

PRESENTATION FOR NPS ENQUIRY
Christchurch 12th May 2009

My view is unquestionably that the replacement of our reliance on fossil carbon as a fuel and fertiliser is challenging in the extreme. Nevertheless the global economic growth and population growth of the last 200 years is unsustainable. A book "Overshoot" by William Catton published in 1980 by University of Illinois had the comment on its dust jacket that "Anyone who thinks that growth can continue indefinitely in a finite world is either mad or an economist".

Richard Heinberg was recently asked "Do you have hopes that President Obama will face the challenge of peak oil? He responded "Our new President inspires many hopes, but in reality he must answer to entrenched economic and political interests. Thus, even if he fully understands the challenge of peak oil—and I am not entirely sure that he does—it may be impossible for him to speak openly about it. He is pursuing the development of renewable energy, energy efficiency, and public transportation, and these will all help mitigate the worst impacts of oil depletion. I am concerned, though, that the efforts along these lines that are politically feasible may be too little, too late" . I trust that you will bear this response in mind when drawing up your report. I realise that similar vested interest pressures exist in New Zealand.

The Ministry of Research Science & Technology report Dec 2006 "Energy Research" was a generally very positive document but unfortunately included major proposals for expenditure on CO2 sequestration etc. This in my view is a chimera and total waste of effort, but I do not intend to comment further as I suppose it is outside your brief.

I propose first to run through a presentation I regularly give to various captive audiences of clubs and senior citizens organisations etc. As I am sure most of you will be familiar with most of the material I apologise for that and will not spend much detail time on individual slides unless asked. My objective is to emphasise the range of renewable options available, and indicate the stage of development.

Hopefully this presentation has made the point that although many of the renewable energy resources are intermittent, they have different operational characteristics and we should encourage them all, especially because New Zealand is extraordinarily wealthy in its share. With the exception of Osmosis and Secondary Hot Rock Geothermal all use only existing technology requiring only development. They do have varying economic considerations. The only type which NZ lacks in superior quantity is Concentrated Solar Thermal requiring desert conditions.

A major factor which should lead all considerations of exploitation of the various solar driven so-called renewables is that their costs are entirely the cost of establishment and construction, their running costs are solely capital repayment, maintenance and operation, THERE IS NO DIRECT FUEL COST. So the costs of renewables are free from international vagaries over which we have no control. The other major factor is of course that they do not contribute to greenhouse gas increase nor to climate change.

Distributed Generation

Germany, Spain, Japan, South Korea and California have all proved that individuals will install micro generation systems particularly PV and Wind despite their economics not being immediately obviously beneficial to them. The Feed In Tariff system in Germany's case has resulted in a major manufacturing and export industry both in PV and in Wind. The example of Denmark is also worthy of study for emulation. Many other countries and some US States are now adopting similar legislation. I submit a brief article by a Mark Lupton from The Engineering and Technology Journal of 5July-18July 2008 on Micro-generation respecting the UK government's problems to achieve zero carbon for new homes by 2016.

Incidentally it has recently come to my notice that a farmer at Rakaia has 3 drop structures on his property which he is equipping with microturbines. He is doing this although he merely has a net tariff. I am sure many more similar units would be installed if a good feed in tariff was legally required. A firm in Christchurch offers a design and install service and a firm in Hamilton has an agency for manufacture of a British designed micro wind energy converter.

Feed In Tariff results in several advantages.

- Distributed Generation. It is important to appreciate that except for the Bluff smelter and NI supply, electrical load is distributed, so if generation is also distributed, then transmission losses are materially reduced. Protection systems and peak loadings have to be designed accordingly. It seems as if large generators usually may not wish to encourage competition, and resist encouraging small scale generation.
- Investment by citizens or businesses is made without bulk financing having to be arranged by central generators.
- No extra space is occupied. In the case of PV or Micro Wind because PV is rooftop and micro wind usually uses existing buildings. Irrigation drop structures exist.
- Increased investment in distribution can be delayed for several years to everyone's benefit. Orion's experience has indicated that Distributed generation enabled such delays. When I was practising I installed several diesel generators to take advantage of a two-part tariff with real gain to both the client and the Power Authority. Small renewable generators can serve a similar benefit to local lines companies and consumers provided a tariff exists for the purpose.
- RMA problems are unlikely to arise.
- Widespread Exploitation of Dairy methane production for electricity is likely as in California. The NZ system was developed primarily for chilling because electricity generation at present is barely economic for small generators.

Wind Energy

There is no need for me to comment here as it is probably the cheapest generation system at present. Its chief problem appears to be NIMBY because of lack of appreciation of the importance of renewable energy to our very survival by some

citizens. There is a need for public education of the benefits to compensate for the significant adverse publicity emanating from partially informed sources. The European Wind Energy Association released its 156 page “final report” in March this year on “The Economics of Wind”. I recommend it as a document for essential reading.

Marine Energy

My PP presentation pointed out that we have an enormous resource of marine energy of both types. Although at present the optimum way of exploiting it is not settled, it is such a valuable resource that we should be investing the maximum amount available in full scale trials. Our CRI Wave device is potentially more advanced than any other being looked at because it exploits both the kinetic and the potential energy of a wave

. The tidal characteristic of the country could hardly be improved on. Geographically our two islands are nearly N-S and have two straits, one in the very centre of the country. Dead water can be forecast for centuries ahead and moves in a clockwise direction around the country so system operation is straightforward. Potentially dead water can always be covered by tidal power available somewhere else.

Geothermal

High temperature natural geothermal energy is already exploited and should be continued, we are very fortunate in possessing a shallow high temperature resource. Deep drilled hot rock exploitation as being trialled in Australia has many potential problems and certainly a trial some years ago by the Camborne School of Mines proved extremely costly. Also I believe in 2006, Basle experienced an earthquake triggered by an experiment of this nature.

But also we should encourage the use of soil sourced low temperature heat pump applications eg Domestic and industrial heating. Central country settlements cannot use Air to Air heat pumps for this purpose but soil heat sources are quite feasible and are used in Europe for even low cost applications. Cornwall now uses soil heat pumps for low cost Council housing.

Storage

Most other countries considering their options regarding Renewable energy exploitation have a major consideration how to arrange storage for intermittent loss of generation. But we have a very substantial storage system already in service. Our hydrosystem was initially designed to 50% load factor and nearly all our hydro power stations were designed accordingly when we had no thermal generation at all. It takes about 1 minute to start a hydro plant up, so they are ideal for use as a storage system. Renewables of various types enable water to be stored in dry years by simply reducing station output. Should we ever reach a stage where the existing storage may become inadequate, then installation of extra penstocks is much less costly than building a hydro-station from scratch. Our system administration may suffer from the way it has been set up since NZED was privatised, and problems inherent in operation for private profit without adequate regulation in the national interest may need to be addressed. We have already experienced unnecessary water spillage purely for reasons of profit.

Osmosis

I'm uncertain that this will ever be practical but both Norway and Netherlands are seriously investigating different ideas. At present it is very much at the initial investigation stage, but if suitable membranes can be developed so as to become practical and economic NZ might be ideally situated to exploit it also. If our specific problems could be overcome there is a huge potential inherent in the idea. Long term it is a method to keep an eye on.

Liquid Fuel

To make liquid fuel from any waste material can only be regarded as a good sensible practice. However to make it from crops grown where food can be grown is certainly unethical, but also as far as I can discover in all cases energy economics are very dubious. It is essential that the ratio Total Energy In over Energy Out is closely examined before such schemes are encouraged. Fossil carbon in whatever form should certainly not be considered as a mere fuel. In my view the idea of expecting a gas to remain in a disused oil well or other similar subterranean cavity is fairyland apart from the inefficiencies likely in adding sequestration schemes to boiler furnaces. All fossil forms of carbon not only contribute to greenhouse gas but also are a vital feedstock for many materials essential to our modern lifestyle and merely burning them is to rob our successors of their birthright.

Thank you for your attention and I should be glad to respond to any questions you may have.

D.W.King. MIET FIPENZ
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