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Submissions
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Response to MDAG 100% Renewable power supply - MDAG issues discussion paper

1. Orion New Zealand Limited (Orion) welcomes the opportunity to respond to the Electricity Authority (the Authority) consultation on the Market Development Advisory Group (MDAG) 100% Renewable power supply - MDAG issues discussion paper. In our submission we provide;
 - (a) our response to your specific questions; and
 - (b) Orion specific context and high-level submission points.

Orion's orientation

2. As New Zealand transitions to a low-carbon economy, the energy sector has a critical part to play. Orion Group has established its Purpose, and developed its strategy, as shown below, to ensure it is a vital player in that transition for our community, our region and New Zealand.



High-level comments on the MDAG issues discussion paper

3. Orion commends the MDAG for their commitment to identifying the issues associated with the wholesale electricity market in New Zealand under a 100% renewable electricity system. The paper presents many of the complex issues associated with this transition.
4. As New Zealand moves toward a 100% RE electricity system, a whole of systems perspective is required to achieve the Authority's objective of efficient operation of the electricity industry for the long-term benefit of consumers. While Orion appreciates the MDAG's project has a specific focus on the Wholesale Electricity Market, a whole of system perspective requires consideration for other

elements of the energy system including consumer drivers (which may be operational or emotive rather than financial) and other connected systems such as transport, heat and gas.

5. We have summarised several areas covered within our response that warrant further consideration alongside the key issues identified in the discussion paper. As outlined in subsequent sections.
6. **Coordination of plans and actions of DER in the future will require local system operation (supported by local engagement and real-time network visibility) in addition to wholesale markets.**

- (a) **Local system operation:** The report does not acknowledge the spatial value drivers that will emerge in a 100% RE system with growth of distributed (and intermittent) generation and other DER and the development of locational marginal pricing and the emergence of flexibility markets. These will introduce additional opportunities to the value stack for customers, particularly distributed energy resources (DER). The South Island Distribution Group (SIDG) is exploring Distribution System Operation (DSO) models to deliver this local system operation and co-optimisation of DER is the focus of the cross-sector FlexForum.
- (b) **Risk of conflict between capacity and energy signals:** Spatial value drivers will incentivise optimal use of local network capacity, and depending on the time and location, may strengthen or conflict with signals from the wholesale electricity market. Therefore, the interaction between these value streams must be better understood to maximise opportunities for flexibility while maintaining network reliability. As wholesale market prices become more volatile, the impact of these signals on the operation of distributed resources must be coordinated between national and local network operators over operation and planning periods.
- (c) **System visibility and planning:** The efficient operation of DER depends heavily on the visibility of the flexible resources available and real-time network conditions. To facilitate visibility of these to the system operator, networks require better access to data including third-party data such as smart meter data and location of DER. As well as improving the visibility of low voltage network conditions, access to this data will support identification of trends in technology adoption and utilisation to inform local and national planning and forecasts. Coordination and sharing of data in a way that manages privacy while enabling optimal operation of the network needed, as in many cases data is not accessible to networks at the granularity required to enable this.
- (d) **Local engagement:** To maximise opportunities and participation in demand side flexibility (DSF), local area energy planning and more in-depth consumer engagement are required. This includes deeper engagement with customers of all scales to ensure the opportunities to provide DSF and the value of this to the consumers is understood as consumers look to decarbonise their own activities and leverage market opportunities to support the energy transition.

7. **Markets should be developed to strengthen incentives for DSF to support the best whole of system operation**
 - (a) **Intraday intermittency:** It is important to model this and ensure strong price signals are translated into simple, attractive and effective incentives for DSF to enable consumers of all sizes to access the value of this flexibility and improve whole system operation.
 - (b) **Market development:** The development of the spot market, the contracts (hedge) market and other markets needs to be done with a whole of system view that understands how demand side incentives can be passed through to consumers to ensure that DSF is encouraged, not compromised.
 - i. Load shaped hedge products and developments in the Contract Market may help generators and retailers manage risk and support a well-functioning market, but these financial solutions may impede signals driven by the physical conditions in a 100% RE system.
 - ii. If retailers can fully hedge at low cost with confidence, they have much less incentive to do the hard work of engaging with the demand side and innovating to find ways for the DSF to provide lower-cost alternatives.
 - iii. Although market theory indicates retailers will not pay for a hedge if demand side can deliver more cheaply, the behavioural economics behind this and lack of effectual incentives for demand-side response suggests otherwise.
8. **Collaborative innovation is required to de-risk market developments and ensure that DSF incentives can be passed through to consumers via simple and attractive propositions.**
 - (a) **Access to the full value stack:** Optimal operation of the energy system depends on the optimisation of assets against the full value stack. This does not mean all consumers need to be directly exposed to market signals, but it requires signals to be passed through to consumers in a way people can participate, act on them and be rewarded for doing so.
 - (b) **Innovation stimulus:** To build confidence in future market arrangements and de-risk regulatory change, the Authority needs to support collaborative innovation and real-world trials to ensure market developments stimulate consumer-centred incentives for DSF and mitigate risks to those in energy hardship.
 - (c) **Consumer behaviour:** Unlike centralised energy assets, the primary purpose of distributed energy resources may be transport or heating. Therefore, consumer preference/external parameters will also impact the effectiveness of wholesale market prices and other price signals incentivising DSF. These behaviour factors are difficult to predict or model and reinforce the importance of innovation and real-world trials ahead to inform regulation.
9. We would like to highlight the importance of adaptive regulatory settings to manage the uncertainty associated with price signals/markets for energy and network capacity as we transition to 100% RE. The interaction between these two signals and the impact this has on DSF at a local level will

materially impact the network investment required over the next 15 years and regulatory settings need to be adaptive to this.

10. Orion welcomes the announcement of a Government consultation on a National Energy Strategy, as more coordinated infrastructure planning and alignment between forecasts will be needed to ensure optimal development and operation of the energy system (including links to gas/storage).
11. General comment: Battery used throughout report. This should be replaced with the term storage to be technology agnostic.
12. Our response to your specific questions is informed by the orientation we describe above and is included in Appendix B.

Concluding remarks

Thank you for the opportunity to provide this submission. We do not consider that any part of this information is confidential. If you have any questions please contact Evie Trolove (Energy Futures Programme Manager), DDI 027 228 4426, email evie.trolove@oriongroup.co.nz.

Yours sincerely



Nigel Barbour
Group Chief Executive

Appendix A

Submission by Orion Group on MDAG 100% Renewable power supply - MDAG issues discussion paper

Submitter:	Orion Group
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	Question	Page references	Comment
1	<p>Do you agree with the broad conclusions that emerge from the simulations in relation to spot price levels and volatility, in particular:</p> <p>(a) significantly more spot price volatility is likely with a 100%RE system, especially shorter-term weather driven volatility?</p> <p>(b) New Zealand’s sizeable hydro generation base is likely to moderate the growth in volatility to some extent, making extreme oscillations between zero and shortage spot prices relatively unlikely?</p>	p18, p61	<p>(a) Yes, we agree with this point.</p> <p>(b) We partially agree with this point as explained below.</p>
2	<p>If you disagree, what is your view and the reasoning for it?</p>	p18, p61	<p>The report noted the ability of hydro to moderate price volatility may be limited in a dry year and that a 100% RE system will increase intraday volatility. Due to this, we feel there is a strong need to use a range of solutions to manage volatility, including demand-side flexibility and distributed energy resources (DER). Requirements such as the speed and duration of response required to respond to various flexibility needs will also impact the suitability of solutions to respond and mitigate price volatility for various value streams.</p> <p>As DER can stack value from multiple streams (national and local), understanding the relative size and interaction between various drivers for flexibility (e.g. consumer preferences, local network reinforcement deferral, energy arbitrage) and the impact of these on the electricity system is important.</p>
3	<p>Do you agree that in a 100%RE system there will be many diverse and disaggregated</p>	p18, p65	<p>We agree that there will be many diverse and disaggregated assets to coordinate and that wholesale markets are an important input. However, the term “preferred mechanism” fails</p>

	Question	Page references	Comment
	<p>resources to coordinate, and that a wholesale market will be the preferred mechanism to coordinate plans and actions among all the resource owners? If you disagree, what is your view and the reasoning for it?</p>		<p>to acknowledge that the wholesale market is part of a wider value stack which assets may be optimised against.</p> <p>Coordination of plans and actions of DER in the future will require local system operation (supported by local engagement and network visibility) in addition to wholesale markets. The report does not acknowledge the spatial value drivers that will emerge in a 100% RE system with the development of locational marginal pricing and the emergence of flexibility markets. These will introduce additional opportunities to the value stack for customers, particularly distributed energy resources (DER). These spatial value drivers will incentivise optimal use of local network capacity and depending on the time and location, may strengthen or conflict with signals from the wholesale electricity market. Therefore, the interaction between these value streams must be better understood to maximise opportunities for flexibility while maintaining network reliability. Therefore, the interaction between these value streams must be better understood to maximise opportunities for flexibility while maintaining network reliability. The South Island Distribution Group (SIDG) is exploring Distribution System Operation (DSO) models to deliver this local system operation and co-optimisation of DER is the focus of the cross-sector FlexForum.</p> <p>Because consumers will not necessarily be exposed to signals in the wholesale market, the effectiveness of the wholesale market alone in coordinating these resources would be limited. Greater cross-industry collaboration and coordination is required to support the best whole of system operation.</p>
4	<p>Do you agree that these are the key issues in relation to real-time coordination? If you disagree, what is your view and the reasoning for it?</p>	p20, p69	<p>We agree with the challenges outlined.</p> <p>Proposed modifications:</p> <ul style="list-style-type: none"> (b) Significant investment and ongoing innovation will be required to understand and influence new forms of demand such as EV charging and behind the meter storage. As this is a complex challenge, there is a risk that many parties develop and utilise different forecasts which could result in sub-optimal operation of the energy system. We would like to highlight the need for a coordinated and aligned approach to forecasting and planning, informed through regional engagement. (f) Enabling downstream parties to facilitate participation by distribution resources requires optimisation of the assets against the value streams available. To build confidence in future market arrangements and de-risk regulatory change, the Authority needs to support collaborative innovation and real-world trials to ensure

	Question	Page references	Comment
			<p>market developments stimulate consumer-centred incentives for DSF.</p> <p>We propose that the following also be recognised as a key challenge:</p> <ul style="list-style-type: none"> • System visibility, planning and operation: The efficient operation of DER depends heavily on the visibility of the flexible resources available and real-time network conditions. To facilitate visibility of these to the system operator, networks require better access to data including third-party data such as smart meter data and location of DER (e.g. vehicle registrations). As well as improving the visibility of low voltage network conditions, access to this data will support identification of trends in technology adoption and utilisation to inform local and national planning and forecasts. Coordination and sharing of data in a way that manages privacy while enabling optimal operation of the network is needed, as in many cases data is not accessible to networks at the granularity or timeliness required to enable this. • As wholesale market prices become more volatile, the impact of these signals on the operation of distributed resources must be coordinated between national and local network operators over operation and planning periods. A degree of real-time coordination will be needed at a local level to optimise the use of electricity network capacity (i.e. smooth peaks in demand). The conflicts and synergies between national and local requirements must be understood and coordinated to ensure optimal whole energy system operation and to achieve the energy transition at the lowest overall cost to consumers.
5	Do you agree that these are the key issues in relation to ancillary services with 100%RE? If you disagree, what is your view and the reasoning for it?	p21, p74	<p>We broadly agree with the key issues raised and propose the following be considered:</p> <p>(d) How collaboration between the system operator, EDBs, retailers/aggregators and consumers will maximise access and participation of distributed resources in energy markets, including ancillary services. This collaboration is needed to ensure the full value stack is considered and made accessible in a manner which asset owners can respond to.</p>
6	Do you agree that these are the key issues in relation to price signalling with 100%RE as summarised in paragraph 3.42	p24, p88	No comment

	Question	Page references	Comment
	above? If you disagree, what is your view and the reasoning for it?		
7	Do you agree that the preconditions in paragraph 3.38 would need to be in place for an energy-only market design to be effective? If you disagree what is your view and the reasoning for it?	p24, p88	No comment
8	Do you agree that we should take forward to the next stage of the process (options identification and analysis) the measures referred to in paragraph 3.43 above? If you disagree, what is your view and the reasoning for it?	p24, p88	No comment
9	Do you agree that these are the key issues in relation to demand-side flexibility with 100%RE? If you disagree, what is your view and the reasoning for it?	p25, p93	<p>The content in Section 7.90 to 7.102 is very valuable. We would like to see the following more clearly reflected in the key issues for this section:</p> <ul style="list-style-type: none"> • How will the wholesale market interact with other value drivers for DSF? <ul style="list-style-type: none"> - Optimal operation of the energy system depends on the optimisation of assets against the full value stack, including local opportunities for flexibility for distributed energy resources. The interaction between energy and network capacity must be considered as there may be conflicts or synergies in the signals at a local vs national level. Coordinated operation of DSF will require greater local system operation, an area the SIDG group is exploring through the development and evaluation of DSO models. - As outlined in our response to question 4, visibility of network conditions and the flexibility resources available will enable more effective management of DSF. - To maximise opportunities and participation in DSF, local area energy planning and more in-depth consumer engagement are required. This is because unlike centralised assets, the primary purpose of DER may be heating or transport so understanding consumer needs is

	Question	Page references	Comment
			<p>important to understanding the opportunities for DSF.</p> <ul style="list-style-type: none"> In relation to 7.98 (b), stronger incentives or pricing principles are needed for retailers to pass on DSF incentives to consumers in simple, attractive and effective ways. This should be supported through collaborative innovation to de-risk market developments with insight from real-world trials. We would like to sign-post UK Power Networks Shift project which successfully developed a range of consumer incentives to shift demand in response to both wholesale price, consumer preferences and distribution pricing, which led to the first electric vehicle virtual power plant.
10	Do you agree that these are the key issues in relation to contracts markets with 100%RE? If you disagree, what is your view and the reasoning for it?	p26, p98	<p>We would like the following to be considered alongside the key issued raised:</p> <ul style="list-style-type: none"> The development of the spot market, the contracts (hedge) market and other markets needs to be done with a whole of system view that understands how demand side incentives can be passed through to consumers to ensure that DSF is encouraged, not compromised. <ul style="list-style-type: none"> Load shaped hedge products and developments in the Contract Market may help generators and retailers manage risk and support a well-functioning market, but these financial solutions may impede signals driven by the physical conditions in a 100%RE system. If retailers can fully hedge at low cost with confidence, they have much less incentive to do the hard work of engaging with the demand side and innovating to find ways for the DSF to provide lower-cost alternatives. Although market theory indicates retailers will not pay for a hedge if demand side can deliver more cheaply, the behavioural economics behind this and lack of effectual incentives for demand-side response suggests otherwise.
11	Do you agree that these are the key issues in relation to transition to 100%RE? If you disagree, what is your view and the reasoning for it?	p28, p102	No comment

	Question	Page references	Comment
12	Are there any other 'lumpy' issues that warrant specific consideration in the transition to 100%RE?	p28, p102	No comment
13	Do you agree that we should analyse how competition in the wholesale market is likely to be affected by a shift to 100%RE, in particular, in competition for seasonal flexibility services? If you disagree, what is your view and the reasoning for it?	p29, p104	We agree that the impact of seasonal flexibility should be assessed further. However, we would also like the analysis consider intra-day flexibility so the interaction between this and spatial value drivers for DSF can be considered. This relationship is important to understand as it will impact the incentives consumers receive to provide DSF and the amount of flexibility network are able to access to and therefore, the long-term network investment needed.
14	What other key areas of opportunity or challenge (if any) will arise in the wholesale electricity market with 100%RE that are likely to have a significant impact in relation to achieving the statutory objective of the	p29, p104	<p>Over the next few years, we expect to see local flexibility drivers and DSO models emerging in New Zealand. As these will be prevalent by 2030, it is important to consider the interaction between these locational signals and the wholesale market. These increased opportunity for spatial service could enable value stacking, thereby strengthening incentives for flexibility. However, in some cases, signals between the wholesale market and local signals may conflict. There is a need to better understand these risks to ensure optimal development and operation of the energy system, delivering the lowest cost transition for consumers.</p> <p>We would also like to highlight the need to support consumers in making informed decisions to support optimal energy system operation in an increasingly complex landscape. We feel this is best achieved through consumer centric design and real-world trials to avoid unintended consequences and inform the development of effective mechanisms ahead of wider implementation/regulatory reform. We see a role for the Authority in providing an innovation stimulus and a regulatory environment that enables this experimental approach (e.g. sandbox).</p> <p>Lastly, we welcome the recent announcement of plans to develop a National Energy Strategy. We strongly support this and would like to see it reflect a whole of system perspective, coordinate approaches to national vs local area energy planning and system operation.</p>