Energy Bill Benchmarking: Decision Regulatory Impact Statement

Prepared for

Standing Committee of Officials of the Ministerial Council on Energy

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Background

In August 2004 the MCE committed to implement a package of policy measures comprising the National Framework for Energy Efficiency (NFEE) Stage One Implementation Plans, noting the significant benefits that can flow from enhanced energy efficiency in Australia. The *NFEE Stage One Implementation Plans*, as approved by MCE, December 2004 note that:

> *Energy retailers will be required to include average energy consumption data on energy bills and also to allow end users to compare their energy consumption against an appropriate benchmark. The objective of this measure is to motivate energy consumers with above average energy consumption to implement energy efficiency improvements.*

This direction is subject to an objective analysis of the issue, and the implementation of an energy bill benchmark will only occur if the case for it is established through the RIS process. This document forms the Decision RIS for the RIS process.

Though the Consultation RIS covered both electricity and gas benchmarking, it became apparent when the impact analysis and cost benefit analysis were conducted that it would not be cost effective to introduce a benchmarking scheme for gas. Consequently the majority of the this RIS document focuses on introducing an electricity benchmarking scheme, though the impact and cost benefits of gas benchmarking are still analysed.

Considerable research has been undertaken exploring the potential implementation of an energy benchmarking program and what form of benchmarking might appeal to householders and affect their energy usage. Consultation with energy suppliers and other stakeholders has been conducted over several years and a Consultation RIS has been released. The potential conflicts and the complementary relationships of a benchmarking scheme with other energy efficiency and greenhouse emission abatement schemes has been reviewed, including schemes such as the carbon pollution reduction scheme (CPRS) and renewable energy targets.

Analysis of research on benchmarking schemes has been done and both water and energy benchmarking schemes were found to be successful both in Australia and internationally. For example, the preliminary analysis of the Ergon Energy trial of their energy benchmarking scheme showed, that energy benchmarking can be successfully implemented. Ergon is now rolling out bill benchmarking across their total network area. Other international energy benchmarking programs, such as Positive Energy in the USA, have also measured significant energy use reductions following the use of their benchmarking schemes.

The Problem

On 11 March 2008, Australia's ratification of the Kyoto Protocol was officially recognised by the United Nations Framework Convention on Climate Change (UNFCCC). Under Kyoto, Australia is obliged to limit its greenhouse gas emissions in 2008-2012 to 108 % of 1990 emission levels. The present Australian Government[1] is committed to meeting a long-term target of a 60 per cent reduction in greenhouse gas emissions from 2000 levels by 2050 and to a medium-term national target to reduce Australia's greenhouse gas emissions by between 5 per cent and 15 per cent below 2000 levels by the end 2020. A key contributor to Australia's greenhouse emissions is its residential energy use.

Residential energy use continues to grow, driven by both population growth, growth in the number of appliances we use and by the hours of operation of those appliances. Network infrastructure constraints and the need to manage peak demand are driving up energy prices. This will create social/economic issues, in addition to the greenhouse emission issues also caused by our rising energy consumption. However, there is considerable potential to reduce our energy consumption and researchers have estimated that an average savings of 13% of energy use per Australian household[2] are possible.

In order for householders to implement the cost-effective energy efficiency actions that are available to them, the market failure resulting from information asymmetry concerning the use of energy efficiency measures need to be overcome. Implementing the energy benchmarking scheme will help to overcome this lack of information, by enabling householders to identify when they are using excessive amounts of energy and helping to motivate them to modify their consumption. International research has confirmed the importance of information if householders are to control their energy usage and that householders do respond to the provision of such information.

The Objective of Government Action

The MCE's primary objective in their General Consumer Capacity Program under NFEE Stage One is:

> *To raise the awareness of consumers regarding the benefits of energy efficiency, to enable consumers to make better informed decisions about actions to reduce energy consumption, and to motivate general consumers to implement energy saving actions.*

The key element of the proposed changes is to introduce a requirement for energy retailers to provide benchmark data on household energy bills. Other secondary objectives include aiming to minimise implementation costs, to provide meaningful benchmark data to the householder, and to produce an efficient outcome that provides a net benefit to the community.

[1] Department of Climate Change and Energy Efficiency, *Carbon Pollution Reduction Scheme: Australia's Low Pollution Future*, December 2008

[2] The Private Cost Effectiveness of Improving Energy Efficiency, Productivity Commission Inquiry Report August 2005, p. 71

In light of the objective of producing an outcome which has net benefits for the community, the introduction of a gas benchmarking scheme has not been recommended, as the cost benefit analysis showed this could not produce positive net benefits. However, the electricity benchmarking scheme could and is further explored in the RIS document.

Energy Benchmarking Options

Three options are presented in the RIS due to the MCE requirement and the options examined are:

Option A: The status quo

Option B: Alternative benchmarking and aspirational targets

Option C: Mandatory energy bill benchmarking

Analysis of these options showed that only the introduction of a mandatory electricity benchmark scheme would address the market failure previously discussed. The market research and international experience reviewed supports the use of energy benchmarks as effective means of encouraging energy savings, as does the success of the Ergon Energy benchmarking trial.

Impacts and Cost/Benefit Analysis

The impacts of the proposed energy benchmarking scheme have been modeled and a cost benefit analysis conducted. This modelling uses conservative assumptions to reduce the risk of the modelling falsely predicting it would produce net benefits to the community. The potential impacts on the key stakeholders groups were analysed and the main impacts are:

- **Households**: The main impact on householders will be the availability of the benchmark information, which they will be encouraged to act upon. All households will also incur a cost of approximately one dollar per household per year, assuming the full costs of the scheme are passed through to the householder, while only those households that are prompted to increase their energy efficiency due to the benchmarking scheme will receive a direct benefit from the scheme. However, householders acting on the benchmark feedback could potentially reduce the energy use by on average 6.9%[3], saving approximately $75 p.a.[4] The cost benefit analysis estimated $191 million at present value in electricity cost savings could result from the benchmarking scheme, which is the equivalent of $20 per household for all households in Australia.

[3] Based on all households that act on the scheme achieving 5% energy savings through behavioural adjustments and but only 37% of these also achieving a further 5% savings from technical changes to increase their energy efficiency.

[4] Calculated using Australian household electricity costs at $1100 p.a.

- **Retailers**: The main impact on retailers will be a requirement to include an energy benchmark to all their bills sent to residential customers. They will incur costs in revising their systems to provide this information, in printing the benchmarks and in responding to the expected customer queries about the benchmark. The total national cost to the retailers is estimated at approximately $65 million[5] over ten years, at present value, but in the medium term it is expected the retailers will pass these costs through to the householders. Retailers will also potentially suffer from reduced gross revenues, equivalent to the householders electricity cost savings, which is the outcome of any successful energy efficiency initiative.

- **Distributors**: Electricity distributors are expected to be involved in the collecting the consumption data per post code that will be used to calculate the benchmarks. The main impact on distributors will be in the time and resources required by the distributors to create appropriate programs to extract the required data from their information systems and arranging for this data to be sent to the required government agency. The present value of the costs to the distributors is estimated at around $4-6M, but these costs are spread over ten years, and may be passed through to the householders.

- **Generators**: Will be only marginally affected by any reduction in residential electricity consumption.

- **Government and Regulator**: The main impact of the energy bill benchmarking program on the Government and/or the Australian Energy Regulator (or alternate body) will be the initial development and ongoing management of the benchmarks and making these available to electricity retailers. The cost for this data collection and analysis to undertake this task should be relatively small, provided the data is supplied in the right format, and will be around $100,000 to $150,000 nationally. The logistics of benchmark development and management tasks are still to be confirmed. If household size benchmarks are used there may be additional research costs to produce the appropriate algorithm.

Cost Benefit Analysis

The analysis is based on conservative assumptions, of which the most important are:

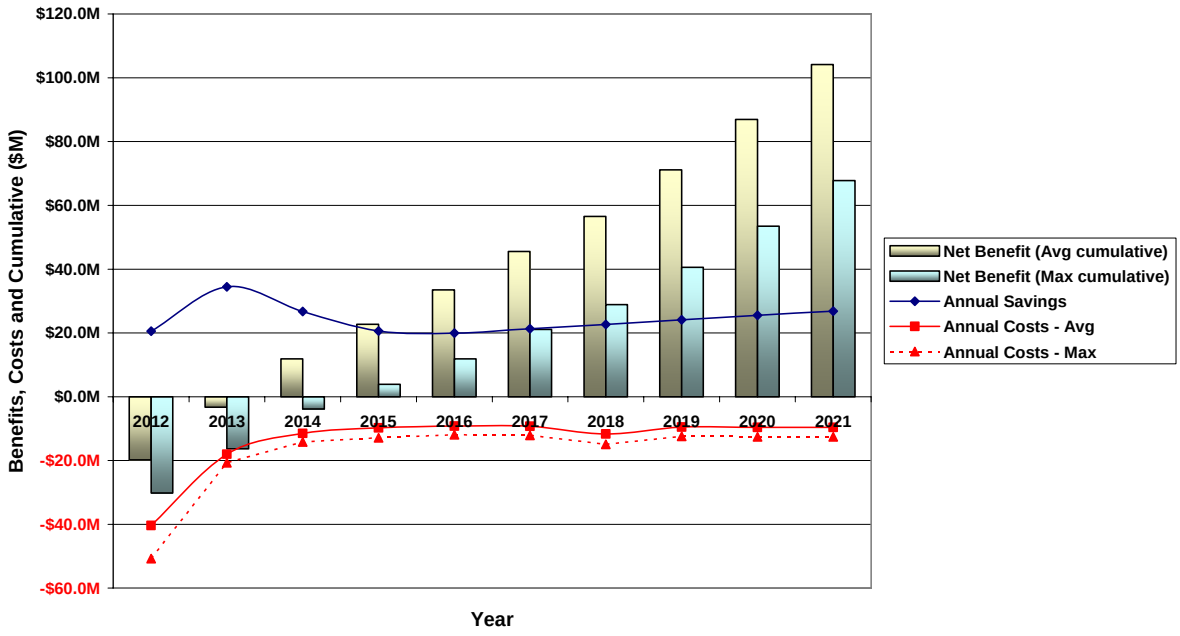
- Costs are based primarily on energy suppliers' estimates and both average and maximum estimates were used
- Householder costs to implement energy saving actions are included in the modelling

[5] This is the mid point of the maximum and minimum cost estimates developed from the cost feedback obtained from energy retailers via the stakeholder request for information.

- Only a low rate of uptake was assumed in the base case, with 2.5% of households responding in the first year and the response rate decreasing to 0.5% by year four
- A low rate of energy saving was assumed, 6.9% on average, for those acting on the benchmark which is around half of the 13% potential average saving identified by researchers[6]
- The maximum average energy savings assumed in the base case does not exceed 0.6% of residential electricity usage in any year.

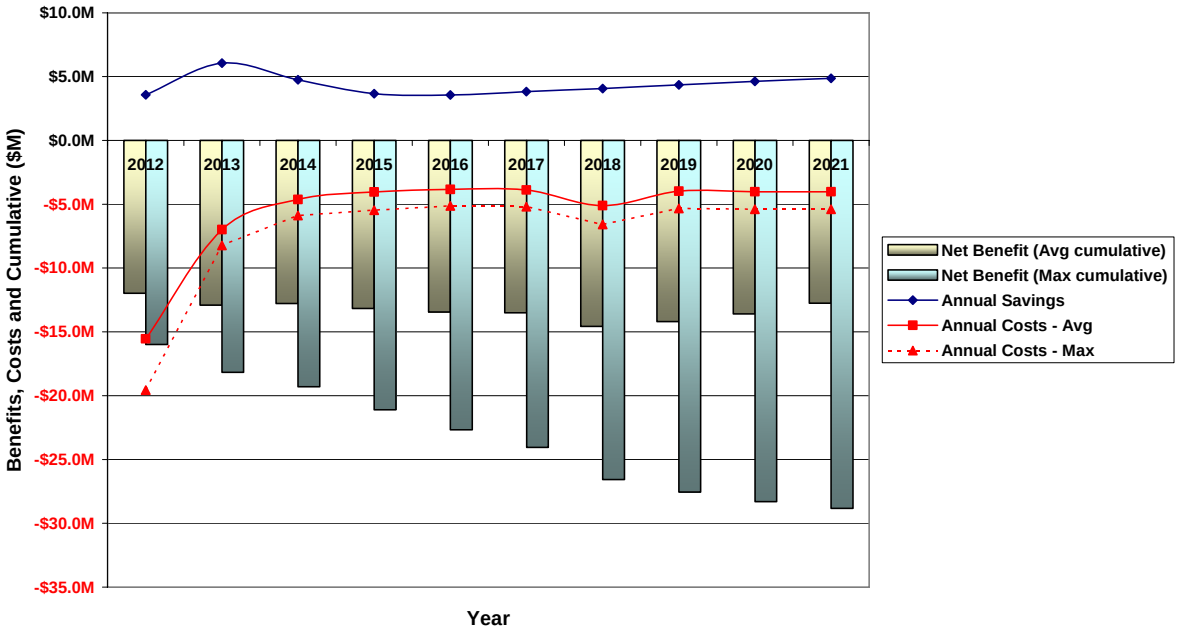
The modelling results showed that benefits exceeded costs for the base case scenario for electricity benchmarking, but not gas benchmarking. There was a net benefit from the electricity benchmarking scheme, assuming the program ran for ten years and incurred average costs of $69,503,667 NPV. The cumulative benefits, annual savings and annual costs for electricity and gas benchmarking are illustrated in the charts below.

Figure 1: National Cumulative Benefits and Costs for Electricity Bill Benchmarking



[6] The Private Cost Effectiveness of Improving Energy Efficiency, Productivity Commission Inquiry Report August 2005, p. 71

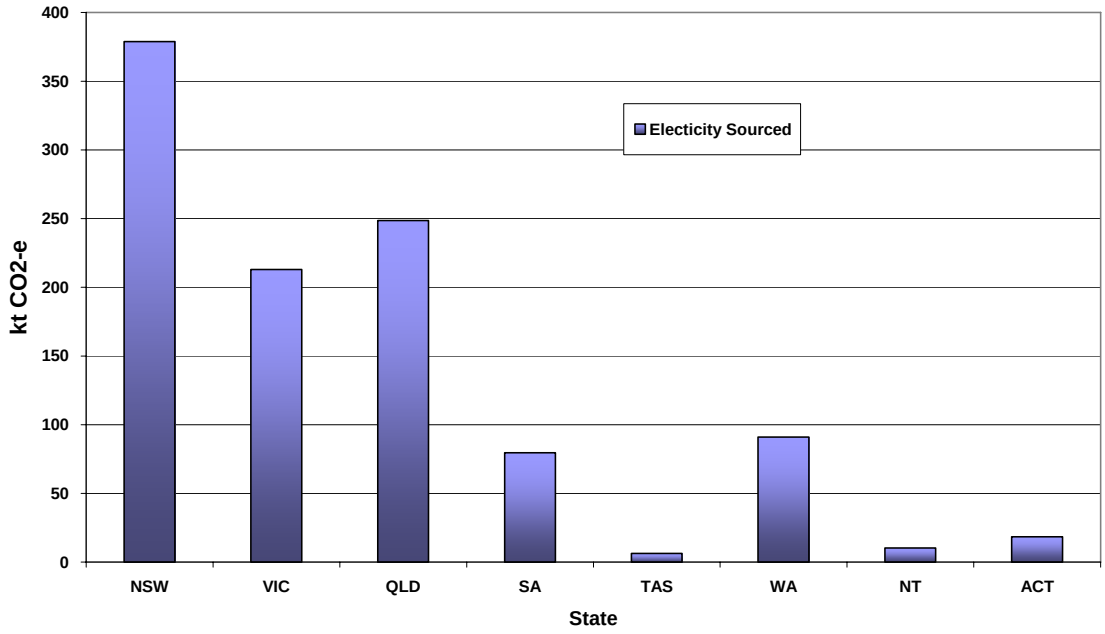
Figure 2: National Cumulative Benefits and Costs for Gas Bill Benchmarking



Other significant analyses and results included:

- A break even analysis was undertaken and the electricity benchmarking scheme produced net benefits, even if maximum costs were assumed, when uptake of energy efficiency actions by householders was only 1.5% in year one.
- The estimated maximum benefits, assuming a 5% uptake, were also modelled. This resulted in cumulative net benefits of over $166M at present value by year ten.
- An analysis of the impacts on the States and Territories revealed that the electricity benchmarking produced net benefits over ten years for all jurisdictions, under the base case scenario with average costs assumed.
- Greenhouse savings of around 1 million tonnes over the ten year life of the program, as illustrated below, are forecast.

Figure 3: Base Scenario: Projected Cumulative Greenhouse Emissions Savings by State -2021



Conclusions

Given the evidence of the existing information outlined in this document, it would appear that providing benchmarking information on utility bills does result in positive behaviour changes. The impact modelling and cost benefit analysis outlined in the document reveals that an electricity bill benchmark could provide net benefits that exceed costs even with a minimal level of influence of the benchmark on householders, defined as 1.5% of households being affected in year one. The base case of 2.5% uptake in year one resulted in a forecast net benefit of $69.5 million, and the maximum scenario with a 5% uptake resulted in a $166 million net benefit. These results strongly suggest that the electricity bill benchmarking could be cost effective and is recommended policy.

The impact modelling and cost benefit analysis conducted on gas bill benchmarking revealed that gas benchmarking would not be cost effective. For the base case scenario, assuming average costs and a 2.5% uptake, a net loss of approximately $13 million occurs. Negative NPV values for the gas bench marking scheme are also forecast under even the most optimistic scenarios. As gas energy costs for householders are usually much lower than their electricity costs, the cost savings from reduced gas consumption are also much lower, however the cost of implementing the benchmark scheme is roughly the same. This would explain why the projected cost savings from the gas benchmarking are insufficient to cover the costs of scheme. Consequently a gas bill benchmarking scheme is not recommended policy.

Introduction

Background

In August 2004 the MCE committed to implement a package of policy measures comprising the National Framework for Energy Efficiency (NFEE) Stage One Implementation Plans, noting the significant benefits that can flow from enhanced energy efficiency in Australia. Subsequently, seven implementation committees were formed (later reduced to six committees) to deliver on plans to achieve the goals of the NFEE. The Consumer Information Implementation Committee (CIIC) has the task of establishing a package to raise consumer awareness regarding the benefits of energy efficiency, to enable consumers to make better informed decisions about actions to reduce energy consumption and to motivate them to implement energy saving measures.

The *NFEE Stage One Implementation Plans*, as approved by MCE, December 2004 note that:

> *Energy retailers will be required to include average energy consumption data on energy bills and also to allow end users to compare their energy consumption against an appropriate benchmark. The objective of this measure is to motivate energy consumers with above average energy consumption to implement energy efficiency improvements.*

In response to this directive the CIIC was tasked with the Energy Bill Benchmarking (EBB) Project to develop an effective and efficient benchmark to provide electricity and gas consumers with greater information to improve energy efficiency. This direction is subject to an objective analysis of the issue, and the implementation of an energy bill benchmark will only occur if the case for it is established through the RIS process.

Role of an Energy Benchmark

The prime impact that energy benchmarking can have is in alerting high energy consumers that their consumption is above the norm, thereby potentially increasing their motivation to reduce their energy consumption. This will motivate the relevant households to reduce their consumption by:

- **Making reducing energy consumption feasible and realistic**: The benchmark information indicates to high consumption households that it is possible for them to consume less energy, as other comparable households are consuming less energy. This is important because people will not attempt to undertake anything unless they believe it is possible.

- **Quantifying their potential savings**: The benchmarks will enable households to determine how much energy and energy cost savings they can realistically save, by indicating how much additional energy they are using compared to the norm. Householders can be expected to respond better to, and be more motivated to

achieve energy savings when they have clear feedback on their energy consumption.[7]

- **Establishing a new behavioral norm**: People in communities generally aspire to achieve and live by the norms of their community, and norms potentially can be powerful means to encourage sustainable behavior, as argued by Mohr, 1999.[8] The energy benchmark may help to establish a new norm, where households try to consume the energy average or better, in a similar way that householders in Australia have been successful in achieving the water consumption targets for their region.

Bill benchmarking alone is not the sole mechanism that can improve energy efficiency in households. Householders will need information on how they can reduce their energy consumption. Also there are many other potential alternative methods for encouraging energy efficiency: from public education and information campaigns, to the introduction of minimum energy performance requirements or by using rebate/incentive programs to promote energy efficient home retrofits. However, whilst these alternative methods may have value, the MCE considers energy bill benchmarking to be an important facilitator of consumer awareness and education.

Focus on Electricity Benchmark Scheme

Though the Consultation RIS covered both electricity and gas benchmarking, the impact analysis and cost benefit analysis revealed that it would not be cost effective to introduce a benchmarking scheme for gas. Consequently the majority of the this RIS document focuses on introducing an electricity benchmarking scheme, though the impact of gas benchmarking is analysed and discussed in the Impacts and Cost/Benefit Analysis section, page 38.

Research Conducted

The CIIC has initiated extensive research and market testing of the benchmarking approach, including:

- A report by McLennan Magasanik Associates (MMA) in 2005 developing ideas for presenting benchmarking data on energy bills based on a review of energy and water bills in Australia and overseas and interviews with a number of energy retailers.

- A report by Newton Wayman Chong (NWC) and Associates in 2006 on market testing of six alternative benchmarking formats based on the outcomes of the MMA study.

[7] Darby, Sarah, University of Oxford Environmental Change Institute, *The Effectiveness of Feedback on Energy Consumption: A Review of the Literature on Metering, Billing and Direct Displays*, 2006, p.3

[8] Doug MacKenzie Mohr, '*Fostering Sustainable Behavior*', page 37, 1999.

- A report by NWC in 2006 based on discussions with nine retailers exploring their view of benchmarking and the challenges and opportunities it could provide, and their reaction to the alternative benchmarking formats tested on consumers.

- A report by CRA International in 2009 containing a review of national and international benchmarking experiences; an assessment of implementation issues associated with various benchmarks models; and market testing of community attitudes to energy benchmarking.

- A consumer survey by CRA International (2009) in which 77 % of respondents indicated that they would be likely to take action to reduce household energy consumption if a benchmark showed that their household's use was higher than other households. It is widely acknowledged that respondents report in a survey they will do, and the actions they actually take can differ greatly. However if even a quarter of respondents respond as they indicated, this represents 10% of all Australian households[9].

These documents can be found at http://www.ret.gov.au/Documents/mce/energy-eff/nfee/committees/consumer/focus.html

Consultation

As part of consultation with stakeholders, the CIIC met with retailers and distributors in April 2008 to discuss the EBB Project. There was agreement between the CIIC and attendees that some of the models previously suggested by the CIIC would be unnecessarily costly to implement. The CIIC agreed to undertake further work to inform the possible costs and benefits of EBB. The work of CRA International has been important in this process, in its assessment of implementation issues related to mandating a benchmark.

A Consultation RIS was released in October 2009 which sought further input from stakeholders. This was followed up on the 17th of November 2009 with a stakeholder consultation forum and request to stakeholders to supply feedback and information to the Committee in December 2009. The feedback and information supplied from this consultative process was used to develop the present RIS.

The CIIC is also liaising with Ergon Energy to review the outcomes of its EBB trial in the Mackay region in north Queensland. Preliminary findings from the trial are included in this RIS.

[9] Calculated based on 77 per cent (survey result) x 25 per cent (discounting factor) x 50 per cent (assumed proportion of households that consume above the average) = 10 per cent. The discounting factor is based on the professional judgement of CRA International. This factor may be well above or well below this assumption and can only be determined with accuracy once the bill benchmarking measure is rolled out and there has been some experience in the field. Although there is likely to be some skew in the distribution of household electricity use in a given population, the assumption that 50 per cent of households consume more than the average is considered a reasonable estimate for the purposes of this study.

Relationship to Other Complementary Energy Initiatives

Once this RIS has been accepted as meeting relevant standards by the Office of Best Practice Regulation, the requirements to implement the EBB will be considered by MCE as part of the National Energy Consumer Framework (NECF) of which the First Exposure Draft was released on 30 April 2009[10].

Since MCE's commitment to the NFEE Stage One Implementation Plans in August 2004, there have been a range of national policy initiatives that will complement existing energy efficiency initiatives, impact on future energy prices and may influence the need to provide householders with energy efficiency options (such as EBB) to reduce their bills. These developments include:

Carbon Pollution Reduction Scheme

The Carbon Pollution Reduction Scheme (CPRS) White Paper, released in December 2008 stated on page 110 (Vol 2) that:

"Energy efficiency is the final piece of the emissions reduction strategy. Energy use is the key driver of emissions growth in Australia. The Renewable Energy Target and Carbon Capture and Storage will reduce the emissions produced and released in generating energy, but there is also considerable scope to increase the efficiency of energy use. Using energy more efficiently can significantly reduce the cost of greenhouse gas abatement and ease the transition to a low-carbon economy" and

"There are several impediments to the uptake of energy efficiency measures, including gaps in the information available to households and businesses to make informed decisions. By becoming more energy efficient, households can reduce the cost impacts of the Scheme. Prior to the commencement of the Scheme, the Government will deliver household energy efficiency initiatives building on existing programs to help households do their bit to tackle climate change and reduce energy bills".

Assuming the introduction of a CPRS occurs, from July 2011 the market will reflect the environmental costs of goods and services that lead to the production of greenhouse emissions. The CPRS will encourage consumers to consider the environmental impact of their behaviour, by providing price signals to consumers regarding the greenhouse impacts of their consumption of goods and services.

The level of success of the CPRS in the residential sector will be influenced by the extent that householders' energy consumption is sensitive to energy prices, and by the information consumers have available to them about their energy use and methods to reduce it. The introduction of the Energy Bill Benchmarking could complement the introduction of the CPRS through its provision of benchmarking information and referral to other energy efficiency information sources. The Energy Bill Benchmarking scheme would advise relevant householders whether they are high energy consumers, thereby

[10] The First Exposure Draft of the NECF is available at http://www.ret.gov.au/Documents/mce/emr/rpwg/necffed.html

alerting them that there is scope for them to reduce their energy consumption and energy costs.

National Strategy for Energy Efficiency

A National Strategy for Energy Efficiency has been developed through the Council of Australian Governments (COAG) to accelerate energy efficiency efforts across all governments and to help households and businesses prepare for the introduction of the CPRS. In July 2009, COAG signed the National Partnership Agreement on Energy Efficiency, which will deliver a nationally-consistent and cooperative approach to energy efficiency. The agreement by Australian Governments is a comprehensive 10-year strategy to accelerate energy efficiency improvements for householders and businesses across all sectors of the economy. The strategy will complement the CPRS by addressing the barriers that are preventing the efficient uptake of energy efficient opportunities, such as split incentives and information failures.

The strategy is divided up into four key themes. One of these is entitled 'Assisting households and businesses to transition to a low-carbon future' and includes a sub-section on advice and education. This sub-section states:

'The efficient use of energy requires information that motivates, facilitates and reinforces rational and responsible behaviour by business and consumers. The Strategy is designed to ensure Australians have access to clear, consistent and credible information on energy efficient products and services. The jurisdictions will collaborate when developing communication campaigns designed to change community attitudes and behaviours in relation to energy efficiency, and consumers will be given energy use benchmarking information. Governments will support the uptake of new technologies by showcasing and promoting energy efficient technologies and energy conservation measures.'[11]

The document goes on to outline that the strategy will:

'Continue to support the NFEE project on energy bill benchmarking, which will provide householders with information that will allow them to measure and compare their energy consumption.

A regulatory impact analysis for energy bill benchmarking will be prepared and released for consultation during 2009.

Subject to regulatory impact analysis, regulatory requirements will be incorporated in the National Energy Customer Framework package to be enacted in 2010.'[12]

Consequently the introduction of the Energy Bill Benchmarking scheme would be an integral part of the overall NSEE initiative.

[11] Page 11 National Strategy on Energy Efficiency, Council of Australian Governments (COAG) July 2009
[12] Ibid Page 12

Renewable Energy Target

On 20 August 2009 the Australian Government's Renewable Energy Target (RET) Bills were passed through both houses of Parliament. The expanded scheme will deliver the Government's commitment that the equivalent of at least 20 % of Australia's electricity comes from renewable sources by 2020. To achieve this, the RET scheme guarantees a market for additional renewable energy generation, using a mechanism of tradeable Renewable Energy Certificates known as RECs. Increased energy prices which may result from this initiative would be expected to encourage consumers to have more regard to their energy consumption and therefore seek more information on how to reduce it.

Smart Meters

In February 2006 COAG committed to the progressive national roll-out of 'smart meters' for electricity, to permit the introduction of time-of-day pricing and to allow users to more appropriately manage their demand for peak power, in circumstances where benefits outweigh costs. This type of pricing will require consumers to have greater awareness of their energy use. After reviewing a national smart metering cost benefit analysis in 2008, MCE noted a wide range of potential net benefits, but that benefits and costs were not certain in all jurisdictions. Given the potential net benefits MCE supported the development of a national smart metering framework and smart meter deployments initially in Victoria and New South Wales. Ministers agreed to further progress the smart meter roll-out by undertaking coordinated pilots and business-specific business case studies in most jurisdictions (not including South Australia and Tasmania). These pilots and business cases seek to confirm the findings of the cost-benefit analysis, reduce the range of uncertainty to inform whether a roll-out should proceed, and also inform the development of roll-out implementation plans to maximise benefits.

The installation of smart meters alone will not reduce the need for energy benchmarking as the meters alone will not supply comparable household energy consumption. However, if the smart meters are installed with communication capabilities, then it is possible that they could complement the use of energy benchmarks in energy bills.

State and Territory Government energy efficiency initiatives

There are various State and Territory Government energy initiatives to help reduce the impact of energy consumption on the environment and deliver economic benefits such as reducing consumer energy costs. As a result of these initiatives there is greater consumer awareness and interest in energy efficiency, and climate change more broadly, which is likely to increase the motivation of consumers to make changes in response to the proposed energy benchmark. Consequently the State and Territory initiatives are likely to complement the energy benchmark scheme and to enhance its impact.

Relevant Jurisdictional Policies

Victoria

In October 2008, the *Energy Legislation Amendment (Retail Competition and Other Matters) Act 2008* was made. Among other provisions, this Act amended the existing requirement (introduced in July 2002) for energy retailers to include in their electricity bills to customers, information on greenhouse gas emissions associated with the generation of electricity. The amendment introduced an alternative performance-based regulation that allows retailers to provide energy bill benchmarking information to a residential customer.

Bill Benchmarking information enables a residential customer to:

(a) make a comparison between:

(i) the use of electricity at the residential customer's place of supply; and

(ii) the average use of electricity at similar places of supply; and

(b) assess whether the use of electricity at the residential customer's place of supply is above, equal or below the average use of electricity at similar places of supply.

The Victorian Government has undertaken householder research to obtain data that will provide guidance to energy retailers on electricity bill benchmarking for Victorian householders. Retailers' feedback on potential benchmarking formats is presently being sought. It should be noted that the legislation currently enables electricity retailers to provide bill benchmarking information to householders based on their own data. However it is understood that retailers are keen to utilise the Government provided data as a basis for this information.

In Victoria, the Energy Retail Code also requires retailers to include on a householder's bill, a graph showing the householder's consumption for that billing period and the householder's consumption for each billing period over the past 12 months. This allows the householder to compare their current consumption with the same period of the previous year.

A national energy benchmarking scheme would complement the Victorian scheme, with the prime difference of retailers being mandated to supply energy benchmarking information.

South Australia

The South Australian Electricity Act 1996 and South Australian Gas Act 1997 outline the responsibilities of retailers with regard to provision of consumption and greenhouse information. These requirements apply to all small customers and state:

- the amount of greenhouse gas emissions for the period to which the account relates;

- the amount of greenhouse gas emissions for each period during the preceding 12 months in respect of which the customer was sent a bill;
- the information referred to in paragraphs must be presented in graphical form;
- the amounts of the greenhouse gas emissions must be calculated, in a manner approved by the Essential Services Commission, by reference to material about emissions coefficients published by the Australian Greenhouse Office of the Department of the Environment and Heritage of the Australian Government. The information must also be accompanied by explanatory material of a kind approved by the Commission.

The existing greenhouse reporting requirements could complement an energy benchmarking scheme.

Queensland

Queensland electricity retailers' billing obligations, including information that is required to be stated on a small householder's electricity bill, are set out in the Queensland Electricity Industry Code. The regulations state that a retailer must include data on average daily usage and a comparison to the same period in the previous year, however there is no requirement to include greenhouse gas information. Similar billing provisions are set out for gas householders under item 4.4 of the Gas Industry Code.

The existing household historic energy use reporting requirements could complement an energy benchmarking scheme.

Western Australia

Western Australia has no legislated energy benchmarking or greenhouse gas reporting requirements. Energy retailers are encouraged to display current energy consumption compared to the previous period and the same period last year, as well as greenhouse gas emissions for the current period.

New South Wales

There is no statutory obligation in NSW for retailers to report on greenhouse abatement as part of their bills to householders. The former Premier Bob Carr wrote to standard retailers (Energy Australia, Integral Energy and Country Energy) requesting that they provide greenhouse abatement information on their bills. The NSW Independent Pricing and Regulatory Tribunal (IPART) was not involved in this process and, as it is not a licence condition, has no power to enforce this request. Other energy retailers in NSW may provide greenhouse abatement information on their bills as this is a requirement in other jurisdictions.

The obligation to provide consumption details regarding previous billing periods is set out in *clause 31(1)(f) Electricity Supply (General) Regulation 2001*. In brief, this obligation requires standard retailers to provide the average daily consumption figure for the corresponding billing period during the previous year. This is subject to the retailer supplying the customer over the whole period. This obligation applies to small retail customers (less than 160MWh/annum) on standard supply contracts.

The existing household historic energy use reporting requirements could complement an energy benchmarking scheme.

Tasmania

There are no energy benchmarking or greenhouse gas reporting requirements in Tasmania.

Australian Capital Territory

The ACT has two specific regulations requiring retailers to provide information on accounts which could assist consumers to benchmark their energy use. The first is Section 13.5 (1) (f) in the *Consumer Protection Code* (under the *Utilities Act 2000*) which requires retailers to provide 'current and comparative consumption data'. The second is Section 2.2 (2) in the *Guidelines for Greenhouse Gas disclosure On Customer Accounts* (Under the *Consumer Protection Code*) which requires retailers to provide a: 'graphical representation of greenhouse gas emissions associated with electricity consumption for all previous billing periods over the last twelve months, to the extent that this information is available'.

The existing energy use and greenhouse emissions reporting requirements could complement an energy benchmarking scheme.

Northern Territory

There is no legislated energy benchmarking or greenhouse gas reporting requirement for the Northern Territory, although the Territory's sole supplier's billing format does display current consumption against the last period and the same period the previous year, the national / regional average for domestic consumption and associated greenhouse gas emissions on bills.

Existing Benchmarks

The following examples of benchmarks present some of the details of the ways schemes can be introduced and their potential benefits.

Ergon Energy Benchmark Trial

Ergon Energy in Queensland has recently completed a bill benchmarking trial with around 40,000 householders in the Mackay region to test consumer response to a

benchmark. Ergon have since rolled out their benchmark to all their residential customers in Queensland.

Ergon Energy has elected to base their household benchmarking initiative on a weather zone area comparison. It also has a web based comparison which allows householders to enter their average daily electricity kilowatt hours (kWh) consumption for each of three possible tariffs, and then select the area they live in (Maranoa, Central West, or Peninsula, for example), reflecting the various climatic zones within the State.

The benchmark compares the household's average daily electricity use for the last quarter with the average daily consumption in their area. It also includes a statement telling householders how much their consumption is above or below the area average in percentage terms.

The average consumption data for each of the eight benchmark areas is calculated and updated daily on a previous fortnight rolling average. Ergon Energy developed the benchmark using consumption data from its vertically integrated retail business. It should be noted that this approach is unlikely to be possible in a national benchmarking roll-out because the majority of retailers are disaggregated from distributors. This may have a bearing on some of the costs, benefits and impacts attributed to the Ergon Energy trial in this RIS.

Some findings from the Ergon Energy trail, based on a survey of customers, were:

- 67% said they would read (benchmarking) information and actively try to reduce energy
- 63% want see how the electricity usage in my household compares to other households
- 88% said reducing energy consumption was important;

Unfortunately detailed analysis of the energy savings impacts of the Ergon Energy trial is not available. Ergon Energy advise that due to the amount of 'noise' in the market from other energy efficiency campaigns and incentives, it was not possible to conduct a quantitative assessment or cost benefit analysis on the impacts of the benchmark study. For example, it was not possible to state how the energy consumption of householders varied as a result of the energy benchmarking. However the benchmark initiative was producing some queries to the Ergon call centre, averaging seven per day. This indicates that householders were reading the benchmarking but were overall accepting of the scheme, as it did not generate significant complaints or concerns from customers. Ergon concluded that comparative benchmarking can form a tactical element of an overarching, energy efficiency and demand management strategy and they must also be satisfied with the trail results, as they have decided to roll out the program across their network.

Ergon Energy's web based comparison tool is available at http://evolve.ergon.com.au/WhatcanIdo/Athome/Compareyourelectricityusage.aspx

Brisbane Water

In 2005, Brisbane Water introduced a Separate Water Advice (SWA) notice for Brisbane residents, which is distributed together with the Brisbane City Council's rates notice.

This SWA was developed to provide informative and tailored water consumption advice to help Brisbane residents better understand their own water consumption in comparison to a local area average and ultimately to promote water saving behavior. The SWA contains customised messages and water saving ideas based on a number of factors, including water consumption, property size and property location. This notice is used to inform residential rate payers of their quarterly water consumption along with a comparison to previous quarters, the Brisbane average and their local area average water consumption.

Brisbane has managed to reduce its daily water consumption per individual from over 300 litres to under 200 litres, but as water restrictions have been introduced it is difficult to determine the extent that the SWA notice contributed to that reduction. However, analysis done by Brisbane Water of its water benchmarking program has revealed that 68 % of respondents believe that the inclusion of this information in their rates bill has helped them to decrease their household's water usage[13]. This information strongly suggests that the SWA notice contributed to the overall water consumption reduction.

Positive Energy, United States

A number of US power utilities have commenced providing their householders with home energy reports. The reports provide benchmarks that allow householders to compare their electricity usage with other similar householders and encourage householders to reduce their electricity use. The report is sent out separately to the bill. The Sacramento Municipal Utility District in California has sent out reports to 35,000 randomly selected householders. Puget Sound Energy in Washington also commenced a similar pilot program in suburban Seattle with 40,000 householders. To date, the approach has been adopted by utilities in 10 major metropolitan areas, which suggests it is effective and well regarded.

The Positive Energy's reports provide householder's monthly electricity usage and compared it against that of neighbours in 100 homes of similar size that used the same fuel type for heating purposes. The householder's usage is also compared against the 20 most energy efficient neighbours within the same group.

The benchmark presentation format is a simple horizontal 3 - bar chart that compares the householder's usage for the month in kWh against the average of all neighbours in the comparison group and against the 'efficient' neighbours sub-group. The graphic also

[13] Brisbane Water. Separate Water Advice Research report by Colmar Brunton August 2006 slide 40

includes a statement relating how much higher (or lower), in percentage terms, the householder's energy usage is in comparison to the neighbours. The benchmark information is incorporated in a stand-alone one page report, and is not part of the bill.

The reports are produced by a third party, Positive Energy, on contract to the utilities. The utilities provide the energy billing data and Positive Energy generates, print and mail the reports. Energy usage data is sourced from each utility's householder billing database. It is not clear from the available material where the house size and fuel type for heating information is sourced from. Positive Energy, states on its website that they also incorporate external data sources in the compilation of the report. Positive Energy has reported average reductions of 2.5 % of annual energy use across all households that received the report for a full year. This equates to 300 kWh per household in energy savings[14].

The Positive Energy benchmarking report appear to have been effective, as suggested by the uptake of the scheme by ten additional utilities and the average reported savings of 2.5% of annual energy usage of those households receiving the report.

Summary Background Review

While there is currently no direct equivalent of the national energy bill benchmark being proposed, there are bill and online benchmark schemes which have achieved success in reducing consumption of energy or water. These examples demonstrate:

- Market research conducted strongly suggests that a significant proportion of households will undertake energy efficiency actions if benchmarking information showed they had above average consumption.

- There would be no conflict with the existing energy saving initiatives of jurisdictions and energy benchmarking could complement and potential enhance significant initiatives, such as the Carbon Pollution Reduction Scheme.

- There is no conflict with State and Territory legislation regarding energy billing and the energy benchmarking would complement energy/greenhouse emission initiatives when they exist.

- Ergon Energy has conducted the only trial of energy bill benchmarking in Australia and is extending that initiative throughout its network. Unfortunately it has not been able to quantify the impact of the scheme due to other marketing campaigns creating too much 'noise' in the market.

[14] Positive Energy in CRA International, *Energy Bill Benchmarking Desktop Analysis,* 2009, p.16

- Internationally, Positive Energy has trialled energy benchmarking successfully in a number of places, demonstrating significant savings, which have been quantified at an average of 2.5% p.a. across benchmark recipients.

Problem Statement

The EBB proposal seeks to fill a current information gap for energy consumers in the residential sector of Australia. It also seeks to implement a consistent approach across all jurisdictions so as to minimise cost and inefficiency.

Many consumers currently have no or minimal accessible information on how their energy consumption compares to other people and therefore limited ability to identify if they are a high energy user. Providing an energy benchmark is one method of filling this information gap and potentially encouraging consumers to implement energy efficiency improvements.

Problem Context

Climate change is a serious global challenge, requiring an effective global response (IPCC 2007). There are now strong community concerns regarding the threats posed by global warming, and governments are responding with a wide range of programs to reduce greenhouse emissions.

On 11 March 2008, Australia's ratification of the Kyoto Protocol was officially recognised by the United Nations Framework Convention on Climate Change (UNFCCC). Under Kyoto, Australia is obliged to limit its greenhouse gas emissions in 2008-2012 to 108 % of 1990 emission levels. As documented in the Carbon Pollution Reduction Scheme White Paper[15], the present Australian Government is committed to meeting a long-term target of a 60 per cent reduction in greenhouse gas emissions from 2000 levels by 2050 and to a medium-term national target to reduce Australia's greenhouse gas emissions by between 5 per cent and 15 per cent below 2000 levels by the end 2020. Energy efficiency is a key element of the Government's Carbon Pollution Reduction Strategy (CPRS), as are complementary measures designed to address market failures that the CPRS will not overcome or to ameliorate the distributional consequences of the scheme.

Australia is heavily dependent on fossil fuels for energy production, providing 96% (5,380 PJ) of the energy consumed, with renewable sources providing approximately 4 % (260 PJ) of the energy consumed. The total energy sector accounts for approximately 70 % (401 Mt) of Australia's greenhouse gas emissions, comprising stationary energy (50 per cent), transport (13 per cent) and fugitive emissions in production and delivery (6 per cent). Australia therefore faces a significant adjustment task if is to meet it greenhouse gas emissions reduction targets.

Energy prices in Australia are already beginning to rise sharply, driven by short term and longer term factors, including the impact of the drought on electricity generation capacity, changing demand patterns (particularly increased peak load associated with increased use of air conditioners) and the shift towards greater use of wind, solar and other renewable

[15] Department of Climate Change and Energy Efficiency, *Carbon Pollution Reduction Scheme: Australia's Low Pollution Future*, December 2008

energy generation technologies in response to climate change. Prices are expected to escalate further as the economy adjusts to a lower carbon-intensive environment.

It is anticipated that Australia will place a price on carbon emissions, possibly by the Carbon Pollution reduction Scheme (CPRS). This will provide incentives for increased investment in low carbon pollution generating technologies and will help to reduce demand reducing some of the environmental externalities associated with the consumption and generation of energy. However, it is unlikely that in the short to medium term the CPRS will capture all the environmental externalities of energy use and generation.

However, households may fail to take advantage of all privately cost effective improvements in energy efficiency in the absence of information to assist the adjustment process. Indeed, the Productivity Commission concluded that one of the most important barriers to the adoption of privately cost-effective energy efficiency improvements was a failure in the provision of information[16].

Growth in Residential Energy Consumption and Investment in Electricity Generating Capacity

Overall energy consumption by Australian households has grown significantly over the past three decades. In the period from 1974–75 to 2006-07, energy usage in the residential sector almost doubled from 246 petajoules (PJ) to 442 PJ[17]. Indeed energy use on a per person basis has increased by around 18.1 % from 17.7 to 20.9 GJ/person in 20 years from the early-mid 1980s. Significantly, the Australian Bureau of Agriculture and Resource Economics (ABARE) has projected that over the period 2005-06 to 2011-12 the residential sector's energy use will continue to increase by 1.8 % per annum and then 1.5 % up until 2029-30[18].

The continued growth in electricity consumption across all sectors of the economy requires ongoing investment in network infrastructure to meet rising demand and avoid network failure. This investment includes the provision of new infrastructure such as power stations and transmission lines, and also regular maintenance of existing infrastructure. The CPRS and renewable energy targets will also drive a need for investment in new generation. The costs for this investment are substantial, with the 40 members of the Energy Supply Association of Australia stating that they have infrastructure investment plans worth more than $30 billion over the next decade.[19] Although costs are borne initially by network operators (distributors), these costs are ultimately passed on to electricity consumers through higher electricity prices. For example, the NSW Independent Pricing and Regulatory Tribunal (IPART) has recently

[16] Productivity Commission Inquiry Report *The Private Cost Effectiveness of Improving Energy Efficiency*, August 2005 p 71

[17] Australian Bureau of Resource and Agricultural Economics (ABARE), *Energy in Australia 2009,* p.16

[18] ABARE, *Energy Projects to 2029-30* (research report 07.24), p.33

[19] Ibid. ESSA

confirmed a determination which includes electricity prices increases of up to 64% over the next three years, 2010-2013[20].

Peak demand has also become a significant issue for several States as summer peak electricity loads increase, driven by increasing air conditioning demand, which in turn is driven by current drought conditions and/or climate change. The rising peak demand requires better management of the load and augmentation of the energy infrastructure. Both approaches result in costs that are ultimately passed on to all electricity consumers through higher electricity prices. Current electricity tariffs and most residential metering are not able to pass on the costs of this peak demand consumption to the residential consumers driving the peak, e.g. air conditioner users, so these consumers have little incentive to alter their behaviour and the problem can be expected to increase.

The process of adjusting to climate change will impact on householders and society in general. Rising energy costs will create a range of social and economic issues and contribute to social hardship in some sections of the community. One way of reducing these adverse consequences is to improve the energy efficiency of households and to decrease the energy consumption of the residential sector.

Potential to Improve Residential Energy Efficiency

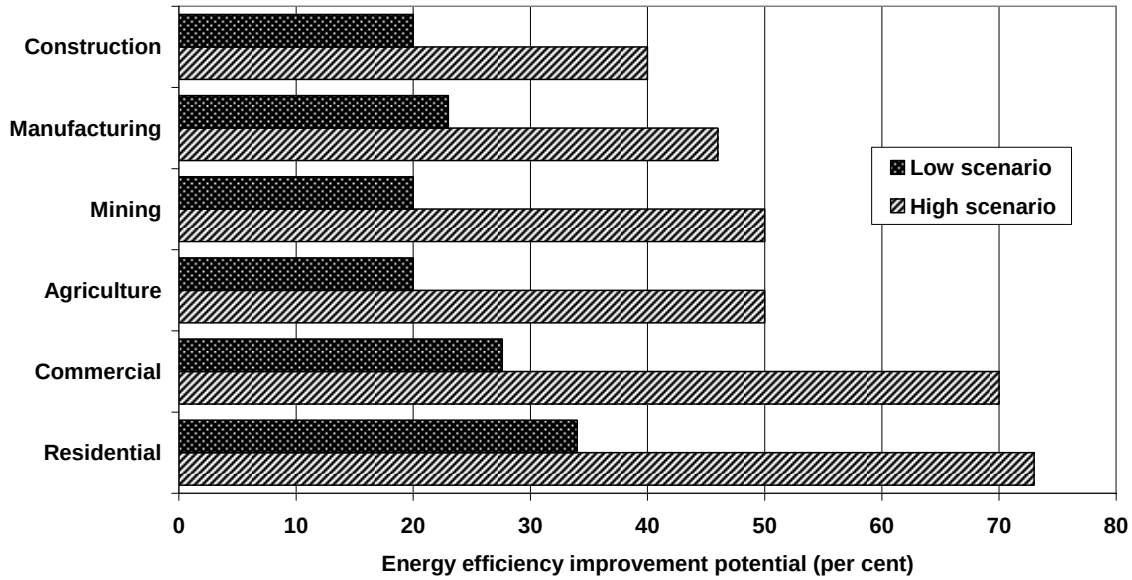
At the same time as consumption is growing in Australia, there may be considerable potential to improve energy efficiency and to reduce the energy efficiency gap—the difference between actual energy efficiency and what is considered to be the most energy efficient processes and technologies that are achievable.

The true extent of the energy efficiency gap is largely immeasurable. Numerous researchers have, however, used case studies of a subset of all possible energy efficiency improvements to demonstrate that Australian producers and consumers have failed to adopt energy efficiency improvements that are cost effective for them. In 2005 the Productivity Commission in its report entitled 'The Private Cost Effectiveness of Improving Energy Efficiency' reported on some of the case studies. A preliminary phase study by the Sustainable Energy Authority of Victoria (SEAV), with assistance from several consultants, produced estimates of Australia's energy efficiency potential for the National Framework for Energy Efficiency (NFEE), which indicated there was significant scope for producers and consumers to adopt improvements in their energy efficiency that would be cost effective for them[21].

[20] IPART, 'Final Report and Final Determination on Review of regulated retail tariffs and charges for electricity 2010 to 2013, March 2010.

[21] The Private Cost Effectiveness of Improving Energy Efficiency, Productivity Commission Inquiry Report August 2005, p. 71

Figure 4: Preliminary (phase one) SEAV-NFEE estimates of potential energy efficiency improvements (a)



(a) Energy efficiency improvement potential is expressed as a percentage of current energy use. The low energy efficiency improvement scenario was based on current commercially available technologies with an average 4 year payback period. The high energy efficiency improvement scenario was based on existing or developing technologies potentially available during a 12 year projection period with an average 8 year payback period.

Data sources: EEWG (2003); SEAV, Armstrong and Saturn Corporate Resources (2003).

In a second phase assessment of the SEAV-NFEE, SEAV commissioned two more detailed studies for the residential sector:

- George Wilkenfeld and Associates (2004b) analysed potential improvements in the efficiency of water heating; and
- EMET Consultants (2004b) examined 15 potential energy efficiency improvements for lighting, cooking, refrigeration, dishwashers, clothes washers, building thermal performance and heating/cooling systems.

In summary, the residential sector estimates suggested that, by 2014, householders will have overlooked additional cost-effective actions that could have reduced their energy consumption by at least 13 % in that year. Whilst some time has passed since these studies were undertaken they would nevertheless suggest that there is substantial scope to improve energy efficiency in the residential sector. Initiatives that improve the consumer's information about their energy consumption will make a contribution to improving overall energy efficiency[22] and to improving the overall efficiency of the energy market.

[22] Ibid

Information Asymmetry

The Productivity Commission, in its assessment of the private cost effectiveness of improving energy efficiency, concluded that one of the most important barriers to the adoption of privately cost-effective energy efficiency improvements was a failure in the provision of information[23].

Whilst households currently have information about their individual energy consumption, and in some cases previous usage information, they lack information on the potential for them to reduce their energy consumption and to operate more energy efficiently. At present householders' energy bills tells them the amount of energy they have used for a given period, and in some cases their daily consumption over pervious billing periods. However, the bill will not tell them if they are a high or low user in comparison to other households, or in comparison to an energy efficient household.

Research clearly shows that such comparative information can influence householder's consumption. For example, a consumer survey undertaken by CRA International[24] for this project found 77% of respondents stated they would be likely to take action to reduce household energy consumption if a benchmark showed that their household's use was higher than other households. (See section Option C – Mandatory energy bill benchmarking, page 34, for further information). Likewise the University of Oxford's Environmental Change Institute found that overall, literature from the USA, Canada, Scandinavia, the Netherlands and the UK on metering, billing and direct displays demonstrated that "clear feedback is a necessary element in learning how to control fuel use more effectively over a long period of time"[25].

The implication is that householders' current lack of comparative information on their consumption is affecting their energy consumption and the overall energy efficiency of households. Consequently, comparative energy consumption information can be seen as one of the important components in the total set of energy efficiency information which householders require if they are to behave rationally regarding their energy usage and energy efficiency options.

The Productivity Commission[26] has noted that one of the main reasons householders may not adopt cost-effective energy efficiency improvements is due to imperfect information or information asymmetries. The Commission recognises that the provision of energy efficiency information has public good characteristics, with the market having little incentive to supply the information, and that imperfect information regarding energy

[23] Pg 71 The Private Cost Effectiveness of Improving Energy Efficiency, Productivity Commission Inquiry Report August 2005,

[24] CRA International, *Energy Bill Benchmarking Desktop Analysis*, 2009

[25] Darby, Sarah, University of Oxford Environmental Change Institute, *The Effectiveness of Feedback on Energy Consumption: A Review of the Literature on Metering, Billing and Direct Displays*, 2006, p.3.

[26] Pg 103 The Private Cost Effectiveness of Improving Energy Efficiency, Productivity Commission Inquiry Report August 2005,

efficiency can be regarded as a market failure. Lack of comparative energy consumption information is one aspect of this market failure.

Problem Summary

Greenhouse emissions leading to climate change is a serious global challenge. Energy use is a major contributor to Australia's greenhouse emissions and residential energy consumption constitutes a significant part of Australia's total energy use. Residential energy use continues to grow, despite various initiatives to reduce household energy consumption and to improve energy efficiency.

In addition to the environmental issues associated with increased energy use, there are a range of other issues associated with our growing usage of electricity. These include peak demand issues, peak management issues and escalating infrastructure investment requirements. This has resulted in rapidly increasing energy prices, with their associated social and economic consequences.

However, despite the rising residential energy usage, research has shown there is considerable scope for energy efficiency savings by householders. Information asymmetries are one type of market failure which is preventing the adoption of cost-effective energy efficient initiatives by households, and lack of comparative energy consumption information is one aspect of this market failure.

This RIS seeks to encourage the adoption of energy efficiency in the residential sector through the provision of comparative energy consumption information to householders, in the form of energy benchmarks. The RIS examines the option of retailers providing consumers with a comparative energy benchmark on the bill (or by some other means) and shows that such information can be provided cost-effectively. The RIS shows that provision of energy benchmarking is expected to contribute to the reduction of residential energy consumption, energy costs and to reduce greenhouse gas emissions.

Objective of Government Action

The MCE's primary objective in their General Consumer Capacity Program under NFEE Stage One is:

> *To raise the awareness of consumers regarding the benefits of energy efficiency, to enable consumers to make better informed decisions about actions to reduce energy consumption, and to motivate general consumers to implement energy saving actions.*

The key element of the package is:

> *A requirement for energy retailers to provide benchmark data on household energy bills.*

This RIS analyses the primary objective and explores options to determine if there is a satisfactory case for the implementation of an EBB.

As part of the analysis of the primary objective, four secondary objectives have been identified as relevant to the overall analysis of the EBB against the status quo.

The secondary objectives are as follows:

1. Minimise implementation costs – i.e. an option will be preferred if it minimises the initial and on-going costs of implementation given the benefits being delivered;
2. Provide meaningful benchmark data to the householder - i.e. an option will be preferred if it results in relevant and credible information being presented on householders' bills, for example by accounting for climatic or household characteristics;
3. An efficient outcome is achieved that provides a net benefit to the community; and
4. An approach is identified that is simple to implement and understand for both energy retailers and householders.

This RIS assesses the EBB options against these secondary objectives in equal terms and in relation to their adherence to the primary objective.

Electricity Bill Benchmarking Only

Consistent with the MCE secondary objectives defined above, especially objective 3, the majority of this RIS is focused on the introduction of electricity bill benchmarking. This is because the cost benefit analysis of the introduction of gas bill benchmarking, see page 42, revealed that benchmarking for gas would not provide a net benefit to the community, while benchmarking for electricity does. Consequently much of the remainder of the RIS focuses on the introduction of electricity bill benchmarking. The possibility of introducing gas bill benchmarking will be reviewed in two to three years.

Energy Benchmarking Options

Three options are presented in this RIS due to the MCE requirement, that the CIIC examine the requirement for energy retailers to allow end users to compare their energy consumption against an appropriate benchmark. The options examined are:

Option A: The status quo

Option B: Alternative benchmarking and aspirational targets.

Option C: Mandatory energy bill benchmarking

It is recognised that energy benchmarking can be seen as just one of many information tools that may encourage energy efficiency. However, the focus of this RIS is on energy benchmarking, on correcting an information asymmetry regarding householders' knowledge of their energy consumption versus what can be achieved in similar households and therefore only energy benchmarking options will be examined.

Option A – The status quo

The status quo in this case is no national benchmarking requirements at all, leaving only the benchmarking and/or greenhouse reporting requirements imposed by jurisdictional Governments where they consider them necessary. As outlined in the section Relevant Jurisdictional Policies, page 14, there are currently energy benchmarking and/or greenhouse reporting requirements in some States and Territories. These programs would continue. There is also a possibility other jurisdictional Governments may choose to impose requirements on retailers that operate in their State or Territory, which as mentioned above, the Victorian Government have done.

The Victorian Government enacted the *Energy Legislation Amendment (Retail Competition and Other Matters) Act* in 2008. Provisions included allow retailers to provide either energy bill benchmarking information to a residential customer or to provide greenhouse emission information relating to the customer's energy use. It is not known yet whether retailers will elect to supply benchmark information on customers' energy bills.

There are also a range of web based tools which can assist a household to determine how efficient their energy use is compared to other household types.

Under the status quo the following will occur:

- Different jurisdictions may impose varying energy benchmarking requirements on energy retailers, potentially increasing the cost to retailers of implementing varying benchmarking schemes.
- Most households would continue to have limited access to information to compare their energy consumption to other households. This is supported by research

undertaken by Ergon Energy during its EBB trial which found that people generally have a low awareness of their energy use[27]. Awareness is based on how much their bill costs them rather than kWh consumption.

- Continued ignorance of many households that their energy consumption is above average, and could be reduced, will remain which will contribute to excessive energy consumption and energy expenditure.

- Overall energy consumption across the country is projected to continue to increase, creating the need for more energy generation and infrastructure, which is ultimately paid for by consumers through energy charges. Net capital expenditure in 2005-2006 for electricity generation, transmission and distribution was $9 billion[28].

- Without measures to reduce energy consumption, greenhouse gas emissions would continue to rise. Between 1990 and 2006 CO_2 emissions from the stationary energy sector increased by 40 per cent[29].

Consequently, the status quo as an option was not recommended as it did not address the underlying market failure, the lack of information on comparable household energy consumption, which currently exists.

Option B: Alternative Benchmarking Measures

The market failure regarding householders lack of information on average household consumption to which they can compare themselves, could potentially be addressed through a number of measures; including voluntary benchmarks, online benchmarks, smart metering with communication facilities or aspirational consumption targets. These options are examined below and it is concluded that none of these options effectively address the market failure or would be more effective or efficient than a mandatory benchmark.

Voluntary Benchmarks

Energy retailers could be encouraged to introduce voluntary benchmarks on bills, providing householders with information on average consumption of comparable households. One way of doing this would be to regulate for retailers to have the discretion to supply benchmark information instead of any other mandated greenhouse information provision they are already required to supply. This is the option being implemented by Victoria, as discussed in the Status Quo section above.

[27] Ergon Energy, Bill Benchmarking Trial Evaluation Research April 2009

[28] http://www.garnautreview.org.au/chp11.htm

[29] Department of Climate Change, *Australia's Greenhouse Gas Emissions – Fact Sheet*, available at http://www.climatechange.gov.au

Another key difficulty with the voluntary approach is there is no guarantee that most or even any retailers will introduce energy bill benchmarks. The feedback from the Consultation RIS showed, as further discussed under the impacts on Retailers, page 39, introducing a benchmark on a retailer's bills can involve considerable costs and unless retailers saw some competitive advantage in using benchmarks it is unlikely they will supply benchmarks. Retailers may also introduce a variety of different types of benchmarks, reducing householders' ability to discuss and compare their consumption with others. Differences between retailer's benchmarks may also confuse householders if they change retailer or location.

A further complication with a non-mandatory national benchmark approach is that some jurisdictions may introduce mandatory benchmark requirements, and these may differ between jurisdictions. This will increase the costs to energy retailers in supplying the benchmarks if they operate in different jurisdictions and have to meet different regulatory requirements. As the majority electricity retailers operate in more than one jurisdiction[30], this means most retailers could be affected by such additional costs. These increased costs will eventually be passed onto household consumers. It also will mean that across the national market there are differences in the availability of benchmark information to householders.

The result of the voluntary approach is there is no guarantee benchmarks will be introduced, householders' understanding of benchmarks will be reduced, and almost certainly some households will not have access to benchmark information. Consequently the information asymmetry and market failure that exists in the residential energy market will continue. In addition, some jurisdictions may introduce mandatory benchmark requirements that are likely to add to retailers' costs. So the voluntary approach is unlikely to address the market failure and could be a more expensive option, therefore it was not recommended as a solution.

Online Benchmarks

An alternative to energy bill benchmarking, where the benchmark is included on the printed bill, is the option to provide benchmarks online. These could be in the form of providing benchmark similar to that which could be provided on a printed bill but via a web site or a more sophisticated web-based tool that identifies the householder's drivers of their energy consumption in some detail. The second option has the greatest appeal, as it would enable householders to gain greater knowledge of their energy consumption and how it could be reduced. Retailers could be mandated to supply such web tools and/or to place messages on householder bills advising householders that such advice was available and where.

[30] For example, all Victorian electricity retailers, seven of the eight retailers of Queensland, all of the NSW retailers targeting residential customers, and five of six retailers in South Australia operate interstate.

The advantages of the online benchmark approach are these tools could provide householders with more information and of greater relevance, than a printed benchmark. However the major difficulties with an online benchmark are restricted access and anticipated low usage rates. Some evidence supporting the existence of these difficulties includes:

- People without access to the internet would not be able to view the benchmark. According to the 2006-07 Australian Bureau of Statistics Census, 63 % of dwellings had access to the internet[31]. This varies considerably according to geographical location and demographics. At the national level 66 % of dwellings in major cities have access to the internet, compared to 42 % for remote Australia.

Table 1: Internet Access and Use at Home by Age - 2006-07

Age group (years)	Internet access (%)	Internet use (%)
15-24	79.7	76.5
25-34	75.8	71.8
35-44	80.2	72.6
45-54	78.5	66.5
55-64	64.7	51.7
65-74	42.2	28.1
75 and over	21.8	10.5
Total	**69.5**	**60.9**

Source: ABS 2006-07 Household Use of Information Technology Survey.

- People with low internet access or usage may not feel comfortable accessing the benchmark online or understand the benchmark in an online format. Australian Bureau of Statistics (ABS) data shows that people aged 55 years and over use the internet at home less than those in younger age groups.

- Positive Energy reported that only 3 % of utility householders in the United States visit their utility's website, suggesting that web-based tools and calculator have limited penetration. Low income users and the elderly are particularly disadvantaged[32].

[31] http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/8146.0.55.001Main+Features12006?OpenDocument

[32] Op cit CRA International p.25

- Feedback from Ergon Energy's evaluation of its benchmarking trial was that an online tool would be useful for some but others believe, while interesting, they are unlikely to visit the website. Respondents clearly preferred information on the bill[33].

An internet based energy benchmark only resolves part of the market failure of information asymmetry as almost a third a households will not be able to access online benchmarks, and most of the remainder will not bother to access such a site. Consequently online benchmarks were not recommended as an option for bill benchmarking, though they may be a complementary measure to a printed benchmark.

Smart Metering

The introduction of smart metering could be regarded as a potential solution to the information asymmetry that currently exists regarding residential energy consumption. However, as previously mentioned, smart meters can not convey benchmark information unless they are coupled with information displays. Also the smart meters and communication displays would need to be are available throughout the residential market to display benchmark information to all householders.

In Victoria, the first State to rollout smart meters, smart meters will not be fully installed till 2013. NSW's deadline for its smart meter rollout is 2017 and others States and territories can be expected to take longer to install their smart meters (if at all). As yet there are no plans for rolling out information displays. Consequently it may be ten years (or longer) before smart meters combined with information displays are available throughout Australia. The implication is that smart meters, even if supplied with communication displays, can not meet the MCE energy benchmarking objectives as the meters will not be rolled out nationally at an appropriate time.

Given the long time period before smart meters are universally available, and information displays also installed, smart meters can not be seen as a solution to the present market failure and will not be a potential national solution for at least another decade. This indicates that energy bill benchmarking can have a useful role for the medium to long term in addressing the lack of information available to householders, before smart meters potentially make bill benchmarking obsolete.

Aspirational Targets

An alternative to providing benchmarks based on the average consumption of relevant comparable households is to provide aspirational targets. Such targets have been used successfully in the water conservation campaigns, see Existing Benchmarks page 16. The key difference between a benchmark and an aspirational target is that the benchmark supplies comparable household energy consumption information while the aspirational

[33] Op cit Ergon Energy

target is a reasoned but arbitrary consumption level applicable to a wider group of people (e.g. State/Territory).

Aspirational targets are effectively a means of individualising a public education/conservation campaign so households will have a concrete measure of whether their household is effectively contributing to the overall society's campaign to save water/energy. The aspirational target is part of a broader community awareness raising and social change program to increase conservation of a resource, and so must be backed by extensive media campaigns and promotion of conservation by other channels. Society as a whole needs to agree to the conservation goal and to work towards it, for aspirational targets to be effective.

Aspirational targets appear to have been effective in reducing water consumption because the broad community appears to understand the need for water conservation and, with the help of public education/conservation campaigns, have been willing to commit to water conservation. However, there are some significant differences between water and energy which have helped in the water targets success; such as water being tangible, being seen as a natural resource, water reserves are clearly becoming lower, that photos of empty dams can be shown, etc.

At present there does not appear to be an overall agreement or understanding across Australia concerning the need to conserve energy, so the introduction of mandatory aspirational targets is unlikely to be effective. As energy is not tangible, and the need to reduce energy consumption due to greenhouse effects is much more contentious, it is much harder to convince the public to commit to energy conservation. Without the support of extensive public education/conservation campaigns at considerable expense, it is considered unlikely that an energy aspiration target would be as effective as it has been for water conservation. Also, no evidence has been sighted to suggest that aspiration targets would be more effective than energy benchmarks.

Another disadvantage of mandatory aspirational targets is their introduction will be more expensive than energy benchmarks. To create aspirational targets very similar research on present consumption of households would need to be first conducted, so there is no cost saving there compared to energy benchmarks. The costs to energy retailers to include relevant aspiration targets in their billing systems and to print graphics of these targets, together with appropriate text messages, will be at least as costly as for energy benchmarks as similar system changes and printing costs are incurred. Feedback from the Consultation RIS suggests that retailers expect aspiration targets will generate more customer queries than benchmarks, as householders seek to understand what the target means and how it was derived and by whom. The increased customer queries will add to retailer costs. Finally, the aspiration targets will be ineffective without effective public education/conservation campaigns, which will add significantly to the costs of introducing the aspirational targets.

So in summary, there is no reason to believe aspirational targets will reduce energy consumption further than energy benchmarks and such targets will potentially be more

expensive to introduce. Consequently, aspirational targets were not recommended as an alternative to benchmarking.

Option C – Mandatory energy bill benchmarking

Mandatory energy bill benchmarking involves the energy retailers being required to provide consumers with a benchmark on their energy bill to which they can compare their energy consumption. The energy benchmark would consist of the mean energy consumption of similar households.

The key reasons that mandatory energy bill benchmarking is regarded as the preferred option to solving the present market failure is it directly and effectively addresses the market failure, and does so at minimal cost versus the alternatives. The advantages of energy bill benchmarking are:

- It conveys the benchmarking information in the one universal communication medium seen by all households on their energy bill.
- It provides all consumers with a point of comparison with a household in their local area and can provide a link to a website where the benefits of an online tool can be achieved (for those who chose to take the extra step).

  A range of market research and experience overseas, as outlined below, has shown that householders are interested in obtaining information on the consumption of comparable households and that they will undertake energy efficiency actions in response to such information.
- It is a low cost solution, with a cost of around $1.oo per annum per household. These costs are further discussed in the Impacts and Cost/Benefit Analysis, page 38.

The market research and international experience supporting the use of energy benchmarks as effective means of encouraging energy savings include:

- In a consumer survey undertaken by CRA International for this project 77% of respondents indicated that they would be likely to take action to reduce household energy consumption if a benchmark showed that their household's use was higher than other households. It is widely acknowledged that what respondents say in a survey and what action they actually take can differ greatly, however if even a quarter of respondents respond as they indicated, this represents 10 % of all Australian households[34].

[34] Calculated based on 77 per cent (survey result) x 25 per cent (discounting factor) x 50 per cent (assumed proportion of households that consume above the average) = 10 per cent. The discounting factor is based on the professional judgement of CRA International. This factor may be well above or well below this assumption and can only be determined with accuracy once the bill benchmarking measure is rolled out and there has been some experience in the field. Although there is likely to be some skew in the distribution of household electricity use in a given population, the assumption that 50 per cent of households consume more than the average is considered a reasonable estimate for the purposes of this study.

Further discussion in *Energy Bill Benchmarking Desktop Analysis*, p.34

- In 2008, the Queensland Government undertook a household survey which canvassed 900 people on a number of energy issues. When asked if they would be motivated to use less electricity if they had information such as a graph on their bill that showed they were above average for their area, 80.7% of adults stated that they would be motivated to use less electricity[35]. Again this percentage will probably overstate the proportion who will act on the benchmark information but the results are consistent with those of CRA International survey results.

- The Ergon Energy findings are consistent with trial research undertaken by Wilhite et al in Norway which found that over 85 % of trial participants showed interest in continuing to receive a benchmark following the trial period. The research also found that over three quarters of trial participants said they would be motivated to reduce their energy consumption if they were found to be above the average[36].

- Benchmarking in the Australian water industry provides useful insight into the impact of benchmarking. For example as previously mentioned, page 18, analysis done by Brisbane Water of its water benchmarking program revealed that 68% of respondents believe that this information program has helped them to decrease their household's water usage.

- Positive Energy (US), which includes energy benchmarking in a Home Energy Report provided to consumers, has reported average reductions of 2.5 % of annual energy use across all households that received the report for a full year. This equates to 300 kWh per household in energy savings[37].

- A trial undertaken by Haakana et al of 105 households in Finland, in which consumers were given a range of feedback on their energy consumption, resulted in a total reduction in electricity consumption of 17-21 % of monthly consumption. Over half of this reduction was attributed to visual feedback provided to the consumer, which equated to an 83 – 125 kWh per month reduction[38].

This information shows that energy bill benchmarking can be an effective communication medium for conveying comparable household consumption to households and is likely to lead to a significant increase in the number of households undertaking energy conservation. The support of Ergon Energy for benchmarking, in rolling out benchmarking across their electricity network after their initial trial, provides strong evidence that energy benchmarking can be usefully applied in the Australian energy market. The impact and cost benefit analysis, reported in Cost Benefit Analysis page 42, also indicated that the use of a mandatory energy bill benchmark will be a cost effective method of reducing electricity consumption.

[35] Office of Economic and Statistical Research, Queensland Government, *Queensland Household Survey 2008* p 60

[36] Wilhite et al in CRA International, *Energy Bill Benchmarking Desktop Analysis,* 2009, p.13

[37] Positive Energy in CRA International, *Energy Bill Benchmarking Desktop Analysis,* 2009, p.16

[38] Haakana, M., Sillanpaa, L. & Talsi, M., *The Effect of Feedback and Focused Advice on Household Energy Consumption*, 1997, p.10

The disadvantages and criticisms of introducing mandatory energy bill benchmarking are presented below, together with any counter arguments:

- There is no definitive evidence or research in Australia that will confirm that benchmarking will lead to increased energy savings or how much savings will occur. However, the market research results strongly suggest that the provision of energy benchmarking information will have a significant effect, as does the Ergon Energy experience. Also international research has shown provision of such information does lead to significant savings.

- The national costs in total to introduce energy benchmarking are high, and it is possible that the costs may not be justified by the unknown amount of energy savings that could occur. However the cost benefit analysis in the section National and State Costs and Benefits, page 46, clearly show the costs of a mandatory electricity benchmarking scheme can be justified by a minimum level of householder response. The net present value of the scheme at 2021, when the benchmarking program has been operating for ten years, is estimated at $69,503,667. The breakdown of the present values is presented in the table below, with the estimates assuming average implementation costs and uptake. These assumptions are discussed further in the Impact Modelling and Assumptions page 42 and further details of the present values are in Table 3 page 48.

Table 2: PV of Benefits and Costs for Electricity Benchmarking, with average costs and uptake

NPV at 2021: Average Costs	$69,503,667
PV Benefits at 2021	$190,845,937
PV Average Costs at 2021	$113,387,482

- Energy suppliers state they have concerns that they will incur the costs of introducing the benchmarking but will be unable to recoup these costs via increased tariffs or charges. Presumably this is because in competitive markets the competitive pressures may persuade some retailers to choose not to increase their tariffs, but this would be an independent decision made by each retailer.

  In regulated markets the different jurisdictions have arrangements where the retailers' costs of supplying energy, including their operating costs and costs resulting from changes in regulation, are examined by the relevant regulator as part of regular reviews of the regulated tariffs. Any costs of introducing the benchmarking scheme could be included as part of the retailers' submissions to any tariff review, and the relevant regulator would assess whether these costs can be passed through and include in the regulated tariffs.

- There is the potential that if the energy retailers can not recoup the cost of implementing the bill benchmarking scheme from their customers, this could adversely affect their financial position. However, as the cost benefit analysis in the section National and State Costs and Benefits, page 46, the cost per customer is approximately $1.00 annually or less than 0.1% of the average revenue per domestic customer. So the financial impact on the energy retailers is relatively small. In addition, in the short to medium term it is anticipated retailers will pass implementation costs through to householders.

- It is possible that within a few years the introduction of smart meters may mean the distribution of benchmarks via printed energy bills is unnecessary. However, as discussed, it will be many years before smart meters are widely distributed and even then they require information displays to convey benchmarking information, so they will not replace the need for bill benchmarking for many years.

- It is possible that the take-up of online billing, plus greater penetration of the internet, may mean the distribution of benchmarks via printed energy bills is unnecessary. However, the penetration and use of the internet, plus of online billing, would need to be much higher than it is at present for these to be viable alternatives to bill benchmarking and this is not expected to occur in the short to medium term.

- Ergon Energy suspects that over time, the additional benchmark information may be ignored. This possibility was recognised and the assumption that the benchmarking scheme may have a rapidly decreasing effect was used in the cost benefit analysis. Despite this conservative assumption, the electricity benchmarking scheme still appears to be cost effective.

In each case these disadvantages and criticisms of the energy bill benchmarking approach have been shown to be minor and do not justify rejection of the use of benchmarking. Consequently the introduction of mandatory energy bill benchmarking is seen as the preferred solution to the current market failure and this is the solution which is further explored in the following section on the impacts and cost/benefits of the proposed benchmarking program.

Impacts and Cost/Benefit Analysis

The impacts on the main stakeholder groups are first discussed and then the outcomes of the cost benefit analysis. As previously mentioned, the cost benefit analysis shows that implementing gas bill benchmarking is not cost effective, so the majority of the impact assessment involves the impacts of the electricity bill benchmarking scheme alone. The cost benefit analysis of the gas benchmarking option is discussed in the Cost Benefit Analysis section, page 42.

Impact on Main Affected Stakeholders

Households

The most important impact of the mandatory energy bill benchmarking scheme will be the ability of households to access information on the average energy consumption of comparable households. This will empower consumers to reduce energy consumption, as they will now be aware when they are consuming energy that exceeds the average. In addition, the benchmark information will direct them to a website where they are expected to be able to access energy saving advice and tips.

Bill benchmarking provides an opportunity for energy cost savings by householders. To what extent this is possible depends on household consumption levels and types. It is quite possible for households who decide to reduce their energy consumption to achieve savings of 20% to 30% or more, and certainly savings of 5% to 10% are routinely achieved. As previously reported, Potential to Improve Residential Energy Efficiency on page 23, it is estimated that average household energy savings of 13% are possible.

For the cost benefit analysis a more conservative average of 6.9% saving per participating households has been assumed, see Impact Modelling and Assumptions page 42. Assuming this energy saving rate, the introduction of energy bill benchmarking could result in an average savings of around $75 per participating household[39] and an overall benefits to the residential sector of $190,845,937 at present values through electricity cost savings by 2021. This represents a present value saving of around $20 per household, as explained in the Cost Benefit Analysis section on page 42.

It is quite possible the bill benchmarking scheme may be a catalyst to much larger energy savings, as it may motivate householders to access a range of government programs designed to encourage energy efficiency. However, as a conservative impact analysis was undertaken, no energy savings via increased uptake in other energy efficiency programs has been assumed.

The main disadvantages of the energy benchmarking scheme to the householders will be that the costs of the scheme initially carried by the energy suppliers will be eventually

[39] Calculations based on the average electricity consumption per households now being over $1100 p.a.

passed on to the householders. However, the cost will be a very small increase in householders' total bill charges, estimated to be around $0.76 to $1.15 per household annually, averaged over the ten years of the program and based on energy suppliers average and maximum cost estimates. As discussed further in the cost/benefit analysis, these costs are easily outweighed by the forecast benefits of energy benchmarking. Even for households that choose to ignore the energy benchmarks and gain nothing from the benchmarking scheme, the cost of around $1.00 annually is insignificant.

As is illustrated in the cost benefit analysis below, it is clear that with even low proportions of households being influenced by the electricity benchmarking, the benefits of introducing the benchmarking scheme outweigh the costs. Given the strong market research results and findings of the success of related energy benchmarking schemes internationally, the introduction of the energy benchmarking for electricity seems clearly justified from the residential customer perspective.

Retailers

Energy retailers will be impacted by the introduction of mandatory energy bill benchmarking in a number of ways. These impacts assume that the retailers are supplied with benchmarking information by a third party and that the retailers have some discretion in how and where they present the energy benchmark information on their bills. The impacts will include:

- Retailers would be required to include an energy benchmark on all their bills sent to residential customers. This will require retailers to undertake initial set up of their billing systems and ongoing data management tasks to ensure relevant benchmarks are provided to consumers. There will therefore be some ongoing IT/bill processing costs to the retailer.

- Retailers will be required to print the relevant benchmark on each householder's bill, together with text directing them to energy saving websites. This means the retailers will incur additional printing and possibly paper costs.

- There may be an opportunity cost to the retailers in the benchmark using up space of the bills which might be used for marketing purposes. However, the benchmark may also be an opportunity for retailers to promote products, such as GreenPower, and to assist householders with high energy consumption reduce their impact on the environment. The benchmark may also allow retailers to direct customers to their websites to view tips on energy saving and other products offered by the retailer. It has been assumed in the cost benefit analysis that such costs/benefits concerning opportunity costs of the bill space are neutral.

- When benchmarks are first supplied it is probable there will be increased traffic to the retailers' call centres, as householders make enquires and seek information about the energy benchmarks. Staffing the call centres to deal with such extra call traffic

will result in a cost to the retailers, which were included in their submitted estimates of the costs of implementing the benchmarking scheme.

- The cost of implementing the benchmarking scheme is $70.2 million over ten years, based on average cost estimates, of which approximately $65 million will be costs initially incurred by the retailers. This is the equivalent of less than 0.1% of gross residential electricity revenue.

- Retailers have stated that they may not be able to recover the costs of implementing the costs of the energy bill benchmarking. However, as previously discussed, it will be the retailers' choice whether to recover costs by increasing their tariffs in competitive markets, though they may choose not to due to competitive pricing pressures. In the regulated markets, increases in retailer operating costs or costs due to regulation are generally passed through into regulated tariffs but it is expected will be up to the relevant regulator in each jurisdiction to decide on the appropriateness of costs allocations.

- The energy retailers may lose some revenue in response to the decrease in residential energy usage/sales that will occur. Assuming the retailers' loss in revenue is equal to the energy cost savings of the householders, the retailers' lost revenue will be equal $190.8 million at present value by 2021, as reported in the Cost Benefit Analysis section, page 42. However, this revenue loss is spread over ten years and twenty retailers, and represents approximately 0.2% of their gross revenue from the residential sector. The extent that this revenue loss may affect each retailer and their profitability is unknown, and will vary with the retailer. Also retailers may also be able to recoup this lost revenue, for example by the use of the communication associated with the benchmarking to increase their sales of other products and services.

In summary, the energy retailers will undertake much of the implementation of the energy bill benchmarking and will, at least initially, incur many of the costs of implementing the scheme before passing them on to the consumer. The retailers' costs represent about $65M of the $70M costs to implement the benchmark scheme over ten years, ignoring householder energy efficiency action costs and assuming average costs and the benchmarking program operates to 2021. These costs are significant, but they are spread over approximately twenty retailers and over ten years. Also, the costs are relatively minor compared to the residential revenue the retailers receive, estimated at less than 0.1% of gross residential revenue. Any such costs are not expected to produce a significant or long lasting impact on the energy retailers' profitability. The costs to the retailers were estimated from their feedback to the Consultation RIS and are included in the cost benefit analysis.

Distributors

Electricity distributors are expected to be involved in the collecting of the consumption data per post code that will be used by the government the Australian Energy Regulator or alternate body to calculate and provide the benchmark. The main impact on distributors will be in the time and resources required by the distributors to extract the required data from their information systems and arranging for it to be sent to the required government agency. The costs to the distributors were estimated from their feedback to the Consultation RIS and are included in the cost benefit analysis. The total present value of these costs is estimated at around $4-6M, but these costs are spread over ten years.

Consumption information from gas distributors is not expected to be sought, as many are not yet in the position to clearly identify who are residential consumers in order to supply useful data for benchmarking purposes. This task is likely to be done by gas retailers. However, as previously mentioned, the cost benefit analysis indicated that it is not cost effective to introduce gas benchmarks, so it is not expected that gas distributors will be required to provide any data.

Generators

The generators will lose some profits in response to the decrease in residential energy usage/sales that will occur. As the decrease in residential energy use is expected to be a very minor percentage of the total energy that generators provide, no attempt has been made to estimate this cost.

Government and/or Regulator

The main impact of the energy bill benchmarking program on the Government and/or the Australian Energy Regulator (or alternate body) will be the initial development and ongoing management of the benchmarks and making these available to electricity retailers. The cost for this data collection and analysis to undertake this task should be relatively small, provided the data is supplied in the right format, and will be around $100,000 to $150,000 nationally. The logistics of benchmark development and management tasks are still to be confirmed.

If household size consumption data is incorporated into the benchmarks then this will need to be based on relevant research and analysis. Some of this research already exists, such as Victoria's recent benchmark research, and could be used for a national benchmarking scheme. However, ideally a broad household survey will be conducted at the beginning of the benchmarking program and another survey around five or six years later. The results of such a survey will be analysed to develop models relating energy consumption to household size, possibly in different climate zones as well.

In keeping with taking a conservative position in developing the cost benefit analysis, it is assumed that an energy survey would be undertaken and surveys with an estimated cost

of up to $1,400,000 have been included in the cost benefit analysis. This is the estimated expense to undertake the survey and model development work nationally, based on Victoria's experience with such research. This broader survey is expected to be useful for purposes beyond energy bill benchmarking, but the extent and nature of any survey work conducted will need to be made at the benchmark implementation stage. Also, in practice, the costs will be lower as some jurisdictions have already undertaken this research

Cost Benefit Analysis

Impact Modelling and Assumptions

Modelling of the impact of the energy billing benchmarking scheme has been undertaken and the results of this modelling used to develop cost benefit analysis for the scheme. The impact modelling is based on a set percentage of households undertaking energy savings in response to the energy bill benchmarking, with the number of households in each jurisdiction being based on ABS data and EES (2008)[40] forecasts. The impact of the households' actions is estimated as a percentage of the total energy usage in each jurisdiction, with the total energy use by fuel being obtained from EES (2008) forecasts. The impact modelling and CBA was done for electricity and gas separately, as the different energy sources have different costs for their respective energy bill benchmarking schemes and different impacts and benefits.

In all cases a conservative position has been taken in the modelling of the energy savings, as the impact of energy bill benchmarking has not been verified in Australia. Examples of the conservative modelling position and assumptions used include:

- For those households which implement behavioural changes to save energy, only a saving of 5% of average energy consumption is assumed and these behavioural based savings are expected to stop after two years.

- Technically based energy savings- from changes to appliances, appliance settings or house thermal properties- are also assumed to only occur in owner occupier households, with only 5% savings being achieved by these households.

- The number of households implementing technical changes is assumed to be 37.5% of the number implementing behavioural changes, based on these changes only occur in owner occupied households, which make up 75% of households, and only in half the households that implement behavioural changes

- A maximum energy savings of 10%, and an average savings of 6.9%[41] across all households, is assumed for households that are influenced by the energy benchmark. The assumed savings is therefore considerably lower than the potential

[40] Energy Efficiency Strategies, *Energy Use in the Australian Residential Sector 1986-2020*, 2008.

[41] Calculated as 5% from behaviour changes plus 37.5% of 5.0% for technical changes

average energy saving of 13% across all households that is estimated to be possible, as discussed in Potential to Improve Residential Energy Efficiency on page 23. The maximum savings under the benchmark scheme is assumed to occur for the households that undertake energy savings through 'behaviour changes'; i.e. householders changing their use of appliances, heating/cooling and lighting; and through 'technical changes'; i.e. changing the setting of appliances, or alterations to appliances to improve their efficiency.

- No major technical changes are expected to take place; such as installing ceiling insulation or installing solar hot water systems; as such changes are often covered by existing rebate schemes and other incentive schemes. This means there is a risk of double counting if such technical changes were assumed to result from the benchmark scheme, even though the benchmark scheme may well increase the take-up from other energy savings schemes.

- The technical changes assumed to occur as a result of the benchmarking scheme are costed, and estimates of the average cost to achieve a 5% energy saving are included as residential costs in the CBA.

- The benchmarking scheme is primarily targeted at above average consumption households, so it could be argued that the estimates of energy saving should be a proportion of the energy use of high consuming households. Instead savings are based only on the average household consumption, producing a smaller estimate of energy savings.

- Energy costs are expected to increase significantly throughout the period of the benchmarking program, but no increase in energy prices is used in the model. Energy costs used are the forecast 2010 costs corresponding to the Treasury CPRS-5 Scenario[42].

- Considerable energy savings will continue to occur after the ten years it is assumed the benchmarking scheme will operate, mainly from technical changes made by households. If these savings are included then the net benefits of the electrical benchmarking almost double. However, these additional savings have been ignored in the CBA, again to ensure a conservative estimate of the benefits of the benchmarking scheme was developed.

- A discount rate of 7% was used in the cost benefit analysis, as advised by OBPR.

The costs of implementing the bill benchmarking scheme can be divided into costs to the tax payer, business compliance costs and costs to the consumer/householder. The most significant costs are those of business compliance costs, followed by householder

[42] http://www.treasury.gov.au/lowpollutionfuture/default.asp

implementation costs. These costs did not correspond very closely to the OBPR Business Cost Calculator categories, as almost all costs would be classified as 'Other', so alternative methods of developing the compliance costs were developed.

Business Compliance Costs

The business compliance costs arise from energy distributors and retailers implementing the benchmarking scheme through their collecting and analysing consumption data, storing and allocating appropriate benchmarks to relevant customer records and from including and printing the benchmarks on the householders' bills. Estimates of these costs were based on cost information supplied by energy suppliers in response to the Consultation RIS. The information sought from retailers and distributors included information on the costs of implementing a number of different forms of the benchmark: ranging from a state average; local climate zone average; post code zone average with/without personalised message and with/without household size related averages.

Retailers and distributors were asked to supply information on:

- data collection costs
- redesigning billing systems costs;
- printing costs;
- call centre costs;
- data management; and
- opportunity costs associated with billing space.

A range of costs were given by different suppliers for the different activities the suppliers needed to undertake, so the costs from suppliers were divided by their number of customers to create a per household cost. This enables the different cost estimated of suppliers to be compared and for them to be grouped into minimum and maximum cost estimates. The 'average' costs were estimated as the mean between the lowest and highest costs obtained for each of the activities. The average and maximum cost estimates were then used to develop the average and maximum costs each jurisdiction was likely to incur, by multiplying these costs by the number of households receiving the relevant energy type in that jurisdictions. The use of the average and maximum costs enabled a base and worse case scenario testing approach to be used with regard to costs.

Household Costs and Take-up

The costs the householder incurs from the scheme consist of the costs of implementing the scheme, when these costs are passed on by energy suppliers to the householders, and the cost of energy efficiency actions undertaken by those householders implementing energy efficiency actions. The scheme implementation costs have already been captured as business compliance costs. The householder implementation action costs are only incurred by those householders that undertake 'technical' energy efficiency actions, and are estimated at $234. These are the average costs estimated to undertake a range of small

energy efficiency actions that will result in the 5% energy savings expected to be achieved. The average cost is a weighted cost which considered the estimated efficiency savings of the different potential technical actions, and the proportion of household energy that is affected by the end use that each action affects. The actions may include stopping, adjusting thermostats, replacing lamps etc.

The proportion of households expected to undertake energy efficiency actions as a result of the energy benchmarking was estimated by CRA International (2009) as 10%, but a much more conservative base case scenario was assumed of 2.5% households responding in year one, declining to 0.5% by year four. In addition, sensitivity estimates were made using a break-even, worse base scenario which was modelled at 1.5% responding, and a best case of 5% response was also modelled.

Finally, in the base case scenario the total savings is modelled to not exceed 0.6% of residential energy consumption in any year, which again is a highly conservative estimation of the potential impact of the benchmarking scheme. This value is significantly less than the 2.5% average savings reported by Positive Energy from their benchmarking program, as previously discussed on page 18.

Cost Benefit Analysis Perspective

In terms of an approach for the cost-benefit analysis, it is necessary to do this from either a consumer/householder or societal perspective, although the ratio between retail and resource costs will be much the same for both electricity prices and any incremental costs associated with the energy benchmarking scheme, so the cost/benefit outcomes are likely to be similar.

Analysis from a consumer/householder perspective involves the use of business compliance costs, assuming these are passed through to the householder in the form of increased energy prices and marginal retail energy prices. Since the objective is to assess whether consumers as a group would be better off, transfer payments such as taxes are included.

Analysis from societal or resource perspective, involves assessing the cost to the economy of encouraging increased residential energy efficiency though the benchmarking scheme using the marginal cost of resources diverted from other activities. Only the extra costs involved in the scheme (i.e., extra materials, data management, printing costs) are counted and any benefits are valued at the marginal cost of electricity production rather than the retail price. Price components not related to costs, such as retail mark-ups and taxes are not included.

The dollar value of both costs and benefits will be lower from the resource perspective than from the consumer perspective, although if they both fall in the same proportion then the cost/benefits ratios will be much the same. Carrying out a separate cost/benefit analysis from the resource perspective is only necessary if the ratios of private to public costs are expected to be significantly different for costs and benefits.

For this analysis, a consumer or householder perspective has been assumed as the available data corresponds to that perspective and this is the most readily available information. Retail mark-ups and taxes will be passed onto the consumer and this perspective will simplify the process (while still remaining appropriate), whereas a new set of factors and assumptions have to be introduced, particularly regarding supplier costs, if assessing from a resource perspective. The consumer approach is recommended for the development of RISs associated with the E3 programme (NAEEEP 2005), and hence is considered relevant to the current RIS. The impact of varying discount rates is also very much more difficult to assess from a resource perspective.

National and State Costs and Benefits

The criteria used to determine if the energy bill benchmark results in an overall net benefit are:

- NPV of the benefits and costs is positive for the scheme at the national level
- If the ratio of the present value of the benefits and costs exceeded one, so benefits exceeded costs
- NPV of the benefits and costs being positive for the scheme in each State and Territory.

The base scenario was first examined to determine the effectiveness at the national level of the electricity and the gas bill benchmarking. The base case, with 2.5% of households undertaking energy savings in response to the energy benchmarks in year one, was modelled and the costs and benefits determined for electricity and gas. The cumulative net benefits for Australia are illustrated in the following charts.

examining the present values of the benefits and costs of the electricity and gas schemes, as shown in the table below.

The electricity bill benchmarking resulted in positive NPVs when modelled with the average estimated costs of implementing the scheme and also when maximum costs were used. The benefit/cost ratio was also greater than one, again indicating benefits exceed costs for electricity benchmarking. Consequently electricity bill benchmarking will be further examined regarding its potential as a regulated option.

Table 3: Present Value Measures of Benefits and Costs

NPV at 2021: Average Costs	$69,503,667	-$12,970,402
NPV at 2021: Maximum Costs	$40,388,284	-$25,681,419
PV Benefits at 2021	$182,891,149	$32,562,317
PV Average Costs at 2021	$113,387,482	$45,532,719
PV Maximum Costs at 2021	$142,502,865	$58,243,736
BC Ratio at 2021- Avg Costs	1.61	0.72
BC Ratio at 2021- Max Costs	1.28	0.56

The gas bill benchmarking resulted in negative NPVs when modelled with the average and maximum estimated costs of implementing the scheme. The benefit/cost ratio was also less than one, likewise indicating costs exceed benefits for the gas benchmarking. An examination of the gas NPV at 2026, including five years of additional post-program savings indicated that the gas benchmarking did not produce net benefits even in the long term. Consequently it is concluded that gas bill benchmarking is not a cost effective option.

Scenario testing was carried out to determine the lowest level of influence on households that could occur before the costs of the electricity bill benchmarking scheme exceeded the benefits, which was 1.5% of households undertaking energy saving in year one, and also to test the impacts of the scheme at the maximum expected level of influence, 5% taking actions. The results are illustrated below.

Figure 7: Minimal Influence Scenario: National Cumulative Benefits and Costs for Electricity Bill Benchmarking

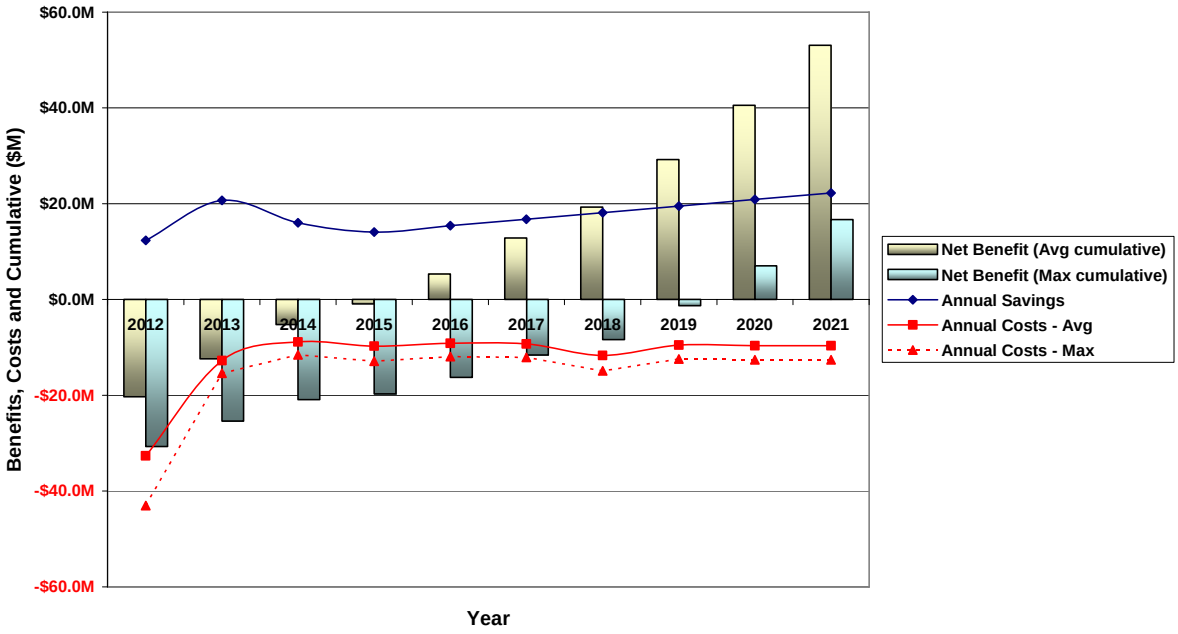
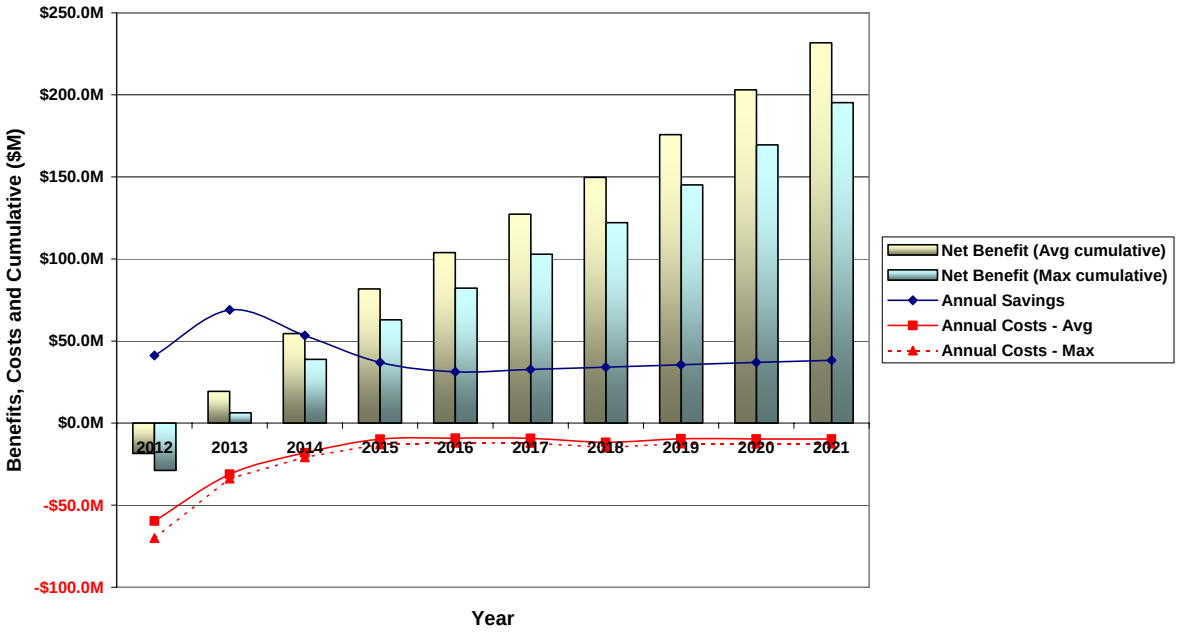


Figure 8: Maximum Influence Scenario: National Cumulative Benefits and Costs for Electricity Bill Benchmarking



The results show that even for the minimal level of influence and with maximum benchmark implementation costs, the electricity benchmarking scheme produced benefits

exceeding costs by year seven. The maximum take-up scenario also clearly shows that with this level of uptake, net benefits are achieved by year two and the scheme will produce cumulative net benefits of over $200M by year ten.

The net present value results of the three scenarios are compared in the table below. They show that only 1.5% of households need to undertake energy savings actions in year one for the benchmarking scheme to be cost effective, and higher uptake will produce significant increases in net benefits.

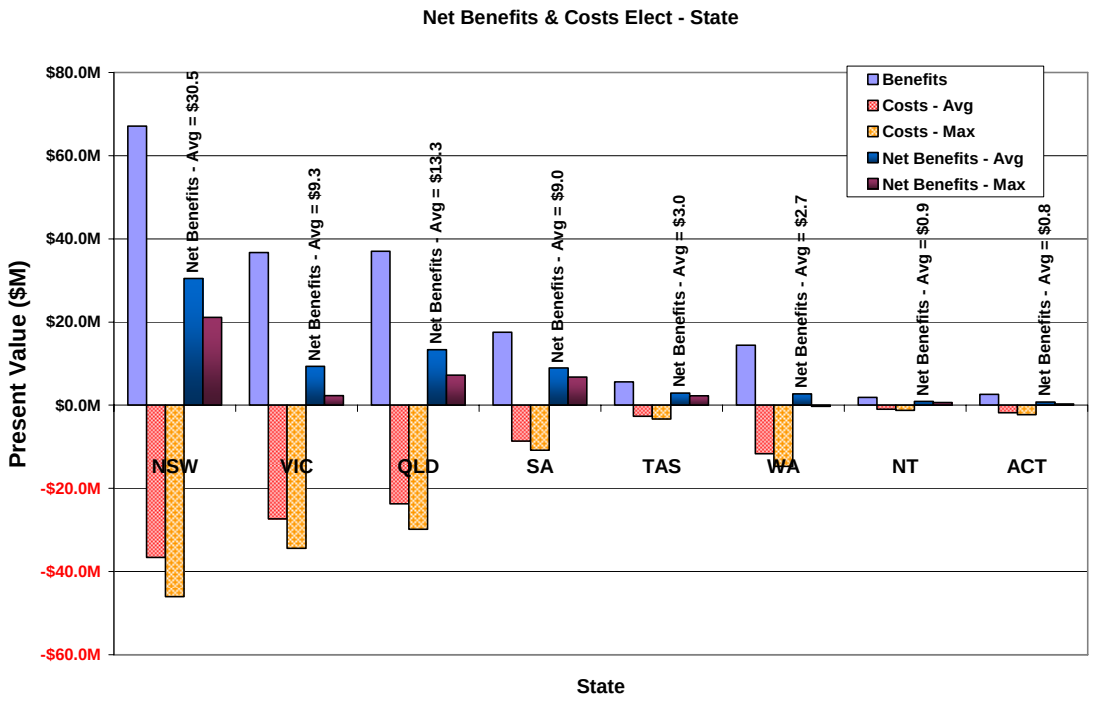
Assuming the maximum uptake and average costs, this means the electricity benchmarking scheme will achieve a NPV of $166M over the life of the program.

Table 4: Present Value Measures of Benefits and Costs for Different Scenarios Tested

NPV at 2021: Average Costs	$30,891,515	$69,503,667	$166,034,045
NPV at 2021: Maximum Costs	$1,776,132	$40,388,284	$136,918,662
PV Benefits at 2021	$129,340,877	$182,891,149	$316,766,829
PV Average Costs at 2021	$98,449,361	$113,387,482	$150,732,784
PV Maximum Costs at 2021	$127,564,744	$142,502,865	$179,848,167
BC Ratio at 2021- Avg Costs	1.31	1.61	2.10
BC Ratio at 2021- Max Costs	1.01	1.28	1.76

The next step was to examine the impacts of the electricity bill benchmarking at State/Territory level. These are illustrated for the base scenario in the chart below. In all cases the net benefits exceed costs for each jurisdiction over the life of the program, for both average and maximum costs of implementation. The result is that net benefits exceed costs for all jurisdictions.

Figure 9: PV of Cumulative Benefits and Costs for Electricity Benchmarking in each State/Territory



Finally the impact of various discount rates on the cost benefit analysis was tested. The base case was for the discount rate to be 7%, but the impact of using 3% and 11% on the analysis for electricity was also tested. The results of the various discount rates are shown in the table below and show that the electricity bill benchmarking scheme produces net benefits regardless of the discount rate assumed.

Table 5: Present Value Measures of Benefits and Costs for Different Discount Rates

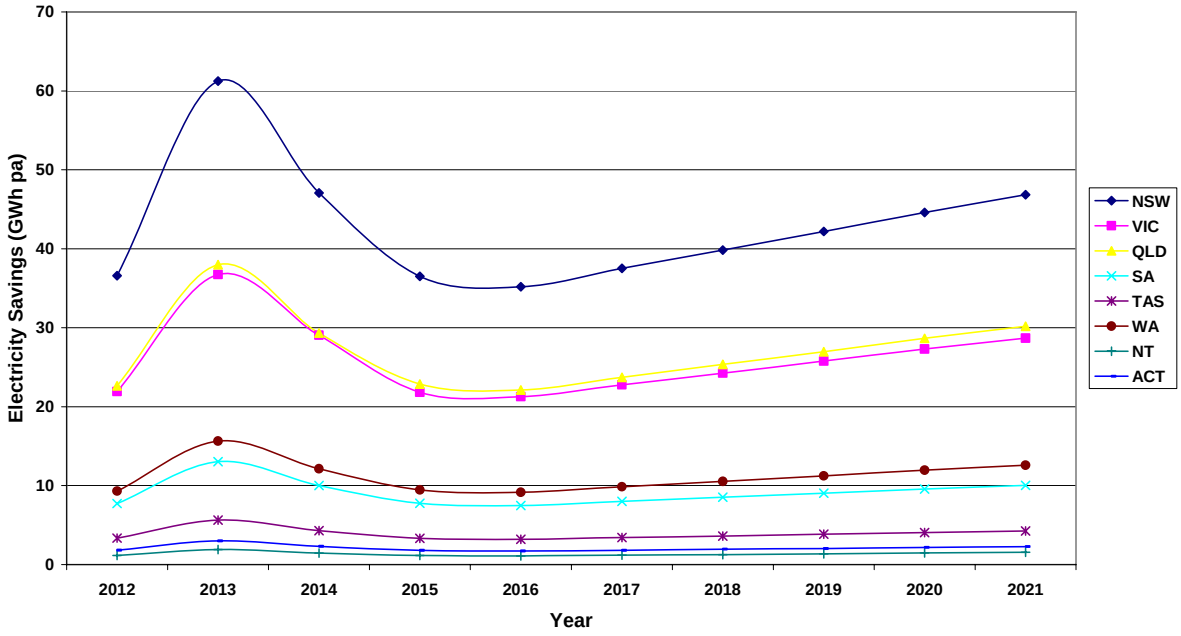
NPV at 2021: Average Costs	$69,503,667	$87,142,601	$56,046,125
NPV at 2021: Maximum Costs	$40,388,284	$54,307,594	$29,790,510
PV Benefits at 2021	$182,891,149	$213,441,245	$159,435,855
PV Average Costs at 2021	$113,387,482	$126,298,644	$103,389,730
PV Maximum Costs at 2021	$142,502,865	$159,133,651	$129,645,345
BC Ratio at 2021- Avg Costs	1.61	1.69	1.54
BC Ratio at 2021- Max Costs	1.28	1.34	1.23

Electricity and Greenhouse Emission Savings Projections

Based on the projected energy savings from the electricity bill benchmarking scheme described above, and assuming the base scenario, the estimated electricity and greenhouse savings were determined. All greenhouse emission factors are based on factors to be used for E3 RIS analyses.[43] These savings at a State and territory level are illustrated below. Nationally the total savings over ten years, assuming the base scenario, are:

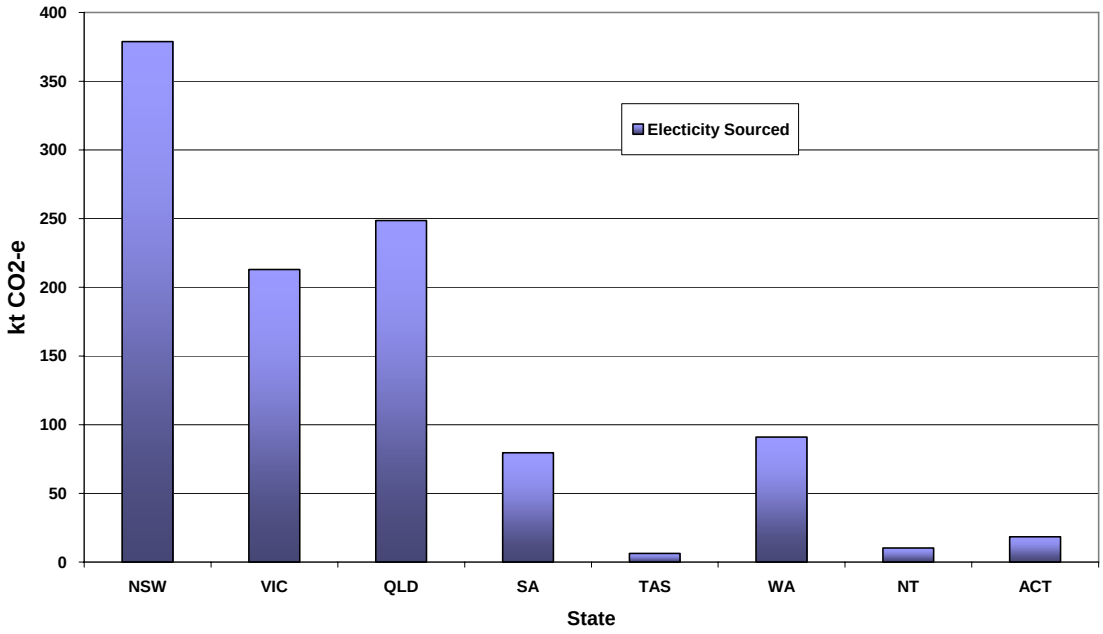
- For electricity- 1.2 million MWh
- For greenhouse emissions – 1.05 million CO_2e tonnes.

Figure 10: Base Scenario: Projected Electricity Savings by State



[43] http://naceec.energyrating.com.au/reports/household-greenhouse.xls

Figure 11: Base Scenario: Projected Cumulative Greenhouse Emissions Savings by State -2021



Consultation

Consultation with Stakeholders

Various forms of consultation on this policy initiative have been facilitated by the CIIC. Consultation with stakeholders was a primary focus of the initial phase of the examination of energy bill benchmarking options. In late 2005 the CIIC commissioned McLennan Magasanik Associates (MMA) Pty Ltd to review the content requirements of electricity and natural gas bills in order to "develop ideas for showing benchmark information on energy bills". This work included:[44]

- a review of national and international billing information to help identify best practice approaches to energy bill benchmarking;
- the release of a Discussion Guide to retailers across the jurisdictions, for the purposes of informing them and seeking general feedback from them; and
- a series of one-on-one interviews with retailers for the purposes of obtaining their specific views on benchmarking information and to gather information on the nature of their specific billing systems and the constraints that may exist to implementation.

The information gathered from this process was presented to the CIIC in a December 2005 report by MMA entitled "*Showing comparative energy consumption information on customer's bills*".

On the basis of the energy bills that were reviewed and the constraints that were identified by retailers about the practicalities of implementing energy bill benchmarking, MMA:

- proposed a limited number of bill designs for testing – i.e. designs showing information about a householder's historical energy use and a benchmark;
- recommended a number of design elements for the CIIC's testing phase for the identified designs; and
- considered various regulatory scenarios to encourage retailers to show benchmarking information.

Following CIIC endorsement of the recommendations of the MMA Report, a process of qualitative consumer market testing was undertaken during 2006 to evaluate the effectiveness of the energy bill benchmarking options and to optimise the presentation of billing information for maximum consumer understanding, motivation and likelihood of positive action.

[44] McLennan Magasanik Associates Pty Ltd, *Showing Comparative Energy Consumption Information on Customer's Bills*, December 2005, p.3. Can be found at http://www.ret.gov.au/Documents/mce/energy-eff/nfee/committees/consumer/focus.html#focus1

The next stage involved the development of the market testing parameters which was supported by a report by Evans and Peck Pty Ltd[45] who recommended:

- suitable design options for showing benchmarking information on household energy bills, given current and predicted constraints of energy retailers;
- appropriate sample sizes in order to be statistically significant;
- the most appropriate market testing methodology or methodologies to engage participants to promote the integrity, robustness and rigour of results; and
- appropriate target markets and market segments in order for a nationally consistent approach to be recommended.

The recommendations in Evans and Peck's report were used to inform a market testing exercise of bills. Qualitative market testing was then undertaken by NWC Research during 2006 to recommend models for provision of energy bill benchmarking for Australian electricity and gas consumers. This work included the design of six residential bill 'mock-ups' to market test the appeal of benchmark data, methods of communication and the potential impacts of its presentation. The program of qualitative testing included:[46]

- 10 pilot in-depth interviews prior to finalising the draft material; and
- A combination of focus groups (involving 210 respondents) and in-depth interviews (involving 44 respondents), structured to cover five states (Queensland, New South Wales, Victoria, South Australia and Western Australia); metropolitan, regional and rural areas; householders of English-speaking and non-English speaking origin; and a mix of smaller and larger households.

The information gathered from this process was published in a report by NWC Research entitled "Energy Bill Benchmarking - Consumer Market Testing Final Report". The report was publicly released in September 2006. This report made a number of specific recommendations regarding the design of benchmark models and associated presentation of the data based on the consumer testing.[47]

In August 2007, a Retailer Survey sought information from a cross-section of energy retailers about the nature and quantum of their costs in order to quantify the costs of implementing a range of identified bill benchmarking options. The survey was sent to a selection of retailers who were considered to be representative of all States and Territories and the electricity and gas industries.

[45] Evans and Peck Pty Ltd, *Energy Bill Benchmarking – Market Testing*, March 2006. Found at http://www.ret.gov.au/Documents/mce/energy-eff/nfee/committees/consumer/focus.html#focus1

[59] NWC Research, *Energy Bill Benchmarking – Consumer Market Testing Final Report*, September 2006, page 3. found at http://www.ret.gov.au/Documents/mce/energy-eff/nfee/committees/consumer/focus.html#focus1

[47] Ibid, page 47.

The Survey also sought to identify issues associated with implementing the various options, including those issues that would impact on the timeframe for the commencement of any potential bill benchmarking proposal.

In response to the concerns and issues raised by the retailers through this survey, the CIIC held a workshop with retailers and distributors in April 2008 to discuss the development of the EBB Project and had subsequent discussions with representatives from the Energy Retailers Association of Australia. The CIIC noted the concerns of retailers at that meeting with regard to the complexity of the previous benchmark designs that were tested and the potential costs associated with implementing such detailed benchmarking models. Due to these concerns, this document proposes regulation that is far less prescriptive than what was originally proposed.

Opportunity for Stakeholders to Comment on Consultation RIS

The release of the Consultation RIS in October 2009 was followed by a consultation forum held on 17th November, 2009. This workshop was widely advertised in advance and provided an additional opportunity for stakeholder engagement and feedback. Over thirty stakeholders attended, including a number of distributors and energy retailers. A summary of the RIS was presented and discussion encouraged about the questions raised in the RIS. The main issues or comments raised at this forum are as follows:

- A number of stakeholders were frustrated that the process of developing the benchmarking scheme had been so drawn out, that their views might not be considered and about the limited time available to provide submissions regarding costs
- Retailers wanted clarification of the benchmarking approach that would be used, in order to supply more accurate cost estimates and in order to respond appropriately
- Some stakeholders were concerned that benchmarking scheme would not be effective and believed other public information campaigns would be more effective
- Distributor and retailer views on providing the benchmarks were sought and some members of both groups expressed the view that other group were best placed to supply this information, while all saw a need for government involvement
- Energy suppliers emphasised that the gas supply and billing systems were different and this must be considered in developing any benchmarking scheme
- Stakeholders expressed a variety of views on the appropriateness of state, local climate zone or post code based benchmarks, with all options having some support
- Consumer advocacy and social equality advocate groups were concerned about the cost of the benchmarking scheme being too onerous for low income/low

usage households, and that an online benchmark scheme would not be accessible to many households

- The option of using aspirational targets was proposed and discussed by stakeholders
- Stakeholders requested that the form of the benchmark be defined as much as possible in any request for information, so did not need to respond to a myriad of options.

Following on from this in a number of jurisdictions additional briefings were provided to distributors and retailers.

After the 17th November, 2009 workshop, written comment was sought on the Consultation RIS from affected stakeholders and interested parties. Stakeholders were requested to focus on the individual questions contained in the text. In addition an information request was distributed to Australian energy distributors and retailers regarding specific questions in the RIS, particularly those relating to implementation costs and options.

Two subsequent Request for Information (RFI) documents were sent to retailers – the second including three benchmark models – to extract more detailed estimates- as requested by stakeholders at the workshop.

In total 21 submissions were received in response to the Consultation RIS and RFI's. These submissions were used to develop the cost benefit analysis. Due to Commercial in Confidence nature of some responses no submissions were made public. However, some of the ways that the feedback has been responded to and incorporated into this RIS include:

- Recognition of the difference between the requirements of a gas and electricity benchmarking scheme, with the eventual rejection of gas benchmarking at this time
- A strong emphasis on selecting benchmarking options which will minimise the implementation costs, hence costs to households, while still obtaining an effective benchmarking scheme
- Requiring the benchmark to be supplied on the energy bill, not as an online service
- Revision of the cost assumptions used in the cost benefit analysis, in light of the more recent costing submissions
- Increasing the control and flexibility that energy retailers may display regarding the placement of the benchmark on the bill and format of the benchmark
- Reducing the frequency with which the benchmarks will need to be updated, in response to impact more frequent changes had on energy suppliers and costs

- Recognition that government agencies may be required to prepare and distribute the benchmarks
- Instituting an on-going consultation process with energy suppliers regarding the form and process that may be used to implement the bill benchmarking.

Implementation Issues: Summary

Assuming a mandatory energy bill benchmark is introduced, there are a number of significant issues that need to be resolved regarding its format. The variations of the energy benchmark that are possible and the principle ones explored are as follows:

- Benchmark locality: State average, climate zone average or post code average
- Nature of the benchmark average: varying with household size, fuels used, appliance types etc
- Time period of benchmark
- Benchmark metric

The mandatory energy benchmark that was used in the cost benefit analysis was a climate zone average, with averages for different household sizes, varied quarterly and expressed in energy usage units. This benchmark was used as it was determined to be one of the most practical to implement, while being likely to be acted upon by the most householders. It was also estimated to be the benchmark which would have the greatest costs to implement and so was chosen as this would mean the cost benefit analysis would produce the most conservative benefit/cost ratios. This is consistent with the conservative assumptions used throughout the cost benefit analysis.

An alternative benchmark that could have been used was a climate zone average, with a personalised message varying depending on whether the household's consumption was less then, equal or greater than the relevant average. This benchmark would also vary quarterly and be expressed in energy usage units. This benchmark was not used as it has slightly lower implementation costs than the household size benchmark, hence would not result in quite as conservative estimates of the benefit/costs for the benchmark scheme. Both of these two benchmarks are expected to have similar effects, and appear preferable to the other options considered. However, the exact format of the benchmark has not been decided and will be further refined in the light of planned research on this topic.

An analysis of the benchmark format options is presented in more detail in Appendix 2: Implementation Issues on page 68, but the following sections present a summary of this analysis.

Benchmark Locality

Three benchmark options were considered, as discussed below:

- State average benchmarks
- Climate zone localities based benchmarks
- Postcode locality based benchmarks.

A State based benchmark is the simplest to produce as it results in one single benchmark for each jurisdiction and everyone gets the same benchmark. The key advantages of the State benchmark are it will be simple to administer as it can be overlayed across existing

consumption graphs and universally applied to all customers, plus it is marginally less costly to implement. The disadvantages of a State benchmark are it may be misleading when energy consumption varies significantly across the State, and consumers consider a State/Territory benchmark as being less relevant to them and therefore take no action to reduce their energy consumption. The State benchmark therefore can be seen as the cheapest but probably less effective of the benchmark options. Given the marginal cost savings of this option, it was not recommended in favour of other options which are likely to be more effective.

A climate zone locality benchmark, based on the energy use in a localised area, based on a climate zone, provides consumers with a benchmark they can easily identify with which is expected to improve its overall effectiveness. The benchmark will provide more accurate and pertinent information to householders and market research suggests it is much preferred over a State or Territory benchmark. The key disadvantages of the climate zone benchmark are there will be costs associated with implementing climate zone benchmark that may be more than for a State/Territory average, and administering the climate zone benchmark will be slightly more complex. Given the relatively minor additional complexity and cost increase to use a climate zone based benchmark, this is the preferred option compared to a State average.

A postcode benchmark based on a small localized area would probably be the most strongly identified with by householders, given CRA International[48] survey finding that the majority of households preferred a benchmark based on their local community. However, benchmarks based on such small areas may mean socio-economic differences are strongly influencing the benchmarks and the benchmarks could be misinforming.

Nature of Benchmark

In terms of presentation, it is assumed that the energy benchmark will be presented visually, probably as a bar graph or something similar, on the energy bill. However, the nature of the benchmark can still vary significantly depending on whether factors affecting energy consumption are taken into consideration in the benchmark. Such factors include household size, fuel mix and appliance mix.

The simplest benchmark will be the average consumption for all household types in the relevant locality. This average consumption data can be obtained by analysing the consumption records in the relevant locality, and feedback from energy suppliers indicates that this information can be obtained from the relevant distributors (electricity) or retailers (gas) in the area. The average household benchmarks have another advantage in that they can be supplied with a personalised message, informing the household if they are above, the same or below the average consumption for their area. This may further encourage high energy consumers to implement energy efficiency measures. The disadvantage of this type of benchmark is it ignores the large variation that exists between

[48] CRA International, *Energy Bill Benchmarking Desktop Analysis*, 2009, p 31

households of different sizes; fuel mixes etc. so householders may ignore the benchmark because they consider it irrelevant.

Household size based benchmarks are the next most complex benchmarks, and convey the average consumption for all households of a particular number of people in the relevant locality. This means the householder can compare their consumption against a household of equivalent size and market research shows respondents strongly supported the use of household size based benchmarks. The main advantages of a household size benchmark are the benchmark would convey more information to householders and could potentially have more relevance and appeal to consumers. The main disadvantages of household size benchmarks are the additional cost to produce them and they do not allow for the supply a personalised message with this benchmark.

On balance, household size based benchmarks appear to have some advantages over benchmarks based on averages for an area. However, further research is to be conducted to assist in deciding the most appropriate type of benchmark for Australia, and which benchmark should be used when implementing the scheme.

The more complex benchmarks of fuel mix and appliance mix benchmarks were also examined but were considered to be impractical to implement at the present time in a form that would not confuse householders.

Time period of the benchmark

The timing of the benchmark refers to what time period the benchmark is based on, such as annual consumption or quarterly consumption etc. The timing of the benchmark is important as the energy consumption of households varies with the seasons. Consequently a benchmark based on annual consumption conveys less information than a benchmark that is based on consumption in the time period that more closely resembles the period that a household is being billed for.

An annual benchmark is the simplest and cheapest benchmark to obtain and supply to households but supplies the least relevant information to a householder, even if the annual consumption is converted to quarterly consumption to match the householders' billing periods. Energy consumption varies widely between quarterly bills in many parts of the Australia, which could make the benchmark of little guidance or even confusing to householders for much of the year.

A quarterly benchmark, varying with seasonal energy usage, is the next simplest benchmark to apply. Four quarters of the year could be chosen and the average energy consumption for houses billed in those periods could be used as the quarterly benchmarks. The main disadvantage is the relevancy of a quarterly benchmark will depend on when a household is billed in the quarter.

A variation on the quarterly benchmarks is the rolling quarterly benchmark, where each quarterly benchmark provided to households billed during any given month, would be

determined by the average consumption of the preceding three month period. This version of the quarterly benchmark has all the advantages of the previously described quarterly benchmark approach, but it also has the advantage that the benchmark information will be of greater relevance to more householders. Consequently this is the recommended time period for the benchmark.

Another option considered was for the benchmarks to be based on a rolling average for the consumption of households billed at the time. For example, in any given week the average of the consumption for all households billed in that week would be calculated and this would be used to provide the benchmark for households billed that week. In the next week, a new consumption average would be calculated and used to provide a new benchmark for households billed in that next week. This is the approach of Ergon Energy, although it should be noted that Ergon is a vertically integrated organisation and this options is probably not a possibility for most retailers. As this is a more complex option, and may not be feasible for all retailers, this option was not recommended.

Benchmark Metric

The benchmark could be expressed in dollars, tonnes of greenhouse emissions or in energy units- kWh or MJ. Dollars are the most familiar to householders but convey the least information on energy consumption as some energy costs are fixed and also prices will vary for energy. Greenhouse emissions vary with use of Green Power by householders, so a metric based on emissions will not clearly convey information in energy consumption. Only an energy unit metric will reliably convey information on energy consumption and so this is recommended.

Review

The program will be monitored on an ongoing basis. A review will be undertaken after three years to coincide with the first updating of the bill benchmark to consider its impact and operation.

Summary Recommended Energy Benchmark Option

In summary, due to the reasons stated above and explained in more detail in Appendix 2: Implementation Issues, the benchmark option used to model the impacts of the benchmarking scheme was a mandatory benchmark based on climate zone localities. The benchmark is to indicate average consumption by household size and is to be calculated using a rolling quarterly method to reflect seasonal variation in energy use. The metric for the benchmark is to be energy consumption, measured in kWh of electricity consumption and MJ to gas consumption.

This form of the benchmark was the one used for the cost benefit analysis and at present is considered the effective and practical to implement. It was estimated to be slightly more costly to implement than other practical benchmark options, and so it was used in keeping with using conservative assumptions for the cost benefit analysis. However,

further research is to be conducted, and additional information sought from energy suppliers and other stakeholders, in order to ensure the most effective benchmark as possible is implemented. This may result in some slight variations in the final benchmark that is implemented.

Conclusion

MCE has stated that it considers energy benchmarking, subject to objective analysis, an enabler to encourage consumers to undertake more energy efficiency measures. This is in response to Australia's ever-growing energy consumption and the infrastructure and environmental impacts this has. Australian and international evidence suggests there is value in the concept. That same evidence provides a variety of options as to what information consumers prefer and what is the most effective way of presenting this information in changing consumer behaviour. Some experience points to a simple benchmark being the most effective whilst other evidence points to more detailed benchmarking encouraging greater energy reductions.

Consideration of the potential benefits must be weighed up against the implementation costs that are associated with each option and the status quo. The trade-off between potential benefits and implementation costs is an issue that the MCE Standing Committee of Officials is committed to exploring, and it has sought stakeholder guidance on an appropriate policy response. All stakeholder submissions were considered in the development of this policy.

Given the evidence of the existing information outlined in this document, it would appear that providing benchmarking information on utility bills does promote positive behaviour changes regarding energy consumption. The impact modelling and cost benefit analysis outlined in the document reveals that an electricity bill benchmark could provide net benefits that exceed costs even with a minimal level of influence of the benchmark on householders, defined as 1.5% of households being affected in year one. Important results are:

- The base case, of 2.5% uptake in year one, could result in a net benefit of $69.5 million
- The base case could produce approximately 1 million CO_2e tonnes of greenhouse emission reductions and 1.2 million MWh of electricity savings
- An 5% uptake in year one could result in a $133 million net benefit and 1.7 million CO_2e tonnes of greenhouse emission reductions.

This result strongly suggests that the electricity bill benchmarking could be cost effective and is recommended policy.

The impact modelling and cost benefit analysis conducted on gas bill benchmarking revealed that gas benchmarking would not be positive. Negative NPV values and costs exceeding benefits for the gas benchmarking scheme are forecast under even the most optimistic scenarios. As gas energy costs for householders are usually much lower than their electricity costs, the cost savings from gas consumption reductions are also much lower but the cost of implementing the benchmark scheme is roughly the same. This would explain why the projected energy cost savings from the gas benchmarking being insufficient to cover the costs of scheme. Consequently a gas bill benchmarking scheme is not recommended policy.

Details as to a possible benchmark comparator (i.e. state average, local average or household size); a possible benchmark metric (i.e. kWh or greenhouse gas); responsibility for calculating the benchmark; and how the benchmark might be provided (i.e. via energy bills or online), have been considered and the recommended form of the benchmark defined. The recommended approach for the electricity bill benchmark is for a mandatory benchmark to be produced and printed on electricity bills. The benchmark is to be based on climate zone localities and to be calculated using a rolling quarterly method to reflect seasonal variation in energy use. The metric for the benchmark is to be energy consumption, measured in kWh of electricity consumption as this is what consumers currently see on their electricity bills and as it removes the need for retailers to convert the figure into greenhouse gas emissions. Further details concerning the implementation of the electricity benchmark scheme will be decided in consultation with key stakeholders during the implementation stage of the scheme.

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Appendix 2: Implementation Issues

Format of Energy Benchmark

The variations of the mandatory energy bill benchmark that are possible and the principle ones explored are as follows:

- Benchmark locality: State average, climate zone average or post code average
- Nature of the benchmark average: varying with household size, fuels used, appliance types etc
- Time period of benchmark
- Benchmark metric

The analysis presented below will be further refined in the light of planned research on this topic. The exact format of the benchmark has not been decided and the final format will be further refined in the light of planned research on this topic.

Benchmark Locality

Three benchmark options were considered, as discussed below:

- State average benchmarks
- Climate zone localities based benchmarks
- Postcode locality based benchmarks.

State average benchmarks

A State based benchmark is the simplest to produce as it results in one single benchmark for each jurisdiction and everyone gets the same benchmark. The use of such benchmarks has been undertaken overseas, and of the ten national and international examples of benchmarking found by CRA International two were found to use a broad average[49]. The Danish Electricity Saving Trust uses a national benchmark of 1000 kWh per person per year for households and 1500 kWh for those who live alone although it must be noted that the size of Denmark and its single climate zone lends itself to a single benchmark. The key advantages of the State benchmark are:

- It will be simple to administer as it can be overlayed across existing consumption graphs and universally applied to all customers.
- It is marginally less costly to implement, with energy suppliers costs information supplied in response to the Consultation RIS suggesting between 0% to 20% less expensive than a climate zone locality benchmark.

[49] Op cit CRA International, p.14-15

The disadvantages of a State benchmark include:

- Benchmarks may be misleading when energy consumption varies significantly across the State, in response to climate variations. For example the Nationwide House Energy Rating Scheme (NATHERS) has identified 69 climate zones throughout the country. This issue has been acknowledged by Ergon Energy in their benchmarking trials where they identified 14 climate zones for the State of Queensland.

- Consumers consider a State/Territory benchmark as being less relevant to them and therefore take no action to reduce their energy consumption. The market research, including Ergon's research, show that householders are interested in more localised benchmarks.

Given that a State average benchmark is less informative than a benchmark based on a smaller locality, and householders want benchmarks for smaller locality, householders will be less likely to reduce their energy consumption in response to the State benchmark as much as the more localised benchmarks. The State benchmark therefore can be seen as the cheapest but probably less effective of the benchmark options. Given the marginal cost savings of this option, it was not recommended in favour of other options which are likely to be more effective.

Climate zone locality benchmarks

The advantages and evidence in support of a benchmark based on the energy use in a localised area, based on a climate zone, include:

- As identified in the market research previously reported, a local area benchmark provides consumers with a benchmark they can easily identify with which is expected to improve its overall effectiveness.

- Positive Energy, which uses a benchmark based on 100 approximately similar households in its Home Energy Report, stressed that it is critical that comparative information is perceived by consumers as being valid and credible otherwise the information is ignored. Consumer responses to their report have indicated a high satisfaction level. Of the 1-2 % of recipients dissatisfied with the report, most felt the benchmark was not relevant to them[50].

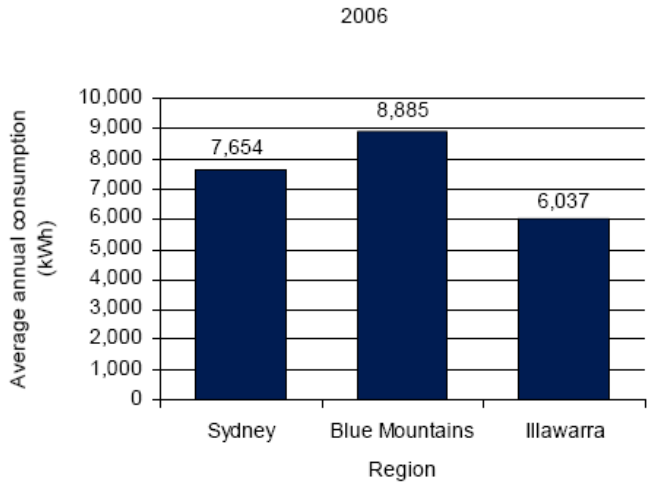
- Positive Energy's feedback is consistent with Ergon Energy's consumer testing of its benchmarking trial which found that the benchmark needed to be clear on what people were being benchmarked against. Most people perceived local area to be their street[51].

[50] ibid p.20

[51] Op cit Ergon Energy

- A local benchmark has the ability to consider regional factors such as climate and access to natural gas. Weather, in particular, can be a large factor in how much energy a household uses, especially in heating and cooling. As displayed below, the energy consumption across different areas of New South Wales varies greatly.

Figure 2.1 Average electricity consumption by region, 2006



Source: Source: IPART: Results from the 2006 household survey

- A local area benchmark would be more likely to promote 'friendly' competition amongst neighbours within communities. Consumers often feel that their neighbours are people just like them and are more relevant to them than households in other areas.

- Consumer testing found that 65% of respondents preferred a local area benchmark whilst 22 % preferred a State/Territory comparator[52]. When asked why they preferred a local average the most common responses were: that the weather in the local region was an important factor in energy consumption; and the desire to be compared with people in their community. Those that preferred a State/Territory average did so because they saw it as important to give a 'big picture' perspective.

- Of the ten national and international examples of benchmarking found by CRA International, six were found to use a local average[53]. The US Department of Energy's *ENERGY STAR Home Energy Yardstick* requires the user to input some basic information such as their zip code (post code), the size of the house and utility bill information for 12 months. Once this information is entered, the energy calculator shows how a home performs energy-wise relative to comparable homes in

[52] Op cit CRA International p.31

[53] ibid p.14-15

the same location. The Lawrence Berkley Laboratories *Home Energy Saver* operates on a similar basis.

The key disadvantages of the climate zone benchmark are:

- As discussed earlier in this RIS there will be costs associated with implementing climate zone benchmark that may be more than for a State/Territory average, with the total implementation costs being somewhere between 0% and 20% more.

- Administering the climate zone benchmark will be slightly more complex then for the State average, as information may need to be collected from more parties and several averages will need to be calculated. However, in terms of the overall cost and resources required to implement a benchmarking scheme, the difference will be very small.

Given the relatively minor additional complexity and cost increase to use a climate zone based benchmark, this is the preferred option compared to a State average due to the greater appeal the benchmark is expected to have to householders and the resulting greater likelihood it will motivate households to reduce their energy consumption.

Postcode benchmarks

A benchmark based on a small localized area was found in the market research to be the most strongly identified with by householders, and presumably would most motivate them to improve their energy efficiency. The smallest localities from which consumption data could realistically be obtained are postcode areas.

The costs of supplying benchmarks based on postcode versus climate zones are very small, so it would appear that postcode benchmarks are the preferred option. However, due to the often considerable variations between postcodes in their average energy consumption, generally related to the demographics of the householders in the postcodes, there is the strong possibility that using a postcode based benchmark may not be a sufficient size to be truly representative of residential consumers.

For example, one postcode might consist almost entirely of large, affluent, high energy consuming homes and its average consumption may greatly exceed the average consumption for that climate zone. However, a postcode based benchmark may not inform the householders in the postcode that their consumption was above average. The postcode based benchmark for this area would only be encouraging a minority of the households in the area to reduce there consumption, with the majority of households being told their consumption was average or below, even though their consumption was above average when compared to the broader community. Similarly, many households in a low-income postcode with low average energy consumption might be told by a postcode based benchmark that their consumption was above average, even though their consumption was below average for their climate zone.

In comparison, energy benchmarks based around climate zones will not be as strongly influenced by socio-economic variations between zones but mainly by how climate variations affect the need for space heating and cooling. Consequently, to avoid the potential miscommunications that can arise by using post code benchmarks, the use of climate based zoned benchmarks appears the best option.

Nature of Benchmark

In terms of presentation, it is assumed that the energy benchmark will be presented visually, probably as a bar graph or something similar, on the energy bill. Visualisation of energy use is an effective tool to help consumers consider their energy consumption in comparison to other households. Customers in Ergon Energy's benchmarking trial found the graph to have most impact.[54]. Additionally, the Ergon Energy trial found that the graph comparing them to their local area average had a stronger impact on heavy energy users making them feel guilty about their energy use. Consequently the benchmark is assumed to be visually presented, probably as a graph, with some explanatory text. However, the nature of the benchmark can still vary significantly.

As the energy consumption of households varies according to the different characteristics of the households and its appliances, the nature of an energy benchmark can also be varied to make the benchmark more or less specific concerning such characteristics. A simple benchmark will just report the average consumption for all household types in the relevant locality, but more complex benchmarks can report averages which vary on other characteristics. Benchmarks can report averages that vary with household size, fuels used or appliance/equipment mixes. Selecting which of these options can be used can be undertaken by considering which options will supply households with useful information and which are practical to implement.

Average Consumption Benchmark

The simplest benchmark will be the average consumption for all household types in the relevant locality. This average consumption data can be obtained by analysing the consumption records in the relevant locality, and feedback from energy suppliers indicates that this information can be obtained from the relevant distributors (electricity) or retailers (gas) in the area. The average household benchmarks have another advantage in that they can be supplied with a personalised message, informing the household if they are above, the same or below the average consumption for their area. This may further encourage high energy consumers to implement energy efficiency measures.

The disadvantage of this type of benchmark is it ignores the large variation that exists between households of sizes, fuel mixes etc. This can mean the information the benchmark supplies will be misleading and, possibly more importantly, households may disregard the benchmark as they intuitively recognise it is not necessarily applicable to

[54] Op cit Ergon Energy

them. For example, most one and two person households will have below average energy consumption due to there lower number of household occupants and so a benchmark that informs them they have below average consumption will not be informative and probably be ignored. Meanwhile larger households may ignore the any 'above average' message, assuming that this is because they are larger households.

Household sized benchmarks

Household size based benchmarks are the next most complex benchmarks, and convey the average consumption for all households of a particular size in the relevant locality. So a benchmark graphic might show the consumption of 1, 2, 3, 4 or 5 or more person households. This means the householder can compare their consumption against a household of equivalent size. Market research conducted as background for this RIS strongly supported the use of household size based benchmarks as being those most preferred by respondents, as reported below.

Studies conducted in Victoria and New South Wales show a correlation between number of occupants and energy usage. In 2006 the NSW Independent Pricing and Regulatory Tribunal (IPART) commissioned household surveys in the Sydney region and found that households who were high electricity users or high gas users on average had more occupants, whereas households who were low electricity users and low gas users had on average fewer occupants[55]. The Victorian Utility Consumption Survey 2007[56] conducted by the Department of Human Services shows a strong positive correlation between total electricity consumption per household and the number of occupants in the house. Benchmarks could be provided for a range of household sizes, say from one person to six person households, based on either a State/Territory average or local average.

Recent research conducted by Department of Primary Industries, Victoria, on the major variables that affect household consumption also found that, with the exception of the presence of a swimming pool, that the size of the household was the major determinant of electricity use.

The mechanics of producing a household size benchmark are straightforward. Research that already exists could be used to develop algorithms relating household size to energy consumption. Alternatively, national surveys could be undertaken concerning household sizes and energy consumption and algorithms relating household size to consumption would be developed. Either way, these algorithms could then be combined with the average consumption data for the relevant area to produce estimates of average consumption per household size. These estimates would then be used by retailers to supply the household sized based benchmarks to householders.

The additional costs of the household size benchmark compared to the average consumption benchmark are therefore any survey and analysis work undertaken and any

[55] Residential energy use in Sydney, the Blue Mountains and Illawarra. Independent Pricing and Regulatory Tribunal P5

[56] http://www.dhs.vic.gov.au/concessions/research/publications/victorian-utility-consumption-household-survey-2007

additional costs for the retailers. The retailer costs might include additional printing costs and billing system alteration costs, and further clarification is being sought concerning such costs. For the cost benefit analysis, the cost estimates submitted in December 2009 were used.

The main advantages of a household size benchmark are:

- The benchmark would convey more information to householders than the average benchmarks, as household size is a major determinant of energy consumption.

- The benchmark could potentially have more relevance and appeal to consumers as they would be able to compare themselves with households of similar size. Feedback from Ergon Energy's evaluation of its benchmarking trial revealed that some people rejected an average benchmark comparison, as they felt that they should not be compared to other people who have different lifestyles and family sizes.

- Research undertaken by Newton Wayman Chong on behalf of the CIIC found that approximately 80 % of participants favoured a benchmark figure which compared them to other households of a similar number of people[57].

The implication is that a benchmark that includes consumption related to household size will contain more useful information for households and will also be the benchmark most favoured by householders.

The main disadvantages of the household sized based benchmark compared to the average consumption benchmarks are:

- If it is decided that existing research is inadequate to develop benchmark household size/consumption algorithms, there may be some additional extra cost, estimated of up to $1.4 M nationally, to undertake surveys of the relationship of consumption to household numbers
- There may be some additional costs to retailers in introducing and supplying bill benchmarks related to household size, but not all retailers report this to be the case and further information has been sought to confirm this point
- Household size benchmarks do not allow for the ability to supply a personalised message with this benchmark (as the retailer would not have knowledge of how many people are in each billed household), unlike benchmarks based on averages for an area, which may be a powerful communication tool to encourage households to act in more energy efficient ways.

[57] Newton Wayman Chong, *Energy Bill Benchmarking – Market Testing,* 2006, p.21

On balance, at present household size based benchmarks appear to have some advantages over benchmarks based on averages for an area, and the household size benchmarks costs are higher. Consequently the costs of household sized benchmarks have been used in the cost benefit analyses, in keeping with using conservative assumptions in the analysis. However, further research is to be conducted to assist in deciding the most appropriate type of benchmark for Australia, and which benchmark should be used when implementing the scheme.

Compared to more complex benchmarks, the disadvantages of the household size benchmarks are they ignore the fuel mix and appliance mix of households which also influence energy use. However, as discussed below, it is not practical to use more complex benchmarks.

Fuel Mix Benchmarks

The fuel mix of a household greatly affects their consumption of electricity. Many households in the southern states use natural gas for space heating and water heating, which significantly reduces their electricity consumption. Other households, especially in regional areas, use wood as a fuel source and other fuels are also used. The fuel mix of households can vary greatly so, in theory, a benchmark recognising the household fuel mix would be more useful to householders.

An energy benchmark that reflected these fuel mix variations could supply more pertinent information to households in areas where the fuel mix varied. These benchmarks would also need to vary with household size, so they would need to be based on average consumption for the relevant region plus a complex algorithm of consumption as determined by household size and fuel mix.

For example, electric consumption benchmarks might be developed for all electric households and households with space heating using other fuels. Such benchmarks could be delivered to households as multiple benchmarks for typical fuel mixes being supplied on each energy bill, or different benchmarks for different fuel mixes being supplied on alternate bills. Householders would be required to identify the relevant benchmark if multiple benchmarks were supplied in this manner.

Alternatively, energy billing data could be used to determine if reticulated gas was supplied to households, and then these households could automatically be sent an electric/gas benchmark. However, as electricity and gas usage information for a household is rarely held by a single party, it will be impractical to identify which electricity users are also gas users. Information could in theory be collected from both electricity and gas suppliers, and them matched by householder details, but in reality this would be ineffective, costly and result in many errors and mismatches.

The major advantage of fuel mix benchmarks are they will provide more pertinent benchmark information to households, so they may be treated as more relevant and result

in greater energy conservation. However, the main disadvantages of the fuel mix benchmarks are:

- Fuel mix gives some important information about the energy consumption of households, but its value is significantly reduced by which end uses use the non-electric fuels. For example, in households with natural gas connections households may use gas just for cooking, for hot water and/or for space heating and any of these combinations is possible and used by a significant minority of households, even in cooler climates with significant space heating loads.

- Creating the algorithms of consumption as determined by household size and fuel mix would require more complex and extensive survey work and analysis. This would raise the costs of supplying this type of benchmark, costs which would probably be incurred by government.

- Supplying multiple forms of a benchmark to households, either on the one bill or on alternate bills, will significantly increase the costs of supplying the benchmark.

- Supplying multiple forms of a benchmark to households may confuse the households.

Due to these limitations of the duel mix benchmarks, this benchmark option was not recommended. However, this more complex type of benchmark information might be effectively supplied by online tools and electricity bill benchmark communication could refer householders to such information. It may also become of greater relevance and more practical to implement in the future, so this option should be reviewed in two to three years.

Appliance mix benchmark

The appliance mix of a household may be a major determinant of their energy usage. The appliance mix of a household, combined with its fuel mix and household size, could be a very effective predictor of energy use and effective for selecting a relevant benchmark. For example, if a household uses electric resistive heaters versus a heat pump for heating, or uses refrigerant air conditioning versus evaporative air conditioning, then this will significantly affect their energy use. Use of swimming pool pumps, plasma televisions, electric hot water systems etc will all affect electricity use.

In theory appliance mix benchmarks could be developed for all the typical mixtures of appliances that households use. These benchmarks would also need to vary with household size and fuel mix if they are to be a more pertinent benchmark for householders. Such benchmarks may be treated as more relevant by householders and result in greater energy conservation.

However, the major difficulty with an appliance mix benchmark is the number of potential benchmark variations will be too large to convey this information via a printed

bill, certainly without greatly increasing the costs of the benchmark. This information could be conveyed via a web site, or used to make a energy advice web-based tool, but is not appropriate for a printed benchmark on or with an energy bill. The cost of researching and providing this type of benchmark will also be higher, potentially reducing the cost effectiveness of the benchmarking scheme.

Due to these limitations of the duel mix benchmarks, this benchmark option was not recommended. However, this more complex type of benchmark information might be effectively supplied by online tools and electricity bill benchmark communication could refer householders to such information. It may also become of greater relevance and more practical to implement in the future, so this option should be reviewed in two to three years.

Time period of the benchmark

The timing of the benchmark refers to what time period the benchmark is based on. For example, is it based on the average annual consumption of households in the relevant locality, their quarterly consumption, or a rolling average depending on when a household's bill is supplied. The timing of the benchmark is important as the energy consumption of households varies with the seasons. Consequently a benchmark based on annual consumption conveys less information than a benchmark that is based on consumption in the time period that more closely resembles the period that a householder's bill is being billed for.

The advantages and disadvantages of the different time periods are discussed below.

Annual benchmark:

An annual benchmark is the simplest benchmark to obtain and supply to households. Annual consumption data for postcodes can be obtained from energy suppliers and easily converted to average energy consumption for a climate zone locality, equating to a number of postcodes. Obtaining annual data will be the lowest cost of the timing period options and there might be a cost savings for retailers in providing benchmarks that do not vary throughout the year.

The major disadvantage of the annual benchmark is that most households receive quarterly electricity bills, so an annual benchmark will not correlate with their reported consumption. The annual benchmark consumption could be converted to a quarterly consumption for comparison purposes, but a second difficulty is that energy consumption varies widely between quarterly bills in many parts of the Australia. This could make an annual consumption benchmark of little guidance or even confusing to householders for much of the year.

For example, a household might when compared against the annual benchmark might appear to have average consumption for its autumn energy bill, above average for its winter energy bill and below average for its summer energy bill. However, if compared to

a seasonally adjusted benchmark the same house might be seen to have consistently average energy consumption.

Given the limited amount of information conveyed in an annual benchmark, this option was not recommended.

Quarterly benchmarks

A quarterly benchmark, varying with seasonal energy usage, is the next simplest benchmark to apply. Four quarters of the year could be chosen and the average energy consumption for houses billed in those periods could be used as the quarterly benchmarks. There will be minimal additional costs in obtaining data for the quarters compared to the annual benchmark and probably only small additional costs in providing multiple benchmarks per year.

The main advantages of a varying quarterly benchmark, as opposed to the annual benchmark even if expressed a consumption for a three month period, are the quarterly benchmark:

- Will convey much more information than the annual benchmark
- Is less likely to mislead households about their consumption
- Is more likely to encourage energy savings in appropriate households.

The main disadvantage is the relevant of a quarterly benchmark will depend on when a household is billed. The benchmark is likely to be an accurate guide for those billed during the middle of a season/quarter, but those households billed at the beginning or end of season will have consumption based on mix of two seasons so the benchmark may be less useful as a guide. However, given the general level of relevance of a quarterly benchmark, and the relative simplicity of implementing such benchmarks, a quarterly benchmark appears appropriate. Whether this version of the quarterly benchmark or the rolling quarterly benchmark described below is most appropriate will need to be decided during the implementation phase of the benchmark program.

Rolling Quarterly benchmarks

This is a variation on the quarterly benchmarks, but instead of there being four different benchmarks for the year for each relevant locality, there would twelve benchmarks. Each quarterly benchmark provided to households billed during any given month, would be determined by the average consumption of the preceding three month period. So the January quarterly benchmark would be based on average consumption over the preceding October to December, the February benchmark would come from the November to January consumption, etc.

This version of the quarterly benchmark has all the advantages of the previously described four quarterly benchmark approach, but it also has the advantage that the benchmark information will be of greater relevance to more householders.

The key disadvantage of this version of the quarterly benchmark is that retailers will need to provide more benchmarks, but initial feedback suggests that this may not affect their costs. This option will be further explored and decided upon during the implementation phase of the benchmark program.

Rolling Averages

Another option is for the benchmarks to be based on a rolling average for the consumption of households billed at the time. For example, in any given week the average of the consumption for all households billed in that week would be calculated and this would be used to provide the benchmark for households billed that week. In the next week, a new consumption average would be calculated and used to provide a new benchmark for households billed in that next week. This is the approach of Ergon Energy, although it should be noted that Ergon is a vertically integrated organisation.

The advantage of the rolling average is that the benchmark provided will always accurately reflect the average consumption of the period being billed. There will not be a decrease in accuracy depending on the timing of the bill within a quarter, compared to the quarterly benchmark where the accuracy of the benchmark varies on when the householder is being billed compared to the quarter. The disadvantage is that collecting and analysing the consumption data required for a rolling average is more complex and expensive to implement for distributors and retailers. This approach would also likely require information to be sent via the AEMO Business to Business (B2B) hub. This would likely create the need to system upgrades to the B2B hub. . Consequently though the use of benchmarks based on rolling averages, or of averages updated more frequently than quarterly, is to be encouraged, the use of such averages for a mandatory benchmark is not recommended.

Benchmark Metric

The benchmark could be expressed in either:

- Cost to the householder.
- Greenhouse emissions produced
- Energy units- kWh or MJ

Dollars

Dollars are easily recognisable to consumers and were found to be the most favoured metric by 71 % of respondents in the NWC survey undertaken on behalf of the CIIC[58]. However, the presentation of benchmarking information in dollar terms is not necessarily the most accurate representation of a customers' usage and/or the impact of any reductions (or increases).

[58] Newton Wayman Chong, *Energy Bill Benchmarking – Market Testing,* 2006, p.20

The cost of energy option is not recommended as it will not supply consistent or easily interpreted information to householders. Even for households with the same energy consumption their energy bill will vary depending on the retailer they are with, their use of off-peak power and their use of green power. In addition, energy prices are increasing, so a household energy bill may rise even if they have reduced their consumption. Energy bills also are influenced by non-consumption related costs for example fixed supply charges. Consequently, an energy benchmark expressed in financial terms will not convey information to householders about their energy consumption versus comparable households.

Carbon Emissions

The use of greenhouse emissions as a metric is not recommended, as the use of varying amounts of GreenPower by some households means that average greenhouse emissions as a benchmark will be misleading to these households. Also such a benchmark metric might encourage greenhouse reductions, but it may not directly encourage energy conservation. In addition, over time as the requirement for renewable energy content in electricity increases, the greenhouse emissions of the average home will fall, without any reduction in their energy consumptions. All of these factors suggest that use of a greenhouse emission metric is inappropriate.

Energy Units: KWh or MJ

The use of energy measurements for the energy benchmark is the most appropriate option. The two other options do not clearly convey to the householder how their energy use compares to comparable households, so they do not satisfy this information requirement of the market. The use of an energy metric removes these complications and will ensure that information on the average energy use of comparable households is clearly conveyed to the householder.

Summary Recommended Energy Benchmark Option

In summary, due to the reasons stated above, the benchmark option used to model the impacts of the benchmarking scheme was a mandatory benchmark based on climate zone localities, that indicate average consumption by household size and that varied on a fixed quarterly basis in response to seasonal variation in energy use. This benchmark appeared practical to implement and was the most costly to implement, of the potential practical options, and so was used in keeping with the use of conservative assumptions in the cost benefit analysis.

Given the current level of information available, it is also recommended that a mandatory benchmark based on climate zone localities, that indicate average consumption by household size, and that are varied on a quarterly basis in response to seasonal variation in energy use, be used by the national electricity bill benchmarking scheme. The metric for the benchmark is to be energy consumption, measured in kWh of electricity consumption and MJ to gas consumption. However, as discussed in the sections above, research and

additional information sought from energy suppliers and other stakeholders in the program implementation phase may show that some variations in this form of the benchmark may prove to be more effective, and so the final form of the benchmark is yet to be decided.