The future operation of New Zealand's power system – Intellihub Consultation Response

Intellihub Limited
Private Bag 99 949 Newmarket
Auckland 1149
New Zealand
NZBN 9429047189027
T 0800 NZ IHUB
E info@intellihub.co.nz
intellihub.co.nz

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Intellihub

About Us

Intellihub Group is an Australia and New Zealand utility services company that delivers innovative metering and data solutions to utilities to enable digital and new energy services with a focus on driving an exceptional customer experience. It is an experienced and leading provider of multi-utility services across electricity, gas and water networks for residential, commercial & industrial, embedded network, solar metering, and distributed energy customers. Intellihub is a growing business with over 300 employees working across 8 ANZ office locations.

Intellihub currently has over two million advanced meters under management.

We are focused on creating business value for energy retailers through the best customer experience for installing advanced meters and afterwards maximising the digital and ‘new energy’ services that this technology can enable.

To achieve this, we have built a proven business model of partnering closely with our customers. The Intellihub business has created a distinctive culture based on blending the industry 'must haves’ on safe and reliable practises with the latest thinking in adopting new technology. Our technologies are designed to facilitate innovation across our whole business covering meters, communications, edge computing, IoT and cloud application hosting.

Our ‘Intelli-Suite’ enables broader innovation beyond-the-meter, and we believe it forms a strong basis for new products & services in the electricity industry – particularly where it relates to distributed energy resources (DER) including solar, batteries, hot water heaters and electric vehicle charging. Intellihub is the only ANZ metering provider that is developing and delivering these innovative metering and distributed energy resources services at scale. Since our inception, we have been investing in foundational infrastructure and capabilities to enable the transition to a decentralised and digitised energy system.

Response to the Authority's Consultation Paper

Introduction

1. Intellihub is pleased to submit a response to the Authority's February 2024 consultation paper 'The future operation of New Zealand's power system'.

2. Intellihub applauds the Authority recognising the crucial role that Distributed Energy Resources (DER) will play in future power system operations. Particularly, DERs are a component of a more flexible electricity ecosystem which is affordable, reliable, and sustainable. At the same time, failure to integrate DER into the power system appropriately can result in adverse outcomes for the power system and consumer.

3. As a leading provider of metering equipment and data solutions, we understand the valuable insights and opportunities that can be unlocked through digitalisation and democratisation of energy in New Zealand. Participants in the electricity market will be able to develop and use new data solutions to increase the efficiency and resilience of New Zealand's electricity infrastructure, better manage the capacity crunch, and deliver better outcomes for consumers.

4. We are excited to be able to contribute to bringing benefits to consumers in New Zealand, and we welcome the opportunity to work alongside the Authority and other participants in the electricity industry to support the development of distributed flexibility in New Zealand.

Structure of this submission

5. This submission provides responses to a sub-set of the questions for which the Authority has sought feedback and is structured as follows:

   a) Our response to Question 4 is covered in paragraphs 6 to 26.

   b) Question 5 is discussed in paragraph 27 to 49

   c) We respond to Question 6 in paragraphs 50 to 80

   d) Our response to Question 8 is included in paragraphs 81 to 85.

   e) Question 9 is covered in paragraphs 86 to 100.

   f) Paragraphs 101 to 113 summarise Intellihub's recommendations.

Q4: What do you consider will be most helpful to increase coordination in system operation?

6. Our response to Question 4 focuses on the following topics:

   a) DER visibility and potential options for digitalising DER information in New Zealand (paragraphs 7 to 16).

   b) Paragraphs 17 to 26 touch on the potential risk of nationally inconsistent practices emerging with respect to DSO roles, coordination practices and the approach to flexibility service procurement.

Lack of DER visibility poses risks to future system operations and aggregator entry.

7. Distributed flexibility at scale will require transparent and low friction processes to share accurate and credible information while ensuring customer consent is captured, and any customer data meets all regulated privacy requirements. The following information will be needed to drive efficient decision making:

    a) What DER exists, where it exists and its functional capabilities. This information would enable aggregators to recruit capable DER and can support compliance monitoring activities where standards are regulated. This information can also be used by DSOs to estimate constraints and hosting capacity more accurately. Mandatory DER asset registration would enable visibility of asset capability and location.

    b) Visibility of devices and device characteristics to enable compliance monitoring with standards (e.g., where inverter standards are regulated). Such information will be needed by both DSOs and the SO. For example, Australian Energy Market Operator (AEMO) uses AS 4777.2 compliance data to deem how many inverters are compliant with Voltage Disturbance Ride-through (VDRT) requirements, which is used to set the Contingency Reserve Raise (Instantaneous Reserve) requirement for the National Electricity Market (NEM) on the east coast and the Wholesale Electricity Market (WEM) on the west coast[1].

    c) Trading arrangements between DER owners and aggregators or other third parties to provide services not captured by the wholesale or network flexibility services markets. As penetration of DER increases, retailers/aggregators may recruit DER owners to provide 'off-market' services (e.g., to shift consumption from higher to lower priced periods to reduce exposure to spot prices). Individual arrangements like this will not necessarily be visible to the power System Operator or DSOs. Lack of visibility of 'off-market' trading arrangements may compromise the accuracy of the System Operator and DSOs' operational planning and forecasting activities.

8. The regulatory and business to business (B2B) infrastructure to collect, maintain and disseminate DER data does not currently exist in New Zealand.

Digital solutions for DER data access in New Zealand

9. While 're-purposing' the meter Registry to provide a digital solution for DER data access might seem a low-cost solution prima facie, it is not an optimal solution. The Registry has functional limitations which would prevent the full advantage of technology developments and could give rise to unintended consequences if there is too much transparency, at the expense of consumer consent, privacy, and incentives to invest.

10. Some challenges we have identified in repurposing the Registry are as follows:

    a) *Current registry processes provide unreliable DER data and cannot scale*. While the Registry currently provides some visibility of DER (namely distributed generation resources connecting to ICPs), the process is inefficient and subject to material inaccuracies. This is because accuracy of information provided depends on installers who have no incentive to comply and use manual processes to input data which is then passed to EDBs to populate the Registry. Currently, very limited information about distributed generation is required by the Registry. In the future, the volume and complexity of data needed will increase as the uptake of DER accelerates and more devices (e.g. EV chargers, heat-pumps, and other demand-

[1] High levels of VDRT non-compliance may require AEMO to procure additional Contingency Reserves to cover nuisance tripping of inverters in response to voltage disturbances.

flexible devices) need to be made visible to multiple parties. The existing processes and systems will no longer be fit for purpose to meet varying information requirements for multiple parties with varying permissions. Particularly, collection of accurate information will require minimisation of manual input and the ability to validate data. As indicated above, distributed generation data in the Registry is subject to material error due, in part, to the manual processes used by installers. Moving forward, it will be important to ensure that data collection activities by installers are automated with the source of the data being the OEM back-office as opposed to manual entries.

b) *The Registry cannot be a control platform*. While the Registry will provide some visibility of DER, we understand that it will not function as a platform which enables the transparent remote control of DER assets. The development of secure 'controllable DER' technology has created a significant opportunity to enhance the efficient operation of the New Zealand energy sector. In particular, controllable DER enables improved coordination and utilisation of DER across networks, reducing costs across the system. The ability to transparently and securely control DER will assist distributors to deliver peak demand reduction by balancing generation across the network. As the uptake of DER gain's momentum, distributors will be able to take advantage of these tools to facilitate the aggregation and coordination of DER devices, to manage congestion and reduce the need for investment and augmentation of the network.

c) *The Registry is not built for permissioned data access within an ICP*. Without having greater functionality than what the existing Registry system provides, there is a risk that excessive transparency could have unintended and adverse effect on competition and innovation. Putting aside privacy concerns, certain participants having open access to detailed DER information at ICPs could discourage innovation. For example, flexibility traders may be reluctant to invest in new technologies if commercially sensitive data about their services is available to their competitors (e.g. information on which customers are utilising those services could be used by other flexibility traders to promote competing products).

11. Intellihub recommends leveraging existing platform technologies to develop an automated data exchange that not only facilitates the registration and visibility of DER assets, but also manages consumer consent issues and enables remote control of DER to facilitate planning and operational requirements. In particular, there are existing specialist products that already offer key functionality, and which could be utilised to provide a more comprehensive solution for the New Zealand electricity industry.

12. For example, GreenSync's[2] Decentralised Energy Exchange (known as the 'deX') creates a digital record of consumer consents to the transfer of smart meter data, register and enrol multiple DER devices at each ICP, and provide detailed visibility and control over distributed energy resources, at scale. This integrated system enables networks to support more renewables faster, without compromising on important considerations such as the protection of sensitive data. It also simplifies the complexity of relationships in the electricity industry (commonly referred to as a 'many-to-many' problem) by facilitating transactions and communication between distributors, generators, retailers, flexibility traders and consumers, as well as DER devices.

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[2] GreenSync is a subsidiary of CrescoNet, the technology development arm of the Intellihub Group

Mandatory registration of DER resources utilising an appropriate digital solution will enable greater visibility.

13. The UK has established a feasibility study between a consortium of key industry partners, including the Data Communications Company (or 'DCC', the centralised UK entity that oversees electricity sector data transfers), to develop a solution for an automated, standardised, secure data exchange process for registering small scale energy assets. Phase 2 is supporting the "LCT Connect" project, which is developing a solution to automatically register small-scale energy assets in an accompanying Central Asset Register.

14. The LCT Connect project leverages GreenSync's proven deX technology and experience in Australia, and will innovate on the existing deX software platform, tailoring and extending its capability to reflect the United Kingdom context. The core project team, led by GreenSync and guided by Energy Systems Catapult's regulatory advice, is supported by a broad and diverse range of companies from across the energy sector. This includes LCT manufacturers, installers, distribution network operators, energy retailers and flexibility providers as well as cybersecurity specialists and innovators. Collectively, the team will develop and test in a real-world environment an innovative automatic asset registration and central asset register solution that enables LCTs to be digitally and securely registered and visible to all market participants with ease and accuracy.

15. The project will also identify and assess sustainable commercial and operating models that will best support implementation in the United Kingdom energy system; and will seek input and insights from other stakeholders such as end -consumers, local authorities, and government institutions to explore the admissibility, regulation and policies, data privacy and other relevant requirements for building and managing a nationwide automatic asset registration and central asset register solution.

16. Intellihub supports a similar feasibility study in New Zealand to investigate:

    a) Automatic device/asset registration. Intellihub also recommends mandatory DER asset registration to ensure the location and capability of controllable DER assets is visible to aggregators, with appropriate permission from consumers/asset owners.

    b) Collection and secure exchange of DER data across multiple parties with varying permissions.

Clarity needed on high level market structure, and roles and responsibilities.

17. Overseas experience suggests integrating increasing quantities of DER into local networks while harnessing the flexibility of these devices at scale will not occur organically and requires policy and regulatory intervention. Policy research in Australia indicates that harnessing distributed flexibility at scale requires the following,

    a) A deep pool of controllable and capable DER in the right locations. The AS4777.2 inverter standard is mandated in all Australian states. This standard enables DER to be controllable.

    b) Distribution System Operators (DSO) must have the capability and digital infrastructure to integrate increasing quantities of DER to increasing hosting capacity. Who performs the DSO rule will depend on the market model (see paragraph 22.

c) Electricity Distribution Business (EDB) or distributors must have the incentives, capability, and digital infrastructure to utilise the flexibility from DER as a standard operational response in managing their networks.

d) Visibility of the capability and location of DER and efficient methods of sharing that information with parties with varying requirements.

e) Low friction processes for aggregators to access consumer meter data.

f) Low friction processes for procurement of flexibility services to support both network and power system operations. Standardisation of product definitions and terms and conditions will be critical.

g) Standardised protocols governing communications and data sharing between the System Operator, DSO, DNO and Retailers/aggregators. For example, the Australian implementation of the IEEE2030.5 protocol (CSIP-AUS) will be used to govern DOE communications between DNSPs and retailers in Australia.

18. Our submission touches on each of the points above in more detail. However, it is important to note that in the absence of any policy and regulatory guidance from the Government, some distributors have commenced their own planning to develop DSO capability. For example, the Northern Energy Group (NEG) has recently published its evolution plan to develop DSO capability which sets out a phased approach to enabling greater network visibility, implementing Dynamic Operating Envelopes (DOE), procuring network flexibility services, and facilitating DER orchestration in the wholesale electricity market. The NEG DSO model envisages DER orchestration or control as a DSO specific capability. On the other hand, markets such as the United Kingdom and Australia have created market structures where only aggregators can control DER. This has been driven by a concern that allowing a monopsony procurer of network flexibility services to also become a monopoly provider of those services may stifle innovation and ultimately result in poorer outcomes for consumer.

19. Distributors progressing DSO strategies in silos may result in inconsistent practices and models across different network franchise areas. A fragmented approach may result in inconsistencies with respect to:

a) DER asset data management which may impede or add cost to aggregators wanting visibility of DER assets. A centralised approach to collecting and disseminating DER asset data is preferable. A clear vision on the approach to DER assets data sharing will ensure technology investments are appropriately directed. For avoidance of doubt, a centralised register for DER assets does not necessarily require centralised control. Intellihub recommends a centralised register for DER assets with decentralised control to enable data dissemination to multiple parties with varying permissions and requirements.

b) Procurement practices with product definitions, asset qualification and technical requirements varying by network. This will add transaction costs for aggregators. Clear guidance from the Government on the approach to procurement is needed. This includes but is not limited to:

i. Roles and responsibilities of the DSO, Distribution Network Operator (DNO, i.e., the role currently performed by EDBs), Distribution Market Operator (DMO), SO and aggregators as it pertains to procurement and control/orchestration of network and wholesale electricity market flexibility services.

ii. Flexibility service definitions

iii. Procurement processes.

c) Allocating available hosting capacity to consumers and aggregators via Dynamic Operating Envelopes. This may result in some consumers being worse by virtue of where they live.

d) Data and information sharing between the SO, DSOs, DNOs, DMOs and aggregators.

20. The OpEn Energy Networks Project developed by Energy Networks Australia and AEMO has developed three different distribution market frameworks to test options for integrating DER into wholesale markets and response of DER to distribution constraints.

21. The OpEN Energy Networks position paper uses the following definitions for DSOs and DMOs:

a) A Distribution System Operator (DSO), with visibility of power flows and DER on the network, will be required to manage the network within the technical constraints of the assets (otherwise known as “operating envelopes”), identify when network issues emerge and act to manage these issues. To do this, the DSO will need to see the flow of power across the distribution network in real-time. Where an issue on the network emerges, the DSO may obtain services to support the operation of the network from DER directly, or via aggregators, retailers and third parties and such services would be compensated. The DSO provides inputs to the DMO to ensure DER participation in markets does not compromise system security at the distribution level.

b) The Distribution Marker Operator (DMO) manages the distribution market, optimising the provision of services and energy from DER within operating envelopes provided by the DSO. The DMO also provides information to AEMO to support the participation of DER in the wholesale market and ancillary service provision. At the distribution level, a DMO administers, operates, and manages platforms for aggregators, the DSO and AEMO to access flexibility services. The DMO might also administer, operate, and manage platforms to support local market trading for energy and capacity.

22. The same paper proposes four potential frameworks for integrating DER:

Framework	Description	Roles and responsibilities
Single integrated platform	There is a single central market comprised of wholesale and ancillary services that is operated via a central market platform. Market participants, including DER via aggregators/retailers, submit bids and offers for system services to the central market platform which in turn makes them available to the power system and wholesale market operator for whole system optimisation	The power system and wholesale market operator act’s as DMO and DSO. EDBs would maintain network assets
Two-step tiered platform	There is a single central market comprised of wholesale and ancillary services markets that is operated by the power system and wholesale market operator. There is a local market(s) for regional and national system service provision from DER that is operated via a local market platform.	The DSO role is performed by EDBs who take full responsibility for optimisation of DER dispatch within their own networks
Independent DSO	Same as the Two-step tiered platform except the DSO role is performed by a third	Both DMO and DSO roles are performed by a third party.

Framework	Description	Roles and responsibilities
	party – this would require either an independent DSO (IDSO) for each region or a national IDSO. This is the most complex of all models as it will require establishing the IDSO role(s) and requires the IDSO to establish extensive capability for power system and network operations.	EDBs would continue to maintain network assets.
Hybrid model **(adopted in Australia)**	There is a two-sided market platform, comprised of wholesale and ancillary services that is organised and operated by the power system and wholesale market operator. Market participants, including DER via aggregators/retailers, submit bids and offers for system services to the market platform which in turn makes them available to the power system and wholesale market operator for whole system optimisation.	The DMO role is performed by the power system and wholesale market operator; however, it can also be performed by a third party. The DSO role is performed by the EDB.

23. The cost benefit analysis used to evaluate the four models concluded:

"*The two-step tiered, and single integrated platform frameworks represent contrasting end points of market design. Consequently, a logical conclusion is that a hybrid is a pragmatic solution that might represent the best of both frameworks, while minimising the weaknesses. However, a hybrid framework would benefit from more detailed definition to ensure that roles and responsibilities are clear.*"

24. Internationally, variants of the hybrid model seems to be the preferred approach:

a) Australia has adopted the hybrid model in both its pilots (Project EDGE and Project Symphony).

i. DSO roles are performed by the relevant DNSP and are responsible for procuring and scheduling network flexibility services.

ii. Aggregators or flexibility traders provide flexibility services and maintain control of devices.

iii. AEMO is responsible for procuring, scheduling and dispatching wholesale energy market services and is also responsible for dispatching network flexibility services (based on instructions from DSOs).

b) The United Kingdom model is also a hybrid approach:

i. Distribution Network Operators (DNO) act as DSOs for their local networks. They are responsible for procuring and scheduling network flexibility services. However, there is a centralised procurement platform so that all DNOs procure standardised services irrespective of their location. Pre-qualification and qualification activities are also centralised via the platform.

ii. Aggregators or flexibility traders provide flexibility services and maintain control of devices.

c) The Northern Energy Group (NEG) DSO model also contemplates a hybrid approach with some key differences to the Australian and UK models:

i. EDBs would act as DSOs for their local networks per the Australian and UK approach.

ii. Unlike the Australian and UK approach, EDBs can procure network flexibility services directly themselves or through flexibility traders.

25. Intellihub notes that developing policy positions governing the high-level roles and responsibilities and market framework that will apply in New Zealand will ensure nationally consistent approaches and mitigate investment risk. Areas that would benefit from further clarity from the Authority include the following:

a) Who will perform the DSO role? For example, will it be performed by a third party (e.g. a new Market Operations Service Provider), by individual EDBs, or regional DSOs representing EDBs within that region?

b) Whether the DSO will be allowed to directly contract with DER owners and control DER themselves or whether they must go through aggregators who retain responsibility for control and aggregation.

c) Whether there will be a single market for distribution network flexibility services. As indicated above, a centralised approach to procurement, scheduling and dispatch will reduce aggregator transaction costs and facilitate greater entry.

d) Who will perform the DMO role for any distribution network flexibility services market. In the New Zealand context, this could be performed by a third party or individual EDBs.

e) The high-level framework or model that will be used to integrate DER into existing and new markets.

26. If the Authority opts for a laissez-faire approach, then it would be useful for the Authority to explicitly communicate this to industry so that investors have assurance that their investments will not be rendered obsolete due to policy decisions.

Q5. Looking at overseas jurisdictions, what developments in future system operation are relevant and useful for New Zealand?

'Learning by doing' will enable starting simple and extending complexity as knowledge and technology evolves.

27. Despite the rapid uptake of DER by consumers in recent years, the integration of DER into new and existing markets is still a nascent issue. This is because, DER devices are decentralised with uncontrollable load behind the meter, and cannot meet the communications, connectivity and measurement requirements placed on traditional grid-connected resources.

28. DER orchestration at scale will require testing the capability of DER to identify:

a) Coordination requirements between parties (SO, DSO, SMO, and aggregator)

b) Minimum device standards, communication protocols, and changes to existing service definitions, dispatch, and settlement arrangements.

29. To this end, Australia is running world-leading pilots on both coasts (Project EDGE on the East Coast and Project Symphony on the West Coast) to identify next steps for integrating DER and enabling orchestration at scale. The purpose of these pilots is:

a) To demonstrate the end-to-end technical capability of DER, and its ability to respond in a coordinated manner under central dispatch instruction.

b) Test the incorporation of aggregated DER into energy markets, including market dispatch and settlement arrangements from the market operator to individual customer.

30. Both trials above have government funding from the Australian Renewable Energy Agency (ARENA).

31. The lesson to take from the Australian experience is that ongoing market and technology trials are **essential** to understanding the capability of DER so that market and technology integration issues can be resolved.

Integrating DER into power systems and existing and new markets will require enabling research.

32. Achieving DER orchestration at scale requires more than regulatory intervention. Information and data gathering activities, specification of technical requirements (such as standards and protocols) and activities to inform policy making are also required.

33. Both Australian and United Kingdom governments are centrally coordinating research to inform DER integration policy.

34. ARENA has established the ARENA has established the Distributed Energy Integration Program (DEIP) that researches and publishes papers to guide policy and regulatory action.

35. In Western Australia, the State Government released a DER Roadmap in 2019, which it continues to update. The DER Roadmap Distributed Energy Resources (DER) Roadmap which set out high level requirements to ensure:

    a) Growing levels of DER can be integrated into the South-West Interconnected System (SWIS), particularly within distribution networks, safely and securely.

    b) Households and businesses can continue to benefit from distributed generation and other distributed technologies such as Electric Vehicles (EV).

36. Particularly, the DER Roadmap includes a specific action to develop a plan for the establishment of a Distribution System Operator (DSO) and Distribution Market Operator (DMO) in the South-West Interconnected System (SWIS), including the identification of roles, functions, costs, and practical operations.

37. The Western Australian State Government also established the DER Coordination Committee to implement and steer the roadmap.

38. Likewise, the United Kingdom regulator (OFGEM) has been very active in investigating changes needed to facilitate distributed flexibility as scale.

    a) In 2021, OFGEM published a Smart Systems and Flexibility Plan in 2021 that sets out a vision, analysis and policy actions to drive a net zero energy system. OFGEM also established the Smart Systems Forum to implement and steer the plan.

    b) In 2023, OFGEM published a Call for Input to the Future of Distributed Flexibility to test the role of a common digital infrastructure to facilitate flexibility market liquidity.

    c) As noted earlier (see paragraph 13), the UK has also established a feasibility study to develop a solution for an automated, standardised, secure data exchange process for registering small scale energy assets.

39. The key lessons to take from Australia and the United Kingdom is that centralised coordination of policy development activities including high level action plans are useful to identify policy and regulatory gaps **and** areas that need further investigation and research. High level action plans/roadmaps can also provide certainty to industry by providing guidance on likely future market structures.

40. Intellihub notes that there may be benefit in the Authority adopting a policy lead role in DER integration by centrally coordinating policy development activities. This will reduce the risk that research and development activities are conducted in a disjointed and piecemeal fashion.

Regulated device standards on their own may not ensure compliant devices – DER registration is key.

41. Australia and California have both implemented technical standards for inverter-based resources connecting to their low voltage networks.

42. Analysis by AEMO indicates that there are material levels of non-compliance with inverter standards across the east and west coasts. Levels of non-compliance are related to gaps in the existing regulatory framework and existing connection processes.

43. Work is underway in Australia and California reviewing their connection processes relating to DER. Additionally:

    a) South Australia has implemented a 'three strikes policy' which enables the State Government to revoke an installer's license if the installer breaches connection requirements three times. The policy has been implemented using a SmartApply and SmartInstall app to facilitate efficient information capture and notification.

    b) The Clean Energy Council in Australia administers the New Energy Tech Consumer Code (NETCC) which sets out a code of standards to protect customers buying new technology. Installers that are certified under the scheme must:

        i. Ensure all connections are completed to the relevant regulated standards.

        ii. Provide customers with appropriate informational resources (e.g., how to maintain compliance with DER connection standards, explanation of the connection process, etc.).

44. Australia has also implemented DER Registers for both coasts and have noted that the quality of information being collected is not fit for purpose. Again, this is because existing connection processes are not fit for purpose.

45. The lesson to take from Australia and California is that there has to be a rigorous mechanism to capture information about DER installations at time of connection.

46. South Australia has opted to regulate installers. New Zealand could potentially follow a similar tack. However, ensuring that installers have access to technology that enables them to capture key information at time of installation will still be critical. For this reason, Intellihub reiterates the importance of mandatory asset registration coupled with a digital solution that enables automated capture of key information that can be used to determine compliance (see paragraphs 11 to 16). Having an effective automated data exchange system may well prevent the need for regulating installers.

'Flexibility first' approach is essential.

47. The United Kingdom has adopted a 'flexibility first' approach that requires networks to explicitly commit to a flexibility first approach to network operations and asset management.

48. To facilitate this, OFGEM has implement sweeping changes to its network regulations including:

a) The use of innovation funding to help networks cover loss leading investments.

b) Switching from a building blocks approach to a Totex approach to remove CAPEX bias. The Totex Incentive Mechanism provides networks with incentive to deliver the required outputs efficiently while enabling customers to share the benefits of outperformance. The Totex combines a portion of the distributor's CAPEX and OPEX into one regulatory asset that allows a rate of return on both, based on a pre-set percentage split. This diminishes the incentive for distributors to favour CAPEX investments (that earn a rate of return) over OPEX (traditionally passed through without a return).

49. The United Kingdom has also implemented a centralised approach to procurement including standardised product definitions for all distribution networks. Network flexibility procurement activities are delegated to an independent provider. Piclo Flex is an independent marketplace that provides asset qualification services, flexibility service tendering services and information to drive increased participation in the UK flexibility market. Piclo Flex provides an interactive map that identifies the precise location that flexible assets will be required in the near future alongside information on the type of service that will be required. This provides potential service providers the detailed information needed to inform investment, i.e., location and capability requirements, and revenue potential (as services are defined (see Table 1) with standardised terms and conditions including technical requirements, performance requirements, payment structures, etc.).

Table 1: Summary of network flexibility products in the United Kingdom.

Product	Type	Payment	Description
Secure	Pre-fault constraint management	Availability payment + Utilisation payment	• Manage peak demand loading on the network and pre-emptively reduce network loading. • Declared and accepted week-ahead • Dispatch notice 15 minutes
Sustain	Scheduled constraint management		• Manage peak demand loading on the network and pre-emptively reduce network loading. Requirement windows for service provision scheduled and fixed at the point of contract. • Declared and accepted week-ahead • Dispatch notice 15 minutes
Dynamic	Post-fault constraint management		• Support the network in the event of specific fault conditions, often during summer maintenance work. • Declared and accepted week-ahead • Dispatch notice 15 minutes
Restore	Post-fault network restoration	Utilisation payment only	• Help with restoration following rare fault conditions to reduce the stress on the network. • Declared and accepted week-ahead • Dispatch notice 15 minutes

Q6. Do you consider existing power system obligations are compatible with the uptake of DER and IBR-based generation? Please provide reasons for your answer.

50. Our response to question 6 focuses on the following topics:

    a) The importance of regulated device standards in ensuring aggregators and DSOs are able to access controllable DER with the required functionality to provide flexibility services (paragraphs 51 to 57).

    b) The role Dynamic Operating Envelopes will play with respect to optimising consumer access to distribution networks is discussed in paragraphs 58 to 68.

    c) Technological and market integration issues relating are covered in paragraphs 69 to 80.

Identifying and regulating minimum device standards will ensure DER investment is directed toward 'smart' devices.

51. Distributed flexibility at scale will require devices that have the required functionality to meet various use cases while not having unintended adverse outcomes on network and power system operations.

52. Device standards are technical specifications that define the functionality of the device.

    a. Technical specifications may define minimum functionality required to ensure network and power system operators can operate their systems securely, reliably, and safely.

        i. For example, the AS 4777.2 inverter standard enables secure reliable integration of distributed solar and battery storage through autonomous Volt-Watt and Volt-Var responses to network conditions and Voltage Disturbance Ride-through (VDRT) capability. This standard is mandatory in Australia.

        ii. Dynamic Operating Envelopes (DOEs) (see also paragraphs 58 to 68) will be a key tool required by EDBs to operate their network secure and reliably and at least cost. However, for devices to be subject to DOEs, they must be controllable and have specific communication functionality. See paragraphs 58 to 68 for a more detailed discussion on DOEs/

    b. Technical specifications may also define functionality required to provide flexibility services. For example:

        i. Devices providing network flexibility services to EDBs must have communications functionality to enable aggregators to send instructions to devices.

        ii. Devices providing frequency response services to Transpower will require autonomous functionality that can detect system frequency and respond autonomously.

        iii. Devices providing market services will require measurement functionality to enable service verification and settlement (see also paragraphs 69 to 80).

c. Communications functionality is critical as it enables aggregators to communicate instructions to devices but also obtain both static and dynamic device data.

   i. Communications functionality will necessarily introduce cyber-security risks. Device standards will need to cover such risks.

   ii. Proprietary standards will be problematic as it will limit the parties/systems that devices can communicate with ultimately stifling innovation and competition. Interoperability of devices is therefore a critical requirement.

d. In their 2022 Green Paper, EECA proposed core functionality for residential EV chargers that would enable EV chargers to be deployed to provide flexibility services and enable better visibility . This included proposals for:

   i. 'Smart functionality' to mitigate the impacts of en-masse charging during peak periods and to enable vehicle to grid (V2G) capability.

   ii. Power quality and control requirements

   iii. Communications requirements covering cybersecurity and interoperability.

   iv. Functionality to enable monitoring the use and location of chargers and of electricity consumption.

53. EECA has recently published a list of 'approved chargers' that meet two-way communication requirements and EECA's technical specifications.

54. There are currently no regulated standards pertaining regulating inverter connected systems or EV charging equipment to distribution networks in New Zealand. The lack of regulation means there is a risk of uncontrollable devices proliferating that:

   a. Do not meet minimum requirements to ensure safe, secure, and reliable operations of networks and the power system. While the risk is currently immaterial, as the uptake of technologies such as rooftop solar, battery storage and EV chargers increases, the risk will become more significant.

   b. Do not possess functional requirements to provide flexibility services including lack of interoperability.

   c. Pose cybersecurity risks.

55. Particularly, without regulation, there is a credible risk that consumer investment in DER will be misdirected towards devices that are not functionally capable of having their flexibility harnessed for the benefit of consumers in New Zealand as a whole. Worse still, there is a credible risk that the combination of high uptake of DER and lack of regulation can lead to serious network and power system operations risks.

   a. For example, in Australia, the combination of favourable subsidies[3] and lack of regulated standards has resulted in unintended consequences of a legacy fleet of rooftop solar whose export cannot be controlled. This is causing security issues both for network operators and AEMO as power system operator. State governments in Australia have since mandated the AS 4777.2 inverter standard. The standard in combination with the adoption of the CSIP-AUS communication protocol will enable the deployment of DOEs with all Australian states having imminent plans for DOE implementation.

   b. Additionally, the South Australian and Western Australian Governments have implemented solar curtailment schemes that enables the remote curtailment of

[3] See paragraph **Error! Reference source not found.** onward.

rooftop solar systems if 'minimum demand' conditions create a material power system security risk. This is an 'emergency' measure and undesirable from customer utility maximisation and emissions minimisation perspective. Instead, regulating devices to ensure controllability coupled with measures to enable distributed flexibility to occur at scale will prevent the need for such draconian measures.

56. Intellihub therefore recommends a review of DER devices with a view to determining which devices should have regulated standards and what those standards should be. In the first instance, the regulation of standards for inverter connected systems to distribution networks and EV chargers should regulated should be prioritized. This should consider the type of functionality such devices will require to provide both flexibility services and respond to DOEs.

57. Intellihub further reiterates that market trials testing the capability of DER to provide various power system and network flexibility use cases can contribute greatly to the specification of minimum device standards.

Dynamic Operating Envelopes will be critical to efficient network operations.

58. Dynamic Operating Envelopes (DOEs) are a principled method of allocating access to network capacity; they define the limits that an electricity customer can import and export to the electricity grid, with these limits varying by time, location, and network conditions. Dynamic limits enable network hosting capacity to be maximised.

59. It is important to note that DOEs and network flexibility services perform different functions and can be implemented together or separately: one is not a pre-requisite for another:

    a) DOEs will enable consumers to have greater access to the network than they otherwise would. For example:

        i. The absence of DOEs may result in distributors implementing size restrictions for consumers wanting to install solar panels or battery storage of EV chargers. This is a crude approach to limit the amount of export or import into the local network.

        ii. The use of DOEs would enable consumers to connect larger DER to their local network. Distributors would manage network congestion not by restricting the size of the connection, but by varying the quantity the DER can import and export depending on network conditions. Hence, during periods of low congestion, the consumer can export and import as much as they like. However, during periods of high congestion export and imports are reduced to prevent network constraints being violated.

    b) Network flexibility services, on the other hand, enable DER to support power and network operations and thereby lower energy costs for consumers as they are a cheaper alternative to network augmentation.

    c) While they are separate concepts, the implementation of DOEs may increase the pool of DER available to provide flexibility services as the former enables larger quantities of DER to be connected to the network.

Export DOEs are critical to increasing network hosting capacity.

60. To incentivise investment in DER by consumers and aggregators, distributors must have the ability to accommodate large quantities of DER on their networks while still operating their networks in a secure, reliable, and least cost manner.

61. Export DOEs (or flexible exports) will enable distributors to operate their networks securely and reliably while maximising hosting capacity – thereby enabling more DER to connect and consequently lowering energy costs emissions. South Australia is implementing flexible exports in 2024, with all other Australian state following suit in the next two to three years. To date, research has been almost exclusively focussed on export DOEs in Australia by necessity.

62. Increasing network hosting capacity will increase the pool of DER that aggregators can access to provide both wholesale energy market and network flexibility services.

63. Intellihub supports investigating the use of export DOEs to increase hosting capacity in New Zealand.

National export capacity allocation principles will ensure consistent application of DOEs.

64. The DEIP DOE Working Group Outcomes Report (2022) published the following draft principles that should govern the allocation of network hosting capacity to consumers:

    a) Distributors are responsible for setting DOE limits, with the calculation methodology used to determine the limits being transparent and subject to stakeholder consultation.

    b) Allocation should seek to maximise the use of network export hosting capacity while balancing customer expectations regarding transparency, cost, and fairness.

    c) Capacity allocation can initially be based on net exports and measured at the customer's point of connection to the network.

    d) Capacity should be allocated to small customers irrespective of the size or type of customer technology (e.g. solar or batteries) at the customer premises.

    e) In the near term, DOEs should be offered on an opt-in basis with capacity reserved only to make good on legacy static limit connection agreements, with efficient incentives provided for customers to transition to DOEs over time.

65. The paper noted that further work was needed to understand how these principles would be applied in practice.

66. Specification of high-level capacity allocation principles that DSOs must comply with in New Zealand will ensure consistent allocation across all distributor networks so that consumers are not disadvantaged by virtue of where they live.

Import DOEs will become increasingly important as demand patterns change due to electrification.

67. Import DOEs (to manage consumption), in combination with network flexibility services, will become important as electrification of transport ramps up. Import DOEs can be used by distributors to manage congestion and defer/avoid augmentation. Implementation of import DOEs will require capability and technology to estimate and control the non-discretionary component of consumer load to ensure consumer utility is not adversely affected.

68. While most of the international focus to date has been on implementing export DOEs, Intellihub notes that the implementation of import DOEs needs to be considered as well.

Significant work is needed to resolve technical and market integration issues to enable DER to participate across the full spectrum of flexibility services.

69. Integrating DER into the spot market will require addressing certain technical issues due to the unique and decentralised nature of consumer owned DER.

Technology integration issues

70. The flexibility inherent in DER devices makes them a good candidate for the provision of instantaneous reserves. However, there are challenges associated with technology integration that must be resolved to facilitate the provision of instantaneous reserves from aggregated DER.

71. Instantaneous reserves performance is measured using high speed data recorders. Response is autonomous; the generator control system monitors local frequency and responds when the frequency goes outside a defined range. High speed recorders measure response at a highly granular sub-second level.

72. It is unlikely that aggregated DER can be measured to this level of granularity. The Australian Energy Market Operator's (AEMO) Market Service Ancillary Services Specification (MASS) trials in the NEM used one second granularity to measure contingency reserve response. Measurement at this granularity can lead to over-estimation of service delivery (i.e. the measurement exceeds actual service delivery). Additionally, unexpected responses due to oscillatory behaviour as a result of voltage or frequency disturbance cannot be detected at coarser measurement granularity.

73. To enable aggregated DER to provide instantaneous reserves in the New Zealand electricity market, approaches to measuring performance will need to be investigated. It will be important to trade-off the benefits of highly granular measurements against the costs of mandating such requirements.

74. Likewise, dispatch compliance (for energy) of generators and dispatch capable load stations is currently monitored via SCADA. SCADA monitoring is inappropriate for DER aggregations. Instead, AMI data could potentially be used for dispatch compliance monitoring. However, this could potentially require enormous quantities of data to be transported through communication networks to a MEP's head-end. See also paragraphs 86 to 100 for a discussion on the role of AMI in enabling distributed flexibility.

75. To ensure the appropriate technology infrastructure investments occur to enable energy and ancillary services provision by DER, technology providers need transparency on what the technical requirements will be for DER providing energy and ancillary services.

76. DER will usually be installed as a site component rather than having a dedicated Installation Control Point (ICP). Similarly, demand side flexibility may be associated with only some elements at ICP. This means that the location at which a service should be measured may be different than the network connection point for the site. Many DERs come with a dedicated built-in measurement device, and it will be more efficient to use data from these devices rather than requiring additional meter equipment within an ICP. The current Electricity Industry Participation Code does not allow this[4].

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[4] Note, the recent AEMC Draft Determination on Unlocking CER benefits through flexibility trading recommends the use of secondary settlement points (without requiring a new network

77. Market trials will be an essential tool to develop solutions for the issues identified above. Lessons can be leveraged from Ara Ake's Multiple Trading Relationships trials, as well as Australian Project EDGE and Project Symphony trials.

Market integration issues

78. Transpower (as System Operator) conducts Real Time Dispatch by dispatching the market every five minutes. Dispatch instructions are sent to generators and demand-capable load stations just prior to the start of a five-minute dispatch interval. Meeting such timeframes is not an issue for generators or demand-side participants in the industrial sector who will have fit for purpose control systems. However, meeting five-minute dispatch targets may be challenging for aggregated DER. This is because the communications and dispatching infrastructure for DER aggregations will be completely different to traditional control systems. Once an aggregator receives a dispatch instruction for its Virtual Power Plant (VPP), it needs to optimise that instruction across its VPP portfolio before communicating the instructions to the devices that make up the VPP. There may be latency issues that prevent a VPP from being able to meet five-minute dispatch instruction. As such, lowering barriers should consider alternative dispatch models that accommodate latency issues. For example, the Project Symphony pilot in Western Australia trialled a model whereby DER was dispatched off the pre-dispatch schedule instead of the real-time dispatch schedule.

79. Value stacking is important for aggregator investment to be economically viable. This will mean that DER aggregations may provide energy and ancillary services to the Power System Operator while also providing network flexibility services to EDBs. This will require coordination between the Power System Operator, aggregator and EDBs who will be operating as Distribution System Operator (DSO). Robust coordination protocols will need to be developed to ensure the Power System Operator has visibility of any DER trading activity that can impact on power system operations. Standardised communication protocols governing information transfers between various parties will need to be specified[5].

80. We reiterate the importance of ongoing market trials to address market integration issues.

Q8: Do you think there are significant conflicts of interests for industry participants with concurrent roles in network ownership, network operation and network planning?

81. The regulatory framework must have the right incentive structures in place to ensure distributors:

    a) Invest in digitalisation to improve the visibility and operations of their network.

    b) Utilise network flexibility services as a standard operational response in operating their networks.

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connection) in conjunction with newly defined meter types that utilise the inbuilt measurement functional of DER devices.

[5] For example, the IEEE 2030.5 protocol has gained traction in Australia and has been applied in South Australia to govern DOE communications between aggregator/retailer and distribution companies. The protocol has additional use cases beyond communicating DOEs.

82. If the current regulatory framework incentivises capital expenditure over operational expenditure, then distributors will be incentivised to build out their network instead of spending operational funds to defer or avoid investment. OFGEM has switched from a building blocks approach to a Totex approach in regulating network company revenues in an effort to remove capital expenditure bias (see also paragraph 48).

83. Substantial investment in network digitalisation will be required to enable network flexibility services to be procured, scheduled, dispatched, and financially settled at scale. The regulatory framework must also enable distributors to make loss leading investments. An example is the RIIO framework in the United Kingdom that provides innovation funding to distributors to cover loss leading investment. Moving forward, it will be important to scrutinise the existing regulatory framework to assess whether it provides the right incentives to distributors to invest in and use flexibility.

84. Concurrent roles in network ownership, network planning and network operation can be appropriately managed as long as the network regulatory framework provides the correct incentives to network owners to:

a) Utilise flexibility services as a standard operational response.

b) Make loss leading investments or investments whose benefits are realised over a longer time frame.

85. Intellihub supports a review of network regulations in New Zealand with a view to identifying opportunities to improve flexibility incentives and enabling digitalisation and capability building investment.

Q9: Do you have any further views on whether this is a good time for the Authority to assess future system operation in New Zealand, and whether there are other challenges or opportunities that we have not covered adequately in this paper?

AMI data will play an increasingly important role in enabling distributed flexibility.

86. AMI data will be critical for aggregator business development, DSO planning activities, and scheduling, dispatch, and settlement of flexibility services.

87. Aggregators will need access to customer consumption and power quality data to create innovative aggregation products.

88. DSOs will also require this information to support network planning and operations.

New Zealand's regulatory framework is largely fit for purpose to facilitate the sharing of historical AMI data.

89. MEPs, such as Intellihub, have a commercial incentive to provide consumption data and additional non-consumption data, such as power quality data, to distributors and aggregators, to maximise the revenue streams from their infrastructure investment. For the similar reasons, Intellihub is also incentivised to ensure that its contractual arrangements with retailers do not restrict or inhibit its ability to share non-consumption data with distributors and aggregators.

90. Intellihub already works collaboratively and invests in partnerships with distributors to create additional data services that benefit and support distribution networks. [...] We consider that dialogue between distributors and MEPs should be encouraged, as

the data distributors seek for their network management purposes can be captured by smart meters already installed. Support systems and data processing will need to be tailored to suit the different requirements of distributors (in comparison to traders).

91. Likewise, aggregators are able to request AMI data from MEPs as long as consumer consent is given. In designing data services to meet the requirements of aggregators, MEPs face the practical difficulty of identifying whether or not these participants are lawfully able to access and receive consumer data. While we acknowledge that aggregators have legitimate requirements to access data (e.g. to assist in service design or customer onboarding), there should be processes in place to ensure that each flexibility trader requesting access to data has obtained prior consent from the owner of that data. Accordingly, data management systems will play a crucial role in unlocking the full value of flexibility services for New Zealand consumers. There must be clear contractual arrangements governing the disclosure of consumer data to aggregators, together with a robust process for recording and managing consumer consent to data access. As discussed above (from paragraph 9), the Registry is unlikely to be fit-for-purpose, and there are existing technology platforms that could help to better solve this problem.

92. Intellihub notes, however, that there may be potential to improve the existing regime by:

   a) […]

   b) Clarifying the privacy status of all AMI data. Detailed energy consumption data from smart meters is likely to be 'personal information' for the purposes of the Privacy Act 2020 ('Privacy Act'). For this reason, the Authority will need to be mindful to ensure that any regulation introduced to address the processing of energy consumption data is designed to comply with the Privacy Act. Clarifying whether only consumption data is considered private while power quality data is not would also make existing data sharing practices more efficient. If power quality data is not deemed private under the Privacy Act, the consumer consent issue would not be a factor when sharing such data with aggregators.

93. The Authority notes in paragraph 5.28 of its Consultation Paper, that the Ministry of Business Innovation and Employment is working to develop a Consumer Data Right (CDR) that will be rolled out in the energy sector. We caution against moving to a centralised approach to implementing a CDR for energy meter data as has been adopted in Eastern Australia with AEMO as the data coordinator. This approach is unnecessary in New Zealand and may stifle innovation. Under the current regime, MEPs are incentivised to innovate their fleet and data management systems to best meet the needs of their customers (retailers and other parties seeking AMI data). […].

Evolution of AMI fleet must be managed carefully.

94. AMI data will be essential in providing distributors both planning and operational visibility:

   a) Planning visibility is needed to forecast adverse network conditions and to plan and signal any operational or investment response, including signalling network flexibility service requirements. The latter is a critical component of ensuring a pool of providers are present when needed. Service specification and granular identification of opportunities within the planning timeframe will require visibility of the low voltage network.

   b) Operational visibility is needed to:

i. Understand the hosting capacity of the network to implement methods which optimise the allocation of available network capacity (i.e., using Dynamic Operating Envelopes (DOEs)), rather than using static limits.

ii. Support operational responses including the deployment of network flexibility services. This will require communications infrastructure to coordinate network use in real or near-real time so that DER resources can be dispatched to provide flexibility services and have their performance measured for compliance purposes.

95. Visibility requirements will depend on the use case; but in all cases there are four dimensions to consider:

a) What data is being collected and where?

b) What is the granularity at which data is to be measured?

c) How frequently is the data required (update rate)?

d) What coverage is required or what is the sampling density (e.g. is the data required from all connection points or is sampling sufficient?)

96. The Australian Energy Market Commission (AEMC) notes the following operational visibility requirements (in the context of the four dimensions above) for seven use cases in the DER Monitoring and Visibility Best Practice Guide.

Table 2: Table 1: Visibility requirements by use case.

Use Case	Data required (at NMI)	Measurement granularity	Update rate	Sampling density
Network state estimation and performance	Voltage (assumes voltage and current available at substation)	5-10 min	Real-time (could be Monthly)	>2% of premises, greater fidelity at higher density, ideally 75% of "nodes". 20% required for MV.
Fault identification	Voltage and current	1-5 min	Real-time	>2% of premises. Note millisecond likely required for broken neutral
DER hosting capacity	Voltage, Active/Reactive Power generated and consumed	5 min	Monthly	2 sites per feeder, with greater certainty/ redundancy from greater coverage
DER compliance	Voltage, Active/Reactive Power generated	5-10 min	Monthly	>20% DER, with greater accuracy and compliance at near 100% coverage
Constraint management	Capacity, Voltage, Active/Reactive Power generated and consumed	10s –5 min	Real-time	Participating DER
Constraint reporting	Capacity, Voltage, Active/Reactive Power generated and consumed	10 min	Weekly/Monthly	At least 1 customer per LV feeder, more increases accuracy
Orchestration (dispatch[6])	Capacity, Voltage, Active/Reactive Power	10s-5 min	Real-time	Participating DER. Note that full orchestration will

[6] For market settlement in the WEM (post five-minute settlement), a measurement granularity of five-minutes and an update rate of a few hours to a day would be sufficient.

Use Case	Data required (at NMI)	Measurement granularity	Update rate	Sampling density
	generated and consumed			require 1 min or better

97. Use cases will require highly granular data to be transmitted at frequent intervals to DSOs and aggregators.

a) The dispatch interval in the wholesale market is five-minutes (i.e., for the RTD schedule). This means that the provision of energy by aggregated DER will require visibility of consumption/generation data at five-minute granularity.

b) Provision of frequency control ancillary services will require measurement at an even more granular level. For example, Project EDGE in Eastern Australia has trialled using 1 minute AMI data to verify service delivery for DER providing Instantaneous Reserves[7].

98. […]

99. Market trials testing the capability of DER in providing various use cases will be instrumental in informing how services can be measured using AMI data and whether it can be supplemented with Original Equipment Manufacturer (OEM) data.

100. Over time, the AMI fleet may need to evolve to better meet the needs of aggregators and DSOs. This transition needs to be managed carefully and without over-regulating AMI data requirements. Particularly, we caution against regulating minimum data requirements for power quality and energy data. Consideration would need to be given to who bears the cost of upgrading or replacing meters to ensure that they are able to meet any minimum standards. Retailers would typically incur the cost of leased metering equipment, but in a case where the upgrade or replacement is not for the benefit of the retailer but third parties, it is unclear. […]

Summary of Intellihub recommendations

Recommendations relating to Question 4

101. Low friction data sharing mechanisms will be essential to ensure visibility of DER:

- Aggregators will need to know where to access controllable and capable DER so they can undertake investment and product development planning.
- Distributors need visibility of DER to enable better estimation of network hosting capacity and to identify the need for network flexibility services.
- The System Operator may also need visibility of DER to inform operational planning activities.

102. Fit for purpose data sharing mechanisms to enhance DER visibility will also enable compliance monitoring if device standards regulated.

Intellihub therefore recommends:

a) Mandatory registration of DER. Consideration needs to be given to the types of devices that should be subject to registration requirements. In the first instance,

[7] Instantaneous Reserves provision is verified for traditional generators using high speed recorders that can measure output at millisecond granularity. Even at 1 minute granularity, there is scope for service provision to be materially over-estimated.

solar PVs, household batteries and Electric Vehicle charging equipment should be subject to registration requirements. Overtime, further demand flexible devices such as heating and cooling systems and pool pumps may also need to be added.

b) Exploring fit for purpose digital solutions to enable automated exchange of DER information to multiple parties with varying permissions. We reiterate the importance of leveraging existing platforms instead of repurposing the Registry.

103. As indicated in our response to Question 4, there may be benefit in the Authority providing clarity around high level market structure, roles, and responsibilities (see paragraph 24). Furthermore, in our response to Question 6, we note that the United Kingdom and Australian experience indicates that centralised coordination of policy development activities including high level action plans are useful to identify policy and regulatory gaps **and** areas that need further investigation and research. High level action plans/roadmaps can also provide certainty to industry by providing guidance on likely future market structures.

104. There is currently no centralised coordination of research and development activity to inform DER integration policy in New Zealand. Research and development activities are occurring in a piecemeal fashion and are not being driven by Government the way it has been in Australia and the United Kingdom.

105. Intellihub recommends the following:

a) The Authority consider adopting a policy lead role in DER integration by centrally coordinating policy development activities and consider developing policy positions governing the high-level roles and responsibilities and market framework that will apply in New Zealand will ensure nationally consistent approaches and mitigate investment risk.

b) If the Authority opts for a laissez-faire approach, then it would be useful for the Authority to explicitly communicate this to industry so that investors have assurance that their investments will not be rendered obsolete due to policy decisions.

Recommendations relating to Question 6

106. Intellihub recommends regulating device standards to ensure aggregators can access controllable and capable DER and to mitigate the adverse impacts of proliferation of uncontrollable DER. As above, the immediate priority is regulating inverters and Electric Vehicle charging equipment. Regulations should be flexible enough to regulate additional device standards as needed over time.

107. Enabling large quantities of DER to connect to distribution networks will ensure aggregators have access to a deep pool of demand side resources in the right locations. EDBs will therefore need to be able to optimise their network hosting capacity to accommodate increasing quantities of DER connecting to their network. As such, Intellihub, recommends investigating the use of both export and import Dynamic Operating Envelopes.

108. Intellihub advocates for the use of market trials to address the various technical and market integration issues addressed in our submission. The issue of measuring service performance is particularly critical from both a system security and financial settlement perspective.

Recommendations relating to Question 8

109. Concurrent roles in network ownership, network planning and network operation can be appropriately managed as long as the network regulatory framework provides the correct incentives.

110. Intellihub therefore supports a review of network regulations in New Zealand with a view to identifying opportunities to improve flexibility incentives and enabling digitalisation and capability building investment.

Recommendations relating Question 9

111. New Zealand's regulatory framework is largely fit for purpose to facilitate the sharing of historical AMI data. However, there is opportunity to improve access to such data by making some minor changes:

    a) Regulating the rights of access to AMI data so that retailers cannot unreasonably withhold consent.

    b) Clarifying the privacy status of power quality data.

112. Intellihub also cautions against moving to a centralised approach to implementing a CDR for energy meter data as has been adopted in Eastern Australia with AEMO as the data coordinator. This approach is unnecessary in New Zealand and may stifle innovation. Under the current regime, MEPs are incentivised to innovate their fleet and data management systems to best meet the needs of their customers (retailers and other parties seeking AMI data).

113. Over time, AMI data will play an increasingly important role in near-real-time/real-time power system operations. Enhancing operational visibility of distribution networks using AMI data will require increasingly granular data to be collected and transported at frequent intervals. New Zealand's heterogenous meter fleet means that not all metering installations will be capable of measuring the required data, and over-time the fleet will need to evolve. This transition needs to be managed carefully and without over-regulating AMI data requirements. Particularly, we caution against regulating minimum data requirements for power quality and energy data.