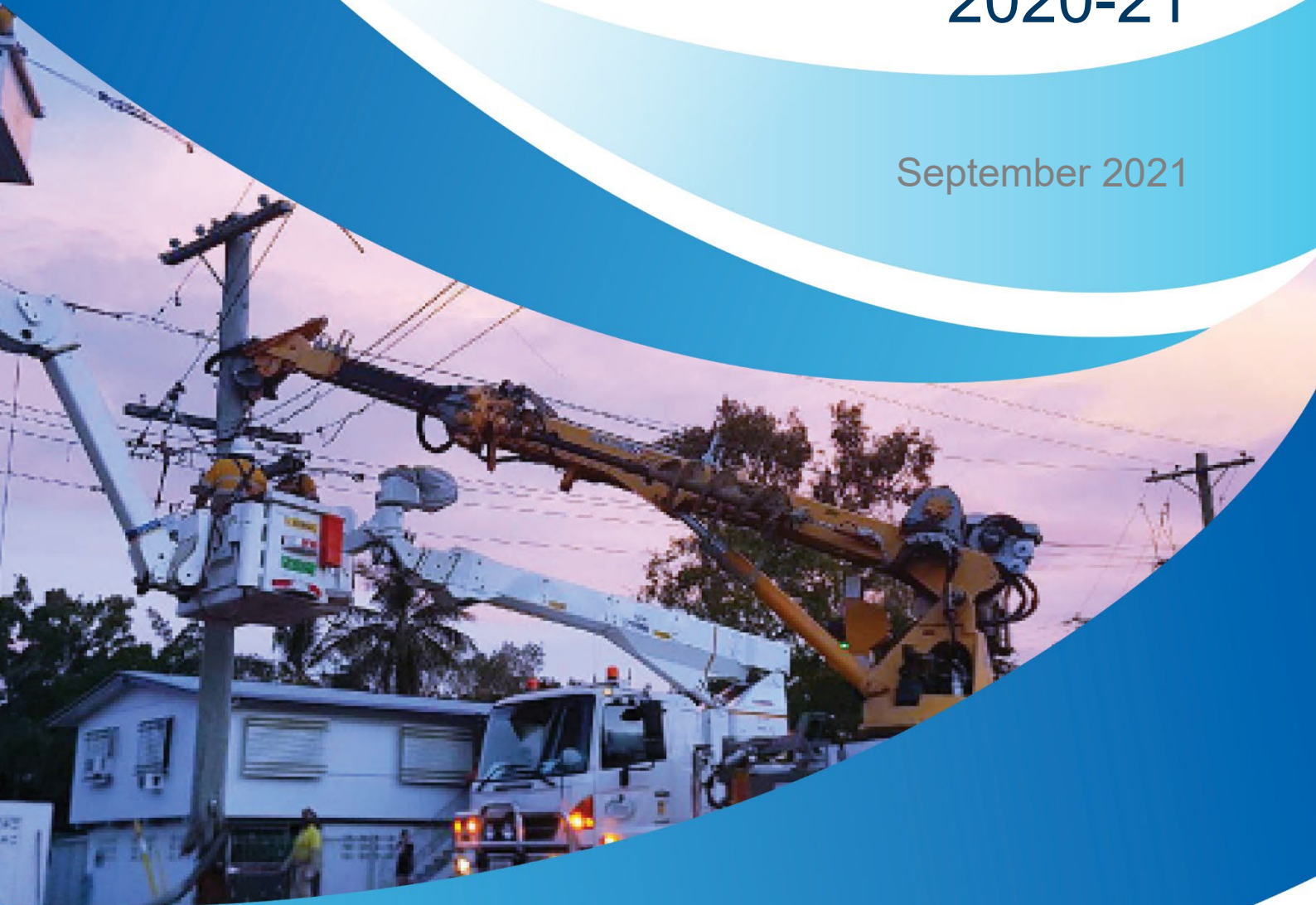


Ergon Energy Demand Management Innovation Allowance Report 2020-21

September 2021



Part of Energy Queensland

Contents

1. Introduction	2
1.1 Purpose and compliance	2
1.2 DMIA projects summary	3
2. DMIA Project development and selection process	4
3. DMIA Project updates	5
3.1 Alternative Supply Bustard Heads	5
3.2 Solar Analytics Customer Devices Enabling	6
3.3 Western Grid Lab Testing & Product Development	9
3.4 West Leichhardt SWER	10
3.5 IPDRS Pilot	13
3.6 Evolve	14
3.7 Expanded Network Visibility Initiative	16

1. Introduction

1.1 Purpose and compliance

Ergon Energy is pleased to present the Demand Management Innovation Allowance (DMIA) Report for the 2020-21 regulatory year. The purpose of this report is to allow the Australian Energy Regulator (AER) to:

- assess Ergon Energy's 2020-21 DMIA initiatives and Ergon Energy's entitlement to recover the expenditure under the AER's Demand Management Incentive Scheme (DMIS)
- confirm Ergon Energy's compliance with the annual reporting requirements of the AER's Regulatory Information Notice (RIN).

This report has been completed in accordance with Schedule 1, paragraph 6 of the AER's RIN (refer figure 1), which requires a DNSP to which the DMIS applies to submit an annual report to the AER on its expenditure under the DMIA. This report, and the information contained in the report, is suitable for publication by the AER.

DMIA reporting requirements Schedule 1: Item 6 – Demand Management Incentive Allowance

- 6.1 Identify each demand management project or program for which Ergon Energy seeks approval.
- 6.2 For each demand management project or program identified in the response to paragraph 6.1:
 - a) Explain:
 - (i) how it complies with the Demand Management Innovation Allowance criteria detailed at section 3.1.3 of the demand management incentive scheme;
 - (ii) its nature and scope;
 - (iii) its aims and expected outcomes;
 - (iv) the process by which it was selected, including its business case and consideration of any alternatives;
 - (v) how it was/is to be implemented;
 - (vi) its implementation costs; and
 - (vii) any identifiable benefits that have arisen from it, including any off peak demand reductions.
 - b) confirm that its associated costs are not;
 - (i) recoverable under any other jurisdictional incentive scheme;
 - (ii) recoverable under any other Commonwealth or State Government scheme; and
 - (iii) included in the forecast capital or operating expenditure approved in the 2015-20 Distribution Determination or recoverable under any other incentive scheme in that determination; and:
 - c) state the total amount of the Demand Management Innovation Allowance spent in the relevant regulatory year and how this amount has been calculated.
- 6.3 Provide an overview of developments in relation to projects or programs completed in previous years of the regulatory control period, and any results to date.

1.2 DMIA projects summary

In its Distribution Determination¹, the AER decided to apply Part A of the DMIS (i.e. the DMIA component) to Ergon Energy, approving an innovation allowance amount of \$5,564,333 over the 2020-25 regulatory control period.

The DMIA is provided to investigate opportunities that are not yet commercial, in addition to any business-as-usual capital and operating expenditure allowances for demand management and embedded generation projects approved in Ergon Energy's Distribution Determination. This provides a direct incentive for DNSPs to assess emerging opportunities for potentially efficient non-network alternatives, to manage the expected demand for standard control services in some other way or to enable more efficient connection of embedded generation other than through network augmentation.

Ergon Energy's 2020-21 DMIA program comprised seven projects. The total cost incurred for the DMIA initiatives during 2020-21 was \$1,574,592.02. The table below summarises Ergon Energy's DMIA program expenditure recovery for the 2020-21 regulatory year.

Project	2020-21 expenditure (\$) direct cost only				
	Total project budget	Capital	Operating	Total	Status (at 30 June 2021)
Alternate Supply Bustard Head	932,673		365,145.40	365,145.40	Continuing
Solar Analytics Cust Devices Enablement	232,912		1,360.94	1,360.94	Closed
Western Grid Lab Testing & Prod Dev	382,500		62,347.60	62,347.60	Closed
West Leichhardt SWER	3,131,525		776,638.86	776,638.86	Continuing
IPDRS Pilot	636,636		43,216.27	43,216.27	Continuing
Evolve	240,000		173,382.95	173,382.95	Continuing
Expanded Network Visibility Initiative	155,464		152,500	152,500	Closed
Total	5,711,710		1,574,592.02	1,574,592.02	²

Ergon Energy confirms that the costs of the projects specified in this report are:

- not recoverable under any jurisdictional incentive scheme;
- not recoverable under any other Commonwealth or State Government scheme;
- not included as part of:
- the forecast Capital Expenditure or the forecast Operating Expenditure; or
- any other incentive scheme applied by the 2020-25 Distribution Determination

¹ AER (2015), Final Decision, Ergon Energy determination 2016-17 to 2019-20, Attachment 12 – Demand management incentive scheme, October 2015.

² These project costs have been submitted to the AER for approval and are awaiting the AER's decision.

2. DMIA Project development and selection process

Ergon Energy considers DMIA investments an important component of its commitment to delivering customer value over the longer term. The DMIA program complements our demand management program, which is geared toward providing a more efficient solution to network augmentation. The DMIA initiatives have enabled Ergon Energy to investigate and test innovative approaches to a range of network issues, customer behaviours, renewable integration and tariff enablement.

For the 2020-21 DMIA program, all nominated DMIA projects are subject to a screening and feasibility processes, consistent with the AER's DMIS. The general DMIA project development and assessment process applied in Ergon Energy involves:

- Promotion of DMIA funding and criteria to internal stakeholders to encourage project ideas to be submitted, as an EOI or more formal DMIA Project Scope;
- Review of EOI or DMIA Project Scope against DMIA criteria as a minimum, and against relevant internal strategy documents, including the *Energy Queensland Future Grid Roadmap**, Ergon Energy's *Demand and Energy Management Strategy* and *Load Control Strategy*;
- Project proponents are encouraged to discuss project ideas with other Ergon or Energex subject matter experts, which helps guide and refine the idea;
- Projects that are deemed to meet the DMIA criteria are then formally submitted to the DMIA Program Manager for approval, or endorsement to the appropriate financial delegate.

*The Future Grid Roadmap is a document that outlines a range of themes and supporting activities and no-regret investments necessary for the Energy and Ergon Energy to achieve a transition to the intelligent grid of the future over the next 10-20 years. It is not essential to meet criteria other than the stated DMIA criteria, however project proponents within EQL should, where possible, ensure their project aligns with these existing EQL strategic network direction and priorities.

Budgets are prepared in accordance with Ergon Energy's standard project methodology, detailing information including project goals, deliverables, milestones and resources required. Cost estimations were developed for the requirements identified, for each phase of the project. These cost estimations drew upon various sources including the cost of similar projects undertaken by Ergon Energy, current preferred contractor panel contracts and market research.

In November 2020, a workshop was held with key internal stakeholders at which a wide range of potential DMIA project ideas were brainstormed and assessed against DMIA criteria and other internal strategy documents. A list of projects was identified as possible or probable, which will be considered for further development into actual projects during the regulatory period. Looking forward to 2021/22, formal engagement with universities will be undertaken to explore potential project partnerships, potentially using DMIA funding where applicable.

3. DMIA Project updates

This section of the report details the status of Ergon Energy's DMIA projects in 2020-21 by describing each project, its objectives, progress and findings to date.

3.1 Alternative Supply Bustard Heads

Trial a stand-alone power system (SAPS) as a network support device, with the long term aim to reduce network costs.

3.1.1 Compliance with DMIA Criteria

The Bustard Head SAPS project complies with the Demand Management Innovation Allowance criteria detailed at section 3.1.3 of the demand management incentive scheme as the project will enable the substitution of costly network components with alternative supply arrangements that provide improved power quality and reliability whilst enabling improved value to all customers.

3.1.2 Nature and Scope

Trial a stand-alone power supply system as a network support, with the long term aim of using SAPS as a lower cost solution to network maintenance/replacement.

3.1.3 Aims and expected outcomes

Direct outcomes and benefits:

- The customer outcomes will be a more reliable power supply.
- The network outcome will be a reduced operating cost and reduced network losses on their distribution system

Indirect outcomes and benefits:

- Ergon has developed new approaches to working with customers towards more cost-effective supply solutions through the development of a SAPS Customer Engagement Strategy;
- Ergon will develop new equivalent electricity supply standards for solar/battery hybrid systems including working with the ENA to develop new across DNSP business standards and guidelines for utility grade SAPS;
- EQL is using the knowledge and experience gained from the SAPS trials in working with ENA and other DNSPs to develop national guidelines for DNSP led SAPS.

3.1.4 The process by which it was selected, including its business case and consideration of any alternatives

'All Ergon Energy DMIA projects are selected and scoped to respond to current and emerging network limitation drivers, and adhere to the standard governance framework. The eligibility-screening process is performed on nominated projects as a high-level assessment, to determine whether the projects meet the objectives of the DMIA. Specifically, this tests whether each potential project is in accordance with paragraph 3.1.3 of the DMIS. Provided all the specified conditions are met, then the project proceeds to the feasibility assessment and approval stages, as per the gated governance framework and with internal subject matter expert review and feedback. Information from

the development activities undertaken enables implementation scheduling, milestone planning and confirmation of resources.

3.1.5 How it was/is to be implemented (i.e. general project update)

The Bustard Head SAPS was installed and commissioned in December 2020 (installation photo's below). It has been in operation since this time supplying the full energy needs of the two customers it supplies. The SAPS is being monitored and its performance measured, and an initial customer survey has been undertaken to gather customer insights through the whole project process. The SAPS will continue to be monitored and lessons learnt captured for the development of future standardised DNSP SAPS. This trial will lead into new work to enable appropriate life-time management of alternative supply dependent on the criteria set under the new AEMC rules for SAPS.

3.1.6 Any identifiable benefits that have arisen from it, including any off peak or peak demand reductions

The project has already developed some criteria for equivalency in design that now need to be tested. Customer engagement has been positive for the project. As a result of this project, a Stand-Alone Power Systems Customer and Community Engagement Strategy has been developed which can be used for any future similar engagement.

Image 1: Bustard Head SAPS



3.2 Solar Analytics Customer Devices Enabling

Trialling HEMs device to test ability to deliver customer and network benefits (including outage notifications for load control, PV export limits, and increased LV visibility for the network).

3.2.1 Compliance with DMIA Criteria

The project is exploring the benefits and opportunities that smart customer side devices can deliver for both customers and the network. Focus areas for the project include; outage notifications for irrigators, development of renewable energy value streams for irrigator customers that reduce strain on the network, PV and demand management in isolated communities and increasing LV visibility for the network using Solar Analytics customer data.

3.2.2 Nature and Scope

Project to work with Solar Analytics and explore the opportunities that additional product development of the Solar Analytics device can provide Energy Queensland's network and customers. Areas of opportunity that are to be examined include;

- Developing additional features to assist irrigators on trial QCA tariff structures
- Providing increased visibility and control of solar PV and customer block loads for the isolated communities
- Investigating how a limited deployment may provide greater accuracy for state estimation at a lower cost than some current data streams
- Explore general load and renewables control via a customer side device

3.2.3 Aims and Expectations

The Solar Analytics Customer Devices Enabling Renewables (SACDER) Project Scope has several aims:

- To drive development of additional capabilities within customer owned devices that provide network benefits for both niche and widespread uptake;
- To determine opportunities for Energy Queensland to improve LV visibility based on existing and growing Solar Analytics data sets that provide richer customer information without requiring network owned monitors;
- To participate actively in the development of customer side products that enable opportunities to improve network outcomes in enabling customer choice and increasing renewable energy;
- To trial new products and determine the value they can provide the community.

3.2.4 The process by which it was selected, including its business case and consideration of any alternatives

All Ergon Energy DMIA projects are selected and scoped to respond to current and emerging network limitation drivers and adhere to the standard governance framework. The eligibility-screening process is performed on nominated projects as a high level assessment, to determine whether the projects meet the objectives of the DMIA. Specifically, this tests whether each potential project is in accordance with paragraph 3.1.3 of the DMIS. Provided all the specified conditions are met, then the project proceeds to the feasibility assessment and approval stages, as per the gated governance framework and with internal subject matter expert review and feedback. Information from the development activities undertaken enables implementation scheduling, milestone planning and confirmation of resources. The Solar Analytics devices proved to be an effective method for the participating irrigation customers to be notified of load control switching and energy consumption. An

unexpected benefit was obtained by Ergon Network in that the devices gave enhanced visibility of the effectiveness of a dedicated audio frequency load channel used for irrigations customers in the trial, identifying some signalling errors to be rectified.

3.2.5 How it was/is to be implemented (i.e. general project update)

A total of 10 trial devices were installed at irrigation customer pumping sites to meet the requirements of Milestone 1. This phase of the project targeted customers participating in the existing Agricultural Tariff Trial, which was trialling the use of Tariff 33 (a load control tariff) and aimed to develop the Solar Analytics product so that it is capable of providing Agricultural Tariff Trial customers with notifications about power supply outages at their irrigation points of connection following load control events instigated through the tariff. This was a voluntary program that sought to understand how customer owned energy monitoring devices can provide benefits for both customers and Ergon Energy's network. Existing Agricultural Tariff Trial (Tariff 33 Group) customers were invited to participate in order to help Ergon Energy Network understand the benefits of knowing when a customer's supply is switched off under the load control tariff conditions.

The project as linked with work from a consortia of businesses that intended to provide more demand management features with the device used in the SACDER trial. This did eventuate and therefore more effort was placed on analysing not only the data for the 10 trial sites, but also reviewing the Queensland data of an additional 2000 plus Solar Analytics devices to determine greater understanding of network impacts of load and photovoltaic generation systems on the low voltage network.

3.2.6 Any identifiable benefits that have arisen from it, including any off peak or peak demand reductions

An outcome of this trial was that it enabled fault identification and diagnosis in relation to the network audio frequency load control system, as part of the Agricultural Tariff 33 (load control) trial. This reduced customer angst and improved customer acceptance of load control tariffs for non-domestic purposes. As a result of the success of the overall Agricultural Tariff 33 Trail, of which the Solar Analytics devices as an important element, 3 new load control network tariffs were submitted and approved as part of the Energex and Ergon Energy Tariff Structure Statements for 2020-25 regulatory period. Based on the feedback from customers, Ergon Energy also developed and trialled an SMS notification system (non-DMIA funded) utilising the trigger of load control being activated through the Network load control system. This will improve the attractiveness of these load control

tariffs for non-domestic customers, in turn providing greater loads under control for network management purposes.

3.3 Western Grid Lab Testing & Product Development

Lab trials of a number of devices with the potential to enable increased capacity and improved to quality of supply for fringe of grid customers.

3.3.1 Compliance with DMIA Criteria

The project is developing and implementing demand management capability for SWER networks, by examining prototype technologies with the potential to reduce network costs through minimising SWER network augmentation.

3.3.2 Nature and Scope

The Western Fringe of Grid refers to extensive Single Wire Earth Return (SWER) networks. These networks can require upgrades to service the evolving power needs of their customers.

The project sought to further EQL understanding of device capabilities and opportunities for deployment to increase network capacity, improve power quality at reduced cost on the Western Fringe of Grid.

The suppliers and manufacturers of the tested devices were engaged and were provided feedback.

3.3.3 Aims and Expectations

The Western Grid – Laboratory Testing Project Scope has two aims:

- Trial some developing and early offering products that are available to assist in SWER capacity and power quality enhancement;
- Engage with industry in the development of products that meet the growing needs of Energy Queensland to seek alternatives for SWER customers in both on-grid and off-grid scenarios.

The desired outcomes are:

- Ability to improve SWER capacity
- Ability to improve customer power quality
- Ability to be utilised in SWER environments

3.3.4 The process by which it was selected, including its business case and consideration of any alternatives

Ergon Energy DMIA projects are selected and scoped to respond to current and emerging network limitation drivers, and adhere to the standard governance framework. The eligibility-screening process is performed on nominated projects as a high-level assessment, to determine whether the projects meet the objectives of the DMIA. Specifically, this tests whether each potential project is in accordance with paragraph 3.1.3 of the DMIS. Provided all the specified conditions are met, then the project proceeds to the feasibility assessment and approval stages, as per the gated governance framework and with internal subject matter expert review and feedback. Information from the development activities undertaken enables implementation scheduling, milestone planning and confirmation of resources.

3.3.5 How it was/is to be implemented (i.e. general project update)

Laboratory testing and analysis has been completed.

The devices tested were:

Product	Category	Partner
LVR-30	Voltage Regulator	Fundamentals Australia Pty Ltd
SP PRO	BESS Integrator	Selectronic Australia Pty Ltd
EcoSTORE	BESS Integrator	EcoJoule Energy Pty Ltd
UBI 3.0	HEMS	Mondo Power
ElektroBank	BESS Integrator	Empower Energy

3.3.6 Any identifiable benefits that have arisen from it, including any off peak or peak demand reductions

The project has identified several devices suitable for pilot for use on SWER networks. The manufacturers were engaged to enhance learnings and provided feedback for additional product development.

The device testing highlighted the importance several key attributes:

- Operational independence from constant communications / internet
- Robust performance during power interruptions and at various voltages
- Documentation of the device to allow the technician to get the best performance out of the device

The project identified several devices suitable to be trialled on network locations to apply the project learnings in real world situations.

3.4 West Leichhardt SWER

Trial two larger scale stand-alone power systems (SAPS) as network support devices as an alternative to grid supply.

3.4.1 Compliance with DMIA Criteria

The West Leichhardt SAPS project complies with the Demand Management Innovation Allowance criteria detailed at section 3.1.3 of the demand management incentive scheme as the project will enable the substitution of costly network components with alternative supply arrangements that provide improved power quality and reliability whilst enabling improved value to all customers.

3.4.2 Nature and Scope

Trial SAPS as network support and develop supporting policies, processes and systems that can more broadly enable DNSP led SAPS across Ergon Energy's and Energex's networks.

3.4.3 Aims and expected outcomes

- Improved reliability and power quality for the two customers involved in the trial
- Informing design rules and scenarios for SAPS
- Developing customer engagement strategies and plans to transition customers from grid to SAPS supply
- Identifying changes to Ergon Energy's connection policy and connection agreements to ensure a consistent approach for SWER customers and encouraging alternate solutions where appropriate rather than extending the SWER network;
- Acquiring the knowledge and experience to inform;
 - future business requirements for SAPS supply; and
 - future product solutions to enable a more flexible approach to connections in the future by the planning teams.

3.4.4 The process by which it was selected, including its business case and consideration of any alternatives

All Ergon Energy DMIA projects are selected and scoped to respond to current and emerging network limitation drivers, and adhere to the standard governance framework. The eligibility-screening process is performed on nominated projects as a high-level assessment, to determine whether the projects meet the objectives of the DMIA. Specifically, this tests whether each potential project is in accordance with paragraph 3.1.3 of the DMIS. Provided all the specified conditions are met, then the project proceeds to the feasibility assessment and approval stages, as per the gated governance framework and with internal subject matter expert review and feedback. Information from the development activities undertaken enables implementation scheduling, milestone planning and confirmation of resources.

3.4.5 How it was/is to be implemented (i.e. general project update)

Two SAPS to supply the two customers involved in this trial were commissioned in February and March 2021 and have been operational since this time supplying the operational needs of the two customers (installation photo's below).

The SAPS are being monitored and their performance measured, and an initial customer survey has been undertaken to gather customer insights through the whole project process. The SAPS will continue to be monitored and lessons learnt captured for the development of future standardised DNSP SAPS.

This trial will lead into new work to enable appropriate life-time management of alternative supply dependent on the criteria set under the new AEMC rules for SAPS.

3.4.6 Any identifiable benefits that have arisen from it, including any off peak or peak demand reductions

The project has already developed some criteria for equivalency in design that now need to be tested. Customer engagement has been positive for the project.

Image 2: SAPS Trial Site 1



Image 3: SAPS Trial Site 2



3.5 IPDRS Pilot

The purpose of this project was to undertake market discovery to establish a complete end-to-end energy management system that enables the Internet Protocol Demand Response Device (IPDRED) functionality. Regulatory change regarding a DNSPs ability to own assets behind the customer meter has led to a Network strategic change as to the securing of demand management/response direct with customer. The movement away from direct firm load control has shifted to market procurement. This project is joint funded under Ergon and Ergon DMIA allowance.

3.5.1 Compliance with DMIA Criteria

The project aims to orchestrate improved energy management (peak lopping, valley filling, neutralise otherwise disruptive loads) to reduce network augmentation requirements. The purpose of an IPDRED is to increase the amount of load under management (more appliances, improved geographic coverage), improved the ability have more granular / targeted load control; and to complement existing load control based around audio frequency-based load control. As the project was initiated in 2019-20 but expected to carry forwarded into the 2020-25 regulatory period, it was assessed against the DMIA criteria applicable in both Regulatory periods. The project was deemed to be in compliance as it was a program for researching, developing or implementing demand management capability or capacity, that could be used broad based or in specific network demand constraint areas.

3.5.2 Nature and Scope

Undertake market discovery to establish a complete end-to-end market-delivered demand response (MDDR) process; from DNSP signalling a requirement to third parties reacting, and verifying their response, to satisfy that requirement. Market discovery will enable understanding for a broader market undertaking. This scope covers engagement of potential third-party solution providers delivering MDDR.

3.5.3 Aims and expected outcomes

The aim is to identify suitable service providers for a complete energy management platform (from platform serve to a demand response communications pathway). The outcome will be a detailed business case to move forward with market roll-out Internet Protocol Demand Response Enabling Device (IPDRED) requirements if the pilot is successful.

3.5.4 The process by which it was selected, including its business case and consideration of any alternatives

With regulatory requirements seeking DNSP movement away from any activity behind customer meters this program seeks to fulfil the stated D&EM strategic intent of managing two-way energy flows, being cost-efficient in encouraging other market players to deliver attractive demand management/response mechanisms that value add to them and their customers. With growth of residential DER, understanding how to support a pathway for this market will increase both the type and magnitude of loads under management and accessible for network support. With individual customer addressability there will be greater granularity and flexibility in response to network constraints. With other market players encouraging take-up of their services to optimise energy use to tariffs and value from demand response the cost to procure these services from the market only as

required should significantly reduce cost to serve, whilst augmenting the existing network value of the audio frequency load control / demand management platform.

3.5.5 How it was/is to be implemented (i.e. general project update)

The project was meant to operate through the engagement of service providers of technology solutions being sought for platform and communication pathways. Service providers were asked to secure new participants to their existing “home energy management systems” based on a set of DNSP requirements, including an incentive payment. Unfortunately, to date this customer acquisition model has not been successful. Alternatives to boost customer participation are in review.

3.5.6 Any identifiable benefits that have arisen from it, including any off peak or peak demand reductions

Given the regulatory moves toward market procurement of load control, part of the original objective to have a better understanding of the cost to deliver an end to end control methodology has morphed to being that of formalising with the market, a DNSP's requirements of their vendor solutions to enact demand management/response on the DNSP's behalf.

18 events were called seeking a mixture of both peak and minimum demand between the 22 February and 6 June 2021. Very positive results identify that the IPDRS solution is technically successful in delivering significant network relief when required. Diversified demand reductions of over 2kW, and diversified minimum demand relief of at least 2kW per event participant were observed with relative ease. A full report on the pilot will be released providing full detail of the pilot and results.

As the project draws to a conclusion in Q1 of FY 2021/22, it has identified five outcomes;

- (i) The existing embryonic market conditions make it exceedingly difficult for third-party providers to make meaningful inroads to customer acquisition. Solutions can be costly due to lack of economy of scale, and customers are not really aware of the home energy management market, meaning
- (ii) significant financial assistance would be required to inject impetus to the market, whilst
- (iii) finding other channels to market will assist in generating market uptake (e.g. greenfield sites),
- (iv) that IPDRS orchestration of DER and loads within a home can present significant opportunities for network support as well as customer savings, and
- (v) the IPDRS program has helped EQL networks understand better how to request the specific network support from IPDRS suppliers.

3.6 Evolve

The Evolve project will implement systems and capabilities that calculate and publish, (via a software API), the operating envelopes for individual and aggregate DER (specifically rooftop PV and batteries) in the distribution network. Those operating envelopes that underpin increased network hosting capacity of distributed energy resources (DER), by ensuring high penetration DER are able to maximise their connection, operation and participation in markets for energy, ancillary and network services, whilst ensuring the secure technical limits of the electricity networks are not breached.

3.6.1 Compliance with DMIA Criteria

The project was viewed as meeting DMIA Criteria by investigating ways to shift or reduce demand for standard control services through non-network alternatives. The Evolve project includes active

management of DER to enable visibility and control of targeted network areas with constraints. The operating envelopes (outcome of the project) will provide an upper and lower limit for safe operation of the network for both DER import and export that potentially can be used to implement more granular and effective demand management programs to respond to local network constraints.

3.6.2 Nature and Scope

The scope is to calculate the operating envelopes for DER assets using a variety of low voltage (LV) and medium voltage (MV) network data sources and will include the as-switched network model, as well as the current and forecast operating state. The operating envelopes will be published to DER aggregators and other interested parties using a mutually agreed and developed API.

3.6.3 Aims and expected outcomes

The Evolve project will include the augmentation and extension of software systems and installation of additional sensors targeting specific locations to calculate and publish normal-state and emergency operating envelopes and constraints that apply to individual or aggregated DER operating within the electrical network. Outcomes of the project are to develop capability with calculating and projecting localised envelopes, reduce the costs of deployment as well as optimal network hosting capacity of DER, while ensuring the secure technical limits of the electricity distribution network are not breached.

3.6.4 The process by which it was selected, including its business case and consideration of any alternatives

The DMIA project approval process was followed for selecting this project (Evolve). Potential DMIA projects are selected and scoped to respond to current and emerging network limitation drivers and adhere to the standard governance framework. Accordingly, once projects are identified and nominated, the eligibility-screening process is performed on nominated projects as a high-level assessment, to determine whether the projects meet the objectives of DMIA. Specifically, it tests whether any potential project is in accordance with paragraph 3.1.3 of the DMIS. Provided all the specified conditions are met, then the project proceeds to the feasibility assessment and approval stages, as per a gated governance framework and with internal subject matter expert review and feedback. Information from the development activities undertaken enables implementation scheduling, milestone planning and confirmation of resources.

3.6.5 How it was/is to be implemented (i.e. general project update)

The Evolve project is strengthened by the involvement of multiple distribution network partners by allowing it to understand and meet the needs of different types of electricity networks, with varying age, construction and population densities. It will also provide an opportunity to integrate with different operational technologies and explore the development of standards-based approaches to obtaining the reference electricity network models needed for the envelope engine algorithms.

By involving a number of DER aggregators, it will be possible to better understand the coordination and orchestration requirements between different DER assets, DER aggregators and different software architectures and implementations used by each.

The Evolve project is implementing operating envelopes within an Evolve framework, an open-source technology framework which is deployed into cloud infrastructure and integrated with both DNSP and aggregator systems. The Evolve framework ingests the relevant network and DER data and then makes this available for analysis in a standards-based form. The calculation and publication of operating envelopes are implemented as a series of software modules and algorithms within the

Evolve framework. Testing and validation of operating envelopes for Energex and Ergon Energy networks occurred in the first half of 2021 and preliminary results were presented to Energex and Ergon Energy staff. More knowledge sharing session available to broader audience will be scheduled by the project team at ANU after results from NSW utilities are analysed.

3.6.6 Any identifiable benefits that have arisen from it, including any off peak or peak demand reductions

The Evolve project is still in the early testing phase but has shown capability that has potential for DER management and consequently network demand management.

There are several projected benefits of operating envelopes at the current maturity levels of DER deployed within the electricity system:

- 1) Operating envelopes can address multiple use cases including challenges currently being faced in both electricity distribution networks and at the whole of system level;
- 2) Operating envelopes promise to be simple to implement across a variety of different DER assets, and do not require the use of sophisticated local control and optimisation systems;

Operating envelopes can be deployed progressively into different segments of a distribution network as they are needed.

3.7 Expanded Network Visibility Initiative

The purpose of the Expanded Network Visibility Initiative (ENVI) is to build on the work of the Solar Enablement Initiative and LV State Estimation project, former DMIA projects, which successfully demonstrated a novel state estimation in operation on Energex's network. ENVI will develop the tools and systems to enable the scale-up of Distribution System State Estimation (DSSE) across Energy and Ergon Energy Network medium and low voltage feeders.

3.7.1 Compliance with DMIA Criteria

The Expanded Network Visibility Initiative complies with the Demand Management Innovation Allowance criteria detailed at section 3.1.3 of the demand management incentive scheme. The visibility over historical and near real-time network performance that can be achieved by application of DSSE will improve the business' ability to identify areas of network which may benefit from additional demand management and facilitate better orchestration of distributed energy resources on the low voltage network.

3.7.2 Nature and Scope

Broadly, this project will focus on developing and deploying the capability to perform state estimation on medium and low voltage feeders in Energex and Ergon Energy. In addition, it will explore the

application of state estimation to improve existing demand management approaches through improved network visibility and capacity constrained optimisation analysis.

3.7.3 Aims and expected outcomes

The purpose of the Expanded Network Visibility Initiative (ENVI) is to expand on the work of the Solar Enablement Initiative (SEI), a previous DMIA project, which successfully demonstrated a novel State Estimation Algorithm (SEA) in operation on Energex's network. ENVI has one primary objective and three secondary objectives:

1. Development of the tools and systems required for Ergon Energy and Energex to scale-up the SEA across their MV and LV networks to provide expanded network visibility as an intelligent foundation to enable distributed energy resources (DER) and facilitate demand management activities (Primary).
2. Refine the prototype semi-automated network analysis tool developed by the SEI to enable engineers to accurately predict the impacts of future Distribution Energy Resource connections – both generation and load (Secondary).
3. Further refine and maintain the SEA to facilitate Dynamic Operating Envelope trials which seek to dynamically signal customers or third parties, such as Virtual Power Plants (VPPs) or aggregators, to operate within an operating envelope based on near real time network operating conditions (Secondary).
4. Develop a tactical plan for the use of the SEA's companion Capacity Constraint Optimisation to inform and automate existing manual Load Control Schedules (LCS) (Secondary).

The work will be undertaken in a collaborative engagement with external company GridQube who has been granted the rights to commercialise the SEA from the University of Queensland.

3.7.4 The process by which it was selected, including its business case and consideration of any alternatives

This project was selected based on the multiple benefits it can provide to many areas of the business, demand management being one. DSSE is seen to be an efficient approach to gaining visibility over the network, without the need for extensive and costly network monitoring. It can achieve the same level of visibility using less data. Using the business' Opportunity Matrix it was identified as an innovative venture with high opportunity potential.

3.7.5 How it was/is to be implemented (i.e. general project update)

The project is progressing well with DSSE operational in EQL's Amazon Web Services tenancy. A data streaming platform has been established to push data from field devices in near real time with data available for DSSE every 5 minutes on select trial feeders. The transfer of time series data has also been established with an interface to the businesses' PI Historian databases. Basic network tracing scripts have been built to extract network feeder models from both Energex and Ergon systems enabling testing of various use cases.

3.7.6 Any identifiable benefits that have arisen from it, including any off peak or peak demand reductions

The project was not targeting a specific quantity of peak or off-peak demand reduction but is targeted as establishing platforms and capability from which sound demand management decisions can be made based on the increased network visibility provided by DSSE.

This project is now in the close-out phase having delivered:

- (i) A cloud-based technology platform on which DSSE can be run within EQL's operational environment.
- (ii) A data streaming solution to deliver data from various sources and systems to the DSSE.
- (iii) Access to network monitoring data to support both near real-time and historical DSSE.
- (iv) A basic mechanism to extract and load network feeder models into the DSSE. A more advanced and automated solution is under development as EQL introduces new geospatial and asset record systems from which future network models must be extracted.
- (v) An integration of DSSE, capacity constrained optimisation and dynamic operating envelope calculations as run in AWS with the operational technology platform from which DOE will be published externally. This work is directly related to the Dynamic Operating Envelopes Phase 1 Commercial project (refer to 3.6 below).
- (vi) A demonstration of the use of DSSE to optimise demand management calls via peak smart. This demonstration is still being refined as part of the project close-out together with a demonstration related to optimising AFLC scheduling across a zone substation.
- (vii) A demonstration of the use of DSSE to automate network connection assessments.