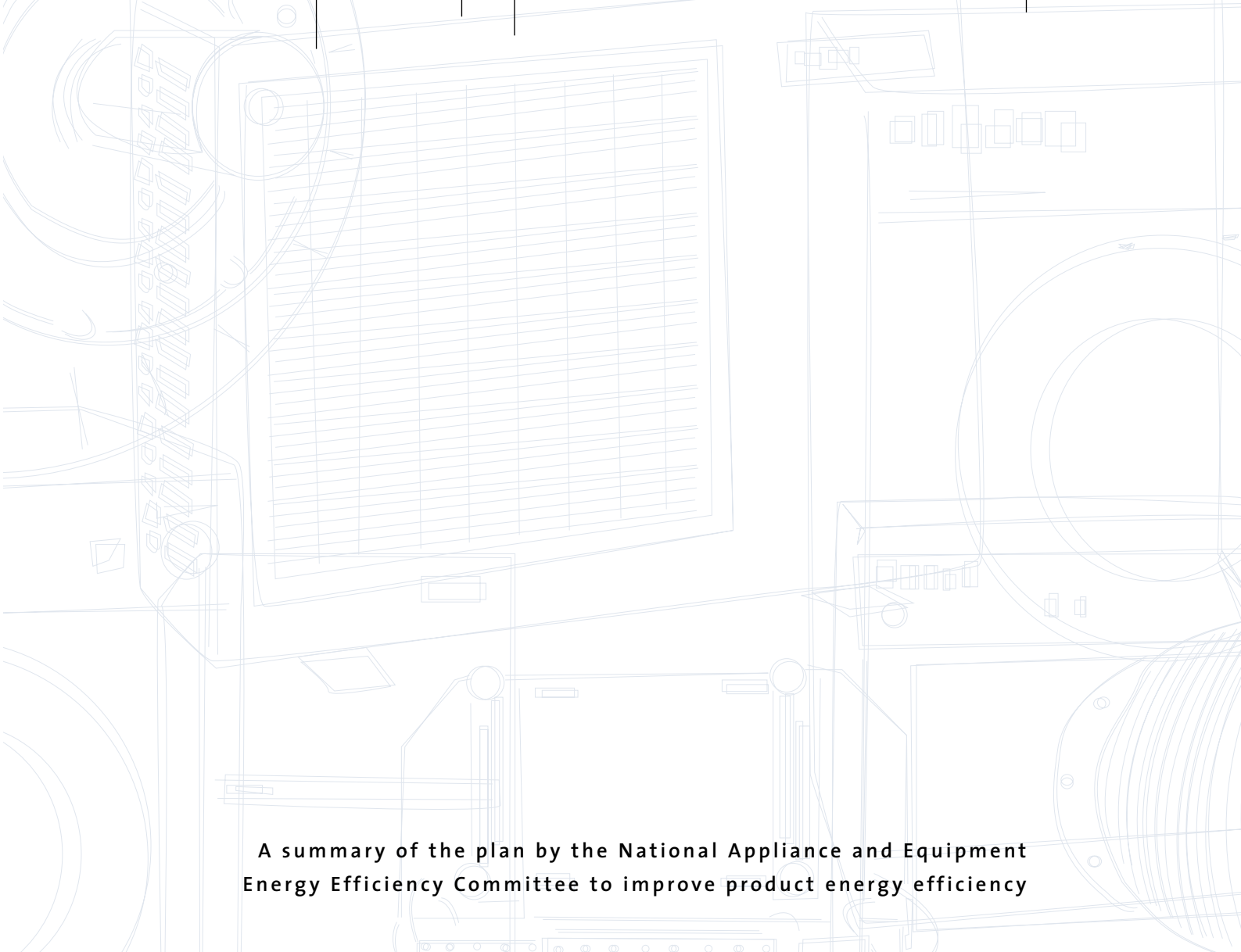




**NATIONAL APPLIANCE & EQUIPMENT ENERGY EFFICIENCY PROGRAM**  
**Consideration of Miscellaneous Electric Water Heaters**  
**For Minimum Energy Performance Standards**



**A summary of the plan by the National Appliance and Equipment Energy Efficiency Committee to improve product energy efficiency**

## Overview

The National Appliance and Equipment Energy Efficiency Committee (NAEEEC) is collecting information for consideration by the Ministerial Council on Energy about the appropriateness of minimum energy performance standards (MEPS) or a range of voluntary measures, for improving the efficiency of electric water heaters not covered by existing MEPS.

MEPS are a government regulatory program stipulated in state and territory law that excludes from the market products that do not meet the minimum energy performance levels. NAEEEC comprises energy efficiency officials and regulators that implement the MEPS program in Australia and New Zealand. The Ministerial Council on Energy comprises the Minister of State from each Australian jurisdiction responsible for energy matters.

This plan for Australia represents the first stage of a public process to extend nationally consistent minimum energy performance standards to low pressure storage, instantaneous, boosted solar, calorifiers, heat exchanges and boiling water heaters. NAEEEC seeks community and stakeholder comment on proposals to improve the energy efficiency of these products by:

- Mandating MEPS for miscellaneous electric storage water heaters within relevant state and territory legislation commencing in or around July 2005 that are equivalent to the existing Australian MEPS levels for mains pressure electric water heaters up to 630 litres.
- Promoting and marketing the best-available products in the Australian marketplace.

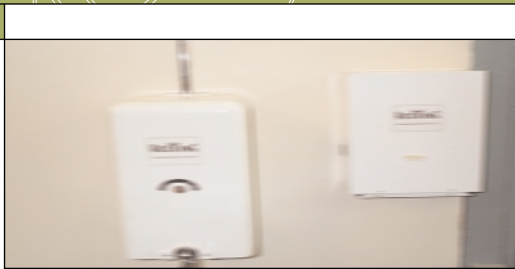
### Public comments invited

NAEEEC seeks comment on the proposals contained in this plan from any interested person or organisation. Please address your comments in writing to:

Energy Efficiency Team  
Australian Greenhouse Office  
GPO Box 621  
CANBERRA ACT 2601 **or**

Facsimile: (02) 6274 1884 **or** Email: [energy.efficiency@greenhouse.gov.au](mailto:energy.efficiency@greenhouse.gov.au)

Comments received by 1 March 2002 will help NAEEEC to advise MinCoE of stakeholder views on the approach being proposed for miscellaneous electric storage water heaters and also to shape any future voluntary program.



## Introduction

### Program goals

Energy consumed by equipment and appliances is a major source of greenhouse gas emissions. Codes and performance standards programs are amongst the most effective and widely used measures throughout the world to reduce greenhouse emissions attributable to this source. In 2000 for example, 25 of the 29 OECD countries had such programs and, within our region, New Zealand announced plans to institute a similar program in the near future.

The Australian Appliance and Equipment Energy Efficiency Program provides an important stimulus for the development of world-class energy efficient products. Benefits can flow through to the general community in the form of monetary savings from lower operating costs and increased employment levels resulting from Australian industry's ability to exploit potential export markets.

Under the National Greenhouse Strategy, responsibility for this program rests with the Ministerial Council on Energy (MinCoE). It is committed to improving this national program and has authorised NAEEEC to develop and publish plans for those products targeted for MEPS. These plans represent a transparent way for government agencies to explore community and stakeholder support (for both mandatory and voluntary measures) to reduce greenhouse gas emissions produced by these types of equipment.

### 1999 Expansion

In 1999, MinCoE's predecessor, ANZMEC (Australia and New Zealand Minerals and Energy Council), accepted proposals from NAEEEC to include in its program any items of industrial or commercial equipment identified as a significant contributor to the growth in energy demand or greenhouse gas emissions. Each product proposed for MEPS is subject to both a feasibility assessment and public consultation before any final decision is made. These assessments include technical and economic cost-benefit analyses as well as consideration of all supervisory measures available (voluntary, mandatory or a combination of both) to ensure that the most appropriate energy efficiency regime for that specific product is chosen.

The NAEEEC work program contains a list of all products scheduled for consideration and is available at the Australian Greenhouse Office website: [www.greenhouse.gov.au](http://www.greenhouse.gov.au)

This miscellaneous electric water heaters' plan plays an important role in the MinCoE process, communicating the potential levels and timetable for regulatory initiatives in general terms. It also demonstrates the extent to which Governments want all stakeholders to participate in the development of policies to meet the challenge of reducing the climatic affects of energy intensive products.



## Miscellaneous electric water heaters

This report covers the following types of electric water heating technology in both the residential and commercial sectors:

- low pressure storage heaters (vented and unvented)
- instantaneous heaters (little or no storage)
- boosted solar
- calorifiers and heat exchangers
- boiling water heaters (primarily used in the commercial sector).

Currently, no mandatory requirements apply to these units. By comparison, MEPS levels for all mains pressure electric storage units are included in AS1056 Part 1, were effective from 1 October 1999 and are based on maximum allowable standing heat losses. The MEPS levels for other types of units (vented types) remain at the 1985 levels and voluntary in nature. Since 1999, The Australian MEPS levels for mains pressure electric storage units have represented world's best practice for water heaters above 80 litres. New US MEPS levels announced in January 2001 for implementation in January 2004 will be more stringent for water heaters up to 270 litres (see NAEEEC report 'International Review of Minimum Energy Performance Standards for Electric Resistance Storage Water Heaters', 7 May 2001).

Mains pressure, electric resistance, storage water heaters are not covered by this paper.

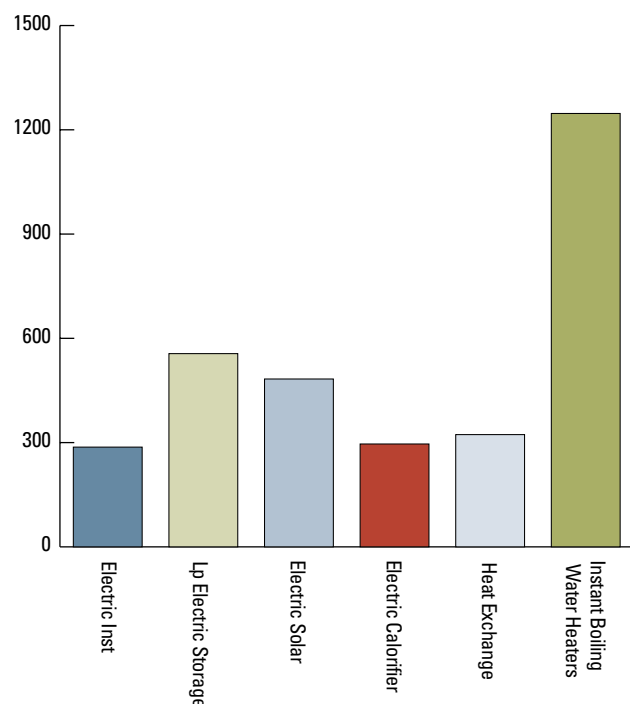
A more detailed description of these miscellaneous products can be found in a report commissioned by NAEEEC held at [www.greenhouse.gov.au/energyefficiency/](http://www.greenhouse.gov.au/energyefficiency/)

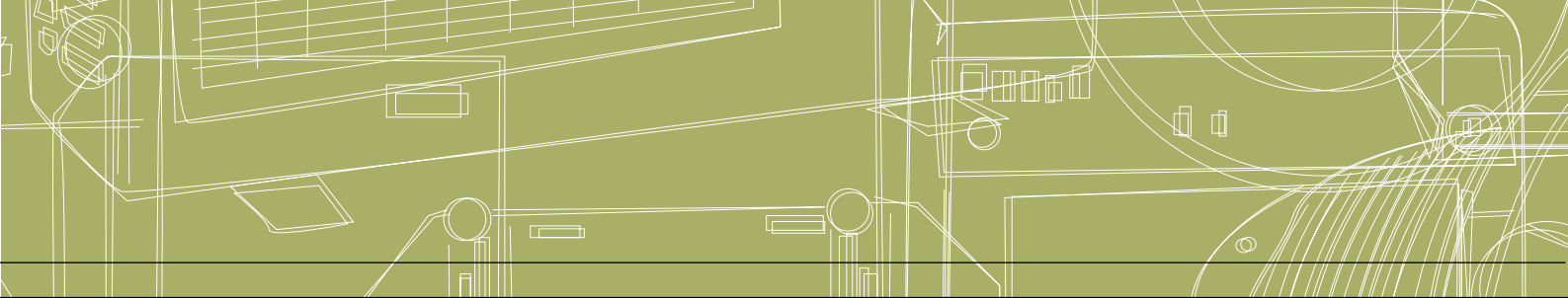
## Why electric water heating technologies have been targeted for MEPS

The main reasons for considering MEPS for water heating technologies are:

- Electric water heating technologies are estimated to account for 14.8 Mt CO<sub>2</sub>-e per annum, or approximately 81% of greenhouse gas emissions from all water heaters in Australia.
- Although the majority of emissions result from storage water heaters, electric water heaters (including boiling water units) currently not covered by MEPS are responsible for annual greenhouse gas emissions of approximately 3.2 Mt CO<sub>2</sub>-e. The following figure shows the approximate annual emissions in 2000 from the water heater types under review.
- MEPS have been adopted for most categories of electric water heaters in the United States, Canada and many European Countries.
- Emissions from boiling water units are a substantial proportion of non-regulated emissions and industry experts believe that these will grow through to 2015.

Fig 1: Greenhouse Emissions from Electric Water Heaters under review, 2000





However, NAEEEC does not consider the development of MEPS for commercial-sized electric water heaters, ie. above 630 litres, to be cost-effective at this stage since they typically occupy small niche markets which are considered unlikely to grow substantially in the foreseeable future. While emissions from instant boiling water heaters are significant, these do not yet appear to be covered by MEPS in other countries. Therefore further work is required before a suitable performance level and test methodology can be identified.

As the majority of water heaters under review are manufactured locally, the implementation of new standards should have sufficient lead times to allow existing manufacturers to allocate capital to pay for re-designing products and adjusting manufacturing processes, to minimise potential economic impacts and arbitrary changes in market share. The NAEEEC proposed timetable provides a three year notice period for local industry to adjust to the MEPS proposals after finalisation.

## Elements of the planned program

### Regulatory

NAEEEC proposes to regulate the efficiency of the following water heating technologies in the residential sector (ie. with capacities up to 630 litres). The proposed Australian MEPS are targeted to commence in 2005.

### Electric storage water heaters

In most cases, the following electric storage water heaters are directly comparable to conventional mains pressure units:

- › Low Pressure Water Heaters (vented and unvented);
- › Electric Boosted Solar Water Heaters;
- › Calorifiers;
- › Heat Exchangers.

The relevant Australian standard for some of these technologies already defines MEPS levels, although this is not currently a mandatory requirement. In order that Australian manufacturers compete on a fair and equitable basis, NAEEEC wants these substitutable products to meet minimum heat loss standards equivalent to the losses

from mains pressure hot water storage units (AS1056 Part 1). This level would match world's best practice in 2006 for some technologies following the implementation of similar levels in the US in 2004, and will bring other technologies in Australia into line with competitive products.

### Electric boiling and other water heaters

In view of the substantial and increasing greenhouse emissions due to **electric boiling** water heaters, NAEEEC will work with the industry to develop an appropriate package of measures to address this issue. NAEEEC will closely monitor overseas developments of MEPS levels and testing methodologies.

At this stage NAEEEC does not intend to introduce MEPS for electric **instantaneous** and **heat pump** water heaters, but will keep a watching brief on market trends and relevant activities and policies for these product types.

### Voluntary

NAEEEC does not propose to require mandatory energy efficiency labelling of all water heater technologies. Instead, NAEEEC will seek to develop a range of initiatives in conjunction with stakeholder organisations, as described below.

NAEEEC considers that there is a role for the water heating industry to provide information to consumers on the relative running costs and greenhouse gas emissions for various water heater types. This should cover a range of water heating technologies, fuel types, climates and usage patterns. This may be achieved through a public listing on a website, for example [www.energyrating.gov.au](http://www.energyrating.gov.au).

NAEEEC also wishes to work with stakeholders to develop "best practice" information programs aimed at hot water installers, and the development of modules in existing training courses for the building trades. NAEEEC is interested to hear whether parts of the industry are interested in operating and promoting these initiatives, supported by government. This work together with the development of a mandatory residential building code covering, amongst other things, water heater installation, should improve the overall system efficiency.

## Proposed Australian MEPS levels

NAEEEC's proposal to regulate the different types of water heaters is described below:

### Low pressure water heaters

Low pressure water heaters will be required to meet performance levels equivalent to those contained in AS1056 Part 1 (or any future revisions) for mains pressure electric storage water heaters, as reproduced in the following table.

Rated Hot Water Delivery (Litres)	Displacement Electric Water Heaters – no feed tank attached Maximum Heat Loss, kWh/24hours	Displacement Electric Water Heaters – with feed tank attached Maximum Heat Loss, kWh/24hours
25	1.4	-
31.5	1.5	-
40	1.6	-
50	1.7	-
63	1.9	-
80	1.47	-
100	1.61	1.91
125	1.75	2.05
160	1.96	2.26
200	2.17	2.47
250	2.38	2.68
315	2.66	2.96
400	2.87	3.17
500	3.15	3.45
630	3.43	3.73

**Source:** Amended version of AS1056.1:1991 Amendment 3, 5 August 1996, Table 2.1

**Note:** Water heaters with attached feed tanks have been allowed an additional 0.3 kWh/day heat loss under AS1056.1

### Electric boosted solar water heaters, calorifiers, heat exchangers

For close-coupled solar water heaters with electric boost, calorifiers and heat exchanger models, experts assert it is more appropriate to define MEPS levels in terms of static storage capacity, rather than hot water delivery capacity.

The proposed MEPS level for these types is a linear equation as follows:

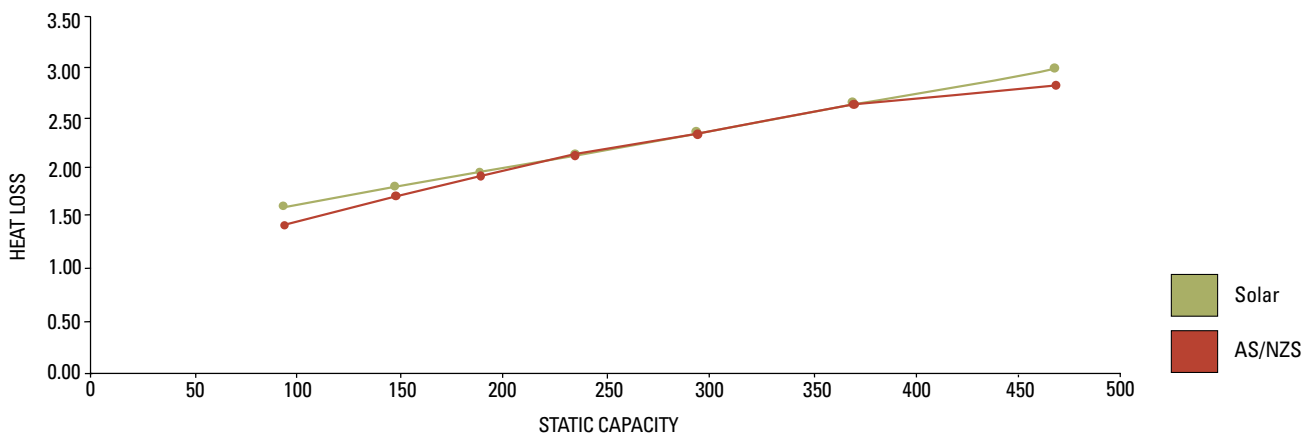
$$\text{MEPS (max allowable heat loss)} = 1.30 + 0.0037 \times V_s$$

Where the heat loss is in kWh per day at a nominal hot water/air  $\Delta T$  of 55K

$V_s$  is the static storage capacity of the tank in litres.

This provides an equivalent heat loss to a mains pressure unit in the size range from 200 to 400 litres assuming that the ratio of delivery capacity to static storage capacity is 0.85 (see Figure 2).

**Fig 2: Comparison of Allowable Leat Loss from AS 1056 Part 1 Compared to Proposed MEPS for Solar and Other Electric Storage Water Heater Types**



The Water Heater Standards Committee is developing appropriate test methods for each of the above water heater types where they currently do not exist.

New mains pressure storage water heater MEPS levels have been announced in the USA for implementation in 2004, which are more stringent than those contained in AS1056 Part 1 for some product sizes. NAEDEC intends to revise the existing standard with a view to harmonising across economies. It will commence a process involving the Australian industry immediately with a view to publishing a plan for these units later in 2001.

- > that the greenhouse intensity of electricity supply will reduce slowly over the next decade;
- > that the impact of MEPS will be a 10-15% reduction in consumption of products entering the market, compared to those being replaced.

Based on available information concerning the stock and performance of Australian residential water heaters, it is estimated that the annual greenhouse savings in 2010 resulting from the implementation of the proposed MEPS levels for electric water heaters will be 92 kt CO<sub>2</sub>-e per annum. Savings are predicted to rise to 176 kt CO<sub>2</sub>-e in 2015.

## Greenhouse reduction potential

Current annual greenhouse emissions due to water heaters in Australia (excluding boilers, and boiling water units) is estimated to be 17.0 Mt CO<sub>2</sub>-e. Boiling water heaters contribute an additional 1.25 Mt CO<sub>2</sub>-e.

Electric water heaters, including boiling water units, are estimated to comprise 81% of total water heating emissions in 2000. Technologies under review for MEPS account for emissions of 3.2 Mt CO<sub>2</sub>-e in 2000, rising to 4.5 Mt CO<sub>2</sub>-e by 2015.

In calculating the impact of the proposed MEPS, the following assumptions have been made:

## Economic implications

Incremental increases in water heater efficiency generally are highly cost effective, since most of the technology improvements involved are not complex. In this case, the majority of improvements have already been made to mains-pressure electric storage heaters (or are in the process of being adopted), and many of the techniques developed, such as improved tank insulation, are readily transferable.

This should mean that on-costs are small per unit and that these are covered by fuel savings to customers over a short period.

## Timetable and implementation

NAEEEC proposes to recommend to MinCoE the following target timeframe for the introduction of MEPS, giving industry an appropriate period of notice to undertake any necessary modifications to production procedures. This proposed timeframe might be modified to take into account specific circumstances that may arise:

1.	Development Stage	Timetable
	<p>Following the publication of the desk-top review (the full report is available upon request) of the energy impacts of mandatory and / or voluntary measures, the following steps will occur</p> <ul style="list-style-type: none"> <li>&gt; A steering committee will work to refine the initial MEPS proposals.</li> <li>&gt; Cost/benefit analysis of potential legislative options.</li> <li>&gt; Industry and stakeholder consultation on potential legislative proposals.</li> <li>&gt; Development of Australian and New Zealand Standards for inclusion in regulations.</li> <li>&gt; Ministerial approval required before introduction of any new regulations.</li> </ul>	<p>Commenced from April 2001 and completed by July 2002</p>
2.	Notification Stage	Timetable
	<p>Period of notification will depend on the level of manufacture undertaken in Australia. Longer periods would apply if Australian industry required to undertake substantial development or re-tooling</p>	<p>The Australian standard will be published by July 2002 containing the MEPS levels and the MEPS will come into effect from around July 2005 (ie 3 years notice)</p>
3.	Duration Stage	Timetable
	<p>This is the "stability period" in which no changes to regulations are made (ie MEPS levels unchanged).</p>	<p>Commences from July 2005 and scheduled for reconsideration by not earlier than July 2009 (ie fixed for at least 4 years)</p>

In addition to commenting on this paper, stakeholders will have further opportunities to comment through the process to the Australian Greenhouse Office and others. For example, Standards Australia seeks the views of the public when circulating discussions drafts of standards and the regulatory impact statement process provides everyone with the chance to comment on the detailed cost benefit studies and the draft regulation.

## Comments sought

The Australian Greenhouse Office would like to hear your views on these proposals. The contact details are contained on the inside cover of this plan.