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Report on the findings of the Gilmore Group Workshop:

"Evaluation of the findings of the Productivity Commission Inquiry into Energy Efficiency with specific focus on the Building Industry"

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1 Executive Summary

1.1 Productivity Commission Draft Report into Energy Efficiency

The Productivity Commission released the draft report of its Inquiry into Energy Efficiency on 21 April 2005 after receiving 85 submissions from interested parties in government, industry, community groups and individuals. The report was highly critical of existing and proposed building regulations aimed at reducing the energy use of buildings through improvement of the thermal efficiency of their building fabric. It has called for a halt in the implementation of new building regulations till the existing regulations have been evaluated to ensure that these regulations do save energy. Its analysis suggests that existing regulation is likely to offer little improvement to energy efficiency, that the costs are underestimated and benefits overstated, and that there is little evidence of market failure sufficient to justify government intervention. Its alternative prescription is essentially an increase in the price of energy to reflect the real costs incurred in its production and 'light handed' regulation combined with the provision of targeted information to ensure that markets work efficiently. The Commission believe that competitive pressure in the market will provide a natural improvement to energy efficiency without the need for regulation and that overlooking this natural improvement is part of the reason why the energy savings provided by regulation has been overstated.

1.2 Expert Workshop

The draft report was released to provide an opportunity for further public consultation and comment. The Insulation Council of Australia and New Zealand, the Australian Glass and Glazing Association and the Business Council for Sustainable Energy joined together to sponsor an expert workshop to evaluate the implications of the draft report with a specific focus on the building industry. The Australian Conservation Foundation was also invited to participate in the workshop. The workshop met on 30 and 31 May 2005. The experts assembled have a wide range of expertise in economics, energy efficiency, engineering, architecture and public policy development. For a full list of participant see Appendix A.

1.3 Workshop findings

The Workshop found that the Commission's recommendations to halt further regulatory development were not justified. The Terms of Reference - which only allowed the Commission to only look at energy efficiency improvements which are cost-effective for individual producers and consumers - hamstrung the Inquiry and gave it a perspective that was not useful in helping government develop viable energy efficiency policy. The Commission's narrow interpretation of market failure and private cost effectiveness but not social benefit virtually eliminated the consideration of many effective policy options. Further, the usefulness of simulation techniques as an effective instrument to reduce the energy use of buildings was brought into question based on the evidence of a few submissions, despite international precedent for the use of simulation and many submissions to the contrary. In arguing for light handed regulation and targeted information provision the Commission ignores the fact that such approaches have been tried in Australia for over 25 years and yet greenhouse gas emissions from buildings have continued to grow at a rate which is inconsistent with an effective response to climate change or societal net benefit.

1.3.1 Terms of Reference

In criticising the focus on private cost effectiveness the workshop does not believe that energy efficiency improvements cannot be justified on the basis of cost effectiveness. Rather this narrow focus does not allow the Commission to examine existing and proposed policies on the terms in which they were developed. Building regulations and the policy program for the National Framework for Energy Efficiency (NFEE) were justified on the basis of their net social benefit i.e. measures which produce overall benefits to individuals, provide economic growth, a reduction in peak loads on energy utilities and environmental benefit in terms of reduced pollution and greenhouse gas emissions. The Victorian government analysis of its five star housing regulations showed that the cost benefit ratio for individuals of 4 star was better than for 5 star. However, economic modelling showed that a 5 star standard produced twice as much economic growth.

Because the social benefits of 5 star outweighed the benefits of 4 star, and 5 star was still positive for individuals, the government chose to implement 5 star. If the government had the same narrow focus as the Inquiry it would have rejected 5 star because it has a lesser benefit for individuals. The workshop believes that because the justification for all these policies is not maximising private cost effectiveness but is instead net social benefit the terms of reference should mean that the Commission is unable to consider these policies at all.

1.3.2 Market failure

The terms of reference also mean that the Commission have a narrow view of the extent to which the market is failing to deliver energy efficiency. The Commission believe that it is rational behaviour to select a very inefficient appliance or house if one values other features such as capital cost more highly and that these choices are not a basis for government intervention. The nature of the failure in this case is that in order to deliver adequate reductions in greenhouse gas emissions of the scale required to fulfil greenhouse policy obligations government intervention is needed to steer such 'privately rational' choices to more 'socially rational' energy efficient options. The consideration of such issues is beyond the Inquiry's scope. It should be noted, however, that the workshop did not consider this example to be privately rational. The only basis on which a very inefficient choice could lead to the individual being better off would be if the house was rarely heated or cooled or the appliance was rarely used. This may sometimes be the case but over the life of a house or appliance it is likely that the intensity of use will not remain at this low level and individuals will be significantly worse off as a result.

A number of submissions to the Inquiry and previous policy evaluations have provided quite detailed examples of low cost solutions to improved energy efficiency which is clearly beneficial for the individual. However, the Commission argues that these case studies show examples where the opportunity for energy saving is greatest and that the benefits were so clear that in many cases these improvements would have been implemented without government intervention. While it dismisses these examples as unrepresentative case studies, it seems quite happy to accept other limited and statistically unrepresentative case studies which it believes cast doubt over the benefits of energy efficiency.

The workshop found that there may well be many cases where energy efficiency improvements have greater potential than shown in the case studies due to the entrenched nature of market failure. In general the workshop believes that the Commission has failed to appreciate how much of the infrastructure and institutions needed to facilitate energy efficiency simply does not exist due to path dependency. The low price of energy and the lack of government emphasis on energy efficient building until recent times have meant that developing skills and provision of information in this field has not been seen as important. Government policy intervention is needed to transform markets to develop a cultural and institutional framework that facilitates energy efficiency rather than the current conditions where energy efficiency is virtually ignored. Indeed, many market intermediaries have vested interests in encouraging energy waste, for example by encouraging installation of over-sized equipment.

1.3.3 Discount rates

The Commission believes that the benefits of energy efficiency policy are overstated because discount rates used for evaluation were under 10% when there are many examples where private discount rates are found to be two or three times higher. Again the workshop found this is a legacy of the terms of reference and is not the appropriate way to assess measures with social benefit. Furthermore, the use of such 'implied' discount rates is not consistent with government policy as shown in the Department of Finance Handbook for Cost Benefit Analysis which recommends application of the Capital Asset Pricing Model (CAPM) which would lead to the use of discount rates in the order of 8% (though even this may be considered high). The research suggesting the high discount rates for individuals is predicated on the basis that if the decision was taken in a fully informed and rational manner, the only way to explain the outcomes is to assume that a high discount rate has been applied. However, where there is market failure e.g. lack of information or bounded rationality, this higher discount rate becomes a proxy for the extent of this market failure. High discount rates may also be appropriate where risk is considered to be high, but investment in energy efficiency is often considered less risky than market investment alternative because the energy is saved independent of market cycles or changes to the cost of capital. Finally it is

important to note that even if an inappropriately high discount rate of 30% were applied to the NFEE modelling significant economic growth benefits would still be shown.

1.3.4 Regulation based on simulated building energy loads

It is clear however, that the Commission does believe energy savings are risky because they call into question whether the use of thermal performance simulation in regulations will actually lead to reduced energy consumption.

Simulation is used throughout the world as the basis of demonstrating compliance with building regulation. Its use has been supported by many submissions to the Commission. Some submissions questioned whether energy savings would be delivered because the final actual energy consumption of buildings will not match the simulation prediction. The Commission's findings 7.2 and 7.3 state that the ranking of building energy consumption does not match the ranking given by simulation and that there are many other determinants of energy use that are not included in simulation. On the basis of these findings it reasons that simulation (of house energy efficiency) could distort the market to favour solutions that are less cost effective. The workshop entirely rejected this analysis.

There is enormous diversity in the way in which households use energy for heating and cooling. Consequently, a one star house that is heated and cooled for a few hours a day could easily use less energy than a 5 star house heated and cooled for most of the day. The intention of simulation is to ensure that over a broad range of potential use the 5 star house would use less energy than it otherwise would have. It is likely that those who do not use heating and cooling frequently will not derive significant financial benefit from the application of the energy efficient housing regulations; however, their houses will be more comfortable. The Commission fails to appreciate that it is rare for the one house or household to have low demand for heating and cooling over the life of the house or household. As houses are bought or sold or as household circumstances change e.g. the birth of children, the need for heating and cooling will also change. Further, energy use for heating and cooling in homes is closely tied to occupancy i.e. if one is away from home no heating or cooling is required. Those households with the highest occupancy rates will generally have fewer household members in full time employment. Consequently, an energy efficient house will minimise heating and cooling bills at the very time when demand is higher and income is lower.

With respect to the application of simulation to commercial buildings it is true that poor commissioning and maintenance of systems can lower the energy savings obtained. However, even those submissions which note this still consider that simulation is a fundamental part of any strategy to reduce building energy use. However, it is important that actual system performance be checked after occupancy to ensure that systems are working efficiently and are properly maintained — cost effective regulation should ensure this. Just as there are requirements for fire systems to be checked the workshop believes that similar post occupancy requirements for energy systems would help to ensure that the level of performance the building was designed to achieve is actually delivered.

The Commission calls for 'ex-post' evaluation of current regulations to be undertaken to test the efficacy of these regulations. The workshop found that such testing would be invaluable but do not see this as a requirement to justify the regulation, but rather as an instrument to ensure that the regulations are improved to maximise their effectiveness.

1.3.5 Alternative policy prescription

The Commission argues that market forces will drive firms to further improve energy efficiency and that as a result there will be a natural improvement in energy efficiency over time. After calling for a halt to further regulatory implementation it suggests that further cost effective energy efficiency will be delivered through increases to energy pricing to better reflect the cost of production, targeted information and other light handed regulatory approaches. To address these issues in the way the Commission proposes requires governments to reverse their traditional policy emphasis on low energy prices, and would require substantial justification, analysis and detailed policy development, little of which is provided in the Draft Report

However, the Commission has dismissed unreasonably the extensive evidence that shows firms and households are not implementing cost effective opportunities to invest in energy efficiency. A range of market and organisational failures not related to energy pricing impedes these

investments — although lack of cost reflective energy prices also contribute to less than optimal outcomes. A range of cost effective policies has been demonstrated domestically and internationally to improve energy efficiency outcomes. By overcoming market failures and improving outcomes for the large majority of consumers and firms, these policies deliver significant net economic benefits.

In addition, cost effective intervention to improve energy efficiency also can deliver additional social benefits through helping to manage the risk of future climate change. Policies to address climate change now have a time imperative as delay may cause irreversible changes to our climate that bring substantial economic, social and environmental cost.

1.3.6 Conclusion

The Productivity Commission's Draft Report fails to make any contribution to the development energy efficiency policy for the built environment in Australia. Its 'do nothing but put up the price of energy and provide more information' conclusion fails to recognise the political difficulty such a policy would face and no options are provided to address the problems higher cost energy would cause for the poor and the competitive position of businesses. It dismisses evidence of market failure and of cost effective policy alternatives with economic theory rather than a through evaluation of the feasibility of its alternatives and an investigation into the appropriate policy responses that would be needed to overcome the barriers to implementation. The Commission gives no consideration to the gap between how quickly we may be improving efficiency under current policies and what rate of improvement is needed to adequately to address the broader policy needs of greenhouse gas emission reduction.

Building regulations and policies to improve energy efficiency in the built environment developed through NFEE were developed on the basis of net social benefit. It is already understood that such policies will not benefit all firms and individuals – but will provide an overall net benefit while providing private benefit for most. The Commission's narrow terms of reference should put such policies beyond its consideration.

Further, the implementation of proposed regulations would bring the national consistency industry has argued for. Failure to act would simply see state and local governments continue to increase the stringency and breadth of local regulations because current national regulation is inadequate.

The Commission has not evaluated the cost to industry that further delay would impose. Materials suppliers have already invested in new plant and builders and designers have already begun to modify houses to comply with new regulations. Rather than simply stop further regulatory implementation the Commission should have investigated what alterative policies may be available to government to help industry deal with the difficulties it has found with these regulations such as improved training and subsidies.

Australia needs to act without delay to improve the energy efficiency of its built environment as part of an overall coordinated approach to the challenge of climate change, management of supply-side infrastructure investment, health and equity. This means that the effectiveness of regulation needs to be monitored so that policy outcomes are seen to be delivered and the regulations improved to maximise their impact. The evidence does not justify further delay and the imperative of climate change means this is no longer an option.

2 Introduction

2.1 Background to workshop

This report presents the findings of an expert workshop conducted to evaluate the Productivity Commission's (PC's) Draft Report on its Inquiry into Energy Efficiency (referred to hereafter as the 'Inquiry') with a specific focus on energy efficiency in the built environment. The workshop was funded by the following organisations:

- Insulation Council of Australia and New Zealand (ICANZ)
- Australian Glass and Glazing Association, and (AGGA)
- Australian Business Council for Sustainable Energy (BCSE)

The expertise of the workshop participants included specialists in

- economic evaluation of energy efficiency and building regulation,
- building design,
- thermal performance simulation of buildings,
- glazing and insulation product performance,
- environmental impacts of climate change,
- development of public policy in energy efficiency,
- energy generation and markets,
- energy auditing and retrofitting of commercial and residential buildings.

A full list of the participants in the workshop and their relevant experience is shown in Appendix A.

While this workshop was funded by a number of bodies the findings presented here solely reflect the views of the workshop participants. While the views of the funding organisations may concur with several of the findings of this report it should be understood that the workshop was run on the basis that the workshop report would be produced with editorial independence from the funding organisations.

2.2 Report Structure

The report evaluates the PC's Draft Report using the following structure:

- **Productivity Commission's Findings and Recommendations regarding energy efficiency in the Building Industry.**

  This section provides a brief summary of the PC's rationale for its findings and recommendations

- **Statement of the Problem**

  To determine appropriate policy responses requires that the problem the policy is intended to fix be stated accurately. This section examines the policy context of the Inquiry and the implications of the Terms of Reference for the Inquiry's usefulness as an aid to policy development.

- **Existence of Market Failure**

  There is a range of market failures preventing economically optimal investments in energy efficiency, There is a case for government intervention, where this is cost effective and

delivers overall net economic benefits. This section evaluates the extent of market failure in the building industry and whether this market failure has been recognised by the PC.

- **Implications of Business as Usual (BAU)**

  It is important to identify accurately trends in BAU, and whether as a result cost effective opportunities are being missed to improve energy efficiency. This section examines the PC's conclusions regarding BAU and presents the workshop's findings on BAU for the building industry.

- **Evaluation of Policy Options and Assessment of Policy Impacts**

  Determination of correct policy directions depends on whether the full range of policy options has been evaluated and the extent to which the determination of the various policy outcomes have been evaluated accurately — in terms of costs and benefits. This section examines how the PC has evaluated policy options and its assessment of the efficacy of these policy responses.

- **Conclusion**

  Provides an overview of the policy directions the workshop found to be justified and the evidence to support these conclusions.

3 Productivity Commission's Findings and Recommendations regarding energy efficiency in the Building Industry

3.1 General Conclusions

Key conclusions that flow from the draft report include:

- Energy efficiency has been oversold: while large savings are often claimed, actual outcomes are generally much smaller and costs of implementation much higher than acknowledged. In particular, Regulatory Impact Statements used to justify policies have used unduly low discount rates and have assumed high levels of savings while under-estimating costs of administration and compliance
- Governments have over-reacted and have gone too far on energy efficiency policy given the present level of evidence regarding its effectiveness.
- Mandatory performance standards reduce choice and lead to sub-optimal outcomes
- Most barriers to energy efficiency are normal market characteristics. There is only a limited role for governments to improve some aspects of information and remove some distortions (such as energy market reform and introduction of pricing of environmental impacts through emissions trading)
- Given the Inquiry found little evidence to suggest that the current approaches will be effective in saving energy it recommends against committing to stronger energy efficiency action, and finds that work on current programs should be deferred until thorough evaluation of past programs has been carried out.

The Commission repeatedly criticises the analysis in Regulatory Impact Statements regarding costs and benefits, even though the Commission's own Office of Regulatory Review (ORR) and similar state level organisations must approve all such documents. The Commission has suggested during the hearings that the role of the ORR was to ensure all the requirements were addressed, not how adequately they were addressed. It argues that these previous evaluations could now be seen to be inadequate because:

- The discount rates applied are too low
- The scale of savings is generally overstated (as is the extent to which the policy measures will contribute to savings) due to over-optimism, failure to recognise rebound effects, and an overly pessimistic view with regard to the growth of energy use in Business as Usual projections etc.
- The adverse impacts on some groups have been inadequately considered
- Alternative less intrusive policy options have often been inadequately evaluated
- The costs of implementation for individuals and governments are generally understated
- The potential distortions created by intervention are greater than is generally acknowledged.

The ORR guidelines to the preparation of regulatory evaluation1 makes it clear, however, that many of the factors mentioned by the Commission above should be taken into account in preparing regulatory evaluation. If the Commission's conclusions are correct it would seem that either the ORR has not been adequately scrutinising Regulatory Impact Statements or it disagrees with the Commission's findings. Note that these same guidelines also require that a range of externalities, environmental and social impacts should all be evaluated. These factors are outside the scope of the Terms of Reference for the Inquiry.

[1] Office of Regulatory Review, "A Guide to Regulation", Second Edition 1998

3.2 Conclusions regarding Residential Buildings (Chapter 7)

Key points arising from this chapter are:

- Subsidies and advisory services for households seem to have had a small positive effect, although subsidies (where the actions are cost-effective) are difficult to justify in the Commission's view.

- While appliance energy labelling has probably had a net benefit, Minimum Energy Performance Standards are seen as potentially inappropriate because they may reduce consumer choice, denying some consumers of cost-effective products (for them) and features they may prefer, while also reducing competition.

- Based on the Commission's assessment, mandatory residential building rating schemes may be flawed and create issues similar to those identified for appliance MEPS. Action should be deferred subject to further evaluation.

- Criticisms of the ACT's building disclosure scheme are used by the Commission to justify blanket rejection of such schemes, even though the European Union plans to introduce them.

The PC uses examples presented by Dr Terry Williamson to underpin its argument that present regulatory approaches may not deliver savings. The HIA has also challenged cost estimates used by governments, and PC has accepted these as evidence of the need for more work. However, neither the PC nor the HIA have provided robust examples of the extent of underestimation of costs.

Formal draft findings and recommendations for the residential sector related to buildings include:

DRAFT RECOMMENDATION 7.2

Before the States and the Northern Territory mandate energy-performance ratings for existing dwellings at the time of sale or lease, the Ministerial Council on Energy should commission an independent evaluation of the ACT rating scheme that has operated since 1999. The evaluation should include an assessment of:

- the accuracy of home energy ratings in predicting the actual energy performance achieved by home buyers and tenants; and
- the costs, benefits and effectiveness of the scheme, taking account of the diverse preferences and financial circumstances of individual homebuyers.

DRAFT FINDING 7.2

Energy efficiency standards for residential buildings are based on computer simulation models — such as the Nationwide House Energy Rating Scheme energy-rating software — that exclude many of the determinants of a building's actual energy efficiency.

DRAFT FINDING 7.3

A ranking of residential buildings by star rating (using energy-rating software such as Nationwide House Energy Rating Scheme) may be very different from a subsequent ranking based on actual energy consumption or efficiency.

DRAFT RECOMMENDATION 7.3

New or more stringent energy efficiency standards for residential buildings should not be introduced until existing standards have been fully evaluated. The evaluation should be commissioned by the Australian Building Codes Board to:

- consider whether defining building standards in terms of simulated heating and cooling loads is an effective way to raise actual energy efficiency;
- investigate whether weaknesses in energy-rating software distort the housing market in favour of particular building designs that are not necessarily the most cost effective, particularly over the longer term as innovations are made in building design;
- evaluate costs and benefits in a way that takes account of the diverse preferences and financial circumstances of individual home buyers;
- assess how effectiveness and compliance costs differ between the deemed-to-satisfy and performance-based standards;
- analyse the distributional impacts of standards on different socio-economic groups, including first-home buyers and less-affluent groups; and
- examine the process used to set the stringency of standards in the Building Code of Australia, including the impact of any increase in stringency by individual States and Territories.

3.3 Conclusions regarding Commercial Buildings (Chapter 8)

Key points raised in this chapter include:

- The Commission challenges the Australian Building Codes Board's recent analysis of the economics of non-residential building regulations in its Regulatory Impact Statement.
- As in other sections of the draft report, the Commission proposes that higher discount rates should be applied in the economic analysis.
- Research by Exergy that shows many buildings fail to perform efficiently because of poor commissioning, maintenance and management. Evidence such as this is used by the Commission to argue that regulations that improve design performance may not be effective.
- A number of the issues raised for Residential Buildings are found to apply equally to Commercial Buildings e.g. that savings potential is overstated, that there is little evidence of market failure that would justify other than light handed government intervention etc..

Draft findings and recommendations relating to non-residential buildings include:

DRAFT RECOMMENDATION 8.2

Energy efficiency standards for commercial buildings should not be introduced without a more thorough evaluation of the costs and benefits of such a policy and a comprehensive analysis of the other policy options. In such an evaluation, the Australian Building Codes Board should give greater consideration to:

- the sensitivity of regulatory impact statement estimates of cost savings to the assumptions used;
- the costs of introducing energy efficiency standards, including administration costs and compliance costs; and
- the effectiveness of standards in achieving higher actual energy efficiency.

4 Evaluation of the Draft Report

4.1 Statement of the Problem

4.1.1 Policy Context

In its June 2004 White Paper, the Government stated:

"A Productivity Commission inquiry will be established to provide further information on the potential benefits of, and policies to achieve, improved energy efficiency (p.105)"

It went on to state:

"The potential economic and environmental gains from increasing the uptake of commercial energy efficiency opportunities warrant a high-priority response from government. Past efforts to improve energy efficiency have had successes, but have been focused largely on the residential and commercial sectors. More limited results have occurred in the industrial energy sector.

"The Australian Government is determined to improve the uptake of commercial energy efficiency opportunities by Australian businesses and households, and will focus policy on:

- improving market signals through reform of Australia's energy markets
- setting minimum energy performance requirements for widely used appliances and residential and commercial buildings
- providing information for consumers and businesses about the energy performance of appliances and buildings
- encouraging (and in some cases requiring) firms to identify and report on energy use and energy efficiency opportunities within their business
- working within the Australian Government, and with state and territory governments to improve the delivery of existing programmes.

"To provide further information on energy efficiency and possible policy responses the government will also establish a Productivity Commission inquiry to examine the potential economic and environmental benefits from improving energy efficiency. The inquiry will report in the second half of 2005, and examine the full range of options to improve energy efficiency. The government will consult with the states and territories on its terms of reference."

The Inquiry was framed within a context of Government commitment to stronger action and acceptance that energy efficiency was worthy of higher priority because of its "potential economic and environmental gains". This potential was identified by the state, territory and federal government's National Framework for Energy Efficiency (NFEE). The NFEE Phase 1 and Phase 2 reports identified the potential for energy efficiency across all sectors of the economy and modeled the impact of these effects for individuals and firms on economy and energy supply. NFEE identified that in addition to providing cost effective solutions for individuals a nationally coordinated implementation of energy efficiency programs would enhance economic growth and ease the pressure on the supply of peak demands for energy utilities. NFEE's modeling was based on indicative evaluation of the potential of energy efficiency measures, however, and the PC's Inquiry is intended to help guide the direction of energy efficiency policy development.

4.1.2 Terms of Reference (ToR)

4.1.2.1 General problems due to the narrow focus on private cost effectiveness

The ToR for the Inquiry included reference to a broad variety of energy efficiency strategies but limited the considerations of the Inquiry to those which are "cost-effective for individual producers and consumers". The ToR therefore put the social benefits identified by the NFEE beyond the consideration of the Inquiry. This has particular implications for the PC's consideration of the building regulatory measures. The core of the rationale for these measures is the social good they provide while on average providing benefit to individuals. Given the policy basis of the regulations it is difficult to see how the terms of reference allow the Inquiry to make any recommendations at all regarding such policy approaches.

The ToR also created other problems which hinder the ability of the Inquiry to provide useful policy advice to government because it removed the need for the Commission to examine economic and environmental externalities where failure to consider them reduces the private benefit. This precluded much of the rationale driving the current focus on energy efficiency — that is, the net benefit to low cost opportunities for responding to climate change. These opportunities tend to be seized on given their ability to provide a low cost path forward on greenhouse in the face of considerable uncertainty.

The narrow focus on private benefit does not allow the PC to examine market failure in terms of net social benefit. From an individual perspective no market failure may exist - individuals may be making decisions which are rational for them. Even if these decisions value other factors more highly than energy efficiency or do not involve the consideration of energy efficiency at all, one can argue, as the PC does, that this is normal market behaviour and no basis for government intervention. However, the key to understanding market failure in the energy efficiency area is that not all individuals are taking decisions which benefit society and which would may benefit them over a timeframe longer than that which they typically consider. If by intervening governments change these decisions to those which benefit society and, on average, leave firms and individuals better off this is a good policy outcome yet the narrow ToR of the Inquiry does not allow such solutions to be considered.

4.1.2.2 The Commission's interpretation of the terms of reference

The PC's interpretation of what constitutes private benefit itself appears to be quite narrow. In the development of building regulations it is acknowledged that not all individuals will benefit and the total benefit will outweigh the disbenefit. The PC, on the other hand, gives examples where some individuals will not benefit and uses this as a reason to delay further change till these effects are evaluated2. It appears therefore, the Productivity Commission may have interpreted the emphasis on private cost effectiveness to require a 'strict Pareto improvement' criteria for determining which policy options can be considered. Under a strict Pareto criterion, some members of society may be better off, but no one can be worse off.

However, the strict Pareto improvement criterion is not considered to be a practical approach to policy making. Economists have developed approaches to work around the problems with the strict Pareto criteria. Stavins et al point the way to an oft-adopted solution:

> Actual Pareto-improvements are exceptionally rare, of course, perhaps even non-existent. Hence, the strict Pareto criterion is virtually never taken as a guide for public policy, despite its considerable normative appeal. Economists resort instead to seeking 'potential Pareto-improvements' in the Kaldor-Hicks sense — the world is viewed as being made

[2] See for example page 125 of the Productivity Commission's report, which argues Minimum Energy Performance Standards might make some householders worse off (Productivity Commission 2005, *Energy Efficiency: Productivity Commission Draft Report*, www.pc.gov.au, p125).

> better off if the magnitude of gains and the magnitude of losses are such that the gainers can fully compensate the losers for their losses and still be better off themselves.[3]

The idea that a 'potential Pareto improvement' (PPI) can be welfare improving was developed by the economists Kaldor and Hicks in the late 1930s. Much of public policy decision making since, and importantly also cost benefit analysis, has been informed by the PPI criteria.

The PPI allows a policy option to be considered on the grounds that it is welfare enhancing, even if some are worse off — because the winners could compensate the losers and society would still be better off (or in other words, the benefits outweigh the costs). In practice, provided that policies meet the PPI test, actual compensation may not even occur; compensation becomes an issue for politics and equity. Provided policy moves outcomes from inside the 'production possibility frontier', to somewhere on the 'production possibility frontier', then it is considered welfare enhancing, even if the strict Pareto criterion has not been satisfied.

The Productivity Commission needs to be explicit in addressing this issue — application of the strict Pareto improvement criterion is of such stringency as to be of little practical use for policy making. While it may have been reasonable to exclude greenhouse, for example reflected in energy prices that are too low, it is not reasonable to exclude other PPI policies that might enhance economic welfare through energy efficiency.

[3] R.N. Stavins, A.F.Wagner and G. Wagner 2003, Interpreting Sustainability in Economic Terms: Dynamic Efficiency plus Intergenerational Equity, *Economics Letters* 79 (2003) 339-343.

4.2 Existence of Market Failure

4.2.1 The Commission's evaluation of the extent of market failure

The Commission believe firms and households generally implement energy efficiency improvements that are cost effective for them — 'most do not deliberately waste energy'. Hence the benefits of energy efficiency improvements may be overstated and the costs of adoption underestimated. The real energy efficiency gap is therefore believed to be much smaller than it appears.

The Commission conclude the most important barriers to improving energy efficiency appear to be:

- a failure in the provision of information; and
- the different incentives facing those who take decisions about installing energy-efficient products (heaters, air conditioners, etc) and those who might benefit from using them.

The Commission believe problems are most pronounced in the residential/consumer/small business sectors. Information problems are less pronounced for commercial and industrial firms, particularly firms with large energy bills because managing this cost will be key to them maintaining their profitability.

The Commission asserts that the case studies intended to show the cost effectiveness of energy efficiency do not point toward general market failure or give an indication of the general magnitude of energy savings available. It believes that audit results are likely to overstate the gains available for a sector as a whole, because the case study sample is likely to have greater opportunities for energy efficiency than the sectoral population, and because heterogeneity of energy consumption within a sector means that savings may be incorrectly applied. Further, the very fact that such case studies may show significant savings appears to indicate evidence that market forces are working. The PC believes that it is likely that such firms would have undertaken this work without intervention and those who have not undertaken such work have not done this because it is not economic for them to do so.

The PC does not see the evidence presented regarding the failure of firms and individuals to adopt energy efficiency measures as a convincing indicator of market failure. If such measures are not adopted the PC argues it is because either the measure is not cost effective for the individual or firm, or because there are other uses for the resources needed to implement the measures which offer greater value or economic return e.g. home buyers may prefer to install granite bench tops rather than double glazing and the government has no business interfering in this choice. In other words: 'Energy efficiency opportunities are sometimes overlooked, but so too are other income or cost-saving measures. There is nothing intrinsically different about energy in this regard, nor does failure to take up such opportunities necessarily warrant policy intervention.'

Cost reflective energy pricing is supported by the Commission as the most effective ('first' best) means to encourage appropriate investments in energy efficiency over the longer term. While the Commission acknowledges that some regulatory responses to market failure are appropriate it favours light-handed responses and information provision wherever possible, rather than overly prescriptive and intrusive approaches. It argues that Mandatory measures override consumer and producer sovereignty, and are inconsistent with the proposition that the energy efficiency improvements they promote are privately cost effective.

4.2.2 Critique of the Commission's evaluation of Market Failure

4.2.2.1Reliance on the use of cost reflective pricing to address market failure.

The workshop agreed with the PC and a variety of submissions from the energy industry that current energy prices are not cost reflective. Further it is acknowledged that more cost reflective pricing would assist in sending better signals to the market and increase the financial return of implementing energy efficiency measures. There are a number of problems associated with relying on price signals alone to deliver energy efficiency gains without more heavy handed government intervention:

- Excess supply may have led to prices below long run costs, inappropriate price expectations, less than optimal investment in energy efficiency, and an institutional and cultural bias against energy efficiency. Cost reflective pricing alone may not be sufficient to remove these market barriers.
- Governments have a long history of enforcing low energy prices in order to achieve a variety of economic objectives e.g. to maintain the competitive position of Australian business; social objectives e.g. to ensure public essential services are affordable even for low income households, and political objectives: governments often believe that policies which increase prices to voters reduce their ability to be elected. Governments across Australia have shown little inclination to reverse these policies so the 'first best' strategy of cost reflective pricing may simply not be available. By failing to take into account the political milieu in which energy efficiency policy is implemented the PC has not provided government with comprehensive advice on which to base policy decisions.
- The PC has dismissed a number of overseas experiences with energy efficiency because Australia's energy prices are significantly lower. The energy efficiency measures evaluated will therefore be less cost effective in Australia. Yet many OECD countries with similar climates to Australia have far more heavy-handed energy efficiency regulations. This begs the question: "If in an environment with higher energy prices overseas regulatory intervention is still needed, why would higher energy prices in Australia remove the need for similar intervention in Australia?"
- As the Draft Report points out, energy costs are generally a low proportion of business costs and household expenditure. As a consequence even substantial price rises may fail to generate a significant enough shock to overcome market barriers.
- Research into the impacts of energy price and the rate of innovation in energy efficiency improvements in some products by Newell et al (1999)4 shows that innovation did not correlate strongly with energy price but that innovation was substantially increased after labelling was introduced.

4.2.2.2 Emphasis on consumer sovereignty

The Commission seem to believe that producers have a right to sell highly inefficient appliances or buildings to consumers. The Commission seems to believe that improvement in energy efficiency generally comes at the expense of other attributes that may be valued by consumers. In reality, this is rarely the case. Indeed many energy efficient products offer improvement across a range of attributes (eg less noise, lower maintenance, etc). Where it is the case, competitive pressures usually address the issue: for example, the cost of double-glazing is declining (driven by the strengthening of regulations) so homebuyers face less conflict between large windows and energy efficiency. There are very few scenarios where the use of inefficient products would lead to net benefit unless the product is hardly used, and this would be a small minority of cases. Despite acknowledging the failures in energy efficiency relating to poor information disclosure, adverse

[4] Newell RG et al, "The induced innovation hypothesis and energy saving technological change", Quarterly Journal of Economics, August 1999, v114 i3 p941(3), MIT Press Journals

selection, moral hazard, split incentives and bounded rationality, it is argued by the Commission that governments should not take action because we are denying consumers rights. This offers little protection from moral hazard and even exploitation and could easily damage consumer rights far more than the protection of sovereignty. Further it is founded on the false assumption that a more efficient product is always more expensive. This is not the case:

- In the case of Minimum Energy Performance Standards for appliances, more efficient appliances offer the same level of service at lower energy use, but generally cost no more. The Commission offers no evidence that consumers have had to forgo product features as a result of MEPS.
- In the case of buildings, MEPS are likely to improve services, given more natural light from north facing windows and better occupant comfort. Further, Sustainable Energy Authority of Victoria analysis of its 5 star housing regulations showed that most consumers are better off in cash flow terms even in the first year because increases to mortgage payments are more than compensated for by reductions in energy bills.

The narrowness of the terms of reference logically leads to this emphasis on sovereignty. For example, if an individual determines that there is greater benefit to them in installing granite bench tops rather than double-glazing – even if the double-glazing is cost effective - because private benefit is achieved there is no basis for intervention.

However, there may still be a case for intervention based on net social benefit. Although some of the individuals may be worse off due to the possible need to forego expenditure on granite bench tops, many more are better off as the result of intervention, such that there is a net social benefit overall. Further, from the point of view of responding to the greenhouse effect, the private benefit is at odds with the social benefit and would be far better served by the installation of the double-glazing. It is precisely because of the misalignment between private and social benefits that intervention in this case is warranted. This potential clash of social and private benefit goes to the heart of the failure of the market to more readily adopt energy efficiency and the rationale for intervention but the PC's ToR does not allow it to evaluate policy options from this perspective. This restriction seems particularly strange because in other fields of policy development the Government regularly restricts the sovereignty of some consumers in the interests of achieving a social benefit, for example, seat belts, restrictions on smoking and fire regulations.

4.2.2.3 Recognition of external to the firm organisational failures

The Commission completely ignores 'market failures' that have led to a lack of institution and market development. In this context, the recent economic literature on the importance of appropriate institutions and rules for well functioning markets applies, as well as an understanding of the implications of 'path dependence'.[5]

In the context of the building industry this path dependence is shown in the lack of institutional development to support energy efficient building design which has been in part responsible for the low take up of energy efficient solutions. The low price of energy and the lack of government emphasis on energy efficient building until recent times have meant that developing skills and provision of information in this field has not been seen as important in the building industry. Consequently undergraduate design courses and professional development courses for the building industry are only now starting to catch up with the needs of optimising economic welfare. The quality and reliability of product information provided to industry on energy efficient products has also only just begun to reach the standard needed with the development of schemes like the Window Energy Rating Scheme and new Australian Standards for the labelling of insulation products. If the importance of energy efficiency been understood 20 years ago as it is today the institutional and cultural frameworks of the building industry would have been developed with a greater emphasis on energy efficiency with the result that the building industry would find it much

[5] See for example P. A. David, Path dependence, its critics and the quest for 'historical economics', in P.Garrouste and S.Ioannides 2001, *Evolution and Path Dependence in Economic Ideas: Past and Present,* Elgar Publishing (available at http://www-econ.stanford.edu/faculty/workp/swp00011.pdf).

easier to adapt to the new regulations. Intervention by government is needed to break the inertia of the status quo created by path dependence. While one may argue that the development of these institutions will happen over time the cost of delay to both individuals and community is very large, especially because buildings have such long lives. Furthermore, in the absence of regulation, there may be a number of other policies needed to ensure this institutional development does happen.

The significance of path dependence can also be seen in the supply-side focus of the energy sector. This means it has not been inclined to focus on consumer efficiency. As originally envisaged by Edison, electricity was to be an element in an 'energy services' industry that would deliver light and other useful services: if this structure had been established demand side efficiency would have had a far higher significance today as energy service providers tried to minimise their overall costs of service delivery instead of focusing on reducing energy price per unit and encouraging energy growth to capture economies of scale.

Government intervention can assist market transformation to change the dynamics of a market, allowing cost effective solutions to gain scale, overcome barriers and gain familiarity and acceptance. There is large scope to transform markets for energy services and provide substantial benefits for owners of existing buildings, as evidenced by success in markets overseas. Market transformation can help to overcome the path dependent inertia preventing uptake of clearly cost effective energy efficiency technologies. By failing to adequately recognise path dependence the PC draft report struggles to come to terms with why so many have overlooked available cost effective solutions for so long.

4.2.2.4 Recognition of internal to the firm organisational failures

The Commission argue that internal organisational failures are not a concern for policy, and that the best way to deal with these problems is to encourage competition. Yet governments regularly work to improve business decision making as part of industry extension services. The rationale is the spillover benefits that prevent optimal uptake of systems and business practice innovation by firms. In this context, governments do have a role to identify profitable energy efficiency investments that have broad application, and facilitate their uptake by firms. As noted by Sorrell:

> The target of the intervention can be both energy service markets and internal organisational decision-making. This rationale for the latter is that, as a consequence of bounded rationality and organisational failure, governments can help individuals and organisations help themselves. For example, minimum efficiency standards on certain types of motors may benefit both the purchasing organisation and society as a whole. Whether the intervention improves net social welfare depends upon the consequences of the barrier and the cost of the intervention and would need to be assessed in each case… There will not be a single best policy solution for a particular problem. Instead, multiple approaches are likely to be required, addressing the specific features of individual situations.[6]

In part the policy prescription is information provision, but it can also be actively targeted as part of industry extension services. The Energy Efficiency Best Practice program provided a good example of targeted support to encourage cost effective uptake of energy efficiency, yet this program has since been disbanded by the federal government.

Organisational failures may mean the operations manager never sees the energy bill and is therefore not aware of the importance of the energy cost. This may be as distorting as non-cost reflective energy pricing not sending a market signal to users of domestic air conditioners. Yet the PC seems to consider the latter a basis for government intervention but not the former. This is important because the nature of the market failure recognised can impact substantially on the development of suitable policy approaches.

It was disappointing that the PC did not provide advice to government on how it should deal with a situation where helping an individual to do something from which they benefit (and which is cost-

[6] S.Sorrell, J.Schleich, S.Scott, E. O'Malley, F.Trace, U.Boede, K.Ostertag, P. Radgen, 2000, *Barriers to Energy Efficiency in Public and Private Organisations*, SPRU Environment and Energy, www.sussex.ac.uk/Units/spru/environment/research/barriers.html, pxxvii.

effective on a 'rational basis') also helps society. This is a real 'policy hole' into which many energy efficiency measures fall. If it were definitely not cost-effective for the individual but was beneficial (and sufficiently important) for society, governments would use strong measures such as regulation or incentives. And where individuals find a measure attractive for themselves they are likely to do it. But where a measure is minor or only cost-effective over a long period, it may still be in their private interests but they may not undertake this measure. This creates a cost to society and it would be useful for PC to provide some guidance as to what criteria might be used to guide government action – rather than just dismissing it as 'normal' market behaviour. For example, would government act if the community benefit were substantially greater than the private benefit?

4.3 Implications of Business as Usual

4.3.1 Use of BAU in NFEE & other modelling work

The Commission is critical of the use of BAU assumptions many years into the future by the NFEE modelling and in RIS work. It believes predictions of BAU growth in energy requirements are overly pessimistic because they do not include natural improvements in energy efficiency and the effects of energy efficiency improvements are optimistic. Yet use of BAU is standard practice in any general equilibrium modelling, as a means of developing a counterfactual. The Commission commonly use BAU estimates itself when making a case for policy change, such as when estimating the benefits of micro-economic reform7. Indeed, the parameters that drive BAU are generally econometrically estimated from data from the immediate past.

The Commission cite US studies to argue that the assumed BAU improvements in energy efficiency are too pessimistic8 — estimates of the energy efficiency gap used for the NFEE analysis are criticised on these grounds. Yet this is illogical, as elsewhere the Commission argues that at our energy prices, it is reasonable that we have lower rates of energy efficiency improvement.[9]

4.3.2 Productivity Commission interpretation of ABARE energy efficiency data

The Commission implicitly criticise the National Framework for Energy Efficiency (SEAV-NFEE) case studies on the grounds that the potential for cost effective improvements in energy efficiency is overstated because the 'assumed business as usual improvements in energy efficiency are too pessimistic'.10 Energetics assumptions about sectoral energy efficiency, for zero improvement in some sectors, are criticised on these grounds.

However, the Commission ignore evidence from ABARE that is presented in their report that indicates that Australia's business as usual improvements in energy efficiency have been close to zero or even negative over the past 30 years.

For example, the Commission note that:

> Analysis by ABARE researchers (Tedesco and Thorpe 2003) shows that, during 1973-74 to 2000-01, there was a decline in the residential sector's carbon dioxide emissions intensity. They estimated that this would have reduced Australia's total carbon dioxide emissions from energy consumption by 1.2 per cent during 1973-74 to 2000-01, if there had been no increase in the number of householders and their consumption of goods and services… Tedesco and Thorpe (2003) estimated that about two-thirds of the fall in residential carbon dioxide emission intensity during 1973-74 to 2000-01 was due to technical effects, which includes increased energy efficiency.11

The decline in emissions of 1.2 per cent is the total change in the residential sector over 27 years due to changes resulting from the real intensity effect, in turn comprised of changes in fuel mix and improved technical efficiencies.

The improved technical efficiency component of changes in final energy intensity most closely corresponds to improved energy efficiency in end use in its purest sense. Fuel mix changes are an important contributor, but reflect the opportunities in fuel switching, rather than improving the

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[7] Industry Commission 1995, The Growth and Revenue Implications of Hilmer and Related Reforms: A Report by the Industry Commission to the Council of Australian Governments, www.pc.gov.au.

[8] Productivity Commission 2005, op.cit., p89.

[9] Productivity Commission 2005, op.cit., p.xx.

[10] Productivity Commission 2005, op.cit., p 89.

[11] Productivity Commission 2005, op.cit., p 103.

efficiencies of existing end use applications. According to ABARE, the effect of improved technical efficiencies on carbon dioxide emissions intensity over the 27 years in the residential sector is a decline of 0.9 per cent — which is approximately equivalent to an annual reduction of just 0.03 per cent per annum, very close to zero.[12]

In the case of mining, technical changes in end use energy intensity contributed an increase of 1.5 per cent in total over the 27 year period. Again, this is close to zero in average annual terms.

For manufacturing, technical changes in end use energy intensity also contributed an increase, of 3.5 per cent over the 27 year period. This is approximately equivalent to an annual average deterioration of 0.1 per cent in end use energy efficiency.

This evidence suggests that the assumptions incorporated in the SEAV-NFEE work are likely to be common in many sectors of the Australian economy. It is surprising therefore that the Commission criticise the SEAV-NFEE work on these grounds.

4.3.2.1 Use of expenditure as an indicator of efficiency

The PC suggests that energy efficiency has been improving:

> In per capita terms, residential energy use grew by 19 per cent from 1973-74 to 2000-01. But the average householder's consumption of all goods and services grew much faster over the same period (real per capita household final consumption expenditure grew 64 per cent). This suggests that, after taking account of a growing population and standard of living, householders have become more energy efficient.[13]

This is a simplistic view:

1. It takes no account of whether the energy was used efficiently at all. To determine this one would need to understand how the energy was used and whether, for the amount of energy used greater utility was obtained.
2. It may be perfectly logical that the amount of energy use grew at a slower rate than household expenditure without any improvement in efficiency. As living standards and income increase so too do the options for spending that income. The last thirty years has seen the development of entirely new markets for consumer products. If growth in energy consumption has not been proportional to growth in expenditure this could simply reflect that the type of goods and services purchased has shifted toward those types of goods and services that do not require the use of energy within the home.
3. There may well have been improvement in efficiency over this time but to suggest that this is a 'natural' i.e. market driven ignores the host of interventions that have occurred over that time e.g. insulation regulations, energy labelling, MEPS, public information programs, audit and retrofit services, improved public housing standards, subsidies at various times for insulation, solar hot water and photo voltaic systems, development of energy rating systems and the general improvement in the standard of design that experience with rating systems bring.

   The graph below shows average domestic gas consumption per gas-connected household in Victoria from 1980 to 2001. Over this period the penetration rate of gas central heating increased substantially from 15.6% in 1983 to 37% in 1999, with the penetration rate in new housing at 66.5%. Survey results from the Gas & Fuel Corporation (G&FC) show that central heaters typically use twice the energy of space heaters. Despite this substantial growth in the use of central heating the average gas consumption after 1991 shows far lower annual growth. While there may be many other factors involved communication with researchers at the G&FC suggested that they believed that the insulation regulations

[12] ABARE 2003, *Trends in Australian energy intensity 1973-74 to 2000-01*, Report 03.9, p 67.

[13] Productivity Commission, 2005, op cit, p100

played a role in this trend. This demonstrates that in addition to any 'natural' improvement to energy efficiency the impact of government intervention over this time is also significant.

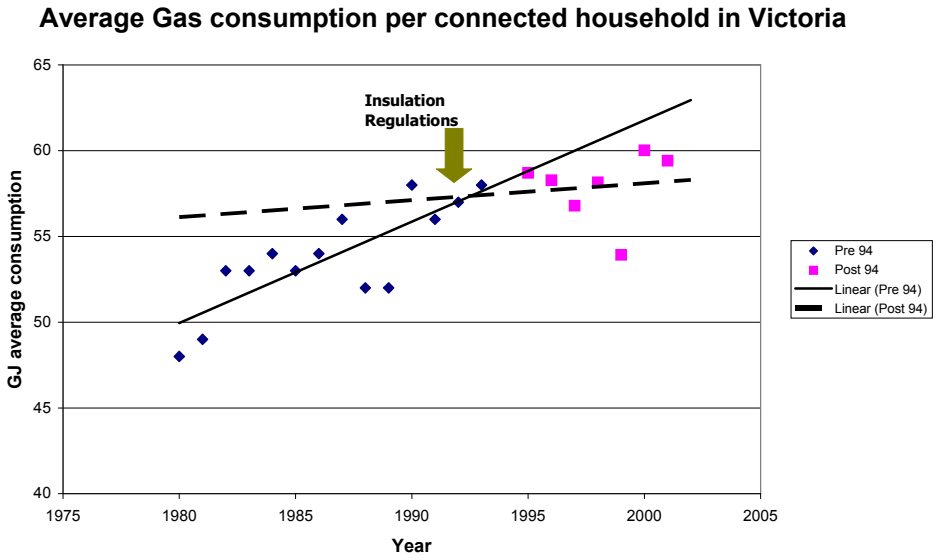

Figure 1 2 Annual gas use per gas connected household in Victoria (sourced from GFC, AGA, DHS data)

4. The BAU projections of the Australian Greenhouse Office (AGO) from 1990 to 2010 for energy use in buildings have been shown to have underestimated growth in consumption. The original study was developed in 1998, using the 1990 -1998 data was used to allow modelled BAU to be compared to actual. More recent research for the AGO shows that this projection underestimated the growth in consumption from 1998 to 2003 significantly. This was due to both the higher number of houses built than projected and a higher level of energy use in these houses than expected. Previous Regulatory Impact Statement work by the ABCB relied on these BAU projections to evaluate impacts. This would suggest that not only is BAU showing lower efficiency but because of this, RIS work has been overly conservative.

4.3.3 Likely directions for BAU in the built environment

The PC is critical of the overly pessimistic BAU projections showing increasing energy use arguing that this overvalues the energy savings obtained by policy intervention because some of this improvement would have happened naturally. The BAU projections for growth in energy use in residential and commercial buildings developed by the AGO14 use data for the immediate past to verify model projections and generally agree well with other sources. Because these are based on immediate past trends any natural increase in efficiency should be captured. The figures below compare the BAU projections of ABARE and Energy Efficient Strategies work undertaken for the AGO.

[14] AGO, 'Australian Residential Building Sector Greenhouse Gas emissions 1990 – 2010', 1999. Prepared by Energy Efficient Strategies with assistance from Energy Partners and George Wilkenfeld

AGO, 'Australian Commercial Building Sector Greenhouse Gas emissions 1990 – 2010', 1999. Prepared by EMET Consultants and SolArch Group

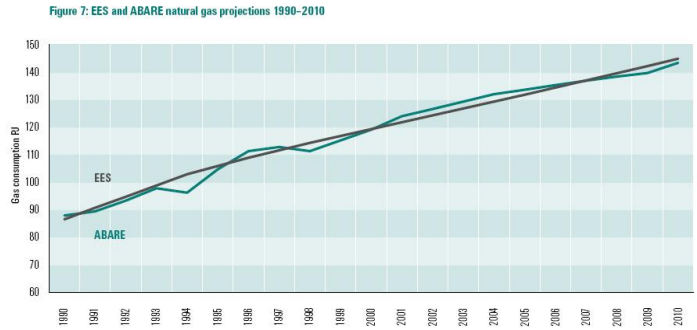

Figure 3 BAU projections for Gas demand growth in residential sector EES and ABARE

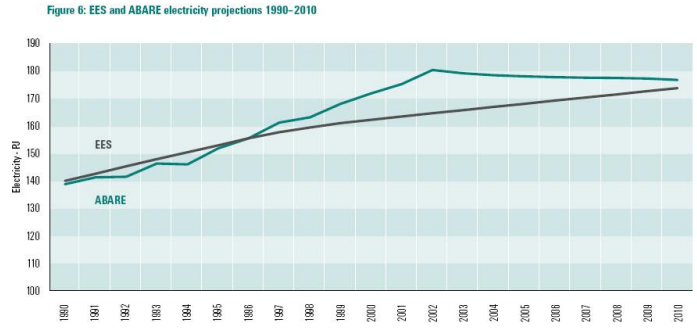

Figure 4 BAU projections for Electricity demand growth in residential sector EES and ABARE

Furthermore, these figure show substantially greater increase in energy use over the period of actual data than the 19% growth from ’73 quoted by the PC.

The BAU studies show that in residential buildings, growth in energy use for space heating and cooling has been greater than for other uses and is expected to maintain this higher growth rate. This is important because it is this energy use which is specifically targeted by building fabric regulation. As the component of energy use showing the largest growth it is only appropriate that this be targeted for intervention.

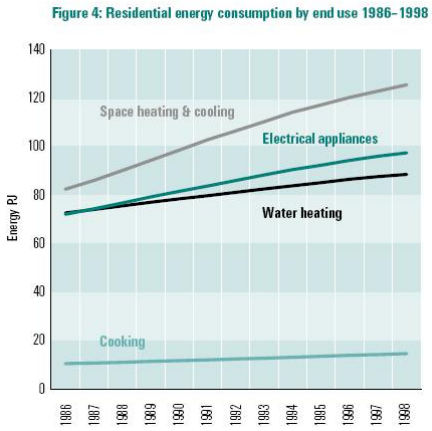

Figure 5 Components of residential energy use growth

The PC criticises BAU projections for assuming no improvement in efficiency. As discussed above by basing models on immediate past data any natural improvement is captured. The modelling for Commercial Buildings BAU went one step further and modelled a frozen efficiency scenario to isolate the natural improvement. The results are shown below:

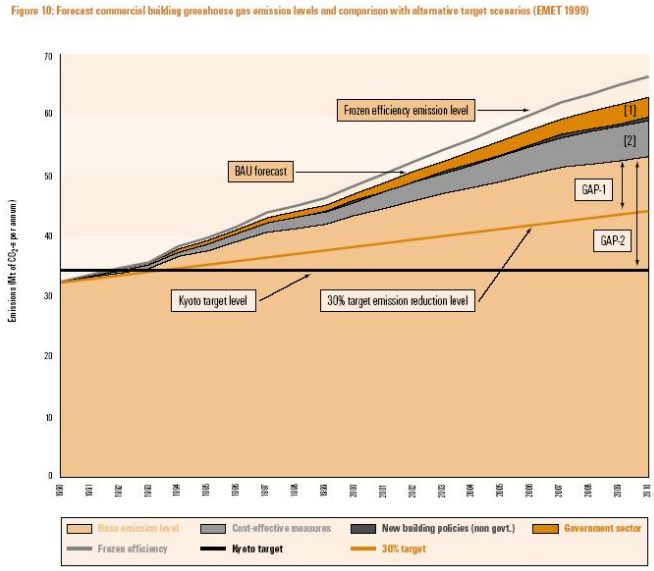

Figure 6 BAU projections for growth in commercial building associated energy use

Furthermore, the growth projection for BAU has been shown to be overly conservative by later research15. Actual figures from the greenhouse inventory show higher total energy use and rates of growth than the BAU projections reported above in the commercial and residential sector. Residential emissions had grown to be greater than the projected emissions for 2010 by 2003. While there may be some issues regarding differences in accounting for emissions between the BAU projections and the inventory the rate of change indicates that BAU estimates may well be conservative. The figure below presents this information drawn from the BAU projections and the Greenhouse inventory.:

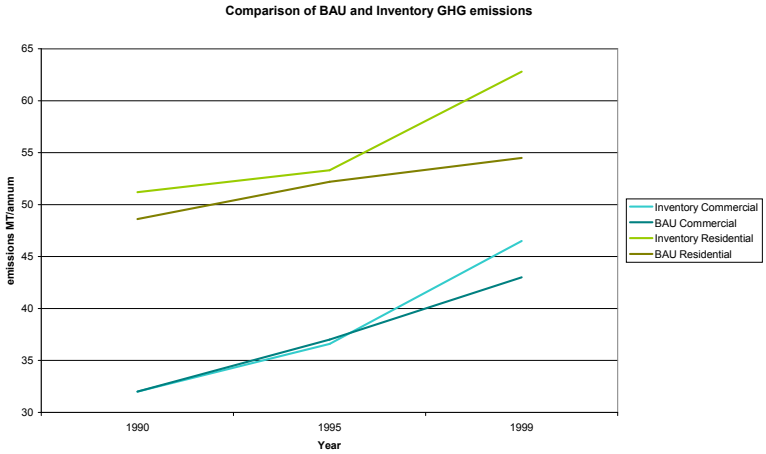

Figure 7 Comparison of BAU projections and Greenhouse Inventory figure

[15] Various: Australia's National Greenhouse Gas Inventory reports

There are a number of reasons why BAU energy use in the residential sector may grow rather than improve as the PC suggests:

- Social trends like the aging of the population and working from home increasing the duration of home occupancy,
- The increasing size of new homes which in turn can increase the area heated and cooled (Figure 5).
- The increasing use of central heating (two thirds of all new homes in gas reticulated areas in Victoria)
- The increasing use of air-conditioning (Figure 6). The stock of domestic air conditioners is predicted to grow by around 2,000,000 to 2014.
- It is likely that hours of use of heating and cooling equipment has increased since 1986, yet the 1986 data is only reliable data on hours of use of domestic heating and cooling. BAU is based on this information and will underestimate growth as a result.

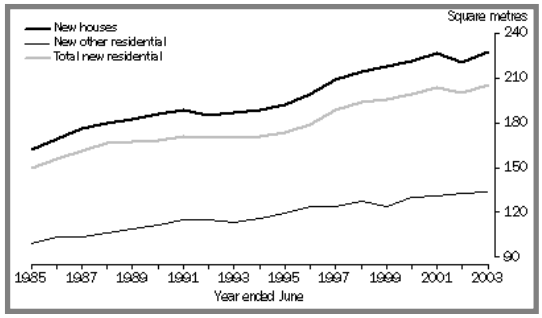

Figure 8 Increase in house size

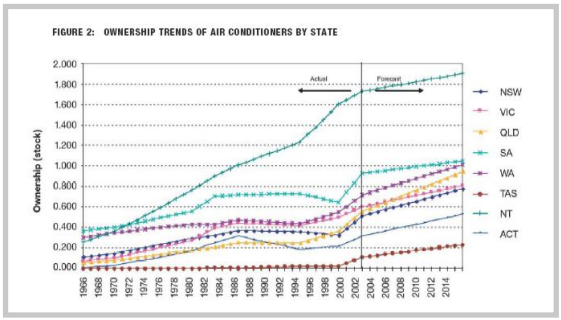

Figure 9 Increase in air conditioning installation

The PC's claim that BAU is overly pessimistic and does not allow for natural improvements is simply wrong. If anything the BAU for buildings is overly conservative and even higher benefits could be expected.

4.3.4 Implications of inaction

4.3.4.1 National Inconsistency

The current housing regulations are inconsistent across Australia and this has been a particular problem for the housing industry. Differing software is used for performance assessment, differing stringency is required, some jurisdictions do not have a Deemed to Satisfy option and some do not use a performance option. In addition state and local government augment the basic regulations with a variety of planning requirements. The proposed 5 star regulations will deliver a far more consistent and predictable regulatory environment. Further, because the stringency level is high, state and local governments will have less reason to want to top up requirements with measures of their own. Failing to progress with the 2006 housing regulations would leave the current inconsistencies in place and provide scope for further inconsistency because state and local governments are dissatisfied with current stringency in the BCA. While the PC recognises the importance of consistency it does not seem to have accounted for the increased consistency that the 2006 regulations will bring. This highlights the reality that national consistency must come through leadership and setting of appropriate standards. Where national coordination leads to 'lowest common denominator' outcomes, individual jurisdictions will apply their own additional requirements.

4.3.4.2 The cost of inaction

Building Regulations are designed to enhance overall economic welfare. They are not designed solely to conserve natural resources or promote lower cost options as part of an international effort to avoid the costs of climate change. Nevertheless if the higher stringency regulations do not proceed, then there will be a cost to society in terms of managing the risk of action on climate

change, and ultimately, its impacts. Such impacts are difficult to attribute to individual policy responses but it is clear that climate change can and already has had a significant negative impact on economic growth. Reports by the Insurance industry16 show clear trends to increasingly frequent and severe weather events which cost the community billions of dollars. The limited terms of reference do not even allow the potential impacts of inaction to be addressed when this is clearly a key driver to government policy.

Addressing Climate change is becoming an urgent issue. There are indications that without further cuts to emissions the changes to climate could become irreversible and some changes may already be in this category17. This does not leave governments with the luxury of waiting until the best possible policy can be found and the PC's recommendation to delay introduction of regulations is therefore less than helpful.

With the release of the new regulations and associated RIS documents many in the building industry have already incurred some of the transaction costs associated with the regulatory change:

- Manufacturers of energy efficient building products have begun installation of new plant, investing tens of millions of dollars already
- Building designers have already started to modify and cost changes to standard plans to conform to the new regulations and are negotiating new supply contracts.

[16] For example see IAG's report on "The Impact of Climate Change on Insurance against Catastrophes" by Tony Coleman the Chief Risk Officer and Group Actuary for the Insurance Australia Group

[17] Joint science academies' statement: Global response to climate change, 2005

4.4 Assessment of the benefits of energy efficiency

The PC does not believe there is a significant energy efficiency gap. As noted above it reasons that individuals will not deliberately waste energy and that if energy efficiency could deliver significant benefits market forces would see those firms implementing energy efficiency to gain a competitive advantage which provides a powerful incentive for firms to implement energy efficiency. If energy efficiency measures are not being implemented it is because firms and individuals do not see this as the best use of their resources. The PC does not see a role for government intervention in this context.

We believe this is a flawed view that stems in part from the limitation of being unable to consider matters of social benefit, but also from a failure to recognise and quantify the extensive opportunities that are available to invest in cost effective energy efficiency. In this context, the PC is very critical of previous attempts to define the costs and benefits of energy efficiency in NFEE and RIS work. They believe the costs are underestimated and the benefits are overestimated. The reasons for this conclusion appear to fall into several main categories:

- The analysis depends on case studies used to derive savings estimates are unlikely to be representative of sector savings potential,
- The ability of regulations based simulated performance to achieve energy savings is questioned by some submissions,
- Even if savings were accurately assessed the use of sub-10% discount rates overvalues the extent of the benefits and may lead to the adoption of measures which have a negative impact,
- The Commission is critical that higher envelope ratings will not benefit all individuals and calls for the distributional impacts to be more closely examined, particularly for housing where the energy use behaviours and financial circumstances of individuals is diverse,
- Business as Usual projections are said to overestimate savings because they exclude the natural improvements to energy efficiency that would have occurred anyway, and
- The cost of compliance and transaction costs.

The following sections look at each of these perceived limitations. Note that the issue of Business as Usual projections was covered in the section above.

4.4.1 The usefulness of Case Study evidence

The Commission has ignored a wealth of case studies that show that households and firms do indeed overlook significant energy savings opportunities, and thereby fail to implement energy savings capital investments that could leave them better off in cash-flow terms, even in the first year. Some of the greatest opportunities exist in the residential and commercial buildings sector. The draft report says of these case studies:

The case studies typically find that producers and consumers have failed to adopt energy efficiency improvements that appear to be cost effective for them. Such findings, however, are based on many debatable assumptions, including:

· the criterion for cost effectiveness;
· business-as-usual improvements in energy efficiency;
· extrapolation of audit and best-practice study results to a whole sector;
· representativeness of simulated producers and consumers.18

While there is scope for improvement in the available evidence, it is not reasonable to dismiss the raft of evidence on these 'debatable' grounds. For example:

- Cost effectiveness — use of payback periods may overlook some opportunities with high net present value based on longer lives, but this is a conservative assumption rather than an optimistic one. The Commission itself cites evidence that 80 per cent of firms use the payback period as a criterion when evaluating energy efficiency investments.
- Discount rates — the Commission argues that consumers and firms use discount rates of 10 to 30 per cent, higher than most cost effectiveness studies which tend to apply nominal discount rates of less than 10 per cent. But application of high discount rates is not consistent with the economic theory of efficient markets, unless there are greater uncertainties associated with energy efficiency investments. It can be debated that the converse is true. Conducting sensitivity studies on the National Framework on Energy Efficiency (NFEE) modelling for the 50 per cent-low (conservative) case19, we find that even at a real 30 per cent discount rate, the net present value of GDP is still a significant $860 million (down from $5.3 billion using a more rational 4 per cent real discount rate). At 15 per cent it is $2 billion. This reflects that the average internal rate of return on the NFEE measures is around 50 per cent (average payback of 2.4 years). The issue of discount rates is considered further later in this report.
- Business as usual assumptions (BAU) — the see section 4.3 above the draft report's assertion that BAU shows improving efficiency is in contrast with the facts and therefore the modelling results are not overestimating savings.
- Extrapolation of audit results and best practice studies, and representativeness of simulated producers and consumers — the Commission argue that audit results are likely to overstate the gains available for a sector as a whole, because the case study sample is likely to have greater opportunities for energy efficiency than the sectoral population, and because heterogeneity of energy consumption within a sector means that savings may be incorrectly or partially applied. However, the use of sectoral averages in modelling is reasonable, even in the presence of variance, provided that there is no significant skew in the target population. Even then, the sensitivity of the results is likely to be small, provided that sample sizes are adequate. There is no evidence to suggest that diversity in the use of energy is significantly skewed one way or the other. Furthermore it is equally plausible, if not more likely, that firms that are not interested in energy efficiency (and hence do not self select for energy audits) have greater opportunities for energy savings, rather than less.

It is strange that the Commission is unable to see an overall picture emerging from case study material of opportunities for cost effective energy efficiency improvement at current prices. Even at

[18] Productivity Commission 2005, op.cit., p75

[19] The Allen Consulting Group 2004, *Economic Impact Analysis of Improved Energy Efficiency: Phase 2 Report*, Report for the Sustainable Energy Authority of Victoria, www.seav.vic.gov.au.

very high discount rates the NFEE studies suggest that there are savings to be made that would deliver significant economic benefits.

Evidence of the benefits of energy efficiency presented in case studies has also been dismissed as not being representative of sectoral averages because the case study sample is likely to have greater opportunities for energy efficiency than the sectoral population, and because heterogeneity of energy consumption within a sector means that savings may be incorrectly applied. In fact it can be argued that it is more likely that even greater savings will be available to many individuals and firms because they are unaware of the benefits.

The Commission seems not to have fully appreciated the extent of market failure due to:

- Bounded rationality (eg where time and other pressures limit the amount of attention that can be paid to a decision, or where incorrect perceptions of the value of the future benefits lead to undue emphasis on up-front costs), and
- Organisational failure including:
    - Imperfect information on energy use or energy saving options within the organisation due to the complexity of organisational relationships or the 'bounded rationality' of individual agents,
    - Organisational failures between firms, where cooperation of a chain of agents is required to deliver an outcome, but a series of minor problems (such as communication failures, changes from standard practices, etc) may accumulate to discourage action or undermine success.

Case study evidence is dismissed as describing rational behaviour when it is actually showing how market failure is deeply entrenched.

4.4.2 Use of simulation in building regulations

The draft report questions whether simulation of energy load will be effective in reducing actual energy consumption. The draft report summarises these arguments as follows:

"However, the key issue is not whether it is energy consumption that is simulated (it is not), but whether a building standard designed to reduce energy loads is effective in achieving the policy objective (improved energy efficiency that reduces greenhouse gas emissions).

"If, for a given householder, energy load and actual energy consumption are highly correlated, then the energy efficiency standards in the Building Code are likely to be effective. But it cannot be assumed that such a strong correlation exists. Both the Department of the Environment and Heritage (sub. 69, p. 18) and Dr Terry Williamson (sub. 78, p. 2) noted that the behaviour of a given householder may not be independent of a building's characteristics. In some cases, the interaction between householder behaviour and building characteristics could be counter intuitive.",20 and

"The interaction between building characteristics and householder behaviour can also be illustrated by comparing a house with no air conditioning to the same house with an air conditioner in every room. The simulated energy load (and hence energy rating) could be the same in each case, because no account is taken of differences in the appliances that are actually installed. However, a householder is likely to use the air conditioners if they are installed, leading to markedly higher energy consumption and greenhouse gas emissions."21

Immediately after these observations Findings 7.2 and 7.3 are presented which conclude that simulation tools do not consider other important determinants of energy use and as a result may fail to provide a similar ranking of efficiency to that provided by actual consumption.

The following sections deal with two key aspects of the Commission's concerns regarding the use of simulation:

- Submissions which questioned the efficacy of a simulation as an indicator of final consumption,
- Other factors have a large impact on the energy use of buildings e.g. occupant behaviour and appliance efficiency and tariff can easily have as much impact on energy consumption as building fabric. Consequently, the ranking of houses produced by the rating tools will not correspond to the ranking of actual consumption.

4.4.2.1Submissions questioning the effectiveness of simulation methods

Williamson's submission provides evidence that casts doubt on the energy savings that may be obtained through the implementation of residential building energy standards:

- that energy ratings do not relate to household consumption and therefore should not be used as an indicator of efficiency, and
- that there is no relationship between the thermal properties of building fabric and house energy use and consequently no evidence that building regulations will save energy.

The Williamson submission has been the subject of an earlier submission to the Commission by ICANZ. The full analysis will not be repeated here. In summary the case studies presented by Williamson do not test the intention of house ratings: 'that a house with a high rating would have a lower energy use than it would otherwise have at a lower rating'. The results of monitoring houses with low energy bills seem to confirm that their low rating is justified because their comfort performance is poor. Their low bills seem entirely due to the behaviour of their occupants. These case studies actually reflect 'energy conservation' or cutting back, as it is clear that temperatures in the houses move outside accepted comfort standards. This is NOT energy efficiency, which involves delivering equivalent service with less energy. The Commission specifically rejects energy

[20] Productivity Commission, 2005, op cit pp147-8

[21] Productivity Commission, 2005, op cit pp148

conservation as being outside its terms of reference (on page 15). Yet it accepts Williamson's arguments.

Williamson contends that there is no relationship between energy rating and energy consumption. As evidence he presents a study of a sample of 31 houses and quotes reports which have attempted to correlate building fabric properties with energy use and have failed. The sample of 31 houses shows that there is a loose relationship between the rating and consumption if appliance efficiency is allowed for. The rating is therefore shown to have a relationship with energy use, but as it is not a 1:1 relationship. This is actually a deliberate feature of the rating to give greater emphasis to cooling energy use due to the problems electricity utilities have with peak air conditioning loads. It was a most surprising finding that any relationship at all was found in a sample of 31 because individual variations in use such as hours of heating and cooling, thermostat temperatures and areas heated and cooled would normally hide any relationship at all.

Many studies have found a relationship between improved building fabric and energy use. The ICANZ submission quotes four separate studies which found large and statistically significant savings due to wall insulation ceiling insulation and unshaded north glass. These demonstrate that the type of building fabric improvements which the rating promotes do lead to reductions in energy use. There are many more such studies and consequently there is ample evidence linking improved building fabric with reduced energy consumption. The workshop concluded that there was no reason to delay the introduction of regulations on the basis of Williamson's evidence, however, there is no doubt that the ex-post studies recommended by Williamson would be most helpful in ensuring the maximum effectiveness of the regulation.

Another feature of the argument presented by Williamson is that rating schemes are ineffective because they do not take into account the comfort preferences of the occupants but instead use a standard measure of comfort and duration of use of heating and cooling. It seems implied that had the case study houses been rated on a comfort preference basis they would have achieved a much higher rating. Williamson argues that the low energy use of these houses has been achieved because the houses suit the comfort preferences of their users. By not taking into account the comfort preferences of the occupants it is argued that the rating enforces a range of modifications to the building design that will not be cost effective for these individuals. This may be true but constructing the rating scheme to adapt to individual comfort preferences would be bad policy if the intent of that policy is to achieve societal benefits as well as individual benefits:

- Providing a comfort preference based rating is not suited to the volume housing market. There are many practical considerations regarding a comfort preference rating model:
    - Would a *spec* house not be able to advertise it's rating because it will change depending on who buys it?
    - Would builders need to have a book of variations to standard plans so that they could meet the regulatory requirements for a variety of comfort preferences depending on the client?
    - Would such a scheme be open to abuse by owners claiming to have very relaxed comfort preferences to lower the cost of their house?
    - Is it useful that two identical houses may have different ratings simply because their owners have different comfort preferences? etc…

  Unfortunately Williamson sheds no light on how this could be made to work.

- The occupancy of a house, the need for energy use and the comfort preferences of the household may vary over the life of the one household. A house designed to suit the comfort preferences of a childless couple may not suit the same couple's comfort preferences when children are born due to the need to provide greater comfort for infants, these children may have a different comfort preference to their parents as they grow up and finally the comfort preferences of this couple may be very different when they are elderly. Designing to suit the individual's current comfort preference may deliver unsatisfactory and energy inefficient results in future.
- Estimates of house turnover in Australia typically range between occupancy of 7 years and 14 years. Consequently a house designed to suit the specific comfort preferences of the home buyer when the house is purchased may not suit the comfort preferences of later purchasers. A comfort preference based rating means that the house rating would change

> each time it changes ownership. As noted in many submissions to the Inquiry it is much more expensive to improve the energy efficiency of a house after construction than during construction. A comfort preference based system may therefore provide a significant barrier to further energy efficiency improvement – and create significant implementation difficulties.

Williamson provides no model for how such a comfort preference based scheme would work. It is conceivable that even allowing for such preferences the houses in the case studies would still require significant modification before they would comply rather than require no modification as Williamson's submission implies. Further, development of such a model would take a number of years and require the consent and co-operation of all state and federal government agencies. To further delay the introduction of the proposed regulations does not seem justified, particularly when no state or federal governments believe such a change is necessary and there is no significant precedent for a comfort preference based house energy rating in any other building regulation throughout the world.

The submission by Exergy appears to have been used by the PC to question the applicability of simulated ratings in the commercial building sector in much the same way as Williamson's submission was used in the residential sector. Exergy's evidence that simulated energy use does not correlate directly with energy consumption seems to have been taken to mean that the use of simulation as an indicator of energy efficiency is futile. In fact Exergy states: "any credible design based assessment would use simulation as a key component of its formulation". His submission is arguing for more regulation to ensure that the full potential of the fabric and equipment are realised by introducing a requirement to verify performance post construction. He states in his submission regarding the draft report:

> "Overall therefore I would argue that the minimum standards proposed under the BCA for commercial buildings appear broadly justifiable, subject to my reservations expressed above. However I feel that the logical forward approach is not to go into a further holding pattern of inaction, but to institute reasonable minimum standards and then initiate further work to focus on ensuring delivery of stronger performance benefits in the future",
>
> "Poor quality of design has an overriding impact on performance relative to the commissioning-type issues that cause better designed buildings to fail to meet expectations. This would support the validity of basic prescriptive measures as minimum standards", and
>
> "There is little doubt in my experience that a high ACTHERS rating equates to a house that is more comfortable year round and that costs less to heat or cool to any given level of comfort."

The data presented by Williamson challenging the effectiveness of energy ratings is open to alternative interpretation and his suggestion that there is no evidence to link building fabric improvement to energy consumption is simply false. The interpretation the PC took of Exergy's submission was clearly not in line with what Exergy believed to be the case as their subsequent submission on the draft report shows. There is little evidence to suggest that simulation is an unreliable or ineffective tool for use in regulation. Simulation has been used in this context in regulations throughout the world in the same fashion as it is proposed to be used in Australia.

4.4.2.2 Does the different ranking given by rating tools compared to actual consumption matter?

The Commission considers that building regulation based on simulated energy load will only be effective if this simulated load correlates well with actual consumption. Because evidence is provided by Williamson and Exergy that simulated performance will not correlate with actual consumption and this is confirmed by the Department of Environment and Heritage, the Commission concludes that the regulation will be ineffective. This conclusion is wrong because it is not necessary for energy rated consumption to correlate directly with actual consumption for the policy to be effective. The Commission have made the same mistake as Williamson. As stated above the intention of the scheme is not that a 5 star house will always have a lower consumption than a 1 star house, its intention is: 'that a house with a high rating would have a lower energy use than it would otherwise have at a lower rating'. To illustrate this point I will use a similar example to

that given by the commission of two houses otherwise identical except in their intensity of use of heating and cooling:

House 1 has central heating and air conditioning used for most of the time, House 2 has a space heater and no air conditioning. As constructed house 2 receives a two star rating and house 1 receives a five star rating. The table below describes their energy use under different fabric efficiency ratings and the as constructed energy use is shown in bold:

House	Energy Consumption at 5 stars	Energy Consumption at 2 stars
1	**50**	100
2	20	**40**

Table 1 Example of energy use for two houses at different star ratings and with different use of heating and cooling

As constructed (bold) house two has lower energy consumption than house 1. Using the PC's logic that ratings should correlate with actual consumption one would conclude that house 2 is the more energy efficient, and therefore the rating is seriously flawed. But the table above shows that house 1 may have had substantially higher energy use had it not been constructed to a 5 star standard, and that house 2 could have saved significantly if it had constructed to a higher 5 star standard. The impact of the regulation is intended to achieve the outcomes shown between the columns and not that shown between the rows. The determinants of energy consumption outside the scope of building regulation relate to the differences between the rows. Governments seek to influence these determinants by providing information, MEPS and labels. As the Commission would agree it is not the role of government to tell people what to do inside their own home.

The Commission's conclusions regarding the use of simulation are wrong and the recommendations made on this basis should be withdrawn. That said there is still tremendous value to be obtained from ex-post studies. Such studies will ensure that the regulations can be amended to maximise their beneficial effect. The workshop supports the Commission's conclusion that such studies are vital as a way of improving regulations but these studies are not necessary to justify regulations in the first place.

4.4.3 Discount Rates

The Commission argues that individual's implicit discount rate is more like 30%, rather than the sub 10% values traditionally used for this type of analysis.

- The federal government's own procedures state that the 'implied discount rate' used by consumers is not appropriate for this sort of analysis. (see below)
- Energy saving can be viewed as less risky than the core business of many firms. Profitability of a business fluctuates with economic cycles while energy savings continue independent of this cycle. Lower discount rates are therefore appropriate.
- Because the NFEE measures use short payback period criteria most measures would be justified at substantially higher discount rates. Economic modelling would still show positive impacts on GDP even at 30% discount rates.

4.4.3.1Investment analysis & discount rates

It is sensible to give more attention to big decisions than to small decisions. For example, if there is an opportunity to invest $200,000 and earn $50,000/year for the next 10 years, it would be sensible to investigate that opportunity more seriously than an opportunity to invest $200 and earn $50/year ($1/week) for the next 10 years. Much more analytical effort would be justified if the opportunity is to invest $200 million to earn $50 million per year. What kind of investment is an investment in energy efficiency?

From the perspective of the individual household or business, energy efficiency requires a multitude of small decisions - about insulation, glazing, shading of windows and walls, lighting, appliance efficiency, etc. It is not surprising that these decisions don't attract much analytical attention. Implicitly, very high rates of discount are applied. The investment has to be abnormally attractive in order to be implemented. This does not mean that high discount rates have actually been applied; it just means that the decision has been made with minimum information and given minimum thought.

The following table provides some evidence on that point. It reports estimates of the implied discount rate for alternative equipment, taken from a recent OECD review. It suggests that implied discount rates are higher for equipment that uses less energy or are less obvious users of energy (refrigerators), and lower for appliances that use more energy (motor vehicles). The Commission seems to interpret this as evidence that consumers' time preferences change from one appliance to another. Why that should be is not clear. The obvious interpretation is that the decision-making effort increases with the size of the purchase and the extent to which energy use is an obvious issue, and better decisions are made as a consequence. Better decisions present as reductions in the implied discount rate.

Source	Appliances	Estimate
Train (1985)	Refrigerators	40%->100%
Meier and Whittier (1983)	Refrigerators	58%
Gately (1980)	Refrigerators	> 45%
Dubin and McFadden (1984)	Space Heating and Water Heating	20%-30%
Hausman (1979)	Air Conditioners	25%
Ruderman et al (1987)	Heating & Cooling Equipment and Residential Appliances	> 20%
Verboven (1999)	Motor Vehicles	5%-13%

Table 2 Estimates of implied discount rates for various consumer durables[22]

We emphasise that the table provides no evidence that actual rates of discount are high. It simply says that, if the decision was taken in a fully informed and rational manner, the only way to explain the outcomes is to assume that a high discount rate has been applied. If the decision is not taken in a fully informed and rational manner, the high discount rate is simply a proxy for:

- Lack of information;
- Lack of confidence in the information;
- Lack of expertise in interpreting the information and making the required calculations;
- Lack of time or interest in interpreting the information and making the required calculations.

An energy efficiency regulator approaches these same investment decisions from a quite different perspective. The multitude of small individual decisions across the country – each costing hundreds, thousands or tens of thousands of dollars – present to the regulator as investments that cost hundreds of millions of dollars. It is appropriate that the regulator adopt a much more rigorous approach than the individual. This includes consideration of a range of options, detailed costing of options, intensive energy modelling, consideration of the avoidable costs of energy, and adoption of best-practice investment criteria. Regarding the latter, the Department of Finance (Handbook of Cost-Benefit Analysis, 1991) recommends application of the Capital Asset Pricing Model (CAPM).

4.4.3.2 Why the CAPM discount rate for energy efficiency is under 10%

The Department's handbook says that, in the absence of project-specific benchmarks, the CAPM framework suggests a discount rate of 10-11%. This number seems to have been obtained by adding the average market risk premium on equity investments (6%) to an estimate of the risk-free rate (5%) – see chapter 5 of the handbook. The handbook goes on to recommend a rate of 8%, taking the view that activities of the general government sector are characterised by less than average market risk.

However the Department still seems to have erred on the high side. The account given in the handbook ignores the fact that listed companies are partly financed by equity and partly financed by debt, and that the debt component has a much lower return than the equity component. (The average debt component is about 50% but can be higher for companies that are less exposed to market risk. Eg, basic food industries may be less exposed to market risk than tourism or housing industries.) The cost of capital is a weighted average of the costs of debt and equity. It is lower for investments that are less exposed to market risk because such investments typically have a larger component of debt and a smaller premium on the remaining component of equity.

[22] Source: OECD (2002) Decision-making and environmental policy design for consumer durables, page 12

To put this another way, estimates of the average market risk premium would be much lower – at around 3% - if listed companies were entirely financed by equity and no part of the income stream was pre-committed to bondholders. The starting point for the present discussion would then be a discount rate of 8% (5% + 3%), before allowing for the fact that investments in energy efficiency are characterised by below-average market risk.

Better insulation of domestic storage water heaters provides a good example of energy efficiency investments with low market risk. It is reasonable to assume that the use of domestic storage water heaters is not sensitive to the state of the economy; heaters keep bubbling away in the laundries across the country regardless of the level of unemployment or the level of consumer confidence. Similarly, basic heating and cooling services are just that – basic. These investments can therefore be highly leveraged and the required rate of return would be low.

The Commission has also suggested that a higher discount rate be adopted to allow for various risks. The Handbook is clear on this point, in its discussion of techniques for handling risk and uncertainty (chapter 6). It specifically recommends against loading the discount rate. … The technique of 'loading' – that is, adding a premium to – the discount rate has proved tenacious because of its simplicity but its use is often problematic (page 64). Sensitivity testing of assumptions is preferred. The Commission can't have it both ways, loading the discount rate for risk and also requiring extensive sensitivity analysis.

The general point is that, if the Commission has identified a discount rate that it prefers, it should also identify all other elements of the associated decision making process and recommend the alternative process in its entirety. It is wrong to recommend one element of an alternative assessment process but put aside other elements of the alternative that the Commission finds less appealing. The less appealing elements may include that there is no information on the energy efficiency of the alternative appliances, or there is no attempt to analyse the information that is available, or there is no sensitivity analysis.

4.4.3.3 Do the poor have higher discount rates?

The Commission seems impressed by studies, reviewed by Train (1985), that find an inverse relationship between implied discount rates and consumer income. That is, the poor discount the future more heavily. The poor are therefore more likely to be worse off as a result of the regulations. There are two obvious counter arguments:

1. The poor may simply have less information or less capacity to process the information, and make worse decisions as a result. The poor quality decision emerges as a high implicit discount rate.
2. The poor also tend to be tenants and are therefore do not face the cash management problems associated with investments in energy efficient dwellings or the purchase of some energy efficient appliances that are required to be installed in such dwellings, such as space heaters. They don't make an investment and wait for the benefits to arrive. Instead, the landlord makes that investment on their behalf and raises the rent to make a return on the additional capital. The poor pay the higher rent but simultaneously benefit from a reduction in energy costs.

4.4.4 Distributional effects

The Commission is concerned that the additional cost of energy efficient housing will have a particularly significant effect on the poor:

> "The increase in capital costs could make building energy efficiency standards regressive. This will be the case if the proportionate increase in capital costs tends to be greatest for cheaper homes and such homes are typically bought by less affluent people. Poorer (and first) home buyers are more constrained in their ability to finance higher capital costs now in return for lower operating costs many years into the future."23

There are a number of factors to consider when evaluating whether improved building standards are regressive:

- There is no evidence to suggest that the relative costs for smaller homes will be greater than for large homes. This WAS the case when the rating scheme was first introduced because smaller homes have a higher relative surface area than larger homes. The rating methodology now includes an area correction that makes it easier for smaller (and therefore cheaper) houses to achieve the five star rating. Figure 7 shows the simulated energy load per square metre required to achieve 5 stars using the AccuRate rating software. It shows that houses of 100 m2 are allowed to achieve a 22% higher simulated load (per m2) than a house of 200 m2.

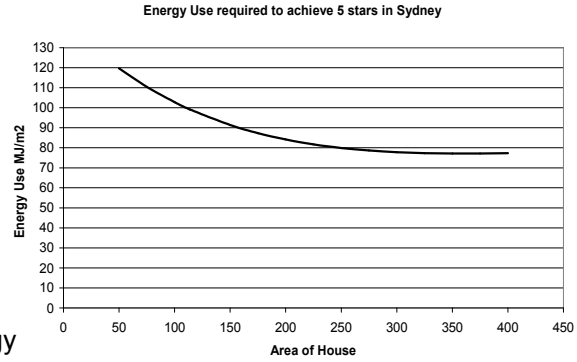

Figure 10 Energy loads for five stars in Sydney versus floor area

- As shown in the evaluation for 4 and 5 stars housing regulations in Victoria, on average householders are better off with an energy efficient house from day 1 because the increase in mortgage payments is less than the amount of energy savings. Hence a 4 or 5 star house has, on average, a lower cost of ownership. Due to the lack of data available on actual usage of houses for heating and cooling Regulatory Assessment uses conservative assumptions when estimating the energy use of houses. It is likely that actual energy savings will be higher than that forecast. The impact on poorer house buyers of energy efficiency regulations is therefore likely to be positive.
- Energy savings reported in policy evaluation are an average effect across the sector. It is clear that the tremendous range of user behaviour for households will mean that some households with minimal energy requirements for heating and cooling do not receive a financial benefit. As discussed in the ICANZ submission to the Inquiry and in its initial response to the draft report, household demand for energy use does not stay constant over the life of the household but varies as household circumstances vary:

  "A key determinant of the energy use of a home is occupancy. If the house is not occupied then in most circumstances the house will not be heated and cooled. Over the lifecycle of a family occupancy will vary considerably:

  - The 'Dual Income No Kids' family: both partners in paid employment, occupancy mainly in evenings,
  - The 'Young Family' where one parent is at home taking care of pre school children: house occupied all day, evening and there may be a demand for heating and cooling at night,

[23] Productivity Commission 2005 op cit p 154

- The 'Established Family' where children are learning during the day and both parents may be in full or part time employment: house unoccupied during school hours. Note that though the house may be unoccupied during weekdays, if one accounts for weekends, public holidays, annual leave and sick leave the house is potentially occupied during the day 40% of the time.
- The 'Empty Nest family' where children have left home and parents may both be working, but may also have chosen to return to study or start a business from home: occupancy variable, and
- The 'Retired family': occupancy all day and evening.

This analysis suggests that benefits will vary over the life of a household i.e. that the same households that currently derive little benefit are the same households who will derive the greatest benefit at different times of the household lifecycle. There are also times within these family phases where home occupancy – and therefore heating and cooling demand – may be greater, e.g. times of unemployment or illness.

When the home is occupied during the day it often means that one or more of the adults are not in full time employment. As a result the benefits of houses regulated to save energy will be greatest at those times when income is lower. The Regulatory Information Bulletin for the Victorian 5 star regulation makes reference to these effects."[24]

The workshop concluded that the distributional effects the Commission refers to are not likely to cause significant problems because the rating system is less stringent on smaller houses, the cash flow implications of the 5 star rating are likely to be positive and the benefits of energy efficiency are greatest when house occupancy (and therefore the need for heating and cooling) is greatest and it is at these times when household income is least.

[24] ICANZ submission 94 to Productivity Commission Inquiry, page 22

4.5 Evaluation of Policy Options

4.5.1 Evaluation of current policy proposals: housing regulation

The Commission develops a complex argument to support its recommendations that housing regulations should be placed on hold pending further evaluation. Around 1/3 of chapter 7 is devoted to the consideration of housing regulations. Due to the complexity of its argument the following section summarises these arguments and then provides comments after each paragraph.

Commission's comments on BCA

The Commission is concerned that the energy efficiency regulations in the BCA were not based on a proper evaluation of the alternatives. It says that initial stringency was based on maintaining the stringency of state based regulation and the new regulations are simply 'playing catch up' with states and territories rather than a first principles evaluation of what is the most cost effective alternative. The statement made by the ABCB that some decisions were based on limited data or anecdotal evidence is taken to give further evidence to its contention that the analysis of costs and benefits is not soundly based. The increase in stringency in the new regulations is of concern because as each increase in rating level becomes more technically demanding the cost of achieving it becomes disproportionately higher, particularly if the basis for the initial stringency itself may not be sound.

Workshop Comments

The contention that simply because the ABCB's current regulations sought to provide no lower standard than the pre-existing state based regulations presumes these regulations were not soundly based. No evidence is given for this presumption. The NSW, Victorian and ACT regulations were not enacted on a political whim. The level of analysis for each varied each considered the social, environmental and economic impacts as well as the alternatives to regulation. All these proposals were considered by Treasury and Cabinet and involved significant periods of consultation with industry. In each case the building industry eventually gave a measure of support to the regulations. Analysis by the Victorian government showed that the benefits of a 5 star standard exceeded those for the previously mandated 4 stars.

The ABCB statement that some decisions were made with limited data may or may not affect the overall robustness of their Regulatory Impact Statements. The PC seem quick to assume that these limitations were important but do not detail what data was lacking or the importance of this data to the final conclusions. It is difficult to see how the PC can criticise the ABCB's regulatory assessments without knowing the extent of the limitations the ABCB refers to, and the extent to which the ABCB applied conservative adjustments to compensate for the data quality issues.

The ABCB go on to say:

> "One reason why this data is not available is because of the current fragmented approach to funding energy efficiency research activities. From a government perspective, better coordination and targeting of funding is essential to ensure that reliable data is available for informed policy decisions to be made."25

It would be helpful if the PC made a recommendation as to the extent of funding and nature of the research required to ensure that the ABCB has adequate data in future.

Commission's comments on environmental importance

The Commission is also concerned that the burden of achieving greenhouse gas reductions is falling too heavily on the housing industry. While the AGO quote that the regulation affects 9% of energy used in Australia, Williamson uses ABARE data to demonstrate that it is more like 4.8%, and the HIA claim it is as low as 1.6% of greenhouse gas emissions.

Workshop Comments

[25] ABCB submission to PC Inquiry on Energy Efficiency, submission sub007, page 9

The HIA claims residential sector heating and cooling comprises only 1.6% of Australia's greenhouse gas emissions. Wilkenfeld's end-use analysis of Australia's greenhouse gas emissions26 indicates that residential heating and cooling generated 11.15 Mt in 1999, out of an Australian total of 523 Mt, of which 282 Mt was from stationary energy use. So Wilkenfeld's analysis suggests home heating and cooling is 2.1% of all Australian emissions and 3.9% of non-transport energy emissions. However, decisions relating to the energy performance of a new house impact on energy use for up to 70 years, the average life of a new house. Other energy-related decisions last for much shorter periods. So the emissions from home heating and cooling should be more heavily weighted to take into account their longer-term impacts. Other factors such as equity, health and so on (seemingly beyond this Inquiry's Terms of Reference) add to the importance of ensuring building envelopes work well.

The HIA also fails to remind the Inquiry that in 1997 the Prime Minister gave the building industry a year to achieve voluntary improvement: it is almost 8 years later, so it cannot be said that the industry has not had a reasonable chance to respond.

Commission's comments on the effectiveness of regulations

There is also much concern regarding the appropriateness of simulated energy use as a suitable measure of building performance. The report quotes Williamson who argues that the star rating does not correlate with actual energy use, and this is confirmed by the AGO. Because the regulation affects only one part of the many factors which determine household energy use for heating and cooling the Commission argues that there is a risk the regulation will not be effective. The limited scope of the regulation and questions raised over its effectiveness means that the regulation may skew the market away from measures that actually reduce energy consumption to those favoured by the rating tool.

Workshop Comment

These issues have been substantially discussed in section 4.4.2. The ability of building regulations to save energy does not depend on the correlation of star ratings with actual consumption. The Commission's finding 7.3 is wrong and should be withdrawn from the final report. The Commission questions whether building ratings are the best way to save energy, suggesting that policies to influence behaviour may be more effective. But it has undertaken no evaluation of the current information policies or why they appear to have been of limited effectiveness. It provides no models for a successful information program and the resources it would need or the likely effect of these programs. State regulations for housing came into place because virtually every non-regulatory policy had been exhausted and yet energy inefficient building practices continued unabated.

The Commission reiterates Williamson's concern that resources may be diverted away from more cost effective measures because of the inadequacy of the rating. Williamson makes this conclusion because 6 supposedly efficient houses receive a low rating. ICANZ submission in response to the draft report demonstrates that these houses deserve their poor rating and that no misallocation of resources would therefore occur. Note that there is always the option of complying with regulation by using expert opinion. In both NSW and SA designers have successfully used expert opinion to achieve compliance where they have argued that their design contains features which cannot be modelled by rating tools. The regulation therefore has a methodology to deal with cases where strict application of the rating may lead to inappropriate solutions.

Commission's Findings

In light of the above the Commission finds that simulation tools do not include all the determinants of energy efficiency (7.1) and that the ranking of house performance by these tools may be very different to a ranking based on actual consumption (7.2).

Commission's comments on financial costs and benefits: market failure

While many submissions showed the technical feasibility of energy saving, few were able to demonstrate why householders would not make such improvements without regulation if they were

[26] Wilkenfeld, "Australia's National Greenhouse Gas Inventory 1990, 1995 and 1999 End-Use Allocation of Emissions" Report to the Australian Greenhouse Office by George Wilkenfeld & Associates Pty Ltd and Energy Strategies, 2002

cost effective. It is implied that if these measures are so valuable for householders then there should be other policy options to encourage their adoption rather than heavy handed regulation.

Workshop Comments

Many of the improvements to the energy efficiency of a house can only be economically made during construction. Insulation of an existing wall is several times more expensive than insulation of a wall during construction. Many improvements can and will be made after construction but better design of the house can reduce or eliminate the need for these later improvements e.g. one can reduce energy gains through large west windows by the installation of a blind, but better design practices could have significantly reduced these heat gains and consequently avoided the need for a blind at all. The best option for improving the energy efficiency of a house is to address this at the design stage. After construction opportunities are limited.

The Commission itself describes many of the reasons why the market would fail to implement cost effective measures for housing in the draft report. Split incentives, principal-agent factors, organisational failure etc. are all well known to exist within the housing market. However, the Commission has stated that a number of these market failures represent rational behaviour and are not of themselves reason for intervention. An analysis of the Commission's estimation of market failure is given in section 4.2. A more detailed evaluation is given in the Business Council for Sustainable Energy's initial submission to the Inquiry[27].

The problem for the Commission is that its ToR are limited to private cost effectiveness. This makes it impossible for it to consider the nature of the real market failure: that decisions of many individuals are irrational given their preferences — for example, who would be better served through the installation of double glazing and other energy saving investments, increasing their cash flow. There are also additional benefits in terms of reduced greenhouse gas emissions. The basis of the housing regulations is the need to reduce energy use for the benefit of society while at the same time not adversely affecting individuals on average. The Inquiry's ToR effectives put the housing regulations beyond their consideration.

Commission's comments on financial costs and benefits: Regulatory Impact Statements

The Commission is also critical regarding the assessment of financial costs and benefits for the regulation.

Given the evidence discussed above the Commission reiterates previous criticisms of the ABCB: the need for ex-post reviews of policy, consideration of non regulatory alternatives, risk analysis and better treatment of costs and benefits. The Commission is also critical of the discount rates used finding that based on observed household behaviour much higher discount rates should be used. A Queensland Government regulatory assessment noted that the benefits of its measures decrease by 20% for every percentage increase in discount rate. As the rates used in regulatory assessment are low: between 4 and 6% and substantially higher discount rates are appropriate there may be no individual economic benefit in housing regulations.

Workshop Comments

The criticism of the ABCB is only valid if the findings of the draft report are correct. As explained above these findings are incorrect see section 4.4.2.

The issue of the use of discount rates has been dealt with in section 4.4.3.

Commission's comments on financial costs and benefits: distributional effects

Benefits of energy efficiency will also apply differently across the sector. The most rational solution for poorer homebuyers may be a less energy efficient house because they are capital constrained. The Commission is critical that regulatory impacts assessments did not consider this issue.

Workshop Comments

See section 4.4.4. Note that if mortgage payments increase by less than the amount of energy savings, then there is no basis to consider most, poorer home buyers to be worse off. It is then irrational for poorer home buyers to select a cheaper energy inefficient house. In the event that the

[27] Submission 50

poorer home buyer is unable to increase their loan to finance what is a clearly cost effective investment, then there is a capital market failure.

While the Commission provides no evidence of actual distributional effects and makes a theoretical argument that they may occur, this may provide a case for policy if distributional effects are found. The first home buyer grants could be tied to the level of sustainability of the house to relieve the capital constraints on poorer home buyers, with repayments out of the savings made (a kind of government sponsored 'performance contract').

Commission's comments on financial costs and benefits: cost of compliance

Finally the Commission is concerned that the costs of compliance may be much higher than predicted because, as the ABCB says, jurisdictions did not want performance only regulation. Because Deemed to Satisfy solutions may be less effective and more expensive the Commission is concerned that the costs may be understated and the benefits overstated. The Commission is critical of the ABCB for not exploring this issue further.

Workshop Comments

It is true that industry argued for the provision of Deemed to Satisfy clauses. Because ratings are only in widespread use in a few states and the methodology of the rating has been criticised in northern states Deemed to Satisfy is needed as a transitional strategy. In states where ratings are in common use, however, the housing industry has shown a preference for the rating:

- In Victoria and the ACT there are NO DtS clauses. The regulation is a performance only regulation. This was done in part because analysis showed changing to performance based regulation from DtS can save on average $1,300 per house. Note that the cost of 5 star in Victoria quoted in the draft report is the cost of meeting a Deemed to Satisfy Option that is not available to builders in Victoria. It does not represent the cost of current DtS, which is significantly lower
- In NSW under the energy smart homes policy builders have the option of a check list (DtS like provisions) or a rating. Personal communication with the Association of Building Sustainability Assessors in NSW indicated that 80% of houses use the simulation method.

While industry argued the need for DtS it is clear that as it gains familiarity with the rating this is the overwhelming preference. The experience of Henley Properties in Victoria showed that they could meet 5 stars for less than half the average cost predicted by the Victorian government. Henley found that as they became familiar with the rating system cheaper ways to achieve the rating were found. This is a powerful incentive to use performance ratings. The Commission's concerns over higher costs appear to be ill-founded. It seems that in the eyes of the Commission the possibility of the existence of a problem is an adequate basis to reject policy options. Further, observed market failure is rejected on the basis that this is not consistent with economic theory.

Commission's recommendations:

New or more stringent energy efficiency standards for residential buildings should not be introduced until existing standards have been fully evaluated.

The following table comments on the specific areas that the PC recommends need further research before proposed regulations are implemented:

Area to be investigated	Workshop comments
Consider whether defining building standards in terms of simulated heating and cooling loads is an effective way to raise actual energy efficiency;	• This is a common feature of regulation around the world. • Submissions to suggest problems with this approach are either wrong or have been misinterpreted. (4.4.2, ICANZ initial response to DR.)

Area to be investigated	Workshop comments
Investigate whether weaknesses in energy-rating software distort the housing market in favour of particular building designs that are not necessarily the most cost effective, particularly over the longer term as innovations are made in building design;	• Only one submission commented on weaknesses and distortional effects and the findings of this submission are incorrect. (4.2.2) • Rating is far more flexible than prescription and encourages innovation. • The small number of specialists who use features not covered by ratings are already using expert opinion as a means of satisfying regulatory compliance.
Evaluate costs and benefits in a way that takes account of the diverse preferences and financial circumstances of individual home buyers;	• RIS work uses average effects but considers a range of circumstances. • The diversity of user behaviour in houses means that some measures will not be optimal for individuals at certain times, rather than for different groups of people. On average benefits will accrue and as circumstances change the households who 'lose' today may 'win' tomorrow. (4.4.4). • It would be impractical and exceedingly costly to take into account the circumstances of every individual.
Assess how effectiveness and compliance costs differ between the deemed-to-satisfy and performance-based standards;	• Industry has already shown a preference for performance assessment. Not as big a problem as the PC makes out. • Victorian 5 star RIB has an extensive comparison. Cost benefit for DtS is lower but still positive.
Analyse the distributional impacts of standards on different socioeconomic groups, including first-home buyers and less-affluent groups; and	• Many reasons to expect this will not be a problem (see earlier comments). • No solutions suggested by PC as to how these problems could be solved e.g. subsidies etc.
Examine the process used to set the stringency of standards in the Building Code of Australia, including the impact of any increase in stringency by individual States and Territories.	• Victorian 5 star regulatory assessment is the most comprehensive in the country's history. Cost and benefits of 94,720 cases evaluated using a statistically valid sample. Results apply generally to ACT and similar climates in NSW and SA. • Stringency was not set on the basis of maximum private cost effectiveness but on the basis of achieving environmental outcomes without disadvantage to individuals. The ToR for the inquiry put the examination of these standards beyond its scope for comment.

4.5.2 Evaluation of current policy proposals: mandatory disclosure

The Commission has called for a halt to plans to implement a mandatory rating disclosure scheme for existing houses till existing schemes are evaluated. It was the understanding of the workshop that this was planned by NFEE. NFEE didn't plan to delay, just to do evaluation (to underpin future developments rather than stop existing processes). Other than suggest a voluntary system the Commission has nothing further to say.

If there is one area where market failure is crystal clear it is in the area of rental and energy efficiency. Landlords have no interest in investing in energy efficiency because they know the market does not have sufficient information to value these energy efficiency improvements and they will not benefit from the reduced energy use. If house purchasers and renters had reliable information about the efficiency of property the market would be more able to make rational decisions, though the existence of market failure means this may not always occur. It was surprising that the Commission did not at least support the principle of disclosure, as this is one of the few policies that appear to be justified solely within the Commission's ToR.

The workshop does not consider the model in place in the ACT to be ideal, but does support the principle of disclosure as a way of ensuring the proper market consideration of energy efficiency. The workshop considered some ideas to improve the scheme:

- A simplified fabric rating methodology that is accurate enough but easy enough to be completed on site in a few minutes is possible to develop and would take significant transaction costs out of the scheme.
- Simplified fabric rating is justified because there are many equally important factors that should be disclosed such as:
    - The efficiency, fuel and tariff of heating and hot water,
    - The efficiency of other installed appliances such as dish washers, cookers, fridges, clothes washing and drying machines,
    - The number of installed lights and their wattage (though usually a small component of energy bills, large numbers of downlights can be very expensive),
    - The nearest public transport routes, stops and stations
- This range of information could be presented on a web site that would allow users to enter approximate details of their own appliance usage and receive an estimate of their monthly energy costs that they could use to compare the total costs of their purchase/rental decisions. Alternatively, running costs for a range of typical household usage patterns could be provided to prospective tenants or buyers as part of an information pack.

New housing standards will be effective in the long term but to effectively reduce emissions in the near term, energy use in existing houses must be addressed. The basic first step in addressing this issue is to give the market the information it needs: likely energy costs at the time it matters most at the time of purchase and rental transactions. The European Union recently issued a directive requiring mandatory disclosure and the Danes have been doing this since 1997. Disclosure is an important part of energy efficiency policy throughout the world.

4.5.3 Evaluation of current policy proposals: Commercial Buildings

The Commission calls for Commercial Building regulations to be delayed until further evaluation shows the extent of administration and compliance costs, sensitivity studies are undertaken (particularly on the impact of discount rate), and it is demonstrated that they will be effective in saving energy. The claimed lack of effectiveness of the regulation is in part said to be due to their reliance on simulation. The Commission presents evidence from Exergy to demonstrate that simulated and actual bills do not correlate well. It considers the cost benefit ratio of 1.66 for class 2 – 4 buildings to be very marginal.

As discussed in section 4.4.3 the workshop considers that the Commission is incorrect in suggesting higher discount rates are appropriate. It states incorrectly that compliance costs are not

included in the RIS for commercial buildings. As explained in appendix A of the RIS "… To allow for additional planning, design and compliance costs for a new building, a uniform figure of 12.5% has been applied to baseline estimates of additional construction costs "(section A3.5.) Section 4.4.2 finds that simulation is a useful and effective tool as part of an overall strategy to reduce energy use in buildings.

As described in section 4.4.2.1 Exergy's submission regarding the draft report shows that the Commission has misinterpreted the intent of Exergy's original submission. Exergy endorses the use of simulation for both residential and commercial buildings, and calls for further regulation to undertake post occupancy evaluation to ensure commercial building systems are functioning effectively. The workshop supported Exergy in this respect.

The Cost Benefit ratio of 1.66 could only be considered very marginal if the risk of achieving that benefit is considered high. As explained above the reasons for the Commission's concerns are not well founded. Furthermore, the cost: benefit study the Commission refers to in the Draft Report is for classes 2-4, which are actually residential units of various kinds. The cost benefit ratio for class 5 – 9 buildings (offices, hospitals, retail, etc – that is most forms of non-residential buildings) has been shown to be 4.6. This is extremely cost-effective. This is far from marginal and shows just how poor current practices and market failure must be if such clearly cost effective measures need to be regulated.

5 Conclusion

The first Gilmore Group workshop found many opportunities to enhance energy efficiency in Australia have been lost. It found governments often overestimate costs and underestimate benefits of building energy efficiency measures because the lack of available data forces government to use conservative assumptions such as the use of hours of use data from 1986 for space heating when there is much anecdotal evidence to suggest usage has increased. It found that energy efficiency has benefits for health, productivity, reduction of peak energy loads, economic growth, pollution, and reduction of greenhouse gas emissions which have generally not been included in cost-benefit studies. The second workshop found the PC Inquiry's draft report to be an example of another lost opportunity. In particular the workshop found that the ToR for the Inquiry were totally inappropriate given the policy context and the imperative of achieving reductions in greenhouse gas emissions. This has meant that the Commission has been asked to consider policy without taking into account two key pillars supporting it: the existence of net social benefits from intervention, and the ability to manage future risks of a significant environmental externality arising from climate change.

The context of this Inquiry is the Commonwealth Government White Paper and the NFEE discussion paper and reports. These reports suggest a government commitment toward greater greenhouse gas emission reductions via energy efficiency. The modelling for NFEE shows that in addition to the overall net benefits a national improvement in energy efficiency would bring to individuals and firms, economic growth is stimulated and peak energy demand problems for utilities are eased. Reduction of emissions had only been seen in the context of a cost to growth so this new research pointed the way to achieving both the goals of emission reduction and economic growth. Even if the potential for savings is as bleak as the Commission suggests, broader terms of reference would have allowed the Commission to offer advice on which policies may still be worthwhile pursuing to meet the broader policy objectives despite possible costs to individuals, and how best to implement such policies.

The impacts of the ToR are all pervading. Because it is limited to considering individual cost effectiveness it can not address the essential failure of the market to deliver cost effective energy efficiency that would enhance economic welfare while meeting the needs of policy to reduce energy use as a means of addressing climate change. While it readily understands that individuals may not choose energy efficient options that may be of benefit to them it does not see many of these cases as a basis for policy intervention. The Commission argues that this is often rational behaviour and that the market is simply valuing other goods and services above those that deliver energy efficiency. The basis for intervention is the government commitment to greenhouse gas reduction due to the social good this brings both in terms of the environment and economic growth. This is beyond the scope of the terms of reference.

The flawed ToR is not the only way in which the workshop believed the Commission's evaluation of market failure was problematic. It seems to have underestimated the impact of path dependency on the implementation of cost effective energy efficiency improvements. There are substantial cultural and institutional barriers to energy efficiency. This exacerbates a variety of market failures and organisational failure in particular. The Commission seem to have taken a very narrow definition of individual cost benefit, to the extent that the identification of any potential losers would seem to invalidate the policy proposal. The diversity of occupant behaviour in buildings means this is virtually impossible to achieve.

The limited ToR also gives the Commission a particular philosophical position: that of the individual. It therefore calls for the effects of the proposed policies to be assessed using the implied discount rate of the individual. This report discusses this issue and believes that the use of implied discount rates is wrong and inconsistent with government policy.

The Commission takes a particularly optimistic view of the ability of the market to maintain a natural rate of improvement in energy efficiency. While it is critical of NFEE and the ABCB in terms of what it considers to be overly pessimistic BAU projections it also states the potential for cost effective improvements is low due to our low energy prices. It concludes that cost reflective pricing will be the trigger to stimulate investment in energy efficiency and see this with the provision of targeted information and some light handed regulation is all that is justified. Even if one agrees with this contention it still fails to give government the advice it needs to develop policy. The Commission do not state how much energy will be saved, whether this is adequate to meet policy objectives, make

no evaluation of which industries will benefit or which technologies will become economic under a higher price regime. Perhaps most importantly they don't suggest how much price increase would be adequate, whether the increase should be across the board or sectoral, what the impact on economic growth would be, what impacts this would have on the poor and how these could be overcome. If it is serious about its recommendations it should have done this work. Again, the narrow ToR has hamstrung the scope of Commission's evaluation.

The Workshop believed that the Commission tended to dismiss evidence in favour of energy efficiency with inadequate analysis. Many times policy options were dismissed because they did not fit the particular economic paradigm of the Commission. In these circumstances the Workshop considered that the proper basis for policy evaluation is a thorough technical evaluation of the energy efficiency potential and the associated economic benefits combined with an assessment of whether cost effective policy response is available to deliver those benefits. Its suggestion that the poor have a right to be locked in to exorbitant energy bills through the purchase of inefficient appliances because this would uphold consumer sovereignty for a misinformed few was one such case.

The rejection of regulations based on house energy ratings because they will not produce the same ranking as actual household consumption was another example of the Commission failing to adequately evaluate policy alternatives. Simulation is used throughout the world as the basis for energy efficiency regulations. These simulations fix many of the operational parameters of the building to standard hours of use and comfort requirements. In so doing they can not predict the actual energy usage of the building. These simulations do indicate the efficiency potential of building fabric and give a generally realistic picture of whether one house will need more energy to heat and cool than another for their particular comfort requirements. These techniques are more flexible, produce lower compliance costs and are more successful in achieving the required efficiency level than prescriptive regulations. They may not deliver the optimal solution in every case but the building design and construction responses they promote such as insulation, better orientation of windows, more highly efficient windows, shading from summer sun, improved design for ventilation and control of unwanted air leakage have all been shown in studies around the world to be effective in lowering the energy use of houses. The Commission's findings regarding regulation of house energy efficiency are wrong and it should withdraw its recommendations based on these findings. Ex post studies are supported as a means of enhancing the effectiveness of the policy.

The Workshop considered that Mandatory Disclosure is a vital part of the strategy to address energy use in existing homes. While it agrees that a full evaluation should be conducted this is understood to be planned. While the principle of disclosure is supported the current scheme could be improved.

The cursory dismissal of the RIS for Commercial Building Regulations partly based on the quoting cost benefit ratios which were easily exceeded in most classes of commercial buildings and the call for a halt to further development pending further study is ill founded. The high cost benefit ratios for these regulations show that they should be implemented without delay. There will be few opportunities like these to capture such cost effective savings.

The failure of the Commission to provide useful information to assist the development of policy is related to its narrow focus on individual cost effectiveness. The failure of this perspective within the context of the establishment of the Inquiry can be seen in the following example:

> The Victorian government analysis of its five star housing regulations showed that the cost benefit ratio for individuals of 4 star was better than for 5 star. However, economic modelling showed that a 5 star standard produced twice as much economic growth. Because the social benefits of 5 star outweighed the benefits of 4 star and 5 star was still positive for individuals the government chose to implement 5 star.

Such evaluation is beyond the Inquiry's ToR. Indeed because these regulations and the ABCB's regulations have all been formulated on the basis of net societal benefit the Workshop concluded that the consideration of these regulations, and for that matter the entire NFEE policy program, is beyond the scope of the Inquiry. The Commission has no basis for making recommendations regarding such policy, but only whether such policy would bring cost effective private benefit.

The Commission's draft report was disappointing and its narrow focus unhelpful for the prosecution of effective energy efficiency policy in Australia. The Workshop believes the government should set about engaging with industry to determine what policy prescriptions are needed to deliver the level

of energy efficiency improvement this country needs to make a meaningful contribution to the reduction of greenhouse gas emissions. The government needs to take the task of market transformation in the building industry seriously and assist in the development of institutional frameworks that will facilitate adoption of energy efficient practices. In doing this it must acknowledge the need to provide some financial and other forms of assistance to the industry in some areas to overcome the barriers that our previous dependency on high energy use has created.

Appendix A: Workshop Participants

Name	Relevant experience
Robert Foster	Robert is Practicing Architect with extensive experience in modelling the impacts of energy efficiency programs. Robert undertook the modelling of the energy benefits for Victorian 5 star regulations. This is the most extensive evaluation of its kind in Australia with impacts evaluated over 4,500 houses. He has also evaluated the impact of planning height and setback restrictions on the energy efficiency of housing development and examined the impact of house rating on heating and cooling appliance size. At Energy Efficient Strategies Robert has consulted with federal and state governments on appliance efficiency for several years.
Geoff Andrews	Geoff Andrews founded Genesis Automation in 1991, and subsequent experience in the analysis of energy management requirements and the implementation of practical energy efficiency measures. This work has necessarily included the custom design and manufacture of energy efficient equipment. Geoff was a co-founder and is a director of Ark Resources Pty Ltd, an environmental management company specialising in small performance based contracts, commercial office and residential developments, and energy ratings. Prior to venturing out, Geoff was an energy management consultant with Enersonics Pty Ltd for 6 years, including extensive industrial and commercial energy audit and implementation project supervision experience. Following graduation, 6½ years as an Engineer Officer, with the RAAF. Geoff's memberships include Australian Institute of Energy, Institution of Engineers, Australia, Institute of Instrumentation and Control Australia (IICA), Australian and New Zealand Solar Energy Society and Alternative Technology Association. Geoff's experience covers energy efficiency implementation projects covering most end use sectors and equipment types. He has undertaken over 250 energy audits of various types of facilities including defence bases and other campuses, factories, shopping centres, office buildings, and swimming pools and recreation centres. He has developed an energy manager hire service, and been involved in energy performance contracting and other innovative services focused on achieving implementation of energy saving and other environmental benefits
Holger Wilrath	Dr. Holger Willrath is one of Australia's leading experts in the thermal performance simulation of buildings. He has developed his own modelling program (the Building Energy Rating which uses has worked in the renewable energy industry since the mid 1970's. His work in this field has taken him to may countries outside of Australia, Thailand, Indonesia, Singapore, Maldives, India, Hong Kong, Korea, Philippines, Tonga, Samoa, Cook Islands, and Malaysia. He has also visited various renewable energy projects in Europe, the British Isles, Asia, New Zealand and the Pacific. Dr. Willrath sits on various steering committees and advisory groups dealing with renewable energy and energy efficient building design issues. He has provided consulting services in this field to several state government organisations including Queensland Government Departments, federal government organisations including the Australian Greenhouse Office and the former Department of Primary Industry and Energy, local government authorities including Brisbane and Maroochy Councils, industry organisations including the Master Builders Association and the Australasian Window Association, as well as private and public companies

Stefan Bray	Stefan is a senior specialist with the global consulting firm Ove Arup. He is a mechanical and manufacturing engineer with a Masters of Engineering Science degree. Stefan's areas of expertise include solar energy, thermal and visual comfort, glazing system design, energy modelling and passive building design. Stefan is experienced in establishing minimum performance requirements for façade elements to satisfy overall building performance expectations of thermal comfort, daylight and energy consumption. Recently he has been responsible for the specification of façade performance targets, to satisfy the ESD requirements of many projects in Melbourne. This includes Freshwater Place, Toyota Corporate Headquaters, the MCG re-development and several projects in the Docklands precinct. Through his mechanical and manufacturing engineering background Stefan provides a communication link between mechanical services design teams, façade design teams, and suppliers to facilitate the integration of indoor environmental quality and energy consumption with aesthetics, functionality and cost. He is currently working with the Insulation Council of Australia and New Zealand, the Australian Glass and Glazing Association, the Australian Building Codes Board and state regulatory bodies on the development and implementation of energy efficiency regulation for the building industry
Richard Begley	Richard is one of Australia's most experienced economists in the economic modelling of environmental programs and now works with the Allen Consulting Group. He designed and commissioned the Commonwealth Government's economic modelling and sensitivity analyses assessing the impacts of the Kyoto Protocol under a range of global scenarios for 2008-12 and beyond. Richard managed a two-year project developing projections to 2020 of Australia's greenhouse gas emissions. The projections gave for the first time a robust indication of the likely gap to Australia's Kyoto target for 2008-12. His recent work includes ground breaking modelling for the National Framework for Energy Efficiency.

Name	Relevant experience
Peter Dempster	Policy and program analyst – expert in using economic, statistical and modelling tools to assess policy issues, options and proposals. Key clients are the Australian Greenhouse Office, Australian Building Codes Board, Department of Industry, Tourism and Resources – dealing with issues of environmental protection, risks to human health and safety, equity and access. His areas of expertise include • Policy and program analysis o Benefit cost analysis o Cost effectiveness analysis o Economic impact analysis o Regulatory impact analysis o Policy research and statistical analysis o Evaluation of R&D programs o Needs assessment • Communications o Stakeholder consultation o Report writing o Executive briefing
Adj. Prof. Alan Pears	Alan is one of Australia's most experienced and broad ranging consultants in the energy efficiency and renewables field. His experience ranges from his pivotal role in the introduction of Victorian insulation regulations and national appliance labelling through to analysing the potential for cost-effective greenhouse emission reduction in a number of industries, and developing educational resources. Alan has also been involved in development of energy efficient products and appliances as well as helping his clients identify and implement substantial energy savings.
Tony Isaacs	Tony is one of Australia's leading experts in the thermal performance of buildings. He has been a lecturer in thermal performance of buildings at Melbourne University and was among the first in Australia to use computer thermal simulation programs. Tony managed a high volume public housing program for the Victorian government where he was responsible for the production of over 2,500 houses in 4 years. At SEAV he developed the FirstRate house energy rating software. FirstRate is the largest selling thermal performance evaluation tool in Australia and has won a number of building industry awards. Tony has trained over 1500 building industry professionals in energy efficient housing. Tony managed the Cost Benefit Study for the Victorian 5 star regulations which was the first of its kind in the world to include comprehensive macroeconomic modelling of an environmental policy.