

SUSTAINABLE SUNRAYSLIA

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Abstract

The Sunraysia Region in North West Victoria is one of regional Australia's most rapidly growing areas. Encompassing approximately 10% of Victoria's land mass and with a population in excess of 57,000, the geographical diversity extends from dryland farming to irrigated horticulture, the Murray River and wetlands to Mallee scrub and the Murray Sunset National Park. The effects of climate change and subsequent drought have caused widespread distress to the regions resources which has placed a heightened sense of urgency to realise improved environmental management initiatives. Mildura Rural City Council has taken steps to accelerate a program of environmental awareness to ensure a sustainable and viable economic future. Measures to be undertaken include: environmentally sustainable design for an eco-centre demonstration building, recycling of pool 'backwash' water, recycling of storm water, wetlands water diversion to sporting reserves, smart metering control systems and numerous other water and energy saving initiatives identified for key Council assets throughout the municipality. These initiatives provide a new paradigm for economic and community development in regional Australia and investigate the measures necessary to adapt infrastructure, built in an era of cheap, abundant, energy and water, to one of constraint and to carry these lessons directly to the wider community.

Key Words: Emissions, Engineering, Environment, Greenhouse, Recycle, Stormwater, Sunraysia, Sustainability

Introduction

The Sunraysia Region (with Mildura as its regional city) in North West Victoria, is one of regional Australia's most rapidly growing regions and includes a number of smaller communities, extending to both Victorian and New South Wales sides of the Murray River. The region has a population in excess of 57,000, which enables it to have a significant commercial and industrial base. The geographical diversity extends from dryland farming to irrigated horticulture, the Murray River and wetlands, to Mallee scrub and the World Heritage listed, Willandra Lakes and Mungo National Park. The district also produces hundreds of millions of dollars in export revenue through sustainable, clean and green food production. Positioned near the borders of Victoria, New South Wales and South Australia, Mildura is an important transport link between three capital cities and is situated close to the meeting point of Australia's two great rivers, the Murray and Darling Rivers.

The Sunraysia region is now firmly on the national map as a centre for renewable energy, with Mildura recently announced as the chosen site for construction of Solar Systems, 154 MW solar power station (the world's largest and most efficient solar

photovoltaic power station). The \$420M investment will provide an estimated 400,000 tonnes reduction in greenhouse emissions per year. This investment will ensure Mildura becomes an extremely high profile location for a Green Precincts demonstration site.

The drying effects of climate change are causing widespread distress to Sunraysia's 150 year old irrigation economic base. This joint initiative, between Council and a resourceful community, will explore and model a radical reassessment of the future for Sunraysia's two principal natural resources – sun and water – and how both can be conserved and sustainably exploited, to guarantee a long term future.

The Background

The Sunraysia Green Precinct Initiative will operate from a number of selected sites and feature distinct water and energy savings programs. The energy and greenhouse reductions element of the project consists of five Council facilities, including two offices, Deakin and Madden Avenue, a works depot at Red Cliffs and two premier public use facilities, the Alfred Deakin Centre and Mildura Arts Centre.

Measures to be undertaken include: environmentally sustainable design (ESD) for

an eco-centre demonstration building, installation of solar panels to generate renewable electricity, installation of solar hot water services, recycling of pool 'backwash' water, recycling of storm water, wetlands water diversion to sporting reserves, smart metering monitoring systems, installation of rainwater tanks, lighting system upgrades and other numerous energy saving initiatives identified for key Council buildings across the municipality.

Efficiencies introduced will comply with required standards outlined in the Green Precinct guidelines, including products compliant with the Water Efficiency and Labelling Standards, Smart Approved Watermark water storage equipment, Green Building Council environment design principles and solar panels that meet IEC61215 and other relevant codes of practice.

Further to these initiatives Mildura Rural City Council has proposed the establishment of the Sunraysia Community Environmental Education Centre, on an operational landfill site, focussing squarely at a future where energy and water farming to underpin a more diverse, self-sufficient local economy, with an elevated skills base. It will provide opportunities for the public to fully experience and participate in environmental education aimed at water and energy savings, including exploring and implementing sustainability options and strategies, recycling, waste reduction and resource efficiency in the built environment.

The Sunraysia Eco-centre

The construction of the Eco-centre demonstration site at the current landfill will provide further opportunities for Council and other stakeholders of the Sunraysia Sustainability Network, to demonstrate practical water and energy savings initiatives. The Eco-centre will aim for a zero target in emissions and water use, to showcase comparisons that can be achieved with similar facilities. It will demonstrate substantial savings in energy and display environmentally efficient products that provide education in waste management and recycling benefits that could be achieved in the home, business sector and other community environments.

The community building (hub of the complex) will be conceived as a community teaching resource from the design stage, right through its construction, to its day to day use. Principally its design criteria will be the application of sound ecologically sustainable development principles, the use of local materials and the incorporation of simple technologies. Sunraysia Institute of TAFE has made an explicit commitment to use the building as a base for teaching renewable energy courses to Certificate IV and beyond and has offered the full and enthusiastic participation of its Construction and Engineering departments. Amongst the educational paths currently being researched by the Sunraysia Sustainability Network includes:

- a robust website, supporting and detailing all the energy and water initiatives of the project, with links to National and State information resources and partners;
- a comprehensive scheme using Council's GIS facilities, to 'map' the uptake of sustainability measures in the domestic, industrial and commercial spheres;
- a year long series of sustainability talks, involving an array of local partners and culminating in a biennial sustainability fair - the Mildura Sun Festival;
- reinforcing the provision of information by a community enterprise, offering energy and water audits and retro-fits to the private, public and rental housing markets;
- the establishment of neighbourhood carbon reduction action groups; function of the site to act as a sustainability 'incubator' - through encouragement of supporting businesses to locate to the site;
- encouragement of other community groups to use the centre as a meeting place; and pilot demonstrations of commercial renewable energy technology applicable to the region.

The development of the Eco-Centre site will be overseen by the collaborative partnerships of the Sunraysia Sustainability Network Incorporated, a registered not for profit agency of collaborative partners that comprises of industry, community, education and government representatives. The project management structure, governance roles and individual responsibilities have been

comprehensively detailed in the groups Business Plan, developed specifically for this site, with the assistance of Council support in June 2008.

A key stakeholder group is the 4 acre 'AroundAgain' facility run by the Christie Centre, a local community based organisation, providing adult education, training and support services for the disabled. 'AroundAgain' is a salvage and reuse centre, creating an annual income of \$200,000 and employment and training for 20 people. 'AroundAgain' not only draws substantial crowds to the landfill, but provides priceless, practical community education on the value of recycling in reducing primary energy and water usage.

Throughout 2009-12, community education will be a key element of the project. To demonstrate water and energy savings initiatives, interactive touch screens will be installed at all major Council venues (including the Eco-Centre), an interactive DVD will be produced, Green Precinct "feature walls" will be installed at Council sites, together with an extensive marketing and promotional campaign, for the community to share. Council's leading vision to take action on climate change, using water wisely and to reduce greenhouse emissions.

Energy and Water

An additional \$500K per annum has also been incorporated into Council's capital budget to boost environmental management, water and related infrastructure projects, including allocations over the next three years to address the identified energy saving priorities of the Greenhouse Action Plan. Endorsed by council in August 2007, the Plan indicates that over the five year period between 2007 & 2012, Council will need to allocate in excess of \$600K to fund actions in order to achieve just two of the five milestones identified. Ongoing costs, including the audit of operations, buildings and facilities for defined water and energy saving initiatives, will also require funding through the annual operational budget process. Additional to this, Council have committed up to approximately \$500K towards project implementation costs of the Etiwanda Wetlands/Mildura Waves Stormwater Reuses for irrigation of the Mildura Sporting Reserve, Environmental

Education & Promotion, and Project Monitoring & Reporting.

Council's Greenhouse Action Plan feeds Implementation Plan and effectively sets out the actions, timeframes, current status and proposed project outcomes to be achieved for Council's energy and greenhouse reduction strategies for 2009-12. Subject to additional funding, further greenhouse reduction strategies and actions in Council buildings, will be identified, costed and assigned priority to appropriate Council Branches, throughout the three year project period.

Supplementing the Greenhouse action plan is the recently established Stormwater Quality Management Plan for addressing stormwater issues throughout Mildura and surrounding regions. Priority storm water management issues were identified with industrial and residential run off in Wetlands sites, seen as one of the top three outcomes for the plan. The plan includes the management actions, description, costs and responsibilities to develop the diversion and re-use systems to supplement up to one third of the irrigation requirements of Mildura's sporting reserves. Innovative approaches and partnerships have been identified which involve refurbishing redundant Lower Murray Water pipelines to 'reverse the tide' and re-distribute treated stormwater back to key sites.

The stormwater report recommends Council implement strategies for storm water and pool backwash water reuse, from ponds at the Etiwanda Wetlands and pool water from the Alfred Deakin Centre to irrigate the Mildura Sporting Reserve. There is potential to save over 350 ML during the life of the project, plus bring about numerous other community and environmental benefits.

Etiwanda Wetlands

MRCC continues to demonstrate new technologies in environmental sustainability. The recent introduction of the innovative 'floating reed bed' into the new Etiwanda wetlands environment, a first of its kind in North West Victoria, is a recycled plastic 'island' providing a natural habitat for native wetland vegetation to purify stormwater inflows. The 300m² structure floats around a sedimentation pond, allowing plants to develop a root structure underneath panels,

to further cleanse stormwater pollutants, before flowing into the Murray River.

Old Aerodrome Sporting Complex

Mildura's largest sports and recreation complex has been made "drought-proof" following a \$175K grant under the first round of the \$10 million Stormwater and Urban Water Conservation Fund. The sports complex boasts 14 individual sports venues catering for than 2000 members, as well as parkland, bike tracks and playgrounds. The funding will allow the Old Aerodrome Sporting Complex to use reuse water from the Lower Murray Water Seventh Street Treatment Plant for irrigating its recreation grounds. This will replace Council's existing supply accessed from the Murray River.

This project is an excellent example that will save up to 250 ML of drinking water each year, savings that will be a direct gain for the Murray River, the source of Mildura's drinking water.

Reverse Osmosis

A problem that needs to be overcome is the availability of key resources such as water to remote areas. This water supply is not only critical to sustaining communities in outlying areas but also for council to be able to undertake maintenance and remedial works and sustain recreational and other significant community elements. When you consider that our most remote townships rely solely on trucked in and (rare) rainfall events to replenish the town water supplies, this poses a significant risk to the longevity of those communities. In an attempt to find a solution, Mildura Rural City Council has extensively investigated the idea of using existing bores in its rural regions and periodically install portable reverse osmosis plants. Reverse Osmosis is the finest level of filtration available. Reverse Osmosis is a membrane process that acts as a molecular filter to remove 95 to 99% of dissolved salts and inorganic molecules, as well as organic molecules with a molecular weight greater than 100. The Reverse Osmosis membrane also removes more than 98% of residual biological and colloidal matter from the feed water, resulting in a highly purified product stream.

Thus far our attempts to locate suitable sites for this process have been unsuccessful as

the shallow and spectacularly deep aquifers are extremely salty – typically greater than 30,000 microsiemens per centimetre – or about two-thirds the electrical conductivity levels found in seawater. This EC level has challenged our ability to implement typical reverse osmosis plants for the production of acceptable quantities of water in terms of volume, efficiency and economy. In addition, the existing monitoring bores are simply not suitable for water extraction as they just weren't constructed for that purpose.

For this initiative to succeed council will need to construct specifically designed bores for extraction and have them suitably licensed. Part of this problem also incorporates how we deal with the safe and effective disposal of the hyper-saline brine resulting from the reverse osmosis system. This disposal dilemma draws considerable concern from the Department of Sustainability and Environment as well as significant environmental and logistical difficulties during the operation of the plant. We still however, remain optimistic that radical ideas such this one may be feasible at some sites but further detailed investigation needs to be undertaken.

Dust mitigation using treated runoff

Another simple but effective solution is evident at the Mildura Landfill Complex. With a network of unsealed pavements to maintain for vehicle access, the dust mitigation strategy for the site uses potable water which was originally accessed from the Lower Murray Water main town supply. Since the retrofit the site now uses an alternative water supply from a constructed wetland area via an overflow channel incorporating macrobiotic filtration. This storm water is pumped into storage tanks, which have a capacity to hold 90,000 litres. The water tankers now access the water from these large tanks and proceed to 'wet down' the road network when required. Solar Power is utilised at the pumping site to supply the pumps with the energy required to move the storm water from the wetlands overflow channel into the storage tanks. For occupational, health and safety reasons an iodine treatment plant was installed to treat the stormwater prior to storing it into the larger tanks. This was a direct recommendation from EPA Victoria

The amount of potable water saved annually falls somewhere between 50 and 60 megalitres. Given the price and availability of high security water in the region, this represents a substantial saving for the site. Further improvements for the plant will include investigation of alternative water treatments rather than iodine injection. This technology and infrastructure has turned out to be an expensive exercise with the added supply of iodine tanks amounting to \$10,000 every year. This project managed to achieve a number of positive outcomes; using stormwater to replace the potable water supply, utilising solar power to save energy costs, increasing community awareness as well as provision of an education project for students at Sunraysia college of TAFE to further their studies in Water Management and Sustainability.

Awards and Education

MRCC's commitment to sustainability has already been recognised by taking out a number of awards, including winning a 2008 National award for Natural Resource Management. Future design technologies in smart metering monitoring systems, rainwater tanks, variable speed pumps, motion sensor lighting, solar hot water heating, photovoltaic panels and other energy saving initiatives, will also be investigated for suitable retrofitting to key Council buildings. Innovative features will be highlighted to visitors via interactive demonstration kiosks and feature walls.

The effects of water shortage have been an obvious and pressing problem in Sunraysia for the past decade. Energy security is now emerging as an issue of similar urgency. The Sunraysia Sustainability Network and consortium partners intends to undertake series of demonstration scale projects in commercial renewable energy technologies at the Eco-Centre site, as an added educational and economic development component to the project. Accordingly, joint research and funding partnerships are being undertaken to illustrate the potential for the most obvious regional natural energy sources. If successful, this will see the potential introduction of integrated energy and water projects such as: a community owned solar farm, a combination of geothermal and solar pond technology,

providing the power and low grade heat to desalinate groundwater at the landfill (direct linkage of sun and water), methane and then power generation through anaerobic digestion of 'green waste', and a community biofuels storage facility.

New approaches and technologies to be demonstrated and evaluated at the Eco-Centre have been included in the SWOT analysis of the Business Plan and will include latest research and best practice in waste treatments, landfill management, avoidance and reuse, sustainable resource management and conservation, salinity control, renewable energy systems, eco-construction, stormwater collection, saline water reuse, wetland development, revegetation and carbon abatement measures. Demonstrations of water and energy efficiencies for the community include; visitor and outreach sustainability education, passive solar architecture, comprehensive rainfall capture and reticulation systems, hybrid/composting toilets and other grey and black water recycling methods, sustainability café, fruit and vegetable production, community garden, festivals, eco-building workshops, energy and carbon audits, new sustainability walking trails to showcase tip operations, identification of resource savings, local landmarks, natural habitats and linkages to other regional sites featuring 'sustainability in action'. As an environmental sustainable designed, purpose-built centre, the building will aim to achieve a 6 Star Green Star Certified Rating (signifying 'World Leadership') in design, construction and energy use.

Conclusion

The Sunraysia Green Precinct initiative has enormous potential to raise environmental awareness levels, through its community-based, sustainability education and demonstration hub. The Eco-Centre has the capacity to become a future, world-class venue for changing behaviours towards sustainable living. It will introduce visitors to wide ranging sustainability initiatives, behaviours and technologies currently being implemented. Regular educational tours, community workshops, community e-newsletters, 'Youtube' presentations, 'blogging', promotional brochures, posters and other educational material, will further

compliment the visitor experience, to encourage greater awareness of water and energy savings that could be both practically and affordably, replicated at home, or in similar facilities.

Ultimately, Council's goal for this Green Precincts project is to stabilise (and even reduce) per capita greenhouse emissions and water consumption, raise community understanding of the issues of climate change and greenhouse and prepare the community for a future reductions goal.

Many elements of the Sunraysia Green Precinct Initiative are 'ready to commence' following the completion of detailed commissioned reports on water and energy efficiencies. The 2009/10 Capital Works Program outlines the infrastructure works associated with the first stages of implementation of the Energy Audit and Improvement Report, across the five Council sites. The Stormwater Quality Management Plan (2008-2013) identifies the Etiwanda Wetlands diversion project as one of six priority areas for required water infrastructure to address stormwater run off and reuse. A design brief and tender process is expected to be announced in late 2009, for proposed construction of works commencing thereafter. The Sunraysia Sustainability Network is scheduled to meet regularly and at monthly meetings, discuss the agreed Terms of Reference for the Governance Committee and schedule prioritised actions contained within the Eco-Centre Project Plan. These include detailed Management and Reporting systems, project coordination requirements and; subject to funding, construction using environmentally sustainable design, mechanisms that will place the region in a strong position for a long and prosperous future.

As detailed in the guiding principles behind council's environmental management initiatives, MRCC is seeking to demonstrate commitment to sustainability. To support council's vision it will be essential to communicate with stakeholders – both internally and externally. It will be important to communicate with those working directly with MRCC to ensure that they are aware of the goals to be able to contribute to its effective implementation. In addition to this however, MRCC is also undertaking extensive community consultation during the

early stages of implementation. By adopting a proactive approach to community engagement, MRCC can reduce negative community feedback regarding more visible water and energy reduction initiatives.

Biography

Matt George is the Engineering Services Coordinator at Mildura Rural City Council where leads a multi disciplinary team to deliver of councils Capital Works Program and associated engineering works. A qualified Civil Engineer with over 10 years of experience in consulting and local government roles, Matt is currently undertaking a Masters of Environmental Management through the University of New South Wales where he is looking to apply his knowledge of sustainability and the environment to council infrastructure projects, facility upgrade and retrofit programs.



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