

# **Research Plan**

## **RC412“Renewable Energy for the Ningaloo Outback Coast”**

### **Chris Barker**

#### **1) Title**

The project is to develop an energy management tool that will primarily assist the eco-development at the Carnarvon/Quobba Blowholes but also be useful for all new and existing tourism nodes proposed for the Ningaloo Outback Coast.

#### **2) Background**

The Blowholes at Quobba point are situated about 70 km north of Carnarvon. It is a popular location for visitors (both local and international) due to the proximity to tourist attractions, a beach protected by an island and the existence of an extensive reef system (It is located at the southern tip of the Ningaloo reef).

The Area is used for many different activities including windsurfing, snorkelling, sand boarding and sightseeing. It is a hot spot for caravan stopovers, day trips and overnight stays. There are no specific camping grounds and the site is under-managed allowing people to camp wherever it suits them best, normally on the sensitive foredune. (SMEC *et al*, Carnarvon Coastal Strategy 2001)

The Quobba Point Blowholes area consists of privately owned beach shacks which are located on the fragile foredune. These beach shacks impact on the visual landscape, they have no appropriate wastewater treatment and the use of generators is widespread creating unwanted noise. The existence of the shacks also jeopardises the full and unfettered use of the Blowholes area by the broader community, both locals and tourists.

A sealed road is in place from Carnarvon to the blowholes and a composting toilet is the only available amenity. There is water connected but it is of a brackish quality. No power is available.

The Blowholes have been earmarked for a low key development (DEP *et al*,1999). This will involve the development of under roof accommodation, located back from the sensitive foredune, as well as managed campsites. It will offer the site an improved environmental management plan (as funds from the development are channelled back into management). It will also clear and rehabilitate the foredune so that all users can enjoy this site.

#### **ENERGY**

There are no power lines to the area. This means shack owners are using generators (and a small percentage are using solar systems) to run their everyday requirements. This has implications for noise, air quality and possible pollution through oil/petrol spills.

Proposed tourism developments will require energy for water heating, air cooling, refrigeration, lighting, general electrical appliances and water pumps. The Office of Energy suggests that viable alternative energy sources are available (such as passive and active solar, wind, gas and geothermal) as noise produced by conventional power generators may spoil the wilderness experience.

The Western Australian Tourism Commission is investigating the viability of alternative sources of power generation for heating, air cooling and power generation for low-impact tourist development locations along the west coast (Ministry of Planning *et al* 1999).

Energy is just one aspect of an eco-tourism development. For an integrated renewable energy system to be successful and viable it depends on a lot of contributing factors. This includes solar passive design, use of materials (thermal mass and embodied energy), ventilation and climate.

By far the biggest energy consumers in a dwelling are hot water production and air cooling/heating. The use of gas boosted solar hot water systems will be essential in reducing the energy produced by renewable sources. For air cooling/heating an appropriate solar passive design with correctly placed thermal mass and adequate ventilation is essential in reducing or even eliminating the need for air cooling/heating appliances.

There are tools available for assessing tourism development and energy use in structures (Bayer et al, 2003 ) as shown below.

Assessment/ Rating tool	Description	Relevance to this project
SPeAR	A broad sustainability assessment software tool	<ul style="list-style-type: none"> <li>• Larger projects, especially industries where resource consumption is high.</li> <li>• No remote area focus</li> <li>• Exclusive access software – not freely available</li> </ul>
NABERS	A broad environmental assessment of building stock	<ul style="list-style-type: none"> <li>• Planned to be a nationally accepted method for assessing sustainable buildings, domestic and commercial.</li> <li>• No focus on nature tourism</li> <li>• No remote area focus</li> </ul>
BASIX	An Energy Audit program for people to calculate their electricity usage	<ul style="list-style-type: none"> <li>• Simple Energy Audit/ management program that is easy to use</li> <li>• Suits Residential dwellings</li> <li>• No remote area or tourism focus</li> <li>• Designed for NSW residential developments</li> </ul>
Retscreen	A very detailed renewable energy calculator	<ul style="list-style-type: none"> <li>• Very Detailed in Climate and Electronic information. Created for designers, industry and policy makers. Difficult for people without an inside knowledge to use.</li> <li>• Calculates energy output, GHG emissions and estimates the cost of specifically designed renewable and conventional energy systems.</li> </ul>

Although there are guidelines written, there seems to be a lack of an energy management assessment tool when it comes to renewable energy in eco-tourism developments. The focus is primarily on energy reduction techniques, building rating systems and to recommend a renewable energy system.

There are also many eco-tourism certification programs some of which are not up to best practice standards (Font, X, 2002). The following Accreditation Schemes have achieved and implemented some best practice principles.

NEAP	National Nature Based Tourism Accreditation	<ul style="list-style-type: none"> <li>• Current national “best practice” assessment method</li> <li>• Very Comprehensive</li> <li>• Too complex for remote area eco-tourism</li> </ul>
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		<ul style="list-style-type: none"> <li>• Not a software based assessment tool</li> </ul>
Green Globe 21	The path to sustainable travel and tourism	<ul style="list-style-type: none"> <li>• Is a system for certifying sustainable practises in Tourism worldwide.</li> <li>• Accepts 10% renewable energy production for certification.</li> <li>• Forges partnerships to improve standards for the industry</li> </ul>

I believe the tool that I develop may be helpful to organizations planning this development, to assess energy management guidelines and renewable energy effectiveness.

### 3) Aims

This project aims to provide a tool that will assist developers and community groups to assess their potential energy use and to assess the outcomes of changes to the development. It will take into account natural energy sources such as wind and solar and will also report on greenhouse gas emissions.

The objectives are to:

- Create a tool for assessing potential energy use in a residential tourist development that is simple to use and widely available (using MS Excel)
- Provide a Case study of the Quobba Blowholes and test the tool for the Shire of Carnarvon
- Create a greenhouse gas logging tool for residential tourist developments
- Provide recommendations to the developers on the best design strategy to minimize energy use and greenhouse emissions

### 4) Methods

This study will begin with a literature review to understand:

- The existing tools available to determine energy consumption, greenhouse gas emissions and possible renewable energy alternatives (incorporating local climatic data)
- The existing energy infrastructure – production and consumption
- Energy use in other similar tourism sites and facilities
- The renewable resources (wind and solar) available at the site
- The expected energy consumption of the new development

The three research components of the study are:

#### 1. Desktop Study

The desktop study will focus on energy resources in the region and known consumption levels. The available renewable energy resources will be deduced from a range of climatic and scientific data. Some consumption data for the existing shacks may be available, though metering may be required to confirm the figures. Metering results from other tourism developments will also be reviewed to get a good idea of typical consumption levels and how these can be reduced .

#### 2. Tool Programming

Using Microsoft Excel I want to create a spreadsheet that will incorporate an energy audit, a renewable energy comparison and an expected greenhouse gas outcome. I am quite competent in Excel but I will need to refresh my macros skills in order to incorporate climatic data at the click of a button. Excel courses are available through the Teaching and Learning Centre at Murdoch and are offered regularly. I want to make it as easy as possible to use so that users will need minimal time/effort to use it.

### **3. Field Work.**

This will involve the collection of data on:

- The energy sources used to generate electricity for everyday requirements
- The energy use for the existing shacks and facilities using metering and community consultation
- The areas of highest consumption
- The estimated future load for the region

Field work will also be undertaken to consult with Shire officers and planners to recommend an energy management plan and the local community will have access to workshops on power generation techniques and savings. I will be involved in preparation and delivery of these community workshops with Dr Martin Anda and other staff of the ETC and Energy Studies. This aspect of the work is funded through the Shire of Carnarvon and SEDO and is not dependent on resources from the Division.

### **4. Case Studies**

The main case study will be carried out to examine in detail: energy use, energy generation, thermal comfort, occupancy level effects and renewable energy resources. The site selected has a similar mix of accommodation and natural resources to the proposed Blowholes site.

#### **Bayview Coral Bay**

This proposed Case Study site comprises of a campsite that caters for about 1200 people per night. It is a large Caravan Park that comprises of chalets, caravan sites, powered tent sites and un-powered tent sites. The Blowholes project will be estimated to cater for up to 500 people per night with a similar mix of accommodation types available.

It also has many features which are not presently available at the blowholes site like a bore with geo-thermal properties and accommodation (lightweight prefabricated structures with concrete floor) that will be useful for testing thermal comfort levels against other building types in the region. Bayview also has comprehensive data on occupancy levels and diesel consumption which will help predict the upper level energy use for the Blowholes site if it was to operate in the mould of Bayview. This will give us an idea of how much diesel and conventional fuels can be saved by integrating efficient and renewable systems into the design, implementation, management and operation of the project

Therefore it is proposed to use Bayview as a case study site to determine the possible renewable energy resources available (Wind, Geothermal and solar), the energy consumption for individual and total accommodation of all types regarding occupancy levels, and to use as an upper limit energy guideline to see what improvements design, renewable energy and management strategies can do to reduce diesel consumption and emissions in an environmentally sensitive area.



## 7) Budget

Potential costs for this project are:

ETC car use	\$200
Inter-Library Loans	\$100
Photocopying	\$100
Books	\$200
Stationery	\$100
4WD driving course	\$200?
Other	\$100
<b>TOTAL</b>	<b>\$1000</b>

Other possible expenses are maps and the services of a field assistant which will be funded by the Shire of Carnarvon.

## 8) Stop Points

If these points emerge then alternative arrangements will be made and I will proceed with my desk based research and documentation.

- Carnarvon Shire staff away on leave when visitation necessary
- Community workshops. If the community workshops are delayed or cancelled
- Review of drafts by Carnarvon Shire staff. If the staff are busy with other projects and can't get back to me in time for thesis writing.
- cyclonic weather in the region.

## 9) References

Arup, (2003), Sustainability services [homepage of Arup Global]  
<http://www.arup.com/sustainability/services/SpAR.cfm>

Beyer, D & Anda, M (2003)“CRC Sustainable Tourism Project # 62004”  
ETC, Murdoch University Western Australia

BRE, (2001), BREEAM and EcoHomes [Homepage for BRE services  
[http://www.bre.co.uk/services/BREEAM\\_and\\_EcoHomes.html](http://www.bre.co.uk/services/BREEAM_and_EcoHomes.html)

Department of Environmental Protection (DEP) and Ministry for Planning (1999)  
“Environmental and planning Guidelines for Tourism Development on the North West Cape”  
Department of Environmental Protection, Perth, WA

Department of Infrastructure, Planning and Natural Resources NSW (2003) “BASIX  
Assessment Tool”  
<http://www.iplan.nsw.gov.au/basix/>

Font, X 2002, “Environmental certification in tourism and hospitality: progress, process and  
prospects” TOURISM MANAGEMENT, 23 (3): 197-205 JUN 2002

Hyde, Richard & Law, Joyce, Green Globe 21 – “Designing Tourism Infrastructure”  
[www.greenglobe21.com](http://www.greenglobe21.com)

Natural Resources Canada & CETC 2004, “Retscreen International”  
<http://www.retscreen.net/>

Prasad, D & Fox, E “DES 10 - Renewable Resources”, BDP – Environment Design Guide  
RAIA Feb 1996

SMEC and Carnarvon Shire Council, (2001) “Carnarvon Coastal Strategy”

Synergy 1998, “Intelligent software to improve RAPS operating efficiency”  
Volume 2, No. 3 1998  
<http://about.murdoch.edu.au/synergy/9803/rapsim.html>

TIES (2003), The International Ecotourism Society  
<http://www.ecotourism.org>

Signed:

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