

DEVELOPING AN AUSTRALIA NET ZERO ENERGY HOMES COALITION – BACKGROUND PAPER



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BACKGROUND

A Net Zero Energy Homes Workshop was held on 4 March 2009 in Brisbane.

Mr. Gordon Shields, Executive Director of Canada's Net Zero Energy Homes Coalition presented at the workshop to share his knowledge of the coalition's formation. The coalition's formation was initiated in 2003; informal discussions began among a group of forward thinking home builders and developers. In 2004 the group formalised its efforts into the Net Zero Energy Homes Coalition and began formulating an action plan to involve other stakeholders and government in turning their vision into a reality.

At the workshop a session followed Gordon's presentation, which focused on the value and scope of establishing a Net Zero Energy Homes Coalition in Australia. The following questions were discussed:

- ▶ Is there scope in Australia for an initiative similar to the Canadian model?
- ▶ How would this initiative be approached in an Australian context?
- ▶ Would there be value in establishing an Australian coalition?
- ▶ What could the scope of the coalition be and what could it aim to do?

Workshop participant responses, regarding who could be involved in the coalition, suggested:

- ▶ Market leaders - it shouldn't be an all inclusive group, only those who are leading the way, not to be dragged down by those who haven't caught up,
- ▶ research bodies in a technical advisory role,
- ▶ technology transfer agents, (access to "green building" knowledge and training is essential)
- ▶ it must be industry led but could have Government involved as observers,
- ▶ building associations and practitioners across the whole building spectrum, including building developers, building product manufacturers, research organisations, utility companies, suppliers of onsite renewable energy technologies and,
- ▶ a neutral, independent chair.

Following the workshop discussions, volunteers were sought to drive this initiative forward in Australia. A leader to convene a follow-up meeting was not identified and The Department of the Environment, Water, Heritage and the Arts suggested they would speak to the Australian Sustainable Built Environment Council (ASBEC) as the relevant peak body to facilitate the follow up meeting with key stakeholders.

This is a brief discussion paper which includes the development of a draft Vision, road map/action plan and proposed funding model to be discussed at the September 10 2009 workshop.

PREAMBLE

A growing body of organisations across all levels of government, the NGO sector, universities and large and small business are working on activities in the Zero Net Energy Sector. These include, but are certainly not limited to:

- ▶ [The Net-Zero Energy Commercial Building Initiative](#), a government research program sponsored by the U.S. Department of Energy (DOE) that focuses on improving the energy efficiency of commercial buildings in the United States. And provides guidance and coordination of public and private partnerships to advance the development and market adoption of net-zero energy commercial buildings (NZEBS).
- ▶ [The Net-Zero Energy Homes \(NZEH\) Coalition](#), an incorporated, multi-stakeholder organisation comprised of Canadian organisations including those involved in residential construction and building products, the utility sector, research and development and, manufacturing and deployment of onsite renewable energy technologies.
- ▶ Swinburne Hybrid Buildings - this project aims to develop virtual prototypes of hybrid buildings (similar to NZE buildings) and assess their potential for becoming the principal agent for achieving significant reduction in the carbon footprint of Australia's current and future residential building stock.
- ▶ The [Australian Zero Emission House Consortium](#), involves CSIRO and a consortium of government and industry partners. AusZEH's research, development and demonstration program is intended to deliver:
 - an integrated technology assessment and demonstration platform for achieving a ZEH; this culminates in the design and construction of full-scale [demonstration ZEH\(s\)](#);
 - a best-practice [Technical Guide for Low Carbon Housing](#) as a possible companion/supplement to a building code;
 - a [house design tool](#) for house-level what-if analyses; and
 - a [housing stock options tool](#) for housing stock what-if analyses.
- ▶ Landcom in NSW are establishing three Sustainable Display Homes at *The Ponds* to showcase sustainability concepts and products for the wider project home industry and general market. The three homes will be based on different sustainability concepts
 - Current base practice
 - Recycled and renewable products, and
 - Independent from energy, water and waste grids
- ▶ [Zero Emission Neighbourhoods \(ZEN\)](#) a \$6 million Victorian Government funding grant program, designed to shape the future of sustainable residential development in Victoria.
- ▶ The [UK Zero Carbon Hub](#) supports and reports to the 2016 Taskforce which is chaired by the Housing Minister and the Executive Chairman of the Home Builders Federation. It is a public/private partnership established to take day-to-day operational responsibility for co-ordinating delivery of low and zero carbon homes.

DEVELOPING A NET ZERO HOMES COALITION

In researching the variety of programs in place nationally and internationally the key theme that emerged was the lack of clarity of what constitutes Net Zero.

WHAT IS A ZERO NET BUILDING?

Despite sharing the name, there are numerous definitions of what zero energy building means in practice. The following are some of the definitions used:¹

Net zero site energy use

In this type of ZEB, the amount of energy provided by on-site renewable energy sources is equal to the amount of energy used by the building. In the United States, “zero energy building” generally refers to this type of building.

Net zero source energy use

This ZEB generates the same amount of energy as is used, including the energy used to transport the energy to the building. This type accounts for losses during electricity transmission. These ZEBs must generate more electricity than net zero site energy buildings.

Net zero energy emissions

Outside North America, a ZEB is generally defined as one with zero net energy emissions, also known as a zero carbon building or zero emissions building. Under this definition the carbon emissions generated from on-site or off-site fossil fuel use are balanced by the amount of on-site renewable energy. Other definitions include not only the carbon emissions generated by the building in use, but also those generated in the construction of the building and the embodied energy of the structure. Others debate whether the carbon emissions of commuting to and from the building should also be included in the calculation.

Net zero cost

In this type of building, the cost of purchasing energy is balanced by income from sales of electricity to the grid of electricity generated on-site. Such a status depends on how a utility credits net electricity generation and the utility rate structure the building uses.

Net off-site zero energy use

A building may be considered a ZEB if 100% of the energy it purchases comes from renewable energy sources, even if the energy is generated off the site.

Off-the-grid

Buildings are stand-alone ZEBs that are not connected to an off-site energy utility facility. They require distributed renewable energy generation and energy storage capability (for when the sun is not shining, wind is not blowing, etc).

¹ Source: http://www.absoluteastronomy.com/topics/Zero_energy_building#encyclopedia

DEVELOPING A COMMON DEFINITION

PWC's "*Zero Carbon Buildings, a worthwhile aspiration*" paper notes that since the launch of the UK government's policy packages there has been considerable debate over the definition of a zero carbon leading to extensive government consultation and consideration of seven different definitions.

The IEA Joint Project: Towards Net Zero Energy Solar Buildings (NZEBS) is currently looking to establish an internationally agreed understanding on NZEBs based on a common methodology².

ACTION STEPS

Based upon the lessons of the Canadian Net-Zero Energy Home (NZEH) Coalition, the following are suggested key action steps in establishing an Australian Coalition are to:

1. Identify a core set of key stakeholders to establish the coalition.
2. Develop a definition (this is seen as critical and important if Australia would like to link into international programs).
3. Develop an agreed Vision.
4. Develop a position paper that justifies the business case for Net Zero Homes.
5. Establish targets (and reevaluate over time)
6. Establish strategies for the coalition to become to be self sufficient.

However before the establishment of any coalition is established it would appear the following issues/opportunities need to be discussed.

Do we need to look beyond homes to Net-Zero Energy Buildings?

Do we need to look beyond buildings and look at Net-Zero Energy Precincts?

Do we need to look beyond Net-Zero Energy to Carbon Positive?

Do we need to look at Green Infrastructure (i.e. The regenerative capacity of the landscape) and how it can support a Net-Zero goal.

Is there a real need for such a coalition or are there enough projects/groups that are working in this space?

² http://www.iea-shc.org/publications/downloads/task40-Net_Zero_Energy_Solar_Buildings.pdf

ESTABLISHING TARGETS

Many in the built environment industry are still waiting for the Federal government to develop a clear target especially in regard to energy efficiency. In their election speech the Labor Party announced that Australia would be 'at the forefront of OECD energy efficiency improvements'.

Currently Australia has committed to meet a long-term target of a 60% reduction in GHG emissions by 2050 based on 2000 levels, as well as to reduce GHG emissions by 5-15% below 2000 levels by 2020.

A brief desk top study undertaken highlighted that a wide variety of methods are used across the world to encourage the reduction of emissions from buildings. Some countries have set targets with others providing a range of voluntary initiatives. The Zero Carbon Compendium provides an excellent resource to identify the range of government and voluntary programs in place.

The following are targets, goals or aspirations from a number of governments/industry groups from around the world. These have been sourced from the Zero Carbon Compendium and other web sites.

Canadian Net Zero Energy Home Coalition

"Adopt a 1,500 NZEH target to be completed over the next five years in each Canadian province. Adopt this target as a major program element of conservation and demand side management objectives and energy supply policy goals"

<http://www.netzeroenergyhome.ca/index.php?option=about>

China

Today's revised standards call for increased enforcement, and by 2010, more than one-third of new buildings will be required to cut energy consumption by up to 50% - 20% from thermal insulation and 30% from building systems and management. By 2020, all the new buildings will be expected to reduce energy use by 65%.

Denmark

For all types of buildings the new energy requirements include two classes of low energy buildings. Class two has an energy demand of 75% or less compared to a normal house, and class one, 50% or less. There are plans to impose stricter building standards (25% energy savings) in 2010, followed by an additional 25% in 2015 and another 25% in 2020. Denmark has also set a target that all new housing should meet Passivhaus standards by 2020.

Japan

In 2006, the government announced a target for energy saving measures to be implemented in 40% of households by 2015. In 2008, a similar target for solar panels to be installed in 30% of households by 2030 was set.

Germany

Germany's Kyoto commitment is to reduce CO₂ emissions by 20% by 2012 based on 1990 levels, a goal which was achieved in 2007. Currently the goal is for 40% reduction by 2020.

Netherlands

In 2007, the Clean and Efficient programme set targets for 30% reduction in GHG emissions, 20% share of renewables in the energy mix, and improvements in energy efficiency of 2% per year until 2020.

United Kingdom

The UK Government requires all new homes to be zero carbon from 2016. The government's National Energy Efficiency Action Plan (NEEAP) also sets a target to reduce emissions from the residential sector by 31% by 2020.

Ecohomes system, was introduced to drive a step change in sustainable home building practice. It awards a rating from 1 to 6, based on 9 sustainability criteria which include energy and CO2 emissions. A Code Level 1 home represents a 10% improvement over building regulations standards, while a Code Level 6 home would be equivalent to a zero-carbon home, or a 150% improvement, as it includes not only regulated energy.

In March 2008, the government announced that a Code rating would be required for all new homes from May 2008.

United States

The Building America program aims to develop cost effective solutions that reduce the average energy use of housing by 40-100%. The ultimate objective would be that its research activities would lead to the development of net zero energy homes.

Points of discussion regarding targets

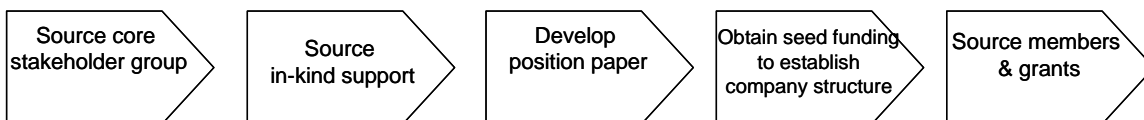
Should an Australian net zero energy homes coalition set targets?

Does a coalition want to be a policy taker or a policy maker?

In the context of the COAG energy efficiency strategy should a coalition set a stretch goal?

DEVELOPING A FUNDING MODEL

Here are the proposed steps to be undertaken to facilitate the coalition becoming self sufficient.



The diagram below provides an overview of possible collaboration and funding sources, through grants, in-kind support and membership fees.

Points of discussion regarding funding

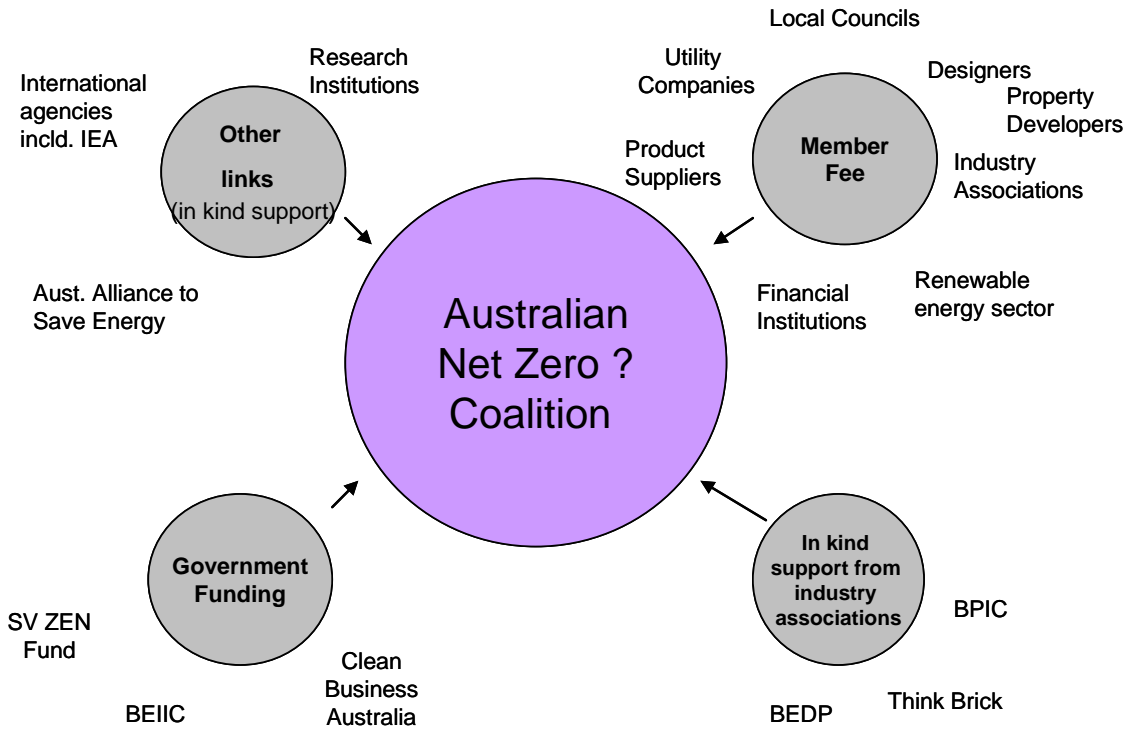
What other links need to be included?

What are the other potential sources of funding?

Is Coalition membership the best way forward?

Is there overlap with other organisations and if so how can they support one another?

Proposed Funding /Support Links



RESOURCES/FURTHER READING

Adapting to Climate Green Infrastructure: planning increasing connectivity, multi functionality and landscape performance in the built environment. <http://www.aila.org.au/greeninfrastructure/>

Hybrid Buildings: A Pathway for Greenhouse Gas Mitigation in the Housing Sector, P.W. Newton and S. Tucker, Swinburne 2009 www.sisr.net/publications/0907newton.pdf

IEA Joint Project: Towards Net Zero Energy Solar Buildings (NZEBS), http://www.iea-shc.org/publications/downloads/task40-Net_Zero_Energy_Solar_Buildings.pdf

Net Zero Homes Coalition Strategic plan, <http://www.netzeroenergyhome.ca/index.php?option=about>

Positive Development: Design for Net Positive Impacts, Dr Janis Birkeland, Professor of Architecture, QUT 2008.

The USA Building Technologies Program's Zero Energy Goals, <http://www1.eere.energy.gov/buildings/goals.html>

Zero Carbon buildings, a worthwhile aspiration?, PWC 2009, http://www.gbca.org.au/docs/Zero%20carbon%20buildings_PwC.pdf

Zero Carbon Hub <http://www.zerocarbonhub.org/flipbook/ZCH-Compendium/>