Human Settlement

Case study 1

5 Star Plus

WHAT ARE THE ANTICIPATED OUTCOMES OF 5 STAR PLUS?

5 Star Plus will reduce GHG emissions by 129,000 tonnes over five years in Western Australia — the equivalent of taking more than 25,000 cars off the road, and the same benefit achieved by planting 15 trees per house.

It is estimated **5 Star Plus** could deliver water savings of up to 30 gigalitres — the equivalent of one million backyard swimming pools over five years, saving 17,000 tonnes of CO_2 in water provision.

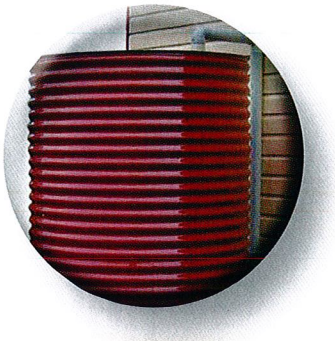
It will also have potential savings of about $300 per year for the average household.

The program will contribute to ensuring new homes in Western Australia are better suited to meet future challenges such as increased energy and water costs, a changing climate and requirements to reduce GHG emissions.

RELATIONSHIP TO GOVERNMENT POLICY

The Western Australian Government has committed to national agreements on building regulation reform that include adopting the BCA as the primary building standard. **5 Star Plus** has been carefully developed to complement the existing BCA provisions and indeed foreshadows the inclusion of nationally consistent minimum requirements for hot water heating and water efficiency in the BCA.

For more information visit www.5starplus.wa.gov.au.



Case study 2

National Australian Built Environment Rating System (NABERS)

The vast majority of environmental impacts from buildings are due to the operation of existing buildings in the marketplace. Most existing rating systems in Australia and overseas are intended for use at the design and development phase. While design is clearly of crucial importance, good design is no guarantee of sound environmental performance during operation.

The Western Australian Government is working in partnership with the commercial property industry to achieve successful energy saving solutions through the National Australian Built Environment Rating System (**NABERS**).

WHAT IS NABERS?

NABERS is a voluntary performance-based rating system for existing buildings. **NABERS** rates buildings on the basis of its measured operational impacts on the environment, and provides a simple indication of how well these environmental impacts are being managed compared with other buildings. **NABERS** incorporates the former Australian Building Greenhouse Rating (ABGR) Scheme.

With existing buildings making up 98 per cent of the building stock, it makes sense to use a rating system that is specifically tailored for existing buildings, and that measures relevant impacts during the operational phase of buildings.

Case study 1

Human Settlement

5 Star Plus

The built environment, responsible for almost a quarter of Australia's greenhouse gas (GHG) emissions, is arguably the most important industry sector outside Australia's Carbon Pollution Reduction Scheme. Fulfilling the energy-efficiency potential of the building sector can lower greenhouse emissions by 60 megatonne per annum by 2030, a reduction of almost 30 per cent from business as usual, without any cost, or, indeed, net savings, to the economy[1].

Creating energy-efficient new buildings ensures our future housing stock is designed to play its part in meeting economy-wide emissions reduction targets. One mechanism to achieve this is through the Building Code of Australia (BCA), which provides minimum standards in various areas, including sustainability, in new buildings.

The most significant single user of energy in a typical Western Australian house is water heating, representing a third of the total household energy use.

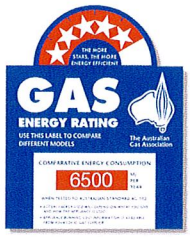
5 Star Plus is a set of additional requirements above and beyond the BCA 5 Star energy efficiency standard. It has been implemented in Western Australia since 2007 and addresses energy use for the provision of hot water and water use in houses. In particular, **5 Star Plus** requires low GHG emitting hot water systems. This can save up to 3.5 tonnes of GHG emissions per household, per year, or about 25 per cent of overall household emissions.

WHAT IS 5 STAR PLUS?

5 Star Plus was developed to deliver a set of simple measures that ensures a significant reduction in energy and water use, with least cost to the homebuyer and easy implementation for industry. To implement the most expensive option available under **5 Star Plus** will only add about $1,000 per household. In many cases this will be much less.

5 Star Plus:

1. Confirms the 5 Star energy provisions of the BCA.
2. Requires all new housing have installed a low greenhouse hot water system that is either a:
   a. solar hot water system;
   b. 5 star gas system; or
   c. heat pump system.



3. Requires water-efficient fixtures and fittings:
   a. 3 star WELS rated showerheads;
   b. 4 star WELS rated taps (except bath and garden taps); and
   c. 4 star WELS rated dual-flush toilet.

4. Requires that the pipe from a hot water system to the furthest hot water outlet be no more than 20 metres long, or two litres internal volume in order to reduce energy and water wastage.
5. Requires any new outdoor private swimming pool or spa installed in a home be supplied with a cover or blanket to reduce evaporation.

[1] ASBEC, 2008, Building a low carbon economy with energy efficient buildings, Victoria, pp vii

Case study 4

Human Settlement

Living Smart Household Program

HOW DOES LIVING SMART WORK?

The **Living Smart** program is offered, over a 12-month period, to the majority of households (those with listed telephone numbers) in a number of target suburbs. Engagement is conducted by letter and telephone to assess the individual needs of each household. Participants are then offered a 'menu' of services to suit their needs:

- Home delivery of simple, practical, 'how to' information on selected actions (from a suite of more than 50 actions) with carbon reduction outcomes.
- Follow-up telephone support (and up to two additional information deliveries).
- Five sets of meter readings (interpreted against suburb average and best-practice use for the season) with telephone support over several months.
- Home consultations to identify and agree potential improvements to energy and water efficiency (includes free Compact fluorescent lamps (CFL) and waterwise showerhead installation as required).
- Community workshops on sustainable living.

WHAT ARE THE POLICY OUTCOMES?

The benefits of **Living Smart** are projected to be:

- GHG abatement, over 10 years, at a project cost of between $10 and $20 per tonne.
- Household CO_2-e abatement at a net cost (Government project costs less household fuel bill savings) of negative $300 per tonne.
- Total abatement of 190,000 tonnes CO_2-e over 10 years from the demonstration project alone.
- Household empowerment to respond to increasing fuel prices by improving energy and water efficiency.
- Reduced pressure on energy and water supply systems, as well as a lower overall carbon price for the economy.

WHAT IS THE POTENTIAL FOR THE ROLL OUT OF LIVING SMART?

From an operational perspective, and at a cost of less than $200 per target household, it is possible to offer **Living Smart** to a significant proportion of the Australian population by 2020. A target GHG abatement for such a program would be about six million tonnes per annum.

Left: Celebrity gardener, Josh Byrne, leads a community workshop on productive and sustainable gardening.

1 Stern N (2006). The economics of climate change: the Stern Review, Cambridge University Press (Summary of Conclusions page viii)

2 Garnaut R (2008). The Garnaut Climate Change Review Final Report, Cambridge University Press

3 Ashton-Graham C (2008). Behavioural responses to peak oil and carbon pricing; Save 70 cents per litre by driving less PATREC Research Forum Papers http://www.patrec.org/conferences/PATRECForum_Oct2008/index.php

4 AGO (2006). Evaluation of Australian TravelSmart Projects in the ACT, South Australia, Queensland, Victoria and Western Australia 2001–2005. Australian Greenhouse Office, Department of Environment and Heritage: Canberra, ACT. http://www.travelsmart.gov.au/publications/pubs/evaluation-2005.pdf

5 SMEC (2008). DPI Living Smart Report. Department for Planning and Infrastructure, Western Australia. http://www.dpi.wa.gov.au/livingsmart

6 Socialdata Australia. Potential Analysis Perth. Department for Planning and Infrastructure, Western Australia. http://www.dpi.wa.gov.au/mediaFiles/tsmart_Report.pdf

7 Climate change in-depth

8 SMEC (2008). DPI Living Smart Report. Department for Planning and Infrastructure, Western Australia. http://www.dpi.wa.gov.au/livingsmart

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Human Settlement

National Australian Built Environment Rating System (NABERS)

NABERS SUCCESS IN WESTERN AUSTRALIA

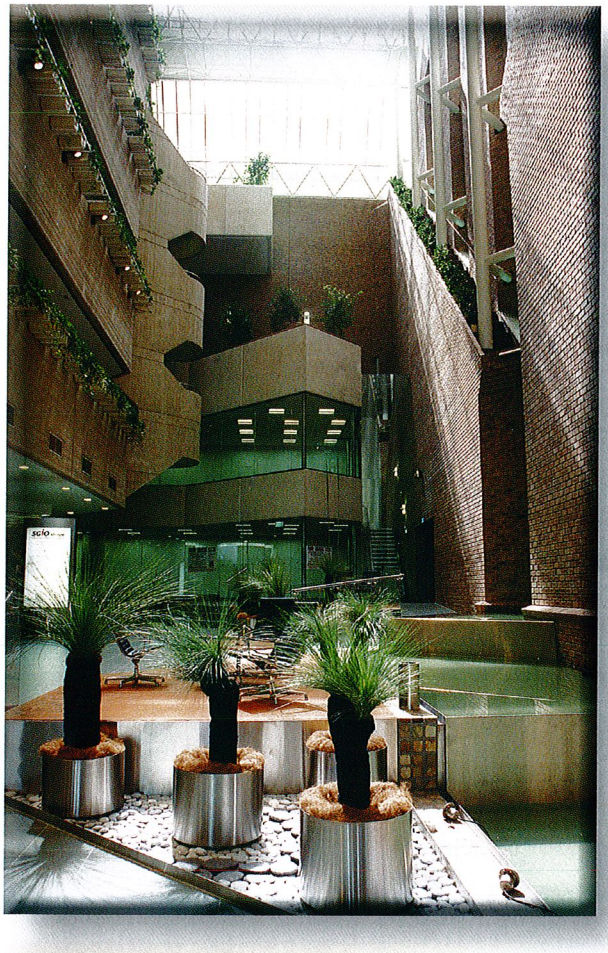
Western Australian commercial buildings are performing at levels above the Australian average in many areas.

1. Existing buildings

The average **NABERS** building rating for the Perth metropolitan area is 3.3 stars out of 5 stars (1 star indicates poor environmental performance and 5 stars is excellent). The current national average rating is 3.1 stars.

The total rated area for the Perth Central Business District (CBD) of 700,000 m² equates to 55 per cent of the total CBD building area. Perth and Sydney share the highest percentage of buildings rated, with other Australian CBDs significantly lower.

In the Perth CBD, 29.5 per cent of the rated buildings have a high rating of 4, 4.5 or 5 stars. This compares favourably with other Australian CBDs — Sydney 24.3 per cent, Brisbane 12 per cent, Melbourne 10.8 per cent, Adelaide 10.6 per cent and Canberra 5.8 per cent.



2. New buildings

There are 16 new building developments with Commitment Agreements in Western Australia. These are new office buildings where the developer has signed a commitment with the Sustainable Energy Development Office to design, construct and operate their building to an agreed 4 star or higher **NABERS** Energy rating.

WHY IS NABERS SUCCESSFUL IN WESTERN AUSTRALIA?

1. Government leadership

The Western Australian Government provides leadership through its Energy Smart Government policy and the introduction of sustainability requirements within its office accommodation policies. Included are policies for **NABERS** Energy ratings in government buildings and tenancies of 4 stars or higher.

2. Partnership with local commercial property industry

A partnership between the Sustainable Energy Development Office and the Property Council of Australia (Western Australia) has been instrumental in promoting the **NABERS** scheme to the local property industry and ensuring a high take-up of the tool.

For more information visit www.nabers.com.au.
For more on becoming energy efficient visit www.sedo.energy.wa.gov.au.

NABERS

Case study 3

Human Settlement

The Mandurah Line

The start of passenger services on the Mandurah Line on 24 December 2007 meant that, overnight, the Public Transport Authority (PTA) increased the size of its rail network by 70 per cent; increased its railcar fleet by 34 per cent; added 62 new feeder bus routes; and increased the size of its potential catchment by about 400,000 people.

The New MetroRail project, of which the Mandurah Line was the centrepiece, was the biggest public infrastructure undertaking in Western Australia's history. The new line is providing long-term sustainable environmental benefits by reducing the number of vehicles on Perth roads and reducing the release of GHG and poisonous gases into the air.

With the first year of operation on the new line now complete, patronage is already averaging the forecast 50,000 weekday boardings, in 135 scheduled trains in each direction, with 4,500 connecting bus trips, with passenger throughput at some stations well in excess of expectations.

Each year, the new line is expected to carry more than 15 million passengers, result in 9.6 million fewer motor vehicle trips, and each weekday is expected to take approximately 21,000 cars off the Kwinana Freeway.

The Mandurah Line will produce approximately 56,500 tonnes of carbon dioxide equivalents (CO_2e) per year. To transport the same number of people by car would generate 84,275 tonnes of CO_2e per year; therefore, the Mandurah Line has the potential to reduce GHG emissions by 27,775 tonnes (33 per cent).

The new B-series three-car trains built to service both the new line and the established Joondalup Line, have been installed with a regenerative braking system that harnesses the heat produced by the braking to recycle at least 20 per cent of its electricity requirement back into the system. There are currently 31 of these state-of-the-art trains in operation, with another 15 progressively arriving in Perth during the next two years.

During planning, 81.46 hectares of land originally included in the construction area was preserved due to a range of initiatives that included combining railway maintenance tracks with existing emergency and management tracks; relocating the route to avoid sensitive sites such as the Spectacles Reserve in the Beeliar Regional Park; and removing the East Rockingham maintenance depot.

PTA also installed four underpasses under the railway in bushland to facilitate the movement of fauna under the barrier created by the railway. Native fauna are using the underpasses, and monitoring will continue over the next two years to further assess the effectiveness of the underpasses.

Other changes initiated by PTA or with stakeholders to reduce the environmental impact of the railway included:

- Amending the design of two railway stations (Murdoch and Warnbro) to create protected areas.
- Protecting significant trees and other fauna habitats where possible during construction activities.

- Changing the route into Rockingham to use the Garden Island Highway reserve, which saved 21 hectares of good-quality vegetation that would otherwise have been cleared.
- Changing the rail alignment in Leda Nature Reserve to avoid wetland areas.
- Planting of 427,000 seedlings as part of a massive effort to rehabilitate construction areas. Half of the 315 kilograms of native seeds needed were collected from areas near the construction site over two summers.
- Fauna surveys recorded the presence of 26 mammal species, 146 bird species, 43 reptile species, nine frog species and five freshwater fish species. Survey results were used to develop the fauna management plan, which recommended the relocation of many fauna species, including the quenda.
- Successful removal of 5,000 grass trees and 2,000 zamia palms from the construction area for future replanting.

Long-term environmental benefits will be achieved through the rehabilitation program.

Measures put in place for the rehabilitation works, including strict guidelines in respect to soil and seed quality, mulching, weed control and ongoing management will ensure the long-term success of rehabilitation works.

The project set new benchmarks for community involvement through its Environmental Community Consultative Committee (ECCC), which was established in March 2002 to interface between the project and local environment groups. It met more than 40 times during the life of the project.

Such was the quality of the environmental work undertaken by the NMR project that it increased human knowledge, albeit by a very small amount — several new species of stygofauna were identified. Little wonder then that in the 2008 Engineers' Australia (WA) Engineering Excellence Awards, the Mandurah Line was named the Environment category winner.

Case study 4

Human Settlement

Living Smart Household Program

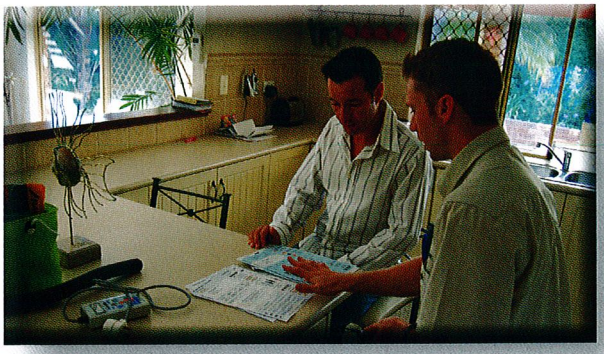
Behavioural changes in the areas of home energy and transport efficiency have been highlighted (by the Stern[1] and Garnaut[2] Reviews) as key strategies for carbon pollution reduction.

Living Smart is an education, motivation and empowerment program which directly assists households to reduce their carbon footprint. The program is the world's first intervention to use large-scale and intensive community based social marketing, combined with technical home assessment, to reduce household demand for water, energy, transport and waste services.

Living Smart is building on similar, but separate, interventions on travel and water demand management each of which have delivered around a 10 per cent reduction in demand[3] [4].

Still in its demonstration phase, **Living Smart** is expected to achieve CO_2-e abatement of more than one tonne per household per year in the target communities. The **Living Smart** program provides a powerful complementary measure to the Carbon Pollution Reduction Scheme (CPRS) by delivering abatement below the expected carbon permit price and equipping households to make energy efficiency changes that will more than offset the energy price rises resulting from the CPRS.

The **Living Smart** service has been offered to 15,000 households across the cities of Joondalup and Mandurah. Some 73 per cent of households contacted by telephone agreed to take part in the program. Approximately 7,000 households ordered specific information on how to take action to reduce their carbon footprint. About 6,000 households chose to take part in regular feedback on gas, electric and water meter readings and 3,000 households accepted a home assessment to identify areas of energy and water saving for the home.



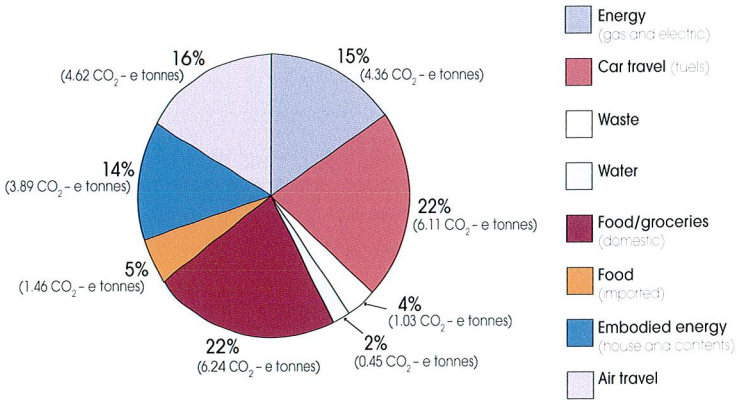
Personal Home Assessments provide essential information, motivation and a powerful plan to achieve change.

Living Smart
Acting on Climate Change

WHY TARGET HOUSEHOLDS?

Direct consumption of energy, water, car travel and waste service by each household in Western Australia generates almost 12 tonnes of GHG per annum (12.8 per cent of the State's emissions), and up to 28 tonnes when embodied energy in consumer purchases are taken into account[5]. Behavioural research[6] [7] and analysis of household energy use patterns[8] suggest that up to 50 per cent of these emissions could be reduced by behaviour change alone.

PERCENTAGE OF HOUSEHOLD EMISSIONS



'Source: Living Smart Report, SMEC 2008, DPI.'

HOW IS LIVING SMART EVALUATED?

The evaluation framework includes qualitative assessment of household responses to each of the services and analysis of quantitative water, gas and electric consumption data. Special meter readings, billing history and aggregate suburb supply data is being used to track changes in consumption for the target group against control groups. Car use is being measured through random sample travel diary surveys, and waste data is collected as aggregate disposal tonnage for target and control areas.