ERGON ENERGY

Demand Management Innovation Allowance Annual Report 2012/13

ERGON ENERGY CORPORATION LIMITED ABN 50 087 646

Listing of figures and tables

PURPOSE & COMPLIANCE

Ergon Energy is pleased to present the Demand Management Innovation Allowance (DMIA) Annual Report for the 2012/13 regulatory year. The purpose of this report is to allow the Australian Energy Regulator (AER) to:

- assess Ergon Energy's 2012/13 DMIA initiatives and Ergon Energy's entitlement to recover the expenditure under the Demand Management Incentive Scheme (DMIS); and
- confirm Ergon Energy's compliance with the annual reporting requirements of the AER's Regulatory Information Notice (RIN, the Notice) issued to Ergon Energy.

This report has been completed in accordance with,

- Clause 6.6.3 of the National Electricity Rules (NER) which allows the AER to develop and publish a DMIS which provides incentives for DNSPs to assess (potentially) efficient non-network alternatives or to manage the expected demand for standard control services in some other way; and
- Schedule 1, paragraph 6.1 (a)-(e) of the AER's RIN which requires a DNSP to which the DMIS applies to submit an annual report to the AER on its expenditure under the DMIA.

The provision of information in this Report demonstrates compliance with paragraph 6.1 of Schedule 1 of the RIN, the Notice issued by the Australian Energy Regulator (AER) on 28 September 2012.

Furthermore, as noted by the AER in its issuance of this Notice to Ergon Energy, information provided in accordance with paragraph 6.1 of Schedule 1 of the Notice is considered to constitute the provision of an annual Report for the 2012/13 regulatory year in accordance with paragraph 3.1.4.1 of the AER's *Demand Management Incentive Scheme for Energex, Ergon Energy and ETSA Utilities 2010-15*, October 2008.

This report and the information contained in the report is suitable for publication by the AER.

TABLE 1: SCHEDULE 1, PARAGRAPH 6.1 - DMIA COMPLIANCE

6.1	Requirement	Report Section
(a)	Provide an explanation of each demand management project or program for which approval is sought;	Chapter 4
(b)	Explain, for each demand management project or program identified in the response to paragraph 6.1(a), how it complies with the DMIA criteria detailed at section 3.1.3 of the DMIS, with particular reference to:	
(i)	the nature and scope of each demand management project or program;	Chapter 4
(ii)	the aims and expectations of each demand management project or program;	Chapter 4

6.1	Requirement	Report Section
(iii)	the process by which each demand management project or program was selected, including the business case for the project and consideration of any alternatives;	Chapter 2
(iv)	how each demand management project or program was/is to be implemented;	Chapter 4
(v)	the implementation costs of the project or program;	Chapter 3
(vi)	any identifiable benefits that have arisen from the project or program, including any off peak or peak demand reductions;	Chapter 4
(c)	Provide an overview of developments in relation to projects or programs completed in previous years, and any results to date;	Chapter 4
(d)	State whether the costs associated with each demand management project or program identified in the response to paragraph 6.1(a) are:	
(i)	are not recoverable under any other jurisdictional incentive scheme;	Chapter 3
(ii)	are not recoverable under any other Commonwealth or State government scheme;	Chapter 3
(iii)	not included in the forecast capital or operating expenditure approved; or any other incentive scheme applied by the 2010-15 Distribution determination; and	Chapter 3
(e)	provide the total amount of the DMIA spent in the previous regulatory year, and how this amount has been calculated	Chapter 3

INTRODUCTION

SUBMISSION SUMMARY

In the AER's *Final Decision, Queensland distribution determination 2010-11 to 2014-15*, (May 2010) for the current regulatory control period, an allowance of $5 million over the period was made for a Demand Management Innovation Allowance (DMIA) for Ergon Energy.

The DMIA is provided to investigate opportunities that are not yet commercial, in addition to any "business as usual" capital and operational expenditure allowances for demand management projects approved in Ergon Energy's distribution determination. This provides a direct incentive for Distribution Network Service Providers (DNSPs) to assess emerging opportunities for potentially efficient non-network alternatives or to manage the expected demand for standard control services in some other way, than through network augmentation.

Ergon Energy's 2012/13 DMIA program comprised of nine continuing projects from 2011/12 and six new projects added to the program during 2012/13. The total cost incurred for the DMIA initiatives during the 2012/13 period was $881,264.

Table 2 summarises Ergon Energy's DMIA program expenditure recovery for the 2012/13 regulatory year.

TABLE 2: ERGON ENERGY DMIA PROGRAM - 2012/13

Projects	Number	2012/13 spent ($)
Continuing projects	9	380,886
New projects	6	500,378
Total	15	881,264

Ergon Energy is seeking the AER's approval to recover the costs for the full amount of DMIA spent in the 2012/13 regulatory year.

In line with all Ergon Energy investments, the DMIA program follows Ergon Energy's 3 tiered gated governance framework, with built-in review for prudency and efficiency at each gate as the project moves through the investment lifecycle.

For the 2012/13 DMIA program, all nominated DMIA projects were subject to a screening and feasibility processes consistent with the AER's DMIS and a subsequent cost benefit analysis to identify the highest value projects based on factors including their ability to shape energy load profiles and gain community and customer acceptance.

Budgets were also prepared in accordance with Ergon Energy's standard project methodology detailing information including the projects' goals, deliverables, project milestones and resources required. Cost estimations were developed for the resources identified as being required for each phase of each project. These cost estimations drew upon various sources including the costs of similar projects undertaken by Ergon Energy, current preferred contractor panel contracts and market research. For projects with co-contributions from industry partners and research institutions, the total project budgets were inclusive of such amounts and assessed on this basis.

Ergon Energy's DMIA Program is delivering strongly against its DMIA objectives. Positive results from trial projects such as Stockland North Shore Display, Auto Demand Response Trial, and RECESS[1] has allowed their progress towards Ergon Energy's "business-as-usual" demand management program.

[1] RECESS, Residential Electrical Contractor Engagement SessionS

PROGRAM DEVELOPMENT

Ergon Energy considers DMIA investments an important component of its commitment to delivering customer value over the longer term. The DMIA program complements our non-network alternative program which is geared towards providing a more efficient solution to network augmentation. To date, the DMIA initiatives have enabled Ergon Energy to investigate innovative approaches for improved knowledge, capacity and management of factors impacting network limitations and their associated costs. Illustrated in Figure 1 are the current DMIA projects categorised in Ergon Energy's identified network limitation drivers.

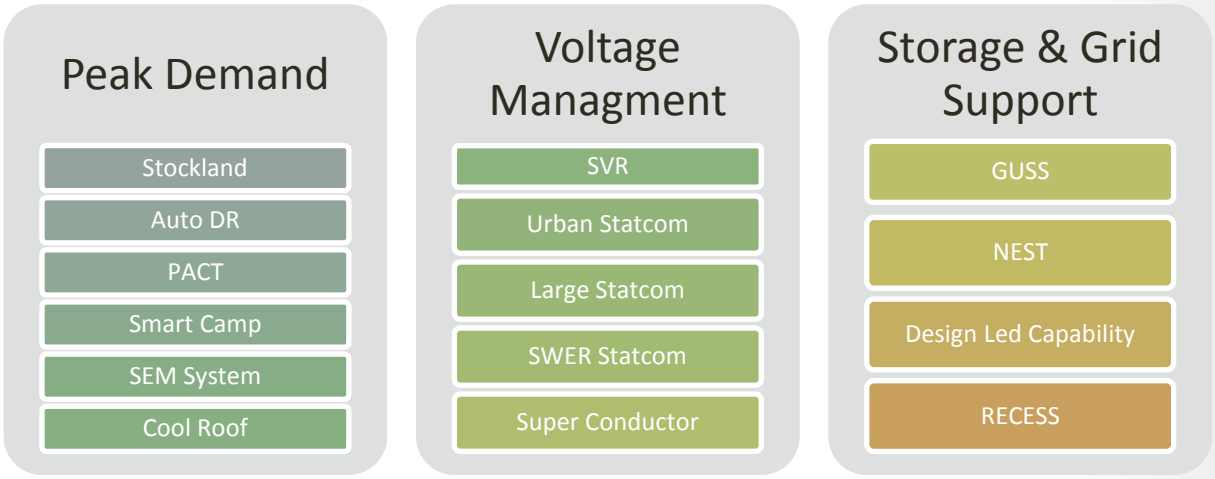


FIGURE 1: DMIA INITIATIVES BY NETWORK LIMITATION DRIVERS[2]

Ergon Energy considers that over the longer term, in addition to addressing the network constraint challenges, non-network alternatives can add significant value through providing networks and customers more optionality in solutions. This offers both customers and networks the opportunity to reduce costs through finding solutions that better fit their needs. As such the diversity of initiatives across the DMIA program reflects this commitment to lowering capital investments through finding alternatives for limitations driving network investments.

The DMIA investment portfolio demonstrates a mix of projects exploring demand management opportunities to respond to capacity requirements, voltage management opportunities to respond to voltage fluctuations from photovoltaic customer take-up and future knowledge and capacity building.

[2] Full project names:
Auto DR, Auto Demand Response Trial; Cool Roof, Cool Roof Trial; Design Led Capability, Building Design Led Capability; GUSS, GUSS Phase 2 (REGUSS); NEST, Network Embedded Solar Thermal; PACT, Passive Air Cooling Trial; RECESS, Residential Electrical Contractor Engagement SessionS; SEM System, Solar Energy Management Systems; Smart Camp, Smart Camp Feasibility; Stockland, Stockland North Shore Display; SVR, Smart Voltage Regulator Trial

PROGRAM CYCLE

Identifying innovation opportunities

The DMIA program has enabled Ergon Energy to place greater emphasis on the importance of innovation for non-network alternative opportunities. By drawing on its own experience and examples of industry practice, Ergon Energy has developed an environment that characterises solutions beyond the traditional network solution.

To identify and increase the innovation opportunities, Ergon Energy's innovation environment comprises of three key groups to funnel innovation ideas into the DMIA program, as illustrated in Figure 2:

- The DMIA program team, providing opportunity for anybody in Ergon Energy to contribute;
- The Guided Innovation Alliance (GIA), providing input and co-contribution from Universities/researchers and Industry; and
- The Smart Network Reference Group providing senior management representation and oversight from 12 teams across the business.

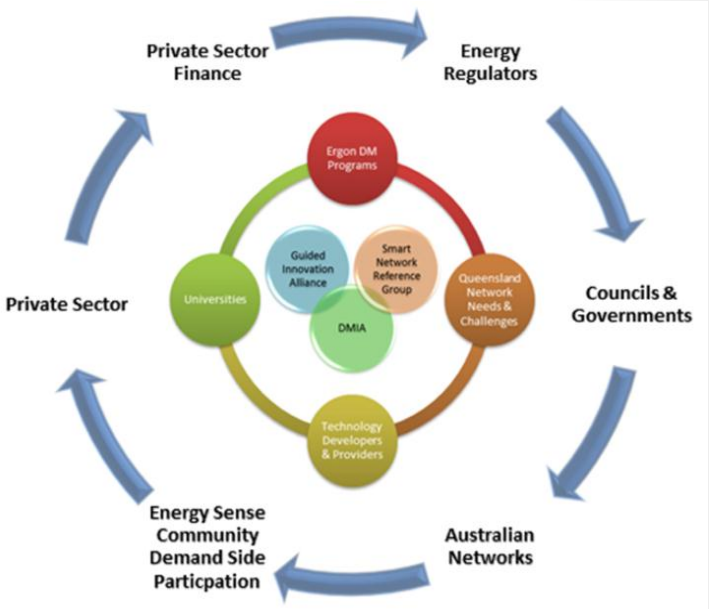


FIGURE 2: ERGON ENERGY INNOVATION ENVIRONMENT

Selection Process

To ensure prudent investment choice & project delivery efficiency, all Ergon Energy investments adheres to a 3 tiered gated governance framework. The DMIA projects follow the same methodology with particular emphasis placed on meeting the DMIA criteria and objectives. Accordingly, once projects are identified and nominated through the above mentioned innovation environment, 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 AER's Demand Management Incentive Scheme for Energex, Ergon Energy and ETSA Utilities 2010-15, October 2008.

Table 3 outlines the criteria in detail.

Provided all of the specified conditions are met then the project proceeds to the feasibility assessment and approval stages per the gated governance framework. All Ergon Energy DMIA projects are selected and scoped to respond to current & emerging network limitation drivers. Information from the development activities undertaken enables implementation scheduling, milestone planning and confirmation of resources.

TABLE 3: ERGON ENERGY DMIA PROJECT SELECTION CRITERIA

- *Reduces and or shifts the electricity demand (to off-peak periods) of parties affected; or projects or programs designed to build demand management capability and capacity and explore potentially efficient demand management mechanisms, including but not limited to new or original concepts;*
- *Has costs which are not recoverable under any other jurisdictional incentive scheme;*
- *Has costs which are not recoverable under any other state or Commonwealth Government scheme;*
- *Has costs which are not included in Ergon Energy's 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; and*
- *Is technically feasible (based on whether, in Ergon Energy's assessment, the project is suitable for its intended application and whether it can be theoretically and physically integrated with Ergon Energy's infrastructure).*

DMIA PROGRAM EXPENDITURE

Ergon Energy's DMIA total expenditure for 2012/13 was $881,264. The costs incurred on the DMIA program for the year were all operational expenditure. Ergon Energy is seeking the AER's approval to recover the costs for the full amount.

For the year the DMIA program comprised of fifteen projects with nine continuing projects from 2011-12 and six new projects. All projects were developed and managed in accordance with Ergon Energy's established program management framework as outlined in the previous chapter.

Table 4 summarises the actual expenditure for 2012-13 Ergon Energy DMIA program along with the total approved budget costs, actual annual, program to date incurred costs and any applicable comments.

TABLE 4: ERGON ENERGY DMIA PROGRAM EXPENDITURE - 2012/13

Project	Budget ($)		2012-13 expenditure ($)		Project to date expenditure ($)		Comments
	Total Project Budget	Ergon Energy Total Contribution	Capital	Operational	Capital	Operational	
Stockland North Shore Display	179,000	179,000	-	26,487	-	105,372	-
Auto Demand Response Trial	480,000	480,000	-	48,220	-	484,041	Projected completed
GUSS Phase 2 (REGUSS)	450,000	450,000	-	139,455	-	171,281	-
Passive Air Cooling Trial (PACT)	190,475	190,475	-	66,754	-	163,812	Project completed
Smart Camp Feasibility	65,552	65,552	-	6,980	-	37,105	Project completed
Smart Voltage Regulator Trial	129,999	84,999	-	3,459	-	45,531	-
Urban Statcom	206,570	206,570	-	13,909	-	19,757	-
Large Statcom	348,640	348,640	-	56,026	-	148,552	-
SWER Statcom	259,175	259,175	-	19,596	-	72,196	Project closed out
Solar Energy Management Systems	593,830	200,000	-	64,960	-	64,960	-
Network Embedded Solar Thermal	192,700	65,200	-	58,225	-	58,225	-
Cool Roof Trial	304,896	201,712	-	204,781	-	204,781	-
RECESS	164,243	164,243	-	128,412	-	128,412	Project completed
Building Design Led Capability	34,000	34,000	-	34,000	-	34,000	-
Super Conductor	40,000	15,000	-	10,000	-	10,000	-
Total	-	-	-	881,264	-	-	-

Of note, Ergon Energy costs associated with each of the 15 DMIA projects, as identified in Table 4, are not:

- recoverable under any other jurisdictional incentive scheme;
- recoverable under any other Commonwealth or State Government scheme;
- included in the forecast capital or operating expenditure approved in the AER's 2010-15 distribution determination for the current regulatory control period under which the DMIS applies or under any other incentive scheme in that determination.

Of the 15 projects, four projects reached completion and final closure during 2012/13. They are,

- Auto Demand Response Trial
- Passive Air Cooling Trial
- Smart Camp Feasibility
- RECESS

Further information on the completed and closed projects is presented in Chapter 4 with summary of key findings presented in appendix section. The final report for RECESS is currently being prepared and to be submitted in the next annual DMIA report.

It should also be noted that, one additional project (SWER Statcom) was closed out early during 2012/13 based on initial modelling results. During modelling on multiple SWER networks it was found that the voltage improvements were marginal and not worth pursuing further. These findings represent a contribution to demand management research and the project met all of the DMIA criteria at its commencement.

Ergon Energy's claim for approval to recover its costs associated with the SWER Statcom is based on its understanding that:

- the DMIS is provided for DNSPs to explore potentially efficient demand management mechanisms - with every intention that these are developed into successful programs which reduce or shift demand; and
- the rejection of DMIA funding for demand management related expenditure which does not result in a successful program being developed will reduce DNSP's desire to explore effective, innovative and potentially efficient demand management mechanisms in favour of more robust and proven technologies.

Summary of the project findings from SWER Statcom are presented in the appendix section.

Longer Term Trends

Ergon Energy's DMIA program has progressively expanded over the last 3 years as demonstrated in Figure 3. The expansion of the innovation program has also expanded opportunities with innovation partners who are willing to contribute to DMIA projects and trials. Ergon Energy has found co-contributions are a useful way to lower Ergon Energy's innovation costs, share risks and identify collaboration opportunities to share knowledge and capabilities.

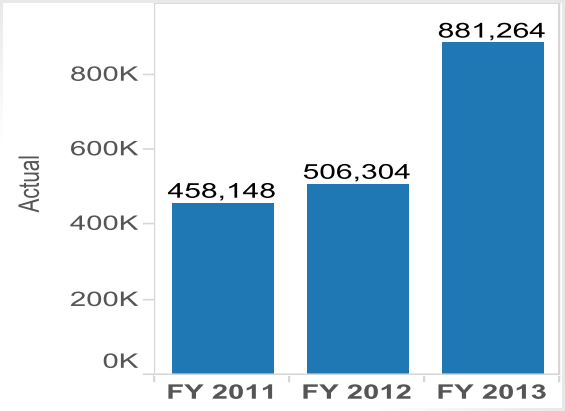


FIGURE 3: ERGON ENERGY DMIA EXPENDITURE

Table 5 presents a summary of co-contributions into Ergon Energy DMIA funded projects. It shows that Ergon Energy has lowered its DMIA costs by $694,514 through partner co-contributions and is conducting research that promotes research from industry and the research community. Importantly, the parties value these projects or programs as they are willing to make contributions towards these costs.

TABLE 5: ERGON ENERGY DMIA PROJECT CO-CONTRIBUTIONS

DMIA Project	Funding Source[3]	Funding Amount ($)	Co-contributions Amount ($)	Ergon Energy Amount ($)	Project Total Amount ($)
Network Embedded Solar Thermal	AUSTELLA	42,500	127,500	65,200	192,700
	ACRE	85,000			
	Ergon Energy	65,200			
Solar Energy Management Systems	CSIRO	163,830	393,830	200,000	593,830
	GWA	230,000			
	Ergon Energy	200,000			
Super Conductor	QUT	25,000	25,000	15,000	40,000
	Ergon Energy	15,000			
Smart Voltage Regulator Trial	QUT	25,000	45,000	84,999	129,999
	Microplanet	20,000			
	Ergon Energy	84,999			
Cool Roof Trial	StrongGuard	55,291	103,184	201,712	304,896
	SmartGrid	10,000			
	QUT	37,893			
	Ergon Energy	201,712			
		Total	694,514	566,911	1,261,425

[3] AUSTELLA, Australia Solar Thermal Energy Association; ACRE, Australian Centre for Renewable Energy; GWA, GWA Group; Microplanet, Microplanet Technology Corp; StrongGuard, Aerotact Pty Ltd; QUT, Queensland University of Technology; SmartGrid, SmartGrid Partners Pty Ltd

PROGRAM DELIVERY

This section of the report details the status of Ergon Energy's DMIA projects in 2012/13 by describing each project's objectives, progress against defined milestones and findings to date.

To measure the DMIA implementation progress, Ergon Energy uses a Red-Amber-Green (RAG) rating system against the defined targets. For the 2012/13 DMIA program, 34 deliverables were defined across the 15 projects.

A brief explanation of the RAG ratings and a summary of the implementation progress are presented in the table below:

TABLE 6: ERGON ENERGY DMIA IMPLEMENTATION PROGRESS - 2012/13

Definition	Rating	Number achieved
Green flag indicates that the target was substantially or fully achieved		30
Amber flag indicates that the target was partly achieved		-
Red flag indicates that the target was not achieved		4

As the performance targets indicate, 30 of 34 (or 88%) of the project performance targets were achieved for the year. The exceptions were the result of project scope changes on the SWER Statcom and Urban Statcom, following unfavourable findings in the development phase.

Projects that did not fully achieve targets included:

- **Urban Statcom**: This project was restructured and re-scoped following the recommendations of the initial assessment. The scope now includes laboratory testing and field trials of commercially available products rather than performing a laboratory test with concept type products that require considerable development work.
- **SWER Statcom**: This project was closed following the recommendations of the initial modelling assessment at development phase. Initial modelling indicated minimal benefit compared to other technologies.

STOCKLAND NORTH SHORE DISPLAY

PROJECT PHASE

Indicates current phase

Nature & Scope

This project emerged from an offer made by Stockland to Ergon Energy to promote energy sustainability in Stockland's new Living Display Centre at their North Shore residential development in Townsville.

The North Shore master planned community will eventually comprise 5,200 lots and around 15,000 people. Around 1,300 lots have been built on with another 3,900 to be occupied over the next ten years. North Shore is located in close proximity to the Energy Sense Community project's study area around the Bohle Plains and Mount St Johns substations.

The Stockland offer provides Ergon Energy an ideal opportunity to work with a keen developer partner to develop pathways to reduce network requirements in a greenfield estate.

BENEFITS & OUTCOMES

▲ ***Sustainability Handbook***

Majority of the 2000 copies of the Handbook (launched in Oct. 2011) have been distributed to visitors to the Sales Centre and individual display homes. Very positive feedback from home buyer survey (Nov-Dec 2012) leading to the next edition of the Handbook

▲ ***Developer Engagement***

A positive and collaborative relationship with Stockland Developments which has progressed to an Energy Sense Communities project.

ISSUES

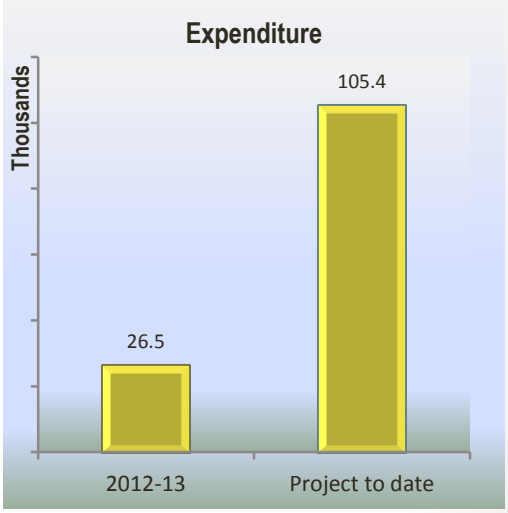
▼ ***Measurement***

Homes used as builders' sales offices were not suitable to indicate normal residential patterns.

Aims & Expectations

The aims and expectations of this broad-based demand management project are to:

- utilise the Living Display Centre to educate prospective new home buyers for home package inclusions to reduce energy usage and electricity charges (e.g., building features, use of off-peak tariffs, etc.);
- educate and encourage local builders to include energy conservation and demand management features in their product offerings;
- establish a working relationship with Stockland that assists Ergon Energy to promote energy conservation and demand management; and
- measure the impact on network demand of concentrated installations of inverter systems within a residential environment.



Implementation Progress (as at June 2013)

		Ratings
1.	Educating prospective home buyers about the value of energy conservation and demand management features in reducing their home's operating costs;	
2.	Influencing builders to incorporate or offer energy conservation and demand management features in their product suite; and	
3.	Developing a relationship with a major Queensland developer that will provide Ergon Energy an opportunity to work with their other developments to reduce network requirements.	

Update Summary

Project delivery phase concluded in Quarter 4, 2013 with project final report to be prepared in Quarter 3, 2013/2014. The project final report will include key findings from home buyer & builders survey conducted by Colmar Brunton late in 2012. Handbook feedback very positive with positive indicators on the effort to educate and inform buyers. Success of this project has led to a much larger extended project called New Residential Business Models within the Energy Sense Communities program.

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

AUTO DEMAND RESPONSE TRIAL

Nature & Scope

There are numerous opportunities for working with customers to reduce their peak demand or indeed to reduce their consumption when the network is under a constraint.

There are many cases where customer equipment may be shut down or "dialled back" for short periods of time in order to reduce peak load with minimal or no impact on the customer. Working in conjunction with our customers will empower them to make better energy choices that benefit their business and climate change, while better utilising network assets and reducing the need for network augmentation.

PROJECT PHASE

Indicates current phase

BENEFITS & OUTCOMES

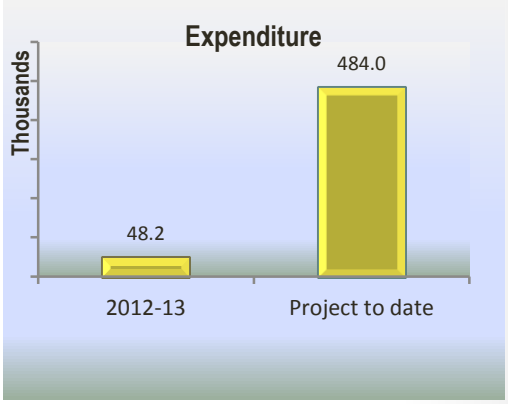
- The trial averaged demand reductions of 122kW from an average baseline of 372.3kW or reductions of 32.6% over all the demand events.
- The maximum demand reduction event was 189kW from a baseline of 428kW, or a reduction of 44%.
- Automation of the demand reductions will be required in order to manage a portfolio appropriately.

ISSUES

- Capability needs to be integrated into the wider business including the control room, planning, strategy, and asset management and impact assessment will be required.

Aims & Expectations

The aim and expectation of this broad-based demand management project is that at the end of the trial, Ergon Energy will be able to determine the effectiveness of Auto Demand Response (DR) in interacting with legacy energy systems on customers' premises such as heating, ventilation and air-conditioning management systems in such a way that material peak demand and energy reductions can be achieved.



Implementation Progress (as at June 2013)

		Ratings
1.	Final calling of demand response events and analysis of the event performance	
2.	Project competition and write up of final report	
3.	Confirmation or not of the project hypothesis	

Update Summary

The project was completed on time and on budget and confirmed that it was possible to work with customers to actively reduce load on request with a peak demand saving of 44%. The project highlighted several key aspects of automatic demand management including the need for infrastructure to actively manage demand and the customer portfolio to ensure that network requirements are met while complying with customer demand contractual obligations.

Ergon Energy will next commence investigations into the integration of automated demand response capabilities and a deployment of demand response as a business as usual product. This work is scheduled for Q3 2013/14 and the scope includes the technical infrastructure, processes, customer incentives and overall capabilities for possible implementation.

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

GUSS PHASE 2 (REGUSS)

PROJECT PHASE

Indicates current phase

Nature & Scope

The goal of the project is to further develop the Grid Utility Support System (GUSS) (medium scale storage, grid interface inverter, system control and monitoring) to allow for the connection of renewable energy systems – in particular photovoltaics (PV), in such a way as to optimise the value that the renewables can present both to the network and to the customer. Appropriate integration will allow renewable energy generated to be stored, when it is not of value, and released at times of need.

Automated operation, to manage the system and support the network in the most effective way is a key objective that will benefit all future energy storage products for the (Single-Wire Earth Return) SWER networks.

The REGUSS project specifically addresses integration of PV into our SWER networks and enabling the generation of PV energy to be stored and shifted to peak demand and network need times.

BENEFITS & OUTCOMES

▲ ***Testing complete***

Product has completed Factory Acceptance Testing

Further laboratory testing complete

▲ ***Improved automated functionality***

Successfully integration and laboratory trial of automated grid support mode.

▲ ***Continued energy storage learnings***

Provided leanings to feed into other energy storage trials/products

ISSUES

▼ ***Continued developmental issues***

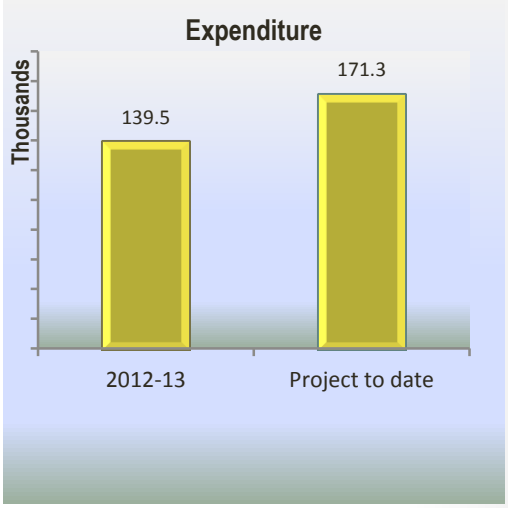
Some minor issues still arising in technology but will not prevent field trial progress

Such issues typical in new technologies and improvements occurring all the time

Aims & Expectations

The aims and expectations of this project are to:

- Improve the value renewable energy can provide to the distribution network and low voltage connection points;
- Reduce the impact peak demand has on specific network constrained areas through the combined use of renewable energy and storage;
- Develop and integrate an automatic operating algorithm that effectively manages the system and supports the network without the need for upstream communication; and
- Ensure the equipment is grid ready, and there are processes to support their connection to the network.



Implementation Progress (as at June 2013)

		Ratings
1.	Factory acceptance testing complete	

Update Summary

The REGUSS project has developed to the stage where it is ready for the field trial phase. The factory acceptance testing was completed and further additional testing was performed at Queensland University of Technology. This was undertaken to further improve and test the automated mode and prevent costly issues arising once installed in the remote trial site, as much as possible. The hosting agreement has been signed, network connection equipment installed and solar panels and mounting are at local depot awaiting install. The trial is due for completion in late 2014.

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

PASSIVE AIR COOLING TRIAL (PACT)

PROJECT PHASE

Indicates current phase

Nature & Scope

The Passive Air Cooling Trial (PACT) was been developed to determine the commercial potential of a current market product that may help to reduce air conditioning load.

As both the manufacturer and the supplier lack scientific data to support the efficacy of the product, the PACT seek to determine if this product can demonstrate energy and demand saving that can be actively promoted in the residential market, thereby reducing network peak demand.

BENEFITS & OUTCOMES

- The trial showed that there were no benefits of any discernible nature of this type of cooling technology

ISSUES

- Installation of many of the sites proved difficult and led to technical problems. For a product to encounter this type of issue means it is not ready for market.

Aims & Expectations

The purpose of the trial is to determine the energy benefit per installed in ground cooling unit. The data findings will enable Ergon Energy to consult, in terms of energy saving capacity with government agencies, the Australian product supplier and other interested parties to promote the product's benefits and wider residential and commercial application.

Implementation Progress (as at June 2013)

		Ratings
1.	Completion of trial	

Update Summary

The trial has concluded with little or no demonstrable positive impact of the PACT system on energy-use of air conditioning systems. No further pursuit of this initiative will be undertaken.

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

SMART CAMP FEASIBILITY

Nature & Scope

The purpose of this project is to identify energy efficiency and demand management measures and to develop a cost/benefit model for evaluating efficiency improvements that result in a demand reduction, in camp type loads. A 'camp' load refers to a construction or mining type camp that comprises multiple demountable buildings for accommodation, with shared common areas. The idea is to draw together all existing and applicable technologies that may be suitable, and to evaluate their cost/benefit in both a Greenfield and Brownfield application.

PROJECT PHASE

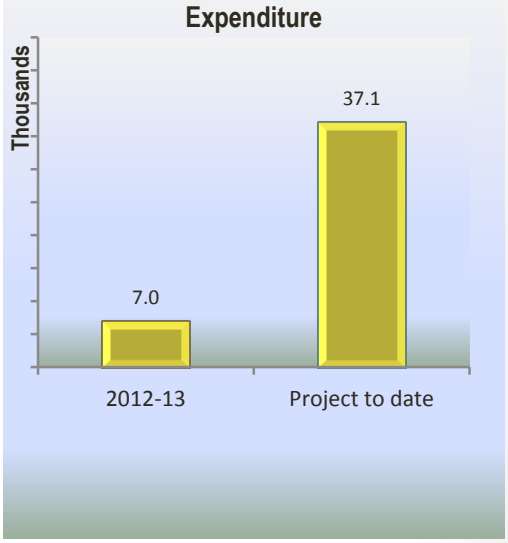
Indicates current phase

BENEFITS & OUTCOMES

- Project outcomes have been shared with mine camp industry
- Use project findings in discussions with mine camp operators seeking new network connections, to encourage operators to opt for lower demand operations.

Aims & Expectations

- Review current camp loads, demand drivers based on an assessment of up to 6 sites through 3 regions;
- Review existing camp loads and customer needs, and ascertain opportunities to improved energy efficiency/ demand management outcomes;
- Canvass market for existing, applicable technologies that target demand drivers, and that could result in a demand reduction in Greenfield applications
- Canvass market for existing, applicable technologies that target demand drivers, and that could result in a demand reduction in Brownfield applications
- Compile a report highlighting energy efficiency and demand management opportunities, costs, benefits, barriers to implementation application and risks for consideration.



Implementation Progress (as at June 2013)

		Ratings
1.	Implementations of findings to business as usual practices within Ergon Energy	

Update Summary

With the delivery phase of the project concluding in 2011/12, an additional amount ($7k) was spent in 2012/13 for completion of a cost estimate study on a chilled water system to cover a 500 & 1000 bed site (in place of the business as usual split system air-conditioners) and the potential of the inclusion of a thermal energy storage (TES) solution. These findings were included as an addendum to the final report.

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

SMART VOLTAGE REGULATOR (SVR) TRIAL

Nature & Scope

The Smart Voltage Regulator (SVR) Validation project will laboratory test the effectiveness of three phase SVRs in maintaining distribution network power quality in light of increasing penetration of renewable generation.

The full validation will need to be conducted in a phased way, roughly split between single device testing and validating and a subsequent larger scale deployment in selected areas of the network depending on the agreed application of the device.

PROJECT PHASE

Indicates current phase

BENEFITS & OUTCOMES

- Understanding of operation of in-series voltage regulation
- Understanding of where in-series voltage regulation may assist with Low Voltage (LV) Management

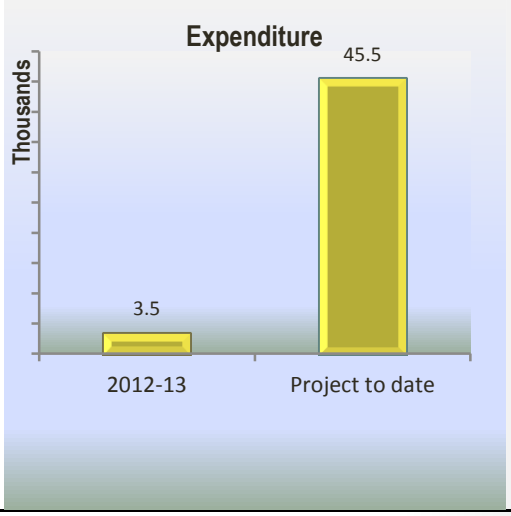
ISSUES

- The optimal location to place these devices on LV networks to ensure maximum benefit
- Procedures and risks with failure or by-pass of the unit which may cause voltage supply issues to the customers

Aims & Expectations

A staged process is proposed to effectively assess the SVR and enable an informed commercial decision to be made:

- A full functional test of the SVR will be firstly conducted by the Queensland University of Technology (QUT) at their Banyo test laboratory.
- A network model of the SVR be developed by QUT suitable for use within Ergon Energy Network Modelling tools
- If the above mentioned laboratory testing shows that the SVR's performance is suitable, a study will be performed to compare cost/benefit/performance against other competitor technologies (such as the regulating transformer, STATCOM etc.).



Implementation Progress (as at June 2013)

		Ratings
1.	Completion of In Lab Tests	
2.	Preliminary Report	
3.	Modelling of SVR	
4.	Final Report and Close Project	

Update Summary

The project had delivered all of its milestones, with the successful Laboratory testing and reporting on the performance of the unit completed. The unit performed above expectations with one minor operational issue when used in a reverse power flow situation (this will be in the next release of the product).

The business is now considering its option and how this product fits into our LV management plans.

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

URBAN STATCOM

Nature & Scope

The increasing prevalence of residential Photovoltaic (PV) systems and non-linear loads is starting to have a significant impact on our network and customer supply.

These impacts include over-voltage and voltage swings on the Low Voltage (LV) network affecting customer loads, causing PV systems to trip off (reducing output) and necessitating (partially effective and expensive) network augmentation and potentially restriction of PV system connection.

Ergon Energy has placed a high priority on identifying solutions and products to mitigate these problems including lower cost, more effective alternatives to network augmentation.

PROJECT PHASE

Indicates current phase

BENEFITS & OUTCOMES

- Improved low voltage supply quality
- Allows for increasing amount of PV without the need for network augmentation
- Can be installed in brownfield sites that do not have customer Var inverters but are experiencing low voltage network issues

ISSUES

- One of the products on order does not address out of balance issues. Whilst not impacting the project, having this feature (as they are further developed) would provide better network outcomes.

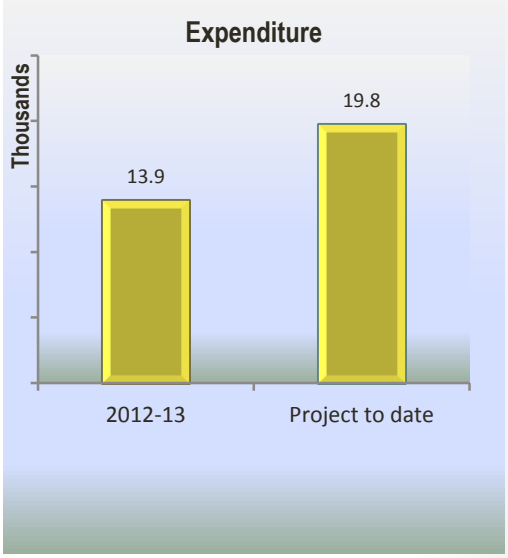
Aims & Expectations

This project laboratory tests and field trials 2 different products from different manufacturers.

Product 1 is a single phase 10kvar capacitive only type of unit. For this product, the distribution transformer would be tapped down then the unit would supply capacitive vars to boost the voltage when needed. This system can address out of balance voltages.

Product 2 is a three phase 20kvar Statcom, that can act as both a capacitor and inductor. Although the product is a three phase unit, it does not address out of balance issues on the network.

Field trials will be undertaken in Townsville on a low voltage network that suffers from voltage fluctuations, as a result of both high load and high PV. This will allow practical assessment of the capability of LV Statcom's to mitigate PV related voltage issues in a real situation.



Implementation Progress (as at June 2013)

		Ratings
1.	Laboratory test prototype Statcom	
2.	Cancel supply arrange with prototype supplier	
3.	Search for suitable Statcom suppliers	

Update Summary

Project scope and implementation plan updated to the above, which now reflects laboratory testing and field trials of commercially available products – as opposed to performing a laboratory test with concept type products that require considerable development work. Purchase orders have been placed and product delivery is expected by early Quarter 3 2013/14, for both products. Project expenditure to date has been modest, because of product unavailability. New products have been found and total project budget is expected to be utilised by the end of 2013/14.

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

LARGE STATCOM

Nature & Scope

Ergon Energy has extensive networks of long rural and remote feeders which are being stressed by the increasing demands placed on them by modern customer electricity needs and by the increasing prevalence of distributed generation, particularly residential PV.

The Large LV STATCOM project will trial a three phase 300kVAr unit on the Ergon Energy network. The main application is to support the voltage on a long medium voltage rural feeder with voltage regulation issues, partially due to higher penetration of PV, and avoid the conventional network upgrade which may otherwise be required.

PROJECT PHASE

Indicates current phase

BENEFITS & OUTCOMES

Operation and deployment

- Settings and impacts determined through modeling
- Costing information provided to planning for inclusion in AER submission
- Control procedures and processes developed with system controllers

Design and installation

- Civil works complete
- Lines works currently being installed
- STATCOM currently being installed

ISSUES

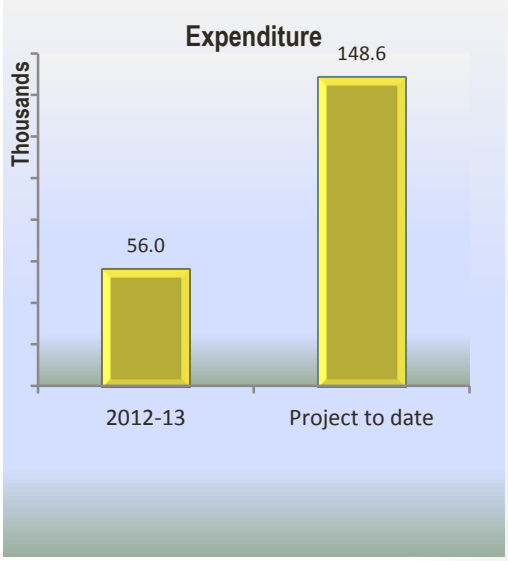
Minor deployment issues

Non-standard aspects typical of new technologies has caused delays to date in some areas

Aims & Expectations

Distributed LV STATCOMS are low voltage power electronic products which have the ability to inject both capacitive and inductive reactive power into the electricity network.
Project expectations are,

- Confirmation (or not) of the learning hypothesis;
- Identification of the control methodology for large LV STATCOM to optimise voltage profile while avoiding deleterious impacts such as inter-unit hunting;
- Broad brush investigation of optimal placement of these devices;
- Evaluation of product capability to provide the desired performance.
- Compare the value of large LV STATCOMs coupled to the MV versus small distributed LV STATCOMs in LV networks



Implementation Progress (as at June 2013)

		Ratings
1.	Factory acceptance and laboratory testing completed	
2.	System delivered	

Update Summary

The Large STATCOM project is about to enter the field trial phase. The system is currently being installed and commissioning is booked in September 2013 with the supplier. A number of items have been worked through to enable this system to be installed and operated on the distribution network. This ranges from research and modelling to determine optimal settings and address protection concerns, communications and line design to allow project aims to be assessed effectively, to operating procedures and processes for field crews and network operators. The trial is due to finish in October 2014.

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

SWER STATCOM

Nature & Scope

The Single-Wire Earth Return (SWER) Low Voltage (LV) Sic synchronous compensator (STATCOM) project will laboratory test and the field trial two 20kvar single phase low voltage static compensators unit on the Ergon Energy network.

The main purpose is to assess their performance and ability on SWER networks to provide reactive power support to assist with the network voltage management.

In addition the capability of the STATCOM to mitigate harmonics will be tested on SWER networks.

PROJECT PHASE

Indicates current phase

BENEFITS & OUTCOMES

- Initial modeling indicated minimal benefit compared to other technologies

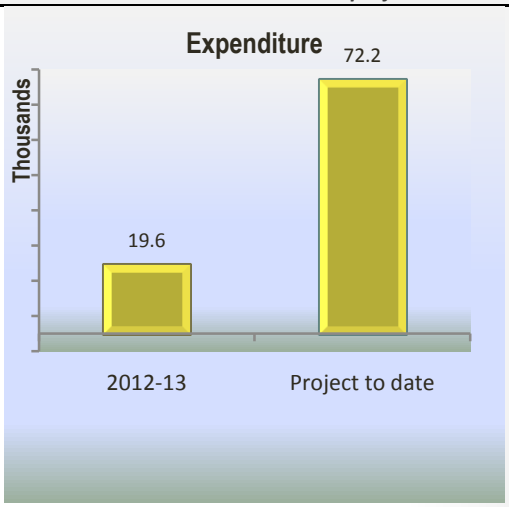
ISSUES

- ***Voltage improvement on the SWER lines not as expected***
- ***Control methodology of the unit***
- ***Decision made to close the project***

Aims & Expectations

The aims and expectations are:

- Comprehensive system simulation studies to be conducted prior to installation of the units to develop and verify the control methodology;
- A comprehensive test program to be developed prior to installation. It is expected that units to be trialled for a period of at least 1 year;
- Confirmation (or not) of the learning hypothesis;
- Identification of the control methodology;
- Evaluation of product capability to provide the desired performance.



Implementation Progress (as at June 2013)

		Ratings
1.	Factory Acceptance Testing Completed	
2.	Lab Testing	
3.	Installation	
4.	Completion of 12 month reporting	

Update Summary

In September 2012, it was decided to place the SWER Statcom project on hold and then in February 2013 to close the project. This decision was made due to the results which had been found during the initial modelling to determine suitable sites for the units and the supplier's direction as a company.

During modelling on multiple SWER networks it was found that the voltage improvements were marginal (only 0.5% voltage improvement for a single unit). Other technologies with real power capability were able to achieve 3-4% improvement for a similar size. It was also found that control of the Statcom unit used a different methodology to other products

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

SOLAR ENERGY MANAGEMENT SYSTEMS (SEM SYSTEM)

Nature & Scope

This project represents development of a world-first firm solar system with Solar Energy Management (SEM) controller that is capable of continuous operation, overcoming solar intermittency, displacement of electrical consumption, increasing the penetration of cost-effective renewable energy technology and providing reliable renewable energy.

As a utility energy management tool the system is capable of simultaneously satisfying both (i) renewable energy supply and (ii) electricity network demand management objectives.

This project will develop, prototype and evaluate this firm solar system through the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in collaboration with Ergon Energy and heating and cooling manufacturer GWA Group.

PROJECT PHASE

Indicates current phase

BENEFITS & OUTCOMES

- Engagement of Customers
- GWA delivered the prototype to CISRO in Newcastle
- Conduction first round of testing
- Completion of milestone 1 and 2 leading to secure further project funding.
- Ergon Energy allocated a dedicated channel to activate the DRED control to test Control Centre sending signal on regular basis to residential sites.

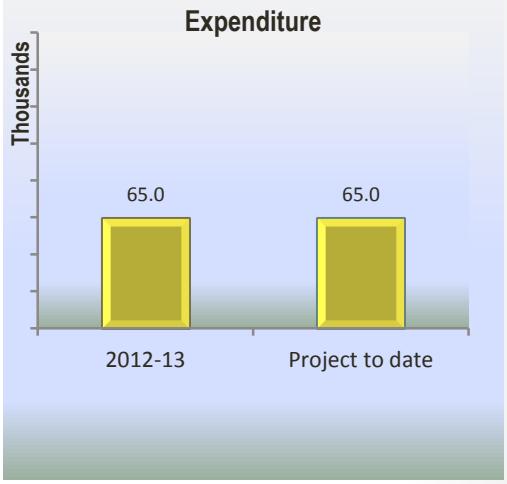
ISSUES

- ***Data Quality issues from Measurement & Verification (M&V)***

Aims & Expectations

The expectation is that an operating model is produced that shows the demand reduction and energy related benefits to both the customer and Ergon Energy of the SEM system. In effect it will assist in determining the opportunity to develop a solution for residential air conditioning that removes the electrical demand from the distribution network when needed.

Ergon Energy being involved in such an activity will allow a significant opportunity for improving both its community standing both in the electricity industry and the residential market.



Implementation Progress (as at June 2013)

		Ratings
1.	Start of project	
2.	Milestone 1 achieved: Customer engaged, baseline data collected, First project report delivered	
3.	Milestone 2 achieved: Design of the system completed , Prototype delivered , first test result displayed	

Update Summary

The Project team have designed, developed and assembled a SEM prototype, including developing a technical specification, and have undertaken testing and have undertaken planning in relation to system installation at the three host sites. The following activities are now completed: Draft specification provided to Ergon Building and testing of SEM prototype; Development of technical design, implementation and installation guide.

The project has faced M&V data quality and reliability issues. Accordingly steps have been taken to mitigate this risk, and noted for future projects on M&V plan ownerships.

The project is scheduled for completion by 30 June 2014

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

NETWORK EMBEDDED SOLAR THERMAL (NEST)

Nature & Scope

This project aims to quantify key economic benefits which may arise from developing Concentrating Solar Thermal (CST) electricity generation in the distribution network, namely the potential network benefits in grid constrained areas, and the employment that could ensue from CST development with the correct policy settings.

The project develops some of the specific issues raised in the Australian Solar Institute's (ASI) "Review of the Potential for Concentrated Solar Power (CSP) in Australia", which is currently being undertaken by IT Power.

The ASI Review will consider barrier that network connection may pose to CST development and potential macro-economic benefits of CST development.

PROJECT PHASE

Indicates current phase

BENEFITS & OUTCOMES

- Identify network constraints in Ergon Energy area and other locations across then National Electricity Market (NEM) capable of supporting solar thermal solutions.
- Develop key case studies using the latest Levelised Cost of Energy (LCoE) pricing assumptions for solar thermal technologies and possible revenue streams including gap funding requirements.
- Ergon has demonstrated good working relationships with the Australian Solar Thermal Industry and its supporters.

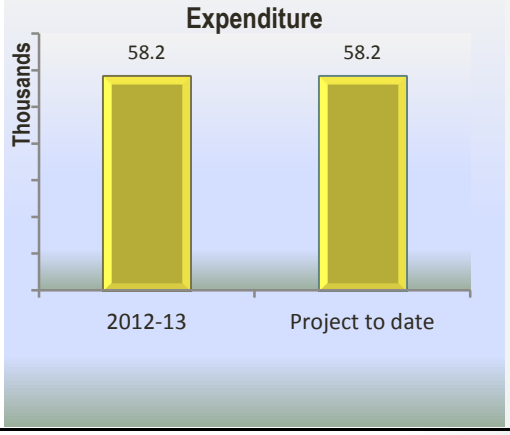
ISSUES

- The cost analysis reported is based on a Levelised Cost of Energy calculation (LCoE) and does not report a project developer view with Net Present Value (NPV) and cash flow methodologies. Ergon raised this as an interpretation issue with readers of the report.

Aims & Expectations

The project will:

- Identify and map locations where CST could provide cost-effective network support, and quantify the value that providing "network support services" could yield for CST electricity generators, and the resulting cost-effective CST capacity that could be installed between now and 2020.
- Quantify the potential employment deriving from various scenarios of Australian CST deployment.



Implementation Progress (as at June 2013) — Ratings

1.	Progress towards completion of final report by 31 August 2013	

Update Summary

The Final Report "Breaking the Solar Gridlock" will be launched late October to early November 2013. The project achieved all of its targeted objectives.

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

COOL ROOF TRIAL

Nature & Scope

Ergon Energy is facing critical challenges in managing peak demand and utilisation of its distribution network.

This is a collaborative project with industry partners and Queensland University of Technology (QUT), bringing together multi-disciplinary expertise in the electricity sector, infrastructure, scientific testing and modelling, in developing a roof coating system that maximises energy and demand reductions for customers.

PROJECT PHASE

Indicates current phase

BENEFITS & OUTCOMES

- Good range of trial sites (commercial-school and university and residential) chosen and application of coating system applied
- International desk top study completed by QUT. Measurement and Verification commenced following roof coating application

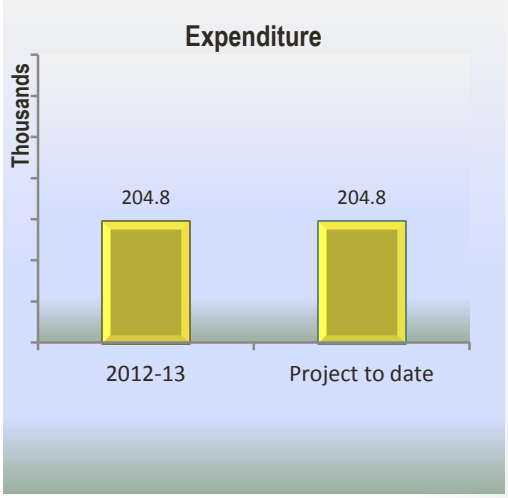
ISSUES

- ***Delays with completion of final report***

Aims & Expectations

The aim of the trial aims to develop a scientifically valid testing regime that validates the performance of cool roof products, and quantifies the energy and demand reductions with prescribed confidence.

With assistance from industry expertise the trial will also look to shape a product for the end market user.
Ergon Energy's requirement is a product that has been tightly specified to achieve quantifiable demand reductions across the life of the product.



Implementation Progress (as at June 2013)

		Ratings
1.	International desktop study completed by QUT.	
2.	Field trial sites completed	
3.	Measurement and Verification period providing valuable data on energy and demand effect which will be incorporated into final report	

Update Summary

Final field report completed and circulated to internal stakeholders awaiting feedback. Decision to be made as to whether to close project or continue measuring over forthcoming summer period.

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

RECESS

PROJECT PHASE

Indicates current phase

Nature & Scope

Although 69 percent of existing homes in Ergon Energy's network take advantage of an off-peak retail tariff (Tariff 31 or 33, or a combination of these tariffs), it is believed that less than 10 percent of new homes connecting to Ergon Energy's network take advantage of off-peak tariffs.

This program seeks to bring electricians together for a face-to-face education and information on demand management, energy-efficiency and conversation on the network, customers and the opportunities it presents them to deliver a win-win-win for the market. It also seeks to address the operation issues between Ergon and electricians to reduce costs for both and streamline work practices.

BENEFITS & OUTCOMES

- RECESS has market recognition and brand awareness.
- Good engagement regarding operational issues

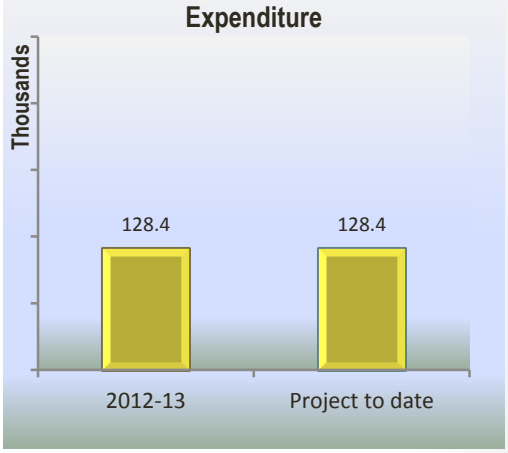
ISSUES

- Benefits are difficult to quantify. Ergon will need to develop methodology and systems to capture the benefits
- ***Message fatigue***

Aims & Expectations

Given the significant number of new customers not connecting to an off-peak tariff, the aim of this project was to increase customers' and electricians' awareness of the off-peak tariffs and the associated value propositions.

Ergon Energy sought to raise awareness of the benefits of connecting to off-peak tariffs through its collaboration with industry publications and electrician education.



Implementation Progress (as at June 2013)

		Ratings
1.	Renew funding source roadshow for electricians and establish a strategic intent to build this activity as a product	
2.	Review and maintain training module for RTO's as demand management opportunities expand.	

Update Summary

The trend is towards discussion of the operational issues between Ergon and electricians who attend these meetings/sessions. This DMIA project is now closed, a business case is in preparation to integrate RECESS as Business as usual.

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

BUILDING DESIGN LED CAPACITY

PROJECT PHASE

Indicates current phase

Nature & Scope

The proposed project seeks to implement Design Led Innovation within a succinct project as a means of prototyping the internal business development with a view to scaling across the business. Throughout the process, research will be conducted to identify, understand and report barriers to the uptake of Design Lead Innovation within the business.

The development of deep customer insights related battery storage and grid connect was chosen as the demonstration project. The project has gathered deep customer insights, presented these to the business and will use these as seeds for business model workshops

BENEFITS & OUTCOMES

- Development of one page view of key business drivers and stakeholders
- Internal understanding of qualitative deep customer dives and how this research differs in process and outcome to quantitative customer research
- Presentation of deep customer insights seeding thought on further engagement with the DLI process in the business

Aims & Expectations

The objectives of this project are to pilot the introduction of Design Led Innovation to demonstrate its effectiveness and to document the internal cultural barriers to the changes. The pilot project aims to develop business models with a focus on leveraging the coming uptake of battery storage in domestic settings.

The Design Led Innovation process is built on achieving alignment with all stakeholders through an iterative process of engagement and co-design build on a basis of deep customer insights. Both Ergon and its customers can benefit from the development of collaborative business models. The customer benefit will be realized in cost savings due to tariff utilization, control of onsite solar PV generation and uninterruptable power supply. The network stands to gain from peak load shifting, and also through levelling of distributed generation feed-in through onsite storage.

Implementation Progress (as at June 2013)

Ratings

1. Initial research investigation of business as usual
2. Development of a key drivers and stakeholders map

Forthcoming:

3. Deep customer insights gathered and presented to the business (October 2013)
4. Prototyping and business model workshops (Quarter 2, 2013/14)
5. Present outcome of overall process + proposed business models (Quarter 3, 2013/14)

Update Summary

The project is progressing as planned. The feedback from internal Ergon Energy stakeholders upon presentation of current finding is positive with good understanding of the difference between current business processes and that being demonstrated. The potentially higher value outcomes of the business model workshops will provide a key platform for demonstration to the business of the potential of the process. The challenge will be to go beyond demonstration of the process of Design Led Innovation, to further implementation within the business.

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

SUPER CONDUCTOR

PROJECT PHASE

Indicates current phase

Nature & Scope

High Temperature Superconducting (HTS) power cable significantly increases the network capacity and flexibility by replacing conventional electrical assets with new cryogenic technology. It is expected that HTS will become a standard technology to be implemented in Ergon Energy's network beyond 2020.

To begin the HTS program, Ergon Energy intends to implement 600 metre of HTS power cable in Toowoomba network as a pioneer project in 2015-2020. The experience resulted from design, construction, implementation, maintenance and operation will benefit this technology future in Ergon Energy.

Queensland University of Technology (QUT) is involved in the HTS implementation study. The academic support provided by QUT plays key role in the whole process of HTS technology implementation.

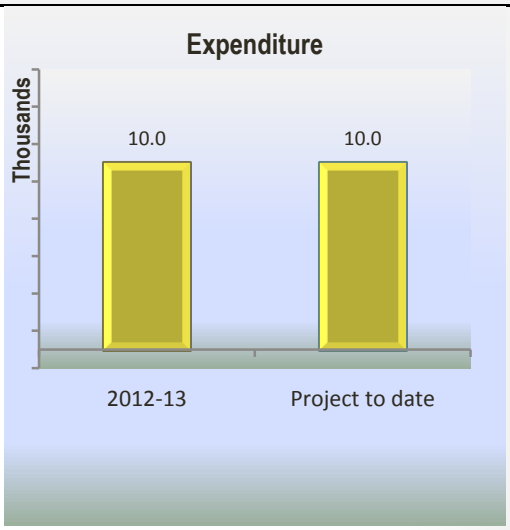
BENEFITS & OUTCOMES

- Knowledge transfer of HTS technologies between partners
- QUT establishing the first "Applied Superconductivity Lab" (ASL) in an Australian University
- ASL to pursue applied research with potential involvement from Power Industry. These applied research topics would be expected to have a near term application for benefits and improvements in the Australian power grid.

Aims & Expectations

The project aims to provide research findings on the introduction of HTS into the power network to:

- manage long-term capacities (>20 yrs) of the future power systems in heavy-urban, high-density and the CBD areas in their major centres;
- eliminate multiple voltage transformations where possible;
- use distribution voltages to supply sub-transmission and transmission loads;
- replace 132kV and 110kV feeders in heavy density urban areas with HTS UG networks;
- use 11kV and 22kV switching stations instead 33/11kV, 66/11kV, 110/11kV, 110/33/11kV, 66/22kV and 132/22kV zone substations, especially in urban areas where sites for the future zone substations and transmission corridors are always problematic;
- manage increasing fault levels; and
- reduce capital investment for the network



Implementation Progress (as at June 2013) — Ratings

1.	Progress towards completion of HTS Business Case by October 2013	

Update Summary

The development of the business case for the first HTS pilot project in Australia is progressing well and will be completed on time.

Target is fully achieved within the timeframe. Target is partly achieved within the timeframe. Target is not achieved within the timeframe.

SUMMARY FINDINGS - COMPLETED & CLOSED PROJECTS

Auto Demand Response Trial

Project Scope

The Automated Demand Response (AutoDR) project aimed to trial technologies that work in conjunction with customers to enable the management of customer side loads for the purposes reducing peak demand. The enablement of customer participation in demand reduction can provide low cost methods to reduce peak demand and defer the need to augment the network as well as support contingency responses and potentially the active trading of demand in retail markets. The trial proposed to utilise Cisco's Mediator demand response interface unit and Honeywell's Akuacom demand response automation server with three customers across multiple sites in Townsville.

Outcomes & findings

The AutoDR trial was successful proving that, by working with customers, it was possible to dynamically reduce demand on request. The trial averaged demand reductions of 122kW from an average baseline of 372.3kW or reductions of 32.6% over all the demand events, with every event bar one recording demand reductions of over 23%. The maximum demand reduction event was 189kW from a baseline of 428kW, or a reduction of 44%. The only event with a demand reduction below 23% was also the worst performing event with no recorded reductions. This was expected due to the event timing and the trial participant mix (the event was in the evening and the participants were mainly commercial in nature with a mainly daytime load).

The key findings from the trial included:

- The use of open standards, especially industry accepted standards, can lower the costs and reduce barriers for customer participation in demand response programs. The trial used the OpenADR protocol which has been adopted by suppliers of industrial equipment such as Honeywell, Schneider, Echelon, Siemens, Johnson Controls and GE. OpenADR has been adopted as the demand response communications protocol by utilities throughout the world such as Pacific Gas and Electric (PG&E), San Diego Gas and Electric (SDG&E) and Southern California Edison (SCE) (OpenADR Aliance, 2012).
- The average site installation cost was relatively low at $25,000 which included audits, hardware, contractors and travel, however these costs could be reduced further if the site utilised control equipment that natively supported OpenADR, such as appropriate Building Management Systems.
- The customer participation in demand response was excellent when the demand events coincided with suitable site participation times, with a participation rate of 72% over all events. It is important to ensure that sites are aware of times and seasons when demand events are likely to occur (e.g. the expected network constraint time, summer early afternoon) and will be able to deliver demand reductions during those periods.
- Customers readily accepted the automatic control over their sites in the trial, even without monetary reward, provided they had an override or opt out capability i.e. a safety net.
- There needs to be a clearly defined measurement and verification method that enables transparency for the market and the flexibility for the varying types of demand profiles

that exist in the network so as to ensure that estimated savings are accurately reflected resulting in any demand incentive payments reflecting the network derived benefit, i.e. not overpaying for customer under performance.

- HVAC loads will have a bounce back at the end of events and have a limited capacity to deliver long duration demand reduction. HVAC loads responded very quickly which, when combined with other slower forms of demand reduction i.e. generation, could provide complete demand management capability.
- The automation and management of the portfolio will be a key aspect on any scalable demand reduction capability that supports a wide variety of contracts, customers, and demand types.
- The management of the demand needs to be carefully considered and where possible a level of automation should ensure that the lowest cost demand be called as a priority, working backwards across all the available demand options. This will ensure that any calling of a demand event will have the lowest operational cost and hence increase the value of the demand for network management purposes. As the number of customers grow automation will be necessary to ensure that any customer contractual obligations are adhered to.
- The ability for the DRAS to track the loads and report on the demand event performance including the predicted performance and estimated available load will be necessary tool for an integrated demand reduction capability.

The successful testing and evaluation of automatic demand response technology opens the way for the integration of this technology into the business to enable sophisticated management of demand side loads for network management purposes. In order to enable the exploitation of the future resource there needs to be some key foundations established to enable market direction and surety. Such foundations include:

- Measurement, verification and base-lining methods which will enable the market to understand the requirements for participating in demand reduction events.
- The definition of connection and interface standards such as OpenADR, which will enable the market to prepare for demand response and lower the barriers for connecting to a program
- Contract offering for demand response participation, availability, response times etc. need to be well defined.
- Internally, Ergon needs to develop the process systems and procedures to enable a business-as-usual approach to contracting demand reduction, which will include the governance structure, operational processes, training development, information technology, security standards, etc.

Passive Air Cooling Trial

Project Scope

The purpose of this trial is to determine the energy benefit per installed in ground cooling unit. After such data has become available and in efforts to reduce network peak demand, Ergon Energy will be in a position to consult, in terms of energy saving capacity, with government agencies, the Australian product supplier and other interested parties to promote the product's benefits and wider residential and commercial application.

As part of DMIA funded program, this trial was to:

- work with the Melbourne-based Australian distributor of a global Danish business which sells energy efficient heating and cooling solutions,
- conduct a series of trials on up to 15 units installed at temperature-variant Queensland locations,
- collect data from installations upon which energy saving and demand measures can be produced,
- make such data results available to all interested parties.

Outcomes & findings

It was not possible to undertake all 15 planned site installations due to difficulties in finding suitable sites (soil, water table height, and buildings), willing customers and adept tradespeople to install such a different type of product suitably. Five installations at four sites were chosen, three that were in summer climatic conditions of hot and humid and two that were in hot and dry.

Results suggested that existing system solution does not provide the efficacy required.

Smart Camp Feasibility

Project Scope

The project aimed to develop a cost/benefit model for evaluating efficiency improvements that result in a demand reduction in camp type loads. A 'camp' load refers to a construction or mining type camp with multiple demountable buildings for accommodation, with shared common areas. The concept is to draw together all existing and applicable energy efficient technologies, and to evaluate their cost/benefit in both a greenfield and brownfield application.

The project commenced with a desktop review of camp sites in high-growth locations within Queensland. Contacts were established with some of the camp owners to access suitable target camps and site visits and audits were conducted to collect data and establish baseline performance. The next step saw a desktop review conducted of the types of transportable buildings manufactured for use in the camps, and the efficiency measures already included in those buildings as part of their compliance with the Building Code of Australia.

Four sites were visited between September 2011 and February 2012. Ergon selected the sites from central and northern Queensland to gain a view of site specific issues, and understand the operational constraints affecting the energy performance of the camps. The sites audited gave a broad selection of camp size and type, from small 120-bed sites through to 320, 500, and 600-bed sites.

Outcomes & findings

The key findings are:

- Improvements in camp site energy consumption (kWh)of 20 – 50%, a reduction in consumption of 1,648 MWh per year (500 bed camp), and up to 250 kVA reduction in peak demand which could be achieved through implementation of measures identified in this report; (excludes centralised cooling & heating system option).
- The potential benefits obtained through the installation of a centralised cooling system for 24 hour operation providing the superior solution with a NPV of $2.8m vs. $3.4m for split systems (simple payback was around 6 years).
- The combined benefit by adding hot water production to the central plant, improving the NPV to $3.1m versus $5.1m for split systems and hot water systems. Simple payback was reduced to five years.
- Subject to site factors, implementing energy efficiency measures can provide significant cost advantages over the lifecycle of a camp, for both brownfield and greenfield sites.

SWER Statcom

Project Scope

The SWER Statcom was a project providing reactive voltage support to SWER lines as part of the larger LV Statcom program of work. The objectives were,

- Laboratory testing of 2 x 20kVA Statcom units
- Development and verification of control methodologies
- Report detailing learning outcomes of investigations of VAr compensation capability, harmonics mitigation capability, control methodologies, rating suitability and protection requirements

The project was initiated in June 2012 to trial a Single Phase Statcom unit for voltage support on our SWER Network.

In July 2012 Ergon Energy purchased two 20kVA single phase Statcom. Both units were to be coupled to the SWER network via dedicated standard 25kVA MV/LV SWER transformers and located on the ground to enable easy access during the trial. The units would operate in a decentralised manner based on local measurements and be capable of harmonic compensation; however any harmonic compensation provided would reduce the capacity available for VAr compensation.

It was planned to install one unit on the Wambo Creek 12.7kV SWER and the other unit on the Stanage Bay 19.1 kV network. The specific installation sites were to be confirmed after technical (simulation) studies and site surveys.

Outcomes & findings

In September 2012 it was decided to place the SWER Statcom project on hold. This decision was made due to the results which had been found during the initial modelling to determine suitable sites for the units. During modelling on multiple SWER networks it was found that the voltage improvements were marginal (only 0.5% voltage improvement for a single unit). Other technologies with real power capability were able to achieve 3-4% improvement for a similar size. It was also established that control of the unit used a different methodology to other products on the market which raised some concerns about the long term viability of this product.

The modelling undertaken on the SWER Statcom, suggested its contribution to voltage and load improvements were not sufficient to resolve network issues. It was decided that installing these Statcoms on SWER to provide both inductive and capacitive support was not effective. The reasons for deciding not to continue this project are based on the following:

- The capacitive VArs provided by the Statcom were not providing a large amount of voltage support to SWER lines;
- The main reason for voltage drop on SWER lines is due to the resistive component in the lines, not due to the reactive component. Real power injection is required to provide a significant voltage improvement; and
- Our 19.1kV lines are inherently power factor leading due to the Ferranti Effect. Installing a capacitor to improve voltage would only place more load on the feeder, making the situation worse.

APPENDICES

ABBREVIATIONS, DEFINITIONS AND UNITS OF MEASURE

AER	Australian Energy Regulator
AutoDR	Automated Demand Response – or another name for the commercial energy management system, which is the process of managing customer demand automatically
BMS	Building Management System – the controller that manages a building operation, it can be sophisticated to include full climate, security and building operation or simple to only include the management of the air conditioner system.
CAPEX	Capital Expenditure
Constraint	A condition whereby a limit, that has been pre-set to a declared criteria, is exceeded.
Demand (Maximum Demand MD)	The maximum electrical load over a set period of time. The figure may be for use with tariff calculations or load surveys and the units may be in either kVA, kW or amps.
Demand Side Management (DSM)	Demand Side Management is the design and implementation of programs designed to influence customer use of electricity in ways that will produce desired changed in system load shape.
DF	Distribution Feeder
DLC	Direct Load Control
DNSP	Distribution Network Service Provider
DR	Demand Reduction – amount of electrical load that can be removed for a period of time
DRAS	Demand Response Automation Server – a server that can be internally or externally hosted that communicates between the utility control centre and the customer end equipment. A DRAS can be fully featured to include predictive demand reduction algorithms or basic to only have communication and verification functionality
EECL	Ergon Energy Corporation Limited
HVAC	Heating, Ventilation and Air Conditioning – refers to the climate control systems and infrastructure of a building.
LV	Low Voltage – 240V or the voltage used in residential houses
MD	Maximum or Peak Demand
Network Limitations	A network limitation can be defined as a situation when the high voltage network is unable to supply electricity to the customer in accordance with the following supply standards. Network limitations which relate to system peak loading are: (i) Acceptable standards of reliability of supply cannot be maintained. (ii) Acceptable network voltage levels cannot be maintained. (iii) The thermal rating of plant and equipment is exceeded. (iv) The fault rating of equipment is exceeded. (v) The age, condition or specifications of equipment renders its continued use operationally unsafe, unreliable or uneconomic
OpenADR	Open Automated Demand Response – an open standard for communicating between a utility DRAS and customer end equipment and was defined by Berkley Labs. (http://www.openadr.org/)
OPEX	Operating Expenditure
PF	Power factor. The ratio of active power to apparent power. A unity power factor indicates no reactive power in the element.
PV	PV stands for Photo Voltaic which is a technical term for solar power generation.
SWER	Single Wire Earth Return. Distribution to customers using a single wire conductor with the greater mass of Earth as the return path.
TOU	Time of Use – A tariff structure where the cost of energy changes with time.
ZS	Zone Substation, A site incorporating equipment that provides control and voltage transformation from the sub-transmission or transmission network to the distribution network.

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24 hours a day, 7 days a week

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