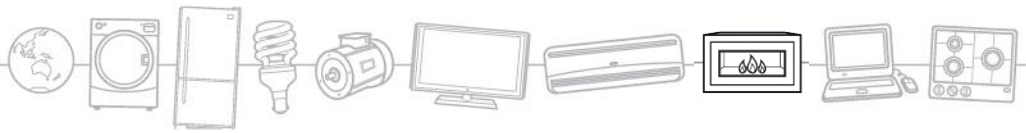
E3
Equipment Energy Efficiency

Gas Appliance Energy Efficiency Labelling

Discussion paper

April 2012



A joint initiative of Australian, State and Territory and New Zealand Governments.

This Report is available at

www.energyrating.gov.au

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Executive summary

A comparative energy rating label enables buyers to compare the relative energy efficiency and energy consumption of appliances at the time of purchase. Labels can encourage consumers to purchase more efficient appliances, and can provide a competitive incentive for manufacturers/suppliers to develop more efficient products. A gas labelling scheme presently operates in Australia, covering gas ducted heaters, space heaters and water heaters, but this is an industry led scheme which forms a small component of what is primarily a mandatory gas appliance safety program. New Zealand has had no gas labelling program.

This report addresses whether or not the current Australian gas appliance labelling scheme should transition to come under the control of the E3 Program, whether it should be formally expanded to New Zealand, and whether or not the scope of products included in the scheme should also be expanded.

Any changes to the gas labelling schemes will affect a combined Australian and New Zealand gas appliance market of approximately 538,000 sales annually. The breakdown of this market is shown below. Gas ducted heaters are increasing their penetration of the Australian market but are a small proportion of the New Zealand market, while space heater sales are static and probably will go into decline for both markets. Gas water heater sales continue to grow, though at a slowing rate.

Table 1. Annual Gas Appliance Sales

Gas Appliance Type	Sales Australia p.a.	Sales New Zealand p.a.
Gas Space and Decorative Heaters	60,000	1000
Gas Ducted Heaters	71,000	70,000
Gas Water Heaters	294,000	42,000

The current Australian gas labelling program has evolved from a program first introduced in Victoria and then developed into a national program under the control of the Australian Gas Association (AGA) in the mid-1980s. The AGA gas codes, which are principally appliance safety requirements, were shifted in the mid-2000s to Standards Australia. The requirement for certification to these standards, which includes energy labelling, is now a mandatory requirement of the State Government Gas Technical Regulators, as part of the gas appliance certification scheme in Australia. AGA maintains some influence on the gas labelling scheme via its involvement in the relevant Standards Australia standards committees.

The current Australian gas energy rating labelling scheme has several significant limitations, these being:

- No real ownership of the scheme by either government or industry, and no organisation formally responsible for maintaining the integrity of the scheme
- The lack of an effective compliance and enforcement regime for gas energy labelling, without which it is difficult for both consumers and government to have confidence in the integrity of the scheme.
- No requirement for suppliers to update the labelling of products which are currently certified when new methods of testing or labelling requirements are introduced into the standards.
- Concerns that the efficiency test standards for gas ducted heaters, and possibly other gas appliances, may not be accurate enough to support the labelling claims made.
- The bunching of models at the top of the 6 star rating scale reduces the comparative information supplied by the label to consumers, and also the value of the energy rating for suppliers who wish to differentiate their products as being of higher energy efficiency.
- The low awareness of the gas label amongst consumers.

These issues with the current Australian gas energy rating labelling scheme are largely the result of inadequate management, support, ongoing development and promotion of the scheme. To address these issues requires the labelling scheme to move from being part of a co-regulatory appliance safety scheme to being a nationally government regulated energy efficiency scheme. As a government scheme the gas appliance energy labelling scheme could be integrated into the E3 program. It could then receive adequate support to ensure it was updated

as required, the deficiencies of the current testing standards were addressed, compliance was monitored and enforced, and the scheme was promoted and marketed. Synergies and savings from operating the gas labelling scheme in parallel with the electrical appliance program could also be gained.

Critically, the Government would have the responsibility and authority to research, develop and update the standards and testing on which the gas appliance MEPS and energy labelling scheme rests and could ensure that the gas labelling did not become misleading to consumers.

The situation in New Zealand is very different, as there is no mandatory gas appliance labelling scheme operating there at the present time. The principal arguments for a mandatory gas appliance labelling scheme in New Zealand can be summarised as:

- Address the information asymmetry which occurs unless appliances have energy labelling.
- Enable and encourage consumers to purchase more energy efficient gas appliances, thereby reducing their energy costs and greenhouse emissions.

The main argument against mandatory energy labelling normally rests on the cost such schemes impose on suppliers, but if New Zealand adopted the same labelling scheme as Australia, these costs would be relatively small. Gas water heaters must already meet Australian standards requirements and the vast majority of gas ducted heaters and space heaters sold in New Zealand are already certified in Australia. So if appliances have already met Australian gas labelling and testing requirements, then the suppliers should incur no additional testing or registration costs when supplying these appliances to New Zealand. The additional costs would largely be restricted to the minimal cost of affixing energy labels to products, which had not previously had them attached, and the New Zealand government costs of managing and promoting the scheme.

The report presents a preliminary cost benefit analysis on the option of making the Australian gas labelling scheme a mandatory government scheme under the E3 program, and of introducing gas labelling to New Zealand under the E3 program. The modelling results showed, for Australia and New Zealand, if 1% of consumers make a purchase which results in them installing a product which is 5% more efficient than they would have otherwise chosen, the energy costs savings benefits will exceed the costs of the scheme. In both countries it appears highly feasible that an effective gas labelling scheme could induce this level of behavioural change, even given the extent that consumers are excluded from many gas appliance purchase decisions. Introducing a mandatory government gas labelling scheme should therefore be cost effective.

Given these findings, there appears to be sufficient arguments for the implementing of a trans-Tasman Government energy rating labelling scheme for gas products to be further progressed. It is recommended that Regulatory Impact Statement for Australia be conducted to explore the unbundling of the gas product safety regulations from the energy efficiency regulations, and the moving of the responsibility and authority of managing the current mandatory gas labelling scheme to the E3 program. Similarly, a Regulatory Impact Statement for New Zealand could further explore the introduction of a mandatory labelling scheme, with the scheme based on a joint (E3) gas labelling program. For both countries, it is advised that the introduction of the new mandatory gas labelling scheme be done together with the introduction of MEPS for the relevant appliances, as this would significantly reduce the labelling scheme costs and improve its cost effectiveness, while also addressing some of the split incentive issues.

Questions

A more extensive cost-benefit analysis on labelling will be carried on a product by product basis when appliances are investigated for MEPS. While we welcome any comments on all aspects of this discussion paper, information that can help answer these questions in the breakout box below would be of particular assistance.

1. Do you agree with the findings of this report about the limitations with the current Australian gas appliance energy labelling scheme?

2. Do you agree with the recommendations presented in this report (summarised below) – and if not, why not?

- That the responsibility and authority of a gas appliance energy labelling scheme should be moved to the E3 program.
- That the shift to a gas appliance energy labelling scheme operated through the E3 Program could occur with the introduction of MEPS for relevant appliances, if both are possible/practical to implement together.
- That the cost-benefit analysis for labelling should occur alongside the analysis for MEPS (through a Regulatory Impact Statement – RIS).
- That a gas labelling scheme operating through the E3 Program could be investigated initially for gas water heaters and/or gas ducted heaters (furnaces and central heating systems), gas non-ducted space heaters and decorative/flame effect fires and potentially for portable gas heaters in New Zealand.
- That a gas labelling scheme should have similar properties to the joint (E3) electrical appliance labelling program. i.e appliances must be tested for efficiency and registered; a public list is compiled of makes, models and efficiency; there is a check testing and compliance enforcement regime etc.
- That a gas labelling scheme operated through the E3 Program be made mandatory in New Zealand and replace the efficiency components of the current Australian gas appliance labelling scheme.
- That the appropriate methods of test and algorithms could be based on the existing AS standards.
- That the existing AS standards need updating.
- That unbundling of the gas product safety regulations from the energy efficiency regulations in the AS standards should be investigated.

3. Do you agree with the assumptions about the size and structure of the gas appliance markets in Australia and New Zealand?

4. Can you outline any complications or costs that could arise if the current Australian energy efficiency labelling requirement was expanded and transferred to fall under the trans-Tasman E3 program?

Where to from here?

Written comments should be sent via e-mail and should be received by 1 June 2012

Australia	**New Zealand**
Gas labelling scheme	Gas Products Advisor
energyrating@climatechange.gov.au	Energy Efficiency & Conservation Authority
	regs@eeca.govt.nz

The case for an E3 gas labelling scheme will be reviewed in light of any written submissions and input from stakeholder meetings. A decision on whether to proceed will be made by the E3 Committee. If the preferred option involves regulation for labelling, alongside MEPS, then the costs, benefits, and other impacts of the potential regulation will be analysed in a regulatory impact statement (RIS) on a product by product basis. Consultation will be undertaken with stakeholders prior to any final decisions being made. Final decisions on policy will be made by the Standing Council on Energy and Resources in Australia and by the New Zealand Cabinet.

1. Introduction

An Energy Rating Label is a market intervention which enables buyers to compare the relative energy efficiency and energy consumption of appliances at time of purchase. This allows the buyer to compare the relative energy efficiency of models they are considering purchasing and, if they desire, the running cost and energy savings if they purchased a more efficient model. Labels are also a form of information disclosure to the "market", comprising both manufacturers/suppliers and consumers, and can provide a competitive incentive for manufacturers/suppliers to develop more efficient products.

Labels are required by both Australian and New Zealand governments on many electrical domestic appliances such as fridges and washing machines under the trans-Tasman E3 program. One aim of the E3 program is to reduce energy use and greenhouse gas emissions by implementing Minimum Energy Performance Standards (MEPS) and/or Mandatory Energy Performance Labelling (MEPL) for appliances and equipment. This provides economic and environmental benefits while enabling both countries to honour their commitments as trading partners under the Trans-Tasman Mutual Recognition Arrangement (TTMRA).

Domestic gas water heaters are the first gas appliance to be covered by the E3 program. They are subjected to MEPS in New Zealand and Australia from 2011, but initially there will be no mandatory energy labelling required *under the E3 program.* In Australia however, they will continue to be required to have an energy rating label as part of Australia's existing industry led gas appliance certification scheme. Domestic gas space (room) heaters, central (ducted air) heaters and also 'decorative' (flame effect) appliances are also being considered for MEPS and/or MEPL in Australia and New Zealand under the E3 Program.

In Australia, gas water heaters, ducted gas heaters and gas space (room) heaters are already required to have an energy rating label as part of the existing industry led gas certification scheme. The existing gas appliance certification scheme is principally an appliance safety scheme, but it also includes comparative energy efficiency labelling component for these products and that the products meets some minimum energy efficiency requirements. The testing requirements and the standards which underpin the labelling scheme were initially developed by the gas industry but now reside with Standards Australia, with industry still controlling these standards via the standard committee. However, there is no government or industry body responsible for maintaining the standards or for implementing a compliance and enforcement regime of the labelling or minimum energy performance requirements component of the standards.

Given the potential introduction of MEPS for gas water heaters, and the possible introduction of MEPS for a number of other gas products, it is timely to consider the use of Australia /New Zealand energy performance labels for a wider range of gas products, in keeping with the nature of the E3 program. The use of energy performance labelling on gas water heaters, gas space heaters, decorative 'fires' and ducted heater appliances has been considered and the purpose of this discussion paper is to:

- Assess the feasibility of implementing a trans-Tasman Government energy rating labelling scheme for these gas products implemented through the E3 Program.
- Investigate the rationale, economics, possible energy savings, greenhouse gas abatement and any co-benefits that may occur if a mandatory labelling scheme for a range of domestic gas appliances was introduced in both New Zealand and Australia through the E3 Program, and
- Recommend whether a more comprehensive labelling proposal under the banner of the E3 Program should be developed and assessed through a Regulatory Impact Statement.

The issue being investigated is not so much whether there should be a gas appliance labelling scheme – an industry developed scheme currently operates in Australia and is likely to continue to operate if the E3 Program decides not to pursue labelling – but whether or not the current gas appliance labelling scheme should transition to come under the control of the E3 Program, whether it should be formally expanded to New Zealand, and whether or not the scope of products included in the scheme should also be expanded.

The recommendations made in this discussion document are that E3 considers:

- Developing a Regulatory Impact Statement for Australia, to explore the unbundling of the gas product safety regulations from the energy efficiency regulations.
- Moving of the responsibility and authority of managing the current mandatory gas labelling scheme to the E3 program.
- Developing a Regulatory Impact Statement for New Zealand to further explore the introduction of a mandatory labelling scheme, with the scheme based on a joint (E3) gas labelling program.
- That the mandatory labelling scheme proposed, aims to cover gas water heaters and/or gas ducted heaters (furnaces and central heating systems), gas non-ducted space heaters and/or decorative/flame effect heaters. Labelling of portable gas heaters in New Zealand may also be considered.
- That for both countries, the introduction of the new mandatory gas labelling scheme could be undertaken together with the introduction of MEPS for the relevant appliances.

2. The Trans-Tasman Gas Appliance Market

Forms of Gas

Due to differences in the availability of the natural resource, and the development of transmission and distribution gas networks, the use of natural gas and LPG differ quite significantly between Australia and New Zealand. The composition of LPG also varies between Australia and New Zealand. These differences are significant as gas appliances need to be designed or commissioned for the type of gas they will use, and appliances will need different burner arrangements for the different fuels.

In Australia, LPG accounts for less than 6% of total household gas use (8.9 PJ LPG compared with 151.5 PJ natural gas in 2010).

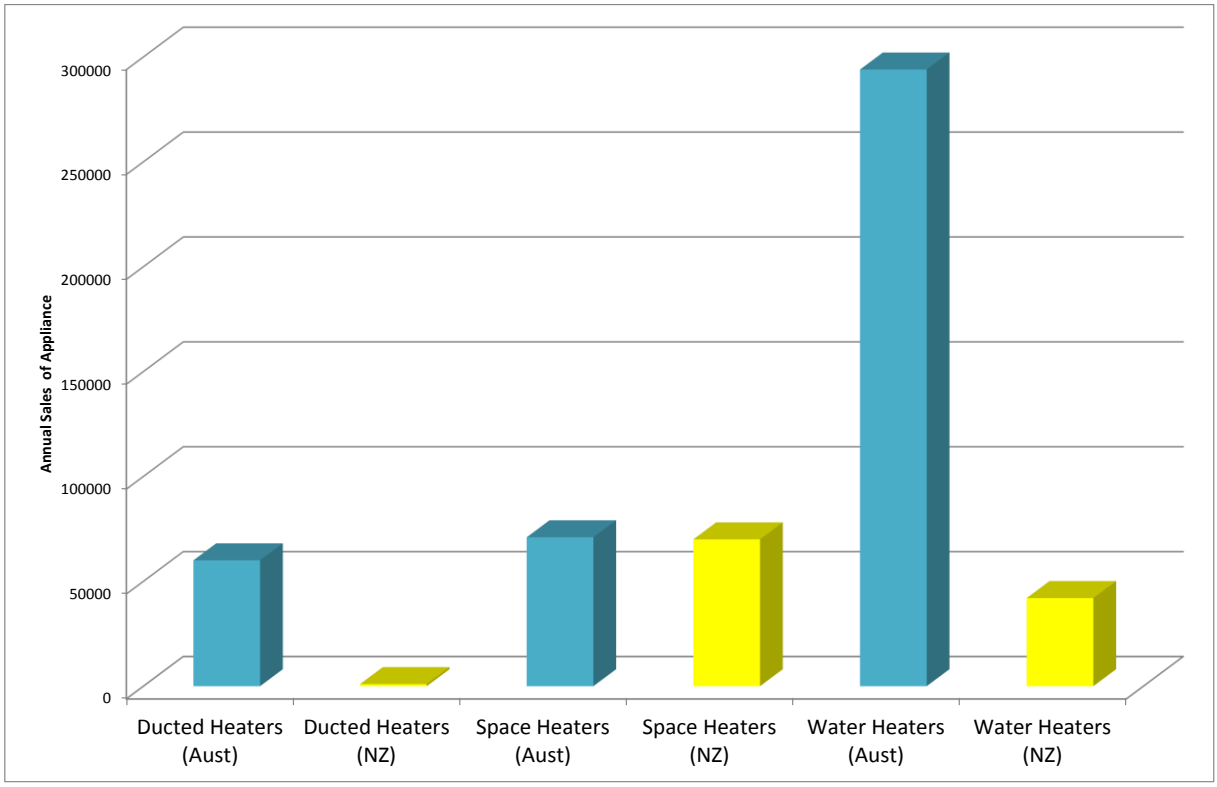
In New Zealand, LPG accounts for over 40% of total household gas use (2.1 PJ LPG compared with 2.5 PJ natural gas in 2007).[1]

Gas Appliances in Australia and New Zealand

An overview of the gas appliance markets is presented below and further details are presented in Appendix 1: Gas Appliance Market. An indication of the variation in the efficiency of the appliances in the market is also given, which can be used to determine the current technical potential to increase appliance efficiency.

The chart below shows that Australian sales dominate the market for ducted gas heaters and water heaters, but the sales of space heaters are nearly the same in both countries.

Figure 1: Australian and New Zealand Gas Appliance Sales



1http://enduse.eeca.govt.nz/default.aspx

Gas Ducted Heaters

The main facts and trends in the gas ducted heaters market are as follows:

- The total Australian annual energy consumption by gas ducted heaters is estimated to grow from 49 PJ pa in 2000 to 80 PJ pa in 2025. The increase in energy consumption is largely due to the increasing stock of gas ducted heaters.
- The estimated energy consumption by gas ducted heaters in New Zealand is projected to grow from 1.0 PJ in 2000 to 1.2PJ over the period 2009 to 2012, and then decline to 1 PJ by 2025, due to a declining stock of gas ducted heaters (largely at the expense of heat pumps).
- In Australia gas ducted heaters are required to meet AS 4556 requirements for them to be certified, so they must be tested for their energy efficiency and meet the current low level MEPS requirements, and have an energy rating label attached.
- The sales of gas ducted heaters in Australia are around 60,000 p.a. and expected to continue to grow at a modest pace, but in New Zealand the sales are around 1,000 and probably declining, though the currently poor economic conditions may be masking a moderate increase. Stock levels are around 1,000,000 in Australia and around 20,000 in New Zealand.
- There are six major suppliers in Australia and five in New Zealand, all of whom operate in Australia too. They supply product to specialist heating dealers and major retailers, who in turn supply installers, builders and home owners.
- The market segments by sales numbers in Australia, and probably also in New Zealand, can be defined as:
  - New homes builder market 50%
  - Renovations making up 20% to 25%
  - Replacement in existing homes 25 to 30%
- The breakdown of sales in Australia indicated about 80% of units are sold in Victoria, 10% in ACT, 5% in NSW and the balance in SA, NT, WA and Tasmania.
- The vast majority of gas ducted heaters sold in New Zealand are imported from Australian manufacturers/suppliers with a very small portion of commercial heaters, such as gas-electric roof-top packaged and unit/duct heaters, imported from North America.
- There are only mid and high efficiency heaters now in the market with a range of models from 2.4 to 5.5 stars. High efficiency heaters are estimated to be around 25% of total sales in 2008/09.

There is sufficient variation in the efficiency of the gas ducted heaters on the market for a gas label to convey useful information to consumers. The concern with this appliance group is that the energy efficiency test method may not be adequate or suitably robust, which is further discussed later in this report. There is also no active compliance enforcement or check testing regime.

Gas Space Heaters and Decorative Appliances

The main facts and trends in the gas space heaters and decorative/flame effect heater market are as follows:

- In Australia, gas space heaters are required to meet AS 4553 requirements, so they must be tested for their energy efficiency, meet the current low level MEPS requirements, and have an energy rating label.
- Decorative/flame effect heaters do not need to meet requirements of the AS 4553 but must instead meet AS 4558 requirements, and do not need to meet any MEPS requirements or labelling requirements. Decorative appliances are installed primarily for decoration, for the 'flame effect' but in practice many are used as space heaters.[2] Confusion arises between true space heaters versus decorative appliances because both are commonly referred to as flame effect space heaters. For the purposes of this report, 'decorative' appliances are defined as those units that are certified to AS 4558 (or have the potential to be). These tend to have a lower heat output or a higher gas through rate than true 'space' heaters. Decorative appliances are invariably very inefficient as heaters and many stakeholders believe they should also be required to meet MEPS and/or labelling requirements, though decorative suppliers naturally tend to disagree.
- Decorative heaters consume around 10% of the gas that is used in gas space heaters and make up around 10% of the total space heater sales in Australia and New Zealand.
- The total estimated Australian annual energy consumption by gas space/decorative heaters is estimated to decline from 27 PJ pa in 2000 to 14 PJ pa in 2020. The decrease in energy consumption is largely due to the

2 See EnergyConsult, 2011, Product Profile on Gas Space and Decorative (Fuel Effect) Heaters.

decreases in the stock of gas space heaters, especially of wall furnaces (partly due to the increased penetration of gas ducted heaters and reverse-cycle air conditioners). The estimated natural gas and LPG consumption from space and decorative heaters in New Zealand is approximately 2.3 PJ in 2007/08 and the trends for LPG between 2006 and 2008 also suggest a decline in gas space heating is occurring, but this may be a reaction to the global financial crisis.

- The sales of gas space heaters from 2006 to 2008 in Australia were largely static at around 71,000 p.a. In New Zealand in 2007 it is estimated that around 70,000units were imported and approximately half of these units were portable, flueless LPG gas heaters. Information is conflicting concerning whether the sales numbers are declining, though these did fall in 2008 probably as a result of the global financial crisis. The current Australian stock of gas space heaters is around 1.6 million, and in New Zealand around 320,000.
- In Australia, there are 31 suppliers of gas space heaters and decorative appliances listed in the AGA Certified Product Directory (Aug 2008) with over 40 brands and more than 190 models. Though other certifying bodies also list suppliers and products, the number they list is relatively small, e.g. in early 2009 the SAI Global's Gas Safety Certification Scheme contained three suppliers with approximately 10 products certified to AS 4553 and one to AS 4558. Consequently the AGA Directory was used as the prime data source for Australian products. For New Zealand, there are 18 suppliers and/or importers of gas space heaters and decorative appliances.
- The sales weighted average thermal efficiency for space heaters is relatively stable and, with the possible exception of flueless heaters, there is scope to improve the efficiency of all product types.

There is sufficient variation in the efficiency of the gas space heaters on the market for a gas label to convey useful information to consumers for the flued categories but the flueless heaters provide the smallest range of star rating and are bunched between the 5 and 6 star rating. However, this is largely an artefact of the energy labelling algorithms whereby the conversion efficiency is assumed and not tested, plus there being no consideration of the need for ventilation in rooms where flueless heaters are used. Consequently, some stakeholders including government consider the flueless heater ratings are misleading and testing and rating should include an allowance for room ventilation in their calculation, which if implemented might lead to a greater spread in their ratings.

Gas Water Heaters

The main facts and trends in the gas water heater market are as follows:

- In Australia, sales of gas water heaters are increasing, by a total of 12.5% from 288,000 in 2009 to 324,000 in 2020. A number of factors are contributing to this trend; such as the trend away from electric water heating, increasing distribution of reticulated gas, the electric water heater phase out and the introduction of BASIX in NSW. Sales of gas instantaneous water heaters have grown rapidly since the mid-1990s and now form the majority of sales of gas water heaters. The remainder of the sales are principally divided between conventional three star storage heaters and more efficient five star storage heaters. The installed stock of gas water heaters is approximately 3.4 million.
- In New Zealand, the sales of gas storage water heaters were around 7,000 p.a. and gas instantaneous water heaters were around 29,000 p.a. in 2006. Sales are expected to increase to around 45,000 in 2020 and by then the sales of gas storage water heaters is expected to decline to almost zero. The installed stock of gas water heaters is approximately 350,000.
- Gas storage water heaters are manufactured in both Australia and New Zealand, and all but one of the water heater certifications in Australia are from the three suppliers – Rheem, Dux and Aquamax. Gas storage water heaters tend not to be imported to Australia, due to their size leading to high transport costs and the Australian market being sufficiently large to support local manufacturing. However, New Zealand imports almost all of its gas storage water heaters, mainly from Australia and a very small number from the USA. The exception for New Zealand is around 2,000 units for internal use which are manufactured locally by Rheem NZ.
- In contrast, the vast majority of gas instantaneous water heaters are imported, mainly from Japan. Bosch, Rinnai and Rheem appear to be the major suppliers to both the New Zealand and Australian markets, and market the same range of products in both markets.
- Efficiency trends show an improvement of efficiency over time for externally fitted gas storage water heaters. For gas storage heaters there are now a number of heaters which are rated as 4 Star or 5 Star and improvements in instantaneous water heaters mean recently certified heaters are rated between 5 Star and 6.5 Star, with one manufacturer claiming performance equivalent to a 7-Star rating (which cannot be formally recognised under the current scheme). MEPS has be implemented in New Zealand at 4-Star level and is pending in Australia.

Given the variation in the energy ratings of the 3 Star storage heaters through to the 6.5 Star instantaneous systems, there is currently sufficient range for a gas label to convey useful information to consumers, though the range will decrease with the introduction of MEPS at 4 Stars in 2011for gas water heaters.

Gas Appliance Purchase Decision Making and Appliance Labelling

For an efficiency labelling scheme to influence consumers, the consumers need to be involved in the decision making when their appliances are purchased. The consumers also need to be able to see the energy rating label on appliances displayed in retail outlet, or at least to be able to easily access this information from retail catalogues, web sites or point of sale materials.

For most gas appliance purchases, the end user of the appliance is not involved in the purchase decision and the decision is made by market intermediaries. The agents involved in the different product types decision making include:

Gas ducted heaters: Around 50% of GDH sales are directed towards the new home market, where the builder is the primary decision maker in the GDH purchase and generally purchases the unit with the lowest upfront cost. The next 25% of GDH sales are for the renovation market which is mostly serviced by small to medium volume builders and owner-builders, who again are capital cost driven. The final 25% of sales are for replacement units, and here the consumer generally has a greater involvement in this decision. Another reason that consumers have a low involvement regarding the efficiency of GDH purchases is that generally these units are not displayed in retail outlets, and hence the consumer does not see the energy rating label attached to the GDH.

Gas space heaters: In Australia, the stock of gas space heaters is in decline, in part due to households replacing gas space heating with ducted heating or reverse cycle air conditioners. Though no reliable statistics are available, the sales and stock data indicate only around 30% of sales will be for the new home or renovation market and the majority of the sales are for replacement purposes, where consumers will be more involved in the purchase decision. As space heaters are displayed in retail outlets, consumers will regularly see the gas labelling. In New Zealand, sales of flued gas space heaters are for a mix of replacements, renovations and new homes, so consumers are probably involved in slightly less of the purchases than in Australia.

Gas water heaters: It is estimated by the International Energy Agency[3] that 87.5% of installed stock are subject to split incentive issues, due to the purchase being for rental housing, for a new house or for an emergency replacement. In all of these situations, people other than the end-user are making or have a significant say in the purchase decision. This estimate may be too high, as it is based on some untested assumptions, but it does suggest in the majority of purchases the consumer has a limited role in the heater choice.

This information suggests the majority of gas appliance purchases are undertaken by market intermediaries, rather than the consumer end-user, which will limit the direct impact of any gas labelling. However, gas labelling can still influence the supply side of the market, by enabling suppliers to compete to provide more efficient appliances and to enable information of the efficiency of their appliances to be conveyed to the market.

3 Cited G. Wilkenfeld, Regulatory Impact Statement: Proposal to Introduce a Minimum Energy Performance Standard for Gas Water Heaters, 2009.

3. Policy Context and Developments

Purpose and Background of Energy Labelling

When consumers purchase an appliance or other energy-using product, they are in fact purchasing an 'energy service' that is delivered by a combination of the product and the energy supplied to it. There is no demand for appliances without energy, and no demand for energy (whether electricity or gas) without a device to convert it to a useful service such as heat, light, power or information.

Before the introduction of energy labelling, consumers purchased the two components of the energy service in completely separate ways. They purchased the product before knowing how much energy it would use, and then purchased the energy as they consumed it, usually bundled with the energy purchased for many other products and purposes. Not surprisingly, very few non-expert consumers had any idea about the amount of energy that each appliance used or how much it cost to run. They were unaware that different models could supply the same service at vastly different energy efficiency and running cost, and even if aware of this, had no reliable means of identifying the more efficient models.

The disclosure of information about the energy performance of products in a way that allows consumers to make an informed choice before purchase is called 'energy labelling'. Enabling consumers to make this informed choice is the key function of energy labelling, a function which leads to the encouragement of the purchasing of more energy efficient equipment and the supply of more efficient products.

The first government–led energy labelling schemes were introduced in France (1966), the USA and Germany (1976) and Canada (1978). Australia adopted energy labelling in 1986. There are now energy labelling programs in over 60 countries.[4]These vary greatly in the range of products covered, the physical form of the label, the type of information on it, the graphics and symbols conveying information, and the 'supporting framework' of legislation, energy tests and administration.

Nearly all the labels fall into two categories:

- Comparative labels. These enable consumers to compare the energy efficiency of one product against another, and usually give energy consumption as well (e.g. the kWh or MJ the product would use in a year if operated under standardised conditions). This gives interested users enough information to calculate both parts of appliance ownership cost – up-front capital plus operational energy – and to select the one with the lowest total cost. The Australian and New Zealand energy rating labels for electric and gas appliances are examples of comparative labels.
- Endorsement labels. These identify products which have features that contribute to lower energy use (e.g., low standby power consumption), exceed a defined threshold of energy efficiency or are in the highest performing segment of their market. Buyers can identify products with these features, but cannot calculate total ownership costs or compare products (other than all products with and all products without the label). An example of this type of label is the ENERGY STAR® label, used to differentiate the "Top 25% performers" in a given class of product.

Initially, energy labels were physical stickers or swing tags attached to products, intended to be visible to buyers going to showrooms. As suppliers came to realise the commercial value of a good energy rating, they began to report label ratings, or reproduce the entire label image, in brochures and in advertising for the relevant products. The government or other agencies sponsoring the programs also published paper guides and lists from time to time.

Today label images and data also appear as internet images, brochures and advertising. The label sponsoring agencies also make use of the internet, with searchable lists of products which can perform comparisons, sort products in efficiency order and automatically calculate energy costs. The Australian and New Zealand electrical energy labelling scheme is supported by the joint government www.energyrating.com.au website. In comparison

4http://www.clasponline.org/clasp.online.worldwide.php

the gas labelling scheme is not supported by a consumer-friendly website, though the Australian Gas Association (AGA) website provides a *Directory of AGA Certified Products*, at http://www.aga.asn.au/uploads/148/Mar_2011.pdf, which has a list of labelled gas appliances, along with many other categories of non-labelled appliances.

Energy labelling can impact the market through two main avenues, on the demand side or the supply side. Energy labelling affects the supply side of the market when suppliers decide they wish to position their products as more energy efficient compared to other suppliers' similar products, or compared to products that fulfil a similar end-use function. For example, there is evidence with both gas water heaters and gas ducted heaters that the labels have provided a competitive incentive for suppliers to bring more efficient products onto the market. This was the case with gas storage water heaters which aimed to be at least achieve a 5 Star rating to compete with instantaneous units, with the Aquamax 5 Star gas storage water heater which came onto the market in the 1990s, and also with gas ducted heaters where all main manufacturers have now introduced 5 Star high efficiency models. Currently there is competition amongst instantaneous gas units to introduce high efficiency condensing models with some 6 Star and claimed 7 Star models now available.

On the demand-side, energy labelling can encourage consumers to purchase more efficient appliances, raising the average efficiency of the appliances sold. Research previously mentioned[5] on the use that consumers make of the electricity energy label showed 88% of consumers use the information on the energy label when buying an appliance and 75% say that the energy rating label is very important in the appliance purchasing process. Consumers generally make a preliminary decision on features, size etc. to develop a short list of possible products to purchase and then use energy consumption as one of the factors in making their final selection.

However, energy labelling will have more limited impacts in some product markets, where purchases are conducted by intermediaries such as builders or rental property owners, whose financial incentive is to install the cheapest possible products. This is because the energy cost will be borne by the home purchaser or tenant, while the builder or landlord incurs the capital cost, a situation labelled as a split-incentive. As discussed in the section Gas Appliance Purchase Decision Making and Appliance Labelling page 14, the majority of gas appliance purchases are conducted by intermediaries. The impact on the demand side can also be reduced if consumers do not see the product before purchase, which often happens with water heaters and ducted air heaters, the two products that account for the greatest share of gas use in the house, and where energy costs make up the greatest share of ownership cost.

5 Research conducted by Artcraft Research for the E3 program, Appliance Performance Labelling in Australia and New Zealand, 2005 http://www.energyrating.gov.au/library/details200608-labelling.html

Policy Context: Australia

Gas appliance labelling was first introduced in Australia in 1981 by the State Government Gas and Fuel Corporation of Victoria (GFCV), when the first 'high efficiency' balanced flue gas storage water heaters (GSWH) came on to the market. In 1985 the Australian Gas Association (AGA) took control of the program and devised a scheme whereby products could carry '20%', '30%' or '40%' labels to indicate the extent to which they consumed less gas than the maximum specified in Australian Gas Standard AG102. This represented a relatively soft Minimum Energy Performance Standard (MEPS) level.

In 1988 the AGA adopted the current six star rating label design, largely for visual consistency with the electrical energy rating label which was introduced in late 1986. The gas labelling scheme was subsequently expanded to gas space (room) heaters and gas ducted heaters. Table lists the range of gas appliances currently labelled.

Table 1 Gas appliances labelled in Australia

Gas Appliance	Standard/ Committee	Labelling introduced	Most recent MEPS revision
Storage water heaters	AS4552/AG102	1981; Initially 1988 current label	2011
Instantaneous water heaters	AS4552/AG102	1988	2011
Flued radiant/convection heaters	AS4553/AG103	1991	1983
Balanced flue convection heaters	AS4553/AG103	1991	1983
Wall furnaces	AS4553/AG103	1991	1983
Flueless radiant/convection heaters	AS4553/AG103	1991	1983
Flued radiant/convection heaters	AS4553/AG103	1991	1983
Ducted air heaters	AS 4556/AG106	1996	1983
Decorative appliances - Gas log fires	AS 4558/AG108	Not labelled	No MEPS

Source: Ellis et al 2002

In March 1993 the AGA decided to make it a condition of appliance certification, or re-certification, that products be tested and the gas energy rating be calculated in accordance with the required standard and that the labels be affixed to all water heaters and space heaters produced (space heater labelling was introduced in 1991, and ducted heater labelling in 1996). Thus labelling became effectively mandatory by 1995, by which time all pre-existing registrations had to be renewed.

As the gas industry has changed and been restructured over the last fifteen years, the gas appliance energy labelling program has moved from being a program administered by an industry body, to a co-regulated program. The AGA gas codes were shifted in the mid-2000s to Standards Australia, and are now an incorporated into Australian Standards. The requirement for certification to these standards, which includes energy labelling, is now a requirement of the State Government Gas Technical Regulators as part of the gas certification scheme in Australia. The result is essentially co-regulation, with the requirement for product certification imposed by government but the test standards and labelling requirements determined originally by the gas industry and now 'maintained' through Standards Australia. However, as Standards Australia is a non-government body and industry continues to lead the gas appliance standards committees, so effectively industry continues to manage key aspects of the gas appliance energy labelling program.

The implementation of the product certification and some limited policing of the requirements is now undertaken by certification organisations. Three certified bodies, including the Australian Gas Association (AGA), SAI Global and IAPMO R&T Oceana, undertake gas product certification and they have an ongoing responsibility for policing and compliance of the certified products, including carrying out annual product audits. Product suppliers pay for the auditing of their products to be done at their factories or distribution warehouses, which involves confirmation that certification labels are being affixed. However, there is no check-testing of products to confirm their energy labelling is correct and apparently no monitoring to ensure the energy rating label is affixed, or displayed on products at retail outlets.

A significant result of this change in the administration of the gas appliance energy labelling program is that now the AGA is no longer responsible for promoting, maintaining or modernising the program, though industry still manages the standards which dictate labelling requirements. However, no other organisation has the clear responsibility or resources for undertaking the role of managing or promotion of the labelling program. The result is the Australian gas appliance energy labelling program is in many ways, an orphan program.

Another result of the evolution of the gas labelling program from an industrial scheme is that there is a fundamental difference between the regulations and standards used in the gas and electrical appliance energy efficiency programs in Australia. Electrical appliance energy efficiency programs have separate standards and separate regulations governing energy efficiency and energy labelling requirements, but the energy performance and labelling requirements of gas appliances are simply a small component of their overall safety standards are regulation. The electrical appliance energy efficiency programs fall under the control of, and receive the support of, the E3 program, while the gas labelling and performance program is basically an aside to an industry led safety program.

The main differences between the gas labelling and energy performance requirements and the E3 electricity energy labelling and MEPS program are summarised in the table below.

Table 2: Comparison of gas and electric appliance labelling and MEPS schemes

Aspect of Scheme	Current Australian Gas Labelling and Minimum Performance Requirements	E3 Labelling and MEPS scheme
Mandatory Requirement	Yes, but only as a small component of a safety compliance program	Yes, form key components of energy efficiency scheme
Regulatory Requirement	Yes, as part of safety regulation. States/Territories refer to Australian Standard. Products must be compliant with Standards and be certified	Yes, as independent energy efficiency regulation. States/Territories refer to Australian Standard. Products must be compliant with Standards and be registered
Labelling requirements	Part of safety standards for relevant appliance type	Part of separate efficiency standards
Minimum efficiency requirements	Yes, part of safety standards for relevant appliance type. Need updating.	Yes, defined as MEPS.
Appliance Testing	Yes, mandatory but can be of prototypes	Yes, mandatory
Testing Standards and algorithms	Yes, contained in relevant safety standards. Standards need to be revised	Yes, contained in efficiency standards
Setting of Australian Standard	Were established by industry and industry still manage process of revising standards, though revisions are not occurring	Set by government/E3, in consultation with industry
Promotion and marketing	Minimum, and not effective in developing public awareness	Managed and resourced under E3, high public awareness of electric appliance labelling
Labelling Compliance Enforcement	Limited. Suppliers are audited at factories but no check testing or monitoring at retail outlets	Yes, compliance check testing and enforcement occurs.

Issues resulting from the lack of support and management of the gas labelling scheme are that are becoming increasingly important include:

- Many test methods were developed nearly two decades ago, and have not kept pace with changes/improvement to test equipment and methodologies, and are not adequate for the more complex gas technology which is available today (e.g. variable gas rates, variable speed fans in heaters, electronic controls and thermostats). Reviews of the test standards on which gas appliance labelling is based undertaken today by the E3 Program also suggest that some the test standards are not accurate or repeatable enough to form the basis of formal government regulated energy efficiency labelling.
- Compliance is only being monitored or audited in a very limited fashion, and there is no check testing program to ensure that commercially available products comply with their energy labelling claims.
- There is no formal enforcement and compliance regime, such as store surveys, product check testing, or penalties for non-compliance, as exists for electrical products regulated for MEPS and/or labelling.
- Unlike electrical products which are regulated for energy efficiency, when the test standards which underpin the labelling scheme are changed there is no requirement for all products to be re-tested and re-certified to the new standards. Only new products certified after any revision to test standards are required to be certified to the new standards. In the 1990s there was a very significant change to the test standard which was used as the basis of

labelling gas space heaters – to the extent that comparisons between labels based on the two tests could were not meaningful – leading to two completely different labels being used on gas heaters in retail outlets.
- The lack of ongoing development of the scheme has meant that now the variation in the energy rating of some appliance types is so limited that the gas label no longer conveys any useful information to the consumers
- Consumer awareness of the gas label has decreased and is very low.

These issues are discussed more fully in Limitations of the Current Australian Labelling Scheme, page 22.

Policy Context: New Zealand

The use of MEPS and mandatory energy labelling programs in New Zealand has been more limited than in Australia, in part because of the much smaller reticulated gas market. The current situation regarding MEPS and energy labelling programs is as follows:

- New Zealand does not had a gas appliance energy labelling program. Though some gas appliances imported into New Zealand from Australia arrive with an Australian gas energy rating label, there is no mandatory requirement for such a label. However some suppliers actively promote their products using the Australian gas energy rating label in their literature and on their appliances.
- Consequently, most consumers will have no information available when selecting a gas appliance, even though the energy consumption and lifetime costs of the appliances may vary considerably.
- Endorsement labels, such as from the New Zealand ENERGY STAR®labelling program, are also not fitted to gas appliances in New Zealand, though a number of electrical products in New Zealand do carry the ENERGY STAR® mark.
- New Zealand introduced its first MEPS regulation of gas appliances in June 2011 for domestic gas water heaters. This MEPS was introduced under the trans-Tasman E3 program. To harmonise the program and prevent the introduction of unnecessary technical barriers to trade (TBT), the energy performance tests used for MEPS will use the existing Australian standard (AS4552). As a significant proportion of water heaters are imported from Australia, their testing to AS 4552 is straightforward at minimal cost, though a very small number of water heaters are imported from the USA[6]. As water heaters for the New Zealand market will have been tested to the energy performance requirements of AS4552, a major requirement of introducing energy performance labelling for these products, the product testing, will already have been fulfilled.
- New Zealand is active in the voluntary, USA based ENERGY STAR® endorsement label programme for electrical appliances. The marked products are usually within the top 25% of efficiently performing units on the New Zealand market, and industry partners commit to an advertising programme each year. The specification and test method to qualify for the ENERGY STAR® mark is typically based on a MEPS method of test and labelling algorithm.
- Many appliances are manufactured in, or imported from, Australia, so they will already have been tested to the relevant AS standards – i.e. the cost of labelling may be minimal for many of the suppliers to the New Zealand market, if labelling were to be extended to New Zealand under a trans-Tasman scheme.
- The New Zealand government also produces performance information on its website for all Solar & HPWHs offered under their programs, but does not cover all gas water heaters.

Recent Regulatory Developments and Research Outcomes

The role and effectiveness of gas appliance labelling in Australia and the option to move to a mandatory national program under the banner of the E3 Program have been analysed at regular intervals since the early 1990s.The *Switch on Gas* strategy published by the Ministerial Council on Energy in 2004 envisaged a gradual and orderly shift from an industry-led to a mandatory scheme.[7] It is fair to say that progress has been poorer than envisaged, and different elements of the Strategy have moved at different rates.

A number of key developments though have occurred since:

- **Gas water heaters**: The energy efficiency of gas instantaneous water heaters on the market (none of which are manufactured in Australia or New Zealand) has increased to the point where there are very few models rated below 5 stars. There are now some 6 star models available and some models which claim that they would receive up to a 7 star rating if the rating scale extended this far. This bunching of models at the top of the star rating

6 See Appendix 1: Gas Appliance Marke, page 53 for market description for details on water heaters

7http://www.energyrating.gov.au/library/details200419-switchongas.html

scale leaves energy labelling with little to tell buyers and limits the extent that the rating scheme can encourage competition amongst suppliers to improve efficiency. Another impact of the bunching of models is that there will be greater emphasis on the decimal star differences between models, but these differences are of limited practical value to consumers due to the limitations of star rating test accuracy and the diminishing value of the energy consumption represented by each scale gradation. Given the apparent ability of some products to reach efficiencies of 7 stars, this suggests there is a need to revisit the calculation of the star ratings for this product group, or to implement a "super-efficient" version of the label as has been the case for a number of labelled electrical appliances.

- The introduction of gas water heater MEPS at 4 star level has been approved by both Australia's Ministerial Council on Energy and New Zealand Cabinet, and the regulations are now being implemented.[8] This will mean that the efficiency range that consumers see on gas storage water heaters will become reduced to only 4.0 to 5.3 stars (the highest currently available). This bunching of models at the top of the energy star rating scale will not leave labels much room to differentiate products and suggests there is a need to revisit the calculation of the star ratings for this product group.
- **Gas ducted heaters**: A recent product review of gas ducted heaters found that in Australia the majority of consumption for gas space heating comes from ducted gas heaters and these present the greatest efficiency potential. The efficiency of current gas ducted heaters ranges from around 2 to 5 stars. Gas ducted heaters are purchased in much the same way as gas water heaters, in that the selection is often left to builders, plumbers or other intermediaries. The review has found that 'the most cost effective approach to increase the average efficiency of gas ducted heaters would be to implement a trans-Tasman MEPS at a higher level than is currently required in Australia, complemented by mandatory energy labelling.'[9] No formal decision has yet been made on the implementation of either a MEPS or energy labelling for gas ducted heaters, and this will require a Regulation Impact Assessment process to be completed.
- **Gas space heaters**: A product profile on gas space heaters and decorative/flame-effect appliances has also been prepared by E3. It discusses the energy rating label and the potential for government intervention that might increase the efficiency for these appliances. The profile notes that the spread of star ratings for the various flued heater categories appears to be sufficient to allow consumers choice of more efficient models (see **Appendix 1: Gas Appliance Marke**), however the star ratings for almost all flueless heaters are between 5.7 and 5.9, with the vast majority at 5.9 Stars. This is essentially due to the nature of these types of heaters, as no heat is lost in the flue gas. However, considerable ventilation must be used in rooms heated by flueless heaters, resulting in net heat loss, so the ratings do not indicate the real efficiency of the flueless heaters. This suggests the calculation algorithm of the rating of the flueless heaters needs to be reviewed to include the requirement for ventilation. Overall, the implication is there is considerable potential for improvement in the efficiency of flued heaters, but no real potential for the flueless heaters.
- **Other Gas appliances**: The case for energy labelling gas cooktops and ovens has also been reviewed from time to time, and found to be less than compelling due to the relatively small amount of gas consumed by cooking, the limited efficiency performance variation of cooking appliances, lack of a suitable test standard and the declining market share of gas ovens.

In summary, MEPS have been implemented for gas water heaters and may in the future be considered for gas ducted heaters and space heaters. The research conducted also supports that there are issues with the current labelling of gas appliances and that the rating algorithm and testing procedures may need to be reviewed.

Alternative Government Schemes and Efficiency Information

Other government schemes have also been developed which provided alternative energy rating information or relied on the existing energy rating labelling schemes. The Australian Small-scale Renewable Energy Scheme (SRES) has provided a paperless energy performance information rating for rating and comparing the efficiency and performance of solar-gas water heaters, and comparing them with other solar types and with heat pump water heaters. The number of Small-scale Technology Certificates (STCs), created by a solar-gas water heater could be compared to those produced by other water heaters and heat pumps and provide some indication of the energy savings.

8http://www.ret.gov.au/Documents/mce/_documents/quicklinks/Gas_Water_Heater_RIS.pdf

9http://www.energyrating.gov.au/library/pubs/201102-gas-ducted-heaters.pdf

Likewise the Victorian Energy Efficiency Target certificates in Victoria and Residential Energy Efficiency Scheme emission savings in South Australia also could fill a similar role of providing appliance efficiency information, though these schemes in fact tend to rely on energy efficiency information obtained from the labelling schemes. The New Zealand government produces such performance information on its website for all Solar & HPWHs offered under their programs, but does not cover all gas water heaters.

In summary, none of these recent government schemes have created a "physical" presentation of appliance efficiency information like an energy labelling scheme does, and as such generally convey less efficiency information directly to the consumer when purchasing a product. These developments therefore do not affect the need for gas appliance labelling.

4. Limitations of the Current Australian Labelling Scheme

There are a number of limitations and issues with the current gas labelling scheme that can be broadly classified as follows:

- Measurement and Verification Issues
- Compliance and Enforcement Issues
- Inadequate Promotion and Awareness of the Label.

These issues are discussed below.

Measurement and Verification Issues

There are two main measurement and verification issues with the present labelling scheme, these being there is no check testing of gas appliances and the test standards are out of date and possibly inadequate. The issue of check testing is addressed in the next section on Compliance and Enforcement.

The efficiency and nature of gas appliances has changed and will continue to change over time. In order for the energy labels to remain relevant, it is necessary to periodically research and update the testing procedures and standards that underlie the energy labelling, but this has not occurred. Many of the gas test standards and the energy labelling algorithms on which the gas labels are based are now over a decade old and were developed when gas technology was less sophisticated than today.

Regarding the efficiency testing procedures for gas ducted heaters, a review of measurement testing procedures was conducted by Enertech in 2008 which found "the current method of test for gas ducted heaters needs to be improved if it is to form the basis of a government regulated energy efficiency regime". The current test method was developed for simpler ducted heaters than are currently on the market and it cannot adequately test systems which have modulated burners and sophisticated thermistor and thermostat controls. The report found there were issues with repeatability of the tests and that some testing parameters were not adequately defined. The use of the heat load reduction factor as the basis of assigning up to one additional stars was also found to not necessarily indicate higher efficiency performance. A number of recommendations were made concerning how the testing procedure could be improved and better defined.

Further work on developing new testing procedures for gas ducted heaters was conducted in 2010 by SAI Global/Enertech on behalf of the E3 Committee and resulted in the development, drafting and trialling of a new Method of Test for gas ducted heaters for consideration. This proposed new method will form the basis of discussions with industry stakeholders and the relevant Standards Committee, if the E3 Program decides to proceed with taking over responsibility for gas ducted heater labelling.

In addition, if the introduction of government regulated MEPS for gas ducted heaters occurs this will remove many of the less efficient appliances and will result in 'bunching' the remaining appliances at the top of the rating scale. This will reduce the usefulness of the current gas label.

Regarding gas space heaters, a review of their testing procedure has not been conducted but it is known that the allocation of the efficiency rating of unflued heaters involves significant assumptions regarding conversion efficiency which are not tested. The testing procedure also ignores the impacts of these unflued heaters being recommended, and in some cases regulated, to only be used in ventilated rooms. The requirement for ventilation means the effective efficiency of the unflued heaters in heating the conditioned space will be much less, but this is currently ignored in the present testing procedures and labelling algorithms.

The testing for gas water heaters has recently been reviewed for the gas water heaters MEPS, but the testing changes could not be implemented in time for the current MEPS.

Incorporation of gas appliance labelling under the E3 regulatory program will require test standards that are accurate and repeatable. Also, rather than testing one model (which may be a prototype) for gas certification, the E3 program is likely to require that a number of commercially available models are tested, and results averaged. Significant resources are required to fund a test review and development program, and to implement a new testing

and labelling standard, especially as the testing of gas appliances is more technically challenging than for electrical appliances. In addition to costs required to develop the test standards it requires funding to develop the capability of test laboratories and to ensure a consistent testing program can be put in place.

The electrical appliance energy efficiency program has separate standards for energy efficiency and energy labelling requirements making it simpler to revise each portion of the relevant standard. However gas efficiency is bundled into each relevant gas appliance Standard with their safety requirements.

Many test methods were developed nearly two decades ago, and have not kept pace with changes/improvement to test equipment and methodologies, and are not adequate for the more complex gas technology which is available today (e.g. variable gas rates, variable speed fans in heaters, electronic controls and thermostats). Reviews of the test standards on which gas appliance labelling is based undertaken today by the E3 Program also suggest that some the test standards are not accurate or repeatable enough to form the basis of formal government regulated energy efficiency labelling

With the present industry led standards development and co-regulatory arrangements for gas appliance labelling, no organisation has the responsibility, authority or resources required to undertake the ongoing development the gas appliance labelling scheme requires if it is to continue to effectively function. The gas labelling scheme is effectively 'orphaned' and, as the standards and testing becomes increasingly inappropriate, the labelling scheme may soon run the risk of supplying misleading information to consumers.

Compliance and Enforcement

In Australia, the existing gas appliance labelling scheme is part of the gas appliance safety certification scheme covering: gas water heaters, gas space heaters and gas ducted heaters. These appliances need to meet energy labelling requirements of the relevant Australian Standards if the products are to be certified for use in Australia. All gas appliances must be certified if they are to be sold or installed in Australia, so this means the regulators can remove the certification of an appliance if it is not meeting the requirements of the Standards, including if it is not meeting the labelling requirements.

There are three certified bodies for gas testing and certification, these being the Australian Gas Association (AGA), SAI Global and IAPMO R&T Oceana. All gas safety regulators in the states and territories have accepted these companies as certification bodies. The certifying bodies have the role of undertaking the policing of the scheme and have an ongoing responsibility for compliance of the certified products, which means they are required to carry out annual product audits. The auditing of products, which are undertaken at the suppliers' premises, appears to be the only policing of the scheme.

The difficulty in Australia is that there is no targeted check-testing program or verification that the commercially available gas energy labelled appliances meets their labelling claims. This is essential to support a compliance and enforcement regime for the energy rating of all appliances. Nor is there any regulatory/legal basis for such check-testing and enforcement of the energy labelling scheme. Without a central authority taking the responsibility of monitoring and enforcing the labelling scheme, and with the resources and regulations to support a check testing, monitoring and enforcement regime, it is difficult to see how compliance with the gas labelling scheme will be enforced in the future.

Anther limitation of the current labelling arrangements are that there are no requirements to comply with new test standards. The development of new or revised energy labelling standards has not required gas appliance manufacturers to re-test and re-label appliances to comply with the new standards. This has meant that appliances labelled to different standards have appeared side-by-side in retail outlets, undermining the integrity of the labelling scheme. Consumers need to have confidence that there is a level playing field for all labelled appliances and the present labelling scheme has not supplied this.

Moving the gas labelling scheme in Australia to the E3 program and establishing the required regulation to support gas labelling compliance could enable compliance of products to be properly monitored and enforced. Check testing and appropriate prosecutions of products that did not comply would form part of such enforcement.

Inadequate Promotion and Awareness of the Gas Label

An energy rating labelling scheme is primarily directed towards the consumers of the appliances, though it may also act as a form of disclosure to the market and provide a competitive incentive for suppliers to encourage them to supply more efficient appliances. In the early years of the Australian gas appliance labelling scheme, the label

and its meaning were well promoted, but more recently the promotion of the scheme does not appear to have been very effective. The result is there is now a very low awareness of the gas energy rating label as shown by research conducted for a review of gas labelling (Artcraft 2006).This research found that only 15% of people were able to recall the gas label unprompted, rising to 20% when prompted. Even in Victoria, with the highest rate of gas connections, prompted awareness was only 26%. Artcraft described the research methodology as follows.

> *With gas and water about to join electricity as resources covered by mandatory efficiency labelling, a series of quantitative studies were commissioned investigating awareness and use of the labels among the general public, recent buyers of appliances, retailers, and installers of appliances.*
>
> *A series of six surveys were designed and conducted, mainly by telephone using a structured questionnaire format. The overall study involved 3,460 members of the general public, (1,730 electrical appliance buyers, 1,730 gas appliance buyers in Australia and New Zealand) and 500 retailers and installers in Australia. Random sub-samples were drawn in each city using an electronic phone book with an inbuilt sampling function. At the analysis stage, data was weighted to realign the samples with population proportions. A sub-sample of 200 general public was interviewed face-to-face to validate questions on prompted recall of the labels, producing results within 1% of the main samples. The interviews were conducted in September and October 2005. (Artcraft 2006: page 1)*

These findings were in contrast to the high recognition of the energy label for electrical appliances.94% of Australian consumers recall the electrical label unaided, rising to 96% when prompted, on a par with leading market brands and high profile celebrities. 88% of consumers say that they use the electrical appliance labelling information at some point in appliance selection processes. In New Zealand recognition of the electrical energy rating label is about 96% (2011 EECA consumer research monitor - by Synovate).

The lack of recognition of the gas appliance label is of greater concern as for gas water heater and gas ducted heaters, because the consumer rarely sees the appliance before installation. (Note: two of the main gas appliances groups and the highest users of gas.) These appliances are not regularly displayed in retailer outlets, unlike, say, gas space heaters. This means the consumers need to be aware that there are gas energy ratings if they are to select or ask their builder, plumber or other installer to select a higher efficiency appliance.

Increasingly consumers research appliance purchases online, and again a higher awareness of gas appliance labels would assist them to select higher efficiency appliances. Stakeholder feedback indicated that there is some work being planned by the AGA and other compliance testing organisations to establish a centralised database of certified appliances, which may make it easier for consumers to compare appliances. However, ideally a user-friendly website dedicated to this purpose is required.

The energy labelling scheme could also be marketed to the intermediary stakeholders in the gas appliance purchase; such as builders, plumbers, developers, architects, building designers and retail outlets. These groups of people are often involved in the selection of space heating and water heating appliances so encouraging them to offer the end-consumer a choice regarding the efficiency of their appliances could significantly affect the average efficiency of appliances installed.

For many of these intermediaries the key consideration is obtaining a low cost appliance, by making them aware that they could upsell the consumer to a higher quality and efficiency product may make financial sense to them, as there could be larger margins on the better quality products. In some cases more efficient products exist at very similar prices to less efficient appliances, which could encourage the intermediaries to move to more efficient appliances. Other building rating schemes, such as the Home Energy Rating Scheme, BASIX and the Green Building schemes, may also encourage builders to develop more effective buildings and these schemes in combination with gas labelling may encourage market intermediaries to select more efficient gas appliances. Promoting more efficient gas appliances to this market though requires that a recognised, trusted and simple method for comparing the efficiency of products exists, and the gas labelling scheme fulfils this role.

Another “target audience” has developed over the last few years in the form of various government incentive, white certificate and minimum installation requirement schemes that have been started. A number of these schemes rely on energy efficiency ratings of appliances to implement aspects of their schemes. These schemes work in tandem with the gas labelling scheme to facilitate the take up of high efficiency appliances.

The format of the gas energy rating label is also important to its effectiveness and to market awareness of the label. The current gas energy rating label format is based on the design of the pre-2000 electrical energy label. However, the electrical label design was updated to a more modern format in 2000, and also shifted to display only half star ratings from this date. More recently a new label format was introduced for “super-efficient” (6 to 10 star

appliances). Consequently the current gas label is now inconsistent with the format of the electricity appliance label.

If the E3 Program is to take over responsibility for gas labelling, it is likely that the gas energy label would be updated to match the more modern format of the electrical label (while most probably retaining its blue colour), and the labels would be limited to displaying increments of half-stars, rather than the current continuous rating scale which, in any event, is not consistent with the level of accuracy of the testing. This would ensure that the label was not misleading and also that the marketing of the label could leverage the high degree of awareness that exists for the electricity energy label.

5. International Gas Energy Labelling Programs

Internationally the energy focus has tended to be directed toward water heaters, boilers and gas ducted heaters or furnaces with little attention on space heaters, decorative gas log fires and outdoor radiant heaters. Leading countries that have voluntary or mandatory standards or energy labelling programs are summarized below:

Table 3: Summary of International MEPS and Energy Labelling Programs for Gas Appliances

Gas appliance type	Policy	Australia	New Zealand	US	Canada	Europe	UK	Japan
Water heaters, boilers and combo-boilers	MEPS	Yes, excludes combo and internal storage types	Yes, excludes combo and internal storage types	Yes	Yes	Yes	Yes	No
	Energy Label	Mandatory	Voluntary	Mandatory	Voluntary	Yes	Yes	Mandatory
Ducted heaters, furnaces and central heating systems	MEPS	Yes	No	Yes	Yes	Yes	Yes	n.a.
	Energy Label	Mandatory	No	Mandatory	Voluntary	No	Voluntary	n.a.
Space and local heaters	MEPS	Yes	No	Yes	Yes	Yes	Yes	No
	Energy Label	Mandatory	No	Yes	Voluntary	No	Voluntary	Mandatory
Gas fireplaces (vented) and decorative gas log fires	MEPS	No	No	No	Some products	No	No	No
	Energy Label	No	No	No	Voluntary	No	No	No

Comparing international efficiency and labelling programs can be complicated as definitions of gas appliance types (i.e. hot water systems, boilers and combi-boilers) and test methods can vary significantly which can be particularly confusing when comparing efficiency values or MEPS levels.

The dominance of the North American manufacturers in the gas appliance industry means many overseas standards and policies have evolved from this region. In the US there is a mandatory labelling requirement for water heaters, boilers, furnaces and other gas appliances under the EnerGuide program. This program is often used in conjunction with MEPS and the ENERGY STAR® program, which is used as a voluntary high efficiency endorsement label.

The ENERGY STAR®mark indicates that the product is among the most efficient of its type, either because it is in the top 25% of the range on the market, or because it exceeds the MEPS level by a specified margin. The US EPA and US DOE and NZ EECA are responsible for developing the specifications and consumers are encouraged to use qualified products with state and/or federal financial incentives and/or tax breaks.

Canadian technical gas standards are generally regarded as the most stringent international standards and their energy policies often consist of MEPS in conjunction with a voluntary label. Water heaters use the ENERGY STAR® label and the technical specification used in Canada is very similar to the requirements to qualify for ENERGY STAR® in the US. Furnaces, space heaters and gas fireplace (vented) heaters, excluding decorative gas log fires, use a voluntary EnerGuide label which is administered by the Heating, Refrigerating and Air Conditioning Institute of Canada in all provinces except Quebec. While Canada is the only country to have labelling and MEPS requirements for gas fireplace heaters, it does not fully cover all fireplace heaters such as decorative appliances.

EU members and the UK generally have MEPS for gas heating appliances, excluding decorative gas log heaters and are prescribed in building directives such as the UK Guide to building regulations which specifies recommended MEPS for individual HVAC appliances for domestic and non-domestic buildings. Some products such as water heaters, boilers and combi-boilers are on the list of appliances to be labelled with a mandatory EU Energy Label according to the 92/75/EC Framework Directive and is complemented with country specific voluntary endorsement labels.

Germany operates the voluntary Blue Angel environmental label scheme for a variety of gas appliances including gas-fired heating devices up to 70 kW, however water heaters are not a category included in the scheme. The UK has a voluntary labelling scheme operated by the Energy Saving Trust with incentives provided under the Enhanced Capital Allowance scheme that includes radiant space heaters, central heating products, water heaters and boilers that meet a set of energy-saving criteria.

Japan is unique in that it does not have MEPS and instead operates the Top Runner standards program for selected appliances including water heaters, space heaters and gas cooking appliances. This high efficiency program aims to improve the energy efficiency of appliances by setting target values based on the current highest efficiency level of each type of product instead of a minimum efficiency level. Retailers have a mandatory labelling requirement to display energy consumption and expected electricity costs, and the Top Runner label is voluntary.

In summary the international trend is for the use of voluntary endorsement labels to indicate that products belong to the “most energy efficient” class of products available or meet a predetermined standard or eligibility criteria. However, the merits of voluntary labelling programs are frequently questioned, especially if there is no complementary dis-endorsement label for the poorer performers. To overcome this concern there is a trend for endorsement labels to be linked to financial incentives and/or tax breaks.

6. Rationale for Mandatory Gas Appliance Labelling

The Case for Gas Labelling

The overall rationale or justification for an energy labelling scheme is to address the information asymmetry which occurs unless all appliances have energy labelling. When consumers purchase a gas appliance to provide a service they will incur the initial cost of the appliance, but will also incur an ongoing cost as they purchase the energy required by the appliance. Energy labelling provides the information disclosure required in order for consumers to make informed choices and encouragement for suppliers to produce more efficient products.

Without information on the comparative efficiency of gas appliances, and on their average annual consumption, consumers are purchasing an appliance to provide a service, but where typically around 75% of the cost of the service remains unknown to the consumer. This lack of information can be seen as a market failure which disadvantages consumers, who may pay $1000's in energy costs more over a product's life, and creating barriers to the improvement in gas appliance energy efficiency. Likewise, unless the suppliers are able to communicate the efficiency of their products to consumers in a manner which will be believed, they will have no incentive to compete to provide more efficient products and again a distortion in the market may follow.

A second argument in support of a mandatory gas appliance energy labelling scheme is that it contributes to the reduction of market barriers to improve gas appliance energy efficiency by encouraging appliance suppliers to compete to provide more efficient appliances. Appliance labelling enables suppliers to communicate the efficiency advantages of their products to consumers via the products' energy rating, and also to compare their products to their competitors. Both these information flows will encourage the development and sale of more efficient products.

Comparative or Endorsement Labelling

The current Australian gas appliance comparative label is a comparative efficiency label, as is the energy label for electric appliances. These labels inform the market of the relative energy efficiency of an appliance compared to other appliances of a similar type. To be effective a comparative labelling scheme must be mandatory so consumers can compare all similar appliances. A key advantage of comparative labelling is it conveys the most information to the consumer, as all products are labelled, and also allows suppliers to compare their products to competitors.

An alternative to the comparative label is the endorsement label, such as the ENERGY STAR®label. Endorsement labels are used to signal to a consumer that the product has been judged to reach a "Best in class" standard, in this case signalling it is a high-efficiency product. Alternatively, a dis-endorsement label indicates the product has particularly poor performance.

Advantages of the endorsement labelling approach include:

- It would be voluntary, as suppliers of high performance products will be motivated to have their product tested and to receive the label.
- Only the highest performing products need to be labelled, reducing costs.
- The efficiency level at which a product will be endorsed can be changed over time, without the need to rescale the rating label.
- In New Zealand, consumers are already familiar with the ENERGY STAR® endorsement label for a wide range of products.

However, the endorsement label approach also has disadvantages, including:

- Endorsement labelling schemes also require the development of appliance test standards, so any limitations in the current gas labelling testing procedures will equally apply to an endorsement label, unless another country's testing standards were adopted and used.

- Consumers receive less information, as only some products will be labelled and the label only conveys information if a product is/is not endorsed.
- There would be no information to differentiate between non-labelled products, or between labelled products.
- Suppliers of all but the highest efficiency products will have less incentive to improve the efficiency of their product, as there will be no information supplied to consumers to differentiate between non-endorsed products, which can still significantly differ in their efficiency.
- For an endorsement label to be effective, it must be heavily promoted by government agencies to ensure the public obtain and maintain a high degree of awareness and confidence in the labelling program, a requirement that would significantly add to the cost of the labelling program.
- An endorsement labelling program for gas appliances would significantly differ from the existing Australian gas, electricity and water consumption schemes for appliances, which could potentially confuse consumers.

On balance, the disadvantages of endorsement compared to comparative appear to out-weigh the advantages. Endorsement labels convey less information to consumers, which in turn reduces suppliers' incentive to improve the efficiency of the majority of their products. Promoting and maintaining an endorsement program will also be more expensive for government agencies. Consequently, it is not recommended that endorsement gas appliance labelling on its own be used in preference to comparative labelling.

However, another option is to use endorsement labels in addition to comparative labels, which has been done in the past in Australia. This has the advantage that the consumer gains all of the advantages of the comparative labelling, a testing regime will exist to support the endorsement labelling and higher efficiency products are specifically promoted.

Rationale for a Government Labelling Scheme in Australia

The current Australian gas energy rating labelling scheme has several significant limitations, these being:

- No real ownership of the scheme by either government or industry, and no organisation formally responsible for maintaining the integrity of the scheme.
- The lack of an effective compliance and enforcement regime for gas energy labelling, without which it is difficult for both consumers and government to have confidence in the integrity of the scheme.
- No requirement for suppliers to update the labelling of products which are currently certified when new methods of test or labelling requirements are introduced into the standards.
- Concerns that the efficiency test standards for gas ducted heaters, and possibly other gas appliance, may not be accurate enough to support the labelling claims made.
- The bunching of models at the top of the 6 star rating scale reduces the comparative information supplied by the label to consumers, and also the value of the energy rating for suppliers who wish to differentiate their products as being of higher energy efficiency.
- Minimal marketing of the scheme, a very low awareness of the gas label amongst consumers and inadequate online information on appliance efficiency.
- The majority of major gas appliances being chosen by builders, developers or other intermediaries, rather than the end users and the resulting split incentive situation that this creates.

With the exception of the split incentive issue, these issues with the current Australian gas energy rating labelling scheme are largely the result of the current inadequate management, support, development and promotion of the scheme. These issues should not be seen as intrinsic limitations of a comparative labelling scheme, but rather of issues that can be addressed by establishing a formal government regulated labelling scheme implemented through the E3 Program which can be appropriately regulated, managed and enforced. Moving the scheme would involve changing the labelling scheme from being part of a co-regulatory program appliance safety scheme to a Government managed energy efficiency regulation program.

The market intervention required to correct these inadequacies of the current co-regulated mandatory gas appliance labelling scheme will involve a change in the nature of regulatory framework supporting the gas labelling program, but probably not in the degree of regulation of the market. The change required is to change the functioning, responsibility and authority of the labelling scheme from being part of a co-regulatory appliance safety scheme to being a nationally government regulated energy efficiency scheme.

As a national scheme the gas appliance energy labelling scheme could be integrated into the E3 program, where it could receive adequate support to ensure it was updated as required, the deficiencies of the current testing standards were addressed, compliance was monitored and enforced, and the scheme was promoted and marketed.

Synergies and savings from operating the gas labelling scheme in parallel with the electrical appliance program could also be gained. Critically, the Government would have the responsibility and authority to research, develop and update the standards and testing on which the gas appliance MEPS and energy labelling scheme rests and could ensure that the gas labelling did not become misleading to consumers.

As a mandatory energy labelling scheme already exists, with impositions and costs of energy efficiency testing, labelling and registration already accrued by appliance suppliers, the movement to a national scheme is unlikely to impose any significant additional costs on the suppliers, though testing costs may increase if testing requirements are altered in the future. Nor will there be any additional costs for consumers, as any costs from mandatory labelling are already carried by consumers as a mandatory scheme already exits. The Government will incur some significant additional costs, such as the costs of managing the scheme, enforcing compliance, ongoing research and development, and of promoting the scheme. However, the benefits of an updated and nationally operated scheme will easily outweigh the costs, an issue analysed further in Potential Impacts and Cost Benefits, page 40.

Consequently, as there are significant defects in the operation of the existing mandatory gas appliance energy labelling scheme, and only minor costs to making the scheme a national scheme, it has been proposed that the gas appliance energy labelling scheme be translated into a national mandatory energy efficiency scheme. Some of the issues with the current scheme could be addressed under a Government scheme as follows:

- Concerns over testing procedures can be addressed by assigning the required resources to research and develop better testing, though refinement of the testing procedures are likely to occur if MEPS in introduced for gas ducted heaters and space heaters.
- A rigorous compliance and enforcement regime would be implemented, including a targeted check-testing regime, and surveillance of retail outlets. This would need to be supported by appropriate legislation, with penalties for non-compliance.
- The lack of model rating variation can be addressed by reviewing the rating algorithms, and maybe the number of stars an appliance can gain, to spread the efficiency of appliances over a greater range and to enable higher ratings to be achieved only by very high efficiency models. This could be achieved either through re-scaling the energy ratings within the existing 6-star scale (resulting in some appliances receiving a lower rating), or introducing the 10-star labelling scale which has been implemented for some electrical appliances.
- An issue relevant to any gas labelling changes would be whether the greenhouse emission impacts of gas appliances versus comparable electrical appliances in the market (e.g. heat pumps for gas space heaters), should be considered when allocating star ratings. Gas appliances which are less emission intensive than their electric equivalents potentially could receive a high star rating. However, this would be difficult to implement given the variation in electricity emission factors by location and due to its controversial nature of such a label for appliance suppliers.
- The low awareness of the gas appliance label can be remedied through increased promotion, marketing and public education. Inclusion of gas appliances in the E3 Program would require all products to be formally registered, automatically creating a central data base of all certified products. This would facilitate the provision of information on public websites. Changing the gas label to the electric energy rating label format could also help raise awareness.

The situation of non-end users selecting the majority of appliances, and the resulting split-incentive issues, is not something easily addressed by an appliance labelling scheme and is one of the reasons why MEPS has been introduced for gas water heaters, as well as many electrical appliances. However, though MEPS raises the minimum efficiency requirements for an appliance, it does not on its own encourage suppliers to exceed that minimum requirement nor does it encourage competition between suppliers to create and promote more efficient models. Energy labelling though does encourage suppliers to exceed that minimum requirement and to create and promote more efficient models. This in turn means there is enough variation in the efficiency of models on the market to enable MEPS levels to be further raised. Consequently the combination of MEPS and energy labelling schemes can be effective in raising the efficiency of appliances into the future, if adequately resourced and managed.

Rationale for a Government Labelling Scheme in New Zealand

The situation in New Zealand is very different, as there is no mandatory gas appliance labelling scheme operating at the present time. Consequently any argument for introducing a gas labelling scheme needs to rest on the merits of the scheme, and the associated costs and benefits. The principal arguments for a mandatory gas appliance labelling scheme have been previously described, but for New Zealand can be summarised as:

- Address the information asymmetry which occurs unless appliances have energy labelling.
- Enable and encourage consumers to purchase more energy efficient gas appliances, thereby reducing their energy costs and greenhouse emissions.
- Enable gas appliance suppliers to compete on the efficiency of their products, encouraging the overall improvement in appliance efficiency.

The main argument against mandatory energy labelling normally rests on the time and cost burden that such schemes impose on suppliers. However, New Zealand has already regulated the use of the same test method for MEPS compliance of gas water heaters and the vast majority of gas ducted heaters and space heaters sold in New Zealand are either sourced from Australia or are the same models that are sold in Australia. These appliances will already have to meet Australian gas labelling and testing requirements. If New Zealand adopted the relevant gas MEPS and labelling Australian Standards, or joint Australian/New Zealand Standards were developed, there would be no additional testing and registration costs for almost all gas appliances. The additional costs would largely be restricted to the minimal cost of affixing energy labels to products, which had not previously had them attached, and the New Zealand government costs of managing and promoting the scheme.

For the relatively small numbers of gas water heaters and gas ducted heaters that were not previously tested according to the Australia Standards, there would be additional costs, from sending products to Australia for testing, or sourcing compliant models.

The implication is that New Zealand consumers could potentially gain the advantages of an energy labelling scheme for gas water heaters and gas space and ducted heaters without imposing significant additional costs on appliance suppliers or on the New Zealand Government, as most existing gas appliances that are sold are already to be tested and meet energy performance compliance under the Australian Standards. These issues concerning the introduction of such as scheme, and the benefits and costs will be further explored in later sections of this report.

TTMRA Issues

Due to differing safety and testing regulation differences, gas appliances are among the few products granted exemptions under the Trans-Tasman Mutual Recognition Arrangement (TTMRA). This means that products that are lawful to sell in one country can, in this case, be prohibited from sale in the other. The TTMRA exemption for natural gas products is 'temporary', even though it has been renewed every year since its inception. In 2009 however, the exemption for LPG appliances was made permanent, on the grounds that that the use of different LPG formulations in Australia and in New Zealand, and the prohibition in Australia of the portable LPG 'cabinet heaters' that are popular in New Zealand, meant that the differences are effectively irreconcilable.

These exemptions and differences are primarily concerned with the safety testing and requirements of the appliances, and it is unlikely they would affect the introduction of a Australian/New Zealand energy labelling scheme. This has been found to be the situation with the recent MEPS standard for gas water heaters, where this MEPS has been be mandated using the AS/NZS 4552.2 Standard, under the various energy efficiency regulations of the States, Territories and New Zealand. Consequently the differences in safety regulations are unlikely to mean the introduction of mandatory energy labelling will raise any TTMRA issues for gas appliances.

Another difference in the gas markets between Australia and New Zealand is the extent that natural gas versus LPG are used as fuels. In Australia, LPG accounts for less than 6% of total household gas use (8.9 PJ LPG compared with 151.5 PJ natural gas in 2010). In New Zealand, LPG accounts for over 40% of total household gas use (2.1 PJ LPG compared with 2.5 PJ natural gas in 2007).[10]However, this should not affect testing as differences in gas composition are taken into consideration in testing and the standards, and in Australia the energy labelling and MEPS schemes are applied equally to natural gas and liquefied petroleum gas (LPG) products.

A potential TTMRA issue might involve any exemptions to the energy rating, testing and labelling that might be granted to gas appliances sold in New Zealand but not sold in Australia, if their low sales numbers did not make it economical to test the products.

10http://enduse.eeca.govt.nz/default.aspx

7. Stakeholder Feedback and Issues

Australian Stakeholders Feedback

A diverse mix of industry participants were interviewed including manufacturers and suppliers of gas water heaters, gas space heaters, decorative 'fires', ducted heaters and pool/spa gas heaters; Gas Appliance Manufacturers Association of Australia council members and Energy Safe Victoria, the primary technical gas regulator.

Some common themes and key points during consultation were:

Energy Efficiency and Labelling

- All manufacturers supported the concept of providing useful independent energy efficiency information for consumers and purchasers as the AGA and other certified lists of appliances was used only by manufacturers.
- All manufacturers of products requiring testing and labelling claimed they designed products around the test method to maximize the star rating outcomes.
- Several Australian participants (including the technical gas regulator) explained that the energy efficiency requirements and energy rating label is already mandatory in Australia through the existing certification process, so participants (principally suppliers) could not see energy efficiency benefits in a national/trans-Tasman mandatory labelling scheme (i.e. we already have one).
- The gas industry is currently considering a data base (possibly managed by Energy Safe Victoria) rather than current system which comprises the AGA directory and product data bases operated by SAI Global and IAPMO.
- The GAMAA position on labels is that when gas appliances are compared to electrical appliances they need to have distinctly different labels to avoid any confusion. This message was consistently communicated throughout all interviews.
- All participants commented that a gas label with a similar style to the electrical label, and only with different colouring, would not provide sufficient differentiation between energy sources, which would be confusing or misleading for consumers. Some participants claimed that similar styles would be possible if both gas and electrical labels displayed the same information such as carbon emissions. One participant mentioned that the label format is not as critical with gas water heaters as customers are generally not comparing different sources.

Role of Labels and Energy Efficiency in Decision Making

- Most participants believed MEPS was more relevant than labels as consumers are not always involved in the purchasing decision.
- Particularly in tough times, suppliers believed energy efficient upgrades in new homes and renovations are often competing with other choices such as plumbing fittings or granite bench tops where builders make more margin.
- However, a BIS Shrapnel survey of consumers and retailers of gas water heaters conveyed a more positive picture, claiming that energy efficiency and lower energy costs were either important or very important the large majority of the time when making a purchasing or replacement decision.
- BIS Shrapnel also asked gas water heaters consumers how important the energy-rating label was on their final purchase decision, using a scale of 1 to 5, where 1 = no influence at all and 5 = vital/critical influence. From a total sample of 574, gas respondents placed slightly more emphasis on the energy rating than their electrical counterparts (3.3 versus 3.0).
- Several manufacturers commented that when purchasing a gas water heaters or gas ducted heater that consumers generally consider the unit must have a 'good' rating (not necessarily the best), must work (i.e. not run out of water) and then the consumer weighs up other features before making a final purchase decision.
- Some manufacturers have product ranges that are more about "leadership or flag ship" product rather than sales volume. Energy rating labels are frequently used with these types of products, however can be found in most forms of supplier communication (web, leaflets, brochures etc.).

Appliance Decision Making

- Manufacturers believe significant split-incentives exists with the majority of purchases of gas appliances.
- Builders, plumbers or landlords are generally the key decision makers, not consumers or end-users paying the energy bills.
- Builders commonly purchase the cheapest product that meets their contract or regulatory requirements, plumbers typically follow instructions from the builders or emergency replacements are made based on based on stock availability and landlords make grudge purchases.

Sales Trends

- The general economic outlook is tough as new–build homes are down by 5% or more, with consumers spending less on fit-out.
- Gas hot water system sales are in decline due to previous government rebates fast-tracking other fuel sources as replacements.

The Australian perspective on New Zealand

All Australian industry participants suggested that NZ should harmonise technical standards and labelling requirements with Australia. Comments supporting these comments were:

- Joint Australian/New Zealand standards make sense, but with a NZ section that deals with country specific issues such as seismic requirements, etc.
- The NZ market is very small and for some suppliers is difficult to service, and is at risk of losing suppliers if NZ requirements are made difficult or too different.
- The existing self-declaration system can result in safety, efficiency and market issues. Several participants mentioned that a self-declaration scheme has merit with electrical appliances where there is greater global harmonisation of technical standards however it is not that easy with gas appliances.

New Zealand Stakeholder Feedback

A range of stakeholders from the supply sector and regulators were interviewed. The following summarises their feedback and comments.

The State of the market

The gas heater market is steady in terms of the numbers of gas heaters sold as a percentage of the total market. However with the recent decline in the NZ building industry this has translated to a reduction in sales of gas space heaters in line with the reduction in number of home builds. Unflued gas heaters are in decline as are free standing fires. Flame effect fires are increasing as are gas central heating systems (although volumes of central heating are still relatively low).

Portable LPG Cabinet heaters are still a significant seller due to their low capital cost and the ability of householders to budget for their fuel purchases by pre-purchasing gas cylinder refills.

The New Zealand heater market is dominated by electric heat pumps (reverse-cycle air conditioners), as operating costs for an efficient gas heater using reticulated natural gas are generally slightly higher than with a comparable sized heat pump's operating costs.

There is an increasing consumer awareness of energy efficiency and some gas heater suppliers are working with that increasing awareness. However, energy efficiency is often lower down the list of desired attributes when buyers are making a decision on a gas heater. There are separate parts of the market with some focused on efficient heating and others focused on the visual appeal of the fire. For some, visual appeal is the prime consideration followed by factors such as operational features of the fire, safety etc. all ahead of efficiency.

Interviewees commented that the NZ gas heater market is more diverse than that in Australia in terms of the range of models offered and the source markets.

At 'point of sale' there is generally insufficient information on gas heating efficiency available that would allow consumers to make a reliable comparison between products based on energy efficiency.

There is often a disconnect between a householder wanting to buy a gas appliance and the eventual unit that is installed in their home due to the involvement of builders and architects in the case of gas heaters,) and plumbers for water heaters.

Sales of condensing gas water heaters are currently much smaller than for non-condensing units, but the compelling economics of the condensing models means that this segment is growing. Continuous flow gas water heaters are also making inroads into the more traditional electric storage water heater share of the market.

Introducing gas labelling into NZ

Gas efficiency labelling was generally considered to be a challenging proposition. A number of issues were frequently raised including:

- To what test standard and should heaters be tested?
- Should decorative heaters be included in the scheme or not? Some interviewees were firm on the view that all flame effect fires should be included so that those with poor efficiency can be identified and consumers can make the decision to buy alternative models. However others were adamant that decorative types should only be compared with other decorative types, to leave enough products on the market to enable adequate consumer choice.
- Ensuring that the fuel specification was based on typical New Zealand gas composition will be covered in the Method of Test.
- Some interviewees were of the opinion that a testing and labelling program should apply to all gas burners regardless of where they were manufactured. Others were of the opinion that exemptions could be made for lower volume products so as not to make it uneconomic for them to be made available in New Zealand.
- On the question of mandatory or voluntary participation, stakeholders saw each has its pros and cons. A mandatory scheme would be seen as imposed bureaucracy, while a voluntary scheme would be more likely to be supported by those offering more energy efficient products.
- Giving consideration to the view that energy efficiency is not the major driver of buying a gas heater in many cases. However it is possible to buy flame effect fires with relatively high efficiency (70-80%) which will use substantially less energy and cost substantially less to run than some of the very inefficient (20-30%) gas heater models on the market. If consumers are made aware of the wide range in operating costs of different models it may drive consumers to buy a more efficient model, even if their main requirement is for the flame look.

How the labelling scheme could develop, or be introduced for NZ

Stakeholders believed it makes sense to have a consistent standard that is applicable across New Zealand and Australia. When selecting a standard to test to, an existing Australian standard seemed to make sense.

It was regarded as unlikely that the market in New Zealand is large enough to support gas appliance testing in New Zealand, although SAI Global has apparently recently invested in a New Zealand testing facility.

There is a preference for an energy rating based on percentage efficiency figures rather than star ratings, i.e. an appliance would be identified as being 80% efficient rather than having 4 stars. There is a perception that consumers find it difficult to interpret the star rating and may assume that a 4 star product is twice as good as a 2 star product. Some product brochures exploit this misconception.

A percentage efficiency rating may also allow comparisons to be made against other forms of heating such as wood burners.

There was a perception of difficulty in using labels. There was consensus about not defacing heaters with a permanent label, particularly as the visual aspect of a gas heater is so important. Even removable labels and "swing tag" labels may be an issue in showrooms as some gas fires will be operational in showrooms for demonstration purposes and a label could be a fire risk.

There has been concern raised by some suppliers about the ability to test open gas burners that are installed into existing fireplaces where the flue, draught etc. will vary from one installation to the next. Others are of the opinion that a standard installation situation could be specified for the test which represents a common or likely scenario for installation in the real world.

Labelling is seen as an alternative to a MEPS scheme, and some would argue that introducing a labelling scheme is a mechanism to avoid the implementation of a MEPS. However, the two are not necessarily mutually exclusive – a labelling scheme could be run in parallel with MEPS. There was some comment about the concept of starting off with a labelling scheme that may or may not evolve into MEPS in the future.

It was suggested that the efficiency scores could be publicised in all of the common ways in which a consumer would seek information on appliances i.e. web-based information, product brochures and point of sale information.

New Zealand Industry comments on costs to introduce labelling

Production of the labels themselves (if physical labels are produced) were not expected be expensive, nor would including efficiency information on websites, in brochures etc. It was thought costs would be incurred in the testing of appliances, although no data was gathered on the likely costs.

For models sold in New Zealand and Australia, a move to have a common test procedure and standard would mean that costs could be split across sales in the two countries.

The cost to transport heaters to Australia for testing is not great (assuming heaters needed to be tested in Australia).

Use of different standards by New Zealand or in Australia for MEPS or labelling

There will inevitably be concerns and disagreements raised by those likely to be disadvantaged by this proposal, i.e. those that sell very low efficiency appliances. However, if the objective is to progressively increase the average efficiency of appliances then this is just part of the evolutionary process. Promoting more efficient products will lead to the ongoing development and improvement of energy efficient appliances.

There is a poor level of information on energy efficiency of gas appliances in the NZ market currently. By publishing energy information data that is obtained by a standardised test regime, consumers can make informed choices about appliances. Those that like the look, or other features, of low efficiency appliances can still choose to buy those appliances, but at least they will do so with the knowledge of that poor efficiency.

Other issues around labelling or MEPS

Stakeholder/s claimed labelling should apply to all gas burners whether defined as heaters or decorative heaters. Allowing some models to be defined as decorative and therefore excluded offers a “back door” opportunity to avoid the labelling program. This would defeat the purpose of allowing consumers to consider the efficiency of various models as part of their purchase decision making.

Summary of Feedback

In Australia, the industry stakeholders contacted generally believed they already had a national mandatory gas labelling scheme, and their comments were more concerned with the extent the label and energy efficiency generally affected product selection. They supported joint, consistent Australia and New Zealand energy efficiency standards.

In New Zealand, support for gas labelling was more tentative and they were more concerned with how it might be implemented. However, there was general agreement that if implemented then the labelling scheme should be consistent with Australia’s.

8. Potential Options

The main options which governments (through the agency of the E3 program) could pursue with regard to the energy efficiency of gas appliances are:

- Base case scenario - "Do nothing": Involves allowing the present decentralised approach to the management of the industry led Australian scheme to continue and for New Zealand to have no scheme.
- Introduce government managed mandatory labelling in Australia: Revise the regulatory, administrative and technical basis of the mandatory gas energy labelling program in Australia only and have the scheme managed by E3.
- Introduce government mandatory labelling in Australia and New Zealand: Revise the regulatory, administrative and technical basis of the mandatory gas energy labelling program in Australia and extend the scheme to New Zealand, again with the scheme managed by E3.
- Alternative gas appliance labelling schemes: Introduce an alternative gas appliance labelling scheme, such as a voluntary endorsement scheme to either Australia and/or New Zealand.

It is worth noting that in all cases these choices do not affect the introduction of MEPS requirements, which can be undertaken independently of the gas labelling schemes. However, future labelling schemes are likely to rest on the testing undertaken for MEPS requirements, assuming these tests will satisfy the more stringent requirements for appliance labelling, i.e. the need to measure accurately the relative efficiency of different appliances.

Review of Options

These options will now be reviewed.

Base case Scenario

The "Do nothing" scenario will probably mean that the awareness of the gas energy rating label will remain low and the potential impact of the labelling scheme will be significantly reduced. Check testing and compliance enforcement will not be undertaken, which creates a risk for both government and consumer support for the scheme. The usefulness of some appliance ratings in providing information to consumers or suppliers, the accuracy of some tests and the applicability of the scheme will decrease as appliances develop and change. This option does nothing to improve the current situation but the costs of the current scheme remain in place.

Given the low awareness of the current gas appliance labelling, it is assumed that the scheme will have minimal contribution to the improvement of gas appliance efficiency into the future.

Australian Mandatory Scheme

The key revision required to the existing Australian gas appliance labelling scheme is to change the organisation which is responsible and has the authority for managing, developing and implementing the scheme. At present the management of the scheme is de-centralised across three certifying bodies and managed by default through the Australian Standards committees. The result is that the scheme has become under-resourced and static, with compliance not being adequately enforced and the effectiveness of the scheme is in decline. By centralising the authority and responsibility of the scheme under the E3 program the labelling scheme could be more effectively managed and resourced. The centralising of the management of the labelling scheme would then allow appropriate management and resources to be allocated to:

- Check testing and compliance enforcement.
- The development of the scheme, especially the revision of test methods and rating algorithms.
- Research into the appropriateness of including additional products in the scheme, such as decorative or flame-effect heaters.
- The promotion and marketing of the scheme.

It would be possible to restrict a revised gas labelling program to Australia, but it would be necessary to continue the exemptions of the gas appliances covered by the scheme from TTMRA requirements.

This option would be relatively straightforward to implement, although would require a significant investment of resources from the E3 Program to update, support and better manage the scheme, but the scheme will become more effective. The electric appliance energy rating and MEPS scheme and gas water heater MEPS (and possibly MEPS for gas heaters), are already operating under the E3 programs so the expertise to manage the gas labelling program already exists in the organisation. There also would be synergies in the management and marketing of both labelling programs if both operating from the E3 program.

Mandatory Labelling Scheme for Australia and New Zealand

Revising the regulatory, administrative and technical basis of the scheme in Australia and extending it to New Zealand would enable Australia to obtain the benefits of improving the scheme, explained above. This would also enable New Zealand to obtain these benefits at little additional cost, assuming they adopt the same testing and labelling requirements.

As most gas appliances sold in New Zealand are already registered and compliant with the existing Australia Standards requirements, there is little extra cost for the majority of suppliers in introducing labelling to New Zealand. Many appliances are imported from Australia and some already carry the energy rating label, but affixing the label to the other appliances could be done at almost no additional cost. For appliances that are imported from elsewhere, but certified in Australia and sold in both Australia and New Zealand, the suppliers may already be in the position to affix an energy rating label, or this can be carried out by the importer, as is commonly the case now.

The appliances which are more complicated to include in an extension of the scheme to New Zealand are products not certified in Australia. These include portable LPG space heaters, some niche locally manufactured water heaters, and some imported water heaters again for niche markets. Given the nature of the portable LPG space heaters, which are already exempt from TTMRA requirements, and the small number of relevant gas water heaters, it may be wisest to exempt these heaters from the gas energy labelling requirements.

Extending the mandatory labelling scheme to New Zealand will only require a minor update to the existing Energy Using Products Regulations 2002 along with some administrative costs to manage and promote the scheme. However, involving both Australia and New Zealand in the scheme will also present some opportunities for synergies, which could lead to cost savings for both countries, as well as both gaining the benefits of a more effective gas labelling scheme.

Alternative Versions of the New Zealand Mandatory Labelling Scheme

It would in theory be possible for New Zealand to adopt its own mandatory labelling scheme based on different testing and rating principles to Australia's, but this is less likely to be a cost effective or practical option. If New Zealand required different testing to be undertaken for appliances, compared to Australia, this would result in suppliers of most of the gas appliances sold in New Zealand needing to undertake additional testing for what is a relatively small market internationally. Alternatively, New Zealand could use Australian test standards and results, and develop its own label, but again this would add to the costs for New Zealand suppliers and consumers. Either of these options could encourage suppliers to withdraw from the market, reducing consumer product choice and probably appliance efficiency. Consequently, these options are not considered attractive.

Another variation of the mandatory gas labelling option would be for New Zealand to adopt the Australian testing standards, but to also allow alternative energy rating testing regimes to be used for products imported to New Zealand but not Australia. For example, water heaters imported from the USA might be tested to the USA standards. This could reduce testing costs for such products. However, though this option does not have additional cost impacts for suppliers, the majority of suppliers are unlikely to support such an approach as they will be concerned that a 'level playing field' will no longer exist for the rating of their products. It also could create TTMRA issues as appliances tested and registered in New Zealand would not be compliant with the Australian mandatory labelling scheme.

None of these variations of the mandatory labelling schemes for New Zealand appear to have any overall advantage compared to a combined labelling regime with Australia.

Alternative gas appliance labelling schemes

Finally, an alternative gas labelling scheme could be introduced, such as a voluntary endorsement scheme. Endorsement schemes are the obvious alternative to comparative labelling schemes and, because it is in the suppliers of high efficiency products best interests to label and promote any product that is endorsed, they can be voluntary schemes.

For Australia, introducing an endorsement scheme would entail all the costs of developing a new scheme and its support rating regime, plus the costs of promoting the scheme and building awareness. These costs would be carried by Government, and an organisation to manage and develop the scheme would also have to be appointed and resourced. Presumably a centralised organisation would be required, so this scheme would probably involve similar changes and delegation of authority as would the refinement of the existing mandatory labelling scheme.

On the suppliers' side, assuming MEPS continues to operate for gas appliances, then an endorsement scheme would not significantly increase the costs to suppliers as they would still need to test and register their products as compliant with joint MEPS Standards. Some suppliers would save the costs of affixing labels on non-endorsed products, but the cost savings will be relatively small, so the total gains from moving from the current mandatory scheme are likely to be small.

Another complication for Australia is that an endorsement labelling scheme would be contradictory in nature to the established Australian water and electrical product comparative energy rating schemes, which could have negative consequences for those schemes. Considerable effort would need to be made to ensure the public understood the difference between the two types of schemes, and this public education campaign would add to the overall costs of implementing an endorsement scheme in Australia.

In New Zealand there would not be the complication of have existing conflicting schemes, but there would still be the need for the Government to carry the costs of developing a new scheme and its support rating regime, plus the costs of promoting the scheme and building awareness.

New Zealand could potentially expand on their existing ENERGY STAR® program but the costs to develop, staff/resource, promote and support an endorsement gas labelling scheme for New Zealand would still be significant.

For New Zealand appliance suppliers the cost difference between the existing comparative labelling scheme and an endorsement scheme will not be great, as was argued for Australia. Most suppliers will still need to conduct the compliance testing to Australian Standards that is required by MEPS, and the only real savings for these suppliers would be from not labelling their non-endorsed products. Those suppliers that have not registered products in Australia might gain more through not being required to test their products but, as previously mentioned, many such suppliers are likely to have exemptions to the endorsement labelling requirements so there will not be much relative savings compared to the endorsement labelling proposal.

However preliminary explorations of the feasibility of using ENERGY STAR® for gas space heaters has indicated that there are a number of issues that are incompatible with the criteria for brand use: there would be minimal exposure of the brand for consumer choice (limited range of potentially eligible Partners and qualifying products, with potential domination by 1 or 2 suppliers) and, it would be difficult to ensure a robust testing and verification process as per US programme (lack of Labs in NZ and robust test standard). In addition, there has been very low uptake of gas heating by consumers under the WUNZ government subsidy programme, where a 4 star AGA specification (tested to AS 4553) was a subsidy criterion. The 4 star level of efficiency represented the most efficient 25% of models as listed by the AGA, which is the typical proportion distinguished by the ENERGY STAR® brand. In other words, there are doubts about the impact that an ENERGY STAR® endorsement would have on the efficiency of gas space heaters. If MEPS were introduced however, this would provide crucial information about the industry and what form an ENERGY STAR® specification should take.

In summary, an endorsement labelling scheme for both New Zealand and Australia is likely to cost Governments more to develop and implement and may convey less information to consumers than an effective comparative energy labelling alternative. In addition, suppliers are likely to gain little cost savings given most will need to comply with energy testing requirements as part of the MEPS programs.

Recommended Option

Given the analysis presented above, and the cost benefit analysis results presented in the sections following, the recommended option is to centralise the existing Australian mandatory gas labelling scheme under the E3 program and to extend the program to New Zealand. The program is envisaged to initially investigate the products already included in the scheme; i.e. gas water heaters, gas space heaters and gas ducted heaters. Options to include other appliances, such as decorative/flame effect heaters, can then be incorporated in the revised scheme.

This option is seen as requiring no additional interventions in the Australian market but creating greater benefits to consumers and suppliers by enabling the existing labelling scheme to be more effectively managed, revised and enforced. Suppliers may face some increased testing costs if the testing requirements are made more stringent, but

these additional costs are likely to be minimal as MEPS will probably be implemented on all the appliances which would carry gas labels. A better compliance enforcement regime for the gas labelling scheme may also entail some increased costs for suppliers.

The extension of the scheme to New Zealand imposes few additional constraints or costs on most suppliers as the vast majority of gas appliance products are already tested, rated and compliant with the Australian gas labelling scheme requirements. There will be some small costs to the New Zealand Government in managing, promoting and enforcing/compliance the scheme, but the benefits will be that consumers will gain access to comparative information on the gas products covered and suppliers will gain an avenue to differentiate their more efficient products from their competitors, at little additional cost.

As shown in the section Potential Impacts and Cost Benefits, page 40, this option also appears to be cost effective.

Implementation Issues for the Mandatory Labelling Scheme

To be included in the formal energy efficiency regulatory program operated through the E3 Program, appliances and equipment must satisfy certain criteria relating to the feasibility and cost effectiveness of government intervention. These include:

- the potential for energy and greenhouse gas emissions savings,
- environmental impact of the fuel type,
- opportunity to influence purchase,
- the existence of market barriers,
- access to testing facilities, and considerations of administrative complexity.

It is recognised that there are a number of issues with the current gas labelling scheme that will not be solved simply by changing the management and organisation of the scheme. These issues include:

- How the gas label format should be revised.
- Whether flame/decorative effect heaters should be labelled and if they should be classified as space heaters for labelling purposes.
- Reviewing and implementing the test methods for some appliances.
- Reviewing the rating algorithms to avoid the bunching of models at the top of the rating scale for some appliances.
- Reviewing the algorithms for the rating of flue-less space heaters to incorporate the impact of their mandatory venting of rooms requirement.
- Addressing the apparent lack of compliance enforcement of the gas labelling scheme.
- Developing appropriate regulation which would support a compliance enforcement process.
- Developing new regulation to call up new energy efficiency MEPS and labelling standards, though such regulation may be largely developed to implement the recent gas water heater MEPS.

A detailed method of addressing these issues will not be attempted in this paper, but it is clear that if the gas labelling program is changed to operate under the E3 program, then the management and resources required to address these issues will be needed.

9. Potential Impacts and Cost Benefits

Modelling Approach

The impacts of regulatory changes such as the introduction of MEPS can be forecast with reasonable accuracy, as the physical impact of the regulation on the action of the appliances can be predicted and hence the total impact energy impact over all appliances extrapolated. However, the modification of the Australian gas labelling scheme and the introduction of the scheme to New Zealand will result in behavioural changes by consumers, i.e. selection of more efficient appliances, and the encouragement of suppliers to market more efficient appliances. The impact of these behavioural changes are much harder to predict so the modelling has been approached as a scenario analysis.

The scenario modelling addresses the question of: "What is the minimal behavioural change, in terms of selecting more efficient appliances, that is required before the costs of the proposed regulatory changes will be recovered?" The behavioural change can be seen as what proportion of purchases need to select an appliance which is 5% (approximately 1 Star) more efficient than what otherwise would have been their business-as-usual selection. By changing the percentage of purchases selecting the more efficient appliance, the minimal behavioural requirement for energy savings to cover costs can be found. This scenario is regarded as reasonable as choosing an appliance which is 5% more efficient than the default choice is possible across most gas appliance types, and often involves minimal additional cost to the consumer.

As the introduction of MEPS and BAU efficiency improvements are likely to make it more difficult to select a product which is 5% more efficient that the BAU selection, it has been assumed that after three years the impact of the labelling scheme decreases by 10% per year for the remaining seven years of the modelling.

The model used sales forecasts for Australia and New Zealand, based on the information previously discussed concerning sales trends. For New Zealand, it has been assumed that sales of space heaters and ducted heaters will remain constant for ten years, as there was conflicting information regarding whether these sales were increasing or in decline.

Estimates of average national energy consumption per appliance type were developed from previously published product profiles or RIS, and their underlying models, for gas ducted heating, gas space heating and gas water heating. For space heating, only sales and savings from flued space heating was considered, as there is not the variation in the efficiency of unflued heaters for consumers to select a 5% more efficient heater. Decorative/flame effect heaters were also excluded as these are not yet covered by the gas labelling program.

Other assumptions used in the modelling included:

- Government costs consisted only of the additional costs of introducing/altering the labelling scheme. These include promotion costs, program administration and compliance costs. The promotion costs were expected to halve after three years once the labelling scheme was established.
- Government costs involved in revising testing procedures and standards are assumed to be absorbed as part of the introduction of MEPS for gas ducted heaters, space heaters and water heaters. However, an additional $200,000 in costs were assumed to cover revision of energy rating algorithms and label design. These costs were allocated to Australia.
- Government and supplier costs would increase significantly if it is assumed that gas labelling was introduced/revised without the introduction of MEPS and associated testing. Government costs for the development of MEPS testing procedures, the revision of the Standards and any regulatory changes to enable MEPS enforcement are estimated at $400,000 for gas ducted heaters and space heaters. This cost has been excluded from the labelling cost benefit analysis, as the introduction of MEPS is assumed.
- No additional supplier costs were assumed for Australia as it was assumed that products would already need to be tested for MEPS compliance, and all Australia's appliances already have gas labels affixed. In New Zealand it was assumed that suppliers would incur a cost of $1.00 per appliance sale to affix gas labels, though many appliances will have already had labels. No additional testing costs are assumed if appliances in New Zealand are required to be MEPS compliance requirements.

- The model used discounted cash flows and assumed a discount rate of 7%.
- Real price increases in energy tariffs were assumed, with an increase of 3% p.a. assumed.
- The modelling was undertaken for ten years, on the assumption that the labelling scheme might become significantly altered after that period.

Table 4: Annual Government Costs of Labelling Scheme

Country	Government Costs	Years 1-3	Year 4-10
Australia	Promotion	$700,000	$350,000
	Management and Compliance	$300,000	$250,000
	Standard Development, assuming MEPS	$300,000 Year 1 only	
New Zealand	Promotion	$200,000	$100,000
	Management and Compliance	$150,000	$75,000

Modelling Results

The modelling results indicate that the gas labelling scheme, if made a national E3 scheme in Australia and introduced in New Zealand, would be cost effective if realistic assumptions are made about the behavioural change that the scheme would produce in consumer product selection.

For Australia and New Zealand, if 1% of consumers make a purchase which results in them installing a product which is 5% more efficient than they would have otherwise chosen, the energy costs savings benefits will exceed the costs of the Australian scheme. In both countries it appears highly feasible that an effective gas labelling scheme could induce this level of behavioural change, even given the extent that consumers are excluded from many gas appliance purchase decisions.

Assuming these minimal levels of behavioural change occur, then the resulting discounted costs, benefits, energy and emission savings are as shown in the table below. It is worth noting that the behaviour of the consumers has been adjusted to make the benefits match the costs of the program, so large net benefits should not be expected from the modelling analysis. If the labelling programs have greater impacts, which is entirely feasible, then the net benefits will be larger.

Table 5: Benefits and Costs of Labelling Scheme with Minimal Behavioural Impacts

Country	Benefits	Costs	Net Benefits
Australia	$5,977,698	$5,932,347	$45,351
New Zealand	$2,404,980	$2,392,352	$12,629

The energy and greenhouse emission impacts are shown below.

Table 6: Benefits and Costs of Labelling Scheme with Minimal Behavioural Impacts

Country	Energy Savings (GJ)	Greenhouse Emission Savings (CO_2.etonnes)
Australia	648,712	38,023
New Zealand	92,509	5,551

10. Conclusions

The analysis of the options for gas labelling in Australia indicates that changing the present industry led labelling scheme to a mandatory energy efficiency labelling scheme under the management of the E3 program is the most desirable option. While a labelling scheme currently operates in Australia as part of gas appliance certification, there are some significant problems with the existing scheme including:

- lack of a rigorous compliance and enforcement regime.
- lack of accountability for the operation of the scheme, as there is no government or industry body responsible for maintaining the scheme, ensuring its integrity and driving improvements.
- current test standards and labelling algorithms have become out-dated and are not accurate or repeatable enough to form the basis of a regulatory regime.
- no requirement to re-label or re-certify appliances when methods of test and labelling requirements change.

By enabling the labelling scheme to be managed centrally and by assigning the authority and responsibility of the scheme to the E3 program, the Australian gas labelling scheme will be able to receive the management attention and resources it requires to operate effectively. This change will enable the scheme to be properly promoted, deficiencies in the scheme to be attended to and for enforcement of compliance to be undertaken.

Preliminary consultation with industry stakeholders indicated that they already consider that there is a mandatory gas labelling scheme in place in Australia, but there is still some interest in it being improved. In New Zealand, generally industry stakeholders saw introducing a labelling scheme as challenging but they are also keen for there to be consistency with any Australian scheme.

Modelling has shown that if the proposed mandatory gas labelling scheme only influences 1% of relevant appliance purchases in the first 3 years of the scheme, so the consumer chooses an appliance 5% more efficient than they would otherwise have done, then the benefits of adopting the scheme in both Australian and New Zealand will exceed the costs of such as scheme.

Introducing the scheme to New Zealand would enable consumers to make informed decisions about their gas appliance selection, removing an existing distortion or failure of the market. The cost of introducing the scheme to New Zealand for appliance suppliers is relatively low, as the vast majority of gas appliances the scheme is expected to cover are already tested to the relevant Australian Standards. Government costs would be limited to scheme promotion, management and compliance costs, assuming the Australian labelling scheme design is adopted.

Given these findings, there appears to be sufficient arguments that the implementation of a trans-Tasman Government energy rating labelling scheme for gas products to be further progressed. A Regulatory Impact Statement should explore the unbundling of the gas product safety regulations from the energy efficiency regulations in Australia, and the moving of the responsibility and authority of managing the current mandatory gas labelling scheme to the E3 program. Exploring the introduction of a mandatory labelling scheme should extend to New Zealand with the scheme based on a joint (E3) gas labelling program. For both countries, the introduction of the new mandatory gas labelling scheme could be done together with the introduction of MEPS for the relevant appliances if practical, as this would significantly reduce the labelling scheme costs and improve its cost effectiveness, while also addressing some of the split incentive issues.

11. References

Main links for international research:

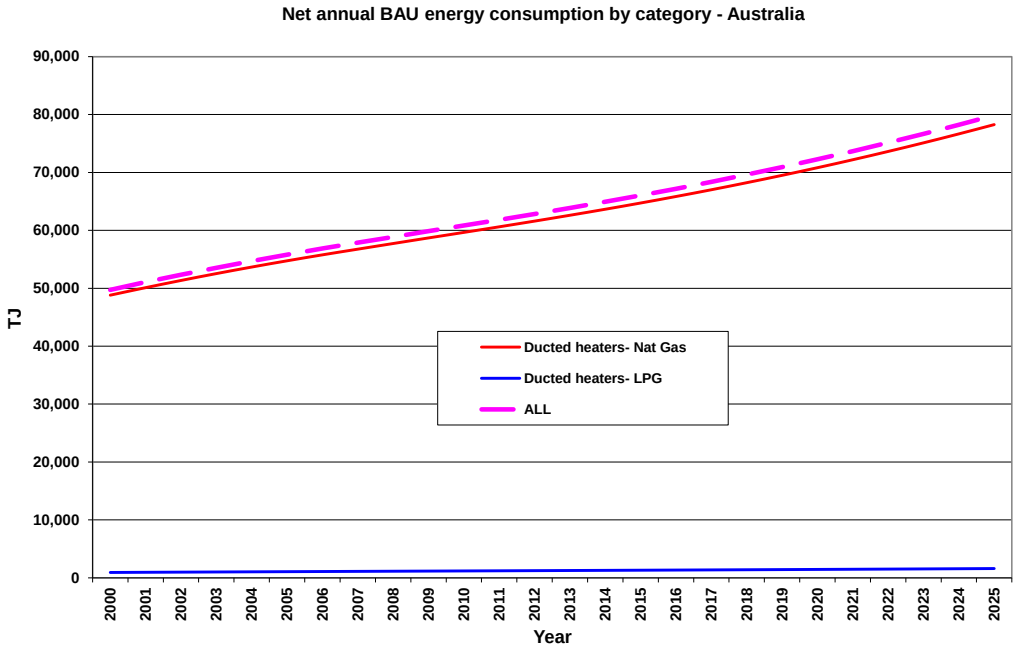
- CLASP
  - http://www.clasponline.org/clasp.online.worldwide.php
- Natural Resources Canada
  - http://oee.nrcan.gc.ca/residential/personal/heating.cfm?attr=4
- Ecodesign
  - http://www.eup-network.de/product-groups/overview-ecodesign/
- ENERGY STAR®
  - http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=FU
- NZ Energy Prices
  - http://www.med.govt.nz/templates/MultipageDocumentTOC____44776.aspx

Ducted Gas Heaters

Energy Consumption and Emissions

The historical and projected energy consumption by gas ducted heaters in Australia and New Zealand has been estimated using a stock/sales model that is combined with various appliance and usage attributes. The total estimated Australian annual energy consumption by gas ducted heaters is shown in Figure 1, with energy consumption estimated to grow from 49 PJ pa in 2000 to 80 PJ pa in 2025. The increase in energy consumption is largely due to the increasing stock of gas ducted heaters.

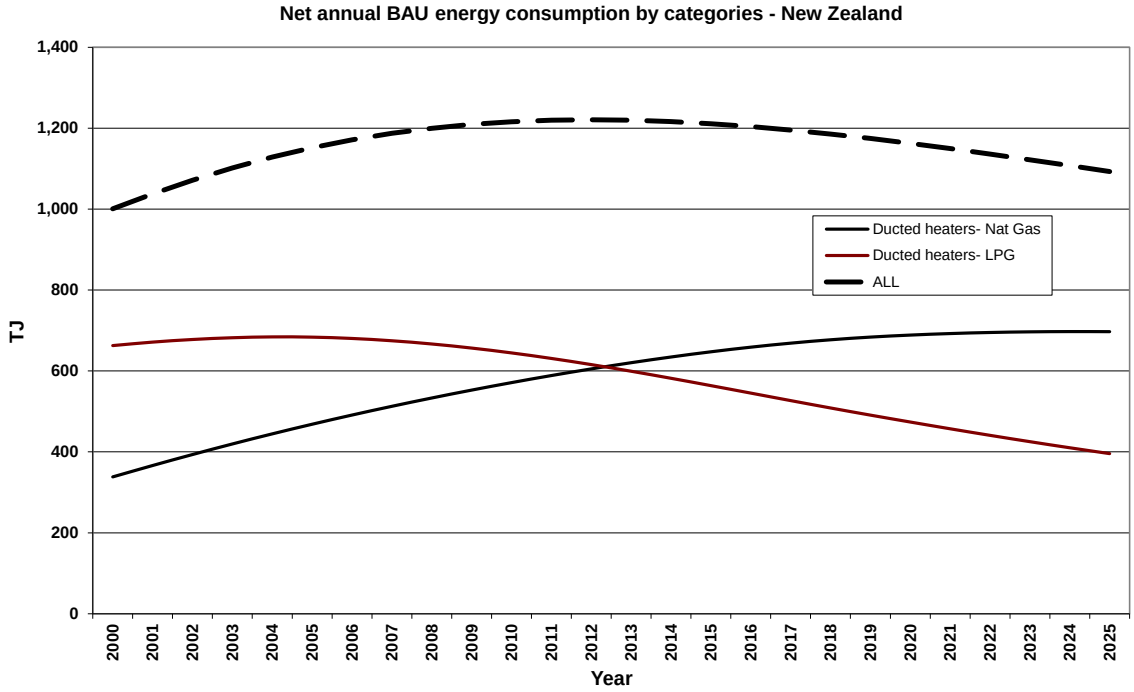
Figure 1: Gas Ducted Heaters - Australian Annual Energy Consumption by Category 2000 - 2025



The estimated energy consumption of GDH in New Zealand is shown in

Figure **2**. Total consumption is projected to grow from 1 PJ in 2000 to 1.2PJ over the period 2009 to 2012, and then decline to 1 PJ by 2025, due to a declining stock of gas ducted heaters.

Figure 2: Gas Ducted Heaters - New Zealand Annual Energy Consumption by Category 2000 – 2025 note the scale is in TJ for better separation of trend lines



Sales trends

The sales of gas ducted heaters in Australia are expected to continue to grow at a modest pace, but to continue to decline in New Zealand, as shown below.

Figure 3: Gas Ducted Heaters Annual Sales 2000 to 2025- Australia

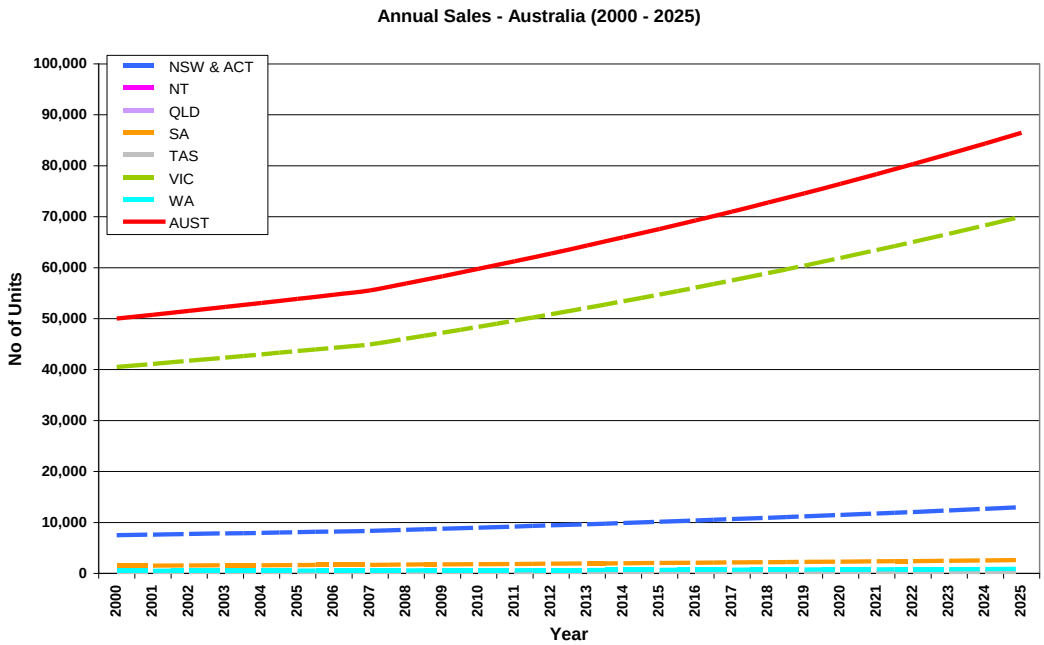
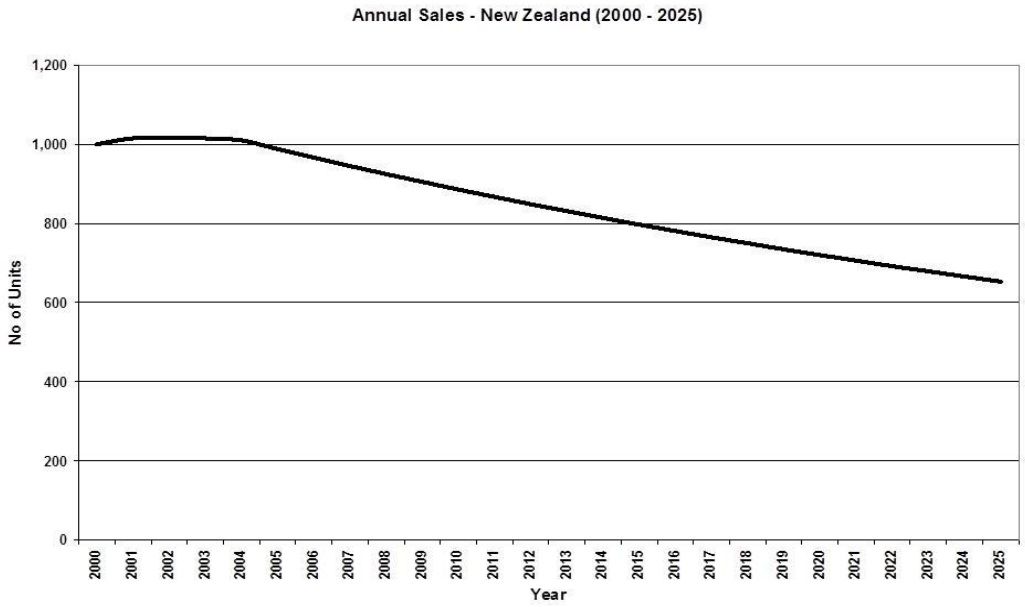


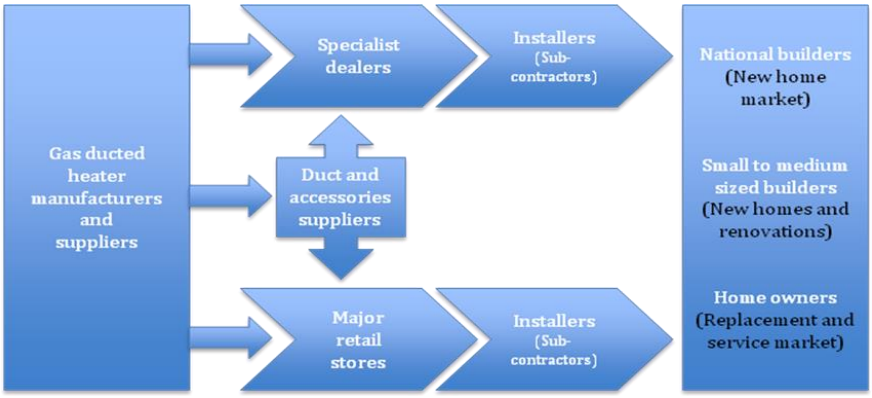
Figure 4: Gas Ducted Heaters Annual Sales 2000 to 2025- New Zealand



Market Structure

The gas market stakeholders and the structure of the market is summarised in the figure below.

Figure 5: Gas Ducted Heater Market Structure



The major players in the market are:

- Major Suppliers- Australia
  - Carrier Air Conditioning (Brivis)
  - Climate Technologies (Vulcan, Bonaire Vulcan, Pyrox, Bonaire Pyrox)
  - Seeley International (Braemar)
  - Heatcraft Australia (Lennox)
  - Omega Climate Systems
  - Eco Pacific (commenced operating in 2006 purchase Stadt Industries business).
- Major Suppliers- New Zealand
  - Warm Air (Brivis);
  - Ducted Heating Supplies (Braemar);
  - Energy Products (Braemar and Lennox);
  - Complete Heat (Braemar), and
  - Abergas with Happy Home outlets (Bonnaire Vulcan)

Note: All suppliers also operate in Australia.

- **Installers/Contractors**: consist of more than 300 small to medium sized contracting businesses in Australia and also large number of small to medium sized contractors in New Zealand.
- **Duct and accessory suppliers**: Polyair, Paltech, Advantage Air, Westaflex, Bradflow, Vic Air Supplies, Air Plus, and The Ventilation Warehouse.

The market segments by sales numbers can be defined as:

- New homes builder market 50%
- Renovations making up 20% to 25%
- Replacement in existing homes (25 to 30%)

The breakdown of sales in Australia indicated about 80% of units are sold in Victoria, 10% in ACT, 5% in NSW and the balance in SA, NT, WA and Tasmania. The growth in air conditioner sales has probably has impacted on GDH sales, reducing their growth rate. Sales of gas ducted heaters are presently above 50,000 p.a. and are assumed to grow slightly at 2.5% p.a. from 2008, based on current trends.

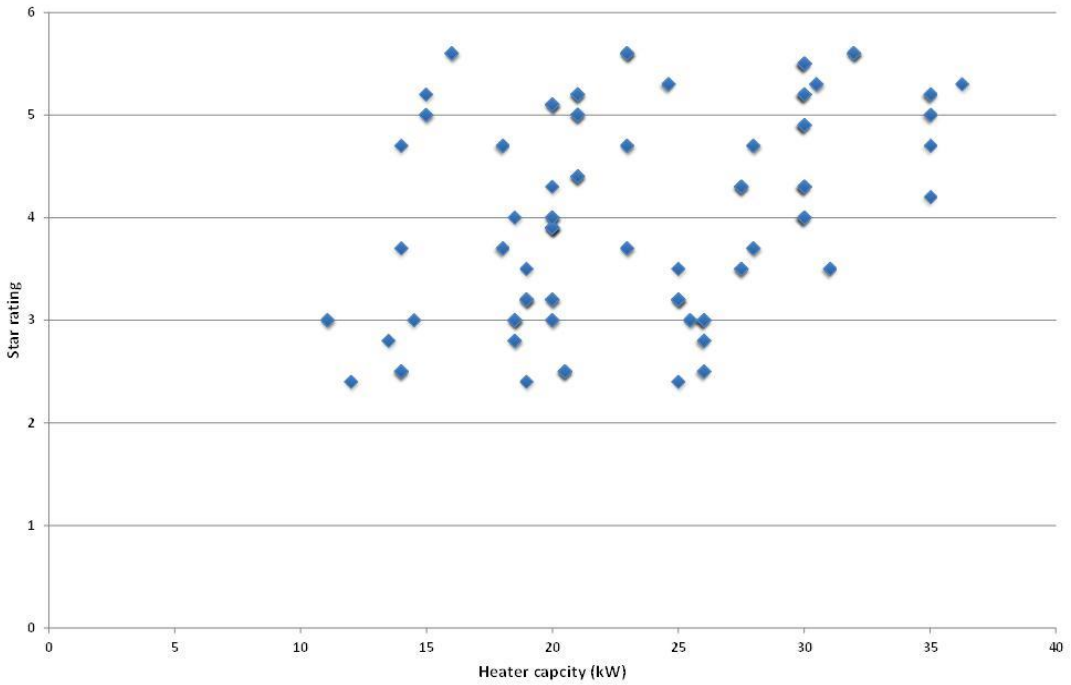
A different sales picture occurs in New Zealand, as sales have been declining since around 2004 and are forecast to continue to decline at around 3%, though interviews with industry representatives suggest this decline is now not occurring. Current sale are around 1,000 p.a. The vast majority of gas ducted heaters sold in New Zealand are imported from Australian manufacturers/suppliers with a very small portion of commercial heaters, such as gas-electric roof top packaged and unit/duct heaters, imported from North America.

The average life of gas ducted heaters is between 15 to 25 years, with the industry sources suggesting that about 50% of the heaters are replaced after 20 years. The implication of this is that in Australia the total installed stock of gas ducted heaters will continue to grow given the current sales volumes, and the efficiency of these heater is of additional importance given the relatively long life of the heaters. However, the sales forecast in New Zealand is unclear so the number of GDH may or may not peak in the next few years.

In terms of the efficiency trends of gas ducted heaters, the older standard efficiency heaters of 1 to 2 stars have become largely obsolete over the last 10 years. There are only mid and high efficiency heaters now in the market with a range of models from 2.4 to 5.5 stars. High efficiency heaters estimated to be around 25% of total sales in 2008/09.

In terms of Seasonal Operating Efficiency, the range of efficiency of models is from 59% to 90%. The high efficiency models have minimal scope to improve technical efficiency, perhaps up to 95%, but the mid-range efficiency GDH have the potential to considerably improve from 70% to 85%. The figure below indicated the distribution of star rating by capacity of GDH.

Figure 6: Star Rating of Models by Capacity

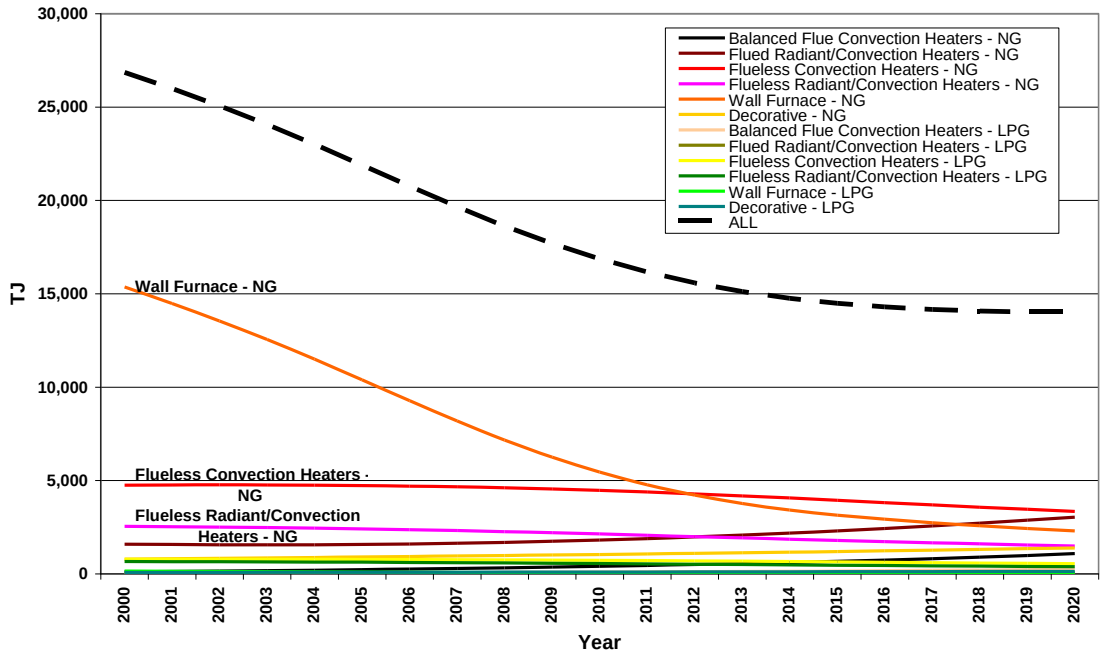


Gas Space Heaters and Decorative Appliances

Energy Consumption and Greenhouse Emissions

The historical and projected energy consumption by gas space heaters in Australia and New Zealand has been estimated using a stock/sales model that is combined with various appliance and usage attributes. The total estimated Australian annual energy consumption by gas ducted heaters is shown in Figure 7 with energy consumption estimated to decline from 27 PJ pa in 2000 to 14 PJ pa in 2020. The decrease in energy consumption is largely due to the decreasing in the stock of gas ducted heaters, especially of wall furnaces.

Figure 7: Space Heater Annual Energy Consumption by Category 2000 – 2020- Australia



The estimated natural gas and LPG consumption from space and decorative heaters are shown in the Table 7 and Table 8. These indicate an approximate consumption of 2.3 PJ in 2007/08 of LPG and natural gas in combination. The trends for LPG between 2006 and 2008 also suggest a decline in gas space heating is occurring.

Table 7: Natural gas home heating energy use- New Zealand

Type of burner	Energy consumption PJ/ year, 2007
Space Heaters (excluding central heaters and decorative appliances)	1.03
Decorative Appliances	0.11
Total	1.14

Source: Environet 2009

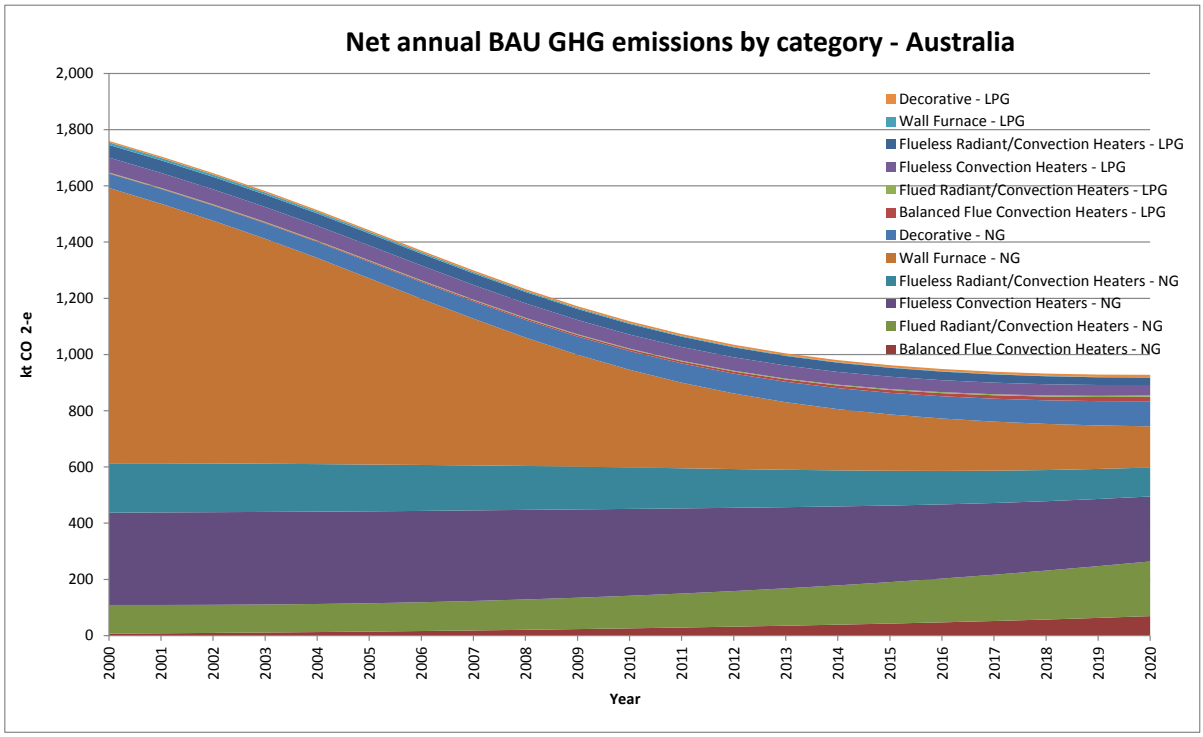
Table 8: Bottled and piped LPG home heating fuel consumption and energy use- New Zealand

	2006			2008		
Burner Type	Households using	Annual fuel consumption Tonnes/ year	Total PJ/ year	Households No.	Annual fuel consumption Tonnes/ year	Total PJ/ year
Space Heaters	325,683	45,684	2.3	163,894	22,890	1.1
Decorative Appliances	9,310	1,341	0.1	9,310	1,341	0.1
Total	334,993	47,025	2.4	173,204	24,231	1.2

Source: *Environet 2009*

The estimated greenhouse gas emissions for Australia by category from 2000 to 2020 are shown in Figure 8.

Figure 8: Space Heater Annual Greenhouse Gas Emissions by Category, Australia 2000 – 2020 (kt CO_2-e)



The greenhouse gas emission estimates for New Zealand from natural gas and LPG residential heaters and decorative appliances are shown in

Table 9.

Table 9: Summary of Greenhouse Gas Emissions by Fuel: Residential Gas Space Heaters and Decorative Appliances

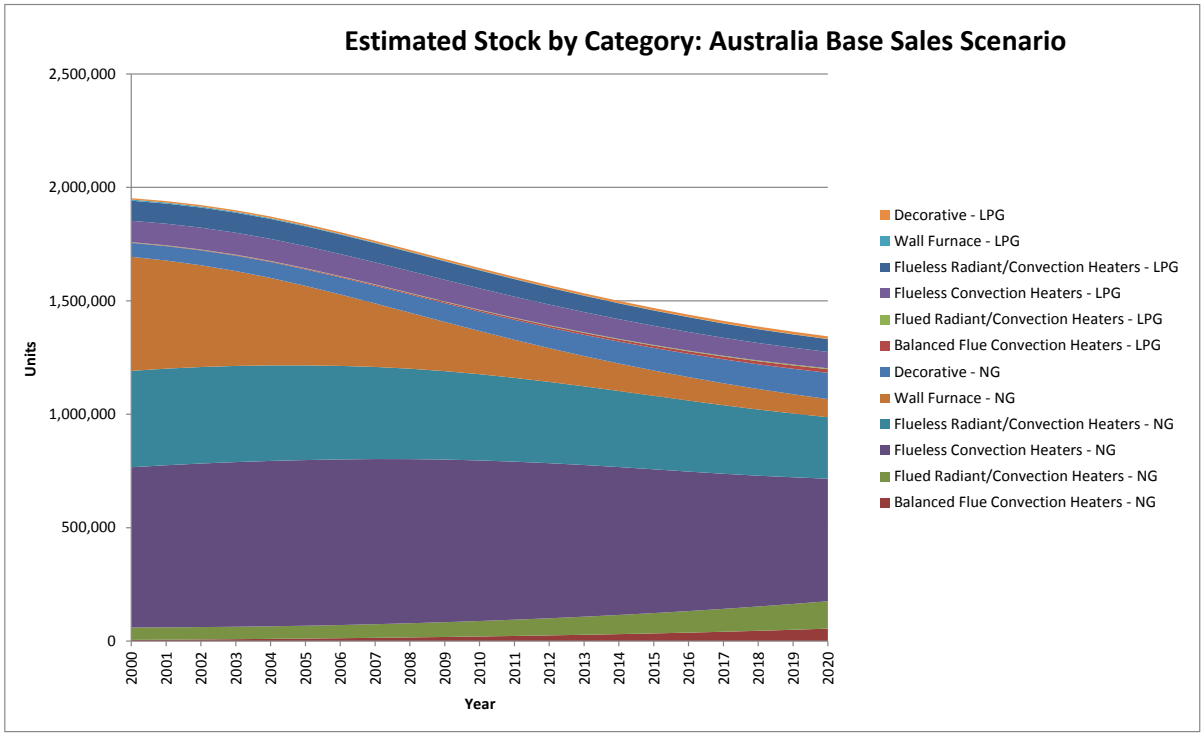
Fuel Source	Total (kt CO_2-e /yr)	Space Heaters (kt CO_2-e /yr)	Decorative Appliances (kt CO_2-e /yr)	Radiant Outdoor Heaters (kt CO_2-e /yr)
Natural Gas (2008)	74	54	6	1
LPG (2007)	166	137	4	8
Total	240	191	10	9

Source: Environet 2009

Stock and Sales Trends

The number of households who use non-ducted gas space heaters as their main form of heating has decreased during the period from 2002 to 2008, according to data from the ABS 4602 time series reports. These reports shows that the number of households using non-ducted gas heating has declined by 6.5% from 2002 to 2008. This is a decline of approximately 1% per annum. This is reflected in Figure 9.

Figure 9: Estimated Stock of Gas Space Heaters by Category 2000 - 2020



Source: ABS 4602 from 2002, 2005, 2008

The sales by category of gas space heater from 2006 to 2008 in Australia are presented in summary form in Table 10.

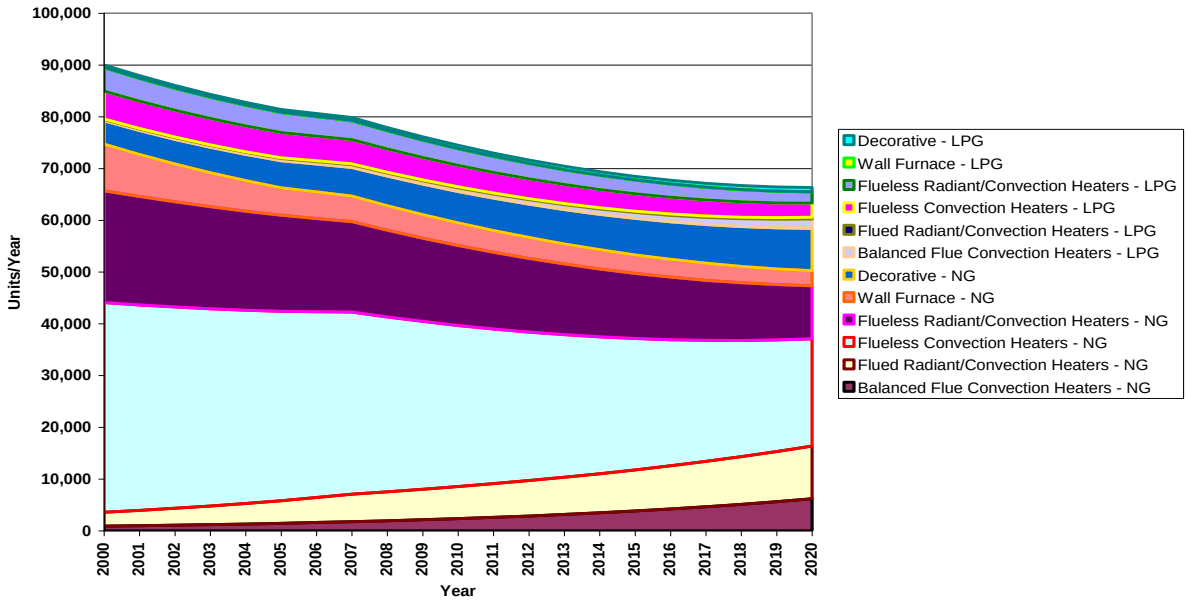
Table 10: Sales of Gas Space Heaters, Australia (2006 - 2008)

Category	2006	2007	2008
Balanced Flue Convection Heaters	2,811	3,466	3,955
Decorative*	10,000	10,000	10,000
Flued Radiant/Convection Heaters	4,699	4,631	4,268
Flueless Convection Heaters	31,303	30,058	30,935
Flueless Radiant/Convection Heaters	19,817	20,948	18,934
Wall Furnace	2,851	2,764	2,638
Total	71,481	71,867	70,730

*** Decorative is based on industry estimate. Source** GfK 2008.

The information on stock and sales trends have been used to develop sales forecasts for Australia, shown in Figure 10. They suggest a decline in annual sales, but that significant sales will continue for the next ten or more years.

Figure 10: Estimated Sales of Gas Space Heaters by Category 2000 – 2020- Australia



For New Zealand, there is less information available on decorative and space heating sales and stock. Table 11clearly indicates a decline in the use of gas heating, for the period 2005 to 2008 but imports of gas heaters had been growing till 2007, so it is possible that the decline in 2008 may be the result of short term economic conditions due to the global financial crisis. The total number of gas and dual fuel heaters imported into New Zealand in 2007 is estimated to be around 70,000 units, but the number of sales of New Zealand manufactured units in unknown. Approximately half of these units were portable LPG gas heaters.

Table 11: Reported home heating methods, main living area, 2008 and 2005- New Zealand

	2008 Heating Methods				2005 Heating Methods			
	%	Total	Mains	Bottled	%	Total	Mains	Bottled
Total Flued gas	8%	123,121	75,999	63,181	9%	134,939	82,462	52,476
Flame effect – Flued	2%	31,151	25,076	12,395				
Other Space Heater - Flued	4%	91,970	28,947	34,304				
Unflued gas	13%	185,423	42,244	127,120	24%	352,339	59,973	292,367
Total Gas	21%	308,543	118,242	190,301	36%	487,278	142,435	344,843

Regarding the stock trends for New Zealand, if it is assumed the households connected to reticulated gas use gas space heating, and the number using portable gas heaters is added, then a total of 625,000 used gas space heating in 2007, though this number would have declined in 2008. Import data suggests that in 2007 imports are around 20,000 p.a. more than is required to satisfy the need to meet existing stock turnover. This suggests the New Zealand stock of gas space heaters was growing up until 2007, but if the decline in imports in 2008 has continued as a trend, then the stock numbers will have stabilised.

Market Structure

For Australia, there are 31 suppliers of gas space heaters and decorative appliances listed in the AGA Certified Product Directory (Aug 2008)[11], with over 40 brands and more than 190 models[12]. Flued radiant/convection heaters have 88 models listed followed by decorative appliances with 38 models.

Approximately half of the suppliers manufacture these units in Australia, which represents 40% of total number of models in the AGA Certified Product Directory. The major countries of origin of the imported models are Japan, USA and New Zealand. For decorative appliances, Australia and the USA represent the major source of models on the market.

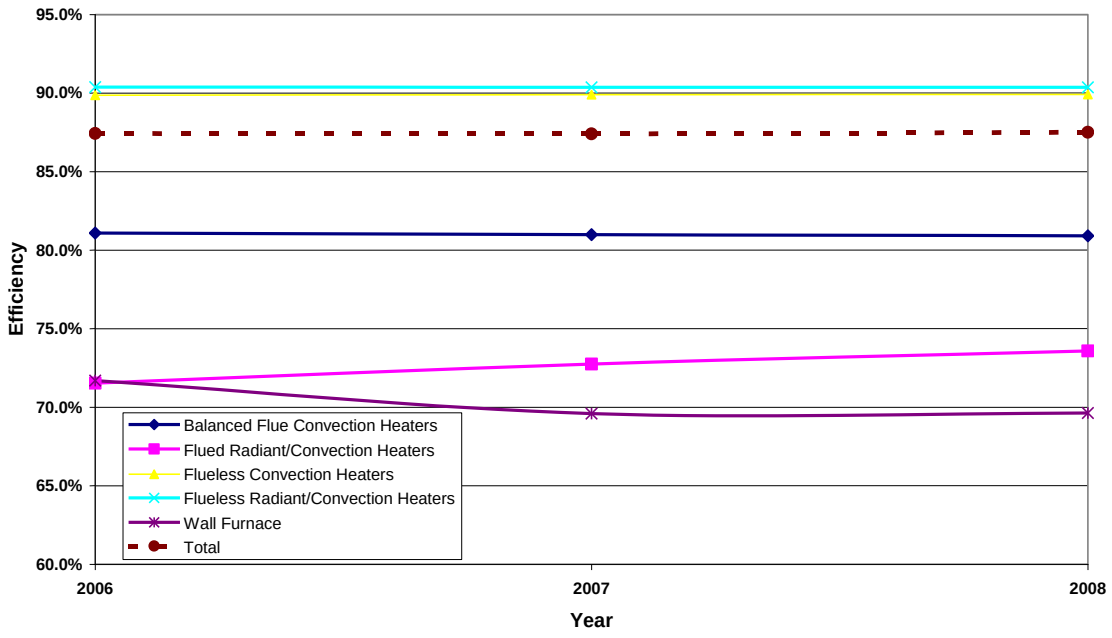
Analysis of the GfK sales data from 2006 to 2008 shows that the vast majority of gas space heater sales are dominated by Rinnai, Everdure, Paloma and Vulcan. An estimated 70% of the units sold in the market are imported.

For New Zealand, there are 18 suppliers and/or importers of gas space heaters and decorative appliances . There are 27 companies that manufacture gas heating appliances for the New Zealand market and a third of these are New Zealand based. However, the proportion or number of space heaters manufactured in new Zealand is unknown. Import data suggests around 75% of gas space heaters imported are imported from China and almost none are manufactured in Australia, with the rest from Argentina, Canada, the United Kingdom, the United States of America, Norway, Canada, Japan and South Africa.

Efficiency Trends

The sales weighted average thermal efficiency for space heaters was determined for Australia for space heaters by category from 2006 – 2008, as shown in Figure 11. No such data was available for New Zealand.

Figure 11: Sales Weighted Average Net Efficiency by Category 2006 – 2008- Australia



11 Though other certifying bodies also list suppliers and products, the number they list is relatively small, e.g. in early 2009 the SAI Global's Gas Safety Certification Scheme contained three suppliers with approximately 10 products certified to AS 4553 and one to AS 4558. Consequently the AGA Directory was used as the prime data source.

12These represent the principal models with many variations in colour, natural gas or LPG, and other features

It appears that average net efficiency of appliances is relatively stable, but this analysis is based on only three years of data, so it is difficult to determine if any changes represent long term trends. The net efficiency of flueless convection and radiant/convection heaters is close to their theoretical maximum of 90.4%.

Table 12: Sales Weighted Average Net Efficiency by Category 2006 -2008- Australia

Category	2006	2007	2008
Balanced Flue Convection Heaters	81.08%	80.99%	80.91%
Flued Radiant/Convection Heaters	71.53%	72.75%	73.58%
Flueless Convection Heaters	89.86%	89.90%	89.91%
Flueless Radiant/Convection Heaters	90.38%	90.36%	90.37%
Wall Furnace	71.70%	69.60%	69.63%
*Decorative**	*15%*	*15%*	*15%*
Total (excluding Decorative)	87.42%	87.40%	87.50%
Total (including Decorative)	77.27%	77.31%	77.14%

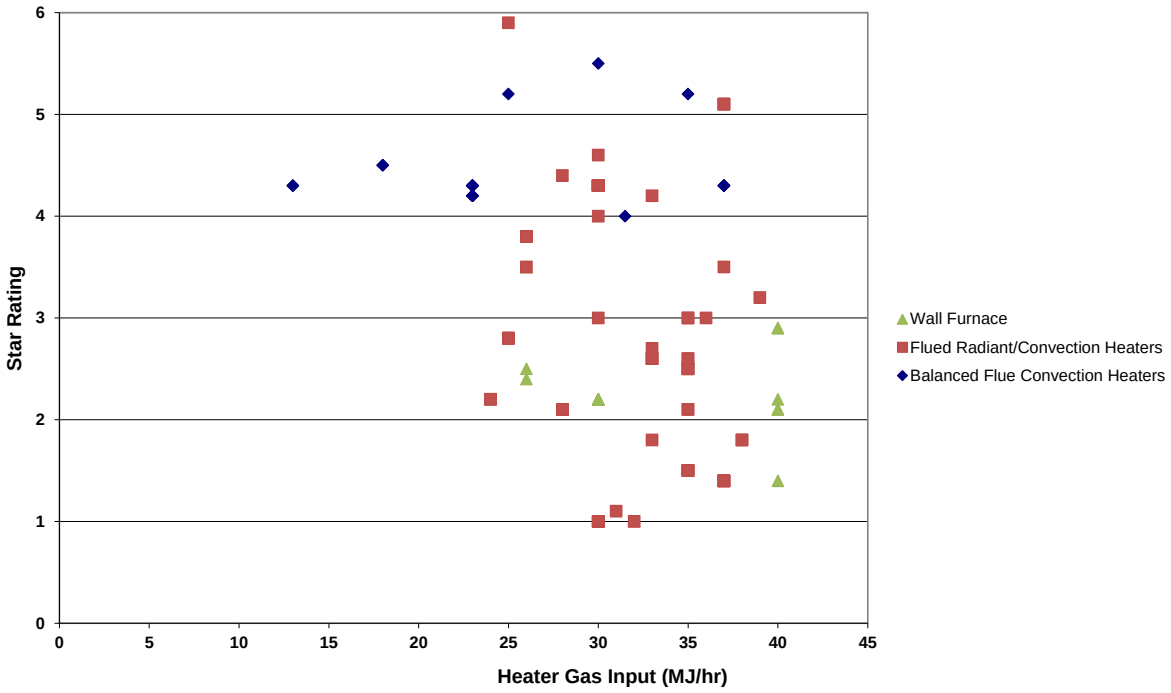
***Decorative net efficiency determined from product information on heat output and input gas consumption**

Source: *Analysis of GfK Sales and AGA model data*

The range of star ratings by model and gas input (MJ/h) is shown in the following figures for each category of heater in Australia. The heaters listed in these figures are the models that are currently on the market for the period 2006 to 2008. No data was available for models sold in the New Zealand.

Although there is a range of efficiency over the five categories of heaters, the flued radiant/convection heaters show the largest spread of star ratings by model, while the flueless heaters provide the smallest range of star rating.

Figure 12: Star Rating by Model and Gas Input - Flued Heaters



There is sufficient variation in the efficiency of the gas space heaters on the market for a gas label to convey useful information to consumers for the flued categories. There is a wide range of star ratings for flued radiant/convection heaters, with a spread of models from 1 to almost 6 stars. This indicates that there is potential for consumers to choose a more efficient heater from the available models. Balanced flue convection heaters are designed to draw air for combustion from outside the home and heat is transferred to the room via a heat exchange. These types of heaters are generally more efficient and all models are 4 stars or more, as shown in Figure 12. Wall furnace type heaters range from 1 to 3.5 stars.

The flueless heaters provide the smallest range of star rating and are bunched between the 5 and 6 star rating (Figure 13 and Figure 14). However, some stakeholders including government consider the flueless heater ratings are misleading and testing and rating should include an allowance for room ventilation in their calculation, which if implemented might lead to a greater spread in their ratings.

Figure 13: Star Rating by Model and Gas Input - Flueless Convection Heaters

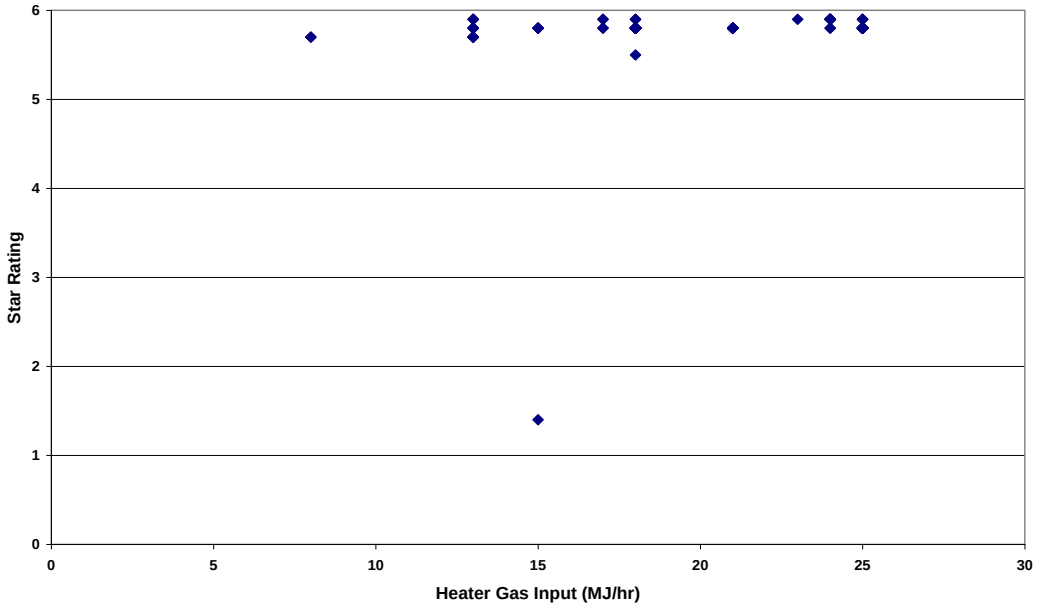
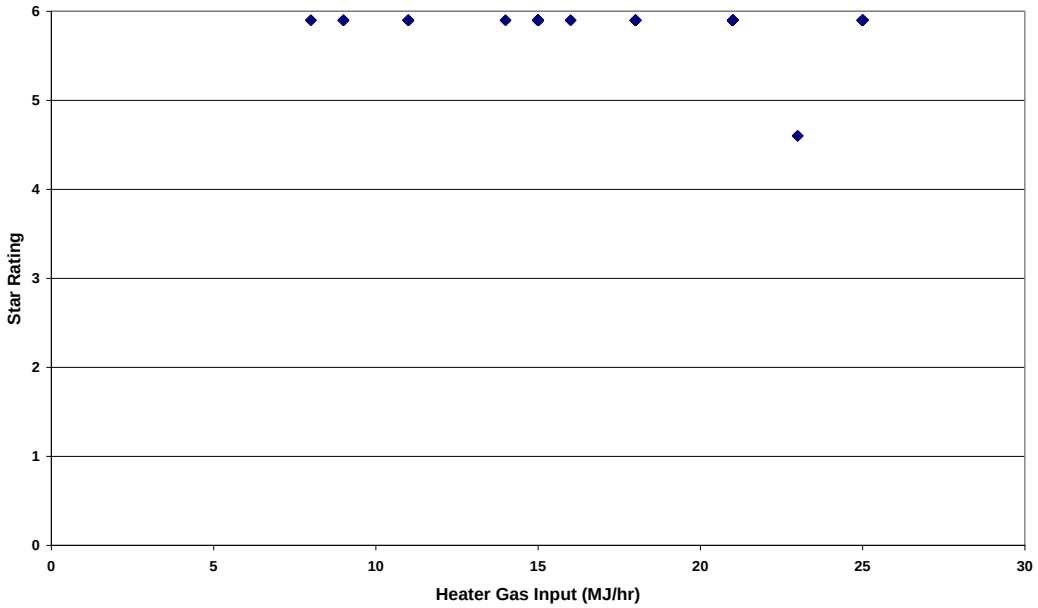


Figure 14: Star Rating by Model and Gas Input - Flueless Radiant/Convection Heaters



Gas Water Heaters

Stock and Sales Trends

The following stock and sales trends for gas water heaters have been observed:[13]

13 Information sourced from the RIS: Proposal to Introduce a Minimum Energy Performance Standard for Gas Water Heaters, commissioned by the Equipment Energy Efficiency Committee, October 2009.

- The projection for the stock to gas water heaters reported in the recently published national baseline study of residential energy use (EES 2008). This research indicated the stock of gas water heaters is projected to increase by 26% from 3.5 million in 2009 to 4.4 million in 2020. This is mostly the consequence of a growing population.
- Gas water heaters penetration increases marginally from 41.6% of households in 2009 to 43.6% in 2020.
- Sales of gas water heaters increase less sharply, by 12.5% from 288,000 in 2009 to 324,000 in 2020. This reflects a slower growth in gas water heaters after a long period of high growth in penetration over the last twenty odd years.
- Sales of gas instantaneous water heaters have grown rapidly since the mid 1990's and now form the majority of sales of gas water heaters. The remainder of the sales are principally divided between conventional three star storage heaters and more efficient five star storage heaters. It is anticipated the market share of five star storage heaters will decrease as instantaneous heaters become more popular, and the number of three star storage heaters sold will remain approximately static.
- There are also a small market of approximately 8,000 internal gas water heaters sold annually, satisfying a variety of niche markets.

In New Zealand, the following stock and sales trends for gas water heaters have been observed:

- Almost all gas storage water heaters, and all instantaneous heaters, are imported, so import data is a good indication of annual sales. This data indicated that sales of gas storage water heaters were around 7,000 p.a. and gas instantaneous water heaters were around 29,000 p.a. in 2006. Sales are expected to increase to around 45,000 in 2020 and by then the sales of gas storage water heaters is expected to decline to almost zero.
- Based on data from the Household Energy End-Use Project (HEEP) and import data, the penetration of gas water heaters is estimated to be between 13% to 17%, so a stock of approximately 250,000 gas water heaters.
- The HEEP study showed that of all storage water heaters, gas and electric, 91% were installed internally and 80% were in a cupboard inside the house. The standing heat losses from internal cylinders are used as an airing cupboard and to contribute to house winter space heating. However, as the proportion of gas storage water heaters of total gas water heaters is small and declining, this may not be a significant finding.

Market Structure[14]

Gas storage water heaters are manufactured in both Australia and New Zealand, and all but one of the water heater certifications in Australia are from the three suppliers – Rheem, Dux and Aquamax. Gas storage water heaters tend not to be imported to Australia, due to their size leading to high transport costs and the Australian market being sufficiently large to have support local manufacturing. However, New Zealand imports almost all of gas storage water heaters, mainly from Australia and a very small number from the USA. The exception for New Zealand is around 2,000 units for internal use which are manufactured locally by Rheem NZ.

In contrast, the vast majority of gas instantaneous water heaters are imported, mainly from Japan. Bosch and Rinnai have the longest history in this market, particularly Bosch. Dux and Rheem have obtained certifications for a range of these products since the late 1990s. Two Japanese suppliers, Tagaki and Chofu, have certifications dating from 2006 and 2007 respectively, and are now marketing products under several brand names. Bosch, Rinnai and Rheem appear to be the major suppliers to both the New Zealand and Australian markets, and market the same range of products in both markets.

There are also smaller Australian suppliers of gas instantaneous water heaters that assemble units from imported components. Two of these operate from Melbourne and Sydney – Douglas & Company and Servgas – and supply small markets for internal replacement units in flats. Primo-Tech is a new entrant to the gas instantaneous water heaters market. It has manufacturing facilities in Perth and made its first sales in 2007/08. There are two small New Zealand importers, Abergas and What Power Crisis. Abergas imports a small range of gas instantaneous and gas storage water heater brands that are owned by Paloma. Paloma is the Japanese multinational company that owns Rheem.

Overall, there are 12 suppliers to the Australian market, one supplying gas storage water heaters only, eight supplying gas instantaneous water heaters only, and three supplying both. There are five suppliers to the New Zealand market, three supplying gas instantaneous water heaters only and two supplying both. The New Zealand suppliers are either owned by multinational companies or dealerships for such companies.

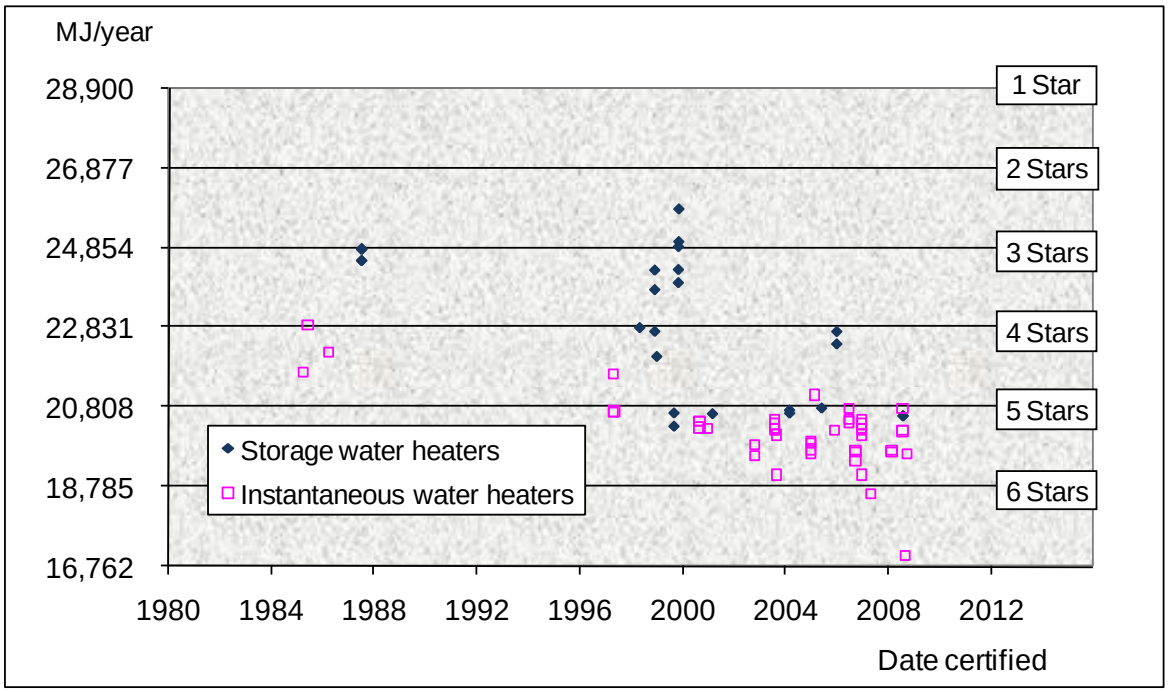
14 All market structure information sourced from the RIS: Proposal to Introduce a Minimum Energy Performance Standard for Gas Water Heaters, commissioned by the Equipment Energy Efficiency Committee, October 2009.

Efficiency Trends

The data available is for Australian certified products and does not enable the efficiency trends to be analyses in the same level of detail for gas water heaters that could be undertaken for space and ducted heaters. However, the figure below clearly shows an improvement of efficiency over time for externally fitted gas storage water heaters. Though gas storage heaters still are often classified as around 3 Stars, there are a number of more recently certified heaters which are rated as 4Stars or 5Stars. In addition, improvements in instantaneous water heaters mean now recently certified heaters are rated between 5* to 6.5 Stars. Though the trends cannot be quantified from the data, it is clear improvement in efficiency is occurring, and the introduction of the MEPS at 4 Stars in mid-2011 will further accelerate this trend.

The trend for internally installed gas water heaters is effectively the same as for instantaneous water heaters, as these are the only type of internal installed heater to be certified in the last 15 years.

Figure 15: Standardised energy consumption of externally installed gas water heaters by type and date of certification[15]



The efficiency trend for New Zealand can be assumed to be largely the same as for Australian water heaters, as the vast majority of gas water heaters sold in New Zealand are also sold in Australia.

15 From RIS: Proposal to Introduce a Minimum Energy Performance Standard for Gas Water Heaters, commissioned by the Equipment Energy Efficiency Committee, page 6, October 2009.

Gas Appliance Energy Efficiency Labelling: discussion paper

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