



## **Productivity Commission Inquiry into the Economic and Environmental Potential of Energy Efficiency**

**April 2005**

The Australian Electrical and Electronic Manufacturers' Association (AEEMA) welcomes the opportunity to provide comment to the above Inquiry. AEEMA represents manufacturers and suppliers of a wide range of electrical products. This submission focuses on energy efficiency issues associated with home appliances.

AEEMA promotes environmental responsibility to its members and works closely with government in developing mechanisms to improve energy efficiency. AEEMA has worked closely with the Australian Greenhouse Office and other agencies in implementing minimum energy performance standards (MEPS) and energy labeling for household appliances. An internal study by one AEEMA member has revealed that over the past ten years energy efficiency across a range of home appliance products had increased by 50%.

### **Lack of understanding of measures at retail level**

An impediment to energy efficiency is the lack of understanding and communication of energy efficiency measures at retail level, and therefore consumer level. While head office of a retail chain may endorse energy efficiency, this often does not get through to the shop floor. Promoting "this month's special", where staff obtain a financial reward for generating a sale, conflicts with promoting energy efficient products, which may entail no financial reward. There is also a lack of understanding of MEPS, energy labeling and general energy efficiency promotion at the retail level. This is somewhat understandable given of the high turnover of retail staff and the large volume of products for which they are expected to have knowledge. Some manufacturers provide exceptional energy efficient product, but if the retailer does not inform the consumer that a product can produce a significant savings in energy consumption and carbon dioxide emissions, the consumer will not comprehend the relationship between the star rating, pricing and benefits.

## **Enforcement and national uniformity**

With product being regulated of a state level and energy efficiency at a Federal level, industry wastes time and money when governments fail to achieve consistency in policy. One example is hot water heaters regulation, where the Federal government imposed MEPS, while individual states or councils actively discriminated the use of electric heaters in new homes. This lack of communication causes wastage of valuable resources in having product comply, only to see it taken off the market.

A common set of regulations, uniformly administered in all jurisdictions, and an effective national surveillance and enforcement regime, essential prerequisites for an effective mandatory energy efficiency labelling and MEPS scheme. Non-uniformity leads to wasteful administration and increases conformance costs for suppliers, which raises costs for consumers.

Effective surveillance and enforcement are also required. In the past these have been inadequately administered and/or under resourced, leading to counter-productive outcomes. In the mid 1990's a supplier of air conditioners registered energy labels for a range of models that were overstated in capacity and efficiency to such a degree that quite mediocre performers were labelled as either among the best or the best available on the market. Because false figures were on the label, purchasers believed the false claims. More than two years elapsed from the time that competitors reported the problem until re-registration was enforced. Enforcement has improved since then, particularly when the AGO entered into an enforcement agreement with the ACCC.

Whenever labelling or MEPS is to be extended to a new or wider range of products, sufficient resources must be applied to surveillance and enforcement. In particular, funding must be available to provide for effective levels of check testing. A single check test on a household appliance typically costs around \$2000 or more. It is so costly that surveillance must be nationally coordinated and funded.

## **Standards and testing measures**

Effective energy efficiency labelling and MEPS depend upon standards that define a method of measuring its energy consumption and pertinent methods of verifying whether a product is fit for purpose. For example, does a dishwasher wash and dry dishes sufficiently well to meet the needs of users when operated on the program on which its energy efficiency rating is established? Also, are the tests repeatable in the same laboratory or reproducible in another laboratory? These seemingly simple questions limit the types of products to which labelling and MEPS can be applied.

For example, electric cook tops and ovens are obvious candidates for labelling and MEPS. The reasons they are not yet rated or subject to MEPS illustrates why the scope for energy efficiency rating of electrical equipment is constrained by lack of appropriate standards.

In the case of cooktops, energy consumption and performance is not difficult to measure on some tasks, but five different hot plate types are in use (coiled elements, solid hotplates, under glass elements, halogen lamps and induction heaters). The relative performance of each of these hot plates depends on the task and the cooking utensils used. Therefore, although it is possible to compare the relative performance of different cook top heaters of the same type on a specified task with specified cookware, it is not possible to rate one type of hot plate against another over the range of tasks for which hot plates are used.

The hot plate case illustrates the need to consider the availability of international performance and energy consumption measurement standards before applying energy ratings to products.

The cost of developing standards and reliable test procedures is high. Whether the standards are national or international, product development costs and compliance testing costs are substantial both in terms of direct costs and opportunity costs when scarce skilled engineers and laboratory resources are diverted from other product improvement or cost reduction projects to meet energy efficiency targets.

## **Differences between apparent and achieved savings resulting from energy efficiency ratings and MEPS**

### **Refrigerators and freezers**

Energy efficiency savings from refrigerators and freezers are one of the success stories of ratings and MEPS. There are several reasons for this:

1. Amount of use: Refrigerators are on all the time.
2. What refrigerators do: The task of a refrigerator can be easily defined. It maintains its compartments at specified temperatures that are reasonably close to what users will select on the appliance controls.
3. Reliability of results: The test method is repeatable and reproducible.
4. International considerations: The Australian and New Zealand standard is sufficiently close to the ISO standard that testing can be performed by overseas laboratories that test to the ISO standard.
5. Effects on product design: Most design changes made to achieve better efficiency ratings based upon the specified test method will improve the energy efficiency in most real world situations. However, as with air conditioners (see below), the introduction of variable speed compressors with complementary control systems are a significant source of potential real world savings that would not be evident in ratings based upon current test methods.

The five criteria described above for refrigerators are different in their effects on other products and generally the criteria are not easily met with other household appliances.

## **Air conditioners**

Application of the five criteria is discussed below in the case of air conditioners. As explained below, air conditioner efficiency ratings are becoming irrelevant to purchasers seeking the highest efficiency airconditioners under real conditions of use.

1. Amount of use: So little is known about real use, including the amount of time that air conditioners are used on heating or cooling and the outdoor and indoor temperatures at which they operate, that no attempt is made on labels to estimate energy consumption per year, as is done for other products. No data is available that would enable reliable estimates of total energy savings attributable to efficiency ratings or MEPS. So far, despite this lack of information, industry believes that rationally derived efficiency ratings and MEPS can save energy in amounts that exceed costs.
2. What air conditioners do: The task of an air conditioner is not easily defined for the purpose of a test method. Air conditioners are used in cooling or heating modes over a wide range of outdoor and indoor temperatures for each mode. Test methods are based on a high heat load condition in which the compressor and fans run continuously. In the real world, generally when air conditioners run they are subject to relatively low heat loads. Over the last 20 years, variable speed compressors with control systems to suit have been developed. Efficiencies of air conditioners with variable speed compressors are similar to those with fixed speed compressors at test conditions. Hence they have similar efficiency ratings. However, they are much more efficient at the lower load conditions at which they usually operate. This is not evident from the efficiency ratings on the labels so the labels are misleading in this case.

Year by year the proportion of air conditioners with variable speed compressors is rising and the relevance of label ratings to purchasing decisions when seeking the highest energy efficiency air conditioners under real conditions is declining to the point of becoming irrelevant. The relevant standards committee is addressing this issue but, in a situation where all air conditioners are imported, effectiveness of their actions will be limited until ISO test methods are developed to address the problem.

3. Reliability of results: The test method is repeatable and reproducible.
4. International considerations: The Australian test method is the same as the ISO method.
5. Effects on Product design: Most design changes made to achieve better efficiency ratings based upon the specified test method will improve the energy efficiency in most real world situations. However, there is an exception in the case of variable speed compressors that save energy in real world conditions. This advantage would not be evident based on to current test methods.

**Clothes washing machines, dishwashers and clothes dryers:** These appliances are discussed together because of similarities in the history and present state of their performance and energy measurement standards.

The history is a case study in what can happen when energy efficiency ratings are introduced with inadequate standards. State regulators introduced energy efficiency ratings in the late 1980's. The test methods specified were inadequate being so loosely defined that false claims of capacity wash performance or energy efficiency could be made without detection by check testing. In 2000 a comprehensive set of changes to test methods was made to each standard. These made test results more reliable. Prior to 2000, many of the claims for capacity, energy consumption and ratings would have been false but there was no means of proving this. In addition, product designs were modified in ways that improved ratings and downgraded performance but did not reduce energy usage.

The original test methods were based on voluntary US standards where reproducibility of results from laboratory to laboratory were relatively unimportant. Further, these methods were not well suited to the mix of local, European, North Asian and American appliances sold in Australia.

The Australian standard required extensive modification to improve the relevance of its tests to users' needs and to improve repeatability and reproducibility to the point where check testing became meaningful.

Australian regulators now consider that test methods for both clothes washers and dishwashers are reliable for check testing, but recent experience has indicated that repeatability and reproducibility of the clothes washer test method is in doubt. Unfortunately the standards committee will be unable to give this matter the attention needed until it has finished working on standby power and water efficiency ratings as demanded by government. One of the problems facing energy efficiency rating and MEPS is that government tends to put priority on new initiatives at the expense of doing the work needed to keep existing programs healthy and relevant in changing circumstances.

1. Amount of use: Usage rates of these appliances, assumed to be daily for clothes washers and dishwashers and once a week for dryers, are based on a Pacific Power study conducted twelve years ago. In this study, frequency of use was determined by metering power used by individual appliances in several hundred homes in NSW. This was a reliable measure at the time but may no longer be valid. This does not directly affect efficiency ratings or MEPS but it would affect estimates of energy usage in cost benefit studies.
2. What these appliances do: Defining the task of a dryer is not difficult but defining the task of a clothes washer or dishwasher is quite complex and is becoming more so as product control systems become more comprehensive and flexible. Test standards define a set of objectives for performance that must be met on a program nominated by the supplier (local manufacturer or importer) in the instructions for use. Certain defined performance requirements must be met on that program to ensure the appliance is fit for purpose. Efficiency ratings are only pertinent when the appliance is used on the program

specified by the supplier. If used on a different program, the appliance will use a different amount of energy and the rating will be irrelevant to energy efficiency in actual use.

Clothes washing and spin performance are individual choices made by the user. Around half of all users of clothes washers usually wash with cold water. However, the standard test uses 35°C water. In those cases actual energy consumption is only a fraction of the rated consumption and energy consumption upon which clothes washer ratings are based is very misleading.

Many users of dishwashers want their dishes dried more effectively than on the rating programme and choose a program that dries better. This uses higher temperature water for the final rinse and uses more energy than the rating program.

The degree to which specified conditions match real conditions of use is important when estimating energy savings and economic benefits attributable to energy efficiency ratings. For this reason, AEEMA invariably questions estimates of the energy savings in discussion and option papers and regulatory impact statements. However, so far, it has never opposed a labelling RIS for this reason because of the greater public interest involved.

3. Reliability of results: Test methods in dryer and dishwasher standards are considered to be of adequate reliability for effective check testing, but AEEMA doubts the accuracy of the clothes washer test method.

4. International considerations: Currently these tests are specific to Australia. However, Australian and IEC test methods are progressively converging. Test reliability would be lost if Australia accepted IEC test methods as they stand at present.

5. Effects on product design: Appliances are being designed to maximise ratings while meeting minimum product performance requirements. This is beneficial when the appliance is used on a program other than the rating program because some beneficial effects will flow on to programs other than the rating program and will, at worst, have no adverse effects. However the principal deficiency of energy ratings in current standards is that they do not provide any incentive for the manufacturer to improve any program other than the rating program.

A recent development that threatens to make energy efficiency ratings based upon current test methods irrelevant to real conditions of use is sensor based automatic programs for clothes washers and dishwashers. In these cases, sensors measure turbidity of wash liquid and rinse water. These readings largely determine how much water and energy are used. Automatic programs require different test methods to conventional programs. This poses a dilemma. IEC test method development processes are inordinately slow and are unlikely to be ready before many clothes washers and dishwashers have this feature. Local development of a method would be costly and may ultimately be fruitless if the IEC does not adopt the method developed here.

## **Effect on competition of energy efficiency measures**

When the Productivity Commission met with AEEMA's Home Appliance and Accessories Forum in December 2004, AEEMA was asked what effects high MEPS might have on competition. AEEMA said that MEPS for refrigerators were quite radical and virtually all products on the market would have to be redesigned. AEEMA also said that early in 2005 it might be able to observe what effect this would have on competition.

Recently AEEMA acquired a summary of current compliant product listed on the National Appliance and Equipment Energy Efficiency Committee (NAEEEC) database of energy efficiency rating label registrations. At present the market has a wider choice than before MEPS 2005 took effect on 1 January because non-compliant product made before that date is widely available for sale under grandfathering provisions of MEPS regulations. However, it appears that once this has been cleared, the range of models will be significantly less than applied before MEPS 2005.

Review of the registrations indicate that MEPS 2005 has significantly reduced the number of participating suppliers and/or numbers of model registrations in some product types or capacity ranges. At least two formerly significant suppliers have left the market entirely.

Cyclic defrost refrigerator freezers will almost disappear from the market. Two European suppliers each offer a single model. Generally fewer models of single door refrigerators and freezers and fewer chest freezers are available. (Demise of the cyclic defrost refrigerator freezers was expected because this is a declining sector of the market, with demand for cyclic models switching to frost free models.)

Generally, fewer models will be available in all size ranges of single door refrigerators, freezers and chest freezers. It is too soon to be sure, but there appears to be enough models in the market in each type and size range to maintain an adequate level of competition, even though the number of brands and models available will decrease.

It appears likely that MEPS 2005 was set close to the highest possible level beyond which competition would have been unduly affected. This was no accident. NAEEEC made a determined effort to consult with industry on the levels. The consultation process was supported by a program of scientifically sound tests to compare proposed Australian limits with USA and European limits. Without that exemplary work, the limits might have been set too low or there might have been insufficient competition in several sectors of the market.