

Network innovation

Customer Forum Week 5

Justin Harding, Deirdre Rose

19 July 2018



Overview and objectives

- ▶ **Innovation expenditure proposals in context of EDPR**
 - › Modest share of costs

- ▶ **Understanding the customer benefits of proposed innovation expenditure**
 - › Customer benefits of AusNet Services' network innovation program
 - › Customer benefits of broader network transformation roadmap (developed with the CSIRO)

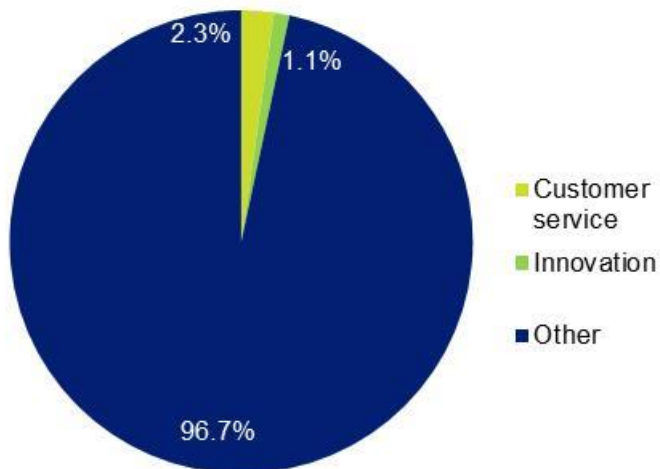
- ▶ **Funding**
 - › Options for funding the proposed innovation program
 - › AusNet Services is also leveraging funding from government and other innovation partners

- ▶ **Next steps**

Innovation expenditure in the context of the EDPR

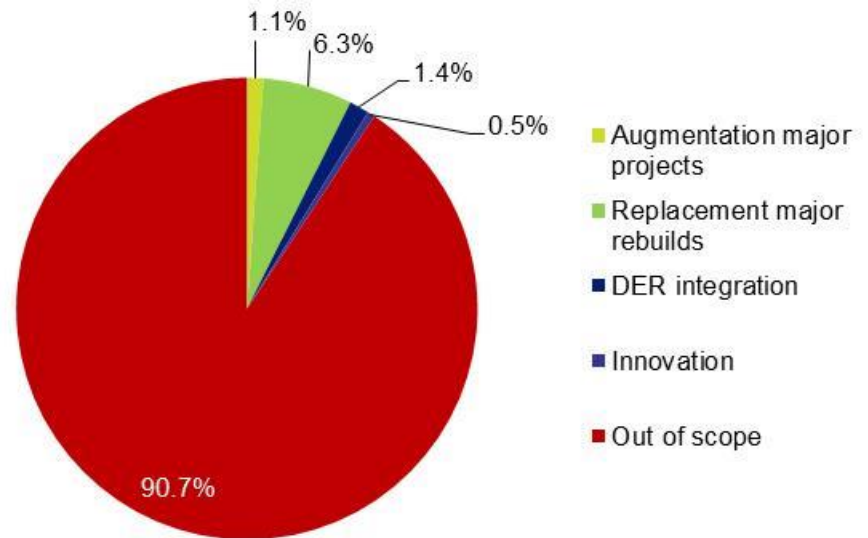
Accounts for just over 1% of proposed opex

Opex



Accounts for 0.5% of proposed capex

Capex



Future customer needs



“Get with the program and you could make it work for you for the next 100 years”
EV Customer, November 2017

Future customers want:



To have a reliable energy supply - if not, show me the alternatives like off-grid and remote area power systems



To decrease costs and make money from generating my own energy



To decrease costs and reduce emissions, show me how to be efficient with my energy/appliances



To share energy with my neighbours/community and be able to buy energy locally at a reasonable price



To have the energy data I need to make my life simple and efficient



To facilitate easy charging solutions in and out of home to power my electric/autonomous vehicle

..but this is only the beginning and expectations will evolve. 4

How a dynamically managed network will meet customer needs



*At its core, our Network Innovation program seeks to test new technologies and techniques that can move us from a **statically managed centralised** network to a **dynamically managed decentralised** network*

Static management  Dynamic management



To decrease costs and make money from generating my own energy

Increasing solar breaches network limits

- Hard limits/refusals placed on solar connections
- Cost increases to cover large augmentation program

Increasing solar is managed:

- Flexible solar connections that allow dynamic management
- New network devices to compensate
- Lower costs through reduced augmentation



To have a reliable energy supply - if not, show me the alternatives like off-grid and remote area power systems

Remote customers continue to experience poor supply reliability

- Non-networks solutions not available
- Increasing DER degrades power quality
- Appliances do not function correctly, solar power systems can not export

Economic options available to improve supply reliability to remote customers

- Backup supplies & microgrids
- Power quality is maintained
- Application of flexible contracts & new network devices



To share energy with my neighbours /community and be able to buy energy locally at a reasonable price

Current retail model persists

- Limited options to share/trade locally
- Local networks not used efficiently
- Low asset utilisation leads to high prices to customers





New retail models are enabled by data & local control with integration to network:

- More options to buy and sell locally with better prices
- Local energy flows make efficient use of the network
- Lower prices to customers

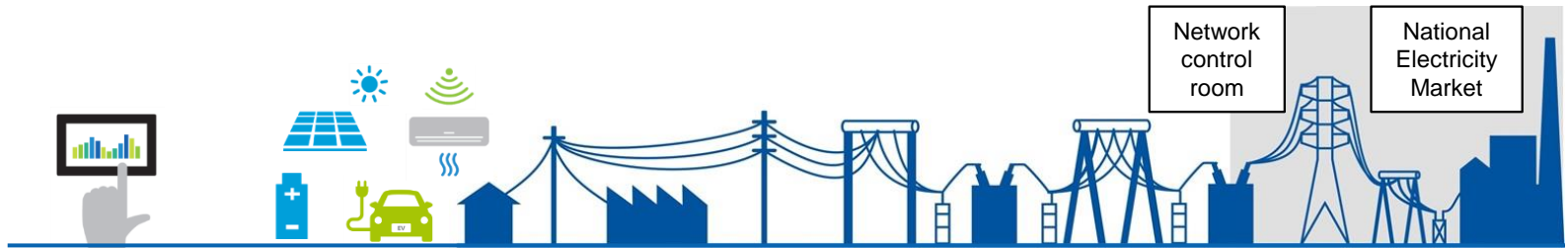
How a dynamically managed network will meet customer needs



At its core, our Network Innovation program seeks to test new technologies and techniques that can move us from a **statically managed centralised** network to a **dynamically managed decentralised** network

	Static management 	Dynamic management
 <p>To facilitate easy charging solutions in and out of home to power my electric/autonomous vehicle</p>	<p>Network limits are breached with low numbers of EVs:</p> <ul style="list-style-type: none"> • Cost increases to all customers to cover early augmentation program • No options for customers to extract value from EV charging flexibility 	<p>Greater numbers of EVs able to hosted:</p> <ul style="list-style-type: none"> • Augmentation is more efficient and reduces prices for all customers • EV customers can extract value from EV charging flexibility options
 <p>To decrease costs and reduce emissions, show me how to be efficient with my energy/appliances</p>	<p>Network insights about customer usage are not leveraged:</p> <ul style="list-style-type: none"> • Customers less likely to know about inefficient usage or faulty appliances • Few options for customers to engage in demand response programs 	<p>Customers can make use of network insights about usage patterns:</p> <ul style="list-style-type: none"> • Customers provided with tips and tools to improve efficiency • Customer have more options and ability to join demand response programs
 <p>To have the energy data I need to make my life simple and efficient</p>	<p>Energy data is difficult to access and interpret by customers:</p> <ul style="list-style-type: none"> • Customers not able make use of data to reduce costs • Fewer service options and less automation available to customers from retailers & DER providers 	<p>Customers can easily access, package and transfer energy data</p> <ul style="list-style-type: none"> • More customers are able to find better deals and reduce costs • Retailers & other service providers can provide better service options with data automation

Capabilities and innovation required to move to a dynamically managed network



CAPABILITIES REQUIRED

Ability to interpret and deliver useful data to customers and service providers

Ability to connect customers quickly and provide flexible service options

Ability to interact with customers for flexible loads and flexible generation

Ability smooth out and manage power flows with new network devices and reduce costs

Ability to fill the network data gap between smart meters and the high voltage network

Ability to control and optimise the flexible network and flexible customers with predictive capability

Ability to integrate customer flexibility into the National Electricity Market and maximise customer returns



OUR INNOVATION INITIATIVES

- Market facing data and information platform trial
- Customised energy efficiency advice

- Automated customer DER connection portal
- Leverage solar for network benefit
- Stand-Alone Power Systems pilot
- Community energy resilience project

- Study into DER Management System integration
- Dynamic DER control testing
- EV Network impact and EV clustering demonstration
- Explore Vehicle-to-Grid opportunities

- Active load balancing using new network devices
- Advanced voltage regulation
- Direct Current trial for rural networks (Single Wire Earth Return)

- 22kV network monitoring pilot
- Virtual 22kV monitoring through analytics

- Development of functions within the 'Distributed Energy Network Optimisation Platform'
- Predictive network "state-estimation"
- Predictive analytics to leverage DER fleets for abnormal weather events

- 'Distribution System Operator' pilot project

- Black = in current program
- Grey = potential additional initiative

Electricity Network Transformation Roadmap benefits



▶ **The ENA/CSIRO Electricity Network Transformation Roadmap is a comprehensive assessment of the benefits of encouraging fundamental transformation of the electricity networks sector**

▶ **Key outcomes by 2050 at national level:**

› Lower bills for valued services →

- Total system spend is \$101b lower to 2050
- Saves households \$414pa by 2050
- Network charges 30% lower than 2016

› Fairness & incentives →

- Networks pay over \$2.5b pa for DER services
- Over \$18b in cross subsidies avoided, saving \$600 pa for med size family without DER.

› Safety, Security & Reliability →

- Real time balancing, reliability and quality of supply at small and large scale, with millions of market participants.

▶ **Transformation can not be achieved without the experimentation & testing of new technologies, techniques, business models and customer offers**

▶ **This is where our network innovation proposal plays a critical role**

Customer research

▶ Outcomes from customer Focus Groups:

- › Full report from Newgate Research is pending, but experience from the Focus Groups is that many participants thought that AusNet Services *'should engage in more R&D activities around new energy technologies'* to provide better customer service
- › Innovation with a long-term payoff is seen as important, but a **supporting rather than a core activity**. This aligns to our modest proposal for innovation expenditure

▶ From previous customer engagement work:

- › *'Innovation should aim to benefit all customers, not just those that adopt new technologies themselves'*
- › We have focussed on finding ways to lower network costs and improve services to all customers

Funding options

► Funding options

There are two options ensure that AusNet Services is able to efficiently invest in innovation projects:

- › Ex-ante expenditure allowance – This ensures that AusNet Services does not incur costs it is unable to recover. If the innovation programs are successful, then customers receive the ongoing benefits of these programs.
- › Incentive mechanism (use it or lose it similar to the DMIA) – The DMIA only relates to demand management projects and so does not include boarder innovation programs. This type of mechanisms would imposes additional controls on this type of expenditure, including reporting and auditing requirements. This provides customers greater comfort that they should receive benefits from this expenditure. However, this would require the AER to develop a new incentive mechanism or allowance

► Leveraging external funding sources

- › The proposed work program costs assume that we are able to access:
 - ARENA funding
 - Project partner internal funding (e.g. Universities)

Next steps

- ▶ **Customer Forum to identify what further information, if any, is needed to form a view on the reasonableness of the innovation program**
- ▶ **The Customer Forum may wish to prepare questions on this topic for its stakeholder engagement**