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Electricity Sector Review 2018

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Abbreviations

Authority	Electricity Authority
CCS	Customer Compensation Scheme
DER	Distributed energy resources
DR	Demand response
ETS	Emissions trading scheme
GPS	Government Policy Statement
LRMC	Long-run marginal cost
MfE	Ministry for the Environment
NPS	National Policy Statement
NZEM	New Zealand Electricity Market
PC	Productivity Commission
RMA	Resource Management Act
SO	System Operator
TPM	Transmission Pricing Methodology
WCM	Winter capacity margin
WEM	Winter energy margin

Executive summary

After more than two decades of retail competition and a wholesale market for electricity, the New Zealand electricity sector is performing reasonably well. Governance has changed along the way, issues have been debated, many improvements to the Code have been made, retail competition has demonstrably improved, dry years managed, and renewable generation built. For the most part, the sector has delivered the outcomes expected of it. However, there are also areas where the industry hasn't done itself any favours. For example, increases in bundled retail prices[1] have never been well explained to consumers and, as a result, consumers remain unconvinced that electricity prices are fair and reflect reasonable costs.

Clarity of the public policy objectives and some stability in the instruments used to achieve those goals are critical for electricity sector performance, especially given its reliance on long-life investments. If policy is aimed at short term political considerations or narrow sector interests, investors face the uncertainty that policy can lurch from one topical issue to another. Any interventions should be made on the basis of a broad base of policy goals.

One way to assess outcomes from the electricity sector is to analyse those outcomes against the following five public policy objectives—objectives that are enduring for policy makers across countries and time:

- Security of supply, in the sense of supply meeting demand without involuntary cutting supply, or a heighten threat of cuts to supply.
- Efficient operation of the wholesale and retail sectors, with competition a primary tool for achieving efficiency.
- Efficient use of, and investment in, long life assets (including transmission and distribution), guided by economic regulation.
- Meeting community or social minimums, including universal access to electricity and support for those who can't pay.
- Integrating environmental objectives while mitigating the impact on the industry of achieving these objectives, with a current focus on climate change.

From time to time, outcomes under one or other of these public policy objectives come to the fore, leading to heightened interest and potential intervention by government. The current Electricity Price Review (Review) is such a case and is the trigger for us to analyse outcomes across all five enduring public policy objectives.

In this report we test the sector's outcomes against each public policy objective. We consider whether the objective is being achieved today and whether it is likely to be achieved given emerging influences. This is the same framework we used in our 2009[2] and 2014[3] reports.

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1 Where we refer to retail prices, unless otherwise specified, we refer to the combined price including transmission, distribution, energy, regulatory, and operational components.

2 Murray et al (2009).

3 Stevenson et al (2014).

Aspects of our findings in 2018 are similar to those in 2014, with further progress on a number of fronts. Additional renewable sources of generation have been integrated into the market and about 1000 MW of fossil fuel generation removed from operation; as result the sector has continued to deliver reliable electricity while further reducing its carbon footprint. Competitive pressure has increased in the retail sector, leading to simplification, greater clarity and improved availability of tariff information.

When assessed against the enduring policy goals, there's still work to be done. In 2014, we emphasised that:

> *Increases in retail prices have not been fully explained – consumers are not convinced the industry is competitive with fair prices that reflect reasonable costs.*
>
> *Fuel poverty appears a significant problem for some NZ households and this problem will not be solved by lower wholesale prices or increased retail competition.*[4]

On the first point, electricity prices have plateaued since 2015, though electricity network companies and retailers continue to blame each other whenever electricity prices rise. It is hardly surprising that consumers and government would want to review electricity prices now when industry continues to explain itself poorly.

The situation of people in fuel poverty hasn't improved much since our 2014 report. Fuel poverty and the consequential cost to the health system remain.

In addition, in this report, we observe that the cost of meeting security of supply (as we progress towards 100 percent renewable electricity generation) and the impact of national greenhouse gas emissions objectives (following the passing of the Zero Carbon Act[5]) will challenge the sector's current settings. There is a regulatory risk of intervention if the industry does not deliver in line with government expectations (as per the mandate it gives to the Climate Change Commission).

Our findings in the context of the Review

Having assessed the industry outcomes across all five enduring public policy objectives, we have come to different perspectives on some aspects of the industry's performance compared with the Review. The Review is focused on the affordability and fairness of the bundled retail price for all consumers. The natural extension of that approach, if prices are not found to be affordable, is to seek solutions that would provide some relief for those consumers for whom they are not affordable. By approaching the sector from a broader perspective we arrive at the following conclusions:

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4 ibid.

5 The Government has consulted on the Zero Carbon Bill and is working towards the Zero Carbon Act coming into force in July 2019. The Act would lock in a target of net zero emissions by 2050 and establish a Climate Change Commission that would set national carbon budgets. Government will request the Climate Commission to also plan the transition to 100% renewable electricity by 2035 (which includes geothermal) in a normal hydrological year.

Competition among retailers is increasing.

1. The Review doesn't' offer evidence that anyone is "fleecing" consumers. The issues the Review identifies with regards to the reluctance of some customers to search for better deals (on price), the use of win backs, the allocation of distributor shared costs and low fixed charge tariffs – don't support a finding that the market is not workably competitive, and therefore that steps need to be taken at the risk of undermining the current competitive model. We agree that prompt payment discounts of up to 26 percent could act more as an excessive penalty for late payment. However, that there is a wide variation of prompt payment terms offered by generators, and competition could be expected to drive retailers to return to consumers the value of paying on time (which would not be a penalty). We agree that the low fixed charge regulations are a poorly designed policy intervention.

2. We agree with the Review's interpretation of indicators of strengthening competition in the retail market, and the Review's observation that the wholesale market has resulted in efficient incentives for investment in generation. The indicators cited by the Review suggest improved performance in both markets in recent years, and considerable gains relative to the regulatory regimes that preceded the introduction of competitive market processes in the mid-1990s.

3. But we draw different conclusions from the Review in relation to the emergence of a two-tier market:

    - The emergence of a two-tier market (i.e. where some consumers know they have a choice of retailer and that they would likely save money from switching, but choose not to do so) is consistent with increasing competition and may be a necessary aspect of the market if the most vulnerable consumers are to benefit the most from competition.
    - Competitive market forces are leading to simplification, greater clarity and improved availability of tariff information. The increased ease with which retailer offers can be compared is a significant development in the retail market bringing the promise of additional consumer benefits from competition.
    - The diversity in service offerings emerging in the New Zealand electricity retail market reflects the strength of current regulatory settings.
    - Competition in the retail market could be improved because about 13 per cent of the market does not appear to know they have a choice. The Review suggests that figure may be weighted towards lower income households.[6]

Affordability for all consumers and fuel poverty are not the same problem.

4. Fuel poverty hasn't improved much since our 2014 report. Fuel poverty and the consequential cost to the health system remain. The Review raises the issues of affordability and energy hardship but doesn't define the distinction.[7] Our reading of the

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6 Review, p38.

7 The term vulnerability is also used. This is a term defined by the Electricity Authority's guidelines and relates to retailers' treatment of consumers with payment difficulties.

Review is that when it refers to affordability it covers the price for all consumers, while households facing energy hardship are a subset of all consumers. We use the international convention and refer to households in fuel poverty. We infer from the Review the view that if electricity were more affordable for everyone, there would be fewer people in fuel poverty and that measures targeted at fuel poverty specifically are the responsibility of agencies outside the sector:

> *Affordability is a real problem and needs targeted measures to fix it.*[8]
>
> *Targeted social welfare measures can help reduce energy hardship.*[9]

5. Fuel poverty is definable and measurable. And there are many ways to address it other than through the price component of the total cost. Fuel poverty is not just about price; it is also about the volume of electricity consumed and the health consequences that follow from the trade-offs households in fuel poverty face. If fuel poverty were defined and measured, if the industry's role with regards to fuel poverty were clarified, and if fuel poverty problems were coherently addressed, the problem of affordability would change. The focus on the affordability of electricity would then correctly be on whether prices are, or are not, efficient due to competition (for the contestable parts of the cost) and whether they are efficiently regulated otherwise. That is quite different from trying to engineer lower prices for everyone so fewer people are in fuel poverty.

The supposed issues with the hedge market may be a problem with vertical integration.

6. The futures market is intended to provide transparency around forward prices, put pressure on the margin that vertically-integrated generator retailers charge for selling fixed price contracts to consumers, and to provide a risk management mechanism for independent retailers. It appears to be fulfilling those roles.

7. The substantive problem the Review focuses on appears to be the "fragility of current arrangements"[10] despite acknowledging that it had been steadily improving since 2010. In particular the Review quotes one new retailer as noting "progress in contract market and liquidity as the key enabler"[11] and that the Authority has "initiated measures targeting improved market liquidity".[12] Having raised the issue of the fragility of current arrangements the Review doesn't establish whether the issue for independent retailers is liquidity or whether it is pricing activity in the retail market and in the futures market aimed at foreclosing competition by independent retailers.

8. We do not consider that there is necessarily a problem with the hedge market (including both over-the-counter forwards trading and exchange traded electricity futures) based on liquidity in the futures market. If there is a problem with the hedge market, we

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8 Review, p28.

9 Review, p4.

10 Review, p45.

11 Review, p44.

12 ibid.

understand it would be the price at which independent retailers can secure hedges relative to the price of hedging for vertically integrated generator retailers. That is related, in turn, to the fact that vertically integrated generator retailers are able to conduct the bulk of trade between their wholesale and retail arms on undisclosed terms.

9. There are a number of progressively draconian measures that could be introduced to address the state of the hedge market if it was shown that vertically-integrated generator retailers were manipulating the price of competitors' hedge costs relative to their retail offering. These measures could include greater disclosure of costs in relation to hedge prices, greater disclosure of hedging practices, greater scrutiny of commercial contracts against ASX futures prices, disclosure of internal transfer prices, an obligation to put a certain amount of generation through the market on an arm's length basis through to accounting separation, or even full separation between retail and wholesale arms. However, no evidence of foreclosure or price squeezing by vertically-integrated generator retailers has been presented by the Review or by anyone else.

Integration of transmission, distribution, generation investment and demand management needs to be well-considered and consistent.

10. In our 2014 report we argued that a key issue for the sector was integrating transmission, distribution, and generation investment and demand management. Coordination issues arise at these boundaries because of joint consumption / lumpy investments, spill-over effects (a decision by one participant affects others), and imperfectly defined and hence priced transmission and distribution services, and different regulatory regimes amongst asset owners. Coordination remains important because transmission, distribution, and demand management are both complements and substitutes for generation:

11. Given these overlaps we were puzzled at what appeared to be a somewhat inconsistent approach taken by the Review in discussing the role of prices. For example, the Review comments on the lengthy time it has taken the Authority to progress transmission pricing but appears to express confidence that distribution pricing will be simpler to resolve. We expect that distribution pricing will prove more complex than transmission pricing and will be on a continuous path of evolution for a period.

12. We consider that on-going engagement by the industry, especially in relation to the impact of new technology, will allow distribution pricing (and with it, customer preferences) to evolve. It will be key that the Electricity Authority and Commerce Commission remain focused on ensuring that there are low barriers to innovation and entry, and there is a level playing field for investment and experimentation (including investment and experimentation by the regulated networks).

13. Development of cost reflective and service based distribution pricing is the subject of a number of work streams including the ENA's Distribution Pricing Working Group (DPWG), one of the Authority's three highest priority work streams[13] and a specific focus from the Commerce Commission on the future impact of emerging technologies

[13] See for example EA (2017a).

in the energy sector. Individually distributors have all published roadmaps indicating their plans and current progress towards adopting cost reflective pricing on their networks. Many of them are drawing on the on-going analytic work being conducted on behalf of all distributors by the DPWG.

14. We find it difficult to reconcile the Review's comments in relation to the allocation of fixed costs in the transmission network with its comments in relation to the allocation of these costs in the distribution network, or why a different set of pricing principles should apply to these overlapping technologies.

15. We also consider that the Review understates the importance of getting the transmission pricing methodology right. In a low emissions future, significant new transmission investment may be required.

On-going regulatory risk around security of supply and sector emissions are not adequately addressed, but these issues require careful consideration and not urgent consideration.

16. The Review's conclusion that there aren't any obvious problems with security of supply is reasonable in the short to medium run, i.e. with existing thermal generation capacity being economically viable for many years yet. We are less convinced of the Review's assessments on both the adequacy of policy settings and the cost of security of supply when the time comes for new investment.

17. Our assessment of sector performance using a public policy framework leads us to observe that the winds of change are creating issues or exacerbating issues that the industry will eventually have to either confront or risk having regulatory solutions imposed on it. If the sector doesn't take the lead on ensuring the investment framework for new security-of-supply projects once current thermal plant reaches end of life, and on the government's commitment to net zero greenhouse gas emissions by 2050, it risks interventions that may not suit the industry and its custodianship of long term assets (and shareholders' interests). The eventual replacement of the Huntly Rankines, TCC and then Huntly Unit 5 are critical decisions points, not just for security of supply, but also for electricity industry emissions. Any political or regulatory intervention is unlikely to be favoured as much as its own derived solutions would be.

18. Clearly, the government may step in and make changes if it loses confidence in the sector's response to security of supply, as it has been before. We say the Review makes unsupported claims that the future costs of security of supply won't be too high due to the declining cost of technology. Our analysis also shows that currently available technology (solar, wind and geothermal) is unlikely to lead to lower costs for security of supply in the long-term.[14] Further, the cost of a number of mechanisms that may come to the fore to support security of supply in an increasingly renewable sector could lead to higher not lower retail electricity prices as well. A higher carbon price will be required

[14] Stevenson et al (2018).

if the sector is to deliver a lower emission profile and this will feed directly into higher electricity prices.[15]

19. The passing of the Zero Carbon Bill will introduce a legislated expectation that all parts of the economy will need to do something to contribute to a net zero emissions target. The electricity industry will be expected to contribute and, based on the Confidence and Supply Agreement[16], the Climate Change Commission will be asked to find ways to assist industry get to 100 percent renewable electricity generation by 2035. Pointing to the Resource Management Act 1991, Climate Change Response Act 2002, Energy Efficiency and Conservation Act 2000 and the Net Zero Carbon Act and arguing that the industry doesn't have to do more than it is won't be any protection. We agree with the Review's conclusion that:

> *The electricity regulatory framework has a role to play in more coordinated efforts to achieve these important objectives [energy hardship and carbon emissions].*[17]

20. We are not convinced by the Review's treatment of environmental objectives. The Review reinforces the sector's current arm's-length position with respect to emissions outcomes in electricity, which we interpret to mean that the sector's emissions reductions should be solely viewed as an outcome of the central government's policy instruments for de-carbonisation. We identify at least three reasons why the electricity sector cannot escape the requirement to integrate environmental objectives in all facets of its decision-making. These are: the need to remove barriers to the uptake of low-carbon solutions in the sector, the need to make trade-offs between multiple policy objectives, and the need to avoid inadvertent lock-in of investments that deliver sub-optimal emissions reductions.

Government Policy Statements do not necessarily deliver public policy goals.

21. When discussing the complexities of resolving transmission pricing, the Review ponders whether more should be made of "government policy statements". The Review does not identify the policy question, or design issue, which it considers would best be resolved by Ministerial guidance. Nor does Review appear to have been briefed on the previous New Zealand experience in directing electricity market reform by government policy statement (GPS). As we documented in our 2009 report, the former Electricity Commission was provided with a 30 page GPS prepared by the Minister of Energy. The GPS was itself revised and expanded in 2002, 2003 (draft), 2004, 2005 (draft), 2006, and 2008. The Ministers of Energy at the time clearly felt it necessary to amend and extend, year after year, the regulatory interventions in the sector, suggesting that Ministerial interventions did not produce the expected results. Perhaps of more consequence, we observed in 2009 that such processes led to a heightened prospect that changes were

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15 Ibid.

16 Refer 2017 New Zealand Labour Party and Green Party of Aotearoa New Zealand confidence and supply agreement. https://www.greens.org.nz/sites/default/files/NZLP%20%26%20GP%20C%26S%20Agreement%20FINAL.PDF

17 Review, p6.

being made to regulations to overcome the effects of previous regulations, at the risk of ever-mounting distortions to sector performance.

Market design evolution is at its best when participants are involved in solving market design challenges.

22. We said in 2014 and remain of the view that good governance is critical for ensuring that the expectations on the sector are met. This is especially the case with security of supply. Given the complexity of market design related to long-run price efficiency and the complex and varied nature of incentives resulting from those designs, good decisions would be best served by ensuring the industry is fully engaged in the rule making process.

We urge the Review panel and industry to focus on the things that are proven to be not working. Interventions always run the risk of unintended consequences, so the threshold for intervention should be accordingly high.

1. Introduction

Looking back over the past two to three decades, electricity policy has had periods where it was highly unstable with significant changes in the focus of policy initiatives. Periods of instability are heightened by a focus on policy interventions rather than policy objectives. For example, in the 1970s electricity initiatives included embarking on construction projects to keep a specialised work force employed.[18] Later on, and prior to the introduction of the Electricity Industry Act 2010, electricity initiatives included an efficient lighting strategy.[19] Although these initiatives are sharply different, they share a common goal as the authors of these interventions believed they would result in lower energy costs over time than would be achieved through 'market forces'.

Clarity of the policy objectives and some stability in the instruments used to achieve those goals is critical for electricity sector performance. Electricity production and delivery is capital intensive, with returns on investments spread over many years – asset lives in excess of 25 to 50 years are typical in transmission, distribution and generation. These long- life assets embody the economic and regulatory conditions at the time of construction; hence inappropriate investment decisions due to poor regulatory policy settings or signals may go on influencing the efficiency and effectiveness of the electricity sector for long periods after initial construction. If construction is delayed or abandoned because of regulatory uncertainty, the costs are greater still because consumers may be denied services for which they would have been willing to pay.

To provide stability to support the long life investments needed to address industry performance, the next step in sector reform should support enduring and broadly-based policy goals for electricity. If policy is aimed at short-term political considerations or narrow sector interests, then further lurches are inevitable.

This paper considers the electricity sector from the perspective of whether it is meeting five public policy objectives that seem enduring for policymakers across countries and time. These public policy objectives can be traced back to the expectations of reforms in the sector in the 1990s:

- Security of supply – in the sense of supply meeting demand without involuntary cutting supply, or a heighten threat of cuts to supply
- Efficient operation of the wholesale and retail sectors, with competition a primary tool for achieving efficiency
- Efficient use of, and investment in, long life assets (including transmission and distribution), guided by economic regulation
- Meeting community or social minimums, including universal access to electricity and support for those who can't pay (as opposed to won't pay).

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18 See Galvin (1985).

19 See: http://www.electricitycommission.govt.nz/opdev/elecefficiency/programmes/lighting/index.html

- Integrating environmental objectives while mitigating the impact on the industry of achieving these objectives, with a current focus on climate change.

In 2014, BusinessNZ commissioned us to assess the outcomes from the earlier 2009 reforms, and the likely outcomes of the NZ Power (NZP) proposal at the time.[20] In that 2014 report we returned to the framework for evaluating significant policy changes in the electricity industry that we originally published in 2009 and which had been used as an input into the 2009 Ministerial Review into the sector.[21] It asked whether the outcomes expected from the reforms that followed the Ministerial Review were being achieved.

In 2014 we said that, assessed against the enduring policy goals, there was still work to be done in the sector. Notably, we reached the conclusion (which we uphold today) that more can and should be done, particularly to address the following issues:

- Increases in prices have not been fully explained – consumers are not convinced the industry is competitive with fair prices that reflect reasonable costs.
- Fuel poverty appears a significant problem for some NZ households and this problem will not be solved by lower wholesale prices or increased retail competition.

We also observed there was progress:

- Security of supply improved - record low inflows were managed without public concern.
- Generation investment (overwhelmingly renewable) had kept ahead of demand.
- The ability and incentive to use market power in wholesale market had significantly diminished due to asset swaps and increased liquidity in forward markets.
- Retail market had become more competitive with varied retail offerings and high churn rates.

The 2010 Electricity Industry Act that adopted all of the Ministerial review's recommendations introduced an independent Electricity Authority bound by a statutory objective:[22]

> *The objective of the Authority is to promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.*

Notably, there is no reference to fairness or equity in the Act. When we presented our findings in 2014, and particularly our finding on energy poverty, we met resistance over (i) whether energy poverty was a discrete measurable issue (a subset of affordability across all consumers), (ii) how significant an issue it was if it existed at all, and (iii) who would be responsible if it was an issue.

We note that the terms of reference for the current Review have the overarching objective:

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20 Stevenson et al (2014).

21 Murray et al (2008).

22 Electricity Industry Act 2010 s 15.

To ensure that the New Zealand electricity market delivers efficient, ***fair and equitable*** *prices as technology evolves and we transition to a lower emissions future, taking into consideration the requirements of environmental sustainability and the need to maintain security and reliability of supply – the energy trilemma.* [23]

Unsurprisingly, the Review asks and answers the following question:

Is our power affordable? Here we are not doing so well.

The framework we used in 2009 and 2014 lends itself to consideration of the sector today especially in light of the recent publication of the Electricity Price Review report and technical paper.[24]

As before, we consider the performance of the sector now and into foreseeable future against all five policy objectives, for better or worse. We think that, from a public policy perspective, this is an important and prudent way to view the sector. We stand by the point we made in 2014:

Experience in New Zealand and elsewhere argues that enduring performance gains will be achieved in the electricity sector if the policy interventions provide a clear path to better outcomes across all of these goals. Undue focus on one or a few goals risk policy swings which undermine the confidence necessary to invest efficiently in the long-life assets of electricity production and delivery.

For each chapter we restate the public policy objective, ask whether it is being achieved, and ask what influences are coming up that might challenge the sector.

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23 Expert Advisory Panel (2018), p1.

24 NZ Government *Electricity Price Review 2018-2019,* First report for discussion and technical paper 30 August 2018.

2. Security of Supply

2.1 The policy objective of security of supply

Security of supply[25] is a fundamental and enduring policy plank. It is embedded in the Electricity Authority's statutory objectives set out by the Electricity Industry Act 2010:

> *The objective of the Authority is to promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.*[26]

Security of supply is the title for those policy settings that describe or imply an 'optimal' level of security of supply, as well as the mechanisms in place to ensure the optimal level is met.

The optimality of security of supply is measured at multiple levels, depending on timeframes and forecasts that range from real-time to the very long-term. The 'optimal' level or levels of security of supply need to be understood in the context of considerable uncertainty, even in the short-term, and the limits of forecasting, especially over longer timeframes. 'Optimal' in this context is only our best estimate of optimality.

As security of supply is increased, the expectation of outages, and the cost of those outages, is reduced while the cost of providing security increases. Security of supply is said to be economically optimal when the cost to the economy from electricity supply outages is equal to the cost of ensuring a higher level of security. A lower security of supply, than is optimal, would result in extra outages that would cost more than the cost of providing a higher level of security. A higher security of supply, than is optimal, would cost more than the cost of avoided outages. Hence, when security is either lower or higher than optimal, the cost to society is more than at the assessed optimal point.

2.2 Scope of the analysis

In our 2009 paper,[27] we define the role of the regulator with respect to security of supply in terms of how effective the regulator is in:

- *creating conditions in which investors are willing to outlay large sums of money to bring forward fuel supplies, generation capacity, transmission and distribution capacity, and demand management*
- *producing credible projections of supply and demand balances so that all parties can plan for eventualities*
- *identifying barriers or constraints (physical, regulatory, political, etc) to increased fuel supply, generation or network capacity, so that these barriers can be addressed by policy-makers*
- *providing a mechanism for managing any shortage of supply event that might arise.*

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25 Or equivalently, reliable supply.

26 Electricity Industry Act 2010 s 15.

27 Murray et al (2009).

We remain of the opinion that the regulator must be able to effectively provide for the requirements above. This paper addresses the first three points. Our focus on the first point relates to new investments in security of supply over the long term, whereas the focus on the second and third points relates to the effective integration of distributed energy resources (DER) into supply and demand forecasting.

In our 2014 paper we:[28]

- acknowledged that management of hydro inflows had improved
- observed that the prospect of either a capacity or energy shortage had receded as the market matured
- concluded that the fear that market prices would not bring forward generation as required had proved unfounded.

Nothing has changed for us to pull away from our observations in the first two points. However, in this paper we extend the second point to cover the appropriateness of current regulatory settings to maintain an economic level of security in the long-term (i.e. accounting for the retirement of discretionary thermal plant). With regards to the third point, we are now less confident that this holds in the current settings for new investments in security of supply.

This is not an urgent issue. A critical point is reached at the point that the current plants that provide firm energy in dry years (mainly the Huntly Rankine units and TCC) are replaced. The replacement decisions for these plants are not only critical for security of supply but are also critical for the emissions pathway. However, these plants will be available for a few years yet. Genesis has committed to retaining two Rankine units until 2022, and Contact committed to mid-life refurbishment of TCC. There is no physical reason why these plants would need to be retired from service in 2022 and we do think the current policy settings create incentives to retain these plants for as long as they are needed and can be economically maintained. We note that there are uncertainties around demand as well as supply. If demand were to reduce, for example with a permanent reduction in load at the Tiwai Point Aluminium smelter, then security of supply would be maintained for many years.

The adjustments to the New Zealand electricity market that might be required to ensure security of supply in the long-term are complex and very difficult to design well. It is important that any changes to the current design to address potential security-of-supply issues are done carefully rather than quickly.

The current policy settings, where security of supply relies on the energy-only market with an administered price intervention for hydrology scarcity, the Customer Compensation Scheme (CCS), have two short-term problems: (i) the complex and abstract nature of security of supply pricing and contracting (including the abstract nature of the CCS pricing mechanism), and (ii) free riding. Nevertheless, the incentives on the larger market players seem to be strong enough for them to tolerate free riding. Both peak capacity margin and firm energy margin for dry years seem to be adequately managed currently.

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[28] Stevenson et al (2014).

Whether the long-term environment will encourage enough investment in security of supply is less clear, especially given the desirability of replacing current discretionary fossil fuel plant with high capital-cost, low-emissions substitutes (underpinned by a suitably high carbon price). Investors will be wary of committing large capital for long durations if there is a risk that, when hydroelectric scarcity occurs and the resultant wholesale market prices need to lift the average wholesale price of electricity to the LRMC of the security-of-supply investment, those prices don't eventuate. Such investors would require long-dated contracts to underpin their investment and manage risk.

The barriers to being certain that there will be enough contract demand from risk-averse purchasers to underpin new security-of-supply investment are greater in the long-term, and especially where the new investments are in high-capex, low-emissions plant. Over the long-term, the problems with contracting for security of supply are:[29]

- with potentially long periods of low variable cost clearing on the spot market, the incentives to free ride would be stronger
- those that currently contract for security of supply can rationalise their commitments to cover only their security-of-supply risk
- agents for customers and the customers on spot-price contracts will have strong incentives to take short-term opportunities. These parties may not even understand that they are only acting in their short-term interests
- even if small players would choose to contract for long-dated security of supply, they would not meet credit requirements as a counterparty to the investment contract and may not be able to agree to the volume commitments.

The Review doesn't discuss security of supply in much detail. This seems to be based on a general view that there isn't a problem with security of supply, and that the costs of security of supply are not too high. We are not aware of any analysis that supports these views.

The perception that there is no problem with security of supply seems to be based on the single comment that the 2012 dry year wasn't a problem. In fact, the 2012 dry year did indicate a problem with a sub-optimally large generation surplus, which has since been rationalised. The 2017 dry year suggests that security of supply may be optimal now, but this is a single point of data, and it doesn't indicate how the current policy settings will work with new investment.

The Review also makes unsupported claims that the future costs of security of supply won't be too high due to the declining cost of technology. This claim is partially based on an incorrect reference to the Productivity Commissions report on the low-carbon transition.[30] We acknowledge that new technology may lead to a low-cost, and still reliable future, however our analysis shows that currently available technology (solar, wind and geothermal) is unlikely to lead to lower costs for security of supply in the long-term.

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[29] It is possible to conceptualise market solutions to these problems, such as efficient prices which more fully reflect opportunity cost, 'smart' technology that isolates consequences for resource shortfalls, and securitisation of many small contracts. However these solutions are not part of the market.

[30] Productivity Commission (2018).

We also note that good governance is critical to security of supply. Given the complexity of market design related to long-run price efficiency, and the complex and varied nature of incentives resulting from those designs, good decisions would be best served by re-engaging the industry in the rule making process.

To summarise, in this chapter we address the following three questions concerning security of supply:

1. Are current regulatory settings adequate for incentivising new investment in security of supply in general?
2. Are current regulatory settings adequate for incentivising investment in lower-emissions security of supply?
3. Are current regulatory settings adequate for ensuring a proper assessment of security of supply as more renewables enter the system over the long term?

2.3 Overview of relevant regulatory and market settings

Measure of security

There are many methods for determining security of supply. The methods chosen in any electric power system are specifically designed for the prevailing risks in that system. Usually, there is a concern with having enough generation to meet the highest level of electric load that can occur in the system (the system peak). The Electricity Industry Participation Code (the Code) contains a measure of security of supply for the system peak. Given that currently system peaks occur in winter during the morning or evening peak periods, this measure is called the Winter Capacity Margin (WCM). The Code defines WCM:

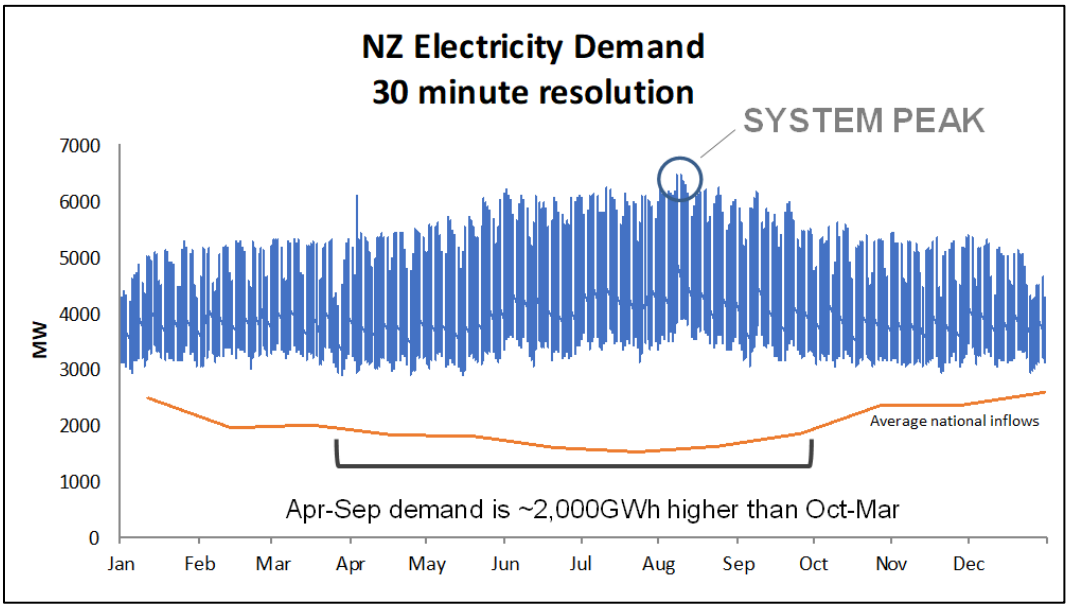
> ***Winter capacity margin*** *means the difference between a measure of the expected capacity and expected demand from 1 April to 31 October between 7am and 10pm, expressed as a MW margin over demand.*

In New Zealand, with large amounts of peaking hydroelectric generation, the WCM is less of a concern than it is in other power systems, but it is still a significant risk that needs to be measured.

In New Zealand, the greater concern relates to the significant contribution of hydroelectricity to the country's energy needs. Although this hydroelectricity has greatly contributed to the low-emissions profile of our electric power system, it does bring the problem of dry years.

New Zealand's hydroelectric catchments are dominated by Lake Pukaki. Pukaki is New Zealand's largest hydroelectric storage reservoir; it supplies the largest chain of hydroelectric power stations (the Waitaki hydroelectric scheme). However, Pukaki is still relatively small by international standards, and New Zealand's total hydroelectric storage capacity is only equivalent to around eight weeks of inflows. Also, being a snow catchment, (as is Lake Tekapo), Pukaki's inflows come in predominantly over spring and summer during the snow melt, which is inversely correlated to electricity demand.

Figure 1 NZ electricity demand - 30 minute resolution



The inverse correlation of inflows coupled with the low storage means that New Zealand's hydroelectric output can vary greatly depending on the level and timing of precipitation in a year. As can be seen in Figure 1 above, this problem can be particularly acute over the winter months.

This security-of-supply problem is relatively unique to New Zealand, and is measured by the Winter Energy Margin (WEM). The Code defines the WEM as:

> ***Winter energy margin*** *means the difference between the expected amount of energy that can be supplied and expected demand during the period 1 April to 30 September, expressed as a percentage of expected demand.*

The Code also specifies the implied optimal setting of security of supply as standards in the Code under sub-clause 7.3 (2) of Part 7:

> *(2) For the purpose of subclause (1)(a)(i) –*
>
> *(a) the energy security of supply standard is a winter energy margin of 14-16% for New Zealand and a winter energy margin of 25.5-30% for the South Island; and*
>
> *(b) the capacity security of supply standard is a winter capacity margin of 630-780 MW for the North Island.*

Sub-clause 7.3 (1)(a)(i) requires the System Operator to publish security of supply forecasts for at least five years to enable interested parties to assess whether the security of supply standards are likely to be met. This raises the question of how security of supply is ensured.

Energy only market

New Zealand has an energy-only market philosophy, insofar as New Zealand doesn't have a capacity market for security of supply as some markets do. In an energy-only market philosophy, a single market (for energy) provides adequate short- and long-term prices to

ensure the efficient running of the power system in both the short and long runs, including the adequate provision of security of supply. In an energy-only market, well-informed market participants contract for both their short- and long-term needs, managing both value and risk, which includes security of supply. The Security of Supply Forecasting and Information Policy under clause 7.3 of the Code, including the assessments of WCM and WEM, assists market participants in being well informed.

In practice there is no such thing as an energy-only market. Right from the outset the New Zealand market included Instantaneous Reserve (IR), which ensures capacity is available at the time of dispatch to manage short run security. If IR hadn't been included in the market solution, then an external intervention would have been required to achieve the same purpose; as is done with other ancillary services and with transmission capacity.

Electricity markets are designed around a principle of security-constrained economic-dispatch. Market designers knew that you couldn't have a market for energy only and that constraints and external mechanisms were needed to manage quality and security.

New Zealand's market is described as energy only because it is deemed to not have a capacity market for security of supply. Many overseas markets include capacity markets, firm energy markets, operating energy reserves and other mechanisms as interventions to ensure security of supply. Many of these capacity interventions have been failures that have burdened consumers with significant costs.

However, New Zealand also has a capacity intervention for security of supply. The Code contains an administered price intervention for that purpose.

Customer Compensation Scheme

The CCS is a scheme mandated under Part 9 of the Code that requires all retailers to pay each qualifying customer[31] $10.50 per week for the duration of a conservation campaign. Conservation campaigns are entered on a mandatory basis depending on hydroelectric storage levels and when the risk of running out of hydroelectric supply exceeds 10%.

For context, if a retailer has a customer base of qualifying customers of 200,000, the CCS payments would be $2,100,000 per week. This is a significant penalty.

The CCS was introduced after the hydroelectric supply shortages of the 2000s (2001, 2003 and 2008) led to three conservation campaigns, one for each shortage. The Ministerial Inquiry of 2009 identified that hydroelectric operators were able to maximise profits by running lake levels aggressively and then getting a free option to alleviate the cost of shortages through public conservation campaigns. The inquiry identified this as a free riding problem that was addressed through the CCS.

The CCS is applied to all retailers, regardless of whether they operate hydroelectric reservoirs or have any generation. The CCS penalty for failing to meet the WEM standard creates a scarcity-price effect that augments the price risk of shortage in the 'energy-only' market. This creates stronger incentives for all retailers to contract for security of supply.

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[31] Relatively small customers, as denoted by their metering category but using more than 3,000kWh per annum.

The CCS market intervention to ensure security of supply was in response to an identified free-riding problem where hydroelectric reservoir operators had a free option to gain price relief from a public conservation campaign. It is worth considering whether this policy intervention is the best intervention to meet New Zealand's security of supply needs now and in the future.

2.4 How we have tracked on security of supply

In our 2014 report, we said that management of hydro inflows has improved. The evidence to support this was that, although the SI hydro inflows were lowest on record in the first six months of 2012, lake levels were managed more prudently than the previous dry year of 2008. The report also provided evidence for the fact that peak monthly wholesale spot prices associated with low hydro generation were less acute than in the previous three years (before July 2013).

The Review makes the same observations about the reforms of 2010 and states:

> *In earlier years, some generators and wholesale buyers adopted risky buying and selling strategies that drained reservoirs, forcing public conservation campaigns. These happened in 2001, 2003 and 2008. Regulatory changes in 2010 have hopefully put an end to the over-reliance on such campaigns. In 2012, water flows into South Island reservoirs were at their lowest levels on record, yet a reliable supply was maintained without any conservation campaign.* [32]

It is surprising that the Review has only used the example of 2012 when 2017 is more illustrative of the actual results of regulatory changes and industry evolution with respect to security of supply. Although our 2014 report, and other commentators, did note an apparent change in the management of the hydroelectric reservoirs, the 2012 event was also greatly assisted by a significant generation surplus created by the inertia of the generation construction programme up to that period, where the industry didn't anticipate the flattening of the demand growth that occurred from 2007.

As can be seen in Figure 2, the generation build overshot demand significantly. The level of generation surplus in 2012 was not optimal, and the flattening of demand led to fossil fuel generation being significantly curtailed even during the 2012 dry year. Relatively low prices during a severe dry year should have been of more concern to the Review, as this would discourage any future investment in WEM role generation.

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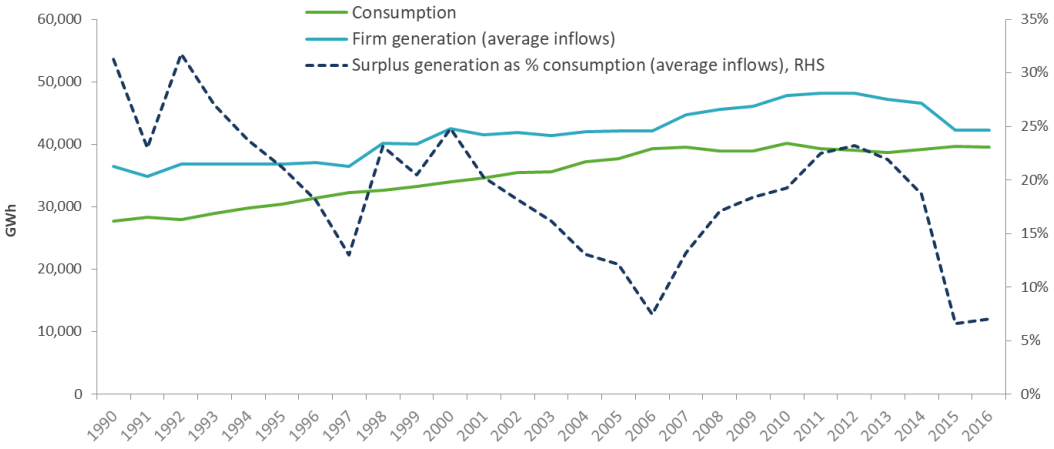
32 Review, p31.

Figure 2 Electricity demand and firm generation

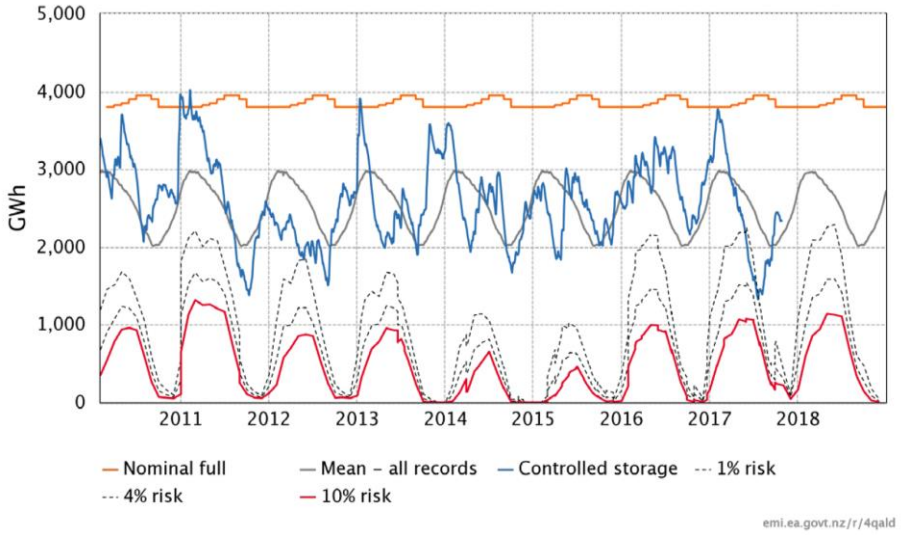


Source: Whiteboard Energy (2016) based on multiple sources of data

As expected in a market with the primary purpose of dynamic efficiency, two fossil- fuel-power stations were retired at the end of 2015 (Southdown and Otahuhu B). Hence, 2017 was a better test for security of supply.

2017 was also a relatively severe dry year. The System Operator's report to the meeting of the Security and Reliability Council on 6 November 2017 declared that the winter of 2017 had the lowest recorded inflows into South Island hydroelectric catchments over the period March through to July since records began. Still, 2017 wasn't as severe as 2012, which had the lowest recorded inflows into the South Island for the first six months of the year. Figure 3 shows that, even though 2012 was a worse hydrological year, the reduction in generation surplus after 2015 led to 2017 reaching dry-year 'Watch' status (the level at which there is an 1% chance of running out of water).

Figure 3 Hydro risk curves



The low inflows in 2017 led the System Operator to trigger the Watch status for hydro risk and to almost trigger the Alert status. If the 2012 hydro sequence occurred in 2017, a conservation campaign may have been called. This doesn't mean that the security-of-supply settings are wrong. As the Review implies, triggering a conservation campaign in an extremely severe dry year is not an over-reliance on conservation campaigns. The Winter Energy Margin over 2017 looks close to optimal. However, we should be careful drawing conclusions from a sample of one.

The WEM would clearly fall below the optimal level if the plant currently performing the WEM role (a Huntly Rankine unit, for example) is retired without a suitable replacement, which would have to come from new investment. We remain unconvinced that the current policy settings would meet the WEM standard following the start of the next investment cycle, particularly while trying to reduce greenhouse gas emissions and maintain affordability.

2.5 Suitability of current regulatory settings for future security of supply

2.5.1 Incentives for new investment in security of supply

This section addresses the question on whether current regulatory settings are adequate for incentivising new investment in security of supply in general, and for lower-emissions security of supply, in particular.

There is always a risk to security of supply. The pertinent question is whether the current policy settings are likely to achieve a near-optimal level of security of supply, with a prudent level of investment in WCM and WEM resulting in a relatively-low expected cost of supply shortages.

We believe there are concerns, arguably in the short-term, and more definitely in the long-term. In the long-term we are considering not just the current economic and technical concerns with security of supply, but also the added concerns of the low-carbon trilemma, where security of supply and cost must also be balanced with low emissions. This is compounded by the potentially significant increase in electricity demand, as electricity is used to decarbonise other industry sectors.

There are concerns with the current policy settings. The CCS addresses one free-riding problem in the New Zealand electricity market but doesn't address, and potentially exacerbates, other free-riding problems, for example by strengthening the incentives to not contract for long-term security of supply in favour of short-term returns on low spot prices.

We identify the following risks to security of supply at the point where current surplus capacity (especially WEM capacity) is retired and new investment is required, as the electricity sector continues to de-carbonise:

- The risk of unnecessary expense and/or unnecessary greenhouse gas emissions to meet the Winter Capacity Margin[33] and Winter Energy Margin standard if security-of-supply policy settings make fossil fuel plant (with higher total costs due to a high carbon price) more attractive to investors once value is weighted by risk (see more below).
- The risk of failing to meet the Winter Capacity Margin and the Winter Energy Margin standard, especially in the longer-term.

These outcomes could occur because investment risk favours low-capital, high variable-cost investments even where total costs are higher, i.e. the risk-weighted returns of fossil fuel investment are higher than the low-emissions alternative; or the risk of investment is too high to underpin enough new investment in security of supply.

For investors to commit capital to a project, they must believe that the project will recover all economic costs, including a return on capital employed.

In highly competitive markets, with low fixed costs and high variable costs, the expectation is that the markets will clear on variable costs. In electricity markets, where fixed costs are also significant, an energy-only market relies not just on variable cash costs but marginal opportunity costs to find a long-term equilibrium. Of course, for hydroelectric generation almost all short run costs are opportunity costs. Periods of scarcity give parties the opportunity for prices to occasionally clear above variable cost, allowing all plants[34] to recover fixed costs. If these plants were not able to realise these prices, they would exit the market. The level of scarcity pricing that is enough for all plant (necessary to meet demand) to recover fixed and variable costs in the long-run is economic and acceptable. If the demand side is completely inelastic, generators may be able to lift long-run prices well above the long-run marginal cost of new supply. This makes it very important to reduce barriers to entry to demand-side technologies that allow consumers to exercise their preferences for cost and risk. An elastic demand side, even if relatively inelastic, ensures electricity spot prices are efficient. However, it is currently very difficult to accurately establish consumer elasticity and demonstrate that scarcity prices are efficient; and it is always politically difficult to accept sustained periods where prices rise above short run marginal cost.

It is a real risk for investors that rely on infrequent periods of high earnings during periods of scarcity to recover total project costs where political or regulatory intervention could remove the required revenues when they occur. This risk of regulatory failure can prevent investment.

In any event, infrastructure investors are inevitably capital constrained. They ration capital and are risk averse. Even where there is a reasonable expectation that a project will return all economic costs to investors, they will prefer projects with less risky cash flows. Indeed, many infrastructure investors are looking for 'yield' stocks that generate reliable and relatively even cash flows.

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[33] We will continue to use the term Winter Capacity Margin but, in the future, the capacity margin shortfall might occur at a different time -for example, during periods of low wind and/or solar output.

[34] In a uniform price auction, which clears at a single price for all parties, some parties recover fixed costs when the clearing price exceeds their variable costs.

In theory, the New Zealand electricity market can deliver a favourable framework for investors in security of supply, and there is evidence that it might in New Zealand. In our chapter on efficient investment and operation of generation, we consider that the market has been efficient in incentivising the entry and exit of generation to meet supply and demand generally. There is also evidence that the market has encouraged the exit of surplus generation while maintaining security of supply. At the end of 2015, the Southdown and Otahuhu B power stations were decommissioned and yet the WEM capacity available in 2017 seemed to be about right. However, we don't consider the evidence for the market incentivising new investment in security of supply to be compelling, either to demonstrate that current settings are adequate or inadequate. This conclusion only relates to the surplus generation capacity needed to ensure security of supply in the extreme. The New Zealand electricity market has managed the general balance of supply and demand well.

Over the 2000's it could be argued that security of supply was not adequately met by the market, but policy decisions hanging over from the 1990s[35] could be argued to be clouding that conclusion, with explicit changes being made in 2009 to address concerns around security of supply. Similarly, the conclusion that 2012 demonstrated favourable incentives to create a generation surplus is clouded by the missed forecast of flattening demand while generation projects under construction, built to meet expectations of demand growth, were completed. In considering the incentives on purchasers to contract for security of supply, we think there are issues that should be carefully considered prior to the need to commit to new investment.

The occasional periods of scarcity and high scarcity prices is a risk to those that purchase electricity who would also seek reliable and relatively even payments. Therefore, purchasers should be willing to contract with investors in security-of-supply projects at a risk premium, where the contract price is set higher than the expected spot market price, and results in positive settlements to the investor, on average, to meet fixed costs.

Although this works in theory, there are real barriers to contracting for security of supply in practice, which arise from:

- short-term planning and profit incentives
- lack of trading and risk management competence
- credit risk
- free riding.

Short-term planning and profit incentives

The Winter Capacity Margin standard requires generation capacity or demand response for only a few periods in a year. The Winter Energy Margin standard requires generation that runs for significant periods in dry years, but it could be many years between dry years. This leaves those that contract for security of supply paying significant premiums for a long time

[35] Deliberate policy decisions to limit the expansion of ECNZ were taken in the 1990s to allow competition from private investors. Some private investment did occur, but ECNZ had very few generation options under development. When ECNZ was split up in 1999, the 'baby SOEs' had very few expansion opportunities and had to develop their investment pipelines from scratch.

with no obvious benefit. Even in a larger business, this can get be very difficult to explain to the business management and owners.

Even when the principles of security of supply are understood, businesses are still concerned that they are paying too much for this service. The appropriateness of the price being paid can potentially be derived from forward price curves, such as the futures price and the hedge price index. However, to assess whether the risk premium being paid is a market rate requires some analytical expertise to understand how the duration to maturity affects the risk premium in futures contracts. Analytical expertise is also required to assess the appropriateness of different contracts at different periods, and how they may affect the notional risk premium in the hedge price index. Of course, this only works if purchasers have faith in the forward price curves at all.

The problem is exacerbated if security-of-supply providers are highly contracted. By design, the contracts transfer high-price risk to the security-of-supply provider who can manage that risk using their plant. However, the providers then have the incentives to put downward competitive pressure on price even in times of scarcity. As the contracts for security of supply meet fixed costs, the providers of security of supply will offer output at variable cost. This means that, under the highly-contracted scenario, prices may not rise much above variable cost even when there is a period of scarcity. This makes it even harder to explain to managers and shareholders why the contracts are beneficial.[36]

Most customers are on fixed-price variable-volume contracts, which means that most customers have no incentive to respond to high prices and provide demand response. Demand response can be particularly effective in helping to manage the WCM standard. Some retailers do offer pricing plans that incentivise response to high prices in the electricity, up to and including customers that are on spot price. Clearly, this encourages demand response support for the WCM standard, but far less so for the WEM standard which would need significant and sustained reductions in demand.

Although spot customers have short-term incentives to assist with the WCM, their long-term incentives are less clear. The Code exempts retailers from the Customer Compensation Schemes for customers on spot price arrangements:

> *(2) Despite subclause (1), a person is not a qualifying customer if the price of all of the electricity provided under the person's contract with the retailer for the supply of electricity is determined by reference to the final price at a GXP.*

Qualifying customers for compensation are also only mass-market customers. The implication seems to be that, where retailers need an administered price incentive to contract for security of supply, spot customers are going to understand all these market complexities and realise they need to contract for security of supply themselves.

Lack of trading and risk management competence

The settings of the New Zealand electricity market are such that contracts and spot market prices are expected to combine in a way that will give conservative investors enough

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[36] In this case, the contracts would be 'out-of-money.'

confidence to invest in security of supply. It is fair to say that the way the electricity market is intended to work to achieve this competitive long-term equilibrium is complex. Even the way in which financial instruments work to achieve reliable supply requires experienced and sophisticated understanding of the market. Many small retailers, and most customers, do not have this expertise.

We observed above that traders might have problems explaining why security–of-supply contracts are substantially 'out of the money'. However, this is often not understood by the traders themselves. For experienced traders and risk managers coming from other industries, this peculiarity of New Zealand's Electricity Market can be misunderstood. And, even for those used to electricity markets, the nature of hydrology risk is not well understood, with very few energy islands such as New Zealand having such reliance on hydroelectricity.

That the risk of triggering customer compensation could be avoided by everyone contracting for long-term security of supply is particularly abstract.

Credit risk

Credit risk is a potential problem for long-term security of supply. In the short-run, the futures market provides an avenue where providers of security of supply can contract in advance, assuming the futures market is working correctly. The futures market intrinsically manages credit risk and, therefore, even small players can contract forward.

If we look long-term, and particularly with an objective of low-carbon emissions, then the preferred contract by which conservative investors in high capital-cost plant would wish to employ creates a credit risk problem. Such investors would prefer long-duration contracts, given that high-capex, low-emissions renewable plant have long payback periods. Even if all retailers were inclined to contract far in the future for their security of supply, they could not meet the credit requirements of the potential investors.

Free riding

Free riding is a known problem in electricity markets where increments of investment are so large that those most exposed to the risk of shortage have no option but to make a large commitment to capacity investment, which benefits many more parties other than themselves. If parties that also benefit believe that the major beneficiary will still go ahead with an investment, they have the incentive to refuse to support the investment financially.

Free riding is a known problem for security of supply in New Zealand. After the 2003 high-price 'crisis', which was as much a fossil-fuel shortage as a hydroelectric shortage, Genesis Energy came under extreme pressure to build up its fuel stockpile at Huntly. After this period, the free riding problem became very acute because industry observers could see that, not only did Genesis have substantial sunk cost in the Rankine units, but also substantial sunk cost in the large coal stockpile.

Despite Genesis demonstrating that the Huntly Rankine capacity, and the coal energy supply, was far more than Genesis required for its own needs, it struggled to get traction on security–of-supply contracts to underpin the significant fixed costs of the Rankine units and coal supply. Only when Genesis demonstrated that it was willing to decommission Rankine units and run the coal stockpile down, arguably in conjunction with the Customer Compensation Scheme, did Genesis start to attract the type of firm-energy contract that underpins investment in security of supply.

Although the free riding problem is partially addressed, it is still a problem. If the rest of the market believes that there are strong enough incentives on Genesis, Meridian and a few other large generator retailers to ensure there are two Rankine units maintained with fuel at Huntly, free riding can occur.

In a future where fossil-fuel plant are replaced with lower-emissions plant in the role of the Winter Energy Margin (in particular), spot prices could be even lower between dry periods as any time when these plants run, (other than during periods of scarcity), their variable costs will be lower than the variable costs of the fossil-fuel plants they replace. Even though scarcity prices should be commensurately higher when they occur, the incentive to free ride becomes stronger. At the same time, the risk to investment is higher as the variation between prices generally and prices during scarcity (that is, price volatility) is greater.

It should be noted that, if purchasers believe that the Government will intervene in a future high-price event, the free-riding incentive increases significantly.

As technology is reducing economies of scale enabling smaller increments of economic generation, parties who are currently bearing the cost of security of supply have the incentive to investigate investments that enable them to meet only their own needs in future investment. Unless all market participants understand this, and believe it, there could be insufficient funding for security of supply in the future.

It could be that the Customer Compensation Scheme is a blunt enough instrument that a few large operators remain willing to bear the cost of the WCM and WEM standards, but there is a future risk that should be carefully considered before current thermal plant is retired (i.e. Huntly Rankines, TCC and eventually Huntly Unit 5).

2.5.2 Assessment of security of supply

This section addresses the question on whether the current regulatory settings are adequate for ensuring a proper assessment of security of supply as more renewables enter the system over the long term.

In our response to the 2008 electricity price review, we made the case that the System Operator (SO) is best placed to provide the outlook for supply and demand, and to offer frank views on the constraints affecting the way in which supply will meet demand. We continue to hold this view. Our judgement followed the logic that the SO is independent from political intervention, has the competency to identify impending imbalances, and has strong incentives to monitor energy security levels.[37]

As the electricity sector moves to very low emissions, the issue that the SO will grapple with is the availability of information with regards to the capability, availability, risk and operating characteristics of distributed energy resources (DER). The SO will need this information to provide accurate security of supply forecasts as required by the Code.[38] The information will need to be collected by the Authority and provided to the SO one way or another (privately

[37] The SO monitors energy security through the Winter Capacity Margin and the Winter Energy Margin.

[38] Sub-clause 7.3(1)(a)(i).

or through public channels). We do not discuss this issue any more here other than to say that efficient market operation would benefit from this information being made public.

2.6 Future costs of electricity

The Government has set an ambitious target of reaching net zero emissions by 2050, which it will legislate through a new Zero Carbon Bill.[39] The electricity sector's contribution to this target is expected to come from replacing fossil-fuelled generation with cleaner output, and from a greater uptake of demand response and storage technologies.

In its section "Outlook for prices," the Review seems to be dismissive about the risk of meeting security of supply with low emissions technology leading to high electricity prices. The Review states:

> *The move from petrol to electric vehicles and the use of electricity rather than coal in industry will significantly increase demand for electricity, requiring sizeable investment in more generation, transmission and distribution infrastructure. We don't know how big the increase in demand will be, but we do know this extra demand will not necessarily lead to major price rises:*
>
> - *New Zealand has abundant renewable energy sources, including wind and geothermal power, that are considered world-class.*
> - *The cost of wind, solar and battery technology is likely to keep falling.*
> - *Charging electric vehicles at off-peak times will avoid the need for major network investment, lowering average network charges.* [40]

The Review's comments here imply that, although the extra demand will not necessarily lead to major price rises, it *could* lead to these price outcomes. However, further on in the report under "Outlook for generation," the Review makes the following statement based on the Productivity Commission report:

> *The Productivity Commission sponsored analysis of the lowest-cost way to achieve net-zero emissions for the economy and the level of electrification needed to achieve this. The results indicated new wind, geothermal and solar power generation could meet the big rise in power demand by 2050. The stable or falling cost of these technologies means significant electricity price rises are unlikely. Indeed, continued reductions in wind and solar power technology costs may even result in falls in the generation component of electricity prices in the longer term.*

This is not what the Productivity Commission said in their final report.[41] From finding F13.3:

> *Under current technology and technology costs, reducing emissions from electricity generation will likely entail an increase in wholesale electricity prices. Rising electricity prices, if*

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39 Key elements of the Bill were put out for public consultation, which has recently closed. See https://www.mfe.govt.nz/have-your-say-zero-carbon

40 Review, p24.

41 Productivity Commission (2018).

substantial, could dissuade adoption of emissions-reducing technology in process heat and in transport, as well as increasing costs throughout the economy. Yet rapid advances in, and falling prices for, low-emission electricity technology may make this trade-off less acute in the future. An effective emissions price will help weigh the efficiency of reducing emissions in electricity against possibly lower-cost options to do so in other sectors.

For the avoidance of doubt, we believe that it is a credible scenario where future energy needs are met with new technology that does not lead to significant electricity price rise. It is also a credible scenario, especially under the more extreme forecasts of electricity demand growth in a decarbonising economy, that New Zealand's electricity system will fail in at least one limb of the energy trilemma - security of supply, low emissions or affordability.

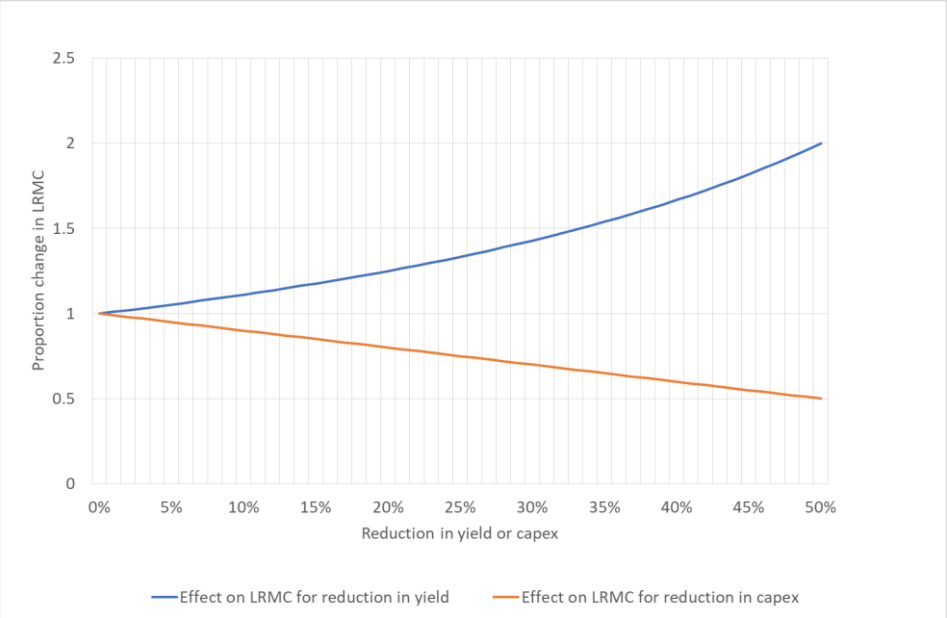
The Review also states

New Zealand has abundant renewable energy sources, including wind and geothermal power, that are considered world-class. [42]

This is true but needs to be understood in context. 'World-class' renewable energy resources are typically understood to be those that require relatively low subsidies to be economic. New Zealand's best wind sites, for example, are economic without subsidy and are genuinely world-class, but still only the best sites have yields that are cost competitive with today's market prices (on a LRMC basis). To achieve the level of generation required to meet the large future forecasts of demand consumption could easily require the development of resources that have half the yield of the best sites. The Wind Energy Association gives load factors for small wind turbines that range from 10% to 40% (although NZ's best large turbine sites get 50%). As the yield effect on increasing LRMC is a binomial function (see Figure 4), the technology cost reductions would have to be very substantial. Admittedly, technology also improves yields, but this is still a big ask for a technology that is already mature.

42 Review, p24.

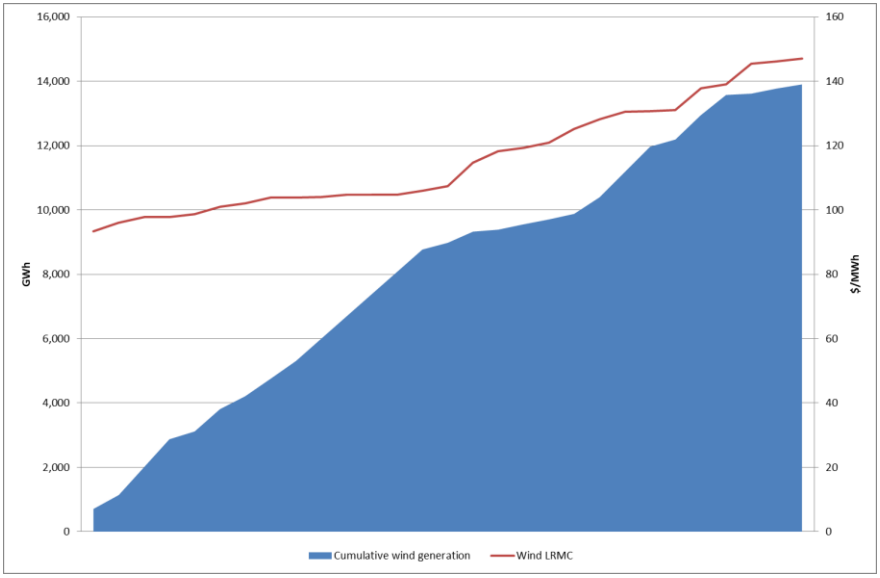
Figure 4 Relationship between load factor and capex for LRMC



Source: Sapere analysis

Capital costs can also vary significantly as projects become more marginal in terms of factors like distance from grid (requiring more transmission) or rough terrain (which increases costs). Figure 5 shows how LRMC increases with a significant increase in wind capacity.

Figure 5 Wind cumulative output and LRMC



Source: Sapere analysis based on MBIE data[43]

[43] https://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/modelling/interactive-electricity-generation-cost-model and https://www.mbie.govt.nz/info-

The case for geothermal is even less clear. A significant capital component of geothermal is drilling costs, and drilling costs are not reducing. As more marginal fields are developed, drilling becomes more complex and riskier, and capital costs are unlikely to reduce.

Even if technology costs did offset the higher cost of lower-tier renewable projects with marginal yields, the case is far worse for security-of-supply investments. The five years between 2012 and 2017 means that for five years any plant required to meet the WEM had to run at very low load factors and run high load factors in dry years. If a high-capital-cost renewable-energy plant is used to perform the WEM role, the technology cost would need to reduce by many multiples to keep the implied spot and contract prices from rising significantly, bearing in mind that investors would expect to recover their total long-run costs.

The statement that:

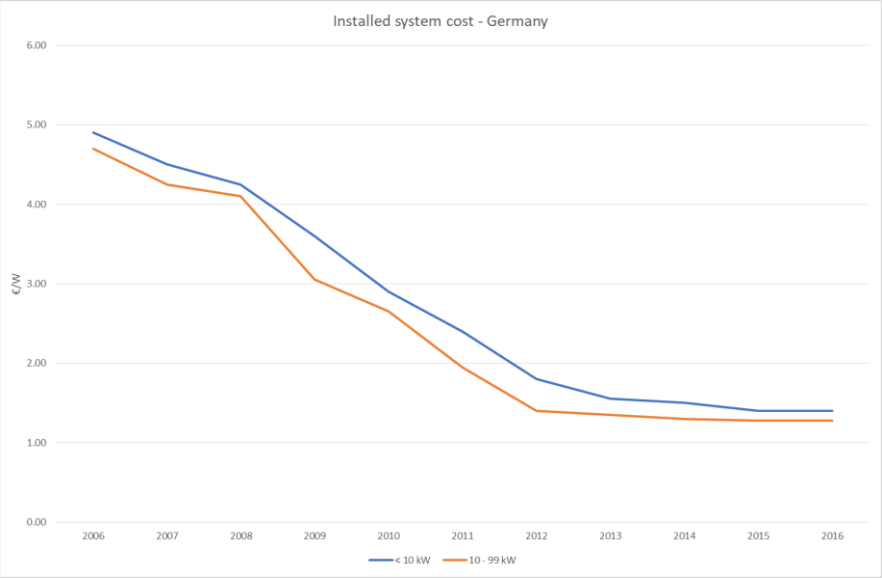
> *The cost of wind, solar and battery technology is likely to keep falling*[44]

is also true but not as dramatically as the Review considers. Of these three technologies, batteries are rapidly decreasing in cost but batteries do not have enough storage to participate in the WEM role. Wind and solar do provide some firm energy, and 'overbuilding' wind and solar can provide WEM. However, wind and solar are mature technologies and we are not convinced that the potential reduction in their costs would be dramatic enough to provide security-of-supply without an increase in prices. Previous analysis we have done on the German market has shown that installed solar costs appear to have plateaued (see Figure 6). The LRMCs of these plants are falling as improved efficiency and operating parameters improve the plants' yields. However, if these plants are used to provide security of supply, the high spot price required to recover investment given the plants' reduced load factor (which is the nature of the role of spare capacity or firm energy) would not necessarily be offset by technological efficiency improvements.

services/sectors-industries/energy/energy-data-modelling/modelling/interactive-electricity-generation-cost-model

44 Review, p24.

Figure 6 Installed solar PV system cost - Germany



Source: Sapere analysis

2.7 Any intervention must be carefully considered

The issues discussed above suggest that current regulatory settings may not be favourable to new investment in security of supply when it is required, when current plant utilised for the security-of-supply role is retired. As such, this is not an urgent issue as current plant (Huntly Rankines and TCC) are confirmed as available until at least 2022; and, as these plants still have economic life post-2022, we think the current policy settings are likely to retain them for as long as they are needed and economically serviceable. It must also be remembered that demand, not just supply, affects security of supply and there are risks that New Zealand's electricity demand could drop before 2022 (such as with a permanent reduction in load at the Tiwai Point aluminium smelter).

Although we have identified issues with the investment framework for security-of-supply investment, which could be exacerbated by the imperative to reduce greenhouse gas emissions in the sector, the case is far from proven. For this reason, we offer no solutions but recommend a process of:

- broad consideration of the environment for new investment, including not only the pricing signals, but all incentives and disincentives around investment and contracting for security-of-supply
- in the context of the above, a clear definition of any problems identified, and their magnitude
- if required, search for the solutions that best address the identified problem.

We stress that the impetus should be to act carefully and not quickly. New Zealand has previously operated a dry year reserve scheme that was not well considered. Until 2009, the Government owned the Whirinaki power station and instructed the Electricity Commission to operate as a dry-year reserve scheme. Operating a government station by the regulator was problematic and the scheme was dropped through sale to Contact Energy after the 2009 review.

The impetus for the current electricity market was driven substantially by the excesses of generation capacity by the Government over the 1970s and 1980s. As well as building a substantial generation surplus (driven by conservatism and mis-forecasting demand), not only was the cost of electricity increased significantly but so too were the resulting greenhouse gas emissions.

The primary reason for establishing the electricity market was to improve capital efficiency. This was predicated on the costs and risks of investment falling on private investors (both as suppliers and purchasers) that are best able to manage those costs and risks rather than on the taxpayer or through a levy on electricity consumers. The greatest benefits from the electricity market (on the supply side) were envisaged to come from private investment in supply. We note that, where there is significant uncertainty around both supply and demand that affect the timing and amount of investment required in security of supply, private capital taking appropriate risk for appropriate reward will make the most efficient investment decisions providing that there are no barriers to the efficient contracting between parties that bear and take risk.

Although we are concerned with the investment environment for security of supply in the long-run, we note that it would be easy to implement interventions in the electricity market that were too benign for investors. The pendulum could easily swing to an environment where investors easily make their return on investment, and costs and risks are borne exclusively by consumers or tax payers. This has happened in other electricity markets, such as Ontario where wholesale electricity prices have fallen but the regulated rates for household consumers has more than doubled since 2003.

As discussed, electricity markets are complex in the way they are intended to work to secure supply, and the way in which incentives arise for different market participants.

We note that:

> *Creating well functioning competitive wholesale and retail markets is a significant technical and institutional challenge. It is easy to do it badly!*[45]

2.8 Good governance is critical for security of supply

Any changes to the market design, or recommendations for regulatory intervention, need to be carefully analysed and considered. It is known that efficient decision-making requires:

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45 Joskow (2002).

- enough diversity of views to eliminate bias and raise all relevant issues
- enough diversity of roles to ensure genuine critique
- empirical evidence where possible
- a good process to reconcile the above diversity, and to formulate concise decisions.

In our 2014 report we said:

> *The current allocation of roles and responsibilities therefore relegates to a secondary role the parties with the expertise and incentives relevant to the design of an efficient market (industry participants, including consumers); in the place of participants is substituted an entity with multiple and conflicting objectives and which was directed to focus its efforts on other matters.*
>
> *A better approach would be to reengage industry participants in a structured industry decision process for rule making adapted from that which existed under NZEM and MACQS. Under these former industry processes, rule changes were developed by technical working groups, and recommended to a rules committee. The rules committee could approve or reject the proposals based on a set of guiding principles, which were primarily aimed at economic efficiency.*

We went on to add:

> *Regulations which have a social or community objective, rather than an efficient trading objective, should be explicit regulatory interventions and subject to cost benefit analysis.*

Security of supply, with the attendant challenges of moving to an emissions budget, would be best served by ensuring electricity industry governance is strong, with appropriate separation of duties and good process. Under such a framework, re-engaging the industry in the rule-making process would lead to better design decisions than otherwise.

Where it becomes obvious that meeting social or community objectives cannot be delivered through economic efficiency principles alone, the industry, working under strong governance and good process, would be incentivised to clearly and succinctly identify the problem definition. This would greatly assist in ensuring that any regulatory interventions for these purposes are well considered.

3. Efficient operation of the wholesale and retail sector

3.1 Competition as a tool to improve consumer welfare

An enduring policy objective for the electricity sector is efficient operation of the wholesale and retail sectors, with competition as the primary tool. This policy goal is reflected in the Authority's objective of promoting competition for the long-term benefit of consumers. Effective competition improves market performance, whether measured in terms of economic efficiency, total welfare or consumer welfare.

At its core, competition is a process of rivalry between sellers (or between buyers) to win and retain sales (or supplies), analogous to a sporting competition. It implies independence of action and the absence of collusion or coordination, where the conduct of each rival affects and constrains the conduct of others. No participant in a competitive market can conduct themselves without regard to the behaviour of other participants.

As the parallel concept of sporting rivalry implies, competition is essentially about conduct. Competition is the process by which firms try to undercut each other's prices, or improve their product range or service delivery relative to rivals, hence driving prices down toward cost and delivering to consumers the products they want by the most efficient and convenient means.

Competition is also the process by which additional resources are directed to the products and services of greatest consumer demand. Suppliers seek to discover product innovations that will appeal to certain customers, and to discover those customers that are least expensive to serve.

Markets in which competitors constantly vie to meet (and to create) consumer needs at efficient costs and prices are referred to as being workably competitive. The idea of workable, or effective, competition has been adopted as a benchmark for public policies which seek to promote competition.[46] The Authority interprets the term competition in its statutory objective to mean 'workable competition' in which "sellers compete on price, quality, location and/or service, or by differentiating their goods or services from their rivals, or through their sales and marketing effort, or via a combination of those activities."[47]

Workably competitive markets are generally in a state of change rather than equilibrium.

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46 The New Zealand Commerce Act, for example, defines competition as 'workable competition'

47 EA (2011), p12, A.15.

3.2 The Electricity Price Review assessment

In its discussion paper, the Review made a number of observations about the performance of the wholesale and retail markets, including:

- assessing that competition amongst retailers had strengthened in recent years, and a rising proportion of consumers were switching between retailers
- expressing concern that a two-tier retail market may be developing, with competition not benefiting all consumers
- suggesting that competition in the wholesale market has delivered sufficient new investment to meet demand, with least cost generation being built before higher cost options
- stating a concern about the ability of generators to exercise market power when supply is tight
- identifying that new entrants are unhappy with 'win-back' discounts aimed at drawing back departing customers
- commenting that a more effective wholesale contract market would help correct the exercise and mitigate the effects of vertical integration.

We agree with the Review's interpretation of indicators of strengthening competition in the retail market, and that the wholesale market has resulted in efficient incentives for investment in generation. The indicators cited by the Review suggest improved performance in both markets in recent years, and considerable gains relative to the regulatory regimes which preceded the introduction of competitive market processes in the mid-1990s.

We therefore focus our analysis on the:

- concerns expressed at the prospect of a two-tier retail market
- indicators of generator market power proposed by the Review (and others)
- the aspects of the market the Review identifies as potentially holding back competition:
  - development of the wholesale contracts market
  - win-back discounts.

3.3 Two-tier markets

3.3.1 The Review's assessment

The Review observes that "a two-tier retail market appears to be developing".[48] Features of this two-tier market identified by the Review include that:

- those who actively shop around enjoy the benefits of competition, and those who don't pay higher prices (Review, page 4)

[48] Review, p4.

- retailers do not make it easy to compare prices and contracts (Review, page 5)
- some households struggle to understand the various plans and how to choose the one that's best for them (Review, page 4), whereas other consumers use technology to take control of their energy needs
- low-income consumers miss out more often on prompt payment discounts – which can be as high as 26 per cent of the bill (page 4).

These symptoms reflect behaviours of consumers and retailers.

3.3.2 Engaged consumers improve market outcomes

Most consumers are engaged, but some are not

Workably competitive markets are generally enhanced when consumers engage effectively.[49] Active and confident consumers complement vigorously competing firms. If consumers are less engaged in the buying process, then suppliers may find it harder to win market share by providing consumers what they most want. Suppliers would therefore be less likely to innovate and the long-term benefit to consumers would be lower than it would have been had consumers been more engaged.

Passive consumers also do not provide the same constraints on firms as active consumers; a passive consumer is likely to reduce consumption by less than an active consumer in response to a price increase. In economic terms, this reduction in price sensitivity is similar to a general reduction in both the product's absolute price elasticity,[50] and its substitutability (or cross-elasticity) with other products.[51] A reduction in substitutability can translate into a lessening of the intensity of competition – a softening of competition – and, as a result, higher prices for consumers.

The Review's reference to a two tier market recognises that by far the majority of consumers are engaged in the market. A survey by the Authority indicates:[52]

- 87% of bill-payers agree they have a choice of electricity retailer
- 70% of bill-payers consider it easy to switch electricity retailer
- 55% of bill-payers agree that they can save money by switching electricity retailers.

However, these survey results also imply that there are proportions of bill-payers who:

- either do not know they have a choice of retailer or consider it likely to be difficult to switch
- know they have a choice of retailer and that they would likely save money from switching, but choose not to do so.

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49 See for example, Colton (1993), Chessler (1996), Giuletti et al (2005).

50 Price elasticity refers to the percentage change in demand in response to a change in price.

51 Klemperer (1987).

52 The figures cited are from EA (2017b).

The existence of the first group weakens competition and, to the extent this group includes people who are energy poor, conflicts with achieving community and social minimums. By contrast, the emergence of the second group may be consistent with *increasing* competition. Tiered markets may also be necessary if the most vulnerable consumers are to benefit the most from competition.

3.3.3 Consumers who do not know they can switch easily

A surprising and troubling result from the Authority's surveys is that around 13 per cent of consumers do not know they have a choice of retailer. The data provided by the Authority indicates that this percentage has hovered between 12 per cent and 19 per cent for much of the past decade.[53]

There is some indication in the survey results that those who are unaware that they have a choice of retailer are more likely to be younger than 30 years (23 per cent) or to earn less than $40,000 (18 per cent). However, it is not feasible to identify from the survey data the characteristics of consumers who are unaware that they have a choice of retailer, despite extensive media advertising by competing retailers, the Authority's 'What's My Number' campaign and its work with community groups to promote switching.

What is clear is that competition in the retail market must be less than it might be, because about 13 per cent of the market does not know they have a choice. We consider it would be consistent with the Authority's statutory objective for it to investigate the characteristics of those who are unaware they have a choice of retailer and why a significant proportion of customers do not receive information from existing forms of promotion and market education.

3.3.4 Consumers who think it might be difficult to switch

Market frictions can reduce competitive pressure and consumer welfare by constraining the ability of consumers to identify and switch to alternative suppliers, and competing retailers to identify customers who could be served at lower cost. Two different forms of friction have been studied in the economics of industrial organisation.[54]

- *Switching costs* consumers may incur as a direct result of changing suppliers, perhaps due to additional effort or lost loyalty discounts.
- *Search costs* that consumers face in gathering information about alternative suppliers.

We focus on search costs because switching costs in New Zealand are low, and as a general proposition, search costs are more anti-competitive and welfare-damaging than switching costs in markets where there are multiple suppliers.[55] Search costs tend to be more detrimental to the competitive process because:

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53 EA (2017b), Electricity pp14, 25.

54 See for example Baye et al (2006) on search costs, and Farrell and Klemperer (2007) on switching costs.

55 Wilson (2012).

- the decision to incur search costs must be made at a time when a consumer is relatively uninformed and is incurred whether or not the consumer decides to switch suppliers. On the other hand, the cost of the switch can be weighed against the expected benefit
- search costs are incurred early, and on the basis of poorer information, consumers can be more easily deterred from moving on to switching at this earlier point[56]
- an increase in search costs prompts consumers to search fewer firms and the consumer may remain unaware of potential benefits from alternative suppliers. At the extreme, if search costs are high, and consumers think all firms' charge at the same level, consumers may not bother searching for better prices but simply choose a firm at random. The best response of firms is then to charge a monopoly price to these consumers.[57]

3.3.5 Do retailers face incentives to reduce search costs

Weak competition may lead to firms shrouding prices

A potential concern in complex industries such as electricity is whether firms "shroud prices" and exploit consumer biases.[58] Strategic behaviours by firms to raise search and switching costs by making it difficult for consumers to understand the price they pay and to compare that price with those of competing suppliers, are known by terms such as spurious complexity, "confusopoly", obfuscation and shrouding.

These strategies by suppliers can raise search or switch costs for consumers as follows:

- **Assessing offers**: Firms can raise search costs by making key information difficult to assess, for example, by making tariffs unnecessarily complex (sometimes referred to as 'shrouding'). Complex information can make it difficult for consumers to compare products and identify better deals.
- **Cost of accessing information:** Firms may exploit differences in consumers' search costs. Rational consumers will not take too much time and effort searching for the lowest price given other demands on their time, and search costs will vary with customer characteristics. So retailers can use sales to attract customers who are price elastic and prepared to search while most of the time charging higher prices for those who are inelastic and can't be bothered searching for various reasons.[59]
- **Acting on information and analysis**: Recent developments in behavioural economics indicate that consumers may display more inertia than traditionally suggested, perhaps due to overconfidence in their capacity to improve things later.[60] Firms, knowing that consumers display this inertia, can increase switching costs.

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56 See for example the discussion in Chessler (1996), Giuletti et al (2005).

57 This situation is the so-called Diamon Paradox, where monopoly prices can exist in a market with multiple suppliers, see Diamond (1971).

58 See Gabaix and Laibson, (2006).

59 Fatas et al (2013).

60 For example, DellaVigna and Malmendier (2006) suggest that consumers might overestimate their propensity to cancel automatically renewed contracts.

Increasing competition may lift price shrouds

As competition increases, retailers may face pressure to provide additional tariff information by, for example, providing products which make a virtue out of being simple for consumers to understand.[61] If some suppliers price in a way that is complex and difficult for consumers to understand, then in a workably competitive market with a reasonable number of competitors, this may provide other suppliers with a competitive opportunity for customer acquisition or differentiation:[62]

> *If consumers recognise the search costs they incur when dealing with complex pricing, they may choose to patronize firms that offer less confusing tariffs and more easily navigable websites. This gives incentives for firms to build reputations for transparent pricing.*

Hence, we consider whether competition in the retail market has led retailers to make it more difficult, or easier, for consumers to assess comparative price information.

3.3.6 Comparative price information now easy to obtain

In 2014, we investigated for the Authority the availability of tariff information in the electricity retail market. Our report was published by the Authority in early 2015.[63] At the time, we concluded that the availability of tariff information could be improved. We observed that, at the time the report was being written, not all retailers published tariff information on their web sites, and that it was not easy to find tariff information as some retailers required prospective customers to telephone their call-centres. We noted that New Zealand had few comparator web sites, and the primary source of comparative information was Powerswitch which existed because of regulatory initiatives (rather than competitive pressure).

Our overall conclusion was:[64]

> *It is not clear whether the New Zealand retail market has reached the stage of development where retailers face strong incentives to compete through being transparent about their tariffs.*

In preparing this report, we have updated our analysis for changes in available tariff information. Our conclusion is now very different.

We have accessed the web pages of 28 retailers offering retail electricity to mass market consumers.[65] Obtaining comparative price information from all retailers reviewed, bar one retailer, was simple and transparent. Twenty seven sites provide the following information in a form directly comparable with offers from other retailers:

- The unit price in cents per kWh.

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61 See for example Shapiro (1995) and Beales et al (1981).

62 Fatas et al (2013).

63 MacIntyre et al (2015).

64 ibid, p2.

65 We exclude commercial-only retailers.

- The daily fixed charge.

Several sites provide this information in an interactive form by requesting the customer to enter their physical address. Sites with this functionality also typically provide an indicative monthly bill, based on average household consumption in the geographic region of the entered address. Retailer web sites which are less interactive (that do not provide an opportunity to enter address details) provide a fixed table which clearly sets out the unit price and daily fixed charges.

Many retailers also present prices for different services, such as interruptible supply, and allow consumers to assess the benefit to them of bundled services, such as electricity and gas, or electricity and other services such as broadband or network television services. Where bundled services are offered, the consumer may see a change in the unit electricity price if they choose a bundled service.

We noticed that some retailers cite their prices on a GST inclusive basis and some retailers provide prices on a GST exclusive basis. This difference in presentation has the potential to confuse some consumers.

Comparing our review of tariff information available from retailers in 2014, with the tariff information now available, we conclude that market forces have led to much greater clarity, availability, and simplification of tariff information. We consider the increased ease at which retailer offers can be compared a significant development in retail market, which brings with it the promise of additional consumer benefits from competition.

3.3.7 Recognising and allowing differentiation by retailers

Competition leads to differentiation in service offerings

Turning from our review of retail offers currently available to consumers, to the opening comments of the Review document is initially unsettling. The Review asserts in its overview that "consumers' wish list is short: they want power that is reliable, affordable and fairly priced (and increasingly, we would add, environmentally sustainable)".[66] However, on further reading it would seem that this phrasing might have been drafting for effect, rather than a reflection of the Review's view of consumer demand as being highly limited in its dimensions.

Further into the document, the Review elaborates that:[67]

> *There is no such thing as a typical consumer, although there are things consumers typically want – a reliable supply of electricity and fair and affordable prices. Until recently, these were the priorities for most consumers. But times have changed.*

The Review goes on to comment about many consumers being increasingly concerned about businesses supplying goods and services in an ethical and environmentally sustainable way.

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66 Review, p4.

67 Review, p15.

We agree with those observations, but would add that the differentiation of service offerings is already much wider than environmental and ethical concerns. From our review of existing service offerings, retailers are differentiating their offers by providing bundled options including with non-energy services, options for risk allocation (prices linked to spot prices, monthly fixed prices, fixed term contracts, etc), and additional information packages on usage and technology options such as applications for phones and laptops.

Competition through differentiation is a critical process which delivers benefits to consumers in the long-term. It is through differentiation that suppliers seek to discover those customers that are least expensive for that retailer to serve, and to discover product variations that will appeal to certain customers.

The diversity in service offerings emerging in the New Zealand electricity retail market is a tribute to work of the Authority to date, as it has been careful to avoid interventions which would have the effect of limiting or encouraging retailers to reduce experimentation or narrow the dimensions of product service over which they compete. Such interventions would have a high risk of doing more harm than good.

Competition can lead to price discrimination

Service differentiation naturally leads to differences in prices – travelling in premium economy on Air New Zealand provides more leg room than economy class, but at a higher price. Importantly, in workably competitive markets retailers can also be expected to offer different terms to customers that might otherwise be in similar circumstances. That is, price discrimination can be an efficient outcome of competitive markets.

There is no economic basis for assuming that competition will be characterised by electricity retailers offering similar terms to different customer groups, as this would imply equal mark-ups over wholesale costs (and wholesale costs may also vary for each customer, depending upon consumption profile and the exposure to price or volume risk taken by the retailer). Similar prices or offer terms may correspond to some concepts of "fairness", but do not reflect commercial reality.

Examples of price differentiation from other workably competitive markets include student and senior discounts to movie theatres, airline pricing (two individuals travelling at the same time in the same class seat may have paid vastly different prices for their ticket). A growing economic literature demonstrates that this differentiation in pricing can be a characteristic of strong competition (rather than an indication of market power):[68]

> *… in a broad range of market types and conditions, where consumers can be separated into distinct groups with different demand elasticities and in which the market's commodity cannot easily be resold by one group to another, market pressures will prevent any equilibrium in which the product price is uniform. Not only will each firm be forced to adopt discriminatory prices, but each firm is likely to be forced to adopt a unique vector of prices, each of which is dictated by the market. Thus this paper seeks to show why price discrimination may occur – and may occur frequently - not despite relative ease of entry (of other competitive pressures) but because of it. In fact, I will show that in highly competitive*

[68] Baumol (2005).

markets, firms may have no choice. Competition can force them to adopt the vector of profit-maximizing discriminatory prices."]

The assumptions involved in Baumol's analysis – customer groups with different demand elasticities, no easy resale, and overhead costs to recover - characterise the retail energy sector.[69] These characteristics also distinguish the electricity retail market from some other energy retail markets – for example, if petrol retailers were to emulate movie theatres and provide student discounts, families would ask their teenage drivers to fill the family car (petrol can easily be resold by changing who fills the car).[70]

Analysis by Waterson (2001) similarly recognised that competition in electricity retail markets will involve attempts by retailers to discriminate in their offers.[71] Waterson demonstrated how consumers' searching behaviours and switching decisions can have a significant impact on suppliers' competitive responses. He posited that, in markets for homogeneous products, all with fixed costs, such as electricity, suppliers would aim to distinguish themselves by service differentiation or by seeking out market niches through price discrimination.

Figure 16 in the Review showing the gap between the lowest and highest prices in each area has been widening, is therefore consistent with outcomes that would be expected as the retail market becomes *more* competitive. (A widening gap is not in of itself an indicator of increasing competition, it is just not inconsistent with increasing competition). As the market matures, the higher priced offers could be expected to track toward the lower cost offers. However, taking any interpretation from the Review's chart is problematic, as the data series finishes 4 years ago and provides little indication of the current situation.

The popularity of 'do not call' registers in the United States and Australia provide further evidence that some consumers prefer other elements of service, including being left undisturbed, over price.[72] These preferences mean that some customers will choose not to seek out the best deal, even though they know that they can choose between retailers and that they may not be on the best priced offering. In a workably competitive market, with price discrimination, the preferences of these customers (such as the "young professional couple happy to stay put" illustration in the Review report[73]) mean they will pay a greater proportion of the fixed costs of retail services. Hence, price discrimination allows prices for services offered to those much more sensitive to price – low income customers in the retail market, students in the movie theatre example – to be driven down closer to incremental variable costs.

In other sectors, notably budget airlines, but also hotels and travel agents, sophisticated pricing (yield management) result in some consumers contributing more to fixed costs than

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69 Some of these characteristics distinguish electricity from other retail commodities, such as petrol, and hence competition in electricity retail markets can be expected to evolve differently – it is more difficult, for example, to price differentiate in petrol markets because of the ease at which the product can be on sold (e.g., a student discount would be undermined by parents asking their children to fill up the family car).

70 Petrol retailers do of course attempt to price discriminate, with customers using a fuel card typically paying a significantly lower prices than customers in the same situation but for the fuel card.

71 Waterson (2001).

72 See for example Varian et al (2004).

73 Review, p15.

others who receive the same service, and low cost flights have become available to many consumers who would not otherwise have been able to afford to travel. Price discrimination (multi-tier, not just two-tier pricing) is a feature of competition in markets in which the product is perishable, supply is limited because it is difficult and costly to add capacity, demand varies with time, the market can be segmented, the service can be sold in advance, and marginal costs are low.[74] Electricity markets share these characteristics.

The implication is that low income customers will be well served by an emerging two-tier market, if policy interventions position those customers to access the best priced offers (or if competitors emerge targeting budget conscious consumers, as occurs in other retail markets). Policy interventions that limit price discrimination are, on the other hand, likely to be regressive and favour higher income households, as appears to be the experience in the United Kingdom.

Limiting price discrimination likely to be as damaging as limiting differentiation

In a review of regulatory interventions in the electricity market in the United Kingdom, former regulator Stephen Littlechild concluded that policies in that market to limit differential pricing:

> *… would not hasten the transition to a more competitive market, nor merely disrupt that transition. It would actually prevent a competitive market by imposing a concept of a "fair" outcome which is different from what a fully competitive market would entail.*

Littlechild argued that since 2008, UK energy regulator Ofgem had imposed increasingly severe restrictions on suppliers to the residential retail market. Initially, non-discrimination conditions aimed to "remove unfair price differentials", particularly between suppliers' prices between regions. In making this intervention, the regulator expected that prices to other customers would increase to maintain revenue neutrality.

Littlechild also singled out that subsequent regulatory interventions on the number and types of tariffs aimed to encourage customers to engage in the market; the objective of these interventions were to standardise retailer offers to make it easier for consumers to choose between retailers. The policy interventions prohibited many tariff types that customers valued. The outcome was reduced competition, customer switching fell by half, and profits of major suppliers increased by nearly £1 billion, at the expense of customers.[75]

3.3.8 Conclusions on two-tier market concerns

In summary, we draw different conclusions from the Review in relation to the emergence of a two-tier market.

- Competition in the retail market must be less than it might be, because about 13 per cent of the market does not know they have a choice.

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74 See for example Donovan (2005).

75 Littlechild (2014).

- Market forces are leading to greater clarity, availability, and simplification of tariff information; the increased ease at which retailer offers can be compared is a significant development in retail market, which brings with it the promise of additional consumer benefits from competition.
- The diversity in service offerings emerging in the New Zealand electricity retail market reflects the strength of current regulatory settings.
- The emergence of a two-tier market (in fact multi-tier) in which some consumers know they have a choice of retailer and that they would likely save money from switching, but choose not to do so, is consistent with increasing competition and may be a necessary aspect of the market if the most vulnerable consumers are to benefit the most from competition.

3.4 Efficient investment and operation of generation

3.4.1 Incentives for efficient investment matter most for consumers

As the Review observes, power stations are expensive to build and operate, so it is important to build those types of stations that produce electricity at the lowest cost per unit first.[76] We agree with the Review's observation that "performance has been good on this front"; that new power stations have mostly been built in order from the cheapest to most expensive.[77] We would add that the market has prompted the retirement of high cost fossil-fuelled power stations – Southdown, Otahuhu B, one Huntly Rankine unit decommissioned and one mothballed, a total of just over 1,000 MW of fossil fuelled plant removed from the market in recent years (about 10 per cent of total capacity) with no disruption of supply to consumers.

These are important achievements. One of the primary motivations for introducing the wholesale electricity market was to provide market incentives for investment decisions in generation. In electricity generation, a sector with high fixed costs, "the most important opportunities for cost savings are associated with long-run investments in generating capacity".[78] The Review estimated that, in inflation adjusted terms, wholesale prices were roughly the same in 2018 as they were in 2004.[79]

We agree with the Review that the performance of the market in disciplining generation development costs contrasts starkly with the period before generation competition in the mid-1990s, when comparatively high cost investments were made ahead of cheaper alternatives. The former central planning process, with its 'least cost' models, failed to anticipate risk properly reaching its zenith with the Clyde Dam project. The Clyde Dam was

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76 Review, p31.

77 Review, p31.

78 Joskow (1997).

79 Review, p22.

last generation project undertaken prior to the legislative constraints on competition in generation being removed. With the government deciding the project was needed, environmental checks and balances were by-passed with Parliament passing the Clutha Development Empowering Act in 1982. The result, according to former Deputy Prime Minister, Rt Hon Sir Michael Cullen, was "the single most monstrous environmental sin over the last 30 years."[80] Its financial performance was no better, costing several multiples of its original budget, and of the order of $3 billion in today's dollars.

A substantial improvement on past arrangement does not mean that further gains are not possible. But it does caution against steps that would centralise investment decisions.

3.4.2 Are profits too high

The Review has been asked to look at generator financial performance and whether they have been making excessive profits. It has tackled this task by collating information on net operating cash flows, excluding interest and tax.[81] The Review concludes that it has not identified any evidence to indicate profits are excessive compared to underlying costs, but notes it lacks sufficiently detailed data to make a definitive assessment.

However, the measure adopted by the Review does not inform an assessment of whether profits are excessive or not. Excess profits arise when profits exceed a competitive benchmark by an amount that can't be attributed to random variation. An analysis of cash flows on their own does not help answer whether profits have exceeded a competitive benchmark. The figure presented by the Review suggests that cashflows have increased over the period of its analysis, but does not explain whether that might be due to changes in the cost of capital, increases in the cost or risks of new generation investment, a bigger asset base or because profits were initially too low.

In the same month as the Review released its report, Dr Stephen Poletti published his study *Market Power in the New Zealand wholesale market 2010-2016.*[82] Dr Poletti arrives at a very different conclusion to the Review. He estimates that generators exercise market power and over the 7 year period of his analysis have extracted market rents from the wholesale market of $5.4 billion.[83]

However, Dr Poletti's method is also not capable of providing insights into whether generator profits are above a competitive benchmark. Dr Poletti considers only prices in the wholesale spot market. The impact of spot prices on generator profits will depend on a firm's net position, as will the impacts on purchasers – wholesale spot consumers and retailers (and therefore retail customers). An entity's net position is a combination of its generation output, retail customer demand (where vertically integrated), and its position in the derivatives market. A generator is said to have a long position where its wholesale revenue (from generation and derivatives) is greater than its wholesale costs (from purchases and derivatives); that is, it is a net seller and benefits from higher wholesale prices. A short

80 Radio New Zealand interview, 2 May, 2009.

81 Figure 20, The Review, p46.

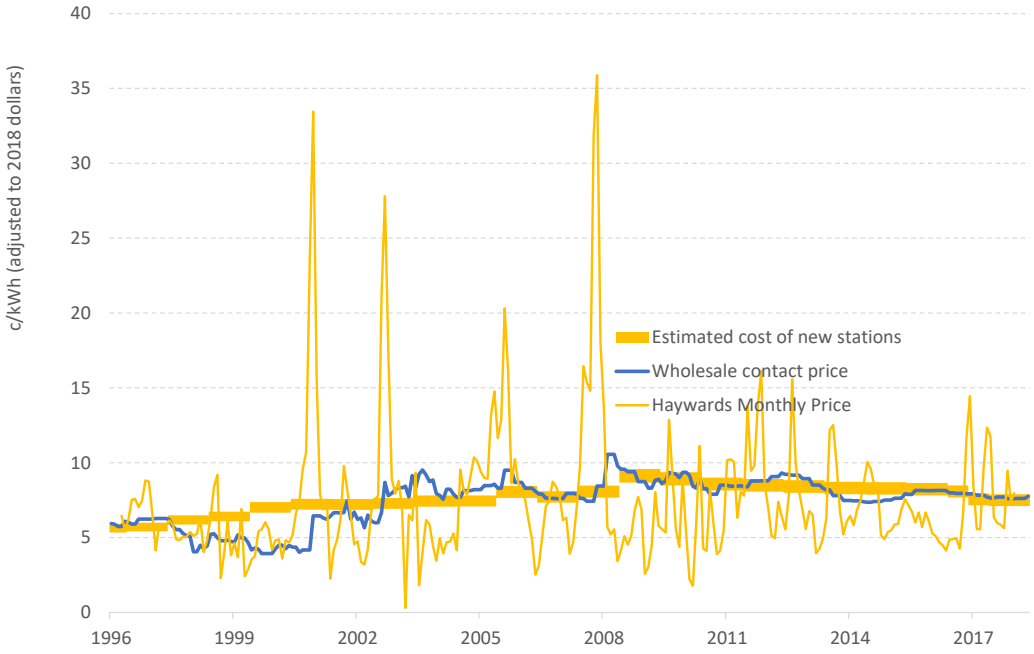
82 Poletti (2018).

83 Poletti (2018), p41.

position is the reverse; that is, the generator's wholesale costs are greater than its wholesale revenue, it is a net purchaser and it benefits from lower wholesale prices.

In Figure 7 below, we have overlaid the Haywards (North Island) monthly average spot price over the Review's figure 14 which provides a comparison of the estimated costs of new stations with wholesale contract prices. The Haywards prices are expressed in 2018 dollars (using Stats NZ CPI figures) so they are on the same basis as the Review's estimates of contract prices and the cost of new stations. The chart illustrates that wholesale spot prices are at times above the contract price, and are at times below the contract price. The profit earned by a generator (or the impact on a purchaser) would depend upon the extent it was net long, or net short, as the spot price varies from the contract price. An analysis of spot prices alone therefore cannot provide insight into whether generators are earning excess returns.[84]

Figure 7 Wholesale spot, contract and cost of building new power stations



In addition to not accounting for a generator's exposure to spot prices, the method adopted by Dr Poletti is fraught with difficulty if the objective is to form a view on whether profits are excessive. Dr Poletti carefully compares wholesale spot price with his estimate of short-run marginal costs of generation, including an estimate of the opportunity cost of water for hydro-generators.

[84] Dr Poletti acknowledges that generators hold contract positions but observes that the "major firms are almost always next sellers onto the spot market" and therefore have "some incentive to push prices up on the spot market" (p11). However, his estimate of total market rent does not appear to recognise contract positions and therefore is not an estimate of excess profits.

An efficient spot price requires that offers to the market are based on the *opportunity cost* of the generation offered and that demand equals supply at the clearing price. The opportunity cost of generating at any point in time includes the financial (operating) costs of resources used *plus* the value of the option to delay generation to a future trading period. This option to delay is especially valuable in markets with significant hydro-electricity generation sources (and will be important in markets with significant battery storage). Dr Poletti's analysis is a static analysis. It does not consider whether historic prices would lead to the efficient entry and exit of investment, arguably, the most critical aspect of electricity market design.

In markets that are capital intensive and which have limited economic storage and where demand fluctuates, like markets for hotel accommodation, air-travel, and electricity, efficient prices (and opportunity costs) may be highly volatile. As demand and supply conditions shift, prices must adjust to clear the market and avoid shortages. Small shocks to demand can translate to large price swings when supply is relatively inelastic. As capacity limits are approached, and prices are set by demand, prices will raise above the average variable costs of all operating plant, and the opportunity costs of generation will alter across multiple periods not just the period in which supply is tight relative to demand.

This concept of spot prices rising above variable costs is often referred to as *scarcity pricing*. The phrase recognises that if prices were constrained to no more than the variable costs of the most expensive generating unit (or room in a hotel or seat on a plane), the quantity demanded would exceed the quantity supplied; in the case of the electricity sector, forced reduction in demand (brown outs) would occur, sooner or later, at typically high costs to consumers.[85]

The component of the price necessary to reduce demand to the point where it can be met by available capacity is sometimes called the *scarcity rent*. This component of the price allows for a contribution towards the recovery of fixed costs of high operating cost plant which are kept in reserve to ensure supply can match demand when there are unusual spikes in demand (for example, particularly cold periods) or limits in supply (for example, periods in which hydro-inflows are low).

In a workably competitive market (and which satisfies several other conditions discussed in our chapter on security of supply), firms would build new capacity as long as the cumulative scarcity rents exceed the cost of capacity.[86] If entry barriers to the market are low, entry and exit of generation capacity would drive scarcity rents to equal (on average) the cost of new capacity over time. If scarcity rents were to materially exceed the cost of new capacity over the life of those assets then this may be an indicator of excess profits – neither the Review's nor Dr Poletti's analysis provides insight into this question.

However, it is extremely difficult to define the appropriate time horizon necessary for cost-recovery of assets that last multiple decades.[87] The fact that plant may not have fully recovered its capital costs, or more than recovered its capital costs, over an annual or a seven

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85 Because of the regulatory provisions in the New Zealand electricity market (discussed in our chapter on security of supply), scarcity is better defined as lower hydro reserves than absolute shortages of energy.

86 Bushnell et al (2017), p11.

87 Bushnell et al (2017), p18.

year period, is not necessary a sign of market failure when the investments are expected to be in operation for decades. A further difficulty arises because the sector has been buffeted by significant changes to design, regulation, and policy. These shocks make it unlikely that the data on investment would result from anything approaching a stable long-run equilibrium.

For these reasons, we are dubious that margin analysis of the type attempted by the Review and Dr Poletti will provide useful policy guidance. Rather the performance of the market in disciplining generation costs and pricing would be enhanced where policies:

- enhance short-term price responsiveness of demand (which would ensure efficient scarcity prices and sufficient capacity reserves)
- lower entry barriers to all forms of generation, including distributed resources
- foster emerging smart technologies that hold to the potential to allow for more diversity in reliability preferences, isolate consequences of short-falls to those responsible for the short-fall, and greater diversity in resources to support reliability.

3.5 Review's focus for increasing competition

The Review comment on two areas where it considered current settings might be improved to enhance competition: the contracts markets and so-called winbacks. We consider each of these issues in turn.

3.5.1 What is the purpose of the contracts market

Contracts markets perform a number of valuable operations to complement and enhance the trading relationships in a market.

We have previously characterised the benefits of a futures market as follows:

1. ***Greater retail competition***. *A liquid futures market provides potential new entrants with the vital ability to access competitively priced supply and manage their risk. The result will be a more competitive retail electricity market which will exert downwards pressure on retail prices. New independent retailers can also offer more innovative retail packages (e.g. green packages or demand side management services) to improve consumer choice.*

2. ***Improved price transparency***. *Transparent price discovery will lead to greater efficiencies in the wholesale and retail markets. Existing and new market participants will be able to see the true cost of managing risk. The energy component risk premium of retail electricity tariffs will then be likely to be compressed as participants reconcile the cost of risk with the level of risk currently being passed on to consumers, which would result in lower retail prices for consumers.*

3. ***Better risk management***. *For generators, a liquid futures market will provide them with a risk management mechanism to better manage planned maintenance, fuel purchase costs and investment decisions. For retailers (especially new independent retailers with no generation assets), the search and*

transaction costs of seeking competitive hedge contracts will be reduced. This improves efficiency and energy security for the electricity market.[88]

It is important to consider how some of these outcomes might play out in practice, however. The retail price is but one dimension; others are price volatility, security of supply and quality of supply.

To provide a partial illustration, consider electricity arrangements where the retail price is lower because it does not adequately factor in the cost of building and maintaining generation needed to cover dry-year risk. Customers may well experience several years of "lower" prices before having to experience curtailed supply in a year of poor hydro inflows.

3.5.2 What is the Review's view of contracts market

The Review cites issues in relation to exercise of market power, barriers to entry, price signals, and overcoming the effects of vertical integration.

The Review places a strong emphasis on the importance of a functioning contracts market and states:

We consider improving the depth and resilience of the contract market should be given high priority[89]

A number of benefits are advanced for what an effective contracts market can deliver. We summarise these in Table 1 below

Table 1 Review view of benefits of an effective contracts market

Benefit	Reference
Generation:	
We have concerns about generators' ability to exercise market power when supply is tight. A more effective wholesale contract market would help correct this, and could also mitigate the effects of companies with both generation and retailing arms ('vertical integration')	P5
Smaller generators often cite the limited depth of the contract market as the key factor inhibiting their expansion or new generation entry.	P34
An effective contract market is critical to mitigating the potential adverse effects of vertical integration and short-term generator market power.	P45

88 Stevenson et al (2016).

89 Review, p45.

Benefit	Reference
Security of supply *Another question raised is whether there are sufficient incentives to retain backup generation plan or other resources (such as users willing to temporarily reduce demand) to manage extreme and infrequent hydro shortfalls. The Productivity Commission believes an effectively operating contract market may help address this question.*	P35
Retail: *The lack of an effective wholesale contract market is another barrier to competition, [new entrants] say.*	P5
Operation of the wholesale market: *An effective contract market, in contrast, supports ready access to contracts on reasonable terms, and sends clear price reference points for buyers and sellers.* *If large portions of the generation and retailing sectors have little use for contract markets, there will be low liquidity and muffled price signals, making it difficult and costly for independent companies to manage electricity price risks. An effective contract market, in contrast, supports ready access to contracts on reasonable terms, and sends clear price reference points for buyers and sellers.*	P43 P43

Source: Electricity Price Review report

The phrases "effective wholesale contract market", "effective contract market", and "more effective wholesale contract market" are used in a number of contexts in the Review.

In our view there is a need to set out more clearly what it is that a contracts market does and why different arrangements to the status quo might be needed. The questions that the Review needs to ask are:

1. What are the objectives being sought in relation to a contracts market?
2. Does an effective contracts market exist in New Zealand?
3. What gaps are there and what are the options for bridging those gaps?

We take each of those questions in turn now, acknowledging that it is not possible to answer all these questions fully without more research.

3.5.3 How well do the current arrangements do their job?

Complete arrangements, but opaque

There are a number of risks that parties to the wholesale electricity market seek to mitigate through various arrangements.

These risks can be assessed by looking at a number of dimensions:

Table 2 Dimensions of risk coverage

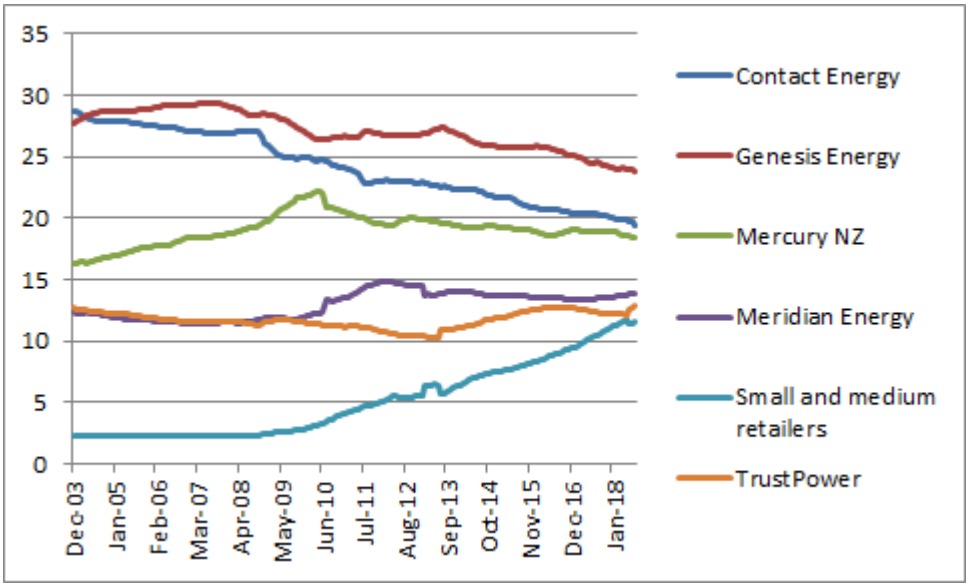
Risk type	Completeness of coverage	Trading level	Evolution of the market
Geographic coverage – ASX	Reference nodes for each island	Sustained over time with emergence of market making	ASX – no change
Geographic coverage – FTR	Two types of contracts at 8 hubs	Active	Increase from 2 hubs originally to 8 now
Time	ASX has quarterly contracts out five years and monthly contracts for up to 12 months ahead	Active, especially in near term	No change
Interval and contract size	ASX offers monthly and quarterly contracts	Active	Contracts now offered at 0.1MW instead of 1MW
Load profiles	ASX offers peak and base contracts Cap products available OTC	Base contracts are well traded. Peak contracts are not.	Peak contracts introduced in 2013 (no actively traded)
Volume	Participants can manage volume risk through trading ASX as anticipated position changes or seek fixed price variable volume contracts over-the-counter	Illiquid and partially transparent	No change

In our section on security of supply we note that there are "potentially insufficient incentives, or even disincentives, to invest in security of supply projects; especially projects with low emissions". We would also suggest some issues in particular with the customer compensation scheme, which mean that those who pay the compensation are not necessarily in a position to easily modify the underlying risk, or to contract out the risk to a party that can. The Review makes no comment on the customer compensation scheme: it is not necessarily the case that the current arrangements allow participants to adequately cover dry year risks.

Retail competition appears to be burgeoning

In Figure 8 below we illustrate the market share of the five largest vertically integrated participants and the rest of the market. The most obvious observation is that the share of the small and medium retailers has increased dramatically since 2009, while the share held by the largest players, particularly Contact, has fallen away considerably.

Figure 8 Retail share by ICP number 2003 to present

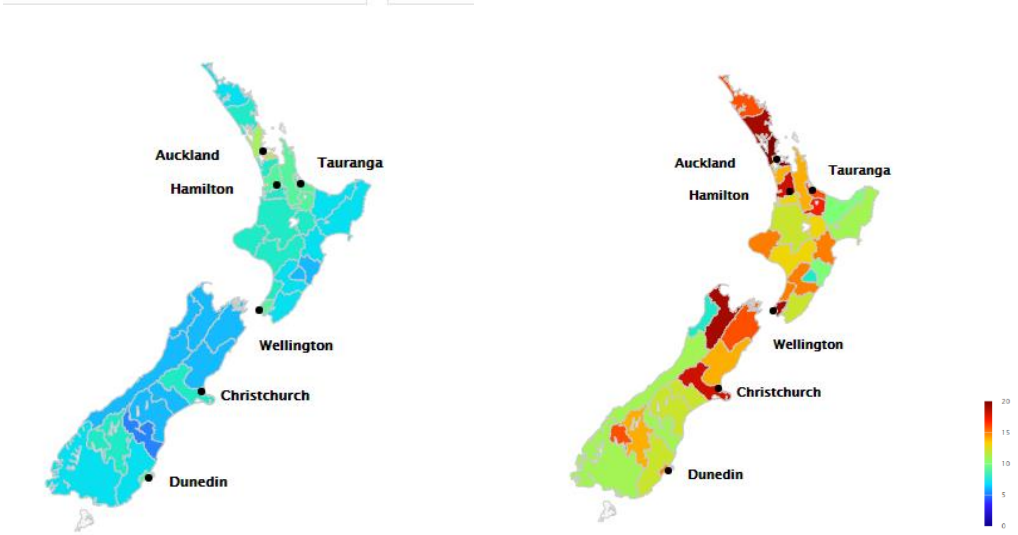


Source: EA dataset

However, this chart masks another evolution, that retail competition has become much better balanced across New Zealand. Since the virtual asset swaps involving Meridian, Genesis, and Mercury, and the transfer of the Tekapo stations to Genesis, retail competition across New Zealand has become much more intense. The decline of the Genesis market share in the above chart masks a far steeper decline in the North Island while the market share in the South Island has risen off very low levels.

Customers (including commercial customers) across New Zealand now have a choice of at least 12 brands (provided by no less than 7 retail parent companies).

Figure 9 Choice of retail brands (by parent company), 2013, 2018



Source: Electricity Authority - EMI

The change since 2013 is stark. In 2013, in only two distribution regions did customers have a choice of more than 10 companies; in 2018 only two distribution regions had less than 10 companies to choose from.

We are not in a position to conclude that effective retail competition is at the point that we would expect a mature market to be at. However we would advise caution in trying to suggest that "more effective" contracts markets would *necessarily* lead to greater competition in retail.

3.5.4 Delivering a more effective contracts market

The futures market undergoes constant evaluation of how it can be improved. That is appropriate if the market is to continue to fulfil the roles set out above. The Review worries that it may not continue to be able to fulfil those roles in future and that something should be done:

> *…events during the winter of 2017 highlight the fragility of current arrangements. For this reason, we consider improving the depth and resilience of the contract market should be given high priority.*

This runs counter to other references to liquidity:

> *The Authority has initiated measures that have had the effect of "improving contract market liquidity.*
>
> *A new retailer described progress in contract market development and liquidity as 'the key enabler' in getting started and applauded the Electricity Authority for its work in this area.*

Using our framework, the issue is whether the roles the futures market plays will continue to be fulfilled, why it may not and what analytic process would identify the best solution to the problem.

One of the key determinants of the level of activity in the hedge market (including over-the-counter trading and exchange traded electricity futures on ASX) is the high level of vertical integration in the sector. Vertically integrated generator retailers effectively trade the bulk of risk management volume between their retail arms and wholesale arms on undisclosed terms. The result is a smaller hedge market than might be the case if there were no vertical integration. The Review acknowledges that a "drawback of vertical integration is that it can result in less use of contract markets" and touches on an issue that has to be addressed which is:

> *Some stakeholders "cite the long running claim that inadequate liquidity in wholesale contract markets is limiting the entry or growth of retailers not linked to a big generator."*

The claims against the contract market include the independent retailers can't get a hedge or independent retailers can't get a competitive hedge or that vertically integrated generator retailers are selling contracts to commercially customers below the ASX futures price.[90] So

[90] Based on Wholesale Market Advisory Group papers.

the issue is not the "fragility of current arrangements", it is whether the futures market is fulfilling its primary roles and whether vertically integrated generator retailers are not competing as suggested. In competition economics this practice is referred to input foreclosure. Input foreclosure is the situation where firms refuses to supply an input to a downstream competitor or raises the input's price.

If there is input foreclosure then focusing on the liquidity in the futures market won't address the problem. If there is no input disclosure then independent retailers should be able to get hedges and compete. We can only know that it is worthwhile focusing on liquidity if we know there is no input foreclosure so analytically that is the first question the Review should be asking and it doesn't. The closest it comes to asking this question is:

> *Another key factor affecting the ability of independent retailers to compete is their ability to access risk management contracts on competitive terms. The performance of the contracts market is discussed in Vertical integration.*

The section on vertical integration focuses on a "steady decline in market maker performance" which doesn't address the underlying problem. What we said in 2014 still applies. We said:

> *However, the nature of the information is inconsistent amongst the generator retailers; some provide very little if any information and the lack of transparency remains a source of suspicion over the business activities of generator retailers.*
>
> *A step that may be helpful could be to provide for greater transparency on the relative operation of generation versus retail arms of the energy companies. For example, a regime similar to the information disclosure regime for regulated business (e.g. lines companies and the grid owner) might provide a thorough and consistent understanding of how these companies make their money and where inefficiencies might lie. However, information disclosure of this nature is costly, both in terms of the resource costs involved and the potential adverse incentives to create information if it is subsequently required to be disclosed to competitors.*
>
> *The underlying problem is part information disclosure part confidence that retail tariffs reflect the efficient cost of delivered energy.*[91]

If vertical integration is the cause of the underlying problem then as we said there are steps that can be taken. Some of these interventions would be expensive and intrusive but they form part of the potential solution set to the problem of whether independent retailers can get a fair hedge or not. Steps that could be considered include:

- greater disclosure of costs in relation to hedge prices
- greater disclosure of hedging practices
- greater scrutiny of commercial contracts against ASX futures prices[92]

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[91] Stevenson et al (2014), pp40-41.

[92] Energylink already provides some commentary on differences between ASX prices and the electricity contracts disclosure from time to time via Energynews. https://www.energylink.co.nz/news/energy-trendz-monthly/energy-trendz-monthly-september-2018-issue-114. The energy contract disclosure regime operated by the Authority provides prices for hedge contracts including end use FPVV contracts above a certain size.

- disclosure of internal transfer prices
- an obligation to put a certain amount of generation through the market on an arm's length basis through
- provide for greater transparency on the relative operation of generation versus retail arms of the energy companies (we raised this in 2014 but it wouldn't be our preferred idea)
- accounting separation
- full separation between retail and wholesale arms.

If it can be confirmed that vertical integrated generator retailers are not undermining competition with their retail pricing and accompanying activity in the futures market then that shifts the discussion back to other remedies to get more liquidity in a market where there are high levels of vertical integration.

Wait and see, with focus on lowering barriers to entry

This is a characterisation of the current approach. We have seen over the past five years or so a number of evolutions in contracts markets such as the introduction of peak products, more FTR hubs, and a decrease in the contract size of ASX products. At the same time new generation has been built (though almost entirely by existing vertically integrated participants) and smaller, non-vertically integrated retailers have taken an increasing share of the market. Given that the direction of travel seems to be right, it could be appropriate to keep the momentum on existing work and continue to review.

Promoting information disclosure

Building on lowering barriers to entry consideration could be given to whether information on a variety of issues is enough to satisfy consumers and independent retailers that the prices they see are efficient and fair. As is noted in the Review report, there is information disclosure for OTC contracts between non-vertically integrated parties. However these disclosures do not extend to disclosure within vertically integrated firms. As mentioned above some possible disclosures are intrusive and expensive but as solutions they are better targeted at the underlying problem and should be given consideration.

The purpose of these disclosure requirements would be to create greater transparency and would assist decision-making bodies in making accurate assessments of the current state of the arrangements. The information generated would support further analysis for a review of the contracts market.

Reinforcing market-making provisions

Under the current arrangements there are four voluntary market makers active on the ASX quarterly products. At present market-makers have agreed to make concurrent bids and offers that have no more than a 5% spread. It is acknowledged that market-making has provided important liquidity to ASX futures. However, as the Review notes, the 5% spread has been breached on a number of occasions and there are still perceptions that liquidity is insufficient.

We understand that market maker arrangements are under continual review. We will be interested to see if the Panel has anything additional to add to that process in particular

whether more information disclosure requirements would make the market more confident in the arrangements.

Concluding remarks on contracts market arrangements

We agree that there are some legitimate questions as to whether the current arrangements are sufficient but we suggest the questions should be broader than how to get more liquidity into the futures market. We agree with this statement in the Review:

> *An effective contract market is critical to mitigating the potential adverse effects of vertical integration and short-term generator market power.*[93]

However, this is a bit circular. It doesn't ask whether the market is effective. Further, the New Zealand electricity futures market is reliant on the vertical integrated generator retailers who provide the market making to make it effective. Thus in New Zealand the effectiveness of the futures market is reliant on the very same vertically integrated generator retailers who could wield short term market power. The question that should be asked and which is not asked is whether those adverse effects are occurring.

3.5.5 Do win-backs inhibit competition

The Review comments that new entrants in New Zealand cite the prevalence of win-back discounts as a barrier to expansion. The complaint from new-entrants about win-backs is that it allows incumbent retailers to price discriminate against non-switchers and create a barrier to expansion.

In the period from 1 January 2015 to 31 July 2018,[94] there have been 19 new suppliers enter the market. If existing suppliers with less than 500 customers at 1 Jan 2015 are added, collectively these suppliers gained more than 80,000 customers, for a combined current market share of all ICPs of almost 4%. This indicates that the current retail market has increased the number of competitors, and small suppliers are able to expand.

Win-backs have risen in prominence since the Electricity Authority banned saves in 2014. If win-backs were banned; it is likely that retailers would find alternative ways to compete. In this case, the absence of win-backs would be a loss of welfare to the switcher. The Authority is currently consulting on whether it an issues that it should act on. The Authority's Market Development Advisory Group's consultation paper doesn't say it is a problem but sees it as enough of a concern to consult on it. The paper says:

> *Evidence suggests the market is functioning as one would expect a competitive market to function.*
>
> *There might be residual and potentially asymmetric advantage to some retailers from early notification of switches – the same regulatory problem which caused the introduction of the saves protection scheme. There is no empirical evidence that this is a problem and it may be*

[93] Review, p43.

[94] Sourced from Electricity Authority EMI website.

that this advantage is much less relevant in the case of win-backs. However, this is one potential issue on which feedback is being sought.[95]

The Australian Competition and Consumer Commission (ACCC) in their report of June 2018, Restoring electricity affordability & Australia's competitive advantage, June 2018 have noted that:

Retention activity is likely to be pro-competitive. Retention activity provides customers with greater choice and the opportunity to achieve the best possible deal, putting downward pressure on prices.

However they also observe:

The large retailers have a unique incumbency advantage that allows them to cross-subsidise their retention offers (pricing them potentially below cost) from the higher profits they are earning from their significant number of sticky high value customers. This ability to rely on retention activities reduces the need for big retailers to proactively give their loyal customers incentives to stay – rather they are likely to be penalised with higher prices.

We don't see the two tier market as anti-competitive so we wouldn't frame the final point in the same terms as the ACCC. In any event the ACCC decided not to limit or prohibit retention activity. This was because it was concerned about unexpected and unintended consequences on the competitive dynamic in the market. This is a valuable observation and combined by our assessment of the two tier market leads us to the same primary position as the ACCC; that this activity is likely to be pro competition.

95 MDAG (2018).

4. Efficient use of, and investment in, long-life assets

4.1 Price control of transmission and distribution networks

The Review compares the rate of return on investment of the distribution utilities and Transpower with the regulatory weighted average cost of capital (WACC) estimated by the Commerce Commission. We recognise that the Commerce Commission closely monitors similar metrics. There are good research-based reasons to suspect that 'excess returns', or under returns, calculated from these measures may be associated with factors other than market power.[96] However, we agree with the Review's conclusion that, for the most part, the differences observed by the Review are minimal and do not in of themselves make a case for reviewing the Input Methodologies.

4.2 The important issues are at the boundaries of the market and networks

In our 2014 report we argued that a key issue for the sector was integrating transmission, distribution, and generation investment and demand management. Coordination issues arise at these boundaries because of joint consumption / lumpy investments, spill-over effects (a decision by one participant affects others), and imperfectly defined and hence priced transmission and distribution services, and different regulatory regimes amongst asset owners – an investment in battery storage for example, is currently subject to different regulatory requirements (in terms of accounting for revenue and costs) if undertaken by a network entity rather than a generator or retailer.

Coordination remains important with the implementation of competitive wholesale markets, because transmission, distribution, and demand management are both complements and substitutes for generation:

- investment in electricity networks allows electricity to be transported from low to high value regions, but locating generation at load centres reduces the need for network investment (and vice versa)
- interconnection reduces the total generation capacity needed to reliably serve demand but demand interruption may substitute for transmission.

Given these overlaps we were puzzled at what appeared to be a somewhat inconsistent approach taken by the Review in discussing the role of prices. For example, the Review

[96] Jagannathan et al (2016).

comments on the lengthy time it has taken the Authority to progress transmission pricing but appears to express confidence that distribution pricing will be simpler to resolve. We expect that distribution pricing will prove more complex than transmission pricing and will be on a continuous path of evolution for a period. For example, DER is able to provide a wide range of lines services and energy services (as a substitute and a complement). At the theoretical limit economic and technical information could be exchanged on energy, power, reactive power, voltage, voltage stability, frequency, frequency stability, inertia, harmonics (and maybe more). A highly automated future might be able to deal with this complexity while making choices and price signalling easier for consumers.

We consider that on-going engagement by the industry, especially in relation to the impact of new technology, will allow distribution pricing (and with it, customer preferences) to evolve. It will be key that the Electricity Authority and Commerce Commission remain focused on ensuring that there are low barriers to innovation and entry, and there is a level playing field for investment and experimentation (including investment and experimentation by the regulated networks).

In this regard, we find it difficult to reconcile the Review's comments in relation to the allocation of fixed costs in the transmission network with its comments in relation to the allocation of these costs in the distribution network, or why a different set of pricing principles should apply to these overlapping technologies.

We also consider that the Review understates the importance of getting the transmission pricing methodology right. In a low emissions future, significant new transmission investment may be required. On current projects, this new investment is not required for another decade or more. But a very large uptake of electrification of carbon heavy industry and transport would bring the demand forward. The issue that could manifest by 2032 is that a large proportion of new generation could be provided by wind, which tends to be concentrated in a geographic region (lower North Island). On some scenarios, the prospective wind generation becomes so large and concentrated (and well away from the biggest load centres) that a very big investment in transmission infrastructure is required. The issue is the infrastructure would require a large upfront investment while the wind generation and electrification (while large over time) would be incremental.

4.3 Deployment of DER and DR as an alternative to investment in, long-life assets

Small scale distributed generation (DG) and storage mechanisms combine as Distributed Energy Resources (DER) offering greater scope for retail products and wholesale market risk management. It is understood the greatest benefits from DER go to the assistance for distribution services in the first instance but this will become an increasingly important feature of the wholesale and retail landscape

Over the past few years the cost of domestic scale distributed generation (DG), batteries and plug in electric vehicles (PIEVs) have fallen to a point where many consumers are starting to buy them and add them to their energy use profile. These technologies are referred to collectively as distributed energy resources (DER).In addition consumers have an

increasingly greater ability to control their load (in response to price signals or by remote switching). The emergence of more DER and more demand response (DR) capability increases the scope for aggregating these resources into significant scale and deploying them as an alternative to investment in, long-life assets. Aggregated DER and DR can be used at the transmission level and at the distribution level.

Transpower has recently consulted on the use of DER and DR as "Transmission Alternatives" (TAs)[97] Transpower defines the term and places it in the context of their regulatory regime:

> *We use the generic term transmission alternatives to capture a broad range of technologies with the potential to provide transmission services, including DG, load reduction, voltage support and electrical energy storage. Our preference is to be agnostic to different forms of TA and between TA and transmission investment. What matters is the ability to reduce or delay expenditure, not the mechanism.*
>
> *As a regulated, commercial business we have incentives to find least-cost solutions to grid investment needs. Our incentive regulation, set by the Commerce Commission under Part 4 of the Commerce Act, rewards us for finding solutions that are least-cost over time, and includes rules for options assessment. Traditionally, we have met grid system needs by investing in transmission assets. Investments in transmission assets tend to be infrequent and lumpy – due largely to their long economic-life, and to achieve economies of scale. TAs may help us to develop, or procure, grid services incrementally and reduce transmission costs by better matching our 'build' with demand for those services over time. TAs may create option value for our grid development plans, such as deferral to a proposed transmission investment that ultimately might mean we avoid the need to invest at all.*

Similarly, distributors are looking increasingly at whether they can deploy DER and DR as alternatives to distribution services including congestion, over/under voltage, frequency, losses, emissions, harmonics, other power quality problems, and even "resilience". The Authority is concerned that, for a variety of reasons, distributors may not be exploring the full potential to utilise DER and DR as network alternatives. Accordingly they have established a project they have called the equal Access project to be conducted by the Innovation and Participation Advisory Group (IPAG) to consider and report on

- whether the operation of the existing equal access framework for transmission and distribution networks is sufficiently effective at promoting competition, efficiency and reliability for the long-term benefit of consumers. This may involve, for example, establishing the current feasibility for competitive supply of network support services
- potential options to strengthen the equal access framework to further promote competition, reliability and efficiency in the provision of electricity and electricity related services, including network support services
- the design, costs and benefits of any changes (regulations and/or market facilitation measures) identified to strengthen the equal access framework (including arrangements for exchange of network support services).

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97 Transpower (2018a).

At the mass market level governance of these developments crosses both the Commerce Commission's and the Electricity Authority's responsibilities. Both regulators are actively involved with the IPAG as it works its way through these issues.

For the Authority the issue forms one of three related issues. The Authority published its 2018/19 Work Programme in June. [98] Of its six Priority 1 projects three go to issue of opening up the relationship between mass market consumers and the provision of distribution services. These projects are: [99]

- Equal access.
- Multiple trading relationships.
- Distribution pricing: review of pricing principles.

These projects are correcting a century of electricity being produced centrally and distributed on a one way flow basis to consumers with supply being varied to meet demand. The market arrangements and retail competition have only been in place since the 1990s but the technology has only become available at an accessible cost in recent years. DER and DR is still in its early adoption phase. The full deployment of DER is not going to happen overnight.

The problems that have to be addressed can be distinguished as follows:

4.3.1 Distribution pricing

Distributors invoice their large consumers directly but, for the mass market, they invoice retailers (with some notable exceptions) who, in the majority, bundle distribution prices with other prices to mass market consumers. The current concerns are whether distribution pricing:

- is not necessarily cost reflective – that is it doesn't signal to consumers the true cost of providing the service to each ICP. This problem will become more acute as DER is added to the mix.
- has limited signalling of congestion on the network resulting in potentially missed opportunities for DER to assist relieving that congestion .

Distributors are working individually and collectively on more cost reflective pricing (as advised to the Chair of the Panel by the Distribution Pricing Working Group 27 September 2018) and the Authority is pursuing initiatives that are encouraging distributors to do so. Early analytic work on the impact of shifts to a wide range of methodologies shows that the more cost reflective the methodology the more cross subsidies are removed thus amplifying the impact on consumers as the cross subsidy is removed. Simpler forms of cost reflectivity

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[98] See: https://www.ea.govt.nz/about-us/corporate-projects/201819-planning-and-reporting/implementation/work-programme/

[99] The Authority's other three **Priority 1** projects are:
- Transmission pricing review.
- Spot market settlement on real time pricing.
- Extended Reserve implementation.

are easier for retailers to pass through but achieve less potent signalling to consumers of the cost of the service. Further, where cross subsidies are removed the negative impact is biased towards households with lower incomes i.e. cost reflective pricing may exacerbate the fuel poverty problem.

4.3.2 Issues facing DER owners/aggregators who would like to provide distribution services

Part 4 as it stands provides incentives to use the lowest cost solution for managing and operating the network. Implicitly where deployment of DER can reliably act in place of physical assets it should be included for consideration (this is referred to as distribution alternatives). Part 4 operation means that the incentives extend to all potential providers of distribution services not just DER owned by the distributor or related parties.

The problem facing DER providers can be characterised as situations where some distributors:

- do not use network alternatives even though they may be a viable solution to network investment challenges and/or real time network operation or
- favour related parties or self-supply. We note that this is the subject of the Commission's decision on Related Parties published December 2017. That paper and some workshop slides from March 2018 can be found on the Commission's webpage[100]
- do not understand the incentives in the Act. This could take the form that the incentives are not strong enough, they may be the wrong incentives, or distributors do not fully understand them
- are vague or imprecise over on-going requirements/plans/opportunities including
  - lack of visibility of plans and data relating to network growth and/or operation. As a consequence there is a lack of visibility of opportunities for providers of network services and equipment. (especially opaqueness evident in Asset Management Plans)
  - lack of transparency over criteria for selection of network solutions
  - lack of transparency around procurement processes.

So this problem is a manifestation of the conflation of the network owner, network planning and distribution system operation roles. It is also potentially a set of issues that a combination of competition problems and the workings of part 4.

The Commission has indicated it is aware of these issues. It has issued a notice under section 53ZD(e) of the Commerce Act 1986 (the Act) seeking information on what distributors are actually doing to ensure the beneficial deployment of DER (although it frames the issues using the more general term of "emerging technologies").

[100] See https://comcom.govt.nz/regulated-industries/input-methodologies/projects/201516-im-review/process-and-consultation/related-party-transactions-provisions

4.3.3 Technical issues for DER providers wishing to support distribution services

One of the factors for DER providers trying to aggregate and utilise DER is access across the networks. These are early days for this trend and it remains to be seen if these barriers get ironed out as the market develops. The sort of issues aggregators raise are the possibility that different distributors:

- prescribe technologies they are prepared to connect and may insist on their own unique connection standards
- have non uniform standards (e.g. third party access to data) for connecting technology and market platforms
- insist on the use of a single platform.

DER available to manage network services may face unnecessarily tight or inconsistent rules that effectively block providers from participating in identified opportunities.

4.3.4 Reciprocity – using EDB owned assets in the competitive market

The issues highlighted to this point relate to DER providers wishing to assist distributors deliver distribution services. The reverse situation also raises issues where distributors may wish to compete in contestable markets, including by using assets that may form part of its regulated asset base (RAB). The Authority has expressed concern regarding the ability of distributors to cross-subsidise involvement in unregulated activities through their regulated asset base.

A knee jerk response of barring distributors from providing services is unlikely to be in the long-term interests of consumers – a policy response to a perceived uneven playing field should not be to bar competitors from the field, even in the short-term, but to level the field. The Commerce Commission's Input Methodologies already provide such a mechanism, by requiring a distributor that uses RAB assets for a non-regulated purpose to apportion the revenue and costs between the regulated and non-regulated activities. If a distributor can provide a service to consumers at a lower cost than others by utilising capacity in an asset for multiple purposes, or utilising its expertise and knowledge, consumers should not be denied that benefit by regulatory barriers to competition.

5. Meeting community or social minimums

5.1 Introduction

If there are households who have to choose between a healthy home and other necessities, because of the cost of electricity, then the sector outcomes under this public policy objective are not fair and equitable. There are a number of measures available to focus on this group other than headline price and there are already agencies who work in the area and social welfare provisions that cover all forms of poverty. If industry regulators and government provided greater support for those measures in relation to electricity consumption then the temptation to interfere in the competitive process in an effort to drag everyone up to a higher level of affordability would be less. That is what we understand the Review proposes.

This section is concerned with whether the energy sector is meeting its community or social minimums. Our principle assertion in this section is that fuel poverty is a discrete measurable issue, that it is prevalent in liberalised modern electricity markets including New Zealand and that where the concept is acknowledged programmes exist that address its causes. In markets where prices are unfettered by any restriction other than competition and where those prices rise, an increasing number of consumers have to choose between maintaining their health through heating their homes and other necessities. We think that if energy affordability is something, as the Review says, that industry, regulators and government must tackle together the same applies to the challenges facing the narrower group of households in fuel poverty.

We have heard the argument many times that there is only poverty, there is no such thing as fuel poverty. In some contexts we agree but in many cases where we have heard that argument the point being made has been that fuel poverty may be an issue but it is not the energy sector's issue.

We also wonder about the use of various terms used to describe the effects of higher retail prices. The Review says:

> *Our analysis shows energy hardship grew significantly between the late 1990s and early 2010s.*

The review switches between the terms energy hardship and the broader concept of affordability without necessarily defining either especially.

Addressing fuel poverty (or energy hardship or affordability or vulnerability) by focusing on headline prices fails to acknowledge that retail bills are made up of prices and consumption volumes. A slightly lower price discovered through switching doesn't address the volume consumed.

The Review circles around issues relating to the bundled headline price for electricity and mechanisms like the prompt payment discount,[101] reluctance to search for better deals (on price)[102] the use of win backs,[103] the allocation of distributor shared costs[104] and low fixed charge tariffs[105]. It raises a number of factors affecting consumption and price but offers no suggestion that the sector has any responsibility for the non-price factors. It simply concludes:

> *In summary, affordability is a real problem and needs targeted measures to fix it.*
>
> *Targeted social welfare measures can help reduce energy hardship.*
>
> *Affordability is clearly a problem the industry, regulators and government must tackle together.*
>
> *To the extent any problems remain, other targeted measures – like grants for insulating houses – will be needed. There may be other initiatives, too, the industry can take as part of its social responsibility to consumers.*

5.2 Community or social minimums and poverty

Underpinning our framework for this (and previous) reports is the idea that enduring public policy goals wax and wane but never disappear completely. In the case of meeting community or social minimums we find that this public policy objective has come to the fore with the recent change of government and has manifest itself in the energy sector specifically through the terms of reference for the Electricity Price Review.

The incoming coalition government included reducing poverty as part of its manifesto and continues to refer to equality at every occasion including a speech by the Prime Minister at the United Nations General Assembly in September 2018: [106]

> *Ms Ardern gave her first speech of the week opening the Social Good Summit in Manhattan. Her speech focused mainly on her government's plans to lift children in New Zealand out of poverty and to assist low and middle income families.*

The coalition that forms the government is founded on two agreements each of which refers to inequality and poverty.[107] The coalition agreement between the New Zealand Labour Party

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101 Analysis of retailer billing data shows vulnerable households are disproportionately affected by prompt payment discounts, p37.

102 There are some indications vulnerable residential consumers may be over-represented among those who do not shop around and are therefore paying higher prices, p38.

103 Switches can also be terminated when a retailer offers to match the new company's price and the offer is accepted, p36.

104 Allocation of distributor shared costs, p61.

105 Low fixed charges, p74-76.

106 See: https://www.radionz.co.nz/news/political/367118/ardern-focuses-on-lifting-children-from-poverty-in-first-us-speech

& New Zealand First and the Confidence and Supply Agreement between New Zealand Labour Party & Green Party of Aotearoa New Zealand state:

> *We will reduce inequality and poverty and improve the well-being of all New Zealanders and the environment we live in.*

The Confidence and Supply Agreement zeros in on energy poverty as well:

> *13. Aim to end energy poverty in New Zealand and ensure that every New Zealander has a warm, dry, secure home, whether they rent or own.*
>
> *a. Budget provision will be made to substantially increase the number of homes insulated.*

The overarching objective for the Electricity Pricing Review includes the orthodox objective of efficiency but goes further to include the question of whether we are meeting social goals in line with the government's stated priority around inequality and poverty:

> *The objective of the review is to ensure that the New Zealand electricity market delivers* ***efficient, fair and equitable*** *prices*

We signalled meeting community or social minimums as one of five broad enduring policy goals in our 2009 and 2014 papers. Our experience when we highlighted the issue of fuel poverty in 2014 was that it was clearly not a high priority for the sector at that time. We are unsurprised that it has now come to the fore.

We note, as the Review observes,[108] that neither Part 4 of the Commerce Act nor the Authority's statutory objective (as per the Electricity Industry act) make explicit mention of fairness or a fairness objective. The fact that Review includes a fairness and equity objective doesn't mean that the objectives of the two regulatory regimes should change. It is simply that the outcomes from those regimes are being viewed by that test.

5.3 Definition

Fuel poverty is a defined term. Kimberley Clare O'Sullivan, Philippa L. Howden-Chapman and Geoffrey M. Fougere observed in 2015:[109]

> *Fuel poverty is a complex problem as it is caused by several contributing factors, including the thermal performance of the dwelling envelope and appliances, household income, and the price of energy. A basic definition of fuel poverty is that a household is fuel poor if it cannot afford adequate household energy, including heating to World Health Organization recommended indoor temperatures (at least 18 °C), for a reasonable expenditure of household income. More specific definitions have also been used, most notably the required energy expenditure for a 10% household income threshold after housing costs in England. More recently England has updated its definition to a 'low income, high costs' model, where*

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107 See: https://www.dpmc.govt.nz/sites/default/files/2017-12/coc-17-10.pdf

108 Review, p73.

109 O'Sullivan et al (2015).

a household is in fuel poverty if the required energy expenditure is above the national median and would leave the household with an income below the poverty line (60% median).

Fuel poverty in England is now measured using the Low Income High Costs (LIHC) indicator.

Under the LIHC indicator, a household is considered to be fuel poor if:

- *they have required fuel costs that are above average (the national median level)*
- *were they to spend that amount, they would be left with a residual income below the official poverty line.*

In New Zealand Stats NZ investigated measures of energy hardship in New Zealand in 2017.[110]

While there is no international consensus around measurement of energy hardship, some indicators have been developed and are in use in Europe, the United Kingdom and Australia. Fuel poverty or energy hardship can be measured using subjective or objective indicators, or through a composite measure where these indicators are combined.

As complex as the issue is, if it captures households that "cannot afford adequate household energy, including heating to World Health Organization recommended indoor temperatures (at least 18 ◦C), for a reasonable expenditure of household income" then a country specific definition can be agreed, it can be measured and responsibility for addressing its causes can be allocated where they are best able to be addressed. Given that the electricity sector charges by volume and is able to raise prices within what competitive forces will bear it is hard to argue that they have no other responsibility than making payment as easy as possible. Yet, that seems to be the current position.

A review of initiatives around energy poverty in Europe, the United Kingdom and Australia revealed an increasing level of acknowledgment of it as a specific problem and a wide range of measures targeted specifically at the problem.

5.4 The treatment of "vulnerable" consumers in New Zealand

In New Zealand attention is given to vulnerable consumers but that doesn't automatically acknowledge a fuel poverty problem and doesn't target consumption. Initiatives aimed at medically dependent and vulnerable consumer in New Zealand are focused on critical supply and payment issues. The problem that come with fuel poverty, energy hardship or vulnerability are not solely related to the headline price.

The consequence of late payment or the struggle to meet a bow wave of unpaid bills is addressed within the medically dependent and vulnerable consumers provisions the Authority administers. The Authority defines a vulnerable customer as[111]

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110 See: http://archive.stats.govt.nz/browse_for_stats/people_and_communities/Households/energy-hardship-report/background.aspx

A domestic consumer who:

(a) for reasons of age, health or disability, the disconnection of electricity to that domestic consumer presents a clear threat to the health or wellbeing of that domestic consumer; and/or

(b) it is genuinely difficult for the domestic consumer to pay his or her electricity bills because of severe financial insecurity, whether temporary or permanent.

The Authority also provides a fact sheet.[112] The guidelines deal very much with customers having payment difficulties. It does not extend to advice outside payment and disconnection arrangements.

A review of the websites of all major electricity retailers finds that the medically dependent and vulnerable consumer guidelines are referred to by all retailers.

Consumer NZ survey for customer satisfaction with electricity retailers. In the June 2018 report Globug gets special attention very relevant to this issue:

Last year alone, 25,300 households were cut off from the grid because of unpaid electricity bills.

Chances are many will end up as customers of prepay power retailer Globug, the last-resort provider for cash-strapped consumers no one else wants on their books. Not only do these consumers have little choice about where they get their power, they're also more likely to get bad service.

In our latest satisfaction survey, 42% of Globug customers had been on the receiving end of poor customer service – the worst result of any power company in our past 3 surveys.

Prepay power retailer Globug was the only company to perform below average on all our key satisfaction measures. One out of 4 Globug customers said they'd complained to the company about its service, which was the worst result of any retailer. Globug's ratings are a major concern given it deals with some of the most vulnerable consumers. Just over half had experienced financial difficulty paying their power bills in the past year.

Globug may be providing poor service as indicated above but most other retailers have exited this space. If the regulator makes life more difficult for Globug, it could exit too, leaving a bigger problem to solve.

For prepayment customers facing fuel affordability concerns, they may manage their own budget by rationing their electricity use, either partly reducing their use or not using at all. In the United Kingdom, this is a recognised concern, and has been defined as self-disconnection. Where customers are self disconnecting, they impact on their quality of life, with attendant risks to health and wellbeing. This is particularly concerning where customers in fuel poverty have other issues, such as poor health or poor quality housing.

The Review does not note this issue, but we believe it may be a further concern for customers.

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111 EA (2009).

112 See: https://www.eranz.org.nz/fileadmin/user_upload/EA_vulnerable_consumers-factsheet-7.pdf

Lawson et al examine the trade-offs New Zealand consumers in poverty make in an effort to better understand the problem of fuel poverty. [113]

> *Firstly, the people who we estimate spend more than 10% of their annual household income on fuel are generally different from those people who admit to going without fuel because they say they cannot afford it. The fact that people are different between the two measures raises the question of understanding the trade-offs that people might be making as to whether or not they are choosing to spend money on fuel from a limited budget. Being able to understand fuel poverty more exactly in the context of wider approaches to poverty would assist this greatly.*

This subtlety goes to the issue of how much electricity volume is consumed and the trade-offs consumer in fuel poverty face given the price of electricity. In some cases they choose to consumer the fuel for the good of their health and comfort. In others they don't. Steps that address the volume consumed or the time that electricity is charged are as important as headline price.

5.5 Assistance available for consumers in fuel poverty in New Zealand

A searched for what assistance is available for consumers struggling with their electricity consumption. This provides a context for where the electricity sector would fit in if it elected to become more involved in the consumption aspect of fuel poverty.

Citizens Advice Bureau

The CAB website has this advice focused on budgeting or financial assistance.[114]

> *Your power company should contact you to discuss your options which may include:*
>
> – *discussing alternative pricing and payment plans*
> – *advising you of agencies which can help you with budgeting*
> – *referring you to Work and Income (with your consent) to determine whether you are eligible for financial assistance:*

EECA

EECA Energywise provides **Tips for a warmer, healthier home** under the following categories:[115]

- Keep your home warm.
- Keep your home dry.
- Save on lighting.

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[113] Lawson et al (2015).

[114] See: http://www.cab.org.nz/vat/consumer/energy/Pages/vulnerable.aspx

[115] See: https://www.energywise.govt.nz/at-home/simple-ways-to-lower-energy-bills/

- Save on hot water.
- Save on appliances.

EECA provides funding to improve insulation in homes.

Warmer Kiwi Homes is a new four-year Government programme offering grants covering two-thirds of the cost of ceiling and under floor insulation. Additional contributions from community organisations will make the cost to homeowners as low as possible in many areas.

Grants covering two thirds of the cost of heating appliances will be available from July 2019 (these grants will be capped). Warm Up New Zealand: Healthy Homes grants for landlords came to their scheduled end on 30 June 2018.[116]

Healthy Homes Initiatives

The Healthy Homes Initiative (HHI) covers 11 district health boards (DHBs) with a high incidence of rheumatic fever. The initiatives identify eligible families, working with them to carry out a comprehensive housing assessment and complete an individualised action plan to create a warmer, drier home. Service providers help families access the interventions they need to create an improved living environment. This may include help with accessing insulation, curtains, beds and bedding, minor repairs, floor coverings, ventilation, heating sources, Work and Income entitlements, support with power bills and finding alternative accommodation if necessary[117].

A review of the HHI commissioned by the Ministry of Health in 2018[118] concluded that referral pathways were satisfactory. The evaluation found that the HHI does well delivering interventions directly within providers' control, such as key messaging related to healthy homes, mould kits and heating sources; but that interventions delivered by third-parties, such as relocation to social housing, insulation, ventilation, private/community housing relocation and minor repairs, are delivered within six months in less than half of cases. It noted that "landlords remain challenging to engage and resistant to making housing improvements".

The majority of families engaged in the evaluation considered that their homes were warmer, drier and healthier after their involvement with the HHI.

With respect to cross-government or cross-agency collaboration, the reviewers recommended that the Ministry of Health (continue to) work closely with its partners to ensure agreements at the national level are reflected in local service provision and enhance feedback loops with HHI providers; and to address barriers to the delivery of interventions to vulnerable families supported by this initiative.

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116 See: https://www.energywise.govt.nz/funding-and-support/funding-for-insulation/

117 https://www.health.govt.nz/our-work/preventative-health-wellness/healthy-homes-initiative

118 Allen + Clarke (2018).

Legislative requirements relating to heating and insulation

Existing regulations

In June 2016, insulation (along with smoke alarm) regulations were incorporated into the Residential Tenancies Act (RTA), requiring ceiling and underfloor insulation to be installed in all rental homes wherever practicable. Unless a specific exception applies, the insulation must be in place by 1 July 2019 and meet minimum standards (resistance to heat flow). Insulation has been compulsory in social housing with income-related rents since 1 July 2016.

Alongside is a requirement that all new tenancy agreements must include an insulation statement that covers what insulation the home has, where it is, and what type.

Landlords have to provide a form of heating in any living room under the Housing Improvement Regulations 1947. A plug-in heater (or similar) would usually satisfy the current requirement unless the local council specifies otherwise[119]. .

New minimum standards being developed

The Healthy Homes Guarantee Act 2017 (HHGA) allows for the introduction of new minimum requirements for heating, insulation, ventilation, moisture and drainage, and draught stopping in residential rental properties.

Proposed new standards are out for consultation during September and October 2018, and consider requirements such as:

- A fixed heating source which can keep a room at a healthy temperature.
- Extractor fans and ground moisture barriers to help control high levels of moisture.
- A higher minimum level of insulation and protection against unnecessary draughts.

Amendments to the HHGA will effectively making changes to the RTA which come into force on 1 July 2019. The timeframe for compliance is still to be decided but no later than 1 July 2024.

With a reform of the Residential Tenancies Act underway

A targeted reform of the RTA is also underway to support the Government's goal of making life better for renters. The review is considering responsibilities for maintenance of devices and whether tenants should be obligated to use improvements such as heating and extractor fans.

A network of sustainable energy trusts

Community Energy Network is a network of organisations working to deliver energy-efficient solutions for warmer homes and healthier communities. There are 17 member organisations across New Zealand (four in the South Island) generally with charitable trust status. Individual trusts have slightly different areas of focus, in addition to their goals

[119] MBIE: https://www.tenancy.govt.nz/maintenance-and-inspections/heating-and-ventilation/

around sustainable energy and healthy homes. For example some work to provide sustainable employment, whereas others are focused on environmental or climate issues.

The range of services offered by these organisations includes (for example):

- Free advice and education (e.g. how to reduce dampness and remove mould).
- Housing advocacy and support.
- Full supply and installation of heating, insulation and ventilation solutions.
- Access to subsidies or providing low cost repayment plans themselves.
- Curtain banks.
- Low cost firewood.

Funders include central government agencies, district health boards, councils, lotteries grants and philanthropic sources, universities, consumer energy trusts and private business. Funders may provide general support or fund a specific initiative such as a curtain bank.

5.6 Current electricity industry settings

We are aware that there are some activities where retailers connect with agencies like MSD to focus on the needs of households in fuel poverty. For example, prior to the introduction of the Winter Energy Payments we understand retailers and the distributor representative body ENA met with EECA, the Authority the Sustainability Trust and MSD to discuss this group of consumers. We are also aware that the retailers' pan industry representative body ERANZ has had fuel poverty on its agenda for some time. Even so, retailers and distributors could do more for this group of consumers. Whenever the plight of households in fuel poverty comes to the public's attention the reputation of the whole sector is undermined. The Review itself is a response to that sort of bad press although it is framed more along the lines of affordability for all.

Looking back at the headline initiatives discussed in the Review they all seem to refer to the broader issue of the headline price for all consumers and not on fuel poverty or hardship at all.

Table 3 Summary table assessing issues the review identities in relation to affordability

	Status quo	Cause	Review framing	Assessment
Prompt payment discounts/late payment charges	Most electricity retailers charge between 10% and 20%	Competitive retailers' initiative	Affects low decile households disproportionately	Electricity retailers are in best position to observe problem. Also need to include entire credit cycle including disconnection, bonds, and other charges
Two-tiered market	Many consumers pay more currently than they should, and some consumers have never switched	Competitive retailers' initiative	This affects lower income consumers disproportionately	As discussed in an earlier section a two tiered market is not a function of lack of competition. However, for households in fuel poverty the solution doesn't solely lie in switching for a lower headline price.
Win-backs	Some companies are successful in luring consumers back after they have switched to new retailers	Competitive retailers' initiative	Win-backs may dampen retail competition and therefore keep prices higher than they should be	We set out why we do not view win backs as anti competitive. We accept that consumers (such as households in fuel poverty) who don't shop around may miss out on this enticement benefit
Distributor shared costs	Allocation of distribution costs has changed significantly since 1990 reducing for businesses and increasing for consumers	Distributors' initiative	A reallocation of distributor costs would make a difference to affordability	The case for the allocation between businesses and consumers should be clear. A reallocation could drive uneconomic behaviour. Does not target fuel poverty and could have unfortunate second order effects by harming business competitiveness.
Low fixed charge tariff regulations	Households who use less than 8,000kWh (in some cases 9,000kWh) qualify for low fixed charge tariffs	Government initiative	The regulations do not necessarily help those who need it most	There is a big question of how best to identify people in fuel poverty and how to assist them; annual consumption is a poor way to do this.

5.6.1 Prompt payment discount

The Review considers that the prompt payment discount may operate as a "late payment charge". The Review emphasises that the discounts can be up to 26 per cent of the bill.[120] However, the amount of discount appears to vary considerably across retailers. Some sources indicate that the most common rate is 15%, but the discounts can go as high as 20%.[121] As the "discount" is applied to the actual amount of the bill it represents an even higher percentage than the stated discount if viewed as a late payment charge. A "discount" of 20 per cent would equate to a charge of 25 per cent,[122] a value which is similar to that emphasised by the Review.

All the major retailers offer a discount, with the exception of Meridian, which ceased applying it from 1 October 2018, in response to the Review's discussion paper.[123] Offering a discount to customers who pay promptly can be an attribute of healthy competition, as retailers seek to retain customers who are higher value to them.

In a workably competitive market, competition could be expected to drive the amount of the discounts toward the benefit (avoided cost) to a retailer from prompt payment. A late payment charge, amounting to 25 per cent of the bill, does not on the face of it appear a reasonable estimate of the costs to a retailer from receiving payment late. If the discount exceeds the potential avoided cost, it could be perceived as a penalty. A penalty for late payment would be an instrument that exacerbates fuel poverty/affordability.

The Review is silent on what can or should be done about such charges. Interventions which limits the dimensions over which a retailer can compete can have large unintended consequences as the United Kingdom experience cited earlier illustrates.

We would also maintain that the Review needs to take into consideration the whole credit cycle when framing this issue. Disconnection charges, bonds, and prepayment meters are closely related to late payment issues, as are unwanted consumers which present as credit risks. Another way to think about this issue would be to look at how much some households are effectively paying for power when all extra charges are taken into account. A household that is consistently paying 25% or more for its power compared to a median household through accumulation of charges should not be overlooked by its retailer. The power company is in the best position to observe this predicament and will need to be part of the solution.

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120 Review, p5.

121 https://www.powercompare.co.nz/p/prompt-payment-discounts

122 i.e. a bill of $125 would become $100 after application of the 20% "discount".

123 https://www.stuff.co.nz/business/money/107041179/Calls-to-ban-electricity-prompt-payment-discounts

5.6.2 Two-tiered market

The Review raises the issue of a two-tier market characterised by '*well-off, internet savvy households that are able to seek out the best deals; and poorer, vulnerable households that lack the motivation or means to make informed choices*[124]'.

It is suggested (as it is in relation to low fixed charges) that poorer households are less likely to have the means to check that they are on the best tariff for their needs.

The two tier market is a competition issue which we deal with in Chapter 3. We referred to an Electricity Authority survey that implies that there are proportions of bill-payers who:

- either do not know they have a choice of retailer or consider it likely to be difficult to switch
- know they have a choice of retailer and that they would likely save money from switching, but choose not to do so.

We accept that the existence of the first group weakens competition and, to the extent this group includes people who are energy poor, conflicts with achieving community and social minimums. By contrast, the emergence of the second group is consistent with *increasing* competition and may be a necessary aspect of the market if the most vulnerable consumers are to benefit the most from competition.

5.6.3 Distributor shared costs

The Review notes that '*before 1990, commercial and industrial consumers typically paid a bigger share of common distribution costs and residential consumers paid a smaller share. This was reversed over time. Shifting costs from businesses to householders was the biggest factor in residential price increases between 1990 and 2018.*[125]'

The Review frames the question of who pays for distribution as a question of fairness, stating that:

> *[I]t could be argued it is unfair for some householders to struggle to heat their homes or pay power bills while also paying a larger share of common costs.*
>
> *Fairness may dictate a need for some distributors to readjust shared network costs between residential and other consumers. By exactly how much is a matter on which we seek your views.*

There are two issues here. First, the review is defining fairness in this context as a question of how much each sector should pay as a proportion of costs – business or consumers. This is not a helpful way of framing the issue. When allocating a fixed charge the primary consideration should be to avoid driving uneconomic behaviour, not fairness (it is of course reasonable to make fairness the next consideration). Incentivising household behaviour that

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124 Review, p35.

125 Review, p21.

causes unneeded investment in infrastructure would be no more useful than imposing additional costs on business that made them unable to compete internationally.

The second issue is that a rebalancing of distributor charges is an untargeted mechanism for assisting in the solution of fuel poverty/affordability. It may help some consumers but there could also be lower cost mechanisms for providing this assistance. The second order effects of businesses that face higher costs of doing business could also harm some consumers and household incomes if a reallocation of costs makes a marginal business unprofitable.

5.6.4 Low fixed charges

The Review acknowledges that the intent of the low fixed charge tariff regulations was "particularly intended to help low income households"[126]. The regulations were also promoted as a means of encouraging conservation[127].

In regard to conservation it is possible to argue that raising the variable price of a product will indeed lower consumption of it and in that sense does promote conservation of the product. However, less use of electricity is not necessarily a desirable outcome for people who, for example, need to heat their houses to a reasonable standard. Consumers should face the true cost of delivery (including environmental costs) and make their choices accordingly.

Regarding the objective of assisting low income households, it is highly contestable that the low fixed charges have achieved what they were intended to do. As we stated in 2014:

> *[T]he low fixed charge regime does not target [low income earners, including pensioners] as there are many low users who are not low earners (e.g. dual fuel customers) and it does not help low earners with high consumption*[128].

The Review makes some useful comments regarding the low fixed charges regulations, for example:

> *We think they are poorly targeted at only one type of household in need of help*[129].

Also, as the report notes, "a significant portion [of consumers] pay more than they have to" as a result of being on the wrong plan"[130]. Reference is made to two thirds of households qualifying for a low fixed charge but only one half actually choosing a low fixed charges plan. This implies that about one sixth of households are on a high fixed charge plan when they should be on a low fixed charge plan[131]. It is also noted that there are consumers who have opted for low fixed charge tariffs when they should be on high fixed charge tariffs, and will be paying more as a result.

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126 Review, p75.

127 Review, p75 footnote #200.

128 Stevenson et al (2014), p23.

129 Review, p6.

130 Review, p75.

131 Note that any further analysis will have to look at whether some of those households are second homes, which do not qualify for low fixed charges.

The Review notes that consumers who have solar panels have the means to qualify as low users. The same goes for dual fuel customers. In both cases those classes of consumers are more likely to be better off.

A repeal of the low fixed charge regulations would be consistent with some policy goals but not others. To summarise the advantages:

- Reduction in the number of tariffs on offer may encourage consumers to engage more with the market.
- Variable tariffs would be more cost-reflective and thus improve economic welfare.
- From a fairness angle, no longer would high use/low income households be cross-subsidising high income households.
- Bills for customers on low fixed charge tariffs would be less variable and would make budgeting easier.

However, there would be negative effects on some classes of customers:

- Low user/low income households, in particular, would be worse off.

  The low fixed charge tariffs are targeted particularly poorly. By using consumption as a proxy for those who need assistance they have created a situation where behaviour is incentivised that is contrary to the intent of the regulations (e.g. inefficient installation of solar for those who have the means, and low/income high users paying more than they should).

5.7 A prescription

We argued in 2014 and argue again today that fuel poverty (or energy hardship) is definable and measurable, has implications for the health system and can be targeted. The Review leads with the Minister's comment that

> *Nearly a third of all households struggle to pay their power bills or spend a large part of their income on power.*

This is based on a Statistics NZ media statement[132] which is based, in turn, on information in their 2017 report **Investigating different measures of energy hardship in New Zealand**.[133] This suggests that we are some way down the track of identifying the problem but it is not clear that the definition has been adopted in any way or the coordinated solutions have been considered.

In 2014 we looked at a range of fuel poverty indicators used overseas and in New Zealand, and the reasons that energy hardship / fuel poverty should be considered separately from other types of hardship. Energy hardship occurs as a result of poor-quality housing, inefficient heating and ventilation, as well as inadequate incomes.

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[132] See: http://archive.stats.govt.nz/browse_for_stats/people_and_communities/Households/energy-hardship-mr.aspx

[133] See: http://archive.stats.govt.nz/browse_for_stats/people_and_communities/Households/energy-hardship-report.aspx

We observed that that cold and damp housing is associated with poor physical and mental outcomes. Therefore, a better understanding of energy hardship will help identify those households and people who are at most risk of experiencing these negative outcomes and enable more effective targeting of resources.

These indicators, when combined with data on the energy efficiency of dwellings, would enable better measurement of energy hardship in New Zealand and allow us to measure changes over time.

And yet the problem is often trivialised. Softer terms like affordability are used and measures targeted at bundled headline price are assumed to target fuel poverty. Figures such as Figure 9 in the Review point to New Zealand's average residential price as being in the lower half of all OECD countries suggesting we have a lesser problem than elsewhere. However, this only picks up on the price component of the bill and ignores the volumes of electricity required to live healthily in New Zealand houses:

> *About three-quarters of New Zealand's domestic energy use is in the form of electricity; this is much higher than OECD norms*
>
> *The World Health Organization (WHO) recommends healthy indoor temperaturesarebetween18and21 1C (World Health Organization, 1987).*
>
> *It seems clear that of the high percentage of people who are potentially in fuel poverty in New Zealand, very few actually spend the necessary proportion of their income on heating needed to attain the indoor environment which will protect their health.*
>
> *Unlike other OECD countries that have also identified the problem of fuel poverty, New Zealand has been too slow to recognise the problem's antecedents—inadequate standards for existing houses, rising income inequality, and the need to protect low-income households from the rising price of heating fuels.* [134]

The fact is that we have poor housing stock, health problems resulting from fuel poverty that are a cost to the whole economy and, in particular, a problems with the energy efficiency of rental housing. In the context of this public policy objective we offer a prescription for fuel poverty:

- First agree a definition of fuel poverty or energy hardship so it can be tracked and conversations are about the appropriate measures rather than the extent to which it is a problem.
- Establish some sort of engagement between industry, regulators and government to think about the problem collectively (e.g. an action group or task force established solely with a view to understanding the issues of fuel poverty and formulating strategies).
- Identify a wide range of options for addressing the problem so assessments can be made whether each is fit for purpose and how effective each could be.

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134 Howden-Chapman et al (2012).

- Identify a strategy/interventions that will lead to improved outcomes without unintended consequences (as for example, there are with the LFUC) or undermine the other five enduring public policy objectives.
- Identify where responsibility lies for action.
- Take steps to ensure that programmes are properly resourced.

5.8 Outcomes under this public policy objective

We see no basis to alter what we said on this subject in 2014. We said the current arrangements do not appear to bear down specifically on the problem of fuel poverty and we remain of that view.

The Review refers to the Stats NZ work on measuring energy hardship in New Zealand.[135] The Review states that if housing costs are excluded 175,000 households spent more than 10 per cent of their income on energy and, of these 121,000 are low income households. Under the first definition 10.4% would be in energy hardship and under the second 7.2% would be. Those figures differ from the figures quoted in our previous report and we expect that the problem is an issue with definitions. It is useful, however, that NZ Stats highlight the issues measuring energy hardship:

> *Energy hardship is hard to measure directly but we can use some information from available statistics through consensual (self-reported) and objective measures. Consensual measures include households that have trouble paying energy bills on time, find their house damp, too cold / difficult to heat, or do not use heating. Objective measures use information on the proportion of household income spent on household energy.*

This reinforces our observation that it would be useful for a definition specific to the New Zealand context to be established and used as the basis for policy.

We said in 2014 an efficient and competitive electricity market is only a partial response to the problem of fuel poverty indicated in the Lloyd and Howden-Chapman et al's studies. A softening of electricity prices is unlikely on its own to substantially alleviate fuel poverty, as it arises from a combination of factors including access to energy efficient appliances, household size and composition, state of housing stock, location, fewer individuals living in institutions, reduced use of solid fuels, and income levels.

[135] Stats NZ (2017).

6. Integrating environmental objectives into all facets of sector decision-making

6.1 Introduction

Since our 2014 report, the policy objective of integrating environmental objectives into all facets of sector decision-making has strengthened considerably. The Government has made the commitment to reach net-zero emissions by 2050, and will expect the electricity sector to play a role in this transition.

The strengthening of the policy objective on emissions raises two related issues:

- Do the current regulatory settings in electricity reflect the policy emphasis on emissions reduction?
- Should the sector take account of this policy emphasis, and if so, how should it do that?

This chapter aims to address these issues.

6.2 The national policy objective on emissions

The 2050 net-zero emissions target

In 2019, the government is expected to introduce a Zero Carbon Bill that will legislate a national target of net-zero emissions by 2050,[136] and will establish an independent Climate Change Commission (CCC). The 2050 net-zero target is much more ambitious than the previous target of achieving 50% emissions reductions below 1990 levels, and is necessary to bring New Zealand more in line with the global ambition under the Paris Agreement.[137]

The Government may risk judicial review if its statutory obligations under the Bill are not satisfied. In turn, this could be used to create a stronger case for government intervention in sectors that jeopardise the national emissions reduction target.

The Climate Change Commission

The CCC will advise the Government on the most appropriate level and composition of emissions budgets, and will monitor the Government's progress towards achieving these budgets.

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136 The government is considering three options for achieving net zero by 2050: net zero CO2, net zero long-lived gases and stabilised short-lived gases, and net zero emissions across all GHGs. See MfE (2018a).

137 See MfE (2018b).

We expect that the CCC would make this advice based on scenario modelling of lowest-cost abatement across the economy, which would in turn determine options for cost-efficient emissions reductions in each sector.[138] For the purpose of this paper, we define these options to deliver 'expected' emissions reductions in the sense that they are consistent with the least-cost 2050 net-zero pathway.

It is worth clarifying that expectations of the electricity sector's contribution to the de-carbonisation of NZ's economy would not necessarily imply meeting a *fixed* emissions reduction target by the sector. The CCC scenarios would provide a high-level sense of direction for de-carbonisation to 2050. These scenarios would still leave significant flexibility in the mix of effort between sectors, technologies and the role of behavioural change. They would also provide the flexibility for innovation and new technologies to emerge.

The Government will be required to take CCC's advice on emissions budgets into account, and issue a public report in response. The report will outline why the Government's actions differ from CCC's advice (where this is the case).[139]

Early indication of electricity sector's contribution to the national target

Modelling suggests that early and strong action on emissions will put New Zealand in the best position to achieve its targets at lower cost over the subsequent decades.[140] Electricity de-carbonisation will play a non-trivial role in this process, as can be seen in Figure 10.

As New Zealand moves to net zero emissions, a significant increase in electricity demand is expected from parts of the economy that will replace fossil fuels with cleaner electricity, particularly transport and process heat. The Productivity Commission expects demand to increase by more than 45% from 2015 levels.[141] [142]

Given the scale of the change, the electricity sector cannot ignore its emissions outcomes, and the different factors that can affect these outcomes (which we discuss further on).

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[138] Our assessment here is based on the assumption that the NZ CCC's functions (to deliver its advice) would mirror those of the UK CCC. For an example of expected sector-level abatement based on a central scenario modelling by UK CCC, see Figure 3.6 in https://www.theccc.org.uk/wp-content/uploads/2015/11/Committee-on-Climate-Change-Fifth-Carbon-Budget-Report.pdfhttps://www.theccc.org.uk/wp-content/uploads/2015/11/Committee-on-Climate-Change-Fifth-Carbon-Budget-Report.pdf.

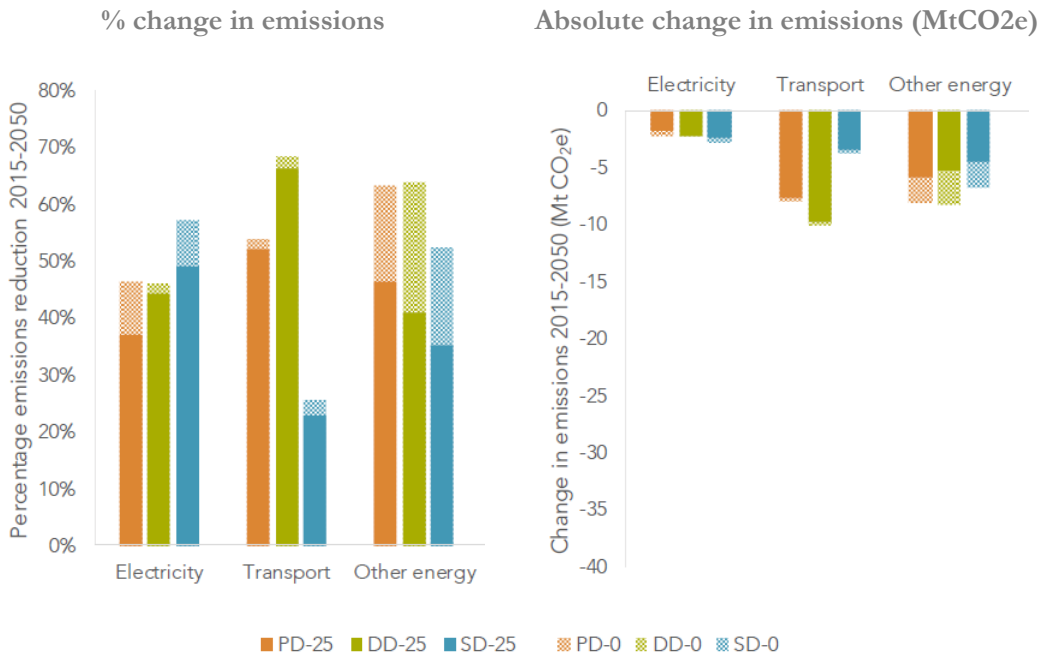
[139] MfE (2018a), p55.

[140] Productivity Commission (2018), p80.

[141] Productivity Commission (2018).

[142] Transpower (2018b) predicts electricity demand to more than double by 2050.

Figure 10 Emissions reduction in the electricity sector to reach economy-wide net zero by 2050[143] [144]



Source: Productivity Commission (2018) citing Concept Consulting et al (2018)

6.3 Current settings for emissions reduction in electricity

6.3.1 Current regulatory settings in electricity do not integrate environmental objectives

Currently, the environmental objective of emissions reduction is not included in the electricity regulatory framework. The Electricity Industry Act 2010 provides the Electricity Authority with a single statutory objective:

> *To promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.*[145]

In 2011, the Authority published a detailed document explaining its interpretation of its statutory objective[146] and, by implication, whether any account should be taken of emissions

[143] See PD-0, DD-0 and SD-0 scenarios.

[144] The authors modelled three scenarios: Policy Drive, Disruptive Decarbonisation and Stabilising Decarbonisation For details, see Concept Consulting et al (2018).

[145] Electricity Industry Act 2010 s 15.

[146] EA (2011).

reductions in the electricity sector. This interpretation is widely accepted and remains in force today:

> *2.4 Efficient operation limb.*
>
> *2.4.1 The Authority also notes that:*
>
> *2.4.1 (b) efficient operation of the electricity industry is interpreted within the context of other Government legislation and regulation affecting the electricity industry, and in particular does not allow consideration of pan-industry externalities such as carbon emissions; and*
>
> *A.60 It is important to note that the Authority does not consider the promotion of efficiency for the long-term benefit of consumers to cover all matters that may deliver long-term benefits to consumers. In particular, the Authority believes that policies to address externalities arising generally from industry and consumer activity that is broader than electricity industry-related activity do not fall within the scope of the Authority's functions.*
>
> *A.61 For example, carbon emissions arise from many sources of human activity, not just electricity-related activity, and are being addressed by the Government's environmental policies, including its emissions trading scheme.*

For our purpose, we understand this to mean that the Electricity Authority takes an arm's-length position with regards to emissions outcomes in the electricity sector, and that it primarily relies on the ETS price as the driver of these outcomes.

Similarly, the Commerce Commission does not consider the implications on emissions when it makes decisions on major transmission projects, nor does the Commerce Commission consider emissions when assessing allowed revenue and pricing approaches by transmission and distribution.[147]

6.3.2 Until now, regulatory settings have favoured low-emissions electricity

Emissions from electricity generation have been falling since 2005 (see Figure 11), primarily due to a significant reduction in coal generation and a decline in natural gas generation particularly from 2014.[148]

Since 2014, the share of renewables has exceeded 80% of total electricity generation. Most contribution to renewable generation is provided by hydro, which typically accounts for 55% - 65 % of New Zealand's generation depending on rainfall.[149] Figure 11 suggests that up until 2005, the pattern of renewable generation was strongly determined by hydro generation. This

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147 e.g., the grid owner (Transpower) earns the same return on assets connecting a coal fired generator to the grid as it does providing access to the grid to a suburb investing in solar and battery packs.

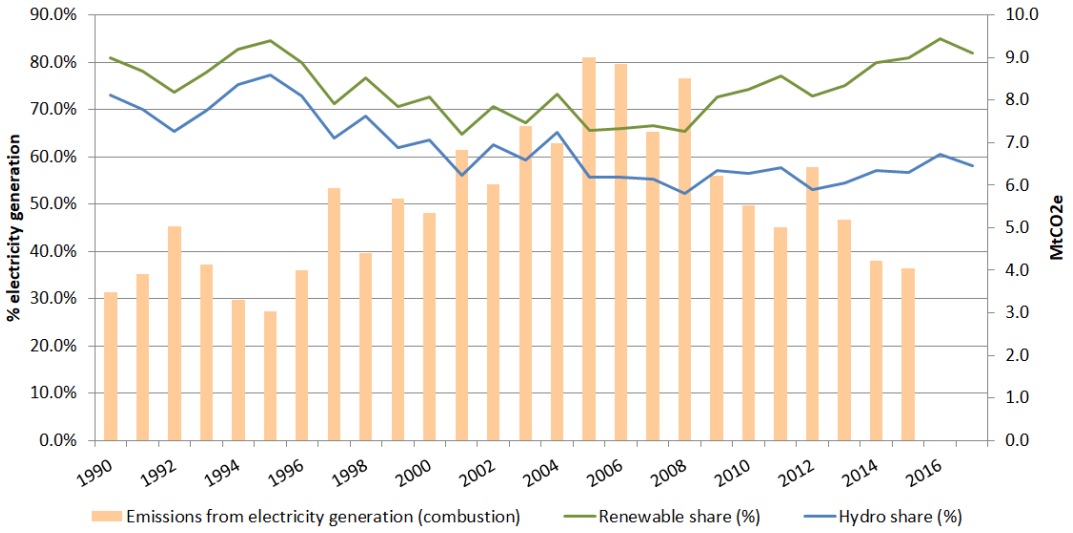
148 This is a lot due to new geothermal and wind being built, which displaced some existing coal and gas.

149 In periods of high rainfall, hydro share can exceed 70%.

pattern started to change from 2008, mainly due to an increase in wind and geothermal generation.[150]

It is therefore fair to say that the regulatory settings in the electricity sector have so far favoured a low-emissions profile of NZ electricity generation.

Figure 11 Renewables, and emissions from electricity generation



Source: Sapere based on MBIE data

6.4 Future settings for emissions reduction in electricity

6.4.1 The Review reiterates the sector's arm's-length position with regards to emissions

The Review asks whether the electricity regulatory framework should regulate the sector to achieve environmental objectives, such as reducing carbon emissions and other environmental effects from electricity infrastructure. The Review states that although these objectives are not included in the electricity framework per se, they can be found in the Resource Management Act 1991, Climate Change Response Act 2002 and the Energy Efficiency and Conservation Act 2000.

Through these Acts, the Review claims, the Government is able to promote environmental objectives by means of different interventions such as providing guidance on consenting and planning decisions, introducing measures promoting the uptake of electric vehicles, and creating a carbon price signal through the ETS.

[150] Note though that geothermal generation is not entirely 'clean,' as it produces fugitive emissions.

In this context, the Review rejects an electricity-specific emissions reduction objective by referring to a similar recommendation by the Productivity Commission in its recent report on the low-carbon transition.[151] The PC's recommendation that the

> *Government should be cautious in specifying targets for emissions within the electricity sector.*[152]

is restated by the Review as follows:

> *Giving the Authority such an objective might result in electricity sector emissions falling, but at a cost that was higher than in other sectors of the economy.*[153]

Furthermore, and as mentioned previously, the Authority's interpretation of its objectives implies that the emissions profile of the electricity sector should be the outcome of the government's environmental policies, and particularly the ETS. This is echoed in another recommendation by the Productivity Commission that the

> *Government should rely on an effective emissions-pricing system as the main instrument to achieve an efficient trade-off between emissions reductions in electricity and emissions reductions in other parts of the economy.*[154]

We agree that the Authority should not be given explicit emissions targets to achieve in the electricity sector, and that the ETS should be the main policy instrument driving the incentives to de-carbonise the electricity market.[155]

However, we believe that there is an important difference between the objectives of (a) *achieving a* specific emissions reduction target, and (b) *deliberately considering* the implications of regulatory settings for emissions outcomes in electricity. Whereas the former implies responsibility for meeting a specific level of de-carbonisation in the sector, the latter implies taking account of the national emissions reduction objective in decisions relating to the electricity sector. The latter implies that although there may be deviations between actual and expected emissions outcomes in electricity (for reasons discussed further on), these potential deviations are not brushed aside but are recognised so that (i) efforts are made by the sector to minimise these deviations where possible, and (ii) transparent decisions can be made by the government with regards to the re-allocation of abatement effort across the economy.

This perspective is consistent with the Authority's existing statutory objective because promoting reliable supply by, and the efficient operation of, the electricity industry in a manner that reduces emissions would – all else being equal – increase the long-term benefit

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151 Productivity Commission (2018).

152 Ibid, R13.2 on p401.

153 Review, p73.

154 Productivity Commission (2018), p401.

155 One of the great benefits of having an independent Climate Change Commission is that sector-level targets would not be the outcome of political decisions, but of least-cost optimisation. A sector-specific emissions reduction objective taken in isolation from the rest of the economy may not yield least-cost emissions reductions overall.

of consumers relative to not reducing emissions. After-all, consumer benefit is not limited to economic efficiency gains.[156]

6.4.2 There needs to be a change in the sector's arm's-length position on emissions outcomes

There needs to be a change to the electricity sector's current arm's-length position on emissions objectives because deviations between expected and actual emissions outcomes in the sector create the risk of increased total costs of achieving net zero, or create the risk that the national target will be altogether missed. The cost of de-carbonisation can increase because any shortfall in electricity emissions abatement would need to be picked up somewhere else in the economy at a higher (marginal) cost. The eventuality of this happening increases the risk of government intervention in the electricity sector.

We identify three primary reasons why the actual emissions reduction in electricity may deviate from the sector's expected contribution to the national target. These deviations are largely attributable to the complexity of the sector's decision-making which may not be fully captured in modelling, as well as to the great uncertainty of carbon price trajectories. These issues are sector-specific, and therefore may escape the scope of other regulations through which the government currently promotes its environmental objectives.

Market and regulatory failures

First, market and regulatory failures can affect the uptake of low-carbon solutions in the sector. In this paper, we discuss the challenges facing DER/DR integration (see Chapter 4),[157] but the low-emissions transition may reveal other challenges which the Authority should be prepared to face. In Chapter 2 we also point out that regulatory uncertainty would disadvantage low-carbon investments more than they would fossil-fuel investments because the former have much higher fixed costs to recover.

Trade-offs between multiple policy objectives

Second, the nature of decision-making in the electricity sector is such that it requires trade-offs between multiple policy objectives in the sector, such as security of supply and energy affordability. Although these trade-offs are necessary to provide for other societal benefits in addition to lower emissions, they may result in a departure from the sector's expected contribution to emissions reduction (see Figure 12).

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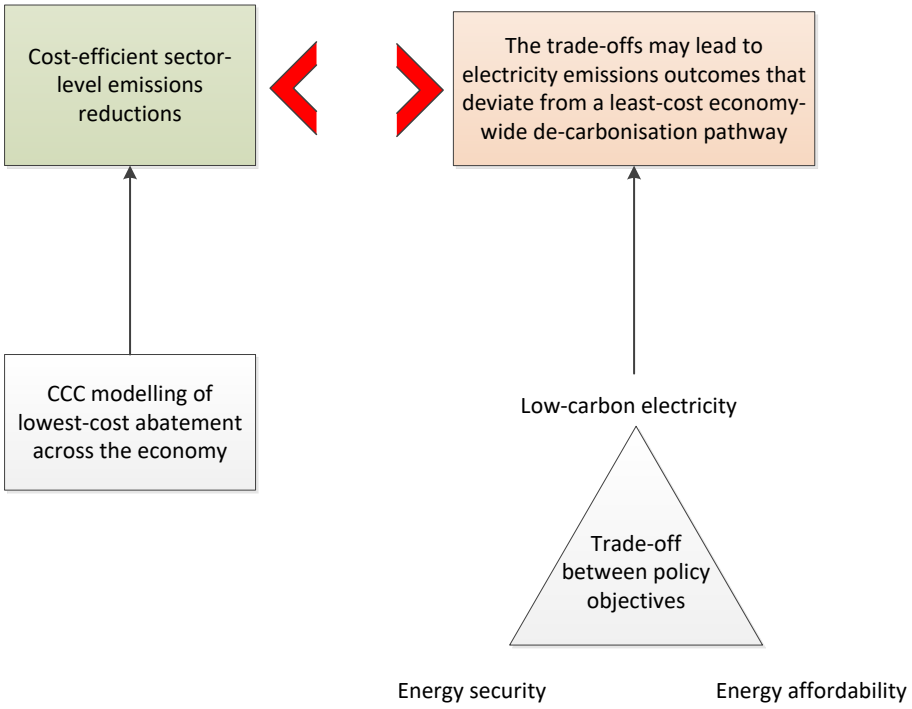
156 See for example, the discussion by the Court of Appeal in NZME vs Commerce Commission CA92/2018 [2018] NZCA 389.

157 We would also like to acknowledge that the Authority is already looking into these issues as part of the equal access programme.

Figure 12 Electricity emissions outcomes may deviate from the national least-cost emissions pathway



Carbon price efficiency

Third, the actual carbon price may differ from the carbon price used in the CCC modelling. This is particularly relevant in the context of security of supply, where new investments will soon be required to replace retiring thermal generation (see Chapter 2). Under the current electricity regulatory settings, the expectation is that the mix of fuels represented by these new investments would be the outcome of the carbon price. The underlying assumption is that the carbon price should provide the signal to attract investments with emissions profiles that are consistent with the 2050 national target.

We agree with this assumption. Given that the CCC will be tasked with determining options for least-cost de-carbonisation, the emissions budgets it will put forward should deliver a carbon price that would determine the necessary abatement across sectors (the 'efficient' carbon price). However, a tension may arise between three time horizons: (i) the time it may take for the carbon price to reach the 'efficient' level; (ii) the relatively short-term horizon in which new investment in security of supply may need to take place, and (iii) the longevity of new assets that will 'lock-in' the potential for emissions reductions in the sector over years or even decades.

To put this in perspective, Huntly could be retired as early as 2022, whereas the major institutional changes involving the CCC's establishment and the implementation of the initial NZ ETS reform package will take place only 3 years prior to that (i.e. 2019). Given the complexity of decisions that will need to be made to determine the least-cost de-carbonisation pathway and to improve the policy instruments supporting this pathway, there is uncertainty around the efficiency of the ETS price in the short or medium terms. The scale

of the necessary carbon price correction is significant: from the current $25 or so to $130.[158] [159]

The electricity sector needs to consider the implications of making new security-of-supply investments that achieve lower-than-expected emissions reductions in the sector over the medium or longer-terms.

[158] This carbon price is necessary to attract investments in geothermal providing flexibility requirements. See Stevenson et al (2018).)

[159] The Productivity Commission (2018) indicates scenarios of carbon prices between $157 and $250 by 2050 to reach 2050 net zero.

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