

## CONSUMER DEMAND DISCUSSION PAPER

## SECURITY AND RELIABILITY COUNCIL

This paper provides the SRC with points for discussion on the issue of consumer demand and understanding its importance in a sustainable transition to a low emissions economy.

**Note:** This paper has been prepared for the purpose of the Security and Reliability Council. Content should not be interpreted as representing the views or policy of the Electricity Authority.

# 1 Consumer Demand

- 1.1.1 The Security and Reliability Council's (SRC) functions under the Electricity Industry Act 2010 include providing advice to the Electricity Authority (Authority) on:
  - a) the performance of the electricity system and the system operator
  - b) reliability of supply issues.
- 1.1.2 At a previous SRC meeting the Chair asked two members to provide a discussion paper on consumer demand. This followed a discussion on the importance of consumer demand, as a key component in the transition to a low emissions economy.
- 1.1.3 With the increase in distributed energy resource (DER) and intermittent renewable energy generation (solar and wind) the need to understand and appropriately incentivise consumers and manage demand is increasingly critical for network resilience.
- 1.1.4 The brief discussion paper "Why the demand side is important for security and reliability" is included as Appendix A to aid further discussion at this meeting.
- 1.1.5 The Authority is currently progressing a number of workstreams that include DER and consumer demand. Attached as Appendix B is a table listing these workstreams with a brief description of each.

## 1.2 Questions for the SRC to consider

- 1.2.1 The SRC may wish to consider the following questions.

**Q1 Does the SRC want to add any specific themes or alter its forward work programme to accommodate further work in this area? (the forward work programme is item #15 in the papers for this meeting)**

**Q4 What further information, if any, does the SRC wish to have provided to it by the secretariat?**

**Q5 What advice, if any, does the SRC wish to provide to the Authority?**

## **Appendix A      Discussion paper “Why the demand side is impotent for security and reliability”**

# **Why the Demand Side is important for Security and Reliability**

Nanette and I were asked to produce a brief outline as to why we both believed that the demand side was an important component of security and reliability.

Basic economics is all about balancing supply and demand. Traditionally NZ has had a very supply side focussed electricity system with all the emphasis being on endeavouring to ensure that there is sufficient generation to meet both our short term and long-term needs.

The energy needs of the customer are the reason we have an electricity system and we expect those needs to be met. However, customers are not just a vacuum sucking up all available electricity, they have choices as to when and how best to use the energy. In fact, it is what electricity can do rather than the kilowatt hours that is important to them eg cold beers, warm showers, industrial heat etc.

That's why the supply to produce hot water can be interrupted, provided there is still sufficient hot water; similarly for charging EV batteries provided they have sufficient charge when needed. There is a wide range of appliances and equipment that this principle can also apply to.

Large customers can establish commercial strategies to manage load in response to spot pricing or other market signals.

Ultimately we have a “reasonable endeavours” obligation to supply and this means there will be rare occasions where we are unable to meet the full demand. August 9, 2021 was one such example and the rare AUFLS is another where the customers have load shed to prevent stalling the system. The demand side contribution is not just required for emergencies, there are a number of market and pricing situations where the optimal solution could be from demand rather than just supply.

The challenge is that we have poor knowledge of the dynamic potential for the demand side to make an efficient and economic contribution to our

ongoing security and reliability. We believe that research into the demand side potential and dynamics would be very beneficial.

A simple example is controlled water heating. There are several hundred megawatts of water that is still controlled, but the availability of all or part of this load is seasonally and daily dynamic. An investigation would provide more specificity of what load was available at any given time. There are an increasing number of appliances and equipment that can be managed and are worth investigating. Increasing connectivity means that there are low barriers to entry into this market particularly as access to ripple control is no longer required.

The substitution of electricity for transport and industrial heat will require major investment in the whole electricity supply chain, particularly as each of those markets contains more energy than the current electricity system.

We believe that there is plenty of value in optimising this investment by engaging with and better understanding the demand side. Smart pricing, smart control technology and a customer centric approach that are all levers to enable this approach.

We were impressed by the gas presentations at the SRC meeting and we would hope that the EA can provide advice to the government on the value gas continues to bring to the security of the electricity system, at least in the transition. The much lower costs of gas energy storage provide an alternative to the Onslow proposal. It is interesting that in most parts of the world gas is seen as a much lower carbon fuel than oil or coal and a legitimate path to carbon neutrality. It is important for a clear and consistent path for gas going forward, which currently seems to be very compartmentalised.

Nanette Moreau  
Mike Underhill

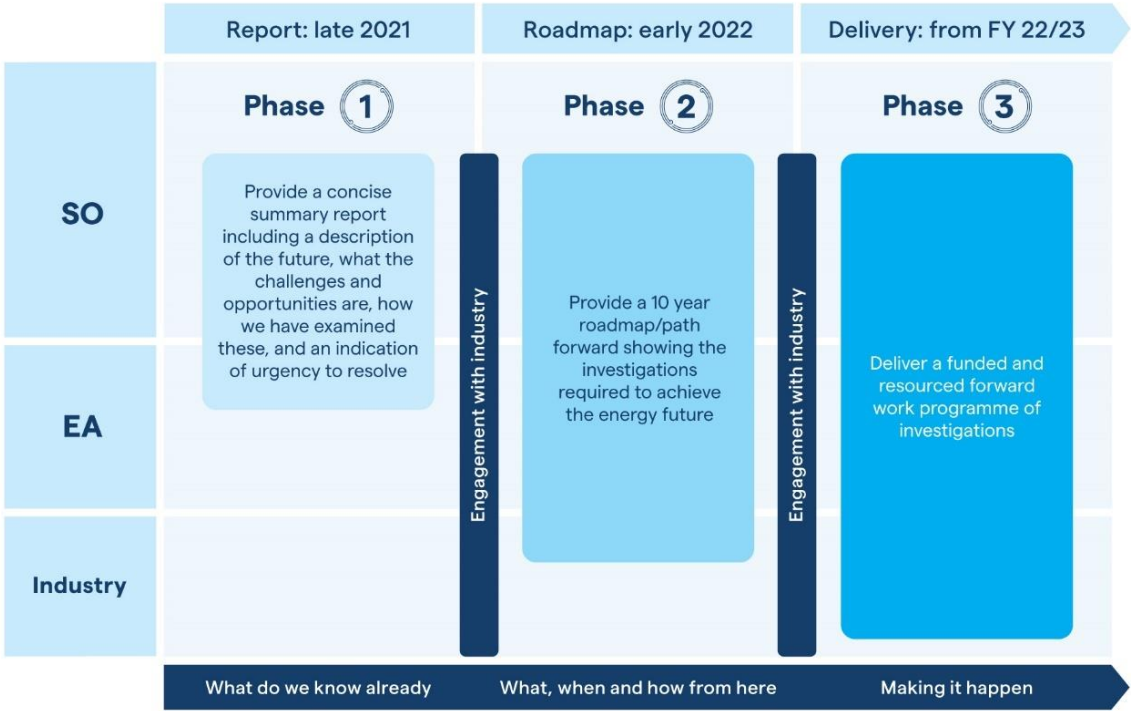
## Appendix B – The Authority’s DER and consumer demand related work programme

The table below sets out the range of consumer-facing or demand-side workstreams the Authority is progressing. This is not an exhaustive list; it is a high-level representative selection of projects to aid the SRC’s advice to the Authority on appropriate areas of focus, highlighted by the events of 9 August 2021.

Project	Brief description
Consumer Care Guidelines	<p>To guide retailers in:</p> <ul style="list-style-type: none"> <li>• adopting behaviours and processes that foster positive relationships with domestic consumers; and</li> <li>• helping domestic consumers maximise their potential to access and afford a constant electricity supply suitable for their needs; and</li> <li>• helping domestic consumers minimise harm caused by insufficient access to electricity or by payment difficulties.</li> </ul>
Real time pricing implementation	<p>Changing the way that wholesale prices are calculated to make spot prices more reflective of the conditions at the time of consumption or generation. This will give DR and DER more accurate and reliable price signals to respond to. Real time pricing will also include new ways for DR and DER to interact with the wholesale market. Dispatch notification will allow smaller aggregators to directly bid and offer their resources into the wholesale market. This service can be used to manage spot price exposure of retailers and larger consumers.</p>
Price discovery under 100% renewable energy supply	<p>In June 2021, the MDAG proposed to the Authority that it undertake a project to understand how price discovery would work in the New Zealand wholesale electricity market (including spot and hedge markets) under a 100% renewable electricity system.</p> <p>The objective of the project would be to develop sound recommendations on what changes should be made to the wholesale electricity market assuming 100% renewable supply to ensure economically efficient price signals (from short to long term) to meet the statutory objective of promoting competition in, reliable supply by, and the efficient operation of the electricity industry for the long-term benefit of consumers.</p> <p>The proposed project would consider short-, medium-, and long-term price discovery</p>

	<p>and would consider:</p> <ul style="list-style-type: none"> <li>(a) how the spot market will promote efficient operation on a daily and inter-seasonal basis when a high proportion of generation has low or zero marginal cost of operation (ie, short-run marginal cost (SRMC))</li> <li>(b) how water will be priced, without thermal plant in the market</li> <li>(c) how the wholesale market will enable efficient investment when supply is dominated by low-SRMC generation</li> <li>(d) how to ensure efficient pricing in extended periods of scarcity such as dry years.</li> </ul> <p>The proposed project would have three stages:</p> <ul style="list-style-type: none"> <li>(a) <b>Issues discovery:</b> understanding the way in which the electricity systems is likely to behave with 100% renewable supply and identifying the key issues that may need to be addressed from a market design perspective.</li> <li>(b) <b>Option identification and analysis:</b> identifying and analysing options to address the problems established in (a).</li> <li>(c) <b>Recommendations/proposal:</b> reporting with recommendations to the Authority's Board.</li> </ul> <p>The MDAG's proposal noted that the project was complementary to the New Zealand battery project and the Future Security and Resilience (FSR) project being undertaken by the Authority and the system operator.</p>
<p>Updating the regulatory settings for distribution networks</p>	<p>This programme of work is considering what issues and opportunities there are, if any, with distribution networks that need to be addressed. Ensuring that the right regulatory settings are in place to promote competition and access to the distribution network is crucial to supporting the transition to a low-emissions future at the pace required and unlocking the potential of distributed energy resources (DER) for the long-term benefit of consumers. This programme of work has five workstreams:</p> <ol style="list-style-type: none"> <li>1. <b>Information on power flows and hosting capacity:</b> What data and information distributors and flexibility traders need to make informed business decisions that will unlock the potential of distributed energy resources</li> </ol>

	<ol style="list-style-type: none"> <li>2. <b>Electricity supply standards:</b> The potential issues caused by increasing levels of DER on electricity supply standards</li> <li>3. <b>Market settings for equal access:</b> Will the market settings that apply to distribution networks enable DER to reach its full potential</li> <li>4. <b>Operating agreements:</b> Considers whether the transaction costs involved in negotiating operating agreements between distributors and flexibility traders may be higher than necessary, creating a barrier to DER uptake</li> <li>5. <b>Capability and capacity:</b> Do distributors have the capability and infrastructure to integrate increased volumes of DER as well as manage the increased load from the electrification of transport and process heat.</li> </ol>
<p>Future Security and Resilience (FSR) Programme</p>	<p>As New Zealand's power system is transformed it's important to understand the implications of the changes to the security and resilience of the system to ensure that as an electricity supply industry we can continue to coordinate and operate the power system, as well as continuing to meet consumer expectations.</p> <p>The Electricity Authority has engaged Transpower, as System Operator, to develop a shared understanding of the future opportunities and challenges for the ongoing security and resilience of New Zealand's power system, and to outline how they can be addressed in an orderly and timely way.</p> <p>The programme is being undertaken in three phases (as shown below):</p> <ul style="list-style-type: none"> <li>• Phase 1: A report which identifies the potential security and resilience opportunities and challenges for the New Zealand power system arising from expected future changes in technologies and use of the system. This is now complete and the report can be view here: <a href="#">FSR-Phase-1-draft-report-Nov-2021</a></li> <li>• Phase 2: A roadmap that outlines a pathway to understand and address these opportunities and challenges in a timely manner and an approach for monitoring the manifestation of risks. This document is the roadmap.</li> </ul> <p>Phase 3: Delivery of the programme of work outlined in the roadmap.</p>



The figure below shows the interdependency of various initiatives:



