Regulatory Test - Request for Information

Emerging Distribution Network Limitations in the Boyne Island/Tannum Sands Area

11 December 2013

Ergon Energy Corporation Limited

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Ergon Energy Corporation Limited (Ergon Energy) is responsible (under its Distribution Authority) for electricity supply to the wider Gladstone area in central Queensland. We have identified emerging limitations in the electricity distribution network supplying the Boyne Island and Tannum Sands areas south of Gladstone. The loads on Ergon Energy's zone substation and 11kV network in the Boyne Island/Tannum Sands area have progressively increased such that augmentation is required if reliable supply is to be maintained.

The Boyne Island/Tannum Sands area is presently supplied by the Boyne Residential 66/11kV zone substation. This substation is supplied from a single 66kV line which connects to the Gladstone South-Awoonga 66kV line.

The load on the Boyne Residential 66/11kV zone substation has exceeded the N-1 substation capacity by 3.7MVA and the level of exceedance is forecast to increase into the future. A transformer contingency may result in customer load shedding of up to 3.7MVA at present with this increasing to be up to 8.6MVA by 2020.

Due to only having a single incoming 66kV supply line Boyne Residential substation does not have N-1 66kV supply capacity and a fault anywhere on the 30km of 66kV supply line will result in a total outage to the Boyne Residential zone substation. This represents the loss of up to 13.7MVA of load at present with this increasing to be up to 18.6MVA by 2020.

To reduce the risk of customer supply outages to the Boyne Island/Tannum Sands area Ergon Energy needs an additional minimum of 10MVA capacity at 11kV to be provided to this area. This size has been matched to expected load requirements within Ergon Energy's typical 10 year planning horizon.

In order to significantly reduce the risk of losing electricity supply to customers in the Boyne Island/Tannum Sands area corrective action should be completed before summer 2015/16. A decision about the selected option is required by April 2014 if any option involving significant construction is to be completed by August 2015.

This is a Request for Information where Ergon Energy is seeking information about possible solutions to the emerging limitations which may be able to be provided by parties other than Ergon Energy.

Submissions in writing (electronic preferably) are due by **12 February 2014** and should be lodged to:

Attention: Network Strategy and Planning

Email: regulatory.tests@ergon.com.au

Updated information will be provided on our web site:

https://www.ergon.com.au/community--and--our-network/network-management/regulatory-test-consultations

For further information and inquiries please submit to the email address above.

1. INTRODUCTION

Ergon Energy has identified emerging limitations in the electricity distribution network supplying the Boyne Island & Tannum Sands area south of Gladstone in central Queensland.

This is a Request for Information where Ergon Energy is seeking information about possible solutions to the emerging limitations which may be able to be provided by parties other than Ergon Energy.

Submissions in writing (electronic preferred) are due by **12 February 2014** and should be lodged to:

Attention:	Network Planning and Strategy
Email:	regulatory.tests@ergon.com.au

A decision is required by April 2014 if the initial stage of any option involving significant construction is to be completed by August 2015.

Updated information will be provided on our web site:

https://www.ergon.com.au/community--and--our-network/network-management/regulatory-test-consultations

2. BACKGROUND & PURPOSE FOR THIS REQUEST FOR INFORMATION

2.1. Background

If technical limits of the distribution system will be exceeded and the rectification options are likely to exceed $10M, Ergon Energy is required under the National Electricity Rules (NER)[1] to notify affected Registered Participants[2], AEMO and Interested Parties[3] within the time required for corrective action and meet the following regulatory requirements:

- Consult with affected Registered Participants, AEMO and Interested Parties regarding possible solutions that may include local generation, demand side management and market network service provider options[4].
- Demonstrate proper consideration of various scenarios, including reasonable forecasts of electricity demand, efficient operating costs, avoidable costs, costs of ancillary services and the ability of alternative options to satisfy emerging network limitations under these scenarios.
- Ensure the recommended solution meets reliability requirements while minimising the present value of costs when compared to alternative solutions[5].

Ergon Energy is responsible for electricity supply to the wider Gladstone area (under its Distribution Authority) and has identified emerging limitations in the electricity network supplying the Boyne Island and Tannum Sands area south of Gladstone. The load on Ergon Energy's supply network in this area has progressively increased such that augmentation is required if reliable supply is to be maintained.

2.2. Purpose of this "Request for Information"

The purpose of this Request for Information is to:

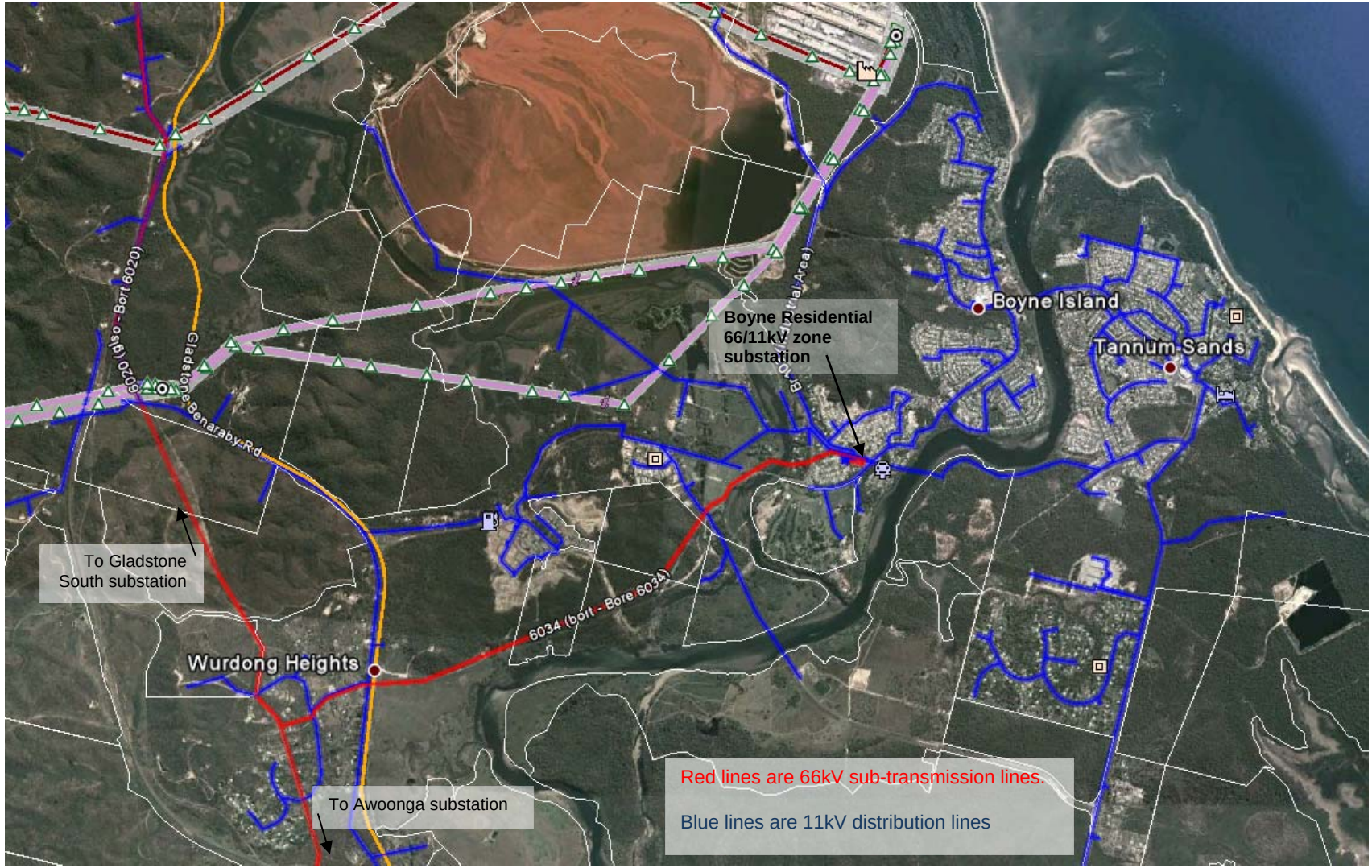
- Provide information about the existing distribution network in the Boyne Island/Tannum Sands area.
- Provide information about emerging distribution network limitations and the expected time by which action must be taken to maintain the reliability of the distribution system.
- Provide information about the criteria that solutions to be provided by parties other than Ergon Energy must meet.
- Explain the process (including approach and assumptions) to be used to evaluate alternative solutions, including distribution options that are currently being investigated by Ergon Energy.

[1] Clause 5.6.2(f)
[2] As defined in the NER
[3] As defined in the NER
[4] NER, clause 5.6.2(f)
[5] In accordance with the Australian Energy Regulator's Regulatory Test Version 3, November 2007

3. EXISTING SUPPLY SYSTEM TO THE BOYNE ISLAND/TANNUM SANDS AREA

3.1. Geographic Region

The geographic region covered by this Request for Information is broadly described as the Boyne Island/Tannum Sands area as shown on the map below.



3.2. Existing Supply System

The Boyne Island and Tannum Sands area is supplied by the Boyne Residential 66/11kV zone substation (the diagram in 3.1 shows the location of this zone substation), which presently supplies over 4500 customers.

Boyne Residential Zone Substation comprises of two 10 MVA 66/11 kV transformers. The output capacity of each transformer is limited to 10 MVA due to the 11 kV transformer cables. The 2013 recorded maximum demand on Boyne Residential zone substation was 13.7MVA with demand forecast to grow at an average of 4% pa over the next 10yrs. Therefore the peak load on Boyne Residential sub exceeds the N-1 transformer capacity by 3.7MVA, with this amount increasing into the future.

The substation has a single 66 kV incoming supply feeder which is connected via a hard tee to the Gladstone South to Awoonga 66kV line. This line has a summer day capacity of 19MVA. Therefore Boyne Residential substation does not have N-1 66kV supply capacity and a fault anywhere on the 30km of 66kV supply line will result in a total outage to the Boyne Residential zone substation.

Table 1 below provides the recorded and forecast demands on Boyne Residential zone substation.

4. EMERGING DISTRIBUTION NETWORK LIMITATIONS

A load history and forecast for the Boyne Residential substation load is shown in Table 1 below.

TABLE 1 – Boyne Residential Supply Substation Load History & Forecast

Substation	Maximum Annual Demand (MVA)											
	Actual Load		Forecast Load									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Boyne Res Sub 50% POE	**12.5**	**13.7**	***15.5***	***16.2***	***16.9***	***17.7***	***17.8***	***18.4***	***18.6***	***19.5***	***19.9***	***20.6***
Boyne Res Sub 10% POE			***16.6***	***17.3***	***18.4***	***19.0***	***19.3***	***19.9***	***20.4***	***21.0***	***21.6***	***22.6***

From the supply system information given in 3.2 above and the demand data from Table 1 the following issues are defined:-

1. The load on Boyne Residential zone substation has exceeded the N-1 capacity of the substation. Based on forecast demands by 2020 the demand on Boyne Residential zone substation will exceed the N-1 capacity of the substation by 8.6MVA.
2. Based on the demand forecast the load on Boyne Residential zone substation will exceed the total transformer output capacity in 2020. This will result in overloaded plant or the need for loadshedding in system normal network arrangements (note: the determination of emerging plant overloads under system normal conditions, is carried out using the 10% POE forecast).
3. Loss from service of the 66kV supply line to Boyne Residential zone substation will result in a total outage to the Boyne Residential zone substation. If the line fault is located on either the Gladstone South to Boyne Res Tee line section or the Awoonga to Boyne Res Tee line section then the Boyne Residential substation supply could be restored in about 30 minutes via network switching. If the line fault is located on the section of line from the Tee to Boyne Residential substation then the supply to the substation cannot be restored until the line is repaired, which could take 6-8 hrs.

4.1. Timeframes for Taking Corrective Action

In order to significantly reduce the risk of losing electricity supply to customers in the Boyne Island/Tannum Sands area corrective action should be completed before summer 2015/16.

A decision about the selected option is required by April 2014 if any option involving significant construction is to be completed by August 2015.

4.2. Known Future Network and Generation Development

(i.e. projects that have been approved and are firm to proceed)

Ergon Energy is not aware of any other network augmentations or generation developments in the Boyne Island/Tannum Sands area that could relieve the emerging network limitations described in section 4.0 above.

5. INFORMATION ABOUT CRITERIA THAT SOLUTIONS MUST MEET

It is essential that corrective action be taken prior to August 2015 to maintain a reliable electricity supply to the Boyne Island/Tannum Sands area. This may involve network augmentation or the implementation of local generation or demand side management options which reduce, delay or remove the need for new network investment.

This Request for Information, and subsequent consultation, provides an opportunity for alternative solutions to be submitted for consideration. The information provided in this document is intended to enable affected Registered Participants, AEMO and Interested Parties to formulate and propose feasible local generation and demand side management solutions.

Ergon Energy has identified the following criteria, to assist solution providers understand the technical and other requirements. These criteria must be satisfied if solutions are to compensate or rectify the emerging technical limitations of the distribution network.

As a distribution network service provider (DNSP), Ergon Energy must comply with technical standards in the NER. In particular, requirements relating to reliability and system security contained in Schedule 5.1 of the NER are relevant to planning for future electricity needs.

Amongst other things, Schedule 5.1 requires that:

- the frequency variations are within the limits described in S5.1.3;
- voltage fluctuations do not exceed limits set out in S5.1.5;
- voltage harmonic & notching distortion do not exceed limits set out in S5.1.6;
- voltage unbalance does not exceed limits set out in S5.1.7;
- the power system can operate in a stable state as defined in S5.1.8;
- faults can be cleared in times specified in S5.1.9;
- load control is in place in accordance with S5.1.10;
- automatic reclosure requirements are met, S5.1.11; and
- AEMO be advised of current ratings as required in S5.1.12. AEMO has a related obligation (4.3.1 (f)) to operate the power system within all plant capabilities.

Schedule 5.1 also includes details of credible contingencies and levels of redundancy to be considered in planning and operating the distribution network, such as:

- 'System Normal': the absolute minimum level of reliability required. Defined as the ability to supply all load with all elements of the electricity system intact (i.e. loss of supply would occur during a single fault or contingency),
- 'N-1': able to meet peak load with the worst *single* credible fault or contingency,
- 'N-2': able to supply all peak load during a *double* contingency.

Ergon Energy has certain obligations to comply with technical standards under the NER and its Distribution Authority (and subsidiary instruments). These obligations must be taken into consideration when choosing a suitable solution for the Boyne Island/Tannum Sands network technical limitations discussed in this Request for Information.

5.1. Size

To reduce the risk of customer supply outages for the Boyne Island/Tannum Sands situation, Ergon Energy needs an additional minimum of 10MVA capacity at 11kV to be provided to this area. This size has been matched to expected load requirements within Ergon Energy's typical 10 year planning horizon.

5.2. Timing

Commissioning needs to be completed by August 2015.

5.3. Location

Additional 11kV capacity is to be delivered to the approximate load centres of the Boyne Island/Tannum Sands area with capability to extend out to other locations where necessary.

5.4. Quality

Proposed solutions must comply with the relevant standards in the NER and furthermore, must not inhibit Ergon Energy's ability to meet its obligations under the NER and other statutory instruments.

5.5. Reliability

The National Electricity Rules' Schedule 5.1 includes details of credible contingencies and levels of redundancy to be considered in planning and operating the distribution network, such as:

- 'System Normal': the absolute minimum level of reliability required. Defined as the ability to supply all load with all elements of the electricity system intact (i.e. loss of supply would occur during a single fault or contingency),
- 'N-1': able to meet peak load with the worst single credible fault or contingency
- 'N-2': able to supply all peak load during a double contingency.

5.6. Longevity

Options must be capable of providing solutions to the projected limitation in the Boyne Island/Tannum Sands area for the number of years contracted. A suitable solution may be contracted for up to 10 years.

6. EVALUATION PROCESS

6.1. Evaluation Criteria

The Australian Energy Regulator's (AER) Regulatory Test[6] and Chapter 5[7] of the NER mandates the evaluation criteria and requires Ergon Energy to consider demand side management, generation and market network service provider options on an equal footing. The Regulatory Test also specifies the assessment methodology to be used:

> "An option satisfies the regulatory test if:
>
> > In the event the option is necessitated principally by the inability to meet the service standards linked to the technical requirements of Schedule 5.1 of the NER or in applicable regulatory instruments – **the option minimises the costs of meeting those requirements, compared with alternative option/s in a majority of reasonable scenarios**."[8]

An augmentation proposed to meet minimum network performance requirements of Schedule 5.1 of the NER, or other statutory requirements including the Queensland requirements described in Ergon Energy's Network Management Plan[9], is referred to as a 'reliability augmentation'.

This means that the assessment of solutions will be based on minimising the present value of costs while meeting minimum network performance requirements.

A public process is required which includes disclosure of project costs and comparison of alternatives. It is important that all feasible options proposed are considered in the process.

If a non-network option satisfies technical requirements, and can be implemented for a lower cost than a distribution augmentation in the required timeframe, it will be necessary for Ergon Energy to enter into a network support agreement with the proponents of the alternative project to ensure supply quality and reliability can be maintained.

Since regulated funding (collected via Ergon Energy's network charges) will be required, it is necessary that network support arrangements satisfy the Regulatory Test in terms of both economics and disclosure of relevant costs to the market.

6.2. Submissions from Solution Providers

This is not a tender process. Submissions are requested so that Ergon Energy can meet its regulatory obligations to compare the present value cost of alternatives against options of augmenting a distribution supply system to maintain reliability of supply.

Ergon Energy will not be legally bound in any way or otherwise obligated to any person who may receive this Request for Information or to any person who may submit a proposal. At no time will Ergon Energy be liable for any costs incurred by a proponent in the assessment of this Request for Information, any site visits, obtainment of further information from Ergon Energy or the preparation by a proponent of a proposal to this Request for Information.

Ergon Energy may seek clarification of details from the proponent of a proposed option provided this does not materially alter the proposal.

If you propose a solution, it should contain the following information:

- Details of the party making the submission (or proposing the solution);
- Details of the party responsible for the providing the solution (if different to the proponent);
- An explanation of the relevance of the proposal and/or options presented;

[6] AER's Regulatory Test Version 3, November 2007.

[7] Clause 5.6.2 (f) and (g)

[8] Emphasis added by Ergon Energy

[9] Ergon Energy's Network Management plan is available on its website - http://www.ergon.com.au/community--and--our-network/network-management/network-management-plan

- Technical details of the project (capacity, reliability, availability, proposed connection point if relevant etc) to allow an assessment of the likely impact on supply capability;
- If applicable to the solution being offered:
  - the size, type and location of load(s) that can be reduced, shifted, substituted or interrupted
  - the size, type and location of generators that can be installed or utilised if required;
  - the type and location of action or technology proposed to reduce peak demand/provide electricity system support;
- Sufficient information to allow the costs of the solution to be incorporated in a cost effectiveness comparison in accordance with AER's Regulatory Test;
- Information about the impact on the proposal if electricity demand were to be 25% above/below Ergon Energy's forecasts.
- An assessment of the ability of the proposed solution to meet the technical requirements of the NER;
- Timing for availability of the option, and whether it is a committed project[10];
- The level of payment required to fund the proposal (initial payment, availability payment, dispatch payment etc) in both $s and/or $/kVA;
- Other material that would be relevant in the assessment of the proposed solution.

Submissions to this "Request for Information' will need to be described in the consultation process and will be made public. As such, any commercially sensitive material, or material that the party making the submission does not want to be made public, should be clearly identified.

It should be noted that Ergon Energy is required to publish the outcomes of the Regulatory Test analysis. If solution providers elect not to provide specific project cost data for commercial-in-confidence reasons, Ergon Energy may rely on cost estimates from independent specialist sources.

6.3. Timetable for Submissions

Submissions in writing are due by 12 February 2014 and should be lodged to:

Attention: Network Strategy and Planning

Email: regulatory.tests@ergon.com.au

[10] As defined in the AER's Regulatory Test

6.4. Assessment and Decision Timetable

Ergon Energy intends to carry out the following process to assess what action should be taken to address the identified distribution network limitations:

Step 1	Request for (initial) Information (i.e. **this Request for Information**).	Date Released: **11 December 2013**
Step 2	Submissions in response to the Request for Information.	Due Date: **12 February 2014**
Step 3	Review and analysis by Ergon Energy. This is likely to involve further consultation with proponents and additional data may be requested.	Anticipated to be completed by: **26 February 2014**
Step 4	Release of Ergon Energy's Consultation Paper and Draft Recommendation of solution which satisfies the Regulatory Test.	Anticipated to be released by: **12 March 2014**
Step 5	Submissions in response to the Consultation Paper & Draft Recommendation.	Due Date: **9 April 2014**
Step 6	Release of Final Recommendation (including summary of submissions received).	Anticipated to be released by: **23 April 2014**
Ergon Energy reserves the right to revise this timetable at any time. The revised timetable will be made available on the Ergon Energy website.		

Ergon Energy will use its reasonable endeavours to maintain the consultation program listed above. However this program may alter due to changing power system conditions or other circumstances beyond the control of Ergon Energy. Updated information will be made available on our website: https://www.ergon.com.au/community--and--our-network/network-management/regulatory-test-consultations

The consultation timetable is driven by the need to make a decision by April 2014 if any option involving significant construction is to be in place by August 2015.

At the conclusion of the consultation process, Ergon Energy intends to take steps to progress the recommended solution to ensure system reliability is maintained.