



Association of Building Sustainability Assessors

Position Paper

**The Home Energy Rating Scheme and
Home Energy Efficiency in New Zealand**

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Association of Building Sustainability Assessors

The Association of Building Sustainability Assessors Incorporated (ABSA) is a not-for-profit incorporated association based in Australia. The Sustainable Energy Development Authority (now the Department of Energy, Utilities and Sustainability), the House Energy Rating Management Board (HMB) and building industry professional associations, established ABSA under the Associations Incorporated Act NSW on 10 October 2003. During 2005 – 2006 ABSA applied to become a National Company. As of 15 September 2006 ABSA was registered in Australia as a company limited by guarantee under the Corporations Act 2001.

ABSA aims to support improvements in the environmental sustainability of buildings, through:

- managing accreditation and quality assurance schemes for building sustainability assessment;
- providing training and support for sustainability assessors;
- liaising with Government, industry organisations and related stakeholder groups;
- building capacity, expertise and professionalism in sustainable building in all sectors of the construction industry; and
- providing advice and information to councils, building professionals and consumers.

In New Zealand, ABSA was contracted to the Energy Efficiency and Conservation Authority (EECA) in September 2007 to implement and manage the training, accreditation and auditing of assessors under the Home Energy Rating Scheme (HERS). For this ABSA employs one staff member in New Zealand on a fixed-term contract. ABSA is currently considering adding a New Zealand representative to the Board of Directors. ABSA also represents the interests of its members – the professionals who form the building sustainability assessment industry in New Zealand.

Background to the Home Energy Rating Scheme

The Energy Efficiency and Conservation Authority (EECA) launched the Home Energy Rating Scheme (HERS) in December 2007 following a lengthy and involved process of research and implementation.

EECA conducted research¹, which examined the scope and effectiveness of other HERS around the world and explored the most appropriate options for New Zealand. In summary, the research concluded that:

1. Voluntary Home Energy Rating Schemes around the world enjoy less than 1% of the population up-taking the Scheme. Relatively higher levels of participation are seen when the following are made available:
 - (a) High and guaranteed levels of funding over relatively short time periods;
 - (b) Financial incentives for energy efficiency financing for mortgage borrowers;
 - (c) Financial incentives for lenders;
 - (d) Diversification of services;
 - (e) Continuity of HERS program – leadership, commitment, funding and marketing; and
 - (f) Active involvement of key stakeholders and public/private sector partnerships.
2. A mandatory requirement for extended or altered homes to meet a minimum energy efficiency requirement will lead to improvements in the energy efficiency of the existing housing stock;
3. A critical mass of homes must be assessed, and the assessments made available, before home energy rating assessments become useful information for buyers or tenants to be able to compare the energy efficiency of houses. Obtaining this mass under a voluntary scheme will be very difficult;
4. A mandatory HERS will have the key advantage, compared to a voluntary HERS, of vastly greater participation rates. This greater participation rate will:
 - (a) Greatly increase the potential for the scheme to create a viable home energy rating and advice service, if the ratings are to be supplied by the private sector;
 - (b) Raise the impact of the scheme in raising public awareness of energy consumption in the home;
 - (c) Greatly increase the usefulness of the home energy ratings as a means of comparing homes, hence the potential to transform the market;
 - (d) Accelerate the improvement of the energy efficiency of existing homes;

¹Final Report – Home Energy Rating Scheme Consultancy¹, Energy Consult Pty Ltd, March 2005

- (e) Provide energy efficient advice to home buyers and sellers at the time they are most likely to act on it, and
- (f) Result in a faster rate of change in the energy efficiency of the residential housing sector.

EECA also commissioned research into an appropriate thermal modelling software tool to use for a HERS in New Zealand. This research² examined the appropriateness of software tools from the United Kingdom, United States, Australia and Canada. Based on this research and other considerations, EECA chose a software tool called 'AccuRate' which was developed by the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO) in association with the Australian Greenhouse Office (now the Department for the Environment, Water, Heritage and the Arts), for use in the Australian National Home Energy Rating Scheme (NatHERS).

CSIRO, under contract from EECA, modified the Australian software tool to create a thermal modelling software tool suitable for use in New Zealand.

During the initial six months of the Home Energy Rating programme, from its launch until the end of June 2008, EECA provided a subsidy of up to \$350 + GST to developers and home owners to undertake a Home Energy Rating. This subsidy enjoyed excellent uptake with almost 500 Home Energy Rating assessments being completed during this time.

Since the end of June 2008 the Home Energy Rating Scheme has continued in a voluntary capacity without any Government subsidies for assessments.

There are currently thirteen accredited HERS Assessors. There are approximately another twelve people currently working their way through the accreditation procedure. This year ABSA has trained 76 people in the Short Course in Building Thermal Performance Assessment, the training course for HERS assessors. A total of 124 people have completed this training to date.

The AccuRate software tool is continuing to undergo development. Earlier in 2008, ABSA submitted a report³ to the Australian Department of the Environment, Water, Heritage and the Arts (DEWHA) with 58 recommendations to improve the AccuRate software. DEWHA is currently funding the implementation of many of these recommendations, and they are also likely to be implemented into AccuRate NZ.

Beacon Pathway, a collaborative research consortium investigating ways to make New Zealand's housing stock more sustainable, has previously recommended to the Government that the HERS be made mandatory⁴.

EECA is working closely with DEWHA to co-operatively develop Australia and New Zealand's respective Home Energy Rating Schemes and the AccuRate software tool.

²Existing House Energy Rating Tools Study', Sustainable Built Environments, September 2006

³AccuRate Input Streamlining – Final Report', ABSA, August 2008

⁴The National Value Case', Beacon Pathway Ltd, Beacon Symposium 2008

Recommendations

ABSA recommends that:

1. The Government implements a minimum standard of sustainability performance for New Zealand homes.
2. The Government implements the Home Energy Rating Scheme as a means of demonstrating compliance for the HI – Energy Efficiency clause of the NZ Building Code.
3. The other methods (Schedule, Calculation and Modelling) of demonstrating compliance with HI – Energy Efficiency are phased out within one year.
4. The disclosure of a home's Home Energy Rating is made mandatory, when the home is sold, leased or rented, by November 2009.
5. The Government provide funding to subsidise a Home Energy Rating for low-income households, to the value of \$350 until June 2012, increasing at the rate of inflation.
6. A widespread marketing campaign be implemented by March 2009 to educate the New Zealand public of the Home Energy Rating Scheme and the imminent introduction of mandatory disclosure.
7. The costs for these programmes be funded through health care cost savings and income generated from any emissions trading or carbon tax scheme.

Discussion

New Zealand's homes are in an appalling state in terms of their energy-efficiency, interior environment quality and the health of New Zealanders living in them.

The World Health Organisation (WHO) recommends that homes have a minimum internal temperature, at any time, of 18°C⁵.

The Building Research Association of New Zealand (BRANZ) conducted a ten-year research programme⁶ into the state of New Zealand homes, which was completed in 2006. This research showed that:

1. The average winter temperature of the living room in all New Zealand homes was 15.5°C. This is the mean temperature, minimum temperatures are well below this;
2. The average winter temperature of bedrooms in all New Zealand homes was 13.9°C. This is the mean temperature, minimum temperatures are well below this;
3. New Zealanders use 34% of all the energy used in their homes to heat them. Despite this enormous amount of energy used, they are still well below the WHO minimum recommended temperature.

The University of Otago researched indoor house temperatures of rented student accommodation in Dunedin during the winter of 2003. This research⁷ showed that:

1. The mean outdoor temperature was 8.5°C;
2. The mean living room temperature was 13.0°C. This is the mean temperature, minimum temperatures are well below this;
3. The mean bedroom temperature was only 12.5°C. This is the mean temperature, minimum temperatures are well below this;
4. 61% of occupants of the houses in this study answered, "No," to the question, "Is your house comfortable in winter?";
5. 72% of occupants of the houses in this study answered, "Yes," to the question, "Do you experience mould or damp in your house?"

⁵Health Impact of Low Indoor Temperatures', World Health Organisation, 1987.

⁶Energy Use in New Zealand Households – Year 10 Report', Isaacs et al, 2006

⁷'Impact of Housing on Health in Dunedin, New Zealand', Shannon, Lloyd, Roos, Kohlmeyer; 2003

These unhealthy interior environments in New Zealand homes have a significant impact on the health of New Zealanders. New Zealand has one of the highest incidence rates of adult asthma in the world, about 25% of children report symptoms of asthma⁸ and asthma is the second most common reason for children to be admitted to hospital⁹. The economic cost of asthma in New Zealand is \$825 million per year¹⁰. There is evidence from Finland that as a home becomes damper and mouldier, incidences of asthma increase¹¹.

Research conducted by the University of Otago School of Medicine¹² showed that:

1. Once houses were insulated, they were drier and warmer;
4. People in insulated houses reported that their houses were significantly warmer;
5. There was a significant improvement in the self-reported health of adults and children living in houses that were insulated, compared to those whose houses were not insulated;
6. Adults and children in insulated houses reported visiting their doctor less. The decrease in the number of visits was significant for the adults;
7. Adults and children in insulated houses reported that they were admitted to hospital less often for respiratory conditions;
8. Adults, who were in the workforce and in insulated houses, were significantly less likely to report sick days off work, and children in these houses were less likely to have had days off school;
9. Warmer, drier homes reduce the severity of asthma symptoms;
10. For every dollar spent on insulation, families saved almost two dollars in health and welfare;

and made the point, **“The study underlines the point that, from a health, energy and environmental perspective, the value for money of improving housing quality by retrofitting insulation is compelling.”**

Cold housing in New Zealand has also shown to have contributed to 1,600 avoidable deaths in winter compared to summer over the last 20 years¹³.

⁸Effects of improved home heating on asthma in community dwelling children: randomised controlled trial', Howden-Chapman et al, July 2008

⁹'Trying to catch our breath: the burden of preventable breathing disease in children and young people', Asher, Byrnes, 2006

¹⁰'The Burden of Asthma in New Zealand', Holt, Beasley, 2001

¹¹'Moisture damage and childhood asthma: a population-based incident case-control study', Pekkanen et al, 2007

¹²'Retrofitting houses with insulation: a cost-benefit analysis of a randomised community trial', Chapman, 2007

¹³'Trends and determinants of excess winter mortality in New Zealand: 1980 to 2000', Davie, Baker, Hales, Carlin, British Medical Journal Public Health 2007.

New Zealand has approximately 1.6 million homes. Data available from EECA shows that, if every home in New Zealand which required it was retro-fitted with energy-efficiency measures, including ceiling and underfloor insulation, draught proofing, hot water cylinder wraps, hot water pipe lagging, low-flow shower heads and energy efficient light bulbs, the annual energy savings would be in the order of 8.8 petajoules¹⁴.

The health, economic and environmental costs and implications of New Zealand's unhealthy homes are enormous, but this problem can easily be addressed. ABSA believes that a considered and bold approach to several key areas can significantly impact on these problems, leading to:

1. Healthier New Zealanders;
2. Lower energy use in our homes and, consequently, less greenhouse gas emissions;
3. A more secure energy and health future as we move into an era of climate change, peak oil, energy shortages and high energy prices.

Each of our recommendations is discussed below.

¹⁴'Benefit Model for Housing Insulation Projects', EECA, 2007

Recommendation 1: That the Government implements a minimum standard of sustainability performance for New Zealand homes

Of all the homes that will exist in New Zealand in 2050, it is estimated that 80% are already built. While addressing new homes is important, the greatest challenge lies with this 80% of existing homes.

In many areas, we have systems to ensure the quality, health and safety of the structures, devices, people and systems that we use in every day life; commercial buildings have warrants of fitness, our cars have a warrant of fitness, the professionals we use, such as doctors and lawyers, have qualifications and systems to ensure the quality of their work.

We spend approximately 70% of our time indoors in our homes¹⁵. If we spend this much of our time on our homes, and they are so unhealthy, why would we not remedy this?

It is clear that homeowners are currently not motivated to undertake energy-efficiency upgrades in their homes. While regulation by Government is not necessarily a good thing, there are cases where regulation provides clear benefits to individuals, families, societies and New Zealand. All of the examples above; commercial building warrant of fitnesses, car warrant of fitnesses, professional qualifications and auditing, are examples of Government sponsored regulation that is widely accepted and contributes significantly to the health and well-being of our society.

It is time for the New Zealand Government to implement a system to ensure that New Zealand homes are healthy, energy-efficient and safe for the people that live in them, now and into the future.

ABSA recommends a system that sets minimum performance standard requirements in the following areas:

1. Energy use for space heating;
2. Energy use for water heating;
3. Water use.
4. Energy efficient lighting

¹⁵'Home is where the heart is—most of the time', New Zealand Medical Journal, October 2007

The first two can easily be implemented by setting a minimum HERS star rating requirement for homes of different ages and typologies. More work needs to be done to identify these typologies and minimum star ratings, a suggested starting point is:

1. Pre 1940 – 1.5 stars
2. 1940 – 1960 – 2 stars
3. 1960 – 1978 – 2.5 stars
4. 1978 – 1992 – 3.5 stars
5. 1992 – 2004 – 4 stars
6. 2004 – 2008 – 4.5 stars
7. post 2008 – 6 stars

The minimum safety standards for cars have steadily risen over the years as better technology becomes available. ABSA recommends that a schedule of gradual improvement be made to the minimum standard for housing as it becomes economically and technically feasible.

A maximum level of water use per household is also easy to implement. We can see two ways to achieve this in the short-term; setting a maximum water use per day per householder, or specifying a minimum standard for water using appliances such as showerheads and toilets.

Energy efficient lighting is also easily implemented, with Government already considering the phasing out of incandescent light bulbs.

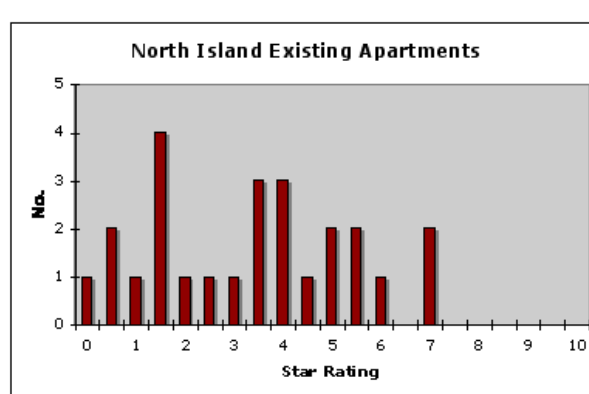
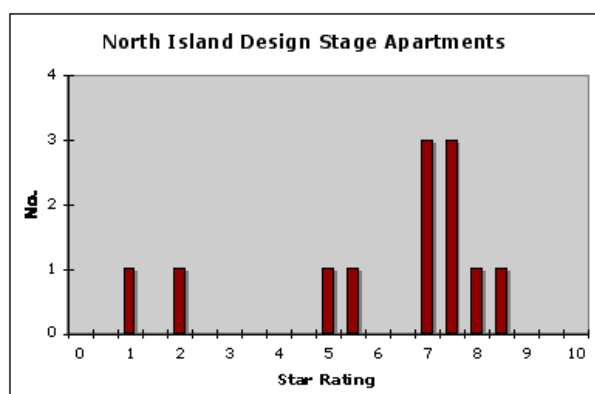
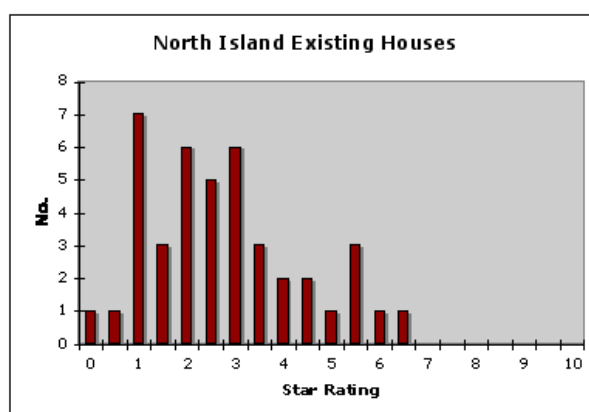
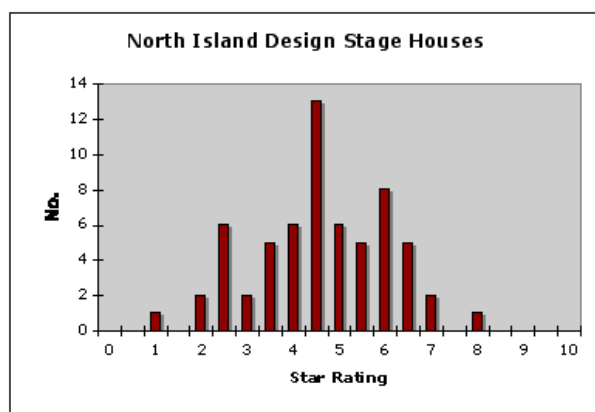
The cost to homeowners for upgrading their homes and achieving these minimum performance standards may be considerable, and unaffordable for some homeowners. This scheme must be implemented alongside a well-funded scheme of subsidies and interest free loans to homeowners to allow the upgrades to happen.

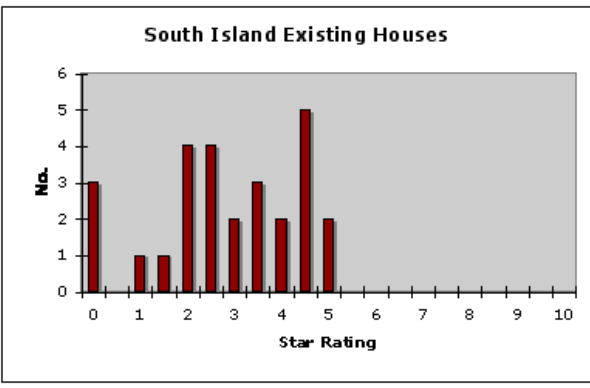
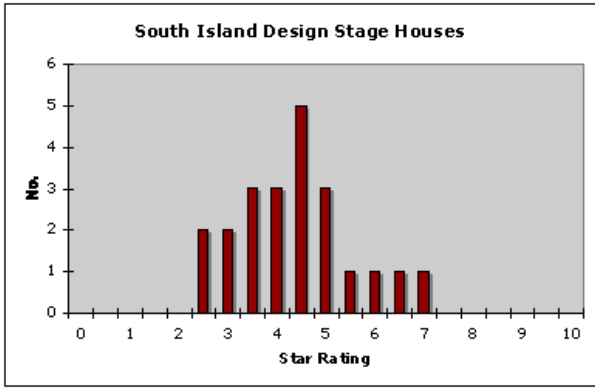
Recommendation 2: The Government immediately implements the Home Energy Rating Scheme as a means of demonstrating compliance for the HI – Energy Efficiency clause of the NZ Building Code

The current methods of demonstrating compliance with the HI – Energy Efficiency clause of the New Zealand Building Code (NZBC) are designed to achieve a minimum performance standard, defined by a metric known as the Building Performance Index (BPI). The BPI uses a formula that takes into account the climate in which the building is located, the size of the building and its energy requirements for heating.

Currently, HI references a New Zealand Standard, NZS 4218:2004, which specifies three methods of demonstrating compliance. These three methods are supposed to all provide the same level of minimum performance for all homes, which we estimate at 4.5 stars out of 10.

HERS assessments done over the past year clearly show that this approach is flawed. The graphs below show the distribution of HERS star ratings for the North and South Islands, for design stage (building consent stage) and existing homes. In the North Island, 35% of homes at building consent stage scored below 4.5 stars, in the South Island 45%. Some score as low as 1 star out of 10.



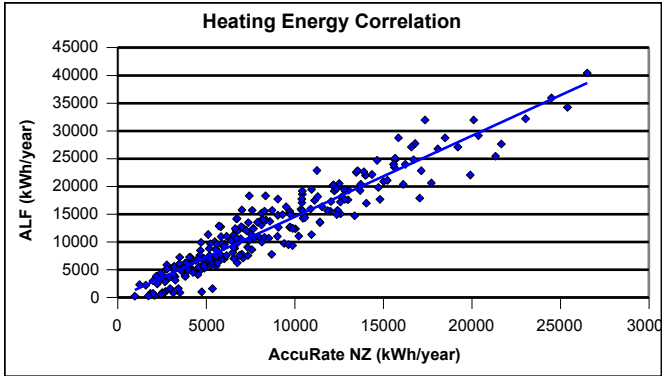


While the majority of homes fall within a relatively narrow band of star ratings, we must consider whether we should be allowing some to fall outside of this, thereby committing the owners and occupants of these homes to a continuously unhealthy, potentially high energy demand home. We should also consider whether we should have a star rating of around 4.5 stars as our minimum benchmark, when it is demonstrable that achieving 5.5 – 6.5 stars is easy, and increases the cost of building only fractionally.

ABSA is of the opinion that we should not in either case. We are moving into an era of a shortage of energy and increasing energy costs, at the same time as the era of climate change and peak oil will happen, and New Zealand will be required to demonstrate compliance with its commitments under the Kyoto Protocol.

Around the world countries are moving towards raising the minimum energy performance benchmarks for homes. The United Kingdom has just introduced a carbon free building code. In Australia, Victoria requires a minimum star rating of 5 out of 10, and are considering moving to 6, Germany and California both set a minimum energy consumption performance standard for new buildings.

A simple solution to this is a two-step process of first achieving a star rating of 4.5 (which we estimate to be equivalent to the current BPI requirement) under the HERS scheme as a method of demonstrating compliance with the building code. Work done by the Department of Building and Housing shows a clear correlation between the current method of determining a building's heating energy use (ALF) and that used by the HERS software, AccuRate.



Source: Department of Building and Housing

The second step is to gradually raise the minimum standard required under the NZ Building Code. This is discussed in the next recommendation.

Recommendation 3: That the other methods (Schedule, Calculation and Modelling) of demonstrating compliance with HI – Energy Efficiency are phased out within one year

Following on from the discussion for Recommendation 2, using only the star rating method to demonstrate compliance with HI - Energy Efficiency has many demonstrable advantages:

1. It allows the gradual and continual improvement of New Zealand's housing stock through the gradual upgrading of the minimum number of stars required. We propose the following timetable:
 - (a) 4.5 stars immediately (or whatever star rating is equivalent to the current BPI);
 - (b) 5 stars in July 2009;
 - (c) 5.5 stars in January 2010;
 - (d) 6 stars in July 2010;
 - (e) 7 stars in January 2012.
2. The process of conducting a HERS assessment collects an enormous amount of data about the housing stock. This data will become populated as new homes are built, and as homes are altered or extended. This data can be a powerful tool for Government to use for policy decisions into the future.
3. The HERS star ratings provide a far more reliable result than the current methods of demonstrating compliance, as can be seen in the results shown in Recommendation 2 where 35% of North Island and 45% of South Island home are scoring less than 4.5 stars. This is primarily due to the fact that the current methods do not account for some significant impacts on the energy-efficiency of buildings which the HERS model does, i.e. shading from neighbours and hills, solar access, exposure to wind, air infiltration.

The timetable proposed above for the gradual upgrading of the minimum star rating requirement must be clearly communicated to industry, allowing planning for these upgrades.

Recommendation 4: That the disclosure of a home's Home Energy Rating is made mandatory when the home is sold, leased or rented, by November 2009

One of the barriers to homeowners implementing energy-efficiency upgrades is a perceived lack of return on investment for 'hidden' upgrades such as insulation¹⁶.

In countries overseas where mandatory energy rating disclosure schemes have been implemented, there has been clear evidence that homes which have a better energy rating demand higher rental and sale prices in the marketplace.

The graphic below shows advertised house prices in the Australian Capital Territories, where disclosure of a home's energy rating when it is sold has been mandatory since 1999.

Increase in median advertised asking price over the last two quarters.				
	0 to 2 Stars	Average	3+ Stars	5+ Stars
1-Oct-07	0.00%	0.00%	0.00%	0.00%
13-Jan-08	4.33%	6.74%	6.99%	8.98%
1-Apr-08	2.27%	8.14%	10.72%	15.29%

Source: ABSA Newsletter, June 2008

This will be a useful strategy for implementing Recommendation 1 meaning that the cost to Government is reduced by homeowners who undertake upgrades by their own initiative, in order to capitalise on the investment.

A clear requirement for the implementation of this recommendation is that the scheme for generating the ratings, i.e. the HERS scheme, is reliable, accurate and robust. The current voluntary HERS is also suitable for a mandatory disclosure scheme. This means that this requirement is already fulfilled.

ABSA has been contracted by EECA to provide the training, accreditation and auditing of the HERS scheme and is doing so in accordance with all of the performance benchmarks set by EECA. This means that the HERS scheme support is also providing a scheme that is reliable, accurate and robust.

The scheme, training, accreditation, quality control systems and infrastructure are all in place for the implementation of mandatory disclosure of HERS ratings. All that is required is a bold initiative by central Government to implement it.

¹⁶Better performing homes for New Zealanders: Making it Happen', NZ Business Council for Sustainable Development, 2008

Recommendation 5: That the Government provide funding to subsidise a Home Energy Rating to the value of \$350 until June 2012, increasing at the rate of inflation

During the period of December 2007 through June 2008 EECA provided a \$350 + GST subsidy towards the cost of homeowners and developers obtaining a HERS assessment. This subsidy was highly successful, with a total of 289 HERS certificates produced during this time, and most of the subsidy funding pool being used.

From July 2008 through November 2008 there have been 142 HERS certificates issued, a reduction of 31% per month. Clearly, the subsidy encouraged the uptake of assessments and was likely to have encouraged energy-efficiency upgrades by homeowners and developers.

The research that EECA commissioned prior to the implementation of the HERS scheme also highlighted the need for continuity of a HERS programme including funding¹⁷. This report showed that countries where Government subsidies were made available for the cost of undertaking a HERS assessment, uptake of the scheme was significantly higher.

¹⁷'Final Report – Home Energy Rating Scheme Consultancy', Energy Consult Pty Ltd, March 2005

Recommendation 6: That a widespread marketing campaign be implemented by March 2009 to educate the New Zealand public of the Home Energy Rating Scheme and the imminent introduction of mandatory disclosure

Public awareness monitoring by EECA shows a low incidence of the awareness of the HERS scheme. This monitoring also shows that whether or not a home is energy-efficient features highly in the decision-making process of buying a home.

Again, the research commissioned by EECA prior to the implementation of the scheme recommended continuity of HERS programme, including marketing¹⁸.

Overseas experience outlined in this report clearly showed that the marketing of a HERS was essential for public awareness and the uptake of the scheme.

Once our previous recommendations are implemented, especially mandatory disclosure, it is essential that the public be clearly educated about their obligations, and the benefits of mandatory disclosure.

¹⁸Final Report – Home Energy Rating Scheme Consultancy', Energy Consult Pty Ltd, March 2005

Recommendation 7: That the costs for these programmes be funded through health care cost savings and income generated from any emissions trading or carbon tax scheme

It is quite clear that the recommendations made here will impose costs on the Government, and New Zealand households.

It is also clear that there are significant benefits that will result from the implementation of these recommendations.

The costs to Government can be funded in two ways:

1. By redirecting funds from the health sector that are saved due to the reduction in health care for asthma and other respiratory conditions;
2. By implementing an emissions trading or carbon tax scheme and funding these recommendations through revenue generated from such a scheme.