ZERO GREENHOUSE GAS EMISSIONS

The vision. The Zero Carbon Australia Buildings Plan is the first comprehensive, nationwide plan to retrofit Australia's buildings. This plan demonstrates how all existing buildings can reach zero emissions from their operation within ten years. It sets out how Australia can transform its building stock to reduce energy bills, generate renewable energy, add health and comfort to our living spaces, and make our workplaces more productive.

The rationale. Australia's existing buildings are not adequately designed to meet many of the challenges we face today. Australian houses and workplaces are often unnecessarily cold in winter, hot in summer, and expensive to run. We now have the technologies and know-how to make our buildings far more comfortable, while protecting us from rising electricity and gas bills.

The science is clear that, in order to reverse climate disruption, developed nations must begin transitioning their economies to zero greenhouse gas emissions, starting now. Accordingly, in June 2010, Beyond Zero Emissions (BZE) launched the ground-breaking Zero Carbon Australia (ZCA) Stationary Energy Plan that showed how Australia's electricity could be supplied by 100% renewable energy sources within 10 years. This acclaimed Plan has since been followed by the government

sponsored 100% renewable energy plans by the Australian Energy Market Operator (AEMO).

The ZCA Buildings Plan is the next step in this transition.

This plan contains detailed bottom-up research, modelling and analysis into Australia's existing buildings and energy consumption. We have collaborated extensively with industry, ensuring our recommended suite of retrofit measures is practical and widely applicable.

FIGURE 0.1 An Australian home well on its way to being a zero carbon building

Under this plan:

- **Residential energy use is halved.** The measures in this plan will, together, reduce the residential sector's annual energy usage by 53%.
- **Homes become renewable energy power stations.** There is enough solar exposed roof space on residential buildings to install 31 GW of rooftop solar photovoltaics. This installation will allow the average Australian home to generate more electricity than it uses over a year.

- **Australian buildings go gas free.** The use of fossil gas (conventional fossil gas, coal seam gas, shale gas & others) is completely removed from the buildings sector. Fossil gas appliances are replaced with higher-efficiency electric alternatives, eliminating gas bills and leading to significant reductions in energy use while avoiding the climate and environmental damage caused by gas.
- **Households save money.** Households currently spend approximately $15 billion per year on electricity and gas bills. The ZCA Buildings Plan will eliminate gas bills while significantly reducing electricity costs. The full upgrade can save $40 billion over the next 30 years.
- **Non-residential energy use nearly halved.** The energy used in non-residential buildings, on average, can be reduced by 44%. 2.5 GW of rooftop solar photovoltaics can be installed on non-residential buildings and the total cost is equivalent to business as usual over 30 years.
- **Energy freedom is achievable.** The plan shows that with the above actions, households and businesses can achieve energy freedom by generating more energy than they use and removing gas as an energy source.
- **Tens of thousands of jobs will be created.** From residential retrofits alone, around fifty thousand jobs can be created in the trades sector employing people to fix Australia's buildings.

- **The transition to 100% Renewable Energy is now $37 Billion cheaper and 15% more achievable.** By detailed testing of the assumptions used in the ZCA Stationary Energy Plan, we show we need 15% less (excluding rooftop solar contribution) stationary renewable energy. By rolling out energy saving measures and rooftop solar we can make the transition to 100% renewable energy for Australia easier and cheaper.

Achieving energy savings

Extensive research, modelling, and analysis have led to the selection of a suite of widely applicable technologies and strategies aimed at decarbonising Australia's existing building stock. Only proven, existing, commercial off-the-shelf building and appliance technologies are employed, and these are listed below:

Fixing Australia's buildings through:

- Full insulation retrofit
- Full draft proofing
- Efficient window glazing
- Better shading
- Cool roof paint
- Installing new chilled water cooling systems and improvements to air handling in commercial buildings

Going gas free through:

- Electric heat pump heating for space heating

○ Uses renewable ambient heat by extracting heat from the air,

○ Five times more efficient than gas, at less than half the running costs

FIGURE 0.2

Roof insulation retrofit is a key recommendation

- Heat pump hot water

○ Air conditioners that heat your water

○ Uses 80% less energy than gas and standard electric-based hot water systems

- Cooking with induction cooktops

○ Same performance as a gas cooktop

○ Uses half the energy

○ Safer than gas and avoids indoor air pollution

Lighting upgrade

- LED lighting replacement for all lighting types.

○ LED downlights save 80% of the energy used by halogens

○ Provides quality light.

Efficient appliances

- Raise the bar on energy performance standards –making today's best appliances tomorrow's benchmark

Energy monitoring

- Real time monitoring of energy use using in-home displays or energy management systems

In combination, these measures were found to achieve a 60-80% saving in eleven different building cases (from the various residential, office, education and retail building types). These savings were achievable across the range of Australia's climate zones.

Summary

The following chapters show how acting on energy efficiency and delivering energy freedom for Australian homes and buildings is achievable, desirable and that now is the right time to start.

This plan confirms what many leading studies worldwide have shown: that investing in efficiency, deploying onsite renewable energy, and leaving gas in the ground are all important steps that make the necessary transition to a zero carbon future easier.

Bringing this plan's recommendations into reality will require our political leaders to step up to the plate, our industry leaders to stay true to the job at hand, and all of us; homeowners, business managers, investors, and citizens, to be active in calling for the change we know Australia and our buildings need.

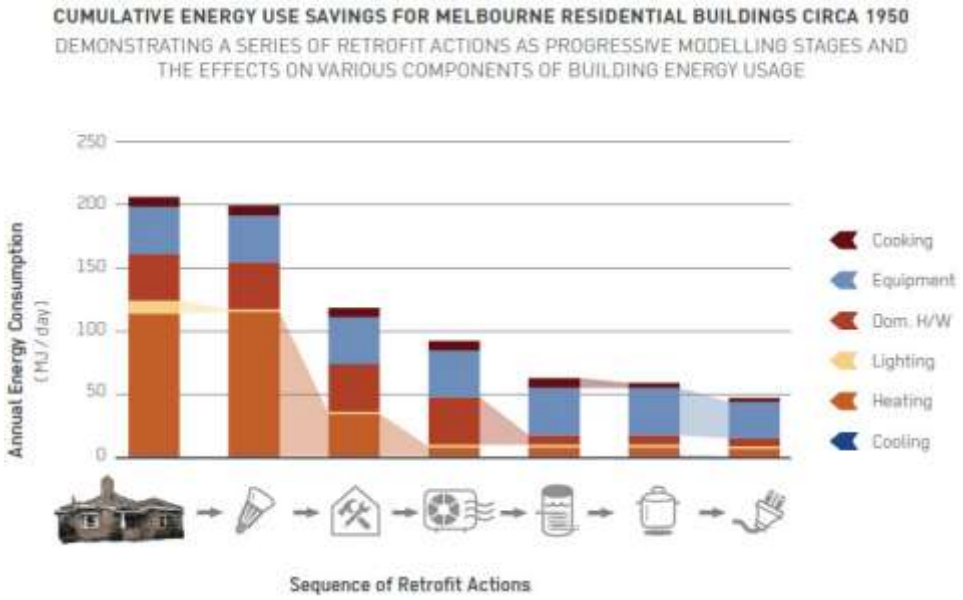

FIGURE 0.3

Key Retrofit recommendations and energy savings for a Residential Home in Melbourne

Source: http://decarboni.se/publications/zero-carbon-australia-buildings-plan/executive-summary