort; people view the program as a non-compensated increase in their workload; staff suspicious of future similar initiatives; staff contemptuous towards the program and disinterested in its success; people disinclined to implement strategies = poor result*

**People are motivated when you do the opposite of these things. So involve them, empower them, set achievable goals, communicate effectively and recognise achievement.**

# Communicating Effectively

## Good communication is essential

Talking, exchanging ideas, and sharing thoughts are all means by which we communicate and build relationships with people. If your resource management plan is to succeed, communication with individuals, groups, the entire company and the public is an essential part of the task.

## Locate your audience

Before communicating your resource management activities, identify your audiences both inside and outside your company. This will make the job of raising the awareness of the program much easier.

Internal communications and reporting energy use usually takes place on a regular basis with:

- senior management
- department heads and budget controllers
- members of the implementation committee
- employees

**A company organisation chart is useful to identify who you need to report to, and to note what kind of report each person will require and how often.**

External communications may take place with:

- regulatory authorities and other government agencies, e.g. Sustainability Victoria, Department of Environment and Climate Change (NSW), Department of Industry Transport and Resources, and Energy Efficiency Opportunities
- shareholders
- the local community and schools
- your customers
- the general public and industry groups.

## Know your audience well

After you have identified your target audiences, ask yourself—**what does this individual or group of people need or want to know and why**. Only when this information is established, can you plan the style and content of your communication strategy (e.g. letters, reports, memos, group discussions, debates, and problem-solving sessions).

A simple question to ask is 'What is the attention span of the target audience?' It is usually pretty short, especially when briefings are full of long words and technical jargon!

Focus your message on the key information and try your best to use ordinary language to explain it. While developing the report information and format, work through a sample with a couple of key people in your target audience and encourage and accept constructive comment.

For example, a senior manager may want to know how energy efficiency improves profits or enhances the company's competitiveness. A chart showing monthly energy and cost plotted against consumption and cost for the previous year could be used to compare with the current period.

Each company needs to develop a reporting process that reflects the needs of the organisation. It may be a simplified version of this chart. The secret to a successful reporting process is to keep it simple and straightforward (KISS).

**Who should receive reports from this information (guidelines only).**

to whom	General Manager	Production Area Managers	Resource Manager	Employees/ major users
<b>what to report</b>	Summary against production + totals \$ (bulk) Consumption, Greenhouse, water and waste benchmarks	Summary against production + totals \$ (for area?) Consumption, Greenhouse, water and waste benchmarks	Detail consumption profiles/patterns trends other diagnostics and analysis to fully understand performance	Summary greenhouse overview/savings (similar to general manager—simple format) energy saving tips for home and work
<b>why</b>	Strategic planning Budgeting Staffing Resource allocation	Management Feedback to/from shop floor staff Control	Analysis Assessment Planning Management	Motivation General information Generate feedback
<b>format</b>	Quarterly report Annual report	Monthly reports, Staff presentation presentation	Quarterly reports, Committee/staff Bulletin board notice	Feature article in staff newsletter

Other stakeholders including the general public will also want to know what your company is achieving with its resource management activities. To improve your company's profile, consider:

- articles in the local newspaper or daily press
- marketing brochures
- feature stories in trade journals or magazines
- entering energy saving awards
- community television or radio
- commercial media coverage
- sponsorships
- the Internet

Try to give your story a **human interest** or **environmental** theme that will add weight to your communication. A good communicator will take time to understand particular audiences and motivate them with a range of relevant promotional ideas.

Ideally, any stories you do broadcast, publish or circulate will take full advantage of the excellent opportunity to **REWARD** those in your organisation who have been instrumental in the program's success, by identifying the contribution of individuals.

This means giving people **RECOGNITION**. It means saying publicly what difficulties they were up against and how they creatively worked around these and what results they got.

**If you do this, not only will you make your publicity efforts far more interesting to their audiences, but you will also simultaneously provide your staff with one of the most valuable means of recognition and thanks they could ever want. There are very few such opportunities in people's lives for their efforts to reap public acknowledgment. People hugely value them. In return, staff loyalty and motivation will be substantial, measurable and sustained.**

**Rewards that motivate—praise**

Recent studies have shown that more than 65% of people would rate 'personal congratulations by managers' higher than any other form of incentive to perform well. In second place was 'a personal note for good performance written by the manager'.

As one successful senior manager says, '**Your largest asset is your work force—growth comes from asset appreciation.**'

The most important message therefore is  
- **give praise:**

- **As soon as possible** - without missing a moment via whatever means is available, even if you have to interrupt a meeting and say it in front of others.
- **As sincere as possible** - do it when it's genuine and you really feel it or it will be perceived as manipulative. If you need to delegate someone else to do it to ensure it has that ring of sincerity, do so.
- **As specific as possible** - make sure you really spell out precisely what it was that the person did well and what were the beneficial results of their actions.
- **As personal as possible** - face to face, in person and with a handshake and a thank you.
- **As positive as possible** - keep it brief and incorporate only praise. If you're tempted to add a '...but' restrain yourself and keep it for another time. This moment is for praise alone.
- **As proactive as possible** - make praise a regular feature of your working days. Make it a habit and part of your management style. Lead with praising and 'catch people doing something right'. It will stop you from becoming reactive (typically about mistakes) in your dealings with others.

**Make the extra effort to show your appreciation and people will reciprocate in a hundred ways.**



# Resource Management Training

Like many training programs, there are six steps in an energy management training program. The actual training is well down the list, but all the preparation should give the training program a firm foundation.

**Remember the six 'p's**

## **'Proper Prior Preparation Prevents Poor Performance'**

Here's what needs to be done.

- Analyse your company's training needs
- Develop learning objectives
- Outline training content
- Select appropriate training methods
- Conduct the training
- Evaluate the training

## **Analyse your company's training needs**

As a resource manager you may require extra skills. Many of these are covered in this Leaders program.

Staff who control or manage resource use will need a training course that is geared to their specific tasks and responsibilities.

Who needs to be trained? What are they to be trained in? In-house or external analysis will give your company an understanding of what training program to undertake.

Make sure courses can be tailored to meet the specific needs of energy decision makers in your company. This could range from a short, simple briefing to an extensive course.

## **Develop learning objectives**

For any training to be effective goals or learning outcomes need to be agreed and set. Trainees need to have a clear understanding of what will be required from them as a result of the training. Why are they doing the training and how will it benefit them and the company?

## **Outline training content**

The content of the training program needs to be specific to your company, as this will give trainees a sense of purpose and 'ownership'. The content should reflect everything the trainees need to learn to achieve the objectives, taking into account their position and their current level of knowledge.



## Select appropriate training methods

Some typical options for energy training are:

	Option	Example	Advantages	Disadvantages
01	On-site using internal staff	Series of lunch time workshops for contractors or staff	Cost-effective. Tailored to site, job and training needs	Lack of exposure to ideas from outsiders
02	Short open courses at a training centre	Two day course on energy efficiency and work practices	Can be targeted to with identified training needs	Some of the course may not be relevant Trainees must sell ideas when they return to work
03	On-the-job training	Course for contractors on installation and maintenance of new equipment	Practical, cost-efficient tailored to individuals receiving one-on-one training	Informality and lack of structure can lead to omissions

Some companies with sufficient resources to conduct in-house training sessions.

**Australian Vinyls, winner of 2006 Victorian Training Award regularly include resource efficiency in their Operations and Maintenance Teams' training**

However, the trend is to outsource resource training to **external consultants**. Good resource managers are not necessarily good trainers and good technical trainers may not have the necessary knowledge for resource management.

The cost of any proposed training should be carefully considered. The payback time varies between companies, depending on the initial level of awareness and the energy saving potential of a particular site.

### Conduct the training

Finally, it's time to do the training. How the training is conducted will depend on the trainees' background, the aims of the course, the materials, and the methods.

The trainer's preferred style also has an impact. Ideally, you would expect a trainer to have a variety of teaching methods such as some theory (presented as very short lectures), mixed with exercises, discussion groups, and perhaps some videos or slides.

Naturally, the trainer must be a good communicator who can relate to people. Technical ability is not enough. Trainers need to be people-oriented.

**Remember—many barriers to change in resource management are PEOPLE issues rather than technical ones.**

### Evaluate the learning

Everyone's come along to the training sessions, and they've been invigorated by the topics. But how do you know if it's all been worthwhile? There are various means to evaluate the effectiveness of a training program. Some methods available are:

#### • Action plans

Trainees complete an action plan towards the end of the course. For example, list five practical measures which you will take to save energy in your department.

- **Tests**

These can provide quantitative feedback on what the trainees have derived from the course. However, skills and attitudes do not usually lend themselves to this type of testing. An informal form of testing, such as quizzes, could be worth considering.

- **Course evaluation sheets**

Trainees complete these sheets at the end of the course. Make sure the questions generate more than simple 'yes' or 'no' answers. Ask trainees for constructive criticism of the course. Trainees' comments can be anonymous if you think this will generate more honest responses.

- **Open evaluation**

This will depend on the 'tone' of the group. You can use the questions on the course evaluation sheets as a trigger for general discussion. Be sure to summarise comments on a whiteboard. This gives credence to the comments.

- **Observation**

Managers observe trainees' behaviour and attitudes once back at work.

- **Resource use monitoring**

An improvement in resource use efficiency usage is one way to identify the effectiveness of training in energy efficiency. This may not be apparent immediately, but it is ultimately what the training is all about

# InfoSheet 1A

## Commitment plan

Take a few minutes to identify key stakeholders (individuals or groups), assess their current level of commitment and influence, analyse what they have to gain or lose and what they want. Then determine what you need to do to get their buy-in.

[illegible]

# InfoSheet 1B

## Force field analysis

Take a few minutes to identify key stakeholders (individuals or groups), assess how much they currently would help the program or hinder the program. Then determine what you need to do to change those hindering to help or be neutral, and to increase the force of those helping.

## Assisting Forces

## Opposing Forces

## HELPS

**HINDERS**

# InfoSheet 1C

## SWOT analysis

Some stakeholders may already know of the advantages to business in establishing a resource efficiency program. Others may not. To strengthen commitment, it may be necessary to raise awareness regarding:

- benefits to the business from implementing a resource management system
- financial implications of the investment needed to implement a system
- organisation's capability of making the changes necessary to implement a resource management system.

## Using swot analysis

One tool for quickly gathering and presenting resource information is a SWOT (Strength, Weaknesses, Opportunities, Threats) analysis.

**STRENGTHS**—What are the existing features in the organisation that can be built on?

**WEAKNESSES**—What are the features in the organisation that we need to recognise and minimise?

**OPPORTUNITIES**—What opportunities, real or potential, could be gained by the organisation implementing a resource management system?

**THREATS**—What could or will happen to the business if a resource management system is not implemented? Do we need to eliminate these?

SWOT analysis is undertaken initially as a brainstorming exercise. Attendees, ideally from all levels in the organisation are encouraged to think as laterally and creatively as possible.

The first two elements, Strengths and Weaknesses, focus on internal factors existing currently. The second two, Opportunities and Threats, focus on real and potential situations with an emphasis in the external domain.

## SWOT analysis Worksheet

In your implementation team, brainstorm the strengths, weaknesses, opportunities and threats for implementing a resource management program.

<b>STRENGTHS</b>	<b>OPPORTUNITIES</b>
<b>WEAKNESSES</b>	<b>THREATS</b>

The results of the SWOT analysis, together with the information on the current status of the organisation and your resource use assessment, can be provided to management.

# InfoSheet 2

## Influencing people

### Introduction

As a leader in your organisation, you are already ideally situated to inspire others at all levels to participate. That's all well and good but how do you go about it?

Sales/marketing/advertising professionals have traditionally motivated the research on powerful techniques for influencing other people. And we all know how effective they can be at influencing our behavioural choices. So, let's take from these professionals some of their principle 'weapons of influence' and see how we can use them to our benefit.

### 1. Commitment and consistency

People want to be perceived by others as consistent and reliable. They will be more motivated to follow through with a plan if they have made a public statement of their commitment to its outcomes and values. For example, AA and Weight Watchers require people to make verbal public commitments to their cause—once having done so they're more likely to stay with it.

### 2. Social proof

People think of themselves as individuals but all tend to identify with groups. People will dress, speak and behave in ways that conform with their group. If enough of their group decides to adopt a certain course of action, many people will automatically follow suit.

### 3. Liking

People are more likely to do something if it's suggested to them by someone they like or who likes them. The axiom 'It's not what you know but who you know' still holds true!

### 4. Authority

People are inclined to automatically comply with requests from others whom they perceive in roles of authority over them. They will accord respect to anything which appears to have been generated by someone with credibility.

What follows is a strategy which, in order to be effective, would need to be utilised at the very **beginning** (if used after the word has already spread it could backfire). But if employed early enough in the process it will engage people on the above four levels simultaneously such that they will be inclined to do the following.

- Feel impelled to respond supportively to the idea of the initiative and, once having declared their support in principle, will feel compelled to follow through
- Feel good about assuming a responsible role in the program OR to nominate someone else who is well regarded and likely to garner widespread cooperation
- Feel good about being consulted by management on an important issue, being invited to contribute their ideas and being 'heard'
- Concur with the majority view of their peers and give enthusiastic support.

# InfoSheet 3A

## Getting started - the three steps

### 1. Questionnaire (Sample on next page)

- Send out an all-staff questionnaire—perhaps accompanying payslips.
- In the introduction to the questionnaire, let staff know that the organisation is **considering undertaking the energy saving program and wants their input**.
- Indicate that all personnel are required to return their completed questionnaire by a set date (ideally accompanying their next timesheets).

### 2. Follow-Up Letter #1

- Tell staff that their response was overwhelmingly supportive and therefore you're proceeding with the plan.
- Break down the data into three main reasons staff welcomed the initiative, e.g:
  - Good for environment
  - Proud to say they're working for XXX
  - Saving money, jobs etc.
- Congratulate staff on their support and thank them for their concrete suggestions, ideas and enthusiasm
- Tell them that their suggestions are all welcome and will be incorporated.
- Tell them that more ideas/suggestions are welcome anytime. Direct them to a contact person.
- Let them know that their supervisors will contact volunteers and nominees shortly.

### 3. Follow-Up Letter #2

- Congratulate staff on their continued support and thank them for their enthusiasm and suggestions.
- Announce the details of your plan, incorporating the names of responsible people, any rewards, competitions, incentives and their relative dates; the time frames for the various stages of the program and the date for its first evaluation and review.

Obviously, the timing and content specifics of your follow-up letters will follow your development of the appropriate strategies and policies.

*NOTE: This questionnaire strategy uses a few documented techniques to coax people towards feeling positive about the initiative and their opportunity to become involved. The success of this strategy relies upon a few variables—timing and trust being significant. To this end, you'll need to ensure the questions and the wording are both entirely relevant to your own situation, without detracting from the potential impact.*



# InfoSheet 3B

## Step #1: sample questionnaire

Organisation YYYY (host) has invited XXXX (you) to participate in a resource Efficiency. In order to give thorough consideration to this proposal we are asking ALL staff to complete the following questionnaire as soon as possible, returning it to (who and where) by (when).

1. Employee's name

2. Work area/department

3. Are there children (under 17) living in your home?

Yes      No

4. What is your age group?  
(tick the appropriate box)

- (Under 30)
- (31 – 40)
- (41 – 50)
- (Over 50)

5. What do you do to reduce energy and water use and minimise waste to landfill at home

6. Do you believe Australian industry, as a rule, should be play a larger, more pro-active role to become more efficient in the way its uses resources, water, energy, raw materials?

Yes      No

7. What difference do you think it would make if YYYY adopted such a role? (E.g. Like to know the company is doing its bit; might pick up some tips for saving energy at home; like to think I can do something positive while working; etc)

8. Do you believe YYYY wastes energy and water?

Yes      No

9. Do you believe YYYY can produce less waste?

Yes      No

10. Do you believe there are opportunities for YYYY to make major reductions in its energy and water consumption?

Yes      No

11. In what ways do you think XXXX might benefit from instituting a program of energy saving strategies?  
(E.g. cutting costs; good PR; etc)

12. For such an initiative to be successful, YYYY would need your active support. Would you be happy to actively support the initiative?

Yes      No

13. What would motivate you to give your support?/What would you need?

14. Would you be prepared to make some changes to your current habits of using energy and water and waste disposal at work?

Yes      No

15. In what other practical ways do you think you might be able to help?

16. Would you be happy to do any of the following? (tick your preferred option)

- Coordinate a working party/ be a team leader?
- Suggest a target objective for your area?
- Spread the positive word among colleagues?
- Coordinate your colleagues' ideas for energy saving strategies?
- Other (please be specific)

17. Please nominate (if you can) anybody else in your work area whom you think might make a good team leader?

18. Name three areas where you think YYYY can save energy?

19. Name three areas where you think YYYY can save water?

20. Name three areas where you think YYYY can reduce/re-use or recycle waste?

# InfoSheet 3C

## Notes on the questionnaire

The INTRO: This is worded to engage staff—to encourage people to feel consulted and involved. It is strongly suggested that you allow the introduction to imply that all staff are required to respond to and return the survey. Most will. Do not impose any punitive measure on those who don't.

Question	Note
01	It is suggested that you DON'T imply that it is optional for people to fill in their names. Some individuals will simply leave the space blank—so be it. The majority however will glean the impression that their name is required. The action of identifying themselves and declaring their values and feelings about something of this nature will make people feel more committed to follow through in a cooperative and proactive way (see Commitment and consistency).
02-04 (incl)	These questions are procedural and their responses unimportant, but they are a component of most qualitative research. As such they are included to give the survey a tone of credibility (see Authority).
05	Sows a seed that people don't waste energy and water at home because it costs them money. Most people now recycle domestic waste so again thinking about what and how they dispose of waste at work
06	An introductory question—gently leads them towards a positive response. However, don't worry if you receive a negative response, here it is unimportant.
07	Again, it merely sows a seed. It doesn't matter if people respond with 'none'.
08-09	As the questions proceed, a certain mind-set is gradually taking root. People will start to become more positive and constructive. Even the most negative will be hard-pressed to say 'no', since practically every organisation and everybody can become more resource efficient in one way or another
10	Again, we're still laying the groundwork in their minds for consideration of the general issue. By now they have started to accept the idea as probably a good one.
11	Very few responses will have anything new here, but they've been invited to consider the initiative from perspectives other than simply the environment
12	This is the first key question. Staff are being invited here to commit. Those who have indicated general support up to this point will respond in the affirmative. Those who do commit will be inclined to carry through proactively to the end
13	The responses here will be extremely useful in ascertaining what people value most—you may get some good ideas for what to offer as rewards.
14	Sows the seed of what they might expect to be asked of them.
15	Identifies for what people think of as useful activities. This can form the basis for future activities
16	DEFINITELY follow-up on those who 'volunteer' their services.
17	Again, FOLLOW-UP with those nominated and let them know that one (or more) of their colleagues nominated them as ideal in this role (see Social proof and Liking).
18-20	Starts people think of improvement areas and can support the Energy Efficiency Opportunities assessment process

# InfoSheet 3D

## Notes on follow-ups

### Follow-up letter #1

**Send about a week after the questionnaires are returned.**

- Tell employees their response was overwhelmingly supportive and therefore you are proceeding with the resource management saving plan. It may not be entirely true that they were all so supportive, but people will not be in a position to verify and will tend to accept your word. The result is that those who knew they had been negative will assume that they were in the minority and will be inclined to fall into line with their colleagues (see Social proof on page 39).
- Break down the data obtained into three main reasons staff welcomed the initiative (such as good for environment; proud to say they're working for YYYY; saving money, jobs etc).
- Make sure you use examples drawn directly from their responses, wherever feasible quoting people in their own words, but not naming your sources at this stage.
- Congratulate people on their support and thank them for their concrete suggestions, ideas and widespread enthusiasm. Again at this stage it doesn't matter if they were not widely enthusiastic—they'll believe most must have been anyway and this will be contagious.
- Tell them that their suggestions are all welcome and will be incorporated. Make sure that one way or another you do incorporate their suggestions.
- Keep the lines of communication open—tell people that more ideas/suggestions are welcome anytime. Direct them to you? Your pigeon hole?
- Let them know that their supervisors will contact volunteers & nominees shortly. Be sure and utilise all who've volunteered in some capacity or other, no matter how minor. All who are given roles and responsibilities will be motivated to make the extra effort. Try to get the cooperation of those who've been

nominated by others. Chances are good they're people who are liked and respected and will therefore be able to garner the support of their colleagues.

### Follow-up letter #2

**Send about a fortnight later.**

- Congratulate staff on their continued support and thank them for their further enthusiasm & suggestions. Even if you've received none!
- Announce the details of your plan, incorporating:
  - The names of responsible people and their roles—all those who volunteered should be utilised in some capacity
  - The details of any formal rewards, competitions, incentives (see next page for more ideas)
  - The time frames for the various stages of the program; the date for its first evaluation and review; information on how staff will be notified about any progress or achievements, and how often.

# InfoSheet 4

## More rewards that motivate

Here are some examples of low-cost rewards successfully utilised in other organisations, which you might wish to adapt for your company.

- Write a letter to the employee's family telling them about the accomplishments of the person and what it means to you and the company.
- Reward staff with a weekend for two at a location/venue of the company's choice OR a dinner for two at a good restaurant.
- Arrange to have a top manager or the president/CEO of the company telephone the employee and personally thank them for a job well done OR have them write a letter to the employee stating the same.
- Find out what an employee's personal hobby is and purchase a small gift which relates to that hobby.
- Use examples and stories of individual achievers in your publicity materials spreading the word about the energy saving program and its contribution to lowering greenhouse gas emissions. Use their names and photos wherever possible to ensure they have the widest possible chance of being recognised in the community for their efforts.
- Provide gift packs (tips on energy savings in the home; fluorescent light bulbs; thermometers; stubby holders etc) to present publicly to 'bright sparks' who have provided good suggestions leading to significant energy reductions.
- Announce, congratulate and thank individuals publicly for their contributions. Attend departmental meetings to do this in front of the recipients' colleagues or find a way to incorporate this into the format of existing staff communications activities. Recognition is a hugely motivating reward for people.
- Put up an attractive, attention-grabbing noticeboard somewhere auspicious (foyer, lunchroom, admin office, etc). Regularly add names and photos of staff being congratulated

and thanked. Ensure that this is backed up by a personal note from the individual's manager and endorsed by a senior manager. Perhaps a plaque with the people's names engraved.

- Dedicate the parking space closest to the building entrance for the outstanding energy saver of the month.
- Arrange to have the employee's car washed in the parking lot during lunch one day.
- Award high achievers in the energy savings program 'energiser bunnies' because they just 'keep going and going and going . . . '
- 'Thanks a bunch' notes can be sent to high achievers, accompanied by a bunch of flowers.

## Competitions and quizzes

### Competitions

Creating incentives is a good way to involve staff in resource efficiency measures. Holding a competition is a less formal way to achieve results, inform staff and encourage participation.

For example, a competition could be held between different groups or sections of a company to improve reduce their efficiency.

To promote fairness, measure reduction based on a percentage improvement of that group or section's current performance

You may also wish to establish reduction targets eg 5% 10% or even 20%, or set a time limit for reduction. This is done by setting for example an energy reduction target of perhaps 5% with the first section reaching this target deemed the winner, OR by setting a time limit of perhaps number of months, and the section to reduce their energy consumption by the largest percentage wins.

## **Rewards**

For a competition requiring as much effort and participation as this, substantial rewards should be offered, perhaps a financial bonus in the winning participants' wages, or a complimentary meal for the winning section.

Whatever prize is given, it should be accompanied with wide recognition within the company. This can be done through announcements on the bulletin board, a special mention in the newsletter and a prize presentation.

## **Warning**

Before deciding on a competition, check that a section will not be rewarded for doing what they should be doing already, eg fixing steam leaks.

A section winning the prize that the rest of the organisation deems unworthy of that prize will demotivate the rest of the organisation.

## **Quizzes**

Quizzes are a good starting point in educating staff about resource efficiency, and require less organisation and participation. One idea is to run information sessions/ meetings/ discussions and quiz staff afterwards.

This activity would be most beneficial if run with sections as it will create a sense of teamwork, participation and motivation.

# InfoSheet 5A

## Ideas for raising staff awareness

### Sample text for newsletters

Sustainability Victoria provides media briefings to many sources on a regular basis. There are samples of these available and can be included for your use in company newsletters. Please acknowledge the Sustainability Victoria if reproducing this information and provide contact details for Sustainability Victoria Advisory Centres, as listed at the end of each media briefing.

### The first step to energy saving

Recent market research conducted by the Sustainability Victoria shows that most people don't know what they actually spend on household energy costs. Many households are unaware they actually spend thousands of dollars on energy bills.

A typical Victorian household spends around \$2500 in energy bills each year and contributes around 16 tonnes of greenhouse gases to the atmosphere. This figure will be much higher for uninsulated or poorly designed homes.

The first step to saving is learning where the money goes and what to do about it. Record and monitor energy bills as they come in. This will help you identify where savings can be made.

## Domestic energy efficiency information

None of us like wasting our hard earned money. People who learn how to achieve energy and water savings at home can bring these skills and behaviours to their work and benefit themselves and their organisation.

Sustainability Victoria has numerous guides to show how to reduce energy use in the home, including heating and cooling, hot water and general appliances. Passive solar house design principles are also covered

For queries regarding **energy and related matters**, please call 1300 363 744

For queries regarding **waste and recycling**, please call 1800 353 233

Visit the website [www.sustainability.vic.gov.au](http://www.sustainability.vic.gov.au)

## Fact sheets

These fact sheets provide a range of information about sustainable energy practices in and around the home. For more information about any of these topics please contact Sustainability Victoria at <http://www.sustainability.vic.gov.au/>

### Lighting

- Error! Filename not specified.[Lighting \(391KB\)](#)
- Error! Filename not specified.[Halogen Lighting Solutions \(91KB\)](#)

### Appliance operating costs

- Error! Filename not specified.[Electrical appliances - operating costs \(237KB\)](#)
- Error! Filename not specified.[Gas appliances - operating costs \(267KB\)](#)

### Heating

- Error! Filename not specified.[Choosing a heating system \(493KB\)](#)
- Error! Filename not specified.[Electric slab heating \(168KB\)](#)
- Error! Filename not specified.[Electric space heating \(148KB\)](#)
- Error! Filename not specified.[Gas ducted heating \(144KB\)](#)
- Error! Filename not specified.[Gas space heating \(158KB\)](#)
- Error! Filename not specified.[Heat shifters \(130KB\)](#)
- Error! Filename not specified.[Hydronic heating \(180KB\)](#)
- Error! Filename not specified.[Portable heaters \(297KB\)](#)
- Error! Filename not specified.[Reverse cycle air conditioning \(171KB\)](#)
- Error! Filename not specified.[Wood heating \(225KB\)](#)

### Building

- Error! Filename not specified.[Air movement \(787KB\)](#)
- Error! Filename not specified.[Benefits of insulation \(311KB\)](#)

- Error! Filename not specified.[Insulation installation \(699KB\)](#)
- Error! Filename not specified.[Insulation types \(426KB\)](#)
- Error! Filename not specified.[Landscape design \(366KB\)](#)
- Error! Filename not specified.[Siting and solar access \(408KB\)](#)
- Error! Filename not specified.[Thermal mass \(613KB\)](#)
- Error! Filename not specified.[Window placement \(390KB\)](#)
- Error! Filename not specified.[Window protection \(563KB\)](#)

## Hot water

- **Error! Filename not specified.**[Choosing a hot water system \(465KB\)](#)
- **Error! Filename not specified.**[Solar hot water \(263KB\)](#)

## Cooling

- **Error! Filename not specified.**[Choosing a cooling system \(374KB\)](#)

## Renewable energy

- **Error! Filename not specified.**[Renewable energy systems \(115KB\)](#)

# Waste and recycling fact sheets

Always wondered what happens to the recycling once it's in the truck? Confused by the different types of plastic? Maybe you want to try home composting. Download one of our information sheets to get up to date and useful information about your area of interest!

- **Error! Filename not specified.**[1 - Garbage \(88KB\)](#)
- **Error! Filename not specified.**[2 - Waste Facts \(90KB\)](#)
- **Error! Filename not specified.**[3 - The 3Rs - Reduce, Reuse, Recycle \(46KB\)](#)
- **Error! Filename not specified.**[4 - Waste Tips \(55KB\)](#)
- **Error! Filename not specified.**[5 - Paper \(116KB\)](#)
- **Error! Filename not specified.**[6 - Plastic \(144KB\)](#)
- **Error! Filename not specified.**[7 - Glass Recycling \(110KB\)](#)
- **Error! Filename not specified.**[8 - Steel Can Recycling \(101KB\)](#)
- **Error! Filename not specified.**[9 - Aluminium Can Recycling \(61KB\)](#)
- **Error! Filename not specified.**[10 - Milk & Juice Carton Recycling \(110KB\)](#)
- [11. Home Composting \(html\)](#)
- [12. Composting Methods \(html\)](#)
- [13. Troubleshooting with Compost and Mulching \(html\)](#)
- [14. Worm Farms \(html\)](#)

- **Error! Filename not specified.**[15 - Resources \(39KB\)](#)
- **Error! Filename not specified.**[16 - Key Contacts \(42KB\)](#)
- **Error! Filename not specified.**[17 - Action for Consumers \(34KB\)](#)
- **Error! Filename not specified.**[18 - Action for Producers, Distributors & Retailers \(31KB\)](#)
- **Error! Filename not specified.**[19 - Litter \(107KB\)](#)



# InfoSheet 5B

## More ideas for raising employee awareness

### Comparing company energy use to a typical residence

Provide information on your company's energy use in a more digestible form to the average employee by making comparisons to the home situation. Work out your company's energy consumption on a kg CO<sub>2</sub>/employee per day and compare this to a typical residential situation.

A simple calculation to do this is:

Electricity MWh/year x 1.325 tonnes/MWh gives  
= t/yr (1)

Natural gas GJ/year x 0.0636 tonnes/GJ gives  
= t/yr (2)

Add these together to give a total CO<sub>2</sub> emission  
= t/yr (1+2)

Divide the total CO<sub>2</sub> emissions (use above figure) by the number of employees

= t/yr/person

Compare this to the average Victorian residential situation where energy use contributes around **3.5 t/yr/person**.

Alter the time base to get weekly greenhouse contribution (divide by 52) or daily greenhouse contribution (divide by 365).

#### Tip

Include this energy performance measure in your regular reporting. Sustainability Victoria suggests you include the number of employees in your energy use database/spreadsheet so that this performance measure can be incorporated.

## Section Three

# Gathering Data

# Introduction

## Introduction

To discover where your company can save energy, water and waste you will first need to identify what your current usage profiles are:

- What the costs of each (energy, water and waste) are
- How much energy/water is used, and where it is used.
- How much waste is generated and how it is handled, re-used, recycled or disposed of.

Gathering this data, together with information about your operations, will give a baseline of your company's current performance. This can then be used to measure the success of future improvements.

Establishing tracking and monitoring systems, particularly for energy, provides evidence of what is used at a given time. This information can be an effective tool for reporting information to managers and major users.

## Aims of this section

On completion of this section you should have an understanding of the resource use patterns in your company. This will be achieved by:

- collating electricity, gas and water bills over the past 24 months and reviewing the data for abnormalities
- obtaining information on waste generated and cost of disposal for at least 24 months
- assembling background information about your company to produce benchmarks/metrics
- identifying and developing monitoring methods to improve knowledge of energy use patterns, and as a first step in energy analysis
- identifying large plant and equipment's energy/water usage—how much do they use and when
- establishing an ongoing system for tracking and monitoring energy/water use
- developing a reporting format for information distribution

# Tracking and Monitoring

As resource manager, analysing energy/water consumption and waste generated will provide a base to ensure your company's resources are used to their maximum advantage. It is an essential element of an effective resource management plan. Tracking and monitoring will help you:

- confirm savings from any existing efficiency investments
- identify new opportunities for savings
- set up a database for cost control and benchmarking (possibly with other similar companies)
- check billing accuracy
- tracking and monitoring are separate activities and have different purposes.

Tracking resource consumption by recording bulk use information (e.g. from invoices) gives an overview of usage patterns. Results of tracking are used to inform everyone on site of use, preferably against production or other index, benchmark or metric.

Monitoring implies closer measuring of use, of either, the whole site, particular areas or just a single item of plant. Results of monitoring inform the resource manager and other relevant parties of problems and possible solutions to wayward resource use.

Tracking resource use allows tight budgetary control over a company's resource consumption, which can reduce waste and establish a level of resource efficiency.

However, cost controls alone will not show whether resources are being used efficiently or how it can be used more efficiently.

For proper control over resource use it is necessary to have information on resource inputs and flows across the entire company to establish a baseline of resource use. Please see the Infosheets at the end of this chapter for guidance on developing a baseline. Please see the section on reporting resource use in the next chapter to assist with distilling the important resource use information gathered during tracking and monitoring, for distribution around the site. Only then can resource use be effectively managed in a manner similar to other operating resources.

A resource system can be a simple tracking system, where resource bills are your data source. Basic calculations can be made using a personal computer with standard spreadsheet software to analyse the data.

On the other hand, the information system can be a complex multi-site computer-based monitoring system with sub-metering for each production area, different floors, or other subdivision of the business, fully integrated into the plant control system. Data can be read online as events occur.

## Benefits of tracking resource use

- transparent resource costs
- allows a system for checking the accuracy of bills
- better information for analysis of resource consumption trends
- less time loss as accurate information is obtained quickly
- financial information needed to make strategic decisions regarding operating activities
- information to justify and support a strategy for achieving improvements through target setting
- impartial and accurate reporting, which enables senior management to assess and control resource consumption and costs

## **Benefits of monitoring resource use**

- gives better information for analysis of resource consumption
- provides technical information needed to make strategic decisions regarding operating activities
- identifies inconsistencies in operating and shut-down procedure
- provides a system for checking the accuracy of bills
- gives information to identify out-of-specification control systems

# Tracking Resource Use

## Collating historical data

This can be a very simple process. Use accounts from the past 24 months to establish the annual total consumption and cost for each utility. Use a spreadsheet to record the resources used (e.g. gas, electricity, water etc), consumption and cost.

Once you have recorded this information you can then express each resource as a percentage both in terms of consumption and cost.

With a clear picture of what your company consumes, and where it is used, you can then assess where savings can be made. Remember, if you can't measure it, you can't manage it.

### Resource Use

	Production t	Elect Use MWh	Gas Use GJ	Water Use kl
Jul-05	3,098	800	6,710	13,690
Aug-05	3,027	841	6,887	12,473
Sep-05	2,906	819	6,448	12,440
Oct-05	2,894	961	6,953	11,723
Nov-05	3,055	829	7,234	15,987
Dec-05	2,815	946	7,731	13,448
Jan-06	2,924	1,009	7,018	12,318
Feb-06	2,378	751	6,898	11,188
Mar-06	2,734	919	7,081	13,401
Apr-06	2,648	904	7,002	14,496
May-06	3,146	884	6,471	13,438
Jun-06	3,237	915	6,424	14,224
Jul-06	2,825	894	6,113	13,542
Aug-06	3,411	922	6,050	12,726
Sep-06	3,020	912	5,375	13,441
Oct-06	3,475	1,055	6,354	14,294
Nov-06	3,408	1,118	6,046	15,308
Dec-06	2,964	927	6,660	13,672
Jan-07	3,136	1,023	6,536	13,801
Feb-07	2,859	969	6,923	11,752
Mar-07	3,019	938	7,119	12,960
Apr-07	3,163	875	6,624	18,413
May-07	3,221	919	6,462	13,803
Jun-07	3,220	936	6,437	15,088

# Monitoring Resource Use

## Analysing data

Table of Data from Excel Spreadsheet Showing Use per Tonne

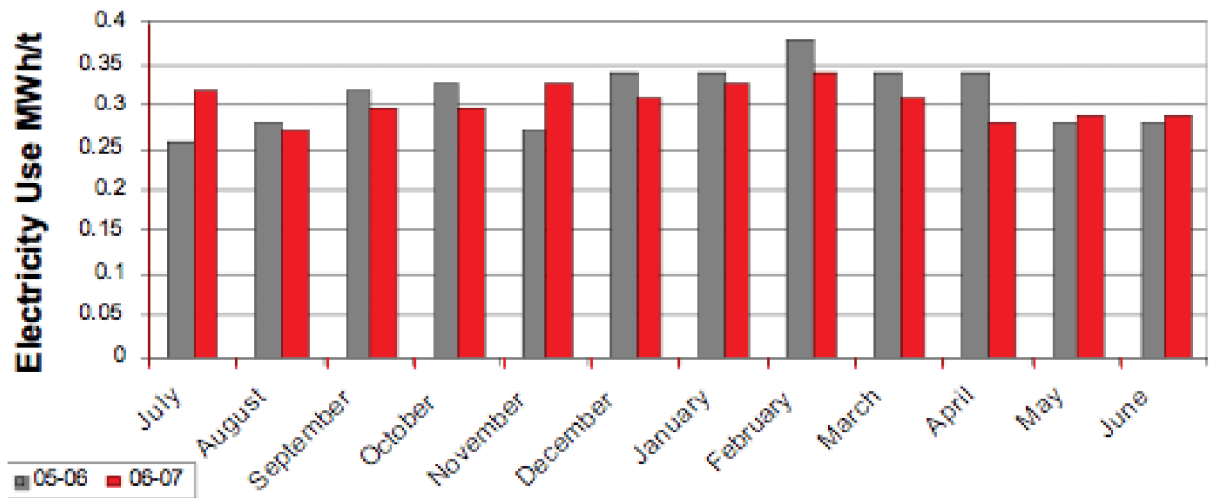
	Production t	Elect Use MWh	Gas Use GJ	Water Use kl	Electricity MWh/t	Gas GJ/t	Water kl/t
Jul-05	3,098	800	6,710	13,690	0.26	2.17	4.42
Aug-05	3,027	841	6,887	12,473	0.28	2.28	4.12
Sep-05	2,906	819	6,448	12,440	0.32	2.22	4.28
Oct-05	2,894	961	6,953	11,723	0.33	2.40	4.05
Nov-05	3,055	829	7,234	15,987	0.27	2.37	5.23
Dec-05	2,815	946	7,731	13,448	0.34	2.75	4.78
Jan-06	2,924	1,009	7,018	12,318	0.34	2.40	4.21
Feb-06	2,378	751	6,898	11,188	0.38	2.90	4.70
Mar-06	2,734	919	7,081	13,401	0.34	2.59	4.90
Apr-06	2,648	904	7,002	14,496	0.34	2.64	5.47
May-06	3,146	884	6,471	13,438	0.28	2.06	4.27
Jun-06	3,237	915	6,424	14,224	0.28	1.98	4.39
Total Yr	34,862	10,578	82,857	158,826	0.30	2.38	4.56
Jul-06	2,825	894	6,113	13,542	0.32	2.16	4.79
Aug-06	3,411	922	6,050	12,726	0.27	1.77	3.73
Sep-06	3,020	912	5,375	13,441	0.3	1.78	4.45
Oct-06	3,475	1,055	6,354	14,294	0.3	1.83	4.11
Nov-06	3,408	1,118	6,046	15,308	0.33	1.77	4.49
Dec-06	2,964	927	6,660	13,672	0.31	2.25	4.61
Jan-07	3,136	1,023	6,536	13,801	0.33	2.08	4.40

There are various analysis that can be carried out. This can be a simple use per tonne against a target or a more detailed analysis with an x-y scatter plot and trendlines.

The advantage of an x-y scatter plot is that sometimes use per tonne is just an inverse measure of production. That is when production

goes up; use per tonne goes down and vice versa. For companies part of the Federal Government Energy Efficiency Opportunities program x-y scatter plots are one of the recommended analysis techniques.

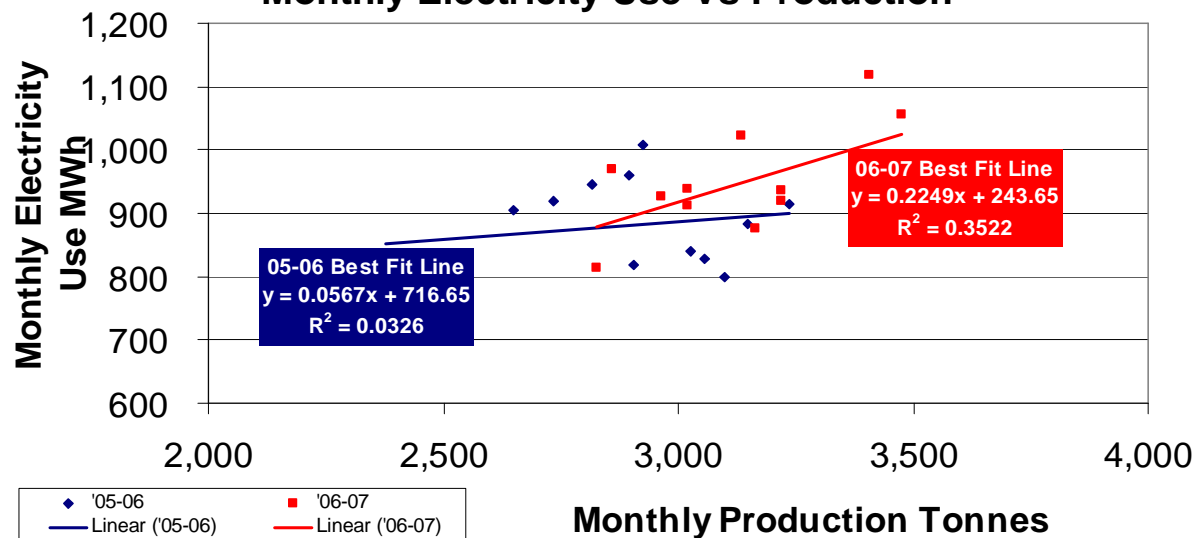
**Monthly Electricity Use Per Tone of Production  
Comparing 05-06 and 06-07**



This graph shows that there is

1. Seasonality in electricity performance. Generally the highest months are in summer. This is common in Australia as all cooling loads, from air conditioning to cooling towers go up in warm weather
2. That for eight months 06-07 performance was lower than 05-06. The actual figures indicate that electricity use for the year was the same as for 05-06.

**Monthly Electricity Use Vs Production**



This graph clearly shows that at average monthly production in 06-07 of 3,150t, electricity use is higher than in 05-06. In particular this is as a result of two very high consumption months. An investigation took place into this and found that extra shifts were worked to make the high production but this resulted in air compressors being left on at weekends with no production.



With an x-y scatter plot the best fit line can be used as a baseline for future monitoring. Points above the line should be investigated for the 'poor' performance

Similarly points say 10% below the line should also be investigated to find out if this good performance can be replicated. The objective is to get a thorough understanding of what impacts electricity performance.

This process should be repeated for gas and water (and for all utilities).

### **Benchmarks, metrics, indices, specific performance**

Benchmarks vary greatly and depend on the nature of the business. Benchmarks can be across an industry sector and allow comparison of the whole business. An example would be \$/kg for bread baking. A particular bakery would be able to see how it compares to the industry norm.

A benchmark can also be developed internally for use over time. This ties in with tracking resource use and provides a means to quantify resource costs and consumption against production. This type of benchmark can be developed from units of resource use per widgets produced; per sales; per production days; per commodity input; per indicator product; or against whatever constitutes a good month's performance. Benchmarks can also be developed per number of employees or per building area.

Note that factories or production facilities may have high resource use as part of the production process. These businesses will have a low resource 'overhead' and a large component of resource consumption per unit of production.

Office and warehouse space will have a high resource 'overhead' and so the best benchmark will be per square metre/hour such as those produced by the Property Council of Australia (formerly BOMA).

For commercial buildings, such as offices, shops, hotels, and department stores, specific energy consumption is usually expressed as use/unit of floor area serviced, that is MJ/m<sup>2</sup>. The Property Council of Australia has produced a Resource Guide providing guidelines for typical building elements. The guide also outlines ways to establish a resource target for building design and operation.

## **Understanding your electricity bill**

(See InfoSheet 11 for more details)

When electricity retailing was deregulated a few years ago, many different tariff options were first used. These have now converged to a simpler system, where most electricity accounts are based on peak and off-peak consumption, plus a demand charge and standing charges. It is not that difficult to condense the apparently complex 'transparent' billing format required by government regulation to a simpler format.

Since electricity frequently is the largest resource cost, it is important to understand how it is billed and what effect certain strategies will have in terms of cost savings.

Demand is based on the highest rate of consumption during the billing period. A smart meter calculates demand by measuring energy consumed in sequential 15-minute periods throughout the billing period.

Electricity costing is different from oil and gas, and appears to have changed dramatically over recent years. Electricity is charged to the customer using various cost components as described above. An important change is to demand charges which are based on the maximum average demand over a 15 minute period. kVA tariffs are now being introduced by electricity distributors and passed on to customers. kVA tariffs are dependent on the power factor.

The 15-minute period with the maximum consumption is then converted to an average rate of consumption in units of kilowatts (kW). The bill includes a cost for maximum demand based on the maximum that has occurred in the past. If the monthly maximum is higher than the demand charged, the cost will ratchet up for that month and for the future. kVA demand is similar in structure to kW demand charges but is based on the highest volts multiplied by maximum average current over 15 minutes.

In simple resistive loads such as heating and incandescent lights the kW=kVA but for normal, more complex loads such as motors, transformers and lighting ballasts the kVA>kW.

Demand can be shown on a 'load profile' plot as shown in the next section. A load profile will help show the nature of your electricity consumption. It is a very useful tool for the resource manager. Demand costs can often make up 35% or more of the total electricity bill. If your actual monthly demand charge is consistently lower than the demand charge, then you can negotiate with your retailer to reduce the charged demand.

However, if your maximum demand is consistently being set to a higher value, then a control system to better schedule loads may be worthwhile investigating.

Power factor always has a value between zero and one. A simple formula describes the relationship between conventional kW demand and the new kVA demand  $kW = pf \times kVA$ . Having a power factor below 0.8 to 0.85 will cause your demand charge to be higher if you are subject to the new kVA demand charges.

The power factor can be corrected by installing banks of capacitors within the plant or by providing a matched capacitor to each motor to offset their reactive effect. Some types of motors, electronic motor drives, and electronic lighting ballasts can improve power factor closer to one.

It is important then to be familiar with the rate structure that the electricity retailer is offering the customer. The recent changes in electric utility regulation are such that the retailer should be more than glad to assist any company in getting the best rate structure because competition between retailers is expected to increase significantly in the next few years. The informed consumer is best placed to take actions which can decrease costs.

# Establish Effective Monitoring - Load Profile

Monitoring is the process of measuring and analysing data from a more detailed source such as a smart meter. It is the basis of a disciplined approach to resource management that ensures that your company's resources are used to their maximum economic advantage. Monitoring is one of the key tools the resource manager has to keep a closer eye on the performance of plant and equipment as well as total resource consumption patterns.

In particular, electricity monitoring can be done in a range of ways. By negotiation, your retailer will be able to supply you with data from your electricity smart meter on a regular basis. Electricity smart meters can be installed as sub-meters and read locally by electronic download, and dedicated monitoring equipment can be used to monitor electricity use. Your billing smart meter data may be available via the Internet. Several retailers are posting smart meter data on the web and access is via password. This may be the easiest way to get the information.

Gas meters can be adapted to give a pulse output that is compatible with a data logger and recorded on a self-contained data acquisition (SCADA) system.

Effective monitoring of resource use can go one step further. The resource used by each functional group in the company could be logged separately, so costs can be assigned accurately to departmental managers.

Agreed levels of resource use should be established. Fair targets should be established in consultation with managers and operators. When energy is used mainly for heating and cooling buildings, levels usually take account of seasonal variations in the weather. Similarly, a manufacturing operation, allowances are made for variations in the level of production, or changes in the product mix, which directly affect performance. Production metrics, benchmarks or indices serve as yardsticks for controlling resource use and assessing performance.

Key information on resource use can then be built into operating reports along with costs and other information on performance such as material use, levels of output, losses and yields. Load profile graphs are a key tool available to the resource manager, giving a great insight into actual operating events and practices. They can be invaluable for identifying problem areas. With careful explanation, these graphs may help the resource manager explain irregular consumption patterns to production managers etc.

Load profiles can identify when resources are used. Anomalies such as the plant turning on too early can be identified and time clocks can be altered to save electricity. Any variation in base load use from day to day needs to be investigated as it may indicate unnecessary equipment use or poor shut down procedure.

Load profile plots can be arranged on a daily time scale (x axis, horizontal) and overlaid. In this example, the weekend days have been overlaid for August 1999 and shows abnormal loads on 7 and 14 August. The resource manager can follow up with production or maintenance people to see if there is valid reason for equipment to be on, or take corrective action to ensure better control in the future.

When benchmark levels for current performance have been defined and accepted in practice, targets can be set for improvements in the efficient use of resources. However, targets (e.g. aiming to reduce the amount of resource consumed during the coming period by a given percentage) should be set in consultation with those managing and working in particular areas rather than being imposed from above. Improvements may involve changes in operating practices, modifications to existing plant or buildings, or capital investment in more resource efficient plant or buildings.

## Rules of thumb for effective tracking and monitoring

- Record only the most relevant variables
- Record historical data from the past 24 months at least
- Ensure measurements are accurate enough to be useful
- Ensure recordings are regular and frequent enough to pick up any relevant highs and lows, and are compatible with the rate at which control actions occur
- Plot the ratio of peak and off-peak electricity
- Plot actual versus charged demand (electricity)
- Record relevant associated data simultaneously (e.g. production rate)
- Monitor large plant items individually
- Install sub-meters to measure usage by areas with separate accountability
- Hold regular meetings with departmental budget controllers and report on resource savings in their area and potential areas of improvement

## Gathering data: things to do

- Collect and collate electricity, water and gas bills over the past 24 months
- Record production data for benchmarking
- Establish annual resource use, costs and greenhouse gas emissions
- Establish benchmarks (e.g. energy used per product)
- Procure a site plan
- Identify large plant and equipment - amount of resource used and when. Mark on site plan
- Mark smart meter locations and note meter number on site plan
- Identify and gather smart meter data. This information can be obtained from energy retailers
- Prepare or procure load profile plots for your site for your analysis
- Find out about your company's long-term strategic plan
- Analyse data for resource saving ideas

## Gathering water data

On your water bill there is a reading at the start and end of the billing period. As many water meters are manual read by the suppliers, the readings will not always line up with your production or costing periods. Ideally you should read your water meter to line up with your monthly production periods.

Reading water meters is straightforward and this will give the best possible correlation with your activity.

## Gathering waste data

Where as energy and water use is invoiced through a accurate +/-1% meter, obtaining accurate waste generated data can be much more difficult. Waste generated can be handled in three distinct ways:

- Disposed- either to landfill or as liquid effluent through trade waste
- Reused - either in process or as lower quality product. E.g polymer fines captured in effluent used to make low grade plastic products
- Recycled- treated either on/off site and put back into manufacturing process e.g waste paper, glass bottles, aluminium cans.

In addition there are two distinct categories of waste: general waste that can be sent to landfill and prescribed waste that has to be disposed of to licensed waste handling facilities.

Starting from scratch will require some effort to get a handle of what waste is generated and where it ends up. This will involve any/all of the following:

- Reviewing billing data from waste disposal contractor
- Production records
- Actual audit of waste bins

Once this information is complete it may be possible to present data as shown below.

---

**Site:**

Prescribed/hazardous waste	Annual to Landfill kg	Annual Reuse kg	Annual Recycle kg	Stored on Site kg
Contaminated paper/packaging/plastics				
Chemicals				
Contaminated or hazardous oils/lubricants				
General hazardous e.g. process wastes, PPE lights, electrical equipment				
<b>TOTALS</b>				

Non Hazardous Waste	Annual to Landfill kg	Annual Reuse kg	Annual Recycle kg	Stored on Site kg
Building waste/rubble				
Soil/garden wastes				
Food				
Wood/Pallets				
General non-hazardous e.g. office wastes, carpets, desks etc				
Paper/cardboard				
Oils				
Glass				
Metals, steel, aluminium, copper etc				
Plastics				
Drums/containers				
Chemicals/raw materials				
<b>TOTALS</b>				

# InfoSheet 6

## Site analysis

This sheet gives an overview of physical resource use across the site to identify 'hot spots'. For each area of a metered site, highlight the resource consuming plant and equipment on an area layout plan. Invite responsible staff in each work area to assist as it is an excellent opportunity for them to gain an understanding of resource use. The area analysis worksheet can be copied and used for each area. Similar plans such as CAD drawings should be used wherever possible).

- Area number    Area name
- Area layout plan (sketch or attach area plan drawings e.g. CAD drawing if possible).
- You may choose to expand this process by having one plan for site services (e.g. lighting, air, steam, heating/cooling, electricity buses and ring mains etc) and one plan to mark key production plant.
- Transparent film or CAD overlays may be useful here.
- Complicated plant and repeated services may have key information on the plan and refer to data sheets elsewhere for detail. Larger scale plans may also be required for complicated parts of the plant. These should stem from an overall plan.
- Legend (insert symbols to represent the various equipment types)
  - Lighting (fittings)
  - Process machinery
  - Comfort heating/cooling
  - Work stations
  - Compressed air
  - Fan units
  - Pumps
  - Process refrigeration
  - Process heating
  - Other
- Comments about area

# InfoSheet 7

## Resource using equipment

Further to the site plan, this sheet develops an inventory of energy using equipment. A summary of these should be made to use in general awareness programs, induction procedures and training. A pie chart with about six sections indicating the key energy using areas may be useful. Try to aim for the 'other' sector to be less than 10% or the smallest sector.

This is simply an inventory of the equipment in use at your company and their hours of operation.

The worksheets for energy using equipment include generic energy consuming equipment types and may require alteration to describe the energy consumption of each type.

Please use your own tabulation if equipment is not adequately represented here. For example on lighting

Note: if you have a large amount of lighting it may be necessary to further split the table down into more areas.

Similarly this can be further developed for energy using equipment

- Boilers
- Compressed air
- Materials handling
- Heating/drying systems
- Furnaces
- Refrigeration
- Cooling water
- Pumps
- Fans
- HVAC
- Office equipment
- Transport, trucks, cars forklifts
- Lifts, escalators
- Cleaning systems
- Water treatment

## Energy Using Equipment

Site name		Area number	
Lamp type	Quantity	Wattage/type	Operational hours/week
Fluorescent all types			
Metal halides			
Incandescent globes			
Mercury high bay			
Low voltage/others			
Sodium vapour			



# InfoSheet 8

## Negotiating your energy supply contract

### Electricity

To get the best electricity contract, you need to negotiate a price with a retailer. Retailers are companies that sell electricity to customers and invoice them. The retail and metering charges are the only parts of your bill that are contestable.

Distributors are regionally based. You will need to ensure that you get the most appropriate network tariff from your distributor (the company who maintains the electricity poles and wires). The Office of the Regulator General approves these charges.

### Understanding national electricity market

The exchange between electricity producers and electricity consumers is facilitated through a spot market where the output from all generators is aggregated and instantaneously scheduled to meet demand through a centrally-coordinated dispatch process. This process is operated by AEMO, the market and system operator of the Australia Energy Market Operator manages the market according to the provisions of Australian National Electricity Law and Australian National Electricity Rules.

Scheduled generators submit offers every five minutes of every day. From all offers submitted, AEMO systems determine the generators required to produce electricity based on the principle of meeting prevailing demand in the most cost-efficient way AEMO then dispatches these generators into production. This is split into state prices based on what electricity and at what price has been dispatched into each state

A dispatch price is determined every five minutes, and six dispatch prices are averaged every half-hour to determine the spot price for each trading interval for each of the regions of the National Electricity Market (NEM). NEMMCO uses the spot price as the basis for the

settlement of financial transactions for all energy traded in the NEM.

The Rules set a maximum spot price of \$10,000 per megawatt hour. This is the maximum price at which generators can bid into the market. The maximum spot price is also called Value of lost load (VoLL), and it is the price automatically triggered when AEMO directs network service providers to interrupt customer supply in order to keep supply and demand in the system in balance.

At present electricity can be fed into the grid from renewable sources, coal fired generation, gas fired generation and even from some industrial sites. It is a very complex process. High spot prices in 2007 were caused due to a combination of high demand and reduced hydro-electricity output because of the drought in NSW. It must be remembered that if the cheapest form of generation is lost it will be replaced by a form that is significantly more expensive.

### Preparation for electricity contracts

- Decide who in your company will be responsible for purchasing electricity (purchasing officer? technical officer?). Nominate someone as energy manager to coordinate the process
- Prepare a summary information spreadsheet (include account number, site, service address, meter number, historical billing data such as franchise tariff, peak and off-peak kWh, actual demand)
- Forecast your electricity consumption at each account over the next 12 months. Start from the historical data, then consider any changes in occupancy patterns or building programs
- Decide which value-added services you want retailers to quote on (e.g. access to electronic billing data/smart meter data for resource management purposes, consolidated accounts, improved payment terms, tailored billing periods, resource audits, 24 hour emergency service, nominated account manager)



- If you choose to go to tender, prepare a request for quotation in the format you require and send it to your preferred retailers. Give the retailers all the above information and also ask for a quote on standard load scenarios and value-added services as separately listed items, so you can compare 'apples with apples'
- determine your price structure in relation to your business operations, e.g. two part tariff: peak and off peak . Peak (7 am–11 pm Monday to Friday, Vic) and off- peak (all other times)
- determine your preferred contract length or ask for options on prices for longer/shorter contracts
- specify price to include/exclude loss factors
- ensure you understand the terms of contract with each quotation received.

### **Analysing quotations**

Check all quotes are based on the same consumption (both peak and off peak) and loss factors

### **Metering—pricing**

- host retailer may not need a new meter
- other retailers will require new meters. Metering is contestable and it is important to ask what charges are involved. Cost of meters includes: supply of meter, communications and meter reading
- any additional charge for rural sites or discounts for multiple meters

### **Check demand.**

If you are on a demand tariff, check whether a reduction in charged demand is possible, based on historical actual demands

### **Check network tariff.**

Set charges levied are by the distributor. Network charges are passed through to the customer by the retailer

### **Check the following dates:**

- how long the offer is valid for
- the start and end date of the contract period
- any changes to charges. Is there an increase in retail electricity charges from one year to the next?

### **Distribution (network) charges**

Check which would be the cheapest network tariff for your account. Request this tariff from your distributor. If you cannot reach agreement, contact the Essential Services Commission on telephone 96510222

Check demand if on a demand based tariff. The demand charge (maximum power at a given time over the billing period) makes up a sizeable percentage of an electricity bill so it is in your interest to have the charged demand as low as possible.

For advice and assistance, contact your Industry Association for negotiating advice on electricity contracts. Some associations provide a special service for members.

### **Hiring consultants**

If you decide to hire a consultant to negotiate your electricity contract, it is advisable to hire the consultant on a fee for service arrangement rather than on a shared profit basis.

### **Negotiating gas contracts**

The procedure for negotiating gas contracts is effectively the same as for electricity contracts. The key points to cover are:

The more accurately you can forecast consumption the less risk for both parties and the more likelihood of a lower price

Keep your maximum hourly and daily quantities as low as practicable

A tip for saving, if you can manage demand during coldest winter weekdays you will save on peak injection charges which are based on your use during highest demand days.

# InfoSheet 9

## Purchasing new equipment

Operating costs are often overlooked when purchase decisions are being made—suppliers don't readily provide such information and buyers often neglect to actually ask for it. Once the equipment is installed it's certainly too late and significant opportunities for savings may well have been missed.

Don't let this happen at your workplace!

## Resource efficiency checklist

- How much water/energy does the equipment use per year when it is actually operating?
- What is the resource consumption per year when the equipment is 'on' but doing nothing useful? For most equipment, between 20–80% of total resource use occurs when it is on stand-by waiting to be operated.
- Can the equipment be set to a minimum consumption level? For many types of office equipment low-energy standby mode models are available.
- Is the equipment the correct size for the job it is required to do? Over-sizing of equipment often means it won't work at the optimum level of efficiency.
- Is the equipment really necessary or are there other ways to provide the service?

## Procurement procedures

Document some procedures for negotiations on electricity and gas contracts—all offers to be in the same format, request data and assistance (see *Negotiating your contract* for further details).

- Incorporate into purchasing guidelines a requirement for providers of control, monitoring and general equipment to supply data on generation and/or protection against spikes and harmonics, on a regular basis (specify).

- Incorporate into purchasing guidelines a requirement for all office equipment to have power saving functions (see *Energy Efficient office infosheet* for further details).
- Incorporate into purchasing guidelines a requirement to give preference to more resource efficient equipment e.g. more efficient motors, variable speed drives, high efficiency cleaning systems etc.
- Incorporate into purchasing guidelines a requirement for specification of power factor correction (see *Power factor correction infosheet*).

## Purchasing

Develop standard specifications to be used for purchasing specific types of equipment or services, e.g. all new and changed lighting circuits should incorporate unit switching and energy efficient lighting principles.

Ensure that nominated personnel approve the purchase of any new equipment such as air compressors, pumps, cooling towers, steam boilers etc. This applies where standard specifications are not appropriate because of the varying needs in each situation and/or where purchases are rarely made so that the cost of developing standard specifications is not warranted. Equipment listed for such approval is that which has significant long-term resource implications for the site. Personnel nominated should have a specific understanding of the equipment and options available in each case.

In both cases above, total lifelong costs and resource consumption shall be considered in the decision making process. Unless there is reason to do otherwise, the most resource efficient option should be taken.

Purchase recommendations should detail the reasons for preferring an option that affords less-than-optimum resource efficiency, if this is the case. In such instances, alternatives should also be assessed and details incorporated into the

recommendations showing total life-cycle costs, including the costs of resource at the current tariffs.

## **Projects (defined as new, replacement or modified plant)**

Much of the above should automatically apply for projects.

It is important that specifications and requirements in 'Purchasing' above are not bypassed if projects are run on a 'lump sum' basis. Specific requirements need to be incorporated in project specifications. It is good practice to request that offers include standard equipment and also any extra cost which would apply to higher efficiency components where these are available. These options can then be considered as part of offer analysis. All projects require some form of approval that appropriate resource efficiency consideration has been given. The method of achieving this will vary greatly depending on the size and type of project. One person or a significant team of experts could provide approval for large projects. Regardless of who is actually responsible for approval it is important that the best available expertise is involved in the approval process. The process should start with the development of the project specification. Note these comments apply to many disciplines in addition to resource efficiency and similar systems should exist to address them all.

### **End of life**

When purchasing any plant/equipment/materials, it is essential that thought is given to its disposal. Ideally everything should be recyclable/reusable, from the packaging right the way through to the dismantled equipment.

Giving thought to this, particularly at project definition can save your company cost at future date.

## **Maintenance**

Contracts for maintenance of utility systems (boilers, air compressors, cooling water, space heating and air conditioning systems etc) should include specific requirements including resource efficiency measurement and reporting to verify that equipment is operating at required resource efficiency levels.

## **Contracts**

Some contracts have potential for significant resource efficiency impact. Because new contracts may only be reviewed occasionally, it is important to ensure that appropriate requirements are included when these renegotiations are held. One way to ensure appropriate review is to arrange for a small knowledgeable group to review the list of contracts, and to nominate who should review specific contract specifications and approve offers before new contracts are let. Such contracts should then be tagged for this review as part of renegotiation.

## **Sample supporting statement**

'In line with our environmental policy, ABC & Co, expects ALL suppliers to provide three quotes with adequate detail on costs, benefits, and related intangible benefits.

Performance details such as energy and water use, environmental quantities and power factor is expected, as well as price and performance. Guarantees and performance testing are strongly preferred.

Please provide information on future disposal and percentage recyclable content

ABC & Co will favour suppliers who actively comply with the spirit of these requirements. It is expected that suppliers will provide eco-efficiency options with each quotation.

# InfoSheet 10

# Understanding bills - an electricity bill

Account Number		NMI: VCCCAE 071		
Period of Supply 01/07/07 to 31/07/07				
Account Details		Unit Charge	Units	Amount
Energy Charges		(kWh Loss Factor)(Excl GST)		
Peak	7.0 c/kWh	1,016,000.01 kWh		
Off Peak	3.5 c/kWh	1,100,000.00 kWh		
Energy Sub-total				\$
Network Charges				
Peak	2.0180 c/kWh	333 kWh		
	2.0180 c/kWh	1334 kWh		
	2.0180 c/kWh	4186 kWh		
	2.0180 c/kWh	kWh	2,779.87	30,578.57
Off Peak	0.6410 c/kWh	kWh	997.74	10,975.10
Standing Charge	\$0.00/month		0.00	0.00
Demand	\$ 0.050300 /month/kVA	5425 kVA	295.00	3,135.00
Reserve Feeder Charge	\$4.55136/month	1.0000	455.14	5,006.50
Network Sub-total			\$ 517.75	\$ 8,695.17
System Operator Charges				
Levy Fee	0.0000 c/kWh	kWh	0.00	0.00
NEMMCO Ancillary Fee	0.2978 c/kWh	kWh		
NEMMCO Market Fee	0.0359 c/kWh	kWh		
Reconciliation April 2007 ASC			-177.51	-1,952.85
Reconciliation August 2006 ASC			-269.23	-2,851.51
Reconciliation December 2006 ASC			-242.86	-2,668.55
Reconciliation February 2007 ASC			-240.85	-2,648.38
Reconciliation January 2007 ASC			-159.56	-1,755.14
Reconciliation July 2006 ASC			-238.43	-2,633.77
Reconciliation June 2007 ASC			-225.47	-2,480.18
Reconciliation March 2007 ASC			-270.90	-2,980.76
Reconciliation May 2007 ASC			-347.50	-3,722.53
Reconciliation November 2006 ASC			-214.75	-2,362.21
Reconciliation October 2006 ASC			-205.35	-2,208.85
Reconciliation September 2006 ASC			-217.38	-2,395.97
System Operator Sub-total			\$ -1,177.51	\$ -12,900.44
Metering & Other Charges				
Metering Charge \$1801.84/year	\$5.100354/day	1 @ 31 days pro-rata	15.81	173.92
Metering & Other Charges Sub-total			\$ 15.81	\$ 173.92
Amount payable this account due 07-SEP-07			\$ 18,620.39	\$ 182,824.20
Contract Demand is 5425 kVA Highest actual metered demand this period is 5207 kVA/Recorded on 20/07/07 at 12:45 / Load Factor = 75.74% Meter: VCCCAE 071 Usage: kWh/Meter: VCCCAE 071 Usage: kWh The charges levied on this invoice are based on data available at the time of billing. Should the underlying data change, the charge may need to be adjusted at some future point in time. Distribution Loss Factor = 1.0636 Transmission Loss Factor = 0.9988				

Peak Price 7am -11pm weekdays

Off-peak price- All other times

Peak Units

Off Peak Units

Network charges non-negotiable

Peak use of network cost cent per kWh during peak times

Off Peak use of network cost cent per kWh during peak times

Demand charge based on maximum actual kVA . Can be negotiated down if proof exists

Reserve feeder for reliability of supply for this site.

AEMO charges for running the electricity market in Qld,NSW,SA, Tas and Vic.

Reconciliation for over charge

Meter cost

Marginal peak price =  
 $7.0 + 2.018 + 0.2978 + 0.0359 = 9.3517\text{c/kWh}$

Marginal off -peak price =  
 $3.5 + 0.641 + 0.2978 + 0.0359 = 4.4747\text{c}$

## Maximum demand

The component of the electricity bill calculated on the basis of demand (kW) constitutes up to 35% of the total bill. Managing demand can provide substantial cost savings.

Maximum demand is relevant when:

- you have a contestable account which is charged a demand-based network tariff
- the demand charge makes up a sizeable percentage of an electricity bill so it is in your interest to have the charged demand as low as possible.

Therefore, if your actual demand is less than 250 kW and the site is in a 120 kW minimum chargeable demand area (Citipower, United, Eastern, AGL) you should request a reduction in the charged demand.

If your actual demand is greater than 250 kW the contract demand ratchets up each time the actual demand exceeds the contract demand. This peak in consumption may have occurred many years ago, however the site is still charged at the higher contract demand rate, unless a request for demand reduction is made.

Refer to the Essential Services Commission (website <http://www.esc.vic.gov.au>) for further details on demand charges for 2006/2010 by distribution business.  
Electricity Act 1993—Section 158A tariff order

Attachment 10 states that where a customer requires a reduction in contract demand they must give 12 months written notice to the distribution company serving the site.

The local distribution company must then notify the customer in writing within the 12 month period of the new contract demand.

The contract demand requested by the customer is the highest actual demand recorded in the previous 12 months, or the minimum chargeable demand of 120/250kW (or kVA).

The demand charged on tariff L will remain the charged demand when the site becomes contestable unless a reduction is requested.

# Understanding bills - a gas bill

## Detailed Charges

Page 2 of 2

Service Address																																																																																																																																																																	
Contract Number	Meter Number	MIRN Number	Distribution Zone WESTAR CENTRAL	Transmission Zone METRO NORTH WEST																																																																																																																																																													
Authorised Maximum Daily Quantity 0 GJ		Contract Maximum Daily Quantity 1250.000 GJ		Contract Maximum Hour Quantity 58.300 GJ	Contract Maximum Daily Quantity = Maximum quantity taken in any one day.																																																																																																																																																												
10 Peak Injection Day Quantity 1250.000 GJ		Maximum Hour Quantity 63 GJ			Contract Maximum Hourly Quantity = Contacted maximum quantity in any one hour. Based on actual charge if over																																																																																																																																																												
Total Consumption 2800 GJ		Actual MDQ 1155 GJ		Actual MINQ 55 GJ	Maximum hourly quantity. What has been used. If higher then contract this can be renegotiated down if proof exists that a change has occurred																																																																																																																																																												
Price Plan Contract D	Period 01/07/2007 - 31/07/2007	Days 31			Maximum hourly quantity this month																																																																																																																																																												
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Second Block	40.000 GJ	0.00000000 /GJ	\$25,282.80	\$12,512.71	\$2,343.59																																																																																																																																																												
Balance	13.000 GJ	356.980000 /GJ	\$4,640.77	\$2,298.78	\$187.32																																																																																																																																																												
Distribution M/C Charges	31 Days	2.783507 /GJ		\$100.00	\$86.39																																																																																																																																																												
GST Charge					\$140.00																																																																																																																																																												
<b>VENCorp</b>																																																																																																																																																																	
Meter Data Management	31 Days	1.140900 /Day		\$400.17	\$96.36																																																																																																																																																												
System Security	1 GJ	0.010010 /GJ		\$1,539.73	\$285.42																																																																																																																																																												
Commodity				\$4,285.11	\$739.34																																																																																																																																																												
GST Charge	0 GJ	0.029930 /GJ			\$100.11																																																																																																																																																												
Sub Total					\$12,806.67																																																																																																																																																												
<b>3. Additional Charges</b>																																																																																																																																																																	
Excluded Service Charge		254.000000 /GJ			\$254.00																																																																																																																																																												
GST Charge					\$25.40																																																																																																																																																												
Sub Total					\$279.40																																																																																																																																																												
					Regulated Charges Transmission Peak Injection Charge is based on 10 days of maximum daily quantity. Every year there is reconciliation on what gas you used during the 10 highest gas using days by the whole state. These will normally be working days in winter																																																																																																																																																												
					Anytime volume is a charge for carrying every GJ of gas used																																																																																																																																																												
					Distribution These charges are based on maximum hourly quantity. i.e 63 GJ = 10 + 40 + 13																																																																																																																																																												
					<b>VENCorp</b> VENCorp is the Victoria Gas Equivalent of NEMMCOMeter data management is the cost of collating meter volume information with heating value of gas.																																																																																																																																																												
					System security covers the cost of ensuring that there is enough gas available to prevent another Victorian gas outage and is charged on every GJ used.																																																																																																																																																												
					Commodity Charge is a price VEN																																																																																																																																																												
					Additional Charges Excluded Service Charge is basic																																																																																																																																																												

Marginal gas price = 4+0.1886+0.010010+ 0.2593= \$4.22454/GJ

## Understanding bills - a water bill

These are self-explanatory.

- Usage is simply subtracting previous reading from current reading for each meter.
- Rates are in \$ per kl and are usually non-negotiable
- Sewage disposal charge is based on a fixed proportion of the bill and number of employees on site.

### Details of charges on this bill - account calculations details

Volume Charges						
Meter number	Bill days	Previous reading	Current reading	Consumption in kilolitres (kl)	Rate \$	Total \$
M6C18527	30	254310	258834	4524.00		
M6C18517	30	214525	240225	25700.00		
Total Water Consumed				30224.00	0.0507	\$153,454.08
Average - 31/07/2007 to 31/08/2007						\$53,454.08
Total						\$153,454.08
Sewage Disposal				67.47	1.0830	\$73.49
Total						\$73.49
Total - Volume Charges						\$153,527.54
Balance Forward						\$225,384.25
Less incoming						\$4.04
Please pay - GST does not apply						\$278,921.75

### Your charges explained

#### Volume charges

##### Water Volume

This is the cost for the amount of water used at the property, as recorded by your water meter.

##### Sewage Disposal

This is the cost of transporting, treating and disposing of wastewater from the property.

### Important Information

#### Stage 3a Water Restrictions

were introduced on 1 April 2007. It's important to follow the restrictions so we can save water for our future. For information about the restrictions go to [www.citywestwater.com.au](http://www.citywestwater.com.au) or contact us on 131 688.

#### BROW Message

City West Water is pleased to help you in any matter regarding our services. If you have any concerns, please call us on 13 1688 for Account Enquiries or Free call 1800 131 682 for Service Faults and Emergencies. In the event that we cannot resolve an issue, you may choose to call the Energy and Water Ombudsman (Victoria) on free call 1800 680 689.

#### Privacy Statement

City West Water collects personal information for the purpose of providing water, sewerage and related services. We may disclose your personal information to our contractors and other parties including Melbourne Water and Parks Victoria for these purposes. Access to your personal information can be obtained by writing to City West Water at Locked Bag 900, Sandhurst, 3620. We may charge you a reasonable cost for providing you with access. Our Privacy Policy is available at [www.citywestwater.com.au](http://www.citywestwater.com.au) or by calling us on 131 688.

*Please pay*  
*18/9/07*



Section Four

## **Establishing policies & procedures**

# Introduction

Implementing a resource management program requires a review of your current structures, and the development of new strategies to involve and support employees, report program progress and provide guidance to the resource manager.

## Structure of this chapter

This chapter covers the role of the resource manager and the implementation team. There is some background on the change process within an organisation, including a couple of exercises and information on policy development and procedures.

The last part of the chapter deals with raising awareness and motivating people, ongoing communications and reporting, and resource management training.

## Aims of this section

By the end of this section you will understand the following:

- The role of the resource manager
- The role of the implementation team
- Charting resource management
- Developing a resource policy

# The Role of the Resource Manager

An important part of implementing resource management is defining and documenting all roles, responsibilities, authorities and the inter-relating functions that affect the resource efficiency of the company.

Management commitment and the appointment of a resource manager are the first steps to improving the resource performance of a company. The appointment of a resource manager is also an expression of senior management's support for resource management. A demonstrated top-down backing is an important part of changing attitudes and operating practices.

The position of resource manager is not outside mainstream management career paths. For example, resource managers can be directors or line managers through to capable, enthusiastic supervisors. The successful resource manager will eventually know more about inflows, outflows, production and service delivery processes than most managers in the company.

They should have an in-depth understanding of the company as well as its internal and external environments

## The big picture

A resource manager's role is to manage both the company's current resource needs, and its future resource strategy in an environment where supply/price fluctuations can have a significant impact on business performance.

In general terms, a resource manager is part strategist, part project manager and part change manager. They will be able to focus both on the technical aspects of their work, and on issues of communication and involvement.

The resource manager will be someone who is interested in new developments, who will want to assess and test new ideas and new ways of solving problems. They will also be someone who can plan and take a long-term view, especially as savings accrue in both short and long timeframes. They should be good communicators, with a solid understanding of how to introduce change in complex environments.

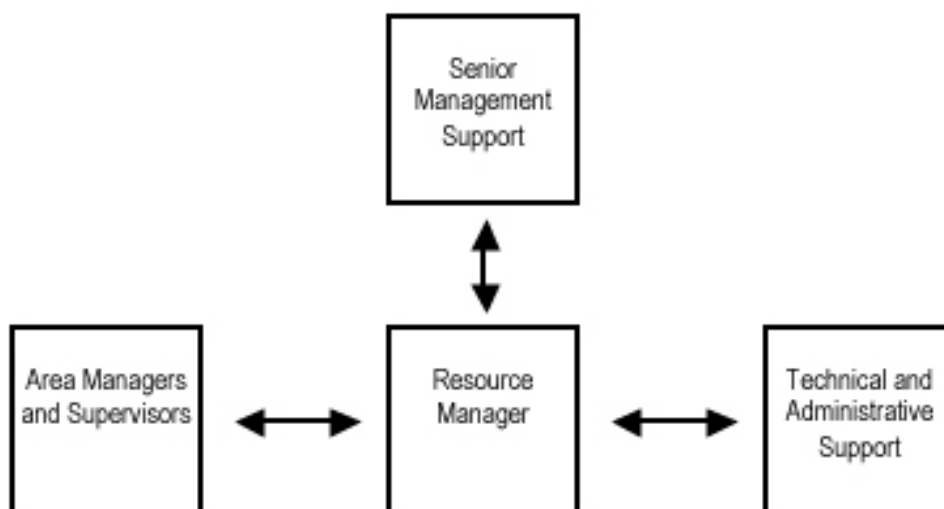
# Who is the Resource Manager

The resource manager will be a multi-skilled individual with;

1. good consultation, negotiation and liaison competency;
3. sound knowledge of production and preferably site services;
4. solid general technical background and preferably engineering experience; and
5. project management experience, especially in new systems implementation.

The diagram below shows the relationship of the resource manager to others who must support the effort for successful outcomes

- researching and identifying best practice resource management;



## Key functions of a resource manager

Managing resource consumption within a company requires a number of functions to be performed. These include:

- developing policy;
- monitoring and reporting resource consumption;

- implementing programs and policies to achieve resource savings;
- securing the support of management and employees; and
- influencing new works policies, tender specifications and construction briefs.

## Responsibility for resource management

The nature of the company will have an impact on the way various functions are performed by the resource manager. The following are some factors to consider.

- Size of the company
- Assets managed (e.g. factories, warehouses, office buildings, people, transport equipment)
- Number of sites
- Complexity of operations

## Key selection criteria for choosing a resource manager

- High-level communication skills, including liaison, negotiation and consultation skills
- Proven experience in project management
- An understanding of energy/water tariffs and the structure of the utility supply and waste management industry
- Familiarity with engineering systems and resource efficiency technologies
- A demonstrated capacity to learn new skills and integrate new knowledge into existing work activities
- Knowledge and experience of change management

## Other relevant skills, knowledge and experience

- Experience with implementing and promoting complex, multi-output resource management programs
- Motivation and willingness to undertake further training and skill acquisition
- Commitment to ecologically sustainable development and reduction in greenhouse gas emissions
- Ability to use word processing, spreadsheet and database packages

## How much time does it take?

The size of the company's total energy, water (including effluent discharge) and waste charge and the potential savings give the best indication of how much time should be devoted to resource management.

Depending on the size and activities of the company, the resource manager may need to be more than one person. It is sometimes a distributed function. In large multi-site companies, there may be a number of people with responsibilities, together with a coordinating committee.

However, the Sustainability Victoria research shows that best results are usually gained when the person or people entrusted with the task of improving resource performance are given clear and dedicated accountabilities that are matched by resources, especially time.

It is unwise to assume that someone who already has their hands full can effectively perform the task simply by being given a new title and a few more tasks to do.

The role of the resource manager will, in some ways, evolve as a resource management program develops within the company.

## Outsourcing resource management

External consultants may perform some resource management functions. Technical consultants can complete resource audits if the resource manager and the implementation team deem this necessary.

See Section 5, Infosheet 17, Guidelines for conducting an energy audit (page 106).

Specialists may be engaged to perform particular tasks such as tracking and monitoring resource use. Resource performance contracting may also be useful, particularly on a central plant which is generic for factors such as lighting, air conditioning, compressed air and steam systems. See Section 4, Infosheet 16, Energy performance contracting (page 96).

## Six steps to becoming a successful resource manager

1. Link resource into key management systems, e.g. ISO14000, greenhouse reduction programs, quality systems, or OHS systems.
2. Gain control over the way resources are used. Ensure they are being purchased in the most economical way; promote good housekeeping and waste reduction.
3. Measure and monitor resource performance, and compare with previous years as well as internal and external benchmarks.
4. Report resource performance simply and clearly to line managers and supervisors. Use a format to report resource performance to senior management that is integrated into other planning and business reporting processes. Ensure investment requests are backed by data and a realistic business plan. Take credit for what you have achieved.
5. Involve employees—seek their input and ideas. Share the credit for achievements with those who have contributed to them. This will motivate, create enthusiasm and further achievement.
6. Promote achievements to senior management and publicise success to employees to ensure ongoing support and enthusiasm for the resource management program.

## How to get the best results in your company

A major part of the resource manager's role is also leadership — negotiating assistance and support, motivating employees, canvassing opinion, providing feedback on ideas, and working with senior management to develop policy and strategy.

As a change manager, the resource manager undertakes the task of introducing change to attitudes and behaviours that may be deeply embedded in the company's culture. The role involves influencing and persuading, planning change and implementing it positively.

The resource manager will need the skills to (see Section 2):

- Define the problem/opportunity – using active listening and information to develop a vision and start to shape the project.
- Build a coalition of supporters – identifying stakeholders, then presenting the ideas and persuading to get buy-in.
- Mobilise resources - creating and working through a participative team to plan and carry out action, and deal with blockers.
- Manage culture by:
  - doing 100 small things often, consistently and with intent,
  - giving recognition,
  - using rituals and ceremonies,
  - using symbols and symbolic actions,
  - ensuring systems are congruent.

## Getting started

Introducing resource efficiency into the company mostly involves influencing people's attitudes and behaviours. To be effective in changing behaviours and attitudes, it is important to have some understanding of the people, the culture and change in your organization:

- Who must be committed to the change and who must carry it out.
- Identify stakeholders whose commitment is needed.
- Identify obstacles and gain support.
- Tools to help you plan this (see Infosheets 1A, 1B, 1C):
  - Commitment Planning
  - Force Field Analysis
  - SWOT Analysis

# Implementation Team

A team of enthusiastic people is needed to assist the resource manager throughout the process of implementing a new resource management program. Clear terms of reference must be defined for the implementation team.

These people will form the main resource for getting the message out to the rest of the company. It is therefore vital that senior management supports the efforts of the implementation team. This group should be retained after the process has been implemented to coordinate and regularly assess the resource management system.

The team may include:

- a senior manager;
- people who have shown an interest and whose assistance will be of benefit to the smooth introduction of the resource/environmental management program;
- a representative from each key function and from different levels so that all parts of the company are represented and participating;
- the production manager(s);
- the occupational health and safety manager(s);
- a finance manager.

Early tasks for the implementation team may include:

- Creating a vision
- Commitment planning
- Raising awareness
- Involving and motivating people to make changes
- Charting where the organization is at with resource management
- Developing a resource policy

# Charting Resource Management

A useful exercise for the implementation team is to plot their company's position on the sustainability management matrix. This will give the team a collective understanding of their company's current approach to resource management.

The sustainability management matrix provides a quick, easy to use, effective way to gain insight into your company's current approach to resource matters. It is based on the categories required to carry out a Federal Government Energy Efficiency Opportunities Assessment

The resultant graph will help you decide which areas present the best opportunities to make the most progress. You can exploit those opportunities to reduce your resource costs. Concentrate on the areas where you can readily make the most impact.

This is the beginning of the journey—your aim should be to move up through the levels towards current best practice and, in doing so, develop an even balance across all the columns.

It can also be useful to have other key managers complete this self-assessment exercise, to help raise awareness that resources are now being managed within the company.

Using the chart regularly will simplify your efforts to identify important resource saving opportunities that can improve the resource efficiency of your company



# Sustainability management matrix

Level	Leadership	People Organising	People Motivation	Information Data Analysis	Decision Making	Communication
4	Sustainability policy, action plan and regular review with commitment of senior management or part of corporate strategy.	Sustainability management fully integrated into management structure. Clear delegation of responsibility for Sustainability use.	Formal and informal channels of communication regularly exploited by Sustainability manager and Sustainability staff at all levels	Comprehensive system sets targets, monitors consumption, identifies faults, quantifies savings and provides budget tracking	Positive discrimination in favour of Sustainability saving schemes with detailed investment appraisal of all new build and plant improvement opportunities	Marketing the value of Sustainability efficiency and the performance of Sustainability management both within the organisation and outside it.
3	Formal Sustainability policy, but with no active commitment from top management	Sustainability manager accountable to Sustainability committee, chaired by a member of the management board	Sustainability committee used as main channel together with direct contact with major users	Monitoring and targeting reports for individual premises based on sub-metering, but savings not reported effectively to users	Same pay back criteria as for all other investments. Cursory appraisal of new build and plant improvement opportunities.	Programme of staff training, awareness and regular publicity campaigns
2	Unadopted Sustainability policy set by Sustainability manager or senior departmental manager	Sustainability manager in post, reporting to ad-hoc committee but line management and authority are unclear	Contact with major users through ad-hoc committee chaired by senior departmental manager	Monitoring and targeting reports based on supply meter data. Sustainability unit has ad-hoc involvement in budget setting.	Investment using short term pay back criteria only	Some ad hoc staff awareness and training
1	An unwritten set of guidelines	Sustainability management the part-time responsibility of someone with only limited influence or authority	Informal contacts between engineer and a few users	Cost reporting based on invoice data. Engineer compiles reports for internal use within technical department	Only low cost measures taken	Informal contacts used to promote Sustainability efficiency
0	No explicit policy	No Sustainability manager or any formal delegation of responsibility for Sustainability use.	No contact with users	No information system No accounting for Sustainability consumption	No investment in increasing Sustainability efficiency in premises	No promotion of Sustainability efficiency

Highlight one panel in each column to indicate at which level your Site is positioned for each Sustainability management activity  
If position is between two panels mark line between panels.

# Resource Policy

After senior management has committed itself to a resource management system which reflects the company's corporate goals, it is time to integrate resource management goals into existing policy statements (e.g. ISO14001) or focus on developing a stand alone resource policy.

A resource management policy is not necessarily the invention of a new policy document, but rather the integration and/or review of existing policy statements to include resource management. This is then supported by new strategies for resource management, decision making and improvement planning.

## Reasons for a resource policy

There are several reasons why a company benefits from the integration or adoption of a formal, written resource policy.

- A clear statement will give a sense of purpose, enhancing your chances of success.
- The senior management can judge the performance of its strategy against an agreed set of targets.
- Resource reduction matters are more likely to be understood and accepted throughout your company if they have the support of senior management.
- Your activities will be more successful if adequate resources are allocated to resource management.

This is an opportunity to put in writing the responsibilities and accountabilities for resource consumed by the company.

A resource policy establishes an overall sense of direction. It sets goals regarding the level of responsibility and performance required by the company, against which all subsequent actions will be judged.

As long as the company's commitment to resource reduction is left to operate on an unofficial basis, it can be derailed or its impact lessened by changes in management personnel, or even resource management staff themselves. A written resource policy will safeguard your company's decision to manage resource consumption.

# Developing a Resource Policy

Since no two companies are ever exactly alike, the resource manager and implementation team need to devise a resource policy that suits the particular corporate culture and meets the company's activities and priorities. However, the resource manager is more likely to gain widespread acceptance for the policy if everyone who is affected in some way contributes and is involved in its development.

The document may be collated and drafted by the resource manager but it should be vetted and amended by an interdepartmental committee or other appropriate forum. Departmental representatives should be invited to participate at the policy creation level and again if any reviews take place.

Where policy statements or environmental management programs incorporating ISO14000 already exist, your resource management statement needs to be included. However, if these policies do not exist, develop a resource policy statement that can be incorporated into such programs at a later stage.

Consultation is the key to a successful resource policy. Never give the impression that the policy is being imposed. The aim is to build a far-reaching commitment to the resource policy.

A formally documented resource policy expresses your resource management aims, and can consist of three parts:

1. An official and public statement of your company's commitment to achieve resource management objectives and protect the environment.
2. Clear specification of delegated responsibilities, monitoring and reporting procedures.
3. A plan to guide your resource management practices and provide continuity. The plan should include setting resource cost reduction targets, timetables and budgetary limits to achieve these aims, allocation of appropriate resources and annual review procedures.

# Policy Details

## The policy statement consists of three parts.

### Part 1

- Summary of core business to provide context.
- A statement of policy intent, endorsed by management.
- A statement of objectives, separated into short and longer-term goals (see Setting targets below).

### Part 2

- A list of designated personnel, their responsibilities and accountabilities for actions outlined, specified by name and post.
- Systematic procedures for recording, evaluating and controlling resource consumption on an ongoing basis, with regular reviews held by management to ensure improvements are identified and implemented. It is suggested that senior management conduct a performance review at least once a year. Existing energy-using equipment will need to be reviewed, opportunities for cost effective investment assessed, as well as appraising the performance of designated employees. Incorporate resource efficiency into new services, expansion projects, and when property and processes are being refurbished or renovated. This provides an opportunity to save on capital costs.
- A system for reporting resource performance figures to employees and shareholders through staff meetings, annual reports and other reporting avenues, along with a description of the resource management committee's structure and membership.
- Details of the nominated committee representative for each department and specification of internal and external lines of communication.

### Part 3

- A realistic action plan, specifying a time-tabled program for improved resource performance. A good starting point is to set a goal of a 5–10% reduction in resource costs and consumption (per unit of production) per year over a period of 3 years.

## Setting targets

In the buildings and manufacturing industry, the Sustainability Victoria's experience has shown savings of 10% are reasonable in the first year, and savings of 3–5% per annum being reasonable thereafter.

## Sample policy content

### Part 1—statement

#### Declaration of commitment

A1 Industries, produces XXX of widgets per year for ice-cream makers (company background information). As part of our environmental strategy, we are committed to responsible resource management and will practise resource efficiency throughout all our premises, plant and equipment, wherever it is cost-effective.

#### Policy

Our policy is to control resource consumption to:

- avoid unnecessary expenditure;
- improve cost-effectiveness, productivity and working conditions;
- protect the environment; and
- prolong the useful life of fossil fuels.

#### Objectives

Our long-term objectives are to:

- buy resources at the most economic cost;
- use them as efficiently as is possible;
- reduce the amount of pollution, particularly greenhouse gas emissions, caused by our resource consumption; and
- reduce, wherever possible, our dependence on fossil fuels, through the use of renewable energy.

#### Immediate aims

- To gain control over our resource consumption by reviewing and improving our purchasing and operating practices.

### Part 2—responsibilities and processes

#### Responsibilities

- nominate person responsible for tracking and monitoring resource consumption;
- nominate person responsible for expenditure;
- nominate person responsible for coordinating resource management activities;
- nominate members of the Implementation Committee and their roles;
- nominate person/committee responsible for formulating and implementing Resource Policy; and state that the resource manager will be located in the section(s) most relevant and supportive to the current phase of resource management.

#### Structure

The resource manager will make a monthly report to the line manager on resource management activities, and through the line manager, will make a quarterly report to the Resource Management Committee.

#### Lines of communication

Formal communication on matters relating to the control of resource consumption by end users or budget holders will be directed through the resource manager who will, where appropriate, bring it to the attention of his/her line manager, other senior managers, and to the Resource Management Implementation Committee (include an Organisational chart).

### Part 3—implementation plan

#### Action plan

During the coming year, the following resource management activities will be undertaken, in order of priority.

#### Resources

The number of people employed in resource management (indicate actions to be undertaken by designated personnel); their mix of skills and the amount of investment (10% of our annual expenditure on energy) correspond with the demands of these activities.

### **Review**

All resource management activities will be subject to periodic assessment and annual review in preparation inclusion in annual budget.

## **Ratifying the resource policy**

As soon as your policy statement has been written, it is imperative that it be formally adopted and ratified within your company.

Senior management needs to endorse the resource policy at board level or equivalent. Without this, the policy may not receive the managerial support it needs to succeed.

Subsequently, the policy can be distributed to all parties within the company that have an interest in its implementation. If necessary, meetings should be held to discuss the policy and its ramifications.

The aim is to give everyone a share in the policy, and to build good relations between the resource management team/individual and other members of the company who can influence the intentions of the Resource Policy.

## **A formal written resource policy acts both as:**

- a public expression of your company's commitment to resource conservation and environment protection; and
- a working document to guide your resource management practices.

It is in your company's best interest that its support for resource management is expressed in a formal, written declaration of commitment, accompanied by a set of stated objectives, an action plan for achieving them and a clear specification of delegated responsibilities.

# Summary

The allocation of responsibilities in a resource management program ensures the most appropriate person carries out each necessary task. It is also the means by which individual members know what tasks they are responsible for as part of the overall resource management system.

It should be made clear that responsible resource use is an integral part of every employee's role. However, the resource manager and implementation team are there to provide guidance and advice.

For effective implementation, a company should develop the capabilities and support mechanisms necessary to achieve its resource policy, objectives and targets.

## Things to do

1. Clarify your role as resource manager with specific responsibilities and authority. If appropriate, draft a position description (use the sample description as a guide) and have this ratified by management.
2. Establish an implementation committee—join an existing management committee or establish a committee or support group for reporting and ideas generation.
3. Negotiate with senior management and the committee various options for rewarding high achievers, and establish a rewards budget.
4. Set up reporting and feedback procedures with line managers and major resource users.
5. Delegate responsibilities as appropriate (e.g. who is the appropriate person to enter tracking data into a spreadsheet).
6. Draft a resource policy to be ratified by the implementation committee and endorsed by the CEO.
7. Wherever possible, incorporate resource policy into an existing management policy, such as the environmental policy.
8. Draft a resource management strategy statement, including a policy statement, communication and reporting procedures.
9. A plan of action can be added at a later stage with details of resources required, responsibilities and a timeline.

# InfoSheet 11

## Sample duty statement of resource manager

This can be adapted to suit the requirements of your company.

### Key purposes

- To achieve company objectives and continuously improve performance by ensuring the effective use of resources and a reduction in waste generation.
- To improve the amenity and value of company assets such as buildings and facilities while ensuring an efficient, low-cost operation.
- To plan for the ongoing availability, continuity and cost effective supply of all inputs so as to help the company meet its goals now and in the future.
- To manage resources and environmental processes so as to enhance relationships with customers and the broader community.

### Key result area/main responsibilities

- Oversee the formulation and implementation of a resource policy.
- Introduce systems to provide management and decision making information about resource consumption.
- Report appropriate resource consumption information to accountable staff and senior managers.
- Develop policies and procedures for the purchase of energy, water, fuels and services, and assist with utility contract negotiations.
- Raise awareness of resource management throughout the company and maintain motivation to reduce consumption.
- Introduce and maintain good housekeeping and plant operation procedures.
- Identify and implement training and education at all levels to develop appropriate skills and understanding of resource efficiency.
- Identify resource saving opportunities and manage the implementation of resource saving measures.
- Formulate an investment/works program for reducing resource consumption.
- Introduce appropriate monitoring and evaluation procedures for resource management projects and identify costs/savings/payback periods; contribute to tender, contract and specification processes for new facilities and refurbishments to ensure resource efficiency becomes part of the design and construction process.



# InfoSheet 12

## Sample policy statement #1

### Environmental policy

ABC & Co is one of Australia's leading products manufacturing and exporting companies and has a sound record of environmental achievement. We are guided by corporate policies in our dedication to minimise the impact of our operations on the environment and to protect human health and conserve resources.

The AS/ANZ ISO14001:1996 standard has been adopted for our Environmental Management System and we have a commitment to demonstrate due diligence in the management of our environmental activities.

In order to ensure that these commitments are met we will:

- identify, review and manage the significant environmental aspects of our business and will integrate these activities with our quality assurance and health and safety programs;
- apply the principles of cleaner production to our operations and design products, processes and packaging to prevent pollution;
- be responsible and accountable for continual environmental improvement through the setting of appropriate environmental objectives and targets;
- achieve compliance with applicable environmental standards and satisfy the requirements of the Memorandum of Understanding with the EPA;
- continue to be responsive to the environmental concerns of our communities; and
- communicate the substance and intent of this policy to employees and all stakeholders.

Managing Director and CEO

September 2007

# InfoSheet 13

## Sample policy statement #2

### Protecting health and the environment

Sustainable economic development is important to the future welfare of the company and to society in general. To be sustainable, economic development must provide for the protection of human health and the world's environmental resource base. It is company policy that its operations, products, and services accomplish their functions in a manner that provides responsibly for protection of health and the environment.

The company is committed to meeting regulatory requirements that apply to its businesses. With respect to health and environmental concerns, regulatory compliance represents a minimum. When necessary and appropriate, we establish and comply with standards of our own, which may go beyond legal mandates. In seeking appropriate ways to protect health and the environment, the issue of cost alone does not preclude consideration of possible alternatives, and priorities are based on achieving the greatest anticipated practical benefit while striving for continuous improvement.

The company's policy of responsibly protecting health and the environment is based on the following principles.

- Protection of health and the environment is an important consideration in business decisions. Consideration of potential health and environmental effects as well as present and future regulatory requirements is an early, integral part of the planning process. Company products, services, processes and facilities are planned and operated to incorporate objectives and targets which are periodically reviewed so as to minimise to the extent practical the creation of waste, pollution and any adverse impact on health or the environment.
- Protection of health and the environment is a company-wide responsibility. Management of each activity is expected to accept this responsibility as an important priority and to commit the necessary resources. Employees at all levels are expected to carry out this responsibility within the context of their particular assignments and to cooperate in company efforts.
- The adoption and enforcement of responsible, effective, and sound laws, regulations, policies, and practices protecting health and the environment are in the company's interest. Accordingly, we participate constructively with government officials, interested private companies, and concerned members of the general public toward these ends. Likewise, it is in our interest to provide timely and accurate information to our various publics on environmental matters involving the company.

The Vice President, Environmental and Safety Engineering, and the Executive Vice President, Corporate Relations (with respect to employee health issues) are responsible for interpreting this Policy Letter in consultation with the Vice President/General Counsel. It is recommended that all subsidiaries and affiliates adopt policies similar to those set forth in this Policy Letter.

This Policy Letter revises Policy Letter No.17 dated 31 October 1989

# InfoSheet 14

## Sample policy statement #3

### ABC &CO environmental policy

The Company respects the environment and is committed to environmentally sound business practices throughout our operations. The Company is committed to implementing an Environmental Management System (EMS) that brings real and measurable improvements. This system is designed to meet the highest standards of environmental responsibility, based on the guidelines of the ISO 14000 international standards.

It reflects the Company's world wide policy supporting the International Chamber of Commerce Business Charter for Sustainable Development—looking at ways of developing economic growth while protecting the environment.

In this way the Company aims to do more than just comply with government regulations. We are constantly looking for new ways not only to minimise waste, pollution and packaging, and save resource and resources, but to address these concerns early in product and process design.

We encourage our employees to take a personal stake, through their own actions, in sound environmental management. In the same way, the Company takes a personal stake in the communities in which we operate. We want to communicate with our customers and community groups and consult with government and industry groups so that environmental concerns can be addressed openly and responsibly.

In particular, the Company is committed to:

- implementing a comprehensive environmental management system across our business including production, marketing, sales, distribution and support services;
- setting up an Environmental Advisory Group to develop a framework for managing environmental improvement throughout the Company. This group will work with the divisional and site management teams who will be responsible for the implementation of this policy. Environmental Officers at each site will assist these teams with regular reviews and corrective action for continuous improvement;
- looking for practical packaging solutions which reduce both the weight and volume of our packaging, minimise waste, increase our use of recyclable material and invest in new technologies;
- supporting conservation of raw materials and resources such as water and energy through reuse, recycling and minimising waste;
- encouraging a similar environmental commitment among our suppliers and contractors;
- encouraging a commitment to individual environmental responsibility among our employees by providing training and raising awareness.

# InfoSheet 15

## Sustainability management matrix

An excellent way to determine your organisation's level of commitment to resource management is to use the Sustainability Management Matrix. This matrix provides a quick, easy-to-use, and effective way to gain insight into your company's current approach to resource matters.

This is a modified version of the previous energy management matrix and is updated to reflect Energy Efficiency Opportunities methodology and terminology.

The matrix is on Page 84

## Charting your position

Each column of the chart deals with one of six energy-related issues:

- Policy
- People Organisation
- People Motivation
- Information systems
- Decision Making
- Communication

The ascending rows from 0 to 4 represent an increasingly sophisticated approach to these issues.

Place a mark in each column. The mark should be in a row that best represents your company's current approach to that aspect of resource management. Join the marks to form a graph line.

The resultant graph will help you decide which areas present the best opportunities to make the most progress. You can exploit those opportunities to reduce your utility bills. Concentrate on the areas where you can readily make the most impact.

This is the beginning of the journey—your aim should be to move up through the levels towards current best practice and, in so doing, develop an even balance across all the columns. Using the chart regularly will simplify your efforts to identify important resource saving activities that can improve the resource efficiency of your company.

# InfoSheet 16

## Energy performance contracting

'Imagine yourself in an economic climate filled with down-sizing businesses, and reduced government budgets and stringent environmental regulations. Sound familiar? Now, imagine a energy efficiency program that requires no up-front investment by the customer and reduces energy costs by 20% to 30% and **GUARANTEES** that energy savings will pay for all technological and efficiency upgrades. Does this sound like snake oil or a cost-cutting bonanza?'

Johanna Munson, Pollution prevention through energy efficiency

Energy performance contracting is a new and emerging service in Australia. Widely used in North America and Europe for more than 20 years, it is an innovative way for businesses to cut their utility bills and improve their equipment.

Overseas experience has shown that performance contracting is a convenient and low risk way to cut energy use and reduce the costs of maintenance and plant ownership. Typically, Energy Performance Contracts can be used for hospitals, schools, office buildings, hotels, industrial sites and shopping centres.

They are an effective way of providing new energy efficient capital equipment, energy savings, or reducing maintenance costs. Under an Energy Performance Contract the contractor generally provides the capital, equipment installation and maintenance for a facility. In exchange, the contractor receives a fee over the length of the contract, which is generated by the equipment energy savings.

The best applications for an Energy Performance Contract are in high capital cost equipment and systems with high savings-to-investment ratios.

A performance contract might typically enable energy efficiency measures such as those listed below, only without the facility owner having to make any up-front financial commitment.

- Computerised energy management systems
- Centralised control of heating, ventilation and air conditioning equipment
- Upgraded operational equipment or building controls
- Repair and replacement of ageing systems
- Energy efficient lighting retrofits
- Equipment maintenance
- Cogeneration facilities

## How it works

Energy performance contracting works like this. A contractor will design, construct and in many cases, finance improvements to the energy efficiency of a client's facility. The work and services the contractor undertakes are paid for by the savings which are gained from using less energy, operating more efficiently and cutting down maintenance costs.

For example, a hospital may be unable to put its scarce resources into the upgrade of its plant. Working with a contractor, the hospital can upgrade its energy management systems and equipment. As a result, the hospital will use less energy, which means savings on the annual utility bills.

What happens to the savings will depend on the initial agreement between the hospital and the contractor. The cost of upgrading or new equipment, the requirement for up-front financing, and the way savings are split can vary according to the contract specifications.

## Types of energy performance contracts

**Fixed fee:** the client and contractor agree on capital and upgrading works, which are then undertaken by the contractor. As a result, the client makes the savings and, in turn, pays the contractor a set regular fee for the ongoing service provided. This option does not require a large up-front investment from the client.

**First out:** the energy contractor retains 100% of the energy savings until all project costs, including an agreed upon profit, are paid out. The contractor generally sells the plant to the client at residual value when the capital cost is paid off.

**Shared savings:** the contractor and the client each receive a fixed percentage or dollar value of the energy savings over the duration of the contract.

**Chauffage:** the contractor pays the energy bills over the life of the contract and the client pays a fee only for the delivered service on a regular basis (much like many existing building maintenance contracts).

## What to look for in a contract

A typical Energy Performance Contract would include the following.

- A full energy audit, including an inventory of facility and energy systems and identification of environmental compliance issues.
- A comprehensive energy analysis which includes energy reduction opportunities and historical analysis of usage patterns and tariff schedules.
- Selection and transparent costing of energy conservation measures.
- Arrangement of financing.
- Design and installation specifications.
- Personnel training and handover regime.
- Implementation of monitoring and review programs.

Savings are specified in writing. If the savings go unrealised, the contractor pays the client the shortfall. Contracts will typically run between 4–10 years.

When considering a Energy Performance Contract recognise that developing and adhering to a change in the way your organisation uses energy, may also imply a change in the way your organisation does business.

For some organisations, the changes are relatively painless, while for others, the changes require significant planning and coordination amongst different divisions or work sites.

The contract may be limited to specifics like building energy systems, or it may be used more creatively as a way of integrating all your environmental management activities under one umbrella. As well as energy consumed, a contract can deal with waste management programs, recycling, contaminated site—clean-up or any aspect of good environmental practice.

## Summary

Energy Performance Contracting has proved especially useful for commercial building owners, industrial sites, larger hospitals, government and educational institutions. It provides a way to upgrade ageing energy inefficient facilities without risking capital. And of course, the contractor is responsible for the operation and maintenance of the new equipment or services.

The contractor takes responsibility for analysis, design, construction, commissioning, performance monitoring and operator training. As in many outsourcing situations, financial risk is transferred to the contractor.

However, performance contracts are just one part of your organisation's energy management program.

A comprehensive program that includes policy implementation, communication and reporting strategies, purchasing guidelines and energy monitoring processes will provide ongoing savings for your organisation

## Section Five

# **Assessing Opportunities**

# Introduction

A resource management action plan guides a company's efforts to improve resource efficiency. It represents a commitment to saving energy and other resources. It creates a management and operational system through which resource efficiency objectives and requirements can be developed, monitored and realised.

The planning and management of any resource efficiency action plan relies on data that accurately and comprehensively monitors trends in resource use.

It is important to assess the current status of the company before developing an action plan.

This initial review is the means by which a company establishes its current position with regard to resource use.

## Aims of this section

Upon completion of this section you will be able to do the following.

- Identify opportunities for reducing resource consumption from staff suggestions and resource assessment reports.
- Develop an action plan for implementation.
- Incorporate regular reports and annual reviews into your action plan, and present it as a business case study.



# Resource Management Action Plan

The scope and detail of the plan will depend upon the resources available, especially time, and possibly upon the proposed coverage of the resource program. The plan may focus on low cost, resource saving practices and procedures as well as resource saving technologies, especially when there are opportunities for an upgrade, maintenance or other changes to plant and equipment.

This chapter will identify where to find resource saving opportunities, how to assess them and prioritise them, and then how to draft an action plan. An action plan will have selected best opportunities, prioritised them and identified resources, budgets, and financial returns for each activity. It will also have a timeline.

# Identify Resource Saving Opportunities

## Where to look, who to talk to

- Consult all employees for resource saving ideas, especially the people at the coal face. They will have an accurate understanding of resource flows and use and will be in a good position to make suggestions.
- Consult internal engineering sources for existing projects 'in the bottom drawer', and for a better understanding of the options and possibilities.
- Review Sustainability Victoria's site-visit report and recommendations on your resource use. The report will include details of resource saving actions and will concentrate on early winners wherever practical. These recommendations are a valuable source of information upon which to base your resource action plan.
- Process equipment suppliers may be able to provide resource efficient options for existing equipment, as well as more efficient new equipment.
- Gather existing resource audits and other reports and list all recommendations. Find out whether there have been similar reports completed in the past few years and review the information for relevant projects that can be included in the action plan.
- If necessary, arrange for new studies or audits after reviewing all of the above ideas.
- Identifying resource saving areas usually falls into three broad categories:

## Reduction of obvious waste

People should be able to contribute ideas on minimising waste in their area. Good housekeeping practices can be boosted through a staff newsletter or by promotional events. Many of these ideas will be low cost or no cost activities such as simple changes to work procedures and practices.

Areas to tackle first include such things as steam and compressed air leaks, equipment running for

no purpose, unnecessary heating and cooling of conditioned spaces, excessive lighting levels, incorrect thermostat settings, etc. Tackling these areas will create a sense of achievement and early wins on the board. The value of chalking up some immediate success is important for motivation and commitment.

When developing an action plan, it is recommended that low cost/no cost activities are implemented along with major projects. Smaller projects collectively can save a considerable amount of energy, water, money and greenhouse gas emissions, as well as enhance the overall results of the resource management program. Making worthwhile resource savings through good housekeeping and small projects will help you push through larger projects.

## Improvements to equipment

This area involves equipment changes to reduce resource consumption and could include improved control equipment, newer more energy efficient burners, improved insulation, more efficient lighting, etc. These initiatives will generally yield more significant resource savings, but will involve some cost.

Many small equipment changes need not cost a fortune and can happen early in the program. For example, replacing inefficient incandescent light bulbs with highly efficient compact fluorescents is a quick and easy means of implementing energy savings.

## New processes or equipment and waste heat recovery systems

These areas may yield both spectacular resource savings and productivity gains, but almost always require high levels of capital investment.

The reduction of obvious waste remains the most fruitful area for cost reduction. The second and third categories can be more difficult to evaluate and may require outside assistance to quantify the costs and benefits.

Contact Sustainability Victoria for assistance.

# Preparing an Action Plan

Once the review of potential resource savings activities has been undertaken, the company is in a position to make decisions regarding priorities. A plan for future action is then developed.

This need not be a stand-alone process. For many companies it is far more effective to integrate resource planning into the general strategic planning of the business and its operations.

The action plan needs to be manageable in size and clearly structured so that it provides clear information, and can be easily used as a key document in the development of the resource management program.

In preparing the action plan, you need to identify efficiency concerns and problem areas and, if possible, prioritise these and other potential impacts and describe the weaknesses of the existing resource management system.

In preparing a resource management action plan do the following:

- Consult people involved in finance, purchasing and management across the company. The implementation team will be of great assistance here.
- Consult internal technical experts and, if necessary, external experts.
- Arrange for training and programs to raise awareness of resource management. Where possible, it may be included as part of the environmental management system's awareness and training.
- Ensure managers are aware of the importance of the planning process for resource management. This will secure their input on appropriate priority of the tasks including housekeeping and reporting.
- Consult company procedures for formatting your planning proposal.
- Seek support from the implementation team, particularly the senior manager on the team. They will help you present the plan for approval in a way likely to garner maximum support. The implementation team is also the key to propagating the action plan and its activities.

# Presenting an Action Plan

It is important to present an action plan, using a format suitable for your company's planning procedures. Once your plan of action has been drafted, it will need to be presented to management for approval.

You can't do everything at once. Make sure priorities are assigned to the various resource management activities and a structured timeline is built and used. Activities like developing a basic understanding of resource use patterns, awareness raising, and housekeeping improvement will be early actions. It is clear that involvement is an interactive process.

Once you understand resource use and the control actions required, you need to involve others. Make sure your timeline accommodates this need. Activities and projects requiring significant funding as well as developing reporting formats will take a little longer and need planning.

Make sure activities needing prerequisite actions are actually done after these prerequisite activities.

## Areas that may be included in an action plan:

- Summary of the background data (e.g. using an initial resource review of the whole facility which can be used to establish the baseline for the development of the resource management program).
- The purpose and scope of the plan.
- Priorities for action (e.g. issues requiring urgent action; issues where no immediate action is required, but there is a need for longer term improvement; and strategically important areas for future development).
- The process or means of achieving the objectives and targets(s).
- The timeframe and resources required.
- Allocation of responsibilities.
- Evaluation processes to assess the effectiveness of the program.
- An executive summary outlining the key information on projects (e.g. potential resource savings and paybacks, greenhouse gas emissions, quality improvements, monitoring of process, savings in maintenance).

# Implementing the Action Plan

Implementation of the action plan will take time. The process will vary markedly between companies, depending on such things as the size of the company, resources available, management commitment and existing resource efficiency practices. The establishment period for an effective resource management program may vary from 6 months to 3 years.

## Revise and review

As the implementation process proceeds, the plan may need to be revised and updated. Regular reporting to line managers will help monitoring and revision of the progress. Resource requirements will also need to be reviewed periodically to ensure they are adequate. Make sure reporting is included in your action plan.

Evaluation of activities and annual reviews are essential for the ongoing success of the resource management program, and an integral part of the continuous improvement process. The results of the review can be built into the action plan for the following year. Make sure an annual review is included in your action plan.

### **An annual review of the resource management program will require you to:**

- review and evaluate progress over the past 12 months;
- note any changes in the strategic plans for your company;
- evaluate any new projects and ideas from staff or external experts; and
- develop a new action plan for the next 12 months, after considering the above.

## Promote the action plan

Once a company has developed its action plan statement there is an ideal opportunity to raise awareness of what is happening. The main objective here is to motivate staff so they become part of the implementation.

Best results for the effective implementation of a resource management action plan are usually obtained if employees are involved at all stages in the process. Experience has shown that cooperation is more easily obtained if awareness sessions are conducted at the earliest opportunity. Employees are then able to prepare for the introduction of the resource management system, and appreciate their involvement.

Some employees will have been involved in developing your action plan, perhaps as part of the implementation team. Use them to build awareness with their work colleagues. It is important to ensure that the resource action plan becomes widely known and understood throughout the company.

There are a number of ways to raise awareness of the action plan:

- Publicise the plan in the company magazine or newsletter together with additional information on the approach that will be taken towards resource management.
- Produce the plan in poster format and display it prominently.
- Include a discussion of the plan in team meetings and management meetings..
- Don't forget the grapevine—it can be the most effective method of all.

## An action plan launch

It is also worthwhile to consider launching the action plan internally. This should be attention grabbing. Some suggestions follow.

- Developing an identity for the implementation team within the company by adapting a name or logo. This raises the profile of the team and the implementation strategy.
- Making the launch part of an open day.
- Contacting peak interest groups that may be associated with local resource or environmental issues. Invite them to be part of the launch process.

# Summary

Commitment to the resource action plan and its targets and objectives must come from throughout the company. The whole program of resource efficiency must be the genuine responsibility of all levels of the company. Its performance should be regularly measured and compared against results in other areas of organisational activity.

## Things to do

- Gather resource efficiency ideas from line managers and major users
- Analyse tracking data with key staff members to generate project ideas
- Review Sustainability Victoria's report on potential resource saving projects as well as other existing audit reports
- Identify and prioritise all activities in terms of costs and savings over the life of the project
- After completing the above tasks, consider the need to contract a specialist to undertake a detailed study or resource audit
- Prepare an action plan according to your company's strategic needs
- Include internal/external resource requirements
- Include an action plan with targets, after consultation with the implementation committee and all stakeholders

Present your proposal to management and promote it to people in the format of a business plan

# InfoSheet 17

## Guidelines for conducting an energy audit

One way of identifying energy improvement opportunities in your company is to conduct an energy audit. However, the term energy audit is often misused or over-used. An energy audit identifies potential saving opportunities arising out of a stock-take of the current energy use and includes recommendations for energy efficiency improvements. Its scope can vary widely, and can include an entire building or plant, or even energy use associated with a specific process.

An energy audit provides the baseline of your organisation's current energy use and it is vital that the report recommendations are incorporated into an energy management action plan.

There is an Australian Standard AS3598 which covers in detail the methodology of completing three types of energy audit. The methodology used for energy auditing equally applies to waste and water auditing.

There are three levels of audit defined in the standard. They can be summarised as:

### **Level 1:**

Walkthrough Audit: Look mainly for low hanging fruit

### **Level 2:**

Includes an energy use analysis and more thorough investigation and evaluation of opportunities.

### **Level 3:**

Detailed analysis of energy use and energy performance and thorough evaluation to +/-10% accuracy of opportunities

The standard is currently being reviewed as its methodology is in conflict with that required by the Federal Government's Energy Efficiency Opportunity Program. Therefore the standard is simplified as discussed below.

An audit can be conducted by an employee of the organisation or by an external resource auditing firm. The scope of an audit starts with the (simple) walk-through audit to a more detailed study which may require the hiring of an audit consultant.

## Walk-through energy audit/review

This is an initial review of energy use within an organisation. It may take about one day to do, in addition to the time required to prepare a summary report. A walk-through review will determine whether there are potential areas to reduce energy consumption. An analysis of gas and electricity bills for the previous year(s) is usually undertaken as part of this review.

It is advisable to undertake an initial review of your energy use before deciding to undertake a detailed energy audit. This will give you an understanding of the scope of work to specify in the consultancy brief.

## A detailed energy audit

This is a comprehensive study of energy use. Data collection usually takes several days, and the study may range from a single building to several processes on a large site. Sustainability Victoria can assist in designing a brief to suit your company's needs.

The work undertaken during an audit may include the following.

- Investigating the usage of all types of energy consumed and energy using equipment within the building or complex.
- Identifying the energy usage of all major heating and cooling applications and its percentage against total energy use.
- Identifying cost-effective measures to improve the efficiency of energy use.

- Estimating the potential energy savings, indicative budget costs and payback periods for each recommended action.
- Reviewing energy management strategies, including monitoring systems and evaluation processes.

## Prepare for a detailed audit

Before commencing an audit, it is recommended that you compile a comprehensive set of existing site and energy data. This is easy to do but it will take time to collate. Provide the following data.

- Site plan and building drawings, and an inventory of major plant and equipment.
- Electricity, gas and fuel accounts from the past 24 months. If you don't have energy accounts on file, ask your energy retailer for the relevant information.
- Activity and/or production levels such as the number of widgets produced per month for industrial plants, bed days for hospitals or square metres and annual hours for offices and warehouse space.
- Sustainability Victoria bill tracker will help you to collate the relevant data.

Once you have completed this assessment, you will have a greater insight into your organisation's energy use. Then decide whether you need to undertake further studies or hire an external auditor

In addition, it is important to do the following.

- Inform line managers in each area who will liaise directly with the person conducting the audit in relation to audit details.
- Ensure staffs are aware of the audit and ask for their suggestions on improving energy efficiency or reducing energy consumption in their area. Invite the auditor to liaise with operational staff.

## Where do I find an energy auditor?

Energy Consultants are listed in the Yellow Pages under the heading 'Energy Conservation Management Consultants and/or Services'. Alternatively, Sustainability Victoria can provide a list of experienced audit consultants.

## Cost of an energy audit

As a general rule, an energy audit can cost up to 10% of your site's current energy bill.

**Just remember that there is a balance to be struck between cost and benefit. Spending large sums on an audit may mean less money for implementation.**

## Obtain quotes and proposals

Prospective energy auditors should be requested to visit your site as part of the preparation of their audit proposal.

## Selecting an energy auditor

There are a number of approaches available for selecting a consultant. There are principles that should be followed regardless of the type of consultant being considered. Standards Australia, AS4121–1993, titled Code of ethics and procedures for the selection of consultants is a useful reference for the principles and procedures that could be followed in selecting a professional adviser.

The Property Council of Australia's (formerly BOMA) Energy Guidelines 1994, recommends a point scoring system to assist organisations in evaluating energy audit tenders. Evaluation criteria used in the selection process is outlined below. Points ranging from 1–5 can be applied to these criteria.



A score of 0 for any criteria would disqualify a company.

- Relevant experience (previous work of type required)
- General track record (reputation)
- Technical skills (people, specific abilities)
- Management skills (quality control)
- Methods (reporting, sound work plan, data gathering, analysis)
- Measurement equipment for data collection (comprehensive details of what will be used)

It is recommended that three quotations be obtained from energy consultants.

## Audit results

The results of an energy audit need to be compiled into a clear and concise energy report. The report needs to include the following components.

- Table of contents
- Executive summary, with recommendations, in order of priority, and estimates of their implementation costs and payback periods
- Relevant building data
- Equipment data with measurements or estimates of the energy consumption for individual plant items
- Actual energy consumption records
- Energy use analysis in graphical form
- Energy/water balance
- Details of energy efficiency improvements
- Comparison of actual consumption with an analysis of estimated results from recommended actions. This part of the report may need to be presented according to departments/sections for implementation purposes
- Recommendations to include energy management strategies such as monitoring systems and review processes.

## Act on report recommendations

To make an energy audit worthwhile, the recommendations from the audit report need to be incorporated into your energy management plan of action.

The following initiatives could come from an audit report.

- Changes to operational procedures
- Review of maintenance which affects the efficient use of energy
- Modification or replacement of existing plant and/or equipment
- Further in depth studies of the potential to reduce the energy use of particular plant or processes
- A commitment to ongoing training and information dissemination to increase awareness.

Sustainability Victoria can assist you with the initial review of energy use and carry out an initial walkthrough audit.

# InfoSheet 18

## Energy efficiency opportunities assessment

This is a Federal Government program that uses a 'business improvement' model approach so that organisations carry out a rigorous and comprehensive assessment of energy use and identify improvement opportunities.

The website

<http://www.energyefficiencyopportunities.gov.au/> has all the details on what is required but the key points are summarised below:

- Applies to all company's using > 0.5PJ/yr
- At least 80% of energy must be assessed by 2011
- All sites over 0.5PJ need to be assessed
- There must be clear leadership from top management
- People and money are made available to carry out the assessment
- Skilled, experienced and knowledgeable people are involved in the assessment (solely or mostly using consultants is not acceptable)
- There needs to be detailed analysis of energy use against appropriate metrics
- Benchmarking needs to be carried out
- Complete mass and energy balances
- Assessments need to use horizontal and vertical slices across the company
- All opportunities costs and benefits, with a payback of <4 years need to be evaluated to +/-30% accuracy
- There must be a transparent decision making process
- The main board need to be aware of the decision making process
- A public report, signed off by the Companies most senior executive is produced every year

- This report needs to be readily available to all stakeholders

The EEO methodology is proving more successful at engaging companies than the AS 3598 energy audit as it does fit more readily into existing business improvement processes and demands that company personnel are actively involved

# InfoSheet 19

## Renewable energy

Renewable energy effectively utilizes natural resources such as sunlight, wind, tides and geothermal heat, which are naturally replenished. Renewable energy technologies range from solar power, wind power, and hydroelectricity to biomass and biofuels for transportation.

These sources of energy are carbon neutral and with the need to combat climate change, offer an alternative to fossil fuel energy supplies. However, with Australia's currently low energy prices, renewable sources of energy are generally not competitive. With the introduction of carbon trading, which will put a price on CO<sub>2</sub> emitted to the atmosphere, the economics of renewable energy sources will improve.

### Mandatory renewable energy target

The Government's Mandatory Renewable Energy Target commenced on 1 April 2001. The *Renewable Energy (Electricity) Act 2000* requires the generation of 9,500 gigawatt hours of extra renewable electricity per year by 2010. There are legally enforceable annual milestones towards this target.

To achieve this target, electricity retailers must purchase a percentage of their electricity from renewable sources to obtain Renewable Energy Certificates. As renewable energy is generally still more expensive than from fossil fuel, this increases electricity costs, which are passed on to the consumer. This typically adds around 1-2% of the total bill.

## Renewable energy types

Below is a summary of the common renewable energy types with comments on their current appropriateness for Australian business.

### Solar photovoltaics

Photovoltaic cells convert the light from the sun into electricity. Current commercially available solar panels are approximately 15% efficient, although laboratory scale units have reached over

40%. Photovoltaics is still an expensive source of electricity and are normally best used in areas where supplying electricity would be expensive due to distance. An example could be a light in a remote part of a site. When using photovoltaics, it is necessary to provide either batteries/generators for power at night

### Solar hot water

This uses the heat energy from the sun to heat hot water through the use of solar panels. Black bodies absorb significant heat from the sun and pumping water through these heats the water to over 60°C even in modest sunlight.

They are now made from materials, stainless steels/ceramics that will give a long life and are competitive with peak electricity and diesel hot water systems for domestic and commercial applications. There are grants available for domestic installations.

### Wind power

At present wind power, through the use of windmills is the most common form of renewable energy being installed world-wide. Modern wind turbines can generate up to 5MW, with blade diameters of 126m. Wind turbines are quoted at maximum power in strong winds. Therefore they are sited in windy locations. In Europe off-shore wind farms are now in operation. Typically, a wind turbine will generate 30-35% of rated power over a year and therefore it is not suitable for base load power

### Wave power

The oceans have huge stores of energy. Wave power involves capturing the vertical motion of the waves and converting this to electricity. This method has not yet been proven on a commercial scale. The main issue is making the generation system robust enough to stand the forces involved.

### Tidal power

This uses the energy in the water as the tide rises and ebbs to drive a form of turbine. One example is like an underwater windmill, but with

much smaller diameter blades as water is 800 times as dense as air so contains more energy. For the reasons with wave power these are still not proven commercially

With wind and tidal power, once the technology and engineering is proven they offer the best renewable option as there is almost limitless power in the oceans.

### **Hydro electricity**

This uses the energy in flowing water to drive a turbine to make electricity. These can produce as much power as 12 Loy Yang power stations. There are now some concerns that hydro-electricity is not as carbon neutral as initially believed due to impacts of rotting vegetation beneath the huge reservoirs needed to drive the schemes.

### **Biofuels**

Biofuels are anywhere where vegetation is converted into an energy source. This could be the bagasse (waste matter from sugar refining), through wood specially grown to provide power.

Biofuels are effectively carbon neutral as the CO<sub>2</sub> captured when they grow equals the CO<sub>2</sub> emitted when they are burnt.

The main biofuels used in transport are ethanol used in petrol engines and bio-diesel which can be made from nearly any organic material (including waste cooking oil). In Brazil, 90% of the automotive fuel use is ethanol.

### **Landfill/sewage treatment methane**

As any organic matter decays or is broken down methane is given off. Methane is a potent greenhouse gas with a global warming potential that is 21 times stronger than CO<sub>2</sub>. It is possible to capture this methane and burn it in gas turbines or diesel engines to generate electricity.

### **Clean coal technology**

Clean coal technology involves firstly reducing the CO<sub>2</sub> emissions from a coal fired power station either by improving efficiency or converting the coal into a gas. Converting coal into a gas means the lower emission Combined Cycle Gas Turbine technology can be used.

The CO<sub>2</sub> that is still produced is then captured and concentrated and pumped into the ground in a process known as geo-sequestration. This process involves significant extra capital and if proven successful will increase electricity costs.

At present clean coal technology will not be carbon neutral because there will still be some CO<sub>2</sub> (about 10%) lost to the atmosphere

There is an alternative clean coal technology being developed where the coal is converted into hydrogen gas. This produces no CO<sub>2</sub>.

# InfoSheet 20

## Carbon neutral

Carbon neutral means that your operations emit no net CO<sub>2</sub> into the atmosphere, either from the direct burning of fossil fuels or from the purchase of electricity. This means that your organisation is not contributing to global warming. How is this achieved?

### Step 1 - measure emissions from all sources, this is

- Fuel purchased, natural gas, LPG, diesel, coal, fuel oils, petrol
- Electricity purchased
- Waste generated
- Refrigerants
- SF<sub>6</sub> in switchgear

[The Greenhouse Challenge Factors and Methodology Workbook](#) will show you how to do this.

### Step 2 - reduce consumption/waste generated

Implementing the learning in this guide will and training will help you reduce your energy use and waste generated. This is normally the most cost effective way to reduce emissions

The more you reduce use the less you have to do in the next two steps.

### Step 3 - install or purchase renewable energy

- Investigate installing renewable energy sources
- Purchase renewable electricity from an accredited green power supplier
- Use biofuels

Generally these have longer or no direct paybacks prior to carbon trading

### Step 4 - assess and offset remaining emissions

Calculate what emissions are left and offset with a robust and approved offset scheme. Examples of this include Climate Friendly and Climate Positive where government accredited renewable energy developments and efficiency improvement projects are used to offset emissions.

The Victorian EPA Case Study is on this website <http://www.epa.vic.gov.au/greenhouse/default.asp>

# InfoSheet 21



<http://www.sustainability.vic.gov.au/www/html/1468-switching-to-greenpower.asp?intSiteID=4>

Green Power is electricity generated from clean, renewable resources, such as solar, wind, biomass, wave and hydro power. When you buy Green Power from your electricity supplier, renewable energy is purchased on your behalf. It is distributed to your business through the grid, in the usual way. By agreeing to pay a small additional charge on your electricity bill, you are replacing conventional electricity with clean, renewable energy.

## How does green power help the environment?

Most of Victoria's electricity is currently generated from coal-fired power stations. These power stations are major sources of greenhouse gases and therefore substantial contributors to global warming.

Australia's emissions of greenhouse gases are amongst the highest, per person, in the world. Victorians contribute over 80 million tonnes of carbon dioxide to the atmosphere each year, including a large proportion from business resource use. Buying Green Power reduces greenhouse gases, representing a significant contribution to improving the environment and, at the same time, positioning your company as a good corporate citizen.

## Is it guaranteed green?

Electricity suppliers use a variety of brand names to identify their renewable energy schemes. When you see the Green Power logo on an electricity scheme, it means that Sustainability Victoria has approved it.

A national accreditation program has been developed to ensure that Green Power offered by electricity suppliers is generated from government approved renewable resources.

Apart from existing approved sources, accredited suppliers must contribute to the development of new renewable generators. Suppliers are regularly audited to ensure compliance with the accreditation program, which means you can have total confidence in Green Power.

## How do I buy green power?

Contact your electricity supplier for further information and to apply for Green Power. For contestable customers tendering for electricity supply, include the option to buy a proportion of your electricity consumption as Green Power in your tender specification.

## How much will green power cost?

Prices will vary between suppliers, but Green Power will usually cost an additional 2–4 cents per kWh. You will be able to nominate a certain proportion of your consumption on which to pay the Green Power premium.

Implementing a resource management program in your business can save you money on your resource bills, thereby offsetting some of the extra charge for Green Power. Your Sustainability Victoria adviser can help you improve resource efficiency and reduce resource use. Buying Green Power is an investment in the future and should be an integral part of an environmental management program.

## Green power offers you more

When you purchase Green Power, you will have the knowledge that you are helping to improve the environment. Green Power customers will also be given assistance to use resource more efficiently, which will help you reduce your resource costs.

Corporations are now realising that purchasing a proportion of their electricity as Green Power provides excellent marketing opportunities for key segments in the community concerned about the environment. Prominent businesses now buying Green Power include the University of Melbourne, the Body Shop, Patagonia, Moreland City Council, Sony Australia and Westfield.

### **How do I switch to green power?**

It only costs a small amount more to have Green Power for your business. Simply call your electricity supplier. Alternatively, contact Sustainability Victoria on 1300 363 744 or e-mail [info@sustainabilityvic.gov.au](mailto:info@sustainabilityvic.gov.au)

# InfoSheet 22

## Kyoto protocol

The Kyoto Protocol is a protocol to the international Framework Convention on Climate Change with the objective of reducing Greenhouse gases that cause climate change. It was agreed on 11 December 1997 at the 3rd Conference of the Parties to the treaty when they met in Kyoto, and entered into force on 16 February 2005.

Australia's target is to limit the increase emissions of all greenhouse gases, calculated as carbon dioxide equivalent (CO<sub>2</sub> e) to 108% of 1990 levels by 2012. The Australian Government agreed to ratify the Protocol in November 2007.

The table below summarises the targets on developed nations.

Country	Treaty Obligation 2008-2012
Germany	-8%
Canada	-6%
Australia	8%
Spain	-8%
United States	-7%*
Norway	1%
New Zealand	0%
France	-8%
Greece	-8%
Ireland	-8%
Japan	-6%
United Kingdom	-8%
Portugal	-8%
EU-15	-8%

\* Since the US did not ratify the treaty, the emissions targets are not a treaty obligation.

Major developing nation emitters such as China and India do not have any binding targets but have ratified the Protocol.

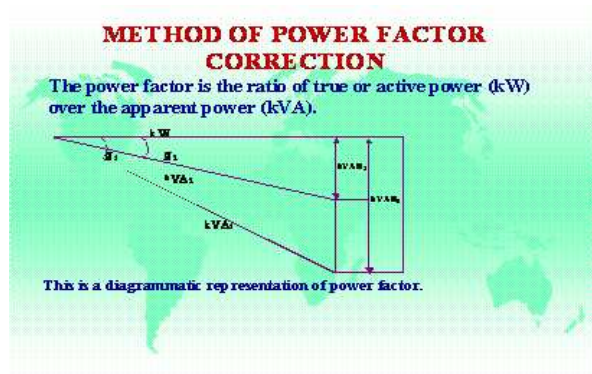


# InfoSheet 23

## What is power factor?

Power factor is the relationship between the active power and the apparent power. Essentially, it is a measure of how effectively electrical current is being used by a system.

The relationship between the types of power used to run a system is usually shown diagrammatically as a right-angled triangle. Note that active power is shown at right angles to reactive power, sometimes known as 'waste' because it is out-of-phase, and does no useful work.



Power factor is usually given as a number between 0 and 1 and is equal to the ratio of reactive power to active power, or Cosine  $\phi$ , as shown above. The higher the number, the more efficient the system is at using the potential available power. Thus a system with a power factor of 0.9 is much more efficient than one with a power factor of 0.6.

$$\text{kW} = \text{pf} \times \text{kVA} \quad \text{pf} = \cos \phi$$

## Why correct poor power factor?

The simple answer is a low power factor can cost you a lot of money, when you are on a kVA not kilowatt tariff.

A more comprehensive answer is that, as well as costing money now, it is probably going to cost a

lot more in the near future. In order to maintain their competitiveness, suppliers use two broad strategies: reduce generation costs, and introduce 'user pays' regimes.

In order to maintain their competitiveness, suppliers use two broad strategies: reduce generation costs, and introduce 'user pays' regimes.

That's where power factor comes in.

A system with a low power factor (say, 0.6) requires the supply company to feed much more current into the distribution system in order to enable its customers to operate their equipment and appliances.

Power companies can do a lot in their part of the system to raise the power factor closer to the ideal of 1.0 and you can be sure they are doing it, as it means they have to buy less electricity from the generation companies.

The difficulty comes in trying to make sure that their customers also have efficient systems with a high power factor. How this has been done in some other states is to charge customers not on the traditional basis of kilowatt (kW) used, but on the more equal basis of kVA (kVA is a better measure of where the current generated is ultimately used).

An acceptable Power Factor is >0.9 for low voltage supply and 0.95 for high voltage supply. See also the Essential Services Commission website: <http://www.esc.vic.gov.au>

### Example

Suppose there are two companies A and B, who both use 500 kW as a maximum demand.

Company A has a power factor of 0.5, which means that under a kVA demand tariff it will use and pay for 1000 kVA monthly.

Company B, on the other hand, has a Power Factor of 0.9. It will use and pay for only 555 kVA monthly—slightly more than half the demand costs paid by company A.

## Effect on equipment

If the power factor of your system is low, more current is used than is necessary to do the work. As a result, excessive heat will be generated, which can damage, or shorten the life of equipment. Beyond these extra maintenance costs, there is also the potential for fires in extreme situations.

Low power factor can also cause low voltage conditions, which result in sluggish motor operation, dim lights and the attendant quality or safety problems.

Typical applications that exhibit low power factor include air compressors, plastic extruders, machine tools, stamping presses and industrial equipment, as well as uncorrected fluorescent and discharge lamps.

## Power factor improvement options

For most businesses power factor correction presents two main efficiency opportunities.

When moving, building new premises, leasing, etc. ensure that your assessments of power costs include an analysis of power factor—It is probably how you are going to be charged particularly if you are a large user.

Secondly, there are a number of options for improving the power factor of existing facilities.

Initially, you should measure the power factor at your workplace and discuss your options with your power supplier, or consultant.

Power factor correction equipment (say, in the form of a capacitor bank) can be installed as close as possible to the meter point or the low power factor equipment. This will have the impact of reducing the total current supplied by the electricity utility to your premises (it will have no detrimental impact on plant and equipment).

In fact, power factor correction has been used most often to increase the power carrying capacity of long cables. For example, new equipment may need to be installed which will overtax the amp rating in existing underground cabling. Instead of the expensive activity of replacing cables or installing new switchboard equipment, it is possible to increase capacity through power factor correction equipment.

With the increase in the use of electronic equipment in offices and manufacturing situations, the costs of equipment failure due to spikes can be extremely high. Power factor correction equipment can be part of an economical solution to the problem of filtering out spikes.

Installing filter reactor equipment in series with the capacitor bank will have the effect of increasing the continuity and integrity in your supply, which will mean less fluctuations, circuit breaks and equipment damage. Installing capacitors will have a typical pay back period of one to two years.

To minimise power factor problems in the future, consider correctly sizing motors to match the load. **Under-loaded motors have lower power factor.**

In order to find out more about the impact of power factor correction on your bottom line, talk to your supply utility, or an experienced resource consultant.

# InfoSheet 24

## Energysaving

Use the below checklists and web links to identify energy saving opportunities for inclusion in your program of works. It is recommended that you consult staff for ideas and inform them of any changes to their area, prior to implementation.

### Lighting systems

- Ensure lighting levels comply with requirements of AS1680 and are not too low or too high
- Check effect of lighting on air conditioning running costs
- Only power factor corrected luminaries to be used for renovations and new installations
- Regularly clean and service luminaries
- Change incandescent bulbs to Fluorescent tubes
- Change standard 40W fluorescent tubes to 36W or 28W T5 high density triphosphor tubes?
- Replace standard fluorescent ferro magnetic tube ballasts with electronic ballasts—cost?
- Consider delamping, voltage reduction, motion detectors, light sensors, time switches, multiple switching, better reflectors, better skylighting
- Fit windows with blinds/shadecloth/external shading to minimise sunlight/glare penetration
- Ensure lighting is switched off when areas are unoccupied—fit extra zone switches if needed
- Use 'Wattstopper' to monitor lights on time versus area occupied time
- Extra low voltage lights—total cost, frequent replacement, effect on A/C costs. Replace with fluorescent equivalents or LED types.

[http://www.sustainability.vic.gov.au/resources/documents/FACT\\_SHEET\\_LIGHTING.pdf](http://www.sustainability.vic.gov.au/resources/documents/FACT_SHEET_LIGHTING.pdf)

### Heating and cooling of buildings

- Check adequacy of ceiling insulation
- Select most appropriate system (e.g. radiant for most factory heating applications)

- On large factory and warehouse doors, fit 'Rollfast' doors or clear plastic strips as appropriate to prevent heat gain/loss
- Set heating thermostats to 18°C in winter and 23°C in summer
- Use time clocks to control system operation and minimise plant operation
- Ensure filters and systems are correctly maintained to reduce system pressure loss
- Minimise air infiltration leakage from air conditioned space
- Ensure shades are closed when sun is shining on windows
- Discourage the use of personal radiators and fans—ban them and replace with panels (1/10 cost)
- Investigate use of evaporative coolers for large space areas
- Check zoning of air conditioning system. Ensure zone thermostats not competing
- Install or upgrade insulation in ceiling
- Use fresh air economy cycles
- Conversion of constant volume dual duct or terminal reheat systems with backward inclined or airfoil fans to VAV, using VSD so that only air volume needed to meet actual load is delivered
- Assess fan performance of VAV systems. If vanes and dampers are more than 20% closed on a peak load day, the fan speed may be reduced
- Fit VSDs to fan drives on existing VAV systems that currently use inlet vanes or outlet dampers for air volume control
- Use VSDs on fan drives—save up to 50% on resource use
- Recover low grade heat for space heating purposes
- Use building thermal inertia and let chilled water temperatures rise in air conditioning systems

during periods of peak electricity load to reduce peak demand. Also ice storage

There is lots of help at this website:

<http://www.sv.sustainability.vic.gov.au/advice/business/infosheets/airconditioning.asp>

<http://www.sustainability.vic.gov.au/www/html/2038-energy-saving-fact-sheets.asp>

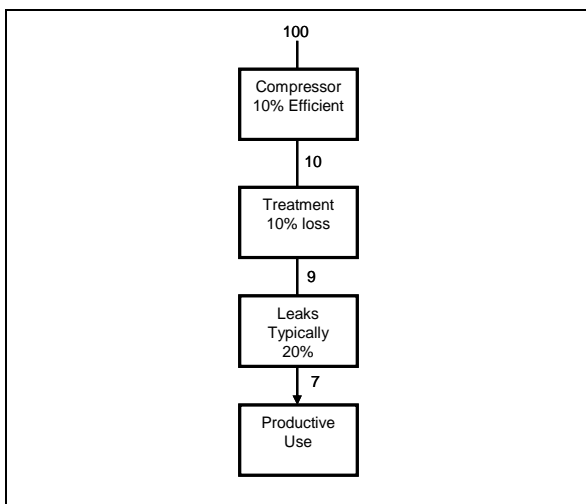
## Hot water systems

- Use solar hot water where practicable  
[http://www.sustainability.vic.gov.au/resources/documents/SHW\\_Factsheet\\_07.pdf](http://www.sustainability.vic.gov.au/resources/documents/SHW_Factsheet_07.pdf)
- Replace small hot water urns with 'Urnies' type units
- Minimise hot water requirements and allow for local boosting in areas such as kitchens
- Ensure separate boilers are installed for domestic hot water and space heating
- Ensure domestic hot water pumps are switched off out of hours
- Set hot water thermostats down to 55°C initially, but certainly not more than 65°C or 70°C.
- Install or upgrade insulation on hot water lines

<http://www.sustainability.vic.gov.au/resources/documents/Choosingahotwatersystem.pdf>

## Compressed air systems

Typical compressed Air System Energy Flow



As can be seen compressed air is very inefficient.  
**COMPRESSED AIR IS NOT FREE**

It is very easy to save resource and operating costs with your compressed air system. The simple measures outlined can be introduced almost immediately with instant benefits.

It is also worthwhile implementing good housekeeping practices. Investment costs are negligible and the benefits are high.

If your system is to be managed successfully, the size of the compressor should be selected carefully to match your needs, and the size of the distribution network should be optimised. Finally, the quality of the compressed air should be carefully controlled.

- Regularly check 'percent compressor on' time—determine efficiency and compare with best ever efficiency after system installation/refurbishment. Some screw compressors use over 50% of running power when 'off-load' and producing no air
- Retrofit low flow blow down nozzles on compressed air systems.
- Can blowers to provide low pressure air. They are typically 10 time more efficient
- Relocate compressor intakes for lowest intake temperature
- Ensure compressed air tools operate efficiently and that their air hoses are adequately sized
- Only use air motors when necessary
- Ensure compressed air is not over-dry
- Minimise system water build-up
- Check systems' air pressures are the lowest practical for the application
- Check Compressed air lines for leaks and repair any leaks found—schedule for maintenance—table of leak rates and costs for given sized holes
- Check potential sequencing of compressors to operate most efficient compressor(s) for total system air requirement

Some compressed air websites

[http://www.energy-toolbox.vic.gov.au/developing\\_an\\_energy\\_management\\_system/energy\\_savings\\_checklist/compressed\\_air\\_systems.html](http://www.energy-toolbox.vic.gov.au/developing_an_energy_management_system/energy_savings_checklist/compressed_air_systems.html)  
<http://www.energyrating.gov.au/library/pubs/aircomp-guide1.pdf>  
<http://www.energyrating.gov.au/library/pubs/aircomp-guide3.pdf>  
<http://www.bcas.org.uk/pdf/carbontrust/GPG385.pdf>  
<http://www.oeenrcan.gc.ca/publications/industrial/cipec/compressed-air.pdf>  
<http://compressorwise.com/2ndbook/>

## Cooling water

- Is there any temperature control on the fans so that they turn off/run slower when the cooling water temperature meets requirements
- Can variable speed drives be used on fans
- Are high efficiency fan blades used
- Is packing in good condition
- For variable cooling loads can variable speed drives be fitted to pumps
- For multiple pump applications can a pump be turned off
- Is the level control working so that the pond is not overflowing

## Refrigeration equipment

- Insulate distribution system and end use/store rooms
- Retrofit electronic expansion valves to reciprocating water chiller sets
- Has system been changed to run with hydrocarbon refrigerants
- Improve chilled circulation/heat transfer
- Adjust suction temperature to maximise efficiency and maintain product temperature
- Maintain defrost on all fan coils
- Increase utilisation of cold room space by closing off unused section
- Check whether unit may be retrofitted with electronic TX valve
- Ensure unit is maintained as manufacturer recommendations. Ensure no refrigerant leakages

## Plant drives

- Ensure appropriate drive is used (i.e. direct drive, vee belt, notched belt, flat belt, etc.)
- Check belt drives are neither too loose or over tensioned
- Replace oversized motors
- Optimise pump/fan flow rates for required duties
- Use variable speed, or at the least multi-speed motors, on condenser water pumps, cooling tower fans and air cooled condenser unit fans. Or use sequential approach. Either way, drives should be controlled by condenser water temperature or condenser leaving air temp
- Check potential use of high efficiency motors

## Other electrical

- If not already fitted, install smart meter. Use results to highlight periods of high demand. At multi-site installations, install separate meters to monitor power used in each building
- Check potential to reduce minimum chargeable demand (12 months advice required)
- Check potential to reschedule plant operations such that plant currently operating in peak periods, operates at a different time to reduce the peak demand (see item 6)
- Check system power factor from smart meter output if on VAR tariff

## Boiler plant, furnaces, drying ovens, etc.

- Ensure correct boiler combustion efficiency. Check excess air/O<sub>2</sub> in flue gas
- Ensure regular and correct boiler waterside treatment
- Optimise blow down—leaks are very common
- Investigate waste heat recovery from boiler stacks, flash steam and/or blow down system
- Monitor steam used by each user department
- Ensure distribution mains properly laid out, sized, drained, vented and maintained
- Install separators to improve steam quality
- Repair leaking joints, glands and valves
- Lag all steam pipes, flanges and valves

- Replace steam ejector vacuum pumps with electric vacuum pumps where appropriate
- Monitor steam trap operation and/or include on maintenance schedule
- Ensure that no condensate is needlessly wasted
- Lag condensate return systems and feed tanks
- Remove or blank off all redundant piping
- Use heat reclaim systems where possible (flue gases, waste water, etc.) to provide low grade hot water, low pressure steam, process heating and space heating. Consider heat wheels, heat tubes, shell and tube heat exchangers, etc. Check potential to recycle portion of hot exhaust air in drying plants after considering possible loss of drying effect
- Lag bare process plant surfaces
- Fit boiler economisers where practicable
- Check potential to use recuperative burners on boilers, furnaces, drying ovens
- Convert oil fired and electric heating plant, ovens and boilers to gas firing
- Install or upgrade insulation on hot water, refrigerant and steam lines
- Maintain lowest acceptable process steam pressures

# InfoSheet 25

## Induction program for contractors

### Contracting and resource efficient work practices

It is recommended that resource efficiency is included and weighted as an integral part of a tendering process for contractors.

At the beginning of a contract, it may be necessary to assess whether there is a need to include resource efficiency as part of an induction program for contractors to ensure they are familiar with the environmental policy of your company and appropriate work practices.

### Selecting appropriate training methods

Some typical options for resource training.

#### Induction Program for Contractors

	Option	Example	Advantages	Disadvantages
1	On-site using internal staff	Series of lunch time workshops for contractors or departments	Cost effective. Tailored to site, job functions and training needs	Lack of exposure to ideas from outsiders
2	Short open courses at a training centre	Two-day course on energy, energy efficiency and work practices	Can be targeted to individuals with identified training needs	Some of the course may be irrelevant. Trainees must sell ideas when they return to work
3	On the job training	Course for contractors on installation and maintenance of new equipment	Practical, cost efficient, tailored to individuals, receiving one-on-one training	Informality and lack of structure can lead to omissions



# InfoSheet 26

## Smart meters

Smart meters are an accurate and economical means of monitoring resource systems. There are several types and makes currently available on the market.

### Typical smart meter features include the following.

- Load profile, power factor, maximum demand voltage and current recording—several channels for 2–3 months at 30 minute intervals
- Remote access via existing communication systems
- Phase voltage indication with LEDs
- 2 pulse inputs—load profile data—selectable and cumulative registers
- 3-level passwords for security
- 3 phase power supply
- Test LED (Wh)
- Battery—fitted to PCB. On/off switch preserves battery life when idle
- Push buttons —reset and alternate
- Low component count—better reliability and longer life

### Optional features

- 8 programmable signal/retransmission solid state outputs
- Extended memory for load profile, e.g. 2 channels, 340 days at 30 minute intervals
- Load control with one or two internal 25A relays

### Communication options

- GSM modem
- PSTN modem
- RS-485 for multi-drop communications in multi-media applications

Up to four TOU registers are available, with common switch times for six selectable energy quantities and independent switch times for two demand quantities. The rate table accommodates a programmable calendar for up to 20 years with daylight saving, multiple season and day types.

### Software

Software is available for reading, programming and diagnostics. Interval data reading/reporting systems are also available. Windows based programs are available to report on meters that called in under preset conditions such as warnings and errors. This provides information for field staff.

Field programmer. These allow easy field programming of smart meters. It stores up to 20 meter programs and allows the technician to set the meter clock and perform diagnostics.



# InfoSheet 27

## A energy smart office

Computers, fax machines, printers and photocopiers are indispensable to running a business today. The rapid increase in the use of such equipment has seen a steady rise in electricity consumption over the past decade. Here are some tips on reducing energy wastage.

### Turning equipment off

The first step to saving energy is to turn equipment off when it is not needed, i.e. at night and weekends.

Use plug-in timers on power outlets to avoid equipment being left on unnecessarily. Timers are available from most hardware stores, and can be set to turn power on and off at certain times of the day. They are especially useful for photocopiers and printers. Look for digital timers as they are easy to use. It's a good idea to post clear instructions on how to override timers, for people who may require equipment out of hours. Otherwise the timers might end up being bypassed altogether by people frustrated with the system.

All office equipment uses energy when not in use (relatively small but significant amounts) and just standing idle. The control circuits and transformers use energy just to be ready to start up immediately they are needed. Many photocopiers, printers and computers have 'stand by' modes, which reduces power to a minimum level, so that equipment almost turns off but is ready to start with only a slight delay.

Even in 'stand-by mode' all machines use a small amount of electricity. If you are unlikely to use your equipment for any length of time, consider, where practicable, to turn equipment off and switch off at the power point.

A quick check at the end of each day, especially at weekends, should be done to make sure that equipment has been turned off.

## Running your office efficiently

### Computer monitors

Switch off monitors if not expecting to use the computer for, say, 30 minutes. Monitors usually use more energy than the computer itself.

Use laptop computers where possible

A laptop has a power draw of around 10% of a conventional desktop computer. If you don't like the small laptop screen you can connect the laptop unit to a standard monitor while in the office and still save almost half the energy of a standard computer.

Screen savers do not save energy—they merely help to maximise your screen's useful life. They do not replace the 'sleep' mode or switching the monitor off.

A technique worth considering is—to set the screen saver to come on after a short inactive time (2 minutes), and you and others can enjoy the visual display. However, after a further time delay (5 minutes), set the computer to switch to sleep mode. 'My settings' (2 minutes, 5 minutes).

### Photocopiers

Photocopiers can be energy guzzlers. They use most of their energy to keep internal surfaces hot to enable the toner to correctly fuse to the paper. Even when no copying is taking place power consumption can remain quite high.

Use the 'energy saver' mode—most photocopiers now have an energy saving feature that puts the copier to 'sleep' when it is not being used. Most copiers will only take 10–20 seconds to become fully functional after coming out of 'sleep or stand-by mode'.

## Add in current program

Ensure equipment has the power-saving feature activated.

Simple instructions for activating the low-power feature (also known as 'stand-by or 'sleep' mode) are readily available at

<http://www.energystar.gov.au>

## Did you know?

- Using the power management feature means your printer will produce less heat, which contributes to a cooler and more comfortable workspace, and reduces air conditioning costs. By generating less heat, your printer may last longer and be more reliable
- Did you know that screen savers actually use energy—they don't save it?
- The average PC produces 620 kg of greenhouse pollution over the course of a year which is the equivalent to a car travelling 1000 km a year
- High-speed copiers that are set to automatically make double-sided copies reduce paper costs and saves energy because it takes ten times more energy to manufacture a piece of paper than to copy an image on it

Using a dark screen when 'googling' reduces power used by about 7.5W on **CRT monitors**. So go to [www.blackle.com](http://www.blackle.com) . All features are the same its just power use that is less.

Try these web sites

<http://www.sustainability.vic.gov.au/www/html/1891-waste-wise-office-kit.asp>

<http://www.environment.gov.au/settlements/publications/government/purchasing/green-office-guide/index.html>

## Section Six

# **Additional Water Efficiency Guide**

# Water

## Restrictions

The current drought has resulted in water restrictions in Brisbane, Sydney, Melbourne Perth and Adelaide.

Current status of water restrictions can be found on the following websites.

[http://www.brisbane.qld.gov.au/BCC:BASE:528444265:pc=PC\\_2095](http://www.brisbane.qld.gov.au/BCC:BASE:528444265:pc=PC_2095)

<http://www.sydneywater.com.au/SavingWater/WaterRestrictions/>

<http://www.melbourne.vic.gov.au/info.cfm?top=120&pg=997>

<http://www.sawater.com.au/SAWater/Environment/WaterRestrictionsConservationMeasures/>

[http://www.watercorporation.com.au/R/restrictions\\_index.cfm?uid=1267-6597-2997-2837](http://www.watercorporation.com.au/R/restrictions_index.cfm?uid=1267-6597-2997-2837)

## Current programs

Current programs are summarised on pg 61-65

## Water metering

### Reading a water meter

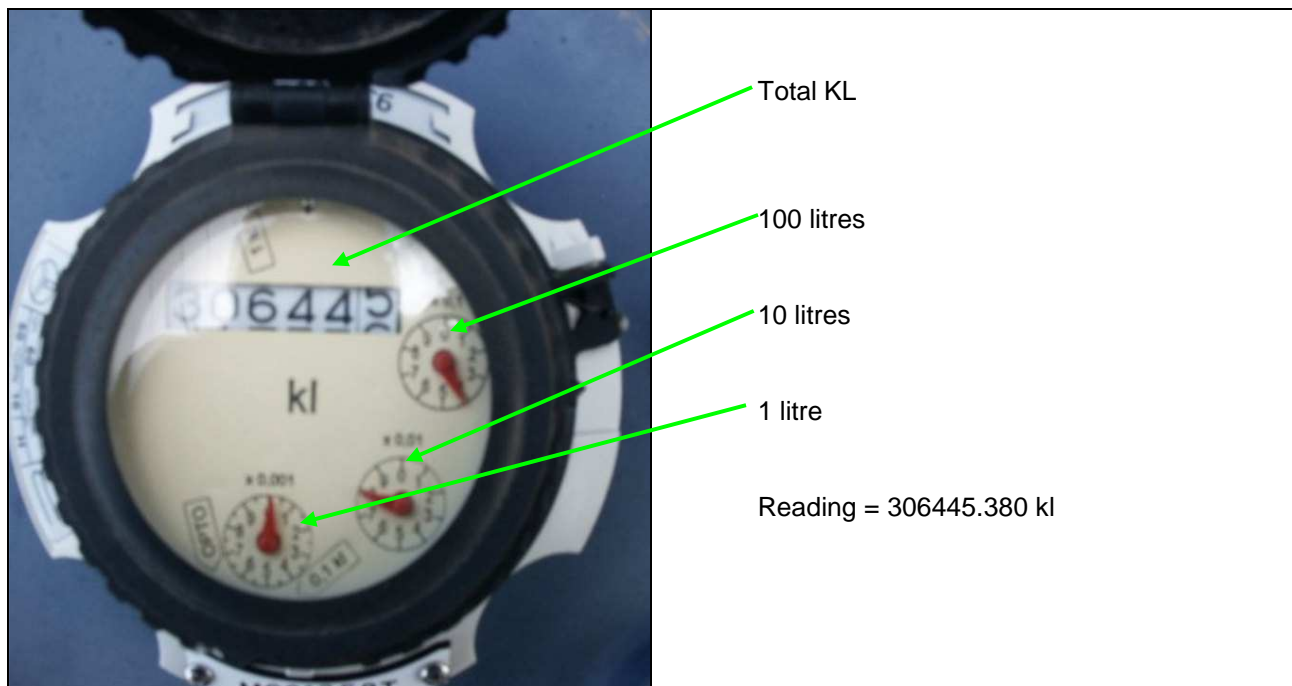
See the diagram below entitled "Reading a Water Meter"

### Sub meters (see following page)

Ideally large water using plant and processes would be fitted with sub meters. These will enable a water balance to be completed as required by Victorian Water Map. There are various types of sub meter from the domestic type meter, see below, to the complex vortex shedding meters. For most applications a simple meter is normally adequate

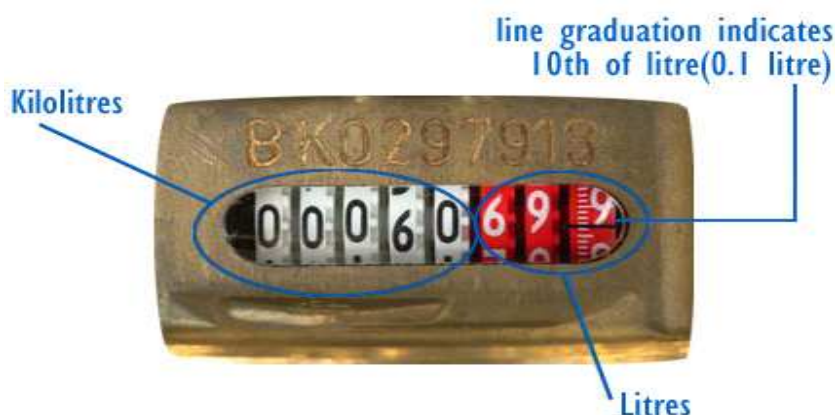
Typical locations for sub-meters are:

- Cooling Towers
- Boiler Plants
- Office Complexes
- Amenities
- Major water using plant



Reading a Water Meter

## Reading a Sub Meter



### Smart water meters

As with electricity and gas meters it is possible to connect site water meters and sub meters up to a SCADA system. The meters will need to be fitted with the facility for a pulsed output.

The Amcor Glass Plant at Gawler has installed sub-meters on all major water users and can account for over 99% of its site water use.

## Water auditing

Water auditing is similar to energy auditing and the methodology in AS 3598 Energy auditing can be used. For organisations subject to Energy Efficiency Opportunities, including water (and waste) in the assessment process has proven very successful.

The WaterMAP program developed by CityWestWater, provides a guide on how to implement a water management program. A link to the guide is given below.

[http://www.citywestwater.com.au/business/docs/Water\\_Conervation\\_Solutions\\_Handbook\\_-\\_Aug07.pdf](http://www.citywestwater.com.au/business/docs/Water_Conervation_Solutions_Handbook_-_Aug07.pdf)

This is very detailed and is recommended for any organisation embarking on a water conservation program and can be used in conjunction with other programs.

### Examples where water is wasted

This checklist is reproduced with kind permission of Orica Ltd.

### Water neutral – water reduction ideas

- Are floors swept rather than washed?
- Is high pressure cleaning equipment used?
- Is mechanical seal water recovered?
- Are there any once through cooling duties?
- Are cooling tower TDS controlled at maximum ppm (1,200 ppm)?
- Can cooling tower evaporation be reduced through reduced heat load?
- Is there any effluent dilution?
- Are all leaks/dripping taps reported and promptly fixed?
- Are urinals using desert cubes to mitigate water consumption?  
<http://www.desert.com.au/waterless.htm>
- What opportunities exist for reusing or recycling water, either back into the process or for other uses?
- Is there anyone who would want to buy the sites wastewater?

## Other sources of assistance and advice

Organisation	Web Address
Vic Water	<a href="http://www.vicwater.org.au">http://www.vicwater.org.au</a>
Department of Sustainability and Environment	<a href="http://www.dse.vic.gov.au/">http://www.dse.vic.gov.au/</a>
Our Water Our Future	<a href="http://www.ourwater.vic.gov.au/">http://www.ourwater.vic.gov.au/</a>
Australian Industry Group	<a href="http://www.aigroup.asn.au/">http://www.aigroup.asn.au/</a>
Plastics and Chemical Industries Association	<a href="http://www.pacia.org.au/">http://www.pacia.org.au/</a>
Victorian Employers Chamber of Commerce and Industry	<a href="http://www.vecci.org.au/">http://www.vecci.org.au/</a>
Grow Me the Money	<a href="http://www.growmethemoney.com.au/">http://www.growmethemoney.com.au/</a>
Property Council	<a href="http://www.propertyoz.com.au/">http://www.propertyoz.com.au/</a>
Textile Rental and Laundry Association of Australia	<a href="http://www.trlaa.com.au/">http://www.trlaa.com.au/</a>
Green Plumber Association	<a href="http://www.greenplumbers.com.au/">http://www.greenplumbers.com.au/</a>
Sustainable Gardening Australia	<a href="http://www.sgaonline.org.au/">http://www.sgaonline.org.au/</a>
Alternative Technology Association	<a href="http://www.ata.org.au/">http://www.ata.org.au/</a>
Environment Protection Authority	<a href="http://www.epa.vic.gov.au/">http://www.epa.vic.gov.au/</a>
Fire Protection Association Australia	<a href="http://www.fpa.com.au/">http://www.fpa.com.au/</a>
Plumbing Industry Commission	<a href="http://www.pic.vic.gov.au/">http://www.pic.vic.gov.au/</a>
Australian Institute of Refrigeration Air Conditioning and Heating	<a href="http://www.airah.org.au/">http://www.airah.org.au/</a>
Facilities Management Association of Australia	<a href="http://www.fma.com.au/">http://www.fma.com.au/</a>
Water efficiency labelling standards	<a href="http://www.waterrating.gov.au/">http://www.waterrating.gov.au/</a>

## Case studies

### Australian vinyls resource conservation program

Australian Vinyls Corporation Limited has been actively implementing a resource conservation program since 1998. This program is part of its Environment Improvement Plan and covers energy and water use.

A water balance of the site was completed in 2000 and has been regularly updated to take into account changes. Water use is monitored against production on a weekly basis and a monthly report produced. Employees are involved in identifying and implementing water saving opportunities. In Winter 2007, CityWestWater delivered water saving training to the site operations team.

Examples of water savings are shown in the following Table

## Examples of Water Savings

Date	Action	Saving kl/yr	Cost \$
<b>Q4 1998</b>	Energy and water awareness sessions. Savings achieved by hosing down less	8,000	2,000
<b>Q4 1998</b>	Install steam trap tanker drivers humpy	200	2,000
<b>Q1 1999</b>	Reduce boiler blowdown	800	0
<b>Q2 1999</b>	Minimise flow at Ammonia absorber	4,000	0
<b>Q3 1999</b>	Reduce Stream 2 Dryer scrubber water flow	10,000	3,000
<b>Q3 2000</b>	Stop steam vent on deaerator control	250	0
<b>Q3 2000</b>	Steam leak/stream trap improvements	2,000	5,000
<b>Q4 2001</b>	Use water softeners instead of demin plant	2,000	60,000
<b>Q4 2001</b>	Continuous boiler blowdown and heat recovery	5,000	30,000
<b>Q2 2002</b>	Extend the number of batches between rumbles on S1 Stripper	6,000	0
<b>Q2 2002</b>	Extend the number of batches between cleaning S2 Stripper	2,900	0
<b>Q3 2002</b>	Reduce water use at mechanical seals	7,800	4,000
<b>Q1 2003</b>	Minimise of incinerator water use 17-14m3/hr	20,000	0
<b>Q4 2003</b>	Improved cooling tower dosing and control	3,000	100,000
<b>Q1 2004</b>	Recycle incinerator water	100,000	400,000
<b>Q3 2004</b>	Stop washing antistat drums	1,500	0
<b>Q2 2005</b>	New dryer condensate line	1,000	30,000
<b>Q2 2005</b>	Take sand filter out of line	500	0
<b>Q3 2005</b>	Reduce Stream 1 dryer scrubber water flow	8,000	3,000
<b>Q3 2006</b>	Use hot water for stripper cleaning	1,000	60,000
<b>Q1 2007</b>	Recycle seal water	10,000	50,000
<b>Q1 2007</b>	Dual flush toilets	100	1000
<b>Q1 2007</b>	Low flow showers	20	200
<b>Q2 2007</b>	Boiler controls operating on two boilers	1,000	300,000
<b>Q2 2007</b>	Trial membrane technology		?
<b>Ongoing</b>	Optimise steam use on S1 stripper	4,000	10,000
<b>Ongoing</b>	Optimise steam use on S2 stripper	6,000	10,000
	Totals	205,150	1,075,200

## **Qenos**

This year Altona plastics company Qenos expects to add \$1.3 million to its bottom line by embracing cleaner production and water conservation.

By the end of 2006, when the initiatives are fully implemented, Qenos will save almost one billion litres of drinking water and about 900 million litres of trade waste discharges a year.

## **Understanding Water Use**

Qenos Environmental Engineer Chris Hutchins said the company's starting point was to understand how much water was used and why.

An overhaul of an inefficient steam condensate recovery system was partly financed by a grant from the Victorian Government's Water Smart industry demonstration projects fund.

Combined with subsequent changes to feedstock operations, these initiatives save 870 million litres of water, and reduce trade waste volumes by 290 million litres a year.

## **Funding support**

A Water Smart grant improved filtration at a water treatment facility at the Qenos plastics plant, allowing water normally discharged to sewer to be recycled in the plastics cooling tower, saving an extra 90 million litres of drinking water a year.

In the 2004 SaveWater Awards, Qenos won the metropolitan manufacturing category as well as an overall excellence award, and also took out the City of Melbourne's Celebrating Melbourne award in the manufacturing category that year.

Qenos now plans to harvest stormwater and uses it to replace drinking water in the cooling tower at its resins plant, and is participating in a major Altona Chemical Complex water and salt reduction study.



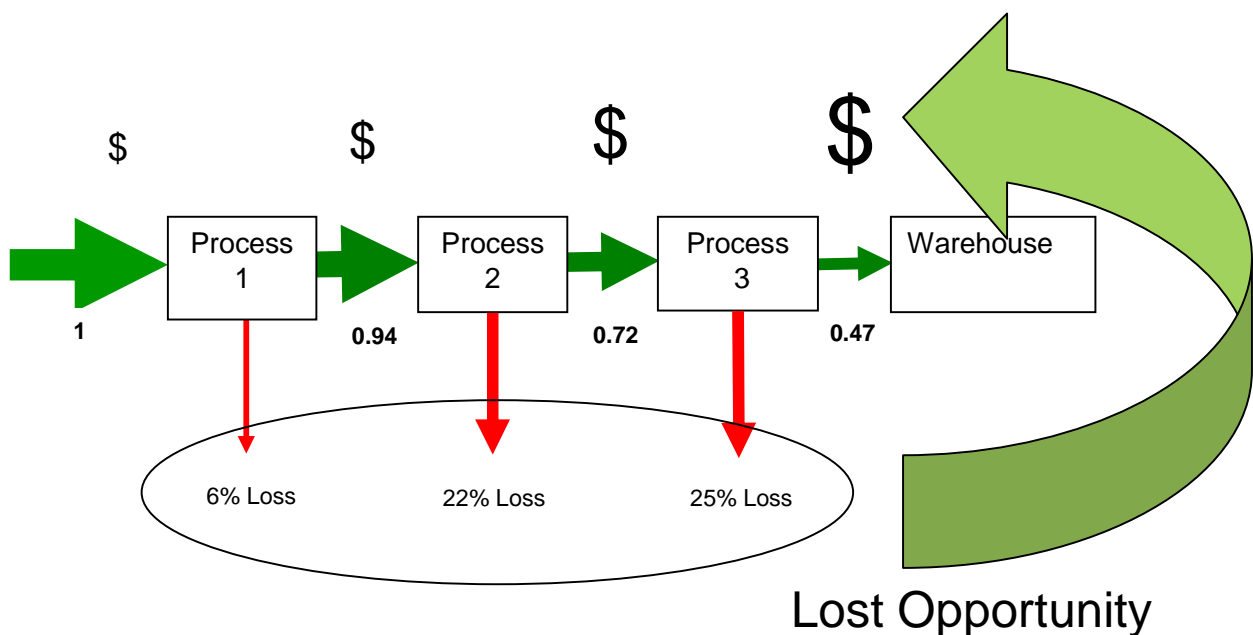
## Section Seven

# **Additional Waste Reduction Guide**

# Additional Waste Reduction Guide

## Consider your total waste costs

Investigate material flows



The cost of waste is more than just the cost of disposal whether to prescribed or general landfill. Of course waste paper and cans and bottles can easily be accounted for but what about waste from your operations.

Twelve manufacturing companies that participated in a resource efficiency program in 2005 identified:

- 12,500 tonnes of waste which cost \$950,000 in disposal fees
- \$23 million per annum of lost value
- a ratio of lost resource value to disposal costs of 23:1
- is not unreasonable to expect a ratio of 10:1

### Waste management cost

- (landfill & trade waste fees + contractor cost)

### With waste in operations you have:

- Raw material
  - Rejects
  - Changeover losses
  - Over specified products. Eg overweight, too low in moisture
  - Spills
- Lost Opportunity
  - Lost in Production Time
  - Rework cost
  - Energy people time in making waste
- Waste management costs (these are usually prescribed or hazardous waste)
- Cost of additional management

**True cost of waste is:**

**Waste management cost + raw material losses + lost opportunity cost + management cost**

## Waste auditing

Involve a cross-section from the company.  
Especially operations teams

Obtain all costs and quantities of waste

- Raw material costs
- Lost opportunity
- Managing waste costs
- Waste management costs

For the first three this will require help from accounts, operations management and technical functions. Remember potential benefits here can be many times the cost of waste disposal

Once costs have been obtained identify where waste occurs in the operations. Develop a material flow/mass balance as shown above.

From this ascertain where the best opportunities are. Often Plant Operators have the best ideas where waste occurs.

### Examples

- Can loss be minimised through more training
- Can cheaper better raw materials be used
- Is there more effective equipment
- Can specifications be relaxed

### Audit waste bins. Identify opportunities for

- Using less
- Re-using
- Recycle.

### Examples of potential waste disposal reduction opportunities. Reproduced with permission of Orica.

- Are there separate containers for recyclable waste (e.g. metals, glass, paper, plastic)?
- Are fluorescent and high bay lamps sent to mercury recyclers?
- Is waste electronic equipment, old mobile phones, old telephones etc sent to approved recyclers?
- Do printers/copiers print on two sides?
- If so, can this be set as a default on all computers?
- Are 'waste to landfill' containers only removed when full?
- Is it possible to use bulk rather than packaged material?
- Can raw material packaging waste be recovered for recycling rather than sent to landfill?
- Can any waste be reused as fuel e.g. oil/solvents?
- Can organic waste (e.g. food, plant waste, carbon sludge) be recovered as compost?
- Can disposable cutlery and crockery (paper or plastic) be replaced (with reusable ceramic etc)?

## Case studies

### **Qenos: divert wax material from prescribed waste landfill**

As part of the PACIA/EPA Victoria REWaRDS program, Qenos were interested in identifying alternative uses of a waste by-product produced in the manufacture of polyethylene. This was the main focus of a workshop conducted by Dr Paul Tebo in March 2005. Potential options identified included:

- Use of hot wax as a fuel in the site boilers
- Use by others as a fuel
- Sale of material as a product

After a detailed study a market was identified for the waste. This will save \$195,000/yr in waste charges and has expected sales of \$150,000/yr.

### **Dulux: powder coating and recovery program**

Dulux makes powder coating materials at its Clayton Plant. This is used on numerous consumer goods and many other metal items. The process achieves 96% material efficiency but 190t of fines powders are still disposed to landfill each year. In 2005 PACIA/EPA Victoria REWaRDS program provided funding to Dulux Australia to undertake production development and R&D to integrate new technology to fuse the powder fines together.

A four stage process of integration, collection and segregation, trial and specifications and a Life-Cycle Analysis was carried out.

The process delivered cost savings of \$66,000/yr with the potential to grow to over \$400,000/yr

There are also numerous case studies on the Victorian EPA website  
[www.epa.vic.gov.au/bus/resource\\_efficiency/case\\_studies](http://www.epa.vic.gov.au/bus/resource_efficiency/case_studies)