

National Appliance and Equipment Energy Efficiency Program  
**Analysis of Potential for Minimum Energy Performance Standards**

for

# **Evaporative Air Conditioners**

Prepared for the Australian Greenhouse Office

by

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**Final Report**

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The study was undertaken by and Martin Poole of Mark Ellis & Associates with the aid of Mark Ellis and Zoe Pilven. We would also like to acknowledge the assistance provided by Lloyd Harrington of Energy Efficient Strategies. In addition, we thank members of the air conditioner manufacturing and supply industries for their co-operation.

Mark Ellis & Associates is a consultancy service specialising in the design, management and evaluation of sustainable energy policies and programs. MEA brings over 17 years experience in Europe and Australasia to the following areas of expertise:

- energy and greenhouse policy
- greenhouse modelling
- design of energy efficiency strategies
- implementation and management of energy efficiency programs
- energy information and advisory services
- green pricing schemes
- energy sector micro-economic reform
- low energy planning and building design
- environmental impacts of energy generation technologies and fuels

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## EXECUTIVE SUMMARY

The scope of this report includes all domestic and commercial evaporative air conditioners, also known as evaporative air conditioners, evaporative air coolers and 'swampies'.

They generally draw in warm outside air and pass it through a series of wetted filter pads that cool it through evaporation before discharging the air into the space to be cooled. Evaporation of water in the filter pads lowers the temperature of the air and increases its humidity.

Evaporative coolers are more effective in climates where the temperature is high and the humidity is low. In Australia, this generally means the southern coastal areas plus most of the inland areas. In terms of capital cities, Perth, Adelaide, Melbourne, Canberra and Hobart would be suitable for evaporative coolers. Sydney's climate is marginal and Brisbane and Darwin are too humid for most of the cooling season.

An extensive range of evaporative coolers is available, from small portable units for domestic use to large ducted systems for commercial and industrial use.

### Comparison with refrigerated cooling

Evaporative coolers provide some benefits over refrigerated coolers, including:

- Lower capital cost (typically 50% less);
- Lower energy cost (typically 80% less);
- No refrigerant required;
- Higher humidity increases comfort in drier areas (refrigerated air conditioners can dry the air too much on a dry day);
- Good ventilation, with 'fresh' outside air continuously flowing, which may be of benefit to hayfever and asthma sufferers.

However, it should be noted that correct maintenance of evaporative coolers is not only vital for continued efficiency and long life, but for good air hygiene. Therefore, evaporative coolers need to be cleaned frequently.

### Market Profile

The estimated market and stock of evaporative coolers in Australia is shown in the following table:

Table E1: Estimated annual sales and stock of evaporative coolers in Australia

Product	Estimated Market Share	Estimated Annual Sales (units)	Estimated Installed Stock (units)
5 – 15kW (Domestic)	96%	65,000 – 70,000	706,000 – 768,000
> 15kW (Commercial)	4%	2,000 – 3,000	29,000 – 32,000
<b>Total</b>	<b>100%</b>	<b>67,000 – 73,000</b>	<b>735,000 – 800,000</b>

Several of the major evaporative cooler manufacturers/importers in Australia are either owned or have corporate links with international companies. Each year around a third of the annual national market (20,000 units) is imported, with the majority of units originating in Taiwan.

Historical data from ABS indicates that the market for domestic units has been growing strongly over the period 1994 to 1999. Industry sources have varying opinions about current growth and future prospects, with some predicting that the market for evaporative coolers will decline over the next five years as refrigerant air conditioners become more competitive on a dollar for dollar basis.

### Standards

AS 2913-1987 applies to evaporative air conditioning devices which cool air by the evaporation of water. The performance of such devices is expressed in terms of airflow, evaporation efficiency,

internal and external sound power levels and electricity consumption. There are no Minimum Energy Performance Standards (MEPS) set within the document. This standard is currently under revision.

Overseas there are no known minimum energy performance standards currently in operation. In Iran, a labelling scheme has been proposed for evaporative coolers, based on the EER value, in order to compare the efficiency of similar evaporative coolers. The classification is similar to an energy label previously developed for Iranian household refrigerator-freezers.

## Greenhouse Emissions

Greenhouse emissions have been calculated based on the following assumptions:

- The average size of domestic units is assumed to be 10kW<sub>r</sub>\* and to run for 200 hours/year;
- The average size of commercial units is assumed to be 20kW<sub>r</sub> and to run for 2,000 hours/year.

\*Note: kW<sub>r</sub> is the total cooling supplied – the effect is a temperature reduction of the air

The average ratio of cooling supplied to input energy is strongly dependent on the temperature and humidity of the incoming air. In this comparison, the ratio is assumed to be 14 although in practice there would be considerable variations in this figure around Australia.

Based on these assumptions, the total greenhouse emissions resulting from the current installed stock of evaporative air conditioners in Australia are estimated to be 190kt CO<sub>2</sub>-e per annum. 55% of emissions are estimated to be attributable to the domestic sector.

When used in a suitable climate region, evaporative coolers use much less energy than refrigerative coolers to produce the same effect. For example, a refrigerative air conditioner with a 5-star rating produces approximately 2.8kW<sub>r</sub> (kW of cooling) from 1kW of electricity. An evaporative cooler could consume 200W to produce the same cooling effect - one fifth of the power consumption.

Use of evaporative coolers instead of refrigerative units in appropriate climate zones is therefore a much more significant source of greenhouse reductions than increasing the average efficiency of evaporative units.

For example, the greenhouse benefits arising from the use of evaporative coolers rather than refrigerative are therefore approximately 20 times greater than the benefits of increasing the average efficiency of the stock of evaporative coolers by 25%.

## Recommendations

The current estimated emissions due to evaporative air conditioners in Australia are 190kt CO<sub>2</sub>-e per annum. This is equivalent to approximately 0.4% of energy sector emissions in 1988 (NGGI 2000). Furthermore, industry sources estimate that the market share of evaporative air conditioners will fall over forthcoming years.

As has been demonstrated, the greenhouse benefit of increasing the proportion of cooling loads met by evaporative air conditioners instead of by refrigeration units far outweighs the potential derived from improvements in the performance of evaporative air conditioners.

An examination of overseas standards has revealed that MEPS have not been proscribed for evaporative coolers elsewhere.

In view of these factors, it is considered that the development of MEPS in Australia for evaporative coolers would not be cost-effective, and therefore MEPS are not recommended at the current time.

However, consideration could be given to programs aimed at increasing the market share of evaporative coolers in suitable climate zones. These include:

- education programs focused on specific sub markets (e.g. particularly those areas where the climate would allow evaporative cooling but where market penetration is very low and use of vapour compression air conditioners is widespread);
- information programs designed to enable consumers to compare the performance and running costs of equivalent evaporation and refrigeration units;
- It is probably not feasible to extend the current labelling program for air conditioners to cover evaporative units, in order to provide consumers with a direct comparison. However, the *Guide to Energy Efficient Air Conditioners*, should include information on the attributes of evaporative air conditioners such as their relative performance, operating cost and purchase cost advantages;

- promotion of case studies demonstrating cost savings from evaporative cooling;
- finance packages whereby energy savings pay for capital costs - through energy retailers or others;
- underwriting of advice from energy experts, measuring of energy savings and development of payback models.

There is still some debate on which exact locations in Australia provide a suitable climate for the successful operation of evaporative coolers. For example, opinion is divided on whether they are suitable in Sydney. Clearly this is a major barrier to the promotion of these products. We therefore recommend that governments and industry work together to undertake appropriate analysis so that a definitive view on suitable locations can be agreed, and used as the basis for future promotions.

## Analysis of Potential for Minimum Energy Performance Standards:

### Evaporative Air Conditioners

## 1. PURPOSE

This report has been commissioned by the Australian Greenhouse Office as part of the National Appliance and Equipment Energy Efficiency Program (NAEEEP). Its purpose is to explore the potential for energy and greenhouse savings through the introduction in Australia of Minimum Energy Performance Standards (MEPS) for evaporative air conditioners.

## 2. SCOPE

The scope of this report includes all domestic and commercial evaporative air conditioners.

## 3. PRODUCT DESCRIPTION

Evaporative coolers are also known as evaporative air conditioners, evaporative air coolers and 'swampies'. They generally draw in warm outside air\* and pass it through a series of wetted filter pads that cool it through evaporation before discharging the air into the space to be cooled. Evaporation of water in the filter pads lowers the temperature of the air and increases its humidity. By controlling the airflow (fan speed) the temperature can be controlled, within limits, depending on the temperature and moisture content of the incoming air.

*\*Note:* Some portable units draw air from inside the dwelling.

In order to ensure adequate airflow, ventilation of the cooled space is required. In a residential application, for example, this could mean leaving a window open in each cooled room. In commercial or industrial applications, open doors or windows or return air ducts are needed.

An extensive range of evaporative coolers is available, from small portable units for domestic use to large ducted systems for commercial and industrial use. They all operate on the same simple principle described above.

### Suitable climate zones

Evaporative coolers are more effective in climates where the temperature is high and the humidity is low. Many designs of evaporative cooler are most effective up to a wet bulb temperature of 22°C, or even as high as 24°C. In Australia, this generally means the southern coastal areas plus most of the inland areas. In terms of capital cities, Perth, Adelaide, Melbourne, Canberra and Hobart would be suitable for evaporative coolers. Sydney's climate is marginal and Brisbane and Darwin are too humid for most of the cooling season.

In theory, the climate in Sydney is suited for evaporative cooling for most of the summer months although for a small number of days per year, conditions are sufficiently humid that evaporative coolers would be unable to provide much cooling. They are better suited to the inland suburbs where temperatures are higher and humidity lower than the coastal fringe. However, the market penetration of evaporative coolers in Sydney remains very low.

## Comparison with refrigerated cooling

Evaporative coolers provide some benefits over refrigerated coolers, including:

- Lower capital cost (typically 50% less);
- Lower energy cost (typically 80% less);
- No refrigerant required;
- Higher humidity increases comfort in drier areas (refrigerated air conditioners can dry the air too much on a dry day);
- Good ventilation, with 'fresh' outside air continuously flowing, which may be of benefit to hayfever and asthma sufferers.

However, it should be noted that correct maintenance of evaporative coolers is not only vital for continued efficiency and long life, but for good air hygiene by limiting the accumulation of sediment, bacteria and algal growths within the unit. The water in evaporative coolers becomes dirty as windblown dust and pollen are collected and form a sludge in the basin, sometimes blocking the pump or water distribution system. Therefore, evaporative coolers need to be cleaned frequently. (DHS 1997).

## 4. IDENTIFICATION OF STAKEHOLDERS

### 4.1 Manufacturers / Importers

There are several evaporative cooler manufacturers and/or importers in Australia. Further details are provided in Appendix A.

Currently just under a third of the annual market is imported, with some of the more commonly recognised brands/companies manufacturing in Australia.

Historical data from ABS (EES, 2000) indicates that the market for domestic units has been growing strongly over the period 1994 to 1999. Industry sources have varying opinions about current growth and future prospects, with some predicting that the market for evaporative coolers will decline over the next five years as refrigerant air conditioners become more competitive on a dollar for dollar basis.

### 4.2 Engineering & Design Services

There is a very large number of companies that design or specify, supply and install air conditioning equipment. According to their advertisements in the Yellow Pages, many of these companies will supply evaporative units. It is likely that the availability of these services in a particular area depends primarily on the climate zone.

## 5. MARKET PROFILE

### 5.1 Domestic Units

Units for domestic use can generally be categorised as having a capacity from 5 to 15 kW of cooling. Some units towards the top of this capacity range may be used for light commercial applications. According to industry sources, domestic evaporative coolers make up over 95% of the Australian market. Based on an average lifetime of 15 years it is estimated that installed stock for domestic application evaporative coolers is in the range 706,000 to 768,000 units.

According to ABS4602.0 (ABS, 1999) the total number of households with evaporative air conditioners in 1999 was 679,000. Using an estimated saturation of 1.1 (EES, 2000), this figure indicates a likely total stock of evaporative air conditioners of about 747,000 in 1999. This is in good agreement with the figure derived from industry estimates.

Historical data from ABS (EES, 2000) indicates that the market for domestic units has been growing strongly over the period 1994 to 1999. Industry sources have varying opinions about current growth and future prospects.

## 5.2 Commercial Units

Units for commercial use can be classified as any unit with a capacity of around 15kW or greater (the range goes up to about 50kW). Sales of commercial application evaporative coolers comprise only a small proportion of national sales – less than 5%. Using an average product lifetime of 15 years it is estimated that there are approximately 30,000 commercial evaporative coolers installed in Australia.

## 5.3 Industrial Units

At this time, no information regarding the use of evaporative coolers for industrial applications.

## 5.4 Summary

Table 1: Estimated annual sales and stock of evaporative coolers in Australia

Product	Estimated Market Share	Estimated Annual Sales (units)	Estimated Installed Stock (units)
5 – 15kW (Domestic)	96%	65,000 – 70,000	706,000 – 768,000
> 15kW (Commercial)	4%	2,000 – 3,000	29,000 – 32,000
<b>Total</b>	<b>100%</b>	<b>67,000 – 73,000</b>	<b>735,000 – 800,000</b>

## 6. INDUSTRY LINKS

Several of the major evaporative cooler manufacturers/importers in Australia are either owned or have corporate links with international companies.

- Brivis, which manufactures in Australia, is owned by Carrier Australia, which in turn is owned by Carrier USA.
- Seeley manufactures in Australia and is Australian owned. The company owns the Braemar, Breezair, Coolair and Convair brands. The company has offices in England, Spain and the USA.
- Excelair is an Australian-owned company which imports complete products from Hong Kong.
- Celair is an Australian owned company that manufactures in Australia. The company exports some products, mainly to South Africa. In the 'domestic' product range (7,700 to 16,000m<sup>3</sup>/h) there are 7 units and in the 'industrial' range (8,400 to 69,000m<sup>3</sup>/h), 17 units. Celair's share of the national market for domestic units is about 25% and for industrial units about 50%. Celair estimates the market in general has grown over the last 10 years and grown strongly over the last 5 years.

Each year around 20,000 units are imported from a variety of countries (ABS, 2000), with the majority of units originating in Taiwan. This is around a third of the annual national market. The import data available does not distinguish between unit categories and therefore the final application of imported units can not be determined.

Table 2: Source and number of imported evaporative coolers (ABS 2000)

Country of Origin	Quantity	Value (Aust \$)
China	3,206	\$285,896
Hong Kong	4,106	\$387,988
Italy	655	\$153,528

Malaysia	25	\$35,713
New Zealand	190	\$42,768
Taiwan	11,043	\$924,279
USA	6	\$12,564
<b>Total</b>	<b>19,241</b>	<b>\$1,842,736</b>

## 7. STANDARD DEVELOPMENT

### 7.1 Australia

#### **AS 2913-1987 Evaporative Air-conditioning Equipment**

This Standard, published in April 1987, prescribes a basis for rating specified features of evaporative air-conditioning equipment, and specifies the test procedures and equipment applicable for each form of rating. It also prescribes basic requirements for construction.

The Standard applies to evaporative airconditioning devices which cool air by the evaporation of water. The performance of such devices is expressed in terms of airflow, evaporation efficiency, internal and external sound power levels and electricity consumption.

Performance requirements and methods of test are specified, together with other requirements relating to construction, markings and published data.

This Standard was prepared by the Association's Committee on Evaporative air coolers at the request of the Air Conditioning and Refrigeration Equipment Manufacturers Association of Australia to fill a need to standardize the methods of determining the data that would be used as product information. The Association also prepared and submitted a proposal, from which the standard was developed. Responsibility for the document was subsequently transferred to the Standards Australia Committee ME/62, Ventilation and Airconditioning.

This standard is currently under revision. The objective of the revision project is to ensure that the data published in relation to any particular equipment are sufficiently accurate to ensure that equipment can be selected correctly for the individual application. The information required for proper selection concerns the unit's airflow, its evaporation efficiency, its electrical power consumption, its nominal rating and its sound power output, and appropriate methods for the determination of each are described. Established techniques already exist for airflow and acoustical measurements, so this standard makes reference to them.

While the current Australian Standard does contain a requirement that the electrical consumption of the unit is measured, there are no Minimum Energy Performance Standards (MEPS) set within the document. The standard requirement is that the electrical consumption of a particular unit is measured during the evaporation efficiency test. The areas of electrical consumption within a typical unit would be the supply air fan and the water-circulating pump. Generally the electrical consumption of evaporative coolers is significantly less than refrigerative cooling systems (as there is no compressor - the main power is for the fan and pumps which are relatively lower power), and indeed this tends to be one of their main selling points. Some evaporative cooling systems also incorporate an electric or gas heating system that use the same ducting and air distribution system so the system can also be used for heating purposes; however these units are the exception rather than the rule in Australia.

### 7.2 Summary of overseas standards

There are no ISO, IEC or CEN published standards for evaporative coolers. The following overseas standards relate to evaporative air conditioners, although it should be noted that there are no known minimum energy performance standards.

#### **7.2.1 United States**

The following two standards are currently in preparation by ASHRAE

### **(SPC 133P: Method of Testing Direct Evaporative Air Coolers)**

This standard establishes a uniform method of laboratory testing for rating packaged and component direct-evaporative air coolers. The scope of this standard covers a method of testing for rating the saturation effectiveness, airflow rate, and total power of packaged and component direct-evaporative air coolers. Covered tests also include methods for measuring static pressure differential of the direct evaporative air cooler, density of the air, and speed of rotation of the fan.

Although based on ASHRAE Standard 51/AMCA 210, Laboratory Methods of Testing Fans for Ratings, this standard requires that packaged and component direct evaporative air coolers be simultaneously tested for air flow, total power, and saturation effectiveness. The ratings resulting from application of this standard are intended for use by manufacturers, specifiers, installers, and users of evaporative air cooling apparatus for residential, commercial, agricultural and industrial ventilation; air cooling applications; and for commercial, industrial, and agricultural processing applications.

Authorised: 86/06/22. (Scope revised 96/06/26)

### **(SPC 143P: Methods of Testing for Rating Indirect Evaporative Coolers)**

This standard provides standard test methods and calculation procedures for establishing the cooling capacities and power requirements for indirect evaporative cooling equipment.

This standard covers methods of testing under steady state conditions for rating of indirect evaporative coolers that sensibly cool a primary air stream through heat exchanger(s) by the evaporation of water into a secondary air stream, and are self contained or are components of packaged systems. This standard does not cover devices that use mechanical refrigeration or thermal storage to cool the primary air stream, the secondary air stream or the water provided for evaporation, and devices that dry the primary or secondary airstreams.

Authorised: 89/06/25. (Scope revised 95/02/01)

#### **7.2.2 India (IS 3315 – 1974: Evaporative Air Coolers)**

Published: 1974, reconfirmed 1991

Issued by: BIS Bureau of Indian Standards

#### **7.2.3 Saudi Arabia (SASO 35: Evaporative Air Coolers (Desert Coolers)**

Published: 1997-10-10

Issued by: SASO Saudi Arabian Standards Organisation

#### **7.2.4 Saudi Arabia (SASO 36: Methods of Test for Evaporative Air Coolers (Desert Coolers)**

Published: 1997-10-10

Issued by: SASO Saudi Arabian Standards Organisation

#### **7.2.5 Canada (C22.2 No 104: Humidifiers and Evaporative Coolers)**

Published: 1983, Amendment No. 1 1989

Issued by: CSA International

#### **7.2.6 Iran**

Energy labelling for evaporative coolers is under discussion in Iran. The following extract summarises the proposal (Heydari):

“A number of design options for improving the performance and reducing energy consumption of a typical direct evaporative air-conditioner were studied with the manufacturers and alternations in the design and manufacturing of direct evaporative air-conditioners were outlined. Design and manufacturing alterations such as improving the design of blower fan, use of more efficient fans, effect of variations in fan speed, pad density, water circulation rate and atmospheric conditions on the cooler output were modelled using the developed computer simulation model of the evaporative coolers. These changes in design and manufacturing of the evaporative coolers were considered feasible without having the manufacturers to make a major investment.

“The engineering analysis indicates that a substantial reduction in energy consumption is achievable with minor modifications to design and production processes of manufactured evaporative air-conditioners in Iran. The Iranian National Energy Efficiency Standards Acts and energy labelling program legally enforce a proposed improvement scheme in the energy consumption labelling of evaporative air-conditioners.

“The energy label for evaporative coolers was designed based on the EER of evaporative coolers, making it possible to compare the efficiency of similar evaporative coolers for at the same rated CFM values.

“The proposed energy label shown in Figure 2 is similar to an energy label previously developed for Iranian household refrigerator-freezers. (Heydari, 1997) The classification are based on the experimentally determined values of energy efficiency ratio (EER) and the efficiency thresholds are proposed according to the following scheme:”

**Table 3: Efficiency thresholds for the proposed Iranian energy label**

<b>EER Value *</b>	<b>Rating</b>
EER>=65	→ 1
58<=EER< 65	→ 2
50<=EER< 58	→ 3
42<=EER< 50	→ 4
34<=EER< 42	→ 5
26<=EER< 34	→ 6
EER<26	→ 7

(\* EER = Energy efficiency ratio)

## 8. GREENHOUSE EMISSIONS

### 8.1 Total Greenhouse Emissions

To calculate total greenhouse emissions, evaporative coolers have been considered in two groups: domestic and commercial units.

The average annual utilisation of the domestic units has been assumed to be 200 hours (AGO, 2000) and for commercial units 2,000 hours.

The number of units in each category is the mid-point of the estimated stock ranges in Table 1. The average size of unit in the domestic category is assumed to be 10kW<sup>r</sup>\* and in the commercial category 20kW<sup>r</sup>.

\*Note: kW<sup>r</sup> is the total cooling supplied – the effect is a temperature reduction of the air

The average ratio of cooling supplied to input energy is strongly dependent on the temperature and humidity of the incoming air. In this comparison, the ratio is assumed to be 14 (Breezair, 2000) although in practice there would be considerable variations in this figure around Australia.

Based on these assumptions, the total greenhouse emissions resulting from the current installed stock of evaporative air conditioners in Australia are 190kt CO<sub>2</sub>-e per annum. Figure 1 below shows the breakdown of annual emissions by sector.

**Table 4: Greenhouse emissions from evaporative cooling, 2000**

<b>Emissions</b>	<b>Domestic</b>	<b>Commercial</b>
kt CO <sub>2</sub> -e	105.0	86.9

## 8.2 Greenhouse reduction potential

When used in a suitable climate region, evaporative coolers use much less energy than refrigerative coolers to produce the same effect. For example, a refrigerative air conditioner with a 5-star rating produces approximately 2.8kW<sub>r</sub> (kW of cooling) from 1kW of electricity. An evaporative cooler could consume 200W to produce the same cooling effect - one fifth of the power consumption.

Use of evaporative coolers instead of refrigerative units in appropriate climate zones is therefore a much more significant source of greenhouse reductions than increasing the average efficiency of evaporative units.

Using data from the website [energyrating.gov.au](http://energyrating.gov.au) for electricity consumption of refrigerative air conditioners, the greenhouse emissions from the existing stock of evaporative coolers are estimated as about 420kt CO<sub>2</sub>-e per annum less than if an equivalent level of cooling were provided by refrigerative units. By comparison, if the average efficiency of the evaporative coolers were increased by 25% (on the basis of data in Heydari, using difference between the average energy efficiency and the best in their data), the annual emissions reduction would be just 20kt CO<sub>2</sub>-e.

The greenhouse benefits arising from the use of evaporative coolers rather than refrigerative are therefore approximately 20 times greater than the benefits of increasing the average efficiency of the stock of evaporative coolers by 25%. (See Figure 2)

Table 5: Comparison of the benefits of using evaporative air conditioners instead of refrigeration units, versus improved efficiency of evaporation units.

Potential Emission Reduction	Benefit of Evaporation over Refrigeration Units	Improvements in Evaporative Units
Kt/annum	421.14	21.1

## 9. APPROPRIATE MEPS LEVELS FOR AUSTRALIA

The current estimated emissions due to evaporative air conditioners in Australia are 190kt CO<sub>2</sub>-e per annum. This is equivalent to approximately 0.4% of energy sector emissions in 1988 (NGGI 2000). Furthermore, industry sources estimate that the market share of evaporative air conditioners will fall over forthcoming years.

As has been demonstrated, the greenhouse benefit of increasing the proportion of cooling loads met by evaporative air conditioners instead of by refrigeration units far outweighs the potential derived from improvements in the performance of evaporative air conditioners.

An examination of overseas standards has revealed that MEPS have not been proscribed for evaporative coolers elsewhere.

In view of these factors, it is considered that the development of MEPS in Australia for evaporative coolers would not be cost-effective, and therefore MEPS are not recommended at the current time.

However, consideration could be given to programs aimed at increasing the market share of evaporative coolers in suitable climate zones.

## 10. OTHER POTENTIAL PROGRAMS

Consideration should be given to strategies designed to strengthen preference for evaporative coolers in suitable climate zones. These could include:

- education programs focused on specific sub markets (e.g. particularly those areas where the climate would allow evaporative cooling but where market penetration is very low and use of vapour compression air conditioners is widespread);

- information programs designed to enable consumers to compare the performance and running costs of equivalent evaporation and refrigeration units;
- It is probably not feasible to extend the current labelling program for air conditioners to cover evaporative units, in order to provide consumers with a direct comparison. However, the *Guide to Energy Efficient Air Conditioners*, should include information on the attributes of evaporative air conditioners such as their relative performance, operating cost and purchase cost advantages;
- promotion of case studies demonstrating cost savings from evaporative cooling;
- finance packages whereby energy savings pay for capital costs - through energy retailers or others;
- underwriting of advice from energy experts, measuring of energy savings and development of payback models.

There is still some debate on which exact locations in Australia are provide a suitable climate for the successful operation of evaporative coolers. For example, opinion is divided on whether they are suitable in Sydney. Clearly this is a major barrier to the promotion of these products. We therefore recommend that governments and industry work together to undertake appropriate analysis so that a definitive view on suitable locations can be agreed, and used as the basis for future promotions.

## 11. IMPLEMENTATION

Since MEPS has not been recommended, we understand that the AGO will proceed with consultation with the industry in order to discuss and progress the other programs suggested in section 10.

## REFERENCES

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## APPENDIX A: MAILING LIST OF INTERESTED PARTIES

### A.1 Organisations

#### A.1.1 Air-conditioning and Refrigeration Equipment Manufacturers Association

National Secretary

PO Box 7622, St. Kilda Road, Melbourne, Vic 3004

Ph: +61-3-9280 0111

Fax: +61-3-9280 0194

#### A.1.2 Australian Chamber of Commerce and Industry

PO Box E14, Kingston ACT 2604  
Ph:+61-2-6270 8006 Fax:+61-2-66273 6596  
Email:fordr@acci.can.com.au

### **A.1.3 Australian Industry Group**

PO Box 817, Canberra ACT 2601  
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email: [vvf@aigact.aigroup.ans.au](mailto:vvf@aigact.aigroup.ans.au)

### **A.1.4 Airconditioning and Mechanical Contractors Association**

Executive Director  
PO Box 289, Burwood VIC 3125  
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### **A.1.5 Australian Greenhouse Office**

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GPO Box 621, Canberra ACT 2601  
Telephone: 02 6274 1888 Facsimile: 02 6274 1795  
[www.greenhouse.gov.au](http://www.greenhouse.gov.au)

### **A.1.6 Chartered Institute of Building Services Engineers**

Hon Secretary  
9 Mather Road, Mount Eliza Vic 3930

### **A.1.7 Institute of Refrigeration Heating & AirConditioning Engineers of New Zealand**

The Secretary  
PO Box 11130, Ellerslie, Auckland, NEW ZEALAND  
[www.irhace.org.nz](http://www.irhace.org.nz)

### **A.1.8 Refrigeration & Air Conditioning Companies Association (New Zealand)**

The Secretary  
PO Box 12737, Auckland 1135, NEW ZEALAND

### **A.1.9 Refrigeration & Air Conditioning Contractors Association of Australia**

The Secretary  
485 Princes Highway , St Peters NSW 2044

### **A.1.10 The Australian Institute of Refrigeration Air Conditioning and Refrigeration Inc.**

AIRAH National Office,  
James Harrison House, 52 Rosslyn Street, West Melbourne, Victoria 3003, Australia  
Ph: +61 3 9328 2399, Fax: +61 3 9328 4116  
WWW: [www.airah.org.au](http://www.airah.org.au)

## **1. Manufacturers/Suppliers**

### **2.1 AERE SERVICES Pty. Ltd.**

7/1368 Kingsford Smith Drv, Pinkenba, QLD 4008 Australia  
Ph: 61-7-3280 2777 Fax: 61-7-3260 2766

## **2.2 AIR CONDITIONING EQUIPMENT Pty. Ltd.**

Unit 9/12-14 Miles St, Mulgrave VIC 3170

Ph: 61-3-9561 4422 Fax: 61-3-9561 8692

## **2.3 AIRA Pty Ltd**

144 Colchester St, Kilsyth VIC 3137

Ph: +61-3-9728 5566 Fax: +61-3-9761 4732

Email: [aira@aira.com.au](mailto:aira@aira.com.au)

WWW:[www.aira.com.au](http://www.aira.com.au)

## **2.4 COBAIR – COBAR ENGINEERING**

16 Thirteenth St, Cobar NSW 2835

Ph: 61-2-6836 2103 Fax: 61-2-6836 3646

## **2.5 ECP (Australia) Pty Ltd (EMAILAIR)**

745 Springvale Rd, Mulgrave VIC 3170

Ph:61-3-9271 3505 Fax:61-3-99271 3575

Email: [ecp-au.com](mailto:ecp-au.com)

## **2.6 MUNTERS Pty Ltd**

1 Blissington Rd, Springvale VIC 3171

Ph:61-3-9562 3677 Fax:61-3-9562 3866

email [maumelbourne@munters.com.au](mailto:maumelbourne@munters.com.au)

WWW:[www.munters.com](http://www.munters.com)

## **2.7 SEELEY INTERNATIONAL**

PO Box 140, Melrose park SA 5039

Ph:61-8-8276 3207 Fax:61-8-8276 4542

## **2.8 STADT INDUSTRIES Pty Ltd**

17 Havelock St, Bayswater VIC 3153

Ph:61-3-9720 1333 Fax:61-3-9720 3387

## **3. Regulators**

### **3.1 NSW Ministry of Energy and Utilities**

Tim Aldrich

PO Box 536, St Leonards NSW 2065

Telephone: 02 9901 8837 Facsimile: 02 9901 8403

### **3.2 Office of the Chief Electrical Inspector**

Chairman, Electrical Approvals

3/4 Riverside Quay, Southbank VIC 3006

PO Box 262, Collins Street West V 8007

Telephone: 03 9203 9700 Facsimile: 03 9686 2197

### **3.3 Office of Chief Electrical Inspector**

Michael Grubert

PO Box 262, Collins Street West VIC 8007

Telephone: 03 9203 9741 Facsimile: 03 9686 2197

### **3.4 Department of Mines and Energy**

Electrical Safety Branch

61 Mary Street, Brisbane QLD 4000

PO Box 194, Brisbane QLD 4001

Telephone: 07 3237 0239 Facsimile: 07 3237 0229

### **3.5 Department of Mines and Energy**

Energy Division

Level 19, 30 Wakefield, Adelaide SA 5000

Telephone: 08 8226 5500 Facsimile: 08 8226 5523

### **3.6 Power and Water Authority**

Chief Electrical Inspector

4th Floor JAPE Building, 18-20 Cavenagh Street, Darwin NT 0800

GPO Box 1921, Darwin NT 0801

Telephone: 08 8924 711 Facsimile: 08 8927 212

### **3.7 Office of Energy**

Technical and Safety Division

20 Southport Street, Leederville WA 6007

Telephone: 08 9422 5200 Facsimile: 08 9422 5244

### **3.8 Hydro-Electric Commission**

Chief Electrical Inspector

4 Elizabeth Street, Hobart TAS 7000

GPO Box 355D, Hobart TAS 7001

Telephone: 03 623 05855 Facsimile: 03 622 33279

### **3.9 Department of Urban Services**

GPO Box 158, Canberra ACT 2601

Telephone: 02 6207 5111 Facsimile: 02 6207 6229

## **4. Testing Interests**

The most likely source of Testing Laboratory interest would be through certification bodies such as.

### **4.1 QAS. Homebush - Head Office**

1 The Crescent, Homebush NSW 2150, Sydney Australia

Toll Free: 1300 360 314

Phone: (612) 97464900 Fax: (612) 9746 8460

Email: [customerservice@qas.com.au](mailto:customerservice@qas.com.au)

### **4.2 NATA**

7 Leeds Street, Rhodes NSW 2138

Ph: +61 2 9736 8222 Fax: +61 9743 5311

## **5. Retailers**

Australian Retailers Association

Executive Director

132 Grenfell Street, Adelaide SA 5000

## **6. Consumers**

This Group would best be covered through consumer associations such as;

Australian Consumers Association

57 Carrington Road, Marrickville NSW 2204

Phone 02 9577 3333

Fax 02 9577 3377