



Demand Management Innovation Allowance Mechanism Compliance Report

Submission to the Australian Energy Regulator

2021-2022

PowerWater

Contents

Introduction	1
Purpose and Compliance	1
DMIA Projects Summary	1
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DMIA Project development and selection process	2
DMIA Project updates	2
Future Networks Readiness Plan	2
Network visibility and forecasting	6
Future Network Strategy	9

Introduction

Purpose and Compliance

The Australian Energy Regulator (AER) applied a Demand Management Innovation Allowance Mechanism (DMIAM) to Power and Water Corporation (Power and Water) for the 2019–24 regulatory period. The DMIAM provides distribution networks with funding for research and development in demand management projects that have the potential to reduce long term network costs.

Demand management projects should have the potential to deliver ongoing reductions in demand or peak demand and be innovative and not otherwise efficient and prudent non-network options that a distributor should have provided in its regulatory proposal.

In its final determination for the 2019–24 regulatory period, the AER provided Power and Water with a total funding of \$1.57 million (\$2017-18) under the DMIAM. Under the mechanism, Power and Water can spend the funding amount on AER approved eligible projects during the 2019–24 period. If Power and Water does not spend the full amount on AER approved eligible projects, there may be a revenue adjustment in the next period equal to the shortfall.

Power and Water is required to submit an annual compliance report to the AER setting out the projects that have been undertaken under the mechanism for the past regulatory year. The 2021-22 regulatory year is the third year the DMIAM has applied to Power and Water.

The information provided in this report will also be reflected in the relevant sections of our Annual Regulatory Information Notice (RIN) for 2021-22.

DMIA Projects Summary

In the 2020-21 period, Power and Water has identified the following research and development projects in demand management that comply with the DMIAM criteria:

Project	Description	Cost (ex GST)	Status
Future Network Readiness Plan	Identification of optimal programs for effective demand management through pilot and trial programs.	\$48,100.00	Completed
Network visibility and forecasting	Assessment of network data and systems to improve visibility, better incorporate distributed energy resources (DER) and manage increasing two-way energy flows.	\$75,454.55	Ongoing
Future Network Strategy and Coordination	Comprehensive strategy to cost-effectively and safely transition Power and Water's networks in line with the clean energy goals of the Northern Territory.	\$219,187.00	Ongoing
Total		\$342,741.55	

DMIA Project development and selection process

Power and Water are required to maintain safe, reliable and affordable electricity for Northern Territory customers, while supporting the Northern Territory Government's target of 50 per cent renewable energy consumption by 2030 and the aims and objectives set out in the Darwin-Katherine Electricity System Plan (DKESP), Alice Springs Future Grid Roadmap and Remote Power System Strategy¹. Power and Water have identified the need for demand management programs and technologies as part of readying the network for significant changes in the transition of its generation and supply composition. This was highlighted as a priority within the Future Network Readiness Plan² outlined in Power and Water's DMIAM Compliance Report during the 2020-21 regulatory year (referred to initially as a DMIA roadmap).

Several projects were identified as priorities for demand management in the 2020-21 regulatory year, including:

- Trialling improved visibility and optimisation of the network and dynamic operating envelopes (DOEs)
- Low-cost ways to improve visibility of the network
- Understanding the role of community batteries
- Proactively preparing for electric vehicles

Analysis and stakeholder engagement undertaken as part of Power and Water consultation on the above topics identified further work programs of benefit to Northern Territory network customers, which are outlined in greater detail below.

Power and Water has also engaged several subject matter experts to advise on demand management programs and assist in developing implementation plans.

Power and Water is committed to expanding and sharing our knowledge and outcomes from its demand management innovation projects.

DMIA Project updates

Future Networks Readiness Plan

Nature and scope

This project involved development of a Future Networks Readiness Plan to allow for greater integration with DER on the Power and Water network. This work evolved from its initial conception as a DMIA Roadmap to the Future Networks Readiness Plan, which was published in November 2021.

The Future Networks Readiness Plan (**Readiness Plan**) outlined actions and initiatives for Power and Water to ensure the network is in the best place to meet evolving customer needs, particularly regarding demand management. Development of the plan relied on industry research and an extensive consultation process.

Aims and expectations

¹ <https://territoryrenewableenergy.nt.gov.au/strategies-and-plans/electricity-system-plans>

² https://www.powerwater.com.au/__data/assets/pdf_file/0022/94261/Future-Networks-Readiness-Plan.pdf

The Readiness Plan sought to set out how Power and Water could best invest funds available through the Demand Management Innovation Allowance (DMIA), prioritising innovative ways for fast tracking demand management network preparations. This will integrate with other initiatives Power and Water plan to undertake now and into the future. The Readiness Plan also sought to identify opportunities to partner with and leverage off other key projects, such as the Alice Springs Future Grid Project, to ensure its work fits into potential total system solutions.

Specifically, the Readiness Plan reviewed network operations to identify:

- linkages between low voltage visibility and operating state with customer energy resource solutions, such as community batteries, smart meters and other emerging technologies;
- low voltage solutions to assist in achieving the Darwin-Katherine Electricity System Plan, considering expected timeline and cost of program delivery;
- options to support the establishment of virtual power plants to efficiently coordinate solar, batteries, and customer appliances;
- options to transition from internal combustion engine cars to electric vehicles without the need for major network upgrades; and
- better manage network demand to improve the capability of the network to cater for two-way power flows.

Compliance with DMIA criteria (as outlined in section 2.2.1 Project Criteria of the Demand Management Innovation Allowance Mechanism guideline)³

DMIA Criteria	How the project aligns
<p>(a) be a project or program for researching, developing or implementing demand management capability or capacity;</p>	<p>The purpose of the Readiness Plan was to identify and prioritise demand management programs that would provide benefit to Northern Territory network customers through innovative research and program development in alignment with NT Government objectives like the DKESP.</p>
<p>(b) be innovative, in that the project or program:</p> <ul style="list-style-type: none"> i) is based on new or original concepts; or ii) involves technology or techniques that differ from those previously implemented or used in the relevant market; or iii) is focused on customers in a market segment that significantly differs, from those previously targeted by implementations of the relevant technology, in relevant geographic or 	<p>The Readiness Plan researched and consulted on demand management technology and program options that could be utilised in the NT.</p> <p>Given the wide and sparse distribution of network customers in the NT and the significantly smaller relative customer base, the options review needed to identify programs flexible enough to be adapted to meet the unique NT characteristics.</p>

³ Australian Energy Regulator, Demand management incentive scheme and innovation allowance mechanism, <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/demand-management-incentive-scheme-and-innovation-allowance-mechanism>

demographic characteristics that are likely to affect demand	
(c) have the potential, if proved viable, to reduce long term network costs.	<p>The Readiness Plan enabled Power and Water to prioritise resources on projects that had the best chance for success or could meet the most pressing needs for customers, minimising the risk of unnecessary cost overruns for unsuccessful projects.</p> <p>Projects investigated are those with the potential to lower long term network costs.</p>

Implementation approach

Subject matter experts CutlerMerz were engaged to assist in development and production of the Readiness Plan, which was released in November 2021. The Readiness Plan was delivered based on engagement with key Power and Water personnel providing direction and expertise, options analysis to identify the best suited demand management programs for the unique nature of the Northern Territory networks, and extensive industry and consumer group engagement to identify optimal technology solutions.

Power and Water has since worked with technology partners and subject matter experts to further consider options and initiatives identified in the Readiness Plan.

Outcomes and evaluation approach

The Readiness Plan recommended four initiatives to fund under DMIA arrangements:

- a Small-Scale Network Visibility and DOE Pilot Trial;
- Network Visibility Options Assessment and Business Case Development;
- Community Battery Feasibility Study; and
- EV Charging Impact Research

As a result of the Readiness Plan, Power and Water have either commenced or will soon commence the recommended initiatives.

The Network Visibility Options Assessment and Business Case Development work is underway and will be a significant foundational piece for enabling dynamic operation of the network. This work will be crucial for Power and Water to transition the network to implement DOE, work that will also be taken further by the Future Network Strategy, further detailed in this report.

Studies are also underway to investigate opportunities for integration of community batteries and EV charging, with further detail also outlined in the Future Network Strategy portion of this report.

Customers and interested parties have been invited to engage throughout the process either through accessing documents published online for knowledge sharing purposes, or through targeted and facilitated engagement forums. Insights gained from these readiness initiatives will be used to help inform our future network expenditure requirements.

The Readiness Plan was released in November 2021. Pilot programs will undergo a detailed review process following completion to determine suitability for further expansion.

Costs/Benefits

Project costs totalled \$48,100 (ex GST).

Production of the Readiness Plan has enabled Power and Water to progress to the next stage of delivery for its demand management programs, identifying the optimal programs for investment. Benefits are not yet quantifiable during the early research phase of the project however are expected to result in significant cost efficiencies for the future operation of the network.

The Readiness Plan is publicly available,⁴ and we have shared our learnings with several distribution network businesses in the NEM. Recommendations from the Readiness Plan have been adopted, with the next phase of research and detailed business case development being undertaken through the **Future Network Strategy** and **network visibility and forecasting** work, detailed further below.

⁴ https://www.powerwater.com.au/__data/assets/pdf_file/0022/94261/Future-Networks-Readiness-Plan.pdf

Network visibility and forecasting

Nature and scope

The project seeks to improve the accuracy and validity of Power and Water’s network visibility capability, in particular for network planning, operating and forecasting purposes. Initial work will be undertaken to establish a proof of concept using small samples of data. If successful, this will be expanded into a whole of network congestion and capacity assessment study which will identify early black spots of available data and data quality issues. This work will help to identify the future focus of data acquisition as well as focus for congestion and constraint management.

Power and Water aim to work with a range of stakeholders and business partners to test the interoperability of real time visibility with future market interfaces. This project will integrate with market-based work being trialled in the Alice Springs Future Grid.

Aims and expectations

Power and Water is working with GridQube and other technology partners to enable visibility of the operating state of the network in near real time. This work will help inform future network expenditure needs, identify investment required for accommodating greater renewables and DER, and develop robust business cases for undertaking identified investments.

This work will also allow Power and Water greater visibility over customer generation and demand through improved real-time access to metering data. This will be essential for managing greater penetration of DER, enabling the use of DOEs, better managing customer connections and safely managing network system constraints.

Compliance with DMIA criteria (as outlined in section 2.2.1 Project Criteria of the Demand Management Innovation Allowance Mechanism guideline)⁵

DMIA Criteria	How the project aligns
(a) be a project or program for researching, developing or implementing demand management capability or capacity;	Power and Water network operations have been without visibility or ability to respond to two-way energy flows in its networks. The network visibility and forecasting work seeks to address those constraints through managing growing DER and facilitating effective demand management.
(b) be innovative, in that the project or program: i) is based on new or original concepts; or ii) involves technology or techniques that differ from those previously implemented or used in the relevant market; or	This work is utilising innovative software developed as part of the Solar Enablement Initiative (SEI), partly funded by ARENA and led by the University of Queensland ⁶ .

⁵ <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/demand-management-incentive-scheme-and-innovation-allowance-mechanism>

⁶ <https://arena.gov.au/projects/increasing-visibility-of-distribution-networks/>

<p>iii) is focused on customers in a market segment that significantly differs, from those previously targeted by implementations of the relevant technology, in relevant geographic or demographic characteristics that are likely to affect demand</p>	
<p>(c) have the potential, if proved viable, to reduce long term network costs.</p>	<p>This program is expected to result in significantly improved visibility and operability of Power and Water’s networks in managing various demand management requirements, improving safe operation of the network and reducing the need for more costly network replacements.</p>

Implementation approach

The work completed to date has involved:

- assessment of the current state of network asset data and network metering data, conducting a gap analysis, identifying potential errors, and facilitating data quality improvements;
- assessment and data transfer of GIS shapefiles into a compatible and uniform ESRI functionality;
- assessment of power flow system visibility and commentary of effect of customer connections;
- assessment of capability requirements to ensure effective integration with future network system needs; and
- options analysis for the best approach in implementing network visibility including identifying means of alleviating minimum demand issues and integrating DOE solutions.

Outcomes and evaluation approach

The work is being undertaken by software specialists, GridQube. Several summary reports have been produced to date that provide an overview of the system’s operations, identify areas for improvement, and will be necessary to enable the operating systems to be developed.

In addition, GridQube digitised and automated data collation from metering and PV and GIS databases through application of SQL software. This allows Power and Water to readily collect and analyse export service data for a range of further data applications. In the first instance, Power and Water was able to use this process to respond to the AERs export service metric request. This will enable significant cost and time savings for future requests of this nature as well as improving export operations.

This work remains ongoing. Power and Water will conduct a review of the program following its completion to determine benefits and value in expansion.

Costs/Benefits

Workstream	Cost (ex GST)
Network visibility	\$45,454.55
Export service metrics automation	\$30,000.00
Total	\$75,454.55

The network visibility work is providing invaluable expertise and network insights to Power and Water to enable effective automated and real-time operation of various DER. The assessment work remains ongoing and is expected to deliver an automated system for Power and Water to effectively integrate and operate two-way energy flow systems, including DOEs.

Benefits will be quantified following completion of the program. Power and Water will look at the best options to share learnings of this work following its review.

Future Network Strategy

Nature and scope

Power and Water will develop a Future Network Strategy to outline some of the planned initiatives underway over the next 5–10 years to support the decarbonisation of the NT economy in response to feedback from our community, government and industry stakeholders. The strategy will focus on a number of solutions to manage growing DER, building on the programs identified in the Future Network Readiness Plan. These may include:

- DER Integration Strategy and Roadmap;
- Electric Vehicle (EV) Readiness Strategy and Options Analysis; and
- Community Battery Options Study and Analysis.

Aims and expectations

The aim of the Future Network Strategy is to promote the long-term interests of customers by articulating a vision of our future network, identifying what future capabilities will be needed and outlining how we can achieve this to maximise the value we deliver to customers.

The Future Network Strategy will be a 10-year strategy and will be updated periodically to account for changes in technology, customer preferences and the economic, regulatory and policy landscape.

Compliance with DMIA criteria (as outlined in section 2.2.1 Project Criteria of the Demand Management Innovation Allowance Mechanism guideline)⁷

DMIA Criteria	How the project aligns
(a) be a project or program for researching, developing or implementing demand management capability or capacity;	A key focus of the Future Network Strategy is to highlight opportunities for demand management programs and technologies that can maintain security and reliability of NT networks while managing costs for customers.
(b) be innovative, in that the project or program: <ul style="list-style-type: none"> i) is based on new or original concepts; or ii) involves technology or techniques that differ from those previously implemented or used in the relevant market; or iii) is focused on customers in a market segment that significantly differs, from those previously targeted by implementations of the relevant technology, in relevant 	<p>The Future Network Strategy is reviewing and identifying the demand management opportunities that are best suited to the unique needs of the NT network; a system which is required to support a relatively small number of customers over a relatively widely dispersed area.</p> <p>This requires adaptation from solutions applied in other jurisdictions to ensure the right network application and the best outcomes for customers are found.</p>

⁷ Australian Energy Regulator, Demand management incentive scheme and innovation allowance mechanism, <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/demand-management-incentive-scheme-and-innovation-allowance-mechanism>

geographic or demographic characteristics that are likely to affect demand	
(c) have the potential, if proved viable, to reduce long term network costs.	Program recommendations provided by the Future Network Strategy will be prioritising options that reduce long term network costs.

Implementation approach

This project is being supported by expert advice and content delivery from consulting group Engevity Advisory Pty Ltd, building on work completed by energy, engineering and economic firms CutlerMerz Pty Ltd, Synergies Economic Consulting Pty Ltd, GridQube Pty Ltd and Energeia Pty Ltd.

The Future Network Strategy will provide a guiding framework to prepare the network for this long-term state vision. Each objective and program is informed by five core principles that underpin the Strategy, which will be developed in consultation with customers and key stakeholders. The latest industry thinking and best practices will be adopted to build the roadmap.

Delivery of the strategy is being informed by market and industry research and stakeholder engagement to provide effective and timely recommendations.

We consulted with our customer and stakeholder to understand and evaluate their needs, views and preferences for the future network strategy – this included customers who face barriers to participating in and benefiting from new technologies like solar PV. The following table outlines our consultation forums, the stakeholder segments, and timeframes of each engagement.

Consultation forum	Description	Engagement timeframes
Peoples Panel	The Peoples Panels were delivered as a series of focus groups with residential customers representing the Darwin-Katherine, Alice Springs and Tenant Creek regulated networks. The sessions explored high level concepts of Future Networks activities, including DOEs, to understand customer sentiment and support initial expenditure forecasts for Future Networks activities and potential impacts on affordability.	November 2021 March-April 2022
Future Network Forum	The purpose of the Future Network Forum was to discuss opportunities of transitioning to a renewable energy future. In particular, we sought feedback and insights from stakeholders on: The role we should play to support the achievement of NT Government’s renewable energy targets The network capabilities required to support this transition and Initiatives to bridge identified gaps in our existing capabilities. The Future Network Forum enabled us to get feedback on the preferred pathways for implementation of future network initiatives, including DOEs.	November 2021 June 2022

Reset Advisory Committee	The Reset Advisory Committee (RAC) was established as a broadly representative customer group to consult on customer preferences. The RAC provided us with an opportunity to deep dive on more detailed content, stress test customer preferences and get feedback on how the Future Networks Strategy was developing.	March 2022 – June 2022
Small-medium business survey	Power and Water collaborated with the Chamber of Commerce to survey small-medium businesses to understand their views on the renewable energy future. We surveyed 22 small-medium businesses on how they valued reliability, affordability and facilitating renewables. A large majority of the business community were supportive of us investing in infrastructure to accommodate the shift to renewables.	March-April 2022

Outcomes and evaluation approach

The Future Network Strategy will recommend a set of pilot and trial programs for testing demand management solutions. These may include:

- customer interaction, including information sessions and interactive portals, tariff reform, and management of two-way energy flows;
- DER management, including review and update of DER connection and registrations and updating DER interaction systems;
- pilot EV charging and integration programs and expand to other CER technologies;
- explore alternative DER flexible connection options and approaches to implement DOEs; and
- enhancing network planning, forecasting and optimisation systems

Delivery of the Future Network Strategy remains underway and is expected to be completed during FY2023.

Power and Water will conduct a review of the program following its completion to determine benefits and value in expansion.

Costs/Benefits

SME	Workstream	Cost (ex GST)
Engevity Advisory Pty Ltd	Future Network Strategy Project Coordination	\$83,762.50
Synergies Economic Consulting Pty Ltd	DER Strategy Development	\$32,466
Energeia Pty Ltd	EV Charging Roadmap & Expenditure Forecast	\$24,865.32
Ernst & Young	Electric Vehicle Impact Assessment	\$39,088.18
Cutler Merz Pty Ltd	Community Battery Options Study	\$39,005

Total		\$219,187.00
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Delivery of the Future Network Strategy will provide a range of demand management programs for Power and Water to implement that will realise savings for network customers while maintaining secure and reliable networks. The absence of the strategy and its associated recommendations would have meant higher costs, lengthier program delays, and safety and security risks to network users as customer energy resources increased without the right tools, programs, and technologies in place to support their increased penetration.

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