3.01

Strategic Innovation Portfolio

Ausgrid

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01 Executive Summary

The Strategic Innovation Portfolio (the Portfolio) outlines strategic innovation initiatives Ausgrid plans to undertake in the next five year regulatory period. These investments are intended to build upon the innovative projects and trials conducted by Ausgrid and others in the industry in recent years, and meet our customers articulated expectation that we invest to facilitate the delivery of improved customer outcomes as we continue the transition to a lower carbon economy.

The Portfolio has been shaped by the Energy Networks Australia (ENA) and CSIRO Electricity Network Transformation Roadmap (ENTR) and is presented here to assist in understanding how Ausgrid is intending to ensure achievement of the critical milestones. The ENTR represents a robust plan that aligns to Ausgrid's principles of taking a customer centric view to the transformation of the industry. In our view this plan articulates well many of the key activities and milestones that should be delivered against if we are to succeed in meeting our customer expectations in a rapidly changing environment.

In terms of delivery against the ENTR, Ausgrid has identified the subset of critical milestones that will require proactive investment by DNSPs in order to meet the roadmap objectives expected by 2024. The 27 innovation initiatives within the Portfolio have been aligned to each of the key milestones within the ENTR in that timeframe and have separately been assessed in terms of how they deliver against the 5 customer outcomes in the ENTR balanced scorecard.

Initiatives have been grouped and are presented here under five programs of work, which represents how they will be structured for delivery:

- Advanced Distribution Management System (2 initiatives)
- Planning & Technology Data Usage (5 initiatives)
- Network Innovation Program (11 initiatives)
- Demand Management Innovation Program (8 initiatives)
- Accelerated Tariff Reform (1 initiative)

The initiatives within the Portfolio are expected to have different funding sources. Some are planned as capital or operational investments within the Ausgrid Regulatory Proposal, others will be funded under the Demand Management Innovation Allowance (DMIA). They are all referenced individually in other parts of the proposal, but have been brought together and summarised in this document for ease of identification and to understand the breadth of innovative investments, pilots and trials that Ausgrid is planning for the FY20—FY24 period.

The Portfolio presented provides a point in time view of Ausgrid's planned program, with individual initiatives at varying stages of planning maturity. This will be updated on an ongoing basis throughout the FY20—FY24 period as initiatives are further investigated, customer requirements evolve, technological developments occur, and new initiatives are identified. Despite this ongoing refinement, the overarching nature and objectives of the Portfolio and the initiatives underpinning it should not materially change. As initiatives are developed, they will progress through Ausgrid's investment governance framework.

For some of the pilots and trials outlined, Ausgrid expects to seek commercial and/or R&D partners, to share the costs and maximise research benefits. The costs outlined in this document represent those Ausgrid expects to incur in any such partnership.

Overall, this portfolio of innovative investments, pilots, and trials represents approximately 1% of total expenditure for the period. This is lower than or in line with similar innovation investments levels in overseas jurisdictions (e.g. the UK), and we propose this to be an appropriate level of investment in innovation at this time of significant transformation across the industry.

02 Innovation Portfolio

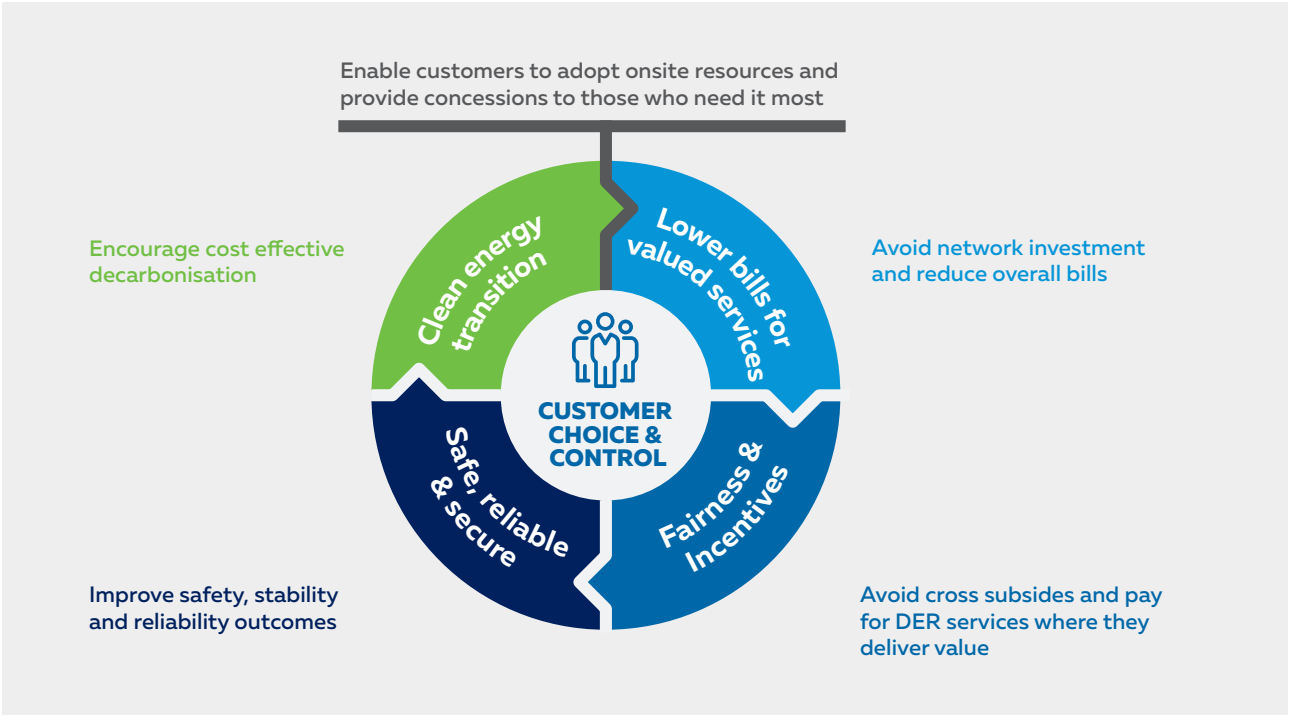
2.1 Background

The Portfolio outlines the future innovation direction for Ausgrid. The Portfolio has been developed in response to direct feedback from customers, the Energy Networks Australia (ENA) and CSRIO Electricity Network Transformation Roadmap (ENTR), and the future needs specific to the Ausgrid network. It outlines the projects, pilots and trials that Ausgrid plan to undertake between FY20 and FY24 in meeting the milestones laid out in the ENTR.

Ausgrid considers this collaborative work, with the ENTR central balanced scorecard focused on customer outcomes, choice and control, to a robust guide for the industry in its transformation. We consider the customer centric view articulated by the ENTR provides a strong basis on which to upon which to identify and priories the innovation investments we make.

ENA ENTR Balanced Scorecard – highlighting key objectives for the next 5 years

Adapted from: electricity network transformation roadmap: final report April 2017



This balanced scorecard has been central to identifying and prioritising the innovation projects that are being proposed for the FY20–FY24 period and is used here to capture the nature of the potential customer benefits from each innovative investment.

2.2 How the Portfolio Delivers Against the ENTR

The ENTR is structured around five key focus areas each with corresponding sub-areas and milestones. Ausgrid has identified those milestones that require specific action on behalf of the distribution networks to action. These specific milestones and way in which our Portfolio of innovation initiatives delivers against these objectives is illustrated below:

ENA ENTR focus areas and milestones – highlighting critical actions for DNSPs

Adapted from: electricity network transformation roadmap: final report April 2017

CUSTOMER ORIENTED ELECTRICITY	**CUSTOMER ENGAGEMENT & CUSTOMISED ENERGY SOLUTIONS**				
	Milestone 1 — By 2018, network customer engagement and collaboration	Milestone 2 — By 2021, investments are based on customer value; improving service performance	Milestone 3 — By 2024, active enablers of expanding products and services	Milestone 4 — By 2027, provide a platform for stimulating customised energy options	
	CUSTOMER SAFETY NET				
	Milestone 1 — By 2018, universal authorisations and exemptions framework for the provision of new energy services	Milestone 2 — By 2018, code of practice to ensure consumers receive appropriate information	Milestone 3 — By 2019, rights and responsibilities of small consumers regarding the provision of electricity	Milestone 4 — By 2020, nationally consistent framework for energy concessions and emergency assistance	
CARBON ABATEMENT	**CARBON AND RENEWABLE POLICY OPTIONS**				
	Milestone 1 — By 2017, agree an enduring, stable and nationally integrated carbon policy framework	Milestone 2 — By 2020, emission intensity baseline and credit scheme	Milestone 3 — By 2026, introduce an economy wide carbon pricing mechanism	Milestone 4 — By 2022 and 2027, adjust Australia's nationally determined contributions	Milestone 5 — By 2017, independent agency to complete an assessment of national energy market implications
	EFFICIENT CAPACITY UTILISATION				
	Milestone 1 — By 2018, light vehicle emissions standard policy	Milestone 2 — By 2020, national approach to electric vehicle charging			

INCENTIVES & NETWORK	**PRICING & INCENTIVES**				
	Milestone 1 — By 2021, residential and small business customers are assigned to a new range of cost reflective electricity tariffs	Milestone 2 — From 2021, new prices are introduced to reflect new and differentiated services	Milestone 3 — From 2021, deploy or procure micro-grids or SAPS as a substitute for traditional delivery models	Milestone 4 — By 2027, customers selling their DER services to networks on a dynamic, locational basis	
	REGULATORY AND POLICY FRAMEWORKS				
	Milestone 1 — By 2018, customers' role is central to regulatory processes	Milestone 2 — By 2018, structured trialling of alternative regulatory approaches is well advanced	Milestone 3 — By 2019, regulatory frameworks that are more adaptive		
POWER SYSTEM SECURITY	**POWER SYSTEM SECURITY**				
	Milestone 1 — By 2018, central and transformed role for the transmission system	Milestone 2 — By 2018, market based approaches for efficient capacity, and balancing and ancillary services	Milestone 3 — By 2019, coordinating and optimising decisions across the power system as a whole	Milestone 4 — By 2020, forecasting to better anticipate constraints could lead to system security issues	Milestone 5 — By 2022, advanced protection mechanisms
INTELLIGENT NETWORKS & MARKETS	**GRID TRANSFORMATION**				
	Milestone 1 — By 2018, approach & protocols to address the management and exchange of information	Milestone 2 — By 2019, integrated suite of advanced network planning models, techniques and DER-services valuation	Milestone 3 — By 2019, suite of distributed grid intelligence and control architectures and tools	Milestone 4 — By 2020, advanced network operation mechanisms and tools	Milestone 5 — By 2022, Advanced Network Optimisation (ANO) tools
	NETWORK OPTIMISATION & MARKETS				
	Milestone 1 — By 2018, basic Network Optimisation Market (NOM) functions	Milestone 2 — By 2019, Advanced Network Optimisation (ANO) functions	Milestone 3 — By 2020, Integration of Advanced Network Optimisation (ANO) functions and NOM procurements	Milestone 4 — By 2023, integrated set of Advanced Network Optimisation (ANO) functions and NOM procurements	Milestone 5 — By 2027, conceptual design of a digital Network Optimisation Market (dNOM) platform

We have highlighted how individual Ausgrid initiatives within our innovation Portfolio address each of the critical milestones that require proactive investment from individual DNSPs:

AREA	SUB-AREA	MILESTONES REQUIRING DNSP ACTION	LINK TO AUSGRID INNOVATION INITIATIVES
CUSTOMER ORIENTED ELECTRICITY	CUSTOMISED ENERGY SOLUTIONS	**Milestone 2** – By 2021, electricity networks are recognised as demonstrating their investments are based on customer value; improving service performance and response times; and enabling more flexible network products	We will deliver enhanced processes, data analytics, and digital customer interfaces, and enable streamlined connection of growing range of DER, building capability to share network data with the market via our **Continuous VCR, Network Digitisation and Network Insight** Programs. We will evaluate opportunities to support delivery of DER services with 3rd parties through a number of initiatives including our **Customer DER Investment Evaluation Portal**.
		Milestone 3 – By 2024, electricity networks are trusted by customers and market actors as active enablers of expanding products and services with streamlined connections which avoid impacts on other customers	Our **Grid Battery** trial will prototype localised products, services and information services with 3rd parties.
CARBON ABATEMENT	EFFICIENT CAPACITY UTILISATION	**Milestone 2** – By 2020, partner to resolve national approach to electric vehicle charging	In collaboration with retailers or other market actors, we will review incentive systems for encouraging managed electric vehicle charging, irrespective of progress in electricity pricing reform via our investments in **EV Charging Capacity Information** sharing, both the **Advanced** and **Dynamic EV Charging pilots**, and our **Tariff Reform Program.**
INCENTIVES & NETWORK REGULATION	PRICING & INCENTIVES	**Milestone 1** – By 2021, residential and small business customers are assigned to a new range of cost reflective electricity tariffs, enabled by a high penetration of smart meters with the right to 'Opt Out', effective customer support and decision making tools, and reforms to government concessions	We will review and test alternative peak charging and residual structures with regard to future technological disruption via our **Tariff Reform Program, Dynamic Load Control, Demand Management for Replacement Needs, Residential Peak Time Rebate** and our **Behavioural Demand Response** study.
		Milestone 2 – From 2021, new prices are introduced to reflect new and differentiated services customers want to use the network for including 'standalone power system tariffs' for customers with self-sufficient on-site DER	We will develop and evaluate charging mechanisms and rules for Stand Alone Power System (SAPS) Tariffs via our **Fringe of Grid Optimisation** initiative, and identify new services that customers may want to use the network for through our **Emerging Technology** and **Future Trends** research.
		Milestone 3 – From 2021, networks deploy or procure micro-grids or standalone power systems as a substitute for traditional delivery models where it is demonstrably efficient and fair	We will trial micro-grid deployment via our **HV Microgrid** and **Portable All-in-one Off-grid Supply** trials and share key learnings for broader scale rollout.
		Milestone 4 – By 2027, network orchestration using DER on a dynamic, locational basis, results in one in three customers selling their DER services to networks on a dynamic, locational basis, directly or through their agents	We will develop frameworks to implement locational & dynamic incentives which act in competition to traditional network augmentation/ replacement expenditure or non-network solutions under RiT-D frameworks via our **Tariff Reform** and **Demand Management for Replacement Needs** Programs and will work with market actors in its implementation via our **Distributed Storage Demand Response** and **Coolsaver IoT.**

AREA	SUB-AREA	MILESTONES REQUIRING DNSP ACTION	LINK TO AUSGRID INNOVATION INITIATIVES
INTELLIGENT NETWORKS & MARKETS	GRID TRANSFORMATION	**Milestone 5** – By 2022, the full suite of Advanced Network Optimisation (ANO) tools have been trialled and validated across a diversity of Australian network topologies and DER scenarios	We plan to have advanced distributed grid intelligence and control systems developed, trialled and validated via our **Asset Condition Monitoring, LFI, STATCOM, Network Insight, and Self Healing Network** trials.
	NETWORK OPTIMISATION & MARKETS	**Milestone 3** – By 2020, collaborative projects demonstrating the integration of Advanced Network Optimisation (ANO) functions and NOM procurements have validated direct and market based orchestration of distributed energy resources as a reliable non-network alternative	We intend to trial and test the technical operation of the optimisation processes to meet a range of system objectives via our investment in a new **ADMS** and **DSO pilot**.
		Milestone 4 – By 2023, networks with very high distributed energy resource levels are performing an integrated set of Advanced Network Optimisation (ANO) functions and NOM procurements as mainstream activities to ensure technical stability, economic efficiency and market animation	We will trial DSO capabilities in multiple network areas, with different network structures, and technical resilience is demonstrated, and progressively normalise interconnection and islanding of microgrids and virtual power plants via our **ADMS** investments and our, **DSO pilot, HV Microgrid** and **Distributed Storage Demand Response** initiatives.

2.3 Portfolio Overview

These 27 initiatives comprise a wide range and scope of work across the Ausgrid network. They touch a wide range of elements within our business to build, develop and create a network that anticipates and serves the diverse needs of our customers. The Portfolio of initiatives is managed in five Program areas. A summary of the Portfolio initiatives by Program is shown below.

ADVANCED DISTRIBUTION MANAGEMENT SYSTEM	
Advanced Distribution Management System (ADMS)	Distribution System Operator (DSO) Pilot
PLANNING & TECHNOLOGY DATA USAGE	
Customer DER Investment Evaluation Tool/Portal	Continuous Value of Customer Reliability (VCR)
Network Digitisation	Electric Vehicle Charging
Smart Metering Benefits Realisation	
NETWORK INNOVATION PROGRAM	
Advanced Voltage Regulation (STATCOM)	Portable All-in-One Off-Grid Supply Units
Network Insight Program	Self-Healing Networks/FDIR Trials
Fringe of Grid Optimisation Pilot	Dynamic Load Control
HV Microgrid Trial	Asset Condition Monitoring Trials
Advanced EV Charging Platform Trial	Line Fault Indicator (LFI) Trials/Development
Grid Battery Trials	
DEMAND MANAGEMENT INNOVATION PROGRAM	
Demand Management for Replacement Needs	CoolSaver IoT
Future Trends Research	Behavioural Demand Response
Distributed Storage Demand Response	Residential Peak Time Rebate
Emerging Technology Research	Electric Vehicle Dynamic Charging
TARIFF REFORM PROGRAM	
Tariff Reform Acceptance Research	

03 Advanced Distribution Management System

INITIATIVE	CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
Advanced Distribution Management System (ADMS)	✓	✓		✓	✓
Distribution System Operator (DSO) Pilot	✓	✓		✓	✓

3.1 Program Overview

The Advanced Distribution Management System (ADMS) program will transform Ausgrid's network management environment by implementing a world class ADMS with more robust, adaptable and effective processes and tools across its operations. This will mitigate the cyber-security and obsolescence risks associated with its current systems and enable Ausgrid to take advantage of future industry and technological developments in order to better serve its customers and stakeholders.

3.2 Advanced Distribution Management System (ADMS)

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓		✓	✓

The replacement of the existing system to an ADMS will also permit, over time, the rationalisation and integration of a number of legacy ancillary systems which support operations, planning and design, leading to more efficient and effective processes with commensurate service improvement and reduction in future expenditure requirements. This program continues the implementation of the ADMS that was commenced in the current regulatory period.

An ADMS provides an integrated set of tools for planned and emergency event management, powerflow management, fault location analysis, and fault isolation and restoration capabilities. It also enables integration of distributed energy resources and network optimisation capabilities. An ADMS enables digitised field operations to streamline the day-to-day management of the network, including intelligent field crew dispatch. It is a platform to integrate core and ancillary network and corporate systems to deliver best practice asset management and operations.

3.3 Distribution System Operator (DSO) Pilot

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓		✓	✓

The proposed Distribution System Operator (DSO) trial involves adding capability into the ADMS project to trial DER (Distributed Energy Resources) dispatch capability, demonstrating how operating a localised balancing function has potential to reduce customer bills through efficient provision of services and optimised network performance while facilitating cost effective growth in local generation, demand side response and energy storage services.

04 Planning & Technology Data Usage

INITIATIVE	CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
Customer DER Investment Evaluation Tool/Portal	✓				✓
Continuous VCR (Value of Customer Reliability)	✓	✓			
Network Digitisation		✓		✓	
Smart Metering Benefits Realisation		✓		✓	
Electric Vehicle Charging Capacity Information	✓	✓			✓

4.1 Program Overview

This Program will drive greater usage of data to sustainably and safely optimise the use and maintenance of network assets. This will be done by improving data quality from various information systems, the capture of new asset data, and systematically updating business processes and systems to better utilise this data where available. It addresses risks relating to sub-optimal capital expenditure due to inadequate or insufficient asset and performance information. This will enable Ausgrid to provide impartial information to customers and other third parties to assist them in their use of the network or investment decisions.

4.2 Customer DER Investment Evaluation Tool/Portal

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓				✓

This tool/portal will provide impartial information to customers to allow them to analyse Distributed Energy Resources (DER) options for their geographic area and energy profile. Ausgrid sees this as a key enabler for the industry to progress tariff reform; allow customers and installers to incorporate forward looking retail prices and tariff structures when calculating long term financial metrics (ROI, payback, etc.) of DER investments.

4.3 Continuous Value of Customer Reliability (VCR)

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓			

This initiative will conduct research on systems and processes that can be used to measure the value customers place on network reliability. It will explore methods for obtaining this information outside of the manual methods currently used. In the previous 5+ years, external parties have been responsible for conducting customer surveys to set the benchmark for the value of customer reliability.

This initiative will examine and identify suitable tools to quickly and regularly gather this information in an automated way to understand how the customer value of reliability changes by location and by customer demographic. This will enable our investments to better reflect customer choices in the different regions of our network. We will also use this information to work with regulatory bodies and other distributors to enhance and improve the veracity and use of VCR across the NEM.

4.4 Network Digitisation

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
	✓		✓	

Ausgrid has been undertaking helicopter based aerial photography and LiDAR analysis of our network since 2012 to manage bushfire risk in rural areas, covering approximately 25% of our overhead network. Ausgrid is commencing a program over FY17 and FY18 to further digitise the network using LiDAR across urban areas of the network using fixed wing aircraft. Into the FY20–24 period we intend to capture significantly more asset data via ground based LiDAR and high definition photography services.

This detailed asset data will support advanced analytics, the development of mature asset management strategies, and underpins efficient operational activities for the organisation. Advanced data collection technologies provide the means to rapidly capture a greater level of detail on assets and their surrounds. This data can then be analysed, reducing the need for traditional manual data collection methods.

The market demand for applications to host and analyse LiDAR and other large datasets has grown in recent years. These applications have reached the stage of maturity where they are capable of processing the large data volumes, converting this information into digital virtual environments. They have easy to use interface tools for end users to fully utilise these datasets for decision making.

A fully digitised virtual network asset world is a strategic opportunity which will provide the foundation for transformational change in the way Ausgrid executes routine tasks such as maintenance inspections, network planning and surveying, data verification, and asset capture. It forms the backbone for future technology advancements and development such as augmented reality, location-based services, virtualised digital networks, big data analytics, spatial data and context awareness, machine learning, and image processing and pixel recognition.

4.5 Smart Metering Benefits Realisation

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
	✓		✓	

With the commencement of contestability in small customer metering on 1 December 2017, the landscape for metering and metering data services has significantly changed. As the market led roll-out of smart meters across the Ausgrid distribution network accelerates, significant potential exists to gain valuable insight into network condition and performance. Over the FY20-24 regulatory period it is expected that metering providers will begin to offer services providing key network performance and status information captured at the meter, in real time. It is expected that capital investment will be required to develop the systems to integrate this data to our operational systems in order to realise benefits such as:

- Neutral Integrity Detection
- Outage extent and restoration validation
- Identification of voltage compliance issues
- Validation of network connectivity models
- Hot connection detection

The acquisition of data to support these services will ultimately lead to improved safety, reduced capital and operational expenditure, and faster operational responses delivering a higher level of service to our customers.

4.6 Electric Vehicle Charging Capacity Information

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓			✓

Ausgrid intends to invest in a web-based system to provide information for the competitive market on optimum areas to connect new services to the network, including electric vehicles (EV) and embedded generation.

The purpose is to better facilitate the market led roll-out of energy services such as EV charging points and embedded generation. This will deliver better value to our stakeholders and the energy market in general. This project is expected to be low cost, but high value by bringing together key network connections data in a form which will help market proponents navigate the connections process in a more streamlined way.

05 Network Innovation Program

INITIATIVE	CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
Advanced Voltage Regulation STATCOM	✓			✓	✓
Network Insight Program	✓	✓	✓	✓	✓
Fringe of Grid Optimisation Pilot	✓	✓	✓	✓	✓
HV Microgrid Trial	✓	✓		✓	✓
Advanced EV Charging Platform Trial					✓
Grid Battery Trials	✓		✓	✓	✓
Portable All-in-One Off-Grid Supply Units	✓			✓	
Self-Healing Networks/FDIR Trials		✓		✓	
Dynamic Load Control	✓	✓			
Asset Condition Monitoring Trials		✓		✓	
Line Fault Indicator (LFI) Trials/Development		✓		✓	

5.1 Program Overview

The Network Innovation Program covers a diverse range of innovative network technology pilots which have potential to deliver better value to our customers. Ausgrid has a long history of innovation and this Program builds on this past experience to identify, develop and integrate into core corporate systems a range of new and innovative solutions to respond to the changing and diverse needs of our customers.

5.2 Advanced Voltage Regulation (STATCOM)

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓			✓	✓

This initiative will leverage experience from a trial currently underway to evaluate modern LV (Low Voltage) Regulator technology that can serve to improve the utilisation of Ausgrid's LV feeder network, improve power quality and provide tools to minimise demand on the network through voltage management. It will trial the use of Static Synchronous Compensators (STACOMs) on the HV (High Voltage) network, larger than those evaluated on the LV network, to mitigate power quality (e.g. flicker and voltage) issues and maximise power transfer by compensating for the disruptive effects of certain loads and distributed sources of supply. As customers adopt more DER it will become increasingly important to manage these types of power quality issues to minimise any technical limitations on DER penetration so that customers are able to get the most value from their investments. This initiative is critical to understanding the lowest cost way to achieve this, particularly in those areas exhibiting high PV penetration.

5.3 Network Insight Program

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓	✓	✓	✓

Ausgrid has 5,500 existing online Distribution Monitoring and Control devices (DM&C devices) in its distribution substations. This initiative increases the reach of these devices via a retrofit program for the upgrade of existing devices and the installation of new devices in a number of strategic locations. This initiative will increase the success and usability of the ADMS, facilitating the Self Healing Networks initiatives and allowing the network to be dynamically reconfigured to reduce technical constraints that occur due to the roll out of DER. Importantly, the broader application of these devices would give Ausgrid the ability to provide a rich data set for any 'open networks' information platform made available to our customers, facilitating easier and more cost effective connections, enabling customers to extract greater value from DER, and foster greater levels of innovation in the industry.

5.4 Fringe of Grid Optimisation

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓	✓	✓	✓

Testing the technology and operational processes associated with managing alternative supply arrangements to derive cost-to-serve reductions, bush fire risk reduction, and reliability improvements for individual and small groups of customers on SWER (Single Wire Earth Return) lines. The solution would be supported by local storage and generation facilities and may be able to operate for extended periods or indefinitely without connection to the greater Ausgrid network. In addition to evidencing the economic and safety benefits, with these trials we expect to be able to provide key learnings for customers wishing to disconnect from the grid, and will be seeking to develop and evaluate charging mechanisms and rules for Stand Alone Power System (SAPS) tariffs.

5.5 HV Microgrid Trial

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓		✓	✓

Testing the technology and operational processes associated with managing an alternative network design for a medium sized, widely spaced remote community to reduce bushfire risk, and cost-to-serve reductions. The microgrid would be supported by local storage and generation facilities and may be able to operate for periods or indefinitely without connection to the greater Ausgrid network. Importantly, this trial would seek inform policy development on the most appropriate operating models for islanded microgrid operation, and their ability to deliver improved outcomes for those customers directly connected to the microgrid and the wider community.

5.6 Advanced EV Charging Platform Trial

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
				✓

This initiative examines the ability for Ausgrid's network to interact with multiple electric vehicles at a single location. The scope of the initiative requires the use of a suite of EV chargers that can sense the level of charge in vehicle batteries, manage their charge rate and prioritise the charging of individual vehicles in response to the network's ability to provide full charging flow for all the vehicles at the same time. Ausgrid may seek a suitable partner or partners for this trial.

5.7 Grid Battery Trials

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓		✓	✓	✓

Ausgrid is planning a small number of grid battery pilots to assess the viability of network use cases including the deferral of network augmentation through peak shaving, improving power quality and reliability outcomes, particularly in locations with high PV penetration, and provision of other network support services. A priority of these trials is to demonstrate and evaluate the operating (and partnership) models that can unlock additional value for customers, i.e. by providing access to 'virtual partitions' within a community battery, enabled though a cloud based trading platform, giving customers access to the range of value that a battery can deliver without exposing them to the upfront installation cost, and maximising the potential for economies of scale to reduce costs and bring forward adoption of local renewables.

This trial will also seek to learn about appropriate tariff structures to ensure customers using community assets are not at a disadvantage compared to behind-the-meter generation and storage solutions.

5.8 Portable All-in-One Off-Grid Supply Units

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓			✓	

As microgrid solutions are increasingly explored, this initiative will trial the use of portable, modular off-grid energy supply units that can be deployed rapidly and provide grid quality supply to a customer (or customers) for an extended period without a physical grid connection. There are multiple uses for portable off grid power, and this trial would be expected to test all such cases, including providing additional support during network maintenance, supporting remote and vulnerable customers during extended planned and unplanned outages, or islanding customers to alleviate bush fire risk, or assessing the suitability of permanent 'off-gridding'. This initiative will trial several off the shelf units to examine their cost effectiveness and ability to deliver improved customer outcomes.

5.9 Self Healing Networks/FDIR Trials

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
	✓		✓	

Expanded trials of automated Fault, Detection, Isolation and Restoration (FDIR) capabilities on the network for improved customer restoration times and reduced impacts from network faults or third-party damage to the network.

This technology was originally trialled in 2012 and Ausgrid continues to operate a small FDIR scheme in the Newcastle area using several intellirupters. This initiative will expand the trial to the Sydney site and combine operating with the current generation of DM&C capabilities to understand the protocols required and opportunities presented when operating FDIR on the Sydney network, whilst also incorporating additional types of devices. Utilising existing investments in DM&C, this will leverage this network equipment to develop more capability in a self-healing network.

Self-healing network applications ultimately have the potential to provide substantial reliability and cost efficiency benefits for the Ausgrid network. This trial would include technologies from multiple manufacturers to ascertain their performance to ensure that the most cost effective solutions are ultimately adopted.

5.10 Dynamic Load Control

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓			

Ausgrid currently operates a significant load control system covering nearly 500,000 installations of off peak hot water systems. While the number of controlled load hot water systems is declining, changes in technology and the roll out of smart meters is opening up new opportunities for flexible load control solutions covering a wider range of energy consuming devices. This initiative will examine the viability of introducing more flexibility into existing load control schemes achievable for customers by integrating the control of emerging devices such as EV chargers and behind the meter batteries in network locations of low utilisation.

5.11 Asset Condition Monitoring Trials

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
	✓		✓	

This initiative will pilot online condition monitoring technology to improve management of aging assets, reduce costs associated with time based physical inspections, and reduce risk of equipment failure.

The trial will pilot a small number of online condition monitoring solutions such as CCTV, temperature, gas discharge and oil pressure sensors to provide real time online information on asset performance and condition primarily at zone substation assets. This would provide predictive intelligence able to provide alerts and alarms when sensors detect equipment requires maintenance, and remote triage ability to mitigate sending crews in some instances.

5.12 LFI (Line Fault Indicator) Trials/Deployment

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
	✓		✓	

Trial and if successful, deploy latest generation LFIs in selected locations. These indicators provide a visual guide to field staff on the location of line faults, enabling the detection of temporary faults before they turn into outages, speed restoration after permanent faults, improve safety outcomes for crews and the public, and ultimately reducing the cost of fault finding and emergency response. Advanced models enable remote monitoring and fault isolation, and capture data around time of fault to enable root cause analysis. Initial trials would seek to verify the cost benefits associated with deployment in remote and hard to access locations.

06 Demand Management Innovation Program

INITIATIVE	CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
Demand Management for Replacement Needs	✓	✓	✓		✓
Future Trends Research		✓			✓
Distributed Storage Demand Response	✓	✓	✓	✓	✓
Emerging Technology Research	✓	✓	✓		✓
CoolSaver IoT	✓	✓	✓		
Behavioural Demand Response	✓	✓	✓		✓
Residential Peak Time Rebate	✓	✓	✓		
Electric Vehicle Dynamic Charging		✓			✓

6.1 Program Overview

The Program consists of initiatives funded predominantly from the Demand Management Innovation Allowance (DMIA), a separate AER allowance for non-network alternatives.

Over the last seven years from FY11 to FY17, Ausgrid has conducted 25 initiatives under the Demand Management Innovation Allowance including research initiatives, trials of new technology and trials of new innovative approaches to meeting and managing customer demand requirements.

Ausgrid's demand management innovation program will explore solutions relating to the risk associated with the retirement/replacement of aged assets (80% of Ausgrid's capital program), emerging technologies such as battery storage and electric vehicles and explore solutions enabled by smart meters and Internet of Things (IoT) automation.

6.2 Demand Management for Replacement Needs

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓	✓		✓

This initiative explores the viability of using a combination of permanent and temporary demand reductions to cost effectively defer or manage the load at risk associated with the replacement of aged assets. The trial which has commenced in the current regulatory period may continue into the FY20–FY24 period to further explore the effectiveness of incentivising permanent demand reductions from new energy efficiency investments such as solar power and LED lighting; and how traditional demand response solutions such as generators, load shedding and battery storage systems can complement the permanent reductions as part of a least cost solution to asset replacement needs.

6.3 Future Trends Research

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
	✓			✓

This initiative has commenced in the current regulatory period and will continue into the FY20—FY24 period. This customer research initiative is in collaboration with Swinburne University, Energy Consumers Australia and AusNet Services and explores future customer lifestyle trends and their implications on electricity demand and demand management options. This initiative employs cutting-edge social science methods and theories to better understand changing trends in future household electricity demand, over the near (2025), medium (2030) and long term (2050), and identify opportunities to ensure the best outcomes for energy consumers.

6.4 Distributed Storage Demand Response

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓	✓	✓	✓

This initiative, which has commenced in the current regulatory period, will continue to explore in FY20—FY24 the potential for reliable, cost effective demand response using customer installed distributed battery storage systems. Delivered via aggregators such as Reposit and others, the trial seeks to capture learnings around customer acquisition techniques, dispatch protocols and demand response performance to refine this emerging demand management solution. This trial is intended to also establish the protocols necessary for dispatch of customer demand reductions through the ADMS demand response platform.

6.5 Emerging Technology Research

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓	✓		✓

Continuing from detailed surveys with both residential and business customers, this program of work will conduct further research, surveys and analysis of customer attitudes and intentions to better understand customer preferences with respect to key emerging technologies. Early collaboration with key research bodies is planned to ensure lessons learned are widely shared.

6.6 CoolSaver IoT

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓	✓		

The proposed CoolSaver IoT (Internet of Things) trial will leverage the increasing automation and connectivity of appliances to provide a lower cost solution to demand response from air conditioners and other appliances. The increasing number of internet enabled appliances and the emergence of home management systems such as Google Home is projected to unlock the vast potential for demand response from the small customer market. This trial will expand upon the lessons learned from Ausgrid's CoolSaver air conditioner demand response program to assess customer acquisition techniques, communication solutions, dispatch protocols and demand response performance to refine and optimise this solution.

6.7 Behavioural Demand Response

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓	✓		✓

The emergence of larger numbers of customers with communication enabled smart meters offers a significant potential to trial a range of demand management solutions that are significantly advantaged by the information made available from the smart meter. An emerging option available is the use of innovative behavioural science techniques to influence customer energy use choices and reduce demand. This proposed trial would partner with electricity retailers and behavioural demand response practitioners to test this solution with Ausgrid customers.

6.8 Residential Peak Time Rebate

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓	✓		

Another solution enabled by the emergence of smart meters is the use of locational rebate type tariffs to reward customers in constrained network areas to reduce their peak demand. Rebate type tariffs were strongly supported by customers in the focus groups/forums conducted under Ausgrid's '*Customers at the Centre*' research project. This proposed trial would partner with electricity retailers to test this solution with Ausgrid customers. Project design considerations might include testing a range of rebate options, gamification techniques, and smartphone applications with real-time feedback from smart meter load profiles and/or network asset monitoring.

6.9 Electric Vehicle Dynamic Charging

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
	✓			✓

The likely emergence of a significant new source of electrical load from electric vehicles raises the possibility of such load increasing peak demand and driving network investment. As the industry develops, Ausgrid plans to identify and trial innovative dynamic charging options to help customers manage their peak demand and their bills.

07 Tariff Reform Program

INITIATIVE	CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
Tariff Reform Acceptance Research	✓	✓	✓		✓

7.1 Program Overview

As Ausgrid plans to introduce new cost reflective tariff structures and accelerate our transition to cost reflective tariffs in the coming regulatory cycle, it is critical that we fast track customer research into the potential design and likely response to alternative tariff and incentive arrangements.

7.2 Tariff Reform Acceptance Research

CUSTOMER CHOICE AND CONTROL	LOWER BILLS FOR VALUED SERVICES	FAIRNESS AND INCENTIVES	SAFE, RELIABLE AND SECURE	CLEAN ENERGY TRANSITION
✓	✓	✓		✓

The purpose of this research is to enable the adoption of network tariffs/incentives that promote sustainable use of the network and deliver value to customers by reflecting the costs to deliver network services and the value of demand side participation.

This initiative seeks to understand the attitudes towards energy service pricing amongst customers, community groups, retailers and aggregators. The research would help Ausgrid understand and assess:

- The broader range of incentives and prices structures available to customers for energy services.
- How different customer groups would respond (both in theory and in practice) to alternative cost reflective tariff arrangements (e.g. critical peak demand charges or rebates, capacity limits, more targeted time of use charges, discounts for controlled load, or locational specific charges, etc.) and alternative adoption arrangements (opt in, opt out, mandatory assignment, etc.).
- How tariffs designed for retailers and aggregators would be structured, how they would function, and how those parties can be encouraged to preserve price signals embedded in network charges.
- Tariff structures suitable for emerging load profiles such residential with electric vehicles.

A pilot for new pricing models may be conducted. Ausgrid envisages at least one large scale trial to ensure findings are statistically relevant and applicable across a range of customer demographics.

Ausgrid