Australian
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Foundation

Submission
No 47

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The Committee manager
Standing committee on public works
Parliament House
Macquarie street
Sydney 2000

Submission on inquiry into infrastructure provisions in coastal growth areas.

OPENING STATEMENT

This submission is lodged on behalf of the Australian Conservation foundation Central Coast branch. Being a coastal branch we are aware of the impacts of overdevelopment and infrastructure lacking in capacity to meet the needs of the community in environmental, social and operational utilities required to help society function cohesively.

The coastal strip of NSW is under attack, attack form overdevelopment from people wanting a sea change or just searching for a cheap land and a safe community in which to live.

All new estates and settlements along the coast should have their infrastructure in place before any major settlements occur. Otherwise problems not just relate to service infrastructure but also social infrastructure break down.

Over the years there have been both federal and state reports and legislation into protecting the coastal zone, many of them inadequate in there scope and open to loop holes to allow overdevelopment of our fragile coastal ecosystems. The developers move in, grab the cash then flee. All the while saying they were only complying with the regulations imposed by the state and local government.

It is necessary to prevent new lands being rezoned for further development before there is an opportunity to properly assess their capability and suitability for populations with unsustainable infrastructure.

"If rezoning greenfield sites for new subdivisions continues while the plans are underway, there is a risk that lands of high conservation value, vital for wildlife and corridors, or needed for infrastructure are lost. The unplanned sprawl could also place an excessive strain on areas where natural resources such as water are already stretched," said TEC coastal campaigner Fran Kelly. Such areas like Byron Bay, which currently have extremely low water reserves but are impacted from the continuing development and tourist influx. Gosford city another prime example with dam water levels hovering around 24 % capacity this will keep declining as more an more development goes on.

"There would be little point in the Department of Infrastructure Planning and Natural Resources (DIPNR) carrying out regional plans across the coastal regions, while developers are busily getting councils to endorse their requests for development rezoning."

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"It is vital that the plans have the natural environment and natural resources, on which all else depends, at the forefront. We would hate to see the plans turned into nothing more than growth strategies, based on extreme population projections pushed by the development industry."

1. Key coastal population growth and urban consolidation trends in nsw

Density – what the current trends are.
Increased densities should not be retrofitted into community areas designed for low densities. This is a recipe for traffic chaos, polluted air, noise and environmental destruction and all the other evils that stem from overdevelopment and overcrowding. Quite the opposite of the all-encompassing quality of lifestyle the minister espouses about high-density living.

2. Short and long term needs of coastal communities for basic infrastructure

There is a drastic need to increase investment in power, water and sewerage utilities across the state. This is also required in road and rail transport as well as additional hospitals, nursing homes and policing units.

There should be a move towards demand management with smart meters to allow the individual customers recognise their demand loads and alter the activities to suit. There is much education of the general public required to advise of methods to reduce their energy usage and the cumulative effect on the power grid eroding the summer energy margins.

Traffic congestion.
Peter Newman The nsw sustainability commissioner advocates increasing population density so as to solve traffic congestion. There is a slight problem though - he cannot quote one city the size of Sydney anywhere in the world where this works. Sure, if you increase the population density a greater proportion of people use public transport. But this is more than outweighed by greater number of people in the area who still have to use their cars (just as you do, because public transport is too inconvenient for many journeys). Why do you think car parking spaces are provided for all the new units being built along railway stations? Because the units would not sell otherwise!

Mr Newman has documented a graph that indicates that more people in the dense inner suburbs of Sydney use public transport which he says proves that high density decreases car usage. However the most important factor is that people living in the inner suburbs are more likely to work in the city, where it is too difficult to use ones car due to congestion and parking problems. Density by itself is not the driving factor.
These are Sydney centric examples, although the similarities are transformed in larger regional coastal areas.

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Solutions – long term design
Satellite cities are the best solution for the current state of transport technology. That way you can try to optimise the advantages of a really large conglomeration. Each city should be as autonomous as practical and linked by high-speed transport and communications. The planning for each satellite city would emphasise: the manageability of cities of 200,000 size.

Such satellite cities should have street layouts designed to maximise access by walking, cycling and public transport. They should be linked up by very fast transport and communication facilities to major regional cities and or State capital cities.

Central to all planning should be the goal of eliminating unnecessary travel by making the communities as self-sufficient as possible. This means that work, education, entertainment, shopping, sporting and recreational facilities must be located within easy reach of the residential precincts. Such development will not solve all the problems relating to car use, but will be preferable to forcing high densities into suburbs designed for low density.

Services - electricity
If the population of New South Wales has to increase a balanced state development approach is required. One aspect of these policies is the development of new satellite cities previously mentioned. These satellite cities should incorporate desirable features such as green belts, underground electrical cabling, energy-efficient buildings that are built with greenhouse friendly materials and fitted with energy saving devices and have thermal properties, drought-resistant plants and water reuse downstream.
The use of solar voltaics reduces the demand loads.

For thousands of years people have used water to produce useful energy. The energy is not extracted from the water, but from its movement, which results from the effects of the sun and the moon upon the earth.

Solar energy drives evaporation, creating rainfall. This provides opportunities to harness the water's energy as it flows downhill, back to the sea. Solar energy also creates the earth's winds, which in turn create the waves in the oceans. The gravitational pull of the sun and the moon on the earth causes the oceans to rise and fall, generating the tidal movement we observe.

As oceans cover over 70% of the earth's surface, the energy contained in waves and tidal movement is enormous.

Defining water power
On hearing the word hydroelectric power, most people think of a water turbine at the bottom of a dam, such as the Ord hydro power station. Hydropower also encompasses other ways of producing useful energy from moving water.

Stream flow generators consist of a turbine (similar to a propeller) placed in a flowing river or stream. The water flow rotates the turbine and this mechanical energy is used to generate electricity. Similarly marine current flow turbines can be moored in areas of saltwater movement to generate electricity.

Tidal power station design needs to be of an appropriate scale to balance initial capital costs against reduced running costs in the long term, and environmental impacts against reduced greenhouse gas emissions and pollution.

The ocean's waves are also a potential source of enormous amounts of energy. A variety of devices have been designed and tested to convert wave energy to electricity, but as yet none has proved commercially feasible.

Tidal basin power stations harness the energy in the tides by building barriers across the narrow entrance of a bay. Sluice gates are opened for the incoming tide and closed at the high tide point. The impounded water is then directed through the electricity generating turbines to the lower water levels in the sea outside.

Tidal basin power stations may generate power on the incoming as well as the ebb tide by using reversible flow turbine blades. This can only slightly increase the total daily energy output due to the lower operating efficiency of the two-way blades. Single basin tidal schemes are characterised by intermittent periods of electricity generation. Incorporating two or more basins improves power availability. If the power grid has excess electricity available, this can be used to pump water, creating a higher generating head for use in peak demand times.

Hydro-electricity supplies some 20% of the world's electricity, and countries with suitable rainfall and raised land areas can generate significant amounts of energy from falling water. Brazil produces 92% of its electricity from hydro-electricity, New Zealand 73%, and Canada 64%. Around 15% of electricity produced in Australia comes from hydro-electricity, over half of which is generated in Tasmania.

While many of the suitable sites around the world for producing hydro-electricity have already been dammed, there remains a considerable potential for new projects, mainly in developing countries. However, the environmental impact of dam building and flooding large land areas is reducing the number of new hydroelectric dams being built in many regions.

Case studies using water to generate power
. Harvesting the tides

In the 11th century the ocean's tides were used to power mills for grinding wheat and corn. Tidal flow energy was used to pump all of London's water supply until 1824. Tidal flow generators are similar to stream flow generators where a turbine is moored in an area of strong seawater movement

New research on tidal flow turbines is currently underway in the Northern Territory (see New developments in tidal flow turbines on *page x*). In the United Kingdom, IT Power is also making advances in developing new technology for generating electricity from marine currents. In 1994, the company demonstrated a moored tidal flow turbine, producing 14 kW in a 2.25 m current in Loch Linn he, in Scotland. It is now investigating development of commercial grid-connected machines in the 250-500 kW range.

Tidal basin power stations have a barrier across an estuary to trap seawater at high tide. These turbines have multiple curved blades, similar to turbines used in hydroelectric dams.

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WA tidal

The North West coast of Australia has long been regarded as one of the best locations in the world for tidal power. Its unique combination of a series of deep inlets and bays coupled with a large tidal range, typically in excess of 10 metres, contains enough tidal energy to meet all of Australia's electricity needs. Unfortunately the high cost of electricity transmission presently precludes sending North West tidal energy to Australia's main energy consuming centres, its cities.

Before investigations began on the proposed Derby tidal power station, Tidal Energy Australia Pty Ltd undertook a comprehensive research project examining the feasibility of constructing a tidal power plant at Cape Keraudren, on the eastern side of Port Hedland in the Pilbara region. Site surveys were undertaken to define the inlet conditions, environmental factors were reviewed, and the needs of local communities assessed. Hydraulic models of the tidal inlet were developed to help design the plant, and computer modelling used to simulate its operation.

The research report published in March 2003 concluded that it would be feasible to construct and operate a tidal power station at this location. However the Cape Keraudren Tidal project was not economically viable due to the current low cost of supplying electricity from natural gas turbines to the Pilbara grid.

Doctors Creek proposal

Derby experiences some of the highest tides in Australia. Derby Hydro Power Pty Ltd, a company combining the expertise of Tidal Energy Australia with infrastructure experts Infratil Australia, are hoping to build a double basin tidal power station at the mouth of Doctors Creek, 12 km north of Derby.

The $125 million project has the potential to supply electricity to around 20,000 homes in Broome, Derby and Fitzroy Crossing, and to the Western Metals Pillara lead and zinc mine at Blendevale, due to commence production in the middle of 1998.

Western Power has been very supportive of the project because it has the potential to offer an economic alternative to their existing diesel fuelled power station. Western Power is presently negotiating a power purchase agreement with Derby Hydro Power.

A condition of the proposal is that Derby Hydro Power installs and operates the transmission lines that will link the towns.

This tidal power project has clear location and design advantages, because it uses the natural forked bay at Doctors Creek to create a double basin scheme which can provide around the clock power.

One basin will retain a high water level and the other a low level. A channel cut between the two would hold the turbines used for power production. At high tide, water would be let into the high basin, and at low tide, water would be let out of the low basin.

The plant would have an installed capacity in the region of 48 MW, producing around 200 GWh per year. This capacity would fully supply the needs of the region, except for the few occasions when neap tides (*see box on page* x) occur, reducing the amount of tidal energy available. At these times, power supply will need to be supplemented with diesel generators.

From An Environmental Review carried out by Halpern Glick Maunsell Pty Ltd. On the effects the project would have on the mangrove trees in the Doctors Creek area. Some mangrove trees would be lost, but the proponents predict new mangrove areas would be created by the new water levels.

Into the future

Power blackouts in nsw have tripled during the last three years. Replacing fossil fuel consumption with renewable sources needs to be looked at whether it is partially or fully phased out. Other electricity production methods such as tidal reduces pollution and greenhouse gas emissions and can help relieve some of the burden on the existing power grid.

Care needs to be taken in designing a tidal power station so that environmental impacts on the estuarine environment are minimised. Erosion, estuarine sedimentation patterns, marine animal migrations, water salinity levels, and changes to flooding regimes all need to be considered as part of a comprehensive environmental review.

The design needs to not only optimise electricity generation but also minimise disturbances to the local environment to ensure its long term viability - for long term viability is very much at issue here. Tidal basin power stations offer stable electricity prices that are immune from oil price fluctuations for a very long time - the expected operational life of the proposed Doctors Creek station is 120 years.

Eventual use and success of tidal power will arise from matching suitable sites to local power needs. Designs need to be of an appropriate scale to balance the initial capital costs against the long term reduced running costs, and the environmental impacts against the reduced greenhouse gas emissions and pollution.

Renewable energy advocates worldwide look at the abundant sunshine and huge tides in WA's North West with understandable envy. If the economic price of fossil fuels increases significantly then the sluice gates to tapping Australia's tidal energy will be well and truly open.

New developments in tidal flow turbines

Innovative technology using tidal energy along the Northern Territory coastline for power generation is being developed in a collaborative project between the Northern Territory's Power and Water Authority (PAWA) and the Northern Territory University.

A turbine with four blades has been moored in the Apsley Strait, between Bathurst and Melville Islands. Monitoring data from this turbine was used to develop a scaled down prototype of a tidal flow generator.

This small prototype produces two to three kilowatts of electricity and is now being operated for a six-month trial period. Blade configuration, pitch and tip speed can be altered for maximum efficiency using an innovative electronic control system developed by the university.

PAWA's Keith Presnell is enthusiastic for this technology's possibilities. **"Wherever there are small coastal communities there is the potential to use tidal kinetic energy to generate power," he said.**

The next phase of the project is to evaluate the economic viability of this method of harnessing tidal energy. If the outcome is positive, a tidal flow generator in the 10-50 kW range is planned.

This technology is ideal for Australia's numerous small isolated coastal communities, which presently rely on diesel generators for their electricity. If the project is successful, tidal flow generators have significant export potential, particularly to Asia and other areas around the world where the coastal conditions are right and the environmental or financial cost of fossil fuel generated power is prohibitive.

Water Infrastructure
Houses should have full on site water retention with water directly plumbed into the house and garden. This not only reduces the load on sewerage and draining it leads to a reduction in town water usage thus a reduced area or number of dams to satisfy town water requirements.

3.Co-ordination of commonwealth state and local government to deliver sustainable coastal growth and supporting infrastructure.

This issue is one that is seen as restraining the smooth implementation of an integrated planning solutions. The current and proposed planning provisions including state wide local environment plans (LEPS) do not lend themselves to integrated planning solutions. They are currently not formulated in a way that allows them to meet such diverse housing options for inclusive liveable communities being established up and down the coast.

Currently, state government policy is to force urban sprawl onto the general populace, impacting on the already strained infrastructure in particular electricity and water systems designed and made for the 1950's.
In a recent *The Australian* article Rod Simms of Port Jackson partners states "one of the most fundamental constraints of electricity infrastructure is the reluctance of state governments moving out of controlling retail prices of electricity" Add to this ownership concerns over private and public and the pricing is further mixed up.

Maybe it is time to have a national control over a national power grid controlled either by the states or federal government for seamless production. For the required infrastructure, of roads, rail, water, electricity and social services and open space management. There could also be the possibility of regional planning authorities with local representation charged with long term planning of the said infrastructure.

The big question is who pays for the all these needs, is the private public project to be the outcome

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In conclusion
If additional growth is to occur it should be in accord with the following planning approaches:

In particular it should provide for balanced development across the state, particularly in regional NSW. This would be achieved through a range of planning policies that are streamlined between the different levels of government, which would include:

1. Whole of State Development and repopulation of declining regions rather than urban consolidation of the capital cities and their fringes.
2. A viable decentralisation policy drawing on international experience particularly that of the European Union. A mix of incentives and infrastructure provision can be used to deal with the time and distance issues raised by decentralisation. These include high speed rail, top class telecommunications and tax incentives.
3. The creation of Satellite Cities. Each to be as autonomous as practical and linked by high-speed transport and communications. The planning for each satellite city would emphasize:
    - The creation of Green belts
    - Optimal location from an environment perspective – upstream of agricultural use
    - Good transport networks - easy walk/bike/public transport to centre and a road network designed to facilitate public transport routes
    - Optimal environmental design – water reuse in city and downstream, thermal properties in buildings, power cables underground, sustainable plantings that do not require large quantities of water to exist.

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