

## Zero Emission Neighbourhoods - Creating precincts for a sustainable future

### **Win Laing**

Acting Manager, Sustainable Precincts  
Sustainability Victoria, 50 Lonsdale Street  
MELBOURNE 3000, VIC

Ph: +61 3 8626 8862 Fax: +61 03 9663 1007 [win.laing@sustainability.vic.com.au](mailto:win.laing@sustainability.vic.com.au)

### **Joanna Hansen**

Project Officer, Sustainable Precincts  
Sustainability Victoria, 50 Lonsdale Street  
MELBOURNE 3000, VIC

Ph: +61 3 8626 8689 Fax: +61 03 9663 1007, [joanna.hansen@sustainability.vic.com.au](mailto:joanna.hansen@sustainability.vic.com.au)

### **ABSTRACT**

The Zero Emissions Neighbourhood (ZEN) program is a Victorian Government initiative to demonstrate sustainable urban residential developments, communities and neighbourhoods. This six million dollar funding grant program will work collaboratively with developers, local government, utilities and industry bodies to demonstrate integrated sustainable design and planning with a range of emissions savings technologies applied to best practice residential neighbourhoods

**KEYWORDS:** Sustainable Precincts, Local energy supply, renewable energy.

### **1. IRODUCTION**

The Zero Emission Neighbourhoods (ZEN) program is a \$6 million dollar funding program to demonstrate sustainable urban developments, neighbourhoods or communities<sup>1</sup>. The neighbourhoods supported through the program will be designed to achieve zero net operating emissions from the use and management of water, waste, transport and energy. The funded projects will represent a range of technologies and types of residential neighbourhoods including greenfield, urban infill, retrofit and brownfield in both regional and urban Victoria.

The program was developed to help address the market barriers to implementing sustainable urban design on a precinct scale leading to a reduction in greenhouse gas emissions. It will do this through:

- Demonstrating design models for sustainable residential urban neighbourhoods
- Providing information and building the capacity of the urban development industry

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<sup>1</sup> For convenience these will be referred to as 'neighbourhoods' for the remainder of the paper without implying there is a preference for new housing developments.

The program is fully funded by Sustainability Victoria and will provide both financial and in-kind support to demonstrate precinct based models that can be designed and implemented in the context of existing planning and regulatory requirements and using currently available technologies. The ZEN neighbourhoods will not only maximise precinct synergies but also support a thriving happy and healthy community

This paper will give a brief summary of the ZEN program and update on progress. More information including the full application guidelines and fact sheets can be found at: [www.resourcesmart.vic.gov.au/zen](http://www.resourcesmart.vic.gov.au/zen)

## **2. ZEN PROGRAM**

### **Overview**

ZEN is a \$6 million dollar allocated funding program over four years focusing on collaborative partnerships with local government, developers, utilities and industry bodies. \$5 million is available for the capital funding of four to six infrastructure projects, \$0.3 million to assist in the scoping of opportunities, feasibility studies and business case development, \$0.2 million to assist in independent research in removing the barriers to sustainable developments and additional in-kind support from Sustainability Victoria.

The neighbourhoods supported will demonstrate residential urban design models using current technologies in the current regulatory and planning environment. Project will need to be completed by the end of 2014. They will achieve zero emissions through providing integrated sustainable infrastructure solutions for the use and management of water, energy, waste and transport.

The program was launched in June 2009 and Sustainability Victoria is currently receiving project proposals. The program is an allocated funding program to ensure that the funded projects represent a range of neighbourhood scenarios in both regional and metropolitan contexts and a range of technologies and design models.

### **2.2 Application process**

Some potential ZEN projects have a commitment to sustainable outcomes, but do not yet have a clear understanding of the full potential for incorporating sustainable water/ waste/ transport/ energy solutions within their developments. The application process is designed to provide support to applicants to develop their proposals further to meet the ZEN funding requirements.

As shown in Table 1 below the application process is staged and provides the applicants with assistance to maximise the opportunities and identify barriers for each neighbourhood and to scope and develop the business case leading to the submission of a formal application for capital funding. The application is then assessed against the selection criteria by an independent panel.

Table 1: Staged Application Process



The application process has been designed to build the capacity and influence projects even if the project does not progress through to receive capital funding. For example, if the project is withdrawn after the Opportunity Assessment Workshop, the proponents still have access to the report and ongoing support from Sustainability Victoria through access to our knowledge experts, knowledge database and networking sessions. This will hopefully influence the final design of their neighbourhood to include more sustainable options.

The time taken for the applications to be processed will depend on the type of neighbourhood and the stage in the planning process the neighbourhood is up to. Because all projects must be completed by the end of 2014, projects that have already commenced the planning process are likely to get priority. This however should not discourage neighbourhoods in the early stages of development from joining the program and accessing the additional support material.

### 2.3 Selection Criteria.

In order to receive funding all projects are required to meet a set of essential criteria and are then ranked against a set of selection criteria. This is to ensure that the neighbourhoods demonstrate an integrated approach to infrastructure design that maximises the benefits from precinct synergies.

#### ***Opportunity Assessment Workshops***

*The opportunity assessment workshops are four hour independently facilitated brainstorming sessions to identify the opportunities and barriers to each neighbourhood achieving zero net operating emissions.*

*They involve all the major stakeholders associated with the Neighbourhood and knowledge experts from Sustainability Victoria in the areas of water, waste, renewable and distributed energy and community functionality.*

*The workshops are invaluable in generating ideas and bringing them together to maximise project synergies.*

*From the workshop a report is generated outlining the findings and the next steps going forward to developing the business case and towards the neighbourhood becoming a ZEN.*

Table 2: Funding Selection Criteria

| Essential Criteria |  | Ranked Selection Criteria |                                     | Points |
|--------------------|--|---------------------------|-------------------------------------|--------|
| 1                  | More than 50% residential component                                      | 1                         | Sustainable master planning         | 10     |
| 2                  | Operational net zero scope 1&2 emissions                                 | 2                         | Zero net emissions                  | 20     |
| 3                  | Maximum of 25% off-site offsets  | 3                         | Utilizing precinct synergies        | 15     |
| 4                  | Organisational capacity to deliver project                               | 4                         | Green precinct infrastructure       | 15     |
| 5                  | Financial viability  | 5                         | Social & cultural sustainability    | 10     |
| 6                  | New technologies and concepts have been trialled successfully previously | 6                         | Community engagement                | 10     |
| 7                  | Project has to comply with current regulatory requirements               | 7                         | Economic sustainability             | 10     |
| 8                  | Delivery timeframe 2009-2014   | 8                         | Other sustainability considerations | 10     |
|                    |  |                           | Total                               | 100    |

The focus of the program is to achieve zero net operating emissions related to the use and management of energy, water, waste and transport within residential neighbourhoods. Therefore all projects must have a residential component of at least 50% but it is envisaged that at least some of the successful neighbourhoods will demonstrate mixed use scenarios.

Embodied energy and emissions generated during construction are not included, however, if these have been considered as part of the neighbourhoods design (for example: embedded emissions in construction material), this may increase the projects ranking against ranked selection criterion.

Emissions will be assessed according to the Australian Greenhouse Office Workbook<sup>2</sup> and where possible, in line with the National Greenhouse and Energy Reporting System (NGERS). The baseline for each neighbourhood will be determined using a theoretical similar neighbourhood designed to minimum regulatory requirements.

In order to ensure a range of different neighbourhoods can be supported through the ZEN program a maximum of 25% offsite offsets (through conventional accredited offsetting mechanisms) are allowed. However, the neighbourhoods will receive more if they can minimise their need to offset. Projects will be ranked higher the closer to zero offsets they can achieve.

For more details on the selection criteria please access the application guidelines at: [www.resourcesmart.vic.gov.au/zen](http://www.resourcesmart.vic.gov.au/zen) or email [zen@sustainability.vic.gov.au](mailto:zen@sustainability.vic.gov.au)

### 3. HOW DO NEIGHBOURHOODS ACHIEVE ZEN?

Becoming a ZEN is not just about providing alternative sources of energy or water or sustainable ways to remove waste. It is about designing a functional neighbourhood that produces zero net emissions through the way it is used, i.e. the way people live, work and play within the neighbourhood. Its design and functionality will make it easier to be sustainable than unsustainable.

<sup>2</sup> [www.climatechange.gov.au/workbook/index.html](http://www.climatechange.gov.au/workbook/index.html)

A critically important component of a ZEN is the integrated approach to the infrastructure design. This has two key benefits:

1. Maximises precinct synergies. For example: a solar array on the local shopping centre .providing charging stations for electric cars.
2. Helps to build a positive business case as the benefits (and costs) can be spread across all infrastructure elements rather than on the individual elements.

### 3.1 Design and planning as part of the solution

The design of each ZEN is will be dependant on the particular characteristics of each neighbourhood. The solutions will vary and some of the influencing factors are outlined below:

Table 3: Local considerations for each Neighbourhood

|                                       | Example  |
|---------------------------------------|--|
| Availability of renewable resources   | <ul style="list-style-type: none"> <li>• Wind, solar, geothermal, tidal</li> <li>• River, dams, aquifers</li> </ul>  |
| Distance from existing infrastructure | <ul style="list-style-type: none"> <li>• Potable water mains</li> <li>• Sewers and wastewater treatment plants</li> <li>• Electricity grid</li> <li>• Composting facilities</li> <li>• Train stations and railway lines</li> </ul> |
| Demographics of intended residents    | <ul style="list-style-type: none"> <li>• Age profile</li> <li>• Socio economic group</li> <li>• Cultural diversity</li> <li>• “green culture”</li> </ul>   |
| Environmental sensitivity             | <ul style="list-style-type: none"> <li>• Protected fauna and flora</li> <li>• Bushfire risk</li> </ul>   |
| Surrounding area/communities          | <ul style="list-style-type: none"> <li>• Location of jobs</li> <li>• Synergies with local businesses and communities</li> </ul>  |
| Activities within the precinct        | <ul style="list-style-type: none"> <li>• 100% residential</li> <li>• Mixed use</li> <li>• High density housing</li> </ul>  |

The design features could include:

- Sustainable master planning that incorporates triple bottom line principles from the conceptual stage and an agreed vision from all major stakeholders
- Efficient building form incorporating sustainable building material, thermal mass, and appropriate solar orientation
- Efficiency measures such as water and energy efficient appliances
- Sustainable resource supply options including renewable energy generation, recycled water and locally sourced food options including community gardens
- Sustainable transport options such as walkable streets, public transport systems, car sharing and electric cars
- Local job creation and facilities such as schools, recreational and community centres available when homes are being established
- Local recycling and composting systems
- Community gardens and local buying schemes
- Alternative service provision models

### **3.2 Technology as part of the solution**

The aim of ZEN is to demonstrate zero emission neighbourhoods using currently available technologies and therefore all technologies must have been demonstrated previously (though not necessarily in Australia) at a larger than pilot scale.

The technology options will address emissions generated at three different levels:

- Building scale: for example this could include energy and water efficient appliances, solar hot water and solar photovoltaic systems, rainwater tanks, and grey water systems and smart metering
- Precinct scale including cogeneration utilising natural gas, biogas and biomass, waste to energy plants, smart energy grids, precinct scale wind, solar or geothermal energy plants, local waste water treatment and third pipe recycling systems, neighbourhood stormwater harvesting and rainwater tanks,
- Site related solutions where the local resource may be limited but the neighbourhood is committed to providing support for large scale wind, solar thermal, solar voltaic, tidal or geothermal energy plants that may be located away from the site but be more economically viable.

## **4. IDENTIFYING AND REMOVING BARRIERS TO SUSTAINABLE DEVELOPMENTS: ADDITIONAL SUPPORT MECHANISMS**

A number of barriers to implementing sustainable precincts have been identified and the program aims to remove these barriers through demonstrating models that work. In particular ZEN will look at:

1. Developing relationships with the energy distribution network service providers
2. Develop and demonstrate effective grid connection models
3. Establish relationships between project partners and the relevant government agencies.

In order to achieve this and the program objectives a number of additional support mechanism are being developed. A data or knowledge bank providing easy access to information, research reports and case studies is under construction and will be available to participants in the program via the Sustainability Victoria website. Workshops and networking sessions around key areas will be held to generate an exchange of ideas and sharing of learnings and provide links between stakeholders groups and government agencies.

## **5. CONCLUSION**

The ZEN program will support four to six residential neighbourhoods designed to achieve net zero operating emissions from the use and management of water, energy, waste and transport within the neighbourhood. The program will build the capacity of the Victorian urban design industry through identify technologies, design models and integrated solutions to demonstrate to the urban development industry what can be achieved using currently available technologies in the current regulatory environment

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