

Energy efficiency on the Web – the new frontier

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Abstract

This paper describes the key elements of government energy efficiency websites and how these are now used to manage all aspects of government energy efficiency programs in Australia. In summary these elements are:

Public Information Resource: www.energyrating.gov.au has information concerning all regulated products including references to all relevant test procedures and regulatory standards.

Registration Database: All electric products that are regulated for energy efficiency are registered using an on-line database system that is accessible from anywhere in the world.

Interactive Listings: Consumers can search for products that are regulated for efficiency through interactive listings which are updated daily.

Internal Policy Document Control: All relevant internal policy documents are kept on an internal secure website to improve process control.

Energy Star website: The Energy Star website in Australia provides details on the program to consumers and partners.

Energy All Stars: This new “high efficiency” database lists the most efficient products available on the market. The database is intended for use by state and federal agencies as well as private industry for procurement contracts.

Motor Solutions On-line: This is an on-line database of high efficiency motors and includes free software for industry to optimise their motor selection.

Water Efficiency Labelling: Australia is introducing mandatory water efficiency labelling in 2006 and the system is being introduced with a fully electronic registration system.

Gas Appliance Labelling: Government regulation is expanding to include gas appliance efficiency labelling and these products will be included into the integrated government website/database system from 2006.

Introduction

Using websites for information distribution is nothing new. But with most businesses now using internet in their everyday operations and with internet access now available in the majority of households (60% had computers at home in 2002 and this is increasing at 10% per annum - ABS4602 2002) and with access to broadband increasing quickly, Australian governments are using this newest form of “network” to boost information to consumers, communicate with key stakeholders, facilitate registration of products, manage internal information flows and provide up to date lists for consumers and government procurement through a series of inter-related websites and databases. This paper attempts to illustrate the benefits that can be achieved through an integrated system of websites and databases, while documenting the lessons for others considering this ground breaking approach.

Since its inception, www.energyrating.gov.au has gradually increased the number of user hits which peaked at over one million in 2004. This website is now the key information portal through which state and federal governments communicate with consumers and stakeholders.

This paper reviews each of the main elements of the energy efficiency information systems used in Australia and attempts to illustrate the benefits of using such a system as well as issues encountered during its implementation.

Background

HISTORY

Australia has had mandatory energy labelling since 1986, with a total of six products required to carry an energy label when offered for sale. Since the commencement of energy efficiency regulations, all Australian state governments have required suppliers of products to register details of each model with regulators¹. This involved submission of a paper application for registration together with test reports to support the claims made in the energy label. Regulators in various states kept a “register” of products that were legally available on the market. Selling of unregistered products is an offence and can lead to prosecution.

This register of products was used as the basis for preparing brochures listing all products available in the market and to assist in targeting products for verification testing (check testing). Each state ran their own system of keeping records utilizing different formats (different sets of fields in different orders) and different software (Access, Excel, Word and other systems). These differences made compiling the information into a central national listing for brochures both tedious and time consuming. Updated lists were printed and distributed to retailers on an annual basis through the 1990’s, but this was an expensive and laborious process.

REVISED ENERGY LABEL IN 2000

By the mid 1990’s it was clear that the “Star Rating” system used on the Australian energy label needed to be re-graded to account for the substantial improvement in energy efficiency that had been evident since the introduction of energy labelling in 1986. Two years of preparation during 1998 and 1999 was required to revise all of the star rating algorithms, finalise changes to the label design and appearance and to introduce a new uniform national system of defining

government energy efficiency requirements within Australian Standards which are then used in regulations (refer to EES 2004 for details). This was also a period when disparate state energy labelling registration “registers” were consolidated into a “distributed” Access database which was updated monthly at a central point.

In 2000 a redesigned energy label was introduced which aimed to improve clarity and consumer understanding. A key element on the new energy label was a government website, www.energyrating.gov.au where more information on the energy labelling program was available. This website started operation in early 2000 about the time the new label was launched in retail outlets. Shortly after its introduction, interactive listings of appliances currently on the market were integrated into the website. This interactive listing made the printing of brochures obsolete. This system is described in more detail below.

MINIMUM ENERGY PERFORMANCE STANDARDS

In 1999 Australia introduced Minimum Energy Performance Standards for refrigerators, freezers and electric storage water heaters. Since then a further nine products have been regulated for MEPS and many more are scheduled to be regulated in the coming years. Many of these products are commercial or industrial equipment and so do not fall into the traditional basket of household appliances that had formed the main elements of the scheme until 2001.

Both energy labelling and MEPS are processed and administered by the same government agencies, so the systems of registration and the associated web tools have become highly integrated.

BENEFITS FROM THE EXPANDED PROGRAM

Over the period 2004 to 2008, the coverage of the energy efficiency program is being expanded rapidly. The estimated energy and greenhouse impact of these measures is reviewed periodically as part of its ongoing evaluation. In early 2005 the latest projections estimated that annual energy would be reduced by some 100 PJ per annum below Business as Usual in 2020, which will result in cumulative greenhouse emission reductions of 204 Mt CO₂-e over the period

Product	Year MEPS introduced/update
Refrigerators and freezers	1999, 2005
Electric Storage water heaters	1999, 2005 (small only)
Heat exchange and vented water heaters	2005
Fluorescent lamp ballasts	2003
Fluorescent lamps	2004
Distribution transformers	2004
Commercial refrigeration	2004
Three Phase air conditioners	2001, 2007
Single Phase air conditioners	2004, 2006, 2007
Three Phase electric motors	2001, 2006
External power supplies	2006
Televisions	2006
Set top boxes	2006
Other home entertainment	2007

1. A registration in any one state is recognised by all other states in the Federation of Australia. While efficiency requirements are set out in state regulations, there is national coordination of all elements under the National Appliance and Equipment Energy Efficiency Program (NAEEEP).

2005-2020. The benefit/cost ratio of all measures is 1.7 at a discount rate of 10% p.a. and the cost of avoided emissions is 14 Euro/tonne saved over the program life (i.e. consumers save 14 Euro per tonne of emissions reduced). Recent achievements of the NAEEEP program and details of the projected savings can be found in NAEEEEC (2005) and Wilkenfeld (2005).

A MOVE TO A CENTRALISED WEB BASED DATABASE

The distributed registration database that commenced operation in 1998 was a vast improvement over the disparate systems that each state had previously operated. However, there were operational issues which caused a degree of inconvenience. In essence, the distributed database was held locally within each state. On the first of the month, the new records over the past month were extracted and emailed to the system administrator, who updated the central system with all new registrations over the previous month. An updated central database was then sent out to all states which was used by the states for the subsequent month.

Whilst the common distributed database was a vast improvement on the old "system" there were several shortcomings:

- The system required all states to send in updates together, which was not always possible if personnel were absent for a few days.
- After the monthly records were extracted, users were not able to enter renew records until a revised new central update had been distributed to all states. Typically this took a few days as all updates were rarely received together.
- The central record system was only updated once a month, which meant that web based model listings were often slightly out of date.
- The distributed system was not very flexible when changes to the software were required (e.g. when new products or fields needed to be added). These could only be done at the time of the monthly updates and had to be loaded by each regulator. Different versions of the Access software and or operating systems used in each state also created some issues.
- From the regulators viewpoint, the new database created additional work (compared to their old systems). The biggest issue was time required for data entry.

After four years of operation, it was decided to centralise all of the distributed registration database operations into a single web based database that could accept direct data input from applicants (typically manufacturers). This commenced operation on 1 July 2002. The timing was important as it was planned to add many new products to the regulatory system over the coming few years and a centralised system provided a high degree of flexibility for both users and administrators. The detailed operation of the centralised web based system is described in more detail below.

Overview of Websites and Tools

The underlying idea of governments in Australia is to firstly, streamline the process of energy efficiency registration for users (manufacturers/suppliers) and to secondly, provide a powerful, integrated and up to date information resource for the use of stakeholders (manufacturers, consumer groups, individual consumers and governments themselves).

Initially this was achieved through the development of www.energyrating.gov.au which provided a central portal for all the government services and policies with respect to energy efficiency. Gradually the scope of web services has grown and naturally a range of new websites for specialist purposes have evolved.

Energy Rating – the main portal

The website www.energyrating.gov.au commenced operation in early 2000. It essentially consists of 2 main parts:

- A static website with a wide range of information and documents, including an electronic library.
- An interactive component which provides services such as registration and interactive listings. These include air conditioners, clothes dryers, clothes washers, dishwashers, refrigerators and freezers, water heaters, three phase electric motors, ballasts, fluorescent lamps, commercial refrigerators and distribution transformers (as of late 2004). New products are added as regulations come into force.

These parts are described in more detail below.

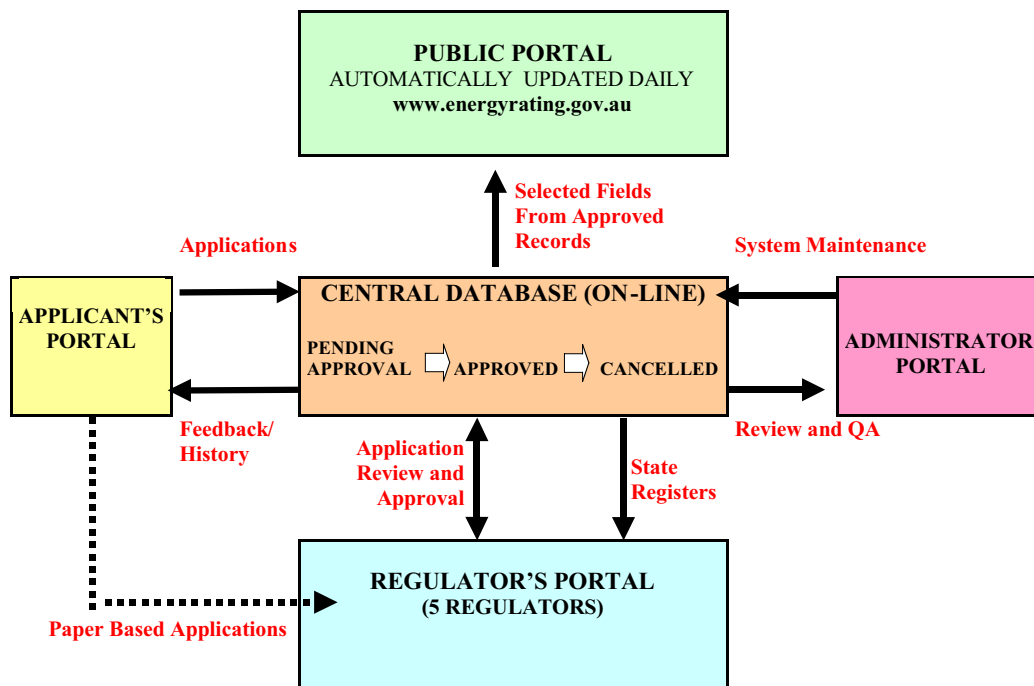
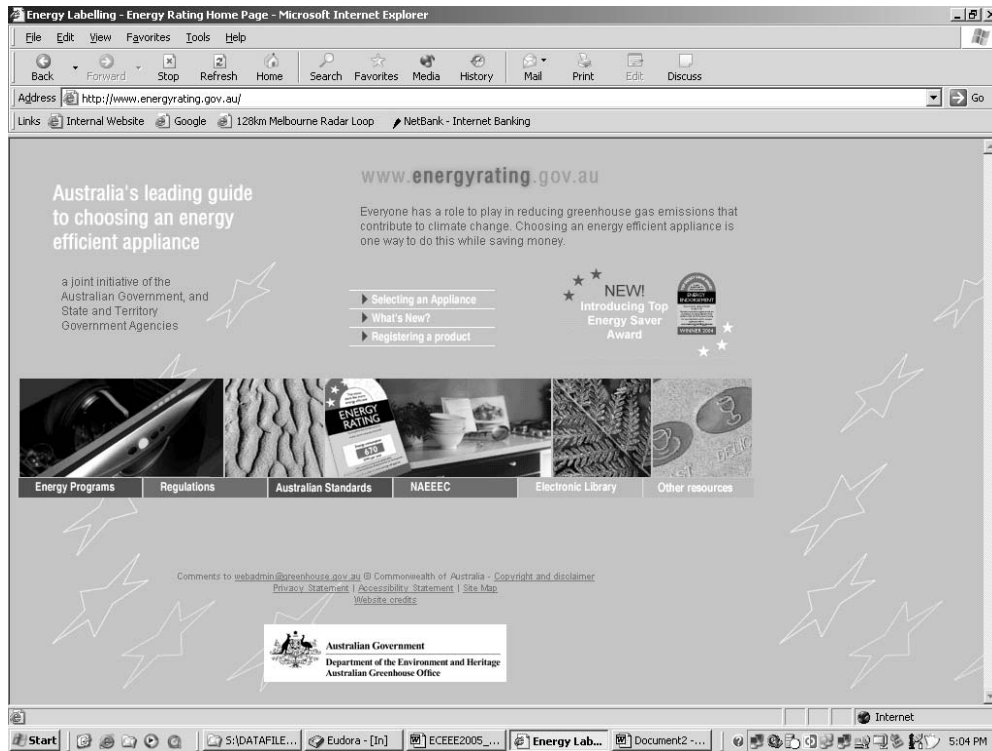
ENERGY RATING – STATIC WEBSITE

The static part of the website provides a wide range of information for consumers and manufacturers. The intent is to have information organised into logical program elements to assist consumers make the best choice of appliance and to assist manufacturers comply with the relevant regulatory requirements. The pages are laid out in a simple format with minimal use of graphics to ensure fast loading on slower connections. Key elements of the static site include:

- Information on current products regulated, test procedures and requirements, draft standards for comment
- Detailed product requirements, lists of material sources, accredited laboratories and technical data
- Information and advice for consumers on how to select and use energy efficient appliances
- An electronic library containing over 300 reports, documents and newsletters on energy efficiency
- Ministerial and government press releases
- Calendar of events and workshops on energy efficiency for consumer and stakeholders
- Regulator contacts, links to legislation and regulations

INTERACTIVE WEBSITE – SYSTEM OVERVIEW

The interactive component of the website is primarily accessed from a link in the Static website. It has two main components; the product registration system a secure access



system used by registration applicants and regulators, and the interactive product listing a public access system used by all stakeholders but primarily designed for use by consumers. The system is available for access anytime from anywhere with an internet connection.

The complete system has four main categories of users:

- Regulators
- Applicants (manufacturers or their agents)

- Public
- System Administrator

The system working relationships between each of these users are graphically described in the figure below.

Data is logged into the central database continually from sites all round the world. Once a day the main database uploads relevant (public) fields from all records with current approved registrations to a second database that serves the interactive product listing function (public portal). This ar-

management ensures that the system operates quickly and efficiently on-line.

The entire system is housed on a dedicated server. Currently the system uses MS Access software but will be converted to an SQL server shortly. New products and amendments to the database can be uploaded easily and are then available for all users immediately. All inputs to the system are copied to an email system that maintains a log of all transactions. In addition, once a day the system automatically creates a copy of itself on a mirror drive off site and once a week a copy is also downloaded by the system administrator, allowing full traceability and redundancy.

Product Registration Component

The requirements for registration of products for energy labelling or MEPS are all set out in the relevant AS/NZS “Part 2” (regulatory) standards. These standards set out the required data inputs for a registration in the application form. These forms are the basis for the on-line database registration system. Each form for each product type is reproduced in an electronic format for applicants to use on-line². To ensure a consistent approach all registration forms have been standardised over the past five years. This common format runs as follows:

- Applicant Details
- Appliance Description (includes traceability data)
- Testing and Test Report (Test Standard / Lab details)
- Specific Appliance Details (Specifications)
- Test Results
- Declarations and Compliance Statements
- Administrative Details (payment of fees, copies of label images)

Making Applications On-line

Applicants wishing to register a product can use a link from the static website to apply for access to register on-line. Following lodgement of the applicants details the system automatically emails the applicant their username and password. Currently there are more than 400 users (applicants) of the system from around the world. Some smaller companies use expert “consultants” to make applications on their behalf.

Upon entering the database the applicant is presented with a main page that provides the applicant with the followings:

- A user guide
- A facility to set up details of any number of Brands they may wish to register
- A facility to create a new registration application by nominating the Brand, Type of appliance and the jurisdiction in which they wish to lodge their application
- A search engine to find and view existing or in progress records.

For each record the applicant creates (there are currently about 20 000 records in the system), a unique Record ID number is assigned and a “status” is provided. Each record the applicant has initiated can be reviewed using the search engine facility. For each record the applicant can:

- View – View all details as currently filled in on the application (Print a copy if required)
- Edit – edit an existing record (does not apply to approved records)
- Copy – Copy the application to a new application (e.g. if the applicant wishes to use an existing record as the basis for a new application).
- Delete – Permanently deletes the record (does not apply to approved records)

Action	Record ID	Status	Appliance	Reg. Number	Reg. Date	Off Market	Brand	Model	Award	State
select	12527	On Hold	EM				TEST	-		TEST
select	12524	Approved	EM	REM0175	24/05/2004		TEST	DTE90C - DTE/DVE		TEST
select	12523	On Hold	EM					DTE90C - DTE/DVE		TEST
select	12522	Submitted	RF				TEST	KDW4000AU	Eligible	TEST
select	12516	On Hold	HW				TEST	111250/411250		TEST
select	12515	On Hold	HW				TEST	E250		TEST
select	12508	On Hold	RF				TEST	HRF-588FR/A		TEST
select	12502	On Hold	BA				TEST	XXXX		TEST
select	12320	On Hold	AC				TEST	ART36RLB3		TEST
select	12319	On Hold	EM				TEST	DTE90C - DTE/DVE		TEST

2. More than 90% of all applicants now log in directly to the system to input their applications. Those without the necessary facilities (or inclination or know how) can still submit the traditional paper based registration form to their chosen regulator who shall log in to the system (via a special regulators portal) and input the registration on behalf of the applicant. Naturally this approach is not favoured by regulators and some are now refusing to accept applications unless submitted electronically by the applicant.

- Withdraw - Withdraws the application (withdrawal is only possible on applications that are yet to be approved).

The application forms are divided into a number of sections that are presented on a series of screens. Each section contains a number of fields to be filled in. Information regarding the required input for each field is provided by the system. At any time during the input process the applicant can choose to place their application on “hold”.

When moving from one section in the form to the next the system will conduct a check on the data input. Various validation checks are applied to ensure (as far as is possible) that the data input is complete and consistent. In the case of test result data checks are also conducted to ensure that the input is within expected limits.

In response to a validation issue the system will return either a warning or an error or a message to the user. Warnings are advisory only and will not prevent the submission of the application, however these warnings are logged and the regulator in reviewing the application will also be able to view these warnings. An “error” must be corrected before the applicant can proceed to the end of the form and submit.

On the final section of each application form the applicant has the opportunity to:

- Attach supporting materials (test reports, label samples etc)
- Upload a picture of the product for display on the interactive product listing
- Input advisory messages to the regulator in a dialogue box
- Notify the regulator of the proposed means for payment of the registration fee (this is not done on-line yet).

Approval Process

Once an application is successfully completed its status changes to “Submitted” and the appropriate regulator is automatically sent an email advising them that a new application has been lodged. The regulator then logs into the database and can review the application (including any warning messages). On viewing the application the regulator can choose to:

- Approve the application (Status = Approved). The regulator will also include a registration expiry date at this time.
- Refuse the application (Status = Refused)
- Return the application with comments (in a dialogue box) for action by the applicant (Status = Returned)
- Put the approval process on hold (Status = Pending)

At anytime the applicant can log into the system and check the status of their application. Once a record is approved it automatically uploads overnight onto the interactive product listing.

Special Features of the Registration Component of the System

Apart from the systems basic features as described above several special features have been included, often in response to users requests. These features include:

- *Off Market Function:* For temporarily discontinued products applicants can assign a date against a record that delists it from the interactive product listing from that date onwards (although its registration remains valid ie Approved Status). This helps to keep the interactive product listing current and was included in direct response to consumers complaints that products of interest to them were not available.
- *Expiry function:* 100 days before the expiry date for a registration the status of the record automatically changes from “Approved” to “Expiring”. Expiring records are then always displayed to both applicants and regulators on their default opening screen.
- *Access Sharing:* Access to records is securely assigned to the original applicants user ID. On occasion however applicants wish to share access to their records with other users. Typically this includes consultants sharing records with their clients and local distributors sharing records with head offices in other countries. To this end an access management system is available to all users whereby specified users (identified by their ID number) can be granted access to any specified record.
- *Brand Details:* Each user is required to set up details for each brand they intend to register. This is a related database that automatically loads the brand data into any new application that applicant undertakes under that brand name. This arrangement helps to maintain consistency between records for the same brand³.
- *Approval Certificates:* Regulators have a special print option to produce an “Approval Certificate” that can be posted to the applicant upon approval of their application. The certificate contains a record of every field in the application submission.
- *Endorsement Award Acceptance:* During the application process the system automatically checks to see if the particular application meets the award criteria for any endorsement programs operating at the time of the application. For products that do meet the criteria the applicant has the option of accepting the award on-line.
- *Download facilities:* Various download facilities in user friendly formats are available to the regulators and system administrator. These are designed to facilitate: research, especially in respect of trends in efficiency compliance actions by regulatory authorities industry communication programs (via user contact detail lists) the production of promotional brochures (although this is becoming less common)

3. For instance, an applicant for a Fisher & Paykel refrigerator may in one application describe their brand as Fisher '&' Paykel and in another application as Fisher 'and' Paykel. The two are considered as different brands by the software that produces the search facility in the interactive product list. Naturally multiple listings for what is in fact the same brand can be confusing for consumers and is to be avoided.

INTERACTIVE PRODUCT LISTING COMPONENT

The public interface for the database system consists of an interactive search engine. The search engine provides access to selected fields from all products (both labelled and MEPS only) with current registrations. The selected fields that are displayed are agreed with industry in advance. The search engine provides the following facilities:

- Access to all designated public records on the database.
- A search engine facility for each product type. This allows consumers to search for products that fulfil their particular requirements – searches can be limited to particular attributes, types or brands.
- Sorting of returned lists of products on any selected field on display. By default products are listed in descending order from most to least efficient.
- Selection of either a basic or comprehensive level of detail in the returned list of products.
- A calculator function for estimating comparative operational costs, parameters can be set by user (tariffs, lifetime, frequency of use).
- Help on searching, headings and content in the interactive product list.
- Frequently Asked Questions.
- Download facilities in CSV and or MS – Access format (restricted fields). These facilities allow consumers to do further analysis off line. They are also used by regulators, field officers and researchers to check products are accurately registered when displayed in retail outlets.
- Links are provided to manufacturers' web-sites (where available) and to pictures of listed appliances that can be uploaded by applicants at the time of registration application.

Meeting The System User Needs

Whilst the system is designed to be as user friendly as possible, it is a dynamic system with some unavoidable complexities that necessitate various support services for users. In addition NAEEEP in Australia continues to develop rapidly with several new products bought into the scheme each year and ongoing revisions to existing schemes (new categories of products included, revised MEPS levels etc) occurring on a regular basis. This means that not only are many new users entering the system for the first time (often with little background in the NAEEEP) but existing users need to be kept abreast of new developments. To cater to these user support requirement the following services are provided:

- *User manuals*: An up to date user manual is available from a link on each users home page.
- *User Support Services*: A telephone support service is available to all applicants (and regulators). The system administrator can log in and review any application in parallel with users. The system administrator (as well as the regulator) can effect necessary alterations to an application on behalf of the applicant.

- *Dialogue boxes for regulators and applicants*: As noted previously all application forms include an applicant and a regulator dialogue box where issues pertinent to the particular application can be noted.
- *Newsletter*: A periodic newsletter "Appliances on-line" is distributed via email to all system users. The newsletter contains information regarding upcoming revisions and upgrades to the system, housekeeping and trouble shooting tips.
- *Energy Rating Query service (email based)*: The Australia Greenhouse Office with support from its technical consultants provided an email query service for users of the interactive product list (principally consumers).
- *Seminars*: In the lead up to the introduction of a new product type into the NAEEEP program Australian governments undertake seminar programs for industry in major cities across Australia (now also in NZ by the NZ government). A key component of these seminar programs is a detailed presentation on the use of the on-line registration system.

Valuable feedback from these various support services feeds into the system maintenance and upgrade program to ensure that it keeps abreast of users needs. Bugs are eliminated and new features are continually added in response to concerns raised and suggestions for improvement offered by users of the system.

Top Energy Saver Award Winner (TESAW)

Each year criteria for the most efficient models on the market are reviewed and released. Criteria are reviewed so that the most efficient 5% to 15% of models on the market are eligible to apply for an award. Eligible products which are newly registered or with current registrations within the award year are eligible to receive a TESAW award. If product is eligible for TESAW during the registration process, the applicant is invited by the system to apply for an award on-line. To receive an award, applicants must agree to the award conditions, which include a declaration that the model is offered for sale in Australia during the award year and the provision of a sample for check testing on the request of regulators.

Products covered by TESAW include those products that carry a star rating energy label (refrigerators and freezers, clothes dryers, clothes washers and dishwashers) as well as electric storage water heaters, gas water heaters and gas space heaters. The program is voluntary but there is no application fee. Products with a TESAW award are indicated on the interactive product listings.

Check Testing Program

Regulatory authorities in Australia commission independent accredited laboratories (which are not associated with the registration holder) to "check test" selected models to ensure that the energy label and/or performance claims made by suppliers are valid.

Models to be check tested are not selected on a random or statistical basis but rather on the basis of a series of factors

that are considered to increase the risk of failure. The on-line database provides the necessary data for assessment of many of these factors including:

- *Efficiency Claim:* For labelled products, those models with the highest claims for energy efficiency (eg. high star ratings) are specifically targeted because of the market's higher expectations with respect to the performance of these models as compared to models with low ratings. For appliances subject to MEPS those appliances with efficiency claims that just pass the MEPS requirement are also targeted as being at a higher risk of failing to meet the MEPS standard.
- *Age of Model (when was it first registered):* Newer models are normally given preference when considering models for check testing because of their potential to remain on the market for a longer period.
- *New entrants to the market:* New Brands to the Australian market are selected as a higher priority for check testing
- *Compliance History:* Suppliers with a demonstrated record of check testing non-compliance are subject to greater scrutiny in the check testing program because of the likelihood of a continuation of such historical trends. History of check testing outcomes by brand are maintained in a related database.

A detailed outline of the check testing program can be found in the Administrative Guidelines (NAEEEP 2004).

Secure Website for Government Officials

With nine governments operating the scheme, there is a need to keep all relevant internal policy documents in a system that can be accessed by a wide range of government officials at any time. The National Appliance & Equipment Energy Efficiency Committee (NAEEEC) now loads all relevant internal documents onto a website for access by authorised government users. The status of any project or product can be checked and links to all relevant documents are available.

Every energy efficiency project has a status sheet which shows at a glance the current stage of the project, the responsible staff, forthcoming work plan and what critical path or contentious issues may be on the horizon. Importantly it provides a value information resource and background information to officials that may have to brief Ministers or senior government officials on energy efficiency policy issues.

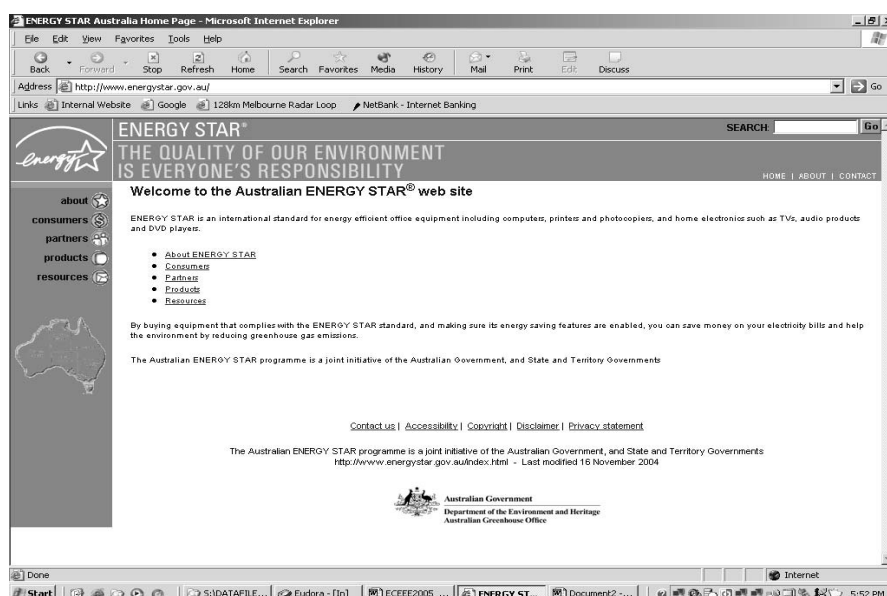
This website is a valuable tool as it makes the regulatory process and the efficiency programs truly national in nature. It also provides strong continuity and history for the program as staff change within different organisations.

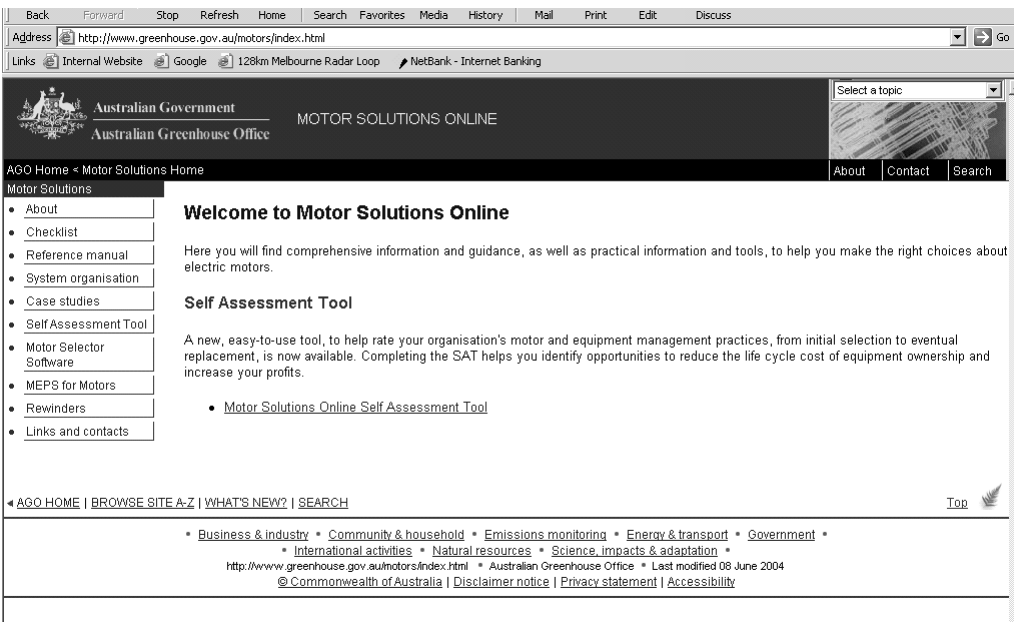
Energy Star Australia

In addition to www.energyrating.gov.au NAEEEC also operates the Australian Energy Star Program website www.energystar.gov.au. The site provides information to consumers and Partners for office equipment and home entertainment products. The scope of Energy Star in Australia currently covers internationally traded items such as office equipment and home electronics. Australia is working increasingly closely with the US Environmental Protection Agency on a variety of aspects of the Energy Star program. One of the areas of interest is the preparation of an interacting listing of eligible Energy Star products that are available on the Australian market.

Energy All Stars – new high efficiency database

This new “high efficiency” database lists the most efficient products available on the market. It covers most of the products regulated for labelling and MEPS and also a wide range of “non-regulated” products as well such as those covered by Energy Star and other equipment covered by Australia's standby program. This database is primarily intended for use by government agencies for procurement contracts but will also have applications for industry, large corporate purchasers and consumers.





For regulated products the on-line database system automatically checks the application to see if it meets the award criteria. For compliant products the applicant is offered an additional application form to confirm acceptance of the award. For non regulated products specially tailored application forms are made available (on the same site) to those who choose to apply for an award.

For regulated products, the Energy All Stars application is integrated with the regulatory application form, offering a one stop shop. The Energy All Stars eligibility criteria are harmonised with other high efficiency specification for motors and air conditioners and the appliance Top Energy Saver Award requirements.

State and federal governments are now moving towards an integrated policy of purchasing products from the Energy All Stars database for the products covered. To facilitate this, the website offers a range of selection tools to compare different products and provide indicative product prices, websites for further information and contacts to negotiate bulk or government contract purchases.

Motor Solutions On-line – downloadable high efficiency database

This is a database of high efficiency motors and includes free motor selection software for industry to optimise their motor selection requirements. The Motor Solutions On-line database is interlinked to and updated from records in the MEPS regulatory motor database which covers motors from 0.75 kW to 150 kW and includes 2, 4, 6 and 8 pole configurations. The Motor Solutions On-line database also includes a wide range of other motors which are outside the scope of motor MEPS in Australia. The database contains highly detailed motor performance information and is generally harmonised with the requirements of the European EURODEEM motor database.

Expanding the Database System

WATER AND GAS EFFICIENCY – COMING SOON

Government regulation is expanding to include water and gas appliance efficiency labelling and these products will be included into the integrated government website/database system. This will include gas space heaters and gas water heaters (currently covered by an industry operated scheme but with some regulation for safety issues) and for water efficiency dishwashers and clothes washers as well as taps, shower heads, toilet cisterns, flow regulators and urinals.

GLOBAL SOLUTIONS

Potential exists to expand the on-line database system and interactive product listing developed in Australia to include other countries. Already New Zealand uses the Australian system. The single NZ regulator is now listed as an additional option (in addition to the four Australian state based regulators) when choosing to register a product for Energy Labelling or MEPS. To differentiate NZ from Australian products applicants nominate in their applications the following details:

- The regulatory standard to be applied to the application (NZ and AU use separate regulatory standards).
- The regulatory authority to which the application is being made.
- The countries into which the product is to be sold (AU only, NZ only, both AU and NZ).

From this data different interactive product lists can be generated to meet the different countries needs.

The Australian Federal Government is currently in discussions with several Pacific Island States with a view to extending the system to those jurisdictions. Potentially a single system could have wider regional application or could be integrated or linked to regulatory systems in other jurisdictions.

Lessons Learned

Australia has moved forward quickly into the electronic age with respect to government regulation and supervision and control of the market for appliances and equipment. The process of using web based communication has greatly improved stakeholder communication and has empowered users and purchasers to select more efficient products based on a systematic comparison of all products on the market. Consumers now actively seek more efficient products even if they are not on display at their local retailers.

One of the most important lessons learnt is that information from the registration system is extremely powerful for governments who are responsible for regulating the energy efficiency of products. Detailed test reports and product details provide:

- Information on brands and models that should be on the market (and those that should not) which allows improved surveillance of unregistered equipment that may be offered for sale in retail outlets and facilitates – this facilitates swifter regulatory action.

- Data on the registration database allows intelligent selection of products for check testing – of most interest are new brands, products with extraordinarily high energy efficiency claims and those that lie close to minimum efficiency requirements (MEPS levels).
- Having detailed product data empowers governments to take a strong position when negotiating with industry on new energy efficiency standards (MEPS levels) or new energy labelling algorithms (star rating equations). Having access to data for the full market (as well as historical data) enables fair comparisons and objective analysis to be made as the basis for more forthright government proposals.
- Historical registration data also allows governments to track efficiency trends over time and helps to provide a basis for quantitative impact evaluation of the program.

Given that there is a wide range of products already regulated for energy efficiency in Australia, and there are proposals to expand this significantly in the coming years, the web based system provides the tools and the flexibility to cope with this period of rapid change. Web based systems allow a high degree of flexibility with regard to keeping registration requirements up to date when there are changes in reporting requirements, regulatory requirements or test standards.

The success of the current system can be measured by a range of measures. Most importantly, more than 90% of new registrations for energy efficiency in Australia are lodged electronically through the on-line system (3 years ago all applications were paper based). Another important measure is that around 5000 new or renewed registration applications have been lodged in the 12 months from March 2004 to March 2005. The number of registrations has increased dramatically as the range of products covered by programs has expanded, but these continue to be processed by 4 state regulators who only spend a small proportion of their time on this function.

In our experience to date we have learned the following valuable lessons from the development of integrated web based systems:

- It is difficult for a single website to meet all user objectives. There are many types of users ranging from consumers who want some simple advice on how to buy an efficient product to corporate users who want the information for detailed internal evaluations for bulk purchases. Even amongst normal consumers there are those that seek a simple message and as well as the engineering types that pour over detailed figures. Web based systems have to be designed to cater for all potential users.
- With respect to regulatory systems, user support services are essential. On-line registration systems are necessarily complex and it is critical to provide timely and accurate assistance to users when required. This is a significant commitment on top of software development and maintenance.
- Web based systems can offer many powerful tools to support users – in particular new records can be inspected and checked while they are being entered and any problems can be solved on-line before data is publicly posted.

- Consistency of data is essential – input controls on data entry are complex and require careful planning. And while development of such screening systems is a significant commitment, once in place, they mean that less skilled staff can be used to process routine regulatory applications.
- Websites, especially those with a large number of hits, will generate significant user inquiries. The host has to be prepared to resource these inquiries. While many are simple inquiries, there will be some complex and intriguing questions and occasionally a negative response.
- One of the most valuable aspects of the websites to date is that the electronic document libraries provide an accessible source of all relevant reports with respect to energy efficiency. This is an extremely valuable resource for not only government officials (who rely on such documents every day) but also to consultants, researchers and academics, as well as industry, consumer groups and consumers themselves.

The web and internet are developing rapidly and so are the tools and software available for website applications. It is critical that software be kept up to date and that applications remain viable under different software platforms. Documentation of the system operation and maintenance is critical – poor quality documentation will ultimately lead to data errors and ultimately an unworkable system. Documentation is critical on large systems as several programmers will often be undertaking simultaneous development on different areas of the system. Good documentation allows flexibility in the use of a range of programming staff, depending on development needs. Similarly, it is critical that normal industry standards of backup, verification and traceability be implemented in any large public software system.

The user interface is perhaps one of the most critical issues and this needs to be evaluated on a regular basis. This applies to equally to information type websites (static pages, navigation and content), interactive systems (for listing of products) and data input systems (for registration of products). Websites must be responsive to users needs – feedback from support services is a valuable resource. Often active evaluation and surveying of user needs to be sought to identify key issues.

Although the setup and operation costs are significant (currently around 60 000 Euro per year for all the current websites, databases and associated software development and support services for nearly 20 products), the whole system is able to process huge volumes of regulatory data and can provide extensive internal services and web based information to consumers. In contrast, development and printing of brochures for distribution in retailers cost more than 45 000 Euro per year in the 1990's for an annual update which only covered 5 product types. Brochures inevitably become outdated as soon as they are printed and the current system provides an order of magnitude of additional services to previous system.

In short, the web based approach to elements of the regulatory system in Australia has been very successful and this is expected to provide the software tools required in the future. However, development, and more importantly, main-

tenance, of this type of system is a significant on-going resource commitment and organisations who are interested in this approach need to be aware of the potential commitment. An under-resourced and poorly maintained system is likely to be worse than no system at all.

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