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Submission in response to: Accelerating renewable energy and energy efficiency

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

The key authors of this report are Peter Whitmore and Thomas Neitzert. Peter Whitmore holds a PhD in chemical engineering, has experience working in glass manufacturing and metal processing industries, later ran his own business and has more recently been involved in climate change-related issues. Thomas Neitzert is a professor emeritus of mechanical engineering at Auckland University of Technology and has a background of leadership positions in industry as well as academia in New Zealand and overseas.

Where we need to aim

Accelerating the use of renewable energy and improving energy efficiency are both very important steps that need to be taken, and we agree with many of the suggestions in the Discussion Document. However, given the extreme climate emergency we are currently now facing, with the strong possibility of catastrophic outcomes if it is not adequately addressed, these steps on their own are not nearly enough for New Zealand to contribute sufficiently towards holding global heating below the current internationally agreed limit of 1.5°C.

Also, the emphasis in the Discussion Document (eg, see p 8) seems to be primarily about New Zealand achieving its currently set climate goals. These are given as: (i) net zero greenhouse gas emissions (except biogenic methane) by 2050, as covered by the Climate Change Response Amendment Act; (ii) our 2030 reduction target made under the Paris agreement; and (iii) the aspirational goal set by the government of 100% renewable electricity by 2035.

Two of these goals are not nearly strong enough for New Zealand to play an appropriate role in holding global warming to under 1.5°C.

First, our Paris target, to reduce our emissions to 30% below 2005 levels by 2030, may initially look reasonable, but it is actually expressed in a non-consistent way by comparing gross emissions in the base year with net emissions in the target year. When expressed in a consistent way, comparing net emissions in the base year with net emissions in the target year, based on recent data we are actually undertaking to increase our emissions to 7% *above* 2005 levels by 2030.

This appallingly weak target has now been made obvious for some time, for example, by the previous Parliamentary Commissioner for the Environment, Dr Jan Wright, in her final report (Stepping stones to Paris and beyond, July 2017), but is still not being made clear in government-related documents, for example, in this Discussion Document.

Second, the goal of 100% renewable electricity by 2035 is also way out of line with the emissions reductions we need to achieve. We can and must do much better than that. See under Specific Points.

Recommendations:

We recommend that MBIE aligns its work and its future suggestions with much faster emissions reductions over the coming period than seem to have been considered to date.

We further recommend that in any future documents, or other communications, that MBIE expresses New Zealand's current Paris target in a consistent net-net matter, and also makes a strong case for the government to do likewise.

Emissions prices needed to drive change

The Discussion Document (p 16) notes that "the NZ-ETS is the key mechanism for reducing emissions". Although the need to reduce emissions has been clear since at least 1990, the ETS only came into effect in 2010, and emissions charges have been too low during most of its life for it to have had any very significant effect.

It is the cost of the damage the emissions are causing that needs to be the primary economic driver for change. As long as emissions charges are below the damage cost, we are subsidising the destruction that emissions are causing to our planet. In keeping with this, the New Zealand Productivity Commission stated in its recent report (Low Emissions Economy, August 2018, chapter 5, p 125): "the Commission recommends a system in which emissions are priced at the level that reflects their harm".

Regarding the cost of the damage emissions cause, often referred to as the social cost of carbon (SCC), the IPCC in its recent report (Special Report on Global Warming of 1.5 °C, October 2018, chapter 2, p 151) says: "the SCC literature has identified a range of factors,

assumptions and value judgements that support SCC values above \$100 tCO₂-1". This is equivalent to above around NZ\$155 tCO₂-e.

The IPCC further concludes that in order to achieve the reductions in emissions that are required to meet the goals of the Paris Agreement, overall global emissions will need to be reduced by around 45% and coal emissions by around 68% below 2010 levels by 2030, and to achieve this by that date carbon prices will then need to be in the range of US\$135 (approx. NZ\$210) to US\$5,500 (approx. NZ\$8,500). Sweden already has a carbon tax at a level of around NZ\$195, and their economy continues to be strong.

It is very clear from all this information that we need to increase our emissions charges rapidly from the current \$25/ t CO₂-e level to over NZ\$155, with further plans for them to be over, and possibly well over, NZ\$210 by 2030. We also need to plan for likely increases in these cost figures, as there is growing evidence that the earth is warming more quickly than the available data showed when the 2018 IPCC report was published. See, for example, Marlowe Hood (Society of environmental journalists, 17 Sept 2019).

Increasing carbon charges to these sorts of levels would be much simpler, give much clearer price signals, and require much lower administration and compliance costs if we had a simple carbon tax rather than the current ETS. This is not covered further in the current submission.

With an increase in emissions charges of \$25 per annum it would take us over 5 years for charges to reach a level of \$150 – still below the possible damage cost as given by the IPCC. A faster increase than this would be appropriate. Continuing at the \$25 per annum rate of increase would, by 2030, take us to the lower end of the price range of NZ\$210 to NZ\$8,500 that IPCC says will be necessary by that date to meet the goals of the Paris Agreement. However, as covered above, we can expect that this price range will have moved upwards by that date.

The Discussion Document gives information (p 16) on conclusions reached by the New Zealand Interim Climate Change Committee (ICCC): "The ICCC estimates that switching away from coal to electricity or biomass at scale will become economic with emissions prices in the range of \$60-\$120/t CO₂-e" and that "switching away from natural gas starts to become economic only above \$120/t CO₂-e". This further drives home the need for a rapid increase in carbon prices.

While there are many useful points made in the consultation document, at present fossil fuels remain the cheapest energy alternatives for many entities. They are also the energy sources that their equipment is designed to use and that they are most knowledgeable about for those applications. If carbon charges start rising rapidly towards \$150/ t CO₂-e, and then beyond that, we can expect to see a rapid uptake of renewable options that would then become more economic alternatives.

These higher carbon charges will require some way of compensating the general population for increases in the cost of living that result, for example, a citizen's dividend paid to all residents, with a half share for up to two children per family who are under 18. This is not covered further in the current submission.

Recommendations:

We need to rapidly start increasing our ETS carbon charge up to the damage figure. This will require significant changes and investment for some businesses, but the longer action is delayed the more damage is done, and the more difficult it is likely to become for businesses to make the necessary changes.

Some of the suggestions in the Discussion Document make excellent sense as they would assist entities in planning ahead and making sensible decisions on how to proceed.

Financial assistance from the government might well be appropriate in some cases to assist business and other entities in making the necessary changes. This could be financed from some of the revenue received from the carbon charge.

OTHER SPECIFIC POINTS

Accelerating renewable electricity generation and infrastructure

Currently around 84% of our electricity is generated from renewable energy sources. In September 1990 the then Prime Minister, Helen Clark, announced a national target of 90% renewable electricity by 2025. More recently, modelling in the IPCC's report, Accelerated Electrification, showed that under "business as usual" we could reach 93% renewable electricity by 2035.

We can, and we must, do much better than this.

Currently, the electricity market works by giving all the suppliers the same price per kilowatt hour as the highest bidder whose electricity is accepted into the market. This highest bidder is often the Huntly power station. The other suppliers therefore like having Huntly in the market because it pushes up their profits. It appears that some of them therefore take steps to keep Huntly active. This is one reason why around 12 consented windfarms, including one in the hills behind Huntly, Hauauru Ma Raki, that has the potential to supply around half the power that Huntly can, have never been built.

Recommendations:

We need to follow in the lines of the German model, and give electricity generated from renewable resources priority access to the electricity market, regardless of price. This would rapidly move Huntly and the other fossil fuel-powered stations into standby mode.

We also need to change how the electricity market works. The price consumers pay should be based on the average price paid to suppliers, not on the highest price paid.

We further need to ensure that electricity companies have the incentive to develop more generating potential from renewable resources because electricity demand is going to significantly increase as we move away from the use of fossil fuels for process heat, transport and other uses. The government could also become involved in this activity.

Maintaining a reliable electricity supply system

There are also steps we can take to provide renewably generated electricity when the sun is not shining and the wind is not blowing. For example, some lakes and hydro dams can be used effectively as giant batteries by holding the water back in them, or even pumping it back up to them when surplus power is available, to produce power when other generating capacity is low.

Tidal stations are another option for producing steady outputs of power, except for brief periods during tide changes. For example, a 200 MW power station previously planned for the Kaipara Harbour never proceeded because of uncertainties about the future electricity market; and a trial turbine in Cook Strait, a tidal channel which experts say has very large potential for generating electricity, never proceeded, very likely for the same reason.

Recommendation: The necessary steps need to be taken so that power companies, or the government, follow up on the above options and make the necessary developments required to maintain a reliable power supply network.

Wind energy

Wind is a key energy source for increasing our renewable electricity generation. Because of all our hill country, typically with limited housing on it and average windspeeds higher than in Europe, off-shore wind farms may not make such economic sense as in some overseas locations.

Recommendation: Ensure that we have rules and requirements that do not unnecessarily block the development of windfarms, including ways of dealing with “not in my back yard” complaints when the proposed windfarm is not at all close and will have no significant effects other than perhaps being visible in the distance.

Wood fuel

Our understanding is that there are sufficient quantities of unused wood waste available to replace coal and natural gas in some major operations requiring process heat, for example in the dairy industry. This is effectively a sustainable fuel if the trees used to produce it are re-planted. Wood is also being used in Sweden to generate gas, which is then fed into the country’s gas distribution system. Our understanding is that the effects on local air quality of emissions from burning wood are normally less damaging than those from burning coal.

At present, the processing and supply system for commercial quantities of wood waste is not well developed because demand is still very low.

Recommendation: We recommend that steps be taken to encourage the development of a wood fuel industry, the use of wood waste as a fuel, and to relax any requirements that might block its uptake.

Geothermal energy

Geothermal heat is already being used in New Zealand to generate electricity and for process heat. However, there are related CO_{2-e} emissions from extracting the geothermal hot water and steam.

Recommendation: While we understand that for a given amount of heat recovery CO_{2-e} emissions from geothermal energy are somewhere around ten times lower than from burning coal, we recommend that the emphasis be more on wind, solar and tidal energy sources.

Solar power

Currently, our understanding is that many power companies are not keen on accepting solar power from their clients, and often pay a quite low price when they do accept it. In some places overseas, for example in Germany, where presumably the treatment of solar producers is better than here, there are areas with large solar installations, sometimes sufficient to supply all the electricity in a neighbourhood by releasing some to the grid during the day and buying it back at night.

Recommendation: We recommend that the existing rules be reviewed and/ or new ones be established that allow home owners, businesses and others to proceed with solar installations and to be able to feed into the grid and obtain a fair price for what they generate.

Local networks

Our understanding is that community energy networks can potentially offer advantages in some circumstances, but that there are currently a number of barriers to being able to establish these.

Recommendation: We recommend that the way the electricity market works, and the requirements that electricity suppliers are required to meet, be changed so as to allow local networks to become established and work in an economically effective manner.

Resource Management Act

Currently, climate change-related matters are not permitted to be considered under the Resource Management Act. This is extraordinary since these are often now the leading environmental issues that need to be considered.

Recommendation: The Resource Management Act urgently needs to be amended so that climate-change-related issues can be considered when deciding whether or not to grant consents.

Other steps to encourage or require the uptake of renewable alternatives

Some possibilities in this regard are covered by the Discussion Document.

Recommendation: We support the introduction of appropriate rules/ regulations/ controls that will promote and speed up the move to renewable energy sources. We therefore recommend that these options be followed up further.

CONCLUDING COMMENTS

For New Zealand to play an appropriate part in holding global warming to under 1.5 °C, much faster reductions in emissions are required than seem to have been considered in this Discussion Document.

To drive these changes at the necessary rate, we need the price of emissions charges to rise rapidly.

Changes in how the electricity market operates could also have a rapid effect in moving us towards having a 100% renewable electricity supply.

Many of the steps that MBIE has suggested to accelerate the uptake of renewable energy, and to improve energy efficiency, sound sensible, but they need to be developed so as to be appropriate when emissions prices are rising rapidly. We have made some suggestions in this regard under Specific Points.

OTHER

Currency conversions from based on US\$1.00 = NZ\$1.55, as at mid-February 2020.

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On behalf of the National Committee of Engineers for Social Responsibility Inc.
