Decision

Approval of Demand Management Innovation Allowance (DMIA) expenditures by Queensland and South Australian electricity distributors in 2019–20

QLD and SA

2019–20 Financial Year and carry-over adjustments for the next regulatory period

April 2021

AUSTRALIAN ENERGY REGULATOR

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Shortened forms

Shortened form	Extended form
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ARC	Australian Research Council
ARENA	Australian Renewable Energy Agency
augex	augmentation expenditure
capex	capital expenditure
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DER	distributed energy resource
DM	demand management
DMIA	demand management innovation allowance
DMIS	demand management incentive scheme
DNSP	distribution network service provider
DRED	demand response enabled device
LV	low voltage
MW	megawatt
NEL	national electricity law
NEM	national electricity market
NEO	national electricity objective
NER	national electricity rules
NNA	non-network alternatives
NSP	network service provider
opex	operating expenditure
PV	photovoltaic
SWER	single wire earth return
VPP	virtual power plant

1. Summary

The Demand Management Innovation Allowance (DMIA) aims to provide incentives for Distribution Network Service Providers (DNSPs) to conduct research and investigation into innovative techniques for managing demand. It also aims to enhance industry knowledge of practical demand management projects and programs through the publication of annual project summary and expenditure reports. The DMIA is part of the Demand Management Incentive Scheme (DMIS) (before 2017) which has been applied to all DNSPs in the national electricity market (NEM) as part of the distribution determinations we made before June 2019.

This report presents our assessment of three DNSPs' annual expenditure claims under the pre–2017 scheme, based on the distributors' DMIA reports for the regulatory year 2019–20 submitted in October 2020. We will publish a separate report for the 2019–20 reporting period of electricity distributors in NSW, ACT, TAS and NT who reported projects under the new Demand Management Innovation Allowance Mechanism (DMIAM) (2017).

The three DNSPs from QLD and SA sought approval of expenditure totalling approximately $3.8 million for 21 projects. The AER has assessed that the projects have met the DMIA expenditure criteria and have therefore approved the expenditure for all the projects.

DMIA is provided to each DNSP in the form of a fixed allowance for each regulatory control period. We review and approve DNSPs' actual DMIA expenditures on demand management projects after the end of each year. We will reject any DMIA expenditure that do not meet the requirements of the DMIA scheme.

If a DNSP has not spent its total DMIA allowance amount in the regulatory control period, it will be required to return the underspent amount to customers in the form of a tariff reduction in the ensuing regulatory control period. However, any overspent amount would be borne by the DNSP.

DNSPs are required to report their DMIA expenditures and activities to us each regulatory year. We approve or reject DNSPs' claims based on our assessment against the six criteria listed in section 2 of this paper. While descriptive, the criteria enable a wide range of demand management project options.

In December 2017, we established a new Demand Management Innovation Allowance Mechanism (DMIAM) to replace the current DMIA in the forthcoming regulatory control periods of all DNSPs. Details of the new DMIAM and DMIS are available from our web site at https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/demand-management-incentive-scheme-and-innovation-allowance-mechanism.

The DMIA expenditures covered by this decision relate to the pre–2017 schemes that apply to all DNSPs rather than under the 2017 DMIAM scheme.

How distributors used the DMIA

Distributors have different approaches for utilising the DMIA funding. Figure 1 compares our total allowance with actual expenditure by the QLD and SA distributors for the current 2015–2020 regulatory period.[1]

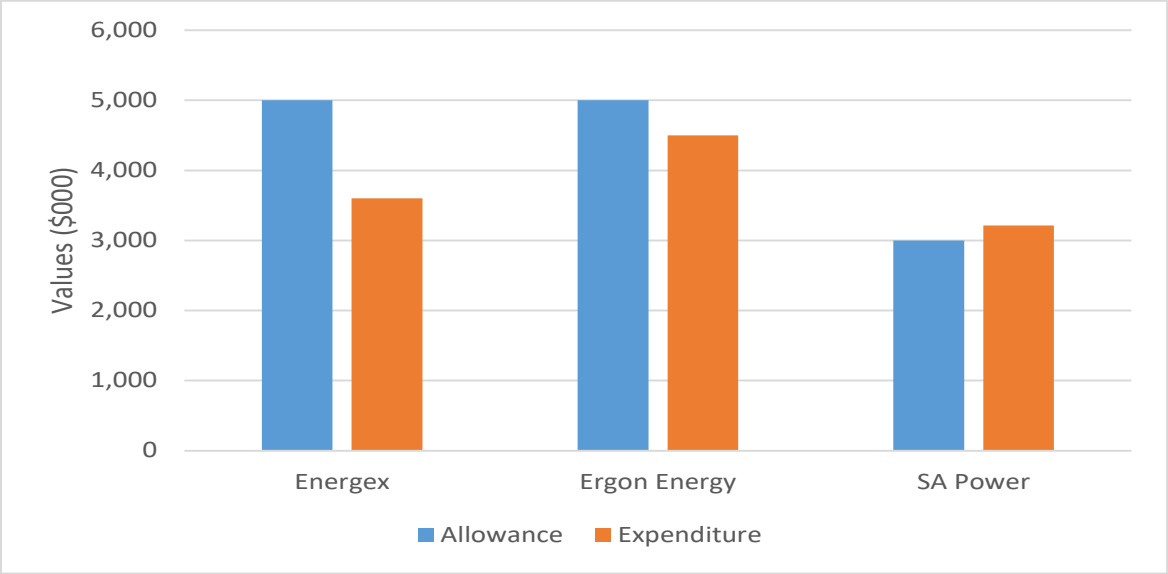
Of the three distributors reviewed, SA Power Network (SAPN) has claimed above its total DMIA allowance. Any overspend is met by the business from its existing budget or other external funding, rather than from its customers.

Overall, the three distributors by their fifth year (2019–20) have spent an average of 86 per cent of their DMIA allowances.

Ergon Energy and Energex have underspent their allowances to date, spending 90 per cent and 72 per cent respectively.

[1] We have approved all the DMIA expenditure claimed by the DNSPs as the expenditures comply with the DMIA criteria.

Figure 1 DMIA – comparison of regulatory period allowance vs expenditure to date ($ nominal)



Source: AER analysis and DMIA reports submitted by DNSPs.

Table 1 QLD and SA DNSPs DMIA expenditures for the 2015–2020 regulatory control period ($'000, nominal)

DNSP	DMIA approved 2015-16	DMIA approved 2016-17	DMIA approved 2017-18	DMIA approved 2018-19	DMIA approved 2019-20	Total DMIA approved	Total DMIA allowance for period	DMIA remaining for period	Percentage of DMIA spent
Energex	472	440	1,123	475	1091	3,602	5,000	1,398	72%
Ergon Energy	338	795	262	441	2662	4,498	5,000	502	90%
SA Power	1,955	1,120	-13	143	8	3,213	3,000	-57	102%
TOTAL	**2,765**	**2,355**	**1,372**	**1,059**	**3761**	**11,313**	**13,156**	**1,843**	**86%**

Source: AER analysis and DMIA reports submitted by DNSPs. Numbers may not add up due to rounding.

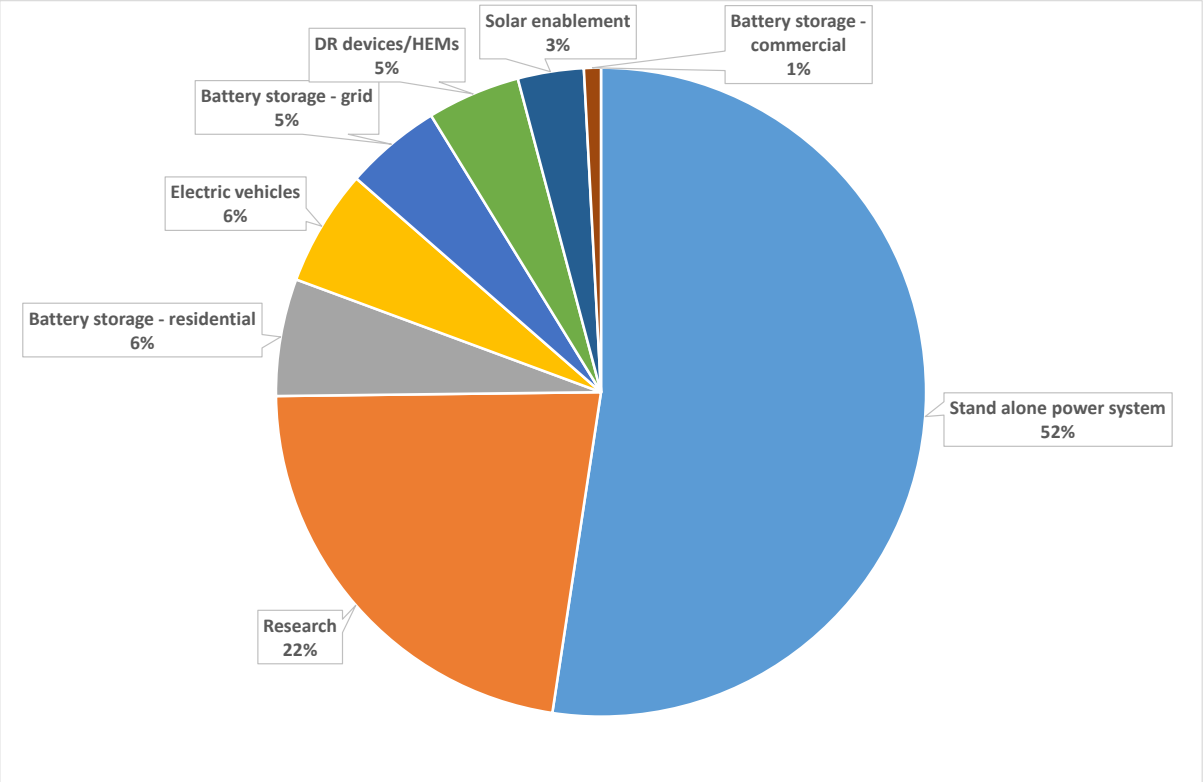
DNSPs' DMIA expenditures by activity types

Figure 2 summarises the expenditure by types of projects provided under the DMIA. The projects undertaken vary in both their nature and scale.

A large proportion of expenditure (52 per cent) was related to projects exploring stand-alone power systems (SAPS). Twenty-two per cent of all DMIA expenditure was for research and 6 per cent for residential battery storage. Examples of projects include:

- Ergon Energy's West Leichhardt SWER trial (SAPS)
- Energex's electric vehicles research
- Energex's market driven battery storage pilot (residential battery).

Figure 2 DMIA expenditure by project type – 2019–20 QLD and SA



Source: AER analysis and DMIA reports submitted by DNSPs

Table 2 DMIA expenditure by project type – 2019–20 QLD and SA

Project type	Expenditure ($ nominal)
Stand alone power systems	1,970,659
Research	843,077
Battery storage – residential	219,481
Electric vehicles	218,041
Battery storage - grid	180,736
Demand response devices	174,203
Solar enablement	123,350
Battery storage - commercial	31,683
TOTAL	3,761,230

Note: numbers may not add up due to rounding.

DMIA carry-over adjustments

As the distributors in QLD and SA have reached the end of their regulatory control periods, we are required to calculate DMIA carry-over adjustments for any underspent allowances.

DMIA carry-over adjustments are for the purpose of returning any underspent allowance or unapproved DMIA spending to customers. This is to ensure that distributors appropriately utilise the DMIA funding. The adjustment is applied to the distributor's revenue in the subsequent regulatory control period. The carry-over adjustment is discussed further in section 4.2 below.

Structure of this report

The remainder of this report is structured as follows:

Chapter 2 provides background information on the DMIS and DMIA.

Chapter 3 provides the criteria contained in the DMIS, against which we are required to assess the service providers' claims for the DMIA each year.

Chapter 4 summarises the results of our compliance assessment of service providers' DMIA reports and supporting information.

Chapters 5 to 7 provide our assessment of service providers' DMIA expenditure claims against the criteria contained in the DMIS.

2. Background

The Demand Management Innovation Allowance (DMIA) aims to provide incentives for Distribution Network Service Providers (DNSPs) to conduct research and investigation into innovative techniques for managing demand. It also aims to enhance industry knowledge of practical demand management projects and programs through the publication of annual project summary and expenditure reports. The DMIA is a part of the pre–2017 Demand Management Incentive Scheme (DMIS), which has been applied to all DNSPs in the national electricity market (NEM) as part of our current distribution determinations.

A key objective of the DMIA is to assist in enhancing industry knowledge of practical demand management projects through the annual publication of DMIA activity reports from DNSPs. As such, we set out annual reporting requirements for DNSPs for the regulatory control period. DNSPs are required to submit a report to the AER on their DMIA expenditure shortly after the end of each regulatory year, providing details of the initiatives they have introduced. We use the information provided in a DNSP's annual DMIA report in our assessment of a DNSP's compliance with the DMIA criteria and entitlement to recover expenditure under the DMIA. The DNSP's report also provides information to stakeholders more broadly on the nature of the DMIA projects that may ultimately be progressed to operating activities or more mature investments. The information may also facilitate the participation of non-network providers for those projects that go beyond the research or testing phase.

In December 2017, we established a new and improved Demand Management Innovation Allowance Mechanism (DMIAM) to replace the DMIA for regulatory control periods commencing after 30 June 2019. We also undertook a review of the DMIS and made significant enhancement to the scheme. Details of the new DMIAM and DMIS are available from our web site at https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/demand-management-incentive-scheme-and-innovation-allowance-mechanism.

This report relates to the operation of the current DMIA scheme only (before the December 2017 version). Also, this report includes only the three DNSPs in QLD and SA, who provided their DMIA reports for financial year 2019–20 in October 2020.

To ensure that DNSPs appropriately utilise the DMIA funding, there is an overall expenditure true-up process in the second year of the subsequent regulatory control period. After the results for the five years of the current regulatory control period are known, a single adjustment will be made to return the amount of any underspent or unapproved DMIA amounts to customers. This ensures that the scheme remains neutral in terms of the expenditure profile which the DNSP adopts during the regulatory control period. As the QLD and SA DNSPs are in their final year of their 2015–2020 regulatory control period and the results for the five years of this period are known, there is a need for this true-up process and adjustment.

3. Demand Management Incentive Scheme criteria

Each year we are required to assess claims for the innovation allowance against the DMIA criteria. The DMIA criteria are:

Criteria #1: Demand management projects or programs are measures undertaken by a DNSP to meet customer demand by shifting or reducing demand for standard control services through non-network alternatives, or the management of demand in some other way rather than increasing supply through network augmentation.

Criteria #2: Demand management projects or programs may be:

a. broad-based demand management projects or programs — which aim to reduce demand for standard control services across a DNSP's network, rather than at a specific point in the network. These may be projects targeted at particular network users, such as residential or commercial customers, and may include energy efficiency programs; and/or

b. peak demand management projects or programs — which aim to address specific network constraints by reducing demand on the network at the location and time of the constraint.

Criteria #3: Demand management projects or programs may be innovative, and designed to build demand management capability and capacity and explore potentially efficient demand management mechanisms including, but not limited to, new or original concepts.

Criteria #4: Recoverable projects and programs may be tariff or non-tariff based.

Criteria #5: Costs recovered under this scheme:

a. must not be recoverable under any other jurisdictional incentive scheme

b. must not be recoverable under any other state or Australian Government scheme

c. must not be included in forecast capital or operating expenditure approved in the distribution determination for the regulatory control period under which the scheme applies, or under any other incentive scheme in that determination.

Criteria #6: Expenditure under the DMIA can be in the nature of capex or opex.

4. DMIA assessment

4.1. Annual DMIA assessment

We conducted our DMIA compliance assessments based on the DMIA reports from Ergon Energy, Energex, and SA Power Networks.

For the 2019–20 financial year, each of these distributors are in year 5 of their regulatory control period.

Distributors have different approaches for utilising the DMIA funding. Summaries of each DNSP's DMIA expenditures are shown in the table 3 below.

The allowance is for the whole of the 2015–16 to 2019–20 regulatory period, and the expenditure column gives the expenditure for the regulatory period.

Of the three distributors reviewed, SA Power Networks has claimed above its total DMIA allowance. The other two DNSPs, Ergon Energy and Energex, have underspent their allowance to date.

Table 3 QLD and SA DNSPs' DMIA expenditure for the 2015–2020 regulatory control period ($'000, nominal)

DNSP	DMIA approved 2015-16	DMIA approved 2016-17	DMIA approved 2017-18	DMIA approved 2018-19	DMIA approved 2019-20	Total DMIA approved	Total DMIA allowance for period	DMIA remaining for period	Percentage of DMIA spent
Energex	472	440	1,123	475	1091	3,602	5,000	1,398	72%
Ergon Energy	338	795	262	441	2662	4,498	5,000	502	90%
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TOTAL	**2,765**	**2,355**	**1,372**	**1,059**	**3761**	**11,313**	**13,156**	**1,843**	**86%**

Source: AER analysis and DMIA reports submitted by DNSPs. Numbers may not add up due to rounding.

4.2. Carry-over adjustment

The purpose of the carry-over adjustment is to return to customers the portion of a distributor's DMIA allowance that was not spent within a regulatory control period. It also returns to customers any DMIA expenditure incurred by a distributor but not approved by the AER.

When calculating the carry-over adjustment to be applied to the electricity distributor's total revenue in its next regulatory control period, we are required to use the formula set out in the DMIA scheme.

This formula calculates the carry-over adjustment on a cumulative basis. That is, any under– or overspend in one year is rolled over to the following year within the regulatory control period. The formula also includes an adjustment for the weighted average cost of capital (WACC). With the WACC adjustment, a distributor would be indifferent, in NPV terms, to the timing of its DMIA spending over a regulatory control period. The DMIA carry-over formula states:

$$C_t = C_{t-1} - \left[\frac{(R_t - A_t)}{(1+i)} \times (1+i)^n (1+i^*)^2\right]$$

where:

C_t = cumulative carry-over balance

R_t = *ex ante* revenue allowance under the scheme for regulatory year *t*

A_t = *ex post* expenditure approved under the scheme for the regulatory year *t*

i = nominal vanilla WACC as set in the distribution determination for the regulatory control period in which the expenditure is incurred

n = the number of years remaining in the regulatory control period in which the expenditure is incurred

i^* = nominal vanilla WACC as set in the distribution determination for the regulatory control period in which the carry-over adjustment is made.

Using the DMIA scheme carry-over formula, we calculated the carry-over adjustments to be applied to electricity distributors in QLD and SA as they have completed the final year of their control period. Our calculations using each distributor's DMIA *ex ante* allowance and our *ex post* review of DMIA expenditure are set out in Table 4 and Table 5.

Table 4 Ergon Energy: carry-over amount calculation ($'000)

	2015–16	2016–17	2017–18	2018–19	2019–20
Ex ante allowance (a)	1,013	1,030	1,046	1,066	1,085
Ex post expenditure (b)	340	801	264	446	2,686
Allowance less expenditure (c) = (a) - (b)	673	229	782	620	-1601
NPV of under/over expenditure (d)	635	204	656	491	-1195
Cumulative carryover balance (e)	-932	-1,230	-2,192	-2,912	-1,159

Source: AER analysis and DMIA reports submitted by the distributor. Numbers may not add up due to rounding.

Notes:

(a): This row represents the real value of the DMIA allowance for each year, using the annual CPI.

(b): This row sets out the actual annual expenditure approved by the AER in its annual assessments.

(c): This row sets out the difference between the *ex ante* allowance and *ex post* expenditure.

(d): Using the annual weighted average cost of capital (WACC), this row calculates the net present value (NPV) of under/over expenditure in each year.

(e): This row converts the value in row (d) to 2021–22 dollar value when the carryover amount will be passed back to consumers, using the annual WACC. Using the formula specified in the DMIA, this row calculates the "cumulative carryover balance" for each year of the regulatory control period. The amount in the final year (2019–20) will be deducted from the distributor's revenues of 2021–22.

Table 5 Energex: carry-over amount calculation ($'000)

	2015–16	2016–17	2017–18	2018–19	2019–20
Ex ante allowance (a)	1,013	1,030	1,046	1,066	1,085
Ex post expenditure (b)	476	444	1,132	479	1,101
Allowance less expenditure (c) = (a) - (b)	538	587	-86	587	-16
NPV of under/over expenditure (d)	507	522	-72	464	-12
Cumulative carryover balance (e)	-744	-1,509	-1,404	-2,084	-2,066

Source: AER analysis and DMIA reports submitted by the distributor. Numbers may not add up due to rounding.

Notes:

(a): This row represents the real value of the DMIA allowance for each year, using the annual CPI.

(b): This row sets out the actual annual expenditure approved by the AER in its annual assessments.

(c): This row sets out the difference between the *ex ante* allowance and *ex post* expenditure.

(d): Using the annual weighted average cost of capital (WACC), this row calculates the net present value (NPV) of under/over expenditure in each year.

(e): This row converts the value in row (d) to 2021–22 dollar value when the carryover amount will be passed back to consumers, using the annual WACC. Using the formula specified in the DMIA, this row calculates the "cumulative carryover balance" for each year of the regulatory control period. The amount in the final year (2019–20) will be deducted from the distributor's revenues of 2021–22.

Given that SA Power Networks overspent its DMIA allowance during the 2015–20 regulatory control period, there will be no carry-over adjustment to be applied in SA Power Networks' 2021–22 annual tariff process. SA Power Networks' own budget or other project funders have funded the over-spending, not its customers.

The actual carry-over adjustment which we will apply to each distributor is specified below:

Table 6 Carry over adjustments for QLD and SA distributors ($ 2021–22)

Distributor	Carry over adjustment ($ 2021—22)
Ergon Energy	1,158,714
Energex	2,066,364
SA Power Networks	nil
Total	3,225,078

5. Ergon Energy 2019–20

We approve Ergon Energy's DMIA expenditure of $2,661,961 in 2019–20 for nine projects because these meet the DMIA criteria. The following section sets out our assessment of the individual projects. Detailed information about these projects is available in Ergon Energy's 2019–20 DMIA report[2] which is published separately on the AER website.[3]

Continuing Projects

5.1. Alternative Supply Bustard Heads

5.1.1. Project overview

This project involves replacing a remote single wire earth return (SWER) line with a stand-alone power system (a solar/battery hybrid system) as a lower cost alternative to network replacement and as a network support device. The SWER line is in a remote coastal location servicing a single customer in Bustard Head, QLD.

Ergon Energy claimed DMIA expenditure of $224,712 in 2019–20 for this project.

5.1.2. Assessment against DMIA criteria

Criteria #1 The project objective is to meet demand by a remotely located customer in a way other than network augmentation.

Criteria #2 This is a broad-based demand management program.

Criteria #3 The project seeks to examine a potentially cost-efficient mechanism in managing demand.

Criteria #4 The program is not based on tariffs.

Criteria #5 Ergon Energy states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

5.2. Solar Analytics Customer Devices Enabling

5.2.1. Project overview

This project is testing home energy management system (HEMS) devices to test their ability to deliver customer and network benefits. These benefits include outage notifications for load control, photovoltaic (PV) export limits, and increased visibility of the low voltage network. The devices and customer data were provided by Solar Analytics.

Ergon Energy claimed DMIA expenditure of $109,836 in 2019–20 for this project.

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2 Ergon Energy, *Demand Management Innovation Allowance Annual Report 2019–20*, September 2020.

3 AER, https://www.aer.gov.au/networks-pipelines/compliance-reporting?f%5B0%5D=field_accc_aer_report_type%3A1203.

5.2.2. Assessment against DMIA criteria

Criteria #1 The project enables Ergon to better understand how customer-owned energy monitoring devices can be used effectively for demand management.

Criteria #2 This is a broad-based demand management program.

Criteria #3 The project will help build Ergon's demand management capability and explore potentially efficient DM mechanisms.

Criteria #4 The program is not based on tariffs.

Criteria #5 Ergon Energy states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

5.3. Western Grid Lab Testing & Product Development

5.3.1. Project overview

This project involved laboratory trials of several devices that could potentially improve the capacity and quality of supply to customers at the fringe of the grid. The project scope includes:

- battery storage systems for SWER customers
- isolated transformer balancing for SWER customers
- customer-side devices for load control.

Ergon Energy claimed DMIA expenditure of $233,452 in 2019–20 for this project.

5.3.2. Assessment against DMIA criteria

Criteria #1 The testing of several devices that could potentially be used for non-network alternatives will assist Ergon in managing electricity demand.

Criteria #2 This is a broad-based demand management program.

Criteria #3 The project would add to Ergon's demand management capability.

Criteria #4 The program is not based on tariffs.

Criteria #5 Ergon Energy states that its expenditure for this project is not being recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

Completed Projects

5.4. Centralised Energy Storage System (CESS)

5.4.1. Project overview

This project was a joint Ergon-Energex project to develop and evaluate a 200kWh energy storage system (an integration of diesel generation, renewable energy, and inverter/battery technologies). The CESS is a test platform to enable further control systems development. The system was tested, trialled and integrated in a controlled, generation test environment in the workshop to develop functionality and verify its effectiveness and reliability.

Ergon Energy claimed DMIA expenditure of $180,736 in 2019–20 for this project. Ergon reported that this trial is in its final stages and it will issue a final report.

5.4.2. Assessment against DMIA criteria

Criteria #1 This project enabled testing a higher penetration of customer-owned renewable generation and also developed micro-grid functionality.

Criteria #2 This was a broad-based demand management program.

Criteria #3 This project enabled higher penetration of photovoltaic (PV) systems in the network using centralised energy storage.

Criteria #4 The project was not based on tariffs.

Criteria #5 Ergon Energy states that its expenditure for this project was not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure was in the nature of opex.

5.5. Lakeland Solar Storage

5.5.1. Project overview

This project sought to explore the use of large-scale solar PV and battery storage to service fringe-of-grid areas, to demonstrate PV supporting modes to improve power quality and manage demand, and to demonstrate micro-grid function on MV distribution networks. The Lakeland Solar & Storage (LSS) is a 10.8MW solar farm with 1.4MW/5.3MWh battery energy storage, located adjacent to the Lakeland substation.

Ergon Energy claimed DMIA expenditure of $2,185 in 2019–20 for this project. This project was supported by the Australian Renewable Energy Agency (ARENA). Due to a change in the project owner, this project was ended prematurely without achieving the final testing and knowledge sharing.

5.5.2. Assessment against DMIA criteria

Criteria #1 For a fringe area of the network, the project sought to demonstrate large-scale solar PV and battery storage solutions to improve power quality and manage demand.

Criteria #2 This was a broad-based demand management program.

Criteria #3 Ergon's role in this project (a) provided technical assistance for the Lakeland Solar & Storage project and (b) facilitated a battery test plan, to demonstrate additional network services through a combination of solar and battery in fringe-of-grid areas.

Criteria #4 The project was not based on tariffs.

Criteria #5 Ergon Energy stated that its expenditure for this project was not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

New Projects

5.6. West Leichhardt SWER

5.6.1. Project overview

Ergon Energy is conducting a trial of two large scale stand-alone power systems (SAPS) as network support devices. This project aims to develop policies, processes and systems that can enable SAPS across Ergon Energy's and Energex's networks.

Ergon Energy claimed DMIA expenditure of $1,743,762 in 2019–20 for this project.

5.6.2. Assessment against DMIA criteria

Criteria #1 For a fringe area of the network, the project will seek to demonstrate large-scale solar PV and battery storage solutions to improve power quality and manage demand.

Criteria #2 This is a broad-based demand management program.

Criteria #3 The project (a) provides technical assistance for Ergon's Lakeland Solar Storage project and (b) facilitates a battery test plan, to demonstrate additional network services through the combination of solar and battery, in fringe-of-grid areas.

Criteria #4 The project is not based on tariffs.

Criteria #5 Ergon Energy states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

5.7. Internet protocol demand response device service pilot

5.7.1. Project overview

This project explores the DM services market to discover third-party service providers who could provide an energy management system with the direct participation of customers via demand response devices. Instead of direct load control by the DNSP, energy management (i.e. peak lopping, valley filling, or neutralising disruptive loads) could be done through devices in the hands of the customer to improve the DNSP's ability to control loads.

This project is a joint Ergon Energy-Energex project under DMIA. Ergon Energy claimed DMIA expenditure of $56,185 in 2019–20 for this project.

5.7.2. Assessment against DMIA criteria

Criteria #1 The project aims to improve energy and demand management through a non-network alternative, which is to facilitate customers' demand responses via home energy management system (HEMS) devices.

Criteria #2 This is a broad-based demand management program.

Criteria #3 The project aims to build Ergon's DM capability by exploring the DM services market for third party providers who can satisfy Ergon's DM objectives.

Criteria #4 The project is not based on tariffs.

Criteria #5 Ergon Energy states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

5.8. Evolve

5.8.1. Project overview

This project investigates systems that could improve the integration of distributed energy resources (solar PV and batteries) with the grid for DM purposes. The systems (of software and sensors) would identify the limits for safe operation of the grid for DER import and export whilst responding to local network constraints. Data/information would be shared with DER aggregators.

Ergon Energy claimed DMIA expenditure of $16,093 in 2019–20 for this project.

5.8.2. Assessment against DMIA criteria

Criteria #1 The project investigates a way to shift/reduce demand by a non-network solution. This is a software/sensor system that could be used to actively manage DER while having visibility and control of targeted network areas with constraints.

Criteria #2 This is a broad-based demand management program.

Criteria #3 The project explores new technology (a cloud-based software system) to build Ergon's DM capability and to share data with DM aggregators (third parties).

Criteria #4 The project is not based on tariffs.

Criteria #5 Ergon Energy states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

5.9. Expanded network visibility initiative

5.9.1. Project overview

This project builds on previous DMIA projects that demonstrated new methods of estimating states of the distribution system. The project aims to develop tools/systems to enable the scale-up of distribution system state estimation (DSSE) across MV and LV feeders in Ergon Energy's and Energex's networks.

Ergon Energy claimed DMIA expenditure of $95,000 in 2019–20 for this project. This is a joint Ergon-Energex DMIA project.

5.9.2. Assessment against DMIA criteria

Criteria #1 This project aims to provide Ergon Energy with a non-network DM solution, an improved DM tool to improve the DNSP's ability to identify network areas that may benefit from additional demand management.

Criteria #2 This is a broad-based demand management program.

Criteria #3 The project aims to build Ergon Energy's DM capability through innovative and better systems for DSSE. The improved system could lead to better visibility on network constraints.

Criteria #4 The project is not based on tariffs.

Criteria #5 Ergon Energy states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

6. Energex 2019–20

We approve Energex's DMIA expenditure of $1,091,370 in 2019–20 for 11 projects because these meet the DMIA criteria. The following section sets out our assessment of the individual projects. Detailed information about these projects is available in Energex's 2019–20 DMIA report[4] which is published separately on the AER website.[5]

Continuing Projects

6.1. Enabling Dynamic Export Limits

6.1.1. Project overview

This is a trial to demonstrate the benefits to customers and networks of moving from zero export limits to dynamic export limits. The scope of the trial includes the installation of a commercially available 50 kW, 3 phase solar PV system complete with a dynamic export limit controller (DELC) that enables the solar inverter to respond to near real-time network demand support requests.

The purpose of this trial is to investigate the viability of enabling energy flow from renewable sources rather than the typical zero export connection agreements for small to medium commercial solar PV customers.

Energex claimed DMIA expenditure in 2019–20 of $52,061 for this project.

6.1.2. Assessment against DMIA criteria

Criteria #1 This project aims to assist Energex to better manage its distribution network through dynamic export of solar PV.

Criteria #2 This is a broad-based demand management program.

Criteria #3 The objective of the project is to investigate the viability of enabling energy flow from renewable sources (solar PV).

Criteria #4 The project is not based on tariffs.

Criteria #5 Energex states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

6.2. Tesla Eagle Farm Distribution Centre

6.2.1. Project overview

This solar PV and battery energy storage system (BESS) trial represents an operational commercial scale system compliant with Australian standard AS4755.3.5, with functionality

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4 Energex, *DMIA Report 2019–20*, September 2020.

5 AER, https://www.aer.gov.au/networks-pipelines/compliance-reporting?f%5B0%5D=field_accc_aer_report_type%3A1203.

for demand response enabled devices (DRED) and off-grid operation. The system has the ability to disconnect completely from the distribution network and operate in island mode for short durations, and the ability to inject or export energy for grid support.

During 2019-20 further testing of the system demonstrated stable operation and confirmed its automated islanding capability.

Energex claimed DMIA expenditure in 2019–20 of $15,797.

6.2.2. Assessment against DMIA criteria

Criteria #1 This project investigates a system (large scale battery system and integrated solar PV) that can be a potentially efficient mechanism to manage demand.

Criteria #2 This is a broad-based demand management program.

Criteria #3 The project is innovative and designed to build Energex's demand management capability.

Criteria #4 The project is not based on tariffs.

Criteria #5 Energex states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

Completed Projects

6.3. Springfield Net Zero

6.3.1. Project overview

This project involved a partnership with a developer of a master planned community to examine the electrical infrastructure impacts of a "net zero" community. (Net zero refers to the total amount of energy used in the community every year being equal to the renewable energy supply.)

Energex claimed expenditure of $100,000 in 2019–20, which is also the total project cost. The project is now completed.

6.3.2. Assessment against DMIA criteria

Criteria #1 This project aimed to manage demand by Energex working with a property developer to investigate building a 'net zero' community. It aimed to provide insights on how DNSPs can work with developers to manage demand at lowest cost, given the growing use of distributed energy resources.

Criteria #2 This was a broad-based demand management program.

Criteria #3 The objectives of the project included building Energex's DM capabiiity and exploring a new concept.

Criteria #4 The project was not based on tariffs.

Criteria #5 Energex stated that its expenditure for this project was not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

6.4. Solar Enablement Project

6.4.1. Project overview

This project proposed to develop, implement and test an innovative state estimation algorithm for monitoring high-voltage electricity distribution networks by running a trial on seven feeders across three distribution network service providers. The aim was to provide an improved understanding of electricity network behaviour to maximise the capacity of new solar PV installations and their export into the Australian grid, thereby enabling an increase in the percentage of renewable energy connected to the grid. This two-year project was run by the University of Queensland (UQ) in partnership with nine stakeholders including Energex.

Energex claimed DMIA expenditure of $108,544 in 2018–19 and $71,289 in 2019–20 for this project. Energex's total project cost amounted to approximately $248,000.

6.4.2. 7.3.2 Assessment against DMIA criteria

Criteria #1 This project aimed to help Energex better manage distribution networks, including the optimisation of distributed energy resources (DER) with particular emphasis on maximising PV connection and export to the grid.

Criteria #2 This was a broad-based demand management program.

Criteria #3 The objectives of the project included improving the dispatch of DER, improving the demand management response, and minimising future network investment.

Criteria #4 The project was not based on tariffs.

Criteria #5 Energex stated that its expenditure for this project was not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

6.5. Large Commercial Battery Energy Storage System (BESS)

6.5.1. Project overview

This project involved integration of a 150 kW solar PV and 250 kW BESS, development of a proprietary control platform to run both off-grid modes and DRED operation of a commercial scale BESS, and the installation of a fault level protection scheme when the system is operating in off-grid mode.

The aim of the project was to gain a better understanding of:

- the commercial customer value proposition and expectations from the electricity network in taking up BESS
- how Energex could leverage off the existing load control system with direct load control and tariffs to benefit both Energex and the customer, and

- how the BESS technology would integrate with the electricity network.

Energex claimed DMIA expenditure of $100,355 in 2018–19 and $15,886 in 2019–20 for this project. Total project cost amounted to around $116,000.

6.5.2. Assessment against DMIA criteria

Criteria #1 The project investigated the BESS system as a non-network alternative to network augmentation.

Criteria #2 This was a broad-based demand management program.

Criteria #3 This project aimed to build Energex's demand management capability.

Criteria #4 The project was not based on tariffs.

Criteria #5 Energex stated that its expenditure for this project was not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

6.6. Low Voltage Network Power System Static-State Estimation

6.6.1. Project overview

This project aimed to develop, implement and test an innovative state estimation algorithm for monitoring low-voltage electricity distribution networks. This algorithm will form the basis for coordinating demand and distributed generation with respect to operational limits of local network segments. A 'static state estimator' can provide a basis for an autonomous low-voltage network management and monitoring system.

This project was a joint project between Energex, Ergon Energy and the University of Queensland (UQ) for a period of three years. The project was completed in 2019.

Energex claimed DMIA expenditure in 2019–20 of $296 for this project. Energex's total cost was about $49,000.

6.6.2. Assessment against DMIA criteria

Criteria #1 The project aimed to produce improved data and information through the application of an estimator, which could then be used to improve the benefits of demand management and coordination of distributed generation across the low voltage network.

Criteria #2 This is a broad-based demand management program.

Criteria #3 This project aimed to test new algorithms for distribution system state estimation for monitoring Energex's low voltage network. It explored new concepts and aimed to build Energex's DM capability.

Criteria #4 The project is not tariff based.

Criteria #5 Energex states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

New Projects

6.7. Internet Protocol Demand Response Device Pilot

6.7.1. Project overview

This project is a joint Energex-Ergon Energy project under DMIA. Energex claimed DMIA expenditure of $8,182 in 2019–20 for this project.

This project explores the DM services market to discover third-party service providers who could provide an energy management system with the direct participation of customers via demand response devices. Instead of direct load control by the DNSP, energy management (i.e. peak lopping, valley filling, or neutralising disruptive loads) could be done through devices in the hands of the customer to improve the DNSP's ability to control loads.

6.7.2. Assessment against DMIA criteria

Criteria #1 The project aims to improve energy and demand management through a non-network alternative, which is to facilitate customers' demand responses via home energy management system (HEMS) devices.

Criteria #2 This is a broad-based demand management program.

Criteria #3 The project aims to build Energex's DM capability by exploring the DM services market for third party providers who can satisfy Energex's DM objectives.

Criteria #4 The project is not based on tariffs.

Criteria #5 Energex states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

6.8. Expanded network visibility initiative

6.8.1. Project overview

This is a joint Ergon-Energex DMIA project.

The project builds on previous DMIA projects that demonstrated new methods of estimating states of the distribution system. The project aims to develop tools/systems to enable the scale-up of distribution system state estimation (DSSE) across MV and LV feeders in Ergon Energy's and Energex's networks.

Energex claimed DMIA expenditure of $394,692 in 2019–20 for this project.

6.8.2. Assessment against DMIA criteria

Criteria #1 This project aims to provide Energex with a non-network DM solution, an improved DM tool to improve the DNSP's ability to identify network areas that may benefit from additional demand management.

Criteria #2 This is a broad-based demand management program.

Criteria #3 The project aims to build Energex's DM capability through innovative and better systems for DSSE. The improved system could lead to better visibility on network constraints.

Criteria #4 The project is not based on tariffs.

Criteria #5 Energex states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex.

6.9. Market driven battery storage pilot

6.9.1. Project overview

This project involved Energex conducting battery energy storage system (BESS) trials over four years to better understand the impact of BESS on the network and how BESS can enable a higher penetration of solar PV. The data obtained from these trials would assist in developing systems to manage new technologies (including battery systems) and provide cost-effective outcomes for Queenslanders.

The three BESS installed at Rocklea were used for educational purposes and testing of load control capabilities and general operation. The commercial BESS and solar PV located at the Energex Eagle Farm Distribution Centre has been constructed and is in the process of final commissioning to enable key project objectives to be tested.

Energex claimed DMIA expenditure in 2019–20 of $211,582 for this project. Energex's total cost was around $1.8 million.

6.9.2. Assessment against DMIA criteria

Criteria #1 This project aimed to gain a better understanding of the customer value proposition and expectations from the electricity network in taking up BESS; how Energex can leverage off the existing load control system with direct load control and tariffs to benefit both Energex and the customer; and investigated how the BESS technology will integrate with the electricity network, which could potentially be used for peak load management.

Criteria #2 This is a broad-based demand management program.

Criteria #3 By testing the capabilities and characteristics of BESS, Energex investigated its demand management effectiveness that may help avoid network augmentation.

Criteria #4 The project is not tariff based.

Criteria #5 Energex states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex and capex.

6.10. Electric Vehicle Research

6.10.1. Project overview

This project will study and monitor, over three years, electric vehicle charging at customers' residences. This would enable Energy QLD to understand EV charging profiles and behaviour, and provide EV benchmarking data.

Energex claimed DMIA expenditure in 2019–20 of $218,041 for this project.

6.10.2. Assessment against DMIA criteria

Criteria #1 The project will enable a better understanding of residential EV charging profiles and enable Energex to assess the value of DM within the EV market.

Criteria #2 This is a broad-based demand management program.

Criteria #3 This project aims to build Energex's demand management capability in managing EV loads and meeting customer needs whilst maintaining network reliability and stability.

Criteria #4 The project is not tariff based.

Criteria #5 Energex states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex,

6.11. Dynamic Operating Environments Phase 1 Commercial

6.11.1. Project overview

This project aims to explore the merits and challenges of dynamic operating envelopes (DOE) as applied to small to mid-sized distributed energy resources (DER). DOEs are expected to assist DNSPs in managing DER to provide customer benefits whilst maintaining a safe and reliable network.

Energex claimed DMIA expenditure in 2019–20 of $3,544 for this project.

6.11.2. Assessment against DMIA criteria

Criteria #1 The project will study the concept of DOEs as a mechanism to allow greater penetration of DER which in turn will assist in alleviating demand.

Criteria #2 This is a broad-based demand management program.

Criteria #3 This project aims to build Energex's demand management capability in managing DER.

Criteria #4 The project is not tariff based.

Criteria #5 Energex states that its expenditure for this project is not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure is in the nature of opex,

7. SA Power Networks 2019–20

We approve SA Power Networks' DMIA expenditure of $7,899 in 2019–20 for one project because this meets the DMIA criteria. This approved amount does not include any amount SA Power Networks overspent above its 2016–20 DMIA allowance. The following section sets out our assessment of the project. Detailed information about this project is available in SA Power Networks' 2019–20 DMIA report[6] which is published separately on the AER website.[7]

Completed Project

7.1. Residential Energy Storage

7.1.1. Project overview

Under this project, SAPN deployed 100 energy storage systems within a selected trial area to study the performance of energy storage systems across the likely applications for this technology as part of efficient distribution network operation and management.

This project was designed as a three-year trial commencing for each customer when their system was installed.

The project is now complete. SAPN claimed DMIA expenditure of $7,899 in 2019–20 and $142,828 in 2018–19. The total project cost amounted to $2.684 million.

7.1.2. Assessment against DMIA criteria

Criteria #1 The trial tested the applicability of residential energy storage systems to defer the building or augmentation of network infrastructure. Another objective is to understand the broader benefits and attractiveness of residential energy storage to customers with a view to informing the likely timing of larger scale take-up and the levels of subsidy required to facilitate take-up for network purposes.

Criteria #2 This was a broad-based demand management program.

Criteria #3 This project tested the applicability of residential energy storage systems to defer the building of new, or augmentation of existing, network infrastructure.

Criteria #4 The project was not tariff-based.

Criteria #5 SAPN stated that its expenditure for this project was not recovered through any other jurisdictional, state or Australian Government scheme, nor through any other part of the distribution determination for the current regulatory control period.

Criteria #6 Expenditure was operating expenditure (opex).

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6 SA Power Networks, *SA Power Networks 2019-20 – Annual RIN – DMIA report*, 30 October 2020.

7 AER, https://www.aer.gov.au/networks-pipelines/compliance-reporting?f%5B0%5D=field_accc_aer_report_type%3A1203.

In 2019–20 SA Power Networks reported on two other projects – Grid Side Storage and Future Network Modelling. SA Power Networks did not incur any expenditure on these projects for the year 2019–20. SA Power Networks reported last year (2018–19) that these two projects were completed. Total project costs were approximately:

- Grid Side Storage $157,000
- Future Network Modelling $372,000.