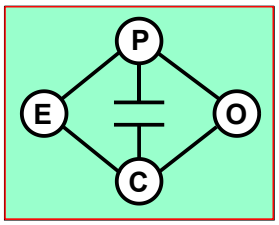

Consultation

on

Price-discovery in a renewable-based electricity system

OPTIONS PAPER

Submission by

Electric Power Optimization Centre

The University of Auckland

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March 6, 2023

Executive Summary

1. The move towards a renewables-based electricity system will have implications for the design and operation of the New Zealand wholesale electricity market. EPOC welcomes the work of the Market Design Advisory group (MDAG) on this issue, and the opportunity to comment on the Options paper.

2. EPOC generally agrees with the proposition that markets are appropriate mechanisms to encourage innovation and deliver socially optimal levels of investment in a range of different technologies for electricity supply. It must be recognized that optimization in this context relates to a long-run equilibrium. If rapid transformation is required subject to a time constraint then some loss in optimality (through intervention) might be acceptable in the interests of a rapid expansion in renewable capacity.

3. The options paper does not support explicit capacity mechanisms, and has eliminated them from further consideration. Although EPOC is not advocating for these per se, we believe that ruling them out is premature.

4. EPOC takes the position that wholesale prices which are close to perfectly competitive levels are required to improve consumer confidence in the wholesale market. Without this confidence, consumers are unlikely to accept the need for high scarcity-prices during shortages. We advocate perfectly competitive counterfactual models to investigate changes in system behaviour as it moves towards more renewables.

5. EPOC sees a need for more responsive demand-side behaviour as renewables grow. This will be needed to deal with capacity shortfalls in operations (e.g., no wind periods) and energy shortfalls over a longer time-scale (e.g., dry winters).

6. Demand-side response derivative contracts with firm delivery obligations will enhance the ability of energy-limited and capacity-limited generators to reduce risk.

7. EPOC welcomes the decision by MDAG to investigate two-settlement (day-ahead and balancing) markets.

Appendix B: Submitter responses

Operational coordination

1. Do you agree that, weighing costs and benefits, our preferred options in Table 7 above are likely to best address the operational coordination issues described in that chapter? If not, why not?

2. What is your view of the proposed sequencing and timing of measures to strengthen operational coordination?

3. What, if any, other options should be considered to strengthen operational coordination?

Response

a) Improving short-term forecasts of wind, solar and demand is a worthwhile objective. The extent to which this can be done successfully is a function of the resources that are allocated to this endeavour, with inevitable diminishing returns. 100% accuracy is unattainable, so before committing to improvements, MDAG should investigate how bad current forecasts are, and the potential for improvement in these.

b) EPOC agrees with the investigation of reserve products to ensure backup plant are online to meet sudden decreases in renewable generation.

c) EPOC supports the investigation of a (day-)ahead market. We note that although the NZ wholesale market has few large thermal units to schedule (and will eventually have none), the increase in short-term storage mechanisms in the wholesale market will entail some increased coupling between periods. This time coupling is currently restricted in SPD to ramping constraints and river-chain optimization. In principle, optimal spot prices should coordinate any actions to provide the optimal solution for the system. However EPOC studies[1] show that clearing spot prices (being the approximate limit of some imperfect tatonnement process) can fail to coordinate this coupling well. A (day-)ahead market could recover this coordination loss.

Risk management

4. Do you agree that, weighing costs and benefits, our preferred options in Table 10 above are likely to best address the risk management and investment issues described in that chapter? If not, why not?

5. What is your view of the proposed sequencing and timing of measures to improve risk management and investment?

6. What, if any, other options should be considered to improve risk management and investment?

Response

a) EPOC generally agrees with the proposition that markets are appropriate mechanisms to encourage innovation and deliver socially optimal levels of investment in a range of different technologies for electricity supply. It must be recognized that optimization in this

[1] (see Philpott, A.B., Price discovery can be inefficient, www.epoc.org.nz).

context relates to a long-run equilibrium. Will this occur in time? If rapid transformation is required subject to a time constraint, then some loss in optimality (through intervention) might be acceptable in the interests of a rapid expansion in renewable capacity. We note that significant levels of renewable investment are required to meet targets proposed by the Climate Change Commission.

b) The options paper devotes some attention to "shaped risk products". Such contracts enable parties to hedge contingencies that are more complicated than simply high or low prices. EPOC agrees that contract markets are essential ingredients to enable risk reduction by market participants. A central planning solution that maximizes socially risk-adjusted expected welfare corresponds to a perfectly competitive (partial) equilibrium under the assumption that markets for risk are complete. This assumption is unrealistic in practice, but numerical experiments with computational equilibrium models show that rich and liquid contract markets make competitive equilibrium nearly as good as the optimal social plan[2]. If complicated contingencies arise often then an instrument to trade the ensuing risks will in general lead to a more efficient market outcome[3].

c) The options paper does not support explicit capacity mechanisms and has eliminated them from further consideration. EPOC thinks this decision is premature. Potential government intervention in underwriting a NZ Battery project might have a chilling effect on future commercial investment, to the extent that maintaining high levels of system security might require capacity payments to provide this backup. The options paper points to international expert opinion favouring energy-only markets, but there are many instances of capacity markets operating in other jurisdictions. To be clear, EPOC is not advocating for such a mechanism, but proposing it is retained in the mix of possible options.

d) If the NZ Government invests in a NZ Battery project that would not have attracted commercial investors, then the commercial investment market will be distorted, and some form of capacity payment might be deemed necessary to ensure existing plant is not retired prematurely.

Demand-side flexibility

7. Do you agree that, weighing costs and benefits, our preferred options in Table 13 above are likely to best address the demand side flexibility issues described in that chapter? If not, why not?

8. What is your view of the proposed sequencing and timing of measures to improve demand side flexibility?

9. What, if any, other options should be considered to improve demand side flexibility?

Response

1. EPOC sees a need for more responsive demand-side behaviour as renewables grow. This will be needed to deal with capacity shortfalls in operations (e.g., no wind periods) and energy shortfalls over a longer time scale (e.g., dry winters).

[2] See Kok, Philpott, Zakeri, 2018, https://www.epoc.org.nz/papers/TransmissionPaperOperationsResearch.pdf
[3] This assertion should be moderated by "second-best" considerations. It is not always beneficial in social welfare terms to add a new contract to an incomplete market.

2. Demand-side response derivative contracts with firm delivery obligations will enhance the ability of energy-limited and capacity-limited generators to reduce risk.

3. EPOC welcomes the decision by MDAG to investigate two-settlement (day-ahead and balancing) markets.

Strengthening competition

10. Do you agree that, weighing costs and benefits, our preferred options in Table 15 above are likely to best address the competition issues described in that chapter? If not, why not?

11. What is your view of the proposed sequencing and timing of measures to strengthen competition?

12. What, if any, other options should be considered to strengthen competition?

13. Do you agree that, weighing costs and benefits, our preferred options in Table 17 above are likely to best address the public confidence issues described in that chapter? If not, why not?

Response

a) EPOC agrees with MDAG and overseas market experts that exercise of market power is undesirable as it distorts merit order signals and investment incentives. The options paper devotes considerable attention to market concentration of flexibility provision. Other forms of market-power exercise should not be precluded. These can be identified through comparison of historical outcomes with competitive counterfactual models[4].

b) EPOC agrees with the MDAG position that attention on competition should focus initially on conduct measures. EPOC advocates for perfectly competitive counterfactual models to monitor changes in market outcomes as the electricity system moves towards more renewables. Comparison of market conduct with counterfactuals provides evidence of market inefficiencies that might arise from market power exercise, market incompleteness e.g. in the risk trading market, or imperfect information.

c) EPOC is not confident that structural measures for improving competition (e.g. breaking up assets to improve HHI) will provide net benefits. In a renewable-based system, large players will be those operating river chains. Physical disaggregation of these will lead to potential coordination losses (as conceded by MDAG).

d) MDAGs preference for structural intervention is Option D7 (re-allocating rights to long-term storage). Such a proposal should be studied thoroughly with industrial-organization models ahead of any possible deployment to avoid unforeseen consequences.

[4] Papers describing these counterfactual models are available at www.epoc.org.nz, see e.g. https://www.epoc.org.nz/papers/PhilpottGuanEMBER2017.pdf

Public confidence

14. What is your view of the proposed sequencing and timing of measures to increase public confidence?

15. What, if any, other options should be considered to increase public confidence?

16. Do you agree the measures in Table 19 should be prioritised to help ensure a smooth transition to a renewables-based system? If not, why?

17. What, if any, other measures should be considered to facilitate a smooth transition to a renewables-based system?

Response

a) EPOC takes the position that wholesale prices which are close to perfectly competitive levels are required to improve consumer confidence in the wholesale market. Without this confidence, consumers are unlikely to accept the need for high scarcity-prices during shortages. We advocate perfectly competitive counterfactual models to investigate changes in system behaviour as it moves towards more renewables.

b) The Options Paper alludes to a smooth transition to renewable energy. Speed is also important. Public confidence will be enhanced if this transition also appears to occur at a pace that is rapid enough to make a difference to the global climate.