

The **Allen Consulting** Group

**Mandatory disclosure of residential  
building energy, greenhouse and water  
performance**

Consultation Regulation Impact Statement

July 2011

Report to the National Framework for Energy Efficiency Building Implementation Committee

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## Acronyms

ABS	Australian Bureau of Statistics
ABARE	Australian Bureau of Agricultural and Resource Economics
ABCB	Australian Building Codes Board
ACG	Allen Consulting Group
ACT	Australian Capital Territory
ASBEC	Australian Sustainable Built Environment Council
BASIX	Building Sustainability Index
BCA	Building Code of Australia
BCR	Benefit-Cost Ratio
BIC	Building Implementation Committee
RBMD	Residential Building Mandatory Disclosure
COAG	Council of Australian Governments
DCCEE	Department of Climate Change and Energy Efficiency
DEWHA	Department of the Environment, Water, Heritage and the Arts
EER	Energy Efficiency Rating
GHG	Greenhouse gas
HERS	House Energy Rating Schemes
HIP	Home Insulation Program
IPCC	Intergovernmental Panel of Climate Change
MEPS	Minimum Energy Performance Standards
Mt	Million Tonnes
NABERS	National Australian Built Environment Rating System
NatHERS	Nationwide House Energy Rating Scheme
NFEE	National Framework for Energy Efficiency
NPV	Net present value
NSW	New South Wales
OBPR	Office of Best Practice Regulation
OECD	Organisation for Economic Co-operation and Development
PJ	Petajoule
REES	Residential Energy Efficiency Scheme
RIS	Regulation Impact Statement
VEET	Victorian Energy Efficiency Target
WELS	Water Efficiency Labelling and Standards

## Executive summary

This Consultation Regulation Impact Statement (RIS) provides a basis for consulting on options for providing the Australian market with information about the energy, greenhouse and water performance of residential buildings.<sup>1</sup> It has been commissioned through the National Framework for Energy Efficiency (NFEE) Building Implementation Committee (BIC) on behalf of the Commonwealth, States and Territories, to assess the proposal under NFEE to introduce mandatory disclosure of building energy, greenhouse and water performance at the point of sale or lease for residential properties (referred throughout as Residential Building Mandatory Disclosure or RBMD).

The Office of Best Practice Regulation (OBPR) and the Council of Australian Government (COAG) guidelines for best practice regulation set out areas that should be covered in a Consultation RIS. These are presented in each of the different chapters contained in this Consultation RIS.

### ***Nature and extent of the problem***

The market for residential buildings suffers from information problems. These problems are evident in our everyday experience, and principally relate to:

- *Uneven information* — buyers and sellers have different information about the energy, water and greenhouse performance of residential buildings (in technical terms there are information asymmetries); and
- *Information shortfalls* — there is a lack of awareness amongst prospective buyers/tenants and property owners about the potential value of improved energy, greenhouse and water performance (that is, what they could save on energy and water costs if they were to improve the performance of a property, or choose a property with particular characteristics over another); a lack of information about what can be done to improve performance; and a lack of information about the value of making changes.

Persistent information problems make it difficult for market participants to differentiate the relative performance of different properties, indicate the value of performance differences and identify opportunities to improve performance. As a consequence the market may be unable to provide the necessary incentives to encourage efficient investment in building energy and water performance. That is, the market exhibits an adverse selection problem.

Underinvestment in a building's energy, greenhouse and water performance may represent a significant problem. Underinvestment is likely to apply across the entire residential housing stock — which is a significant consumer of energy/water and will grow over time.

<sup>1</sup> The energy and water performance of a building relates to its expected energy and water use/consumption. The greenhouse performance of a building relates to the expected direct and indirect greenhouse emissions from energy that is consumed within the building (including the emissions from the generation, transmission distribution and use of this energy).

There exists only limited empirical evidence supporting adverse selection in this market. Data is limited, and there exists no comprehensive national study on which evidence can be obtained. That said however, the market does show characteristics of a product that is conducive to adverse selection and market outcomes are consistent with what would be expected.

The range of policies and regulations currently in place do not fully address the information problems in the residential building market. Indeed, with the exception of schemes operating in the ACT and Queensland, there is little Government action in place to directly address information problems whatsoever.

In light of this, there exists a case for intervention to assist the market overcome information problems — so long as this intervention is economic welfare enhancing. Intervention by government to assist with the provision of information has the potential to improve the energy, greenhouse and water performance of residential properties with resulting positive environmental outcomes.

#### ***Objective of government action***

The objective of intervention is to improve community wellbeing and environmental sustainability, including reducing greenhouse gas emissions, by countering information shortfalls and the uneven distribution of information (or information asymmetries) in the residential housing market that prevent efficient investment in energy and water efficiency. Government intervention should improve the quantity and quality of information available about building performance in order to assist market participants (including buyers, sellers, tenants and landlords) to compare, value and act upon cost effective energy and water efficiency performance in residential buildings.

#### ***Options to achieve government objective***

In line with COAG RIS guidelines, both regulatory and non-regulatory options are considered in terms of which best meets the objective of government action. The regulatory options require that the residential property's energy, greenhouse and water performance be assessed and disclosed to all of the relevant parties when the property is advertised for sale and/or lease. The range of options cover differing degrees of information provision and differing degrees of regulatory burden on households, where Option 1 has the largest degree of information provision and regulatory burden with Option 4 having the least. These options are summarised in Table ES 1.1.

A non-regulatory option — Option 5 — is also considered, in which the Commonwealth, states and territories will fund an information campaign to raise households' awareness of upgrades and appliances that they could invest in to improve the environmental performance of their properties.



The impact of the above options is assessed against the 'no change', 'non-intervention' or base case scenario. The base case takes into account trends in the penetration of energy and water efficiency solutions within residential buildings in Australia. It does not take into account changes in policies that may alter the trend level of penetration of these solutions, such as possible future changes in MEPS and faster adoption of higher energy star rating targets in the Building Code of Australia. Importantly, reflecting the difficulty of obtaining adequate information about the impact of the Australian Government's Home Insulation Program, this has not been included in the base case of this discussion RIS. (Uncertain information about the program has been included in sensitivity analysis).

A variant of the mandatory disclosure options would be to provide a voluntary mechanism whereby property owners could seek to opt-out. The regulation would be modified so that property owners could opt-out of obtaining an assessment but then be required to disclose a 'zero' rating or score. This variant has been considered and discussed in the RIS as Option 6. Full economic analysis of the variant has not been conducted however analysis has been applied to Option two for illustrative purposes only.

A clear benefit of providing a voluntary mechanism to any of the mandatory disclosure options is that it minimises the administrative and cost burdens for property owners who are aware that their property does not perform well, or where it is apparent that the next purchaser will most likely demolish the property.

Limitations with providing an opt-out mechanism are that:

- the option produces a positive bias where only those certain of having better or high performing properties can be expected to opt-in; and
- a zero default rating applying to many properties in the market makes it more difficult to compare the energy efficiency performance of those properties for sale or lease than choose to opt-out.

A key issue with Option 6 and measuring its net benefits relates to the opt-out rate. Determining expected opt-out rates is difficult. For this reason, an indicative analysis of Option 6 has been undertaken where the opt-out rate is assumed to change. This analysis of the three scenarios indicates the way in which the costs and benefits of the mandatory options may change given the ability of property owners to opt-out if they choose to do so. The indicative analysis of introducing an opt-out provision could be applied to any of the regulatory options.

While it is unlikely that the precise level of opt-out can be predicted reliably, the analysis illustrates in all scenarios that although opt-out reduces direct costs incurred by households and industry this flexibility also reduces the direct benefits. This is because increasing the opt-out rate effectively reduces the proportion of property vendors who will make energy performance investments. Whether the option produces a net benefit however is ambiguous and depends upon the degree of opt-out. In some circumstances opt-out may reduce the net benefits expected from regulatory intervention, but still leave a positive impact. In other circumstances, especially with high rates of opt-out, opt-out flexibility may result in changing the picture to expect that the regulatory change detracts from wellbeing.

It will be valuable to obtain insights and information from the community about the many uncertainties surrounding the nature and impact of opt-out from the consultation phase of the RIS.

Table ES 1.1

**COMPARISON OF REGULATORY OPTIONS**

	<b>Option 1 (Full thermal assessment)</b>	<b>Option 2 (Simplified thermal assessment)</b>	<b>Option 3 (Self assessment – online tool)</b>	<b>Option 4 (Self assessment – checklist)</b>
<b>Assessment method</b>	Full thermal performance simulation + other building component information	Simplified thermal performance assessment + other building component information	Simple online thermal performance assessment + other building component information	Checklist of building component information
<b>Drawings required?</b>	Full floor plan drawing required <sup>f</sup>	No	No	No
<b>Data collection requirement</b>	High complexity & high volume <sup>g</sup>	Mid complexity & mid volume <sup>h</sup>	Low complexity	Limited
<b>Compliance approach</b>	Mandatory	Mandatory	Mandatory	Mandatory
<b>Rating provided?</b>	Yes	Yes	Yes	No
<b>Rating type</b>	Quantitative	Quantitative	Quantitative	Binary (present or not present)
<b>Assessor requirements</b>	Approved assessor	Approved assessor	Unskilled (non trained) e.g. householder or agent	Unskilled (non trained) e.g. householder or agent
<b>Registration required?</b>	Certificate lodgement required	Certificate lodgement required	Certificate lodgement required	No
<b>Assessment cost<sup>a</sup></b>	\$774 – Assessor <sup>b</sup> \$50 – Householder waiting cost <sup>c</sup>	\$172.50 – Assessor <sup>b</sup> \$25 – Householder waiting cost <sup>c</sup>	\$68 – Self-assess <sup>d</sup> \$165 – Assessor <sup>b,e</sup> \$18 – Householder waiting cost <sup>e</sup>	\$41 – Self-assess <sup>d</sup> \$150 – Assessor <sup>b,e</sup> \$14 – Householder waiting cost <sup>e</sup>
<b>Level of information provided</b>	<ul style="list-style-type: none"> <li>Comprehensive assessment of a building's thermal performance.</li> <li>High level of accuracy about thermal performance of a building's components.</li> <li>Ratings for the various components of the overall building performance.</li> </ul>	<ul style="list-style-type: none"> <li>Simplified assessment of a building's thermal performance.</li> <li>Mid level of accuracy about thermal performance of a building's components.</li> <li>Ratings for the various components of the overall building performance.</li> </ul>	<ul style="list-style-type: none"> <li>Low level of accuracy about thermal performance of a building's components.</li> <li>Ratings for the various components of the overall building performance.</li> </ul>	<ul style="list-style-type: none"> <li>Information about the various components of the overall performance provided in a checklist format without a rating.</li> </ul>

Notes: a) reflects the cost of a house assessment in an urban area in Victoria. Costs of assessments in non-urban areas are assumed to be higher and costs of assessments on apartments are assumed to be lower. Costs in other jurisdictions vary according to relative average weekly earnings. b) excludes certificate lodgement fee; c) assumes householders will need to be present whilst house is being assessed; d) cost to householder in undertaking the assessment by themselves (based on the cost of their time); e) if householder decides to outsource the assessment to an assessor. Additional details about the methodology and assumptions used to derive these costs are provided in Appendix B and Appendix C. f) Assumes that a floor plan is required to import into the software. Full working drawings (plans and elevations) are not assumed. g) Assumes no house data or plans available, all data collected manually on site and limited software default values for existing properties. h) assumes basic measurements are taken and collected manually on site  
Source: Provided by NFEES BIC.

### Impact analysis

The impact analysis considers the direct and indirect impacts of the options as they are likely to affect households, governments and businesses. The direct costs and benefits are quantified and valued in monetary terms. To account for changes in future value a real discount rate of 7 per cent has been used.<sup>2</sup> The analysis concentrates on the potential changes in buildings over 10 years. The direct costs and benefits are outlined below.

### Benefits

As a result of the information provided through the proposed options, property owners may increase investment in measures that improve the energy and/or water efficiency of their properties. These investments will have direct market benefits. They have been assessed and valued in terms of the lifetime changes that would apply. The following direct market benefits are reflected in the analysis:

- *utility bill savings* — the estimated financial savings to households as a result of lower gas, electricity, water and other fuel bills;
- *greenhouse gas savings* — the value to society (using an indicative price on carbon) of reduced greenhouse gas emissions.

### Costs

There are costs associated with providing the information required by the proposed options. The analysis considers the following direct market costs:

- *assessments* — the amount paid to have a licensed assessor undertake and provide a property assessment, and registering the rating with the appropriate jurisdictional authority;
- *investments (net of rebates)* — the amount that sellers and lessors invest in design or appliances intended to improve the performance of their properties, net of any government rebates and subsidies provided to induce greater investment;
- *householder time* — the opportunity cost of householder time, given that they will need to be present during business hours while the assessment is being undertaken;
- *real estate agents' time* — the cost of time associated with real estate agents assisting with households finding an assessor and arranging for them to undertake the rating;<sup>3</sup>
- *training and insurance* — the costs associated with increasing the supply of licensed assessors, and ensuring that they are appropriately trained and insured;
- *rebates* — the cost associated with increased demand for rebates for energy and water efficiency measures (for example, solar hot water heaters, and other energy or water efficient appliances); and

<sup>2</sup> Discounting is a standard approach used in cost benefit analysis when costs and benefits are expressed over a number of years. This approach puts more quantitative emphasis on costs and benefits that occur in the short term relative to those that occur in the medium to long term. In this case, a 7 per cent discount rate is used, consistent with advice from the Office of Best Practice Regulation. All values included in the analysis are expressed in *real* terms, i.e. they have not been adjusted to account for inflation.

<sup>3</sup> The real estate agents' time is not a formal part of Residential Building Mandatory Disclosure's requirements however it has been included in the analysis to capture what may possibly occur.

- *administration* — these are the costs to government associated with setting up a regulatory approach and monitoring and enforcing it. Note, however, that these costs will likely be recovered from households in the form of a certificate lodgement fee. Costs of administration include:
  - training and development — cost associated with training the trainers who will ultimately train the assessors in the new assessment tool and rating lodgement process;
  - licensing and registration — costs associated with ensuring that assessors are accredited and qualified to make an assessment of a property’s rating;
  - compliance and enforcement — costs associated with monitoring, investigating complaints and taking appropriate action against anybody suspected of violating a regulation;
  - enquiries — the costs associated with responding to questions asked by households and assessors;
  - communications — the costs associated with advertising and awareness raising to let households and industry know what their obligations and rights are under the new arrangements, as well as what investments households can make to improve the energy and water performance of their properties; and
  - reporting obligations — the costs associated with reporting on outcomes and performance.

The direct costs and benefits of Options 1-4 were examined relative to the base case — a summary is shown in Table ES 1.2. This table also includes the results of a scenario where disclosure at point of sale only is mandated, as opposed to mandating disclosure at both the point of sale and lease. This was included to provide a sense of how the impacts would differ if it were limited to sales transactions.

***Findings to be discussed***

The analysis in this Consultation RIS suggests that there is a case that intervention is necessary to overcome market failures and to obtain and provide information about the energy and water performance of housing in Australia.

Measurement of the costs and benefits in this case assesses the balance between the ‘deadweight loss’ that can apply when many in the community are required to pay for information about the performance of residential buildings against the benefits which are concentrated among those people that elect to make cost effective investments in more efficient residential buildings. The preliminary findings based on information that is to hand at present indicates that there are regulatory and non-regulatory options for intervention where the community would be better off with intervention than without it. That is, there are a number of options where the benefits exceed the costs.

Table ES 1.2

**NET PRESENT VALUE OF COSTS AND BENEFITS, BY OPTION COVERAGE (\$M)**

	Disclosure at point of sale and lease					Disclosure at point of sale only				
	1	2	3	4	5	1	2	3	4	5
ASSESSMENTS	\$5,196	\$1,121	\$721	\$263	\$0	\$2,456	\$530	\$340	\$125	N/A
INVESTMENTS (NET OF REBATES)	\$564	\$476	\$341	\$225	\$22	\$366	\$306	\$218	\$145	N/A
TIME	\$383	\$189	\$67	\$8	\$2	\$181	\$89	\$32	\$4	N/A
<b>HOUSEHOLDS SUBTOTAL</b>	<b>\$6,143</b>	<b>\$1,786</b>	<b>\$1,129</b>	<b>\$496</b>	<b>\$25</b>	<b>\$3,003</b>	<b>\$925</b>	<b>\$590</b>	<b>\$274</b>	<b>N/A</b>
REAL ESTATE AGENT'S TIME	\$59	\$59	\$30	\$6	\$0	\$28	\$28	\$14	\$3	N/A
ASSESSOR TRAINING AND INSURANCE	\$54	\$21	\$9	\$2	\$0	\$39	\$16	\$7	\$2	N/A
<b>INDUSTRY SUBTOTAL</b>	<b>\$114</b>	<b>\$80</b>	<b>\$38</b>	<b>\$8</b>	<b>\$0</b>	<b>\$67</b>	<b>\$44</b>	<b>\$20</b>	<b>\$5</b>	<b>N/A</b>
REBATES/SUBSIDIES	\$75	\$65	\$50	\$38	\$4	\$52	\$45	\$35	\$26	N/A
ESTABLISHMENT AND ADMINISTRATION (STATES/TERRITORIES)	\$117	\$99	\$122	\$77	\$13	\$117	\$100	\$119	\$70	N/A
ESTABLISHMENT AND ADMINISTRATION (COMMONWEALTH)	\$9	\$9	\$9	\$5	\$12	\$9	\$9	\$9	\$5	N/A
<b>GOVERNMENT SUBTOTAL</b>	<b>\$201</b>	<b>\$174</b>	<b>\$181</b>	<b>\$120</b>	<b>\$29</b>	<b>\$178</b>	<b>\$154</b>	<b>\$163</b>	<b>\$101</b>	<b>N/A</b>
<b>TOTAL COST</b>	<b>\$6,458</b>	<b>\$2,039</b>	<b>\$1,348</b>	<b>\$624</b>	<b>\$54</b>	<b>\$3,248</b>	<b>\$1,122</b>	<b>\$773</b>	<b>\$380</b>	<b>N/A</b>
POTENTIAL ENERGY AND WATER BILL SAVINGS	\$3,319	\$2,827	\$2,070	\$1,422	\$142	\$2,135	\$1,803	\$1,317	\$913	N/A
<b>HOUSEHOLD SUBTOTAL</b>	<b>\$3,319</b>	<b>\$2,827</b>	<b>\$2,070</b>	<b>\$1,422</b>	<b>\$142</b>	<b>\$2,135</b>	<b>\$1,803</b>	<b>\$1,317</b>	<b>\$913</b>	<b>N/A</b>
POTENTIAL GREENHOUSE GAS SAVINGS	\$155	\$131	\$95	\$64	\$6	\$99	\$83	\$60	\$41	N/A
<b>SOCIETY SUBTOTAL</b>	<b>\$155</b>	<b>\$131</b>	<b>\$95</b>	<b>\$64</b>	<b>\$6</b>	<b>\$99</b>	<b>\$83</b>	<b>\$60</b>	<b>\$41</b>	<b>N/A</b>
<b>TOTAL BENEFITS</b>	<b>\$3,474</b>	<b>\$2,958</b>	<b>\$2,165</b>	<b>\$1,486</b>	<b>\$148</b>	<b>\$2,234</b>	<b>\$1,886</b>	<b>\$1,377</b>	<b>\$954</b>	<b>N/A</b>
<b>TOTAL NET BENEFIT</b>	<b>-\$2,983</b>	<b>\$919</b>	<b>\$817</b>	<b>\$862</b>	<b>\$94</b>	<b>-\$1,015</b>	<b>\$764</b>	<b>\$605</b>	<b>\$573</b>	<b>N/A</b>

Source: Allen Consulting Group analysis.

The following discussion addresses four key questions necessary to satisfy COAG RIS requirements.

*Is there a market failure?*

This RIS highlights the existence of information problems in the market for residential property purchases and rentals. These problems are associated with market failures, especially the prospect of ‘adverse selection’.

There is a lack of definitive evidence in Australia on which the size of the information problems can be measured. Some studies in some jurisdictions support the observations from anecdotal everyday experience in the market for residential buildings that people experience information problems and would value solutions.

There is evidence of under-investment in known and cost effective energy, water and greenhouse savings technologies in the residential buildings sector. That is, there is an observed ‘efficiency gap’ that can be closed by greater penetration of effective investment in efficiency solutions in residential buildings.

It is likely that there is a case for government intervention to improve information in the market, so long as the benefits of doing so outweigh the costs.

*Do the benefits of intervention outweigh the costs?*

With the exception of Option 1, the results suggest that the benefits associated with the intervention outweigh the costs. In other words, the intervention under options 2 to 5 may result in a welfare enhancing effect on society. This finding applies regardless of whether disclosure is mandated at point of sale and lease, or point of sale only. The results of sensitivity and break even analyses also suggest that this broad result is robust to changes in key assumptions and inputs to the analysis.

As such, based on the inputs and assumptions of the preliminary analysis, there appears to be a justification for government intervention in this case.

*What is the option with the highest net benefit?*

The net present value of the options is the total discounted benefits of the option minus the total discounted costs of the option over the period of analysis. Options with a positive net present value represent those where the overall benefits outweigh the costs. Therefore the option with the highest net present value at the national level indicates that this option will result in the greatest increase in welfare to Australian society.

On the basis of this criterion, Option 2 — regulation requiring mandatory disclosure of residential building energy, greenhouse and water performance information at the point of advertising for sales and leases through an assessor based assessment with a simplified thermal simulation, is the option with the highest net present value with the information that is to hand at present. This option generates the potential for:

- a net benefit at the national level, with an estimated net present value of \$919 million over ten years (present value benefit of \$3.0 billion less the present value cost of \$2.0 billion);
- energy savings of 152 PJ over the life of the assets invested in during the first ten years;

- water savings of 279 GL over the life of the assets invested in during the first ten years; and
- greenhouse gas savings of 14 MT of CO<sub>2</sub>e over the life of the assets invested in during the first ten years.

It should be noted, however, that the results of the sensitivity analysis indicate that this finding is sensitive to small changes in key assumptions. Obtaining stakeholder feedback about these assumptions is a vital part of the consultation process.

*Are there any caveats to these findings?*

Residential Building Mandatory Disclosure is characterised by a mandated aspect, which drives the costs, and a voluntary aspect, which drives the benefits.<sup>4</sup> Given this fact, the estimated costs are fairly certain, whereas estimated benefits are inherently uncertain. In particular, the benefits are largely driven by the assumed voluntary investment response (or uptake rate). There is not enough information to measure the level of uncertainty around the assumed uptake rate, but it is likely to be large.

Given the uncertainty over likely uptake rates, a break even analysis was conducted. This analysis suggests that actual take up rates could be much lower than assumed in the analysis while still maintaining positive net benefits to society. Most importantly, however, the analysis also shows that the choice over which option is most efficient is particularly sensitive to changes in assumptions about take up rates.

Uptake rates are not the only relevant factor. In addition, the results of the sensitivity analysis indicate that the selection of the most efficient option is also sensitive to assumptions regarding assessment costs, the discount rate and insulation penetration rates.

The impact of the Australian Government's Home Insulation Program (HIP) is a further source of uncertainty. Naturally, if a large number of houses have been insulated as a result of the program and the benefits of a policy intervention about residential buildings relies upon application of cost efficient home insulation, then there is a risk that the benefits would be overstated. It is difficult at this time to determine precisely how many *additional* residential buildings were in fact insulated. Sensitivity analysis performed and reported in this consultation RIS document suggests that if an additional 1.2 million residential buildings were insulated under the HIP (which may be an overstatement of the additional buildings that were insulated), the net present value of all of the options assessed would be lower than the central case results suggest. The sensitivity analysis indicates that Options 2, 3, 4 and 5 still have a positive net present value with the HIP included. In addition, the impact of this additional information is to switch the option with the highest NPV from Option 2 to Option 4. It will be particularly valuable to obtain stakeholder input about the effect of the HIP. The impact of the HIP will be subject to greater analysis in further phases of the RIS process.

<sup>4</sup> The mandatory aspect relates to the requirement to obtain a building performance assessment and disclose the subsequent rating when advertising, whereas the voluntary aspect relates to the level of investment triggered in response to the information available through Residential Building Mandatory Disclosure.

While noting that Option 2 is assessed as having the highest net present value with the information that is to hand at present, it appears that the findings for Option 4 are less sensitive to changes in the assumptions used in the analysis. In general, the findings about the expected impact of Option 4 has less risk and uncertainty associated with it relative to Option 2.

It is also notable that the choice of the most efficient option may differ when viewed from the perspective of different jurisdictions. While Option 2 has the highest net present value on a national basis and for the majority of states/territories, it does not produce the highest net present value in South Australia, Western Australia and the Northern Territory. In these states, Option 4 has the highest net present value.

Table ES 1.3

**IMPACT OF OPTIONS ON DIFFERENT STATE JURISDICTIONS, \$M NPV**

	Option 1	Option 2	Option 3	Option 4	Option 5
<b>New South Wales</b>	-\$731.7	\$431.7	\$386.5	\$382.8	\$46.3
<b>Victoria</b>	-\$607.9	\$305.8	\$277.1	\$281.1	\$34.4
<b>Queensland</b>	-\$930.9	\$14.6	-\$8.6	\$0.0	\$0.0
<b>South Australia</b>	-\$231.5	\$31.9	\$35.2	\$50.7	\$6.6
<b>Western Australia</b>	-\$371.6	\$91.4	\$90.7	\$107.5	\$13.8
<b>Tasmania</b>	-\$34.5	\$29.6	\$24.4	\$28.6	\$3.5
<b>Northern Territory</b>	-\$31.7	\$13.0	\$10.6	\$16.7	\$2.1
<b>Australian Capital Territory</b>	-\$34.3	\$9.7	\$9.7	\$0.0	\$0.0

Source: Allen Consulting Group Analysis

**Implementation and review**

The analysis in this RIS assumes that Residential Building Mandatory Disclosure will come into effect from 1 July 2011. However, timing of implementation is dependent on the outcomes of the Decision RIS and jurisdictional timing decisions.

In addition, although the measure will be implemented through state and territory legislation, for the purposes of conducting this RIS and assessing alternatives, it has been assumed that the Commonwealth, states and territories would act together where possible to implement Residential Building Mandatory Disclosure cost effectively.

It is the intention to test the option(s) and all the assumptions underlying the analysis with stakeholders as part of the consultation process. Following this, a decision RIS will be released which may contain a more detailed schedule of the proposed implementation of Residential Building Mandatory Disclosure. The decision RIS may also provide information about future reviews.



### **Consultations**

Consultations with stakeholders will be scheduled to discuss key aspects of the Consultation RIS to inform written comments from stakeholders.

This Consultation RIS is being provided to stakeholders for comment and to enable further development of the policy proposals. The period of consultation for this Consultation RIS will be eight weeks, from **18 July 2011** to **12 September 2011**.

Comments can be made on any aspect of the Consultation RIS. Of particular importance is feedback from stakeholders on:

- *The extent of the 'problem' in residential building energy, greenhouse and water performance.* That is, to what extent are there market failures, which present a barrier to improved energy, greenhouse and water performance of residential buildings in Australia? Has the problem been accurately represented in this RIS?
- *The adequacy of the options assessed in the Consultation RIS in addressing the problem* — are there any other feasible policy options that should also be considered in the assessment?
- *The assessment of costs and benefits of options:*
  - Does the assessment fully reflect all potential costs and benefits of the options assessed?
  - Are there costs to industry that have not been accounted for?
  - Are the take-up rates for the proportion of sellers and lessors that invest in upgrades to their properties in each scenario reasonable?
  - Are the costs of the energy and water efficiency measures included in the RIS reasonable?
  - Are the assumptions underlying the analysis valid/reasonable?
  - The impact of the HIP upon the penetration of roof insulation in the stock of Australian residential buildings.
- *Identified risks and uncertainties associated with each option.*

This Consultation RIS will also be presented at stakeholder forums around Australia, and will be available for download from the website <http://www.ret.gov.au/Documents/mce/quicklinks/bulletins.html>

Stakeholders will be able to provide feedback in one of the following ways:

1. attendance at one of the stakeholder forums scheduled below;

Parramatta, 2 <sup>nd</sup> August, 12.30pm, Mantra Parramatta, Corner Parkes St & Valentine Ave, Parramatta NSW 2150
Sydney, 3 <sup>rd</sup> August, 12.30pm, Grace Hotel Sydney CBD, Corner of York & King Streets, 77 York Street, Sydney NSW 2000
Hobart, 5 <sup>th</sup> August, 12.30pm, Mercure Hobart, 156 Bathurst Street, Hobart
Bunbury, 8 <sup>th</sup> August, 12.30pm, Clifton Hotel Bunbury, Corner Clifton & Molloy Streets, Bunbury
Perth, 9 <sup>th</sup> August, 12.30pm, Comfort Inn Bel Eyre, 285 Great Eastern Highway, Belmont
Adelaide, 10 <sup>th</sup> August, 12.30pm Mercure Grosvenor Adelaide, 125 North Terrace, Adelaide
Brisbane, 12 <sup>th</sup> August, 12.30pm Brisbane Mercure, 85-87 North Quay, Brisbane
Darwin, 15 <sup>th</sup> August, 10.30pm Travelodge Darwin, 64 Cavenagh Street, Darwin
Canberra, 16 <sup>th</sup> August, 12.30pm All Seasons Olim's Hotel Canberra, Corner of Ainslie & Limestone Ave, Braddon

2. participation in on-line forums. Please send an e-mail expressing your interest in participating in an on-line forum to [buildings@climatechange.gov.au](mailto:buildings@climatechange.gov.au); and/or
3. through a written submission via email to [residentialdisclosure@climatechange.gov.au](mailto:residentialdisclosure@climatechange.gov.au) or in hard copy to:

Residential Energy Efficiency Team  
 Buildings Government Energy Efficiency Branch  
 Department of Climate Change and Energy Efficiency  
 GPO Box 854  
 Canberra ACT 2601

**The deadline for written submissions is 12 September 2011.**

## Chapter 1

### About this report

The Allen Consulting Group (ACG) has been commissioned by the National Framework for Energy Efficiency (NFE) Building Implementation Committee (BIC) on behalf of the Commonwealth, States and Territory, to assess a proposal under the Council of Australian Governments (COAG) to introduce mandatory disclosure of building energy, greenhouse and water performance at the point of sale or lease for residential properties.<sup>56</sup> This assessment forms the basis of a Consultation Regulation Impact Statement (RIS).

#### 1.2 Regulation Impact Statements

The COAG has agreed that all governments will ensure that regulatory processes in their jurisdiction are consistent with the principles of Best Practice Regulation. These principles are outlined in Box 1.1 and apply to decisions of COAG, Ministerial Councils and intergovernmental standard-setting bodies (including bodies established by statute, or administratively by government, to deal with national regulatory problem).

Box 1.1

#### COAG PRINCIPLES OF BEST PRACTICE REGULATION

COAG has agreed that all governments will ensure that regulatory processes in their jurisdiction are consistent with the following principles:

1. establishing a case for action before addressing a problem;
2. a range of feasible policy options must be considered, including self-regulatory, co-regulatory and non-regulatory approaches, and their benefits and costs assessed;
3. adopting the option that generates the greatest net benefit for the community;
4. in accordance with the Competition Principles Agreement, legislation should not restrict competition unless it can be demonstrated that:
  - a. the benefits of the restrictions to the community as a whole outweigh the costs, and
  - b. the objectives of the regulation can only be achieved by restricting competition
5. providing effective guidance to relevant regulators and regulated parties in order to ensure that the policy intent and expected compliance requirements of the regulation are clear;
6. ensuring that regulation remains relevant and effective over time;
7. consulting effectively with affected key stakeholders at all stages of the regulatory cycle; and
8. government action should be effective and proportional to the issue being addressed.

Source: COAG 2007.

<sup>5</sup> The energy and water performance of a building relates to its expected energy and water use/consumption. The greenhouse performance of a building relates to the expected direct and indirect greenhouse emissions from energy that is consumed within the building (including the emissions from the generation, transmission distribution and use of this energy).

<sup>6</sup> Note that improvements in the energy, greenhouse and water performance of residential dwellings are mainly achieved through investment in household energy and water efficiency measures. For the purposes of brevity, therefore, the discussion in this report mainly refers to household energy and water efficiency rather than improved energy, greenhouse and water performance of residential dwellings.

The principles and assessment requirements apply to agreements or decisions to be given effect, whether at the Commonwealth or State/Territory level, or both, through principal and delegated legislation, administrative directions or other measures which, when implemented, would encourage or force businesses or individuals to pursue their interests in *material* ways they would not otherwise have done.

A RIS is a central component of the COAG's regulation impact assessment process. It is a document prepared to assist with stakeholder consultation (Principle 7). The objective of any RIS is to formalise and provide evidence of the key steps taken during the development of a regulatory proposal, including an assessment of the costs and benefits of each option.

The Office of Best Practice Regulation (OBPR) oversees the RIS process. The role of the OBPR is to ensure that the RIS meets the requirements of adequacy (as defined in the Best Practice Regulation Handbook). This requires the OBPR to determine that a range of alternative options has been identified for assessment including, as appropriate, non-regulatory, self-regulatory and co-regulatory options. Notably, the OBPR is not required to assess the merits of individual policy options. Rather, its role is to assess the rigour with which the impact of each proposal has been assessed (OBPR 2010).

### 1.3 Preparing a RIS

Preparing a RIS ensures that all relevant information to the decision making process is documented, and that the decision making processes are made explicit and transparent. A RIS should identify the following (OBPR 2010):

- the problem or issues that give rise to the need for action;
- the desired objectives;
- a range of options (regulatory and non-regulatory, as applicable) that may constitute feasible means for achieving the desired objectives;
- an assessment of the impact (costs, benefits and, where relevant, levels of risk) of a range of feasible options for consumers, business, government and the community;
- a consultation statement;
- a conclusion and recommended option; and
- a strategy to implement and review the preferred option(s).

### 1.4 Consultation

This RIS is prepared as a basis for consultation with stakeholders in the wider community. It is vital to obtain stakeholder feedback about the findings of this RIS. Further, it is reported in this RIS that the findings are very sensitive to changes in data inputs. As such, it is also crucial to obtain feedback from the community about the inputs used in the analysis.

## 1.5 Structure of this report

This report acts as the RIS regarding the proposal to introduce mandatory disclosure of building energy, greenhouse and water performance at the point of sale or lease for residential properties. It has been developed in accordance with the regulatory principles set out in the COAG (2007) guide for Ministerial Councils and national standard setting bodies, *Best Practice Regulation*, and the OBPR's (2010) *Best Practice Regulation Handbook*.

The remainder of the report is set out as follows:

- Chapter 2 — provides a definition of the problem;
- Chapter 3 — outlines the objective of government action;
- Chapter 4 — discusses a suite of options to achieve that objective;
- Chapter 5 — details the likely impacts of each option;
- Chapter 6 — provides a summary of preliminary findings for discussion;
- Chapter 7 — discusses an appropriate implementation and review strategy; and
- Chapter 8 — provides a consultation statement.

In addition, several appendices are attached to the report that provide additional detail and technical specifics.

## Chapter 2

# The nature and extent of the problem

*This chapter provides an analysis of the nature of the policy problem to be solved and its significance.*

### 2.6 What is the nature of the problem?

A number of 'information problems' appear to be present in the market for residential buildings. Generally residential buildings are in the market when they are being bought and sold as well as when they are offered for lease. Primarily, the information problems relate to:

- *information asymmetries* or uneven information between property owners and potential buyers/tenants; and
- information about building performance and value that is *missing* from the housing market.

Appendix A outlines in detail the current market disclosure of energy and water performance in residential properties available for sale or for lease in Australia. In doing so the current information deficiencies and asymmetries are highlighted.

Following below is a discussion of the role that information plays in an efficient and effective market, and the nature of information problems present in the residential housing market.

#### **Information in an efficient market**

Markets require information in order to function effectively and efficiently. Information (though not necessarily 'perfect information' as defined in economy theory as full information) allows buyers and sellers to make informed decisions about purchases and price points.

In some cases however, information may be insufficient to produce efficient outcomes. Where information availability is imperfect, or where different participants have uneven or asymmetric information, *market failure* may occur and this may result in a sub-optimal outcome. Asymmetric information can manifest as an *adverse selection* problem.

Adverse selection is a phenomenon where market participants are unable to distinguish between high and low quality products. In such cases, price signals are unable to identify product quality and consumers are at risk of consistently purchasing low quality goods and over time, the market fails to invest in offering the quantity of high quality goods that people would buy if they could be confident in the quality of those goods.

Adverse selection is a common outcome among those products where:

- it is difficult for consumers to ascertain quality at the time of purchase (and even for some period after purchase); and

- consumers do not have sufficient prior experience on which to base their decision.

The problems of asymmetric information and adverse selection are well understood in the economics literature — Box 2.2 discusses this concept in greater detail. How imperfect information and adverse selection affects the residential housing market is discussed in the next section.

#### Box 2.2

#### ASYMMETRIC INFORMATION AND ADVSERSE SELECTION

The lack of information, or the existence of barriers and costs associated with obtaining that information, can lead to sub-optimal market outcomes.

This information asymmetry problem can create a situation of 'adverse selection'. Adverse selection occurs when a buyer is not able to differentiate between high quality and low quality goods in the market at the time of purchase, and perhaps also not until a significant period of time after purchase. In the presence of this uncertainty, high quality products can be driven out of the market and lower quality products tend to attract a disproportionate level of patronage because errors in judgement or decisions made on observable factors (e.g. price) work in its favour.

This phenomenon is known as the 'market for lemons', first noted by Akerlof (1970), who explained how the pressure of competition, in the presence of information asymmetries, may cause quality to deteriorate to such low levels that the market may fail to exist. This concept is most commonly described using the example of a used car market, where there are both good quality cars and poor quality cars that look good on the outside, but hold bitter secrets ('lemons'). Purchasers know that there is a risk that they will purchase a lemon, but they have no reasonable means of separating the lemons from the high quality cars until they have driven the car for several months after purchase (in the absence of any other third party assistance).

This scenario can lead to a less than efficient social outcome because:

- buyers do not have sufficient information to make a rational informed decision about quality of a good, and therefore risk inadvertently purchasing a 'lemon';
- as a result, consumers will offer a price which is less than what they would be willing to pay for the high quality product, as they are uncertain as to the quality of the product that they will receive; and
- this, in turn, drives higher quality goods out of the market (as the price is too low to make a positive return for a 'quality' product).

Source: Allen Consulting Group.

#### **Information failures in the residential building market**

Most adults are involved at some point in their life in buying or renting a residential building to live in. Many people are involved in the sale of properties or offering them for rent.

Typically, a wealth of information is transferred between property owners and prospective purchasers/tenants in the lead up to a residential property transaction. As the former seeks to increase the perceived attractiveness of their property and the latter seeks to determine the absolute and relative 'worth' (loosely defined) of their future residence. This information can span information about the condition of the building, pests, legal encumbrances and other sometimes quite complex aspects of the property.

Everyday experience in the current market for residential buildings reveals that information about energy, greenhouse and water performance about residential buildings is generally of poor quality or absent. In the majority of cases, the available information is insufficient to:

- differentiate the relative performance of different properties;
- indicate the value of performance differences; and
- indicate opportunities to improve performance.

To an extent some of this information is simply missing — both buyers and sellers are unaware of the energy/water efficiency of their building. Information asymmetries are also present however, as buyers and sellers have different experience of a building and sellers currently do not have an incentive to reveal this information to the market.

Information shortfalls are not universal as information about the energy, water and greenhouse performance of some residential buildings is provided in some states and territories in Australia reflecting regulatory requirements.

Generally a number of incentives/disincentives seem to exist however that prevent the transfer of information about energy, water and greenhouse performance of buildings. Why property owners currently do not typically reveal information on energy, greenhouse and water performance at the time of sale/lease is explored further in Box 2.3. And similarly, why potential buyers/tenants generally do not seek to obtain this information is discussed in Box 2.4.



Box 2.3

**WHY PROPERTY OWNERS DO NOT TYPICALLY PROVIDE INFORMATION ABOUT THE ENERGY, GREENHOUSE AND WATER PERFORMANCE OF THEIR PROPERTY**

The likely reasons for why property owners are typically unlikely to provide information about the energy, greenhouse and water performance of their property to potential buyers and tenants (outside of those jurisdictions where the disclosure of building performance related information is mandatory) are as follows.

- Many property owners have little awareness of the energy, greenhouse and water performance of their building, or that some prospective buyers/tenants may value this information. They are thus not aware of the potential for this attribute to be used in a property transaction.
- Many property owners do not think that providing information about energy, greenhouse and water performance will increase the return from the sale or lease of their property. In other words, property owners may have a good grasp of the concept of energy, greenhouse and water performance, but feel that it is a second- or third-order issue compared to other factors (such as house size and location).
- Many property owners think that, while providing information about energy, greenhouse and water performance will increase the return from the sale or lease of their property, the likely size of the increase will not be offset by the costs associated with acquiring the necessary information. These costs could include the time and effort spent calculating the energy, greenhouse and water performance of their properties themselves, or the financial cost of hiring a third-party assessor to determine this.
- Many property owners think that providing information about energy, greenhouse and water performance will decrease the return from the sale or lease of their property. This may occur if a property owner is concerned that the energy, greenhouse and water performance of their property is below average, and that disclosing this information will deter potential buyers and tenants. Such concerns may not necessarily arise as the result of a formal energy, greenhouse and water performance assessment. However, a property owner may have suspicions about the poor performance of their property based on their experience living in the property, or from feedback received from previous tenants (e.g. large energy bills and extremely cold winters/hot summers).

Source: Allen Consulting Group.

## Box 2.4

**WHY PROSPECTIVE BUYERS/TENANTS MAY NOT ACTIVELY SEEK INFORMATION ABOUT RESIDENTIAL ENERGY, GREENHOUSE AND WATER PERFORMANCE**

There are a number of reasons why tenants and prospective buyers and tenants may not actively seek information about the energy, greenhouse and water performance of a property.

- Prospective buyers/tenants may have little awareness about the concept of energy, greenhouse and water performance, and the relationship between building design, major devices (e.g. space conditioners and water heaters) and a property's use of energy and water. They are thus not likely to inquire about the energy, greenhouse and water performance of a prospective property. It is important to note that the relevance of this factor is likely to be diminishing, given growing community concerns over, and increased political attention directed at, climate change.
- Prospective buyers/tenants may have awareness of residential energy, greenhouse and water performance, but consider the issue one of lower priority than other property attributes, such as location, size, amenity and price. They may thus judge that obtaining information about building performance is not worth the investment of time/money, especially compared with attempts to obtain information about attributes that are seen to be of greater importance.
- Prospective buyers/tenants may overestimate their ability to determine the energy, greenhouse and water performance of contending properties based on certain 'totem' characteristics (e.g. the presence of a solar hot water system, a rainwater tank or the orientation of the facade) and/or the 'newness' of the buildings. Prospective buyers/tenants may thus perceive the process of acquiring energy, greenhouse and water performance information from property owners as being of little value, except as a means of confirming what they believe they already know.
- Potential buyers may not actively seek information because they plan to demolish or renovate the building.
- Prospective buyers/tenants may believe that the costs involved in obtaining information about energy, greenhouse and water performance are greater than the potential savings (from comparatively lower energy/water use). Typically, prospective buyers/tenants could obtain information about energy, greenhouse and water performance by: (1) purchasing the services of a third-party assessor; (2) undertaking assessments themselves; or (3) simply asking questions of the vendor or agent. The first option imposes monetary costs; while the second option imposes time costs (as prospective buyers/tenants would be required to collect information about building design aspects and device performance themselves, and, potentially, negotiate access with property owners to do so). The third option may not be met with accurate or sufficient information. Prospective buyers/tenants may need to incur these monetary/time costs a number of times, if they are attempting to compare the energy and water performance of different properties and thus want to make an 'apples-to-apples' comparison based on information derived from similar assessment techniques. Also, there no guarantee that information would provide consistent, comparable assessments between properties.

The costs involved with obtaining energy, greenhouse and water performance information may appear to outweigh the potential savings if prospective buyers/tenants:

- are unaware of the full extent of savings associated with energy and water efficient devices and aspects of building design; and/or
- judge that the potential savings are insufficient to recoup the costs involved in obtaining energy, greenhouse and water performance information over a reasonable time frame. This is especially likely to be the case if prospective buyers/tenants are uncertain about how long they intend to stay at a particular property.

In practice, it is likely that each of these factors has some influence — there will be some tenants and buyers who have no interest in energy, greenhouse and water performance, while others do value the information but have difficulties accessing it.

Source: Allen Consulting Group.

***Residential buildings and adverse selection***

Adverse selection in the residential housing market can result in economic inefficiencies and a loss of community wellbeing. Identifying an adverse selection problem empirically requires evidence about the following three points:

- one, that there exists a persistent information failure in the market;
- two, that market participants would behave differently should they have full (or at least more) information; and
- three, that the difference in behaviour generates a suboptimal outcome.

Many of the reasons for why information is generally imperfect in the residential housing market have already been outlined in Box 2.3 and Box 2.4 above. Buyers and sellers face a number of disincentives and obstacles to obtain or provide information about building performance, and with the exception of the ACT and Queensland, governments do not require the provision of this information.

In addition, the market also exhibits a number of characteristics that make transactions particularly susceptible to adverse selection in the presence of poor information. These characteristics are both typical and common to goods and services with known adverse selection problems and include the following.

- Energy, greenhouse and water performance is a difficult attribute to identify in a building without specialist advice — everyday experience suggests that most buyers/lessees do not currently seek to obtain this information.
- Residential properties tend to be large, one-off or low frequency investments where the purchasers cannot rely on significant previous personal experience to determine the quality of the good.
- The presence of ‘totem’ features such as solar hot water systems and rainwater tanks may provide a miscue and cause prospective buyers/tenants to overestimate a building’s energy, greenhouse and/or water performance.
- Property owners with a poorly performing building have an incentive not to reveal this information as it may decrease the return from the sale or lease of their property.
- Branding strategies to signal different qualities are less practical in the residential property market which is comprised of large numbers of providers including many one-off products as well as a large proportion of pre-existing stock.

While pervasive evidence exists regarding missing and asymmetric information from everyday experience of the operation of the current market (see Appendix A), little is known about the extent to which potential buyers/tenants would use this information were it available. No comprehensive national study, for example, has been undertaken that can either support or contradict the presence of adverse selection in the residential buildings market. A building’s energy/water performance is just one of many competing attributes that influence the purchase/lease decision, and the extent to which the provision of this information would make a material difference to decisions made throughout Australia is not measured at present.

Some empirical evidence about the value and use of information is available from a study on the ACT's Mandatory Energy Performance Disclosure (MEPD) scheme (ACT DEH 2006). This study sought qualitative feedback from participants in a focus group discussion attended by recent purchasers/sellers of property in the ACT. The study suggests that buyers value information about energy and water performance and that this information can affect their purchase decision. In particular, some participants reported that high and low energy performance ratings were used as bargaining chips in the negotiation process. The findings of this study are discussed further in Box 2.5.

## Box 2.5

**THE ACT HOUSE ENERGY RATING SCHEME**

The mandatory disclosure component of the ACT's House Energy Rating Scheme (ACTHERS) was introduced in 1999. It requires the disclosure of an existing dwelling's energy rating in all advertisements for sale of a residential building, and that the contract of sale include information about the buildings Energy Efficiency Rating (EER).

Feedback on the ACTHERS was obtained for 2006 study through a focus group of ACT residents recently involved in either the sale or purchase of a residential property in the ACT. The focus group consisted of 35 participants of whom 31 could comment on buying a property in the ACT, and 12 on selling in the ACT.

Concerns from some about the accuracy of ratings provided by vendors, could have been expected to limited influence on market decisions. However, focus group participants indicated that the information provided by the scheme was of some value.

- All home buyers indicated that they were aware of the EER assessment of the houses they were interested in buying before purchasing.
- Among those buyers for whom the rating was a low priority, the rating would be used to influence the decision between two similar houses.
- 15 per cent of buyers considered the star rating 'important' or 'fairly important.'
- Some buyers anticipated that houses with a higher EER would attract a higher resale value.
- A small majority indicated that the rating would marginally impact on the price they would pay, however it was noted that low ratings were used as negotiating points to argue the price down.
- Real estate agents generally only mentioned the rating as a selling point — when the rating was unusually high.

Source: DEH 2006, pp. 18-21.

Finally, the presence of an adverse selection problem would imply that market participants were making less than optimal decisions regarding their investments in energy and water efficiency. Indeed, the presence of a systematic energy efficiency 'gap' — the difference between actual energy efficiency and the level of energy efficiency believed to be achievable and affordable — is a well-recognised phenomena (Productivity Commission 2005).<sup>7</sup> Many households have not invested in energy and water efficiency despite the fact that many available opportunities are able to provide a positive return in a relatively short period.

<sup>7</sup> It should be noted that the literature also identifies a number of other barriers to efficiency investments. These include: limitations of the traditional building design process and the fragmentation of the building industry, which restricts the capacity of industry to provide cost effective retrofit solutions; split incentives in the property market — 'energy-consuming products are purchased on behalf of householders by other parties (such as landlords and builders) who do not benefit from greater energy efficiency' (Productivity Commission 2005); and the initial cost barrier — this 'refers to the fact that energy efficiency products/services tend to be more expensive than their less efficient counterparts' (International Energy Agency 2008). Investments thus

Observed market outcomes are synonymous with a market that suffers from adverse selection. Well-performing properties cannot be ‘rewarded’ for energy/water efficiency investment, and therein receive little incentive to invest. Every jurisdiction in Australia currently oversees a scheme that encourages either energy or water efficiency (or both).<sup>8</sup> Some jurisdictions (Queensland and the ACT) have already recognised the role poor information plays in the space — and have introduced schemes to facilitate the provision of energy/water efficiency information at the time of sale/lease. (The scale of this shortfall is discussed further in Section 2.7 below.)

Again while there is no comprehensive national study that identifies (or dismisses) adverse selection as a problem in the residential housing market *per se*, the strands of everyday experience, the review of likely incentives currently operating in the market and the studies that are available strongly suggests that one is present. Purchasing/leasing a property exhibits characteristics that are conducive to this type of market failure and market outcomes indicate that the market systematically under invests in energy and water efficiency. And although there is little evidence regarding the value of building performance information, the evidence that does exist indicates that some people do use it to make decisions. As a consequence, despite the fact that buyers and sellers are able to come to mutually agreeable terms in the current market — this probably does not reflect energy, water and greenhouse outcomes.

The extent to which adverse selection in the residential housing market is a concern is discussed in the next section.

## 2.7 How significant is the problem?

Adverse selection in the residential housing market is potentially a significant concern. Under-investment by the housing sector presents a barrier to realising substantial savings of energy and water. Accordingly, the residential sector is generally seen as an important area in achieving action on energy efficiency (National Strategy on Energy Efficiency 2009).

The problem is significant because of the following reasons.

- The adverse selection problem may apply to the entire housing stock.
- Under-investment may mean that a substantial proportion of a household’s energy and water consumption is unnecessary and inefficient.
- As a sector, households consume substantial quantities of energy and water — and any efficiency improvement is likely to amass to a significant quantity in aggregate.
- Even in the face of a carbon price, household energy consumption is likely to increase significantly in the future.
- The payments associated with energy/water consumption represent a significant proportion of the average household budget.

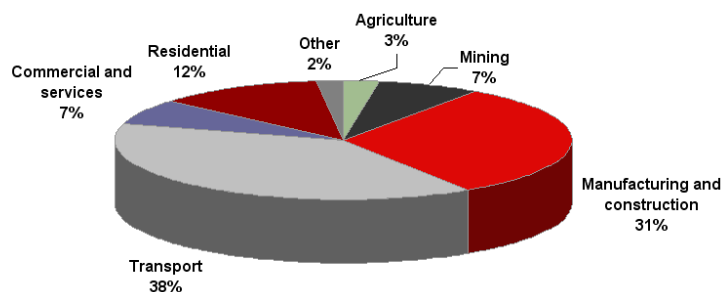
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require the property owner to fully understand the value of this ‘price premium’ in terms of future energy/water savings, and for the future energy/water savings to be sufficient for the owner to be willing to pay the premium (based on their expectations of how long they will occupy the property).

<sup>8</sup> Many of these programs are outlined in Table 2.1 in the next section.

Two case studies commissioned by the Sustainable Energy Authority of Victoria (SEAV) in 2004 indicate that, ‘by 2014, householders will have overlooked cost-effective actions that could have reduced their energy consumption by at least 13 per cent in that year’. According to the Australian Bureau of Agricultural and Resource Economics (ABARE), the residential sector consumed 427PJ of final energy in 2007-08 — equivalent to 12 per cent of Australia’s total final energy consumption (see Figure 2.1).

Figure 2.1  
**FINAL ENERGY CONSUMPTION IN AUSTRALIA, BY INDUSTRY, 2007-08**



Note: Total final energy consumption is the total amount of energy used in end use applications (ABARE 2010a). It is equal to total primary energy consumption less energy consumed or lost in conversion, transmission and distribution.

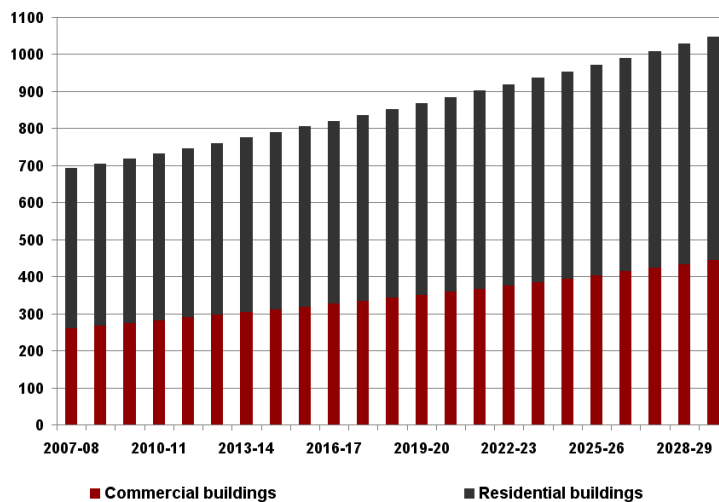
Source: ABARE 2007.

As a sector, the SEAV study estimates that investment in energy efficiency could reduce household energy consumption by 69.5 PJ (in 2014). By contrast, the estimated savings that could be achieved in the commercial and residential sectors were 30.2 and 48.9 PJs of energy respectively. The relatively greater savings that could be achieved by the residential sector reflect: its sheer size; that the sector is made up of a large number of small-to-medium buildings; and that the majority of houses have under-invested in energy efficiency.

Looking ahead, the sector’s consumption is expected to grow significantly. Energy consumption in the (commercial and residential) building sector is forecast to increase by around 2 per cent per annum to the year 2030 — in the face of major government policy initiatives such as the carbon price and Renewable Energy Target (ASBEC 2010). It follows then that the significance of the problem will increase over time. Figure 2.2 below reports the expected increase in energy consumption to 2029-30.

Figure 2.2

**TOTAL BUILDINGS SECTOR: ESTIMATED ENERGY USE (PJ)**

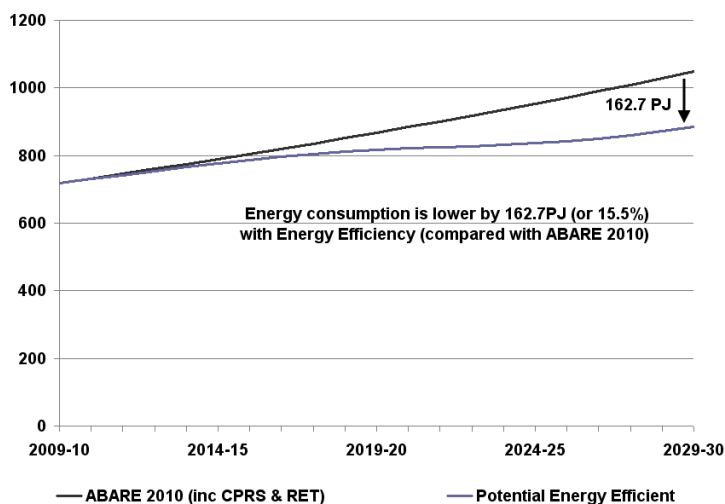


Note: ABARE 2010 projections take into account the Renewable Energy Target (RET), other policies to drive a 5 per cent reduction in GHG emissions below 2000 levels by 2020 packaged within the CPRS, as well as existing government initiatives.

Source: Allen Consulting Group 2010, ABARE 2010 and ABARE 2009.

A study by the Australian Sustainable Built Environment Council (ASBEC) Climate Change Task Group (2008) has considered the technical potential for energy efficiency in the building sector. The study considered energy savings that could be achieved from like-for-like substitution of existing technologies used in housing and office buildings with more energy efficiency alternatives using current and applied technologies. It was estimated that adopting the identified potential range of energy efficiency measures could lower energy consumption in the building sector from 1048 PJ in 2029-30 to 885 PJ — a reduction of nearly 16 per cent. These results are reported in Figure 2.3.

Figure 2.3

**TOTAL BUILDINGS SECTOR: ENERGY USE (PJ)**

Note: ABARE 2010 projections take into account the Renewable Energy Target (RET), other policies to drive a 5 per cent reduction in GHG emissions below 2000 levels by 2020 packaged within the CPRS, as well as existing government initiatives.

Source: Allen Consulting Group 2010, based on ABARE 2010, ABARE 2009, Pears 2007.

Improvements in residential energy efficiency have also been the subject of a number of national and international studies in the context of greenhouse gas abatement. These studies have typically expressed the energy efficiency gap in terms of the potential abatement that could be achieved, but they are nonetheless indicative of the likely scale of cost effective energy improvements that can be achieved in the residential (and broader) building sector. Examples of these studies include:

- the Intergovernmental Panel on Climate Change (IPCC) Working Group III estimates that, on a global basis, measures aimed at reducing energy consumption in the residential and commercial sectors could potentially avoid 'approximately 29 per cent of the projected baseline emissions by 2020' (IPCC 2007);
- the ASBEC Climate Change Task Group (2008) estimates that energy efficiency improvements in the building sector could reduce greenhouse gas emissions by '30–35 per cent by 2050 on an economic basis' — '[e]conomic in this context means that the initial costs would be offset — and in many cases be more than offset — by subsequent energy savings over time';
- McKinsey & Company (2008) estimate that 'low or negative cost' energy efficiency improvements could generate 'a total of 60 Mt of carbon reduction opportunities in the building sector by 2020.'; and



- the Prime Minister's Task Group on Energy Efficiency (DCCEE 2010) identifies that harnessing energy efficiency opportunities in the buildings sector as a key to achieve Australia's long-term energy efficiency and emissions reduction goals. Further, it indicates that as much as 30 Mt CO<sub>2</sub>-e of annual abatement could be achieved in the sector by 2020 in a cost effective way.

## 2.8 Existing regulations and current policy

Outside of jurisdictions with mandatory disclosure regimes (the ACT and Queensland), there appears to be little regulatory and policy measures driving disclosure of information pertaining to residential energy, greenhouse and water performance during residential property transactions.

Table 2.1 reviews a range existing regulation and current policy measures that in Australia. This review seeks to span many of the regulations that impact on buildings and their energy, greenhouse and water performance and information disclosure. The table suggests that there is a wide range of policy measures that have been implemented or are being considered that relate to this. Table A.1 and **Error! Reference source not found.** in Appendix A further illustrates the type of energy efficiency related information that is currently available for properties for sale and for lease via a well-known real estate website. The analysis suggests that very few of the existing regulations and policy measures deal directly with the key problem of providing simple and consistent information about the energy, greenhouse and water performance of existing and new buildings.

Many of the measures considered in the table above would be useful complements to an information policy (such as a mandatory disclosure scheme). Equally, a mandatory disclosure scheme is likely to be a useful complement to the existing policies. They would be mutually reinforcing when they work together. This is because it is likely that the effect of a mandatory disclosure scheme would be to make markets work better, rather than work against them.

Table 2.1

**EXISTING REGULATIONS AND CURRENT POLICY AND THE DIFFERENCE THAT RESIDENTIAL BUILDING MANDATORY DISCLOSURE MAY BRING**

Intervention or issue	Examples	Effect	Differential impact of Residential Mandatory Disclosure
<b>Energy efficiency ratings for dwellings for sale</b>	ACT House Energy Rating Scheme (ACTHERS).	Requires new or previously lived in residential homes to have an Energy Efficiency Rating (EER) Statement, prepared by an accredited assessor, if they are to be sold.	Australia wide application. (Implementation option for other jurisdictions may be different to the ACT scheme).
<b>Mandatory disclosure of a property's environmental and social sustainability features when it is for sale</b>	Sustainability Declaration in Queensland.	Provides information in a compulsory checklist that must be completed by the seller (vendor) when selling a house, townhouse or unit.	Australia wide application. (Implementation option for other jurisdictions may be different to the scheme that currently applies in Queensland).
<b>Mandatory disclosure of the energy, greenhouse and water performance of dwellings for lease</b>	The ACT Residential Tenancies Act 1997.	Requires that if there is an existing rating it must be disclosed or a new rating prepared if it is no longer representative.	Australia wide application. (Implementation option for other jurisdictions may be different to the ACT)
<b>Advertising and general market disclosure about the energy, greenhouse and water performance of dwellings for sale or rent</b>	Trade Practices Act. The Australian Consumer Law (replacing a wide range of State and Territory laws).	Prevention of misleading or deceptive conduct. Outlaws particular types of false or misleading representations, such as claims about a product's value, price, quality, place of origin or impact on the environment.	Requires standardised disclosure about the performance of a dwelling, covering good and possibly poor performance. Also requires disclosure of what changes could be made to a specific dwelling to improve performance.
<b>Disclosure of the performance of dwellings in tenancy laws</b>	Residential Tenancies Act (RTA) in each state and territory of Australia.	Specifies rights and of tenants and landlords. Does not address claims that could be made about energy/greenhouse/water performance.	Requires standardised disclosure about the performance of a dwelling, covering good and possibly poor performance. Could address dwellings for sale as well as those for lease.
<b>Building regulations</b>	Building Code of Australia (BCA).	Requires attainment of energy efficiency standards for new building work.	Provides information to market participants about the performance of existing dwellings in the market which is the larger proportion of dwellings in the market. Provides information about water efficiency and about what can be done to improve performance.
<b>Planning or development approval processes</b>	Local government planning and development approval processes. Includes BASIX in NSW.	Can influence building design depending on each jurisdiction's requirements. Focus is on new dwellings. Some jurisdictions apply requirements for major refurbishments.	Requires standardised disclosure about the performance of an existing dwelling (not just new dwellings), covering good and possibly poor performance. Also requires disclosure of what specifically could be done to the specific dwelling to improve performance.

Intervention or issue	Examples	Effect	Differential impact of Residential Mandatory Disclosure
<b>Incentive schemes</b>	Provision of incentives, rebates or loan concessions for investment in energy and/or water efficiency systems.	Can encourage investment in assisted technologies.	Provides scope for buyers and sellers, lessees and lessors to compare dwellings over all dwellings for offer in the market and make informed decisions.
<b>Mandatory appliance rating</b>	Minimum Energy Performance Standards (MEPS) Regulations in Australia. Are made mandatory in Australia by state government legislation and regulations that give force to the relevant Australian Standards.	Enables consideration and choice regarding the performance of individual domestic appliances.	Provides scope for buyers and sellers, lessees and lessors to compare the performance of dwellings as a whole, which includes attributes that are different than the efficiency of specific appliances. Also enables assessment of all dwellings for offer in the market.
<b>Applying a price on carbon</b>	Proposed carbon price scheme.	Would make living in less efficient dwellings more expensive.	Would enable all buyers and prospective tenants to determine which dwellings would cost less to live in. Would enable all owners selling or leasing a dwelling to determine which actions would improve the market performance of a dwelling.
<b>Energy efficiency obligations</b>	NSW Energy Saving Scheme, Victorian Energy Saver Incentive, South Australian Residential Energy Efficiency Scheme	Involve setting mandatory targets for energy efficiency gains that must be made in a specified timeframe. Creates rules about what activity is eligible for meeting this target, and who falls under the obligation.	Provides information to market participants about the performance of existing dwellings in the market which is the larger proportion of dwellings in the market. Provides information about water efficiency and about what can be done to improve performance.

Source: Allen Consulting Group.

## 2.9 A case for intervention

Under best practice regulation guidelines, government intervention can be justified when:

- there is an inherent failure in the market’s ability to deliver fair and equitable outcomes; and
- the benefits from correcting the failure are greater than the costs associated with doing so.

Again, while there is no direct evidence to suggest that buyers/lessors would make different decisions had they full information — there is certainly evidence to suggest that an adverse selection problem is present and that decisions being made result in less optimal investment in energy, water and greenhouse efficiencies in residential buildings. This is further shown in Appendix A which reviews the current status of market disclosure of energy and water performance in residential properties for sale and for lease in Australia.

However, it is noted that the mere presence of information failure does not *automatically* justify government intervention. As the Productivity Commission (2000, p.64) has noted in the context of consideration of professional regulation:

The possibility that information asymmetries prevent otherwise mutually beneficial transactions occurring provides one rationale for government intervention in a market. However, the need for government regulatory intervention does not immediately follow from the identification of information deficiencies: information deficiencies are pervasive yet most markets continue to function reasonably efficiently. In some cases, the consequences of incomplete information are insignificant.

In this case, the lack of standardised and consistent information through which buyers/lessees can make a judgment on the relative energy, greenhouse and water performance attributes of different properties (one that allows sellers/lessors to objectively signal the relative merits of their property) has led to a disincentive for sellers/lessors to invest in energy, greenhouse and water performance improvements.

As a consequence it is apparent that the market has invested sub-optimally in measures to improve the energy, greenhouse and water performance across the residential building stock. And it follows that there exists a case for government intervention to improve information in the market so long as the benefits of doing so outweigh the costs.

## 2.10 Key points

- The residential housing market suffers from a number of information problems regarding building energy, water and greenhouse performance. These problems principally relate to information unevenness between buyers and sellers (asymmetric information) and information that is missing from the market altogether.
- Persistent information problems make it difficult for market participants to differentiate the relative performance of different properties, indicate the value of performance differences and identify opportunities to improve performance.
- As a consequence of missing and uneven information, the market may be unable to provide the appropriate signals required to encourage efficient investment in building energy and water performance. That is, the market exhibits an adverse selection problem.
- There exists only limited empirical evidence that suggests there is adverse selection in the residential housing market. The market does however, display characteristics of product that is conducive to adverse selection and market outcomes are consistent with what would be expected.

- Underinvestment in known technologies to improve a building's energy, greenhouse and water performance may represent a significant problem: the problem may affect the entire residential housing stock, which is a significant consumer of energy/water and will grow over time.
- With the exception of schemes operating in the ACT and Queensland, there is little Government action in place to directly address information problems.
- A case for intervention to assist the market overcome information problems — so long as this intervention is economic welfare enhancing.

### *Chapter 3*

## **Objective of government action**

Prior to assessing options to address the identified problems, it is important to establish the objectives of government action. The objective should be sufficiently broad to allow consideration of a range of alternative solutions.

The objective of intervention is to improve community wellbeing and environmental sustainability, and reducing potential greenhouse gas emissions in particular, by countering information shortfalls and the uneven distribution of information (or information asymmetries) in the residential housing market that prevent efficient investment in energy and water efficiency. Government intervention should improve the quantity and quality of information available about building performance in order to assist market participants (including buyers, sellers, tenants and landlords) to compare, value and act upon cost effective energy and water efficiency performance in residential buildings.

## Chapter 4

# Options to achieve government objective

As part of the RIS process, it is necessary to develop, describe and consider the different options that can be used to achieve the government objective stated in Chapter 3. COAG RIS guidelines require that the options considered represent the spectrum of regulatory approaches — including explicit regulation, co-regulation and non-regulatory approaches. In addition, these guidelines require that the RIS specify the option that is most efficient out of the options considered.

The options presented and discussed in this chapter are specifically aimed at providing clear and consistent information to the residential property market about the energy, greenhouse and water performance of buildings. The range of options cover differing degrees of information provision and differing degrees of regulatory burden on households, where Option 1 has the largest degree of information provision and regulatory burden and Option 5 has the least. The information provided by these options would remove information barriers to investors and is expected to encourage investments in known technologies aimed at improving the energy efficiency, greenhouse and water performance of existing building stock.

These options were provided by the National Framework on Energy Efficiency's Building Implementation Committee, having been developed through extensive consultation with the individual jurisdictions to determine the range of feasible options for consideration in this Consultation RIS. Note: Aspects of these options, such as scope and measurement, will be reviewed following outcomes from the National Strategy on Energy Efficiency (NSEE) Measure 3.1.1 National Buildings Framework.

### 4.11 Regulatory options — 1 to 4

Under these options, jurisdictional governments would introduce legislation and regulations requiring owners of residential property to assess their property's energy, greenhouse and water performance, if the property were advertised for sale and/or lease. Furthermore, the owner of the property would be required to disclose the performance to prospective buyers and/or tenants. The four options vary with respect to the degree of detail to which an assessment must be done, and whether or not the assessment must be independently completed or verified. In brief, these four options differ in the following ways:

- option one — regulation requiring disclosure of information through an assessor-based assessment with *full* thermal simulation;
- option two — regulation requiring disclosure of information through an assessor-based assessment with a *simplified* thermal simulation;
- option three — regulation requiring disclosure of information through an online self-assessment; and
- option four — regulation requiring disclosure of information through a checklist assessment.

Two variations are being considered under each of these four options:

- that each of these regulatory options apply to sales transactions only; and
- that each of these regulatory options apply to both sales *and* lease transactions.

Applying these options for *only* lease transactions is not within the scope of current policy considerations for the majority of jurisdictions and hence this variation has not been analysed in this RIS.

#### ***Common features of options 1 to 4***

While the options describe a descending scale of regulatory burden, they would apply to the same types of transactions, for the same types of buildings, and involve very similar indicators of a building's energy, greenhouse or water performance. These commonalities are discussed here before the option-specific aspects are discussed subsequently in greater detail.

#### ***Building types covered under the proposed regulations***

The proposed options would apply to the sale and/or lease of *all* types of residential buildings (separate houses, semi-detached houses, flats, units and apartments), with the possible exception of the following:<sup>9</sup>

- residential buildings where facilities are communally provided (such as hospices and aged-care facilities);
- caravans;
- improvised homes (includes tents, sleep-outs and other improvised forms of shelter);
- houses or flats attached to a shop or office; and
- remote and social housing (except where sold to private providers).

#### ***Transaction types when disclosure is required***

Table 4.1 sets out the instances when the disclosure of energy, greenhouse and water performance information would be required (i.e. the applicable transaction types). Jurisdictions may introduce appropriate measures to reduce the impacts of potential delays in the advertising of properties that would be caused by delays in obtaining an assessment, if the seller or landlord has not been able to obtain the assessment at the time of advertising. This would not apply to jurisdictions with existing schemes, e.g. the ACT and Queensland.

<sup>9</sup> Individual states and territories will determine the types of exemptions that may apply to their particular jurisdiction and these types of buildings may be examined in reviews of Residential Building Mandatory Disclosure for possible future inclusion.



Table 4.1

**TRANSACTION TYPES REQUIRING DISCLOSURE OF ENERGY, GREENHOUSE AND WATER PERFORMANCE UNDER THE PROPOSED OPTIONS**

Point of disclosure
<p><b>SALE AND LEASE — At the point of advertising</b></p> <p><i>For options 1 to 3</i> — a rating/certificate is to be displayed in all advertising material and the certificate made available on request. If a rating is not displayed or the certificate is not made available, a penalty may be applied and/or orders applied to rectify.</p> <p><i>For option 4</i> — information about where a person may obtain a copy of the certificate is to be displayed in all advertising material and the certificate made available on request. If the certificate information is not displayed or the certificate is not made available, a penalty may be applied and/or orders applied to rectify.</p>
<p><b>SALE AND LEASE — At the point of contract exchange</b></p> <p><i>For options 1 to 3</i> — the certificate is to be provided to a prospective buyer or tenant (or an agent for a prospective buyer/tenant) at all reasonable times when an offer to buy/lease the property may be made to the seller/lessor and/or available for download from the internet. If the certificate is not made available it is not considered a breach of contract, but a penalty may be applied and/or orders applied to rectify.</p> <p><i>For option 4</i> — the certificate is to be provided to a prospective buyer/tenant (or an agent for a prospective buyer/tenant) at all reasonable times when an offer to buy/lease the property may be made to the seller/lessor and/or available for download from the internet. If the checklist is not made available it is not considered a breach of contract, but a penalty may be applied and/or orders applied to rectify.</p>

Source: Provided by NFEF BIC.

**Assessment process**

*Options 1 to 3* are also similar with respect to the structure of the assessments that must be done. Disclosure of a residential building's energy, greenhouse and water performance would be summarised in a certificate comprised of a combination of the following parts:

- part one — an overall performance rating for the building;
- part two — an assessment of other aspects of the building that are relevant to its performance, but that are not reflected in the overall rating due to issues of methodology and comparability; and
- part three — a summary of recommended upgrades and improvements, identifying the simplest or most cost-effective investments that could be undertaken to improve the building's performance.

The aspects of performance that will be covered in each of these three parts will be the same where they apply across options 1 to 3. More details about each of these parts are provided below.

**Part One**

Part one would contain the components of the property that would be assessed in order to develop the overall rating for the building, such as:

- thermal performance and the building shell;

- fixed heating and cooling systems;
- hot water system;
- lighting;
- clothes line and clothes drying areas; and
- outdoor living areas.<sup>10</sup>

The inclusion in part one of each component noted above in the assessment of the overall rating for a residential building's energy and greenhouse performance is based on the rationale that these individual components are present in most homes, travel with the sale/rent of a home, and have a significant and reliably quantifiable impact on energy or greenhouse consumption. Over time additional components may be incorporated into part one.

#### ***Part Two***

Part two would contain the thermal performance of the building shell (including outdoor living areas) and included in the certificate but may not be included in the overall rating, such as:

- water usage and efficiency performance — toilet, shower head, grey water, rainwater tank, evaporative cooling;
- on-site renewable energy system;
- impacts on peak load; and
- pools and spas.

The inclusion in part two of each component noted previously provides broader information on the potential energy, greenhouse and water performance of a property. These may not form part of the building's overall rating, based on the rationale that these components are either not present in the majority of homes or, they pose particular challenges in creating a quantifiable comparative measure. However work will be undertaken which considers including these components in part one and over time, some of these components may be incorporated into part one.

#### ***Part Three***

Part three of an assessment would contain the suggested upgrades and recommendations as to how the building's performance could be improved, and would include recommendations pertaining to performance indicators in both parts one and two of the assessment.

<sup>10</sup> Jurisdictions may choose to vary which elements are included based on local priorities.

**Option 1: Regulation requiring disclosure of information through an assessor-based assessment with full thermal simulation**

Under this option, sellers and/or lessors must have an assessor undertake an assessment of their building, where the assessment includes a full thermal simulation based on information equivalent to that found on floor and elevation plans. This option could use modified NatHERS tools that have the ability to collect the additional component details, or a final modified HSA tool or modified BASIX tool (not including the DIY aspect) — see Box 4.1 and Appendix G for more detail on possible assessment tools. Compared to the other options presented in this chapter, Option 1 provides the largest degree of information about a property's energy, greenhouse and water performance as it is based on a full thermal simulation using the building's floor plan.

Disclosure of a residential building's energy, greenhouse and water performance under this option would be given as follows:

- an overall rating at the point of advertising for the building would indicate the building's performance (this would include the energy performance only); and
- a certificate provided at all reasonable times that would detail:
  - each individual component of the building that has been assessed and included in the overall rating (refer to *Assessment Process — Part One* previous); and
  - additional components of the building that have been assessed but are provided as information only, and that would not make up the overall rating for the building (refer to *Assessment Process — Part Two* previous).

The tool that the assessor would use to provide an assessment of the property would have the following characteristics.

- *inclusion of part one*: an assessment tool would be used to assess the energy components as listed under part one of the assessment process, which incorporates a full thermal simulation to assess the thermal performance of the building. The assessment tool would produce an overall rating, as well as ratings for the various components of the overall building performance (i.e. thermal performance, fixed heating/cooling, hot water system, lighting, clothes line/drying areas and outdoor living areas). Option 1 would require information from a floor plan or similar relevant level of data to enable the assessment.
- *inclusion of part two*: the assessment method for the additional components of a building's energy, greenhouse and water performance, as listed under part two of the assessment process (water performance, on-site renewable energy system, peak load and pools/spas), would potentially take the form of a 'tick box' method with some limited quantifiable information. Over time, this part of the assessment could evolve to a quantitative assessment if justified.
- *inclusion of part three*: a list of potential upgrades and recommendations would be included as part of the certificate.

As noted above, the assessment would be required to be conducted by an approved assessor. Given that the assessment also incorporates a full thermal simulation, based on the building's floor plan, estimates provided by NFEE BIC suggest that the upper cost of an assessment would come to around \$784. This assumes a minimum fee of \$10, which would need to be paid in order to register the certificate of assessment with the appropriate jurisdiction, where it would be allowed to be re-used for future transactions as appropriate.

Both for a sale and for a lease, the assessment that is given may be re-used for subsequent disclosures *unless* changes are made to the property (or the assessment process or the assessment tool) that affect the energy, greenhouse or water performance of the building (i.e. structural changes, replacement of a fixed appliance, etc.), whereby a new assessment and disclosure would be required. In the event that no such changes have occurred, as outlined in the regulations, owners and landlords would be required to complete a declaration stating their use of a certificate used for a prior transaction and that there have been no changes to the property that affect the performance of the building. Further details on how validity periods are managed in the impact analysis are provided in Chapter 5.

The states and territories would undertake measures to ensure the appropriate monitoring and enforcement of compliance with the regulations under this option. The individual jurisdictions would need to develop or amend their own legislation to establish mandatory disclosure. Each jurisdiction would also be responsible for monitoring compliance with Residential Building Mandatory Disclosure, and acting on non-compliance, including oversight of:

- the conduct of assessors in conducting assessments for mandatory disclosure; and
- the conduct of agents and home owners and landlords in disclosing information.

***Option 2: Regulation requiring disclosure of information through an assessor-based assessment with a simplified thermal simulation***

Option 2 involves introducing regulation that would require disclosure of information through a simplified assessor-based assessment. This option could use a modified NatHERS tool, a final modified Home Sustainability Assessment (HSA) calculator tool, or a modified BASIX tool (including the DIY aspect) — see Box 4.1 and Appendix G for more details on the possible assessment tools). Compared to Option 1, this option would involve a quicker and lower cost assessment for property owners, as it does not require information from a floor plan to enable the assessment. This assessment would, however, involve a lower level of accuracy in assessing the thermal performance components of a building.

With respect to the assessment process, the validity period of the assessment, and arrangements for the monitoring and enforcement of compliance, Option 2 is very similar to Option 1. The key differences between these two options are described below.

- Assessment process:
  - *inclusion of part one:* under Option 2, a building's energy, water and greenhouse performance would be assessed using a tool that incorporates a simplified thermal performance assessment. This approach reflects the fact that upgrades to improve the thermal performance of existing residential

buildings through modification of components of the building fabric (such as floors, roofs, walls and windows) can be difficult and expensive to improve in comparison to modifying these for new buildings prior to them being built;

- *inclusion of part two:* Option 2 uses the same assessment method for all other building components to be assessed (that is, they would report on these components as separate items from the overall rating); and
- *inclusion of part three:* under Option 2, the same method as described in Option 1 would be used for providing a list of potential upgrades and recommendations to be included as part of the certificate, however thermal performance aspects would be less customised.
- Option 2 would involve a quicker and lower cost assessment (estimates provided by NFEE BIC suggest that the upper cost of an assessment would be around \$183 including the certificate lodgement fee)<sup>11</sup> as it requires only basic information on the building, collected on-site, to enable the assessment. This assessment would, however, involve a lower level of accuracy in assessing the thermal performance components of a building.

**Option 3: Regulation requiring disclosure of information through an online self-assessment**

Option 3 involves introducing regulation that would require disclosure of a rating obtained using an online self-assessment tool that is based on simulation of the thermal and other building components, but with increased assumptions and reduced complexity around the specific details for the building. This option could use a final modified HSA tool, or modified BASIX tool (including the DIY aspect) — see Box 4.1 and Appendix G for more detail on the possible assessment tools. While it would not be required under this option, owners and landlords would be able to engage an approved assessor to complete the assessment for them if they wish. Compared to Option 1 and 2, this option would provide a lower degree of information about a property's energy, greenhouse and water performance as it is not based on a full or simplified thermal simulation. However, this option would involve a quicker and lower cost assessment for property owners.

Option 3 would differ from Options 1 and 2 in the following ways.

- Assessment process:
  - *inclusion of part one:* Option 3 allows the use of a simplified online-assessment, which means that property owners can self-assess the performance of their buildings. To facilitate this self-assessment, the level of complexity, accuracy and rigor of the assessment process would need to be reduced to accommodate the expected lower degree of competency of property owners in understanding key concepts and collecting the necessary information to complete the assessment;
  - *inclusion of part two:* for all other building components to be assessed, Option 3 would use a similar assessment method to the one described for Option 1 and 2; and

<sup>11</sup> This is based on the assumption that the assessment tool proposed under Option 2 does not require the same quantity of data to be collected about the property.

- *inclusion of part three*: under this option, a similar method as described in Option 1 and 2 would be used for providing a list of potential upgrades and recommendations to be included as part of the certificate. However, due to the reduced complexity, accuracy and rigor of this assessment tool, the list of potential upgrades and recommendations would be less customised.
- The validity period of the assessment certificate would also differ under this option, compared to Options 1 and 2. When a property is being sold, as the assessment can be undertaken by a non-qualified assessor (homeowner), no validity period would apply and a new certificate would be required for each transaction. When a property is leased, the validity period for an assessment is the same as for Options 1 and 2.

As noted previously, while the services of an approved assessor are not required under this option, there is likely to be a proportion of sellers and landlords that would outsource this assessment to avoid potential penalties and improve the credibility associated with the rating. For these owners and landlords who choose to outsource the assessment, estimates provided by NFEE BIC suggest that the upper cost of this type of assessment would be similar to the cost under Option 2 (around \$180 including the certificate lodgement fee).

One variable that has a very large impact on the accuracy and consistency of the assessments process outlined in the options, is around who undertakes the assessment and what their relevant level of knowledge, training, and responsibility is. Although it is likely that some proportion of sellers and landlords would choose to outsource this assessment so as to avoid potential penalties, it is expected that a greater proportion of sellers and landlords would undertake the assessment (compared to Options 1-2).

Where the outsource option is selected qualified or approved assessors, with the appropriate training and qualifications, would undertake the assessment. Once assessments are completed, there would be an auditing process to ensure accuracy and consistency.

Where a self-assessment is selected, the sellers or landlords would complete the assessment. This option is associated with a higher level of risk in relation to the accuracy of the option as a result of the seller or landlord not being as qualified to assess as qualified assessors. This option would need to incorporate default options for homeowners completing the assessment online in situations where the result is not known. To mitigate the risk of inaccuracy and uncertainty, an audit process for self-assessments may be applied by jurisdictions to ensure a higher level of consistency and accuracy.

Another risk associated with this option relates to the potential risks to the health and safety of the seller or landlord as a result of self-assessment. For example, physical risks arise from property owners undertaking insulation checks where the individual is required to climb into confined ceiling spaces. Consideration of these health and safety risks to those collecting the information for the assessment needs to be considered when designing the online assessment.

As with Options 1 and 2, the assessment certificate would be required to be registered with government to allow it to be re-used for future transactions as appropriate.

As with the earlier options, individual jurisdictions would develop or amend their own legislation and regulations to establish mandatory disclosure, and would be responsible for monitoring and enforcing compliance. As this option uses a tool that is used by the householder to provide an assessment and rating, compliance and enforcement of this option is likely to rely upon existing consumer protection provisions in individual jurisdictions.

**Option 4: Regulation requiring disclosure of information through a checklist assessment**

Under Option 4, sellers and landlords would be required to disclose information about their building's performance through a checklist assessment that could be used by an untrained individual. This option could use a modified Sustainability Declaration. It would apply to the same transaction types as outlined in Options 1, 2 and 3. Rather than developing a building rating, the checklist would assess components of building performance as either being 'present' or 'not present'. The information provided under this option would not be as comprehensive as that of Options 1, 2 and 3 as the heating and thermal performance of a property are not quantifiable through a simple checklist.

The major differences between Option 4 and Options 1, 2 and 3 are outlined below.

- Assessment process:
  - there would an assessment checklist used for the assessment under this option;
  - *inclusion of part one and part two:* under Option 4, the energy, greenhouse and water performance information to be disclosed would vary from Options 1, 2 and 3 with regard to the assessment of the thermal performance of the building and the interaction of assessed components such as heating and thermal performance, as this would not be quantifiable through a simple checklist. As a result, no overall rating for the building would be provided at the point of advertising; and
  - *inclusion of part three:* Where the Disclosure Information under Options 1, 2 and 3 provides for the certificate to report options to improve the assessed components of the building and subsequently improve the rating of the building, under Option 4 upgrade options or recommendations that could improve the building's energy, greenhouse and water performance are assumed to be those boxes not ticked in the checklist.
- The validity period for the assessment will be the same as under Option 3. That is, when a property is being sold, as the assessment can be undertaken by a non-qualified assessor (homeowner), no validity period would apply and a new certificate would be required for each transaction. When a property is leased, the validity period for an assessment is the same as for Options 1 and 2.

Under this Option, there is no requirement for an approved assessor to undertake the assessment, however, it is likely that some proportion of sellers and landlords would choose to outsource this assessment to avoid potential penalties. For those sellers and landlords who choose to do so, estimates provided by NFEE BIC suggest that the upper cost of an assessment will be around \$150. This assumes that the assessment tool that an assessor uses will not require the same level of expertise to undertake the assessment and hence produces a simplified and less comprehensive assessment, in comparison with the tools proposed under Options 1, 2 and 3. It would not be necessary for a certificate to be registered with the appropriate jurisdiction, because a new checklist would be required for each transaction.

One variable that has a very large impact on the accuracy and consistency of the assessments process outlined in the options is around who undertakes the assessment and what their relevant level of knowledge, training, and responsibility is. Similarly to Option 3, although it is likely that some proportion of sellers and landlords would choose to outsource this assessment so as to avoid potential penalties, it is expected that a greater proportion of sellers and landlords would undertake the assessment (compared to Options 1-2). As a result Option 4 is associated with a higher level of risk in relation to the accuracy of the option as a result of the seller or landlord not being as qualified to assess as qualified assessors.

Similarly to Option 3 this option would need to incorporate default options in the checklist tool for homeowners completing the assessment where the result is not known. To mitigate the risk of inaccuracy and uncertainty, an audit process for self-assessments may be applied by jurisdictions to ensure a higher level of consistency and accuracy.

Consistent with Option 3, the potential risks to the health and safety of the seller or landlord as a result of self-assessment are greater than those associated with Option 1 and Option 2. For example, physical risks arise from property owners undertaking insulation checks where the individual is required to climb into confined ceiling spaces. Although these risks arise for tradespeople, such as assessors, they are smaller because of the requirement for assessors to be qualified or approved and adequately trained. Consideration of these health and safety risks to those collecting the information for the assessment needs to be considered when designing the checklist.

As with Options 1, 2 and 3, individual jurisdictions would be responsible for enacting appropriate legislation and regulations, and for monitoring and enforcing compliance.



Box 4.6

**ASSESSMENT TOOLS**

There are a range of assessment tools currently being used in the market that assess the energy efficiency components of properties, to varying degrees and for various purposes:

- *Predictive assessments* which use energy modelling computer software. These tools are based on a standard set of assumption about the comfort range of the occupants, occupancy patterns, and the thermal interaction of the building materials. As these tools are assumption based, they will often not reflect actual energy use.
  - Nationwide House Energy Rating Scheme — thermal performance of the dwelling shell is calculated using the software tools AccuRate, First Rate 5 and Bers PRO and rely on trained assessors. Currently widely used for the modelling pathway of meeting new building compliance with the Building Code of Australia (BCA), NatHERS assessments are used for existing dwelling assessments in the ACT for their residential disclosure scheme called the Housing Energy Rating Scheme (ACTHERS) — noting that an earlier version of the software is used for existing homes and that in general, house plans and other building information is available for assisting with the assessment. See Appendix F more detail on NatHERS, ACTHERS, BASIX and NABERS.
- *Actual assessments* which use actual data obtained through energy bills or metering. Occupancy profiles can be used to standardise or normalise the data to eliminate variability between different occupant behaviour.
  - NABERS Home — assesses the actual energy use of a dwelling and covers the majority of the components of the property noted previously. Currently used as a voluntary tool for householders.
- *Information assessments* which use scorecards or lists of appliance information. These assessments use a variety of data sources and are not affected to the same degree by the assumption of predictive models, or the behavioural factors of actual measurement. However these assessments do not provide an estimate of how the dwelling will perform and do not provide an easy comparison between two properties.
  - Sustainability Declaration — used for the Queensland residential disclosure scheme, this low cost, self assessment (by the home owner) includes a number of property components.

Source: Provided by NFEF BIC 2011.

**Comparison of regulatory option**

Table 4.2

**COMPARISON OF REGULATORY OPTIONS**

	<b>Option 1 (Full thermal assessment)</b>	<b>Option 2 (Simplified thermal assessment)</b>	<b>Option 3 (Self assessment – online tool)</b>	<b>Option 4 (Self assessment – checklist)</b>
<b>Assessment method</b>	Full thermal performance simulation + other building component information	Simplified thermal performance assessment + other building component information	Simple online thermal performance assessment + other building component information	Checklist of building component information
<b>Drawings required?</b>	Full floor plan drawing required <sup>f</sup>	No	No	No
<b>Data collection requirement</b>	High complexity & high volume <sup>g</sup>	Mid complexity & mid volume <sup>h</sup>	Low complexity	Limited
<b>Compliance approach</b>	Mandatory	Mandatory	Mandatory	Mandatory
<b>Rating provided?</b>	Yes	Yes	Yes	No
<b>Rating type</b>	Quantitative	Quantitative	Quantitative	Binary (present or not present)
<b>Assessor requirements</b>	Approved assessor	Approved assessor	Unskilled (non trained) e.g. householder or agent	Unskilled (non trained) e.g. householder or agent
<b>Registration required?</b>	Certificate lodgement required	Certificate lodgement required	Certificate lodgement required	No
<b>Assessment cost<sup>a</sup></b>	\$774 – Assessor <sup>b</sup> \$50 – Householder waiting cost <sup>c</sup>	\$172.50 – Assessor <sup>b</sup> \$25 – Householder waiting cost <sup>c</sup>	\$68 – Self-assess <sup>d</sup> \$165 – Assessor <sup>b,e</sup> \$18 – Householder waiting cost <sup>e</sup>	\$41 – Self-assess <sup>d</sup> \$150 – Assessor <sup>b,e</sup> \$14 – Householder waiting cost <sup>e</sup>
<b>Level of information provided</b>	<ul style="list-style-type: none"> <li>Comprehensive assessment of a building's thermal performance.</li> <li>High level of accuracy about thermal performance of a building's components.</li> <li>Ratings for the various components of the overall building performance.</li> </ul>	<ul style="list-style-type: none"> <li>Simplified assessment of a building's thermal performance.</li> <li>Mid level of accuracy about thermal performance of a building's components.</li> <li>Ratings for the various components of the overall building performance.</li> </ul>	<ul style="list-style-type: none"> <li>Low level of accuracy about thermal performance of a building's components.</li> <li>Ratings for the various components of the overall building performance.</li> </ul>	<ul style="list-style-type: none"> <li>Information about the various components of the overall performance provided in a checklist format without a rating.</li> </ul>

Notes: a) reflects the cost of a house assessment in an urban area in Victoria. Costs of assessments in non-urban areas are assumed to be higher and costs of assessments on apartments are assumed to be lower. Costs in other jurisdictions vary according to relative average weekly earnings. b) excludes certificate lodgement fee; c) assumes householders will need to be present whilst house is being assessed; d) cost to householder in undertaking the assessment by themselves (based on the cost of their time); e) if householder decides to outsource the assessment to an assessor. Additional details about the methodology and assumptions used to derive these costs are provided in Appendix B and Appendix C. f) Assumes that a floor plan is required to import into the software. Full working drawings (plans and elevations) are not assumed. g) Assumes no house data or plans available, all data collected manually on site and limited software default values for existing properties. h) assumes basic measurements are taken and collected manually on site

Source: Provided by NFEI BIC.

#### 4.12 Non-regulatory options

##### ***Option 5: Voluntary uptake through public education and publicity campaigns***

Option 5 is a non-regulatory option, which addresses the government's objective to tackle the market failure associated with a lack of information through a public education program and publicity campaign. Under this option, government would conduct a public education program and publicity campaign to increase awareness of the importance of improving the energy, greenhouse and water performance for residential buildings, and the opportunities that home owners, tenants and landlords have to improve the performance of buildings. This option could adopt a voluntary checklist approach similar to that outlined in Option 4.

This campaign would seek to educate and raise awareness in the marketplace by providing generic information around the attributes of an energy efficient building, the kinds of actions that home owners could take to improve the energy efficiency performance of their building and what likely benefits these actions would deliver. The set of generic actions that would be communicated as part of the campaign and would cover the components of the property as outlined under the assessment process outlined in Options 1-4.

This campaign would also promote the use of existing assessment tools in the marketplace that could be adopted for use by homeowners when they sell or lease their property, by highlighting the benefits of obtaining more targeted information around building performance specific to their property.

The types of assessment tools that could be used for this option include full or partial simulation of the building thermal shell performance and assessment of other building components (similar to the tools outlined in Options 1-3), or a checklist that identifies those key building components present in the property that affect the building's performance (similar to the tool outlined in Option 4).

The intention of this option would be to provide more information than is currently available to the public (including during property transactions). A campaign of this nature would provide both generic information around residential building performance and information about opportunities for the public to access more targeted information specific for their property, should they choose to do so, to enable more informed decision making at the time of sale or lease.

This option, however, would not necessarily facilitate a direct comparison between two properties when they are sold or leased and unlike Options 1-4, this option would not require a specific assessment approach to be adopted.

The objective of this option would be to provide more information than is currently available to the public (including during property transactions).

##### **4.13 An additional option: assessment opt-out**

A variant of the mandatory disclosure options, outlined in section 4.1, would be to introduce scope for property owners to opt-out. The regulation would be modified so that property owners could opt-out of obtaining an assessment, but be then required to disclose a 'zero' rating or score.

Introduction of an opt-out approach would parallel changes in regulatory practice at present. There are now a number of regulatory schemes operating in Australia and overseas that provide a degree of flexibility as a result of opt-out provisions, and in other cases, opt-in provisions. Some examples are summarised in table 4.3.

Under current schemes in Australia, the opt-out and opt-in provisions provide individuals with the flexibility (opportunity) to obtain certain benefits and, in other cases, avoid certain costs. For example:

- in the case of the Do Not Call Register the opt-out scheme provides telephone account holders with the ability to obtain a certain benefit (zero telemarketing calls);
- in the case of the organ donation scheme in Australia, the opt-in scheme provides potential donors with the ability to donate an organ if they pass away with minimal personal cost involved; and
- in the case of the future of financial advice reforms, retail clients may opt-in thereby incurring a certain cost (advice fees) for a certain benefit (receipt of financial advice).

Introducing opt-out arrangements to any of the proposed regulatory options would provide property owners with the flexibility to avoid the administrative and cost burdens of mandatory disclosure. This is likely to be of value to those owners that are aware that their property does not perform well, or where it is apparent that the next purchaser will most likely demolish the property.

In general, the costs of an opt-out arrangement relate to reducing information in the marketplace about property performance.

Limitations with providing an opt-out mechanism are that:

- the option produces a bias where those certain of having better or high performing properties can be expected to opt-in; and
- a zero default rating applying to many if not most properties in the market makes it more difficult to compare the energy efficiency performance of those properties for sale or lease that choose to opt-out.

If a large number of people opt-out of mandatory disclosure the costs would fall but the information base would shrink commensurately. It is then likely that there would be little incentive for vendors of property or buyers to plan for efficiency enhancing investments in those properties, thereby shrinking the benefits of any scheme. Though at present none of the states or territories are actively considering this option it is presented in order to provide a full set of scheme design alternatives for discussion and further consideration.

Table 4.3

## COMPARISON OF REGULATORY SCHEMES WITH OPT-OUT/OPT-IN PROVISIONS

Regulatory scheme	Nature of voluntary provision	Mechanism of voluntary provision
<b>Australian-operating schemes</b>		
Future of Financial Advice Reforms	Both opt-in and opt-out provisions	The proposed reforms include a requirement for advisers to send a renewal notice every two years to retail clients to obtain agreement (by 'opting-in') to ongoing advice fees. This will be supplemented by an intervening annual disclosure notice to the client detailing fee and service information and informing the client of the right to 'opt-out' at any point in time to an ongoing advice contract. A non-response by the client to a renewal notice will be deemed as an 'opt-out' applying 30 days after the anniversary date.
Organ donation scheme	Opt-in	Australia's organ donation scheme has an 'opt-in' scheme. Many other countries have 'opt-out' schemes. The UK however has an 'opt-in' scheme with the UK Organ Donation Taskforce concluding that they were 'not confident that the introduction of 'opt-out' legislation would increase organ donor numbers, and there is evidence that donor numbers may go down.'
Scripture classes in Australia	Opt-out	Under some State Education Acts, you can 'opt-out' your child from being taught scripture at school.
Biosecurity Industry Funding Schemes for the WA Grains and Grazing Sector	Opt-out	This scheme was established under the <i>Biosecurity and Agriculture Management Act 2007</i> (WA) to enable West Australian producers of grain/seed/hay/cattle/sheep/goats to self-determine pest and disease priorities at a whole of industry level, and then to raise funds to implement desired on-ground control programs to mitigate the risks they pose to the viability and sustainability of their industries. It allowed producers to 'opt-out'. Contributions are mandatory initially but those who opt-out can have their annual contributions fully refunded. Those wishing to 'opt-out' must do so every year with written notifications to the Director General of the WA Department of Agriculture and Food.
Telemarketing Do Not Call Register	Opt-out	The Do Not Call Register is a database where telephone and fax account holders can list their Australian number(s), to 'opt-out' of receiving certain telemarketing calls or marketing faxes. Once a number is listed, telemarketers and fax marketers must not contact those numbers.
<b>Overseas-operating schemes</b>		
Lead safety (USA)	Opt-out	The US Environmental Protection Agency used to have an 'opt-out' provision (which they removed in mid-2010) regarding lead safety, whereby if the owner of a residence certified that no child under age 6 or pregnant women resides in the home, then it is exempted a renovation firm from training and work practice requirements.
Kiwi saver (NZ)	Opt-out	A NZ work-based savings initiative designed to assist individuals save for retirement, primarily through pay contributions (there are some situations where withdrawals can be made before retirement). New employees are automatically enrolled in Kiwi-saver, but have an 'opt-out' option which generally must be exercised within 8 weeks of starting the job.

Source: Allen Consulting Group.

A key issue with opt-out is in anticipating the proportion of property owners that decide to exercise the option. Looking at current experience with opt-in or opt-out arrangements may not provide a great deal of information about this. Experience with current schemes indicates that none are exact parallels with an opt-out arrangement for the regulatory options considered in this RIS. Opt-out in the RIS options work to provide property owners with the ability to avoid a certain cost while giving up the potential to receive an uncertain/unknown benefit. Of those listed, The Biosecurity Industry Funding scheme for the Western Australian grains and grazing sector operates in a way that has similarities, although that scheme still differs where producers need to opt-out on a more regular, annual basis. Data about the opt-out performance in the grains and grazing sector is not publicly available at this time. Determining expected opt-out rates in that arrangement based on experience of existing schemes is difficult.

The impact analysis conducted in this RIS will look at how opt-out provisions may alter the balance of benefits and costs of mandatory disclosure. This is included in the analysis in this RIS as Option 6, although it is in fact a variation of one of the other regulatory options.

It will also be important through the consultation process to obtain feedback from the community about such flexibility and insights into how it may affect key factors such as the rate of take up of investment.

#### **4.14 The base case — maintain current approach**

Cost-benefit analysis seeks to estimate the incremental or induced impacts to stakeholders that can be directly attributed to the proposed options. In order to do so, it is necessary to have some idea of what would have happened if none of these options were exercised — effectively, if the current policy approach were maintained. In this assessment, the current approach includes not only a continuation of what happens now, but also future trends (that is, projected change) that can reasonably be expected to have an impact on the problems identified in Chapter 2.

For this RIS, the base case reflects current government policies, existing regulation, standards and incentives that support investment in improved energy, greenhouse and water performance, and trends within the market to provide information on energy efficiency, greenhouse emissions and water efficiency attributes of properties (this is set out in further detail in the impact analysis in Chapter 5). Importantly, the base case also takes into account the fact that some jurisdictions already have household energy and/or water efficiency performance assessment and reporting requirements, which means that if a similar measure is analysed at a national level, these jurisdictions will not derive any benefit or cost associated with the introduction of that measure. Finally, the base case assumes that no carbon price will be introduced over the ten year period analysed (see Appendix C.15 for an explanation).

## Chapter 5

### Impact analysis

*This chapter assesses the costs and benefits of the options set out in Chapter 4, compared with the 'base case' option of no change to the current approach.*

#### 5.15 Estimating costs and benefits

Estimates of the costs and benefits under each of the proposed options were developed in the cost-benefit analysis conducted for this RIS. The methodology and assumptions behind the analysis are outlined in Appendix B and Appendix C.

In addition, indicative benefits and costs were calculated for the operation of opt-out flexibility. As a result of limitations in empirical information on the key dimension of the opt-out rate under a Residential Building Mandatory Disclosure, a sensitivity analysis was undertaken so as to provide the opportunity for stakeholders to provide feedback on expected opt-rates. This analysis is based on application of opt-out to Option 2 and is reported as Option 6.

The majority of the inputs and assumptions used for the analysis were developed by other consultants involved in the project and/or were agreed to be used as a basis for modelling by jurisdictional representatives on the National Framework for Energy Efficiency Building Implementation Committee. The resulting assumptions and inputs were then supplied to the Allen Consulting Group. The Allen Consulting Group was not asked to validate or verify the assumptions provided.

It is important to note that the analysis was conducted over the period early to mid 2010 and was based on the best available data inputs at the time (e.g. information on fuel prices). As such, it is possible that any data releases or policy developments since that time may not be reflected in the analysis. In addition, it was assumed that current circumstances and policy settings (e.g. current rebate schemes that do not have an explicit expiry date) would remain in place over the period of the analysis. This is typical in such modelling exercises as, by their very nature these are only models (or approximations) of what might occur in reality. In the instance that the results were expected to be sensitive to certain assumptions, a sensitivity analysis was conducted, as outlined in Chapter 6.

The base case, direct costs and benefits, indirect benefits and other impacts are outlined below.

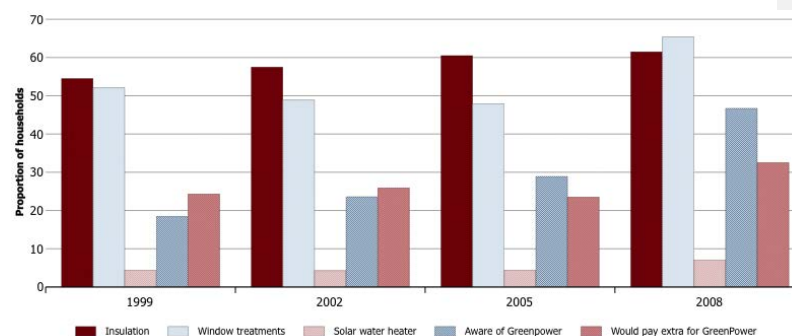
#### ***The 'base case'***

The 'base case' is a description of what is likely to happen to the market for residential property sales and leases, and the investment in energy and water saving measures, in the absence of any further policy intervention from governments. The costs and benefits of the options described in Chapter 4 are estimated as the difference between the costs (or benefits) already being incurred in the base case, and the *additional* cost (or benefit) that can be attributed to the option being considered. To establish this base case, it is necessary to develop a scenario of the 'status quo' for the period being considered.

Consumers are already demonstrating a preference for investing in a range of improved household environmental outcomes — for example, the increase in the proportion of households willing to pay extra for Greenpower Electricity, as shown in Figure 5.4. In addition, both Queensland and the ACT already have residential building mandatory disclosure arrangements in place for some types of properties and transactions. As a result, the base case identifies and separates both the current and expected future costs and benefits associated with the status quo.

Figure 5.4

#### INVESTMENT IN ENVIRONMENTAL OUTCOMES — PROPORTION OF TOTAL AUSTRALIAN HOUSEHOLDS



Source: ABS, 2008.

The base case is characterised by the following assumptions:

- residential building mandatory disclosure arrangements are in place in the ACT and in Queensland (more information on these is provided in Appendix B and Appendix G);
- there is no increase in the demand for, or the supply of, assessors qualified to undertake property performance assessments;
- there continues to be no carbon price of any kind, and subsequently, no carbon reduction implications for energy prices;<sup>12</sup>
- existing growth in investment in household energy and water efficiency measures (for example, as a result of voluntary action or existing government policies such as the introduction of progressively higher energy star ratings in the building code of Australia) will continue over the period of the analysis (more information on existing and projected penetration rates is provided in Appendix C), while accelerated changes in the household penetration of efficiency options through, for example, the faster adoption of changes in building standards are not included; and

<sup>12</sup> On 27 April 2010 the former Prime Minister, Kevin Rudd announced that the Government decided to delay the implementation of the Carbon Pollution Reduction Scheme (CPRS). The Australian Government's current commitment is to attempt to reach political and community consensus on a carbon price of some kind. Different options are being considered, including a carbon tax, an emissions trading scheme or a blend of both.



- current arrangements around mandatory MEPS or Water Efficiency Labelling and Standards (WELS) for household appliances are taken into account, but possible future changes in these policies that may accelerate trend adoption of energy efficient appliances are excluded;
- rebates and subsidies for energy and water efficiency measures that were in place at the time the analysis was conducted will continue to be available over the period of the analysis (more information on these is provided in Appendix C).<sup>13</sup>
- there was insufficient information at the time that this the base case was being prepared to include the Australian Government’s Home Insulation Program and its impact on existing penetration of insulation in the base case. The available uncertain information about the impact of the HIP has been included in the sensitivity analysis in this RIS.

#### **Direct costs and benefits**

The costs and benefits associated with the options described in Chapter 4 will apply across the household, business and government sectors. This cost benefit analysis identifies and quantifies these direct market costs and benefits in order to determine the overall net cost (or benefit) of the options, as well as the distribution of costs and benefits across the three sectors. The direct costs and benefits are outlined below.

#### **Benefits**

The following direct market benefits are considered:

- *utility bill savings* — the estimated financial savings to households as a result of lower gas, electricity, water and other fuel bills;
- *greenhouse gas savings* — the value to society (using an *indicative* price on carbon) of reduced greenhouse gas emissions.

It could also be argued that a further direct benefit to some seller/lessors will be an increase in the value of their property. Indeed, it is possible that those sellers/lessors who chose to make an investment in response to mandatory disclosure will be able to recoup the costs of those investments by seeking a higher price in the property sales/rental market. In addition, they may also seek to recoup the cost of the assessment and/or to charge some sort of ‘green’ premium given the improved rating achieved through the investments. However, from a broader economic perspective, such increases in property values would not reflect in an overall benefit to society, rather a transfer in wealth from property buyers to property sellers, or from renters to landlords.

<sup>13</sup> Note that this assumption does not have a significant bearing on the outcomes of the analysis as the costs associated with increased demand for rebates represent only a small proportion of overall costs.

In other words sellers/lessors might treat the cost of the assessment, and any investments made, as a typical cost associated with selling/leasing a property (such as costs associated with real estate agent fees and advertising) and seek to pass-on those costs (including any 'green' premium) to buyers/renters. Buyers and renters would, therefore, need to borrow more, or reduce their disposable income in order to purchase or lease the property of their choice.<sup>14</sup>

Therefore, if the benefit of increased property values to sellers/lessors were to be included in the analysis, the cost of higher prices/rents to buyers/renters would also need to be included (i.e. given the analysis reflects costs and benefits across the whole economy). As the value of the benefit to sellers/lessors is theoretically the same as the cost to buyers/renters, the two effectively cancel each other out. As such, there is no need to reflect this wealth transfer in the model.

This discussion raises an important question regarding the implication of mandatory disclosure for housing affordability. This is explored in detail in Section 6.22.

### Costs

The following direct market costs are considered:

- *assessments* — the amount paid to have a licensed assessor undertake and provide a property assessment, and registering the rating with the appropriate jurisdictional authority;
- *investments (net of rebates)* — the amount that sellers and lessors invest in design or appliances intended to improve the performance of their properties, net of any government rebates and subsidies provided to induce greater investment;
- *householder time* — the opportunity cost of householder time, given that they will need to be present during business hours while the assessment is being undertaken;
- *real estate agents' time* — the cost of time associated with real estate agents assisting with households finding an assessor and arranging for them to undertake the rating (noting that this is not a formal part of mandatory disclosure requirements but has been included in the analysis to capture what may possibly occur);
- *training and insurance* — the costs associated with establishing the supply of accredited and/or licensed assessors, and ensuring that they are appropriately trained and insured;
- *rebates* — the cost associated with increased demand for rebates for energy and water efficiency measures (for example, solar hot water heaters, and other energy or water efficient appliances); and
- *administration* — these are the costs to government associated with setting up a regulatory approach and monitoring and enforcing it. Note, however, that these costs will likely be recovered from households in the form of a certificate lodgement fee. Costs of administration include:

<sup>14</sup> It should be noted that such buyers and renters, once moving into a property, would face relatively lower utility bills, thus providing the ability to gradually recover the costs associated with higher prices/rents.

- training and development — cost associated with training the trainers who will ultimately train the assessors in the new assessment tool and rating lodgement process;
- accreditation, licensing and registration — costs associated with ensuring that assessors are accredited and qualified to make an assessment of a property's rating;
- compliance and enforcement — costs associated with monitoring, investigating complaints and taking appropriate action against anybody suspected of violating a regulation;
- enquiries — the costs associated with responding to questions asked by households and assessors;
- communications — the costs associated with advertising and awareness raising to let households and industry know what their obligations and rights are under the new arrangements, as well as what investments households can make to improve the energy and water performance of their properties; and
- reporting obligations — the costs associated with reporting on outcomes and performance.

#### **Indirect benefits**

In addition to the benefits discussed already, there are a number of other, indirect benefits that are excluded from the cost benefit analysis because they cannot be precisely defined/measured or are out of scope. There are several types of indirect benefits, which are categorised and discussed in this section based on the manner in which they arise. Indirect benefits are associated with:

- health benefits associated with improved energy efficiency;
- reduced water usage;
- reduced peak load infrastructure demands; and
- the general increased provision of information about residential building performance.

#### **Health benefits**

One of the most significant components of household energy bills are expenses related to heating and cooling. Households may attempt to reduce their usage of heating and cooling in order to conserve energy and money. However, extreme temperatures are shown to have adverse impacts on morbidity and mortality, especially for the elderly and frail<sup>15</sup>. A more energy efficient house or apartment, which has appropriate levels of insulation and a more cost effective heating and cooling system, will make it cheaper to maintain a stable temperature. This in turn means that those living in the building will enjoy a more comfortable lifestyle, and the associated health benefits.

<sup>15</sup> Williamson, T, E Grant, A Hansen, D Pisaniello & M Andamon 2009, 'An investigation of potential health benefits from increasing energy efficiency stringency requirements. Building Code of Australia Volumes One and Two', Report to the Australian Building Codes Board, September.

### *Water savings*

The indirect benefit of reduced water usage comes from changes in behaviour or follow-on effects from the reduction in water usage. For example, if there is sufficient change in household behaviours, then it may no longer be necessary for water restrictions to be in place for the same duration, frequency or level of severity. The removal or relaxation of restrictions means that households enjoy greater freedom in how they use water. For some households, this can result in an increase in leisure time as watering the garden or cleaning the car by hose takes less time than doing so by bucket, or by taking the car to a private car wash.

In the same way, encouraging households to install a rainwater tank or grey water system also frees up the way in which households can use their water, and allows a little more discretion with respect to the allocation of water across activities that are important to the household. For example, property owners who have installed a rainwater tank may enjoy being able to water their garden on a hot day, even if they would not be allowed to do so under water restrictions. And even if water restrictions are not in force, the installation of alternative sources of water storage means that households can use rain or grey water without any guilt, or without feeling as though they are wasting water.

Finally, the reduced usage of water has implications for future investment in water infrastructure, which may be able to be delayed or undertaken on a more modest scale. This includes facilities such as additional dams, or the construction of desalination plants to generate additional capacity.

### *Reduced peak load infrastructure demands*

Improved household energy efficiency, by its very nature, reduces residential energy sector demand for electricity. In addition to reducing householder electricity bills and greenhouse gas emissions associated with electricity generation, this also reduces the pressure on electricity generation and supply infrastructure. In particular, growing use of air conditioners in Australian households during summer peak periods (especially in the south eastern states where the use of air conditioners has traditionally been relatively low) is placing pressure on peak generation plant in many jurisdictions. As such, any policies that have the effect of improving the energy efficiency of residential air conditioning systems, or that improve the thermal efficiency of residential buildings, help to take pressure off electricity infrastructure, thus deferring costs associated with infrastructure upgrades until further in the future. Such deferred infrastructure costs are likely to result from Residential Building Mandatory Disclosure, on the assumption that households will respond by investing in energy efficiency improvements.

### *General*

Residential Building Mandatory Disclosure will apply to all transactions, i.e. at point sale or lease of the property. It is possible that a buyer or a tenant can make their own, visual assessment of different properties and reach a conclusion as to which is likely to have a better performance rating than the others. Buyers or tenants who currently inspect for efficiency features are a small percentage of the market. For these buyers and tenants, who know the housing market and who are experienced in what sorts of things to look for, the provision of an assessment or rating is unlikely to change the decision that they would have made anyway. The same is true for sellers and landlords who undertake investments in insulation or energy efficient appliances currently, when there is no mandatory disclosure of building performance.

It may seem that there is no benefit to this segment of the market, since there is no change in behaviour, but the requirement to undertake an assessment and to disclose a rating — which is required of *all* sellers and landlords — means that the rating confirms what some of the transactors in the market already know. For buyers and tenants, it confirms that the properties that they believe are better performers *are* in fact better performers. This provides a level of comfort to buyers and tenants, in that they have made the right decision, and that they will get something in return for paying the premium if they choose a building with higher performance. For sellers and landlords who spend money on investments that improve their building's performance, it overcomes the adverse selection problem, and allows them to charge a higher price or higher rent in order to reflect their building's superior performance.

### *Other impacts*

The costs and benefits associated with the options set out in Chapter 4 can potentially vary depending on some of the other impacts associated with their implementation and enforcement. This section considers some of these 'other impacts' and the ways in which they may affect the magnitude or the distribution of the costs and benefits.

### *Practical and administrative impacts*

The practical and administrative impacts of each of the options have been described in the discussion of direct and indirect costs and benefits. More detail on the practicalities of, and the administrative arrangements for, the timing, implementation and review of mandatory disclosure will be presented in the Decision RIS.

### *Stakeholders likely to be affected*

The stakeholders who are likely to be affected by the options fall into the following categories:

- households in the residential property market, including sellers and lessors who disclose the property ratings and buyers and tenants who use the information;
- households outside of the residential property market and who make up 'the wider community', who benefit from improved environmental outcomes associated with improved energy and water performance;
- industry, particularly sustainability assessors and real estate agents; and

- governments at the state and territory level, and the Commonwealth government, who will implement mandatory disclosure and monitor and enforce it.

#### *Phase-in options*

In addition to the scope and requirements of the options, it is also necessary to consider when and how Residential Building Mandatory Disclosure is implemented and what impact this may have on stakeholders. The timing will not materially affect the distribution of impacts on stakeholders or the selection of the most efficient option(s). This is because the same stream of costs and benefits would be triggered regardless of when the option is implemented. The only difference is the number of years for which those streams of costs and benefits are discounted, which will not alter the rankings.

A related consideration is the arrangements for transitioning into the selected option(s), from the base case. The jurisdictions consulted in the development of this RIS have provided estimates of the resources allocated for announcing the different options, coordinating implementation across the jurisdictions and raising awareness. If there are any changes to the amount of time allocated for raising awareness or for implementing the selected option(s), these changes will affect the costs to government.

#### *Impacts on real estate industry*

The costs of the different options on the real estate industry are quantified below (see industry costs under each option). In addition, it is likely that the real estate industry will play a practical role in educating households in the residential property market and an informal role in enforcing a regulatory option (for example, ensuring that a valid rating is included in any material advertising a sale or a lease).

#### *Point of disclosure*

For the regulatory options, the analysis assumes that the point of disclosure is when a property is advertised for sale or lease, as outlined in the description of these options. Alternative points of disclosure include providing the information on request, allowing buyers or tenants to conduct their own inspections (for example, along with a building and pest inspection) or making the information available on a public register for buyers and tenants to look up. The alternatives described would be far less effective in providing information to buyers and tenants at the earliest point possible in their decision making process and hence may not be as effective in influencing the purchaser/tenant decisions. As a result, they are not considered as alternative options for estimation in the cost benefit analysis.

#### *Remote and social housing*

In some instances under Residential Building Mandatory Disclosure, tenants might have far less discretionary choice across building selection and would therefore not be able to demonstrate a preference for a more energy and/or water efficient property in a meaningful way. This applies to properties in remote areas and social housing.

Residential properties in remote areas also fall into this category because someone looking to buy or rent in a remote area would have a limited choice of properties to choose from, with properties varying in aspects other than energy and water performance (such as plot-size, location, amenities and so on). As such, a cost-effective assessment process will be developed by states and territories to assess remote housing (where 'remoteness' will be classified by individual states and territories, based on the Australian Bureau of Statistic's ASGC Remoteness Classification: Purpose and Use) specifically for options where an approved assessor is required to conduct the assessment.

Social housing also falls into this category because social housing clients, in fact, have no discretionary choice when they are allocated a property in relation to affecting a preference for a more energy and/or water efficient property. Although social housing clients can nominate a preferred broad locality, they are unable to nominate a particular property having a higher energy, greenhouse and water performance. As a result of social housing recipients having no discretionary choice, a separate process will be undertaken to analyse the full impacts on social housing (where social housing includes public housing, State owned and Managed Indigenous housing, community housing, Indigenous community housing and crisis and transition housing, based upon the Productivity Commission's definition of social housing) from introducing legislation and regulations requiring the disclosure of energy, greenhouse and water performance for residential buildings. When analysing impacts of mandatory disclosure the following will be considered:

- the ability of social housing clients to choose between accommodation options is constrained and rental rates are usually determined based on incomes, which in the case of these types of tenants are constrained;
- there is much less scope for government and not-for-profit social housing providers to recover energy efficiency investment costs through increased rents compared to private providers; and
- there is little motivation of social housing tenants to invest in energy efficiency measures because they are not the owners of the property (either the building envelope or the major fixed appliances) and because they tend to have lower than average incomes.

Nevertheless, where social housing providers sell dwellings to private purchasers, social housing will not be treated differently to other residential property types. That is, Residential Building Mandatory Disclosure will apply to the sale of social housing dwellings to the private sector.

Given the complexities associated with housing in remote areas and social housing, these have been excluded from the analysis.

### 5.16 Direct costs

All of the options considered in this RIS entail costs to government, households and industry. The costs are estimated in constant prices over the ten years from 2011-12 to 2020-21, and summarised as present values using a discount rate of 7 per cent as recommended by the OBPR.<sup>16</sup>

<sup>16</sup> Discounting is a standard approach used in cost benefit analysis when costs and benefits are expressed over a number of years. This approach puts more quantitative emphasis on costs and benefits that occur in the short

A summary of cost estimates under each option is provided in Table 5.2 and Table 5.3. Cost estimates are provided for two scenarios: one where disclosure is mandated at both point of sale and lease (Table 5.2), and the other where disclosure is mandated at point of sale only (Table 5.3). The latter scenario was included to provide a sense of how the impacts of the mandatory disclosure would differ if it were limited to sales transactions. The following discussion focuses on the former of these two scenarios, as the conclusions are consistent between the two in terms of relativities between the options and cost items. The only difference, therefore, is one of magnitude, which is driven by the fact that more property transactions apply when both sales and leases are included.

Table 5.2

**DIRECT COSTS – MANDATED DISCLOSURE AT POINT OF SALE AND LEASE (PRESENT VALUES, \$M)**

Sector	Cost item	Option 1	Option 2	Option 3	Option 4	Option 5
Households	Assessments	\$5,196.1	\$1,120.7	\$720.9	\$263.3	\$0.0
	Investments	\$563.8	\$475.9	\$340.6	\$224.9	\$22.4
	Time	\$382.8	\$189.1	\$67.1	\$7.8	\$2.3
	<i>Subtotal</i>	<i>\$6,142.8</i>	<i>\$1,785.6</i>	<i>\$1,128.7</i>	<i>\$496.0</i>	<i>\$24.7</i>
Industry	Real estate agents' time	\$59.4	\$59.3	\$29.6	\$5.8	\$0.0
	Assessor training & insurance	\$54.3	\$20.7	\$8.6	\$2.1	\$0.0
	<i>Subtotal</i>	<i>\$113.7</i>	<i>\$80.0</i>	<i>\$38.2</i>	<i>\$7.9</i>	<i>\$0.0</i>
Government	Rebates & subsidies	\$75.3	\$65.4	\$50.3	\$37.5	\$3.8
	Set-up/ongoing (states/territories)	\$116.7	\$99.4	\$122.2	\$77.2	\$12.8
	Set-up/ongoing (Commonwealth)	\$9.2	\$8.9	\$8.8	\$5.0	\$12.4
	<i>Subtotal</i>	<i>\$201.2</i>	<i>\$173.8</i>	<i>\$181.3</i>	<i>\$119.7</i>	<i>\$29.0</i>
<b>Total</b>		<b>\$6,457.7</b>	<b>\$2,039.4</b>	<b>\$1,348.2</b>	<b>\$623.7</b>	<b>\$53.7</b>

Source: Allen Consulting Group analysis.

term relative to those that occur in the medium to long term. All values included in the analysis are expressed in *real* terms, i.e. they have not been adjusted to account for inflation.



Table 5.3

**DIRECT COSTS – MANDATED DISCLOSURE AT POINT OF SALE ONLY (PRESENT VALUES, \$M)**

Sector	Cost item	Option 1	Option 2	Option 3	Option 4	Option 5
Households	Assessments	\$2,455.7	\$529.7	\$339.6	\$125.0	N/A
	Investments	\$365.8	\$305.9	\$218.4	\$145.4	N/A
	Time	\$181.3	\$89.1	\$31.6	\$3.7	N/A
	<i>Subtotal</i>	<i>\$3,002.8</i>	<i>\$924.7</i>	<i>\$589.7</i>	<i>\$274.1</i>	<i>N/A</i>
Industry	Real estate agents' time	\$27.7	\$27.7	\$13.9	\$2.8	N/A
	Assessor training & insurance	\$39.3	\$15.9	\$6.6	\$1.8	N/A
	<i>Subtotal</i>	<i>\$67.1</i>	<i>\$43.6</i>	<i>\$20.4</i>	<i>\$4.6</i>	<i>N/A</i>
Government	Rebates & subsidies	\$52.3	\$45.2	\$34.8	\$26.1	N/A
	Set-up/ongoing (states/territories)	\$117.0	\$99.6	\$119.1	\$70.3	N/A
	Set-up/ongoing (Commonwealth)	\$9.2	\$8.9	\$8.8	\$5.0	N/A
	<i>Subtotal</i>	<i>\$178.5</i>	<i>\$153.8</i>	<i>\$162.7</i>	<i>\$101.4</i>	<i>N/A</i>
<b>Total</b>		<b>\$3,248.3</b>	<b>\$1,122.2</b>	<b>\$772.8</b>	<b>\$380.1</b>	<b>N/A</b>

Source: Allen Consulting Group analysis.

**Option 1**

Assuming disclosure is mandated at both point of sale and lease (consistent with the cost estimates in Table 5.2), the total present value cost under this option is \$6.5 billion over 10 years. This estimate is made up of \$6.1 billion incurred by households, \$114 million incurred by industry (specifically real estate agents and sustainability assessors) and \$201 million incurred by government. These estimates are discussed in more detail below. Detailed calculations and assumptions behind these estimates are outlined in Appendix B.

If it is assumed that disclosure is mandated at point of sale only (consistent with the cost estimates in Table 5.3), the total present value cost under this option is \$3.2 billion over 10 years, which is approximately half the cost of the alternative scenario. This lower cost is driven by the need for fewer assessments.

**Households**

The high costs associated with this option are primarily attributable to the cost of assessments, which incorporates a floor plan (not full working plans and elevations) for the property and thermal simulation of its energy performance and assumes that all data needs to be collected on-site. The total cost of assessments is \$5.2 billion, which is based on an estimated 10.6 million property transactions captured by mandatory disclosure over the ten year period and an average assessment cost of \$676.<sup>17 18</sup>

<sup>17</sup> This is different from the assessment cost outlined in Table 4.2 as it represents the average cost accounting for a number of factors that will vary the cost faced by households, such as state/territory differences, urban versus non-urban differences, changes over time and differences in dwelling type.

<sup>18</sup> The number of transactions differs between the options. This is due to the differing assumptions over whether all jurisdictions participate in Residential Building Mandatory Disclosure (see Table B.6). For instance, neither Queensland nor ACT are assumed to participate in Residential Building Mandatory Disclosure under Option 4.

A much smaller component of the costs to households is the investment in energy and water efficiency measures. The total cost of these investments is \$564 million, which is based on an estimated 2.1 million separate investments over the ten year period at an average cost \$415 per investment. The estimated number of investments is driven by the assumed uptake rate under this option that is 30 per cent for sold properties and 15 per cent for leased properties.<sup>19</sup>

In addition to the above costs, households will also incur a time-cost as they will need to be present during business hours while the assessment is taking place. The total opportunity cost to households is \$383 million, which is based on 1.8 hours of foregone leisure time per assessment and an hourly rate based on post tax average weekly earnings in each jurisdiction.

#### *Industry*

Of the three sectors, industry incurs the smallest direct costs. The total cost to real estate agents is \$59 million, which reflects the costs of their time in organising an assessment when a property is being sold or leased. This cost is reflected in the analysis as a direct cost to real estate agents. However, it is likely that it will ultimately be recovered from households through higher estate agent fees. In addition to this cost, sustainability assessors will incur costs associated with training and insurance, which is estimated at \$54 million.

#### *Government*

The cost to government associated with increased demand for rebates on energy and water efficiency measures is \$75 million. This is based on an estimated 2.1 million investments over the ten year period at an average rebate of \$46 per investment. The cost to state and territory governments associated with establishing and running Residential Building Mandatory Disclosure is \$117 million, which is made up of a number of different activities including compliance and enforcement, enquires and communications. The cost to the Commonwealth Government is \$9 million, which is made up of awareness and jurisdictional coordination costs.

These costs are reflected in the analysis as direct costs to government. However, it is likely that these costs will ultimately be recovered from households through some sort of certificate lodgement fee. To avoid double counting, the cost of the certificate lodgement fee is not factored in to the calculation of assessment costs to households (outlined above).

<sup>19</sup> The take up rate refers to the assumed voluntary investment response to Residential Building Mandatory Disclosure as a proportion of the number of houses that are required to comply with Residential Building Mandatory Disclosure in every year. For example, it would be the proportion of houses where an investment occurs of all houses for sale in a year in some scenarios. Assumed uptake rates were developed in consultation with the National Framework for Energy Efficiency Building Implementation Committee. The methodology and assumptions used in developing the uptake rates and the cost of investments are outlined in Appendix B and Appendix C.

### **Option 2**

As discussed before, the most significant difference between options 1 and 2 is the requirement under Option 1 for floor plans in order to undertake a full thermal performance simulation, which has a major impact on the cost. As such, removing this requirement, as under Option 2, significantly reduces the costs associated with Residential Building Mandatory Disclosure. Notably, removing this requirement also means that the assessment would involve a lower level of accuracy in assessing the thermal performance components of a building and hence, would provide a lower level of information than Option 1.

Assuming Residential Building Mandatory Disclosure mandates disclosure at both point of sale and lease (consistent with the cost estimates in Table 5.2), the total present value cost under this option is \$2 billion over 10 years. This estimate is made up of \$1.8 billion incurred by households, \$80 million incurred by industry and \$174 million incurred by government. These estimates are discussed in more detail below. Detailed calculations and assumptions behind these estimates are outlined in Appendix B.

If it is assumed that Residential Building Mandatory Disclosure mandates disclosure at point of sale only (consistent with the cost estimates in Table 5.3), the total present value cost under this option is \$1.1 billion over 10 years, which is approximately half the cost of the alternative scenario. This lower cost is driven by the need for fewer assessments.

### **Households**

The total cost of assessments is \$1.1 billion, which is based on an estimated 10.5 million property transactions captured by Residential Building Mandatory Disclosure over the ten year period and an average assessment cost of \$149.<sup>20 21</sup>

The total cost of investments in energy and water efficiency measures is \$476 million, which is based on an estimated 1.7 million separate investments over the ten year period at an average cost \$415 per investment. The estimated number of investments is driven by the assumed uptake rate under this option that is 26 per cent for sold properties and 13 per cent for leased properties.<sup>22</sup>

In addition to the above costs, households will also incur a time-cost as they will need to be present during business hours while the assessment is taking place. The total opportunity cost to households is \$189 million, which is based on 1 hour of foregone leisure time per assessment and an hourly rate based on post tax average weekly earnings in each jurisdiction.

<sup>20</sup> This is different from the assessment cost outlined in Table 4.2 as it represents the average cost accounting for a number of factors that will vary the cost faced by households, such as state/territory differences, urban versus non-urban differences, changes over time and differences in dwelling type.

<sup>21</sup> The number of transactions differs between the options. This is due to the differing assumptions over whether all jurisdictions participate in Residential Building Mandatory Disclosure (see Table A.5). For instance, neither Queensland nor ACT are assumed to participate in Residential Building Mandatory Disclosure under Option 4.

<sup>22</sup> Assumed uptake rates were developed in consultation with the National Framework for Energy Efficiency Building Implementation Committee. The methodology and assumptions used in developing the uptake rates and the cost of investments are outlined in Appendix B and Appendix C.

*Industry*

The total cost to real estate agents is \$59 million, which reflects the cost of their time in organising an assessment when a property is being sold or leased.<sup>23</sup> The total cost to sustainability assessors is \$21 million, which reflects the incremental cost associated with training and insurance. The cost to sustainability assessors is lower under this option, relative to Option 1, due to lower training costs. Training costs are lower due to less sophistication of the assessment tool.

*Government*

The cost to government associated with increased demand for rebates on energy and water efficiency measures is \$65 million. This is based on an estimated 1.7 million investments over the ten year period at an average rebate of \$46 per investment. The cost to state and territory governments associated with establishing and running Residential Building Mandatory Disclosure is \$99 million, which is made up of a number of different activities including compliance and enforcement, enquires and communications.<sup>24</sup> The cost to the Commonwealth Government is \$9 million, which is made up of awareness and jurisdictional coordination costs.

Government costs are lower under this option, relative to Option 1, due to lower tool development costs (given the assessment tool is simplified) and a lower demand for rebates.

*Option 3*

Under option 3, the assessment tool is an on-line instrument that sellers and lessors can choose to self-complete rather than using an independent assessor. Some households may not feel they are capable of undertaking the assessment themselves (for example, to inspect under the roof for insulation and the homeowner is unable to do so) or they may value an independent assessment. As a result, there will still be costs associated with paying assessors to undertake assessments, as well as training and insurance costs for new assessors, albeit much lower than under options 1 and 2.

Assuming Residential Building Mandatory Disclosure mandates disclosure at both point of sale and lease (consistent with the cost estimates in Table 5.2), the total present value cost under this option is \$1.3 billion over 10 years. This estimate is made up of \$1.1 billion incurred by households, \$38 million incurred by industry and \$181 million incurred by government. These estimates are discussed in more detail below. Detailed calculations and assumptions behind these estimates are outlined in Appendix A.

If it is assumed that Residential Building Mandatory Disclosure mandates disclosure at point of sale only (consistent with the cost estimates in Table 5.3), the total present value cost under this option is \$773 million over 10 years, which is 57 per cent of the cost of the alternative scenario.

<sup>23</sup> This cost is reflected in the analysis as a direct cost to real estate agents. However, it is likely that it will ultimately be recovered from households through higher estate agent fees.

<sup>24</sup> These costs are reflected in the analysis as direct costs to government. However, it is likely that these costs will ultimately be recovered from households through some sort of certificate lodgement fee.

### *Households*

The total cost of assessments is \$720 million, which is based on an estimated 10.5 million property transactions captured by Residential Building Mandatory Disclosure over the ten year period and an average assessment cost of \$97.<sup>25</sup> <sup>26</sup> Under this option, assessment costs include the time cost to households that chose to undertake assessments themselves. The estimate is based on the assumption that 50 per cent of households will conduct a self-assessment while the other half will engage an independent assessor.

The total cost of investments in energy and water efficiency measures is \$340 million, which is based on an estimated 1.3 million separate investments over the ten year period at an average cost \$415 per investment. The estimated number of investments is driven by the assumed uptake rate under this option that is 20 per cent for sold properties and 10 per cent for leased properties.<sup>27</sup>

In addition to the above costs, households will also incur a time-cost as they will need to be present during business hours while the assessment is taking place. The total opportunity cost to households is \$67 million, which is based on 40 minutes of foregone leisure time per assessment (applied to 50 per cent of assessments that are assumed to be undertaken by an assessor) and an hourly rate based on post tax average weekly earnings in each jurisdiction.

### *Industry*

The total cost to real estate agents is \$30 million, which reflects the cost of their time in organising an assessment when a property is being sold or leased.<sup>28</sup> The total cost to sustainability assessors is \$9 million, which reflects the incremental cost associated with training and insurance. The costs to industry are lower under this option, relative to Option 2, due to the fact that sustainability assessors are assumed to be used only 50 per cent of the time under this option.

### *Government*

The cost to government associated with increased demand for rebates on energy and water efficiency measures is \$50 million. This is based on an estimated 1.3 million investments over the ten year period at an average rebate of \$46 per investment. The cost to state and territory governments associated with establishing and running Residential Building Mandatory Disclosure is \$122 million, which is made up of a number of different activities including compliance and enforcement, enquires and communications.<sup>29</sup> The cost to the Commonwealth Government is \$9 million, which is made up of awareness and jurisdictional coordination costs.

<sup>25</sup> This is different from the assessment cost outlined in Table 4.2 as it represents the average cost accounting for a number of factors that will vary the cost faced by households, such as state/territory differences, urban versus non-urban differences, changes over time and differences in dwelling type.

<sup>26</sup> The number of transactions differs between the options. This is due to the differing assumptions over whether all jurisdictions participate in Residential Building Mandatory Disclosure (see Table A.5). For instance, neither Queensland nor ACT are assumed to participate in Residential Building Mandatory Disclosure under Option 4.

<sup>27</sup> Assumed uptake rates were developed in consultation with the National Framework for Energy Efficiency Building Implementation Committee. The methodology and assumptions used in developing the uptake rates and the cost of investments are outlined in Appendix B and Appendix C.

<sup>28</sup> This cost is reflected in the analysis as a direct cost to real estate agents. However, it is likely that it will ultimately be recovered from households through higher estate agent fees.

<sup>29</sup> These costs are reflected in the analysis as direct costs to government. However, it is likely that these costs will ultimately be recovered from households through some sort of certificate lodgement fee.

State and territory government costs are higher under this option, relative to Option 2, due to higher compliance and enforcement costs under this option. These costs are higher due to the increased effort required to monitor and enforce self assessments.

#### **Option 4**

Option 4 is similar to Option 3 in that households can complete their own assessments. As discussed in Chapter 4, Option 4 simplifies the assessment tool even further, reducing it to a checklist of energy and water efficiency measures that are 'assessed' according to whether or not they are installed. As is the case with option 3, the estimation of the costs and benefits for option 4 also assumes that some households will opt to use an independent assessor to apply the assessment tool. Given the simplified nature of the assessment tool, however, only 10 per cent of assessments are assumed to involve an independent assessor, while the remaining 90 per cent are assumed to be self-assessments.

Assuming Residential Building Mandatory Disclosure mandates disclosure at both point of sale and lease (consistent with the cost estimates in Table 5.2), the total present value cost under this option is \$624 million over 10 years. This estimate is made up of \$496 million incurred by households, \$8 million incurred by industry and \$120 million incurred by government. These estimates are discussed in more detail below. Detailed calculations and assumptions behind these estimates are outlined in Appendix B.

If it is assumed that Residential Building Mandatory Disclosure mandates disclosure at point of sale only (consistent with the cost estimates in Table 5.3), the total present value cost under this option is \$380 million over 10 years, which is 61 per cent of the cost of the alternative scenario.

#### **Households**

The total cost of assessments is \$263 million, which is based on an estimated 7.9 million property transactions captured by Residential Building Mandatory Disclosure over the ten year period and an average assessment cost of \$46.<sup>30 31</sup> Under this option, assessment costs include the time cost to households that chose to undertake assessments themselves. The estimate is based on the assumption that 90 per cent of households will conduct a self-assessment while the other 10 per cent will engage an independent assessor.

The total cost of investments in energy and water efficiency measures is \$225 million, which is based on an estimated 0.9 million separate investments over the ten year period at an average cost \$373 per investment. The estimated number of investments is driven by the assumed uptake rate under this option that is 15 per cent for sold properties and 7.5 per cent for leased properties.<sup>32</sup>

<sup>30</sup> This is different from the assessment cost outlined in Table 4.2 as it represents the average cost accounting for a number of factors that will vary the cost faced by households, such as state/territory differences, urban versus non-urban differences, changes over time and differences in dwelling type.

<sup>31</sup> The number of transactions differs between the options. This is due to the differing assumptions over whether all jurisdictions participate in Residential Building Mandatory Disclosure (see Table A.5). For instance, neither Queensland nor ACT are assumed to participate in Residential Building Mandatory Disclosure under Option 4.

<sup>32</sup> Assumed uptake rates were developed in consultation with the National Framework for Energy Efficiency Building Implementation Committee. The methodology and assumptions used in developing the uptake rates and the cost of investments are outlined in Appendix B and Appendix C.

In addition to the above costs, households will also incur a time-cost as they will need to be present during business hours while the assessment is taking place. The total opportunity cost to households is \$8 million, which is based on 30 minutes of foregone leisure time per assessment (applied to 10 per cent of assessments that are assumed to be undertaken by an assessor) and an hourly rate based on post tax average weekly earnings in each jurisdiction.

#### *Industry*

The total cost to real estate agents is \$6 million, which reflects the cost of their time in organising an assessment when a property is being sold or leased.<sup>33</sup> The total cost to sustainability assessors is \$2 million, which reflects the incremental cost associated with training and insurance. The costs to industry are lower under this option, relative to Options 1-3, due to the fact that sustainability assessors are assumed to be used only 10 per cent of the time under this option.

#### *Government*

The cost to government associated with increased demand for rebates on energy and water efficiency measures is \$38 million. This is based on an estimated 0.9 million investments over the ten year period at an average rebate of \$58 per investment. The cost to state and territory governments associated with establishing and running Residential Building Mandatory Disclosure is \$77 million, which is made up of a number of different activities including compliance and enforcement, enquires and communications.<sup>34</sup> The cost to the Commonwealth Government is \$5 million, which is made up of awareness and jurisdictional coordination costs.

Government costs are lower under this option, relative to Options 1-3, due to lower licensing, registration and tool development costs. These costs are lower due to the simplified assessment under this option.

#### *Option 5*

Option 5 is the non-regulatory option, under which improved environmental outcomes are achieved through an awareness campaign and consumer education. There is no requirement to undertake or disclose property assessments and, as a result, there are no costs associated with these activities. At the same time, the awareness campaign will increase the demand for energy and water efficiency investments (compared to the base case). Some households will act on this information and invest in upgrades that generate savings.

There are no costs to industry under this option — only to households and to governments. The total present value cost under this option is \$54 million over 10 years. This estimate is made up of \$25 million incurred by households and \$29 million incurred by government. These estimates are discussed in more detail below. Detailed calculations and assumptions behind these estimates are outlined in B.

<sup>33</sup> This cost is reflected in the analysis as a direct cost to real estate agents. However, it is likely that it will ultimately be recovered from households through higher estate agent fees.

<sup>34</sup> These costs are reflected in the analysis as direct costs to government. However, it is likely that these costs will ultimately be recovered from households through some sort of certificate lodgement fee.

### *Households*

The total cost of investments in energy and water efficiency measures is \$22 million, which is based on an estimated 87,000 separate investments over the ten year period at an average cost \$373 per investment. The estimated number of investments is driven by the assumed uptake rate under this option that is 1.5 per cent for sold properties and 0.75 per cent for leased properties.<sup>35</sup>

Households will also incur a time-cost as they will need to spend a certain amount of time considering the awareness campaign and deciding whether and how to act on the information and decide what energy and water efficiency measures to invest in. The total opportunity cost to households is \$2 million, which is based on 1 hour of foregone leisure time and an hourly rate based on post tax average weekly earnings in each jurisdiction.

### *Industry*

Under this option, there are no costs to industry.

### *Government*

The cost to government associated with increased demand for rebates on energy and water efficiency measures is \$4 million. This is based on an estimated 87,000 investments over the ten year period at an average rebate of \$58 per investment. The cost to state and territory governments associated with the information and awareness campaign is \$13 million. The cost to the Commonwealth Government is \$12 million.

Government costs are lower under this option, relative to the other options as this is a non-regulatory option.

## **5.17 Direct benefits**

Investments in energy and water efficiency measures directly benefit households that chose to invest in response to the information provided through Residential Building Mandatory Disclosure. These benefits are realised as savings to energy and water bills relative to the base case (i.e. once the investments have paid themselves off, the overall cost of running a household is lower, thus freeing up funds for other purposes such as entertainment). At the same time, there is also a benefit to society as a whole, associated with reduced greenhouse gas emissions that arise as a result of the investments by households in energy and water efficiency measures.

<sup>35</sup> Note that, as with the other options, this uptake rate is applied to the total number of sales and leases each year in order to calculate aggregate costs and benefits. An alternative approach would be to apply the uptake rate to the total number of households likely to be exposed to the information/advertising campaign under Option 5. However, given that such information was not available at the time of conducting the analysis, a simplified approach was adopted where it was assumed that only property sellers and lessors would respond to the campaign by making an investment. This was justified on the understanding that the large portion of property upgrades generally occur when a property is being turned over (i.e. sold or leased). Assumed uptake rates were developed in consultation with the National Framework for Energy Efficiency Building Implementation Committee. The methodology and assumptions used in developing the uptake rates are outlined in Appendix B and Appendix C.



For the purposes of this RIS, it has been assumed that no carbon price is introduced over the period of the analysis. The implication of this is that energy price projections contained in the model are not adjusted to account for a potential carbon price. As such, savings to households are lower than they would be if a carbon price were applied. Instead, the analysis allocates the benefits of reduced greenhouse gas emissions to society as a whole and values this benefit by placing a value on the reduced greenhouse gas emissions. The approach adopted for valuing emissions is outlined in Appendix C.

In estimating the benefits to households and society, the present value benefit was calculated over the life of the asset or upgrade — even where this extends beyond the ten-year period analysed. If the stream of benefits were restricted to the ten-year period analysed, households that made an investment in the tenth year would receive a much lower benefit for their investment than households that acted in the first year. This is consistent with the estimation of benefits developed for the Regulation Impact Statement for the Mandatory Disclosure of Commercial Office Building Energy Efficiency completed in 2009 (DEWHA 2009).

As with the cost estimates outlined above, estimates of the benefits are summarised as present values using a discount rate of 7 per cent as recommended by the OBPR Assumptions regarding the number of investments made and the types of upgrades invested in are discussed in more detail in Appendix B.

A summary of cost estimates under each option is provided in Table 5.4 and Table 5.5. As with the cost estimates outlined above, estimates of the benefits are provided for two scenarios: one where Residential Building Mandatory Disclosure mandates disclosure at both point of sale and lease (Table 5.4), and the other where Residential Building Mandatory Disclosure mandates disclosure at point of sale only (Table 5.5). Consistent with the discussion of costs, the discussion of benefits focuses on the former of these two scenarios, as the conclusions are consistent between the two in terms of relativities between the options and benefit items. The only difference, therefore, is one of magnitude, which is driven by the fact that more property transactions apply when Residential Building Mandatory Disclosure includes both sales and leases.

Table 5.4

**DIRECT BENEFITS – MANDATED DISCLOSURE AT POINT OF SALE AND LEASE (PRESENT VALUES, \$M)**

Sector	Cost item	Option 1	Option 2	Option 3	Option 4	Option 5
Households	Energy and water savings	\$3,319.3	\$2,826.7	\$2,069.6	\$1,421.9	\$141.6
Society	Greenhouse gas savings	\$155.1	\$131.5	\$95.2	\$64.1	\$6.4
<b>Total</b>		<b>\$3,474.4</b>	<b>\$2,958.2</b>	<b>\$2,164.8</b>	<b>\$1,486.0</b>	<b>\$148.0</b>

Source: Allen Consulting Group analysis.

Table 5.5

**DIRECT BENEFITS – MANDATED DISCLOSURE AT POINT OF SALE ONLY (PRESENT VALUES, \$M)**

Sector	Cost item	Option 1	Option 2	Option 3	Option 4	Option 5
Households	Energy and water savings	\$2,134.7	\$1,802.7	\$1,317.4	\$912.8	N/A
Society	Greenhouse gas savings	\$98.8	\$83.0	\$60.0	\$40.8	N/A
<b>Total</b>		<b>\$2,233.5</b>	<b>\$1,885.7</b>	<b>\$1,377.4</b>	<b>\$953.6</b>	<b>N/A</b>

Source: Allen Consulting Group analysis.

**Option 1**

The present value of direct benefits under Option 1 is \$3.5 billion, which is made up of:

- \$3.3 billion worth of utility bill savings over the period analysed, stemming from investments in energy and water efficiency measures and calculated over the lives of the assets invested in; and
- \$155 million worth of benefits associated with 16 million tonnes of reduced greenhouse gas emissions over the lives of the assets invested in.<sup>36</sup>

**Option 2**

The present value of direct benefits under Option 2 is \$3 billion, which is made up of:

- \$2.8 billion worth of utility bill savings over the period analysed, stemming from investments in energy and water efficiency measures and calculated over the lives of the assets invested in; and
- \$131 million worth of benefits associated with 13 million tonnes of reduced greenhouse gas emissions over the lives of the assets invested in.

**Option 3**

The present value of direct benefits under Option 3 is \$2.2 billion, which is made up of:

- \$2.1 billion worth of utility bill savings over the period analysed, stemming from investments in energy and water efficiency measures and calculated over the lives of the assets invested in; and
- \$95 million worth of benefits associated with 10 million tonnes of reduced greenhouse gas emissions over the lives of the assets invested in.

**Option 4**

The present value of direct benefits under Option 4 is \$1.5 billion, which is made up of:

<sup>36</sup> Note that the dollar value for greenhouse savings is expressed in present value terms so taking the ratio of this with the tonnes of emissions saved will not provide an accurate estimate of the value per tonne of emissions savings. A discussion of the approach to valuing emissions savings is outlined in Appendix C.

- \$1.4 billion worth of utility bill savings over the period analysed, stemming from investments in energy and water efficiency measures and calculated over the lives of the assets invested in; and
- \$64 million worth of benefits associated with 7 million tonnes of reduced greenhouse gas emissions over the lives of the assets invested in.

#### **Option 5**

The present value of direct benefits under this option is \$148 million, which is made up of:

- \$142 million worth of utility bill savings over the period analysed, stemming from investments in energy and water efficiency measures and calculated over the lives of the assets invested in; and
- \$6 million worth of benefits associated with 669,000 tonnes of reduced greenhouse gas emissions over the lives of the assets invested in.

#### **5.18 Indicative analysis of Option 6**

Option 6 permitting opt-out for assessment introduces flexibility and considerable uncertainty. Given the particularly pronounced lack of evidence regarding key factors such as expected opt-out rates (see section 4.3), there is considerable uncertainty about the impact of opt-out arrangements. The solution is to provide an indicative assessment for this option.

An opt-out provision could be introduced to any of the regulatory purposes. However Option 2 was selected as the basis of the indicative analysis because it is the regulatory option where households and industry incur the highest costs while still exhibiting an overall net benefit (unlike Option 1 which exhibited an overall negative net benefit – see table 6.1).

Three opt-out scenarios for this option are assessed quantitatively. The key feature of each scenario is the hypothetical proportion of seller and rental property vendors that opt-out. The proportion that opt-out of conducting an assessment increases from 20 per cent in Scenario 6a, to 50 per cent in Scenario 6b, and to 80 per cent in Scenario 6c. By changing the number of property vendors opting out of Residential Building Mandatory Disclosure, effectively the pool of property vendors who will make an investment in an energy efficiency measure is changed. By increasing the opt-out rates, effectively the proportion of property vendors making energy performance investments is reduced.

Scenario 6c is even more different. In this scenario the amount of opt-out is so pervasive (at 80 per cent) that it changes the sense and value of information about property performance. As a result the take up rate of affordable investments in improved property performance falls to zero.

The rationale for the situation illustrated in Scenario 6c is that the key driver of investment uptake under a mandatory scheme(s) is the existence of a level playing field. This is because where all properties on the market have a rating the information asymmetry issue is addressed by relative prices providing clear signals about the costs and benefits of different levels of property performance which in turn provides some incentive to invest in a limited range of technical additions in properties that are cost effective. In the instance that the level playing field is significantly eroded where a significant proportion of property owners opt-out, there would be a significantly diminished incentive to invest, thereby resulting in a significantly reduced uptake rate. Furthermore, it is assumed in this scenario that those property owners who do not opt-out already have high performing properties with no need to make any additional investment.

It is acknowledged that the uptake rate could increase as opt-out rates increase given that those choosing not to opt-out would be doing so because they had already made an investment or were thinking of making an investment in improved performance. However, the effect of a weakened level playing field may work counter to this effect and is assumed to more than dominate this effect in Option 6c. There is little or no information on which to base analysis of these possibilities at present. The scenarios have been selected to illustrate possible impacts.

It should be noticed that high levels of opt-out and low rates of adoption are characteristic of the current market situation (or base case). An analysis of the information in the market at present provided in Appendix A shows that currently property vendors actually have an existing option to opt-in and report about energy and water performance attributes of a property for sale or for lease. They may also report an Energy Efficiency Rating (EER) in many advertising facilities, especially those on the internet. At present a very large proportion declare a zero rating and some provide indications such as 'not available' or 'not rated'. Practical experience with voluntary systems in the market seems to suggest that where opt-out is feasible the community will respond with low levels of assessment. The evidence that property owners have not invested in technically feasible efficiency enhancing solutions suggests that currently the market does not provide adequate or reliable returns for such investments. It is an open question how different the current voluntary situation is to that where assessments are required, but where owners can opt-out.

Much of the information about impacts for Option 6 comes from the results from Option 2 that is the underlying option for the opt-out variant. The analysis for Option 6 applies to properties at both point of sale and lease.

In undertaking the illustrative analysis for Option 6, two simplifying assumptions were adopted. Firstly, for simplicity, it was assumed that all states and territories would adopt the opt-out. Secondly, it was assumed that government costs (the majority of which are fixed, so are not dependent on the level of assessments) would be the same across each of the scenarios for Option 6.

The results for Option 6 are outlined in Table 5.6. For comparative purposes, the results for Option 2 are also provided.

In summary, where:

- less than the majority of property owners opt-out from Residential Building Mandatory Disclosure (Option 6a) the regulatory scheme results in a net benefit. The overall net benefit is less than that estimated under Option 2;
- a higher opt-out rate is assumed so that 50 per cent of property owners opt-out (Scenario 6b), Residential Building Mandatory Disclosure still results in a net benefit. The overall net benefit however is less than half the size of the net benefit estimated under Option 2; and
- a significantly high opt-out rate is assumed (Scenario 6c) the regulatory scheme results in a negative net benefit. This is because there is a double effect: the higher proportion of property owners opt-out and the remaining small number of property owners are assumed to already have very high energy performing properties so will not undertake any additional investment as a result of Residential Building Mandatory Disclosure.

This indicative analysis of introducing an opt-out provision could be applied to any of the regulatory options. While it is unlikely that the precise level of opt-out can be predicted reliably, the analysis illustrates that in all scenarios that although opt-out reduces the direct costs to households and industry this flexibility also reduces the direct benefits at a greater rate. This is because increasing opt-out effectively reduces the proportion of property vendors who will make energy performance investments. Whether Residential Building Mandatory Disclosure produces a net benefit however is ambiguous and depends upon the degree of opt-out. In some circumstances opt-out may reduce the net benefits expected from regulatory intervention, but still leave a positive impact. In other circumstances, especially with high rates of opt-out, opt-out flexibility may result in changing the picture to expect that the regulatory change detracts from wellbeing.

It will be valuable to obtain insights and information from the community about the many uncertainties surrounding the nature and impact of opt-out from the consultation phase of the RIS.

Table 5.6

**NET PRESENT VALUE OF COSTS AND BENEFITS, OPTION 6 (\$M)**

	<b>Option 2</b>	<b>Scenario 6a</b> 20% opt-out	<b>Scenario 6b</b> 50% opt-out	<b>Scenario 6c</b> 80% opt-out
ASSESSMENTS	\$1,120.7	\$896.5	\$560.3	\$224.1
INVESTMENTS (NET OF REBATES)	\$475.9	\$380.7	\$237.9	\$0.0
TIME	\$189.1	\$151.3	\$94.5	\$37.8
<b>HOUSEHOLDS SUBTOTAL</b>	<b>\$1,785.6</b>	<b>\$1,428.5</b>	<b>\$892.8</b>	<b>\$262.0</b>
REAL ESTATE AGENT'S TIME	\$59.3	\$47.4	\$29.6	\$11.9
ASSESSOR TRAINING AND INSURANCE	\$20.7	\$20.7	\$20.7	\$20.7
<b>INDUSTRY SUBTOTAL</b>	<b>\$80.0</b>	<b>\$68.1</b>	<b>\$50.3</b>	<b>\$32.6</b>
REBATES/SUBSIDIES	\$65.4	\$52.3	\$32.7	\$0.0
ESTABLISHMENT AND ADMINISTRATION (STATES/TERRITORIES)	\$99.4	\$99.4	\$99.4	\$99.4
ESTABLISHMENT AND ADMINISTRATION (COMMONWEALTH)	\$8.9	\$8.9	\$8.9	\$8.9
<b>GOVERNMENT SUBTOTAL</b>	<b>\$173.8</b>	<b>\$160.7</b>	<b>\$141.1</b>	<b>\$108.4</b>
<b>TOTAL COST</b>	<b>\$2,039.4</b>	<b>\$1,657.3</b>	<b>\$1,084.2</b>	<b>\$402.9</b>
POTENTIAL ENERGY AND WATER BILL SAVINGS	\$2,826.7	\$2,261.4	\$1,413.4	\$0.0
<b>HOUSEHOLD SUBTOTAL</b>	<b>\$2,826.7</b>	<b>\$2,261.4</b>	<b>\$1,413.4</b>	<b>\$0.0</b>
POTENTIAL GREENHOUSE GAS SAVINGS	\$131.5	\$105.2	\$65.7	\$0.0
<b>SOCIETY SUBTOTAL</b>	<b>\$131.5</b>	<b>\$105.2</b>	<b>\$65.7</b>	<b>\$0.0</b>
<b>TOTAL BENEFITS</b>	<b>\$2,958.2</b>	<b>\$2,366.6</b>	<b>\$1,479.1</b>	<b>\$0.0</b>
<b>TOTAL NET BENEFIT</b>	<b>\$918.8</b>	<b>\$709.2</b>	<b>\$394.9</b>	<b>-402.9</b>

Source: Allen Consulting Group analysis.

## Chapter 6

### Findings for discussion

*This chapter discusses in further detail the option identified as having the highest net present value on a national basis. In addition, the results of sensitivity, break even, state/territory and housing affordability analyses are discussed.*

#### 6.19 The case for policy intervention

Under best practice regulation guidelines, government intervention can be justified when:

- there is an inherent failure in the market's ability to deliver fair and equitable outcomes; and
- the benefits from correcting the failure are greater than the costs associated with doing so.

In addition, COAG RIS guidelines require that RISs consider a number of different options to achieve the desired objective and draw a conclusion regarding the option that is most preferred. This aspect, as well as those listed above, is discussed below in relation to Residential Building Mandatory Disclosure. Some key caveats are also discussed.

As this is a Consultative RIS, a preferred option has not been recommended. Rather the purpose of this Consultative RIS is to provide a basis for consulting on the options for ensuring mandatory disclosure of building energy, greenhouse and water performance at the point of sale or lease for residential properties.

#### *Is there a market failure?*

The discussion in Chapter 2 highlights the existence of information failures in the market for residential property purchases and rentals. The lack of standardised and consistent information through which buyers/lessees can make a judgment on the relative energy, greenhouse and water performance attributes of different properties (one that allows sellers/lessors to objectively signal the relative merits of their property) has led to a disincentive for sellers/lessors to invest in energy and water efficiency improvements. In addition, property owners making investments despite this disincentive, often lack the information required in order to maximise the level of environmental outcome per dollar invested.

As a result of the above two factors, suboptimal levels of investment in energy and water efficiency have ensued across the residential building stock, thus exacerbating the energy efficiency 'gap'. Consequently, there exists a case for government intervention to improve information in the market so long as the benefits of doing so outweigh the costs.

*Do the benefits of intervention outweigh the costs?*

A summary of the estimated direct costs and benefits across the stakeholder groups affected is shown in Table 6.7. With the exception of Option 1, all of the options result in an outcome where the benefits associated with the intervention outweigh the costs. In other words, Residential Building Mandatory Disclosure under options 2 to 5 results in a welfare enhancing effect on society. This finding applies regardless of whether disclosure is mandated at point of sale and lease, or point of sale only.



Table 6.7

**NET PRESENT VALUE OF COSTS AND BENEFITS, BY OPTION AND COVERAGE (\$M)**

	Disclosure at point of sale and lease					Disclosure at point of sale only				
	1	2	3	4	5	1	2	3	4	5
ASSESSMENTS	\$5,196	\$1,121	\$721	\$263	\$0	\$2,456	\$530	\$340	\$125	N/A
INVESTMENTS (NET OF REBATES)	\$564	\$476	\$341	\$225	\$22	\$366	\$306	\$218	\$145	N/A
TIME	\$383	\$189	\$67	\$8	\$2	\$181	\$89	\$32	\$4	N/A
<b>HOUSEHOLDS SUBTOTAL</b>	<b>\$6,143</b>	<b>\$1,786</b>	<b>\$1,129</b>	<b>\$496</b>	<b>\$25</b>	<b>\$3,003</b>	<b>\$925</b>	<b>\$590</b>	<b>\$274</b>	<b>N/A</b>
REAL ESTATE AGENT'S TIME	\$59	\$59	\$30	\$6	\$0	\$28	\$28	\$14	\$3	N/A
ASSESSOR TRAINING AND INSURANCE	\$54	\$21	\$9	\$2	\$0	\$39	\$16	\$7	\$2	N/A
<b>INDUSTRY SUBTOTAL</b>	<b>\$114</b>	<b>\$80</b>	<b>\$38</b>	<b>\$8</b>	<b>\$0</b>	<b>\$67</b>	<b>\$44</b>	<b>\$20</b>	<b>\$5</b>	<b>N/A</b>
REBATES/SUBSIDIES	\$75	\$65	\$50	\$38	\$4	\$52	\$45	\$35	\$26	N/A
ESTABLISHMENT AND ADMINISTRATION (STATES/TERRITORIES)	\$117	\$99	\$122	\$77	\$13	\$117	\$100	\$119	\$70	N/A
ESTABLISHMENT AND ADMINISTRATION (COMMONWEALTH)	\$9	\$9	\$9	\$5	\$12	\$9	\$9	\$9	\$5	N/A
<b>GOVERNMENT SUBTOTAL</b>	<b>\$201</b>	<b>\$174</b>	<b>\$181</b>	<b>\$120</b>	<b>\$29</b>	<b>\$178</b>	<b>\$154</b>	<b>\$163</b>	<b>\$101</b>	<b>N/A</b>
<b>TOTAL COST</b>	<b>\$6,458</b>	<b>\$2,039</b>	<b>\$1,348</b>	<b>\$624</b>	<b>\$54</b>	<b>\$3,248</b>	<b>\$1,122</b>	<b>\$773</b>	<b>\$380</b>	<b>N/A</b>
ENERGY AND WATER BILL SAVINGS	\$3,319	\$2,827	\$2,070	\$1,422	\$142	\$2,135	\$1,803	\$1,317	\$913	N/A
<b>HOUSEHOLD SUBTOTAL</b>	<b>\$3,319</b>	<b>\$2,827</b>	<b>\$2,070</b>	<b>\$1,422</b>	<b>\$142</b>	<b>\$2,135</b>	<b>\$1,803</b>	<b>\$1,317</b>	<b>\$913</b>	<b>N/A</b>
GREENHOUSE GAS SAVINGS	\$155	\$131	\$95	\$64	\$6	\$99	\$83	\$60	\$41	N/A
<b>SOCIETY SUBTOTAL</b>	<b>\$155</b>	<b>\$131</b>	<b>\$95</b>	<b>\$64</b>	<b>\$6</b>	<b>\$99</b>	<b>\$83</b>	<b>\$60</b>	<b>\$41</b>	<b>N/A</b>
<b>TOTAL BENEFITS</b>	<b>\$3,474</b>	<b>\$2,958</b>	<b>\$2,165</b>	<b>\$1,486</b>	<b>\$148</b>	<b>\$2,234</b>	<b>\$1,886</b>	<b>\$1,377</b>	<b>\$954</b>	<b>N/A</b>
<b>TOTAL NET BENEFIT (BENEFITS MINUS COSTS)</b>	<b>-\$2,983</b>	<b>\$919</b>	<b>\$817</b>	<b>\$862</b>	<b>\$94</b>	<b>-\$1,015</b>	<b>\$764</b>	<b>\$605</b>	<b>\$573</b>	<b>N/A</b>

Source: Allen Consulting Group analysis.

*What is the option with the highest net benefit?*

In considering the option with the highest welfare enhancing effect on society, consideration could be given to a number of different summary measures such as net present value, the benefit/cost ratio, payback period and total energy, greenhouse gas and water savings. Estimates for each of the different summary measures under each option are outlined in Table 6.8.

Table 6.8

**ESTIMATED COST BENEFIT SUMMARY MEASURES, BY OPTION\***

	1	2	3	4	5
<b>Disclosure at point of sale and lease</b>					
Net present value	-\$2,983	\$919	\$817	\$862	\$94
Benefit/cost ratio	0.5	1.5	1.6	2.4	2.8
Payback period (years) <sup>#</sup>	30	15	16	9	8
Energy savings (PJ)	177	152	114	81	8
Greenhouse gas savings (Mt)	16	14	10	7	1
Water savings (GL)	330	279	202	137	14
<b>Disclosure at point of sale only</b>					
Net present value	-\$1,015	\$764	\$605	\$573	N/A
Benefit/cost ratio	0.7	1.7	1.8	2.5	N/A
Payback period (years) <sup>#</sup>	30	12	13	9	N/A
Energy savings (PJ)	116	99	74	53	N/A
Greenhouse gas savings (Mt)	10	9	6	4	N/A
Water savings (GL)	209	176	127	87	N/A

Source: Allen Consulting Group analysis.

Notes:

\*Energy, greenhouse gas and water savings represent savings over the lives of the assets invested in during the first ten years of Residential Building Mandatory Disclosure.

<sup>#</sup>Number of years until the total accumulated benefits associated with Residential Building Mandatory Disclosure equal the total accumulated costs to society. Any benefits that continue to accrue after this point represent a net benefit to society in the long run.

Each of the different summary measures is discussed as follows.

- Net present value represents the total discounted benefits minus the total discount costs over the period of the analysis.<sup>37</sup> Options with a positive net present value represent those where the overall benefits outweigh the costs. As Option 2 has the highest net present value, it results in the highest return to society and, as such, is superior to the other options on this basis of this summary measure.

<sup>37</sup> Discounting is a standard approach used in cost benefit analysis when costs and benefits are expressed over a number of years. This approach puts more quantitative emphasis on costs and benefits that occur in the short term relative to those that occur in the medium to long term. In this case, a 7 per cent discount rate is used, consistent with advice from the Office of Best Practice Regulation.

- Payback period is an estimate of the number of years for which the option must be in place before the value of the expected benefits overtakes the value of the expected costs. It is useful to consider this in relation to each of the options, because the longer it takes for an option to be paid back, the more opportunity there is for something to go wrong, or for some key factors to change outside of what has been assumed in the estimation of costs and benefits. In this sense, payback period represents the degree of inter-temporal risk associated with an option. On this basis, Option 5 is superior, because the benefits overtake the costs within eight years. Under Option 2, however, it takes 15 years, assuming Residential Building Mandatory Disclosure mandates disclosure at point of sale and lease.
- The benefit-cost ratio indicates the cost-effectiveness of each option by estimating the value of benefit that can be achieved for every dollar of cost. Option 5 is the superior option under this criterion as well, achieving \$2.80 of benefit for every \$1 of cost — roughly twice as much as Option 2 achieves.
- The estimates of energy, greenhouse gas and water savings represent total savings over the lives of the assets invested in during the first ten years of Residential Building Mandatory Disclosure. These measures capture the degree to which each option improves environmental outcomes — noting that the objective of Residential Building Mandatory Disclosure, as outlined in  is to improve these outcomes by addressing certain market failures. Of all of the options, Option 1 is most favourable at meeting this objective as it results in the highest levels of energy, water and greenhouse savings. That said, in comparison to Option 2, Option 1 more than triples the expected costs, while increasing the expected benefits by only 20 per cent. This is consistent with the analysis showing that Option 1 can only be implemented at a net cost to society.

OBPR guidelines indicate that the preferred option should be selected on the basis of whichever option achieves the highest net present value at the national level, or the greatest increase in welfare to society. On the basis of this criterion, from a national perspective Option 2 appears to provide the highest net benefit when applied to both sale and lease transactions.

It should be noted, however, that the results of the sensitivity analysis (see below) indicate that this finding is sensitive to small changes in key assumptions.

As an aside, when comparing between the results for the scenarios where Residential Building Mandatory Disclosure mandates disclosure at point of sale and lease versus disclosure at point of sale only, there are two notable differences:

- the size of the net benefit estimates are smaller for each option under the point of sale only scenario; and
- the results for payback and the benefit cost ratio are slightly better under the point of sale only scenario for most of the options.

Selecting the option on the basis of the highest net present value, disclosure at point of sale and lease is preferred over disclosure at point of sale only.

*Are there any caveats to these findings?*

Residential Building Mandatory Disclosure is characterised by a mandated aspect, which drives the costs, and a voluntary aspect, which drives the benefits.<sup>38</sup> Given this fact, the estimated costs are fairly certain, whereas estimated benefits are uncertain. In particular, the estimated value of the benefits is largely shaped by the assumed voluntary investment response to Residential Building Mandatory Disclosure (or uptake rate).

There is uncertainty about the voluntary investment response to the proposed measures. To minimise this uncertainty, the analysis used the best available evidence on potential response rates in determining the maximum uptake rate possible under Residential Building Mandatory Disclosure.<sup>39</sup> It is important to note, however, that although the findings of this study provide a broad sense of potential uptake rates from Residential Building Mandatory Disclosure, they do not provide an indication of the degree to which uptake rates might vary between the different options included in this RIS.<sup>40</sup> As such, a degree of risk is associated with selecting a preferred option on the basis of the cost benefit results.

In addition, given the uncertainty over likely uptake rates, a break even analysis was conducted (see below) to provide an indication of the level of uptake required to make the net benefits equal to zero (that is, to indicate the level of uptake required to make the costs of the option equal to its benefits in net present value terms).

In addition to uncertainty over uptake rates, the selection of the option on the basis of the highest net present value is also sensitive to assumptions regarding assessment costs, the discount rate and insulation penetration rates. As outlined above, despite Option 2 having the highest net present value, it appears that the estimated value under Option 4 is less sensitive to these assumptions and, therefore, Option 4 can be viewed as having less risk and uncertainty associated with it.

**6.20 Raising wellbeing: Option 2 and its impacts**

On the basis of the above discussion, and subject to the underlying assumptions, the analysis identifies Option 2 - as applied to sales and leases - as the option with the highest net present value. Accordingly, an outline of this option and its impacts is provided below in more detail.

*Outline of Option 2*

Option 2 involves a simplified thermal assessment (not requiring floor plans as under Option 1) and a rating that will be calculated using a computer program. Under Option 2:

- residential energy, greenhouse and water performance must be assessed, taking account of:

<sup>38</sup> The mandatory aspect relates to the requirement to obtain a building performance assessment and disclose the subsequent rating when advertising, whereas the voluntary aspect relates to the level of investment triggered in response to the information available through Residential Building Mandatory Disclosure.

<sup>39</sup> As outlined in Appendix C.18, a study conducted by Energy Consult in 2006 on the impacts of the Australian Capital Territory Home Energy Rating Scheme (ACTHERS) suggests that the response rate for that scheme is up to 30 per cent (2006).

<sup>40</sup> Using the Energy Consult (2006) study as a basis, the National Framework for Energy Efficiency Building Implementation Committee developed a series of uptake rates for the options with the idea that some will be more effective than others in encouraging householders to make an investment (See Appendix C).

- thermal performance and the building shell;
  - fixed heating and cooling systems;
  - hot water systems;
  - lighting;
  - clothes line and clothes drying areas;
  - outdoor living areas;
  - information on the availability or installation of water usage and efficiency performance (toilet, shower head, greywater, rainwater tank, third pipe, evaporative cooling), on-site renewable energy system, peak load and pools and spas; and
  - suggestions in improvements or upgrades that could be undertaken to improve the property's rating;
- the assessment must be undertaken by an appropriately qualified and insured assessor;
  - the assessment must be registered with the relevant jurisdiction; and
  - the assessment must be disclosed at point of sale and lease for all properties advertised on residential property markets.

As discussed in Chapter 5, Option 2 is expected to have direct and indirect impacts on households, businesses in the real estate and assessment industries, governments and society as a whole. Additional detail on these impacts is outlined below.

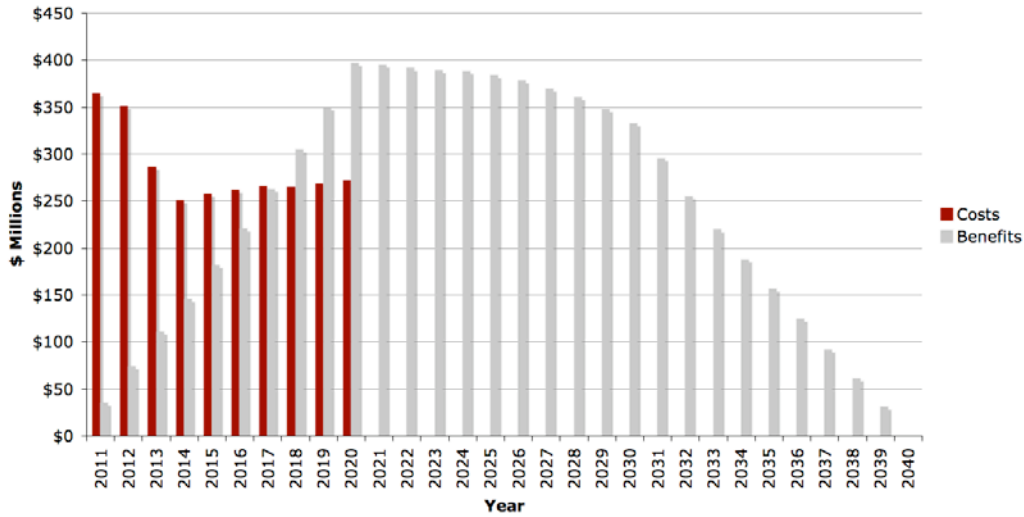
#### *Detailed results of impacts under Option 2*

A graphical depiction of projected costs and benefits resulting from assessments and investments undertaken in the first ten years of Residential Building Mandatory Disclosure under Option 2 is provided in Figure 6.5. As depicted, costs fall over the first few years of Residential Building Mandatory Disclosure, as fewer assessments are required due to previous assessments remaining valid,<sup>41</sup> and then remain relatively constant for the remainder of the first ten years of Residential Building Mandatory Disclosure. Benefits increase steadily over the first ten years of Residential Building Mandatory Disclosure as more and more households make investments in energy and water efficiency. These benefits then fall steadily after the end of the ten year period as the investments gradually reach the end of their asset lives.<sup>42</sup>

<sup>41</sup> The validity period of the assessments refer to the timeframe during which the energy and water rating certificate is current (i.e. valid). The initial assessment is valid for leased and sold properties until changes affecting the energy performance property are made. It is assumed that a new certificate would be obtained every 5 years on average. For leased and sold properties this is based on the average replacement time for a fixed appliance that affects the energy, greenhouse and water performance rating of the building being 5 years. The assumed validity periods were agreed between members of the National Framework for Energy Efficiency Building Implementation Committee. More information about the rating certificate validity period assumptions can be found in Appendix C.

<sup>42</sup> The analysis counts costs over the first ten years of Residential Building Mandatory Disclosure and benefits over the first thirty years of Residential Building Mandatory Disclosure. In particular, it factors in the benefits of the investment stimulated by Residential Building Mandatory Disclosure over the full life of the assets (assuming a maximum asset life of 20 years) and the costs over the life of the regulation (typically assumed to be 10 years for RIS cost-benefit analyses). More information about the timeframe of the analysis can be found in Appendix A and Appendix B.

Figure 6.5  
**TIME PATH OF COSTS AND BENEFITS – OPTION 2 (AS APPLIED TO SALES AND LEASES)**

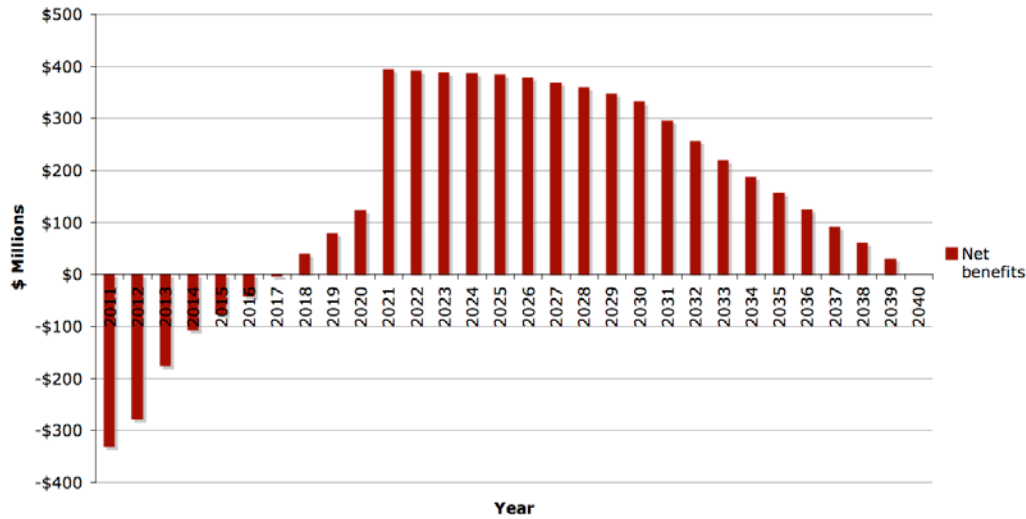


Source: Allen Consulting Group analysis.

A graphical depiction of the time path of net benefits under Option 2 is provided in Figure 6.6. The time path reflects the year-on-year net effect of the costs and benefits outlined in Figure 6.5.

Figure 6.6

**TIME PATH OF NET BENEFITS – OPTION 2 (AS APPLIED TO SALES AND LEASES)**



Source: Allen Consulting Group analysis.

Estimates of the total number of investments, total energy savings and total expenditure on each measure as a result of the investments made over the first ten years of Residential Building Mandatory Disclosure under Option 2, which is calculated to have the highest net present value, are provided in Table 6.9. These estimates are discussed in more detail below.

Table 6.9

**ESTIMATED TOTAL INVESTMENTS, ENERGY SAVINGS AND EXPENDITURE RESULTING FROM INVESTMENTS MADE OVER THE FIRST TEN YEARS OF RBMD, BY ENERGY AND WATER EFFICIENCY MEASURE – OPTION 2 (AS APPLIED TO SALES AND LEASES)**

	Number of investments	Energy savings (GJ)	Expenditure (\$M)
Floor insulation	12,200	2,123,394	\$8.36
Ceiling insulation	197,054	79,055,750	\$177.54
Top up ceiling insulation	416	27,780	\$0.16
Wall insulation	2,400	693,435	\$4.01
Double glazing	0	0	\$0.00
Window tinting	339	9,593	\$0.20
Curtains	295	7,198	\$0.14
External blinds	277	1,546	\$0.04
Draught proofing	410,795	28,417,835	\$119.12
Fixed heating	33,481	3,904,276	\$28.61
Fixed cooling	75,398	4,139,587	\$59.70
High efficiency gas h/w	112,365	5,156,495	\$40.82
Gas for electric h/w	37,294	-455,846*	\$27.21
Solar replacement h/w	0	0	\$0.00
Replace halogens	200,238	3,072,311	\$34.99
Low flow shower rose <sup>#</sup>	660,159	25,925,994	\$38.84
Dual-flush toilets <sup>#</sup>	4,193	0	\$1.55
<b>Total</b>	<b>1,746,904</b>	<b>152,079,349</b>	<b>\$541.28</b>

Source: Allen Consulting Group analysis.

Notes:

\*When switching from electric to gas hot water the consumption of energy in kilojoule terms actually increases. This is why the savings appear as a negative. However, gas is far cheaper and has far lower greenhouse intensity when compared with electricity in kilojoule terms. The net effect, therefore, is a saving in emissions and utility bills.

<sup>#</sup>The total water savings resulting from these two water efficiency measures is 279 GL as outlined in Table 6.7.

As discussed in Appendix B, the degree of investment in each measure is assumed to be a function of the payback period and the existing level of penetration. On this basis, the model predicts that the majority of households responding to Residential Building Mandatory Disclosure will invest in low flow shower roses, draught proofing, replacement of halogen lights, ceiling insulation and high efficiency gas hot water.



In addition, the model also accounts for households with atypical characteristics, rather than simply focussing on a representative house with average characteristics. In these cases, certain measures can work out to be beneficial to a small proportion of the residential building stock, regardless of the fact that they're not beneficial to the average house or apartment. This is relevant for ceiling insulation 'top ups', wall insulation, window tinting, internal curtains and external blinds. The model also assumes that households will not invest in measures with a payback period beyond 5 years (see the discussion regarding uptake rates in Appendix B). This is relevant for double glazing and solar hot water.

The magnitude of the energy savings for each measure is broadly consistent with estimates of the total number of investments, as one would expect. However, the energy savings per investment are not consistent across each. For example, despite there being a lower number of investments in ceiling insulation relative to some of the other measures, the energy savings are highest for ceiling insulation due to the relatively high energy saving per investment. The majority of the aggregate energy savings accrue as a result of investments in ceiling insulation, low flow shower roses and draught proofing.

The majority of the investment expenditure is on ceiling insulation, draught proofing and fixed cooling, reflecting the high investment volume and high price of these measures.

### 6.21 Sensitivity testing

Key areas of uncertainty in the analysis are the likely investment response to Residential Building Mandatory Disclosure (or uptake rate), costs to government in establishing and administering Residential Building Mandatory Disclosure, costs of the energy and water efficiency assessments, the discount rate (which is a function of future interest rates) and the impact that the Commonwealth Government's Home Insulation Program (HIP) has had on the proportion of Australian households that are uninsulated.<sup>43</sup>

Uncertainty over the uptake rate is addressed through the break even analysis (see Section 6.22 below), which provides an indication of what the assumed uptake rate would need to be in order for Residential Building Mandatory Disclosure to break even to society in cost benefit terms. A sensitivity analysis was conducted to address the other areas of uncertainty. For each of these areas, the analysis was conducted as follows:

<sup>43</sup> The impact that the Commonwealth Government's Home Insulation Program (HIP) has had on the proportion of Australian households that are uninsulated is an important assumption for this analysis. This is because ceiling insulation provides a very good return to those households that are currently uninsulated. Therefore, the greater the assumed number of Australian homes that are uninsulated, the greater is the number of households that would achieve high benefits as a result of Residential Building Mandatory Disclosure. For the purposes of the analysis, ABS data on the proportion of the housing stock that is uninsulated was used (see Appendix C.19). However, this data was from 2008 and, therefore, did not reflect the impact of HIP on the proportion of the stock uninsulated. At the time of conducting the analysis, no data were available on how many homes were insulated under HIP. As such, it was necessary to rely on the 2008 ABS data. However, just prior to completing the RIS, the Department of Climate Change and Energy Efficiency was able to provide an estimate of the number of households insulated under HIP, which was approximately 1.2 million. This estimate was not provided at the state/territory level (as is required for accurate modelling). There is also uncertainty about the actual numbers of additional homes that were adequately insulated. This is because the HIP may have applied to some buildings that would have been insulated in any case and included in the base case projections. It is also unclear at this stage how many of the insulation installations were ineffective or subject to fraud. For these reasons this estimate was not reflected in the core analysis. Rather, the potential impact of the assumed insulation penetration rates was tested through the sensitivity analysis, as outlined in this chapter.

- government costs — an increase in costs by 50 per cent and a decrease in costs by 50 per cent was tested;
- assessment costs — a low assessment cost of \$300 under Option 1, \$74 under Option 2, \$68 under Option 3 and \$41 under Option 4 and a high assessment cost of \$1000 under Option 1, \$300 under Option 2, and \$200 under options 3 and 4 was tested<sup>44</sup>, consistent with advice from NFEE Building Implementation Committee on realistic upper and lower bounds for potential assessment fees. In addition, in order to gauge the impact of uniform changes between the options, an increase in costs by 50 per cent and a decrease in costs by 50 per cent was tested;
- discount rate — a low discount rate of 3 per cent and a high discount rate of 10 per cent was tested, consistent with advice from the Office of Best Practice Regulation; and
- impact of the HIP scheme — assumptions over the proportion of the housing stock that is uninsulated were adjusted to reflect the fact that approximately 1.2 million Australian households were insulated under the HIP scheme (this adjustment was a rough approximation given that the 1.2 million estimate was not provided at the state-territory level).

The results of the sensitivity analysis are provided in Table 6.10. For example, the table shows that the NPV for Option 1 under standard assumptions is -\$2,983. If government costs, however, are increased by 50 per cent, the NPV for Option 1 changes negligibly to -\$2,920.

The results indicate that some of the key inputs of the model have a major bearing on the results of the analysis. The results are discussed in question and answer form as follows below the table.

<sup>44</sup> These figures represent the average assessment cost across the different types of assessments. For example, the assessment cost applicable to houses versus units or dwellings in urban versus non-urban areas is different; as such, it is necessary to use the average.

Table 6.10

**SENSITIVITY ANALYSIS – IMPACT OF SENSITIVITY TESTS ON THE NET PRESENT VALUE OF COSTS AND BENEFITS UNDER EACH OPTION (\$M, NPV)\***

Input varied and to what degree	Option 1	Option 2	Option 3	Option 4	Option 5
<b>NPV under standard assumptions</b>	<b>-\$2,983</b>	<b>\$919</b>	<b>\$817</b>	<b>\$862</b>	<b>\$94</b>
<b>Government costs</b>					
Increase costs by 50%	-\$3,046	\$865	\$751	\$821	\$81
Decrease costs by 50%	-\$2,920	\$973	\$882	\$903	\$106
<b>Assessment costs</b>					
Decrease costs to \$300, \$74, \$68 and \$41 for options 1 to 4 respectively	\$186	\$1,539	\$1,110	\$889	N/A
Increase costs to \$1000, \$300, \$200 and \$200 for options 1 to 4 respectively	-\$4,485	\$118	\$711	\$837	N/A
Decrease costs by 50%	-\$385	\$1,479	\$1,177	\$994	N/A
Increase costs by 50%	-\$5,581	\$358	\$456	\$731	N/A
<b>Discount rate</b>					
Decrease to 3%	-\$2,094	\$2,354	\$1,902	\$1,676	\$177
Increase to 10%	-\$3,183	\$351	\$383	\$528	\$59
<b>Impact of the Cth. Home Insulation Program</b>					
1.2 million homes insulated under HIP Program (based on data provided by DCCEE)	-\$3,661	\$332	\$369	\$533	\$62

Source: Allen Consulting Group analysis.

Notes: Assumes mandates for disclosure at both point of sale and lease.

*Of all the key inputs, which ones are particularly sensitive to changes in the assumptions?*

The sensitivity analysis indicates that the modelled results are particularly sensitive to changes in the discount rate and ceiling insulation penetration rates under all options, and assessment costs under options 1 to 3. The fact that Option 4 is not sensitive to changes in assumed assessment costs is explained by the fact that only 10 per cent of assessments under this option are assumed to be undertaken by a qualified assessor. The sensitivity analysis also indicates that the modelled results are not sensitive to changes in government costs under all options.

*Is the overall finding that Residential Building Mandatory Disclosure results in positive net benefits relative to the base case under options 2 to 5 robust to changes in key assumptions?*

The sensitivity results indicate positive net benefits under all sensitivity scenarios for options 2 to 5. As such, the overall finding of positive net benefits relative to the base case under these options is robust to changes in the key inputs. Note, however, that multiple changes in some of these inputs (such as an increase in assessment costs coupled with an increase in the discount rate) would likely result in negative net present values for some, or all, of the options. This suggests that overall finding of positive net benefits relative to the base case may not be robust to simultaneous changes in two or more of the key inputs.

*Is Option 2 sensitive to changes in key assumptions?*

The sensitivity analysis indicates that the finding that Option 2 has the highest net present value relative to the other options is sensitive to assumptions regarding assessment costs, the discount rate and insulation penetration rates. In particular, increases in assumed assessments costs, the discount rate and insulation penetration rates all result in net present value estimates that are highest for Option 4, second highest for Option 3 and third highest for Option 2. In other words, Option 4 is calculated to have the highest net present value when there is upward movements on one or more of these assumptions.

*How high would the option 1 and 5 uptake rates need to be in order for these two options to have the highest net present value estimate?*

The results of the sensitivity analysis (not outlined in Table 6.10) indicate that:

- the uptake rate for Option 1 would need to be to be 78 per cent or above (rather than 30 per cent) in order for it to have the highest net present value overall; and
- the uptake rate for Option 5 would need to be to be 13 per cent or above (rather than 1.5 per cent) in order for it to have the highest net present value overall.

**6.22 Break even analysis**

Given the limited available evidence on the potential level of investment response (or uptake rates) under Residential Building Mandatory Disclosure, a break even analysis was conducted. Break even analyses are common practice in situations where the degree of benefit associated with a proposal is uncertain. It involves a simulation process where a key parameter of the model – in this case, the uptake rate – is varied until net benefits calculated through the model equal zero. In other words, it answers the question: what level would the uptake rate need to be for Residential Building Mandatory Disclosure to break even to society in cost-benefit terms?

This break even analysis is similar to the sensitivity analysis outlined above only the uptake rate was varied to achieve a particular outcome, i.e. it was varied until net present value equalled zero.

The results of the break even analysis are provided in Table 6.11. The results for Options 2 to 5 indicate that, even if Residential Building Mandatory Disclosure achieves uptake rates that are lower than those assumed in the analysis, it is still possible for Residential Building Mandatory Disclosure to achieve net benefits to society. For example, according to the results for Option 2, so long as the proportion of households responding to Residential Building Mandatory Disclosure is above 17 per cent for sold properties and 8.5 per cent for leased properties, Residential Building Mandatory Disclosure will result in a net benefit to society. According to the results for Option 1, the assumed uptake rate would need to be doubled in order for that option to break even to society.

Table 6.11

**BREAK EVEN ANALYSIS (UPTAKE RATE, %)**

		Option 1	Option 2	Option 3	Option 4	Option 5
Sales transactions	Modelled uptake rate	30%	26%	20%	15%	1.5%
	<b>Break even uptake rate</b>	<b>58%</b>	<b>17%</b>	<b>12%</b>	<b>5%</b>	<b>0.4%</b>
Lease transactions	Modelled uptake rate	15%	14%	10%	7.5%	0.75%
	<b>Break even uptake rate</b>	<b>29%</b>	<b>8.5%</b>	<b>6%</b>	<b>2.5%</b>	<b>0.2%</b>

Source: Allen Consulting Group analysis.

**6.23 State/territory findings**

The findings outlined thus far are based on the results of the cost benefit analysis when conducted at the national level. However, the analysis was also conducted individually for each of the states and territories (see Appendix F).

The results of the state/territory analysis suggest that despite Option 2 being identified as having the highest net present value from a national perspective (subject to sensitivity analysis) and for the majority of states/territories, Option 2 does not have the highest net present value for South Australia, Western Australia and the Northern Territory. Instead Option 4 is estimated to have the highest net present value for these individual states and territories. This is because government costs under Option 4 are lower for these jurisdictions on a per property transaction basis. Regardless of this, however, the option considered to have the highest net present value is selected based on the national results of the cost benefit analysis, consistent with advice from OBPR.

This result poses an obvious question: How low would the option 4 uptake rate need to be in order for Option 2 to have the highest net present value for all states and territories? The results of the sensitivity analysis (not outlined in Table 6.10) indicate that the uptake rate for Option 4 would need to be 11 per cent or below (rather than 15 per cent) in order for Option 2 to have the highest net present value option for all states and territories.<sup>45</sup>

For completeness, the results of the sensitivity analysis also indicate that the uptake rate for Option 3 would need to be 19 per cent or below (rather than 20 per cent) in order for Option 2 to be the most efficient option for all states and territories.

**6.24 Impacts of Option 2 on housing affordability**

This section discusses the impact of Option 2 on housing affordability for homebuyers across Australia's capital cities.

Housing affordability is likely to be affected by Option 2 in a number of ways:

<sup>45</sup> This uptake rate is for sales transactions. The uptake rate for lease transactions would need to be half this.

- sellers of houses who decide to make an investment in energy and water efficiency measures may seek to raise their price to compensate for the cost of that investment. “Evidence from the scheme applied in the ACT shows that if a house has a higher EER than another house, but that in all other respects the houses are the same, the house with the higher EER can command a higher price”.(DEWHA 2008a);
- sellers of houses with lower performance may well find that the price that they can obtain for their properties is lower;
- buyers of properties may be willing to pay more for properties that are demonstrated to be more energy, greenhouse and water efficient; and
- buyers may be only willing to pay less for less efficient houses.

When you look at these factors, some house prices may go up, and some may go down. The outcome for every dwelling is not clear, but the average outcome is likely to reflect overall changes in real resource use (which relates to the cost of making the changes and the benefits of avoided energy and water use).

Another key point is that housing affordability is not only influenced by house prices, but it is also influenced by the ability to pay — which is essentially a householder’s disposable income. A range of factors may change disposable income:

- the reduction of household costs due to improvements in energy and water efficiency, which reduces utility bills (and the economic resources required to produce these services);
- the costs involved in providing information about the energy, greenhouse and water performance of a dwelling; and
- their normal background income (which is unlikely to be changed by the Residential Building Mandatory Disclosure).

There are many parties in the property market that would be affected by Residential Building Mandatory Disclosure. Sometimes the seller would be the purchaser of information, and sometimes it is the buyer of the property that would enjoy the benefits of the investment, so there is a question about which party bears the costs or enjoys the benefits.

This situation is similar to analysis of the incidence of taxes and charges. Sometimes the legal incidence of the tax is on the supplier and sometimes it is found that through market mechanisms the cost of this tax is passed forward to consumers. So the legal incidence of a tax can be different to the economic incidence. This often depends on the nature of competition in the market, with more competitive markets resulting in greater pass through.

The property market is a very competitive market. It is likely that the costs and benefits of Residential Building Mandatory Disclosure would be passed forward to the final buyer of a property (i.e. to households). This is particularly the case when we are providing information that would help clarify and signal house prices to the market.

This provides a conservative basis for estimating the community-wide effect on housing affordability. It is possible that some buyers would do better, and it is also possible that some sellers would do better. This section of the report analyses the average effect for the community at large.

#### **Measurement basis**

The impact of Option 2 on housing affordability has been analysed using two widely known affordability indicators. These are outlined below.

- *The median multiple* — the median multiple (or house price to income ratio) reflects the 'years of gross income' required to purchase a house within individual housing markets. A generally accepted definition of affordability is that house prices should not cost more than three times the median household gross income to be affordable. An increase in this measure represents decreased housing affordability.
- *The ratio of mortgage repayment to household income* — this measure indicates the proportion of gross income used for mortgage repayments. Financial institutions have traditionally applied a rule of thumb of not allowing households to take out home loans requiring more than 30 per cent of gross income to service (APRA 2008, p. 3). An increase in this measure represents decreased housing affordability.

#### **Key preliminary points about housing affordability**

Table 6.12 and Table 6.13 show the effects of Option 2 on the two affordability indicators estimated for this report. The results of both indicators suggest that Residential Building Mandatory Disclosure, under Option 2, would have a minimal, but positive, impact on housing affordability in all relevant jurisdictions. This essentially reflects the fact that, although Residential Building Mandatory Disclosure would result in slightly higher house prices, this increase would be more than offset by an increase in household *disposable* income resulting from utility bill savings.

*The results suggest that the net effect of Residential Building Mandatory Disclosure would be an overall improvement in housing affordability in each jurisdiction.*

Table 6.12

**IMPACT OF OPTION 2 (AS APPLIED TO SALES ONLY) ON THE MEDIAN MULTIPLE**

	Currently	Under RBMD
Sydney	8.34	8.28
Melbourne	7.76	7.71
Brisbane	6.69	6.67
Perth	7.15	7.12
Adelaide	7.26	7.22
Hobart	6.54	6.48
Canberra	5.59	5.59
Darwin	5.22	5.19

Note: Based on median house price data as at August 2010 sourced from RP Data and the median household income for each state (that is, the midpoint when all people are ranked in ascending order of income) sourced from ABS. Includes the impacts of Residential Building Mandatory Disclosure on house prices and income outlined in Table 6.15 and Table 6.16.

Source: Allen Consulting Group analysis based on RP Data (2010) and ABS (2007b, 2010).

Table 6.13

**IMPACT OF OPTION 2 (AS APPLIED TO SALES ONLY) ON THE PERCENTAGE OF INCOME USED FOR MORTGAGE REPAYMENTS**

	Annual mortgage payment		Percentage of income used to pay mortgage	
	Currently	Under RBMD	Currently	Under RBMD
Sydney	\$35,512	\$35,528	58.7%	58.3%
Melbourne	\$33,050	\$33,067	54.5%	54.2%
Brisbane	\$30,519	\$30,529	47.0%	46.9%
Perth	\$32,347	\$32,364	50.3%	50.0%
Adelaide	\$27,249	\$27,264	51.0%	50.8%
Hobart	\$22,854	\$22,877	46.0%	45.6%
Canberra	\$33,754	\$33,754	39.3%	39.3%
Darwin	\$34,105	\$34,133	36.7%	36.5%

Note: Based on median house price data as at August 2010 sourced from RP Data, the median household income for each state sourced from ABS and the following mortgage assumptions: prime borrower, standard loan, 20 per cent deposit (i.e. LVR=80 per cent), standard variable rate of 7.40 per cent p.a. (as at August 2010, sourced from RBA) and a 25 year repayment period. Includes the impacts of Residential Building Mandatory Disclosure on house prices and income outlined in Table 6.15 and Table 6.16.

Source: Allen Consulting Group analysis based on RP Data (2010), ABS (2007b, 2010) and RBA (2010).

**Methodology used in affordability analysis**

Broadly speaking, the affordability analysis presented in the previous section was undertaken in three steps:

- first, it estimated the average impact of Residential Building Mandatory Disclosure on households;



- then, it estimated the average impact of Residential Building Mandatory Disclosure on house prices; and
- finally, it estimated the average impact of Residential Building Mandatory Disclosure on household disposable income.

The housing affordability estimates were calculated for all capital cities under two scenarios:

- current median house prices and incomes (as at August 2010); and
- projected median house prices and incomes under Residential Building Mandatory Disclosure, specifically under Option 2 (as it applies to sales transactions). These indicators are estimated on the assumption that costs associated with Residential Building Mandatory Disclosure are passed on to home purchasers and reflected in increased house prices and benefits are passed on and reflected in increased incomes.<sup>46</sup>

Table 6.14 summarises the impact of Option 2 (as it applies to sales transactions) on the average household in each jurisdiction. As mentioned earlier in the report, while Residential Building Mandatory Disclosure would result in investments in some measures that require up-front capital, the benefits of lower energy and water use would accrue over time. To allow the comparison of these costs and benefits, all the impacts in Table 6.14 are reported in net present value (NPV) terms using a real discount rate of 7 per cent.

These estimates were calculated by dividing the present value of costs and the present value of benefits by the total number of property transactions impacted by Residential Building Mandatory Disclosure over the period of analysis. As such, they reflect average societal costs and benefits per household impacted by Residential Building Mandatory Disclosure over the period. In reality, however, costs and benefits will vary between households depending on a number of factors, particularly whether an investment in energy and water efficiency is made.

As shown in Table 6.14, while Residential Building Mandatory Disclosure would generally increase capital costs for households across all jurisdictions (except the Australian Capital Territory), this would be offset by reduced energy and water bills.<sup>47</sup> In net terms, Residential Building Mandatory Disclosure under Option 2 represents a net saving to households in the long run in all jurisdictions, except for the Australian Capital Territory.

<sup>46</sup> In reality, overall household incomes will not increase under Residential Building Mandatory Disclosure. However, future occupants of dwellings that have had an energy and water efficiency improvement as a result of Residential Building Mandatory Disclosure will experience relatively lower utility bills. This will have the effect of increasing household *disposable* income as lower bills imply the availability extra funds for spending on other items such as mortgage repayments or entertainment. Therefore, for the purposes of this analysis, such increases in *disposable* income are reflected as increases in median household income so that the benefits of Residential Building Mandatory Disclosure can be reflected in the housing affordability indicators.

<sup>47</sup> The analysis conducted for this RIS assumes that the Australian Capital Territory will maintain its current scheme for sales transactions under the Residential Building Mandatory Disclosure option (Option 2). As such, Residential Building Mandatory Disclosure will have no impact on sales transactions in that jurisdiction relative to business as usual.

Table 6.14

**ESTIMATED IMPACT OF OPTION 2 (AS APPLIED TO SALES ONLY) ON THE AVERAGE HOUSEHOLD IN EACH JURISDICTION**

	Total lifetime costs	Total lifetime benefits	Net impact
New South Wales	\$238.65	\$474.16	\$235.51
Victoria	\$241.55	\$426.99	\$185.44
Queensland	\$139.61	\$177.41	\$37.80
Western Australia	\$242.80	\$391.07	\$148.28
South Australia	\$220.07	\$306.42	\$86.35
Tasmania	\$323.70	\$528.67	\$204.98
Australian Capital Territory	\$0.00	\$0.00	\$0.00
Northern Territory	\$394.26	\$533.95	\$139.69

Note: Costs and benefits are in present value terms (discounted using a real discount rate of 7 per cent) and are relative to business as usual. The analysis conducted for this RIS assumes that the Australian Capital Territory will maintain its current scheme for sales transactions under Option 2. As such, Residential Building Mandatory Disclosure will have no impact on sales transactions in that jurisdiction relative to business as usual.

Source: Allen Consulting Group analysis.

Table 6.15 shows the effects that the above costs would have on median house prices in Australia's capital cities. As shown in this table, Option 2 would result in a negligible increase in houses prices across Australia. The highest increase in percentage terms (0.1 per cent) would be experienced in Hobart, whereas the lowest increase (0.03 per cent) would be experienced in Brisbane.

Table 6.15

**IMPACT OF MANDATORY DISCLOSURE OPTION 2 (AS APPLIED TO SALES ONLY) ON MEDIAN HOUSE PRICES IN AUSTRALIA'S CAPITAL CITIES**

	Current house price	House price under RBMD	Per cent change
Sydney	\$505,000	\$505,239	0.05%
Melbourne	\$470,000	\$470,242	0.05%
Brisbane	\$434,000	\$434,140	0.03%
Perth	\$460,000	\$460,243	0.05%
Adelaide	\$387,500	\$387,720	0.06%
Hobart	\$325,000	\$325,324	0.10%
Canberra	\$480,000	\$480,000	0.00%
Darwin	\$485,000	\$485,394	0.08%

Note: The analysis conducted for this RIS assumes that the Australian Capital Territory will maintain its current scheme for sales transactions under the Option 2. As such, Residential Building Mandatory Disclosure will have no impact on sales transactions in that jurisdiction relative to business as usual.

Source: Allen Consulting Group analysis based on RP Data 2010.

Table 6.16 shows the effects that the above benefits would have on gross median household income in Australia's capital cities. It is important to note that overall household incomes are not expected to change under Residential Building Mandatory Disclosure. However, future occupants of properties that have had an energy and water efficiency improvement as a result of Residential Building Mandatory Disclosure will experience relatively lower utility bills. This will have the effect of increasing household *disposable* income as lower bills imply the availability of extra funds for spending on other items such as mortgage repayments. Therefore, for the purposes of this analysis, such increases in *disposable* income are reflected as increases in gross median household income so that the benefits of Residential Building Mandatory Disclosure can be reflected in the housing affordability indicators.

As shown in this table, Residential Building Mandatory Disclosure would result in a negligible increase in gross median household income (or, in reality, *disposable income*) across Australia. The highest increase in percentage terms (1.06 per cent) would be experienced in Hobart, whereas the lowest increase (0.27 per cent) would be experienced in Brisbane.

Table 6.16

**IMPACT OF OPTION 2 (AS APPLIED TO SALES ONLY) ON GROSS MEDIAN HOUSEHOLD INCOME IN AUSTRALIA'S CAPITAL CITIES<sup>#</sup>**

	Current income	Income under RBMD	Per cent change
Sydney	\$60,516	\$60,990	0.78%
Melbourne	\$60,590	\$61,017	0.70%
Brisbane	\$64,875	\$65,052	0.27%
Perth	\$64,294	\$64,685	0.61%
Adelaide	\$53,385	\$53,692	0.57%
Hobart	\$49,681	\$50,210	1.06%
Canberra*	\$85,825	\$85,825	0.00%
Darwin	\$92,999	\$93,533	0.57%

Notes:

<sup>#</sup>In reality, overall household incomes will not change under Residential Building Mandatory Disclosure. However, future occupants of properties that have had an energy and water efficiency improvement as a result of Residential Building Mandatory Disclosure will experience relatively lower utility bills. This will have the effect of increasing household *disposable* income as lower bills imply the availability extra funds for spending on other items such as mortgage repayments. Therefore, for the purposes of this analysis, such increases in *disposable* income are reflected as increases in median household income so that the benefits of Residential Building Mandatory Disclosure can be reflected in the housing affordability indicators.

\*The analysis conducted for this RIS assumes that the Australian Capital Territory will maintain its current scheme for sales transactions under Option 2. As such, Residential Building Mandatory Disclosure will have no impact on sales transactions in that jurisdiction relative to business as usual.

Source: Allen Consulting Group analysis based on RP Data 2010.

### 6.25 Impacts of Option 2 on competition

Option 2 is not expected to have any impact on competition for businesses that provide the assessments or on the real estate industry. This is because this option is not expected to:

- alter the competitive relations faced by existing businesses in a way that would reduce the intensity of competition in the market as a whole;
- restrict entry for new businesses;
- raise prices by imposing new costs on producers, facilitate information exchange among producers or lead to the exit of some incumbent firms in a way that raises the prospect of collusion;
- include minimum standards and requirements that will reduce the range of price and quality combinations available in the market;
- limit market growth; or
- have anti-competitive effects in markets that are upstream or downstream of the real estate or property assessors' industries.

### 6.26 Impacts of Option 2 on small business

Option 2 is likely to have an impact on small business to the extent that small businesses are part of the real estate and assessment industries. The Australian Bureau of Statistics estimates that for 2008-09, small businesses accounted for:

- 80 per cent of industry value added and around 77 per cent of total employment in the rental, hiring and real estate services industry;
- 62 per cent of industry value added and around 65 per cent of total employment in 'other service' industries, which assessors would comprise part of; and
- 34 per cent of industry value added and around 48 per cent of total employment for the economy as a whole.

This means that the industries affected by Option 2 have a disproportionately larger share of small business. At the same time, the costs to industry under Option 2 are relatively modest. In addition, almost all of these costs can be recovered from households. The total impact of Option 2 on industry — and on small businesses — is therefore not excessive.

## *Chapter 7*

### **Implementation and review**

The analysis in this RIS assumes that Residential Building Mandatory Disclosure will come into effect from 1 July 2011. However, this is indicative only as the timing of the implementation of any option is dependent on the outcomes of the Decision RIS.

In addition, although the measure will be implemented through state and territory legislation, for the purposes of conducting this RIS and assessing alternatives, it has been assumed that the Commonwealth, states and territories would act together to implement cost effective schemes.

It is the intention to test Options and the preliminary findings in discussion with stakeholders as part of the consultation process. Following this, a decision RIS will be released which may contain a more detailed schedule of the proposed implementation of mandatory disclosure. The decision RIS may also provide information about the future review of Residential Building Mandatory Disclosure.

## Chapter 8

### Consultations

This Consultation RIS is being provided to stakeholders for comment and to enable further development of the policy proposals. The period of consultation for this Consultation RIS will be eight weeks, from **18 July 2011** to **12 September 2011**.

Comments can be made on any aspect of the Consultation RIS. Of particular importance is feedback from stakeholders on:

- *The extent of the 'problem' in residential building energy, greenhouse and water performance.* That is, to what extent are there market failures, which present a barrier to improved energy, greenhouse and water performance of residential buildings in Australia? Has the problem been accurately represented in this RIS?
- *The adequacy of the options assessed in the Consultation RIS in addressing the problem* — are there any other feasible policy options that should also be considered in the assessment?
- *The assessment of costs and benefits of options:*
  - Does the assessment fully reflect all potential costs and benefits of the options assessed?
  - Are there costs to industry that have not been accounted for?
  - Are the take-up rates for the proportion of sellers and lessors that invest in upgrades to their properties in each scenario reasonable?
  - Are the costs of the energy and water efficiency measures included in the RIS reasonable?
  - Are the assumptions underlying the analysis valid/reasonable?
  - The impact of the HIP upon the penetration of roof insulation in the stock of Australian residential buildings.
- *Identified risks and uncertainties associated with each option.*

This Consultation RIS will also be presented at stakeholder forums around Australia, and will be available for download from the website <http://www.ret.gov.au/Documents/mce/quicklinks/bulletins.html>

Stakeholders will be able to provide feedback in one of the following ways:

1. attendance at one of the stakeholder forums scheduled below;

Parramatta, 2 <sup>nd</sup> August, 12.30pm, Mantra Parramatta, Corner Parkes St & Valentine Ave, Parramatta NSW 2150
Sydney, 3 <sup>rd</sup> August, 12.30pm, Grace Hotel Sydney CBD, Corner of York & King Streets, 77 York Street, Sydney NSW 2000
Hobart, 5 <sup>th</sup> August, 12.30pm, Mercure Hobart, 156 Bathurst Street, Hobart
Bunbury, 8 <sup>th</sup> August, 12.30pm, Clifton Hotel Bunbury, Corner Clifton & Molloy Streets, Bunbury
Perth, 9 <sup>th</sup> August, 12.30pm, Comfort Inn Bel Eyre, 285 Great Eastern Highway, Belmont
Adelaide, 10 <sup>th</sup> August, 12.30pm Mercure Grosvenor Adelaide, 125 North Terrace, Adelaide
Brisbane, 12 <sup>th</sup> August, 12.30pm Brisbane Mercure, 85-87 North Quay, Brisbane
Darwin, 15 <sup>th</sup> August, 10.30pm Travelodge Darwin, 64 Cavenagh Street, Darwin
Canberra, 16 <sup>th</sup> August, 12.30pm All Seasons Olim's Hotel Canberra, Corner of Ainslie & Limestone Ave, Braddon

2. participation in on-line forums. Please send an e-mail expressing your interest in participating in an on-line forum to [buildings@climatechange.gov.au](mailto:buildings@climatechange.gov.au); and/or
3. through a written submission via email to [residentialdisclosure@climatechange.gov.au](mailto:residentialdisclosure@climatechange.gov.au) or in hard copy to:

Residential Energy Efficiency Team  
 Buildings Government Energy Efficiency Branch  
 Department of Climate Change and Energy Efficiency  
 GPO Box 854  
 Canberra ACT 2601

**The deadline for written submissions is 12 September 2011.**

## *Appendix A*

# Current market disclosure of residential energy and water performance

This appendix reviews in general terms the current status of market disclosure of energy and water performance in residential properties available for sale or for lease in Australia.

### **A.1 Assessment approach**

The approach taken here is to look at the information that is likely to be available to consumers of residential properties — that is, people considering buying or renting a house. Much of the information reported in this appendix common knowledge given that most adults have at some stage explored the information reviewed when considering their own housing options.

#### ***A wide range of information sources are available***

Consumers of residential property have a vast amount of information available to them about the housing market and specific properties of interest to them.

General information sources often available includes:

- property advertisements (including newspaper and internet advertisements);
- agent's brochure/marketing material;
- personal inspection;
- contract of sale;
- statutory transaction information including warning statements and disclosure statements to buyer; and
- information from inspectors (building and pest etc).

Conceptually, information about the energy and water performance of residential buildings could be embedded in many or most of the information source categories mentioned above. Potentially, personal inspection could reveal much about energy and water performance, but in practice most buyers (and sellers) are not sufficiently expert to assess a property accurately. Notionally, energy efficiency inspectors are available in the market, but as has been discussed already in this report, it is apparent that buyers (and sellers) do not seek inspections for energy and water performance at present.



### ***A focus on information available on the internet***

A major transformation in the marketing of residential real estate has occurred over the last decade. Internet based information is widely used by individuals to advertise, buy, sell and/or lease a property. While there are some properties sold in other ways, a large majority of properties are advertised for sale or for lease on the Internet. Although individuals often still visit the home/apartment they are seeking to buy or rent, the Internet is frequently used as the main tool for refining their search in the first instance. While it has not completely replaced other information sources (some of which have a legal or statutory foundation) the Internet has become a ubiquitous tool in the marketing of residential property. This is evidenced by the growth and development of widely accessed real estate sites such as:

- [www.realestate.com.au](http://www.realestate.com.au);
- [www.propertypoint.com.au](http://www.propertypoint.com.au);
- [www.domain.com.au](http://www.domain.com.au);
- [www.allhomes.com.au](http://www.allhomes.com.au);
- [www.myhome.com.au](http://www.myhome.com.au); and
- websites operated by real estate agencies.

Because Internet advertising is a major source of information in the market for residential property it is a suitable focus for analysis of the information available to market participants about energy and water efficiency performance.

### **A.2 What types of information is advertised?**

Inspection of contemporary Internet advertising shows that some major websites collect and distribute information on aspects of a property's energy and water efficiency. Using a national real estate website such as [www.realestate.com.au](http://www.realestate.com.au), when searching for properties to buy or rent, sellers/landlords are able to list 'eco-friendly' characteristics of a property in the same way as other features of the property can be advertised. For example, sellers/landlords can select from:

- any; or
- solar panels; and
- solar hot water; and
- water tank; and
- grey water system; and
- energy efficiency rating — high;
- energy efficiency rating — medium; and
- energy efficiency rating — low.

Other websites such as [www.propertypoint.com.au](http://www.propertypoint.com.au) also provide sellers/landlords with the opportunities to list the eco-friendly features (solar, double glazing, insulation, rain water tank) of the property.

### A.3 Properties for sale

Market participants are making some use of the facilities provided by property webpages to report some information about energy and water performance.

Having a summary indicator of a complex matter such as the energy efficiency of a residential property is likely to be important for efficient operation of the property market. A key question is, how often do properties advertised in the market actually provide such information?

Casual observation shows that some energy efficiency performance information about some properties is being made available on websites. A sample of listings for properties for sale in various areas of Australia have been collected from one national website ([www.realestate.com.au](http://www.realestate.com.au)) on one day in April 2011 and the number reporting information about an Energy Efficiency Rating (EER) has been counted. The sample reflects a range of regions, jurisdictions and development activities. The findings are summarised in Table A.1.

Table A.1

#### SAMPLE OF LISTINGS FOR SALE REPORTING EER

Suburb	Listings reporting EER				Total EE	Not rated	Listings
	Low	Medium	High				
Kellyville, NSW	2	9	0	11	876	887	
Raymond Terrace, NSW	11	0	0	11	299	310	
Figtree, NSW	0	0	0	0	184	184	
Geelong, Vic	4	7	0	11	776	787	
Essendon, Vic	6	4	0	10	599	609	
Aldgate, SA	0	0	0	0	192	192	
Attadale, WA	3	0	0	3	743	746	
Hobart, Tas	15	4	0	19	2084	2103	
Gungahlin, ACT	67	132	0	199	1	200	
Hendra, Qld	8	2	0	10	802	812	
Townsville, Qld	8	10	0	18	1152	1170	

Source: realestate.com.au, includes surrounding suburbs. Accessed as at 12 April 2011.

The results reported in the table above suggest that a relatively small proportion of listings include information about an EER. The vast majority of listings in most areas reviewed are not rated.

The results for the sample from the ACT in the table above indicate that EERs are (nearly) universally reported there. Clearly the ACT differs from the rest of Australia in this regard. This reflects the current operation of a mandatory EER scheme.

As noted, a variety of additional information items relating to energy and water performance can be included in Internet information sources about residential properties for sale. A review of sample properties listed on [www.realestate.com.au](http://www.realestate.com.au) reveals the following issues with the provision of water and energy information:

- The presence of some energy and water features in a residence are reported in some if not many property listings.
- EERs are reported for some properties.
- In some cases, EERs of zero are reported.
- Properties in Queensland note that a sustainability declaration is available, as required under Residential Building Mandatory Disclosure that applies in that state.
- Given the low proportion of buildings reporting EERs it is hard to see how the market could reliably assess if or how differences in value are aligned with differences in energy performance.
- It is difficult to draw on the information provided for potential buyers to discern what opportunities there may be to improve the performance of the building.

It is not clear how credible the information reported about energy efficiency or performance is because:

- the analysts for this report have not been able to locate information in the public domain about how users interpret the information or its credibility.
- some real estate industry stakeholders advise that the information reported regarding some facilities in a property listing may act as 'totems' playing a role in signalling something about the overall attention to energy and water efficiency and sustainability of the property.
- It is not clear if a property has actually been given an EER of zero under current energy efficiency rating schemes, or if the absence of a rating or information about a rating has been recorded as zero for convenience.

#### **A.4 Properties for lease**

A review of a sample of information included in the Internet market place for properties for lease across Australia on one day in April 2011 revealed the following key observations:

- Typically less information about 'eco friendly features' is provided for properties to lease than for properties for sale.
- There is scope to report an EER and some advertisements do report an EER.
- Some properties report an EER of zero.
- The summary includes examples where energy and water features are reported — there were many more examples where no features were reported suggesting that in fact much information about energy and water performance is absent.

There are some lingering uncertainties about this brief analysis and its observations.

- It is not clear how much confidence users of the information do or do not have in the information reported.
- The use of zero ratings raises some ambiguities as it is not clear if an actual zero rating has been obtained (which would be unusual and generally unlikely for a property that would otherwise be fit for purpose to rent) or if zero has been used to signal the absence of a rating.
- It is hard to see how the fragments of information provided in the current market place would allow market participants to discern the value of performance differences. That is, how would prospective tenants be able to tell from this information if there is a relationship between energy performance and rent to be paid.

#### **A.5 Conclusions**

This appendix seeks to provide some insight about the information that is available to consumers in the market for residential property throughout Australia. The focus of the analysis has been upon reporting what is available in the key information source in the contemporary market — Internet advertising.

While this analysis is constrained in scope and scale, the snapshots of property marketing information summarised here suggest that it is feasible at present to provide information on aspects of a property's energy and water performance within existing market frameworks. Some vendors do make this information available although the majority do not.

A review of the information on internet marketing sites shows that it is not always easy to interpret the information currently provided. For example, in some cases, listings report an EER of zero. It is not clear if this is an actual rating obtained (which is unlikely) or if zero has been used as a surrogate for no rating available, or an approximation of a low rating.

The property website, [www.domain.com.au](http://www.domain.com.au), further highlights the ineffectiveness of providing a default rating of zero by its requirement that property sellers and landlords can only select the 'Energy Efficiency Rating' field found in the property details section when advertising if they have a rating provided by an accredited energy assessor. Therefore, any listings that do not have an Energy Efficiency Rating, as provided by an accredited energy assessor, will not be searchable on the [www.domain.com.au](http://www.domain.com.au) website.<sup>48</sup>

The snapshots provided suggest that in everyday experience in the current market for residential buildings, information about energy, greenhouse and water performance about residential buildings is generally of poor quality, limited or absent. In the majority of cases, the available information is insufficient to:

- differentiate the relative performance of different properties;
- indicate the value of performance differences; and
- indicate opportunities to improve performance.

Reflecting the information that is advertised it is likely that there are problems of uneven information in the market place (owners who live in a building are likely to have more information based on that experience of the thermal efficiency of that building than buyers reviewing the information available about the property). With the information that is available it is hard to see how buyers and sellers could discern how the different energy and water performance qualities of a building translate into different prices in the market.

Information shortfalls are not universal as information about the energy and water performance of some residential buildings is provided in some states and territories in Australia reflecting regulatory requirements.

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<sup>48</sup> <http://selfservice.domain.com.au/public/help/Help.aspx> where an "Energy Efficiency Rating gives prospective purchasers an indication to the current level of energy performance of a dwelling. The energy efficiency rating of a dwelling can be from zero to six stars - the higher the number of stars, the better. An accredited energy assessor needs to provide the EER Statement."

## *Appendix B*

### Methodology for the cost-benefit analysis

#### **B.6 Broad approach**

Cost benefit analysis is a quantitative approach used to aid government decision-makers when considering new program proposals. In particular, it uses a series of inputs and assumptions to calculate summary measures that can be used to answer the following two questions:

- Will the proposed program result in an overall economic return to society relative to business as usual?
- Will the program (including different options for its design) result in a higher return to society relative to alternative programs/options that could be implemented to deal with the same problem?

Cost-benefit analysis lends itself well to assessing the economic merits of options for Residential Building Mandatory Disclosure as it is possible to quantify the majority of the anticipated costs and benefits.

The broad approach is discussed in terms of: costs and benefits, timeframe, options, cost-benefit summary measures, sensitivity, uptake rates, types of investments existing schemes.

#### ***Costs and benefits included in the analysis***

As is typical of RIS cost-benefit analyses, the cost-benefit model (CBA model) developed for this study includes costs and benefit likely to be faced by households, industry, government and society as a whole. The inclusion of societal dimension reflects the existence of benefits that are not specific to any particular sector, rather they accrue equally across the entire population and, indeed, future generations. Costs and benefits included in the CBA model are outlined in Table B.2.

The CBA model quantifies these costs and benefits separately for each option under consideration in this RIS and each state and territory year-on-year over the period of the analysis. The calculation of these costs and benefits is discussed in more detail below. A number of non-quantifiable benefits are outlined in Section 5.15 of the report.

Table B.2  
**COSTS AND BENEFITS INCLUDED IN CBA MODEL**

	Costs	Benefits
Households	<ul style="list-style-type: none"> <li>• Energy and water efficiency assessment</li> <li>• Investments in energy and water efficiency measures</li> <li>• Householder time during energy and water efficiency assessment</li> </ul>	<ul style="list-style-type: none"> <li>• Utility bill savings accruing from reduced energy and water use (only accrue to households that chose to respond to the information provided through Residential Building Mandatory Disclosure)</li> </ul>
Industry	<ul style="list-style-type: none"> <li>• Training and insurance</li> <li>• Real estate agents' time in booking an assessment for clients</li> </ul>	
Government	<ul style="list-style-type: none"> <li>• Scheme administration</li> <li>• Rebates stimulated by increased demand for energy and water efficiency products and services</li> </ul>	
Society		<ul style="list-style-type: none"> <li>• Reduced greenhouse gas emissions from household energy use</li> </ul>

Source: Allen Consulting Group.

Note that the analysis did not include growth in property values as a benefit under Residential Building Mandatory Disclosure. It is possible that investments in energy and water efficiency measures will improve the value of some properties, particularly if the investment is significant. Indeed, this is reflected in the housing affordability analysis outlined in Chapter 6.

However, from a society-wide perspective, increased property values do not result in a net increase in overall wealth, rather, they result in a transfer in wealth from first-time home buyers to existing home owners. As such, inclusion of this as a benefit would fail to account for the potential loss to first-time home buyers resulting from increase property prices.

**Timeframe**

The model assumes a mandatory disclosure start date of July 2011, with costs being counted over the first ten years and benefits over the first thirty years of Residential Building Mandatory Disclosure. In particular, it factors in the benefits of the investments stimulated by Residential Building Mandatory Disclosure over the full life of the assets (assuming a maximum asset life of 20 years). This is a reasonable approach as the key benefits associated with Residential Building Mandatory Disclosure accrue incrementally over a long time period (i.e. the asset life of the investments).

**Options**

The cost benefit model includes five options, where the costs and benefits under each are calculated relative to a business as usual base case where Residential Building Mandatory Disclosure is not implemented. The five options are discussed in detail in Chapter 4 of the report and summarised as follows:

- Option 1 – regulation requiring disclosure of information through an assessor-based assessment with full thermal simulation;
- Option 2 – regulation requiring disclosure of information through an assessor-based assessment with a simplified thermal simulation;
- Option 3 – regulation requiring disclosure of information through an online self-assessment;
- Option 4 – regulation requiring disclosure of information through a checklist assessment; and
- Option 5 – voluntary uptake through public education and publicity campaigns.

Note that, under Options 3 and 4, it is not mandatory for an assessor to undertake the assessment (i.e. householders are permitted to do it themselves). However, it is assumed that, due to the potential complexity involved in the assessment, a certain proportion of assessments (50 per cent under Option 3 and 10 per cent under Option 4) will be outsourced to an assessor.

These options were developed by the National Framework for Energy Efficiency Building Implementation Committee and provided to the Allen Consulting Group for the purposes of this analysis.

In addition, the indicative costs and benefits of Option 6 were examined as a result of feedback from the Office of Best Practice Regulation. Option 6 is a variant of the mandatory option, with an opt-out provision so that property owners could opt-out of obtaining an assessment but then be required to disclose a 'zero' rating or score.

#### ***Cost-benefit summary measures***

The CBA model includes three summary measures that distil the results of the analysis, as listed in Table B.3. In comparing between different options, none of these summary measures represent the definitive method. Rather, the choice of which summary measure to focus on depends on the objectives of the decision-maker. If the objective is to maximise overall economic welfare to society, net present value is most relevant as it reflects the overall size of net benefits. If the objective is to maximise economic efficiency, then the benefit-cost ratio is most relevant as it reflects the degree to which benefits outstrip costs. However, if the objective is to reduce intertemporal risk (e.g. the risk that factors driving key costs and benefits under Residential Building Mandatory Disclosure may change over time), Residential Building Mandatory Disclosure payback period is most relevant as it reflects the length of time required before net benefits begin to accrue to society.

For the purposes of this RIS, the focus is on the option that provides the greatest welfare to society. As such, the option providing the highest net benefit is selected according to the results of the net present value calculation for each option. This approach is consistent with advice provided by the Office of Best Practice Regulation (OBPR). The other summary measures are also reported, however, as they provide a richer understanding of the relative merits, or lack thereof, of the highest net present value option versus the others.



Table B.3

**SUMMARY MEASURES INCLUDED IN THE ANALYSIS**

Summary measure	Description	Success measurement	Comparative ability
Net present value (NPV)	Sum of discounted annual net benefits (benefits minus costs) over the 30 years	Program is beneficial to society if NPV is greater than zero	Provides the ability to compare options according to the total economic return of each, where the option with the largest NPV should be favoured
Benefit-cost ratio (BCR)	Ratio of the present value of total costs to the present value of total benefits over 30 years	Program is beneficial to society if BCR is greater than one	Provides the ability to compare options according to the degree to which benefits outweigh costs for each, where the option with the largest BCR should be favoured
Scheme payback period	Number of years until the total accumulated benefits associated with Residential Building Mandatory Disclosure outweigh the total accumulated costs	Program is beneficial to society if scheme payback period is short, where the judgement of what is short is up to the decision-maker	Provides the ability to compare options according to the time taken for each to payoff to society, where the option with the smallest payback period should be favoured

Source: Allen Consulting Group.

**Sensitivity**

As is typical with most cost-benefit analyses, the results of the analysis are sensitive to certain inputs and assumptions. Key sensitivities in this case are the discount rate, the uptake rate and the cost of the energy and water efficiency assessments. As such, a sensitivity analysis is conducted where key inputs are varied to determine the degree to which such variation impacts on the overall results. For the uptake rate, the sensitivity test is conducted by way of a break even analysis, which determines what the uptake rate would need to be in order for Residential Building Mandatory Disclosure to break even to society in cost-benefit terms.

**Uptake rates**

Uptake rates represent the proportion of all Residential Building Mandatory Disclosure assessments that result in an investment in energy and water efficiency measures. The assumed uptake rates were developed in consultation with the National Framework for Energy Efficiency Building Implementation Committee, as provided in Table B.4. The basis for the assumed uptake rates is outlined in Appendix C.

Table B.4

**ASSUMED UPTAKE RATES**

Option	Sold properties	Leased properties
Option 1	30%	15%
Option 2	26%	13%
Option 3	20%	10%
Option 4	15%	7.5%
Option 5	1.5%	0.75%

Source: Uptake rates developed by the NFEE BIC.

The cost-benefit model converts these overall uptake rates into uptake rates for the different energy or water efficiency measures using a formula that takes into account the following factors:

- investment in a particular measure will depend on the estimated return on investment (or payback period) where investments with a low payback will tend to be favoured over investments with a high payback (such as double glazed windows);
- some measures may only be beneficial to a small number of properties due to certain unique characteristics that are only present among a subset of the housing stock (an example of this is wall insulation, which is only cost effective for a small number of properties due to prohibitive installation costs for most properties); and
- aggregate investment in a particular measure will be relatively low if many households already have that measure installed at their property (an example of this is dual flush toilets).

On the first point, the uptake formula apportions a greater share of the overall investment effort towards measures with a relatively low payback period (i.e. one to two years) and assumes zero investment in measures with a payback period beyond 5 years. This is based on the assumption that households will want to obtain the highest energy/water efficiency gain (and consequent increase in their Residential Building Mandatory Disclosure rating) at the lowest cost. As there are plenty of measures with a payback of less than five years, households will invest in these before investing in measures taking longer for the initial capital outlay to be recouped from savings on energy bills, such as double glazing.

The time period is the period over which the capital outlay for an energy efficiency improvement will be recouped from the resulting savings on energy bills.

Measures with a quick payback period also capture those that will result in a high energy/water efficiency rating. This is because measures with a quick payback tend to be characterised by both more quickly recouped energy/water savings and lower up-front investment outlays. In other words, the fact that it captures measures with relatively more quickly recouped energy/water savings means that it will also capture measures likely to earn a higher rating. Moreover, the fact that it captures measures involving low investment outlays means that it reflects the existence of a household budget constraint.

On the second point, the uptake formula apportions a smaller share of the overall investment effort towards measures that may only be relevant, or cost effective, to a small subset of the housing stock. This mechanism allows the analysis to consider households with atypical characteristics, rather than simply focussing on a representative house with average characteristics.

On the third point, the uptake formula apportions a greater share of the overall investment effort towards measures with a low level of penetration (i.e. those measures that are yet to be installed in many households such as solar hot water). Assumed penetration rates are outlined in Appendix C for each of the measures.

The above three aspects of the analysis were calculated based on sophisticated thermal and equipment performance simulation modelling coupled with models of Australia's housing stock. These models are outlined in more detail below.

#### ***Types of investments included***

The choice of energy and water efficiency measures included in the model was largely driven by previous work undertaken by Sustainability Victoria during the development of the Victorian Energy Efficiency Target scheme.<sup>49</sup> However, the choice was also driven by the availability of comparable data on costs and energy/water efficiency performance of potential measures. In addition to the list developed by Sustainability Victoria, two measures were added: window tinting and dual flush toilets. The final list of measures is provided in Table B.5.

<sup>49</sup> These were thought to be highly relevant Residential Building Mandatory Disclosure as the VEET scheme has an equivalent objective, i.e. to improve the energy efficiency of the existing housing stock by encouraging investment in energy efficiency improvements.

Table B.5

**ENERGY AND WATER EFFICIENCY MEASURES INCLUDED IN THE ANALYSIS**

Name of measure	Nature of measure
<b>Building shell measures</b>	
Floor Insulation	Installation of floor insulation to an uninsulated suspended floor
Ceiling Insulation – None	Installation of ceiling insulation where there was previously none installed
Ceiling Insulation – Poor	Installation of 'top-up' insulation to a poorly insulated ceiling <sup>(1)</sup>
Wall Insulation	Installation of wall insulation where there was previously none installed
Double Glazing	Installation of double glazing windows to replace existing single glazed windows
Curtain & Pelmet	Installation of thick curtain and boxed pelmet to single glazed windows, where previously low efficiency interior window furnishing were installed
External Blinds	Installation of external awnings or blinds on previously unshaded windows
Window Tinting	Installation of tinting for windows which were previously not tinted
Draught Proofing	Installation of draught proofing measures such as draught arrestors & weather stripping around doors, weather stripping for windows, sealing unnecessary vents, use of draft stoppers or self-closing exhaust fans, sealing cracks & gaps and addition of chimney damper to open fire place
<b>Equipment measures</b>	
Fixed Heating	Upgrade of existing fixed heating system to a new, more efficient system
Fixed Cooling	Upgrade of existing fixed cooling system to a new, more efficient system
Hot water - High Efficiency Gas	Upgrade existing gas hot water system to a high efficiency 5-Star gas water heating system
Hot water - Gas for Electric	Existing electric water heater replaced by a high efficiency 5-Star gas water heating system
Hot water – Solar Replacement	Existing conventional electric/gas water heater replaced by a solar water heating system
Lighting - Replace Halogens	Existing 12-volt halogen down-light fittings are retrofitted by an electrician and converted to 240 volt CFL fittings.
Low Flow Shower Rose	Replace existing non-low flow shower rose with a low flow (3-Star) shower rose
Dual-flush toilets	Replace existing non- dual flush toilet with a 4.5/3 litre dual flush toilet

Notes: (1) For this measure it is assumed that existing insulation is 'topped-up' to improve from R1.5 to R4.0, with the addition of R2.5 Batts.

As discussed above, this list of 17 measures is largely based on work by Sustainability Victoria into the types of investments that would most commonly be made at the household level to cost-effectively improve energy and water efficiency. Further work by Energy Efficient Strategies undertaken for the purposes of this RIS, did not indicate that any further measures needed to be added. This suggests that this list covers the majority of measures likely to be invested in as a result of Residential Building Mandatory Disclosure.

Of course, Residential Building Mandatory Disclosure will likely stimulate investment in a wide range of other measures (Such as clothes drying alternatives, outdoor heating, grey water systems, rainwater tanks, evaporative cooling, on-site renewable energy systems and pool/spa efficiency systems), but the level of investment in these is likely to be relatively low for a number of reasons:

- the upfront costs may be high, acting as a financial barrier for many households (this is true for many measures, including on-site renewable energy systems);
- the savings may take many years to accrue (this is true for many of the water efficiency measures as water tariffs are relatively low, even when factoring in potential future increases);
- the measure may only be relevant to a minority of Australia's housing stock (e.g. those with outdoor heating or those with outdoor spa baths); and
- the measure may require a level of behaviour change that most households would not voluntarily be willing to undertake and that would be difficult to enforce (e.g. clothes drying alternatives that require households to voluntarily switch from the convenience of clothes dryers).

During the design phase of the cost-benefit modelling, consideration was given to the possibility of including other such measures in the analysis. However, it was determined that the set of 17 measures represents a sufficient level of detail for the purposes of regulatory impact modelling. It was also determined that this set of measures covers most of the component measures that constitute the proposed Residential Building Mandatory Disclosure rating, which is the core aspect of the proposal.

In addition, it was anticipated that inclusion of other measures would not significantly alter the overall findings for two key reasons:

- many of the alternative measures would be excluded from the analysis, based on the assumption of expected paybacks of 5 years or less by households (see discussion of uptake rates above); and
- any measures not excluded would likely have a similar investment profile to the 17 already included, thus their inclusion would add little to the analysis.<sup>50</sup>

It is important to note two key points about the list of 17 measures. Firstly, other measures may become more important over the longer term phase of Residential Building Mandatory Disclosure (i.e. beyond the first 10 years covered in this analysis). This is because the penetration of these measures in Australia's housing stock will eventually become saturated and households will need to turn to other measures in order to further improve their Residential Building Mandatory Disclosure rating. Secondly, although emerging or niche technologies are not captured in the analysis, it can be expected that Residential Building Mandatory Disclosure will result in investment in such technologies as the costs and benefits are more widely proven and documented over time.

<sup>50</sup> The group of 17 measures can be regarded as representative of the average costs and benefits likely to accrue from investments made under Residential Building Mandatory Disclosure. As such, the addition of further measures would only have a minor impact on this average (i.e. dragging it up or down) unless they were significantly more cost-effective than those already included.

**Existing RBMD-related schemes in the base case**

Two schemes already exist that are implementing Residential Building Mandatory Disclosure: the Queensland Sustainability Declaration and the Australian Capital Territory House Energy Rating Scheme (ACTHERS). Given the existence of these schemes, it was necessary to factor the costs and benefits of these schemes into the base case. More specifically, the costs and benefits of Residential Building Mandatory Disclosure in these jurisdictions were only counted if such costs and benefits were incremental to the existing schemes. In general, incremental costs/benefits were calculated by subtracting the base case from the option in question. The approach used for apportioning costs and benefits to these jurisdictions in each option is outlined in Table B.6.

Table B.6

**ASSUMPTIONS FOR QUEENSLAND AND AUSTRALIAN CAPITAL TERRITORY GIVEN THE EXISTENCE OF THE SUSTAINABILITY DECLARATION AND ACTHERS**

	Queensland	Australian Capital Territory
Option 1	CBA accounts for incremental costs and benefits of this option over and above those under the Sustainability Declaration	CBA accounts for incremental costs and benefits of this option over and above those under ACTHERS
Option 2	CBA accounts for incremental costs and benefits of this option over and above those under the Sustainability Declaration	CBA assumes that ACT would keep ACTHERS for sales transactions, but adopt this option for lease transactions*
Option 3	CBA accounts for incremental costs and benefits of this option over and above those under the Sustainability Declaration	CBA assumes that ACT would keep ACTHERS for sales transactions, but adopt this option for lease transactions*
Option 4	CBA assumes that Qld would keep the Sustainability Declaration under this option, so zero costs and benefits	CBA assumes that ACT would keep ACTHERS under this option, so zero costs and benefits
Option 5	CBA assumes that Qld would keep the Sustainability Declaration under this option, so zero costs and benefits	CBA assumes that ACT would keep ACTHERS under this option, so zero costs and benefits

Source: Provided by Queensland and Australian Capital Territory Government representatives on the NFEF BIC.

Notes: \*ACTHERS does not currently capture the majority of lease transactions that occur in the ACT. As such, this is an area where RBMD could provide a significant incremental impact. As a simplifying assumption, the analysis assumes that ACTHERS does not capture any lease transactions at all.

**Summary**

A summary of the broad approach taken for the cost-benefit analysis is provided in Table B.7.

Table B.7

**SUMMARY OF APPROACH TO COST-BENEFIT ANALYSIS**

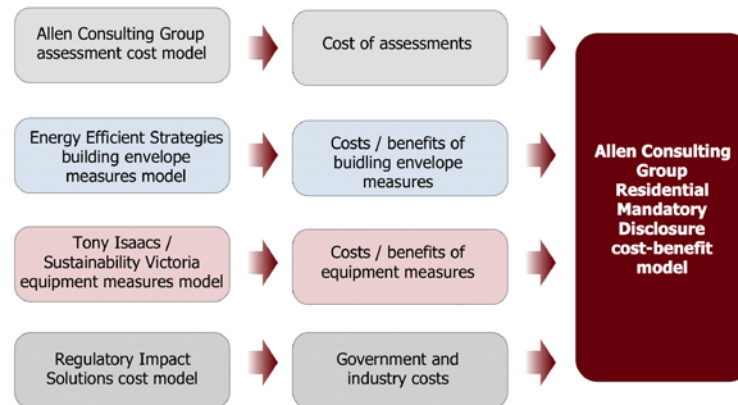
Aspect covered	Degree of coverage
Jurisdictions	New South Wales, Victoria, Queensland, South Australia, Western Australia, Tasmania, Northern territory, Australian Capital Territory, Commonwealth, National aggregate
Sectors	Households, industry, government and society as a whole
Timeframe	2011-12 to 2020-21, where the benefits of assets invested in over that period are counted for the life of those assets (i.e. up to 2040-41 as a maximum)
Options	Options 1 to 5
Costs and benefits	All those for which it is possible to generate a quantifiable estimate
Summary measures	Net present value (NPV), Benefit-cost ratio (BCR) and scheme payback period
Preferred summary measure	Net present value
Existing RBMD-related schemes	The Queensland Sustainability Declaration and the Australian Capital Territory House Energy Rating Scheme are taken into account in the cost-benefit calculations
Uptake rates	Different uptake rates are assumed under each option, and also vary between sales and lease transactions
Sensitivity tests	Discount rate, assessment cost and uptake rate (by means of a break-even analysis)
Types of investments	17 building shell and equipment measures regarded as being representative of the types of investments likely to be encouraged under Residential Building Mandatory Disclosure

Source: Allen Consulting Group.

**B.7 Key inputs**

The CBA model developed for this RIS pulls together summary information from four different input models. Each model represents a detailed and sophisticated analysis of different aspects of the costs and benefit covered in the CBA model. It was necessary to build these models separately as each focuses on a different area of expertise. This approach also allowed for the inclusion of previous analyses that were relevant to the Residential Building Mandatory Disclosure proposal. Each of the different models and the benefits/costs they relate to are depicted in Figure B.1.

Figure B.1

**COST-BENEFIT ANALYSIS INPUT MODELS AND ASSOCIATED COSTS/BENEFITS**

Source: Allen Consulting Group.

These four models, and how they relate to the CBA model, are described in more detail as follows.

**Assessment cost model**

The assessment cost model was developed by the Allen Consulting Group for a previous project for the National Framework for Energy Efficiency Building Implementation Committee relating to Residential Building Mandatory Disclosure. The purpose of the model was to estimate the total number of property transactions likely to be impacted by Residential Building Mandatory Disclosure over the first ten years of operation and the total annual cost to households of the energy and water efficiency assessments.

The model estimates the total number of residential properties sold and leased each year based on data from the Real Estate Institute of Australia, residential bond authorities in each jurisdiction (where applicable) and the Australian Bureau of Statistics. It then applies these estimates to assumed fees charged by assessors for different types of assessments. Different fees were calculated to account for variation between:

- jurisdictions;
- urban and non-urban areas;
- houses and units/apartments;
- new and existing residential buildings; and
- self-assessed versus outsourced assessments (relevant for Options 3 and 4).



Assumptions regarding fees likely to be charged by assessors were developed by the Victorian Department of Sustainability and Environment and agreed to be used as a basis for modelling by members of the National Framework for Energy Efficiency Building Implementation Committee. A full description of the assessment cost model is provided in Appendix D.

#### **Model of equipment measures**

The model of equipment measures was developed by Sustainability Victoria and Tony Isaacs (SV / Tony Isaacs's model) during the policy development phase of the Victorian Energy Efficiency Target (or Energy Saver Incentive) scheme. The model was designed to assess the potential costs and benefits of increased investment in energy and water efficiency measures in Victoria's residential building stock. The model included 15 energy and water efficiency measures likely to be implemented by homeowners under the Energy Saver Incentive scheme. The mix of measures is relevant to both cool and warm climates and the energy saving estimates are derived using Tony Isaacs Victorian Housing Stock model (as updated in December 2008).

This model is highly relevant to the RIS analysis as it contains cost/benefit information on a similar set of energy and water efficiency measures as those applicable Residential Building Mandatory Disclosure. It includes both equipment (e.g. hot water systems and water efficient shower heads) and building shell measures (e.g. insulation and double glazing). However, further work was required for the building shell component of the model in order for it to be accurate for other jurisdictions. This work was undertaken by Energy Efficient Strategies and resulted in a separate model of building shell measures (outlined below).

The equipment component of the SV / Tony Isaacs model was adapted by the Allen Consulting Group to reflect conditions in each of the Australian jurisdictions. In particular, key inputs to the Victorian model were varied to create separate equipment models for each state and territory across Australia. Considerable effort was taken to ensure each of the jurisdictional models reflected key differences, particularly in respect to water and energy costs, climatic conditions (i.e. relative heating and cooling loads), greenhouse gas intensity, appliance penetration and the costs of investments. In order to make the model more relevant to the measures under Residential Building Mandatory Disclosure, dual flush toilets were added.

The SV / Tony Isaacs model was also reviewed by Energy Efficient Strategies to determine ways in which the equipment component of the model could be improved and made more relevant to the RIS analysis. This resulted in a number of recommended changes that were all reflected the final model of equipment measures used for the cost-benefit analysis. The recommended changes are outlined in *Mandatory Disclosure of Energy, Greenhouse and Water Performance of Residential Dwellings: Review and recommend methodology for improvement of the "SV Model"* (EES 2010).

The final model included the following equipment measures: fixed heating, fixed cooling, hot water (high efficiency gas, gas for electric, and solar), lighting (replacement of halogens), low flow shower fittings and dual flush toilets. These are discussed in more detail above.

These measures were selected for the analysis as they were considered to represent the best potential set of equipment measures that a Residential Building Mandatory Disclosure assessment report would provide information on. Further, these measures reflect the currently available technology that can be assessed in an economic model, as there is available data on the potential energy or water savings that can be achieved by each measure (in the average house).

For each of these measures data was collected on the following indicators.

- The current ‘penetration’ of the measure in the housing stock — effectively what proportion of houses already have the measure installed. This indicator sets a base line for the total number of households that may invest in the measure (based on the assumption that any measure already implemented would not be invested in again, though recognising that for some measures, such as fixed heating or cooling, an upgrade to a more efficiency unit is possible). Appendix C contains more detail on assumed penetration rates for each measure.
- The cost of the measure for households. These costs are based on initial estimates within a base model from Sustainability Victoria, with updates to the costs made by ACG through additional research. From these base costs, government rebates have been included to reduce the cost of measures, where these are available to households. Appendix C contains more detail on assumed equipment costs and rebates for each measure.
- The potential energy or water savings that can be achieved through investment in each measure. These estimates are based on Tony Isaacs’ housing stock model developed for Victoria and adapted for the other jurisdictions where relevant. Appendix C contains more detail on assumed energy and water prices, which are an important component to calculating household savings for each measure.

The model of equipment measures includes a discount factor to account for the ‘rebound effect’ or ‘comfort creep’. This is discussed in more detail in Appendix C.16.

#### ***Model of building shell measures***

The model of building shell measures (the EES model) was developed by Robert Foster of Energy Efficient Strategies for the purposes of this RIS analysis. As noted above, it was adapted from a previous model created by Sustainability Victoria and Tony Isaacs during the policy development phase of the Energy Saver Incentive scheme.

- ◆ It was possible to build on this model as it contained cost and benefit information on a similar set of building shell measures (e.g. insulation and double glazing) as those relevant Residential Building Mandatory Disclosure. However, it was necessary to adapt the model so that it could properly account for differences between the jurisdictions. It was also adapted to account for instances where a subset of the housing stock may experience above-average savings, perhaps due to the unusual nature of the subset of buildings. This allowed the analysis to consider households with atypical characteristics, rather than simply focussing on a representative house with average characteristics (as was the case with the SV / Tony Isaacs model).

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The final model included the following building shell measures: insulation (floor, ceiling, ceiling top-up and wall), double glazing, window tinting, external blinds, curtains/pellets and draught proofing. These are discussed in more detail above.

In order to calculate estimates of space conditioning load savings potential, the EES model includes thermal performance simulation modelling which is undertaken on a representative sample of the residential building stock in each state and territory. The model defines the stock in terms of the key parameters that form inputs into the AccuRate thermal performance modelling. The major stock related inputs required for AccuRate that affect performance are as follows:

- Spatial details - floor plan data, ceiling heights, floor areas etc.;
- orientation;
- basic construction types - floor, wall and roof construction combinations;
- insulation;
- glazing - area, type, shading; and
- level of infiltration (air leakage).

It is likely that, within the existing stock, an almost infinite number of variations and combinations of the above factors exist. It was therefore necessary to select a sample of combinations and variations that could adequately represent the actual range of combinations and variations known to be in existence. In carrying out this process, particular regard was given to those factors that were likely to significantly affect thermal performance.

The EES model uses a different housing stock model to that used for the SV / Tony Isaacs's model. It is based on a housing stock developed by EES for their study entitled *Energy Use in the Australian Residential Sector 1986-2020* (DEWHA 2008b). This model draws upon available data to establish a profile of housing in each Australian state over the past 20 years with projections into the future. The available data allowed disaggregation of the stock in each jurisdiction as follows:

- by housing type (detached, semi detached, flats);
- by wall construction (lightweight, brick veneer and heavyweight);
- by floor type (suspended timber or concrete); and
- by insulation (none, ceiling only and both ceiling and wall).

In addition to the above, the EES model included a number of inputs and assumptions developed by the Allen Consulting Group and/or the National Framework for Energy Efficiency Building Implementation Committee (including in relation to investment costs, fuel prices and penetration rates), as outlined in Appendix C. The EES model is outlined in more detail in *Mandatory Disclosure of Energy, Greenhouse and Water Performance of Residential Dwellings: Review and recommend methodology for improvement of the "SV Model"* (EES 2010).

The model of building shell measures includes a discount factor to account for the 'rebound effect' or 'comfort creep'. This is discussed in more detail in Appendix C.16.

### **Cost model**

The government and industry cost model was developed by Regulatory Impact Solutions for the Victorian Department of Sustainability and Environment on behalf of the National Framework for Energy Efficiency Building Implementation Committee. The model calculates estimates of costs to industry and government in Victoria. It also calculates Commonwealth Government costs and costs that are likely to be shared between the states and territories. Cost estimates for Victoria were used as the basis for extrapolating costs for the other jurisdictions. The extrapolation exercise was undertaken by the Allen Consulting Group (discussed in Appendix E).

The government and industry costs model draws on a wide range of information from government and private sector organisations. In particular, the broad structure and key inputs for the model were developed based on information gathered during a workshop in June 2010 with jurisdictional representatives on the National Framework for Energy Efficiency Building Implementation Committee. After the initial workshop, many of the assumptions and calculations were refined and subsequently reflected in the final model.

The model includes costs associated with the following activities: training the trainers, licensing and registration of assessors, compliance and enforcement, enquiries, communications, reporting and assessment tool development. A full description of the cost model is provided in Appendix E.

### **B.8 Calculating costs and benefits**

The approach to calculating each of the different costs and benefits is outlined below.

#### **Costs**

##### *Energy and water efficiency assessment*

Aggregate costs to householders associated with the energy and water efficiency assessment were calculated by the Allen Consulting Group using the assessment cost model (described above). The total cost of assessments for each jurisdiction in each year was estimated by multiplying the total number of property transactions impacted by Residential Building Mandatory Disclosure by the assumed fee charged by assessors. This calculation factored in differences in fees between jurisdictions, urban versus non-urban areas, houses versus apartments, new versus existing properties and assessments that were outsourced versus self-assessed.

Assumptions regarding fees likely to be charged by assessors were developed by the Victorian Department of Sustainability and Environment and agreed to be used as a basis for modelling by the National Framework for Energy Efficiency Building Implementation Committee. The resulting fee estimates are provided in Table B.8.

Table B.8

**ASSUMED FEE FOR ASSESSMENTS (NET OF CERTIFICATE LODGEMENT FEE), BY LOCATION AND RESIDENTIAL BUILDING TYPE**

Option	Urban		Non-urban	
	Houses	Units (or other)	Houses	Units (or other)
Option 1	\$774.00	\$619.20	\$862.00	\$689.60
Option 2	\$172.50	\$138.00	\$232.50	\$186.00
Option 3	\$165.00	\$132.00	\$225.00	\$180.00
Option 4	\$150.00	\$120.00	\$210.00	\$168.00
Option 5	N/A	N/A	N/A	N/A

Source: Allen Consulting Group analysis based on data provided by NFEE BIC.

The results of the model suggest that, on average, 1.1 million properties will be assessed each year over the first ten years of Residential Building Mandatory Disclosure at an average cost per assessment of \$682.20 under Option 1, \$148.88 under Option 2, \$89.94 under Option 3 and \$46.04 under Option 4. The higher assessment cost under Option 1 is driven by the requirement for floor plans to be drawn up in order to undertake the assessment under that option.

*Household investments in energy and water efficiency measures*

Estimates of the average cost per measure in each jurisdiction for each of the 17 measures were calculated in the building shell and equipment models (described above). These estimates were developed by Sustainability Victoria with some updates and adjustments for other jurisdictions based on research by the Allen Consulting Group. The cost estimates were discounted to account for the existence of certain rebates on offer in each jurisdiction and, as such, reflect the actual cost faced by householders when making an investment decision.

These estimates were then aggregated in the CBA model based on the projected number of investments for each measure, which varied depending on the payback and existing penetration etc.

The results of the model suggest that the average cost of an investment across all jurisdictions over the ten-year period will be between \$372 and \$413 depending on the option under consideration. This highlights the fact that, although the model includes a broad range of investments (some of which cost up to \$10,000), the calculations, inputs and assumptions of the model result in an outcome where the average household making an investment focuses on low-cost investments with a high payback.

*Householder time during energy and water efficiency assessment*

As is typical of most situations when a tradesperson attends a property to undertake a service, under Residential Building Mandatory Disclosure, an adult member of the household will need to be present while the assessment is taking place. Moreover, in most instances, this will be during business hours, thus requiring the attending adult to take time off work or domestic duties. As such, the cost associated with this time is included in the analysis.

Estimates of the average time taken by households reflect the predicted time taken to complete an assessment under each option. For all options, other than for Option 5, these estimates were developed by the Victorian Department of Sustainability and Environment, based on information from new home inspections in Victoria, extensive consultation with inspectors in other states, and differences between these other schemes and the proposal. In relation to Option 5, it was assumed that, even though this option does not involve an assessment, it will still impose a cost on householders. This is because those that respond to the advertising and information campaign will need to spend a certain amount of time determining the set of measures that are optimal for their property (a process which is undertaken by the assessor under the other options). The estimate for Option 5 was developed by the Allen Consulting Group.

Estimates of time taken by householders were costed using post-tax average weekly earnings relevant to each jurisdiction. These cost estimates vary from \$24.25 to \$58.26 per assessment depending on the option and jurisdiction under consideration. Assumptions regarding estimates of time taken and average weekly earnings are outlined in more detail in Appendix C.

#### *Real estate agent time to organise assessment*

Although this is not a formal part of Residential Building Mandatory Disclosure requirements, it was assumed that real estate agents may be requested to book an assessment with a registered assessor when a property is being sold or leased. For the purposes of this analysis it was therefore assumed by the Victorian Department of Sustainability and Environment that such a booking would require 10 minutes of a real estate agent's time, based on assumed time required to make one to two phone calls and organise the payment etc. This was costed using average weekly earnings relevant to each jurisdiction plus on-costs and overheads. These cost estimates vary from \$8.85 to \$12.10 depending on the jurisdiction. Assumptions regarding average weekly earnings are outlined in more detail in Appendix C.

#### *Training and insurance for assessors*

Assessors are likely to incur a broad range of costs in delivering energy and water efficiency assessments as part of Residential Building Mandatory Disclosure. The majority of these costs will be recovered through the fees charged to households for the provision of these services (as discussed above). However, costs associated with training and insurance are sunk costs specifically associated with the requirements of Residential Building Mandatory Disclosure and may not be recovered through fees charged to households. As such, these are reflected in the CBA model as costs to the sustainability assessor industry.

Training costs reflect the cost involved in becoming a registered assessor under Residential Building Mandatory Disclosure, noting that the assessment tool will be specific to Residential Building Mandatory Disclosure so will require training by all assessors wishing to become registered. Insurance costs reflect the fact that it will be mandatory to have insurance in order to become registered under Residential Building Mandatory Disclosure. The cost of insurance is assumed to be the mid point between the current Association of Building Sustainability Assessors rate and the rate applicable to Electricians. These cost estimates were aggregated by multiplying through by the predicted number of assessors. This was done separately for each jurisdiction.

These costs were calculated by Regulatory Impact Solutions, as reflected in the industry and government costs model (outlined above). The costs of training the assessors was provided by Sustainability Victoria based on their estimation of what would be required to provide sufficient training for assessors to undertake a proper assessment of a property. In aggregate, the total cost under Option 2 is estimated to be \$1.6 million in the first year of Residential Building Mandatory Disclosure and \$0.2 million annually thereafter in Victoria. The insurance rate is estimated at \$773 per annum per assessor.

*Increased demand for rebates for energy and water efficiency products*

As discussed above, estimates of investment costs to households are discounted to account for rebates offered in different jurisdictions. The assumption is that these rebates would not have been taken advantage of in the absence of Residential Building Mandatory Disclosure, so the demand for these rebates is over and above the demand for these rebates under the bases case. This increase in demand for rebates, comes at a cost to the government and, as such, is reflected as a budgetary impact to government in the CBA model.

The aggregate cost of the product rebates was calculated in the CBA model by multiplying the rebate amounts by the projected number of investments for each measure, which varied depending on the payback and existing penetration etc. Assumed rebates are outlined in Appendix C. The results of the model suggest that the average rebate per investment across all jurisdictions over the ten-year period will be between \$46 and \$58 depending on the option under consideration.<sup>51</sup>

*Administrative costs to government*

Costs under this line item reflect those associated with administering Residential Building Mandatory Disclosure at the state/territory and Commonwealth level. Ultimately, the majority of these costs will be recovered through a certificate lodgement fee payable by assessors upon lodgement of energy rating certificates with the relevant government agency in each jurisdiction (this lodgement fee is only applicable under Option 1, 2 and 3). This fee will subsequently be passed on to households and reflected in a higher assessment fee.

Given the likely existence of full cost recovery under Residential Building Mandatory Disclosure, the majority of the administrative costs will, in reality, not impact on Government budgets, with the exception of Commonwealth Government administrative costs and any other costs that are not recoverable through state/territory-based administrative fees.

The administrative costs included in the analysis do not include any policy development costs (such as the cost of staff involved in developing the Residential Building Mandatory Disclosure proposal) as such activities can be regarded as part of the day-to-day business of government bureaucrats, rather than an incremental cost to government. This is consistent with advice from the Office of Best Practice Regulation.

<sup>51</sup> The average rebate per investment was calculated by dividing estimates of the total government spend on rebates by the total number of investments. This was calculated separately for each option.

Estimates of administrative costs were calculated by Regulatory Impact Solutions, as reflected in the industry and government costs model (outlined above). The model includes government costs at the state-territory level associated with the following activities:

- training the trainers;
- licensing and registration of assessors;
- compliance and enforcement;
- enquiries;
- communications;
- reporting; and
- assessment tool development.

The model also includes costs at the Commonwealth Government level.

The government and industry cost model was developed to reflect likely costs to the Victorian Government. Costs associated with administering Residential Building Mandatory Disclosure in other jurisdictions were not individually developed. Rather, the National Framework for Energy Efficiency Building Implementation Committee agreed that government and industry costs in other jurisdictions would be extrapolated by the Allen Consulting Group based on an agreed approach. This approach is discussed in more detail in Appendix E.

As the estimates from the government and industry cost model were already aggregated, they were reflected in the CBA as line items in the cost-benefit calculation, separately for each jurisdiction. The results of the model suggest that the total upfront costs to government in Australia will range from \$35.6 million under Option 1 to \$8.3 million under Option 5. Total ongoing costs will range from about \$21.8 million per annum under Option 3 to \$7.6 million per annum under Option 4.

Note that the majority of these costs will be recovered from assessors (and ultimately households) through a certificate lodgement fee. Given this, it is foreseeable that the impact to government budgets will be significantly smaller, particularly over the medium- to long-term.

### **Benefits**

#### *Utility bill savings to households*

The key financial benefit associated with Residential Building Mandatory Disclosure will be the savings to households in terms of energy and water bills. More specifically, Residential Building Mandatory Disclosure will provide an incentive for sellers and lessors to make an investment in energy and water efficiency improvements, as properties with a low energy/water rating will be put at a disadvantage in the property market. In addition, sellers and lessors will be provided with clear information on cost-effective investments tailored to the characteristics of their property, which they may not have been aware of prior to the assessment.



The existence of this incentive, coupled with clear information on value-for-money investments, will induce a certain proportion of sellers and lessors to make an investment in energy and water efficiency improvements. Property buyers may also choose to act on the information provided in the assessment as part of the usual process of upgrading that occurs when acquiring a new property. Either way, future occupants of these properties will benefit through lower energy and water bills, with little, or no, impact on lifestyle or comfort. As such, this benefit can be thought of as a productivity improvement to the residential building stock, as an equivalent level of lifestyle and comfort is achieved at a lower net cost in the medium- to long-term.

The quantification of this benefit was based on simulations of appliance and thermal performance of the 17 different energy and water efficiency measures included in the analysis. More specifically, the two models of equipment and building shell measures (outlined above) include detailed information on how each of the measures perform when installed in Australian residential buildings.

These estimates are based on an understanding of the types of building materials (e.g. whether double brick, single brick or weather board and whether insulation is present etc) and equipment (e.g. type of water heater, space heater and air conditioner) that are commonly used/installed in Australia's residential building stock. They are also based on an understanding of typical energy and water usage of Australian households. The resulting outputs of the two models are estimates of average annual energy and/or water savings likely to result following installation of each measure.

Estimates of energy and water savings were valued using information on projected energy and water bills over the period of the analysis (see Appendix C for assumed fuel prices). These estimates were then compared with the upfront costs of the investments to determine a unique payback figure for each.

Overall, the two models provided information on how much each of the 17 energy and water efficiency measures will cost, the average megajoule energy saving and megalitre water saving, the average annual utility bill saving, the average payback in years and the proportion of the housing stock that might benefit from the investment. This information was calculated separately for each jurisdiction and each year of the analysis. All assumptions relevant to these calculations are outlined in Appendix C.

These estimates were aggregated in the CBA model based on projections of the number of households that will respond to Residential Building Mandatory Disclosure under each option. These projections were calculated by applying the assumed uptake rate under each option to the estimated number of assessments. As outlined above, the uptake rate was not applied evenly across all measures. Rather, the model places a higher weighting on investments with a short payback and/or that have a low level of penetration in the existing housing stock. As such, the uptake rate represents the average level of response across all measures. Assumptions behind the uptake rate are discussed in more detail above, and in Appendix C.

The results of the model suggest that the average first year utility bill saving across all jurisdictions over the ten-year period will be between \$188 and \$192 depending on the option under consideration. These savings accrue annually over the assumed life of the assets. Over the broader period of the analysis (up to 30 years), average annual savings are higher due to increasing fuel prices. Estimates of average payback periods range from 2.0 to 2.1 years depending on the option under consideration.

These estimates highlight the fact that the energy and water efficiency measures assumed under the analysis represent a very quick return on investment and provide a reasonable financial return when compared with the upfront cost. It is important to note that these estimates do not factor in the cost to the householder associated with the assessment or costs to industry and government that may also be passed on to householders. Rather, these are factored into the broader analysis.

#### *Reductions in greenhouse gas emissions*

In addition to reduced energy bill savings, investments in energy and water efficiency improvements under Residential Building Mandatory Disclosure will result in reduced electricity and gas consumption in the residential energy sector. Given uncertainty at the time of conducting this analysis over the existence and/or nature of a future emissions trading scheme in Australia, it was assumed that such a scheme will not exist over the period of the analysis. As such, it was also assumed that household energy efficiency improvements under Residential Building Mandatory Disclosure will have a direct impact on greenhouse gas (GHG) emissions at the aggregate level.<sup>52</sup>

Estimates of GHG savings were calculated in the CBA model by applying GHG intensity factors to estimates of total energy saved in gigajoule terms, which were calculated as part of the utility bill saving analysis. Total GHG savings were then valued using the price per tonne of carbon at the time of conducting the analysis according to the European Climate Exchange, which was \$21.41 per tonne in Australian dollars. This calculation is outlined in more detail in Appendix C.

The results of the model suggest that the average first year GHG saving per investment is ranges between 0.52 and 0.55 tonnes depending on the option under consideration. The GHG saving per investment remains relatively consistent across all five options as the same mix of measures is assumed under each. However, aggregate emissions vary widely between the different options given different assumed uptake rates.

<sup>52</sup> Due to the existence of an emissions cap under emissions trading, household action on climate change does not result in reduced emissions, rather it has the effect of lowering the carbon price due to a reduced need for industry to purchase additional certificates. That is, unless Residential Building Mandatory Disclosure is designed such that household action on climate change is factored into on-going reductions in the cap.

### B.9 Key findings

A summary of the key findings for all jurisdictions combined under each option is provided in Table B.9. These findings are discussed in detail in Chapter 5. The results outlined in this table are significantly affected by the assumptions used in the analysis. Uncertainty about these assumptions was dealt with by conducting additional sensitivity and break-even analysis (see Chapter 6). Broadly speaking, however, differences between each option can be explained by differences in the assumed uptake rate and assessment cost under each. The results suggest that Option 2 has the highest net benefit to society (\$919 million), whereas Option 5 has the highest benefit cost ratio (2.8) and shortest societal payback period (8 years). However, Option 5 results in significantly lower total investments and, as such, lowers aggregate energy, water and GHG savings to society. Option 1 results in the highest level of investment, due to the assumed high uptake rate, but has the worst economic return under all three summary measures due to the assumed high assessment cost.

Table B.9

#### SUMMARY OF KEY FINDINGS – NATIONAL AGGREGATE OVER FIRST TEN YEARS OF MANDATORY DISCLOSURE

	Option 1	Option 2	Option 3	Option 4	Option 5
Total costs (\$ millions, NPV)	\$6,457.67	\$2,039.39	\$1,348.17	\$623.66	\$53.71
Total benefits (\$ millions, NPV)	\$3,474.36	\$2,958.20	\$2,164.81	\$1,486.03	\$147.97
Total net benefits (\$ millions, NPV)	-\$2,983.32	\$918.81	\$816.64	\$862.37	\$94.26
Benefit/cost ratio	0.5	1.5	1.6	2.4	2.8
Payback period (years)	30	15	16	9	8
Total number of sales and leases	10,624,872	10,536,661	10,536,661	7,878,881	7,878,881
Total number of investments	2,055,015	1,746,904	1,277,248	879,035	87,422
Total energy savings (GJ)	176,938,899	152,079,349	113,837,019	81,104,211	8,087,894
Total water savings (kL)	329,466,566	278,818,801	201,916,448	136,940,847	13,597,947
Total GHG savings (t CO <sub>2</sub> e)	16,044,767	13,620,580	9,896,089	6,711,157	668,564

Source: Allen Consulting Group analysis.

### B.10 Limitations

In undertaking the analysis, significant effort was put into ensuring that the model covered the range of quantifiable costs and benefits foreseeable under Residential Building Mandatory Disclosure and that estimates of those costs and benefits were based, as far as possible, on available evidence as to their nature, duration and economic value. Despite this, economic modelling by its very nature necessitates the simplification of reality. As such, the outputs of the model should be interpreted as providing a high level guide as to the potential return to households and society more broadly under each option. This is particularly true given the lack of evidence as to the likely uptake rate and assessment cost under Residential Building Mandatory Disclosure.

Uncertainty over the uptake rate was dealt with by conducting a break-even analysis that determines the uptake rate that would be required for Residential Building Mandatory Disclosure to break even in net benefit terms under the option with the highest net present value. Uncertainty over the assessment cost was dealt with through sensitivity testing. Both of these approaches are typical in instances where there is uncertainty over costs and benefits included in a model.

## Appendix C

### Cost-benefit analysis assumptions

The majority of the assumptions used for the cost-benefit analysis were developed by other consultants involved in the project and/or were agreed to be used as a basis for modelling by jurisdictional representatives on the National Framework for Energy Efficiency Building Implementation Committee. The resulting assumptions were then supplied to the Allen Consulting Group. The Allen Consulting Group was not asked to validate or verify the assumptions provided.

The majority of the assumptions reflect the state of play in Australia (and each jurisdiction) in early to mid 2010, around the time the inputs for the analysis were developed. As such, any developments since then that may impact on these assumptions have not been captured in these assumptions.

#### C.11 Time period of the analysis

As is typical for RIS cost-benefit analyses, the focus is on the first ten years of the regulatory proposal under analysis. However, it is important to capture the trajectory of costs and benefits associated with investments in household energy and water efficiency measures. In particular, costs are incurred in the year in which the investment is made, yet benefits accrue annually over the asset life of the investments.

Consistent with this, the cost-benefit analysis captures the costs of assessments and investments undertaken over the first ten years and the benefits of those investments over the asset lives of the investments. As such, the analysis spans a thirty-year time period (2011-2040). Assumed asset lives were based on assumptions by Energy Efficient Strategies for the building envelope measures and Allen Consulting Group for the appliance/equipment measures. Assumed asset lives are provided in Table C.10.

Table C.10

#### ASSUMED ASSET LIVES

Investment type	Asset life
Floor Insulation, Ceiling Insulation, Top Up Ceiling Insulation, Wall Insulation, Double Glazing, Replace Halogens, Low Flow Shower Rose, Dual-flush toilet	20 years
Window tinting, Curtains, External Blinds, Draught Proofing, Fixed Heating, Fixed Cooling, High Efficiency Gas Hot Water, Gas for Electric Hot Water, Solar Replacement Hot Water	10 years

Source: Based on assumptions by Energy Efficient Strategies for the building envelope measures and Allen Consulting Group for the appliance/equipment measures.

**C.12 Discount rate**

For the purposes of calculating net present value estimates, a 7 per cent 'real' discount rate was used with a sensitivity test undertaken for Option 2 using a lower bound discount rate of 3 per cent and an upper bound discount rate of 10 per cent. This was consistent with advice provided by OBPR.

**C.13 Dwelling stock**

Various aspects of the cost-benefit analysis required information on the number of dwellings in each jurisdiction according to whether they are leased or not. These estimates were taken from ABS Census Tables for 2006, as outlined in Table C.11.

Table C.11

**TOTAL NUMBER OF DWELLINGS, BY JURISDICTION AND TENURE**

Jurisdiction	No. dwellings	No. leased dwellings	No. non-leased dwellings
NSW	2,328,218	687,430	1,640,788
Vic	1,781,664	439,028	1,342,636
Qld	1,391,632	432,296	959,336
SA	583,949	153,282	430,667
WA	703,167	191,365	511,802
Tas	181,903	45,579	136,324
NT	55,925	26,733	29,192
ACT	116,918	34,341	82,577
Aust	7,143,376	2,010,054	5,133,322

Source: 2006 Census Tables (ABS 2007c).

**C.14 Fuel prices**

In order to capture the value of household energy and water savings, the analysis includes assumed fuel prices over the thirty-year period starting in 2011. They are based on published fuel price information valid at the beginning of 2010, as validated or supplied by the National Framework for Energy Efficiency Building Implementation Committee member jurisdictions. These prices were then used as a basis for projecting out to 2040. Table C.12 provides a list of the assumed fuel prices, by jurisdiction and fuel type.

Table C.12

**FUEL PRICES — c/MJ IN 2010**

Fuel	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Electricity peak	5.73	5.56	5.42	6.17	5.78	5.46	5.34	5.35
Electricity off-peak	2.30	2.78	2.21	2.60	2.12	2.65	5.34	2.94
Natural gas	1.73	1.50	3.20	2.00	2.98	1.99	2.45	1.99
LP Gas	4.85	4.41	5.19	4.64	4.41	4.79	4.64	4.64
Wood	0.80	0.49	0.80	0.99	0.62	0.49	N/A	0.93

Source: Fuel prices supplied or validated by NFEE BIC.

In considering likely contributors to fuel price increases over the thirty-year period it was determined that the main drivers would be emissions trading and network upgrade costs passed on to consumers through fuel prices, noting that values in the model are reflected in 'real' terms, so it is not necessary to include inflation. Given uncertainty over the nature and likelihood of a national emissions trading scheme, any future impacts of emissions trading on electricity and gas prices were not reflected in the projections, noting that the societal benefits of reduced GHG emissions were captured elsewhere in the model. OBPR were consulted in relation to this assumption and were not opposed to this approach.

Projected fuel price increases, therefore, only reflect the impact of network upgrade costs which are anticipated by many to have a significant impact on energy and gas prices moving forward.<sup>53</sup> For the purposes of this analysis, the impact of increased network upgrade costs on gas and electricity prices was assumed to be 4 per cent per annum. This estimate was based on research commissioned by the Victorian Department of Sustainability and Environment, on behalf of the National Framework for Energy Efficiency Building Implementation Committee. The Allen Consulting Group was not asked to validate or verify this assumption.

The price of wood (used for heating in many jurisdictions) is assumed to increase by two per cent per annum in real terms over the period of the analysis.

Projections were also applied to water prices, which are forecast to rise considerably over the coming years. The current price and the assumed level of increase to 2025 is summarised in Table C.13.

<sup>53</sup> Note that some jurisdictions provided fuel price projections up to 2012 based on known price path agreements. In the instance that these were provided, they were reflected in the relevant years for the relevant jurisdictions.

Table C.13

**WATER PRICES AND ASSUMED INCREASES**

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT
Current water price (c/kL)	190	161.84	184	205	86	77	107.88	390
Assumed increase by 2025	40%	44%	75%	75%	96%*	75%	75%	75%

Source: Fuel prices supplied or validated by NFEE BIC.

Notes: \*based on 38% in 2011, 27% in 2012, 21% in 2013 and 2% per annum thereafter.

**C.15 Greenhouse gas savings**

For the purposes of this analysis, GHG emission savings resulting from investments in energy efficiency measures were valued using the price per tonne of carbon at the time of conducting the analysis according to the European Climate Exchange, which was \$21.41 per tonne in Australian dollars.<sup>54</sup>

An alternative approach would be to assume the existence of an emissions trading scheme and reflect the value of emission savings in increased energy prices and, therefore, higher savings to households investing in energy efficiency measures. However, given uncertainty over proposals for national emissions trading scheme, insufficient information was available to form an assumption on the nature, impact and starting date of such a scheme. As such, it was decided that a more straightforward approach would be to value emissions savings as separate line item in the cost benefit analysis using an indicative carbon price.

Prior to calculating the value of GHG savings, the energy savings estimates were converted into tonnes of GHG emissions using GHG intensity factors from the National Greenhouse and Energy Reporting System Technical Guidelines for the estimation of greenhouse gas emissions by facilities in Australia (DCC 2009). The GHG intensity factors (or GHG coefficients) for 2011 are outlined in Table C.14. For subsequent years projections were used consistent with those adopted for the model of building envelope measures developed by Energy Efficient Strategies.

<sup>54</sup> Based on the European Climate Exchange ICE ECX EUA Daily Futures Contracts Spot settlement price as at 23 June 2010 (<http://www.ecx.eu/>).



Table C.14

**GREENHOUSE COEFFICIENTS 2011 (KGCO<sub>2</sub>-E/MJ OF ENERGY)\***

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT
Electricity	0.2616	0.3191	0.2730	0.2610	0.2302	0.0288	0.2195	0.2617
Gas	0.0661	0.0573	0.0573	0.0707	0.0589	0.0600	0.0571	0.0661
LPG	0.0650	0.0650	0.0650	0.0650	0.0650	0.0650	0.0650	0.0650
Firewood Closed	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044	0.0044
Firewood Open	0.0577	0.0577	0.0577	0.0577	0.0577	0.0577	0.0577	0.0577

Source: DCC 2009.

Notes: \*For every megajoule of energy produced through fossil fuel sources, a proportion of greenhouse gas emissions (CO<sub>2</sub>-e) is emitted to the atmosphere. For example, one megajoule of electricity produced in Victoria will emit approximately 0.32 kilograms of CO<sub>2</sub>-e into the atmosphere. Greenhouse coefficients are factors used to convert units of energy (e.g. megajoules) into units of Greenhouse gases (e.g. kilograms of CO<sub>2</sub>-e). The Australian Greenhouse Office annually determines each State's greenhouse coefficient for different fuel sources.

**C.16 Accounting for the 'rebound effect'**

According to Energy Efficient Strategies '[t]he "rebound effect" or "comfort creep" is the perceived tendency of householder to increase their minimum comfort requirements following the application of building shell improvement measures.' (EES 2010, p.60). Given the existence of the 'rebound effect', it is common practice to apply discount factors when modelling the benefits of household energy efficiency. Consistent with this, both the Tony Isaacs / Sustainability Victoria Equipment Measures Model and the Energy Efficient Strategies Building Shell Measures Model include correction factors to account for the rebound effect. Where applicable, these models apply a 30 per cent discount factor. This is explained in more detail in the Energy Efficient Strategies model documentation (2010). The included discussion concludes as follows:

Determination of an appropriate rebound factor for application in the Australian context is hampered by a lack of available data, particularly data pertinent to the wide range of jurisdictions examined in this study. Studies from Victoria and the ACT as well as further a field tend to place the rebound effect somewhere in the range of 0 – 30% noting that this is likely to vary depending on factors such as the socio-economic status of the household and the severity of the local climate. Considering the results of these various studies it was decided that a conservative rebound effect of 30% would be assumed for this study.

EES 2010, p. 62

**C.17 Valuing time spent by households and real estate agents**

This analysis includes costs to householders and the real estate industry in organising and participating in the energy and water efficiency assessments required under Residential Building Mandatory Disclosure. More particularly, it is assumed that real estate agents will make the booking for assessors to attend a property and that a member of the household at the assessed property will need to be available at the property during business hours whilst the assessment is being undertaken.

Estimates of the average time taken by households reflect the predicted time taken to complete an assessment under each option. For all options, other than for Option 5 (see below), these estimates were developed by the Victorian Department of Sustainability and Environment, based on information from new home inspections in Victoria, extensive consultation with inspectors in other states, and differences between these other schemes and the proposal. Estimates of real estate agents' time were also developed by the Victorian Department of Sustainability and Environment, based on assumed time required to make one to two phone calls and organise the payment etc.

The resulting estimates are provided in Table C.15.

Table C.15

**AVERAGE TIME TAKEN BY REAL ESTATE AGENTS AND HOUSEHOLDS TO ORGANISE AND PARTICIPATE IN ASSESSMENTS**

Option	Real estate agents	Households
Option 1	10 mins	110 mins
Option 2	10 mins	55 mins
Option 3	10 mins	40 mins
Option 4	10 mins	30 mins
Option 5	N/A	60 mins

Source: Developed by Regulatory Impact Solutions (2010) and the Allen Consulting Group.

Note that the analysis reflects the fact that a certain proportion of assessments under Options 3 and 4 will be undertaken by householders themselves. National Framework for Energy Efficiency Building Implementation Committee estimated that 50 per cent would be self assessed under Option 3 and 90 per cent self assessed under Option 4.

Note also, it is assumed that, even though Option 5 does not involve an assessment, it will still impose a cost on householders. This is because those that respond to the advertising and information campaign will need to spend a certain amount of time determining the set of measures that are optimal for their property (a process which is undertaken by the assessor under the other options). Such search costs were assumed to involve one hour of a householder's time. The analysis adjusts this to account for the fact that only a very small proportion of households respond to the campaign under Option 5.

The above estimates of time taken by households and real estate agents were valued using estimates of average weekly earnings, adjusted for the different circumstances of households and real estate agents. Estimates of average weekly earnings (AWE) were taken from the ABS publication Average Weekly Earnings Australia (2010). The hourly rate for real estate agents was calculated by dividing AWE by 35 hours and then multiplying by 1.75 to account for business on-costs and overheads — consistent with the Victorian Guide to Regulation (DTF 2007).

The hourly rate for households was estimated by calculating post-tax AWE using the Australian Tax Office Tax Calculator ([www.ato.gov.au/scripts/taxcalc/calc\\_standard\\_hire.asp](http://www.ato.gov.au/scripts/taxcalc/calc_standard_hire.asp)) and then dividing this by 35 hours. This approach was consistent with advice provided by OBPR. The resulting average hourly rates for each jurisdiction are provided in Table C.16.

Table C.16

**VALUE OF HOUSEHOLDER'S AND REAL ESTATE AGENT'S TIME (HOURLY RATE)**

State	Households	Real estate agents
NSW	\$28.13	\$63.33
VIC	\$27.02	\$60.43
QLD	\$27.39	\$61.39
SA	\$25.69	\$56.90
WA	\$29.75	\$67.41
TAS	\$24.25	\$53.13
NT	\$26.65	\$59.49
ACT	\$31.78	\$72.61

Source: ABS 2010; and Australian Tax Office Tax Calculator ([www.ato.gov.au/scripts/taxcalc/calc\\_standard\\_hire.asp](http://www.ato.gov.au/scripts/taxcalc/calc_standard_hire.asp))

**C.18 Uptake rates**

Uptake rates represent the proportion of all Residential Building Mandatory Disclosure assessments that result in an investment in energy and water efficiency measures. The uptake rates under each option were developed by the National Framework for Energy Efficiency Building Implementation Committee. The uptake rates represent average uptake rates across all energy and water efficiency measures. The cost-benefit analysis uses these uptake rates as a basis for determining specific uptake rates for each measure, depending on a number of factors such as investment payback and existing penetration.

Expected levels of uptake under Residential Building Mandatory Disclosure are a key area of uncertainty. Indeed, there is limited evidence from existing schemes on the degree to which disclosure of information through an assessment stimulates investment in energy and water efficiency measures (Haydock and Arbon 2008). In discussing the impact of certification schemes (or Energy Performance Certificate (EPC) schemes), a European study released in early 2010 finds:

Introduction of EPC schemes in Member States has without doubt increased the public awareness of energy consumption in the existing building stock. It is difficult to quantify the impact on the energy consumption in this segment of the building stock, as there is no information to identify which energy saving measures have been implemented due to an EPC and which would have been implemented anyway. Experiences gained from EPCs are still limited and further surveys of the topic are thus needed to be able to gain knowledge about the impact of certification and how owners/occupiers can best be stimulated to take up measures.

(Energy Performance of Buildings Directive 2010, p.6)

One study conducted in 2006 on the impacts of the Australian Capital Territory Home Energy Rating Scheme (ACTHERS) suggests that the response rate for that

scheme is up to 30 per cent (EnergyConsult 2006).<sup>55</sup> This study involved a series of four focus groups and 300 telephone interviews with home buyers/sellers in the ACT. A key conclusion from the study is that:

... many home buyers act on the energy efficiency recommendations in the EER [energy efficiency rating] report and 31% have implemented or plan to implement improvements to the energy efficiency of their housing, some of which may profoundly affect their dwelling's energy efficiency on a long term basis.

EnergyConsult 2006, p.3

More specifically, the results of the telephone survey conducted for the study 'indicated [that] 16 per cent of buyers had made such improvements already while a further 15 per cent intended to make such improvements' (Energy Consult 2006, p.27).

This study provides some indication of the level of uptake that might be expected under Residential Building Mandatory Disclosure. In the absence of any other studies, the results of this study were used as the basis for developing the uptake rates for each option. More specifically, the minimum uptake rate under Residential Building Mandatory Disclosure was assumed to be 15 per cent – broadly consistent with the estimated proportion of buyers that had made an investment under ACTHERS in 2005 – whereas the maximum uptake rate was assumed to be 30 per cent – broadly consistent with the estimated proportion of buyers that had planned to, or had made, an investment under ACTHERS.<sup>56</sup>

Using the 15 per cent as a minimum and 30 per cent as a maximum for Options 1 to 4, the National Framework for Energy Efficiency Building Implementation Committee developed a series of uptake rates for these options with the idea that some will be more effective than others in encouraging householders to make an investment. The existence, or lack thereof, of a number of benefits under each option was considered when developing the uptake rate under each. The benefits were as follows:

- benefit of having an assessor-based rating – having a qualified assessor undertake the assessment improves the credibility of the information provided;
- benefit of having a rating for comparative purposes – the existence of an advertised rating (and its level of quality) provides an incentive for households to make improvements such that the advertised rating of their house is more appealing to potential buyers/lessors;
- benefit of software driven rating model for use by assessors – the existence of a software driven rating model operated by a qualified assessor improves the quality and persuasiveness of the information regarding the unique benefits to the householder of investing in energy and water efficiency measures; and
- benefit of robust detailed thermal assessment – the existence of a software driven rating model with a detailed thermal assessment further improves the quality and persuasiveness of the information regarding the unique benefits to the householder of investing in energy and water efficiency measures.

<sup>55</sup> This study was undertaken on the ACT House Energy Rating Scheme (ACTHERS).

<sup>56</sup> Although ACTHERS only covers thermal performance, it is assumed that a similar uptake rate would be expected for non-thermal (equipment) elements. As such, assumed uptake rates are applied consistently across both the building shell and equipment measures.

For example, under Option 4, most assessments will be undertaken by households (it is assumed that only 10 per cent will outsource the assessment to a qualified assessor due to a misunderstanding of how to complete it) and the assessment will not result in an advertised rating and will be relatively basic (just a checklist of measures already installed in the property). As such, it is assumed that the minimum level of uptake (i.e. 15 per cent) should be expected under this option.

The uptake rates resulting from the analysis of the above benefits, and how each contributes to the overall uptake rate under each, are outlined in Table C.17 for Options 1 to 4.

Table C.17  
**COMPONENTS OF ASSUMED UPTAKE RATES FOR SALES TRANSACTIONS\***

Incremental benefits	Option 1	Option 2	Option 3	Option 4
Minimum average uptake rate	15%	15%	15%	15%
Benefit of having an assessor-based rating	+3%	+3%	+1%	—
Benefit of having a rating for comparative purposes	+5%	+5%	+4%	—
Benefit of improved rating model for use by assessors	+3%	+3%	—	—
Benefit of robust detailed thermal assessment	+4%	—	—	—
<b>Assumed uptake rate</b>	<b>30%</b>	<b>26%</b>	<b>20%</b>	<b>15%</b>

Source: Provided by NFEF BIC.  
 Notes: \*This table indicates how each of the incremental benefits contributes to the overall assumed uptake rate, which is based on a minimum uptake rate of 15 per cent and a maximum uptake rate of 30 per cent. For example, the uptake rate for Option 1 is composed of the minimum uptake rate of 15 per cent and added to that is an additional 3, 5, 3 and 4 per cent for each of the benefits respectively resulting in a total assumed uptake rate of 30 per cent.

As Option 5 represents an entirely different approach to encouraging investments in energy and water efficiency measures (i.e. a voluntary approach), a different method was adopted for developing the uptake rate. According to research by the Department of Climate Change and Energy Efficiency, the Energy Bill Benchmarking Regulatory Impact Statement suggests a break-even uptake rate for the provision of information to householders of 1.5 per cent (EnergyConsult 2010). Absent any further research, the uptake rate under Option 5 is assumed to be equivalent to this.<sup>57</sup>

<sup>57</sup> Note that, as with the other options, this uptake rate is applied to the total number of sales and leases each year in order to calculate aggregate costs and benefits. An alternative approach would be to apply the uptake rate to the total number of households likely to be exposed to the information/advertising campaign under Option 5. However, given that such information was not available at the time of conducting the analysis, a simplified approach was adopted where it was assumed that only property sellers and lessors would respond to the campaign by making an investment. This was justified on the understanding that the large portion of property upgrades generally occur when a property is being turned over (i.e. sold or leased).

Given that the focus of ACTHERS is predominantly on sales transactions, the above uptake rates were only applied to sales transactions in the cost-benefit modelling. Given the existence of split incentives between landlords and tenants, the degree of uptake for lease transactions was assumed to be half that of sale transactions. As such, the assumed uptake rates for lease transactions under Options 1 to 5 were 15 per cent, 13 per cent, 10 per cent, 7.5 per cent and 0.75 per cent respectively.

The assumed uptake rates were applied annually, and were assumed to be constant over the period of the analysis, i.e. any fluctuation in investment levels between the years (e.g. as a result of increases in fuel prices) was smoothed over the period.

### C.19 Market penetration

As stated above, the analysis takes account of the fact that the energy and water efficiency measures are not applicable across the entire housing stock, as many households will already have the measure installed. As such, a key input to the analysis was data on penetration rates (proportion of housing stock with measure installed) for each measure in each jurisdiction. The penetration rates included in the model were also varied over time, reflecting the influence of other factors that may increase investment in these measures (such as other government policies including the introduction of progressively higher ratings in the Building Code of Australia, improvements in technology which make the measures more attractive for households, etc). Estimates of market penetration are largely based on the results of the 2008 ABS Environmental Issues: Energy Use and Conservation survey (2008).

#### *Insulation*

The ABS survey suggests that at least 61.5 per cent of Australian dwellings have some form of insulation installed (ABS 2008). As Table C.18 demonstrates, the market penetration for insulation varies considerably, with a much higher proportion of dwellings in hotter climates having no insulation at all.

Table C.18

#### **BUILDINGS WITH INSULATION BY STATE AND TERRITORY (%)**

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Australia
With insulation	53.4	73.8	46.9	76.6	69.4	74.6	48.4	77.3	61.5
Without insulation	25.7	8.5	30.0	8.6	16.2	10.9	21.2	4.6	19.2
Did not know	21.0	17.7	23.1	14.7	14.3	14.5	30.4	18.2	19.3

Source: ABS 2008.

The survey also found that, in the majority of cases where insulation was known to have been installed, it was mostly installed in the ceiling (98.0 per cent). The proportion of buildings that had wall insulation varied considerably, from 8 to 43.7 per cent, with an average of 30.7 per cent of buildings reported to have wall insulation. Table C.19 provides a state and territory breakdown of where insulation has been installed in buildings that have insulation.

Table C.19

**WHERE INSULATION WAS INSTALLED AS A PROPORTION OF ALL BUILDINGS WITH INSULATION (%)**

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Australia
Roof/ceiling	97.2	98.7	95.9	99.4	99.3	97.8	98.6	97.9	98.0
Walls	33.4	38.8	23.4	32.4	8.0	32.0	19.2	43.7	30.7
Floor	1.5	1.3	0.4			4.9	0.0	4.3	1.1
Other/unsure	0.3		0.3	0.0		0.5		0.9	0.2

Note: 'Other/unsure' category reflects the proportion of households that were unable to report what type of insulation is installed in their home.

Source: ABS 2008.

Since the ABS survey was conducted in 2008, a significant proportion of Australia's housing stock has been insulated under the Australian Government's Home Insulation Program. To account for this, a sensitivity analysis is conducted to determine how robust the overall findings are to changes in the assumed proportion of the housing stock that is uninsulated. This approach was adopted due to the lack of information on the proportion of the housing stock in each jurisdiction that was effectively insulated under the Home Insulation Program, that is, information that would be required in order to update the estimates from the ABS survey.

It should be noted that floor insulation is only relevant for buildings with a subfloor space, as is the case in houses with wooden floors. According to Sustainability Victoria estimates, approximately 33 per cent of Victorian dwellings have wooden floors. In the absence of detailed information for the other states, it has been assumed that this is also true for the stock of buildings in all other jurisdictions.

**Window fittings**

The ABS survey suggests that window fittings have achieved different levels of penetration in different jurisdictions (ABS 2008). For example, window film is considerably more popular in the warmer climates of the Northern Territory and Queensland. Table C.20 provides a state and territory breakdown of the incidence of energy efficient window fittings installed throughout Australia.

Table C.20

**TYPES OF WINDOW FITTINGS BY STATE AND TERRITORY (%)**

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Australia
Window coverings designed to stop heat or cold	38.3	59.0	41.4	61.7	43.1	56.4	28.9	59.9	47.1
Outside awnings or shutters	26.7	40.8	29.5	43.7	26.2	8.7	14.8	30.4	31.6
Window film	6.8	4.9	19.0	9.0	14.3	8.5	13.3	6.0	9.7
Double glazing	2.3	4.0	1.5	2.4	1.4	5.8	1.8	5.1	2.6
Louvre windows	3.0	3.0	9.8	4.1	3.3	1.5	25.9	1.6	4.6
None of the above	44.7	24.5	34.5	20.7	37.7	35.1	41.6	31.2	34.6

Source: ABS 2008.

***Draught proofing***

There is very little information on the number of dwellings that could benefit from draught proofing products and services. Information for Victoria suggests that 80 per cent of dwellings constructed prior to 1991 that had not been renovated or demolished, plus 40 per cent of dwellings constructed between 1991 and 2005, require draught proofing services. Based on these assumptions the proportion of the housing stock that could potentially benefit from draught proofing measures in 2011 was assumed to be 52.1 per cent. In the absence of detailed information for the other states, it has been assumed that this is also true for the stock of dwellings in the other jurisdictions, with the exception of the Northern Territory and Queensland. For the Northern Territory and Queensland, this figure was revised downwards following feedback from these jurisdictions.

***Water Heating***

The ABS survey suggests differing fuel sources for water heating across the jurisdictions (ABS 2008). Mains gas and off-peak electricity are the main fuel sources for water heating. Table C.21 provides a state and territory breakdown of fuel sources for hot water systems installed throughout Australia.

Table C.21

**FUEL SOURCES FOR HEATING WATER BY STATE AND TERRITORY (%), MARCH 2008**

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Australia
Peak electricity	10.9	6.3	10.6	3.6	17.7	46.8	34.3	21.8	11.0
Off-peak electricity	47.1	22.3	49.3	37.1	2.0	31.8	2.6	25.2	35.0
Mains gas	23.9	64.2	7.4	43.8	52.3		1.2		34.6
LPG/bottled gas	1.6	1.5	4.3	2.4	6.1		4.6		2.6
Wood	0.3		0.1	0.2	0.7		0.0	0.0	
Solar	5.0	2.6	8.5		21.5	2.5	54.3		7.1
Did not know	12.1	5.4	20.5	7.6	3.8	14.2	5.7	13.1	10.9

Note: Data collected through interviews using the ABS Labour Force Survey. The sample used for these estimates was 12,965 households. Reported estimates for 'did not know' reflect the proportion of respondents who were not aware of the type of hot water system they had installed at the time of interview.

Source: ABS 2008.

***Space Heating***

The ABS survey suggests that more than three quarters (77 per cent) of Australian dwellings had at least one heater in 2008 (2008). In the cooler states and territories — Victoria, South Australia, Tasmania and the Australian Capital Territory — over 90 per cent dwellings have some form of heating. Table C.22 provides a state and territory breakdown of the proportion of households with heating across Australia.



Table C.22

**PROPORTION OF DWELLINGS WITH HEATING BY STATE AND TERRITORY**

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Australia
Dwellings with heating ('000)	2061.3	2004.0	720.6	590.3	677.6	195.8	8.4	126.3	6384.1
Proportion of all dwellings (%)	76.1	97.4	44.6	91.2	81.9	97.1	13.7	98.4	77.4

Source: ABS 2008.

Where heaters are in use, the type of heating varies considerably. This variation will impact on the potential for improved energy efficiency from heating. As Table C.23 demonstrates gas-fuelled heaters have the greatest level of penetration.

Table C.23

**TYPES OF HEATERS INSTALLED BY STATE AND TERRITORY (%)**

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Australia
<b>Electric</b>									
Ducted	3.8	2.9	2.3	1.8	2.0	2.5	0.0	4.5	3.0
Not ducted	22.7	8.9	18.2	12.8	9.2	37.2	6.9	16.1	15.8
Floor slab	0.6	1.4		0.4		1.9	0.0	2.3	0.8
<b>Gas</b>									
Ducted	3.9	40.0	0.6	4.2	4.4	1.0	0.0	41.3	15.6
Not ducted	24.3	31.2	4.5	29.2	40.7	2.4	49.7	17.7	25.6
<b>Reverse cycle</b>									
Ducted	10.5	2.0	12.3	15.9	8.0	5.4	0.0	6.2	8.0
Not ducted	20.1	4.2	48.7	21.2	17.5	21.1	28.2	7.1	18.0
<b>Wood</b>									
Combustion	12.1	8.5	9.1	10.9	13.3	22.8	9.8	3.8	10.8
Fire-open	1.2	0.5	1.9	1.2	1.3	2.5	0.0	0.0	1.1
Pot-belly	0.4	0.3	1.8	0.9	2.3	1.6			0.8
<b>Oil (oil-fired)</b>	0.4	0.1		1.4	0.7				0.5
<b>Other</b>	0.0	0.0	0.0	0.2			0.0	0.0	0.0

Source: ABS 2008.

**Space Cooling**

The ABS survey suggests that, on average, 66.4 per cent of Australian dwellings have an air conditioner (2008). The penetration of these appliances varies from 35.5 per cent in Tasmania to over 90 per cent in the Northern Territory. There has been significant growth in the penetration of air conditioners over the last 14 years. On average, the number of dwellings with air conditioners has doubled. Table C.24 provides a state and territory breakdown of the proportion of households with cooling throughout Australia.

Table C.24

**PROPORTION OF DWELLINGS WITH AN AIR CONDITIONER BY STATE AND TERRITORY (%)**

	NSW	VIC	QLS	SA	WA	TAS	NT	ACT	Australia
Proportion of all dwellings with cooler in use	58.3	69.5	64.6	85.0	80.0	35.5	92.9	62.3	66.4
Growth in market penetration since 1994	91.2	88.6	270.4	38.5	126.5	1429.2	22.5	275.5	105.5

Source: ABS 2008.

Where air conditioners are in use, the type of technology varies considerably. This variation will impact on the potential for improved energy efficiency from air conditioning. As Table C.25 demonstrates, reverse cycle/heat pump air conditioners have the greatest level of penetration.

Table C.25

**WHERE THERE IS AN AIR CONDITIONER — PROPORTION BY TYPE BY STATE AND TERRITORY (%)**

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Australia
Reverse cycle/heat pump	77.7	41.9	70.2	59.4	52.0	96.1	21.3	56.3	61.3
Refrigerated	8.5	28.4	21.1	13.2	13.5		58.7		17.6
Evaporative	11.6	27.1	4.4	26.2	33.6	2.7	17.5	32.3	18.6
Did not know	2.2	2.6	4.3	1.3	0.9		2.5		2.4

Source: ABS 2008.

**Lighting**

Little information exists on the number of halogen light fittings installed in Australian homes or how this might vary by jurisdiction. When developing their model, Sustainability Estimates for Victoria suggest that the average penetration of halogen light fittings is 5.1 per dwelling across the whole of the Victorian housing stock. In the absence of detailed information for the other states/territories, it has been assumed that this is also true for the stock of dwellings in all other jurisdictions.

**Water saving appliances**

Results from the 2007 ABS *Environmental Issues: People's Views and Practices* survey suggest that 47.1 per cent of showerheads and 74.8 per cent of toilets within the residential sector could be classed as water efficient (2007). Market penetration by state and territory for different types of shower heads and toilets is summarised in Table C.26.

Table C.26

**SHOWER HEADS AND TOILETS BY TYPE AND STATE AND TERRITORY (%)**

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Australia
<b>Type of shower head</b>									
Water-efficient only	50.1	44.2	49.2	49.6	41.5	41.4	28.5	45.5	47.1
Regular only	41.5	47.6	41.2	44.5	49.3	51.2	63.2	44.4	44.4
Both water-efficient and regular	7.9	7.8	9.0	5.7	9.0	6.5			8.0
No showers at dwelling	0.5	0.4	0.6	0.2	0.2	0.9			0.5
<b>Type of toilet</b>									
Dual-flush only	67.1	79.2	78.6	79.6	81.3	63.7	78.4	69.1	74.8
Regular only	24.3	14.7	16.4	16.3	15.3	27.7	16.6	21.6	18.8
Both dual-flush and regular	8.4	5.9	4.4			8.2	5.0		6.1

Source: ABS 2007.

**Growth assumptions**

Penetration rates for a number of the available energy and water efficiency investments are likely to grow over the period of the analysis, regardless of the influence of Residential Building Mandatory Disclosure (e.g. as a result of other government policies and programs). For the purposes of this analysis, linear growth rates have been assumed based on historical trends derived from ABS data. These growth rates were not developed with particular reference to existing or planned government policies and their potential impact on growth in penetration; as such information was not readily available at the time of conducting the analysis. Table C.27 summarises the annual growth rate that has been assumed over the 10-year period for which investments are made.

Table C.27

**ANNUAL GROWTH RATES IN THE UPTAKE OF ENERGY AND WATER EFFICIENCY INVESTMENTS (%)**

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Insulation	0.48	0.28	1.78	0.15	0.82	1.07	1.02	0.00
Double Glazing	0.00	0.10	0.00	0.05	0.00	0.33	0.18	0.10
Window tinting	0.00	0.18	0.22	0.00	0.00	0.52	0.53	0.08
Curtains	0.12	0.22	0.50	0.12	0.35	0.48	0.52	0.07
External Blinds	0.00	0.30	0.00	0.28	0.60	0.00	0.33	0.10
Draught Proof	0.12	0.22	0.50	0.12	0.35	0.48	0.52	0.07
Solar hot water	0.43	0.33	0.48	0.00	0.97	0.32	0.30	0.00
Water-efficient shower head	4.05	3.38	3.55	3.08	1.73	1.92	1.13	3.80
Dual-flush toilet	3.33	2.32	3.48	1.98	2.23	2.28	2.37	3.45

Source: Allen Consulting Group analysis based on ABS 2007 and ABS 2008.

### **C.20 Investment costs**

The costs for the various measures considered in this report were developed by Sustainability Victoria for that state, with some updates based on ACG research. These prices were varied for the other states using information from the Rawlinson's Construction Cost Guide for Housing on relative prices for different energy and water efficiency measures (2009). The analysis assumes static 'real' prices for measures over the ten-year period. Table C.28 provides a summary of these costs.

Table C.28

**AVERAGE COST OF ENERGY AND WATER EFFICIENCY MEASURES INCLUDED IN THE ANALYSIS**

Measures from analysis	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Floor and Ceiling none (\$/m2)	\$8.97	\$9.00	\$8.83	\$8.66	\$9.14	\$9.25	\$9.14	\$8.97
Ceiling poor (\$/m2)	\$7.58	\$7.50	\$7.27	\$7.11	\$7.77	\$7.66	\$7.77	\$7.58
Wall (\$/m2)	\$20.74	\$20.00	\$19.42	\$18.60	\$22.06	\$21.15	\$22.06	\$20.74
Double glazing (\$/m2)	\$596.29	\$550.00	\$661.32	\$661.32	\$716.43	\$659.12	\$716.43	\$596.29
Curtain and pelmet (\$/m2)	\$145.53	\$145.00	\$142.90	\$142.90	\$142.90	\$142.90	\$142.90	\$145.53
Ext blinds (\$/m2)	\$90.00	\$90.00	\$90.00	\$90.00	\$90.00	\$90.00	\$90.00	\$90.00
Window tinting (\$/m2)	\$80.00	\$80.00	\$79.44	\$78.32	\$79.44	\$80.56	\$79.44	\$80.00
Draught arrestor & weather strip external doors	\$24.96	\$25.00	\$23.10	\$22.33	\$25.66	\$26.55	\$25.66	\$24.96
Seal unnecessary wall vents	\$10.50	\$10.00	\$9.21	\$8.81	\$11.88	\$10.10	\$11.88	\$10.50
Draft stoppa for ceiling exhaust fan	\$62.07	\$60.00	\$61.14	\$59.14	\$64.86	\$62.62	\$64.86	\$62.07
Weather strip windows	\$26.11	\$20.00	\$22.08	\$22.94	\$22.81	\$24.85	\$22.81	\$26.11
Seal cracks and gaps	\$26.24	\$25.00	\$23.02	\$22.03	\$29.70	\$25.25	\$29.70	\$26.24
Chimney damper	\$258.64	\$250.00	\$254.75	\$246.42	\$270.27	\$260.91	\$270.27	\$258.64
Estimated average per dwelling (per sqm)	\$3.24	\$3.00	\$2.95	\$2.89	\$3.35	\$3.21	\$3.35	\$3.24
Ducted gas heating + duct upgrade	\$4,034.84	\$3,900.00	\$3,974.03	\$3,844.15	\$4,216.14	\$4,070.27	\$4,216.14	\$4,034.84
Ducted reverse-cycle heating	\$10,345.74	\$10,000.00	\$10,189.82	\$9,856.78	\$10,810.63	\$10,436.58	\$10,810.63	\$10,345.74
Room gas heating	\$1,862.23	\$1,800.00	\$1,834.17	\$1,774.22	\$1,945.91	\$1,878.59	\$1,945.91	\$1,862.23
Room reverse-cycle heating	\$2,586.44	\$2,500.00	\$2,547.46	\$2,464.20	\$2,702.66	\$2,609.15	\$2,702.66	\$2,586.44
Ducted refrigerative + duct upgrade	\$10,345.74	\$10,000.00	\$10,189.82	\$9,856.78	\$10,810.63	\$10,436.58	\$10,810.63	\$10,345.74

MANDATORY DISCLOSURE OF RESIDENTIAL BUILDING ENERGY, GREENHOUSE AND WATER PERFORMANCE

Measures from analysis	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Room refrigerative	\$2,586.44	\$2,500.00	\$2,547.46	\$2,464.20	\$2,702.66	\$2,609.15	\$2,702.66	\$2,586.44
5 star gas hot water storage system	\$865.62	\$890.00	\$914.38	\$877.81	\$926.58	\$877.81	\$926.58	\$865.62
5 star gas instantaneous hot water system	\$1,183.10	\$1,200.00	\$1,233.80	\$1,183.10	\$1,267.61	\$1,183.10	\$1,267.61	\$1,183.10
Solar electric or heat pump system	\$4,295.00	\$4,295.00	\$4,295.00	\$4,295.00	\$4,295.00	\$4,295.00	\$4,295.00	\$4,295.00
Gas boosted solar system	\$4,595.00	\$4,595.00	\$4,595.00	\$4,595.00	\$4,595.00	\$4,595.00	\$4,595.00	\$4,595.00
Cost of installing CFL downlight fitting	\$57.21	\$50.00	\$63.06	\$50.45	\$62.16	\$60.36	\$62.16	\$57.21
Estimated cost of upgrading shower rose	\$63.00	\$63.00	\$65.38	\$61.81	\$68.94	\$63.00	\$68.94	\$63.00
Estimated cost of upgrading to a 4.5/3 litre dual flush toilet (fully installed)	\$482.58	\$490.00	\$497.42	\$475.15	\$512.27	\$482.58	\$512.27	\$482.58

Source: Prices are based on information provided by Sustainability Victoria. Victorian prices were varied for the other jurisdictions using information from the Rawlinson's Construction Cost Guide for Housing on relative prices for different energy and water efficiency measures (2009).

### C.21 Rebates and other incentive schemes

Rebates and other incentive schemes are designed to encourage investment in particular products by improving the payback period for individual consumers. There are currently a number of rebate offers and incentive schemes operating at a jurisdictional or national level that improve the payback for individual householders. A list of these rebates was developed in consultation with the National Framework for Energy Efficiency Building Implementation Committee. These rebates were reflected in the payback periods calculated for the purposes of the analysis.

The list includes rebates from the following programs:

- Commonwealth Government rebate for solar hot water (part of stimulus package measures), assumed to finish by 2012;
- the Victorian Residential Rebate Program and the Energy Saver Incentive Scheme;
- Queensland Government rebate for solar hot water;
- South Australia Water rebates;
- Northern Territory Government rebates; and
- South Australian Government rebate for solar hot water.

The Australian Government also encourages the uptake of solar hot water through the Renewable Energy Target. Under this program, renewable energy certificates (RECs) can be created for certain types of equipment such as solar water heaters. For the purposes of this analysis, it is assumed that solar hot water systems generate \$1200 worth of RECs and that this program will be ongoing.

Table C.29 summarises the rebates that were included in the analysis. Note that this list reflects rebates assumed for the first year of the analysis (2011-12). Most of these rebates are included for future years with the exception of Commonwealth Government rebate for solar hot water (which was assumed to cease in 2011) and select state/territory government rebates that are due to expire over the coming years.

Table C.29

**REBATES INCLUDED IN THE ANALYSIS FOR 2011-12\***

Measure	NSW <sup>#</sup>	Vic.	Qld	WA	SA	Tas	ACT	NT
Replacing electric hot water system with a solar or heat pump hot water system (Commonwealth Government rebate, RECS, State and Territory rebates)	\$1000 + \$1200 + = \$2,200	\$1000 + \$1200 + \$255 = \$2,455	\$1000 + \$1200 + \$600 = \$2,800	\$1000 + \$1200 = \$2,200	\$1000 + \$1200 = \$2,200	\$1000 + \$1200 = \$2,200	\$1000 + \$1200 + \$500 = \$2,700	\$1000 + \$1200 = \$2,200
Switch from electric to gas hot water	\$0	\$495	\$0	\$0	\$0	\$0	\$0	\$0
Water efficient shower head	\$0	\$45	\$0	\$0	\$30	\$0	\$0	\$0
Water efficient toilet	\$0	\$50	\$0	\$0	\$150	\$0	\$0	\$100
Floor insulation	\$0	\$173	\$0	\$0	\$0	\$0	\$0	\$0
Draught proofing	\$0	\$75	\$0	\$0	\$0	\$0	\$0	\$0
Fixed heating	\$0	\$120	\$0	\$0	\$0	\$0	\$0	\$0
Fixed cooling	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Halogen replacement	\$0	\$30	\$0	\$0	\$0	\$0	\$0	\$0

Source: NFEE BIC.

Notes: \*This list reflects rebates assumed for the first year of the analysis (2011-12). Most of these rebates are included for future years with the exception of Commonwealth Government rebate for solar hot water (which was assumed to cease in 2011) and select state/territory government rebates.

<sup>#</sup>NSW Home Saver Rebates were not included in the analysis as they are due to expire on 30 June 2011.



## Appendix D

### Assessment cost model

#### D.22 Description

The assessment cost model was developed by the Allen Consulting Group for a previous project for the National Framework for Energy Efficiency Building Implementation Committee relating to the proposed implementation of Residential Building Mandatory Disclosure. The purpose of the model was to estimate the number of sales/leases transactions likely to be impacted by Residential Building Mandatory Disclosure over the first ten years of Residential Building Mandatory Disclosure and the total annual cost to those households of the energy and water efficiency assessments.

#### **Number of sales/lease transactions impacted by Mandatory Disclosure**

The model estimates the total number of dwellings sold and leased each year based on the following data:

- Dwellings sold: Total number of house and other dwelling sales (by State), *Australian Property Market Indicators 2007-08*, Real Estate Institute of Australia (2009);
- Dwellings leased: Residential bond lodgements<sup>58</sup> –
  - Victorian Residential Tenancies Bond Authority, *RTBA Annual Reports* (2005-06, 2006-07, 2007-08);
  - South Australian Commissioner for Consumer Affairs, *Annual Report 2007-08*;
  - New South Wales Office of Fair Trading, *Rental Bond Board Annual Reports* (2003-04, 2004-05, 2005-06, 2006-07, 2007-08);
  - Queensland Residential Tenancies Authority, *RTA Annual Report 2007-08*;
  - ACT Office of Rental Bonds, *Department of Justice and Community Safety Annual Reports* (2006-07 and 2007-08);
- New dwelling commencements: Number of Dwelling Unit Commencements, States and Territories, *Dwelling Unit Commencements*, ABS Cat. No. 8750.0 (2009);
- Proportion of dwellings that are detached houses versus other dwellings: Tenure type and landlord type by dwelling structure, by state/territory, 2006 Census of Population and Housing, Cat. No. 2068.0 (2007c); and
- Dwellings by dwelling type, tenure type and locality, Dwelling characteristics (by locality), *ABS Census of Population and Housing 2006 Quick Stats*.

<sup>58</sup> The Northern Territory, Tasmania and Western Australia do not require lodgement of residential bonds with government authorities, or have only just introduced such a requirement. As such, it was necessary to estimate the number of leased properties in each of these jurisdictions. These estimates were calculated by taking the average leases to sales ratio from the other jurisdictions and multiplying this by total sales for Northern Territory, Tasmania and Western Australia.

These data were used to develop estimates for the past few years (up to 7 years prior to 2011-12) of the total number of sales and leases in the following subgroups:

- sales and leases by state/territory;
- sales leases in urban versus non-urban areas;
- sales and leases of detached houses versus other dwellings (mostly units); and
- sales of new dwellings versus existing dwellings.

It was necessary to estimate sales and leases for each of these sub-groups as these were regarded as they key areas where fees charged by energy and water efficiency assessors may differ.

Estimates of the number of sales and leases in each of these groups were then projected forward for the period 2011-12 to 2020-21 using a combination of population growth for each state/territory and a three year moving average based, where possible, on sales and leases data from previous years. This process resulted in a forecast of total sales and leases in each state and territory, by location, dwelling type and whether property was new or not.

The next step was to convert these projections into estimates of the number of sales and lease transactions that will require an energy and water efficiency assessment under Residential Building Mandatory Disclosure. More particularly, given that the proposal includes validity periods for energy and water efficiency rating certificates, any properties with a valid certificate will not require a new assessment unless significant changes have been made to the property.

The assumed validity periods were agreed to be used as a basis for modelling by members of the National Framework for Energy Efficiency Building Implementation Committee. These assumptions are listed in Table D.30.

Table D.30

**RATING CERTIFICATE VALIDITY PERIOD ASSUMPTIONS**

Option	Assumption
Options 1 to 4 – leased properties	The initial assessment is valid until changes that affect its performance are made to the property.  Cost-benefit modelling assumes a new certificate would be obtained every 5 years on average. This is based on the average replacement time for a fixed appliance that affects the energy, greenhouse and water performance rating of the building being 5 years.
Options 1 to 2 – sold properties	The initial assessment is valid until changes that affect its performance are made to the property.  Cost-benefit modelling assumes a new certificate would be obtained each sales transaction. This is based on the average turnover rates of property sales across Australia being greater than 5 years and the average replacement time for a fixed appliance that affects the energy, greenhouse and water performance rating of the building being 5 years.
Options 3 to 4 – sold properties	A new assessment is required each time a property is sold. Cost-benefit modelling assumes a new certificate would be obtained each sales transaction.
Option 5	Not applicable as assessments are not required under Option 5

Source: Provided by NFEI BIC.

In basic terms, the assumptions imply that, on average, every sold property will require an assessment and approximately 50 percent of leased properties will require an assessment, given that the average turnover rate is around 2.7 years for leased properties. This is based on estimates of the average turnover of sold and leased properties, as provided in Table D.31.

Table D.31

**AVERAGE TURNOVER PERIODS FOR DWELLING SALES AND LEASES (YEARS)**

Jurisdiction	Leases	Sales
New South Wales	2.39	18.89
Victoria	2.49	13.96
Queensland	1.95	12.40
South Australia	3.07	17.95
Western Australia	2.48	9.99
Tasmania	3.27	22.36
Northern Territory	3.44	6.62
Australian Capital Territory	2.73	13.74

Source: Allen Consulting Group analysis of ABS 2006 Census Tables (2007c).

These property turnover estimates were used to convert the sales and leases projections for each jurisdiction into projections of sales and lease transactions that will require an energy and water efficiency assessment under Residential Building Mandatory Disclosure. This analysis took account of the fact that all sold/leased properties will require an assessment over the first few years of Residential Building Mandatory Disclosure.

***Total cost of assessments under Residential Building Mandatory Disclosure***

Estimates of the total cost of energy and water efficiency assessments were based on the assumed fees charged by assessors under each option and the projections of sales and lease transactions that will require an assessment under Residential Building Mandatory Disclosure.

Assumptions regarding fees likely to be charged by assessors under Residential Building Mandatory Disclosure were developed by the Victorian Department of Sustainability and Environment and agreed to be used as a basis for modelling by members of the National Framework for Energy Efficiency Building Implementation Committee.

Assumed fees for assessing an average, three-bedroom standard detached house in urban area were \$784 under Option 1, \$183 under Option 2, \$180 under Option 3 and \$150 under Option 4. Assumed fees are significantly higher under Option 1 as it is necessary to have floor plans drawn up in order to undertake this form of assessment.<sup>59</sup> Assumptions and calculations behind these fee estimates are outlined in Table D.32.

<sup>59</sup> As the ACT already requires property sellers to obtain plans for their properties as part of the building inspection process, assessments are assumed to be far less for the ACT under Option 1. In particular, the ACT estimates that assessments will cost approximately \$400 under Option 1. This estimate has been used for the purposes of the analysis.

Table D.32

**ASSESSOR FEES – ASSUMPTIONS AND CALCULATIONS (VICTORIAN PRICES)**

Assumptions	Calculations
<b>Option 1 – Assessor-based full thermal simulation</b>	
<ul style="list-style-type: none"> <li>Qualified assessors undertake assessment - visits home</li> <li>Assessment of:                             <ul style="list-style-type: none"> <li>(a) thermal shell aspect of the assessment ( requires a floor plan to be available or to be prepared)</li> <li>(b) fixed heating/ cooling/ hot water/ lighting/ drying and outdoor areas plus water/renewables/ peak load/ pools</li> </ul> </li> <li>Assumed use of technology (laser measurement connected to plan drawing device) to speed drawing of house plans.</li> </ul>	<ul style="list-style-type: none"> <li>Average charge out for time taken at \$132/hr.</li> <li>Average costs considering known elements:                             <ul style="list-style-type: none"> <li>(a) \$198 - 90 min to draw plan (if required)</li> <li>(b) \$400 – 180 min for thermal shell assessment where plans available (to measure up and enter thermal shell data – technology supported)</li> <li>(c) \$176 - 80 min to assess other elements, data entry and travelling</li> </ul> </li> <li><b>Estimated assessor fee: \$774 per average house</b></li> </ul>
<b>Option 2 – Assessor-based without use of thermal shell simulation tool</b>	
<ul style="list-style-type: none"> <li>Qualified assessors undertake assessment - visits home</li> <li>Assessment of thermal shell/ fixed heating/ cooling/ hot water/ lighting/ drying and outdoor areas (plus water/renewables/ peak load/ pools</li> <li>Floor plan not required</li> <li>Faster in house data collection time (thermal shell) than option 1</li> </ul>	<ul style="list-style-type: none"> <li>Average time of 115 minutes including data collection, data entry, and travel</li> <li>Average charge out for time taken \$90/hr due to reduced skills required (Charge out time cost \$80/hr-100/hr - \$90/hr on average)</li> <li><b>Estimated assessor fee: \$172.50 per average house</b></li> </ul>
<b>Option 3 - Online self assessment</b>	
<ul style="list-style-type: none"> <li>Qualified assessors may undertake assessment - visits home. However, a proportion of householders may undertake a self assessment using simplified version of assessment approach under Option 2</li> <li>Assessment of thermal shell/ fixed heating/ cooling/ hot water/ lighting/ drying and outdoor areas (plus water/renewables/ peak load/ pools as checklist)</li> </ul>	<ul style="list-style-type: none"> <li>Assume self assessment longer but would be costed at lower hourly rate (assume 2 hours at \$80 per hour (Charge out time cost \$80/hr-100/hr - \$80/hr on average)</li> <li>Assume assessment by a qualified assessor would be at a higher rate but take a shorter time - minimum call-out fee of \$150 (likely equal to option 4 costs). Additional data collection and lodgement will add slightly to this cost (assume \$15)</li> <li><b>Estimated assessor fee: \$165 per average house)</b></li> </ul>
<b>Option 4 - Checklist assessment</b>	
<ul style="list-style-type: none"> <li>Self assessment using checklist – may use a modified Sustainability Declaration</li> <li>A proportion of households will use a qualified assessors to undertake assessment - visits home</li> <li>Assessment of thermal shell/ fixed heating/ cooling/ hot water/ lighting/ drying and outdoor areas (plus water/renewables/ peak load/ pools)</li> </ul>	<ul style="list-style-type: none"> <li>Home visits require a minimum call-out fee reflected in current market rates - covers booking, travel, insurance and cost recovery</li> <li><b>Estimated assessor fee: \$150 per average house</b></li> </ul>

Source: Regulatory Impact Solutions (2010).

Notes: These costs are likely to vary widely between different jurisdictions. The estimated assessor fee under each option does not include the certificate lodgement fee. As the ACT already requires property sellers to obtain building information, including plans where available, for their properties as part of the building inspection process, average assessment costs are assumed to be significantly less for the ACT than those modelled under Option 1. In particular, the ACT estimates that assessments will cost approximately \$400 under Option 1, assuming that an assessment tool and protocol suitable for existing homes is used.

As stated above, the assumed fees provided by the Victorian Department of Sustainability and Environment were based on the costs associated with assessing an average existing, three-bedroom standard detached house in urban area in Victoria. As such, these fees needed to be differentiated to account for other dwelling types, dwellings in non-urban areas, dwellings in other jurisdictions and new properties. Fees applicable to these other circumstances were calculated by extrapolating from the fee estimates outlined above. In addition, it was necessary to scale back the fee estimates for Option 1 to 3 slightly as they factor in a certificate lodgement fee.<sup>60</sup> This was necessary as government administrative costs would otherwise be double-counted.

In differentiating fees for assessments in non-urban areas, it was assumed that such assessments would involve, on average, an additional 20 minutes of travel time to and from an assessment (an additional 40 minutes in total). In differentiating fees for assessments involving non-detached dwellings (mostly units and apartments), it was assumed that such assessments would be 20 per cent cheaper as such dwellings are generally smaller in size and faster to assess. It was also assumed that fees for assessments on new dwellings would be 20 per cent cheaper, as they are likely to be easier to assess given the availability of design and construction material information.

These assumptions were developed by the Allen Consulting Group and the Victorian Department of Sustainability and Environment and agreed to be used as a basis for modelling by the National Framework for Energy Efficiency Building Implementation Committee. The above fees (net of the certificate lodgement fee) were adjusted on this basis. The resulting fee estimates are provided in Table D.33/ Table B.8.

Table D.33

**ASSUMED FEE FOR ASSESSMENTS (NET OF CERTIFICATE LODGEMENT FEE), BY LOCATION AND DWELLING TYPE**

Option	Urban		Non-urban	
	Houses	Units (or other)	Houses	Units (or other)
Option 1	\$774.00	\$619.20	\$862.00	\$689.60
Option 2	\$172.50	\$138.00	\$232.50	\$186.00
Option 3	\$165.00	\$132.00	\$225.00	\$180.00
Option 4	\$150.00	\$120.00	\$210.00	\$168.00
Option 5	N/A	N/A	N/A	N/A

Source: Allen Consulting Group analysis based on data from Regulatory Impact Solutions (2010) and assumptions provided by NFEI BIC.

<sup>60</sup> The working assumption behind the Residential Building Mandatory Disclosure proposal was that all government administrative costs will be recovered through a certificate lodgement fee payable by assessors upon lodgement of energy rating certificates with the relevant government agency in each jurisdiction.

In calculating the total cost of assessments, it was also necessary to account for the fact that many households may chose to self assess under Option 3 and 4. The proportion of assessments undertaken by householders themselves was assumed to be 50 per cent under Option 3 and 90 per cent under Option 4. For Option 3, this was based on the expectation that a number of people will choose not to self-assess. For example, under the BASIX self-assessment scheme used for new buildings in New South Wales, 20 per cent of households chose to self-assess and 80 per cent chose to outsource. However, it is assumed a larger portion of people will choose to self-assess under Residential Building Mandatory Disclosure as it also covers existing dwellings. For Option 4, the proportion of self assessments is based on the expectation that a small number of people will choose not to self-assess, as is found to be the case with the Queensland Sustainability Declaration Checklist scheme. However, it is assumed a larger portion of people will choose to self-assess than under Option 3.

The time taken by householders to undertake the self-assessment was assumed to be 2.5 hours under Option 3 and 1.5 hours under Option 4. These assumptions were developed by the Victorian Department of Sustainability and Environment and agreed to be used as a basis for modelling by the National Framework for Energy Efficiency Building Implementation Committee. These were used as the basis for developing an estimate of the cost associated with self-assessments in terms of householder time, resulting in estimates of \$67.55 under Option 3 and \$40.53 under Option 4 for detached dwellings (non-detached dwellings were assumed to be 20 per cent less time-consuming).<sup>61</sup>

In projecting assessment fees and costs out over the period of the analysis, it was assumed that the 'real' cost of these assessments will decline by a total of 10 per cent over ten years. This is based on the assumption that assessors (and self assessing households) will become more efficient at undertaking the assessments due to natural learning over time. The assumption of learning rates is particularly relevant in this case, as the assessments will be based on a new rating tool that may take some time to get used to.

As the estimates of assessment fees and costs were based on information relevant for Victoria, it was necessary to adjust these fees/costs for wage differences in other jurisdictions. The focus is on wages as labour forms the large majority of the total value of assessor fees and is the basis for valuing householder time. As such, the total cost of assessments for each jurisdiction were scaled according to an index of wage relativity for each jurisdiction, as compared with Victoria, based on Australian Bureau of Statistics Estimates of average weekly earnings, as provided in Table D.34.

<sup>61</sup> These cost estimates are based on an hourly rate of \$27.02. See the assumptions appendix for an explanation of how this rate is calculated.

Table D.34

**CALCULATING AN INDEX OF WAGE RELATIVITY**

Jurisdiction	Weekly full-time adult ordinary time earnings	Index of wage relativity
NSW	\$1,266.60	1.05
VIC	\$1,208.60	1.00
QLD	\$1,227.70	1.02
SA	\$1,138.00	0.94
WA	\$1,348.10	1.12
TAS	\$1,062.60	0.88
NT	\$1,189.80	0.98
ACT	\$1,452.20	1.20

Source: ABS, 2010.

**D.23 Results*****Number of sales/lease transactions impacted by Mandatory Disclosure***

Estimates of the total number of property transactions likely to be impacted under Residential Building Mandatory Disclosure are provided in Table D.35. Variation between the jurisdictions is mostly driven by differences in the size of the dwelling stock and, therefore, the overall number of sales and leases. Differences over time are driven by two factors, one is population growth and the other is the validity period of the certificates. More specifically, sales transactions grow steadily over time in line with population growth, whereas leases fall by approximately half between 2012-13 and 2014-15 as previously assessed properties that still have a valid certificate come back onto the market. On average, a total of 1.1 million properties are assessed each year over the ten year period.



Table D.35

**ESTIMATED NUMBER OF SALES AND LEASE TRANSACTIONS IMPACTED BY RBMD ('000)**

		2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
NSW	Sales	128.7	130.3	133.5	132.3	133.0	134.7	135.8	137.0	137.6	138.7
	Leases	287.0	287.6	196.7	140.5	141.2	142.1	143.1	144.3	145.5	146.5
VIC	Sales	131.9	133.3	135.6	138.1	138.7	138.9	140.3	141.8	143.0	144.0
	Leases	183.1	184.7	139.0	93.7	94.5	95.3	96.0	96.8	97.6	98.4
QLD	Sales	119.7	122.0	122.7	124.9	126.7	128.9	130.7	132.5	134.4	136.3
	Leases	238.7	236.4	96.5	97.4	99.1	100.7	102.2	103.6	105.0	106.5
SA	Sales	35.7	36.4	35.8	36.3	36.4	36.5	36.6	36.7	36.9	37.0
	Leases	52.1	52.0	52.3	33.6	32.3	32.4	32.5	32.6	32.7	32.8
WA	Sales	57.8	55.4	56.8	59.6	59.9	60.1	60.6	61.7	62.7	63.2
	Leases	80.5	81.6	60.8	41.4	42.0	42.5	43.0	43.6	44.1	44.6
TAS	Sales	8.8	9.0	9.1	9.4	9.2	9.2	9.2	9.3	9.3	9.3
	Leases	14.1	14.1	14.1	10.6	9.3	9.3	9.3	9.4	9.4	9.4
NT	Sales	5.8	5.3	5.5	5.8	5.8	5.9	5.9	6.0	6.1	6.1
	Leases	8.1	8.2	8.3	6.9	5.9	5.9	6.0	6.1	6.1	6.2
ACT	Sales	8.6	8.7	8.6	8.7	8.8	8.9	8.9	8.9	9.0	9.1
	Leases	13.5	13.7	12.1	7.5	7.6	7.6	7.7	7.7	7.8	7.8
Aust	Sales	497.2	500.3	507.7	515.3	518.4	523.0	528.2	533.8	539.0	543.8
	Leases	877.0	878.2	579.8	431.5	431.7	435.8	439.9	444.0	448.2	452.3
<b>Total</b>		<b>1,374.1</b>	<b>1,378.4</b>	<b>1,087.5</b>	<b>946.8</b>	<b>950.1</b>	<b>958.8</b>	<b>968.1</b>	<b>977.8</b>	<b>987.3</b>	<b>996.1</b>

Source: Allen Consulting Group analysis.

These estimates align reasonably closely with expectations in terms of relative population across the jurisdictions, with the exception of the Queensland and Victoria. The number of assessments on leased properties is higher in Queensland relative to Victoria, despite a higher population in Victoria and a larger dwelling stock (around 1.8 million in Victoria compared with 1.4 million in Queensland). This is likely driven by the relatively high turnover rate of leased properties in Queensland.

***Total cost of assessments under Residential Building Mandatory Disclosure options***

Estimates of the total cost of assessments under Residential Building Mandatory Disclosure are provided in Table D.36. Variation between the jurisdictions is mostly driven by differences in the size of the dwelling stock and, therefore, the overall number of sales and leases, whereas variation between the options is driven by differences in the assumed fees and costs of householder time under each.

Note that these estimates take account of the fact that schemes already exist in Queensland and the Australian Capital Territory (i.e. these schemes are part of the assumed base case for the cost-benefit analysis). As such, estimates for these jurisdictions represent incremental costs over and above existing costs under these schemes. The approach taken in estimating these incremental costs is outlined in Appendix A. In addition, as the ACT already requires property sellers to obtain building information, including plans where available, for their properties as part of the building inspection process, average assessment costs are assumed to be significantly less for the ACT than those modelled under Option 1. In particular, the ACT estimates that assessments will cost approximately \$400 under Option 1, assuming that an assessment tool and protocol suitable for existing homes is used. This estimate was used for the purposes of the Option 1 analysis.

The costs listed in Table D.36 are for 2011-12. These costs fall by approximately 33 per cent between 2012-13 and 2014-15, consistent with the property transaction estimates in Table D.35 above, and level out for the remainder of the period, falling slightly every year as the positive impact of population growth is overpowered by the negative impact of the assumed assessor efficiency gains. The average annual cost of Residential Building Mandatory Disclosure over the ten year period is \$707 million under Option 1, \$151 million under Option 2, \$97 million under Option 3 and \$36 million under Option 4.

Table D.36

**ESTIMATED TOTAL COST OF ASSESSMENTS IN 2011-12 (\$MILLIONS)**

		Option 1	Option 2	Option 3	Option 4
NSW	Sales	\$91.8	\$21.0	\$14.0	\$6.1
	Leases	\$199.7	\$45.0	\$30.2	\$13.3
VIC	Sales	\$93.1	\$21.3	\$14.2	\$6.2
	Leases	\$128.5	\$28.9	\$19.4	\$8.5
QLD	Sales	\$78.1	\$13.8	\$7.3	\$0.0
	Leases	\$160.5	\$27.6	\$14.7	\$0.0
SA	Sales	\$25.7	\$5.9	\$3.9	\$1.7
	Leases	\$37.1	\$8.4	\$5.6	\$2.5
WA	Sales	\$41.4	\$9.5	\$6.3	\$2.8
	Leases	\$58.4	\$13.3	\$8.9	\$3.9
TAS	Sales	\$6.5	\$1.5	\$1.0	\$0.4
	Leases	\$10.3	\$2.4	\$1.6	\$0.7
NT	Sales	\$4.0	\$0.9	\$0.6	\$0.3
	Leases	\$5.9	\$1.4	\$0.9	\$0.4
ACT	Sales*	\$1.7	\$0.0	\$0.0	\$0.0
	Leases	\$4.9	\$2.1	\$1.4	\$0.0
Aust	Sales	\$342.2	\$73.9	\$47.4	\$17.5
	Leases	\$605.4	\$129.1	\$82.8	\$29.3
<b>Total</b>		<b>\$947.6</b>	<b>\$203.0</b>	<b>\$130.2</b>	<b>\$46.7</b>

Source: Allen Consulting Group analysis.

Notes: \*It is possible that assessments for sold properties may be more expensive than is assumed to be the case under Option 2 and 3 if additional "national" components are added to the scheme. However, these costs have not been quantified or included in the analysis. The current ACT scheme does not align with Option 2 and has a thermal performance assessment closer to Option 1. However, for the purposes of modelling base costs are assumed as for Option 2 and additional performance elements and greater stringency in the rating is tested in Option 1.

## *Appendix E*

### Government and industry cost model

#### **E.24 Description**

The government and industry cost model was developed by Regulatory Impact Solutions for the Department of Climate Change and Energy Efficiency. This appendix provides a summary of the documentation provided with the model (Regulatory Impact Solutions 2010).

The model calculates estimates of costs to industry and government in Victoria. It also calculates Commonwealth Government costs that are likely to be shared between the states and territories. Cost estimates for Victoria were used as the basis for extrapolating costs for the other jurisdictions. The extrapolation exercise was undertaken by the Allen Consulting Group (discussed below).

The government and industry costs model draws on a wide range of information from government and private sector organisations. In particular, the broad structure and key inputs for the model were developed based on information gathered during a workshop in June 2010 with jurisdictional representatives on the National Framework for Energy Efficiency Building Implementation Committee. After the initial workshop, many of the assumptions and calculations were refined and subsequently reflected in the final model.

The model includes costs associated with the following activities:

- industry
  - insurance;
  - training;
- government
  - training the trainers;
  - licensing and registration of assessors;
  - compliance and enforcement;
  - enquiries;
  - communications;
  - reporting; and
  - assessment tool development.

These costs are discussed in more detail below. Cost estimates are provided for Option 2 as examples. A summary of cost estimates under all options is provided at E.25 of this appendix.

**Industry costs****Insurance**

Insurance costs reflect the fact that it will be mandatory to have insurance in order to become registered under Residential Building Mandatory Disclosure. The cost of insurance is assumed to be the mid point between the current Association of Building Sustainability Assessors rate and the rate applicable to Electricians. These cost estimates were aggregated by multiplying through by the predicted number of assessors. This was done separately for each jurisdiction. The insurance rate is estimated at \$773 per annum per assessor. In aggregate, the total cost under Option 2 is estimated to be around \$0.4 million annually thereafter in Victoria.

**Training**

Training costs reflect the cost involved in becoming a registered assessor under Residential Building Mandatory Disclosure, noting that the assessment tool will be specific to Residential Building Mandatory Disclosure so will require training by all assessors wishing to become registered.

The costs of training the assessors was provided by Sustainability Victoria based on their estimation of what would be required to provide sufficient training for assessors to undertake a proper assessment of a property. In aggregate, the total cost under Option 2 is estimated to be around \$1.6 million in the first year of Residential Building Mandatory Disclosure and around \$0.2 million annually thereafter in Victoria.

**Government costs – states/territories****Training the trainers**

In addition to the cost of training the assessors, there will be a cost associated with training the trainers. The training of the assessors will likely take place within existing training institutions such as TAFEs. Therefore the people that run those courses will require instruction from someone on how to run and assess the course. It was anticipated that this will need to be done at around 20 institutions, with one per year after that to refresh trainers and potentially train at new institutions. The costs of training the trainers were provided by Sustainability Victoria and were estimated to be in the order of \$6,000 per session. The cost of supplying on-line material under Option 2 was estimated to be \$40,000 per year in Victoria. In aggregate, the total cost under Option 2 is estimated to be \$160,000 in the first year of Residential Building Mandatory Disclosure and \$46,000 annually thereafter in Victoria.

**Licensing and registration**

Residential Building Mandatory Disclosure will require all energy and water efficiency assessors (if required) to be licensed and registered. It was anticipated that registration of assessors in the host department's system would require two members of staff: one Victorian Public Service Grade 2 for 4 hours per application and one Victorian Public Service Grade 3 for one hour per application. In addition, further resources would be required to renew the registration of each assessor, every year. Costings to develop these estimates were obtained from Consumer Affairs Victoria. The total cost under Option 2 is estimated to be around \$0.5 million in the first year and around \$0.1 million annually thereafter in Victoria.

### *Compliance and enforcement*

Under Residential Building Mandatory Disclosure, compliance and enforcement of standards will be required to ensure the appropriate level of quality is being maintained. A number of tasks were identified by Consumer Affairs Victoria based on their experience in dealing with the building industry in Victoria.

Cancellation of assessor's certification may be required from time to time and this has been included in the costs.

It is expected that compliance checks will be undertaken on advertising to ensure that the appropriate information is being presented in real estate advertising. This was estimated as one person checking advertising in Victoria, one day per week.

It was expected that the main form of enforcement would be via a warning notice. This is a relatively cheap way to remind the assessors of the required standards and it was estimated that one in 10 assessors will get such a warning each year.

Reactive compliance is expected to be required in order to respond to complaints. Proactive compliance was assumed in the form of an annual short audit involving a number of staff, based on similar audits undertaken on other schemes.

Complaints handling recognises the greater resources required to deal with a complaint rather than a general enquiry. It was assumed that 3.6 per cent of all enquiries would be complaints, as advised by Consumer Affairs Victoria.

Prosecutions are expected to be rare, and it was assumed that such prosecutions would only relate to the cancellation of an assessor's accreditation. It was assumed that 10 per cent of cancellations will be disputed and that these disputes will be heard at the Victorian Civil and Administrative Tribunal (VCAT). Estimates of the average cost of resolving a dispute at VCAT were taken from a previous regulatory impact statement relating to compulsory referral to conciliation on building disputes in Victoria.

The total cost under Option 2 is estimated to be around \$0.9 million in the first year and around \$0.8 million annually thereafter in Victoria.

### *Enquiries*

Under Residential Building Mandatory Disclosure, a phone line will be established in each jurisdiction to deal with enquiries. It was assumed that the enquiry line will receive calls from assessors, estate agents and conveyancers. However, this was expected to reduce after time. For example, this was the experience in Queensland where they had a very high incidence on enquiries in the first few months that dropped off dramatically after that.

Householders were assumed to have a much higher requirement for assistance over the inquiry line, particularly for Options 3 and 4, which involve a self assessment. With no prior training or experience, householders are unlikely to be able to accurately complete the assessment without assistance. The Queensland government however have advised that this assumption may require further consideration given evidence that they have obtained suggesting an overall low level of enquiries compared with the number of declarations completed.

A small additional cost was assumed to cover software licences for a call centre queuing program necessary to establish the general inquiries line.

Estimates of the costs associated with the enquiries line were developed by the Victorian Department of Sustainability and Environment based on the information supplied by Consumer Affairs Victoria in relation to managing building industry enquiries and disputes in Victoria. In addition, information was provided from the Australian Capital Territory Government, based on experience with ACTHERS.

The total cost under Option 2 is estimated to be around \$0.5 million in the first year and around \$0.3 million annually thereafter in Victoria.

#### *Assessment tool cost*

Residential Building Mandatory Disclosure, a new assessment tool and associated on-line system will be developed. The tool will enable assessors to easily record the information collected at an assessment and easily generate and store an appropriate certificate. It was assumed that the cost of the initial tool development will be shared among the states and territories while each is likely to incur an additional cost to integrate the tool into their existing systems. Shared initial tool development costs were apportioned across the different jurisdictions using the COAG funding formula (see below).

The Victorian Department of Sustainability and Environment commissioned detailed scoping and costing of the tool by technical experts. The costing included:

- on-line application environment development costs
- solution hosting, project management and testing; and
- modifications to the AccuRate (Bers Pro / AccuRate / First Rate) program.

The assessment tool cost estimates were taken directly from this costing exercise. The total cost under Option 2 is estimated to be around \$2.2 million in the first year of and around \$1 million annually thereafter in Victoria.

#### *Communications cost*

Under Residential Building Mandatory Disclosure, a significant advertising campaign will be required in order to raise awareness and educate about peoples' obligations. Communications cost estimates were provided by Sustainability Victoria and include costs associated with brochures, maintenance on a common website that directs users to individual, state-based websites, and TV campaigns for the first two years.

The total cost under Options 1 to 4 is estimated to be around \$2.2 million in the first two years of and around \$0.3 million annually thereafter in Victoria.

Communication and campaign costs are particularly relevant to Option 5, as the focus of this option is on the provision of information via media communications as apposed to information flowing from an assessment. For this option, a separate calculation was undertaken by the Department of Climate Change and Energy Efficiency and Universal McCann to determine the upfront costs of the proposed campaign under this option, see Table E.37. The resulting estimate is \$4.8 million for upfront costs in the first year. This was apportioned across the jurisdictions using the COAG funding formula (see below). Ongoing costs were assumed to be equivalent to ongoing communications costs under the other options, i.e. \$2.2 million in the second year and \$0.3 million annually thereafter.

Table E.37

**COMMUNICATIONS IMPLICATIONS AND CONSIDERATIONS UNDER OPTION 5**

**Background**

Under Option 5, government would conduct a public education program and publicity campaign to increase awareness of the importance of improving the energy, greenhouse and water performance for residential buildings, and the opportunities that home owners, tenants and landlords have to improve the performance of buildings.

The objective of this option would be to provide more information than is currently available to the public, including during property transactions. However, it would not facilitate a direct comparison between two properties when they are sold or leased. Rather, it would seek to address current information gaps in the market by improving overall awareness, understanding and consideration of a property's energy, greenhouse and water performance.

**Communications considerations**

A voluntary program would require communications activities to encourage homeowners to conduct an efficiency rating of their house before they put their property on the market for sale or to let.

The communications campaign would notionally commence from May 2011, when the program would start to be phased in. A targeted approach is recommended as opposed to mass media options.

**Communications Approach**

Universal McCann (Master Media Agency for the planning and placement of Campaign Advertising for the Australian Government) recommends an initial launch of the program that outlines the program and the benefits with an aim to reach 70 per cent of home owners/investors within a four-week period. Once the program has been established, communications activities should focus on keeping the messaging in the market.

**Media Options**

Looking at the general media consumption habits of home owners/investors (including mortgagees), print (newspapers and magazines) and the Internet are two very efficient options. If research indicates that the program required less passive media options, radio could be added in the initial stage to raise awareness. Indicative costs and activities are detailed in the table below. It is important to note that this is considered a conservative / low-level advertising spend and that most of the costs associated with a communications campaign to encourage voluntary uptake of residential disclosure would be in funding staff, consultancies, activities and materials associated with the longer-term below-the-line communications activities.

**Total upfront costs for a one-off national campaign**

Phase	Item	Indicative Cost	Audience Reach
<b>'Above-the-line' communications activities and indicative costs – provided by Universal McCann</b>			
Launch	Metropolitan Press	\$350,000	70% of home owners/investors over four weeks
	Regional Press	\$1,500,000	
	Suburban	\$660,000	
	NESB Press	\$150,000	
	Internet Display	\$50,000	
	Search	\$50,000	
	<b>Sub Total</b>	<b>\$2,760,000</b>	
Continuity program	Magazines	\$600,000	35% of home owners/investors each month, to a maximum of 70% over six months.
	Internet Display	\$300,000	
	Search Engine Marketing	\$300,000	
	<b>Sub Total</b>	<b>\$1,200,000</b>	
<b>Additional communications requirements / below-the-line costs – provided by the Department of Climate Change and Energy Efficiency</b>			
Research	Market research to inform development of effective, targeted communications materials	\$500,000	
Design	Development of creative concepts/communications products	\$200,000	
Testing / monitoring	Market research to test creative concept and messages; monitoring and evaluation	\$100,000	

Source: Prepared by Universal McCann for the Department of Climate Change and Energy Efficiency.



**Reporting cost**

Residential Building Mandatory Disclosure will require a performance reporting process. It was assumed that this would be undertaken by administrative staff that would be responsible for compiling performance data at the state level and feeding that to the Commonwealth. Estimates for this cost were provided by the Victorian Department of Sustainability and Environment based on experience with similar schemes and assuming one full time Victorian Public Service staff member at Grade 4 level.

The total cost under Option 2 is estimated to be around \$0.1 million annually in Victoria.

**Government costs – Commonwealth**

Estimates of costs to the Commonwealth Government were provided by the Commonwealth Department of Climate Change and Energy Efficiency. These estimates were based on the current and future (forward years) budget allocation, which is known for three years.

Commonwealth costs include staffing, managing projects, monitoring, review and evaluation, administration and coordination, travel, stakeholder management/communications, secretariat functions, campaign communications and awarding of contracts/consultancies. The estimates assume Commonwealth involvement in tool maintenance, data collection and general policy oversight.

The total cost to the Commonwealth under Option 2 is estimated to be around \$4.2 million in the first year, \$1.2 in the second year and \$0.8 million annually thereafter.

**E.25 Extrapolation of Victorian costs to other jurisdictions**

As discussed above, the government and industry cost model was developed to reflect likely costs to the Victorian Government. Costs associated with administering Residential Building Mandatory Disclosure in other jurisdictions were not individually developed. Rather, the National Framework for Energy Efficiency Building Implementation Committee agreed that government and industry costs in other jurisdictions would be extrapolated by the Allen Consulting Group based on an agreed approach.

Most government cost estimates were extrapolated using factors representing the number of assessments in each state/territory relative to Victoria, see Table E.38. In other words, estimates for the other jurisdictions were calculated by multiplying the cost estimates for Victoria by the factors contained in Table E.38. This approach was used for those costs that were thought to vary according to the number of households impacted.

Table E.38

**FACTORS USED TO EXTRAPOLATE RELEVANT VICTORIAN COST ESTIMATES TO THE OTHER JURISDICTIONS**

	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
NSW	1.32	1.31	1.20	1.18	1.18	1.18	1.18	1.18	1.18	1.18
VIC	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
QLD	1.14	1.13	0.80	0.96	0.97	0.98	0.99	0.99	1.00	1.00
SA	0.28	0.28	0.32	0.30	0.29	0.29	0.29	0.29	0.29	0.29
WA	0.44	0.43	0.43	0.44	0.44	0.44	0.44	0.44	0.44	0.45
TAS	0.07	0.07	0.08	0.09	0.08	0.08	0.08	0.08	0.08	0.08
NT	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
ACT	0.07	0.07	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07

Source: Allen Consulting Group analysis of data from the assessment cost model.

This approach was used for extrapolating all government costs estimates other than reporting and tool development costs under Options 1 to 4 and upfront campaign costs under Option 5. Reporting and ongoing tool development costs were assumed to be the same across all jurisdictions. Upfront (first year) tool development costs under Option 1 to 4, and upfront campaign costs under Option 5, were apportioned across the jurisdictions using the COAG funding formula.<sup>62</sup> This formula was altered slightly in the instance that Queensland and the Australian Capital Territory were assumed not to participate due to it being a step backwards from their current schemes. In such instances, the Queensland and Australian Capital Territory portion of shared costs were distributed across the other jurisdictions using similar weights implied by the COAG funding formula.

Costs to industry were apportioned using similar factors as those provided in Table E.38, only the factors were based on the number of assessors in each jurisdiction relative to Victoria.

## E.26 Results

Note that these estimates outlined below take account of the fact that schemes already exist in Queensland and the Australian Capital Territory (i.e. these schemes are part of the assumed base case for the cost-benefit analysis). As such, estimates for these jurisdictions represent incremental costs over and above existing costs. The approach taken in estimating incremental costs is outlined in Appendix A.

<sup>62</sup> I.e. 50 per cent of shared upfront costs to the Commonwealth, 16.8 per cent to New South Wales, 12.5 per cent to Victoria, 9.4 per cent to Queensland, 4.9 per cent to Western Australia, 3.9 per cent to South Australia, 1.2 per cent to Tasmania, 0.8 per cent in the Australian Capital Territory and 0.5 per cent in the Northern Territory.

**Total costs to industry**

Estimates of total training and insurance costs to industry under Residential Building Mandatory Disclosure are provided in Table E.39. Estimates are provided for the first two years, representing start-up and ongoing costs. Estimates for subsequent years are reasonably consistent with those for the second year (2012-13). Total upfront costs to industry in Australia range from \$15.9 million under Option 1 to \$0.9 million under Option 4. Total ongoing costs range from about \$4.1 million per annum under Option 1 to \$0.2 million per annum under Option 4. There are no training and insurance costs under Option 5.

Table E.39

**ESTIMATES OF TRAINING AND INSURANCE COSTS TO INDUSTRY UNDER RESIDENTIAL BUILDING MANDATORY DISCLOSURE**

	Option 1		Option 2		Option 3		Option 4		Option 5	
	2011-12	2012-13	2011-12	2012-13	2011-12	2012-13	2011-12	2012-13	2011-12	2012-13
NSW	\$6.0	\$2.3	\$2.7	\$0.8	\$1.2	\$0.4	\$6.0	\$2.3	\$0.0	\$0.0
Vic	\$4.5	\$1.7	\$2.0	\$0.6	\$0.9	\$0.3	\$4.5	\$1.7	\$0.0	\$0.0
Qld	\$4.8	\$1.9	\$1.9	\$0.6	\$0.6	\$0.2	\$4.8	\$1.9	\$0.0	\$0.0
SA	\$1.3	\$0.5	\$0.6	\$0.2	\$0.2	\$0.1	\$1.3	\$0.5	\$0.0	\$0.0
WA	\$2.0	\$0.7	\$0.9	\$0.3	\$0.4	\$0.1	\$2.0	\$0.7	\$0.0	\$0.0
Tas	\$0.3	\$0.1	\$0.1	\$0.0	\$0.1	\$0.0	\$0.3	\$0.1	\$0.0	\$0.0
NT	\$0.2	\$0.1	\$0.1	\$0.0	\$0.0	\$0.0	\$0.2	\$0.1	\$0.0	\$0.0
ACT	\$0.2	\$0.1	\$0.0	\$0.0	\$0.0	\$0.0	\$0.2	\$0.1	\$0.0	\$0.0
<b>Aust</b>	<b>\$19.2</b>	<b>\$7.4</b>	<b>\$8.3</b>	<b>\$2.6</b>	<b>\$3.4</b>	<b>\$1.1</b>	<b>\$19.2</b>	<b>\$7.4</b>	<b>\$0.0</b>	<b>\$0.0</b>

Source: Allen Consulting Group analysis based on data provided by Regulatory Impact Solutions (2010).

Notes: Costs for the Australian Capital Territory and Queensland represent incremental costs over and above costs associated with the building mandatory disclosure schemes currently operating in those jurisdictions.

**Total costs to government**

Estimates of total government costs (excluding costs associated with increased demand for rebates) under Residential Building Mandatory Disclosure are provided in Table E.40. As above, estimates are provided for the first two years, representing start-up and ongoing costs. Estimates of government costs drop from year two to three and continue to slightly drop up until 2014, then increase slightly each year after that. Total upfront costs to government in Australia range from \$36.4 million under Option 1 to \$7.7 million under Option 5. Total ongoing costs range from about \$21.0 million per annum under Option 3 to \$8.1 million per annum under Option 5.

Table E.40

**ESTIMATES OF GOVERNMENT COSTS UNDER RESIDENTIAL BUILDING MANDATORY DISCLOSURE**

	Option 1		Option 2		Option 3		Option 4		Option 5	
	2011-12	2012-13	2011-12	2012-13	2011-12	2012-13	2011-12	2012-13	2011-12	2012-13
NSW	\$8.7	\$6.1	\$8.0	\$5.8	\$8.5	\$7.0	\$6.9	\$6.5	\$0.9	\$2.9
VIC	\$7.2	\$5.0	\$6.6	\$4.6	\$6.9	\$5.6	\$5.3	\$5.0	\$0.7	\$2.2
QLD	\$1.8	\$0.2	\$1.1	\$0.0	\$1.6	\$0.6	\$0.0	\$0.0	\$0.0	\$0.0
SA	\$3.8	\$2.3	\$3.3	\$2.1	\$3.3	\$2.3	\$1.6	\$1.5	\$0.2	\$0.6
WA	\$4.5	\$2.9	\$4.0	\$2.6	\$4.1	\$3.0	\$2.4	\$2.2	\$0.2	\$1.0
TAS	\$2.8	\$1.6	\$2.4	\$1.4	\$2.3	\$1.4	\$0.5	\$0.5	\$0.1	\$0.2
NT	\$2.7	\$1.5	\$2.2	\$1.3	\$2.1	\$1.3	\$0.4	\$0.3	\$0.0	\$0.1
ACT	\$0.5	\$0.2	\$0.01	\$0.01	\$0.02	\$0.02	\$0.0	\$0.0	\$0.0	\$0.0
Cth	\$4.4	\$1.2	\$4.2	\$1.2	\$4.0	\$1.2	\$2.7	\$0.6	\$5.8	\$1.2
<b>Aust</b>	<b>\$36.4</b>	<b>\$21.0</b>	<b>\$31.9</b>	<b>\$18.9</b>	<b>\$32.8</b>	<b>\$22.4</b>	<b>\$19.7</b>	<b>\$16.6</b>	<b>\$7.7</b>	<b>\$8.1</b>

Source: Allen Consulting Group analysis based on data provided by Regulatory Impact Solutions (2010) and assumptions provided by the NFEE BIC in mid-2010.

Notes: Costs for the Australian Capital Territory and Queensland represent incremental costs over and above costs associated with the building mandatory disclosure schemes currently operating in those jurisdictions.

Note that the majority of these costs will be recovered from assessors (and ultimately households) through a certificate lodgement fee. Given this, it is foreseeable that the impact to government budgets will be significantly smaller, particularly over the medium- to long-term.

## Appendix F

### State-level cost-benefit analyses

The cost-benefit results for each state and territory are outlined below. The results are broadly consistent with the national results, noting that the magnitude of the estimates vary according to the number of property transactions impacted by Residential Building Mandatory Disclosure in each jurisdiction.

The net effect of the different jurisdictional results when added together is that Option 2 has the highest net present value when calculated from a national perspective. There are two key instances, however, where the results differ from the national results:

- Queensland and Australian Capital Territory: the results for these jurisdictions differ from the national results to some degree as the cost and benefit estimates for these jurisdictions are assumed to be incremental to the Queensland Sustainability Declaration and the ACT Home Energy Rating Scheme, both of which are similar to Residential Building Mandatory Disclosure so are factored into the base case; and
- South Australia, Western Australia and the Northern Territory: for these jurisdictions, the most efficient option from a net present value point of view is Option 4, rather than Option 2. This is because government costs — on a per property transaction basis — are lower under these options relative to Option 4.

It is important to note that the sum of the state/territory results is not exactly identical to the national results as the those results also factor in the estimated costs to the Commonwealth Government, which are \$9.2 million, \$8.9 million, \$8.8 million, \$5 million, and \$12.4 million under Options 1 to 5 respectively.

Note also that estimates for Queensland and the Australian Capital Territory reflect the assumption that these jurisdictions will not participate in a scheme(s) that are less stringent than the current schemes in those jurisdictions (see Appendix A). For those options where this was the case, it was assumed that these jurisdictions would not incur any costs that might arise as a result of them not participating in a 'national' scheme (should a national scheme be implemented), e.g. dealing with public inquires about the differences between their scheme and the 'national' scheme.

## F.27 New South Wales

Table F.41

## NEW SOUTH WALES — COST BENEFIT RESULTS (\$ MILLIONS, NPV), SALES AND LEASES

	Option 1	Option 2	Option 3	Option 4	Option 5
<b>Costs</b>					
Households					
Assessments	\$1,594.8	\$362.0	\$242.3	\$106.1	\$0.0
Investments (net of rebates)	\$193.1	\$167.3	\$128.7	\$96.6	\$9.7
Time during assessment	\$115.9	\$58.0	\$21.1	\$3.2	\$0.9
<i>Subtotal</i>	<i>\$1,903.8</i>	<i>\$587.3</i>	<i>\$392.1</i>	<i>\$205.8</i>	<i>\$10.6</i>
Industry					
Real estate agent's time	\$23.7	\$23.7	\$11.9	\$2.4	\$0.0
Training and insurance	\$16.4	\$6.4	\$2.8	\$0.8	\$0.0
<i>Subtotal</i>	<i>\$40.1</i>	<i>\$30.2</i>	<i>\$14.7</i>	<i>\$3.2</i>	<i>\$0.0</i>
Government					
Increased demand for rebates	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Administrative costs	\$30.4	\$27.7	\$35.1	\$29.6	\$5.2
<i>Subtotal</i>	<i>\$30.4</i>	<i>\$27.7</i>	<i>\$35.1</i>	<i>\$29.6</i>	<i>\$5.2</i>
<b>Total</b>	<b>\$1,974.3</b>	<b>\$645.2</b>	<b>\$441.8</b>	<b>\$238.7</b>	<b>\$15.8</b>
<b>Benefits</b>					
Households					
Utility bill savings	\$1,188.0	\$1,029.6	\$791.9	\$594.2	\$59.4
Society					
Greenhouse gas savings	\$54.6	\$47.3	\$36.4	\$27.3	\$2.7
<b>Total</b>	<b>\$1,242.6</b>	<b>\$1,076.9</b>	<b>\$828.3</b>	<b>\$621.5</b>	<b>\$62.1</b>
<b>Net benefits</b>	<b>-\$731.7</b>	<b>\$431.7</b>	<b>\$386.5</b>	<b>\$382.8</b>	<b>\$46.3</b>
<b>Payback period (Years)</b>	<b>30</b>	<b>13</b>	<b>12</b>	<b>9</b>	<b>6</b>
<b>Benefit/cost ratio</b>	<b>0.6</b>	<b>1.7</b>	<b>1.9</b>	<b>2.6</b>	<b>3.9</b>

Source: Allen Consulting Group analysis.

## F.28 Victoria

Table F.42

## VICTORIA — COST BENEFIT RESULTS (\$ MILLIONS, NPV), SALES AND LEASES

	Option 1	Option 2	Option 3	Option 4	Option 5
<b>Costs</b>					
Households					
Assessments	\$1,245.1	\$282.6	\$189.2	\$82.8	\$0.0
Investments (net of rebates)	\$130.6	\$113.2	\$87.1	\$65.3	\$6.5
Time during assessment	\$90.9	\$45.5	\$16.5	\$2.5	\$0.7
<i>Subtotal</i>	<i>\$1,466.6</i>	<i>\$441.3</i>	<i>\$292.8</i>	<i>\$150.6</i>	<i>\$7.3</i>
Industry					
Real estate agent's time	\$18.5	\$18.5	\$9.2	\$1.8	\$0.0
Training and insurance	\$13.2	\$5.2	\$2.2	\$0.7	\$0.0
<i>Subtotal</i>	<i>\$31.7</i>	<i>\$23.6</i>	<i>\$11.5</i>	<i>\$2.5</i>	<i>\$0.0</i>
Government					
Increased demand for rebates	\$73.0	\$63.2	\$48.6	\$36.5	\$3.6
Administrative costs	\$26.4	\$23.9	\$29.9	\$24.2	\$4.1
<i>Subtotal</i>	<i>\$99.4</i>	<i>\$87.2</i>	<i>\$78.6</i>	<i>\$60.6</i>	<i>\$7.8</i>
<b>Total</b>	<b>\$1,597.7</b>	<b>\$552.1</b>	<b>\$382.8</b>	<b>\$213.8</b>	<b>\$15.1</b>
<b>Benefits</b>					
Households					
Utility bill savings	\$939.6	\$814.3	\$626.4	\$469.8	\$47.0
Society					
Greenhouse gas savings	\$50.2	\$43.5	\$33.5	\$25.1	\$2.5
<b>Total</b>	<b>\$989.8</b>	<b>\$857.9</b>	<b>\$659.9</b>	<b>\$494.9</b>	<b>\$49.5</b>
<b>Net benefits</b>	<b>-\$607.9</b>	<b>\$305.8</b>	<b>\$277.1</b>	<b>\$281.1</b>	<b>\$34.4</b>
<b>Payback period (Years)</b>	<b>30</b>	<b>12</b>	<b>11</b>	<b>9</b>	<b>6</b>
<b>Benefit/cost ratio</b>	<b>0.6</b>	<b>1.6</b>	<b>1.7</b>	<b>2.3</b>	<b>3.3</b>

Source: Allen Consulting Group analysis.

## F.29 Queensland

Table F.43

## QUEENSLAND — COST BENEFIT RESULTS (\$ MILLIONS, NPV), SALES AND LEASES\*

	Option 1	Option 2	Option 3	Option 4	Option 5
<b>Costs</b>					
Households					
Assessments	\$1,195.2	\$207.9	\$110.4	\$0.0	\$0.0
Investments (net of rebates)	\$110.3	\$80.9	\$36.8	\$0.0	\$0.0
Time during assessment	\$90.2	\$43.8	\$14.3	\$0.0	\$0.0
<i>Subtotal</i>	<i>\$1,395.8</i>	<i>\$332.7</i>	<i>\$161.5</i>	<i>\$0.0</i>	<i>\$0.0</i>
Industry					
Real estate agent's time	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Training and insurance	\$12.9	\$4.6	\$1.6	\$0.0	\$0.0
<i>Subtotal</i>	<i>\$12.9</i>	<i>\$4.6</i>	<i>\$1.6</i>	<i>\$0.0</i>	<i>\$0.0</i>
Government					
Increased demand for rebates	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Administrative costs	\$2.6	\$0.2	\$5.7	\$0.0	\$0.0
<i>Subtotal</i>	<i>\$2.6</i>	<i>\$0.2</i>	<i>\$5.7</i>	<i>\$0.0</i>	<i>\$0.0</i>
<b>Total</b>	<b>\$1,411.2</b>	<b>\$337.5</b>	<b>\$168.9</b>	<b>\$0.0</b>	<b>\$0.0</b>
<b>Benefits</b>					
Households					
Utility bill savings	\$454.6	\$333.3	\$151.6	\$0.0	\$0.0
Society					
Greenhouse gas savings	\$25.8	\$18.9	\$8.6	\$0.0	\$0.0
<b>Total</b>	<b>\$480.3</b>	<b>\$352.2</b>	<b>\$160.2</b>	<b>\$0.0</b>	<b>\$0.0</b>
<b>Net benefits</b>	<b>-\$930.9</b>	<b>\$14.6</b>	<b>-\$8.6</b>	<b>\$0.0</b>	<b>\$0.0</b>
<b>Payback period (Years)</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>0</b>	<b>0</b>
<b>Benefit/cost ratio</b>	<b>0.3</b>	<b>1.0</b>	<b>0.9</b>		

Source: Allen Consulting Group analysis.

Notes: \*Estimates provided in this table represent costs and benefits that are incremental to the Queensland Sustainability Declaration, which is assumed to be equivalent to Option 4. See Appendix A for explanation of how incremental costs and benefits were calculated under each option. Under Options 4 & 5, the Queensland portion of shared jurisdictional costs was apportioned across the other jurisdictions using weightings implied by the COAG funding formula (see Appendix E). It was also assumed that Queensland would not incur any costs under these options that might arise as a result of them not participating in a 'national' scheme (should a national scheme be implemented), e.g. dealing with public inquiries about the differences between the Queensland scheme and any 'national' scheme.



## F.30 South Australia

Table F.44

## SOUTH AUSTRALIA — COST BENEFIT RESULTS (\$ MILLIONS, NPV), SALES AND LEASES

	Option 1	Option 2	Option 3	Option 4	Option 5
<b>Costs</b>					
Households					
Assessments	\$348.0	\$79.5	\$53.1	\$23.2	\$0.0
Investments (net of rebates)	\$32.5	\$28.2	\$21.7	\$16.3	\$1.6
Time during assessment	\$25.2	\$12.6	\$4.6	\$0.7	\$0.2
<i>Subtotal</i>	<i>\$405.8</i>	<i>\$120.3</i>	<i>\$79.4</i>	<i>\$40.1</i>	<i>\$1.8</i>
Industry					
Real estate agent's time	\$5.1	\$5.1	\$2.5	\$0.5	\$0.0
Training and insurance	\$3.8	\$1.5	\$0.6	\$0.2	\$0.0
<i>Subtotal</i>	<i>\$8.9</i>	<i>\$6.6</i>	<i>\$3.2</i>	<i>\$0.7</i>	<i>\$0.0</i>
Government					
Increased demand for rebates	\$1.8	\$1.6	\$1.2	\$0.9	\$0.1
Administrative costs	\$15.1	\$13.1	\$14.5	\$7.6	\$1.2
<i>Subtotal</i>	<i>\$16.9</i>	<i>\$14.7</i>	<i>\$15.8</i>	<i>\$8.6</i>	<i>\$1.3</i>
<b>Total</b>	<b>\$431.6</b>	<b>\$141.5</b>	<b>\$98.3</b>	<b>\$49.4</b>	<b>\$3.1</b>
<b>Benefits</b>					
Households					
Utility bill savings	\$192.0	\$166.4	\$128.0	\$96.0	\$9.2
Society					
Greenhouse gas savings	\$8.2	\$7.1	\$5.5	\$4.1	\$0.4
<b>Total</b>	<b>\$200.1</b>	<b>\$173.5</b>	<b>\$133.5</b>	<b>\$100.1</b>	<b>\$9.6</b>
<b>Net benefits</b>	<b>-\$231.5</b>	<b>\$31.9</b>	<b>\$35.2</b>	<b>\$50.7</b>	<b>\$6.6</b>
<b>Payback period (Years)</b>	<b>30</b>	<b>17</b>	<b>15</b>	<b>10</b>	<b>7</b>
<b>Benefit/cost ratio</b>	<b>0.5</b>	<b>1.2</b>	<b>1.4</b>	<b>2.0</b>	<b>3.1</b>

Source: Allen Consulting Group analysis.

**F.31 Western Australia**

Table F.45

**WESTERN AUSTRALIA — COST BENEFIT RESULTS (\$ MILLIONS, NPV), SALES AND LEASES**

	Option 1	Option 2	Option 3	Option 4	Option 5
<b>Costs</b>					
Households					
Assessments	\$620.2	\$141.3	\$94.4	\$41.3	\$0.0
Investments (net of rebates)	\$67.7	\$58.7	\$45.1	\$33.8	\$3.3
Time during assessment	\$43.7	\$21.9	\$7.9	\$1.2	\$0.4
<i>Subtotal</i>	<i>\$731.6</i>	<i>\$221.8</i>	<i>\$147.5</i>	<i>\$76.3</i>	<i>\$3.7</i>
Industry					
Real estate agent's time	\$9.0	\$9.0	\$4.5	\$0.9	\$0.0
Training and insurance	\$5.8	\$2.3	\$1.0	\$0.3	\$0.0
<i>Subtotal</i>	<i>\$14.8</i>	<i>\$11.3</i>	<i>\$5.5</i>	<i>\$1.2</i>	<i>\$0.0</i>
Government					
Increased demand for rebates	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Administrative costs	\$17.4	\$15.3	\$17.7	\$11.0	\$1.7
<i>Subtotal</i>	<i>\$17.4</i>	<i>\$15.3</i>	<i>\$17.7</i>	<i>\$11.0</i>	<i>\$1.7</i>
<b>Total</b>	<b>\$763.7</b>	<b>\$248.4</b>	<b>\$170.7</b>	<b>\$88.5</b>	<b>\$5.4</b>
<b>Benefits</b>					
Households					
Utility bill savings	\$381.0	\$330.2	\$254.0	\$190.5	\$18.7
Society					
Greenhouse gas savings	\$11.1	\$9.6	\$7.4	\$5.6	\$0.5
<b>Total</b>	<b>\$392.1</b>	<b>\$339.8</b>	<b>\$261.4</b>	<b>\$196.1</b>	<b>\$19.2</b>
<b>Net benefits</b>	<b>-\$371.6</b>	<b>\$91.4</b>	<b>\$90.7</b>	<b>\$107.5</b>	<b>\$13.8</b>
<b>Payback period (Years)</b>	<b>30</b>	<b>15</b>	<b>13</b>	<b>10</b>	<b>6</b>
<b>Benefit/cost ratio</b>	<b>0.5</b>	<b>1.4</b>	<b>1.5</b>	<b>2.2</b>	<b>3.5</b>

Source: Allen Consulting Group analysis.

## F.32 Tasmania

Table F.46

## TASMANIA — COST BENEFIT RESULTS (\$ MILLIONS, NPV), SALES AND LEASES

	Option 1	Option 2	Option 3	Option 4	Option 5
<b>Costs</b>					
Households					
Assessments	\$89.3	\$20.8	\$13.8	\$5.9	\$0.0
Investments (net of rebates)	\$15.1	\$13.1	\$10.1	\$7.6	\$0.8
Time during assessment	\$6.4	\$3.2	\$1.2	\$0.2	\$0.1
<i>Subtotal</i>	<i>\$110.7</i>	<i>\$37.1</i>	<i>\$25.0</i>	<i>\$13.7</i>	<i>\$0.8</i>
Industry					
Real estate agent's time	\$1.3	\$1.3	\$0.6	\$0.1	\$0.0
Training and insurance	\$1.0	\$0.4	\$0.2	\$0.1	\$0.0
<i>Subtotal</i>	<i>\$2.3</i>	<i>\$1.7</i>	<i>\$0.8</i>	<i>\$0.2</i>	<i>\$0.0</i>
Government					
Increased demand for rebates	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Administrative costs	\$11.7	\$9.8	\$9.9	\$2.7	\$0.3
<i>Subtotal</i>	<i>\$11.7</i>	<i>\$9.8</i>	<i>\$9.9</i>	<i>\$2.7</i>	<i>\$0.3</i>
<b>Total</b>	<b>\$124.7</b>	<b>\$48.6</b>	<b>\$35.7</b>	<b>\$16.5</b>	<b>\$1.2</b>
<b>Benefits</b>					
Households					
Utility bill savings	\$88.7	\$76.9	\$59.2	\$44.4	\$4.6
Society					
Greenhouse gas savings	\$1.5	\$1.3	\$1.0	\$0.7	\$0.1
<b>Total</b>	<b>\$90.2</b>	<b>\$78.2</b>	<b>\$60.1</b>	<b>\$45.1</b>	<b>\$4.7</b>
<b>Net benefits</b>	<b>-\$34.5</b>	<b>\$29.6</b>	<b>\$24.4</b>	<b>\$28.6</b>	<b>\$3.5</b>
<b>Payback period (Years)</b>	<b>30</b>	<b>13</b>	<b>12</b>	<b>8</b>	<b>5</b>
<b>Benefit/cost ratio</b>	<b>0.7</b>	<b>1.6</b>	<b>1.7</b>	<b>2.7</b>	<b>4.0</b>

Source: Allen Consulting Group analysis.

**F.33 Northern Territory**

Table F.47

**NORTHERN TERRITORY — COST BENEFIT RESULTS (\$ MILLIONS, NPV), SALES AND LEASES**

	Option 1	Option 2	Option 3	Option 4	Option 5
<b>Costs</b>					
Households					
Assessments	\$60.5	\$14.1	\$9.3	\$4.0	\$0.0
Investments (net of rebates)	\$10.6	\$9.2	\$7.1	\$5.3	\$0.5
Time during assessment	\$4.4	\$2.2	\$0.8	\$0.1	\$0.0
<i>Subtotal</i>	<i>\$75.4</i>	<i>\$25.5</i>	<i>\$17.2</i>	<i>\$9.4</i>	<i>\$0.6</i>
Industry					
Real estate agent's time	\$0.9	\$0.9	\$0.4	\$0.1	\$0.0
Training and insurance	\$0.6	\$0.2	\$0.1	\$0.0	\$0.0
<i>Subtotal</i>	<i>\$1.5</i>	<i>\$1.1</i>	<i>\$0.5</i>	<i>\$0.1</i>	<i>\$0.0</i>
Government					
Increased demand for rebates	\$0.3	\$0.2	\$0.2	\$0.1	\$0.0
Administrative costs	\$11.2	\$9.3	\$9.3	\$2.0	\$0.2
<i>Subtotal</i>	<i>\$11.5</i>	<i>\$9.6</i>	<i>\$9.5</i>	<i>\$2.1</i>	<i>\$0.2</i>
<b>Total</b>	<b>\$88.4</b>	<b>\$36.2</b>	<b>\$27.2</b>	<b>\$11.7</b>	<b>\$0.8</b>
<b>Benefits</b>					
Households					
Utility bill savings	\$54.0	\$46.8	\$36.0	\$27.0	\$2.7
Society					
Greenhouse gas savings	\$2.7	\$2.3	\$1.8	\$1.3	\$0.1
<b>Total</b>	<b>\$56.7</b>	<b>\$49.2</b>	<b>\$37.8</b>	<b>\$28.4</b>	<b>\$2.8</b>
<b>Net benefits</b>	<b>-\$31.7</b>	<b>\$13.0</b>	<b>\$10.6</b>	<b>\$16.7</b>	<b>\$2.1</b>
<b>Payback period (Years)</b>	<b>30</b>	<b>13</b>	<b>13</b>	<b>8</b>	<b>5</b>
<b>Benefit/cost ratio</b>	<b>0.6</b>	<b>1.4</b>	<b>1.4</b>	<b>2.4</b>	<b>3.7</b>

Source: Allen Consulting Group analysis.

## F.34 Australian Capital Territory

Table F.48

## AUSTRALIAN CAPITAL TERRITORY — COST BENEFIT RESULTS (\$ MILLIONS, NPV), SALES AND LEASES

	Option 1	Option 2	Option 3	Option 4	Option 5
<b>Costs</b>					
Households					
Assessments	\$43.0	\$12.4	\$8.4	\$0.0	\$0.0
Investments (net of rebates)	\$3.9	\$5.3	\$4.1	\$0.0	\$0.0
Time during assessment	\$6.1	\$2.0	\$0.7	\$0.0	\$0.0
<i>Subtotal</i>	<i>\$53.0</i>	<i>\$19.7</i>	<i>\$13.2</i>	<i>\$0.0</i>	<i>\$0.0</i>
Industry					
Real estate agent's time	\$1.0	\$0.8	\$0.4	\$0.0	\$0.0
Training and insurance	\$0.6	\$0.1	\$0.0	\$0.0	\$0.0
<i>Subtotal</i>	<i>\$1.6</i>	<i>\$0.9</i>	<i>\$0.4</i>	<i>\$0.0</i>	<i>\$0.0</i>
Government					
Increased demand for rebates	\$0.2	\$0.3	\$0.2	\$0.0	\$0.0
Administrative costs	\$1.9	\$0.0	\$0.1	\$0.0	\$0.0
<i>Subtotal</i>	<i>\$2.1</i>	<i>\$0.3</i>	<i>\$0.3</i>	<i>\$0.0</i>	<i>\$0.0</i>
<b>Total</b>	<b>\$56.7</b>	<b>\$20.9</b>	<b>\$13.9</b>	<b>\$0.0</b>	<b>\$0.0</b>
<b>Benefits</b>					
Households					
Utility bill savings	\$21.4	\$29.3	\$22.5	\$0.0	\$0.0
Society					
Greenhouse gas savings	\$1.0	\$1.4	\$1.1	\$0.0	\$0.0
<b>Total</b>	<b>\$22.5</b>	<b>\$30.7</b>	<b>\$23.6</b>	<b>\$0.0</b>	<b>\$0.0</b>
<b>Net benefits</b>	<b>-\$34.3</b>	<b>\$9.7</b>	<b>\$9.7</b>	<b>\$0.0</b>	<b>\$0.0</b>
<b>Payback period (Years)</b>	<b>30</b>	<b>13</b>	<b>11</b>	<b>0</b>	<b>0</b>
<b>Benefit/cost ratio</b>	<b>0.4</b>	<b>1.5</b>	<b>1.7</b>		

Source: Allen Consulting Group analysis.

Notes: \*Estimates provided in this table represent costs and benefits that are incremental to the ACT Home Energy Rating Scheme, which is assumed to be equivalent to Option 2 for sales transactions. See Appendix A for explanation of how incremental costs and benefits were calculated under each option. Under Options 4 & 5, the Australian Capital Territory's portion of shared jurisdictional costs was apportioned across the other jurisdictions using weightings implied by the COAG funding formula (see Appendix E). It was also assumed that Queensland would not incur any costs under these options that might arise as a result of them not participating in the 'national' scheme (should a national scheme be implemented), e.g. dealing with public inquires about the differences between the Queensland scheme and any 'national' scheme.

## Appendix G

### Energy rating schemes

#### G.35 NatHERS

One means by which governments around the world have sought to reduce energy demand in the residential sector is through the introduction of House Energy Rating Schemes (HERS). As Kordjamshidi (2007) states, these schemes allow for the energy efficiency of different homes to be compared 'by generally providing a standardized evaluation of a home's existing energy efficiency, expected energy use and its potential for improvement.'

During the 1990s, a number of state and territory governments attempted to develop their own HERS. Given the variety of Australian climatic conditions and the seeming benefits of national consistency, however, the then Australian and New Zealand Minerals and Energy Council<sup>63</sup> decided to establish a Nationwide HERS (NatHERS) in 1993.

According to the Department of the Environment, Water, Heritage and the Arts (DEWHA 2008c), the current administrators of the scheme, NatHERS provides 'a framework that allows various computer software tools to rate the potential energy efficiency of Australian homes. NatHERS defines the minimum set of information that must be used by all software tools', including those listed in Box G.1. Software tools that meet this minimum set of information can seek accreditation under NatHERS. Accredited software tools are eligible to use the NatHERS logo (see left), and advertise their association with NatHERS.



Box G.1

#### NATHERS — MINIMUM SET OF INFORMATION

- |                               |   |
|-------------------------------|---|
| • Area correction factor      | • Building material performance characteristics |
| • Climate zones               | • Design interpretation guidelines              |
| • Internal heat loads         | • Star rating scale                             |
| • Occupancy settings          | • Weather files                                 |
| – Cooling thermostat settings |   |

Source: DEWHA 2008c.

In 2006, 'NatHERS was improved to require a more powerful second generation of software tools' (DEWHA, 2008c). These 'can use 69 different climate files (compared to 28 for the first generation)' and provide an energy efficiency rating based on an expanded 10 star scale. The first generation of software tools have subsequently been phased out and are no longer valid under the Scheme. Accredited second generation software tools include:

<sup>63</sup> In 2001, the Council of Australian Governments split the Australian and New Zealand Minerals and Energy Council into the Ministerial Council on Minerals and the Ministerial Council on Energy. The latter now has responsibility for NatHERS.

- Accurate;
- BERS Professional; and
- FirstRate 5.

All States and Territories require (primarily through the Building Code of Australia [BCA]) that all new residential buildings meet minimum energy efficiency standards. NatHERS provides the framework for verifying most of these standards. For example:

- the BCA currently requires new Class 1 and 10 buildings to achieve ‘a nominal level of energy efficiency equivalent to 5 stars under the [NatHERS]’ and the Australian Building Codes Board (ABCB) is proposing to increase this requirement to 6 stars in 2010 (ABCB 2009); and
- in New South Wales, ‘BASIX accepts certain NatHERS software results as one way of meeting its separate targets for the heating and cooling performance of the building shell’ (DEWHA 2008c).

### G.36 Energy Efficiency Rating and ACTHERS

In 1998, the Australian Capital Territory became the first Australian jurisdiction to introduce a mandatory disclosure scheme for the energy efficiency performance of residential properties. As stipulated under the *Civil Law (Sale of Residential Property) Act 2003*, vendors of residential properties are required to provide information about the Energy Efficiency Rating (EER) of their property to potential buyers. The vendor achieves this by:

- including ‘the EER value in all sales advertising of the property’;
- providing a copy of an EER Statement – essentially a summary of the assessment used to determine the EER value – to the purchaser; and
- ensuring ‘that the EER Statement forms part of the contract for sale’ (ACT Planning and Land Authority 2009b).

The EER is a measure (expressed as a star rating, currently ranging between zero and six stars for existing homes and the full 0-10 star range for new homes) ‘of the thermal performance of the building shell’ — ‘[i]t does not include energy used by appliances and fixtures such as hot water systems, lighting or cooking appliances in the calculations’ (DEWHA, 2008a; ACT Planning and Land Authority 2009a). To obtain an EER for their property, homeowners must employ an accredited energy assessor. The assessor calculates the energy efficiency of the dwelling using FirstRate, ‘a “first generation” thermal modelling software tool developed by the Victorian Government’ (ACT Planning and Land Authority 2009a). Houses sold off the plan can use an energy efficiency rating produced on second generation software for demonstrating compliance with building regulations.

### **G.37 BASIX**

The Building Sustainability Index (BASIX) is an online, predictive assessment tool. The designer of a house or unit enters data about the dwelling into the BASIX tool. Requested information includes 'site location, house size, type of building materials, and fittings for hot water, cooling and heating' (NSW Department of Planning 2006). After analysing this data, the BASIX tool provides a score for the design against its water, thermal and energy performance.

All residential development applications in New South Wales must include a BASIX Certificate, demonstrating that the proposed development has passed specific water, thermal and energy targets. These targets vary across the State, depending on location and building type.

### **G.38 NABERS**

The National Australian Built Environment Rating System (NABERS) website (a national initiative managed by the New South Wales Department of Environment, Climate Change and Water) offers residents the opportunity to self-assess energy and water efficiency performance of their properties (separated and semi-detached dwellings only). To undertake this self-assessment, residents are required to enter the following information into the online tool:

- usage information from 12 consecutive months' worth of energy and water bills;
- number of occupants;
- estimated duration of occupancy per year; and
- the relevant postcode (to determine the dwelling's climate zone).

Using this information, the online tool assigns a NABERS Energy and Water rating, ranging from 1 (Poor Performer) to 5 (Top Performer).



## Appendix H

### Glossary

<b>Abatement</b>	Activity that leads to a reduction in the level of greenhouse gas emissions.
<b>Base Case</b>	The base case scenario (or baseline) refers to a situation where the <i>status quo</i> (or current approach) is maintained.
<b>Building Sustainability Index (BASIX)</b>	BASIX is a scheme introduced by the New South Wales Government to regulate the energy efficiency of residential buildings. It offers an online assessment tool for rating the expected performance of any residential development in terms of water efficiency, thermal comfort and energy usage.
<b>Benefit-Cost Ratio (BCR)</b>	The BCR is calculated by dividing the present value of benefits by the present value of costs and can be interpreted as every one dollar of costs delivers 'X' dollars of benefits.
<b>Break even</b>	In this report, the break even point refers to the level of uptake required to make the net benefits of a policy proposal equal to zero (that is, the level of uptake required to make the costs of a policy option equal to its benefits in net present value terms). A definition of uptake rate is provided below.
<b>Carbon Price</b>	The cost imposed on emitting carbon into the atmosphere. It can be a tax imposed by government, the outcome of an emissions trading market or a hybrid of taxes and permit prices. The various ways of creating a carbon price can have different effects on the economy.
<b>Carbon dioxide equivalent (CO<sub>2</sub>-e)</b>	A standard measure that takes account of the different global warming potential of different greenhouse gases and expresses the effect in a common unit.
<b>Cost-benefit Analysis (CBA)</b>	Cost-benefit analysis is an analytical tool that is commonly used to assess the benefits and costs of regulatory proposals.
<b>Cost-effective</b>	A measure is cost-effective when it achieves a desired outcome (for example, obtaining a desired amount of energy savings) at a lower cost than another measure. Cost-effectiveness is not the same as economic efficiency. An outcome is economically efficient when the value of the benefits in monetary terms exceeds the costs; in contrast, cost-effectiveness analysis does not analyse the value or social benefit of an outcome, it just compares the costs of different ways of achieving it.
<b>Emissions</b>	The release of greenhouse gases into the atmosphere.
<b>Emissions intensity</b>	A level or amount of emissions per a specified unit of economic output, such as GDP, sales revenue or goods produced.
<b>Energy efficiency</b>	The ratio of outputs to energy inputs.
<b>Energy efficiency improvement</b>	Using less energy to achieve the same level of outcomes or performance, or improving the level of outcomes or performance from the same amount of energy.

<b>Energy, greenhouse and water performance</b>	The energy and water performance of a building relates to its expected energy and water use/consumption. The greenhouse performance of a building relates to the expected direct and indirect greenhouse emissions from energy that is consumed within the building (including the emissions from the generation, transmission distribution and use of this energy).
<b>Energy intensity</b>	The quantity of energy used per unit of economic output produced.
<b>Greenhouse gases</b>	The atmospheric gases responsible for causing global warming and climate change. The major greenhouse gases are carbon dioxide (CO <sub>2</sub> ), methane (CH <sub>4</sub> ), nitrous oxide (N <sub>2</sub> O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF <sub>6</sub> ).
<b>Information asymmetry</b>	A situation where one party to a transaction has more or better relevant information than another, which can lead to resources being allocated less efficiently than under conditions of perfect and symmetric information.
<b>Market Failure</b>	A situation where the market is not able to provide an efficient level of production and consumption of goods and services.
<b>Minimum Energy Performance Standards (MEPS)</b>	Minimum technical requirements for appliances manufactured or imported to Australia to guarantee that they reach minimum energy efficiency performances. MEPS typically cover appliances such as refrigerators, air conditioners and lamps.
<b>National Australian Built Environment Rating System (NABERS)</b>	NABERS measures an existing building's environmental performance during operation. NABERS rates a building on the basis of its measured operational impacts in categories such as energy, water, waste and indoor environment.
<b>Nationwide House Energy Rating Scheme (NatHERS)</b>	NatHERS provides a framework that allows various computer software tools to rate the potential energy efficiency of Australian homes. NatHERS defines the minimum set of information that must be used by all software tools.
<b>Net Present Value (NPV)</b>	The difference between the present value of cash inflows (benefits) and the present value of cash outflows (costs).
<b>Payback period</b>	The time period over which the capital outlay for an energy efficiency improvement will be recouped from the resulting savings on energy bills.
<b>Private benefit</b>	If an entity invests in an energy efficiency improvement, the private benefit associated with that improvement is the advantage that accrues to the relevant entity. Private benefits do not include the benefits that the improvement might yield to others in the economy (for example, through decreased greenhouse gas emissions).
<b>Private cost</b>	If an entity invests in an energy efficiency improvement, the private cost is the amount that the relevant entity pays for that improvement. Private costs do not include the costs that the improvement might impose on others.
<b>Regulatory Impact Statement (RIS)</b>	A tool that assesses the impact of proposed government intervention.

<b>Social benefit</b>	The social benefit of an energy efficiency improvement is the sum of the private benefit to the entity making the improvement and any benefits that the improvement yields for others in the economy (for example, through decreased greenhouse gas emissions).
<b>Social cost</b>	The social cost of an energy efficiency improvement is the sum of the private cost to the entity making the improvement and any costs that the improvement imposes on others in the economy.
<b>Split incentives</b>	A situation when the parties engaged in a contract have different goals and different levels of information. An example is where neither owners nor tenants have sufficient incentive to spend capital upgrading the energy efficiency of a building as the benefit will be shared by the other party.
<b>Take up rate</b>	In this study, the take up rate refers to the assumed voluntary investment response to the proposed introduction of Residential Building Mandatory Disclosure as a proportion of the number of houses that are required to comply in every year. For example, it would be the number of houses where an investment occurred as a proportion of all houses for sale in a year in some scenarios.
<b>Thermal performance</b>	Calculation of the energy needed to be added or removed from a house to active comfort considering standardised occupant behaviour, and do not include the efficiency of the equipment used to heating and cool or the fuel type used.
<b>Transaction Costs</b>	Transaction costs refer to the costs involved in market exchange. These include the costs of discovering market prices and the costs of writing and enforcing contracts.
<b>Validity Period</b>	Refers to the timeframe during which the energy and water rating certificate is current (i.e. valid).
<b>Water Efficiency Labeling and Standards (WELS)</b>	The WELS Scheme labels a range of products for water efficiency.

## Appendix I

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