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Case Study

Cape Town Marine Landmark inspires Energy Efficiency

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With a deep focus on energy savings and carbon reduction initiatives over the past three years, the Two Oceans Aquarium at the Victoria & Alfred Waterfront in Cape Town has become a leader in optimising energy consumption.

Located in the historic heart of a working harbour, the aquarium is an institution that understands the importance of energy efficiency, and as such, has always endeavoured to inspire through action.

Always room for improvement

One of Cape Town's biggest tourist attractions, the famous landmark has made numerous efforts to lower its carbon footprint and reduce its environmental impact, and is constantly pursuing new energy-saving initiatives and solutions. Although designed to use energy-efficient systems, the aquarium is constantly aware that 'there is always room for improvement'. When Mike de Maine came on board as Technical Manager in 2009, he immediately began looking for ways to reduce energy consumption, which led him to champion on-going energy efficiency interventions.

A range of efficiencies

"I can outline many initiatives we have either implemented or are in the process of implementing. As a start, we have installed a solar water heating system for our diver showers, put geyser blankets on all the electrical geysers, and painted the roof of the aquarium with reflective eco-friendly paint. Furthermore, we have replaced some fluorescent tubes with Light Emitting Diodes (LEDs), changed chiller settings and introduced soft starts. In addition, we are reusing waste hot water from the chilling process to heat some of the tanks, and have installed heat pumps to replace electrical element heaters," said de Maine

- Another energy efficiency initiative under way is the replacement of many of the aquarium's smaller pumps with more energy-efficient, variable speed models, which only use a third of the power of older models.

According to de Maine, the Two Oceans Aquarium also:

- Reduced the size of one of the major sumps, which meant that the aquarium only needs four heaters (4kW), instead of the eight that were previously in use
- Shut off chilling/heating for the open air restaurants where temperatures could not be effectively controlled. The restaurant now only uses circulating air for this purpose
- Installed thermal conducting gel units in the freezer that switch on the chillers only when products' tempreture start to increase, rather than responding to air temperature.
- Disconnected electrical geysers feeding non-essential hot taps.

By separating lighting circuits in the SAPPI River Meander Exhibit, reduced the aquarium's start-up load, by splitting the 35kW lighting into four circuits with slightly different start times.

Solar and wind power

The Two Oceans Aquarium installed a 2kWp solar system, consisting of nine solar photo voltaic modules, as well as a state of the art 1kWp vertical axis wind turbine. With funding from the German government, this has just been increased by 13 panels, bringing the total to 5kWp.

The renewable energy is feeding the administration block on the east side of the aquarium.

Both the solar panels and wind turbine feed power into the aquarium's power grid, considerably lowering not only electricity consumption, but also reducing carbon emissions by an effective 11,52 tons of CO_2 per year.

The aquarium has since upgraded to a 5kWp solar system, as this will provide an even larger contribution to the reduction of electricity consumption and carbon emissions.

Impressive savings

"Between 2009 and 2011 we have reduced our average monthly consumption from 274 000kWh to 221 000kWh. In the past few months, we have also installed heat pumps and changed halogen downlights to LEDs, savings will now be even higher. Heat pumps alone are saving nearly 37kW," added de Maine.

Energy policy document

The aquarium has a comprehensive energy policy document - part of their overall environmental management system - which informs staff, volunteers and contractors, amongst others, what is expected of them in terms of energy efficiency and savings.

"The aquarium incorporates and promotes sustainable living in every aspect of its operation, including signage, communication with visitors and members, staff newsletters and actively promotes the annual Earth Hour amongst both staff and visitors," commented de Maine.

Looking to the future

"We will continue to strive to reduce our energy consumption as much as we can, become as energy-efficient as possible, and look for ways to incorporate renewable energy - which we believe is the energy of the future - into all our operations," concluded de Maine.