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To: Market Development Advisory Group (MDAG), Electricity Authority

Subject: Price Discovery under 100% Renewable electricity Supply – Issues Discussion Paper

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Date:

Submission in response to: Price Discovery under 100% Renewable Electricity Supply – Issues Discussion Paper

Engineers for Social Responsibility Inc. (ESR) is an independent group of engineers who consider that being knowledgeable in the field of technology means that they also have a special obligation to the public at large in matters that relate to engineering, or that can be addressed using engineering approaches. Given the urgency of the issue, for some time now the organization has been particularly focused on how to respond to the climate crisis by reducing emissions and concentrations of greenhouse gases in the atmosphere.

The key authors of this report are members of ESR with strong experience and qualifications in engineering, and a broad knowledge in relation to global heating, what is causing it and how it can be addressed.

General

Clause 1.1 of the Discussion paper (P7) says that "The imperatives of climate change require us to urgently reduce emissions of greenhouse gases, both long-lived and biogenic methane". Clause 1.3 then says that the increased electricity demand we can expect over the coming period "sums up to a 'ramp' of sustained investment in new renewable electricity out to 2050 (and probably beyond)". Following that, Clause 1.8 (P 8) says regarding the MDAG, "our task is to look at whether our wholesale electricity market design is set up to efficiently enable the expected electrification 'ramp'".

We very strongly agree with the need to take strong and immediate steps to limit climate change by reducing our greenhouse gas emissions. There are major issues regarding how the electricity market currently operates that are related to this and require urgent attention, but do not seem to be specifically covered in the discussion paper.

These issues could perhaps be related back to Question 12 in the discussion paper: “Are there any other ‘lumpy’ issues that warrant specific consideration in the transition to 100% RE?” (P28, P102).

1. Electricity market pricing system needs to change

Under the current electricity market system, which has been in place since the mid 1990s, over each half hour period, all generators feeding into the grid get paid the same price per kWh as was bid by the highest priced generator supplying the market at that time. This is often the Huntly power station, running on coal and sometimes natural gas. Other generating companies therefore take steps to keep Huntly in the market because it pushes up the prices they receive and increases their profits.

This market system is effectively encouraging the ongoing use of fossil fuels to generate electricity, and at the same time is severely retarding the development of renewable alternatives. For example, around 10 consented windfarms remain unbuilt, including one behind Huntly that alone could supply up to half the power that Huntly does. Also at least one hydro company has been accused of deliberately spilling water in order to reduce hydro supply and keep Huntly in the market.

Electricity can often be generated at lower cost from renewable energy sources than from coal or gas. Despite this, because of the way the market works, Huntly power station continues to produce large amounts of electricity from fossil fuels, and its coal use has actually increased over the past couple of years.

We need to move to a market system where payments to suppliers are based on their generating costs and not on the bid put in by the highest priced supplier. This move could also be expected to reduce electricity prices for consumers.

2. Electricity market needs to give priority to renewably powered generation

In 1991, Germany started giving renewably generated electricity priority access to the grid. Its electricity generated from renewable resources has increased from 3.4% in 1990 to around 43% now, with aims to move to 100% renewable by 2035. Meanwhile, our electricity from renewable resources only increased from around 81% to 84% over the 1990-2021 period

We need to follow the simple step Germany took in 1991, giving renewably generated electricity precedence in entering the market over fossil fuel generation. Huntly would then rapidly move to back-up status, and later to complete retirement from fossil fuel use.

Changing how the pricing system works, and giving priority to renewably generated electricity can be expected to have a strong and immediate effect on the development of more renewably powered electricity sources. We are going to need this increased generating capacity as we move away from fossil fuel used for heating, transport and industrial uses.

3. Reduced electricity charges to consumers will speed up move away from fossil fuels

Domestic users are now paying, after adjusting for inflation, around 80% more per kWh of electric power that in 1990. This is primarily because we moved to a market system in which all electricity generators feeding into the market get paid the same price as the highest priced generator supplying the market at that time

Besides effectively being unfair to consumers, because what they pay does not relate back to actual generating costs, it is also a disincentive for them to use electricity as an option for moving

away from reliance on fossil fuels. Moving back to a system where electricity prices reflect actual generating costs would address these issues.

4. Allow local electricity generation to feed into the grid at a realistic price

People and businesses with solar panels, or other systems for renewably generating electricity, are sometimes not given permission to feed excess power into the grid, and if they are, often receive quite low prices. This needs to urgently change, as they can potentially make a significant contribution to our total power supplies. Local electricity networks also need to be allowed to connect into the grid, so that they can both buy and sell electricity via this system.

5. Providing generating capacity when wind, solar or hydro capacity is low

Beyond the proposals for changes to how the electricity market works, as covered above, there is also the question of how to provide sufficient electricity supply when wind, solar or hydro capacity is low. Some points in relation to this are covered below

Move to renewable heat-providing fuels

Currently there is a large quantity of timber logs and off-cuts in New Zealand that currently just go to waste. Some timber mills and other commercial operations are now using this material to provide heat and energy.

The Huntly power station could also potentially move to using biomass to provide energy, which would allow it to stop burning fossil fuels, but to continue providing a back-up when other generating sources cannot meet the demand. It is encouraging to learn that Huntly's owner, Genesis, recently announced it plans to trial the use of sawdust compacted into wood pellets to power one of its Rankin boiler units at its aHuntly plant.

Development of other energy sources and back-up capacity

Power from tidal currents is a reliable energy source that only ceases to be available during fairly brief periods when the tide changes direction. In 2008 Crest Energy obtained a consent to place 100 turbines in the Kaipara Harbour, which was later increased to 200 turbines, with a total capacity of 200 MW. The project was dropped in 2013, reportedly because of uncertainties about the electricity market.

Experts tell us that tidal currents in Cook Strait could potentially be used to generate all of New Zealand's electricity. In 2009 Neptune Power received a consent to install a trial turbine there that would produce 1 MW of power. On the basis that this was successful, the plan was then to install 30 turbines that could generate 350 MW of power. However, for reasons that are not clear, the installation of the trial turbine never went ahead.

We need an electricity market that operates in a way that encourages the development of new forms of renewable electricity generation, like tidal power, and that provides some sort of incentive for generating companies to create extra capacity that can be used as backup.

Return to the use of ripple switches

Back in time, it was standard for domestic dwellings to have ripple switches that allowed their electric hot water systems to be temporarily turned off remotely. This was used to reduce electricity

usage during periods of heavy demand. Returning to this sort of approach would strengthen the reliability of our electricity system at comparatively low cost.

Demand side solutions

Solar power is less available during winter, when power demand for heating is high. To reduce winter power demand peaks an investment in better insulations of houses will mitigate this issue.

6. Further comments

It is interesting that in 2013, while the National Party was in power, Labour and the Greens, working together, put forward a proposal to address the two key market-related issues covered above. They proposed setting up a single buyer in the power market, NZ Power, that would purchase the electricity from the power companies for a price that reflected their generating costs. They said this would reduce the average New Zealander's power bill by up to $330 a year. It was also proposed that NZ Power would prioritise renewable generation and energy efficiency.

National won the 2014 election and the proposal was not implemented. The need for action is now even more urgent than it was in 2013 – 9 years ago. Taking these steps would lead to a rapid increase in renewable generation capacity which we will need as we move away from fossil fuels.

In conclusion

The simple steps, covered above, will allow us to rapidly reduce the use of fossil fuels for electricity generation, and at the same time to increase our renewable generating capacity so that electricity can be used to replace fossil fuels as an energy source on other parts of our economy. In order to protect ourselves, our children and grandchildren, our planet, and the many other living species we share it with, we need to take these steps now.

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