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To: DCCEE - Residential Disclosure
Subject: RIS - Residential Building Energy, Greenhouse and Water Performance
Attachments: API Submission - Residential Buildings Mandatory Disclosure Consultation Regulatory Impact Statement.docx; PRRES 2012 Paper - Hurst Reed Bednall - HERS Price Worth Value Final 31_08_2011 (2).docx

Please find attached Submission from the Australian Property Institute in response to the Consultation Regulatory Impact Statement for mandatory disclosure of residential building energy, greenhouse and water performance.

Also attached for information is a Paper to be presented at the 18th Annual Pacific-Rim Real Estate Society Conference in Adelaide during January 2012. The Paper is titled "Home Energy Efficiency Rating Systems: Examining the Impact on Price, Worth and Value" and represents further current study undertaken on this very important issue.

Should you wish to discuss any aspect of the Submission, please do not hesitate to contact me on 0413 235 432.

Regards
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Residential Buildings Mandatory Disclosure – Consultation Regulatory Impact Statement (CRIS) - July 2011

Background

This document is prepared in response to the Regulation Impact Statement on Residential Building Mandatory Disclosure as prepared by The Allen Consulting Group, together with the Issues Papers dealing with Remote Housing and Social Housing.

General Comment

The RIS identifies a well known property market failure being information or more particularly the lack of it. It further suggests that this failure is likely to lead to the economic phenomenon known as “adverse selection”, being the inability to discern between quality differences. This is a sensible observation. However, in order for housing to reduce its carbon emissions regard must be given to other broader aspects the market and societal behaviour. These include; occupant behaviour, taxation incentives, education (of market participants) to name a few.

The COAG proposal is talking about mandatory disclosure of residential building energy, greenhouse and water performance at a time when the residential occupant is, with regards to such, primarily concerned with the continued high cost of the basic utilities of power and water – this proposal will not diminish those concerns. The Australian Property Institute supports the green initiatives being undertaken in the market place, however, it believes the way forward in the current economic climate is through government being seen to encourage behavioural change rather than mandating such change.

It is understood that there is an intelligent long term objective to get our national housing stock more sustainable but when will that overall value be acknowledged within the market and is there a period when the initial cost of “compliance “ will be borne by those who in the short term can least afford it, the first home buyer.

Education will be an ongoing requirement.

Specific Comment

- 1. 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 report identifies the lack of market information as being a significant problem. This is agreed. However, it must be recognised that it is unlikely that mandatory Energy Efficiency Rating (EER) certificates alone, in whatever form they may be calculated and presented, will resolve this issue. There is a hint of the assumption that market buyers and tenants act in an “economically rational” manner when making decisions in relation house purchases. This underlying assumption, to some extent, may be the case for investors, but it is generally not present for owner-occupier buyers or tenants. These people will often make economically “irrational” decisions and purchase a home based upon more personal objectives.

The problem extends beyond market failures to one of education and perception. That is, presenting information alone without knowledge of its purpose or use is likely to be “set aside” in favour of more recognisable information such as location/house characteristics etc. Page 149 presents costs of Communication costs being media campaigns. The wording suggests the emphasis will be to “inform the public of their obligations” under mandatory energy efficiency reporting. This ought to be extended to buyers, benefits and post-occupancy use (may be subject of a separate campaign but no allowance is made and it is considered important).

This is not an argument against mandatory EER reporting but rather one that advocates the introduction along with other measures such as advertising and training programs to inform the market place.

2. 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?

This in part is addressed in point 1 above, namely education and training. It is believed EER options are well considered within the report however these options, as they are presented, don't address all sectors of the community. For example, persons on the pension who have the bulk of their wealth in their home and are seeking to move into a retirement village, for example, are unlikely to be either able to undertake self assessment or pay for certified auditors. The government must have a mechanism to address this within its social welfare structure or similar accessible authority. This concern is briefly discussed in the Issue Paper- Remote and Social Housing. The points made within this document appear quite sensible.

3. The assessment of costs and benefits of options:

- a) **Does the assessment fully reflect all potential costs and benefits of the options assessed?**
- b) **Are there costs to industry that have not been accounted for?**

- c) **Are the costs of the energy and water efficiency measures included in the RIS reasonable?**
- d) **Are the assumptions underlying the analysis valid/reasonable?**
- e) **Are the take-up rates for the proportion of sellers and lessors that invest in upgrades to their properties in each scenario reasonable?**
- f) **The impact of the HIP upon the penetration of roof insulation in the stock of Australian residential buildings.**

- a) Can't comment in relation to such costs.
- b) In relation to "industry", real estate agency and valuation must be considered as being part of the "industry". In this regard training is required for real estate agents to be able to address buyer questions both from a marketing perspective and a limited technical perspective. Page 147 discusses training of assessors but it does not comment beyond this group. Without proper training agents are likely to be vulnerable. There is also a need to be able to demonstrate capital value as opposed to cost / savings to the consumer - this will require research, education and dissemination of such facts.
- c) Thorough evaluation is not possible, however, recent anecdotal advice does not align with those suggested as they appear to not include labour. For example pg 132 cites a 5 star gas hot water storage in Victoria as \$890.00. A recent purchase of such a unit was around this amount, however, after installation and labour costs, the actual amount was \$1490 (this work was carried out in April 2011)
- d) Generally speaking the assumptions are reasonable nevertheless we are unable to validate economic and build cost assumptions. One assumption of concern is pg 119 that real estate agents will become involved in the organisation and participation of energy efficiency assessments. For agents to voluntarily engage in this activity is highly unlikely. The trend for agents is to "step back" from such activities and focus upon the marketing. The reason for this is the intense regulatory constraints of Consumer Affairs (and comparable authorities throughout Australia). They do not need to be subject to litigation, bad press or loss of reputation for something which is not the responsibility of the agent.
- e) Take-up rates appear reasonable. However, the survey to establish these rates was around 2006 (see page 122) which is prior to the GCF and subsequent market uncertainties. The current economic data suggests that people are not likely to spend on speculative outcomes and therefore will need to be convinced of the benefits prior to committing funds. It is our view that modelling should be considering 15% as a maximum and possibly slightly lower. At least in the short term. Recent Victorian announcement suggests that electrical rebates on solar power are to fall from 60 cents per KWhr to 25 cents. This reduction only further strengthens this assessment.
- f) Home Insulation Program- No comment.

4. Identified risks and uncertainties associated with each option.

The key risks appeared to have been considered and mainly relate to the accuracy of the modelling.

General Comments

The understood objective of mandatory energy efficiency rating is to introduce another element of consideration for homebuyers and tenants by the provision EER information at the point of sale and lease. It is assumed that buyers and tenants will factor such ratings into their decision process and low efficient houses will be adversely affected by pricing discrimination. International studies have shown that there is minimal impact on house prices as a result energy efficiency rating. This report suggests a likely increase for more efficient houses based upon an ACT study (refer pg 76).

Introduction of measures that minimise carbon emissions is welcomed. Research has shown that buyers and tenants will generally not place EER of a given home above other considerations such as location, financial constraints, school zones, accommodation features etc. Further to purchase/leasing considerations other research has revealed that energy measures are only likely to be installed/updated when people have satisfied other needs and desires. Meaning people will pay for school fees, home entertainment equipment, comforts etc. and when they feel they are in a financial position, then energy measures. This trait can only be changed by awareness and/or financial incentive.

In terms of the real estate and valuation practices it is imperative that information regarding specific EER rating of all sales be recorded as part of the data collection. Without this data collection it will not be possible to measure the impact EER in terms of buyer perception and willingness to pay for energy efficient houses. The flow on impact has the potential to result increased risk exposure of litigation of property professionals; specifically real estate agents and valuers. Mortgage lenders will also suffer increased risk exposure particularly for highly geared loans.

Issue Paper: Social Housing

It is noted the document includes the following:-

“Fostering Investment by Residential Building Owners - Another objective of mandatory disclosure at the time of lease is to foster energy and water efficiency investment by residential building owners to provide accommodation with lower running costs and better amenity for tenants. In the case of social housing, the building owners are government and not-for-profit organisations which have less scope than private providers to recover efficiency investment costs.”

With due respect, government is in a far better position to be able to drive the mandatory disclosure and provide its tenants with lower running costs and better amenities. In the same way any private provider will pass on costs to the consumer, so should the government absorb such costs when it comes to social housing.

RECOMMENDATIONS

OPTION 4 Voluntary

That EER be introduced along with other measures that:

- a. Support disadvantaged people
- b. Provide taxation incentives to improve EER of established housing stock
- c. Funding be made available to assist with professional development of industry professionals
- d. Awareness campaign to educate the public of post-occupancy behaviours

Mechanism be created to ensure all EER ratings are recorded as part of the sale reporting process.

18TH ANNUAL PACIFIC-RIM REAL ESTATE SOCIETY CONFERENCE

ADELAIDE, AUSTRALIA, JANUARY 15TH – 18TH 2012

**HOME ENERGY EFFICIENCY RATING SYSTEMS:
EXAMINING THE IMPACT ON PRICE, WORTH AND VALUE**

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ABSTRACT:

From an international perspective carbon emissions from residential dwellings contribute substantially to global output; in Australia dwellings represent approximately 13% of total national output (Wang 2010). Governments are either in the process of implementing or have already implemented policies aimed at encouraging carbon reductions attributed to housing in an effort to meet emission target levels. In 2009 the Council of Australian Governments (COAG) agreed, subject to regulatory impact assessment requirements, to ".....introduce a mandatory disclosure scheme across Australia to provide information about the energy, greenhouse and water performance of homes at point of sale or lease" (DSE 2009). The purpose of this scheme was to highlight energy efficiency and identify energy inefficient dwellings. The impact of such a scheme upon the exchange prices of established housing stock is unknown but likely to be significant.

This paper examines industry and other stakeholder perceptions towards energy efficiency ratings and the relationship with house prices. The concept of price, worth and value is discussed in light of this new requirement. Consideration is also given to the Housing Energy Rating System (HERS) and the nexus that may be emerging with exchange prices of housing stock. A literature review identifies international trends and directions emerging within the Australia. The results of this research provide an insight and enhanced understanding of the efforts being made to meet carbon emission reduction targets.

Keywords: Housing, energy efficiency rating, perception, value, real estate agents

INTRODUCTION

At an international level governments are moving towards developing and implementing policies aimed at reducing carbon emissions across sectors in commerce and industry. The debate of climate change appears to have moved on from whether or not it is occurring to one of how best to minimise any impact (Building Commission 2011). Substantial efforts to reduce carbon emissions are also now being made within the built environment including the residential sector. In Australia residential dwellings are responsible for 10% of greenhouse gas emissions (Efficiency 2011) and considerable effort is being directed towards the design, construction and in-use characteristics of new housing stock in a direct effort to reduce emission levels. For example in May 2011 the Building Commission of Australia increased the previous 5 star rating requirement for new dwellings, extensions and alterations to 6 stars (Building Commission of Australia 2011) with this rating requirement specifically being applied to the building envelope. However given the substantial proportion of global housing stock already constructed there is now concern about how the energy efficiency of these existing homes can be improved.

Typically House energy rating systems (HERS) have been developed with consideration given to regional conditions and climates. The ability of energy rating systems to accurately reflect the capability of a home's energy performance has been, and continues to be, of immense interest to researchers (Kordjamshidi 2011a). A growing appreciation of the importance of occupant behaviour has been observed (Hannah 2011; Horne & Hayles 2008; Joelsson & Gustavsson 2008; Kordjamshidi & King 2009) with many studies concluding this observation is intuitive and as expected (Kordjamshidi 2011b; Raisbeck & Wardlaw 2009; Stein & Meier 2000; Willrath 1996; Zmeureanu et al. 1999).

A literature search did not identify a formal definition of efficient energy performance in a housing context and many studies relied upon the Bruntland definition to guide their research framework. The Building Commission of Victoria (2011) as a statutory authority emphasised the importance of energy efficiency in the domestic built environment by stating "*Sustainability in the built environment involves promoting energy efficient buildings and minimising their harm on our environment.*" Notionally an expansion in the quantity of buildings, both new and established, capable of minimising environmental impact can only be seen as desirable in a broader sustainable context.

As a result of a Council of Australian Governments (COAG) meeting in July 2009, the federal government engaged external consultants to provide a Regulation Impact Statement (RIS). The output of this appointment was to recommend options for dissemination of information concerning energy efficiency Rating (EER) of houses to owner-occupiers and tenants in Australian. This project was commissioned through the National Framework for Energy Efficiency (NREE) Building Implementation Committee. The report was released for public viewing and comment in July 2011 and reviewed both mandatory and voluntary HERS options. A key finding in the report was the residential property market is an imperfect market in terms of information dissemination and with particular reference to information concerning a home's energy performance. Further more the report described the market in economic terms as potentially suffering from "adverse selection" (Group, TAC 2011). In other words, the report is suggested the true value and contribution of better quality environmental measures may not be fully recognised and therefore not feature in a buyer's determination of price. The report is silent with regard to occupant behaviour.

International studies argued that occupant behaviour of residential buildings has a significant impact upon actual energy consumption (Gill et al. 2010; Eves & Kipps 2010; Joelsson & Gustavsson 2008). This situation is causing considerable consternation amongst policy makers as to how best to inform the public not only of the characteristics of building's energy performance capabilities, but also how best to maximise these characteristics for the benefit of the environment. This is the ultimate objective behind such policies.

This paper investigates the characteristics of HERS rating systems and perceptions of market participants. It also reviews potential barriers to energy rating systems and critically reviews the experiences of countries where HERS systems have already been implemented. Finally a general assessment is made of the options proposed in Australia.

RATIONALE BEHIND EER - MARKET PERSPECTIVE

The need to reduce carbon emissions is generally seen as a global problem demanding a global solution. Governments are addressing associated and often interrelated environmental issues from multiple perspectives of which emissions from housing is just one. Clearly then, regulating new housing design and energy performance levels to meet desired standards is arguably easier to achieve than mandating post occupancy behaviours or adaptation of existing stock. Mandatory energy efficiency ratings (EER) is an attempt to create a market response by identifying poor performing homes, but how buyers will synthesise this information is largely yet to be determined. When investigating stakeholder responses to residential sustainability declarations it was demonstrated whilst there was considerable conformity on behalf agents to make buyers aware of the houses' performance capabilities, there was minimal awareness of its relevance by buyers and sellers (Eves and Bryant 2011).

This lack of understanding has also been observed in other countries. When examining the post occupancy it was observed that numerous people having consciously purchased high energy efficient homes were dissatisfied with the performance and modified a number of the technologies to "override" the smart systems in order to create a more comfortable internal environment (Crosbie and Baker 2010). Whilst studying risk attitudes in tenancy behaviour towards energy efficiency in dwellings in Switzerland, Farsi (2010) noted that the value of energy efficiency for consumers or tenants was substantially influenced by perceived uncertainty about the comfort benefits and resulting energy savings.

Given that energy representation of dwellings will become a legal document and form part of every purchase contract within Victoria and potentially in other Australian states and territories, it is imperative that all stakeholders understand the implications. It is argued the initial response by real estate agents, and to some extent sellers, may be to overlook comments about the energy performance capabilities of the house particularly if they are poor i.e. low. The basis of this contention is that neither party sufficiently understands either (a) the technical implications or (b) how best to present EER characteristics to purchasers. Nevertheless it is most probable buyers will inquire about these documents when provided. Further more it has been shown that whilst a home may have been designed for specified energy performance level and marketed as capable of achieving this level, actual energy performances within many houses have fallen short of these targets (McGreal et al. 2009; Zhang 2010). The impact of this problem has caused concern amongst marketers of residential real estate and there appears to be emerging confusion about the price premium that should be linked to higher energy rated homes (McLeod & Fay 2011; Purdy 2009; Raisbeck & Wardlaw 2009; Song, Young & Hargreaves 2010). It is argued that for agents to adequately address buyer and seller concerns about how to successfully market mandatory EER disclosure, the agents will require specialised training to raise their awareness and understanding of the potential implications of their marketing decisions.

The impact of housing upon the environment necessitates affirmative action on behalf of governments but it is important that participants in the industry understand the aims and limitations of HERS classifications and the influence occupant behaviour has on energy consumption. The skills, integrity and professionalism of an agent will arguably affect the decisions prospective buyers make when deciding where to live and what type of housing to purchase. Real estate agents are required to market clients' property assets to their best ability; with increasing energy costs it is realistic to include the attributes of an energy efficient home as one of the features. Without a thorough understanding, arguable purchasers and sellers are not likely to be able adequately discern the contributing value of a more energy efficient house which supports the concerns raised in the RIS report referred earlier.

CONSUMER PERSPECTIVE

It has been demonstrated that consumers who purchase products and services regularly become better educated to standards and current market prices (Faiers, Cook & Neame 2007). More expensive purchases are made less frequently and therefore consumers often seek professional and/or statutory information to formulate their decisions. In terms of individual property information about energy efficiency, it is likely to be very difficult for inexperienced consumers to decipher the actual meaning of information and how it applies to individual occupant behaviour. Stein and Meier (2000 pg 349) noted that "... he [the consumer] will buy the wrong house as a result of inaccurate scores or cost estimates or that he will make uneconomic retrofit investments as a result of inaccurate recommendations."

The principle purpose of mandatory EER is to inform purchasers about the ongoing energy costs associated with a particular dwelling. The ratings, whilst in themselves are house specific, are likely to be seen as

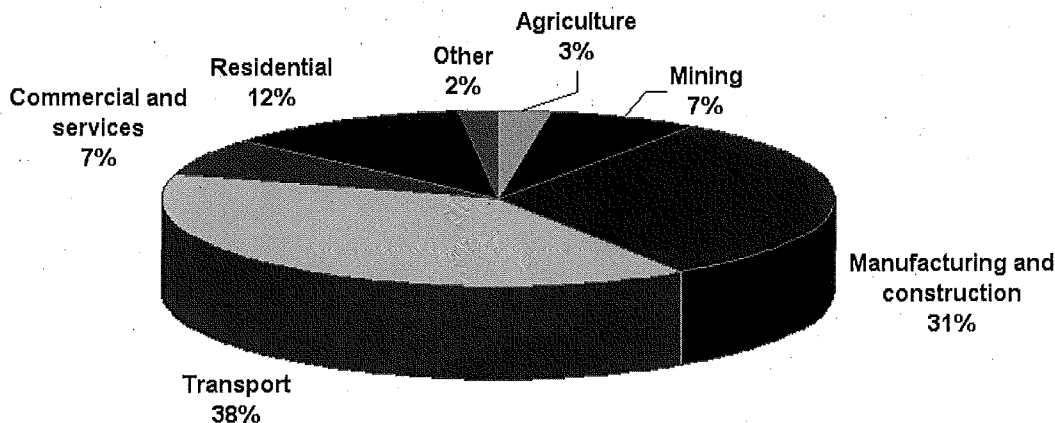
relative by the consumer. That is, it is normal consumer behaviour to compare product characteristics and houses are no different in this regard. It is through this comparative process that the market may begin to discern price and worth to individual house purchasers.

Whilst investigating people's willingness to pay for energy efficient homes a positive correlation was identified between environmental characteristics in a house and the willingness pay for these features (Mandell and Wilhelmssen 2011). However the same study did not investigate whether or not purchasers did actually pay for such features. Another US based study Purdie (2009) found that purchasers are not inclined to pay a premium for energy efficient homes. Zhang (2010) concluded that purchasers tended not to concern themselves with environmental issues until they are more economically comfortable and considered aspects beyond the provisions of security and start to consider comfort. These conflicting findings confirm there is significant work yet to be done to achieve the aim of mandatory reporting i.e. to reduce the level of carbon emissions.

ENVIRONMENTAL ISSUES

The need for affirmative action to reduce carbon emissions has largely been accepted and how this is best achieved is rapidly becoming the central debate within government. Numerous researchers have argued that real change can only be achieved through financial incentives leading to behavioural change (Kriese & Scholz 2011; Raisbeck & Wardlaw 2009; West, Bailey & Winter 2010). Final energy use of major sectors within Australia is shown in Figure 1. Residential is substantial consumer of energy and this use is expected to increase by 55% by 2020 (Efficiency 2011). Energy efficiency ratings are one of a range of measures that aim to ensure people are continually reminded of the potential environmental damage due to then poor design of buildings.

Figure 1. Final Energy Use by Sectors



(Source: ABARE 2007 Cited in Allen Consulting Group 2011)

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

SOCIAL ISSUES

The benefits of long-term sustainable measures to society are now ensconced in public attitudes. Research have shown that public opinion and awareness of the benefits energy efficient housing are increasing and purchasers are expressing a willingness to pay for sustainable benefits in housing (Colmar Brunton Social Research and Redsuit Advertising 2003; Hayles 2006; Eves & Kippes 2010; Kriese & Scholz 2011). However due to the lack of uniformity combined with commercial interests impacting upon market information there is a considerable level of confusion in relation to the real value contribution to both user and the environment (Gill et al. 2010). There is relatively little research in this area.

The question in relation to the impact of housing EER upon public attitudes and exchange price remains unanswered and is likely to remain so until buyers of houses are able to understand the information available them when making a purchase decision. Gill et al. (2010) investigated post occupancy behaviour of purchasers of an award winning sustainable housing development in the UK where the findings suggested behaviour of the occupant had a notable and significant impact upon the energy consumed. It can be argued that more than just the disclosure of the energy efficiency must be communicated. The stakeholders need to be educated about how to use a dwelling's technologies to benefit themselves and the broader community.

ENERGY EFFICIENCY RATING SYSTEMS

House energy rating systems measure the thermal performance of houses that are typically in the same climate conditions and behaviour patterns. A rating scale is given to these systems and in Australia's case this scale is star system where the more stars attributed to a house implies it to be more thermally efficient (Kordjamshidi & King 2009). 'AccuRate' has emerged as the preferred second generation software by Australian Nationwide House Energy Rating Scheme (NatHers). Other schemes within Australia include: ACTHERS, BASIX and NABERS and internationally common systems include LEEDS, BREEM, BEERS, CHEERS. All these schemes are designed to meet the requirements of the architecture and climates in which they are applied. The ability of these schemes to accurately predict the thermal performance of a house has been questioned and the unreliability has the potential to cast doubt over the validity of the scheme in the minds of the public (Stein & Meier 2000).

PERFORMANCE BARRIERS TO EER

Barriers to EER systems arguably are numerous and the level of consumer confidence in HERS system(s) is vital for government objectives to be achieved. An Australian government report reviewed the impact of mandatory HERS reporting upon the residential market cited several barriers and is listed with other research in Table 2.

Table 2. Perceived Performance Barriers to Housing

Source	Perceived Barrier within HERS Systems
Allen Consulting (Group, AC 2011)	Adverse selection, cost, lack of expertise
(Kordjamshidi & King 2009)	Inability to distinguish between energy use and energy efficiency
(Kordjamshidi 2011a)	Not based on design criteria
(Stein & Meier 2000)	Skill and training of assessor
(Stein & Meier 2000)	Actual occupant behaviour Vs default occupant behaviour
(Kordjamshidi 2011a)	Cannot accurately evaluate free running buildings

These performance barriers can be reviewed from various aspects ranging from technical (i.e. building design and fabric) to intangible considerations such as market reaction. The manner in which buyers of residential property are likely to react is considered to ultimately be a major influence on the transfer price (Bloomers, Magnani & Peters 2001; Kriese & Scholz 2011; McGreal et al. 2009). Adverse selection is the inability of the market participants to distinguish between low and high quality products. The inability of a HERS system to properly and accurately discern between various house energy efficiency characteristics or where such information is considered imperfect, such asymmetric information, is likely to lead to adverse selection within the market. It is therefore crucial that underlying imperfections of HERS systems are recognised by all stakeholders.

The significance of information or more accurately lack of information within the property market has been recognised. In order for the EER to have credibility, it is essential that users know and understand its form, construct and significance. Even the most well intended government policy is likely to fail if the end users of the policy do not understand its purpose or long-term benefits.

GOVERNMENT POLICY

In order to minimise the impact of any energy efficiency rating imperfections, such limitations must first be recognised through government policies. Internationally governments are taking various measures to create a change in social behaviours and attitudes to minimise the level of carbon emissions. In Australia the federal government commissioned a private consulting organisation to investigate the impact of mandatory energy rating disclosure with the report released in July 2011. Essentially this report identifies six potential options for the implementation of mandatory reporting of EER ranging from basic home reviews conducted by the owner to extensive evaluations performed by appropriately trained people. The intent of the government is to implement this reporting system appears although it remains to be decided which option will be adopted.

Like many governments globally the Australian government is approaching the task of carbon emission reduction via increased energy efficiency and similar initiatives. A review of the Department of Climate Change and Energy Efficiency web site revealed 50 programs and initiatives ranging from farming initiatives to solar city programs. Initial review of these programs confirmed each largely relies upon financial incentives to those who wish to avail themselves. The underlying presumption being that people will take the initiative and that they themselves have the financial capacity to supplement to gap between government rebates/tax breaks and the commercial cost of the measure chosen. The implementation of mandatory EER appears to digress from the paradigm towards one of placing the responsibility and cost onto the market.

VALUE PERCEPTIONS OF EER

Property characteristics are generally viewed differently when purchasing a home as an owner-occupier compared to acquiring a house for investment purposes. What may be seen as an important investment criterion is likely to be viewed with lesser or differing emphasis for owner-occupation. For example, a large allotment may be seen as a sound investment criterion for future development by an investor. On the other hand a family may see the same allotment as a detriment if they are time poor or conversely an opportunity to have area in which children can play safely. In regard to EER, analogous perspectives are likely to influence value judgements, as the importance of energy reducing technologies will not be of equal concern to all buyers and tenants.

Earlier research into supply and demand levels for low energy homes in the UK Lovell (2005) noted that home buying decisions were often complicated by complex and interrelated factors that melded together. The same study noted a willingness to pay a premium existed but this often did not translate in to actions when negotiating the transfer price. Other studies have also observed a similar phenomenon (Eves & Kippes 2010; Hayles 2006; Mandell & Wilhelmsson 2011). In a study of how tenants would value the effectiveness of energy efficient technology measures, Farsi (2010) found a notable relationship between the perceptions of risk in terms of the measure's performance (i.e. the ability to deliver promised energy savings) and the price they were willing to pay. It was shown that the price increased by around 4% for measures that were known and trusted. A similar outcome was seen in a recent study in the Australian Capital Territory (ACT) that examined the relationship between house prices and energy efficiency ratings over a 2-year period (2005-2006). It was observed that houses that had higher energy efficiency ratings typically sold for more than less efficient homes. The extent of the increase was about 3%. Interestingly, mandatory EER disclosure has been in existence since 1999 and the buying public had adequate time to understand its meaning and purpose. Mandatory reporting has not been in Queensland long enough to observe any trends, similar or otherwise.

RESEARCH QUESTIONS DERIVING FROM THE LITERATURE REVIEW

In order to meet the agreed Kyoto commitments Australia is adopting a multi-faceted approach to carbon reduction and mandatory EER for homes is just one of the measures currently being considered or implemented. Established theories of consumer behaviour, behavioural economics and prospect theory all suggest that buyers will consider numerous factors when purchasing large monetary items. Levy & Kwai-Choi (2004) found that males tend to value location and financial practicality whereas females seek other

features that will benefit the family and this trend is noted extensively in consumer behaviour literature (Kriese & Scholz 2011; McGreal et al. 2009; Pounds 2011; Zhang 2010). Understandably one of the key determinates within any purchase decision is financial capacity and due to the substantial monetary commitment real estate represents, the implications are considerably heightened. The consistent trend when evaluating the value of sustainability and all that it means in the housing environment is that there are restrictions upon people's willingness and/or ability to pay a premium for EER. Often these restrictions are in the form of financial capabilities. Zhang (2010 pg.177) noted "Many home buyers do not care about the environment, but the limited income, when making the actual purchase decisions, pragmatism will prevail." Whilst many purchasers actually do care for the environment, it is nonetheless reasonable to expect that decisions will largely be governed by finances and these are likely to have a significant impact upon any price premium for EER houses.

As Australia appears committed to the introduction of mandatory reporting of EER the following research questions are yet to be addressed in the literature:

1. *How will buyers of residential property perceive the importance of disclosed energy efficiency ratings (ERR)?*
2. *How will buyers of residential property respond to disclosed energy efficiency ratings (EER) relative to other purchase considerations?*
3. *What will be the relationship between disparate house EER and exchange prices?*

Table 1 provides a summary of literature related EER.

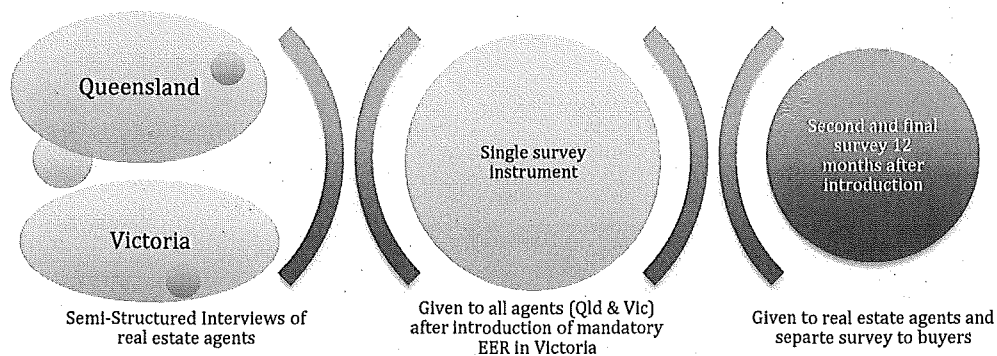
Table 1. Previous Studies into Housing and Sustainability

Author(s)	Research Topic	Methodology	Location	Summarised Findings
(Stein & Meier 2000)	Accuracy of HERS systems	Comparison of ratings against energy billing data	USA	HERS was a reasonable accurate predictor of energy cost
(Eves & Kippes 2010)	Buyer awareness and acceptance of energy efficiency measurers	Survey	New Zealand	Energy efficiency not highly considered relative to other drivers
(Bryant & Eves 2011)	Buyer reactions to energy efficiency disclosure	Survey	Queensland Australia	Buyer awareness is minimal. Agency participation greater
(Kriese & Scholz 2011)	Positioning of sustainability in the residential market	Cluster analysis of advertising material	Basel Switzerland	Energy efficiency is less emphasised compared to location
(Wang, Chen & Ren 2010)	Carbon emissions in varying climate zones	Modelling using AccuRate software	Australia	HERS systems need further refinement to accurately predict performance in varying climatic zones
(Ravetz 2008)	Evaluation of energy performance of existing housing stock	Knowledge mapping with axial design	UK	Energy performance capabilities are low
(Kordjamshidi & King 2009)	Inaccuracies within HERS rating systems	Simulation of thermal performance of standard dwellings in varying climate zones	Australia	Current HERS systems unable to accurately measure design performance
(Farsi 2010)	The undervaluing of energy efficient technologies by consumers	Random utility model applied to data from tenants	Switzerland	That consumers (tenants) are risk averse when being asked to pay more for energy saving technologies
(Pellegrini-Masini et al. 2010)	Whole of life costing of energy reduction technologies	Financial analysis utilising DCF over 25 years	UK	Minimal intervention case (low cost) demonstrated best ROI with payback under 13 years whilst complete intervention (more comprehensive) worst case ROI with payback in excess of 60 yrs
(Gatersleben et al. 2010)	Nexis between materialism and energy efficient lifestyles	Survey	UK	People express both relatively high levels of environmental concern and relatively high levels of materialism simultaneously. Moreover, materialism and environmental concern appear to be related to different types of behaviours
(Horne & Hayles 2008)	Comparison of housing energy performance	Desktop study	United States, Canada, UK and Australia	The study outlined above demonstrates that thermal energy performance can be benchmarked internationally.

RESEARCH METHODOLOGY

To address the above research questions a mixed method research design is appropriate. The research will be undertaken with a semi-structured interview of real estate agents in (a) Victoria where the reporting system is yet to be introduced and (b) Queensland where a system has been introduced. These two states have been selected due to their differing climatic zones; namely cool and humid. It is expected that the climate zones will have a significant impact upon the opinions and responses of buyers within those regions.

Figure 2. Research methodology



In terms of EER, real estate agents are considered impartial and therefore it is regarded they will be best placed to synthesise the views of the buying and selling public. The semi-structured interview is intended to inform the survey instrument. In order to address RQ1 and RQ2, it is considered important that a longitudinal study be adopted and these agents be asked to respond questions. The interviews in Victoria will be conducted (i) prior to (ii) shortly after and (iii) six months after the introduction of mandatory EER. Similar surveys will be distributed in Queensland at the same time and interval length. In the case of Queensland agents, the semi-structured interview will seek to ascertain their experiences of mandatory EER introduction and buyer trends since. It is hypothesised that both RQ1 and RQ2 can be equally informed in this manner.

In relation to RQ3 it is envisaged the interview participants in both states will be equally placed at the time of the second and final survey to provide information regarding the relationship of EER and transfer prices. This research seeks to identify buyer perceptions to EER across varying climate and demographic zones. Therefore it is considered appropriate to survey approximately 12 months after the introduction of mandatory EER reporting in Victoria.

CONCLUSION

This paper has emphasised the importance of EER within the overall framework of reducing the level of greenhouse gas emissions and has also confirmed there has been relatively little research to-date in this rapidly developing area. Given that houses are the most common structural improvement to land in urban Australia and therefore a substantial emitter of greenhouse gases, it is essential that further efforts be made to minimise growth in emissions and reduce the current levels. Stakeholders are generally willing to accept the importance of the environment however the housing environment and the associated behaviours is one of the more difficult areas for governments to intervene into. Much of the emphasis surrounding energy efficient homes have been on the built environment however post-occupancy behaviour is a major factor in energy consumption. Home energy rating systems are considered as one of a number of methods that will raise the profile of energy consumption in terms of house-buying decision processes. Arguably this will demonstrate that the level of house prices of less energy efficient homes will reduce as a result of market forces and also due to increasing energy costs. This in turn is expected to lead to retrofitting established homes to achieve increased levels of energy efficiency. However earlier research suggested purchasers are unwilling to move away from the primary drivers of decision processes and are placing EER lower in their

priority listing with location and finances remaining to be of primary concern. It is clear from the literature review further research is required to establish how, if at all, long term established housing stock, particularly those situated in desirable suburbs, will be affected by mandatory energy efficiency reporting.

REFERENCES

- Building Commission 2011, What you need to know about 6 Star, retrieved 26th August 2011
<<http://www.buildingcommission.com.au/www/html/2562-introduction-of-6-star.asp%3E>>.
- Bloomers, R, Magnani, F & Peters, M 2001, 'Paying a green premium', *McKinsey Quarterly*, no. 3, pp. 15-7.
- Bryant, L & Eves, C 2011, 'Sustainability and Mandatory Disclosure in Queensland: An assessment of the impact on home buyer patterns', paper presented to 17th Pacific Rim Real Estate Society Conference, Gold Coast Australia, 16-19 January 2011.
- Efficiency, DoCCaE 2011, Homes, retrieved 24th August 2011,
<<http://www.climatechange.gov.au/en/what-you-need-to-know/buildings/homes.aspx%3E>.
- Eves, C & Kippes, S 2010, 'Public awareness of "green" and "energy efficient" residential property: An empirical survey based on data from New Zealand', *Property Management*, vol. 28, no. 3, pp. 193-208.
- Faiers, A, Cook, M & Neame, C 2007, 'Towards a contemporary approach for understanding consumer behaviour in the context of domestic energy use', *Energy Policy*, vol. 35, no. 8, pp. 4381-90.
- Farsi, M 2010, 'Risk aversion and willingness to pay for energy efficient systems in rental apartments', *Energy Policy*, vol. 38, no. 6, pp. 3078-88.
- Gatersleben, B, White, E, Abrahamse, W, Jackson, T & Uzzell, D 2010, 'Values and sustainable lifestyles', *Architectural Science Review*, vol. 53, no. 1, pp. 37-50.
- Gill, ZM, Tierney, MJ, Pegg, IM & Allan, N 2010, 'Low-energy dwellings: the contribution of behaviours to actual performance', *Building Research and Information*, vol. 38, no. 5, pp. 491-508.
- Group, AC 2011, Mandatory disclosure of residential building energy, greenhouse and water performance- Consultation Regulation Impact Statement.
- Group, TAC 2011, Mandatory disclosure of residential building energy, greenhouse and water performance. Consultation Regulation Impact Statement, Melbourne.
- Hannah, M 2011, Green ratings canned System 'may mislead public', Y,
<<http://ezproxy.deakin.edu.au/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=n5h&AN=201106051005023369&site=ehost-live%3E>.
- Hayles, C 2006, 'An Examination of the Relationship Between Sustainability and Affordability in Residential Housing Markets', paper presented to PRRES, Auckland New Zealand,
- Horne, R & Hayles, C 2008, 'Towards global benchmarking for sustainable homes: An international comparison of the energy performance of housing', *Journal of Housing and the Built Environment*, vol. 23, no. 2, pp. 119-30.
- Joelsson, A & Gustavsson, L 2008, 'Perspectives on implementing energy efficiency in existing Swedish detached houses', *Energy Policy*, vol. 36, no. 1, pp. 84-96.
- Kordjamshidi, M 2011a, 'House Rating Schemes', in *House Rating Schemes*, Springer Berlin Heidelberg.
- Kordjamshidi, M 2011b, *House Rating Schemes From Energy to Comfort Base*, first edn, Springer, Berlin.
- Kordjamshidi, M & King, S 2009, 'Overcoming problems in house energy ratings in temperate climates: A proposed new rating framework', *Energy and Buildings*, vol. 41, no. 1, pp. 125-32.

- Kriese, U & Scholz, RW 2011, 'The positioning of sustainability within residential property marketing', *Urban Studies*, vol. 48, no. 7, pp. 1503-27.
- Levy, DS & Kwai-Choi, C 2004, 'The influence of family members on housing purchase decisions', *Journal of Property Investment & Finance*, vol. 22, no. 4, pp. 320-38.
- Mandell, S & Wilhelmsson, M 2011, 'Willingness to Pay for Sustainable Housing', *Journal of Housing Research*, vol. 20, no. 1, pp. 35--51.
- McGreal, S, Adair, A, Brown, L & Webb, JR 2009, 'Pricing and Time on the Market for Residential Properties in a Major U.K. City', *Journal of Real Estate Research*, vol. 31, no. 2, pp. 209-33.
- McLeod, P & Fay, R 2011, 'The cost effectiveness of housing thermal performance improvements in saving CO₂-e', *Architectural Science Review*, vol. 54, no. 2, pp. 117-23.
- Pellegrini-Masini, G, Bowles, G, Peacock, AD, Ahadzi, M & Banfill, PFG 2010, 'Whole life costing of domestic energy demand reduction technologies: householder perspectives', *Construction Management & Economics*, vol. 28, no. 3, pp. 217-29.
- Pounds, G 2011, '"This property offers much character and charm": Evaluation in the discourse of online property advertising', *Text and Talk*, vol. 31, no. 2, pp. 195-220.
- Purdy, AJ 2009, 'Market Valuation of Certified Green Homes', Masters thesis, Montana State University.
- Raisbeck, P & Wardlaw, S 2009, 'Considering client-driven sustainability in residential housing', *International Journal of Housing Markets & Analysis*, vol. 2, no. 4, pp. 318-33.
- Ravetz, J 2008, 'State of the stock--What do we know about existing buildings and their future prospects?', *Energy Policy*, vol. 36, no. 12, pp. 4462-70.
- Song, S, Young, M & Hargreaves, B 2010, 'House Price-Volume Dynamics: Evidence from 12 Cities in New Zealand', *Journal of Real Estate Research*, vol. 32, no. 1, pp. 75-99.
- Stein, JR & Meier, A 2000, 'Accuracy of home energy rating systems', *Energy*, vol. 25, no. 4, pp. 339-54.
- Wang, X, Chen, D & Ren, Z 2010, 'Assessment of climate change impact on residential building heating and cooling energy requirement in Australia', *Building and Environment*, vol. 45, no. 7, pp. 1663-82.
- West, J, Bailey, I & Winter, M 2010, 'Renewable energy policy and public perceptions of renewable energy: A cultural theory approach', *Energy Policy*, vol. 38, no. 10, pp. 5739-48.
- Willrath, H 1996, 'HERS and BERS: Rating the thermal performance of houses', *Fuel and Energy Abstracts*, vol. 37, no. 3, pp. 214-.
- Zhang, J 2010, 'Green Marketing Strategy Analysis of Real Estate Based on Low-Carbon Economy', *International Journal of Business & Management*, vol. 5, no. 12, pp. 177-9.
- Zmeureanu, R, Fazio, P, Calla, R & DePani, S 1999, 'Development of an energy rating system for existing houses', *Energy & Buildings*, vol. 29, no. 2, p. 107.

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