Townsville Ocean Terminal

Sustainable Development Opportunities

28 February, 2008

We are already past the tipping points.
We should design accordingly.

SEA O2 are North Queensland's premiere sustainable development consulting firm. We specialize in all areas of sustainable development including carbon management, green buildings and renewable energy and vision planning.

We have been invited to consider sustainable development opportunities for the Townsville Ocean Terminal project which includes both the Cruise Ship Harbor and the adjacent residential development.

Below is a list of elements that might be of value to improve the economic, social and environmental sustainability of the proposed development site. They have been listed in no particular order.

It should be noted that adding a list of sustainable elements to a development proposal does not necessarily guarantee sustainable outcomes. Sustainable development generally requires these elements incorporated through a process. The process determines which elements are relevant. SEA O2 are able to assist in developing that process as well as implementing the elements.

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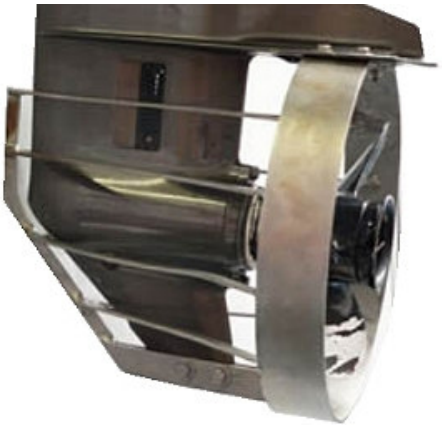
Building Integrated Photo-voltaics. Modern solar power systems actually form part of the building envelope. These systems not only provide power but also offset some of the costs of the building materials. Shown here is a climate sensitive building using BIPV in the UK. The Cruise Ship Terminal should be designed for the Townsville Climate using extensive BIPV.

Storm water storage. Build multi-mega-litre storm-water storage infrastructure throughout the site. This will not only reduce total amount of fill required, but will also reduce the development's impost on the water supply infrastructure. The system shown here, can be used under roads and park lands.

Urban Turbines. Modern aesthetically pleasing urban wind turbines based on the Vertical Axis design. Townsville already has experience with these types of units and considerations with connecting to the mains grid using AS-4777 grid tie inverters. These could be incorporated into house designs or built into the larger buildings.



Propeller guards. Mandatory propeller guards for all vessels permitted in the development area. 'Prop' guards are one of the simplest and most effective means of protecting marine life against harmful collisions with vessels.

Solar car parks. Solar powered car parks providing shade for vehicles as well as providing renewable energy. This renewable energy can be can be used to feed power into the mains grid or to recharge electric vehicles or Plug in Hybrids.

Threatened species research. The Townsville Ocean Terminal could fund a comprehensive research and communication program into threatened marine animals in Cleveland Bay. The program would guide the environmental management program that seeks to ensure that the habitat for threatened species in Cleveland Bay is increasingly improved.

Sustainable Architect. Hire Mick Pearce as the lead architect for the Cruise Ship Terminal and as much of the master planning design as possible. Mick was the lead architect behind the Melbourne City Council CH2 building and the famous "termite mound" building in Harare, Zimbabwe which was designed to stay cool without air-conditioners.

Green walls. Grow aromatic flowering plants extensively throughout the development site to assist to reduce the effect of odor from industrial areas upwind. There are providers and installers of green roof and green wall technology in Townsville.

Local area transportation system. Develop a small electric public transport system that moves around the development area. This will minimize the number of trips made by motor cars in the development area - good for greenhouse, safety, noise and pollution. Modern electric vehicles powered by renewable energy would be perfect for this.

Solar cooling. Modern absorption chillers produce chiller water or chilled air from solar energy. These could be used on an individual house basis or in a large centralized plant for district cooling. A solar powered district cooling system providing chilled water for all of the residences is possible using off the shelf technology.

Intra-generational Equity. Identify opportunities to incorporate a broad spectrum of socio-economic groups into the development. This will improve the social equity of the development, as well as facilitating the establishment of a local economy.

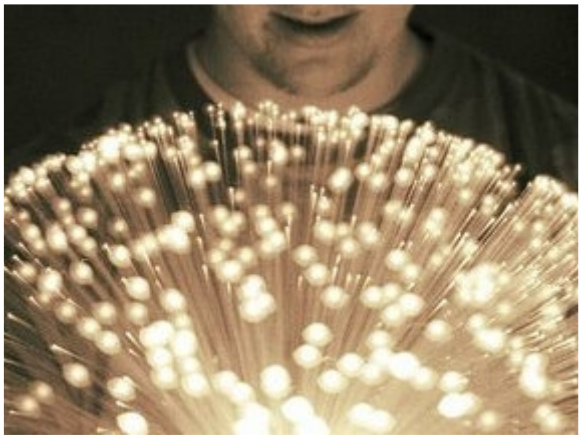
Local Economy. With the provision of community infrastructure (for example, a business center), it may be possible to foster a local economy where individuals develop goods and services to sell to others in the Ocean Terminal community. This will be facilitated by a diverse mix of socio-economic groups in the site.

Plug in Hybrids. Promote the use of hybrid cars with plug in conversions. These vehicles facilitate the possibility of connection to solar charging stations. Latest plug in hybrid technology allows the Toyota Prius to travel up to 50km without using petrol. Conversions are planned to be undertaken in Townsville by mid-year. Solar powered cars are now at hand.

Commercial wind power. Install a row of commercial scale wind power units along the rock wall. There have been a number of studies in Townsville already, indicating average wind speeds of about 7 meters per second. This is a potentially commercially viable wind resource. Some of this data is publicly available.

Passive solar design. Employ rigorous energy efficient design in *all buildings*. This will incorporate climactic considerations into the building design. The more energy efficient the homes, the more cost effective it will be to power and cool them using renewable energy. Above ground houses are favored to allow airflow under them for cooling.

Green Roofs. Roofs should either be white or green or covered in solar panels (if you are not going to use the sunshine, send it back). Green roofs are roofs that have special substrates that permit the growth of vegetation. Green roofs are long lasting, attractive and cool. With the right selection of plants, the roof functions like an evaporative air conditioner.



Fibre optics. Roll out fibre optics to all the homes. Transmit all telecommunications, movies, broadband internet through this. This present a potential profit centre for the developers as they can sell additional services to the residents. It will also obviate the need for the purchase of hundreds of TV antennas and satellite dishes.

Green Walls. Construct free standing green walls planted with aromatic flowering plants, strategically located along open space areas upwind of the urban development zone. This will create a beautiful park land experience as well as assisting to minimize any potential odor considerations from the port.

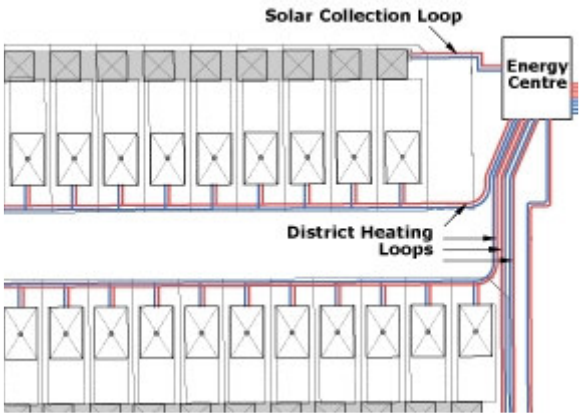
Traffic calming. Employ traffic calming measures on all roads will assist to reduce air pollution and make the development safer by reducing motor vehicle speeds. Calming elements might include the use of single lane roads along the canals with passing bays. This will reduce expenditure on bitumen and reduce urban heat island effect.

Above ground homes. Build the homes above ground. This has a number of benefits. First, it lends towards climate appropriate design, allowing breeze under the house to cool the home. It also gives some protection against claims of projected sea level rise over the coming century.

Climate Adaptation. Design the infrastructure and buildings such that it will be suited for the climactic conditions of today as well as the projected future climactic conditions for Townsville – hotter, drier, more intense cyclones and rain falling in shorter, heavier bursts.

White Roof. The most cost effective energy (and greenhouse) solution for new homes in Townsville is to ensure that the roofs are white or as light in colour as possible. White has a high albedo, which is the reflectance of solar energy. The more solar energy that is reflected, the less is absorbed as heat into the building. Hot houses are energy hungry houses.

Biodiesel. Replace all diesel fuel used in construction with biodiesel. Biodiesel is diesel fuel made from vegetable oils. It is a superior fuel and had 75% less greenhouse emissions and much lower toxics. Commercial grade fuel is available in North Queensland. Everything from late model Peugeot sedans to D9 bulldozers prefers biodiesel.



District Heating. Install district heating system that uses a centralized solar powered plant to heat all water for the development site. This will permit the development managers to sell hot water to residents. There is local expertise in Townsville who can design and project manage the installation of this technology.

Innovative Business Models. Investigate innovative business models that will facilitate the uptake of sustainable technologies. For example, by ordering in bulk and securing low cost finance, it may be possible to include solar panels on every home at minimal cost, which will be offset by their reduced energy bills...

Centralized solar power station. Produce all energy requirements from on-site power stations. Shown here is the receiver of the Lloyd Energy solar heliostat. This uses graphite to store heat allows the steam turbines to run after the sun has gone down. A 10 MW power station using this Australian technology is being built in North Queensland.

Promote cutting edge technology. The Ocean Terminal has the opportunity to promote the wide uptake of sustainable technology by leading the way. An example of this might be a cruise service using the latest solar hybrid ferry, shown here, the Australian designed solar sailor.

Global Icon. Seek to achieve the status of global icon in ecologically sustainable development. Then the eyes of the world will be directed towards this development site. Remember, Townsville is increasingly know as the global leader in sustainable development. The Ocean Terminal project is either on-board, or off-board, with this vision.