8th April 2008

Innaloo
W. Australia 6018

GARNAUT SUBMISION
Level 2
1 Treasury Place
Melbourne
VICTORIA 3002

Dear Sir

The Tidal energy potential across the North of Australia is sufficient to supply our national electricity needs many times over.
According to the Lewis report (1962) The Tidal energy potential in the North West based on 1962 technology is 300,000 Mw or 300Gw. Total national generating capacity in Australia is 50.4Gw (Abare 2004). This resource could supply all our energy needs, including energy for transport, for the whole country. Mr Lewis, an engineer with the Public Works Department (WA) inspected some 50 potential sites for barrage type Tidal power projects in the Kimberly region and further afield in New Zealand, Indonesia and New Guanea. He selected some 25 sites for potential development in the Kimberly region. To quote Mr. Lewis "The best of the proposals are quite spectacular by world standards and probably form the largest block of hydro electric power in SE Asia."

The main obstacles to development of this fabulous resource have been:

1) The lack of large electricity consumers in close proximity.
2) Environmental objections.
3) Intermittant power generation.
4) The lack of Hydrographic surveys, Tide amplitude measurements and tidal current or velocity measurements at potential sites.

5)Cheap, but polluting and finite fossil fuels and a concerted effort by the very powerfull and influential coal and gas industry to ensure that tidal energy does not compete with them.

Having done a fair amount of research and design of tidal power generating systems I believe that I may be able to offer some insights to solving these problems.

I would like to point out a number of misconceptions held and publicly available mis-information on Tidal energy in Australia.

Regarding the high cost of HVDC powerlines. In Australia they have been used over short distances with converter stations at each end (AC to DC and DC back to AC). The cost of these is the same whether the gap between is 180 Kilo meters or 2800 Kilo meters.
Murray link was buried underground for aesthetic reasons and to avoid protracted delays caused by aesthetic objectors, at about 20 times the cost of an overhead line.

According to ABB, the leading proponents of HVDC power lines, a bulk tansmission line of 6,000Mw operating at 800kV HVDC over a distance of 2,000 Kilo meters can be built for US$2,200M x 1.1 = A$2,420M. Now 6,000Mw x 16hrs per day = 96,000Mw Hrs at $10 per Mw Hr (1c per Kw Hr) = $960,000/day. $2,420M / .960 = 2521days / 365days per year = 6.9 years to recover the capital on the transmission line. Certainly not a backbreaking additional cost to consumers or our economy for clean renewable power and in fact a very attractive investment.
These figures are further substantiated by the Hot-rock proponents who quote figures of .6 to .9c per Kw hr on there website for transmission to major centres from central Australia.

There is a synergy to be achieved with Tidal energy in that the tides run in and out twice a day but the bulk electricity market is only there once a day. Instead of laying pipelines to bring water from afar to metropolitan areas the surplus electricity available at night can be used to desalinate sea or inland brakish water and to generate Hydrogen for transport. Further surplaces could be stored as heat close to existing power stations and used to generate steam for those existing turbines to cover peak demand and emergency supply requirements which may result from bushfires, cyclones and the like.

Bulk HVDC powerlines have been used in Brazil to transmit power from 18 x 700 Mw turbines in the Itaipu dam (15% of national capacity) to Sao Paulo. The three Gorges dam project in China will also be using HVDC bulk transmission lines to transmit 18,000 Mw of power from 26 x 700Mw turbines.

Regarding the Derby Tidal Power project. (A 24Hr / 7 day supply) and EPA concern for environmental damage to 1498 Hectares of mangroves. To put this into perspective, we in WA are currently losing 11.4 Hectares per hour of agricultural Land to salinity! (11.4 x 24 x 5.5 days = 1504 Ha.) See Landline 2002. Further more The EPA conceeded that some 700 hectares of mangroves would in all likelihood migrate further inland.
A Tidal demonstration project Vs mass produced Gas turbines with existing gas supply and no Carbon taxes. The Derby project was too small and too close to it's intended market to justify HVDC bulk transmission lines.

The high cost of constructing Tidal barrages is another mis-information. The water authority builds a dam and sells the water captured over the next 10 months at prices which many say have been too cheap. The Tidal barrage captures the water and "sells" it to the turbines twice a day! Further more, there are techniques for energy capture and more cost effective methods of construction available today that were not available 30 and 40 years ago.

The intermittent nature of Tidal power availability and consumer demand is entirely solveable at competitive cost, as is the variation in generating capacity at Spring tide vs Neap tide.

My designs include the harnessing of the Kinetic energy (Tidal current or stream) in the tides as the tide comes in and goes out which enables significant generation for 4

hours, 4 times per day. This system is also more environmentally friendly in that it does not stop the tide or delay its operating cycle.

My design work has been based on The Funnel which is the entrance to Secure bay as this is the only Tidal power sight proposed by Mr. Lewis for which reasonably comprehensive depth soundings are available. Some information is also available for Walcott Inlet. (Two out of 50+ potential sites)
Tidal current velocities where available are limited to those found on admiralty charts to assist boat navigation and in many potential sites have not been measured at all, or if they have the navy does not want them to be available to the general public. Such measurements are only usefull as a guide to design tidal power station concepts.

What is needed is for potential sites to be revisited and re-assesed and the depth soundings and current velocities at various times in the tidal cycle and depths to be recorded and made available to interested parties.

Consideration needs to be given to the fact that thousands of hours of time may be expended on designing a viable Tidal power project and the need for those doing this work to have some security over the site in question and financial remuneration.

To feed a 6,000 Mw powerline would require at least two major projects to be undertaken in quick succession.
Like the Snowy river mountains project I believe that projects of this magnitude need to be done by government or government / private joint venture as was the case with Woodside Petroleum and the development of the North West shelf gas resource. The Premier of WA at that time, Sir Charles Court, signed a take or pay agreement with Woodside and the State of WA built the gas pipeline from Dampier to Perth which they later sold to private enterprise.

It should be appreciated that while Tidal power could supply all our energy needs, this should not diminish our collective national efforts to achieve high standards of energy efficiency through legislation on building and appliance standards and the general push toward more sustainable and less wastefull lifestyles and commercial practices. I would propose the opposite system to that which currently prevails in the market. ie a quota system for households and business users wherin the 1st 100Kw of energy should be at a base price and would increase in price for each additional block of energy used over a given period. In addition there needs to be a cap on energy usage by households and business users. Such a system is currently used by the Water corporation in WA for householders water supply. For too long it has been good for business to promote consumerism at the expense of the environment and the planet.

Yours sincerely

Ivan Quail

References:
Citation: Lewis, John G (1962) The Tidal Power Resources of the Kimberleys
Available at National Library of Australia or Library of Western Australia

Copy will be available to your organisation on official request.

2) Kimberly Tidal Power Project Maunsell and Asso. 1976 (Library of WA)

3) Converter Stations for 800 kV HVDC U Astrom and V. Lescale (page attached to hard copy sent by mail)

4) ABB website (page attached to hardcopy sent by mail)