

# Strategic Scope

## Enabling a Secure Data Zone for Customers



Part of the Energy Queensland Group

## Revision History

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## Document Approvals

Name	Position title	Date
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## 1. Project Summary Information

PROJECT SUMMARY INFORMATION			
Work Request Description	Enabling a Secure Data Zone for medium-large Customer DER		
Work Request Number		Work Request Required by Date	
Initiating Work Group	Intelligent Grid Solutions	Strategic Scope Contact	
Business Owner	AS&P		
Direct Value:	\$1.0M		

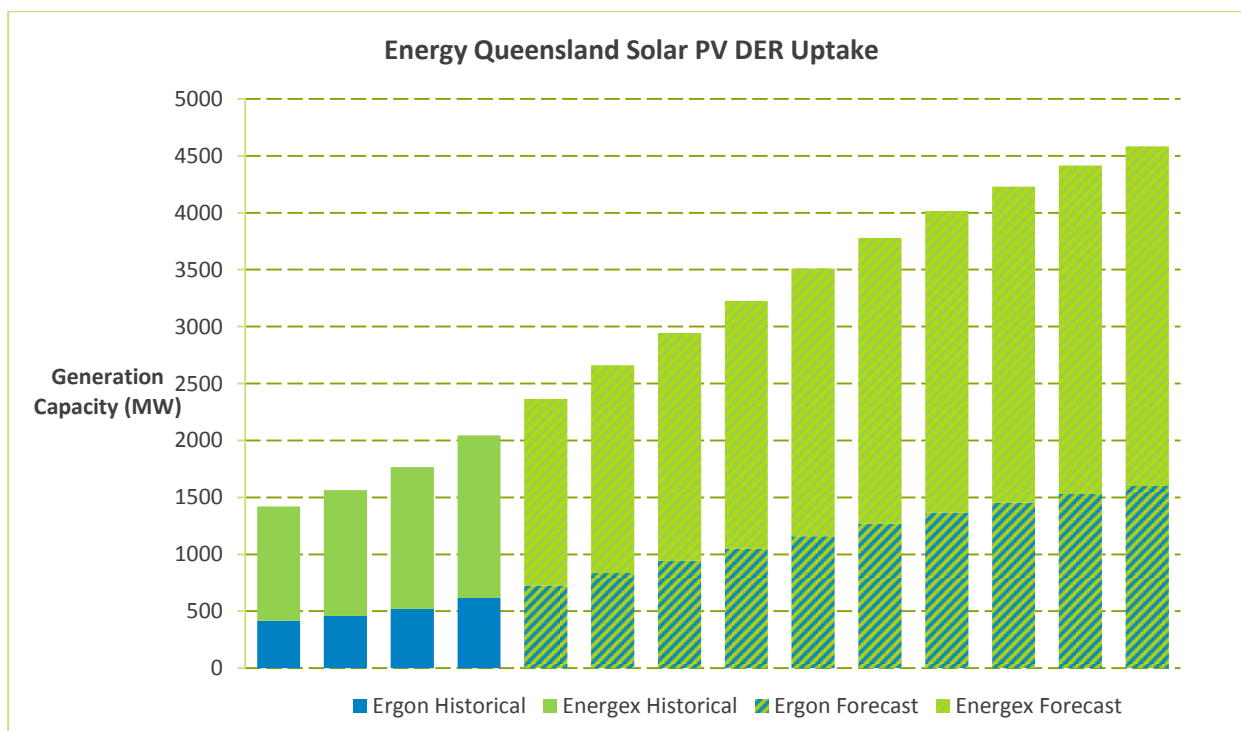
**NOTE:** – This document does not constitute approval of any funds or financial delegation. It is used to provide a high-level description and justification of an allocation of funds in future years. The direct value presented above is in \$18/19 direct dollars.

## 2. Existing Arrangements / Background

This initiative is based on the strategies defined in the Future Grid Roadmap and the Intelligent Grid Technology Plan. From these strategies, a technology solution and its associated costing and benefits have been described below.

Currently, large scale embedded generation connects as a “hard-wired” solution into the nearest substation for the purposes of control and communication. The solution is developed specifically for that connection and provides no flexibility for growth or change in operating parameters.

The chart below shows the growth in MW in Photo Voltaic (PV) across Queensland. A significant portion of this growth will include medium and large scale PV or solar farms.



**Figure 1 – Energy Queensland Solar PV DER Uptake**

The current connection methodology treats the generator as a “fixed” connection with only the need for emergency signalling such as ramp down, and disconnect from the network. These technical connections are developed as a “set and forget” with no flexibility to have the generator operate other than when the connection agreement is established.

This has allowed a simple direct connection from the customer controller/ Remote Terminal Unit (RTU) to the Energex or Ergon RTU in the substation, effectively treating the generator as additional input/output points in the substation. This connection has limited cybersecurity risk as it is serially based and focused on a specific protocol – Distributed Network Protocol (DNP3).

The operational requirements for these generators are changing for a number of reasons:

- Growth in renewables in the distribution networks means the original network parameters that the generator was approved under may no longer be valid
- Economic drivers for the generator to offer more capacity and flexibility in operation (eg variable output) which brings associated control and communication requirements
- AEMO requesting significantly more real-time operational data for the purposes of network modelling and stability studies
- Distributed Energy Resources Management System (DERMS) integration which will require an active data and control connection to the generator

This requires a different methodology in the way that Energex and Ergon Energy currently connects for control and communication purposes to these generators. Due to the requirements around fault tolerance, a local connection to the substation will still be needed, however, this will need to be an IP based connection to allow multiple protocol interactions and transfer significantly larger data sets.

The methodology is to set up a “customer zone” within the operational systems in the substation and the broader Operational Technology environment. This will allow a cybersecurity solution to inspect the data and protect the DNSP infrastructure. It will also allow a separate data collection/storage/transmission system to other parties such as AEMO. Currently, this is being achieved in a limited way using the existing EQL management platform and a data link to Powerlink and does scale as required.

### **3. Rationale / Benefits**

AEMO is recognising that they can no longer continue to operate “blind” to these generators in the distribution network. They will request the DNSP to provide more real-time data around these connections. This will require Energex and Ergon Energy to develop a solution to meet this need.

Customers (such as Solar Farms) are requesting more operational flexibility, where the DNSP dynamically rates the hosting capacity of the network and manages these signals via DERMs. This allows them to maximise their revenue opportunities into the market.

By developing a Customer Zone within the operational architecture, this will allow greater flexibility of data flows to the control room as well as other interested parties (e.g. AEMO). This data will assist in helping maintain network stability and security and reduce the need for costly augmentation to manage capacity.

It will also logically decouple the customer from the substation operations so that there is less impact through lifecycle changes in the substation. It is expected that the average solar farm will have an operational life of 20 years. During this time both the DNSP and the solar farm will have to upgrade their control and monitoring technology. By decoupling the connection (using IP instead of hard-wired) this simplifies these upgrades and reduces the risk of mal-operation.

Finally, it will also provide greater security of the connection. By setting up a dedicated customer zone, the relevant cybersecurity protections can be put in place to minimise the risk to the power network from a compromise of the customer infrastructure.



This investment allows Energy Queensland to provide a common infrastructure that will support and benefit all medium/large DER connections. Individual customer projects will still continue to fund their connection requirements specific to their projects, however, this infrastructure will allow that to occur more flexibly and at a lower cost to the customer.

Customers, typically DER providers, will benefit as follows:

- Support simpler, secure and more flexible data connections to Energy QLD and onwards to AEMO.

## **4. Drivers**

A number of elements of the Electricity Network Transformation Roadmap relate to this initiative. The first is Intelligent Networks and Markets. The expectation is that in the 2020-2025 period, Energex and Ergon have a suite of grid intelligence and control architectures to automate distributed energy resources markets as well as providing system security. The second is Customer Orientated Electricity where it is expected that collaboration with customers and market actors will create new value with streamlined connections. The third is Power System Security where distribution networks provide visibility of DER and potentially enable FCAS and other delegated balancing services through real-time communications and controls.

This is provided in more detail in the Future Grid Roadmap document.

## **5. Scope**

The scope consists of the following items:

- Development of a design of a customer zone with the Energex and Ergon Energy OTE
- Design of an interface to AEMO
- Design of an interface to DERMs
- Development of a security architecture
- Review and trial of technology to enable connectivity, security, data and control from within the substation
- Implementation of all relevant solution components (e.g. changes to zoning, telecommunications, SCADA etc to enable solution)
- Test and Trial on a number of solar farms
- Implement as a standard with Energex and Ergon Energy

The customer zone is expected to be operational around the middle of the regulatory period along with the implementation of the Intelligent Grid Enablement program. However, it may need to be brought into the earlier part of the period depending on pressure from AEMO to deliver the capability sooner.

## **6. Assumptions**

It is assumed that solar farms and other medium–large scale generators will continue to connect to the network at the existing rate.

## **7. Project / Program Dependencies**

This project relies on the organisation continuing the current security models (zones) as per the PRISE architecture principles already adopted by both Energex and Ergon Energy.

## **8. Supporting Information**

This initiative forms part of Energy Queensland's response to meeting the requirements of the ENA/CSIRO Electricity Network Transformation Roadmap

## **9. Options Considered**

### **9.1 Do nothing**

Med-Large generators continue to connect as “one-off” solutions via hardwired solutions into the substations. During the lifecycle of the substation, this will require extra consideration and cost for any control systems assets that are upgraded. Any projects attempting an IP connection will introduce significant cybersecurity risk to the network and not be allowed.

From an economic perspective as the number of solar farms grow the number of network constraints will grow, and without a flexible operating model, the impact of these constraints will significantly impact approvals. This will see a reduction in size and number of solar farms connecting to the network.

This option will increase the lifecycle management costs associated with substation maintenance as any work associated with the control system will need to take into consideration the hardwired connection in terms of maintenance and upgrades.

### **9.2 Implement New DER Security Data Zone**

Implement a data security zone that provides a secure and flexible connection for DER providers to connect to EQL and onwards to AEMO.

This option consists of:

- Development of a new DER connection architecture
- Selection of technology
- Field validation
- Establishment of standard designs for customer connections.

## **10. Risk Assessment**

The network (business) risk the organisation would be exposed to if the project was not undertaken:

Risk Scenario	Risk Type	Consequence (C)	Likelihood (L)	Risk Score	Risk Year
Unable to cost-effectively meet medium/large DER customer data requirements securely	Business Impact (Strategic Direction)	4	6	24	2019
Continued path of hard-wired solutions and ICCP through DMS/SCADA creates an operational performance impacting the Control Rooms and potentially Powerlink	Customer Impact	6	3	18	2021

**Table 1 – Risk Assessment**

#### Network Risk Evaluation Matrices:

- [Consequence and Likelihood Table](#)
- [Tolerability Scale](#)

The preferred option (Creation of a Secure Data Zone for large DER connections) is the right option to reduce this risk, as it provides the right balance of additional security with data performance at the lowest cost to assist in actively managing the medium-large DER connections. This solution removes the current fixed and hard wired solutions that do not evolve to meet the changing needs of the network.

#### Risk Assessment Outcome:

The network (business) risk the organisation would be exposed to if the project was not undertaken is not deemed to be as low as reasonably practicable (ALARP). Addressing the risks as detailed above through implementation of the preferred option will reduce Energy Queensland's risk exposure.

## 11. Delivery Timeframe

It will be delivered as a staged approach across the 2020-2025 period with initial forecasts towards the middle of the period, but potentially moved to the 2020/21 period if pressured by AEMO and customers.

## 12. Project Cost Summary

ENERGEX	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
Labour				\$80,000	\$100,000



Material	\$120,000	\$100,000
Grand Total:	\$200,000	\$200,000

**Table 2 – Energex Cost Summary**

<b>ERGON ENERGY</b>	<b>FY 2020/21</b>	<b>FY 2021/22</b>	<b>FY 2022/23</b>	<b>FY 2023/24</b>	<b>FY 2024/25</b>
Labour				\$120,000	\$150,000
Material				\$180,000	\$150,000
Grand Total:				\$300,000	\$300,000

**Table 3 – Ergon Energy Cost Summary**

**NOTE:** The cost summaries presented above are in \$18/19 direct dollars.

## Appendix 1. Definitions, Abbreviations and Acronyms

<b>BESS</b>	Battery Energy Storage System
<b>CSIRO</b>	Commonwealth Scientific and Industrial Research Organisation
<b>DER</b>	Distributed Energy Resource
<b>DSO</b>	Distribution System Operator
<b>ENA</b>	Energy Networks Association
<b>ENTR</b>	Electricity Network Transformation Roadmap
<b>EV</b>	Electric Vehicle
<b>EVSE</b>	Electric Vehicle Supply Equipment
<b>HV</b>	High Voltage (35kV – 230kV AC)
<b>IS</b>	Isolated System
<b>LV</b>	Low Voltage (50V – 1 000V AC)
<b>MEGU</b>	Micro Embedded Generating Units
<b>MV</b>	Medium Voltage (1kV – 35kV AC)
<b>NER</b>	National Electricity Rules
<b>PQ</b>	Power Quality (of the network)
<b>PV</b>	(Solar) Photovoltaic System
<b>QoS</b>	Quality of Supply (to a customer)
<b>SCADA</b>	Supervisory Control and Data Acquisition
<b>ZS</b>	Zone Substation