Creating Demand for Energy Efficiency in Australian Industry

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ABSTRACT

On 4 December 1997, the Sustainable Energy Development Authority (SEDA) launched the Energy Smart Business program to boost private sector investment in energy efficient technologies and to act as a catalyst in transforming the energy services market within Australia. The program provides both technical and marketing support for companies investing in energy efficiency projects.

This paper will describe the market barriers that exist in the Australian business environment which are inhibiting investment in energy efficiency and the strategies developed to overcome these barriers. This will be supported by references to specific projects and the total program impact on the energy efficiency market. Of further interest is the way SEDA has marketed the concepts to industry.

In addition, the paper will outline SEDA's goal of market transformation. It will provide detail of the imperfections present in the current market and suggested ways to overcome these. This will focus, with particular interest, on the underlying methodology employed to bring about these changes.

Overview and Guiding Principles

In 1996 the New South Wales (NSW) State Government created the Sustainable Energy Development Authority (SEDA). SEDA was established in response to the escalating concern about the enhanced greenhouse effect, coupled with the prospect of reduced electricity costs as a result of de-regulation. SEDA's mission is to "reduce greenhouse gas emissions in NSW by investing in the commercialisation and use of sustainable energy technologies".

SEDA manages a range of voluntary programs that focus on improving energy efficiency in all sectors of the community including government, commercial, industrial and residential. SEDA also manages programs to encourage the growth of the renewable energy generation industry.

This paper focuses on the Energy Smart Business (ESB) program – one of Australia's flagship commercial and industrial energy efficiency programs. Within the first 13 months of operation, over 160 companies had made a commitment to implement cost-effective energy efficiency upgrades within their organisation over a five year time frame.

The ESB program was developed according to the following principles:

- Efficient use of energy should not result in any deterioration of service.

- Energy efficiency should be an economic imperative, it should not require regulation at the user end of the market.
- The market should provide cost-effective energy reduction solutions.
- SEDA's market intervention should result in lasting market transformation, so that improvement in energy efficiency continues.

A Commercial and Industrial Program

The total cost of energy to the commercial, industrial, retail and services sectors of NSW is estimated to be $US 2.8 billion per year, or around 80% of the State's non-transport energy consumption. This represents 503PJ of energy and produces almost 58 million tonnes of CO_{2e} annually (NSW Department of Energy, 1997).

According to the Australian Commonwealth Government, one reason Australia has the sixth highest per capita emissions of greenhouse gases in the world, is because the country's industry is extremely energy intensive (DFAT, 1997). This, combined with low energy prices and a slow uptake of energy saving opportunities, has provided many opportunities to reduce energy consumption, improve process efficiency and work environments, and increase the profitability of businesses. Figure 1 shows the Australian manufacturing sector's improvement in energy efficiency over the period from 1973 to 1988 (research is currently being undertaken by the Australian Bureau of Agriculture Research Economics to update these figures).

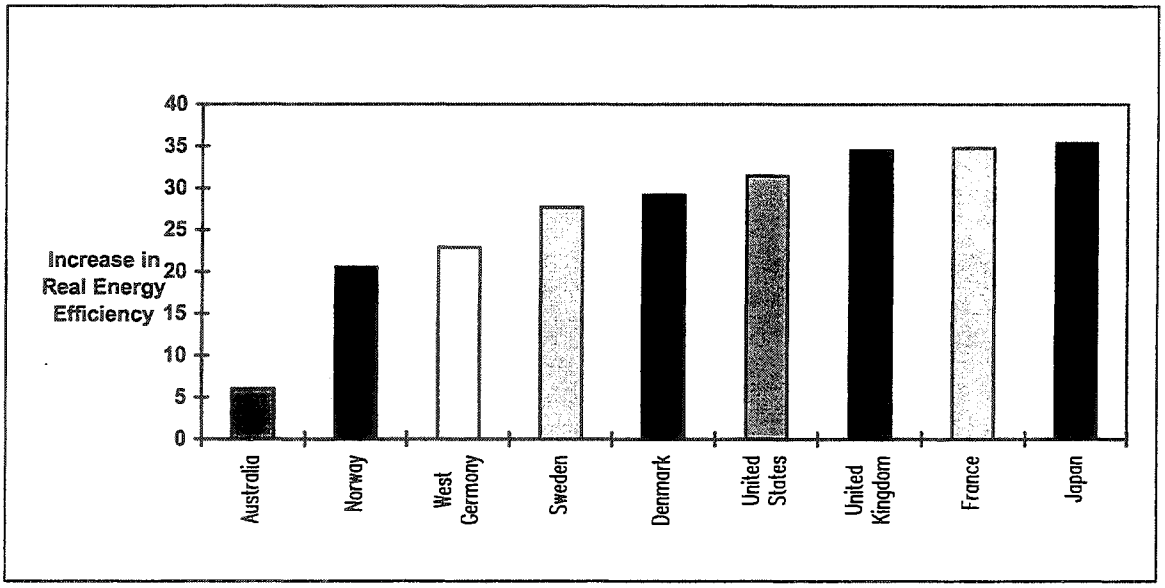

Figure 1. Manufacturing Sector Energy Efficiency (1973-88).

A recent study by SEDA identified the difference in energy efficiency of certain technologies in Australia. The availability of the best and average efficiency technologies in the Australian market was compared to that of the American market. The study found that the best practice energy efficient technologies available in the US are also available in Australia (although in many cases minimum standards are set higher in the US). It was concluded that it is not a lack of availability of energy efficient technologies that is holding back energy

efficiency in Australia. Rather, the reason for low uptake of these efficient technologies was found to be that purchasers usually make choices based on initial cost, not on life cycle cost.

A major contributing factor to the lack of consideration of future operating costs is that in most parts of Australia, in particular New South Wales, electricity is relatively inexpensive. The recent deregulation of the electricity market has enabled many large customers, especially in the industrial sector, to negotiate electricity prices as low as $US 0.02 per kilowatt hour. This has resulted in energy being regarded as a fixed cost, representing a small proportion of a company's overheads. In our experience, many decision-makers do not appreciate that they can manage this overhead profitably.

Even with these low energy costs, anecdotal evidence from energy services specialists, indicates that most businesses could save at least 20% of their energy consumption through cost-effective energy efficiency upgrades. This suggests that the adoption of energy efficient practices and technologies has the potential to save NSW $US 567 million per year in energy costs and 5 million tonnes of CO_2 emissions per annum (SEDA 1998).

In the ideal market, these opportunities would be exploited and suppliers would provide a comprehensive range of technologies and strategies to save energy. Equally, businesses would demand the application of energy reduction solutions to ensure they maintain their competitiveness.

As similar barriers to improving energy efficiency exist in both the commercial and industrial sectors, SEDA chose to establish a broad-based energy efficiency program. This also provides the sustainable energy industry with a larger market in which to establish itself. SEDA's intervention in both the supply and demand sides of the energy efficiency market is expected to create a competitive sustainable energy industry from which a reduction in greenhouse gas emissions and energy will continuously occur.

Program Design

The development of the ESB program drew on experience gained from other government programs (including a pilot program in the fast food sector), and industry consultation with large companies and energy consultants. The program is based on a Memorandum of Understanding (MoU) between SEDA and the participating companies, known as Partners.

As part of the agreement, SEDA provides technical and implementation assistance through external contractors called Partner Support Managers (PSMs). The PSMs are private sector, energy management companies. They are contractually prohibited from performing or supplying any of the services or products they recommend so that the Partners can be confident they are receiving reliable, independent information. In return, Partners agree to implement cost effective upgrades (internal rate of return >20%) across at least 75% of their facilities within 5 years.

Companies with energy intensive processes, such as smelters and foundries account for 40% of commercial and industrial energy consumption in NSW. An additional 35% of energy is consumed by small businesses for which it can be difficult to find cost-effective projects. As a result, the ESB program focuses on the medium and large businesses that make up the remaining 25% of NSW's commercial and industrial energy consumption (Bureau of Industry Economics 1996).

The three main objectives of the ESB program are to:

- create lasting direct CO_2 emission savings;
- accelerate the uptake of energy efficient technologies and strategies; and
- leave a lasting imprint on the sustainable energy market. (ie create market transformation).

The targets for the ESB program are to:

- have 25 PJ of commercial and industrial energy use under partnership
- reduce energy consumption by 3.75PJ, and
- reduce greenhouse gas emissions by 480,000 tonnes of CO_2.

It is estimated that 300 companies will be required to meet these targets. The savings are estimated to be $US 21 million per annum. The total investment required to achieve these savings would about $US 95 million.

Barriers to Energy Efficiency

In designing the ESB program a number of barriers to energy efficiency were recognised. Mechanisms to overcome these barriers, as detailed below, were incorporated into the MoU.

1. **Investment Criteria** - Energy efficiency projects are frequently discriminated against when considered for capital appropriation. Energy efficiency projects are often required to provide a payback in under two years, while other "core" projects are approved with lower rates of return (typical return on funds in Australian industry are around 5 to 12% (Huntley 1999)).

Program Response - The MoU includes a commitment by the Partner to implement energy efficiency projects that provide an internal rate of return of greater than 20%. This minimum return was chosen to be high enough to provide an attractive return for most businesses, whilst being low enough that there are numerous low risk projects that can be implemented.

2. **Time is of the essence** - Energy management is often delayed as it is seen to be something that can always be done later. Improving energy efficiency is generally not critical to core business functions so there is no urgency about implementing upgrades. Yet every time a project is delayed, the energy savings are lost forever.

Program Response - The MoU contains the following timeline that allows early success to be achieved. Implementation is staged so that it is integrated into the normal business planning cycles. Partners make a commitment to:

- upgrade a representative space (usually a small project that can be accommodated within an existing capital or maintenance budget) within 6 months of signing the MoU
- upgrade 20% of operations within 15 months
- upgrade 50% of operations within 24 months, and
- upgrade at least 75% of operations within 5 years.

An important feature of the program is that the minimum requirement is to upgrade 75% of operations. This allows some flexibility so Partners can opt not to invest in

certain facilities because of business constraints. For example, if a company is planning to divest certain operations, it may not be appropriate to upgrade them.

3. **Resources** - As energy management is usually not a core business concern, businesses tend not to allocate sufficient resources to it. Even when responsibility for energy management is assigned to staff members, they find they have other, more critical tasks.

> **Program Response** - SEDA provides a fully funded energy services professional to work with the company as the PSM. Their role is to help the Partner meet all the requirements of the MoU. Their work ranges from identifying energy efficiency improvement projects through to advising on procurement strategies and commissioning requirements.

4. **Information** - Since energy management is usually not the core business for most companies, it is difficult for energy managers to keep up-to-date with the latest and most appropriate energy efficient technologies.

> **Program Response** - The provision of a PSM also addresses this issue. The PSMs, as energy management professionals, have the expertise in energy efficiency practices and technologies to relieve Partners of the burden of having to acquire this information themselves.

5. **Management Commitment** - There is a lack of senior management commitment in pursuing energy management. As energy is often seen as a fixed cost, or is a small proportion of overall costs, management focus tends to be on other issues.

> **Program Response** - The Chief Executive Officer or Managing Director of the Partner must sign the MoU to demonstrate top level commitment to the program and energy efficiency. Senior management are encouraged to demonstrate their commitment through opportunities to be quoted in promotional material, articles and advertising, and through networking functions.

Market Imperfection

In addition to the barriers outlined above, a number of market imperfections have been identified. They are as follows:

A. **Shortfall of supply** - There is low supply of energy services providers.

> **Response** - SEDA actively promotes companies that provide energy efficiency products or services through the Energy Smart Allies program.

B. **Low demand** - There is low demand for energy reduction solutions.

> **Response** - The ESB program creates demand directly through the program milestones and indirectly through publicised events and seminars.

C. **Skills** - Businesses do not have the skills to assess the risk associated with the implementation of technologies.

> **Response** - The PSMs are able to assist businesses assess the risk of various energy efficiency techniques. The use of Energy Performance Contractors providing guaranteed savings is also encouraged as a method of minimising risk.

D. Capital - Businesses do not have ready capital to invest in major efficiency projects.

> **Response** - Project delivery methods that involve financing, such as Energy Performance Contracts and Delivered Energy projects, are being actively promoted. The PSMs are able to assist Partners through the Energy Performance Contract process.

E. New technologies - With some newer technologies there are other market barriers, such as a lack of understanding of their benefits.

> **Response** - Commercialisation of new technologies is supported by SEDA. This may be through promotion of the technology and may include financial assistance.

F. Lack of incentive - There is little incentive for companies to account for the environmental impact of energy use.

> **Response** - The ESB program provides public recognition for companies that join the program and are successful in using energy in an efficient manner. It may also prove to be a useful method for companies to show that they have taken early action on reducing emissions if this becomes an issue in the future.

Achieving Market Transformation

Market transformation has been defined as *"a reduction in market barriers due to a market intervention, as evidenced by a set of market effects, that lasts after the intervention has been withdrawn, reduced, or changed"* (Kunkle, Lutzenhiser 1998).

To achieve market transformation both the supply and demand sides of the sustainable energy industry must be transformed. The ESB program aims to increase the demand for energy efficient equipment and services. It is critical that as the demand generated by the changing market of energy consumers grows, the barriers arising in the supply side of the market are also minimised.

The Energy Smart Allies program was developed to foster a robust energy efficiency industry. The barriers faced by this industry are similar to any new market and are distinguished by lack of information and flawed consumer logic such as neglect of life cycle costing. This program is operated in parallel with the ESB program to take advantage of the potential synergies. For example, it is important that the PSMs in the ESB program are fully aware of the services and technologies available from the Energy Smart Allies. This brings customers (the ESB Partners) into direct contact with the suppliers (Energy Smart Allies).

As the ESB program only works with a small percentage of the target market, the challenge is to persuade the rest of the market to become more efficient. The strategies used by SEDA include:

- Careful selection of Partners for the program to ensure maximum impact of savings and maximum exposure of achievements;
- Targeted promotion of successful companies to demonstrate the benefits of energy efficiency in terms of savings and corporate image;
- Targeted promotion of the benefits of specific energy efficient technologies or practices (eg: efficient lighting, elimination of compressed air leaks);
- Education of potential participants in the wider market through technology showcase seminars, and CEO events;

- Supporting incentives and government policy that encourage energy efficiency; and
- Working with industry associations.

The careful selection of Partners is extremely important for the program. In order for the benefits of energy efficiency to be spread throughout the market, it is essential that the organisations participating in the program represent a suitable mix of the following:

- Industry sector;
- Organisational size; and
- Geographical location.

SEDA has found that the first criteria is the most important because the perception of potential for efficiency improvements is strongly related to the processes and equipment used by an organisation. That is, it is far easier to convince a company of the benefits of improved efficiency if you have evidence of other companies, in the same industry and of similar size, that are already experiencing the benefits.

Being a State government agency, SEDA has the responsibility to provide the benefits of the program to Partners in all areas of the state, not just in the large cities. There are also significant market transformation benefits to a regional approach. Targeting Partners in different areas of the state is a good way to accelerate the dissemination of the lessons learned by companies in the 'big smoke' which have better access to consultants and suppliers in the developing energy services industry. In addition, companies in smaller regional centres often have more effective networks established with associated organisations, so it is possible to educate the entire community of the benefits of energy efficiency.

Marketing the Program

Initially, the marketing of the program targeted high profile businesses in NSW. This was seen as an essential way to build credibility for the program, and to encourage other businesses to participate. Having high profile companies taking part in the program also assists in obtaining media interest in its achievements.

However, not all the Partners are well known to the general public. Many have been targeted because of their importance within particular market sectors. Each of the ESB Program Officers have target market sectors. Each quarter a review is conducted to determine which market sectors are not yet represented in the program and attention is then focussed on those sectors. The approach to recruitment of organisations differs between industries. However, the general approach is to contact and build relationships with industry associations and market sector leaders.

Program Reporting

A database is used to record the identified projects and to track their progress towards implementation. The database is a useful tool, not only to show the successes of the program, but also to monitor the uptake of specific technologies and energy efficiency in general.

The PSMs send monthly database updates to SEDA. For each Partner, the database shows the identified projects and how close each project is to being completed. It also shows

the level of accuracy of the figures. This enables us to calculate the savings identified and implemented for each Partner and across the program as a whole.

The database gives us the ability to monitor the progress of individual Partners, and recognise if particular Partners are not implementing projects. This gives us the opportunity to work with these Partners to identify and overcome the barriers they are facing.

We are also able to establish if there are specific technology related projects that are consistently not implemented. We can then focus on why there are barriers to these projects and establish methods for overcoming the barriers.

Case Studies

Case studies are developed for specific Partners and technologies. The case studies are widely distributed, to existing and potential Partners, to the energy efficiency service and equipment providers, to other interested parties, and are included on SEDA's website (www.seda.nsw.gov.au). This is one way used to disseminate information on the benefits of energy efficiency throughout NSW business.

Sector specific education is also performed. Methods used include articles in trade publications, presentations and attendance at conferences and seminars, and production of "shopping lists" of the energy efficiency measures relevant to given market sectors.

Program Achievements

The ESB program was officially launched on 4 December 1997, with 13 Partners, which varied considerably in size and operations. They represented 7 market sectors including: clubs, education, electricity and gas supply, museums, property development, retail and refrigerated storage.

In just over 13 months of operation the ESB program has grown substantially in terms of the number of Partners, SEDA staff and PSMs, and boasts some significant achievements.

Starting with a team of 3 in late 1997, the ESB team has grown to 10 dynamic staff members. One significant achievement has been transforming a group of engineers, scientists, journalists and marketers, into a well integrated team selling both the program and, more importantly, the concept of profitable energy efficiency. SEDA's staff currently manage 5 PSM companies, which in turn employ 15 people to work with over 160 Partners.

The Partners range from small retail shops to large corporations. They include regional, national and international companies such as BOC Gases and Sanitarium Health Foods. There are also a number of Universities and Local Councils participating. The Partners represent 37 different market sectors, including accommodation, air travel, meat product manufacture, chemical/plastic/pharmaceutical manufacture and electrical equipment and appliance manufacture. A full list of ESB Partners is available on the SEDA website.

Partner Uptake

The number of new Partners joining the program is shown in Figure 2. Since the program began, an average of 10 companies have become Partners each month. The graph shows that the rate of uptake has varied considerably over time. The highest uptake has been

during the months in which SEDA has held special events to generate further interest in the program.

For example, in June 1998, the "Spotlight on Energy Efficiency" cocktail evening was held at Sydney's Government House. The Governor of NSW and the Minister for Energy invited Chief Executives of both existing and potential Partners to the event. The evening was an opportunity to recognise the achievements of existing Partners, welcome new Partners and encourage other companies to join the program. The resulting increase in the number of Partners was an important lesson to the SEDA team. It showed how important the publicity of good corporate citizenship is for many Australian businesses and encouraged an increase in communications support for ESB Partners.

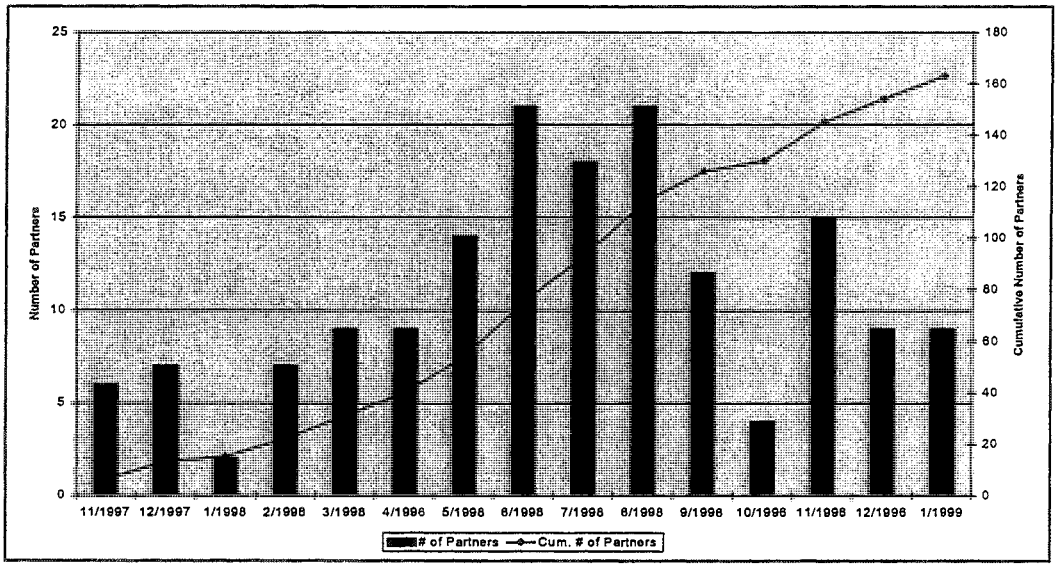

Figure 2. Partner uptake

Project Identification

At the end of January 1999, the average identified savings for those Partners where initial project identification had occurred was 18.8% of their energy consumption. This is in line with the prediction that most businesses could reduce their energy consumption by 20%. As each Partner is involved in the program for 5 years, the identification of projects will continue over that period, leading to an expectation that the average savings identified will exceed the 20% originally estimated.

The identified savings for industrial Partners over the same period, averaged 13.6% of their total consumption. Overall identification for the industrial sector appears to be low, however, project identification is at an early stage as most of them joined the program during the 6 months to January 1999.

After 13 months, the PSMs had assisted the ESB Partners to identify over $US 27 million of energy efficiency projects. These projects were expected to generate savings of over $US 8 million per annum, with an average return on investment of 29% - well above the 20% hurdle rate specified for the program. Table 1 shows the corresponding CO_2 and GJ savings. Interestingly, despite the low energy prices in NSW, it has been possible to identify cost-effective energy efficiency projects for every company that has joined the program.

Table 1. Program Results

	Investment ($US)	Savings per Annum ($US)	Return on Investment (%)	Energy Savings (GJ)	CO_2 Savings (Annual tonnes)
Identified projects	28 million	8 million	29	1 000 000	226 000
Implemented projects	2 million	0.8 million	40	71 000	15 000

Figure 3 shows that, as of the end of January 1999, the CO_2 savings identified under the program exceeded the target for the end of January by over 50,000 tonnes per annum. This is despite the fact that 20 of the more recent Partners had not even commenced project identification at that time.

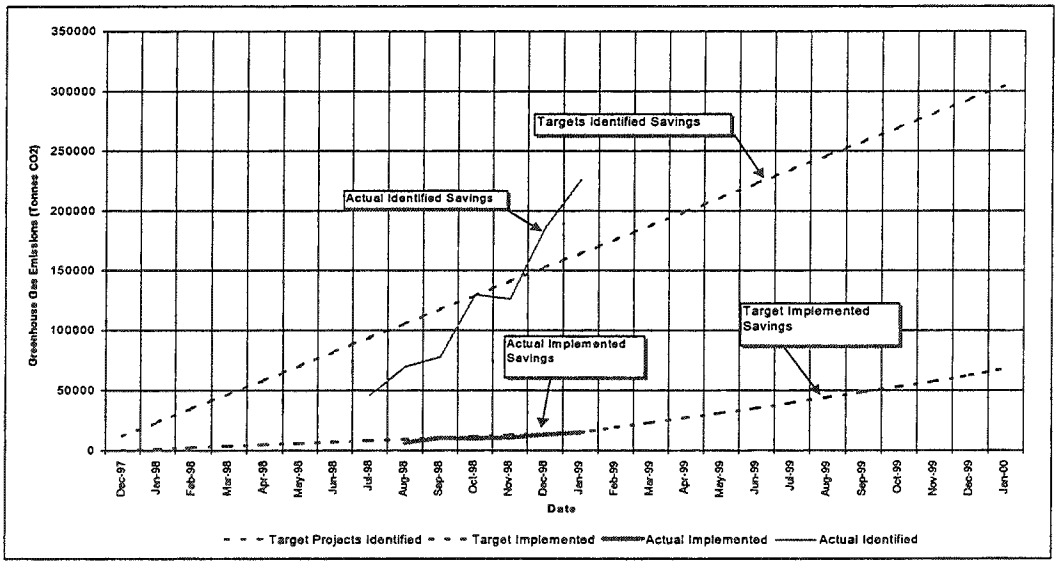

Figure 3. ESB Target Reduction in Greenhouse Gas Emissions

Project Implementation

Only a small number of companies have reached the 15 month / 20% milestone and implemented significant projects. Even so, at the end of January 1999 there had been nearly $US 2 million invested in projects, creating almost $US 1 million of savings per annum. This translates to greenhouse gas emission savings of nearly 15,000 tonnes per annum. As Figure 3 shows, this meets the program's minimum target for that period. SEDA's attention is now turning to how we can accelerate the rate of implementation in order to exceed the targets. Emphasis is on encouraging Partners to implement projects faster than required by their MoU so they can realise the energy and cost savings earlier.

Types of Projects

As a result of the broad range of participating Partners, there is enormous variety in the type of projects being implemented and investigated. Implemented projects vary from

such simple things as ensuring equipment is running only when required and enabling Energy Star office equipment, to the replacement of package HVAC units with new central plant and installation of high efficiency industrial dryers.

In the initial stages of the program we have seen low-capital projects being adopted as they can generally be implemented quickly and incorporated into maintenance budgets. The capital approval processes required for some of the larger projects means that they often require more planning time for allocation in future budgets (as allowed for under the 5 year program).

Industrial Partners are benefiting from high efficiency motors and pumps, repaired leaks in compressed air systems, and insulated steam pipes, tanks and other equipment. Some of the larger projects currently being implemented include:

- the conversion of boilers from coal to natural gas in an abattoir,
- a cogeneration plant for a metal product manufacturer, and
- installation of a heat recovery system for a brick manufacturer.

Metalcorp Limited is an example of an industrial Partner that has already implemented a range of projects. They are a medium sized metal recycling company with 2 sites in NSW. Savings of over 13% of their total energy consumption have been identified. To date they have implemented 4 projects representing 7% of their energy consumption and reduced greenhouse gas emissions of 690 tonnes CO_{2e} per annum.

They have improved their hydraulic system, installed lighting control in a workshop, and have improved the efficiency of the shredder system. The most substantial project both in terms of investment and savings has been the replacement of their existing dust extraction system with a more efficient system.

The projects Metalcorp have implemented give them an average rate of return of 33% and should save them $US 34,000 per year. With a range of other projects yet to be implemented, Metalcorp are expecting to reduce their energy consumption by at least 5000GJ p.a. and their CO_{2e} emissions by 1200 tonnes per annum.

Other Highlights

With the growth of the ESB program, there has been an increased focus on communications. We are working with several companies to promote their involvement in the program to their staff and customers, and also to educate their staff and customers about what they can do in their own homes.

These internal communications activities have included:

- articles in internal newsletters and magazines
- staff competitions
- staff awareness training sessions
- providing promotional materials for distribution

The internal communications support provided to Partners reinforces their commitment to the program to their staff and should lead to continued implementation of savings.

In addition to internal communications, ESB has an active role in external communications. As the program nears capacity our external marketing will shift its focus from selling the ESB program, to selling the concept of energy efficiency. We are accelerating the promotion of the achievements of our Partners to demonstrate that energy is

not a fixed cost, and that it is profitable to manage energy. We have had particular success in getting media attention in regional areas of the state, and in trade magazines.

In December 1998, ESB co-hosted an energy efficiency seminar in Sydney. The event attracted over 100 delegates to seminars during the day, and an additional 140 people to the cocktail evening where our Energy Smart Champion for 1998 was announced. The event was a great success with a number of companies being encouraged to join the program, or investigate methods of improving their energy efficiency through private companies. As a result of the positive feedback, we intend to hold a much larger Conference in 1999 in conjunction with the recently formed Sustainable Energy Industry Association.

Lessons Learnt

Reducing energy and greenhouse gas emissions requires a strategic approach. The following lessons may be useful to others running industrial energy efficiency programs:

- Recruiting well known, or household name, companies at the outset of the program is essential to establish a high profile for the program and to make it easier to attract other companies.
- Increasing the uptake of energy efficiency is more about managing and negotiating with people than about the technologies.
- Energy management consultants need to be trained to facilitate change by dealing with people and not just to generate reports.
- In order to achieve a sustainable cultural change within a company it is important to have an energy management team, rather than placing responsibility for energy efficiency with one person.
- It is important to have champions within companies who are in a position to focus attention on energy efficiency and push its implementation.
- Champions within industry, either individuals or industry organisations, are also vital in encouraging other companies to join the program, or to adopt energy efficient practices privately.
- Raising awareness of individuals' achievements to senior management in companies can increase the motivation to implement further projects.
- Promoting companies for what they have done and what they are continuing to do strengthens the commitment of Partners.
- Recognition of Partners' staff, consultants and Allies helps in building the networks necessary to operate a market transformation program.
- A robust database system is required to manage data for the promotion of the achievements of the program and Partners.
- Obtaining reliable data and having an automated database system is vital for achieving up-to-date and dependable results and for managing and monitoring the uptake of specific technologies and energy efficiency by specific Partners.
- A flexible approach to program management is important in dealing with different company cultures.

At this early stage of the program we are exceeding our targets and are bringing about market transformation. Through communication, demonstrated projects, an enthusiastic team and the ever increasing awareness of climate change issues, the State of New South Wales is leading the way for energy efficiency uptake in Australia.

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