ELECTRICITY PRICE REVIEW

SUBMISSION FORM

How to have your say

We are seeking submissions from the public and industry on our first report into the state of the electricity sector. The report contains a series of questions, which are listed in this form in the order in which they appear. You are free to answer some or all of them.

Where possible, please include evidence (such as facts, figures or relevant examples) to support your views. Please be sure to focus on the question asked and keep each answer short. There are also boxes for you to summarise your key points on Parts three, four and five of the report – we will use these when publishing a summary of responses. There are also boxes to briefly set out potential solutions to issues and concerns raised in the report, and one box at the end for you to include additional information not covered by the other questions.

We would prefer if you completed this form electronically. (The answer boxes will expand as you write.) You can print the form and write your responses. (In that case, expand the boxes before printing. If you still run out of room, continue your responses on an attached piece of paper, but be sure to label it so we know which question it relates to.)

We may contact you if we need to clarify any aspect of your submission.

Email your submission to energymarkets@mbie.govt.nz or post it to:

Electricity Price Review

Secretariat, Ministry of Business, Innovation and Employment

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Use of information

We will use your feedback to help us prepare a report to the Government. This second report will recommend improvements to the structure and conduct of the sector, including to the regulatory framework.

We will publish all submissions in PDF form on the website of the Ministry of Business, Innovation and Employment (MBIE), except any material you identify as confidential or that we consider may be defamatory. By making a submission, we consider you have agreed to publication of your submission unless you clearly specify otherwise.

Release of information

Please indicate on the front of your submission whether it contains confidential information and mark the text accordingly. If your submission includes confidential information, please send us a separate public version of the submission.

Please be aware that all information in submissions is subject to the Official Information Act 1982. If we receive an official information request to release confidential parts of a submission, we will contact the submitter when responding to the request.

Private information

The Privacy Act 1993 establishes certain principles regarding the collection, use and disclosure of information about individuals by various agencies, including MBIE. Any personal information in your submission will be used solely to help develop policy advice for this review. Please clearly indicate in your submission whether you want your name to be excluded from any summary of submissions we may publish.

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Summary of questions

Part three: Consumers and prices

Consumer interests

1. *What are your views on the assessment of consumers' priorities?*

2. *What are your views on whether consumers have an effective voice in the electricity sector?*
Consumer behavior is important not only because it benefits (or fails to benefit) consumers themselves, but rather more importantly, if it drives the behavior of the electricity industry's participants. Unaware consumers--those who do not take advantage of competition, are not only costing themselves, they also represent the highest margins available to the retail electricity sector. This can affects the structure of the sector.

3. *What are your views on whether consumers trust the electricity sector to look after their interests?*

Prices

4. *What are your views on the assessment of the make-up of recent price changes?*
It is clear that residential retail pricing incorporates a sizeable overhead component added by the retailers themselves. This can presumably be attributed to marketing, administration, IT and other costs associated with managing a large and ever-changing roster of small customers. It is much less clear why these costs should have grown so strongly over the two decades since the inception of retail competition, or why they should be relatively high by international standards.

5. *What are your views on the assessment of how electricity prices compare internationally?*
International comparisons indicate that the gap between residential and industrial electricity prices is higher in New Zealand relative to other OECD countries. Hence more significant efficiency gains might be made by concentrating on the retail market as opposed to the wholesale market.

6. *What are your views on the outlook for electricity prices?*
It might be reasonable to expect a gradual increase in electricity price volatility due to increased penetration of intermittent renewables, and potentially a reliance on diesel for peaking (in place of oil and gas).

Affordability

7. *What are your views on the assessment of the size of the affordability problem?*

8. *What are your views of the assessment of the causes of the affordability problem?*
Both the key drivers and the more effective solutions to energy unaffordability tend to involve quantity rather than price. Households with children tend to buy more electricity (irrespective of the price). Home insulation schemes do not make electricity any cheaper but reduce the quantity bought.

9. *What are your views of the assessment of the outlook for the affordability problem?*

Summary of feedback on Part three

10. *Please summarise your key points on Part three.*

Solutions to issues and concerns raised in Part three

11. *Please* briefly describe any potential solutions to the issues and concerns raised in Part three.

Part four: Industry

Generation

12. *What are your views on the assessment of generation sector performance?*

Assessing generation sector performance in a hydro-dominated electricity market is not straightforward. The approach taken in the first report and accompanying technical paper follows a conventional hypothesis of workable competition. In what follows we argue that this analysis is incomplete, and should be more comprehensive.

The analysis carried out on pages 31-33 and in the technical paper compares the time-averaged wholesale contract price with the cost of building a new geothermal plant. This supports a hypothesis of workable competition, where entry (in this case geothermal plant) occurs when prices equal or exceed a plant's long-run marginal cost (LRMC). It is reassuring to see that these measures appear to match up in Figure 14 of the review paper. As argued in the paper, it is a necessary condition for a partial equilibrium, as a mismatch between contract prices and LRMC of entry indicates that capacity should be reduced (when prices are below LRMC) or increased (if prices are above). Over time one would expect the LRMC of new baseload plant to equal time-averaged prices, and the capital costs of peaking plant to equal discounted cash flows from prices in peak periods.

It is important in assessing generator performance to distinguish between generators earning a long-run marginal cost (LRMC) when averaged over time, and them earning this LRMC in every trading period. The latter interpretation could be construed as an inducement to offer energy to the wholesale market at LRMC. In fact it is easy to see that this could not only give an inefficient dispatch in the short term, but also result in spurious long-term signals for investment, encouraging more baseload plant to be built at the expense of peakers. A system with too much baseload plant will not utilize all of it in every trading period as it should in for an optimal level of base–load investment.

In theory (at least in the simple, single-node, perfectly competitive case) the optimal offer for generators is at short-run marginal cost (SRMC). Generators earn LRMC from Ricardian rents that accrue on the difference between clearing and offer prices. Rents for the highest marginal cost plant accrue from the high prices needed for demand response (or imposed shortage costs if load reduction is involuntary) when the system hits capacity, or in the New Zealand case, experiences a dry winter. By pricing scarcity appropriately, regulators can tailor this model to yield the optimal mix of investment at a pre-determined level of reliability.

There are some arguments as to why offers of generators might be allowed to deviate from short-run marginal cost offers. In many instances, it is difficult to estimate these costs, especially when they involve expectations of future costs such as water values. This means that market oversight is expensive and difficult, and may cost more than it is worth. As stated in the report the estimation of marginal cost in hydro-dominated systems requires sophisticated models, so it is not straightforward. Nevertheless, we believe that is the responsibility of the pricing review to attempt to model these costs and use them to monitor market performance.

What are your views on the assessment of generation sector performance?

The EPOC research group at the University of Auckland[1] have developed models for backtesting the New Zealand wholesale market. These models provide perfectly competitive benchmarks for historical years. A recent report by Philpott and Guan [1] studies 2012 and 2013 under varying assumptions on gas costs and risk aversion. Some results of this study are given below.

	2012		2013		2012		2013	
($M)	cost	rent	cost	rent	cost	rent	cost	rent
Risk neutral	$ 459	$ 1,677	$ 388	$ 1,641	$ 557	$ 2,151	$ 478	$ 2,112
Mild aversion	$ 484	$ 1,665	$ 406	$ 1,645	$ 588	$ 2,117	$ 499	$ 2,153
Strong aversion	$ 497	$ 1,680	$ 416	$ 1,632	$ 610	$ 2,241	$ 520	$ 2,176
Historical	$ 517	$ 2,498	$ 444	$ 1,885	$ 651	$ 2,364	$ 583	$ 1,746
Difference	$ 33	$ 833	$ 38	$ 240	$ 63	$ 248	$ 84	-$ 407

Table 1: Differences in Ricardian rent and fuel and shortage cost for three counterfactual models compared with the market (Historical). Left-hand tables use MBIE gas costs while right-hand table uses generator-reported gas costs. Difference is Historical minus Mild aversion.

We compare a risk-neutral social planning solution with a mild risk averse solution that protects against low inflows and a high risk aversion model that assumes that dry winters are almost inevitable. The mild risk aversion strategy gives reservoir storage trajectories that are close to historical, at least in aggregate (see Figure 3 and Figure 4 below). The corresponding policies show that excess Ricardian rents of $833M and $240M were earned in 2012 and 2013 assuming MBIE gas costs. (All figures are expressed in December, 2015 real terms).

The right-hand side numbers in Table 1 come from a model in which gas costs are chosen closer to their opportunity cost (as reported by generators). The differences in rent between the market and counterfactual become smaller, and negative in 2013. As gas costs increase, competitive prices increase and thermal generation decreases in the counterfactual models which then make substantially more rent in the high gas price results compared with MBIE gas prices. Notice that the cost of historical dispatch in the high fuel cost case is higher than the mild risk averse counterfactual by $63 M and $84 M in 2012 and 2013, respectively. So both cost scenarios show detrimental effects in the historical solution – either high rents or high costs More details outlining the modelling methodology and corresponding results are available in the paper by Philpott and Guan [1].

[1] This group is not to be confused with the University of Auckland Energy Centre, who have agent-based model presented in the recent paper by Dr Stephen Poletti.

What are your views on the assessment of generation sector performance?

The wholesale prices obtained by the counterfactual models do not match those observed in the market. Table 2 gives a summary of generation weighted average prices.

GWAP	low cost	low cost	high cost	high cost
$/MWh	2012	2013	2012	2013
Risk neutral	$ 57.77	$ 55.57	$ 73.20	$ 71.04
Mild aversion	$ 58.09	$ 56.15	$ 73.12	$ 72.69
Strong aversion	$ 58.85	$ 55.91	$ 77.06	$ 73.97
Historical	$ 81.38	$ 64.01	$ 81.38	$ 64.01
Difference	$ 23.29	$ 7.86	$ 8.26	-$ 8.68

Table 2: Differences in generation-weighted average prices for three counterfactual models compared with the market (Historical). Left-hand tables use MBIE gas costs while right-hand table uses generator-reported gas costs. Difference is Historical minus Mild aversion.

It is interesting to observe that generation-weighted wholesale prices in 2013 are lower in the actual market than they are in the high-cost counterfactuals. The values in the low-cost counterfactual in 2012 and 2013 average out to about $57/MWh. The historical generation-weighted average over these two years is higher at about $73/MWh.

Table 3 shows time-weighted average prices for three nodes in 2012 and 2013.

	2012			2013		
Price ($/MWh)	OTA	HAY	BEN	OTA	HAY	BEN
low cost - mild aversion	$60.06	$61.50	$58.48	$71.52	$69.45	$41.36
low cost - strong aversion	$61.30	$62.38	$59.02	$80.54	$77.36	$42.23
high cost - mild aversion	$76.99	$76.86	$72.47	$90.09	$86.96	$56.69
high cost - strong aversion	$79.10	$80.38	$78.61	$89.41	$86.54	$59.90
Historical	$78.88	$81.47	$85.80	$67.55	$66.44	$58.73

Table 3: Differences in time-weighted average prices for counterfactual models compared with the market (Historical). Low cost value use MBIE gas costs while high-cost figures use generator-reported gas costs.

Observe that historical time-weighted prices over 2012 and 2013 at Otahuhu in Table 3 are close to the $75/MWh figure quoted in the report as the (approximate) LRMC of geothermal plant. The low cost-mild risk aversion figure is closer to $66/MWh while the high-cost time-average price (over 2012 and 2013) is about $84/MWh.

Observe also that the historical time-weighted average Otahuhu and Haywards prices are lower than the counterfactual prices in 2013. There is evidence in the early part of this year that thermal generators were offering below marginal cost. This could be an artifact of being overcontracted in gas supply, or having large electricity contract positions. As discussed in Ruddell et al [2], generators holding contracts have incentives to offer below marginal cost up to their contract quantities. If water turns out to be more plentiful than forecast, then thermal plant will often be dispatched below their contract quantities, thus depressing spot prices.

What are your views on the assessment of generation sector performance?
In both 2012 and 2013, the historical time-averaged Benmore price is consistently above the competitive counterfactual prices. This is particularly evident in 2013, when inflows were more plentiful than 2012, giving counterfactual prices that are low because of the possibility of reservoir spill. Historical prices at Benmore, however, remain closer to prices in the North Island. The historical variation of prices over time in 2012 is different from that in the counterfactual model. We provide one example, showing a graph of generation-weighted average prices in the South Island for 2012 in Figure 1 (MBIE gas costs) and Figure 2 (high gas costs).

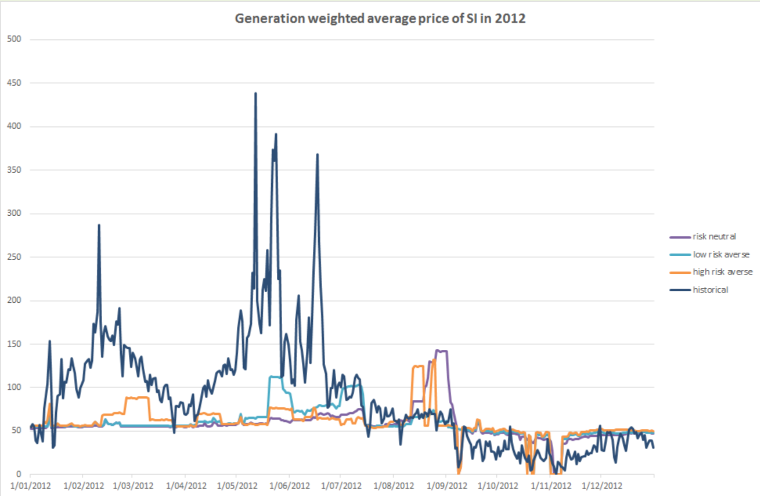

Figure 1: Generation weighted average prices in the South Island in 2012 for MBIE gas costs. Historical values in early 2012 peak much higher than even the high risk-averse case.

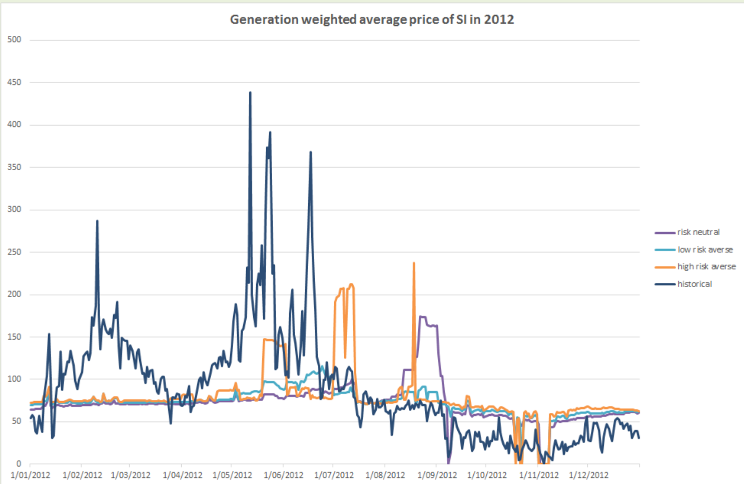

Figure 2: Generation weighted average prices in the South Island in 2012 for high gas costs.

What are your views on the assessment of generation sector performance?

It is difficult to explain these differences, especially in the early months of the year. Historical prices in February and March peaked in anticipation of a dry year. The counterfactual model shows a much smaller increase in these months in Figure 1, and no increase in Figure 2.

As alluded to in the first report, the year 2012 was one of the driest on record. The wholesale market survived this year without requiring a savings campaign, leading to some commentators concluding that the market reforms of 2010 had been successful. Of course 2012 also had reduced demand (particularly from Christchurch).

Taking this into account gives the counterfactual price trajectories shown in Figure 1 and Figure 2 which are well below historical prices, and similarly result in no shortages (Figure 3 and Figure 4 show the South Island and North Island storage trajectories.)

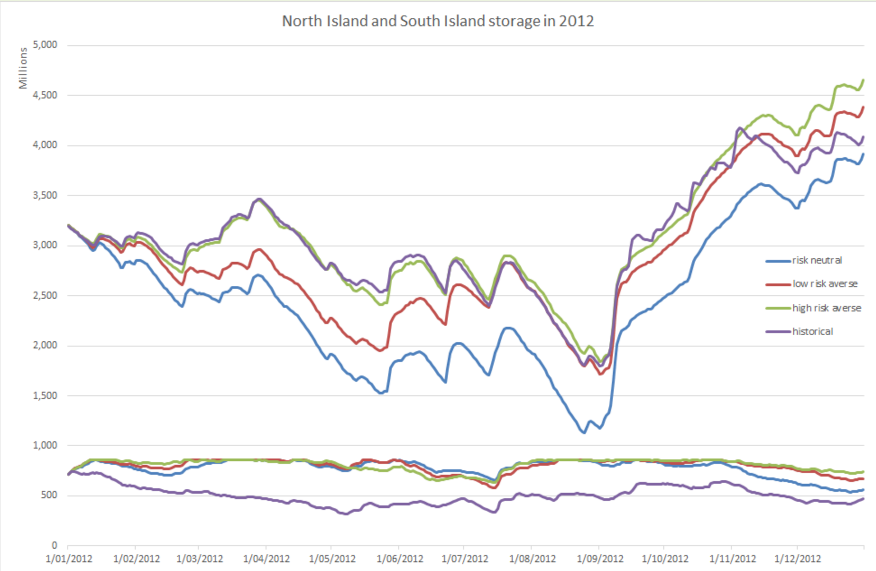

Figure 3: Historical and counterfactual storage trajectories 2012 with MBIE gas costs.

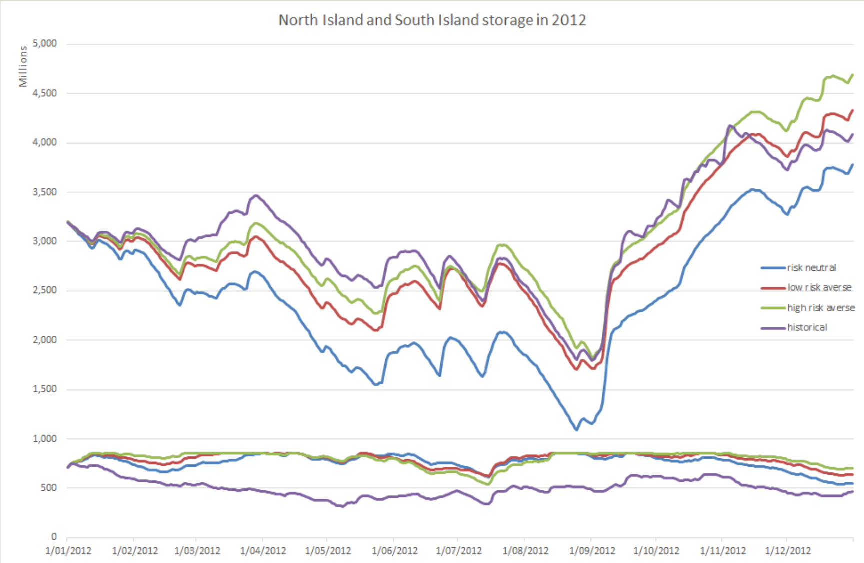

Figure 4: Historical and counterfactual storage trajectories 2012 with high gas costs.

What are your views on the assessment of generation sector performance?

The results arising from these models indicate that wholesale market outcomes have deviated from perfectly competitive benchmarks (at least in 2012 and 2013). When this happens, there is a loss in efficiency, as can be seen in the differences in cost reported in Table 1. Observe that these cost differences represent fuel costs only. As shown in Figures 3 and 4, the risk-averse counterfactual models leave large reservoirs in both islands fuller than what they were historically. So the historical market dispatch uses more water and more expensive thermal plant is run more often, and satisfies exactly the same demand every half hour as the counterfactual models.

A common response to results presented here is to assert that the electricity wholesale market started in 1996 is not working as intended and should be redesigned. We do not advocate such far-reaching reform, and continue to support competitive markets as a mechanism for fostering innovation and reducing inefficiency. But the evidence we have presented suggests that historical prices appear to deviate from this ideal.

From Figure 3 and Figure 4 one can see that many different price sequences will support prudent hydro reservoir releases. Consumers of electricity value it highly, and price has traditionally been a poor instrument to control short-term demand (although more price-responsive demand is emerging through retailers like Flick). Inelastic demand means offer prices early in the year in response to a dry-winter forecast may not lead to much change in consumption or even any change in dispatch. Observed price increases in these circumstances align with broad economic incentives, but this would be true for any price increase.

So what is the perfectly competitive price increase in response to expectations of a dry winter? Given fuel costs, the risk appetite of market participants, and shared views of the probability distributions of inflows, models can estimate what such prices increases ought to be. The perfectly competitive prices computed by these models are the gold-standard benchmark against which wholesale market outcomes should be measured.

References

[1] Philpott A.B. and Guan Z. (2018) Benchmarking wholesale hydroelectricity markets with risk averse agents, www.epoc.org.nz.

[2] Ruddell, K., Downward, A. and Philpott, A. B., (2018) Market power and forward prices, *Economics Letters*, 166 (downloadable from www.epoc.org.nz).

13.	*What are your views of the assessment of barriers to competition in the generation sector?*

14.	*What are your views on whether current arrangements will ensure sufficient new generation to meet demand?*

Retailing

15. *What are your views on the assessment of retail sector performance?*

We repeat our response from point 4 above, here.

It is clear that residential retail pricing incorporates a sizeable overhead component added by the retailers themselves. This can presumably be attributed to marketing, administration, IT and other costs associated with managing a large and ever-changing roster of small customers. It is much less clear why these costs should have grown so strongly over the two decades since the inception of retail competition, or why they should be relatively high by international standards.

16. *What are your views on the assessment of barriers to competition in retailing?*

We note 90% of the retail market shares are held by the five largest gentailers. This might imply that asset-light retailers are not commercially viable entities (See Boroumand and Zachmann 2011 for a comprehensive study on the risks associated with this organizational structure). We suggest a study of alternative models that may including coupling of retailing with other electricity market agents (e.g. large consumers of electricity), having regulated utilities that are distributor-retailers (similar to many US markets), or even the complete abolition of retailers with their functions taken over by industry players (see Basic Electricity Service, Joskow 2000).

References

[3] Boroumand, R. H., and Zachmann G., (2012) Retailers' risk management and vertical arrangements in electricity markets, Energy Policy, 40, 465-472.

[4] Joskow, P. (2000) Why do we need electricity retailers? Or can you get it cheaper wholesale? Revised discussion draft, MIT, Massachusetts.

Vertical integration

17. *What are your views on the assessment of vertical integration and the contract market?*

The analysis of vertical integration of generators and retailers is complicated. It is often cited as a reason for a thin contract market. This acts as a barrier to new entry in the retail market, and makes it difficult for large industrial loads to hedge their exposure. Both of these are negative effects. We note that the market-maker arrangements for the four largest gentailers has improved the liquidity of the contract market and believe it should continue and be improved where needed in order to maintain appropriate bid-ask spreads.

As noted in 16, we suggest a study of alternative models that may including coupling of retailing with other electricity market agents (e.g. large consumers of electricity), having regulated utilities that are distributor-retailers (similar to many US markets), or even the complete abolition of retailers with their functions taken over by industry players (see Basic Electricity Service, Joskow 2000). Any of these alternatives may lead to a much more efficient outcme than the current arrangements. However below we recap the role of contracts and vertical integration in imperfectly competitive markets.

Note that, given an oligopolistic spot market, gentailers' participation in the contracts market is important, since it is well known (from Allaz and Vila[2]) that a generator selling in a forward market behaves more competitively in the spot market. (In fact it is also shown that it is in their interests to sell in the forward market.) Moreover, in imperfectly competitive markets, both contracts and vertical integration affect offer strategies, making them more competitive. The recent PhD thesis by Keith Ruddell[3] shows that the effect is the same in these two models if the integrated retail load is statistically independent of total load. When these loads are correlated (which happens in reality) vertical integration provides more competitive pressures on prices than contracts for differences. The rationale for this result is that firms are less incentivised to mark up the final tranches in their offer stack, since in high load scenarios in which that tranche is dispatched, a resulting high price would coincide with a high integrated retail load.

On the other hand, vertical integration is a hedge against risk in price and volume that can be more effective than hedge contracts (that account for price variation only). This reduction in risk can lead to more efficient investment decisions in perfectly competitive investment models with risk-averse agents. Details and models are discussed in the recent PhD thesis by Corey Kok[4]

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[2] Allaz B. and Vila J-L. (1993) Cournot Competition, Forward Markets and Efficiency. *Journal of Economic Theory*. Volume 59, Issue 1.

[3] Keith Ruddell, Supply function equilibrium in electricity markets, PhD thesis, University of Auckland, 2017.

[4] Corey Kok, Electricity generation expansion under uncertainty and risk, PhD thesis, University of Auckland, 2017.

18. *What are your views on the assessment of generators' and retailers' profits?*

Transmission

19. *What are your views on the process, timing and fairness aspects of the transmission pricing methodology?*

Distribution

20. *What are your views on the assessment of distributors' profits?*

21. *What are your views on the assessment of barriers to greater efficiency for distributors?*

22. *What are your views on the assessment of the allocation of distribution costs?*

23. *What are your views on the assessment of challenges facing electricity distribution?*
There are some well-known challenges facing distributors, such as the so-called death spiral initiated by pervasive solar photovoltaics. There may also be a blurring of the distribution and retail roles in the future, although this may hint at new organizational structures offering new opportunities for efficiency.

Summary of feedback on Part four

24. *Please summarise your key points on Part four.*

Solutions to issues and concerns raised in Part four

25. Please briefly describe any potential solutions to the issues and concerns raised in Part four.

Part five: Technology and regulation

Technology

26. *What are your views on the assessment of the impact of technology on consumers and the electricity industry?*

27. *What are you views on the assessment of the impact of technology on pricing mechanisms and the fairness of prices?*

28. *What are your views on how emerging technology will affect security of supply, resilience and prices?*

Regulation

29. *What are your views on the assessment of the place of environmental sustainability and fairness in the regulatory system?*

30. *What are your views on the assessment of low fixed charge tariff regulations?*

31. *What are your views on the assessment of gaps or overlaps between the regulators?*

32. *What are your views on the assessment of whether the regulatory framework and regulators' workplans enable new technologies and business models to emerge?*

33. *What are your views on the assessment of other matters for the regulatory framework?*

Summary of feedback on Part five

34. *Please summarise your key points on Part five.*

Solutions to issues and concerns raised in Part five

35. *Please briefly describe any potential solutions to the issues and concerns raised in Part five.*

Additional information

36. *Please briefly provide any additional information or comment you would like to include in your submission.*