Friday, 3 December 2021
Comments on the discussion today.

Dear James,

I would like to submit the following feedback to the group.

> "What we must always remember is that nothing that New Zealand does in the way of reducing emissions of carbon dioxide will have the slightest effect on the world's climate. Many of the things that are proposed will actually increase worldwide emissions – shutting down the smelter is only one of them. We should not be blindly embarking on projects that are very expensive in terms of dollars/tonne of carbon dioxide saved. Nor should we be doing anything that will result in an increase in world wide emissions.
>
> I think it is wrong that the "base case" is a decarbonisation scenario postulated by Transpower. "Base cases" are normally based on business as usual. Which, in our case, would be continued gas and geothermal generation. That would provide a benchmark for the other scenarios would reveal the extent of any extra costs imposed on the consumers.
>
> The study should have looked at all options including nuclear power and continued hydropower development. Both are quite feasible (nuclear power is not banned by New Zealand's anti-nuclear legislation) and are likely to be cheaper than the probably very high but highly uncertain costs of renewable energy and the necessary storage. Note that the Climate Commisson's scenario includes 6000 in W of wind generation and another 6000 MW of solar generation that will need something like 5000 MW of storage capacity. Inevitably, this will be a very expensive way of meeting the postulated 4000 MW of increased demand.
>
> The key is assumption behind everything discussed is that sufficient storage will be available at an acceptable price to keep the lights on when the sun isn't shining and the wind isn't blowing. No rational organisation would be willing to invest in large-scale wind and solar power until they are confident that the necessary storage is available at an acceptable price. I don't think enough attention was paid to this. I know it's being handled by the NZ Battery Project but, by now, they must at least have some idea of the timeframe and a lower limit on costs. At the very least, this assumption should have been set out.
>
> It should be noted that batteries and hot water control both store energy: water heaters are much cheaper and there could easily be 500 MWh of storage already installed and waiting to be exploited. For reasons that I do not understand there is a lack of interest in making full use of hot water control which could make a major contribution to load management, spikes in price and in demand, system stability and a number of other things. A group of experts that I set up did get some interest out of Vector but they canned the project without explanation just as we were about to commence building prototypes.
>
> I attach some of the work I and my group have done on smart thermostats."

Kind regards,

Bryan Leyland

Tuesday, 14 December 2021

Consultation Paper - Consultation on the draft report, Opportunities and challenges to the future security and resilience of the New Zealand power system

1 There seems to be no discussion on affordability yet it is a key factor. My interpretation of the Climate Commission report is that something like 12,000 MW of wind and solar plus at least 4000 MW of unspecified energy storage is needed to keep the lights on and cater for the expected 4000 MW increase in demand from electric vehicles and heating.

The need for storage is determined by the amount of energy that needs to be put into storage when the wind is blowing, the sun is shining and the demand is normal. (Demand 10,000 MW, existing hydro and geothermal ~4000, wind + solar 10,000 = 4000 into storage)

If wind and solar costs say $1500/kW and long-term (more than 10 hours) storage is $4000/kW, total cost is about $8500/kW of load served. Capital charges alone would be in excess of $0.10/kWh and operation and maintenance would be at least another two cents. When the costs and losses involved in purchasing the stored energy are also taken into account, the wholesale cost of electricity would be close to $0.20/kWh. Roughly double the existing price. According to the Climate change commission, prices would be in the vicinity of $0.10/kWh.

2 The costs and problems and the timescale involved in providing the necessary storage do not seem to have been considered. As proposed, Onslow is 1200 MW which leaves another 2800 MW to be found. Onslow has many major problems related to cost, hydrology and system operation. It would take at least 10 years to build.

3 A proven, low emissions, safe, reliable, and environmentally friendly option is nuclear power. It is not discussed even though nuclear power generation is not prohibited by New Zealand's antinuclear legislation and there will soon be a number of small modular reactors available on the international market. Right now, ~400 nuclear power stations are under construction or planned. https://www.world-nuclear.org/information-library/current-and-future-generation/plans-for-new-reactors-worldwide.aspx

4 Another option is continuing with gas combined cycle generation. There is now a strong movement afoot in Europe to have this considered as "green".

5 Insufficient consideration is given to the timescale needed for environmental approvals, design, construction and commissioning or to the resources of manpower and materials needed to build wind, solar and storage schemes at the rate postulated.

6 Major changes will be needed to distribution systems to accommodate electric car charging and also exporting electricity from rooftop solar. These cannot be ignored.

Kind regards,

Bryan Leyland,