Transport Choices

Comments

QMDC comments on Toowoomba Regional Council's Transport Choices Paper

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These comments are presented by the Chief Executive Officer, Geoff Penton, on behalf of the Queensland Murray-Darling Committee Inc. (QMDC). QMDC is a regional natural resource management (NRM) group that supports communities in the Queensland Murray-Darling Basin (QMDB) to sustainably manage their natural resources.

1.0 General comments

QMDC commends TRC for its commitment to develop a *Sustainable Transport Strategy* (the Strategy). We support *Choice One* as presented in the *Transport Choices Discussion Paper*. QMDC would also suggest other future transport options for the region. These are discussed below.

2.0 Additional future transport opportunities

2.1 Renewable energy sites for future transport choices and facilities

QMDC believes the Strategy offers TRC an opportunity to safeguard and plan for potential renewable energy sites for future transport choices and facilities e.g. street lighting, solar charged electric vehicles.

Regional and local planning needs to support the expansion of the renewable energy industry in this region, which includes considering land availability for solar or wind electricity generation. If TRC was to adopt a regional target, for example, 40 - 50% of electricity for transport services and infrastructure to be generated from renewable energy in 5 years and then increasing that to 100%, it could use the Strategy to identify suitable sites and prioritize land use that facilitates the capacity to replace non-renewable energy resources with renewable sources.

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2.2 Planning for electric vehicles and other zero emission vehicle technologies

Electric vehicles are cheaper to run, more convenient, less polluting, innovative, and may be better suited to the way Toowoomba residents drive every day. QMDC would like to see the Strategy provide an opportunity for them to become a natural fit for the region.

The first mass-market electric car arrived in Australia in August 2010, and most major companies are now developing electric models. It is predicted that as electric vehicles become more affordable, petrol prices increase and efforts are made to combat climate change this will encourage more people to seek an alternative to petrol and diesel vehicles. Currently, the Victorian Government is trialling electric vehicles, as they currently provide the best blend of potential benefits and viability. See the below website for details.

http://www.transport.vic.gov.au/projects/ev-trial

The Electric Vehicle Trial aims to make Victoria an electric vehicle-friendly place through improved awareness, understanding and acceptance of electric vehicles. The Trial is laying the foundations for a future electric vehicle market. More than 50 organisations are partnering in Victoria's electric vehicle trial, which is being coordinated by the Department of Transport, Planning and Local Infrastructure. The reports listed below articulate important aspects of the Trial relevant in QMDC's opinion to the Strategy and would be worthy of consideration in terms of this region. Medium to long term parking facilities provide potential spaces for electric vehicle infrastructure. Toowoomba city hosts a university, several supermarkets and shopping plazas which could potentially provide the space needed.

Useful information is provided in the following listed reports:

- Creating a market - Electric Vehicle trial mid-term report (PDF, 1.9 MB, 152 pp.)
- Environmental Impacts of Electric Vehicles in Victoria report (PDF, 1.9 MB, 76 pp.)
- Zero Emissions Driving For Electric Vehicles (PDF, 347.3 KB, 3 pp.)
- Guidance on Land-use Planning for Electric Vehicle Parking & Charging (PDF, 653 KB, 24 pp.)

QMDC believes the same opportunity urgently awaits Queensland and would like to suggest that TRC could be the leader in such innovation.

Electric vehicles, however, may not be the only option for TRC to consider when looking for an alternative to petrol. Automotive companies around the world have been researching technology to reduce reliance on oil and our greenhouse gas emissions. Some of the other options now being trialled are:

- Hydrogen ICE and fuel cell vehicles
- Compressed air vehicles

2.3 Solar roads & bridges; charging roads

QMDC believes the Strategy provides TRC the opportunity to consider solar roadways and other surfaces that are able to generate electricity by solar power photovoltaics.

Solarroadways.com

"A solar roadway is a series of structurally engineered solar panels that are driven upon. The idea is to replace current petroleum-based asphalt roads, parking lots, and driveways with solar road panels that collect energy to be used by homes and businesses, and ultimately to be able to store excess energy in or alongside the solar roadways. Thus renewable energy replaces the need for the current fossil fuels used for the generation of electricity, which cuts greenhouse gases and helps in sustainable development."

Carparks, driveways, and eventually highways are all targets for the panels. It has been estimated that if the entire United States Interstate Highway system were surfaced with Solar Roadways panels, it would produce more than three times the amount of electricity currently used nationwide (Brusaw, Scott. "Recycled Materials". Complex Cortex Designs. Retrieved 13 April 2011).

The main advantage of the solar roadway concept is that it utilizes a renewable source of energy to produce electricity, reducing dependence on coal, petroleum and other fossil fuels. Also, the life span of the solar panels is around 20-30years, much greater than normal asphalt roads, which only last 7–12 years.

Additionally in the event of an environmental disaster, solar roadways could potentially provide power when it is needed most. As solar power is renewable, it obviously requires no external connection to an artificial power source.

Another advantage of solar roadways is that they do not require the development of unused and potentially environmentally sensitive lands. This is currently a very important issue within the region. If existing roading infrastructure is utilised large photovoltaic installations, or new transmission corridors, perhaps across good quality agricultural land would not be required to bring power to consumers in urban areas. Transmission lines could simply be run along already established roadways.

Electric cars can be recharged while in motion on top of these roads, relying on induction plating embedded inside these roads. This would increase travel distance capacity and reduce the costs and the time-inconvenience of waiting at a charging station.

Disadvantages, initially, include the start-up and maintenance costs of building such roadways and car-parks, which may be high, although advances in this technology should cause the costs to decrease. Road surfaces also accumulate rubber, salt, etc., which block sunlight. Salt might be easy to wash off, but rubber is more difficult.

The United States Department of Transportation awarded the company Solar Roadways Incorporated a $100,000 research contract in 2009 to develop a solar roadway. This Small Business Innovation Research (SBIR) contract enabled Solar Roadways to prototype solar road panels. The concept has been used for lighting as well. Their current proposal is for 3.658 m x 3.658 m (12 ft x 12 ft) panels including solar panels and LED signage, to be constructed which can be driven on. The concept involves replacing highways, roads, parking lots, driveways, and sidewalks with such a system.

After successful completion of the Phase I SBIR contract, Solar Roadways Inc. announced that the Federal Highway Administration awarded it a follow-up $750,000. Phase II SBIR contract is take solar roads to the next step: a solar car-park. Constructed out of multiple 12' x 12' panels, this smart car-park will also warm itself in cold weather to melt away snow and ice. A layer of embedded LEDs will be used to create traffic warnings or pedestrian crossing signals, and excess electricity could be used to charge electric vehicles or routed into the power grid. The electrical components will be embedded between layers of extremely durable, textured glass.

"YERT Conversation 19.1: Solar Roadways". Youtube. January 13, 2008. Retrieved 2009-11-19.

"2009 DOT SBIR Phase I Recommendations, FY09.1". Volpe.dot.gov (U.S. Department of Transportation: Small Business Innovation Research (SBIR) Program). 2009. Retrieved 2012-04-15.

"Existing prototype panels consist of three layers.

1. Road surface layer - translucent and high-strength, it is rough enough to provide sufficient traction, yet still passes sunlight through to the solar collector cells embedded within, along with LEDs and a heating element. This layer needs to be capable of handling today's heaviest loads under the worst of conditions and to be weatherproof, to protect the electronics layer beneath it.
2. Electronics layer - Contains a microprocessor board with support circuitry for sensing loads on the surface and controlling a heating element with a view to reducing or eliminating snow and ice removal as well as school and business closings due to inclement weather. The microprocessor controls lighting, communications, monitoring, etc. With a communications device every 12 feet, a solar roadway can be an intelligent highway system.
3. Base plate layer - While the electronics layer collects energy from the sun, it is the base plate layer that distributes that power as well as data signals (phone, TV, internet, etc.) down the line to all homes and businesses connected to the solar roadway. It needs to be weatherproof to protect the electronics layer above it."

Shoemaker-Galloway, Jace (September 8, 2009). "DOT Awards $100K for Super-Smart Solar Roadways Prototype". Energyboom.com. Retrieved 2012-04-15.

"Introduction". Solar Roadways. 2010-04-16. Retrieved 2012-04-15.

http://en.wikipedia.org/wiki/Solar_roadway

2.4 Culturally significant sites/areas

QMDC believes the Strategy should include a cultural audit to identify significant historical and contemporary Aboriginal sites and areas (involving archaeological and anthropological technical assistance as well as Traditional Owner engagement). This would aid the Strategy to better represent Aboriginal interests and aspirations.

The erection of interpretive signage of key cultural sites could aid the development of an environmental tourism trail to be owned / operated by Traditional Owner groups and provide financial benefit to Toowoomba's rural communities.

2.5 Rain gardens

TRC will be well aware that urbanisation alters natural water flows, biodiversity, carbon cycles, air pollution levels and ultimately, the climate of local and regional environments. This effect is mainly the result of increasing levels of impervious surfaces across landscapes, at the expense of the natural vegetation of the area.

A program such as Monash University's *Green Cities and Microclimate Program* aims to determine the urban microclimate advantages of decentralised stormwater harvesting solutions, green infrastructure and technologies. Additionally, it aims to examine potential multiple benefits of stormwater harvesting strategies for the improvement of urban climate, carbon sequestration, stormwater runoff and air quality. These endeavours are directed to achieve the ultimate aim of improving the thermal comfort, health and well-being of residents of urban areas.

The *Green Cities and Microclimate Program* is intimately linked with the research being undertaken under the Cities as Water Supply Catchments Program, in particular the work of Project 3 (Green Cities and Microclimate), the aim of which is to identify and demonstrate the social and institutional ingredients to proactively advance the mainstream application of decentralised stormwater harvesting across Australian cities.

TRC could consider including in the Strategy the establishment of rain gardens (aka biofilters) to collect water from impervious surfaces such as roofs, especially as they are a primary contributor to flooding and water quality problems in urban catchments. Rain gardens could be incorporated in the Strategy as a means to both filter pollutants from urban runoff and regulate runoff rates, with significant benefits for the condition of urban waterways and to maintain safer road and walkways. Rain gardens also have considerable value as rainwater harvesting devices, reducing the demand for treated water. As such, the construction of raingardens has been actively promoted in several of the world's cities, including Melbourne, where Melbourne Water has introduced a *10,000 Raingardens* initiative.

Across Australia, cities are facing a range of critical pressures related to climate change and urban expansion. We are experiencing critical water shortages along with increasing weather extremes and the degradation of our urban streams and waterways. At the same time, public health is further threatened by urban heat island effects as our cities become more consolidated to accommodate increasing population and changing social expectations.

The vision presented in the *Cities as Water Supply Catchments* research program is **to harness the potential of storm water to overcome water shortages, reduce urban temperatures, and improve waterways health and the landscape of Australian cities**.

Vegetation plays a critical role in the management of urban stormwater, helping to filter out pollutants, maintaining the permeability of the filter, as well as contributing to nutrient removal both through direct uptake and through facilitation of microbial communities. Plants also help to restore the evapotranspiration that is diminished by urbanisation (through the loss of vegetation and the creation of impervious areas). They also provide both aesthetic and micro-climate benefits (providing shade and passive cooling).

This group of projects is focused on developing a wide range of vegetated stormwater treatment systems, including biofiltration (often called bioretention systems or 'rain-gardens'), swales, wetlands, and vegetated roofs and walls. They are mainly used to treat and/or infiltrate stormwater for the protection of stream health. Recently some of the systems have been adopted for stormwater harvesting.

Research being undertaken under these projects revolves around identifying the role of plants, selecting the optimal species for treatment performance, identifying the impacts of vegetated systems on micro-climates, as well as identifying their treatment performance for a range of pollutants (e.g. sediment, nutrients, heavy metals and pathogens).

2.6 Green spaces

QMDC supports the establishment of more green spaces to increase environmental benefits for Toowoomba's residents. Those benefits include:

- filtering of pollutants and dust from the air
- provision of shade and lower temperatures in urban areas
- reduction of erosion of soil into waterways
- recharge of groundwater supplies and protection of streams
- reduction of nitrate leaching from the soil into the water supply and reduced surface water runoff, keeping phosphorus and other pollutants out of waterways
- trees in a carpark reduce on-site heat build-up, decrease runoff and enhance night time cool downs
- dense cover of plants and mulch holds soil in place, keeping sediment out of streams, storm drains and roads; and reduces flooding
- trees, shrubs and grassed areas remove smoke, dust and other pollutants from the air. One tree can remove 26 pounds of carbon dioxide from the atmosphere annually, equaling 11,000 miles of car emissions. One study showed that one acre of trees has the ability to remove 13 tons of particles and gases annually.5 2,500 square feet of grass turf absorbs carbon dioxide from the atmosphere and releases enough oxygen for a family of four to breathe.6
- by using trees to modify temperatures, the amount of fossil fuels used for cooling and heating is reduced. Properly placed deciduous trees reduce house temperatures in the summer, allowing air conditioning units to run 2 to 4 percent more efficiently. The trees also allow the sun to warm the house in the winter. Evidence is mounting that green roofs (i.e. roofs totally or partially covered with vegetation) can play an important role in saving energy, reducing the urban heat island effect and adding more green space to a built environment. Lawns will be 30 degrees cooler than asphalt and 14 degrees cooler than bare soil in the heat of summer.

- a healthy, sodded lawn absorbs rainfall 6 times more effectively than a wheat field and 4 times better than a hay field. A big tree removes 60 to 70 times the pollution than a small tree.

http://projectevergreen.com/why-green-matters/environmental-benefits/

Mental health benefits associated with green spaces include:

- Stress and violence reduction. Studies have shown that stressed individuals feel better after exposure to natural scenes. Accordingly, green spaces also reduce instances of aggression and violence.
- Improved concentration. Scientists assert that green spaces increase our ability to concentrate, both on the tasks at hand and on our subconsciously-viewed surroundings.

Enhanced health created by green spaces is a proven physical benefit. Studies throughout the world have proven the power of green spaces to improve human health. Cities with high numbers of parks battle obesity and diabetes. Recent studies in the Netherlands and Japan show that people with easy access to green space boasted better health and lower mortality rates. Even relatively passive contact with nature—such as viewing it from a window—lowers blood pressure and anxiety levels.

Social benefits include

- Crime reduction. Most people assume that increased vegetation translates to an increase of crime by offering hiding places for criminals and their criminal acts. Open mowed areas are generally considered safest, while densely vegetated areas are the most feared. Contrary to these common beliefs, maintained green spaces actually reduce crime. A study of 98 vegetated and un-vegetated apartment buildings in Chicago showed that vegetated spaces cut crime by half, in addition to inspiring pride for surroundings that translated into less litter and less graffiti. Besides mitigating psychological precursors to violence by reducing stress and anxiety, green spaces increase neighborhood's collective surveillance: Vegetated landscapes invite more people to use them, ensuring more eyes on the watch to prevent crime in outdoor spaces.
- Increased workplace productivity. In the business environment, green spaces improve productivity and morale among workers. Studies show that desk workers with a view of nature—either out a window, in a picture frame, or around them in the form of indoor plants—feel more relaxed overall, and those with no visibility of plants suffer the most stress and anxiety.
- Safer driving. Vegetated roadsides may also serve a social benefit by reducing fatigue, anger, aggression, fear and stress of automobile drivers. A study using videotapes to simulate differing levels of vegetation along roadside suggests that parkway design and roadside vegetation reduces frustration among drivers.
- Economic stimulation. In multiple studies conducted by Kathleen Wolf at the University of Washington's College of Forest Resources, street trees and other streetscapes in downtown shopping districts were rated as highly preferable in surveys conducted among visitors.

Not only do street trees foster a community's sense of place, but well-maintained streetscapes raise opinions about the quality of goods and services offered. In landscaped shopping districts, surveyed consumers were willing to spend 9-12% more than they would spend in an un-landscaped district.

- Positive effects on children. One American study of 450 children with Attention-Deficit/Hyperactivity Disorder determined that exposure to natural environments alleviated symptoms of the condition. After creative play in verdant settings, children overall demonstrate increased ability to concentrate, complete tasks, and follow directions.

http://ag.udel.edu/udbg/sl/humanwellness/Human_Benefits.pdf

2.7 Transport facilities and infrastructure to advance tourism opportunities

QMDC is concerned that tourism opportunities are being lost to the region and believes the Strategy could add to the region's economy by considering using transport facilities in this arena. Transport facilities that open up and improve local government reserves or truck and roadside stops to cater for tourists including temporary stays for the likes of grey nomads will have long term benefits. Tourism drives and destinies could be better planned for through the provision of better transport infrastructure facilities at key sites.

"Locals know where these reserves are, but tourists are at a disadvantage unless they stumble upon the kindness of strangers. When tourists do find these reserves, they also find a paucity of amenity. Access is difficult, a network of opportunistic and poorly-formed tracks criss-cross the floodplain taking up many of the potential camping sites, and weeds, long grass and the refuse of previous visitors militate against camping. Moreover there are few facilities to foster a prolonged stay." (RMCG Consultants)

3.0 Recommendations

3.1 That TRC progressively build into their planning transport facilities and infrastructure that can be operated with renewable energy sources. and which increase green spaces.

3.2 That TRC in collaboration with QMDC and other key stakeholders conduct a trial similar to Victoria's Electric Vehicle Trial.

The table below summarises the key components of Victoria's Electric Vehicle Trial, modified for the Toowoomba region to help inform the Strategy and future transport options.

Trial component		Outcomes		Objective
 **Household/fleet vehicle roll-out**	→	• Give Toowoomba residents experience of EVs • Help us understand how EVs will work in the Toowoomba region • Find out what EVs mean to Toowoomba residents	→	To make the Toowoomba region an EV-Friendly place through improved awareness, understanding and acceptance
 **Infrastructure roll-out**	→	• Establish beginnings of Queensland EV market • Guide design of the Queensland EV network to meet user requirements	→	To make the Toowoomba region an EV-Friendly place through improved awareness, understanding and acceptance
 **Economic, environmental and social impacts**	→	• Understand EV benefits and costs – now and in the future • Identify issues and test solutions	→	To make the Toowoomba region an EV-Friendly place through improved awareness, understanding and acceptance

 **Education and awareness program**	→	• Engage and inform the community on EV technology • Link local designers and manufacturers into the national/international EV market	→	To make the Toowoomba region an EV-Friendly place through improved awareness, understanding and acceptance

3.3 That TRC in collaboration with QMDC develop a cultural heritage development plan as part of its transport strategy.

3.4 That TRC progressively build into their planning for transport facilities and infrastructure the need to increase green spaces.

3.5 That TRC progressively build into their planning for transport facilities and infrastructure the need to improve tourism facilities.