Network Transformation Roadmap (NTR)

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13 December 2018 Christchurch

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Welcome from ENA

- Domestic arrangements
- Emergency procedures
- Introducing…
  - Jonathan Kay, independent chair of the ENA STWG
  - Dr Allan Miller, principal consultant on NTR project

Purpose of today's briefing event

- Share with our key stakeholders the final draft of the NTR
- Provide an opportunity for you to ask us questions
- Gather any critical comments or insights you wish to share with us (either during or after the event)
- Signal where our future attention and activities will lie

ENA Smart Technology Working Group (STWG)

- The purpose of the STWG is to help EDBs ensure their networks are prepared to support the needs of consumers now and into the future in the face of new technologies, and to provide a common view as to how this might be achieved.
- Comprised of EDB representatives (with Transpower SO and TO)
- Approximately half of EDBs regularly represented on the STWG – good mixture of small, medium and large EDBs

Motivation for Network Transformation Roadmap (NTR)

- All EDBs are keenly aware of the technical impacts new technologies may have upon their networks
- BUT…there is still significant uncertainty about how, to what degree and over what timescales these new technologies will become available and be adopted by consumers
- EDBs want to take sensible, pragmatic steps to adapt their networks and businesses to address these potential impacts, whilst minimising the risk of making sub-optimal decisions in the face of this uncertainty

What the roadmap will deliver

- A set of actions for EDBs to navigate changes in the way electricity distribution networks will be used - plan their networks and operations to maintain flexibility and position EDBs to meet future distribution service needs
- Support long-term planning in a period of uncertainty
- Provide stakeholders with a view of the future role of the electricity distribution network in NZ

Roadmap scope

- A set of guidelines for EDBs to consider when setting strategy and planning for the future,
  - Focused on the next 10 years,
  - Addresses new functions, activities and capabilities
  - Primarily a tool for EDBs – Boards and SMTs to consider in setting strategy
- Based on the core role of the EDB,
  - Resilient electricity distribution service
  - Safe, reliable, efficient, sustainable electricity provision
- Does not promote the commercial activities of EDBs
- Does not recommend how EDBs develop the roadmap capability (some actions collective, others individual)
- A living plan

Scenario uncertainties and megashifts

Uncertainties

- Gas price
- Carbon price
- Alternative renewable fuels
- Demand growth
- Regulation
- Generation costs
- Consumer participation technology and market
- EV uptake, autonomous EVs
- Renewable variability management

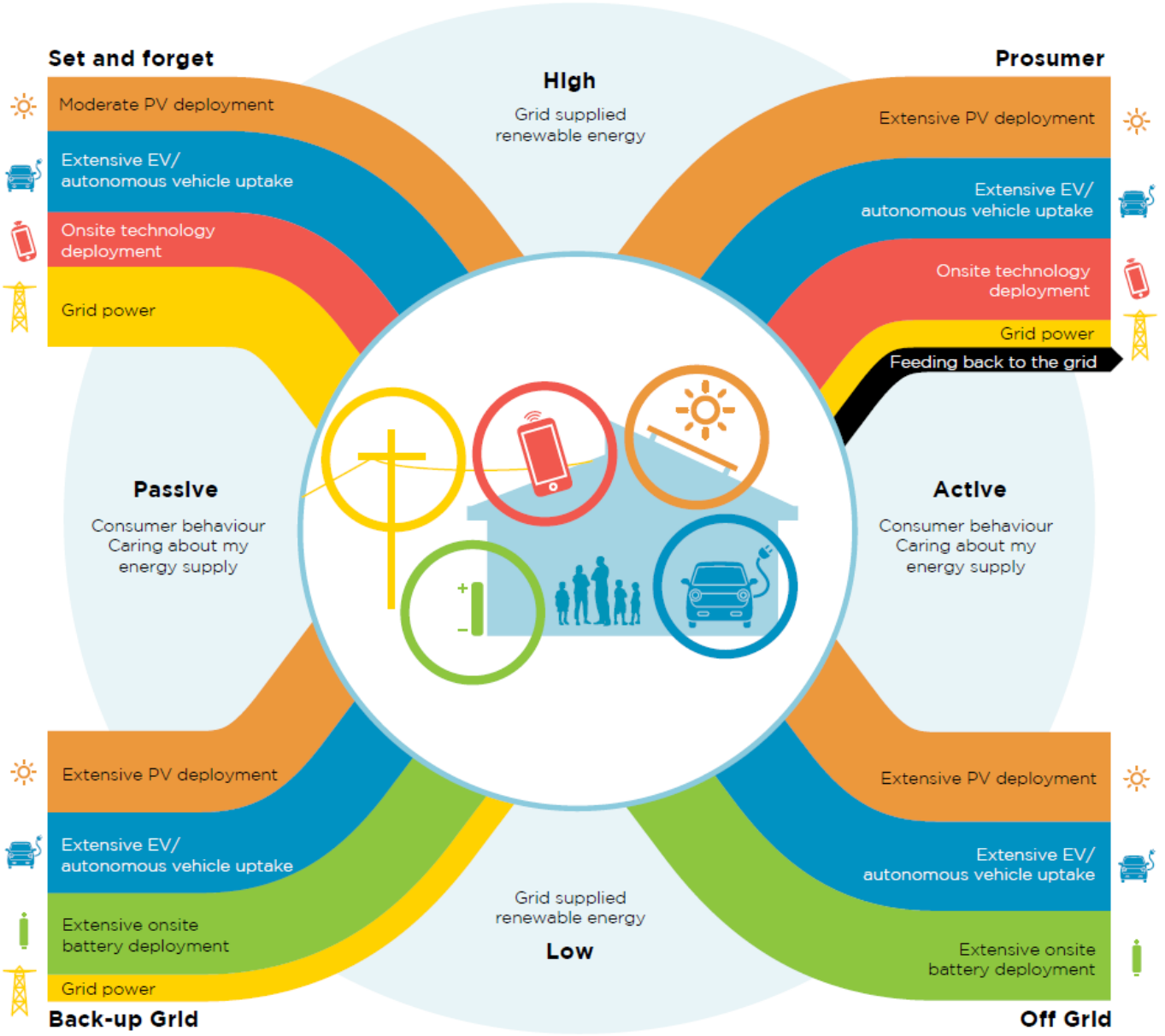
Megashifts

- Greenhouse gas reduction
- Low cost battery storage
- Consumer interest in PV and PV cost reductions
- Demand for greater reliability and services from the grid
- Non-traditional third party management of consumer needs
- Consumer distrust of electricity utilities
- EV uptake

Consumer behaviours

- Active-passive spectrum of consumer behaviours
- Actions not always consistent with expressed values

Scenarios



Network Transformation Roadmap Scenarios:
https://www.ena.org.nz/dmsdocument/403

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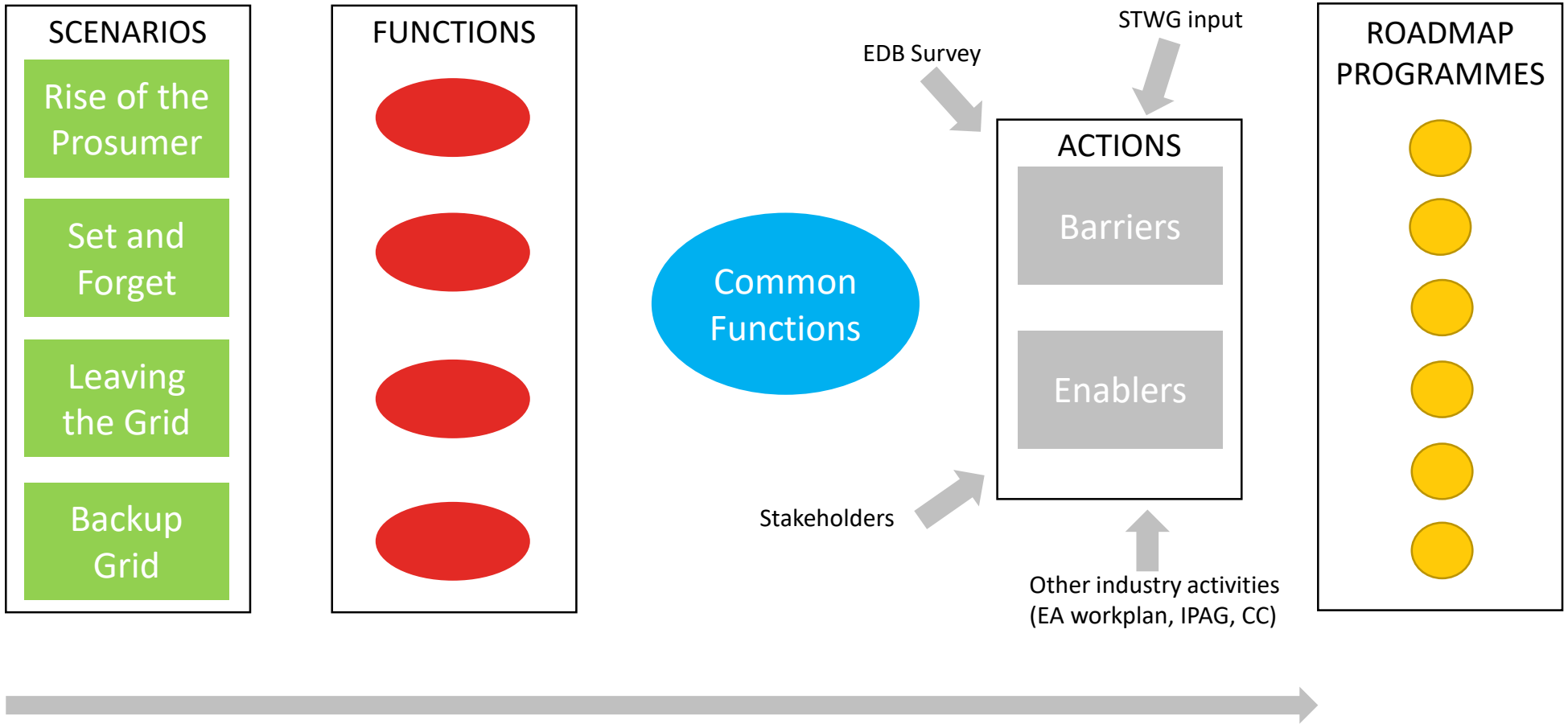
Roadmap development



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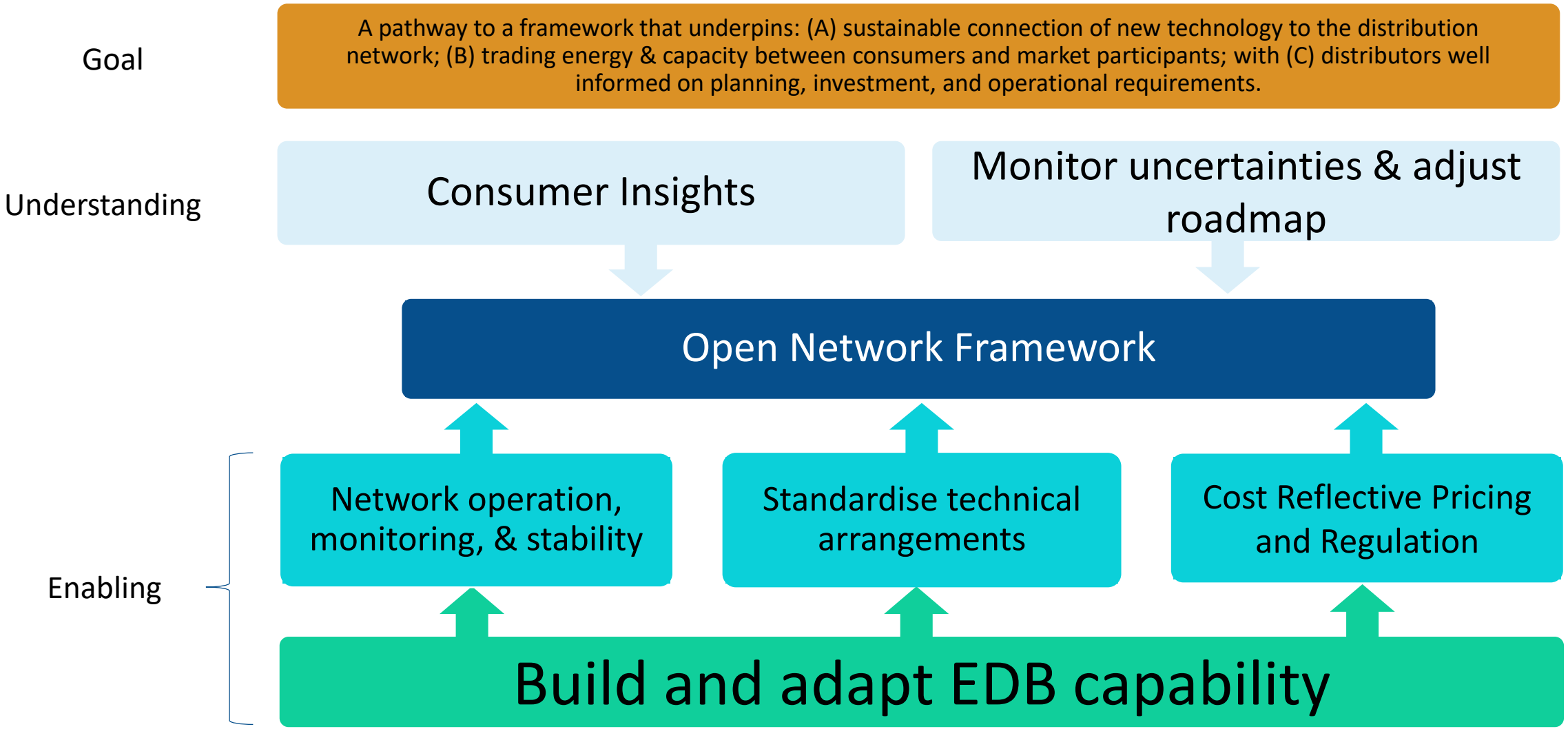
Summary of Roadmap Programmes



1. Consumer insights

Objective: Understand consumer motivations and behaviours to determine: the impact on DER deployment and consumption patterns, and new load requirements.

Access to smart meter data	Progressively over time address barriers to half-hourly consumption data to understand emerging behaviours, and ultimately sub half-hourly and power quality
Understand DER deployment	Data on DER deployment (location, type, etc) available, moving to consumer understanding and scenario modelling to understand DER deployment possibilities
New loads	Start by understanding connection requirements (location and type) of new loads, move to actively planning for and delivering network services to new loads
New DG	Understand new DG connection requirements. Develop & trial new DG connection standards, move to implementation consistently across all EDBs

2. Monitor uncertainties and adjust roadmap

Objective: Understand consumer motivations and behaviours to determine the impact on DER deployment and consumption patterns

Monitor uncertainties	Monitor uncertainties, megashifts and consumer behaviours regularly and feed into roadmap programmes where necessary

3. Open network framework

Objective: Access to the electricity distribution network by existing and new consumers and traders to connect and operate any equipment they desire (specifically DERs and new loads) with appropriate consideration of cost of access, network operation, and standard equipment & access arrangements

Enable distribution network trading	Understand access requirements for DERs, open up access, and move to full and equal access to the distribution network as a vital platform for delivery of energy and capacity to and by consumers
Third party DER and DR for network support	Start by trialling DER and DR support to putting in place processes and systems for acquiring and using it, to it being an important contributor to network operation and support
Demand response framework	Work with regulators on the challenges of multiple users of DR, trial, move to full scale use of third party supplied DR to manage the distribution network

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4. Cost reflective pricing and regulation

Objective: Enable the open network framework through ensuring appropriate incentives are developed , including signalling appropriate long run and short run prices to coordinate DERs for network & system support, and avoid congestion

Cost reflective pricing is an essential aspect of the open network framework

Communicates the cost of using the distribution service for energy delivery, to and from prosumers, and of the need for capacity for network support and by other users

The NTR recognises the importance of providing cost-reflect, service based pricing of distribution services in order to ensure efficient and effective use of the distribution networks now and in the future

The ENA Distribution Pricing Working Group has been tasked with supporting EDB cross-industry efforts to reform pricing and the NTR reflects the mandate that group has to lead on this work.

5. Standardise technical arrangements

Objective: Provide consistent method of connection of any equipment (DERs or appliances) across all EDB areas. Ensure equipment complies to approved standards to minimise its impact on the electrical power system

DER Connection Codes	EDBs jointly implement new agreed connection frameworks/codes, moving to regular and consistent use by all EDBs, with consistency maintained across all EDBs
Appliance and DER equipment standards	EDBs collectively assess and contribute to international standards to ensure they are appropriate for NZ, and adopt equipment standards appropriate to NZ. Test houses to approve equipment as compliant before being allowed on the network. All equipment connecting to the network is compliant to approved standards and codes, with consistency across all EDBs
Cyber security and autonomous DERs	Research appropriate cyber security standards and standards for autonomous DERs, trial, and implement standards to ensure stability of autonomous DERs

6. Network operation, monitoring and stability

Objective: Ensure the stability of the open network through deeper monitoring of the network, and improved planning techniques

LV network monitoring & visibility	Roll out of LV monitoring systems with data management systems and provision of AMI data to assist with network management. Improve quality and type of monitored data over time. Lead to extensive knowledge of each LV network
Network stability	Research the implications of numerous autonomous DERs and methods of control. Trial control systems and implement control systems across EDBs (Note standardisation of these methods is covered in Programme 5)
Provision of network information	Trial provision of network information to operators, moving to regularly providing network information to operators, and extensive provision of information

7. Build and adapt EDB capability

Objective: Understand networks in greater depth, their ability to host DERs, congestion, and contracting for network support. Ensure working understanding of regulations and obligations of those

Network understanding	Understand congestion in LV networks (which may include MV networks). Understand the ability of the LV network to host DERs, and opportunities for DERs to mitigate congestion
Contracting for network support	Trial framing of EDBs requirements for network support and introduce contestable procurement to discover range of solutions. Develop the necessary process to support contestable procurement of network support from trial experience and move to regular practice, practices consistently across all EDBs
Asset management practice	EDBs collectively explore, trial, and implement improved asset management practices and consistent frameworks across all EDBs
Off grid power supplies	Move from trialling remote area power supplies to best practice between EDBs and industry, practiced where it is more economic that traditional networks

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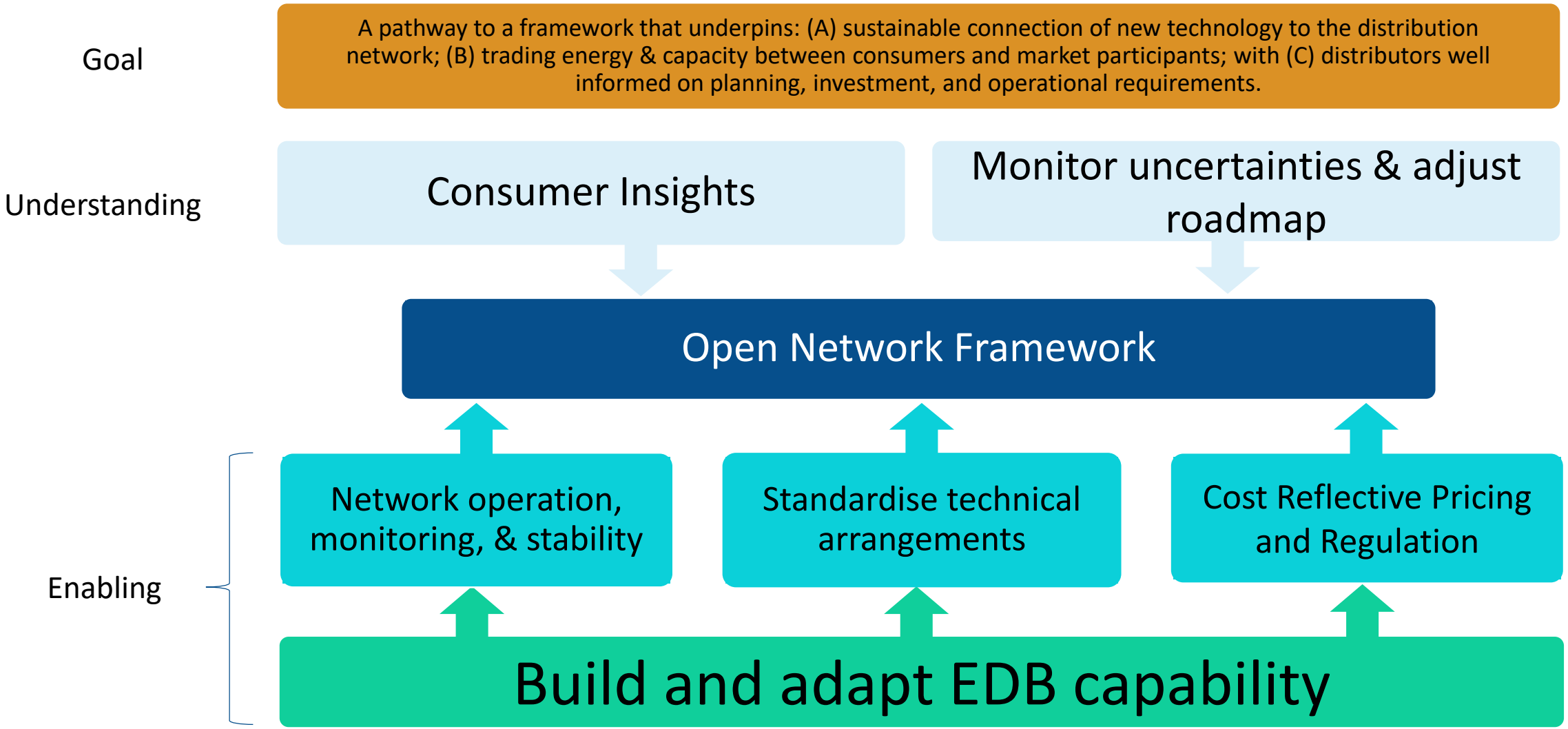

Questions and discussion

Thank You

Andrew Mulligan (Mainpower)

Cristiano Marantes (Vector)

Derek Cauldwell (Horizon Networks)

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Gari Bickers (Transpower)

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Jaun Park (Unison)

Lingsong Zheng (Wellington Electricity)

Luz Rose (Vector)

Mike Parker (Transpower)

Paul Blue (WEL Networks)

Russell Watson (Northpower)

Ryno Verster (Powerco)

Shane Watson (Orion)