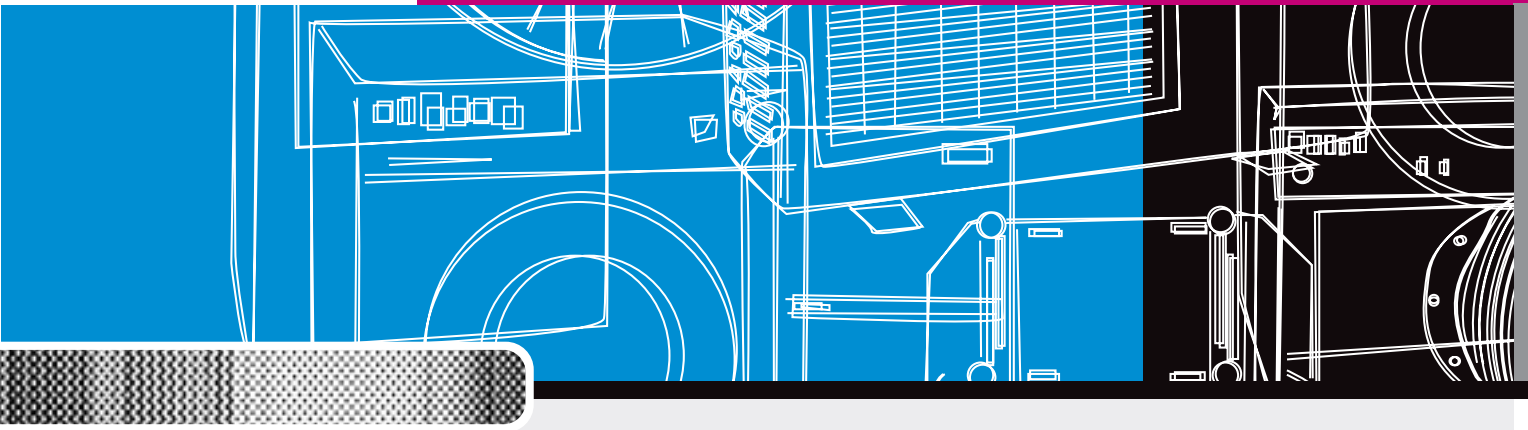


**NATIONAL APPLIANCE AND EQUIPMENT  
ENERGY EFFICIENCY PROGRAM**

**OPTIONS STUDY – MEPS/LABELLING  
POSSIBILITIES FOR STOVES & COOK-TOPS**



**FINAL REPORT**

*February 2002*

PREPARED FOR AUSTRALIAN GREENHOUSE OFFICE

BY ENERGYCONSULT PTY LTD

© Commonwealth of Australia 2002

This work may be reproduced in whole or part for study or training purposes subject to an inclusion of an acknowledgment of the source and no commercial use or sale. Reproduction for the purposes other than those named above requires the permission of the Australian Greenhouse Office. Requests and inquiries concerning reproduction rights should be addressed to:



The Communication Director  
Australian Greenhouse Office  
GPO Box 621  
CANBERRA ACT 2606

For additional copies of this document, please contact the Australian Greenhouse Office Infoline 1300 130 606.

This publication is also available on the internet on the following address:  
[www.greenhouse.gov.au/energyefficiency](http://www.greenhouse.gov.au/energyefficiency)

February 2002

# CONTENTS

<b>EXECUTIVE SUMMARY</b>	4
INTRODUCTION AND BACKGROUND	4
Methods	4
Results	4
Recommendations	5
<b>INTRODUCTION</b>	6
Background	6
Objectives of This Study	7
<b>METHODOLOGY</b>	8
Research of Overseas Programs	8
Research of Australian Programs and Market	8
Telephone Interviews with Key Industry Stakeholders	8
Analysis and Recommendations	8
<b>AUSTRALIAN PROGRAMS AND MARKET</b>	9
MARKET CHARACTERISTICS	9
USAGE AND ENERGY CONSUMPTION CHARACTERISTICS	12
Energy Consumption	12
Australian Testing Standards & Recent Results	13
AUSTRALIAN PROGRAMS	15
INTERVIEWS WITH AUSTRALIAN STAKEHOLDERS	17
Feedback on Potential Stove and Cook-top Program Options	17
Feedback on Market Characteristics and Dynamics	19
Implications of Australian Research Findings	19
<b>OVERSEAS PROGRAMS AND RESEARCH</b>	21
OVERSEAS PROGRAMS	21
MEPS Programs	21
Labelling Programs	23
Information Programs	24
OVERSEAS MEPS AND LABELLING PROGRAM RESEARCH REPORTS	27
EU Appliance Labelling and MEPS Research	27
USA MEPS Determination	28
IMPLICATIONS OF OVERSEAS PROGRAM AND RESEARCH FINDINGS	30
<b>ANALYSIS AND RECOMMENDATIONS</b>	31
CRITIQUE OF PROGRAMS	31
RESEARCH FINDINGS	32
RECOMMENDATIONS	33
MEPS	33
Energy Labelling	33
Information and Research	33

# EXECUTIVE SUMMARY

## Introduction and Background

The Australian Greenhouse Office (AGO) is the lead Commonwealth agency on greenhouse matters, responsible for both the coordination of domestic climate change policy and for managing the delivery of major new and existing Commonwealth greenhouse programs.

The National Appliance and Equipment Energy Efficiency Committee (NAEEEC) comprises officials from the Commonwealth, State and Territory government agencies, with representatives from New Zealand and is responsible for implementing product energy efficiency initiatives in those jurisdictions. NAEEEC's role is to coordinate the National Appliance and Equipment Energy Efficiency Program (NAEEEP). Stoves and cook-tops are covered by the NAEEEP however, there is currently no nationally coordinated program in place to encourage efficiency in these appliances. This consultancy aims to examine all possibilities from voluntary to mandatory measures for a program to encourage stove and cook-top efficiency.

Internationally, a range of approaches have been used to encourage efficiency in stoves and cook-tops from labelling programs, such as endorsement labels in the USA, to standards such as in Canada, and Russia. While Minimum Energy Performance Standards (MEPS) were once applicable for stoves in the USA, the Department of Energy has now abandoned these ruling them unnecessary. It will be important for this consultancy to consider which measures (voluntary or mandatory) are most appropriate in Australia, taking into consideration the experiences and approaches used internationally to encourage efficiency in stoves and cook-tops.

## METHODS

The research focused on several methods for obtaining information on Australian and international stove and cook-top energy efficiency programs, including:

- Comprehensive search via the Internet
- Telephone interviews with key stakeholders
- Overseas and Australian program evaluations – review of and cost benefit analysis.

The aim of this research is to *quickly* obtain information on the programs that have encouraged energy efficiency improvements in the use of stoves and cook-tops

## RESULTS

**Internationally**, the presence of MEPS for cooking appliances is quite low compared to other major appliance groups, with four countries utilising MEPS for cooking appliances. Similarly, labelling of cooking appliances is not highly prevalent, with three countries requiring mandatory comparative labels and four countries with a form of voluntary endorsement labels.

**Australian programs** relating to cooking appliances are all involved with the provision of information – mostly via the Internet, however many were also providing similar printed material. The major organisations involved with provision of efficiency information are:

- SEAV, AGO, ACA
- Energy utilities, such as Actew/AGL, Energex, Citipower, TXU.

The **overseas research reports** (from the EU SAVE program and the USA DOE) draw differing conclusions. The EU is actively investigating labelling and potentially MEPS for ovens, and the USA have removed (1998) the requirement of MEPS for cookers and ovens. It is interesting that the two major western markets for ovens and cookers have proposed differing policy approaches. It is clear from the reports reviewed by EnergyConsult that there are specific differences in underlying assumptions and the economic cost-benefit approaches are clearly different. The major

difference in approach being the USA choice of a minimum customer payback and the EU choice of lowest life cycle cost.

The review of overseas programs showed that there are no "best practice" programs being implemented for encouraging efficient cooking. The provision of information is the main element of the international programs reviewed.

The programs examined show that there is little potential for MEPS for ovens and less potential for cook-tops and stoves, as only a small number of countries have MEPS. In Canada, the only major economy that is similar to Australia, MEPS has so far shown no significant effect on the market. Similarly, labelling is not very prevalent and is still being investigated by the EU, who are developing a new standardised testing procedure that more accurately represents the energy performance of the oven (the "chilled wet brick" test). The EU's regulatory committee on labelling for domestic ovens have recently (November 2001<sup>1</sup>) decided to push ahead on labelling for electric ovens.

The **Australian residential market** has almost complete penetration of cooking appliances, with oven/cook-top combinations or upright cookers in almost all Australian households. The annual sales of new upright cookers or oven/cook-tops is driven by the increase in households corresponding to the number of new dwellings built each year, and by the replacement of existing installed stock, estimated that cooking appliances of this type are replaced every fifteen years. Electrolux dominate the sales of cook-tops, ovens, and upright stoves, which market share in the range of 35 – 90%, depending on the category.

**Interviews with stakeholders** showed the majority did not support MEPS or Labelling of cooking appliances. The ACA, the AGA (although this was not an official position cleared by the AGA members) and some manufacturers considered limited support of MEPS for ovens and possibly cook tops/stoves.

Mandatory mechanisms – as compared to voluntary MEPS or Labelling programs – were highly favoured by the stakeholders, however only if MEPS or Labelling were shown to be appropriate.

Information programs were highly recommended by the stakeholders for development as they believed that significant energy efficiency improvements were possible with changes to consumer usage of the appliances and associated cooking utensils.

## RECOMMENDATIONS

The AGO has asked for this report to consider the most practical voluntary or mandatory measures for encouraging the energy efficiency of stoves and cook-tops. In considering these measures, we have divided them into three types of program elements, as follows:

- MEPS
- Energy Labelling
- Information and Research.

Based on the research the following recommendations are made:

- MEPS should not be considered for cook-tops or hobs. MEPS for ovens should be reviewed once the EU has proposed a system and after the Canadians have reviewed their MEPS levels
- A voluntary program with the Australian industry should be pursued to ensure that minimum heat loss performance required for ovens within AS 1549 is enforced
- Labelling for Ovens, Cook-tops and Stoves is not considered practical at this stage
- Information provision in Australia could be enhanced by a coordinated web site
- Research on the energy impacts of consumer use of cooking appliance for quantitative information.

<sup>1</sup> Personnel Communication, Nick Banks for EES, Feb 2002

# INTRODUCTION

## **Background**

The Australian Greenhouse Office (AGO) is the lead Commonwealth agency on greenhouse matters, responsible for both the coordination of domestic climate change policy and for managing the delivery of major new and existing Commonwealth greenhouse programs.

The National Appliance and Equipment Energy Efficiency Committee (NAEEEC) comprises officials from the Commonwealth, State and Territory government agencies, with representatives from New Zealand and is responsible for implementing product energy efficiency initiatives in those jurisdictions. NAEEEC's role is to coordinate the National Appliance and Equipment Energy Efficiency Program (NAEEEP). Through this program, the various Governments work together to develop and introduce measures that improve the energy efficiency of appliances and equipment used by households and business.

Stoves and cook-tops are covered by the NAEEEP however, there is currently no nationally coordinated program in place to encourage efficiency in these appliances. Through NAEEEC, the AGO want to

investigate the most practical means for improving the efficiency of stoves and cook-tops and to encourage the consumer take up of the most efficient stove and cook-top appliances. This consultancy aims to examine all possibilities from voluntary to mandatory measures for a program to encourage stove and cook-top efficiency.

Internationally, a range of approaches have been used to encourage efficiency in stoves and cook-tops from labelling programs, such as endorsement labels in the USA, to standards such as in Canada, and Russia. While MEPS were once applicable for stoves in the USA, the Department of Energy has now abandoned these ruling them unnecessary. It will be important for this consultancy to consider which measures (voluntary or mandatory) are most appropriate in Australia, taking into consideration the experiences and approaches used internationally to encourage efficiency in stoves and cook-tops.

## **Objectives of this Study**

The AGO commissioned EnergyConsult Pty Ltd to identify and report on what options may exist for voluntary or mandatory labelling and MEPS or other energy efficiency program options that could be used to improve the energy efficiency of stoves and cook-tops in Australia.

This study aims to:

- Conduct desk top research, which analyses existing and past overseas programs that encourage *voluntary* options to improve energy efficiency in stoves and cook-tops. The desk top research should also report on existing overseas *mandatory* measures applied to stoves and cook-tops
- Gather any associated program material gathered from the international review of programs and conduct an assessment of the success and effectiveness of those programs whether mandatory or voluntary
- Conduct a detailed investigation into what is currently being done in Australia to encourage efficiency in stoves and cook-tops both at the manufacturer and consumer level. The investigation should cover all activities undertaken by government agencies and any relevant stakeholders
- Conduct interviews with relevant representatives from market intermediaries, government departments/agencies and any other Australian stakeholders to determine

the most appropriate program direction and mechanisms for cooperation to ensure program effectiveness and success. The interviews were performed to ascertain:

- What are perceived to be the most practical measures or programs for encouraging efficiency in stoves and cook-tops?
  - How can program effectiveness best be achieved?
  - How can governments and relevant stakeholders/market intermediaries cooperate to ensure program success?
- Submit a draft report that provides recommendations on the most practical voluntary or mandatory measures for encouraging energy efficiency in stoves and cook-tops based on the above research.

It should be noted that this report is exploratory only and can be considered as an investigation into possible program options and *not* the final recommended program. The objective of this report is to inform the reader of the range of potential program options and our assessment of those that are the most appropriate, based on the research conducted. The report also provides draft recommendations on the way forward for potential stove and cook-top programs.

Of course, the report does not represent the views of the Australian Greenhouse Office nor any particular stakeholder.

# METHODOLOGY

The research focused on several methods for obtaining information on Australian and international stove and cook-top energy efficiency programs, including:

- Comprehensive search via the Internet
- Telephone interviews with key stakeholders
- Overseas and Australian program evaluations – review of and cost benefit analysis.

The aim of this research is to quickly obtain information on the programs that have encouraged energy efficiency improvements in the use of stoves and cook-tops. The methods are discussed below.

## **Research of Overseas Programs**

A comprehensive search on the Internet was conducted to research existing International programs that encourage cooking appliance efficiency improvements. Over fifty WWW sites were searched for information on cooking appliance programs ranging from government departments, utilities, conservation groups, appliance associations/organisations, consulting firms, manufacturers and research centres. In particular, the search aimed to solicit:

- Specific characteristics of the program including the type of strategies, the intended or targeted market and major players
- Specific program elements such as the type of information provided
- The evidence and reasoning supporting mandatory MEPS/Labeling programs, or the discontinuation of such programs.

The WWW search also focused on obtaining review documents of past or existing programs.

## **Research of Australian Programs and Market**

A comprehensive search on the Internet was also conducted to research existing Australian programs

or information sources that encourage cooking appliance efficiency improvements. Sites examined included government agencies, manufacturers, energy retailers and appliance retailers. The search aimed to solicit information similar to that gathered from overseas programs.

In addition, basic research was conducted to determine present Australian cook-top and stove market characteristics and to determine the current energy usage of Australian cooking appliances.

## **Telephone Interviews with Key Industry Stakeholders**

To ensure that the views of Australian stakeholders were included in this Options Study, telephone interviews were conducted with key industry stakeholders including:

- Westinghouse (interviewed as Electrolux)
- Whirlpool (interviewed as Electrolux)
- Fisher and Paykel
- Miele
- Harvey Norman
- ACA
- AGA
- AEEMA.

The aims of conducting interviews with industry stakeholders were to:

- Determine some of the characteristics of the Australian market
- Seek stakeholders' opinions on those factors that will enhance or inhibit the Australian program
- Determine their views on alternative program options.

## **Analysis and Recommendations**

Following the compilation of the research, and an assessment of the implications of the research on options for cooking efficiency, recommendations were developed.

# AUSTRALIAN PROGRAMS AND MARKET

## **Market Characteristics**

This report investigates three main types of cooking appliance:

### **Cook-Tops:**

Also known as hobs, smooth top cooking surfaces or built in cook-top. These units consist of one or more hotplates or internal heating components.

### **Ovens:**

An oven is essentially an enclosed heated chamber in which baking or roasting can occur. This category includes wall mounted, fan forced and self-cleaning ovens.

### **Upright Cookers:**

Also known as a range, stove or cooker. These products combine both a cook-top and one or more ovens. Upright cookers can be elevated with the cook-top and oven adjacent to each other or free standing with the cook-top above the oven. Additionally, upright cookers may be fixed or portable, i.e. hard wired or have a plug-in operation.

All of these appliances are available in either gas or electrically fuelled models. The report also contains some minor discussion on programs that include Microwave Ovens given the potential for this appliance to replace conventional cooking and thereby altering energy consumption.

The Australian residential market has almost complete penetration of cooking appliances, with oven/cook-top combinations or upright cookers in almost all Australian households. The implication is that there are approximately 6 million of installed upright cookers or oven/cook-tops presently in the market.

The annual sales of new upright cookers or oven/cook-tops is driven by the increase in households corresponding to the number of new dwellings built each year, and by the replacement of existing installed stock. It is estimated that cooking appliances of this type are replaced every fifteen years.<sup>2</sup>

GfK Marketing Services has provided information on current cooking appliance sales and the breakdown of these sales, for a period of two months (August – September 2001). The GfK data is only applicable to approximately 65% of the total market (depending on the category), as this represents those retailers that supply the data to GfK for analysis. If we assume that this is a representative sample of the market and that sales for the period August – September 2001 are representative of total sales for the year, we can obtain a good estimate of the annual sales of cooking appliances and shares of various suppliers. The share of various suppliers are shown in Table 1.

<sup>2</sup> Australian Residential Building Sector Greenhouse Gas Emissions 1990-2010, Energy Efficient Strategies, 1999

**TABLE 1: PERCENTAGE SALES OF COOKING PRODUCTS BY SUPPLIER**

Brand	Electric Cook-tops	Electric Ovens	Electric Stoves	Gas Cook-tops	Gas Ovens	Gas Stoves
Andi	0.4%	1.3%		4.3%		
Ariston	0.6%	0.4%		0.4%		
Blanco	4.6%	4.8%		6.1%		
Bosch	0.9%	1.9%		2.1%		
Brandt	1.5%					
Electrolux	57.0%	44.8%	82.3%	35.3%	89.1%	80.4%
Delonghi	0.6%	1.5%		1.8%		
F & P	4.1%	4.9%	3.5%	3.9%		
Glemgas		0.6%		1.3%		1.1%
Ilve		0.7%	0.4%	1.3%		1.4%
Kleenmaid	9.8%	13.1%	1.1%	11.3%		3.3%
Lagermania				0.5%		3.8%
Lofra			0.8%			
Miele	0.5%	0.6%		0.2%		
Omega	0.8%	1.6%	1.2%	1.3%		
Smeg	0.4%	3.0%	0.6%	5.3%		
Technika	1.9%	3.4%		5.6%		
Whirlpool	3.5%	4.9%		5.2%		
Others	13.5%	12.5%	10.0%	13.9%	10.9%	10.0%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

It is obvious that the market is dominated by the Electrolux company with its various brands (including Chef, Westinghouse, Simpson, AEG). Kleenmaid is the only other supplier with more than 10% market share in any of the product groups.

The total market was estimated by one industry stakeholder, based on past information, as follows:

- Approximately 230,000 wall ovens sold annually, with 95% electric
- Cook-top sales are around 230,000 annually, with 60% electric
- Sales of upright cookers are about 260,000 annually, with again 60% electric.

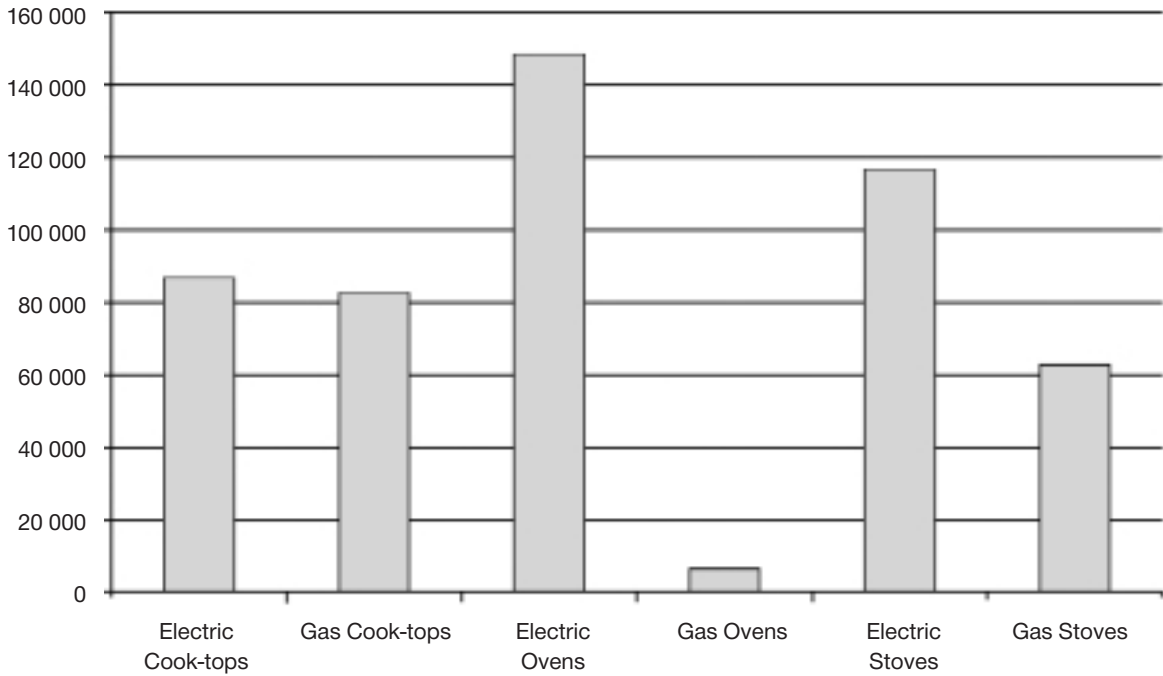
He also added that 90% of upright cookers are locally manufactured and about 70% of wall ovens/cook-tops are locally manufactured. Interestingly, according to the 1998 Australian Design award nomination from Westinghouse, the decrease in the whitegoods import tariff has led to a market increase in low quality wall ovens. It was suggested that imported electric ovens might now represent around half of the total market. This is supported by the data obtained from Gfk, which shows that over 60% of the electric ovens are imported brands.

The total sales of cooking appliances obtained from the Gfk data for 2001 is shown in Table 2 and Figure 1.

**TABLE 2: ESTIMATED TOTAL ANNUAL SALES**

Product Group	Electric Cook-tops	Gas Cook-tops	Electric Ovens	Gas Ovens	Electric Stoves	Gas Stoves
Estimated Annual Sales	86 474	82 357	148 218	6 360	116 428	62 557

**FIGURE 1: ESTIMATED ANNUAL SALES BY PRODUCT GROUP**



These annual sales derived from the Gfk data are less than those estimated by the stakeholder, however this could be due to the sales data from Gfk being collected during a two month period which included the terrorist attacks in the USA during September.

## Usage and Energy Consumption Characteristics

### ENERGY CONSUMPTION

There are a number of studies that have proposed energy consumption characteristics for the Australian cooking market, based on engineering analysis and metering studies. The following reports were used to gain an overview of the range of energy consumption characteristics:

- AGO, Australian Residential Building Sector Greenhouse Gas Emissions 1990–2010 Final Report 1999, by EES, et al. (EES uses and reports on several secondary sources of energy consumption for cooking)
- Oliphant, M; Energy Consumption in Small Households – 1999.

The range of electric energy consumption for all cooking is presented in Table 3. There is also some

consumption information obtainable for gas cooking appliances, however it is not available in the same degree of detail as for electric appliances.

The consumption information suggests that stoves, ovens and cook-tops represent between 400 and 600 kWh of consumption p.a. This represents between 6% to 10% of residential electric energy consumption and an expenditure of \$50 to \$80 p.a.

According to the most recent study (EES 1999), cooking end use is estimated to consume 8.4 PJ of electricity (or 5% of total electric energy consumption in the residential sector) in 2000. To place cooking in perspective with other end uses, Table 4 shows the relative energy consumption of cooking and all major end uses in Australia.

EES also report that ovens probably use a little more than half the energy required for cooking in Australia.

**TABLE 3: COOKING ELECTRICITY ENERGY USAGE (KWH)**

Source	Notes	Griller	Oven	Cook top	All cooking
Oliphant 1999	Small houses				218
SEAV 2000	Unpublished based on ABS				665
Energy Efficient Strategies <sup>3</sup>			233	187	
Bartels 1985					989
Bartels 1988					912
Fiebig and Woodland 1991					571
Fiebig and Woodland 1994					629
Pacific Power 1996	NSW				663
QEC 1993	QLD	12	131	169	
SECWA 1991	Western Australia	54	378	245	

<sup>3</sup> Personal communication, October 2001, based on modelling underlying Australian residential Building Sector GHG Emissions report and modelling, 1999.

**TABLE 4: RESIDENTIAL ENERGY CONSUMPTION BY END USE IN 2000**

End Use	Electric Consumption (PJ)	Gas Consumption (PJ)
Water heating	45.5	41.5
Refrigerator	23.3	
Lighting	15.6	
Cooking	8.4	6.0
Space heating/cooling	8.4	71.8
Freezer	7.1	
Clothes Washer	1.2	
Clothes Dryer	1.5	
Dishwasher	1.4	
TV+VCR	3.4	
Standby	13.0	
Miscellaneous	27.5	
Total	156	119

#### AUSTRALIAN TESTING STANDARDS & RECENT RESULTS

There is an Australian Standard, AS 1549-1983, for the Performance of Household Electrical Appliances - Ranges, Built-In Cooking Tops And Wall-Mounted Ovens. Heat loss for ovens is calculated using the formula:

$$\text{Heat loss (W/m}^2\text{)} = \frac{\text{Measured input energy (W.h)}}{\text{Test period (h)}} \times \frac{1}{\text{Net internal area (m}^2\text{)}} \times \frac{t \text{ (}^\circ\text{C)}}{\text{Av. temp rise (}^\circ\text{C) from test measurements}}$$

Where t = 180°C for conventional ovens and 150°C for fan forced ovens. The standard prescribes that oven heat loss should not exceed 650 W/m<sup>2</sup>, however this level is not enforced. It is noted in the standard, that "A reduction of the 650 W/m<sup>2</sup> limit is under consideration.", which has been in the standard since publication in 1983. Hotplates are subject to separate tests within AS1550, which calculate efficiency. A standard for domestic gas cooking appliances is being currently amended (the original standard is AS 4551 – 2000 (AGA –101) Domestic Gas Cooking Appliances) and thermal performance is one of the tests with a maximum allowable gas consumption maintenance rate for ovens contained in the standard.

Recent tests by the ACA for their October 2001 issue of *Choice* show a large range of heat loss values for ovens in the Australian market including some models which breach the current allowable level. In addition, the ACA tested ovens for a January 1999 publication of *Choice*. The results of the heat loss test to AS 1549-1983, by oven surface area is shown in Figure 2.

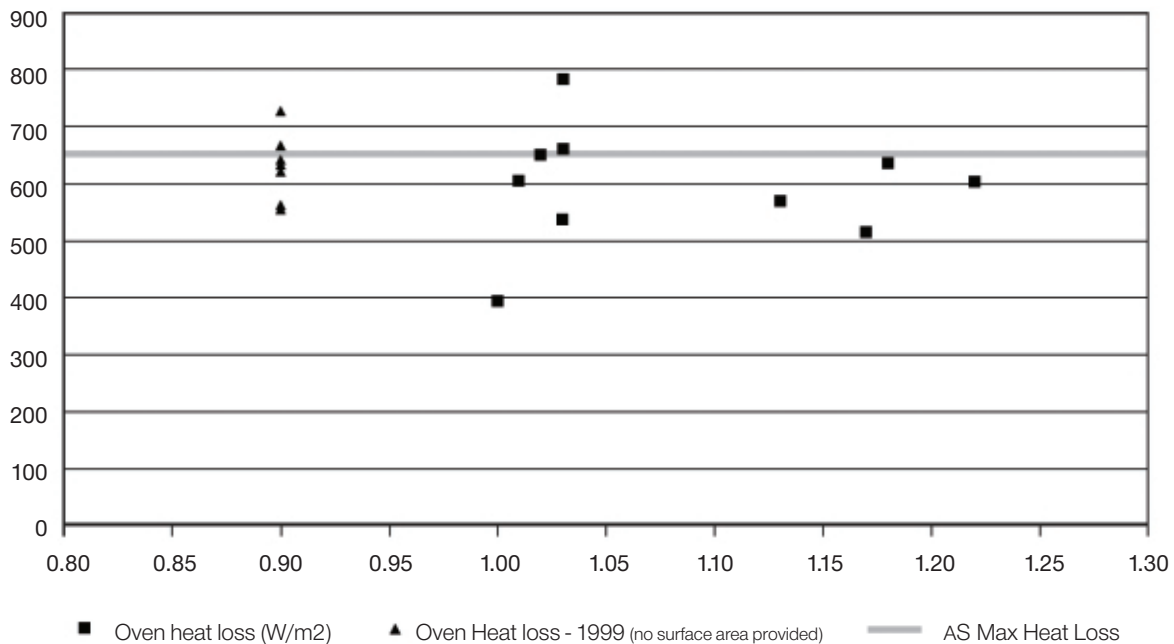
These results show the more efficient oven has a heat loss approximately 50% lower than that of the least efficient oven. However, if the most and least efficient oven is removed from the sample, there is approximately a 25% range of heat loss. The wall ovens tested by the ACA in 2001 were from the high end of the market selling for between \$1,500 and \$2,200, while the 1999 ACA test included ovens with a retail price of range of \$830 to \$1,300. The 1999 ovens are displayed in Figure 2, however the surface area values are not available from the data provided by the ACA. The data does show a similar heat loss range for both sets of ovens and no

obvious relationship between the more costly ovens and heat loss.

The differences demonstrated by this data suggest energy savings are possible for ovens in the Australian market. It is also obvious that several ovens are failing to meet the Australian Standard requirement that oven heat loss should not exceed 650 W/m<sup>2</sup>. The October 2001 *Choice* reports that one oven that failed this test was the **Ilve Tradition** from Italy with the second highest retail price of \$2,195.

Data from the ACA on the range of efficiency for cook-tops (electric ceramic hobs) showed a spread of efficiency of between 66% and 80%, with most small hotplates in the range of 68% to 72%. The large hotplates had a larger range of efficiency, from 66% to 80%. Induction cook-tops are the most efficient, however they require special cookware and are typically more expensive to purchase.

**FIGURE 2: OVENS HEAT LOSS (W/M<sup>2</sup>)**



## **Australian Programs**

There are a small number of Australian initiatives to encourage the efficient use of stoves and cook-tops in Australia. All of the current schemes are information programs most of which are provided in both printed and electronic form. The information provided by these programs aims to inspire consumers to reduce energy consumption influencing one or more behavioural areas. The main behaviour areas are:

- **Appliance Maintenance** requires consumers properly maintain and clean cooking appliances to ensure that the efficiency of the appliance design is maintained, e.g. fixing oven door seals
- **Appliance Use** has been shown to vary enormously from household to household. Information in this area encourages consumers to alter cooking habits for example: not opening the oven door while cooking or defrosting food before cooking
- **Purchase Criteria** is intended to provide consumers with information that will allow them to choose the most efficient appliance when purchasing new cooking equipment
- **Fuel Switch** information recommends which fuel is the most efficient for different cooking applications. This information can be based on the usage or cost of fuel or alternatively on greenhouse gas emissions
- **Appliance Switch** data encourages consumers to use alternative appliances that will reduce energy consumption for the same cooking result, e.g. a toaster instead of a griller
- **Cookware advice** aims to inform the consumer about different materials cookware can be made from and how this along with size and shape of cookware can effect energy consumption
- **Cost Data** is provided to motivate the consumer to change cooking habits by demonstrating the cost of different cooking appliances and different cooking methods.

Table 5 (overleaf) summarises these initiatives.

The information programs provided a variety of maintenance tips including checking seals, tight fitting doors, regular cleaning and periodic professional testing. Generally this aspect of energy efficiency was given minor consideration however, the AGL site was dominated with maintenance ideas. Appliance use tips were the most common suggestions provided for improving efficiency. Altering the way consumers cook by thawing food, not opening the oven door, placing lids on pots and cooking more than one dish at a time were some of the more popular suggestions. Both SEAV and Energex provide extensive lists of energy saving cooking tips.

The information to provide assistance when purchasing, mostly consisted of descriptions of the various different technologies, with only a minimal focus on energy efficiency. Bosch stated that all their products are energy efficient but provided no details as to why. Fisher and Paykel are currently marketing their new upright cooker as having an 'Eco Grill' which allows you to cook small portions without using the whole grill thereby saving energy. However, there is no mention otherwise from manufacturers regarding the energy efficiency of their cooking appliances.

All of the companies not involved with electric cooking appliances recommended that choosing a gas appliance is more energy efficient. There was a lot of support from many information programs to encourage consumers to 'appliance switch' that is to reduce their use of large cooking appliances in favour of smaller electrical appliances such as microwaves, kettles and toaster ovens. In contrast when it came to the energy efficiency and the type of cookware used the information provided was limited. Most electricity suppliers discussed choosing the correct pot size for the job, however there was little data on the materials cookware can be made from or the shape of the surface i.e., flat bottom pots.

Several of the Australian programs provided operating cost data for a broad range of both large and small cooking appliances. However the data is not

**TABLE 5: SUMMARY OF AUSTRALIAN COOKING APPLIANCE INFORMATION PROGRAMS**

Agency	Program Name	Appliances	Type of Information Provided to Decrease Energy Consumption in Cooking Appliances							
			Appliance Maintenance	Appliance Use	Purchase Criteria	Fuel Switch	Appliance Switch	Cook ware	Cost data	Other
<b>GOVERNMENT AGENCIES</b>										
AGO	Global Warming Cool It	UC O CT MW		●		Gas	MW SE		●	
SEAV	Home Energy Saving	UC O CT MW	●	●	●	Gas	MW SE		●	
<b>POWER COMPANY</b>										
ActewAGL	Your Home	UC O CT MW	●	●	●	Gas	MW	●		Links To AGO & SEAV
AGL	Your Home	UC O CT	●	●	●		SE	●		
Aurora	Using Electricity Wisely	CT MW		●			MW SE	●	●	
Citipower	Saving Energy Around The Home	UC O CT MW		●			MW SE			
Energex	A Guide to Better Cooking Appliances	UC O CT MW	●	●	●		MW	●	●	
Great Southern Energy	Being Energy Wise	UC O CT		●			SE	●		
Powercor	Your Guide to Home Appliances Operating Cost and Energy Efficiency	UC O CT MW							●	
TXU	Energy Tips	UC O CT MW	●	●			MW SE	●		
United Energy	Energy Saving Tips	UC O CT MW		●			MW SE	●		
Western Power	Smart Home	UC O CT MW		●	●					●
<b>MANUFACTURERS</b>										
Fisher & Paykel	Eco Grill	UC			●					
<b>OTHER</b>										
Gasmart	Cookers and Ovens	UC O CT			●	Gas				Link to SEAV
Australian Consumers Association	Choice	UC O CT MW	●	●	●	Gas				

presented in a format that allows true comparison between cooking appliances. The information is given purely in a uniform format, i.e., per hour or per year, which doesn't allow that each appliance will take different time to cook the same meal.

In summary the information available on cooking appliances in Australia is generally very broad and

geared at changing peoples cooking behaviour. The most comprehensive site is the SEAV site, which covers most issues in a detailed way.

More detail of these Australian information programs can be obtained from the Australian Greenhouse Office.

## **Interviews with Australian Stakeholders**

Telephone interviews were undertaken with eight Australian stakeholders. They included representatives from:

- Electrolux (makers of Westinghouse, Simpson and Chef appliances)
- Fisher and Paykel
- Miele
- Harvey Norman
- ACA
- AGA
- AEEMA.

The interviews were conducted in accordance with a pre-prepared interview guide, which can be obtained from the Australian Greenhouse Office.

The interviews were used to discuss market characteristics, program options and methods that might effectively lead to a decrease in the energy consumption of cook-tops and stoves.

It should be noted that these interviews are not intended to provide a comprehensive survey of the views of the Australian stakeholders, nor do they represent a verbatim report of the respondent's views. A summary of the interviews is provided below.

### **FEEDBACK ON POTENTIAL STOVE AND COOK-TOP PROGRAM OPTIONS**

The respondents were asked to consider the proposed program elements and if such initiatives would be successful in encouraging the efficiency improvements. The list that was put to the respondents included:

- MEPS
- Energy Rating Labelling – Mandatory and Voluntary
- Information Programs.

The reaction to the program options were as follows:

### **MEPS FOR COOKERS AND STOVES**

There was a mixed response to the suggestion that MEPS for cooking appliances be introduced. The majority of stakeholders generally did not support MEPS for cooking appliances, for the following reasons:

- **Small Potential Energy Efficiency Gains** – compared to efficiency improvements available from changes to usage of the cooking appliances. The respondents mostly noted that the small efficiency improvements that may be possible from MEPS would be dwarfed by the consumers control of energy consumption dependent upon use of the appliance
- **Lack of Adequate Comparative Tests** – between various cooking appliances and within categories of appliances. The only potential appliance that lends itself to a comparative test is the oven. Most of the other cooking appliances (stoves, cook-tops, grillers, etc) do not have an easily implemented comparative energy or performance test
- **Relative small size of energy consumption for cooking end use** – does not warrant the effort involved in implementing MEPS. The energy costs of stoves and cook-tops are likely to be in the order of \$50 – 70 pa, and combined with a savings potential of 10 – 20%, this translates to a maximum of \$14 pa saving to the end user.

However, the ACA does support MEPS for cookers and ovens, but at relatively stringent levels. They say that comparative energy rating labels will not make an impact on consumer choice, and hence MEPS is the more appropriate mechanism for improving cooking appliance efficiency.

In addition, the stakeholder from the AGA suggested that MEPS might be the most appropriate mechanism for improving efficiency, as they believed that the low energy costs of the cooking appliance meant that an energy rating label would not influence consumers.

## ENERGY RATING LABELLING – MANDATORY AND VOLUNTARY

Energy rating labelling of cooking appliances was not highly supported by the respondents, for the following reasons:

- **Lack of Adequate Comparative Tests** – between various cooking appliances and within categories of appliances. Again this was a common reason for the low support of labelling of cookers and stoves. The only cooking appliance that was possibly suitable to comparative testing is the oven. Limited support for labelling of ovens was indicated, however as the respondents noted that problems exist with the comparative tests for currently labelled products – washing machines and dishwashers – they were not keen to see another product group labelled
- **Small Potential Energy Efficiency Gains** – compared to efficiency improvements available from changes to usage of the cooking appliances. The respondents noted again that only small efficiency improvements would be indicated on the comparative label and that user behaviour would influence energy consumption more than a choice between labelled appliances
- **Mandatory Labelling is Better Than Voluntary Labelling.** The stakeholders noted that voluntary labelling does not work as well as mandatory labelling, should any energy rating label be considered for cooking appliances. Suppliers of higher efficiency products generally only implement voluntary labelling, and hence the consumer is not informed of the relative energy efficiency between the products in the market place. An example of the water efficiency label was provided as a voluntary scheme that did not provide the relative range of efficiency as only those products with higher water efficiency were labelled

## INFORMATION PROGRAMS

Education and information programs were highly supported by the respondents. They cited the following reasons and examples:

- **Consumer Behaviour has the Largest Influence on Energy Consumption** of cooking appliances was repeated by many of the stakeholders. They believe that providing information to consumers on ways to improve the efficiency of cooking was highly worthwhile. The respondents gave examples of consumer usage of cooking appliances that was not efficient, such as use of ceramic pots and pre-heating ovens for long periods
- **Consumers Seek General Information on Fuel Type** of cook-tops and cooking appliances. The respondents noted that consumers were commonly asking questions about what type of fuel was more cost effective for cooking. Respondents also mentioned that consumers often preferred a particular fuel and that they were highly conscious of the effect fuel type has on the quality of the prepared food
- **Consumers are Cost Aware and Information Should be Expressed in \$ Savings** was repeated by many of the stakeholders. Consumers are not aware of the costs of cooking and the differences between cooking methods and/or appliances.

The respondents were willing to further participate in any information program and would be generally happy to have links to cooking tips on their web sites or provide authoritative information.

## **FEEDBACK ON MARKET CHARACTERISTICS AND DYNAMICS**

The stakeholders were asked for comments on the following broad market issues:

- Size of the Australian cooking appliance market
- Trends that show decreasing oven usage
- Most appropriate location to target information on cooking efficiency
- Are consumers seeking efficient appliances?
- What are the best ways to increase the energy efficiency of cooking appliances?

## **MARKET SIZE**

The stakeholders generally agreed with the size of the Australian market, however they noted that GfK would provide the most accurate picture of the shares of various suppliers.

## **OVEN USAGE TRENDS**

The ACA noted that no quantitative evidence is available to show that usage of ovens is declining. If the trend does exist, it would be more prevalent in the inner city households and apartments, where consumers are more likely to use microwave ovens for cooking and re-heating of "packaged" meals

## **TARGETING COOKING EFFICIENCY INFORMATION**

Overall, the type of information being considered in a program is important and dependent upon the most appropriate target. If the information is aimed at influencing the choice of cooking appliance, the respondents noted that the best way to get this information to consumers is at the point of sale, however the sales staff must be trained. Other good locations suggested for this information were on established consumer web sites, such as the ACA. Builders were also noted as a good target for a program, but they are highly price sensitive, and more influenced by the features and appearance of the appliance.

## **ARE CONSUMERS SEEKING EFFICIENT APPLIANCES?**

In general, the major barrier identified by the stakeholders to any change in customer purchasing behaviour was the low energy cost impact of an efficient versus inefficient appliance. It was noted that any information encouraging energy efficient cooking appliances must be distilled into running cost impacts. This may be especially difficult with cooking appliances, as the running costs are relatively low, compared to other major appliances.

## **WHAT ARE THE BEST WAYS TO INCREASE THE ENERGY EFFICIENCY OF COOKING APPLIANCES?**

The stakeholders were fairly consistent with their views on the best ways to increase the efficiency of cooking appliances:

- Behaviour/usage of cooking appliances offers greatest potential for improving the efficiency of cooking
- Information on cooking efficiently is the most effective way to increase efficiency
- Ovens may provide some technology based improvements in efficiency.

## **IMPLICATIONS OF AUSTRALIAN RESEARCH FINDINGS**

The research has shown that there is a broad range of information available from Australian web sites with most focusing on behavioural changes. The most comprehensive site was at SEAV, with detailed information on maintenance, appliance use, purchase considerations, fuel type choice, appliance switching and some cost data.

Overall, the major implications for this investigation are:

- There is a large installed appliance base which will change slowly, approximately every 15 years
- Information programs are currently available but the information could be improved in many cases. The effectiveness of information programs is unknown

- The majority of cooking appliances are Australian made involving a small number of manufacturers, in particular Electrolux
- The energy costs of residential cooking are small and play a relatively minor part in most households' annual expenditure. The potential savings from efficiency gains in cooking can be expected to have an insignificant impact on the economic situation of most Australian households. This may mean programs aimed at consumers volunteering to buy more efficient appliances will find it harder to effect behavioural change due to the low energy cost savings that result
- Cooking energy costs and savings may be better expressed in costs per meal prepared when considering behavioural change programs
- The range of data for cooking energy usage was adequate for this investigation and showed that there is some spread of oven efficiency in the Australian market. This warrants further study of the market share and potential of efficient ovens.

The interviews with stakeholders provided some generally consistent responses. The implications for each of the following issues are discussed below.

### MEPS FOR COOKERS AND STOVES

There was mixed support for MEPS, with representatives of the manufacturing/supplier stakeholders suggesting that MEPS would not be suitable for cookers and stoves. However, the ACA and the AGA gave qualified support for MEPS, provided that testing regimes could be developed to adequately reflect the energy efficiency of the appliance. They noted that a significant problem to either mandatory or voluntary programs, such as MEPS or labelling programs, was the complexity and lack of standardised methods for objectively measuring the relative efficiency of different appliances.

If MEPS were proposed, the manufacturer/supplier stakeholders could possibly be supportive if:

- the testing procedures were clear, easy to implement and adequate methods developed

for objectively measuring the relative efficiency of the appliances

- the perceived problems with the current labelled products (washing machines and dishwashers) were being addressed.

### ENERGY RATING LABELLING – MANDATORY AND VOLUNTARY

Overall, the stakeholders were not supportive of labelling and hence at this stage the implementation of labelling would not be recommended. If a labelling program were to be implemented, mandatory labels would be preferable. However, adequate testing and labelling algorithms would need to be thoroughly investigated and discussed with the industry.

### INFORMATION PROGRAMS

All the stakeholders were highly supportive of information programs. They were keen to see education material and information provided to consumers on ways to cook efficiently. This type of information is available on some web sites and would be valuable to make more readily available.

Other information on the selection of cooking appliances is useful for consumers, particularly on fuel choice. The ACA mentioned that this is a common question and has information on their web site to help guide consumers, however most is not quantitative.

Information programs should target consumers as follows:

- **Point of Sale – Web Sites – Brochures** – for selecting cooking appliances based on energy efficiency or greenhouse considerations, together with sales staff education material
- **Web Sites – Brochures** – for cooking efficiently and general tips.

The ACA has also offered to help with further investigations and research for an information program and would support the AGO's efforts.

# OVERSEAS PROGRAMS AND RESEARCH

## Overseas Programs

The research identified several overseas programs with elements that could be considered for an Australian Stove and Cook-top Program. Past and present programs were examined in this step and the characteristics of the programs assessed. While there is a wide variety of programs being offered clearly there is not the same effort being put into reducing energy consumption of cooking appliances

as with some other major appliances. The research could not identify any 'best practice' programs in the cooking appliance area.

There were many WWW sites with energy savings tips that included cooking appliances however, due to the large number and the similarity of information these have not been listed. A summary of researched programs is shown in Table 6.

**TABLE 6: SUMMARY OF OVERSEAS PROGRAMS**

Country	Appliance	Program Type	Participation	Start Date
Canada	O, UC, CT	Comparison Label	Mandatory	1995
	O, UC, CT	MEPS	Mandatory	1995
Costa Rica	O, UC, CT	Comparison Label	Mandatory	1996
	O, UC, CT	MEPS	Mandatory	1996
India	UC	Eco-label	Voluntary	1996
Israel	O, UC	Comparison Label	Mandatory	1986
	O, UC	MEPS	Mandatory	1986
Korea	MW	Endorsement Label	Voluntary	1999
Russia	O, UC	MEPS	Mandatory	1993
Chinese Taipei	MW	Eco-Label	Voluntary	1992
USA	O, UC, CT	Eco-label	Voluntary	1994

O – Ovens UC – Upright Cookers CT – Cook-Tops MW – Microwave

## MEPS PROGRAMS

MEPS are used in four countries. MEPS set the performance level that appliances must meet in order to be sold. The responsibility for the MEPS programs in each of these countries is bestowed upon the National Standards organisations.

## CANADA MEPS

The Canadian's introduced MEPS in 1995 for electric ovens, upright cookers and cook-tops. The scheme is administered by Standards Canada and Natural Resources Canada. Manufacturers, Importers and Retailers are all responsible for ensuring the appliances meet the Energy Efficiency Regulations. The Canadian Standard establishes maximum allowable energy consumption levels set out in Table 7 overleaf.

**TABLE 7: CANADIAN MEPS LEVELS**

**Electric ranges**

<b>Product Class</b>	<b>Maximum E</b> February 3, 1995
Free-standing or built-in ranges with one or more surface elements and one or more ovens	0.93V +14.3
Built-in or wall-mounted ranges without surface elements and with one or more ovens	38
Counter-mounted ranges without ovens and with one or more surface elements on a conventional (i.e., not modular) cook-top	34
Counter-mounted ranges without ovens and with one or more surface elements on a modular (i.e., cartridge that can be plugged into a receptacle on the range surface) cook-top	43

Where V = Volume of oven in litres  
 E = Maximum allowable energy consumption in kilowatt hours per month (kWh/month)

Source: *Technical Requirements For Energy Using Products* Office of Energy Efficiency Canada

According to a recent report by EES (*Review of Energy Efficiency Test Standards and Regulations in APEC Member Economies, for APEC 1999*), the test procedure CSA-C358-95 was adopted in 1999. The energy consumption of the cook-top element is measured by heating an aluminium block to 80°C above ambient. The power is then turned down to 25% and left running for a further 15 minutes. The thermal efficiency is determined from the temperature rise of the block and the energy used to heat it. The annual energy service (useful output) delivered by a cook-top is based on US research and is assumed to be 277.7 kWh of delivered heat per year. The cook-top energy consumption is calculated as this value divided by the efficiency determined during the test oven's energy consumption is measured by heating an aluminium test block to 130°C above ambient.

For ovens, the small test block (at room temperature) is inserted at the geometric centre of the oven. The oven is turned on to normal bake at a temperature rise of 180°C (nominal temperature setting of 205°C). The energy and temperature of the block are noted during the test. The oven is allowed to operate for a full thermostat cycle after the temperature rise has reached 130°C – the energy consumption is then interpolated for the

thermostat cycle before and after to calculate the energy at a temperature rise of 130°C. The thermal efficiency is determined from the temperature rise of the block (130°C) and the energy used to heat it. The annual energy service (useful output) delivered by an oven is based on US research and is assumed to be 47.09 kWh of delivered heat per year. The oven energy consumption during use is calculated as this value divided by the efficiency determined during the test. The total energy consumption of an oven includes energy during use, energy consumed during self-cleaning (assumed to be 11 times per year) and electric clock energy (measured separately). Oven space is also determined.

Canada is currently reviewing the test standard for electric ranges to incorporate some new usage factors and to correct some inequalities in the levels for ranges and ovens. The process involves a consumer economic and environmental impact analysis at the proposed levels, stakeholder input and if appropriate an amendment to the regulation. Canadian studies have not shown a reduction in the average energy consumption of ranges since the introduction of MEPS, however this data does not separate ovens from cook-tops, as shown in Table 8.

**TABLE 8: CANADIAN MEPS ANALYSIS OF AVERAGE ENERGY CONSUMPTION (KWH)**

Year	Self-cleaning ranges	Regular ranges	Total ranges
1998	760	778	771
1994	747	785	774

Source : Office of Energy Efficiency, Natural Resources Canada and Canadian Appliance Manufacturers Association (CAMA).

### OTHER COUNTRY MEPS

Since 1996 Costa Rica has also had laws requiring ovens, upright cookers and cook-tops to meet MEPS. This program is the responsibility of the Ministry of Energy and the scheme is closely linked with an energy labelling program. Israel (1986) and Russia (1983) also require ovens and upright cookers to meet MEPS. Very little is known about these standards, as program information is not available in English. The Costa Rican MEPS are closely linked with the labelling program, which requires the MEPS level to be displayed on the efficiency label. This allows consumers to establish if a product has just met the basic requirements or clearly above the standard. The Russian MEPS follow the local test procedure GOST14919-83E however this document is available only in Russian.

The United States cancelled the requirement for cooking appliances to meet MEPS in 1999. Originally ovens, upright cookers, and microwave ovens were covered by the regulations but an investigation in 1999 decided that no substantial benefit was being derived from these laws. See the section following, USA MEPS Determination, for a summary of the details of this investigation.

### LABELLING PROGRAMS

Cooking appliances are labelled in seven countries. Canada, Costa Rica and Israel use comparison labelling which allows consumers to compare products easily using energy consumption information. All three labelling programs are mandatory. Canada and Costa Rica label upright cookers, ovens and cook-tops while Israel labels upright cookers and ovens only. The Canadian

label, called 'Energuide', is run by the government department, Natural Resources Canada and is a national scheme. The labels, which have been mandatory on cooking appliances since 1995, display the energy consumption of the appliance as well as the lowest and highest energy consumption of equivalent products on the market. To complement the appliance label, the Canadian program produces a booklet annually that lists the energy consumption of all appliances. The program's website also provides tips on buying and using cooking appliances.

Information in English pertaining to the Costa Rican and Israeli programs is scarce. However, it is known that Israel is currently reviewing its program, strengthening the legislation and updating the label for cooking appliances. The information on the label is similar to the Canadian Energuide. The Costa Rican Ministry of Energy implemented its labelling program in 1996. The label displays the product's energy consumption and the required MEPS level for that appliance.

Korea is the only country to use an endorsement label. The program is voluntary and is applicable to microwave ovens only. The label indicates that the appliance has met the fixed standard in relation to standby energy usage. Microwave ovens became eligible for this label in 1999. The program is run by KEMCO (Korean Energy Management Corporation) which is an independent organisation funded by the government.

Voluntary Eco Label programs are available for cooking appliances in three countries. Eco labels are available to products that have low

environmental impact across a number of criteria, however energy efficiency is usually a key determinant when awarding labels to appliances. The USA's Green Seal program is run as a non-profit organisation. The award has been available for upright cookers, ovens, and cook-tops since 1994. The Green Seal label lists the criteria the product has met thereby clearly identifying appliances which are energy efficient. Manufacturers pay Green Seal for product testing and administration of the scheme.

Since 1992 the Chinese Taipei EPA has financed an eco label program that includes microwave ovens. Meeting energy efficiency criteria is crucial in order for appliances to receive the award. The program is implemented by an independent foundation. India's Central Pollution Control Board established criteria for an eco label for upright cookers in 1996, however to-date no manufacturers have been granted an award.

## INFORMATION PROGRAMS

There are many cooking appliance information programs being conducted. Information ranges from detailed booklets on selecting and using cooking appliances to generalised energy saving tips. The information sources are varied with information being provided by governments, power companies, appliance manufacturers, consumer groups and environmental organisations. All of the information was available at web sites with a large proportion also available in printed form. A selection of these programs representative of the international range is listed in Table 9. Definitions of the behaviour changes the information programs are encouraging can be found in the section Australian Programs.

The information provided by these programs can be categorised into seven key areas:

- **Maintenance**

This type of information worked on the premise that a well maintained oven increased the efficiency of performance. Suggestions included checking hinges and springs on oven doors, keeping elements clean and regular servicing of the appliances

- **Appliance Use**

Energy tips in this category required a change in cooking practices such as placing lids on pots, defrosting food properly before cooking, cooking larger quantities, using a pressure cooker, turning off ovens when food is nearly cooked, not opening oven door while cooking etc

- **Purchase**

Advice on purchasing efficient ovens was provided in this section. Information on how the different technologies work and the benefits of each was the key aspect for cook-top information. Whilst for ovens and upright cookers the main topics discussed are the added insulation included in self-cleaning ovens and the reduction of cooking times and hence energy usage when using convection cooking. There was also some discussion on taking oven size requirements into consideration when purchasing cooking appliances. Generally information was presented as facts on technologies rather than advising which appliances to choose

- **Fuel Type**

Some organisations suggested that switching the fuel type of cooking appliances could make energy savings. While most organisations were promoting a switch to gas from electricity, there was information put forward suggesting that the new technologies in electric cook-tops made them more efficient than some gas cookers

- **Appliance Switch**

Microwaves and small electrical appliances such as kettles, toasters, crock-pots were recommended as more efficient alternatives to large cooking appliances. It was suggested that, especially when cooking small amounts the use of these products should be maximised

- **Cookware**

The type and the condition of cookware used was reported frequently as having a significant effect on the efficiency of cooking appliances. Information included the most appropriate materials used to construct the pot for different

**TABLE 9: SUMMARY OF OVERSEAS INFORMATION PROGRAMS**

Agency	Country	Program Name	Appliances	Type of Information Provided to Decrease Energy Consumption in Cooking Appliances								
				Appliance Maintenance	Appliance Use	Purchase Criteria	Fuel Switch	Appliance Switch	Cook ware	Cost data	Other	
<b>GOVERNMENT AGENCIES</b>												
EREN	US	Saving Energy In your Apartment	UC O CT		●					●		Range Hood
EREN	US	Energy Efficiency Tips for Ovens	UC O CT	●	●	●	Gas			●		Range Hood
NRCAN	Canada	Energide Buying and Operating Tips	UC O CT	●	●	●				●		Range Hood
Californian Energy Commission	US	Consumer Energy Centre Tips	UC O CT MW	●	●	●	Gas	MW SE		●	●	Range Hood
Swedish National Energy Association	Sweden	Energy Saving Tips	UC O CT MW		●			MW SE		●		
Swedish Consumer Association	Sweden	Buyers Guide	UC O CT MW		●	●						
<b>UTILITIES</b>												
Mercury Energy	NZ	Power Efficiency Info	UC O CT MW		●	●	Electric		●	●		
Scottish Power	UK	Interactive House	UC O CT		●			MW SE		●	●	
LADWP	US	Energy Conservation for a Green	UC O CT MW	●	●	●				●		
APS	US	Ways to Save Business Service	UC O CT MW	●	●	●		MW SE		●		
PECO Utility	US	Appliance Service	UC O CT MW		●	●				●		
London Electricity Company	UK	Energy Efficiency Tips for Ovens	CT					SE		●		
Northern Electricity and Gas	UK	Using Electricity Efficiently	UC O CT MW		●			MW SE		●		
<b>MANUFACTURERS</b>												
Maytag	US	Ideas and Advice	UC O CT			●				●		
<b>OTHER</b>												
Utah State University	US	Cook-tops and Cookware	CT			●				●		
Rocky Mountain Institute	US	Home Energy Brief	UC O CT MW		●	●	Gas	MW SE		●	●	Range Hood
Nexus	US	Energyguide	UC O CT MW			●	Gas					
National Energy Foundation	UK	Energy Tips	CT MW					MW		●		

Notes: UC upright cooker O oven CT cook-top MW microwave oven SE small electrical appliance

types of appliances e.g. aluminium, glass, ceramic etc. and the condition of pot such as whether the bottom of a pan remained flat or became warped over time. Additionally there was advice on making sure the right size pot was used

- **Cost Data**

Only four of the information sources provided information relating to costs. The way this information was displayed varied from stating how much it would cost to defrost a chicken in a microwave, comparing different appliance types to comparing appliances and fuel types. The

most comprehensive cost information is shown in Table 10 from the Californian Energy Commission site.

In addition to the criteria above, many of the US sites discussed the use of range hoods or exhaust fans and the effect this would have on the energy efficiency of the cooking appliance as well as altering the impact the cooking appliance would have on heating or cooling the home.

More detail of these international information programs can be found in Appendix C: Material from Information Programs.

**TABLE 10: ENERGY COST COMPARISON FOR COOKING A CASSEROLE - USA**

Appliance	Temperature	Time	Energy	Cost
Electric Oven	350	1 hour	2.0 kWh	\$.16
Electric Convection Oven	325	45 minutes	1.39 kWh	\$.11
Gas Oven	350	1 hour	.112 therm	\$.07
Electric Frying Pan	420	1 hour	.9 kWh	\$.07
Toaster Oven	425	50 minutes	.95 kWh	\$.08
Electric Crockpot	200	7 hours	.7 kWh	\$.06
Microwave Oven	"High"	15 minutes	.36 kWh	\$.03

Source: Consumer Guide to Home Energy Savings assumes the gas - \$0.60 a therm, electricity \$.08 a kWh.

## Overseas MEPS and Labelling Program Research Reports

One outcome of the international investigation was to obtain research papers, which analysed the technical potential for energy savings from stoves and cook-tops.

### EU APPLIANCE LABELLING AND MEPS RESEARCH

The European Union have been researching potential policy options it might adopt as part of its SAVE II program and have completed the technical research that might be used to develop a labelling program for domestic ovens<sup>4</sup>. Some of the relevant findings of this research were as follows:

- A new oven testing procedure is being developed, the so-called "chilled wet brick" test
- The technical potential to improve energy consumption could be as high as 55%, however some of the efficiency improvements are not acceptable to customers (such as unglazed door, passive cooling for glazed door/facia and low-emissivity oven design)
- Acceptable improvements included improvements to thermal insulation and thermal insulation of cavity, reduce the thermal mass of the oven structure, optimise the glazed door design, forced convection, optimised vent flow, reduce auxiliary energy and fit reflector above upper element
- Improvements which were acceptable, technically feasible and economically justified, as they would minimise the life-cycle cost of the appliance, would achieve a 28% energy savings compared to the present electric oven reference case (i.e. typical oven). These changes were not economically justifiable for the gas ovens due to the low price of gas
- Improvements that were acceptable, technically feasible and economically cost-neutral, as they would not impact on the life-cycle cost of the appliance, would achieve a 33% energy savings compared to the present

electric oven reference case and a 9% savings for gas ovens.

The implications of the EU study are significant in that they suggest that there are technically and economically feasible ways in which electrical ovens can be built which may significantly reduce the energy consumption of new ovens, but this may not be possible for gas ovens. Given that the majority of wall ovens and cookers being installed in Australia are electric, approximately 80%, the EU findings suggest that technically a savings of up to 33% in the energy efficiency of the 'typical' new oven could be achieved.

The EU study also researched the range and distribution of the CO<sub>2</sub> emissions of different ovens currently sold and this revealed that there are considerable differences in existing ovens in terms of their efficiency. See Table 11 for distribution of ovens by emissions.

The smaller range of ovens available in Australia compared to the EU would imply that the distribution of oven efficiencies in Australia would be less than in the EU, however the data from the ACA tests (see Figure 2) shows a large range of oven heat loss in Australia.

The EU has directed that labelling be implemented for domestic ovens (EU Directive No. 92/75/EEC). Currently, the EU has completed a study under the SAVE II program and work is progressing on the ranges of efficiency/energy consumption for the Classes proposed (see Table 11). The EU have just proposed in a draft directive that "*member states shall adopt and publish the laws, regulation and administrative provisions necessary to comply with this directive by 31 May 2002. Provisions to be applied by 31 Dec 2002*".

The SAVE II report recommended that mandatory MEPS be introduced after the EU has exhausted voluntary mechanisms, such as the voluntary initiative of the European White Goods industry to

4 "Labelling domestic ovens" (Save Study 4.1031/D/97-047) Kevin Lane 2001

**TABLE 11: POTENTIAL CLASSIFICATION OF EU OVENS BY EMISSIONS**

Indirect CO2 emissions (g)	Efficiency class	All ovens (n=86)	Electric (n=73)	Gas (n=13)
<200	A	0	0	0
200-299	B	9	0	62
300-399	C	7	3	31
400-499	D	8	8	8
500-599	E	62	73	0
600-699	F	12	14	0
>699	G	2	3	

phase out ovens with a consumption higher than a certain value and/or reach a certain average energy consumption of appliance sold. Currently, no voluntary agreement is yet established for ovens and the EU is still validating the testing procedures.

**USA MEPS DETERMINATION**

In the USA there was also extensive research and industry consultation conducted throughout the 1990’s to determine whether a MEPS program for cooking appliances should be introduced. In the end the DOE determined in October 1998 that MEPS for cooking was not justified.

The DOE decision was justified on the grounds that there would not be significant conservation of energy resulting from the introduction of the standards and the standards would not be economically justified. This rationalization however needs to be understood within the definition that is used for ‘significant’ conservation of energy and ‘economically justified’. The DOE in determining what is ‘economically justified’ attempted to establish:

- the impact on manufacturing costs of the changes in cooking equipment that might be required under MEPS
- what additional costs this would cause consumers, and
- what reductions in energy costs would be created by the changes.

The DOE first established what technological changes might result in improvements to the efficiency of the ovens and cook-tops. The positive and negative impact of the costs of these changes to the appliances on the Net Present Value of the total life-cycle costs of the appliance were then calculated, together with the resulting payback periods. In addition, the payback period of the additional retail cost of the appliance versus the reduced energy costs due to energy conservation were considered, with the ideal being that the payback should not exceed three years. When these economic criteria were applied to conventional electric ovens (those without self-cleaning features) and conventional electric cook-tops (those with coil elements) then the following conclusions were drawn:

- None of the energy efficiency improvements to the ovens were considered economically justified, with the exception of possibly improved insulation. The improvement in the efficiency of electric ovens by improved insulation resulted in a modest energy saving, US\$2 over the life of the oven. However, as there was no reliable data on the present performance of ovens, introducing a Standard in energy consumption, which was to reflect the use of more insulation, might actually require manufacturers to introduce other oven design changes resulting in additional consumer costs. Given this uncertainty and the additional costs of introducing a testing and certification program, the energy

efficiency gains were not considered to be significant enough to warrant the introduction of the MEPS

- For electrical cook-tops, the use of improved element contact conductance did result in a modest gain in energy efficiency, of about 4.3% or US\$3 in energy over the life of the appliance, and could be economically justified. This improvement in cook-top efficiency is highly influenced by the customer's use of the appliance – in order to achieve the energy savings, consumers would need to reduce their cooking time by 4.3%. Consequently DOE thought it unlikely these savings would be realised and so the burden of a testing and certification program were considered unwarranted.

The EU concluded that there were energy efficiency improvements to the design of electrical ovens which were technically feasible and economically justified, while the USA DOE reached the opposite conclusion. This is mainly due to the different approach to selecting cost effective measures (Pay back vs life cycle costs). Also the DOE did not appear to examine the range of efficiencies in existing ovens and cook-tops, which might have supplied more reliable information on the technical and economic feasibility of moving to more efficient appliances. For example, in Australia

Westinghouse's recent entry to the Australian Design Awards in 1999 claimed to have achieved a 15% efficiency gain in ovens through better insulation while maintaining price competitiveness.

A few other interesting research findings relating to the DOE Determination were also reported, three being:

- The technical potential for energy savings from non-self-cleaning electrical ovens was 41% compared to the baseline and 30% for self-cleaning electric ovens. These are approximately consistent with the EU findings of 28% to 33% potential savings
- The technical potential for energy savings from electrical cook-tops was much lower, 5% for coil elements and 12% for smooth elements
- Consumer cooking behaviour was recognised as a significant factor influencing energy usage. Two studies are reported which found the energy usage of different consumers cooking identical meals varied by 50% and 60% in the two studies.



## ***Implications of Overseas Program and Research Findings***

There are several overseas programs aimed at improving the efficiency of cooking appliances or their usage. The vast majority of programs are information based, with only four countries utilising MEPS and three countries with comparative energy rating labels. This suggests that MEPS for cooking appliances is currently not considered highly important by most of the world economies and labelling also has little support.

The implications of the EU and DOE research for Australia appears to be that:

- Priority should be given to improving oven efficiency before being concerned with cook-top efficiency
- The technical potential for energy conservation for ovens appears to be at least 28% of present baseline consumption
- It is unclear whether MEPS for wall ovens, and possibly the ovens of upright cookers, would be environmentally or economically justified in the Australian market, given the contradictory recommendations of the EU and USA DOE reports
- The effects of cooking behaviour may outweigh the impact of any potential oven or cook-top energy efficiency design changes, so attention must also be given to considering the most effective ways to improve cooking practices.

There were major differences between the EU and USA DOE studies that can be explained by the following observations:

- The USA DOE examined the cost effectiveness in terms of payback to customers while the EU SAVE study examined cost effectiveness in terms of lowest life cycle cost. The EU approach will therefore accept greater "technical potential" efficiency
- The underlying costs of energy are different in the USA and the EU. The lower costs of USA electricity will make energy efficiency measures less cost effective than the EU
- The EU study clearly states that it *"has been profoundly influenced by the lack of an established measurement standard"* and hence most of the efficiency improvements are based on a technical analysis of design options. This means that the results of the EU study may not be replicated if a thorough testing programme was included to validate the technical analysis.

Hence, the EU and USA DOE have basic differences in the study approach and analysis that make it difficult to compare results directly.

# ANALYSIS AND RECOMMENDATIONS

## **Critique of Programs**

**Internationally**, the presence of MEPS for cooking appliances is quite low compared to other major appliance groups, with four countries utilising MEPS for cooking appliances. Similarly, labelling of cooking appliances is not highly prevalent, with three countries requiring mandatory comparative labels and four countries with a form of voluntary endorsement labels.

**Australian programs** relating to cooking appliances are all involved with the provision of information – mostly via the Internet, however many were also providing similar printed material. The major organisations involved with provision of efficiency information are:

- SEAV, AGO, ACA
- Energy utilities, such as Actew/AGL, Energex, Citipower, TXU.

The **overseas research reports** (from the EU SAVE program and the USA DOE) draw differing conclusions. The EU is actively investigating labelling and potentially MEPS for ovens, and the USA have removed (1998) the requirement of MEPS for cookers and ovens. It is interesting that the two

major western markets for ovens and cookers have proposed differing policy approaches. It is clear from the reports reviewed by EnergyConsult that there are specific differences in underlying assumptions and the economic cost-benefit approaches are clearly different. The major difference in approach being the USA choice of a minimum customer payback and the EU choice of lowest life cycle cost.

The review of overseas programs showed that there are no "best practice" programs being implemented for encouraging efficient cooking. The provision of information is the main element of the international programs reviewed.

The programs examined show that there is little potential for MEPS for ovens and less potential for cook-tops and stoves, as only a small number of countries have MEPS. In Canada, the only major economy that is similar to Australia, MEPS has so far shown no significant effect on the market. Similarly, labelling is not very prevalent and is still being investigated by the EU, who are developing a new standardised testing procedure that more accurately represents the energy performance of the oven (the "chilled wet brick" test).



## **Research Findings**

The **Australian residential market** has almost complete penetration of cooking appliances, with oven/cook-top combinations or upright cookers in almost all Australian households. The annual sales of new upright cookers or oven/cook-tops is driven by the increase in households corresponding to the number of new dwellings built each year, and by the replacement of existing installed stock, estimated that cooking appliances of this type are replaced every fifteen years. Electrolux dominate the sales of cook-tops, ovens, and upright stoves, with a market share in the range of 35 – 90%, depending on the category.

**Interviews with stakeholders** showed the majority did not support MEPS or Labelling of cooking appliances. The ACA, the AGA (although this was not an official position cleared by the AGA members) and some manufacturers considered limited support of MEPS for ovens and possibly

cook-tops/stoves. The ACA qualified that MEPS should be as stringent as possible and the AGA stakeholder suggested that MEPS would be more effective than labelling, but most stakeholders commented that either policy mechanism was highly dependent on the development of adequate comparative testing procedures.

Mandatory mechanisms – as compared to voluntary MEPS or Labelling programs – were highly favoured by the stakeholders, however only if MEPS or Labelling were shown to be appropriate.

Information programs were highly recommended by the stakeholders for development as they believed that significant energy efficiency improvements were possible with changes to consumer usage of the appliances and associated cooking utensils.

## **Recommendations**

The AGO has asked for this report to consider the most practical voluntary or mandatory measures for encouraging the energy efficiency of stoves and cook-tops. In considering these measures, we have divided them into three types of program elements, as follows:

- MEPS
- Energy Labelling
- Information and Research.

Based on the research the following recommendations are made:

### **MEPS**

1. ***MEPS should not be considered for cook-tops or hobs. MEPS for ovens should be reviewed once the EU has proposed a system and after the Canadians have reviewed their MEPS levels.***

There is little evidence internationally that MEPS are effective for cooking appliances. Canada, the only country which has available evaluation information on MEPS for cooking appliances, has not had any significant improvement in the energy consumption of cooking appliances after the introduction of MEPS. In addition, of the studies examined that consider proposed MEPS, only the EU has found MEPS cost effective however, this study is based on theoretical technical analysis and higher energy costs than in Australia.

2. ***A voluntary program with the Australian industry should be pursued to encourage the industry to meet the minimum heat loss performance required for ovens within AS 1549***

The ACA tests have shown that some ovens sold in Australia exceed the minimum heat loss requirement of AS 1549. As the actual units tested are not identified by the ACA (except for those named in Choice specifically as exceeding this requirement), it is not possible to identify all the models that exceed the standard requirements.

The AGO should work with the industry to develop a best practice program. The components of this program will be examined with the industry but could include the following:

- A testing program for ovens over the period 2002 – 2004 where the AGO tests a number of ovens and shares the results with the industry
- The industry be asked to provide the results of heat loss tests to the AGO for units they currently sell
- If there are units exceeding the AS 1549 heat loss requirements after 2004, the AGO may take action by publicly identifying those units or look at other options (such as MEPS).

### **ENERGY LABELLING**

3. ***Labelling for Ovens, Cook-tops and Stoves is not considered practical at this stage;***

Energy labelling may not provide sufficient influence on purchase decisions as improvements in cooking energy consumption – and hence the range of cost saving impacts to the consumer – is small. In addition, the stakeholders report that consumers have several other more important attributes to consider with cooking appliances in comparison with other major appliance groups. Stakeholders do not generally support labelling of cookers.

The current testing standards for cooking appliances are not adequate to provide comparative test on energy consumption and efficiency. It would be advisable to monitor the situation in the EU and when they further consider labelling for ovens, Australia could review the situation again.

### **INFORMATION AND RESEARCH**

4. ***Information provision in Australia could be enhanced by a coordinated web site***

At this stage, several web sites exist in Australia with efficient cooking information. A single site with information on purchasing efficient cooking

appliances and efficient cooking tips with quantitative information on savings, could provide a focus for consumer education and information. It is suggested that a coordinated site be investigated with SEAV, the ACA and perhaps the AGA, with the aim to develop a single collection of consistent cooking efficiency advice.

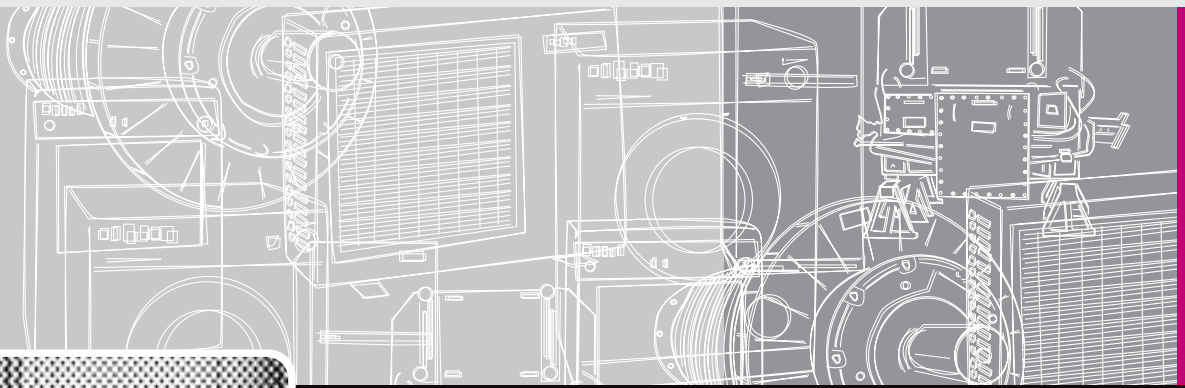
The web site could be promoted by the AGO and state agencies with special events in the electronic media, such as cooking efficiency tips provided by personality chefs during regular TV cooking shows. "Poor" or black-listed" ovens that do not comply with the heat loss requirements of the Australian Standard could also be published on such a site.

**5. *Research on the energy impacts of consumer use of cooking appliances for quantitative information:***

It would be valuable to conduct primary research on the impacts of consumer use of cooking appliances to provide accurate information on the most effective ways to improve efficiency. This research could also support any further investigations of MEPS or labelling of cooking appliances if they are reviewed in the future.

The primary research could be divided into:

- **Technical energy consumption research:**  
A study that quantifies the energy savings from various cooking "tips", such as cooking with different cookware, using small or alternative cooking appliances compared to the stove and maintenance of oven door seals
- **Quantitative usage and trend research:**  
A quantitative study of cooking usage, especially the use of microwave ovens and trends in cooking appliance usage, would be valuable for quantifying and projecting future impact of MEPS or labelling if investigated in the future.



For more information contact:

Built Environment Team  
Sustainable Energy Group  
Australian Greenhouse Office  
GPO Box 621  
CANBERRA ACT 2601

Facsimile: (02) 6274 1884

Email: [energy.efficiency@greenhouse.gov.au](mailto:energy.efficiency@greenhouse.gov.au)