SA Power Networks DMIA report for the year ended 30 June 2016

PROJECTS FOR WHICH DMIA APPROVAL IS SOUGHT

Projects for which approval is sought under the Demand Management Innovation Allowance (DMIA) for the 2015 – 2020 Regulatory Period include the following projects with a total value of $1,955k.

1. Grid Side Storage ($218k)
2. Future Network Modelling ($263k)
3. Residential Energy Storage ($1,474k)

These projects form part of a package of investigations aimed at informing SA Power Networks' approach to design, management and operation of the distribution network in response to increasing Distributed Energy Resource (DER) deployment on the network so as to most cost effectively manage the impacts and capture opportunities from DER.

1 Grid Side Storage

1.1 Nature and scope of the project

Energy Storage is being investigated by the electricity industry as an alternative to generation options which may defer network augmentation. With a large range of storage technologies now available, very little is known about the performance of these technologies under Australian conditions and applications. In conjunction with the University of Adelaide and other partners SA Power Networks is undertaking a practical research study into the performance of energy storage systems across the likely applications within the distribution network.

1.2 Aims and expectations

This project will produce a mobile testing environment to better understand the performance of different energy storage technologies and systems in a range of Australian conditions and applications. The project will create a knowledge base for industry and system developers and provide a platform for advanced training facilities on an operational system.

1.3 Implementation of the project

This project is being led by the University of Adelaide as part of a syndicate comprising SA Power Networks, Solar Storage, ZEN Energy Systems and Power and Drive Solutions, with further funding support from the South Australian Government and the Energy Networks Association. The project has also attracted ARENA funding of $1.4 million.

The mobile testing platform will comprise a mobile testing unit similar in size to a shipping container with 270kW inverter, 270kWh of lithium batteries, associated control equipment and network protection and SCADA interface. The unit will include a Labview installation to provide comprehensive monitoring of the performance of both the inverter and any associated battery systems. This data will be made available as part of the Australian Energy Storage Knowledge Bank maintained by the University of Adelaide.

Initially this unit will be deployed within the SA Power Networks' distribution system. It will also be deployed interstate to test systems under different conditions and network operations. As part of the project, the unit will also operate within the testing environment at the University of Adelaide's Thebarton precinct and at a large commercial customer's premises.

The project is now in final detailed design with construction due to be completed by the end of 2016.

Expected availability of the system for initial field trials is Q2 2017 where after extensive testing it will initially be deployed on a 11kV feeder.

The system will be deployed on the distribution network to trial its performance in providing peak shaving, voltage management and micro grid applications.

1.4 Implementation costs

The project costs to date are $505k, with $218k of this cost having been recognised in the 2015/16 Regulatory year and $287k in the prior Regulatory period.

1.5 Identifiable benefits

This project will provide insights into the suitability and performance of different storage technologies and systems when utilised in the most likely scenarios for distribution network management and operation. It will also determine situations whereby such solutions could be used in future to cost-effectively defer network upgrades. The data collected and analysis undertaken will be made freely available to industry and vendors.

2 Future Network Modelling

2.1 Nature and scope of the project

Energy Storage for residential installations is being proposed as a complementary technology for the renewable energy systems currently deployed within the distribution networks. The impacts of these systems will be driven to some extent by their sizing and ability to supply electrical capacity (kW or kVA) versus their energy stored (kWh). To better understand these impacts on the distribution network and network operations and design necessary to accommodate these systems, SA Power Networks has undertaken a comprehensive modelling project.

2.2 Aims and expectations

The modelling developed under this project identifies the most beneficial energy storage system for different customers based on their interval data records. It can also be applied at higher levels within the network to determine the optimal mix of distributed resources – for example at the distribution transformer or zone substation levels. This modelling will provide insights into the likely rate of take up of distributed energy resources based on the costs of those resources and the economic returns to the customer. It will also enable insights into the likely impacts on network load profiles.

2.3 Implementation of the project

Consultants were engaged to develop an Excel based modelling tool which has been further refined by SA Power Networks. This tool is undergoing final testing and validation before being used to assess specific customers and areas within the distribution network.

2.4 Implementation costs

The project costs to date are $501k, with $263k of this cost having been recognised in the 2015/16 Regulatory year and $238k in the prior Regulatory period. This project is now complete.

2.5 Identifiable benefits

The project will provide insights into the potential scale and timing of distributed energy resources uptake, as well as the opportunity to reduce SA Power Networks' investment in network assets as a result of increased embedded generation and storage. Such opportunities could arise from reduced capacity requirements in greenfield situations or reduction in the size (capacity) of assets installed when asset replacements are undertaken.

3 Residential Energy Storage

3.1 Nature and scope of the project

The deployment of Residential Energy Storage systems is predicted to become increasingly prevalent across electricity networks as customers become more comfortable with the technology. This project will deploy 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.

3.2 Aims and expectations

The primary trial objective is to test the applicability of residential energy storage systems to defer the building of new, or augmentation of existing, network infrastructure. A secondary 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.

3.3 Implementation of the project

The trial is currently in the deployment stage with approximately 55% of the systems deployed on customer installations. The customer recruitment is nearly completed with less than 5% of systems remaining to be committed.

3.4 Implementation costs

The project costs to date are $1,474k, with all of this cost having been recognised in the 2015/16 Regulatory year. Further expenditure on this project is expected in subsequent years of this regulatory control period.

3.5 Identifiable benefits

SAPN envisages the following information will be gained from this trial:

- proof of concept: the effectiveness or otherwise of deployment of PV/storage systems at customers' premises in the manner being undertaken by the project to defer distribution network augmentation. This concept may then be included as a viable option(s) in future RIT-D and/or other expenditure assessment processes;
- the potential to pay customers in the future for the use of their batteries, where it is the least cost option, to defer network augmentation;
- understanding the potential demand reductions that are possible from the use of customers' solar and battery installations;
- better understanding of the technical and cost aspects of installation, operation and maintenance of battery/inverter/energy management systems operated on a portfolio basis;
- performance data on systems deployed;
- better load profile data from customers with and without PV/storage systems;
- the net impact on feeder load profiles;
- better understanding of commercial arrangements with equipment vendors and installers (price, service, equipment lead times) and associated risks;
- a clearer understanding of the benefits and attractiveness of residential energy storage to customers with a view to informing the likely timing of larger scale take-up and levels of subsidy required to facilitate take-up for network purposes;
- customer acceptance or otherwise of embracing this technology and the associated arrangements to defer network augmentation; and
- other customer insights.

4. Costs not recoverable

Costs for the DMIA projects described above:

a. are not recoverable under any other jurisdictional incentive scheme,
b. are not recoverable under any other State or Commonwealth government scheme, and
c. are not included in the forecast capital or operating expenditure approved in the AER's distribution determination for the regulatory control period under which the scheme applies, or under any other incentive scheme in that determination.

5. Calculation of DMIA

The total amount of the DMIA spent in the 2015 -2020 Regulatory Control Period is $1,955k, all of which was incurred in the 2015/16 Regulatory year. This amount equates to the total spend against the three projects for which approval is sought under the DMIA as detailed in sections 1 to 3 of this report. The costs associated with these DM trials have been separately captured at the individual project level in SAP, SA Power Networks' integrated business management system and have been reported in Table 7.11.1 of SA Power Networks' Annual Reporting RIN Response 2015-16 and subject to independent external audit in accordance with the RIN requirements.