

5 Star Housing – Performance Based Building Regulation Delivers Major Sustainability Outcomes

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Although nation after nation has accepted that buildings are major contributors to greenhouse gases and therefore global warming action has been patchy and piecemeal at best.

The political and ideological arguments that the market should determine what action, if any, is taken ignores the consequences of it proving, as it has done to date, ineffective. Many of the key drivers are against change. The noise created by the many actors and options drowns out the many practical energy savings and the little time available to slow global warming. The classic is the dominance of first cost over life cycle considerations.

The argument isn't so much about so-called 'economic rationalism' but between regulation and fragmentation.

I support education, training and persuasion. However in the final analysis Governments have a responsibility which they can't avoid and also the best capacity for action. I must confess that my background is public administration – 21 years in Parliament, half as a Minister – not the building industry.

The Australian State of Victoria (population 5 million) has decided to accept the challenge and introduce '5 Star' standards for all new housing. Technically builders can still construct their old energy inefficient houses; they are just not allowed to sell them.

This presentation will discuss Victoria's previous efforts in energy related building regulation; the adoption, in 2002, of a State Greenhouse Strategy; the development and content of the '5 Star' Regulations; the preparation for change; other Victorian initiatives and suggestions for next steps.

With over 20 tonnes of CO2 equivalent per capita Australians are amongst the world's biggest contributors to greenhouse emissions – twenty times the average Indian's 0.9 tonnes and 100 times a Haitian's 0.2.

Of Australia's 380Mt of CO2 equivalent in 1990 49Mt (13%) and 32Mt (8%) came from the residential and non-residential sectors. More than half (51%) Victoria's 1999 emissions from stationary sources came from residential and commercial buildings. Being cooler Victoria contributed more than 60% of Australia's energy usage for heating and cooling (population share: 25%). Business as usual (BAU) shows a projected increase of 38% between 1990 and 2010. Limiting the growth in residential heating and cooling is an environmental priority.

The 1991 Regulations

In 1990 the Department of Planning and Environment released a 'regulatory impact statement' proposing amendments to the Victorian Building Regulations which would require all new dwellings to satisfy minimum thermal insulation requirements.

As the responsible Minister I was aware of building industry opposition to any change but convinced by the report's finding that:

“The regulations are justified as they will result in the conservation of valuable energy reserves, reduce supply infrastructure costs and reduce greenhouse emissions. The costs to the householder are more than offset by the resultant fuel savings”.

Because costs such as insulation were regarded as outside normal bank lending arrangements very few new homes were adequately insulated. Insulation costs had to compete with furniture, carpet, heating etc. For a \$100,000 loan a bank would typically provide 85%. Post 1991 they still lent the same proportion of \$100,000 plus 85% of the \$3000 for the insulation – the new homeowner paid \$450 extra. Statewide there was an immediate improvement of 40% in new house energy efficiency from just above 0 to 2.2 Stars.

As Treasurer I continued the Government’s interest in energy efficiency commissioning a report by Amory Lovins whose recommendation was to avoid the construction of a further 500MW station by aggressive and comprehensive efficiency measures (negawatts).

For the next decade the chief change in Australian housing was size (plus 25%) with resulting growing energy usage. The regulations were credited with a 9% saving or 0.5Mt of CO₂ annually – Australian Greenhouse Office (AGO), 2000. An Australian Bureau of Statistics (ABS) survey found that the 50.7% of dwellings with roof/ceiling insulation in 1994 increased only marginally to 53.2% in 1999 – walls 14% and floors 0.3%.

Another AGO/ Sustainable Energy Authority (SEAV) 2000 report examined all factors, other than insulation, affecting thermal efficiency. In the ten years the improvement was a marginal 4.4%. The average star rating of 2.2 achieved in 1991 didn’t alter. For example of 240 houses examined only 7 had solar passive design applied.

Another area where Victoria took the lead was in mandating ‘dual flush’ toilets with consequent water savings – and an industry which exports to the US.

In 2000 the Commonwealth, State and Territory Governments agreed to the development of nationally based regulations to reduce emissions:

“Reducing the amount of energy used to achieve comfortable levels of temperature and humidity in buildings is an important strategy to reduce Australia’s greenhouse gas emissions. The Commonwealth, State and Territory Governments have agreed to incorporate a nationally consistent framework of minimum energy performance requirements into the Building Code of Australia (BCA), with the aim of significantly reducing the greenhouse impact of all new and substantially refurbished buildings”

The Victorian Greenhouse Strategy – 2002

Victoria had already decided not to wait. Action item 6.1 of the comprehensive Greenhouse strategy was to introduce new standards for energy efficient housing:

“Energy use in homes is responsible for around 16% of Victoria’s total greenhouse gas emissions. A major contributor to these figures is residential heating and cooling, which account for 50% of the energy consumed in the average Victorian home.

Improving the energy efficiency of homes built in Victoria is critical to reducing the demand for energy for heating and cooling. Currently new homes built in Victoria have an average energy efficiency rating of 2.2 stars.

“The Government will amend the Victorian Building Regulations to require all new dwellings constructed in Victoria to meet a minimum 5 star energy rating. These changes will mean that energy use for heating and cooling in new homes will be cut by half. This will result in a significant saving in household bills, and reduce greenhouse gas emissions by 1.3 tonnes per household per year.”

The Regulatory Process

While allowing for urgent regulation by Ministers through the Governor in Council the basic process is one of consultation before and during the regulatory impact process. In this case a 50 page plus Regulatory Information Bulletin “Energy Efficiency Standards for New Residential buildings” was issued by the Building Commission and served as the basis for a wide ranging and sometimes conflicting public debate.

The Strategy was based on thorough economic analysis including a “Cost-Benefit Analysis of New Housing Energy Performance Regulations” (The Allen Consulting Group) and a “Comparative Cost Benefit Study of Energy Efficiency Measures for Class 1 Buildings and High Rise Apartments in Victoria” (Energy Efficient Strategies) – both released in 2002. The Allen Group advised that:

“The introduction of energy efficiency regulation standards into Victorian housing will produce modest but worthwhile economic benefits for the Victorian community. There will also be social and environmental gains. The benefits are significantly greater under a 5-Star than a 4-Star standard.....
The findings suggest that the benefits are significantly greater than the costs. A 5-Star standard would provide the greatest net benefits, in terms of economic, social and environmental impacts”.

Economic impacts included a boost to the State GDP (\$570m); 1100 new jobs; annual and 20 year energy savings (\$6.2m, \$124m); greenhouse gas savings (starting at 38,000 tonnes and reaching 7.6m in 20 years; and zero impact on housing starts.

The EES results were similar, though inclined towards a 4 Star approach. An increase in annual home loan payments was counterbalanced by energy and water bill savings. At the same time the AGO study of the impact of various policies calculated the 1999 position ranging from a 36% increase in GHG Emissions with no regulations to a 31% reduction with 5 Star.

The Regulations

Traditionally Australian building regulations have been quite specific and prescriptive. In contrast the new regulations are ‘all about performance’ defining building energy efficiency standards for single dwellings and apartments in explicit terms using star ratings. Compliance is demonstrated to “approving” authorities by using accredited software tools.

This approach provides benefits for homebuyers and industry:

- Purchasers, designers and builders can choose how best to meet the standard;
- Flexibility leads to more cost effective designs;
- Whole building assessment allows tradeoffs between individual elements – cost, aesthetics and amenity;
- Innovation is encouraged including achieving more than compliance; and
- Consumers get clear information; and the assessment of compliance is simplified.

Government objectives included:

- Improving the energy efficiency of the building fabric to save energy and reduce emissions;
- Delivering economic and consumer benefits for homeowners;
- Providing higher quality, more comfortable homes – warmer in winter, cooler in summer;
- Slowing the rapid growth of domestic energy consumption and peak utility loads; and
- cushioning homeowners against escalating energy prices.

The need for full consultation, within the Government and the community, took longer than originally expected with the changes commencing in July 2004. Three options were initially available:

1. 5 Star energy rating for building fabric provided by an accredited house energy rater;
2. 4 Star energy rating for building fabric; plus water savings measures and a solar hot water system(SWH); and
3. 4 Star energy rating for building fabric; plus water saving measures and a rain water tank.

From July 1st this year 5 Star was required for the building fabric plus water saving measures and either a rain water tank or SHW system. Victoria has experienced a prolonged drought and widespread water restrictions and water has therefore joined energy use as a major focus of public policy and community concern. The Plumbing Industry Commission administers 5 Star Plumbing and the Government has provided \$10m towards efficient shower heads etc.

Builders using timber, and the timber industry were not adequately prepared so the Governments has set April 2006 for the full application to timber floor construction, mud brick houses and relocateables.

On balance the average new home owner benefits, with energy and water savings (\$260) offsetting the possible increase in home loan repayments (\$90 - \$250 a year. The increase in house costs is between \$1100 to \$3300 (0.7 to 1.9%) and some believe that costs will come down as experience grows.

Was the Community Ready?

The Government directly, and through the Building Commission and the Sustainable Energy Authority (SEAV), mounted an ongoing major press campaign, prepared material for consumers, bankers and builders and where appropriate considered rebates for solar, gas and water expenditures. As well as printed material comprehensive advice was placed on the Building Commission website (www.buildingcommission.com.au; www.seav.vic.gov.au) with frequently asked questions, technical sheets and practice notes. Education extended to the selection of appliances as well (www.5starhouse.vic.gov.au).

Ministers strongly backed the change. Planning Minister, The Hon. Rob Hulls, told the Architects National Conference that:

“For too long we have created houses that act as energy vampires, endlessly consuming non renewable resourcesour collective challenge is to reign in our energy consumption and do more with less (April 21st, 2005)”.

On June 30th, the day before their full introduction, a press statement issued by Deputy Premier Thwaites and Minister Hulls emphasized that the new standards would help the environment by cutting energy and water use, save householders hundreds of dollars on their bills and make houses more comfortable to live in”.

Training courses for thousands of building professionals and tradesmen were accompanied by an ‘Energy Smart’ housing manual and practical case studies. Examples of actions and costs were widely distributed through home shows etc: Changes suggested included:

Increasing ceiling insulation to R3.5	\$3/m2	\$ 445
Increase wall insulation to R2.0	\$6/m2	\$1440
Reduce glazing areas	\$40/m2	\$ 320
Install aluminium window frames	\$20/m2	\$ 900
Seal exhaust fans	\$30/fan	\$ 30
Seal gaps and cracks	\$1/m2	\$ 200
Weather strips for doors	\$32/door	\$ 130

\$2825/3465

Simple advice included fitting blinds to westerly windows and double glazing.

A key element was user friendly 'FirstRate', a rating tool based on the results of 55,000 simulations round Australia. The software and user manual are available at a cost of \$300 and training is provided by accredited training providers statewide. The SEAV provided technical support for software problems and technical issues regarding house designs and ratings (firstrate@seav.vic.gov.au). Raters must be accredited.

The building industry itself said it was ready by the introduction date. A Chant Link Associates study jointly sponsored by the Building Commission and the Housing Industry Association found very high and high levels of understanding and support. An interesting question asked what technical changes had been made to standard designs. Prominent were insulation, double glazing, window size, building orientation, changing materials, using water saving fittings etc. and replacing timber floors with concrete slabs.

Loads, particularly from air conditioning, have halved in many cases and projected greenhouse emissions will decrease as the 40,000 new houses are completed annually.

There has been a major boost for the solar hot water heater, water tank, and energy and water efficient suppliers and installers.

Community and Business Responses

Among those taking up the challenge have been the finance industry, local government, building products suppliers and 'green' builders themselves.

A major credit union, MECU, has enrolled building industry partners in sustainable housing – solar in particular; and developed a 'goGreen Home Improvement Loan'. It also offers lower interest loans for more fuel efficient cars and pays for the planting of trees to offset emissions.

The Bendigo Bank has designed a special home loan to help pay for an energy efficient home and personal loans for environmentally friendly products.

As the Chair of the Australasian UNEP Finance Initiative the Victorian Environment Protection Authority is working with banks and credit unions to increase the number and range of 'green' loans.

Moreland City Council, in inner suburban Melbourne, has through the Moreland Energy Foundation funded a 'Five Star Home Renovators Service'.

Companies such as Insulco have provided technical bulletins as have the solar and water fittings industries.

Homebuilders such as rural based Glen Loddon Homes, Solar Sisters and Sunpower Design have advertised their services to assess and meet the new standards. 'Green' has become a marketing plus.

The Governments campaign to imbed the changes isn't without its detractors. The national government despite its Prime Ministerial commitment has referred energy efficiency to the economic rationalist Productivity Commission which unsurprisingly has issued a draft with a bias towards market mechanisms and individual's capacity to make their own decisions. The lack of any improvement in the 1990's stands in contrast to that view.

While industry peak bodies have continued to be critical environment non government organizations, professional bodies and supplier organizations have been very supportive. The national Building Code of Australia is still scheduled for a 2006 introduction.

The Future – 6 Stars?

Policy changes to be successful require ongoing support and the State has continued a vigorous media and public education campaign including detailed up to date studies of costs and benefits. Jetteree Pty Ltd, and an independent quantity surveyor, have reexamined cost data and broadly confirmed the original additional cost estimate for average homes. The Building Commission Chairman, Mr. Tony Arnel, has highlighted major builders and developers who are going beyond the minimum regulations?

Three new ‘GreenSmart’ display homes in Victoria in suburban Keysborough and provincial Ballarat will have a six star rating. Eight houses in rural Castlemaine have been rated 6 Stars by FirstRate – brick veneer, high thermal mass and insulation, excellent cross ventilation, double glazing, PV and native vegetation.

Other States are also acting. The Australian Capital Territory requires that all new houses be professionally assessed and demonstrate 4 Stars or higher. All existing dwellings for sale must disclose their energy rating values in advertisements and in the contract of sale.

From July 1st all new homes in New South Wales require a BASIX certificate which ensures that they are built to use 40% less drinking water and produce 25% less greenhouse emissions than ‘business as usual’ (www.basix.nsw.gov.au).

Victoria has also decided to set an example by setting guidelines for its own new buildings (self built and rented) and improving the performance of often backward public housing stock. The 2006 Commonwealth Games is seen as an opportunity and challenge to perform to international best practice.

A significant all Party public and political endorsement has come from the Parliamentary Committee on Environment and Natural Resources report “Inquiry into Sustainable Communities” which wants public policy to go further:

- 5 Star should include major renovations, equipment and appliances;
- Mandatory environmental design standards for State government infrastructure projects;
- The disclosure of energy efficiency on the sale or lease of residential property;
- The display of energy consumption on Government, including Local Government, buildings; and
- The promotion of green power.

Clearly the start made in the 2002 Greenhouse Strategy has been overtaken by a combination of community and professional attitudes, the favourable experience of two years of tougher regulations and the growing acceptance that climate change demands a new and radical approach to energy and water policy.

Future change has been made easier by the release of “NatHers Software AccuRate” a nationally accepted tool ranging to 10 Stars – an autonomous house, independent of the grid or selling its surplus to it.

The importance of leadership has combined with a willingness to actively persuade. Victoria is leading in a race to the top not to the bottom.