Notes on Countering Alternative Energy Misinformation Extant in NZ

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http://nofrillstech.net/

There are various types of misinformation about the type and uses of alternative energy suitable for interface with, and complementing of, the main power grid in NZ. Some of the misinformation is a matter of vested interest, some is politically expedient, some just mischief and urban myth, and some just generational. The following file will describe, in a short information package, the status quo of alternative energy use in NZ, and also in view of present and future climate change trends. Cimate Change is a purposive misnomer, along the lines of 'the climate is always changing', a handy cop-out for Deniers. The full title should be CC/GW/OW/AW, aka climate change/global warming/ocean warming/atmospheric warming, to show the full extent of what is happening.

1) NZ's primary electrical power source is at least renewable, in the sense that, once built, hydro dams do hold rainwater for power generation, and, should be of sufficient capacity to do so regardless of season. South Island hydro, ironically, is located within an Alpine rain-shadow, which does not auger well for climate change, as most of the water reserves that will enter the dams are held in snow and ice. North Island dams are dependent entirely on rainfall, and consequent river levels, to be sustainable. Hydro potential in NZ is being further reduced to smaller and smaller installations in more regional areas, especially as there will be increasing competition for water for other purposes, such as irrigation and potable water. Thus, use of alternative energy is becoming more important, not least because insufficient regard is being shown for optimal NZ population numbers, and population nodal balance. The North Island is unbalanced regarding present power generation potential versus population numbers, thus requiring South Island grid supplementation.

Dams themselves are not so green when the initial cost of construction is considered, with heavy reliance on fossil fuels for construction, and, the major power reticulation and maintenance costs that also must be met. Dams also may cause earthquakes in susceptible areas, (eg Benmore), even with the most carefully planned siting and construction. As well as interrupting land use due to raised water levels, and the natural carbon cycle of the original land that becomes submerged. Methane is a major greenhouse gas that is generated by both natural anoxic decay, as well as by methanogens in oxygen-deprived environments, so, original vegetation breakdown, as well as the ongoing accumulation of water-borne organic debris, silt, and mud, means that an endless supply of methane-producing deposits continues to accumulate, as well as a gradual loss of storage capacity resulting if flushing mechanisms are not present. This has occurred at the Aswan Dam, and will occur in the Three Gorges Dam. NZ North Island dams are also susceptible to this shallowing, unless careful land-use is practised.

As for nuclear power, forget it, especially in a country that is one long earthquake zone, with no significant economic reserves and/or flexibility, and, dependent entirely on overseas markets for nuclear fuel, technology, and toxic waster disposal, plus, being remote from many such markets for products and services. Nuclear power, by its very nature, is dirty and dangerous, and can never be completely safe, which is a definite priority, considering the previous history of nuclear power use. Even moored atomic submarines, as once mooted for Darwin's power generation, would be impracticable, hazardous, and politically very unpopular…! The Fukushima accident, also on the Pacific Rim of Fire, has served as a timely example of such hazards. Given NZ's alternative energy alternatives, nuclear power is simply unnecessary, and proponents politically dismissive of development of Alternative Energy and a distributed grid/mixed energy power grid.

2) Thus, properly planned alternative energy can be of great value in complementing all stored water reserves, as well as relieving the need for more dams, or, coal-fired power stations such as Huntly, at a time when GHG emissions are subject to world scrutiny. Keep the water behind the dam walls by optimising alternative energy power generation. The present dams, fortunately for NZ, serve as the 'battery storage' facilities that so many other countries do not have. However, climate change/ CC/GW/OW/AW means that careful water conservation must be ongoing for optimum storage, and this can be maintained by educated power usage, supporting the woollen industry, and, most importantly, by alternative energy generation that pre-empts excessive release of stored water.

3) Geothermal power is very useful, although always dependent on careful management, and, geological stability of the geothermal fields that supply the steam energy. Wind and wave power utilities are, by their very natures, also exposed to the extremes of the elements that provide their generating energy, thus being susceptible to storm damage, are also capital intensive, and, require continuous maintenance.

4) Solar power is also capital-intensive, but, once arrays are set up in optimally-sheltered north-facing locations, (vice-versa for the N. Hemisphere), they will function efficiently for 30 years or more, even then, panel decline is only gradual, and extra panels can be added to an array, or, older panels can be sold off for less demanding functions. The only moving parts are electrons, and the only large-scale maintenance is panel-cleaning as required. (Mostly dust, and bird droppings, good thing cows do not fly..!) Warranties issued with new solar PV technology are currently valid for 25-30 years, and older panels that lose efficiency still generate the same wattage, only amperage declines. Earthquakes and weather turbulence are not major problem for solar arrays, either, though attention must be paid to shelter from potential high wind gusts, and, panel frame construction should be accordingly robust.

Furthermore, the longitudinal spread of NZ, as well as its geomorphology, make any season a good season for solar power generation, as there is a long Indian Summer in the South of NZ, even if not optimal winter performance in all regions, and, there are adequate solar hours all year round in the North Island. Solar farming is also ready-made multimodal, just utilising any existing and/or adjacent grid for interface, thus having easy input into country-wide power generation networks, which also means optimal spread of panel insolation is possible, regardless of any regional weather or seasonal differences. PV panels on every roof in NZ, connected to the main grid, would then save a lot of dam water from unnecessary release during daylight hours, even on cloudy days. In particular, solar panels on every roof in the North Island, including for hot water, would be a most sensible solution to the present power generation imbalance that subsists in NZ.

Please also refer to **Global Solar Atlas** World Solar Maps for detailed information re World Solar Hours; firstly, note that the hours are conservative, (not necessarily accounting for phenomena such as Indian Summers), and secondly, that Northern Hemisphere countries like Germany, with fewer solar hours than Australasia, are spending more per capita on solar power research then we are. China is now becoming a major solar PV producer, and, with 'solar grade' PV silica being less expensive than silica refined for conventional electronics, panel prices will continue to fall.

Regional solar farms would could also support the grid, especially at some elevation, and cause less controversy, re environmental impact and noise, than wind power. The best annual insolation in NZ is actually in the Otago region, and, the Mackenzie Country is a case in point, with high elevation, clear air, suitable north-facing slopes, yet still close to the main grid, although there are plenty of well-elevated positions of similar potential anywhere in NZ. Solar PV and thermal hot water will also produce results during cloudy days, and this counts when the main grid is being supplemented, or, just for standalone installations. Note that 'savings' of dam water thereby should be calculated on a yearly basis, and for the whole country.

5) ***Mixed alternative power generation is the optimal solution***, plus, utilising a distributed energy grid, but, solar power, of the all power generation alternatives, will always be more ubiquitous, and more reliable, and that **must** include solar hot water. Even remote stand-alone power generation benefits from mixed power generation, but, solar is the main reliable low-maintenance solution, and, even with wind and water potential available, stand-alone plant users may choose not to use them, preferring higher investment in solar PV and solar hot water, because of the trouble-free nature of solar power usage. Water movement and storage is also possible using portable solar pumps with a dedicated panel, remote telephones can be solar powered as well as other remote uses of solar PV, with or without battery backup. Noise, maintenance, proximity, and/or reticulation, etc, are all factors to consider with wind and water power supplementation.

Even businesses or homes on a main grid can both benefit from a small backup solar installation, especially when power cuts are probable, with current grid stability an issue. Main grids in Australia and NZ date from the 1950s and 60s, and there are population increases placing and added burden on these older grids at a time when upgrade is well due. Balanced input of any alternative energy to the grid can be economically implemented, excess could be directed to water heating, large-scale battery charging, especially vehicular, etc., and, power prices should also be adjusted during times of peak AE input.

6) ***Much is made of power costs versus efficiencies,*** and, solar gets bad press in this regard by lobbies pushing for complex technical and mechanical power solutions, or, protecting some other outdated economic status quo. Present PV solar technology, at about 27% efficiency, will peak at about 30%, the average off-the–shelf for stand-alone purposes is presently about 20%. But, the price of manufacture has been NZ/AU$10 per watt for more than 30 years, and will continue to fall in relative terms. As well, there is ongoing R&D improving solar technology, especially involving wider utilisation of the solar spectrum. Solar power should be seen as a major power supplement for most installations, unless very large panels and batteries are installed in standalone situations, and, in the case of grid interface, the main grid will support on-demand intensive power needs, then, the solar power unit will farm back solar-generated power, at other times, for a cash return. Note that grid power to a wall-switch is only about 30% of initial power generated, the rest being lost to heat, distance, resistance, inversion/conversion, regulation, metering, et al.

New solar technology also means a healthy market in used solar equipment, so, larger budget-priced arrays can be installed, especially for standalone use. Improving climate-related architecture, improving home appliance technology, utilising thermal hot water, plus, careful supplementation of heating and cooking by other means, such as main power, (not including standalone situations), plus efficient wood-burning, or, of natural gas, (which can be supplemented by biomass production as well), all make solar power more attractive and cost effective. All types of AE power generation can benefit from similar considerations of energy conservation and careful usage. Note that solar PV power can also provide hydrogen generation for fuel cell use, as well as for main grid or standalone use, outside of peak usage periods.

Meanwhile, the average combustion engine is no better than 30% efficient, as well, and that does not take into account the gross energy expenditure to actually bring fuel to the pump, as well as the energy, and the cost, being non-recoverable, once expended. Likewise, apart from capital cost, dams expend water one-way only, depending thence on replenishment that is climate-dependent, and, there are efficiency penalties and costs in turbine use, plus major unimodal power grid reticulation that loses some 60% efficiency as well. **Note again, that grid power to a wall-switch is only about 30% of initial power generated,** the rest being lost to heat, distance, resistance, inversion/conversion, regulation, metering, et al. Geothermal and fossil fuel power can be similarly subjected to cost /efficiency scrutiny, and when this is done properly, solar power, both PV and Thermal, look much more worthwhile, especially when GHG emissions are considered, and, low maintenance and long working life are included.

Solar PV power farming will ensure the quickest return of manufacturing costs in a way that no other power source can possibly do, (5 years is quite realistic, the less so as power prices will continue to rise), and, there really is 'power for free' until PV efficiency declines after 30 years or so. Capital investment is thus returned, and then exceeded, whereas power paid by the usual grid consumer is money that is lost forever. With solar power, both PV and Thermal, the old adage, 'the more you eat, the more you get paid', really does apply in the full economic sense of limitless power returns. Solar farming can connect to any part of a main or regional power grid with simple DC-AC inversion, plus interface technology, and there is consequently less loss of power efficiency to 'The Grid' compared to reticulation from major conventional power-generating plants.

Note that batteries are usually only necessary for standalone applications, and, these are the same batteries that would support wind or water power as well, most commonly flooded lead-sulphuric-acid, and for ultimate low maintenance, nickel-iron-sodium-hydroxide. Lithium-Ion batteries are now in common use, with high recharge cycle rates, and Calcium batteries show even more potential for similar efficiencies. (See also **Nofrillstech.net** re battery management information.) Large scale FLA battery piles have been used to support main power grids in the past, eg, at Niagara Falls, but, t***he water actually held in the dams is always the optimal power storage solution,*** so, any alternative energy source that complements and supports this should be used. Solar power is thus mooted as the best alternative solution, with potential for ubiquity, easy grid interface, and, an energy efficiency that compares very favourably with other energy sources, if gross and net energy costs are factored into efficiency equations, especially solar hot water production.

Most importantly, solar power, whether PV or thermal, is infinitely renewable, gives an early refund, and more, on investment, does not involve serious environmental siting considerations, and, is very low maintenance. Plus, solar power is endlessly ubiquitous in application, even within the far reaches of the Solar System, or, during Polar Summers! Grids with time zones, as well as longitudinal spread, that would utilise solar power, are particularly well favoured because of the continuity of insolation within the grid, plus, staggering of peak usage, and this should always include solar hot water temperature boosting, which also eases grid demands.

Thus, solar power is a potential agent for regional co-operation, as well as for national and even international co-operation. Consider Pan-Eurasian, Pan-African, or Pan-American power grids supported by solar power, and any other utilisable energy source, which will now increasingly be the Australian grid supplementation model, as a further example.

Solar Power for World Peace…? Not least to prevent looming World Water Wars..?

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