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Submission on The climate Change Consultation document

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Notes

- Although I am an engineer working for Fisher & Paykel Appliances Ltd. I am making this submission in a private capacity.
- I am happy for any or all of this submission to be placeed in the public domain.

Q1.

Do you agree with the above objectives for our contribution?

Objective 1

No. It talks of the cost and impact on society of taking action – but does not balance this against the cost and impact on society of inadequate or zero action.

NZ may be a very small bit player in the total sum of emissions but we can act as a catalyst. I saw this in the Montreal protocol negotiations where I was one of the official NZ delegates. (My F&P work has been focussed on refrigeration appliances with their ozone-depleting refrigerants. As a consequence I got thrown into this arena by David Lange.)

Objectives 2

Yes.

Objective 3

I don't consider that we necessarily need to remain subject to the price of carbon and fossil fuels – if we set to weaning ourselves from them. However I agree wholeheartedly that we do need a robust multipartisan plan in place that is not chopped and changed each election cycle. This plan should be enhanced as developments make more options economically viable (as will certainly happen).

What is most important to you?

The whole matrix – not any one item.

Q2.

What do you think the nature of New Zealand's emissions and economy means for the level of target that we set?

Agriculture

In this area we should not expect to pick up answers from other countries as our agriculture is somewhat unique and we have the expertise to do the research and make the breakthroughs. This is certainly an area where we will need to lead and let others follow. It does mean, however, that it is difficult to predict precisely what will be achievable as we appear in this sector to be starting off slightly behind the ball game.

Electricity

While we are doing quite well with renewable electrify generation, we would not use this as a cop-out for going no further than "our fair share". Consider Norway. 98 % of its electricity is from hydro – yet it has a 40% reduction target. We have a variety of under-exploited options for generating renewable electricity and should be aiming for close to 100% and with more electrification of rail and road transport.

Rail

I believe that we should reinforce / extend our rail network (reinstate the Gisborne line, upgrade the North Auckland line and build the short spur to Marsden Point). We should also electrify the lines that should be heavily used (such as the Tauranga line, the Auckland commuter line from Huntly, Helensville and perhaps the line to Marsden Point.

No way should we even be discussing de-electrification of the Palmerston North – Hamilton section of the main trunk. That bespeaks of out-of control sector interests rather than everyone working for NZ Inc.

Private transport

We have a somewhat unique combination of factors in favour of electric cars:-

i) We have a relatively benign climate (batteries do not like extremes of temperature).
ii) We have a high percentage of renewable electricity generation (and the potential to push it out to virtually 100%).
iii) Most people do not park on the street at night (i.e. they can have a domestic charging point in their garage, basement or driveway.
iv) We have a high per-capita vehicle ownership.
v) We have a relatively affluent population.

Considering the pace of development, it is likely that PEHVs (Plug-in Electric Hybrid Vehicles – like the Mitsubishi Outlander or its successors – for example) will become a financially attractive option in many instances within a very few years – provided neither the government nor the energy companies do anything to muck it up. (No road-tax until 2020 is a good start – and could be extended – when most of the running is done on "plugin" electricity and the rest on petrol, setting up an equitable road-tax regime will be "interesting.")

Q3.

What level of cost is appropriate for New Zealand to reduce its greenhouse gas emissions? For example, what would be a reasonable reduction in annual household consumption?

To assume that there is necessarily any cost increase is unduly pessimistic. When we were committed to eliminating CFCs in domestic refrigerator and freezer refrigeration systems, we had only the vaguest idea of what the alternatives might be, yet we replaced them entirely well within the required lead time and without any increase of either price or energy consumption for those appliances. While energy consumption continues to come down we have now also replaced virtually all the high global-warming refrigerant (that replaced the CFCs) – again with no significant effect on price (but in both cases a not-inconsiderable amount of development time as well as expenditure on manufacturing equipment for the safe use of the new alternatives). Both of these changes were greatly facilitated by the fact that globally, manufacturers were mandated with the same challenge and so compressor, refrigerant and insulation manufacturers shifted their development focus onto the required hardware and chemicals alternatives.

As another example our house has a solar water heater that has paid for itself multiple times over in the 30 years that we have had it.

Legislation and / or pricing can help or hinder

MEPS

Australia and New Zealand have joint MEPS levels for appliances (though primarily managed from the Australian end). The next round of MEPS tightening for refrigerators and freezers, underway last year, has come to a grinding halt. Without regulation setting firm goals and no time-line, our development team has shifted their focus onto other things. No target – no focussed action – ultimately more cost – both to the company and the environment.

LED lighting

Every socket where a 60 W filament bulb could be replaced by a 10 W LED, (same light output) would save the cost of the LED bulb every 1000 hours (the life of the filament bulb) and would go on to save around $13 every thousand hours thereafter for the life of the LED bulb. (LED lives, while quoted out to 50,000, are still somewhat variable). So how do we get people to change? Apart from osmosis, we could simply ban filament bulbs (as other countries have done) – or we could tax them so people only bought them when they wanted little heaters. (From my experience with eliminating CFCs and with meeting ever-tightening MEPS levels, I am convinced that in these sorts of environmental areas, realistic regulation is by far the best approach to achieve timely, widespread and cost-effective outcomes.)

Household PV

Let us consider roof-top PV electricity generation for examples of different options and their effect on the environment:-

a) When it was first introduced into Australia, people in some jurisdictions were paid substantially more for their PV-generated power fed back into the grid than they were charged for power they bought from the grid.
b) With net metering (legally required to be available in some jurisdictions – for example "*In the United States, as part of the Energy Policy Act of 2005, all public electric utilities are required to make available upon request net metering to their customers.*" (http://en.wikipedia.org/wiki/Net_metering)) people are only billed for their net

consumption at least until they are exporting as much in a billing period as they are importing from the grid. They are, in effect, using the grid as a giant (free) storage battery.

c) Here the energy companies bill me for what I take from the grid and pay me for what I put in – but at a rate that is heading for about 25% of what they charge me. And GST also has to be paid on "my" electricity that I put into the grid then get back out.
d) The situation is set to get even worse in South Australia *"SA Power Networks says it will now move to charge solar customers $100 more than other average households."* (see http://www.businessspectator.com.au/article/2015/5/27/energy-markets/sa-power-networks-inconsistent-penalty-solar?utm_source=exact&utm_medium=email&utm_content=1378424&utm_campaign=cs_daily&modapt) This article states that 28% of the households in South Australia have PV installed.

Consider what effect these various regimes will have.

a) This encouraged early adopters (and – considering the dramatic recent drops in PV costs is probably "overkill" now).
b) This option is now commercially viable in many places and would encourage a widespread adoption of PV on appropriate rooftops. Requiring such a regime (and ensuring that neither the energy nor the line companies blocked its fair application) would have a huge effect on the net household electricity consumption here.
c) The economics probably only stack up for situations where people can use most of their own electricity.
   i) either as they generate it – as in commercial premises, schools etc.
   ii) or by storing it in batteries for later use. (Although battery storage cost is falling dramatically, this is still not economic.)
   In either situation, expect the take-up to be dramatically reduced with people installing not more PV generation than they calculate they will be able to use themselves. (We are one of the households on Vector's pilot program. Our system includes 3 kW of PV (solar panels) and 10 kWh of battery storage and for precisely this reason we installed the smallest system they were offering even though we had roof space (and funds) available to install the biggest one).
   While there will also be some take-up by people who care more about the environment than their hip pocket, the take-up will be quite restricted.
d) Under this regime, the most cost-effective option for the household or business may well be to go off-grid. This will require a significant investment in batteries (for example, for a house, ~ $14,000 for 14 kWh of storage with two 7 kWh Powerwall packs as recently announced by Elon Musk of Tesla). The take-up is likely to be very low as the cost will be high and people are only likely to do this if they really care for the environment and really want to make a statement.
   Even apart from the low take-up this is the worst option from a global warming perspective. Sometimes each property will be capable of generating more electricity than it can use or store and system will simply shut down as it cannot even give it away to the grid if it is not connected. At other times there will not be enough generation and the household will have to resort to such stratagems as running a fossil fuel generator, using LPG for cooking and heating – or a combination of these.

Because the life of PV installations is measured in decades, not years, it is imperative that the pricing regimes are clearly defined and don't chop and change dramatically from election to election.

There are four parties involved in all this:-

i) the householder, business or school etc. using electricity,
ii) the lines company moving it from where it is generated to where it will be used,
iii) the generator who is producing it for the grid and selling it,
iv) the environment .

What is optimum for one is not quite optimum for the next one. If PV is going to make a significant contribution to cutting greenhouse gases, it will be necessary for central Government to hold the reigns steady and, on occasion favour the environment over the generator.

What would be a reasonable reduction in annual household consumption?

Our all-electric household (of two adults plus a boarder for some of that) had an average daily consumption of 6.5 kWh/day for the last year. However as our PV installation generated 8.42 kW, our net consumption from the grid was – 1.92 kWh/day. We have done most of the obvious things to cut consumption (but not utility) and would not expect to be able to reduce our daily consumption much more. On the other hand I suspect that most houses could, to their net economic advantage, cut their consumption **by** at least 6.5 kWh/day (i.e. at least 25%). Any PV generation on their roofs would reduce (or reverse) their net consumption in addition to that. Note that household electricity consumption is falling here as well as in Australia and USA (and probably other countries for which I do not have data at my fingertips).

Consider these summarised statistics. While those for appliances are from AHAM (the [US] Association of Home Appliance Manufacturers – of which F&P is a member), the joint Australasian appliance MEPS levels are cloned from the US values to the trend data here will be very similar to that of USA. On request, I can supply the full data sets.

Appliance	From	To	Reduction
Top freezer frost-free refrigerator-freezers	1990	2011	-52.8%
Bottom freezer and side-by side frost-free refrigerator-freezers	1990	2006	-31.7%
Bottom freezer frost-free refrigerator-freezers	2007	2011	-0.2%
Side-by side frost-free refrigerator-freezers	2007	2011	-10.9%
All stand alone freezers	1990	2011	-26.1%
Upright frost-free freezers	190	2011	-36.6%
Clothes washers	1990	2011	-75.2%
Dishwashers	1990	2011	-50.8%

When last I did the exercise, the average age of all refrigerators that reached Fisher & Paykel's recycling facility was 15 years and freezers was over 20 years. (I didn't do washers.) Thus, **even without any further efficiency improvements in future models**, householders' normal replacements will significantly reduce appliance consumption. Efficiencies of models under development continue to be rather better than those of models now in production.

Heat pumps for both water and space heating are now available here with COPS of 3 or 4 or better. (The COP is the ratio of heat delivered to the energy used. Thus a heat pump with a COP of 5 will put 5 times as much heat into a room per unit of electricity used as will an ordinary electric heater.) There are several space-heating models listed on the joint Australia New Zealand Government web-site (www.energyrating.gov.au) with COP's over 5 – with the best one being 5.8.

Standby – the power that many devices (mostly communication and entertainment equipment) waste while doing nothing – is generally not measured in MEPS tests but, in an average house, adds up to more than that used by all the refrigerators and freezers. While the number of devices with standby is proliferating, the standby per unit is generally coming down as

designers now have better options available to reduce it. (As an example, early double DishDrawer dishwashers had 11 watts standby consumption while the latest ones have only 0.5 watts.)

LED lights are now available for just over $10 with a light output of over 100 lumens per watt (compared with an ordinary filament light bulb producing about 16 lumens/watt.

It would require a survey to determine how far these technologies have already penetrated the market place and how much savings should be expected from various penetration levels under various scenarios – but all of them (with the possible exception of space-heating heat pumps in very well designed and built houses that need zero or very little heating) are cost-effective and taken in concert over a period could be expected to cut consumption by perhaps 50% - perhaps more.

Q4 .

Of these opportunities which do you think are the most likely to occur, or be most important for New Zealand?

I think they are all important except for the last one with which I disagree

"Remaining aligned with the global transition to a lower-carbon economy will ensure we remain competitive and productive in a world where the emissions intensity of our products and services will increasingly be an issue."

I consider that (provided we take care that we do not export our polluting industries) we must at least match Europe's typical 40% targets. Indeed we should be looking at leaving the pack behind and thereby, reducing our costs, enhancing our "clean green" image and perhaps, most important of all, being a catalyst for change so that other counties follow our lead and we really do make a global difference to emission levels.

Q5.

How should New Zealand take into account the future uncertainties of technologies and costs when setting its target?

We could set two sets of levels, sector by sector. The looser one would be based on what we know there is the technology available now to meet – and the tighter one, not based on what others do but on what we anticipate developments might make possible.

Q6.

Is there any further information you wish the Government to consider? Please explain

The elephant in the room that we choose to ignore.

Successive governments, over the last few decades, have followed the mantra that growth of the economy is desirable and – it seems that population growth is also considered desirable. Clearly the effect of population growth runs counter to the reduction of emissions by NZ Inc. (as well as to running counter to many off the other values that we hold dear and that set New Zealand apart from most other countries.)