

Submission No: 133



**Submission to the House of Representatives Standing Committee on Industry  
and Resources**

**Relative state of development of selected renewable energy sectors in Australia  
and their prospects for economically viable electricity generation, storage and  
transmission**

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## Introduction

Townsville City Council welcomes the opportunity to provide a submission to the House of Representatives Standing Committee on Industry and Resources on the relative state of development of selected renewable energy sectors in Australia and their prospects for economically viable electricity generation, storage and transmission.

Townsville City Council (TCC) sees renewable energy and bioenergy as an important component in progressing the vision of Townsville as a model tropical Sustainable City (see Extract TCC Corporate Plan 2007-2012, Box 1). Renewable energy also forms an integral component in Council's response to the emerging challenges and opportunities presented by climate change and peak oil. The path towards developing a sustainable city ethos (Sustainable Townsville) involves a commitment to showing leadership, vision and working collectively with the corporate, government and community sector to achieve this vision. This submission complements and builds on the 2004 Townsville City Council submission to the House of Representatives Committee on Environment and Heritage Inquiry into Sustainable Cities (see Attachment 1 for full excerpt). The key points Council raised in the 2004 submission respond to:

- Implementing a shift from the existing large-scale energy generation and distribution infrastructure towards an alternative model
- Promoting the uptake of renewable energy for residential and commercial properties
- Addressing impediments to utilising renewable energy sources in residential, commercial and industrial areas
- Promoting renewable energy generation at the single dwelling level and across city regions (renewable energy systems up to 500kW peak, which feed into local residential or industrial areas, and excess power is credited to the supplier at an appropriate price)
- Mandating higher efficiency standards for all new dwellings, appliances and business operations
- Incorporating renewable energy generation into planning and construction of residential and commercial developments
- Changing the public transport systems to be powered by electricity supplied by renewable energy sources (eg electric buses/trams) and/or biofuels (eg biodiesel/methane).

**Box 1. Excerpt from Townsville City Council Corporate Plan 2007-2012.**

**An exemplar city for alternative energy technology and waste management**

The race is on to manage the effects of climate change and develop clean and renewable alternatives to fossil fuels. Averaging over 300 days of sunshine per year, Townsville is in an exceptional position to be a leader in this race. Additionally, our proximity to an established sugar industry provides an advantage and incentive to promote the use of biofuels. Given the need, and our natural advantages, we believe Townsville can be an exemplar city in the use of alternative energy, fuel technologies and innovative waste management.

**Our Goals:**

- Increased community action on climate change
- Increased community use of ethanol, biodiesel, biofuels and solar solutions
- Reduced dependence on fossil fuels and increased use of low and no emission fuels
- Recognition as a centre for innovation in renewable energy technologies and energy efficient tropical design

Renewable energy in particular is seen as an important consideration for distributed energy options and business opportunities to cater for increased energy demand, especially peak load, due to increased population and industry growth in the Townsville region. Renewable energy forms part of the mix along with local base load generation through more greenhouse-friendly options such as gas, and demand-side management, which can cater to the increased demand for base load power and significantly reduce the high infrastructure costs of peak load transformers.

Renewable and other forms of distributed energy is an especially important consideration for regional cities which are located long distance from base load power generation. Renewable energy enhances local base load generation (such as gas), as it provides a sustainable source of power without the transmission loss (up to 11%) experienced from base load generation over 1000km away.

In discussing renewable energy, it is important to consider complementary solutions to maximise the potential for renewable energy and innovative bioenergy solutions to meet demand. This includes consideration of factors such as energy efficient design, energy efficient operation, and innovation and continued improvement. This can also be complemented by Green Power purchase and carbon offsets (carbon neutral). This is discussed in greater detail later, and presented in Figure 1.

In considering renewable energy as an alternative energy option, it is important to also consider institutional issues, such electricity pricing (reforms, incentives etc) as noted in the Transpac Report (Attachment 2 - prepared for Townsville City Council).

In considering the viability of the renewable energy sector, it is important to develop partnerships between government and utilities, such as that between Townsville City Council and Ergon Energy. Such partnerships provide synergies that transfer into other sectors, such as urban development, to spur interest and investment in renewable energy, as evidenced by the links developed between Council, Ergon, and developers such as Delfin Lend Lease (urban residential) and Cafalo Pty Ltd (CBD commercial building) through the "*Townsville: Queensland Solar City*" project.

This submission continues with an overview of Council initiatives, followed by a discussion of the relative state of development and prospects for economically viable renewable electricity generation, storage and transmission. This is followed by a discussion of barriers that retard the development of renewable energy.

### **Council Vision & Planning**

Townsville City Council is a key consortium partner in the Ergon Energy-led "*Townsville: Queensland Solar City*" project ([www.soe-townsville.org/solarcities](http://www.soe-townsville.org/solarcities)). Townsville's project is one of only four announced projects as part of the Federal Government's Solar Cities programme, and the project includes the installation of 500 photovoltaic panels on Magnetic Island as part of a Solar Suburb. This major grid-connected distributed energy trial presents an innovative business model whereby the energy utility will retain ownership of solar panels installed on the roofs of Magnetic Island homes and businesses. Council's component, Citisolar, is about involving the community in an energy-wise response to climate change. Citisolar will use Community Based Social Marketing (CBSM) to identify the often-hidden barriers and benefits to sustainable behaviour, including community support and acceptance for renewable energy options, including "green energy" purchase.

In terms of vision and planning, Townsville City Council (TCC) has been at the forefront of trials to determine the economic viability of renewable energy generation (including waste energy), storage and transmission. To this end, TCC has:

- Installed a 7kw Italian ROPATEC grid connected vertical axis wind turbine (twin rotors). This forms a renewable energy education learnscape that is communicating and demonstrating wind energy in a high profile public space ([www.soe-townsville.org/strandwindproject](http://www.soe-townsville.org/strandwindproject)).
- Installed a small-scale wind project to assist in water circulation in a stormwater quality management wetland at the Townsville Lakes ([www.soe-townsville.org/lakeswindproject/index.html](http://www.soe-townsville.org/lakeswindproject/index.html)).
- Investigated the feasibility of wind energy for power generation in Townsville ([www.soe-townsville.org/windpowertownsville/index.html](http://www.soe-townsville.org/windpowertownsville/index.html)).
- Trialled two methane generators and subsequently have purchased them for upgrade and operation as part of the Carbon Neutral Water Recycling – or wastewater treatment plants and investigating other Carbon Neutral options for energy hungry water recycling upgrades (wastewater) (<http://www.watermatters.com.au/>).
- Investigated methane capture for co-generation at the Vantassel Street Landfill. This has potential to offset the electricity demand from the Cleveland Bay Water Purification Plant.
- Investigating, in partnership with Ergon Energy, solar thermal energy pilot project.
- Converted petrol vehicle fleet to E10 (10% ethanol).
- Trialled biodiesel and dependent upon supply have agreed to convert diesel fleet to B20 (20% biodiesel) – dependent on supply & distribution available (greenhouse gas reduction of 461 tonnes CO<sub>2</sub>e per annum, additional pollution-social health benefits and at additional cost).

TCC itself has taken a lead in supporting renewable energy generation in order to mitigate climate change impacts and has purchased 100% Clean Energy under agreement with Ergon Energy for our Administration Building demonstrating a carbon neutral approach to annual electricity costs. This results in c. 2000 t CO<sub>2</sub>e reduction per year in Greenhouse Gas (GHG) emissions.

### **Involving the Community**

Townsville City Council places a strong emphasis on community involvement, participation and education in order to progress the acceptance and viability of the renewable energy sector as a competitive alternative to traditional energy generation. The Strand Wind Project provides a renewable energy education learnscape that is communicating and demonstrating wind energy in a high profile public space

([www.soe-townsville.org/strandwindproject](http://www.soe-townsville.org/strandwindproject)). This learnscape will be complemented by solar energy learnscares that are under development, including:

- The installation of a 1.5kW grid-connected photovoltaic panel in Flinders Mall, Townsville, as part of the Xstrata Community Partnership programme. A solar energy interpretive learnscape is being developed for the Townsville City Library.
- The future installation of a 1.5kW grid-connected photovoltaic panel on The Strand, as part of a partnership between TCC and Ergon Energy. A solar energy interpretive learnscape will be developed at this high-profile location.
- The future installation of cutting-edge solar technology as part of the Citisolar programme (TCC's programme forming part of the "Townsville: Queensland Solar City" project). These solar learnscares will demonstrate the viability of renewable energy (solar) and distributed energy options to power homes and businesses, as part of the goals of the Solar Cities programme ([www.greenhouse.gov.au/solarcities](http://www.greenhouse.gov.au/solarcities)).

These solar energy learnscares will complement the Townsville State High School Technology, Maths and Science Centres of Excellence (TMSCE) solar energy project which has installed a bank of seven polycrystalline solar panels and a bank of sixteen amorphous solar panels on the roof of the school to generate electricity. Students monitor and compare the performance of the various modules to see how much electricity they generate in tropical weather conditions ([www.townsvilleshs.eq.edu.au](http://www.townsvilleshs.eq.edu.au)).

Townsville students (years 9-11) participating in the "Student Engineer Workshop" as part of the "Engineers Visioning a Sustainable Future" provided a valuable youth perspective on the importance of renewable energy to power sustainable cities (see Box 2).

**Box 2. Excerpts from Student (year 9-11) visions for a Sustainable City**

The energy used in this city will come from wind turbines as well as solar power. The wind turbines can be used to power pumps and small ones can be placed in yards. Solar power will take advantage of the predominately sunny conditions.

The city will be tidal and solar powered because these are the easiest to set up and will not cost as much as all of the others to set up.

The city will be powered by solar energy, with all buildings having solar panels on their roofs.

Transport in the short term will consist of solar-powered vehicles, and in the long term will be via vehicles powered by fuel cells.

Giant solar farms will provide electricity.

Solar power will be used for everything to take advantage of the sunny conditions in North Queensland.

## **Relative state of development and prospects for economically viable renewable electricity generation, storage and transmission**

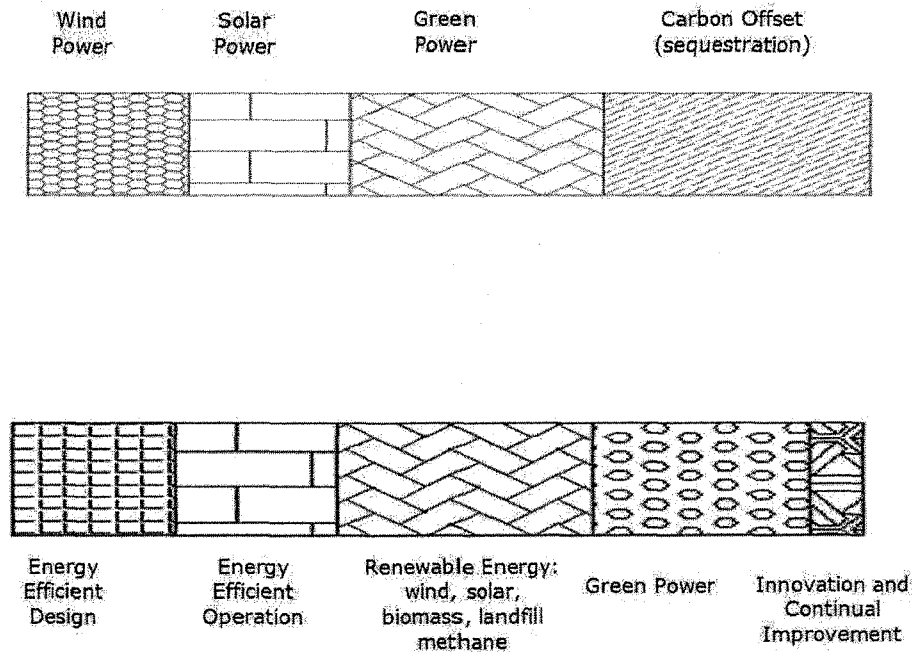
In accordance with our TCC Corporate Plan (2007-2012), Townsville is trialling and investigating various renewable energy options (solar PV, solar thermal, wind, and bioenergy). It is also important to consider different renewable energy sectors as complementary, rather than competing and forming part of both a mitigation and adaptive strategy to climate change. Renewable energy opportunities can also be combined with carbon sequestration projects to progress the vision of a low-carbon economy. This model is presented in Figure 1.

Solar power provides a reliable source of distributed energy to meet peak load demands on hot sunny days, which coincide with heavy air-conditioning demand. Grid-connected solar power can be complemented with alternative renewable energy sectors such as wind, bioenergy, and local gas-fired base load, to provide full-day coverage (eg. at night when grid-connect solar power does not work). Generally, a reduced amount of generation is required during night-time off-peak periods.

Regarding renewable energy storage, the bulk of the experience in Townsville is to have grid-connected renewable energy, or into inefficient and costly battery systems. Grid-connected renewable energy provides an economically viable distributed energy option to reduce demand on base load power at peak times. A further benefit of distributed renewable energy supplementing local base load supply, such as gas, is that it reduces the transmission loss currently experienced from base load generators that are situated over 1000km from Townsville. Townsville is developing its partnership with Ergon Energy to look at the next phase of solar energy storage capabilities, with the potential of trialling solar thermal generation and storage, such as through phase change materials.

Renewable energy opportunities need to be considered in tandem with such aspects as energy efficiency, efficient design, the purchase of "Green Power", and investing in technology innovation and continual improvement. Figure 1 relates to the application of partial solutions to move towards a sustainable energy alternative in a generic commercial or domestic application.

**Figure 1. Complementary solutions towards a sustainable energy alternative**



Townsville City Council, 2005

**Barriers towards the viability of renewable energy**

In discussing the viability of renewable energy, achieving greater levels of energy efficiency is a prerequisite to ensure that the power generation can meet the demand. At present, there is little incentive to achieve demand-side energy efficiency, due to various reasons detailed in the Transpac report (attached). A major cause of demand-side energy inefficiency is recognised as being the cheap price of electricity across Australia. This tends to provide little incentive to reduce energy demand. Institutional reform of the energy market to reflect the real cost of current base load generation (including a price on carbon emission) would provide a more competitive cost structure to encourage the development and innovation of the renewable and bioenergy sectors.

Building design is also an important consideration in achieving greater levels of energy efficiency, thereby providing greater opportunities for renewable energy to meet the required demand. Townsville City Council has facilitated workshops on energy efficient building design, including a workshop in support of the CBD Sustainable Commercial Building as part of the “Townsville: Queensland Solar City” project.

Achieving energy efficiency also requires sustainable (i.e. long-lasting) behavioural change towards reduced energy use within the community. As the Transpac report



(attached) notes, and as demonstrated by Doug Mackenzie-Mohr and William Smith<sup>1</sup>, conventional marketing techniques may raise awareness but do not achieve sustainable behavioural change. Council's Citisolar programme, as part of the "Townsville: Queensland Solar City" project, will use Community Based Social Marketing (CBSM- see [www.cbsm.com](http://www.cbsm.com)) to underpin a community capacity building programme that will involve the community in an energy-wise response to climate change.

As noted in the Townsville City Council submission into the Sustainable Cities Inquiry (see attached), there are significant barriers for providers of small scale renewable energy into the mains grid. Small-scale grid-connected renewable energy suppliers are penalised by the pricing structure, while those who impose new load on the power demand (i.e. new air conditioners) peak are subsidised through cheap electricity. As noted in the Transpac report and Council's submission to the Sustainable Cities Inquiry, reform of pricing structure for base load power, as well as incentives for greenhouse-friendly renewable energy is required. The "Townsville: Queensland Solar City" project will trial measures to overcome barriers towards the economic viability of solar power renewable energy.

A local and regional barrier to uptake of biofuels (eg biodiesel- Townsville City Council has trialled 100% biodiesel and agreed to utilise it in its vehicle and plant fleet) relates to infrastructure issues with distribution networks, uncompetitive costs against petrodiesel, and limitations on local supply to supply appropriate volume.

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<sup>1</sup> Fostering Sustainable Behaviour: An Introduction to Community-Based Social Marketing (1999) New Society Publishers, Canada.