Organisation name	
Submitter name (on behalf):	**Molly Melhuish**
Date	**15 May 2015**

#	Question	Response
1	Do you agree with this description of the purpose of the EDGS, including the material in the appendix?	I agree that sections 35-40 accurately describe the purpose of the EDGS, but believe that the Capex IM gives undue protection of Transpower's revenues in the event they over-invest in assets.
2	In the absence of regional and prudent peak demand projections being a part of the EDGS, the Ministry would like to ask for your feedback on the best way to independently verify regional and prudent peak demand projections.	I agree with the workshop report, that MBIE should work with Transpower and others to create its own process to verify Transpower's regional and peak demand forecasts, mindful of the potential for "optimistic bias". Forecasts should include the potential for peak demands to be cut strongly by demand response including using wood burners on the coldest days, incentivised by critical peak pricing signals. Note that the Parliamentary Commission for the Environment considers that occasional high-pollution days (measured as PM10) do relatively little harm in public health terms, though they do exacerbate asthma.
3	Do you agree that the key uncertainties identified in this section, and the proposed eight equally weighted scenarios, sufficiently represent overall uncertainty for the purpose of the EDGS?	A fourth key uncertainty is the extent to which demand response, including heat (or cold) storage, fuel switching, and battery storage, incentivised by "smart tariffs", will be allowed to substitute for both generation and ancilliary services. PJM has demonstrated very big cost savings through such mechanisns. A single "disruptive" scenario is insufficient to weigh in this strong international trend, which will be greatly facilitated by NZ's "liberalised market"
4	Do you have any specific feedback on the proposed EDGS capital cost assumptions which are sourced primarily from the PB generation data update 2011?	no
5	Is the variation in key assumptions consistent with the scenario design and future uncertainty?	Tiwai 400 is not really compatible with low carbon. High solar uptake should be in more than one scenario, it's happening now. Demand response should become a key assumption, as real-time spot pricing has just been approved.
6	Given the current flat demand environment, should we put more weighting on low demand growth scenarios?	Yes because I believe flat demand has been largely driven by structural change, namely long-lasting energy efficiency investments (insulation, and efficient appliances and commercial HVAC and lighting).
7	Does the high uptake of electric vehicles (and Solar PV) that are used in our Global Low Carbon	This should happen in at least one other scenario, perhaps High Growth because that scenario can best support individual investment in costly systems.

	Emissions scenario adequately reflect future uncertainty?	
8	Should we put more weighting on the low gas availability option given the current level of oil prices?	Very subtle; I could not advise.
9	Does the range of retirement for the Huntly units across the scenarios adequately reflect the associated uncertainty?	I'd emphasise earlier rather than later retirement; partly as I think low carbon will be internationally required, partly because high base load generation makes it more difficullt to integrate renewables.
10	Are there any comments on the build schedules or other key results published in this document and the accompanying excel files?	These are part of a self-consistent model (see "Context" below). Climate change policies in Europe have driven a different, high-variable-renewables model, and 3 decades of energy efficiency investments in the US have also greatly influenced build schedules. New Zealand is in a fantastic position to use both types of technology to create a 100% renewable electricity sector using its uniquely comprehensive market mechanisms.

If you wish to make any further comments or suggestions please include them below:

Context

The purpose of MBIE's Electricity Demand and Supply Scenarios (EDGS) is to support a regulatory system that guarantees that Transpower's future revenue will meet its investment costs. Thus the ground-rule of EDGS is inherently business as usual (BAU).

In contrast to this is the concept of "contestable investments" close to loads, which enable consumers to reduce their energy bills or to increase the value they get from the energy they buy. Regulatory systems that guarantee network companies a return on their investment collide with consumers' decisions to make their own investments to improve their control over their energy costs and even satisfy their own aspirations - perhaps for self-reliance, or to reduce carbon emissions.

The EDGS scenarios are based on a model of electricity economics with costs dominated by the need to build new capacity, in lines and generation, to meet growing demand. Even the EDGS low-growth scenario has electricity demand growing at 0.7% per year – despite the fact that actual demand has been flat, on average, since 2008.

The German "Energiewende", already transitioning to high renewables penetration, is changing the value propositions of electricity (and other stationary energy) suppliers. Grid support services (GSS) are becoming a significant part of the income of even variable energy resources (VER) - wind and solar generators - despite their relative inflexibility. (New Zealand is far more fortunate with hydro resources very flexible in the short run, and an electricity market designed to reward hydro generators for committing them.) Explosive development has cut the prices of solar and battery technologies, and these are now penetrating the New Zealand market.

The EDGS scenarios are no longer fit for purpose. A single "disruptive technology" scenario is not enough, especially if its results are merely averaged into those of the others. At least two disruptive scenarios are needed, differing by whether existing large-scale suppliers or other entities are to provide the necessary capital, or whether consumers are to raise their own money to contest the services provided by the gentailers and network companies.

The most important contestable investment is home insulation; this was formerly supported by Government, but funding for that will soon run out. Rooftop PV is the most important new technology in many European countries, and entered their markets rapidly because of government policies including generous feed-in tariffs. In NZ there are no such policies; instead gentailers have responded by slashing buyback rates. Wood burning is probably the second most important in New Zealand, but this is being increasingly suppressed by air quality regulations including the mandated removal after 15 years of even approved low-emission wood burners in several polluted airsheds.

Centralised electricity suppliers see the uptake of distributed energy supply and efficiency as a spiraling threat to their revenues. Instead, the suppliers could use their deep pockets to provide the capital needed for end-use investments, as described by Andrew Ott at last year's Downstream Conference. The "culture" that prevails in most large energy companies in New Zealand makes this rare, though Vector's solar/ battery offer is a welcome exception.

Consumers who cannot afford such technologies were formerly supported by Government's Warm Homes/ Clean Heat scheme. Most would choose the technology solutions if they could, and would enjoy lower power bills, but they lack the capital. The benefit-cost ratio of warm home investments is almost five to one, mainly because of reduction of hospitalisation costs. The non-monetary benefits of living in a comfortable, inviting home were not even counted in that analysis.

The BAU character of the electricity sector is reinforced – even created – by a series of investor-friendly laws and regulations. The most important is the Electricity Authority's "definition" of Long Term Benefit to Consumers - described in sections 5-10 of their Interpretation of their Statutory Objective, which says that while consumers would prefer lower prices, monopoly profits allow the economy to grow instead of shrink, and this benefits consumers in the long term. Furthermore the Consultation charter, section 2.2, aims to maximise investor certainty.

These and many other legal and regulatory provisions strongly tilt the market in favour of centralised electricity supply and against contestable investment in alternatives - energy efficiency or small-scale supply including solar water heat and PV, and wood burners. Our liberalised electricity market is a key enabler for the integration of variable solar and wind energy, and I believe New Zealand offers a superb opportunity to demonstrate this, especially with its recent decision to develop real-time electricity prices on the spot market. But regulators must not suppress the opportunities for developing diverse small-scale energy supply and storage.

Modelling of the low-carbon scenario shows a very steady increase of gas peaking capacity, rising from 300 MW in 2015 to 1800 MW in 2050. Averaged over their first five years, gas peakers in this scenario are projected to operate at about 8% capacity factor, implying an LRMC of around $300 per MWh. Generation from gas peakers rises rapidly – in most years two to three times as many GWh as in the other seven scenarios. But the calculated LRMCs give no hint of the true value of distributed resources that compete to reduce peaks – much less their potential to improve reliability if only the electricity market let them in. I believe that values of lost load range from

around $10,000 per MWh in Australia to $20,000 or more in New Zealand.

A New Zealand "disruptive scenario" should include the potential for efficient wood burners to be given a pricing incentive to run on "critical peak days", enabling deferral of building and running gas peakers. Both capital and running costs of peakers could be greatly reduced by use of firewood on the coldest days – even in polluted airsheds. Approved low-emission burners could be given incentive to run either regularly through the winter, especially in dry hydro years, or on call as system load approaches peak. At present there are probably no transmission constraints obstructing this mechanism to reduce system costs.

However new interpretation of air quality legislation, by Environment Canterbury and [perhaps] Auckland Council, not only obstructs this means of reducing demand peaks, but actually calls for progressive removal of wood burners, even those that have met national low-emissions standards.

The Parliamentary Commissioner for the Environment has reviewed the national air quality report and concluded that our air quality is generally high compared to the rest of the world. Our annual exposure to "fine" PM2.5 particles (which causes most of the health impacts) is within World Health Organisation guidelines except for a small number of townships such as Wanaka – even the Christchurch airshed just about meets the WHO recommendation. She calls on Ministry for the Environment to review the air quality standards to enable wood burning in communities that have a few smoggy days but a cumulative burden of PM2.5 that is within WHO recommendations.

In summary, New Zealand has a wonderful opportunity to adapt the regulation of networks to encourage active participation by consumers, in ways that reduce total system costs, and would enable a 100% renewable electricity system to extend even into transport markets.

The EDGS do not incorporate such opportunities at all, but rather reinforce a system that guarantees revenues to Transpower to recover their investment in giant pylons which will never be needed. Our own Energiewende is happening under our very eyes, and MBIE needs to incorporate that into their input into our regulatory system.

Appendix: Some sources:

Energiewende
http://en.wikipedia.org/wiki/Energy_transition

Energy transition means a long-term structural change in energy systems. These have occurred in the past, and still occur worldwide. … Contemporary energy transitions differ in terms of motivation and objectives, drivers and governance. In a more narrow sense, a sustainable energy transition is the shift by some countries, most notably Germany (German: Energiewende), to decentralised renewable energy, and energy efficiency.
. . . After such a transitional period, with a continuing increase in renewable energy production these are expected to make up most, if not all, of the world's energy production in 50 years according to a 2011 projection by the International Energy Agency, dramatically reducing the emissions of greenhouse gases.

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Economic grid support services by wind and solar PV
a review of system needs, technology options, economic benefits and suitable market mechanisms
Final publication of the REserviceS project
http://www.ewea.org/fileadmin/files/library/publications/reports/REserviceS.pdf

Wind power and solar PV technologies can provide ancillary or grid support services (GSS) for frequency, voltage and certain functions in system restoration. The REserviceS project confirmed that variable renewable energy sources like wind and solar PV generation (VAR-RES) meet most of the capability requirements for delivering such services, as prescribed in Grid Codes.
. . . An increase of VAR-RES means that generating capacity is increased in Distribution System Operator (DSO) networks. Hence, DSO/TSO (Transmission System Operator) interaction will also be increasingly important in the future with large shares of VAR-RES. DSOs in particular will have an increasing role in the transition of electricity networks. Revised governance for DSO/TSO interaction to properly coordinate frequency and voltage support, as well as restoration services provided by VAR-RES, is needed.

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from the Electricity Authoriy's Interpretation of the Statutory Objective:
https://www.ea.govt.nz/dmsdocument/9494

[Regulation is for "long-term benefit of consumers," but]

A.5 " . . . the Authority considers the net effects on electricity consumers and assesses the benefits to them in aggregate (the aggregate consumer approach)."

A.7 ". . .the Authority's decisions will be consistent with expanding the 'size of the economic pie', whereas if direct wealth transfers are included . . . then regulatory initiatives can be adopted even when they 'shrink the pie'

A.8 At an individual consumer level, workable competition delivers benefits by keeping prices

lower than they otherwise would be, and the lower the prices are the greater the benefit to the consumer.

"A.9 At an economy-wide level, however, workable competition delivers benefits to consumers by placing pressure on firms to set their prices close to their marginal cost of supply.

"A.10 the Authority interprets competition for the benefit of consumers to mean the efficiency benefits of competition. This interpretation excludes wealth transfers . . ."

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Electricity Authority Consultation Charter s. 2.2 https://www.ea.govt.nz/dmsdocument/2941

"As amendments to the Code can substantially affect industry participants, and unpredictable and ill-founded amendments can undermine investor confidence, the Authority considers there is value in stating principles that the Authority and its advisory groups must adhere to when considering Code development matters. The primary purpose of the principles is to provide industry participants with greater predictability about decision-making on likely amendments to the Code, to maximise investor certainty."

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Submission to Productivity Commission on Regulatory Institutions and Practices
Molly Melhuish, 30 October 2013
http://www.productivity.govt.nz/sites/default/files/Sub%20042%20-%20Molly%20Melhuish%20PDF%20-%20145Kb.pdf

Summary
Regulatory failures are costing billions of dollars per year to the New Zealand economy and compromising the health and productivity of our people and the planet. New Zealand's regulatory regimes have for decades supported government strategies that facilitated investments by large corporations; these investments in turn have suppressed diverse sophisticated options that also could have created economic growth and technological development. . . .
My proposed remedy is a move by regulators – both independent and within government departments – to openly engage with interested members of the public: first, to help them better understand how short-term policies cause long-term costs, and then to monitor, assess, and modifiy these regimes to meet goals chosen in a democratic manner. Politicians differ in strategies, but hopefully society can agree on goals.

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Submission, Electricity Authority Retail Data Project Molly Melhuish 11 March 2014
https://www.ea.govt.nz/dmsdocument/17689

The purpose of the retail data project is to improve customer confidence in the benefits to them of retail competition. … My primary purpose for improving data integrity and granularity is different: to identify opportunities for residential and SME (small-medium enterprise) consumers to reduce or increase their demand in a way that reduces costs of supply.

… This model of a market for flexible demand is being realized in the world's largest electricity market, PJM, as described by Andrew Ott, head of PJM, in an interview on National Radio's

Sunday Morning March 12. Their driving objective is innovation, of both technology and business models, and its success is leading to a genuine market transformation there.

The two purposes would merge if we were to define "competition" to include that between retail electricity businesses and innovative businesses that provide household energy services that reduce peak and kWh electricity demand. Thus s. 1.1.3 (b) [of the EA retail data project consultation paper] would be amended to "electricity and gas and their substitutes".

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From Andrew Ott , executive of PJM, presentation to Downstream Conference 5 March 2014 "Competition and Innovation in US Wholesale Power Markets"

Demand Response Innovation – Driven by Competition
91% of DR Innovation [are] in Regions with Competition

Demand Response, Evolving Revenue Streams
- **Nearly 25% of synchronous reserves are provide by DR**
- **DR revenues grew from around $1.4 million in 2002 to over $500 million annually**

PJM oversees a market in which dozens of players write contracts that reward tens of thousands of consumers to reduce electricity use voluntarily when required.

Using low-cost devices and fast internet connections wired into the factories, businesses and households that participate, the system not only avoided burning fuel in fast-starting "peaking" power plants, but in the longer term slows the demand for new generation capacity to be built at all.

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Power System Flexibility Strategic Roadmap
Preparing power systems to supply reliable power from variable energy resources
By: Ken Dragoon and Georgios Papaefthymiou , ECOFYS, Date: 25 February 2015
http://www.leonardo-energy.org/sites/leonardo-energy/files/documents-and-links/strategic_flexibility_roadmap-final-beta_version.pdf

Relying almost entirely on energy from variable renewable resources will require a transformation in the way power systems are planned and operated. This report outlines steps for overcoming the challenges in creating power systems with the flexibility needed to maintain system stability and reliability while relying primarily on variable energy resources.

. . . 2.2.2 Expanded and Liberalized Markets
Markets look significantly different in power systems relying primarily on zero variable cost resources. The value of energy at the wholesale level becomes very low due to the abundance of zero variable cost energy. Grid support services likely come to dominate market trading, reflecting the increased value of flexibility and optionality necessary to ensure reliable power from variable resources. Ensuring low cost service will require markets open to as many participants as possible. Markets will extend to non-traditional participants, potentially including players at the retail level. Participants will include traditional generating resources, variable resources, distribution system-level generation, demand resources, and energy storage.
The state of air quality in New Zealand

Commentary by the Parliamentary Commissioner for the Environment on the 2014 Air Domain Report
March 2015

http://www.pce.parliament.nz/assets/Uploads/The-state-of-air-quality-in-New-Zealand-web5.pdf

Over recent years, scientists have discovered that the smaller airborne particles are, the greater is the damage to the health of the population exposed to them. Fine particles can penetrate deep into the lungs and ultrafine particles can find their way into the bloodstream.

It has also become clear that while spikes of air pollution on still winter days can be harmful to those suffering from respiratory ailments, it is long-term exposure throughout the whole year that has the greater impact on the population as a whole.

Thus, the most important of the four World Health Organization guidelines is that for long-term exposure to PM2.5. It also follows that the least important is that for short-term exposure to PM10. Yet it is this guideline that is the basis for New Zealand's standard for particulate matter.

For this and a number of other reasons, I recommend in Chapter 5 that this standard be reviewed and brought up to date with current scientific understanding. [our emphasis]

. . . the purpose of a state of the environment report is to help us prioritise our concerns about the environment. What are the big issues that deserve a lot of attention? Conversely, what are the issues that do not matter so much? As my staff began to assess the 2014 Air Domain Report, foremost in my mind was the question of how serious a problem air pollution is in New Zealand.

. . . It may be that public money spent by regional councils subsidising 'clean heat' appliances would be better spent on smoking cessation programmes. But the boundaries between what regional councils are responsible for and what public health agencies are responsible for mean that the question cannot even be considered.

Overall, air quality in New Zealand is a good news story.