

Green Cities

Many cities around the world are leading the way in becoming more sustainable, or 'greener', as many people say. This means their leaders are working towards change the way their cities are using up the Earth's resources and damaging the environment, so that future generations are not denied the opportunity to enjoy the world as we know it.

A **sustainable city** only uses resources at the same rate at which they are produced, and produces the minimum possible amount of waste.

How is this achieved?

Here are two of the things that can be done.

Use renewable energy resources

Renewable energy resources such as solar panels can be installed on public buildings and homes and even along highways. This means far less electrical power from fossil fuel power stations is used, which would otherwise emit vast quantities of greenhouse gases every day.

The City of Munich in Germany, for example, is leading the way in using every available space to generate solar power.

Low-energy buildings

New buildings can be designed, and existing buildings can be modified, so they use much less energy. This can be achieved by installing such features as:

- Low-energy light globes.
- Natural sources of light, such as skylights.
- Lighting systems that turn off lights when people leave a room
- More energy-efficient models of appliances such as refrigerators.
- More effective insulation so that less heat energy escapes from the building in winter and less heat energy is absorbed by the building in summer.

'Green roofs'

One way of improving building insulation is to have plants growing on its roof and even down its sides. This can be achieved by installing a roof garden or by incorporate the building into its natural surroundings so that its roof is part of the landscape.

Possibly one of the earliest examples of modern 'green' roofs in the world is that of the Australian Parliament House, built in 1988. This is shown in Figure 1. The building was constructed into the top of the hill where Parliament House is situated, and then the roof was grassed over. The original idea was to create a beautiful and elegant structure in the highest place in Canberra, which symbolised the high purpose of the Australian Parliament and yet preserved the shape of the hill. But now its insulating properties are recognised as a very important feature. There have been recent discussions about replacing the grass with more sustainable local native plants.



Figure 1: The roof of the Australian Parliament House.

See more

See images of some amazing 'green roofs' across the world. Visit the website at:

<https://greenroofsaustralasia.com.au/gallery>

Sydney - a City 'Going Green'

One example of an Australian city that is working towards becoming much more sustainable is Sydney.

Three very exciting projects in Sydney, which will save thousands of tonnes of greenhouse gas emissions over their lifetime, are described next. These projects involve the installation of solar panels on historic buildings.

Sydney Town Hall

A solar generator was built on the rooftop of Sydney Town Hall. Completed in February 2010, this is the largest solar power installation in the Sydney CBD (central business district).

Special techniques and equipment were needed to install the solar system on its heritage slate roof, shown in Figure 2.



Figure 2: The rooftop of Sydney Town Hall

There are now 240 highly efficient solar panels, known as ‘Pluto’ panels, on the roof. These panels were developed by the University of New South Wales (UNSW). They are the first of their kind to be installed in Australia.

The solar system provides all electrical energy required for the council chambers and Town Hall offices next door. This is expected to save 1620 tonnes of greenhouse gas emissions over the lifetime of the solar system.

New South Wales Parliament House

In 2008 the NSW Parliament decided to inspire the community to work together to develop a more sustainable city, by installing solar panels on the rooftop of the office tower of NSW Parliament House.

The solar panels were installed at an angle that would ensure they received as much direct sunlight as possible. The problem with this was strong winds often blow across the roof. To prevent them from being blown over, the solar panels were set into a special state-of-the-art frame, which uses a system of very accurate weights to hold the structure down. This was the first of its kind in Australia.

This solar system provides more than enough electrical energy for both parliamentary chambers all year round. It is expected to save about 800 tonnes of greenhouse gas emissions over its lifetime.



Figure 3: An aerial view of the solar panels installed on the office tower rooftop of NSW Parliament House.



Figure 4: A close-up view of some of the panels.

Sydney Theatre Company and Arts NSW

Did you know that one of Australia's top actresses, Cate Blanchett, and her husband Andrew Upton, have worked to 'green' the historic wharf where the Sydney Theatre Company is located?

Cate and Andrew Upton are Co-Artistic Directors of the company. They dreamed of turning the wharf into an icon of solar-powered technology. Yet they wanted to keep the unique and vibrant character of the buildings.

Around 2000 highly efficient solar panels have now been installed on the rooftop, using technology developed at UNSW. (See Figure 5.) The system of solar panels is expected to save up to 15 000 tonnes of greenhouse gas emissions over its lifetime!

This project was made possible by a \$2 million donation from the Shi Family Foundation, representing Dr Zhengrong Shi and Mrs Vivienne Shi. A renowned photovoltaic scientist, Dr Shi is the founder and CEO of Suntech Power, the world's leading producer of solar panels. He studied at the prestigious School of Photovoltaic and Renewable Energy Engineering at UNSW, with which Suntech maintains a long-term solar research partnership.

Cate and Andrew and the whole company were very excited when the Sydney Theatre Company won two prizes for their 'Greening the wharf' project at the 2010 Green Globe Awards, NSW's leading environmental awards.



Figure 5: Solar panels on the building that houses the Sydney Theatre Company.