Ergon Energy New Mobile Generation

Business Case (Re-submission)

19 November 2024

ERGON ENERGY NETWORK

Part of Energy Queensland

CONTENTS

List of Tables

List of Figures

DOCUMENT VERSION

Version Number	Change Detail	Date	Updated by
1.0	Approved Version	15/11/2024	General Manager Grid Planning

RELATED DOCUMENTS

Document Date	Document Name	Document Type
2017	Updating the costs of disasters in Australia https://knowledge.aidr.org.au/media/5506/ajem-33-2-17.pdf	Article
2018	Ergon Energy Networks and Energex Bushfire Risk Management Plan 2019-2020	Plan
2018	Ergon Energy Networks and Energex Flood Risk Management Plan 2019-2020	Plan
2020	EQL Bushfire Mitigation Strategy	Strategy
2020	Climate and Disaster Resilience, CSIRO	Report
2022	State of the Climate 2022, BoM	Strategy
2022	Ergon Energy DAPR 2022, EQL	DAPR
2022	Energex DAPR 2022, EQL	DAPR
2022	www.poweredison.com - Mobile Energy Storage | Power Edison	Web Page
Dec 2022	February – March 2022 Flood Event Cost Pass, Energex	Report
2023	Extreme weather and electricity supply factsheet, AEC, and ENA	Report

1 SUMMARY

<table>
<tr><th>Title</th><th>New Mobile Generation</th></tr>
<tr><td>DNSP</td><td>Ergon Energy Network</td></tr>
<tr><td>Expenditure category</td><td>☐ Replacement ☒ Augmentation ☐ Connections ☐ Non-Network (Resilience)</td></tr>
<tr><td>Identified need
(select all applicable)</td><td>☒ Legislation ☒ Regulatory compliance
☒ Reliability ☐ CECV ☒ Safety ☐ Environment ☐ Financial
☐ Other
New program to increase the number of Ergon Energy’s existing mobile generation fleet to improve the customer experience with improved electricity supply and coverage during planned works, extended unplanned outages, natural disasters, severe weather events, and community recovery.</td></tr>
<tr><td>Summary of preferred option</td><td>Purchase two 1,500kVA Pegasus generators and twelve 500kVA LV mobile generators.</td></tr>
<tr><td>Expenditure</td><td>
<table>
<tr><th>Year</th><th>Previous period</th><th>2025-26</th><th>2026-27</th><th>2027-28</th><th>2028-29</th><th>2029-30</th><th>2025-30</th></tr>
<tr><td>$, direct 2022-2023</td><td>Nil</td><td>$7.65m</td><td>$0</td><td>$0</td><td>$0</td><td>$0</td><td>$7.65m</td></tr>
</table>
</td></tr>
<tr><td>Benefits</td><td>Generation will support:
reduced customer outage times during extended planned and unplanned events
reduce customers productivity loses and food spoilage due to extended outages for planned and unplanned events
added peak lopping capacity to support resilience, network contingencies and Summer Preparedness Programs
communities experience faster economic recoveries through quicker return of local services to help sustain businesses, while reducing social impacts
improved safety of Ergon’s field crews working on distribution networks
supporting compliance towards Minimum Service Standards (MSS) and SafetyNet, as required from Distribution Authority D07/98 –
avoided reputational risk</td></tr>
</table>

2 EXECUTIVE SUMMARY

The main purpose of this Business Case is to demonstrate our requirements to acquire two 1500kVA Pegasus mobile generators and twelve 500kVA LV mobile generators. This will increase our capability to support our customers' supply:

1. during complex and prolonged planned works
2. recovery after natural disasters and severe storms
3. during prolonged unplanned outages

Following AER's Draft Decision, we conducted further analysis of our generator data and consulted with our Customer and Network Operations groups. As a result, our proposal and Business Case has been modified, with the recommendation to purchase two HV mobile generators (Pegasus) and 12 LV mobile generators with a total capacity of 9,000kVA for a total CAPEX and OPEX cost estimated at $7.65m (2022/23 $).

Caged transformers, SWER mobile generators and load banks have also been removed from this updated business case, reflecting Customer Operation's priorities and where our customers will receive the greatest benefit from our investments.

This business case shows that the existing generation suite is only providing generation coverage to 5.6% of planned events and 3% of unplanned events, only considering events over 6 hours in duration (Table 4). This existing generation is deemed to provide $12m annually of value to customer from the unplanned outages as derived from AERs VCR. While there are still some negotiations on the size of the REPEX programs, the agreed CAPEX programs of distribution, subtransmission and connections are larger than previous submissions. Therefore, there are still thousands of events each year that would utilise generation to improve the customer experience during outages. It is also prophesised that an additional 9,000kVA will provide a further $3.87m of value to customers annually, without considering the use of generation for planned outages.

The economic comparison of options supports the business decision to purchasing Two 1500kVA HV Pegasus and Twelve 500kVA LV mobile generators over hiring the same units. The raw NPV of purchasing the units vs hiring the same units for less than 25% of the year, with no customer benefits included, purchasing the units is 25% more cost positive. When adding the value of customer benefits and the corresponding fuel usage, the NPVs were not only positive, purchasing the units were more cost positive compared to hiring the units.

3 AER'S DRAFT DECISION

In its Draft Decision in September 2024, the AER provided the following observations and recommendations related to Ergon's proposal for Mobile Generators (page 83):

> *"… the primary driver for this program appears to be compliance with Ergon Energy's Distribution Authority conditions, rather than resilience. While we acknowledge that resilience may be an outcome from the deployment of mobile generators, Ergon Energy did not provide sufficient information for us to assess this program from that perspective.*
>
> *Therefore, given the lack of information, we have included 10% of the proposed capex based on its historical deployment of mobile generators for planned and unplanned outages at a ratio of 9:1 (ratio of planned to unplanned outages).*
>
> *We encourage Ergon Energy to provide further information including a root cause analysis for its higher planned and unplanned outages in recent years as well as the flow-on impacts of its replacement programs in its revised proposal.*

Updated material related to the AER's feedback is provided in Section 6.1 to 6.4.

In preparation of our response, we have conducted the following:

- collated additional data from different sources to respond to the AER's feedback.
- further consulted with our Customer, Network Operations and Mobile Generation groups across regional Queensland on their experiences and data repositories in the use of mobile generators (MGs)
- analysed available data on the usage of MGs, during prolonged planned and unplanned outages and severe weather events.
- derived a new economic assessment of MG's effectiveness and customer benefits, based on the value of customer reliability.
- derived a new NPV from a comparative study between hiring or owning mobile generation assets.

In addition to the above, specific events have been discussed and confirmed with colleagues from Operations and Mobile Generation, and real examples of utilisation of mobile generators included in Appendices 8, 9 and 10.

As per the AER's feedback, chapters explaining the root causes of higher planned and unplanned outages and econometrics of MG utilisation are included.

Note, this Business Case is an updated version of original joint BC, with all sections associated with Energex' submissions removed.

4 PURPOSE AND SCOPE

The main purpose of this Business Case is to demonstrate our requirements to acquire two 1500kVA Pegasus mobile generators and twelve 500kVA LV mobile generators. This will increase our capability to support our customers' supply:

1. during complex and prolonged planned works
2. recovery after natural disasters and severe storms
3. during prolonged unplanned outages

5 BACKGROUND ASSET POPULATION, SITE SUMMARY AND CAPABILITY

5.1 Network

Ergon Energy distributes electricity to approximately 780,000 residential, commercial, and industrial customers, supporting a population base of around 1.5 million in Northern and Southern Queensland. Ergon Energy network area covers 1.7 million sq. km, served by 29 bulk supply substations, 259 zone substations and more than 100,000 distribution transformers via power lines with a total length of almost 160,000km consisting of 335 sub-transmission and 1283 distribution feeders.
Ergon Energy's regional and rural networks are mostly radial with minimal ties points close to depots or zone substations. Ergon Energy also manages one of the largest Single Wire Earth Return (SWER) networks in the world reaching 64,000km in length, supplying around 26,000 customers predominantly located in western areas of regional Queensland, all radial.

5.2 Compliance

5.2.1 Minimum Service Standards (MSS)

The two main legislative compliances related to this Program are specified in Ergon Energy Distribution Authority No. D01/99 (amended in November 2018). Clause 9 sets principles of Minimum Service Standards (MSS), as Clause 10 specifies criteria for application of Safety Net targets.

While the purpose of MSS is to provide a standard against which the distribution entity's performance, by feeder type will be assessed across its supply network, its intent is to guide the distribution entity in using all reasonable endeavours to minimise the number and length of interruptions to customers. This will be assisted with the use of generation.

(a) the distribution entity must use all reasonable endeavours to ensure that it does not exceed in a financial year the following MSS:

(i) SAIDI limits; and

(ii) SAIFI limits,

(b) Exceedance of the same MSS limit (i.e. SAIDI limit or SAIFI limit) three financial years in a row is considered a "systemic failure" and constitutes a breach of the distribution authority.

5.2.2 Service Target Performance Incentive Scheme (STPIS)

The role of this scheme is to provide incentives for DNSPs to maintain and improve service performance as set out in clause 6.6.2(a) of the NER1.

It achieves this by providing financial incentives to distributors to maintain and improve service performance where customers are willing to pay for these improvements. While generation is not cost positive for a DNSP to supply customers, generation support does supply energy for customers to continue to function during recovery efforts. This extra generation will have an immaterial STPIS benefit, as most generation events are for major disasters, MEDs, and planned outages, which are excluded from the STPIS scheme.

5.3 Mobile Generation

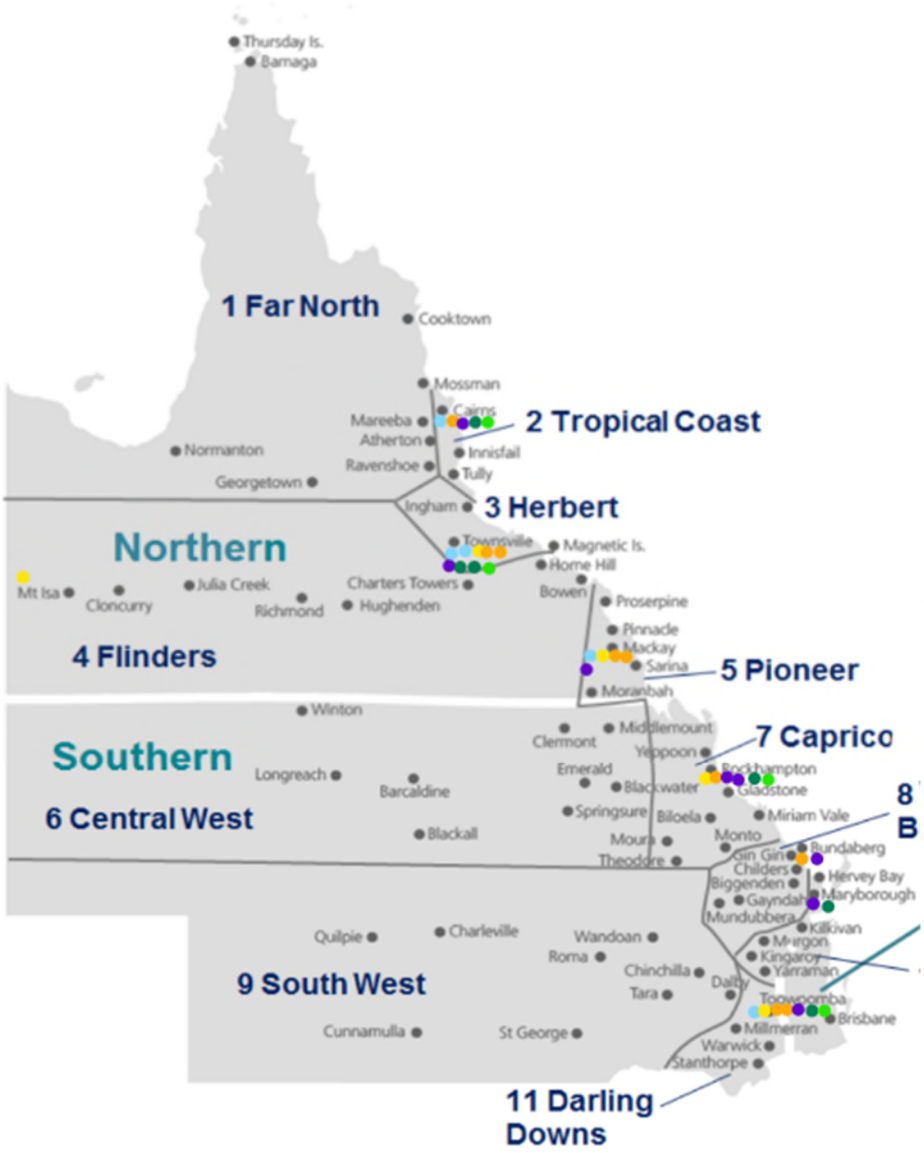
Ergon Energy owns 43 mobile generators that range in size from 60kVA to 1500kVA (Table 1) that are positioned at strategic locations and major centres in regional Queensland for optimum utilisation. Ergon Energy utilises this 28MVA of mobile generation to maintain supply for customers that would otherwise experience a planned outage when we perform maintenance on the network or augment the network for new connections. This same generation set is utilised as a contingency supply during extended unplanned events and peak lopping during summer load conditions. Ergon Energy also had five large unplanned events in 2023 where large volumes of additional generators were hired to minimise the loss of supply to impacted customers.
A summary list of generators owned by Ergon Energy is captured in Table 1. The coloured cells in the left-hand column of the table will assist in identifying the location (Figure 1) where the generators are typically located in Queensland.

Table 1 Generator Sizes, Numbers of Units and Legend for Locating Map

Map Legend	Mobile Generator Size (kVA)	Connection (HV orLV)	No of Units
	60	LV	5
	150	LV	7
	300	LV	8
	500	LV	9
	1250	LV	5
	PEG-1500	HV	5

[1] Service target performance incentive scheme Version 2.0, November 2018. Page 5

Figure 1 Service Area of Ergon Energy with Generator Locations



* Scale ~100kms:10mm

The largest of Ergon's generation fleet is the 1500kVA Pegasus that are manufactured in EQL's Banyo Workshops and are capable of efficiently connecting into the 11kV or 22kV network and operating in parallel or island mode. The Pegasus units are highly utilised in rural areas when major substation or sub-transmission work is required that will either impact large numbers of customers, significant time or both. Due the long feeder lengths and the radial nature of the network, whole towns could be without supply for periods of time, therefore Ergon utilise multiple Pegasus units to supply the town for multiple days or weeks. A few such deployments of Pegasus are shown in Table 2.

Table 2 List of Deployments of Pegasus for a feeder outage

HV generation - Pegasus 4 required to supply Camp FDR during outage 22MK3683 from 0700 - 1730 Reference AFWs 22MK5223 - 01/08 Connect PEG 3 to Coppabella Town Fdr 22MK5229 - 02/08 Connect PEG 4 to Camp Fdr 22MK3683 - 03/08 Moorvale TX Outage 22MK5227 - 03/08 GEN AFW PEG 3 Coppabella Fdr 22MK5233 - 03/08 GEN AFW PEG 4 Camp Fdr 22MK5226 - 03/08 Black Changeover Coppabella Fdr 1700-1730 22MK5232 - 03/08 Black Changeover Camp Fdr 1730-1800 22MK5224 - 04/08 Disconnect PEG 3 from Coppabella Town Fdr 22MK5231 - 04/08 Disconnect PEG 4 from Camp Fdr

Ergon will still utilise short term mobile generation hire where it is prudent, such as post cyclone recovery, where for cyclone Ita Ergon hired an additional 82 generators. The initial tracking list is provided in Appendix 7.

Ergon uses 500kVA larger generators and greater to parallel the network for summer peak lopping and adding capacity to forecast constrained networks for planned outages on radial networks. Due to the extra protection requirements, hire units are limited in their capability and cannot be set up and used for peak lopping and parallelling the network.

The following Appendix 6 shows a sample number of generation events listed in the outage management system with the number of hours of generations for planned and unplanned events.

5.4 Mobile Generation Process and Support

All planned works are assessed for Minimum Service Standards (MSS) System Average Interruption Duration Index (SAIDI), National Energy Customer Framework (NECF) requirements and the best endeavours to minimise the impact to customers. As identified in Figure 1 there are many towns and cities with no generation located for customer support. Generation Coordinators will coordinate with the local team leads to transport generators to site as required. This means that while generation may only be utilised for a single day, the generator/s needs to be available for 3 days, a day each side for transport and set up.

Generators are prioritised for critical businesses such as sewerage and water treatment plants, supermarkets, hospitals, emergency services and large employees. Further consideration is given to the length of the outage and the impact to small business and residential customers.

6 IDENTIFIED NEED

6.1 Problem and/or Opportunity

While Ergon Energy has exceeded all Minimum Service Standards (MSS) SAIDI limits (Figure 8) for the last five years, and has little chance of obtaining the minimum service standards as set by the Queensland Competition Authority (QCA) in the near future, Ergon still maintains industry good practice endeavouring to meet NECF guidelines and minimise outage impacts to customers where

prudent. Customer Operations assess several activities such as network switching and Live Line work, customer impacts before considering deenergising and the use of generation.

Ergon Energy's generation activity as captured for the previous five years is shown in Table 3. The activity summary shows that on average there are currently 532 times a year where one or more generators are utilised to provide supply to one or more customers during an outage. Of the 532 events, 404 are for planned events with the network set up as an island, 73 planned events where generators are placed in parallel to the network where the generators peak lop load and 55 events where generators are used for extended unplanned outages in islanded mode.

Table 3 Generation Activity Summary

Year	Total Events	Planned Peak lopping Events	Planned Island Events	Unplanned Island Events	Planned Average days per event	Unplanned Average days per event	Planned Maximum days for an event	Unplanned Maximum days for an event
2019	437	34	332	71	2.01	3.14	116	14
2020	595	77	468	50	4.48	7.85	225	71
2021	568	107	401	60	1.19	9.62	63	233
2022	512	79	405	28	1.97	4.62	35	23
2023	547	69	413	65	4.47	11.29	184	210
Average	532	73	404	55	2.82	7.30	125	110

* Peak lopping could be the use of a generator to provide extra capacity into a contingency network configuration for maintenance or to provide extra capacity in the normal network configuration during peak summer loads.

** An event may utilise one generator or multiple generators. While the average time of use is 7 days, some events may require multiple days to transport and connect generator, same with removal and transport back to main storage.

The list of events in Table 3 includes the following terms:

- Events – Total number of outages where generators assisted with reducing the number of customers without supply.
- Island Events – Where a section of feeder and customers are isolated from the grid and supplied with a generator/s while an outage is in progress.
- Peak lopping events – a generator operates in parallel with the network reduce the probability of the customer load overloading the assets and causing an outage. No customer benefits are deemed to be derived from these events. This activity normally takes place over summer when the assets are stressed due to peak loads.
- Average days per event – Average number of days a generator/s is operating during the event.

- Maximum days for an event – this is the largest number of days a generator was operating due to an outage. This may be for example due to access or requiring further work before Ergon Energy could complete network connection.

In 2023 there were 35,813 planned outages where one or more customers were deenergised while Customer Operations performed maintenance or modifications to the network (Table 4). Of these events, there were 7,241 events that required an outage longer than 6hrs, 143 events where the outage was longer than 12hrs and 127 events where the outage was longer than 127hrs. Currently Ergon Energy is only providing generation to 404 / 7,241 = 5.6% of those planned events. Therefore, with additional mobile generators there is an opportunity to supply a further 6,837 planned events each year, on average.

Table 4 2023 Network Outage Count

Events	> 6 hrs	> 12 hrs	> 24hrs	Total
Planned	7241	143	127	35813
Unplanned	5888	1902	548	37850

* if the event was > 12hrs, it would also be counted as > 6hr

Ergon Energy is well known for their cyclone and major disaster response. During these major events Ergon Energy on top of their existing fleet of 39 generators, hires in as many generators as possible from third party suppliers to assist customers during the recovery efforts. Generators are prioritised for critical businesses such as sewerage and water treatment plants, supermarkets, hospitals, emergency services, fuel stations, and hardware stores. Further consideration is given to the length of the outage and the impact to small business and residential customers.

While Customer Operations don't generally instigate the use of generators for shorter unplanned outages due to logistics, when unplanned outages are likely to require an extended outage like a Major Event Day (MED), generation coordination will be instigated. On average, Ergon Energy has had 55 events per year over the last five years where generation has been utilised to minimise the impact to customers that are expected to be out of supply for extended periods. In 2023 that would be less than 55/1,902 = 3% of events, therefore depending on the locations, there is an opportunity to supply another 1,847 events per year on average.

Table 5 Generation supported Events with Hours Operated

Year	Total Events	Planned Total Hours	Unplanned Total Hours	Planned Average Hours	Unplanned Average Hours
2019	437	17,301	6,872	48	97
2020	595	23,021	9,602	82	185
2021	568	15,651	13,846	28	231
2022	512	20,391	5,009	46	111
2023	547	46,232	17,621	99	263
Average	532	24,519	10,590	61	177

Of the 532 events, this equated to 24,519 hours of customer support during planned outages and 10,590 hours of customer support during unplanned events on average over the previous five years (Table 5).

In reference to whether Ergon's current planned works program (POW) will be maintained or decreased and whether the amount of extra customer support / generation is justified, even if it is assumed that the program of work was reduced by 50%, and using current averages, Ergon would still only be covering 404 / (7,241*50%) = 10.6%. Therefore, there would still be 89.4% of planned events greater than 6hrs that could use generation support. It should be noted that our RRP forecast does not decrease relative to our current spend, and so a reduction of 50% is not a realistic future scenario to consider.

In summary, Ergon Energy is currently covering 5.6% planned events and 3% of unplanned events on average each year with generation support, indicating that there are plenty of opportunities to utilise an increased generator fleet to reduce outage impacts to customers. Section 6.7 and 8.1.3 utilises the Value of Customer Reliability (VCR) or a small proportion of VCR, demonstrating that these other customers will benefit from further generation.

6.2 Root Cause Analysis for Higher Planned and Unplanned Outages

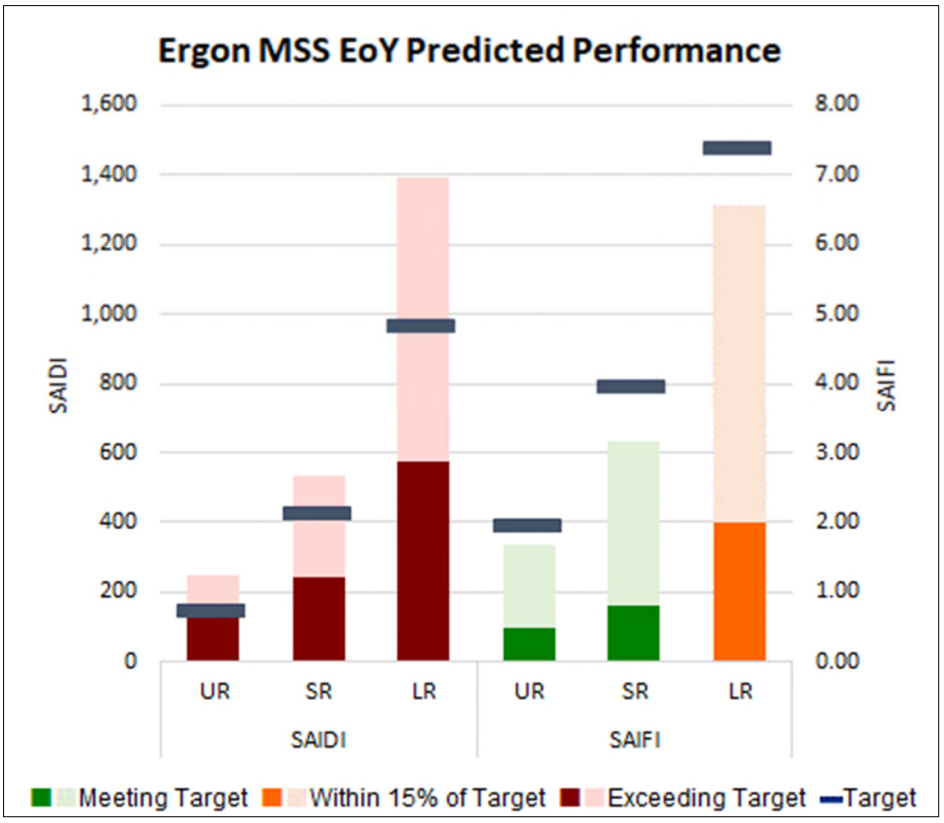
Ergon Energy's MSS SAIDI and SAIFI (System Average Interruption Frequency Index) performance outcomes are influenced by both planned and unplanned interruptions to supply.

During the 2018/19 financial year, Ergon Energy initiated changes to its corporate program to rectify defects and improve the performance of its ageing assets. There are several activities that contribute to Ergon Energy's planned program of work, which are highlighted in our replacement expenditure business cases. These changes resulted in an increase in planned works and, consequently planned outages for customers.

As a result, Ergon Energy exceeded its 2018/19 end of year MSS SAIDI targets for the Long Rural feeder category and has continued to exceed these targets in subsequent years. Similarly, Ergon Energy's Urban SAIDI exceeded its MSS limit since 2019/20 and Short Rural SAIDI has exceed its MSS limit since 2020/21.

All three categories are expected to exceed their prescribed MSS SAIDI limits at the end of this financial year, 2024/25 (Figure 1).

Figure 2 Ergon MSS EoY 2024/25 Projected Performance at end of September 2024 (dark-planned, lighter-unplanned)



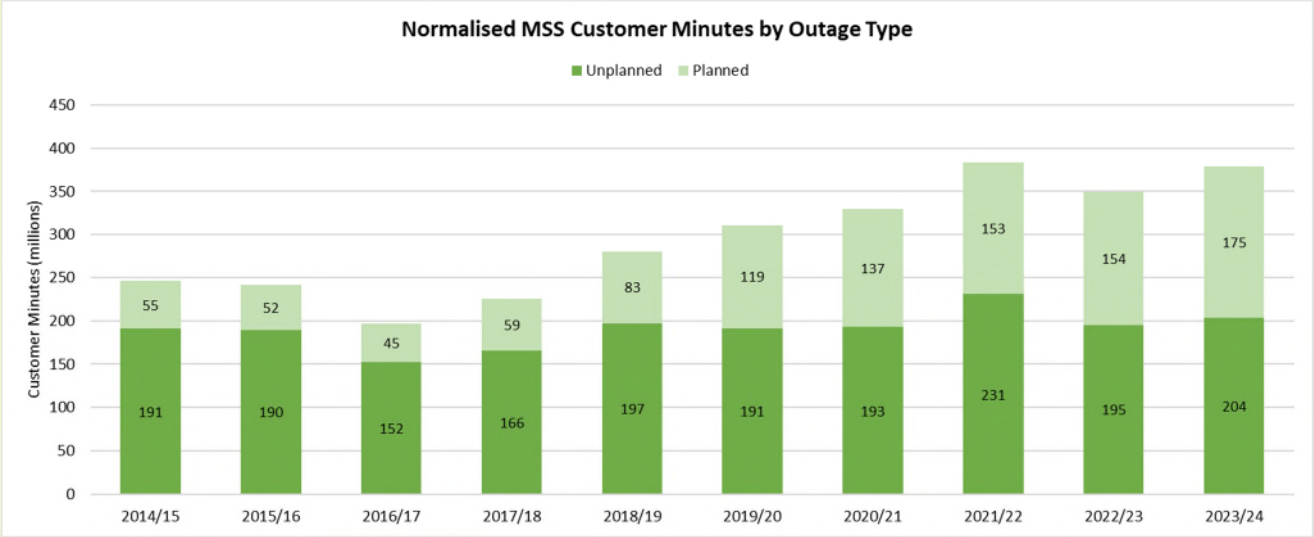
Ergon Energy's MSS SAIDI performance is also influenced by unplanned outages, such as those experienced in the Long Rural network due to High Voltage (HV) asset failures (e.g. cross-arm and pole failures), primarily during severe weather events. In the last five years, twice Ergon's unplanned lost Customer Minutes (CMINs) have exceeded 200 million CMIN, with an absolute maximum of 231 million in 2021/22.

In the perspective of a ten-year horizon, analysing normalised MSS CMINs by outage type (Figure 3) in five-year regulatory cycles, there are two main conclusions:

- Average ratio of planned and unplanned CMINs has increased from 33% in the period 2014/15-2018/19 to 64% in the last five years.
- On five-year average, UNPL CMINs have increased by 12% in the last five years (from 179.1m to 202.7m of CMIN). At the same time, PLN related lost CMINs have been increased by more than 60%.

In summary, it can be concluded that the trends of Ergon's lost CMINs are increasing from 2018/19, dominantly in the PLN domain, although UNPL trends are also higher compared to the regulatory period 2014/15-2018/19.

Figure 3 Normalised MSS Customer Minutes by Outage Type



6.3 Planned Outages

Planned outages are outages scheduled by the distributor to allow the safe undertaking of works on the distribution network. Customers identified as being impacted by a planned outage must be notified in accordance with requirements under the National Energy Retail Rules and the Electricity Distribution Network Code. Planned works include several categories, with most requiring an outage to enable their completion. The most dominant categories of planned works include Priority one (P1) and Priority two (P2) Lines Works Corporate and Customer Initiated Line Works and Coordinated Maintenance.

Planned outages have twenty different “parent” cause codes in Ergon Energy’s outage management system (Appendix 3). Some of the cause codes capture many different activities. For example, P2 Lines Works may include activities such as pole replacements, conductor clearance rectifications, conductor replacements and other pole asset replacements. These activities follow different work practices and procedures, and the size of the outages and customer experience will vary depending on the location, type of work and network connectivity.

Note that for example P1 poles require replacement in 30 days allowing a short planning window where there is limited opportunity to bundle with other work to reduce customer outage impacts. P2 poles require replacement in six months and provide more opportunity to plan and bundle work effectively to minimise the impact on network reliability performance and customer impacts.

Ergon Energy’s main program of works, includes:

- Pole replacement program
- Conductor replacement program
- Clearance programs
- Customer initiated works
- Corporate initiated augmentation projects

- Corporate Maintenance Programs.

Where possible Ergon Energy balances the scheduling of planned works to minimise customer impacts by using system applications to bundle field work. The bundling of field work improves delivery efficiency and reduces outages to customers by enabling the coordinated completion of multiple work requirements during a single planned outage event.

For comparison, Figure 4 shows planned customer minutes for a rolling five-year period grouped by planning reasons for interruption. As can be seen, safety driven P2 Lines Works are dominant (>40%). Depending on the type and scope of works, locality, network topologies, overhead and/or underground infrastructures, and network asset and environmental conditions in general planned outage management processes involve extensive planning (as per Ergon's working procedures strongly focused on employee safety), diverse resources and sectionalising distribution feeders. If works are planned on HV and LV circuits, outage management complexity significantly increases.

In addition to Lines Maintenance, Corporate and Customer Initiated Line Works have also significant impact on planned performances. Annually thousands of new residential, commercial, and industrial customers are connected to Ergon Energy's network. These may include residential, solar PV, residential or commercial developments and large industrial connections. The volumes of new connections in Ergon have been strong over the past five years, as each of the complex connections requires a planned outage at one or various stages of the connection process.

A few times per year there may be significant amount of work linked to a particular feeder. In these scenarios the depot will have a "super outage" and Ergon Energy will coordinate staff and equipment from multiple depots to reduce the impact to customers.

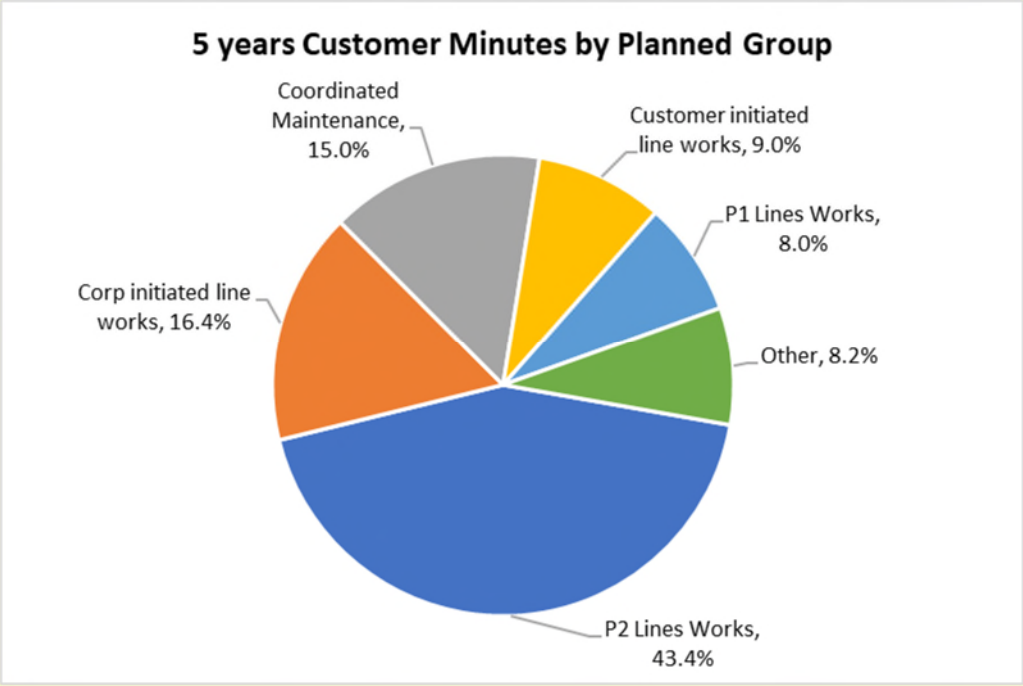
Appendix 10 provides examples of "super outage" management using business cooperation and generation resources.

Other planned works have also significant impact on network performances. In most cases, customer connections construction tasks are not combined with corporate initiated works due to difficulties aligning to timeframes committed to in connection offers and the low probability of scheduled works coinciding with connection locations.

Among feeder categories, the Long Rural network is especially sensitive to Customer Initiated Line Work. The radial nature of Long Rural feeders prohibits field crews from utilising alternative supply, which can be used to reduce outage impacts in Urban and Short Rural situations. As a result, the impact of new customer connections on Long Rural feeder SAIDI is more significant.

Considering projected volumes of P2 and P1 works, and corporate and customer-initiated developments, Ergon Energy expects that planned outages will continue to increase and SAIDI performance will continue to degrade during the next regulatory period.

Figure 4 Planned Reasons for Interruptions (2019/20-2023/24)

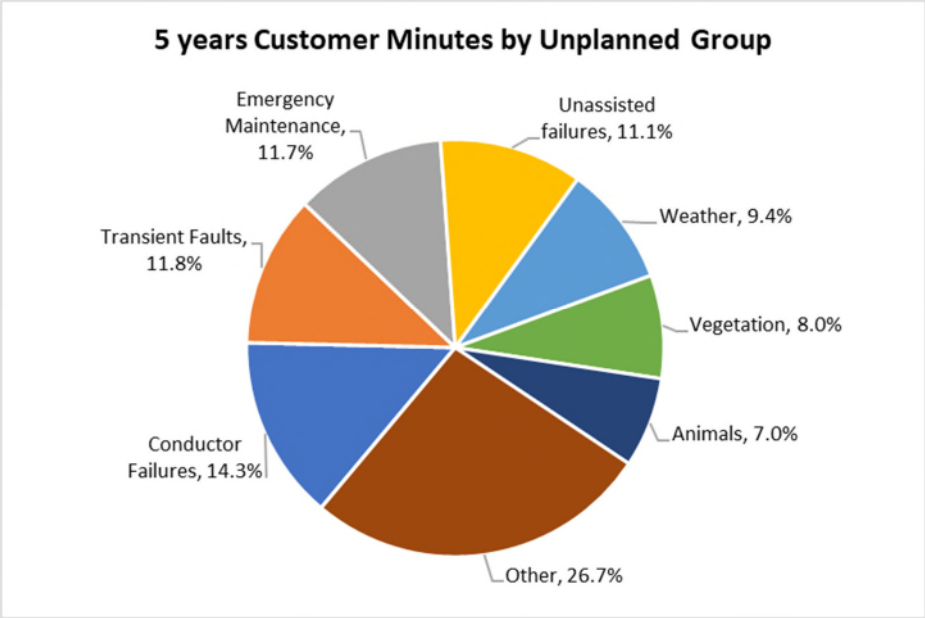


6.4 Unplanned Outages

Unplanned outages are unforeseen interruptions that can occur for several reasons, including but not limited to, severe weather events, and asset failures. Ergon Energy uses an event trigger to record the primary cause of an unplanned outage. Primary event triggers that fall within the asset failure category may be impacted by secondary triggers (Appendix 4), such as weather, which can further delay restoration, therefore generation may be required or further increases SAIDI. Our analysis of weather as a secondary trigger contributing to different types of unplanned outages, show that vegetation, trip and manual recloser (transients) and asset failures, as primary triggers, are dominantly occurring during storms. Contribution of weather varies between feeder categories and years. On Long Rural feeders where storm related outages primary triggers are most common, contribution of weather goes over 90% in vegetation outages and 50% during transients and asset failures.

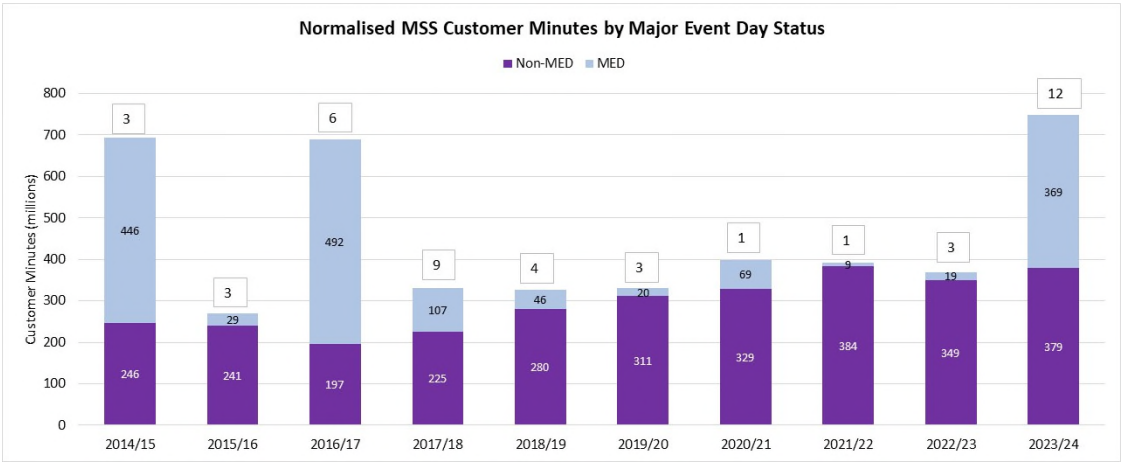
The diversified nature of unplanned triggers is an important factor impacting restoration times. It also varies between feeder categories and regions, and is spread between asset failures, transients, emergency maintenance, unassisted failures, weather, vegetation, and animals (Figure 5).

Figure 5 Unplanned Trigger Analysis (2019/20-2023/24)



In addition to these, there are unplanned outages excluded from the MSS and STPIS. The most significant are the Major Event Days (MED) when Ergon customers are exposed to prolonged outages caused by severe weather conditions, tropical cyclones, and natural disasters. Figure 6 provides a graphical representation of normalised MSS CMINs by MEDs. As can been seen, in the year of La Nina (2021/22) there was only one MED event. At the same time, although impacted by storms UNPL outages during non-MED events, due to high tMED threshold applied for Ergon, could not be excluded, and exceeded 380 million lost customer minutes, which the highest UNPL impact in the last ten years.

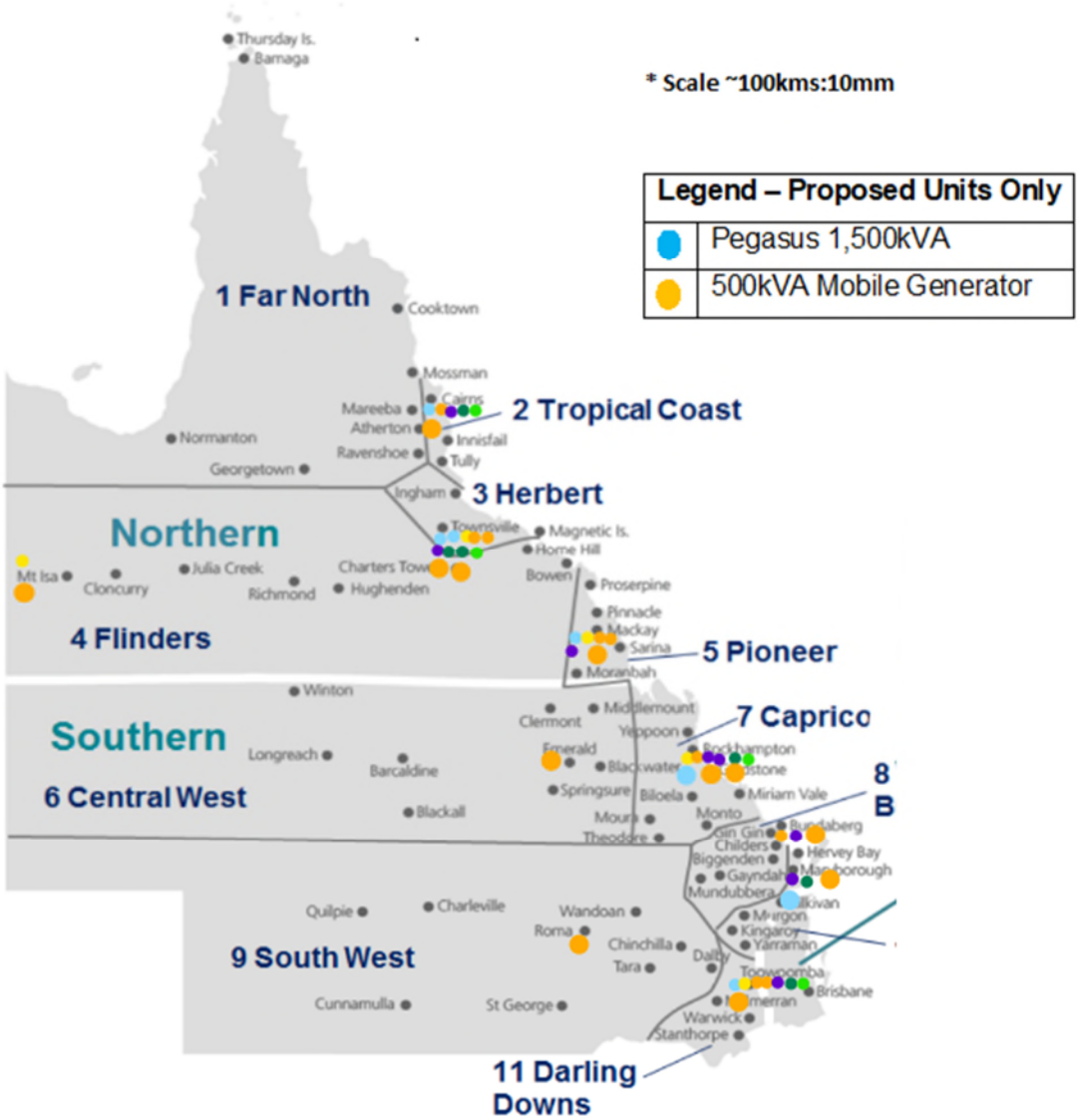
Figure 6 Normalised MSS Customer Minutes by Major Event Day



6.5 Location, Size and Logistics

In consultation with Customer Operations, it was determined that a further two 1,500kVA Pegasus units would be prudent to cover the Hervey Bay and Rockhampton areas, with a further twelve 500kVA generators located strategically around the state providing the best utilisation and needs for our customers. While 500kVA is a larger set, it was advised that the 500kVA unit had more opportunities to be used for residential developments, small to medium businesses including schools, small supermarkets (e.g. IGA) and hotels. Also, for peak lopping and parallel operations. Figure 7 shows the existing location (see Table 1 legend) of generators owned by Ergon Energy, indicated by small dots and the larger dots indicating the proposed location for the new generators.

Figure 7 Existing (small dots) and Proposed New Generators (larger dots)



6.6 Compliance

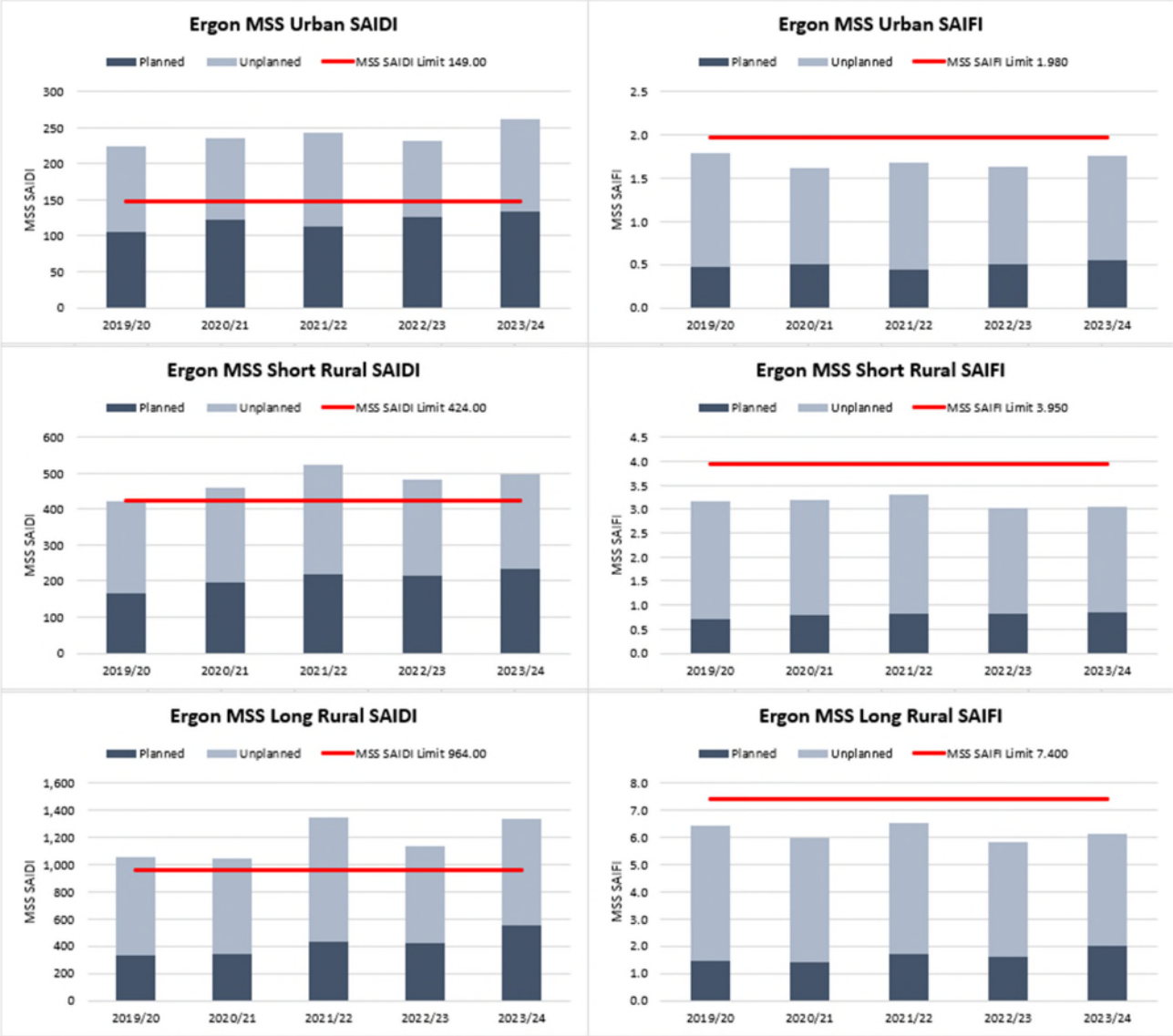
6.6.1 Minimum Service Standards (MSS)

The purpose of MSS is to provide a standard against which the distribution entity's performance, by feeder type will be assessed across its supply network, with the intent to guide the distribution entity in using all reasonable endeavours to minimise the number and length of interruptions to customers. Currently, Ergon Energy is exceeding MSS SAIDI limits for each of the feeder category with the expectations that the outages required to meet the current augmentation and maintenance program will produce SAIDI levels that will continue to exceed MSS in the near future (Figure 8).

If it is considered that unplanned outages would continue as shown in Figure 8, using these same planned SAIDI figures for 2023/24 Urban, Short Rural and Long Rural planned works would need to reduce significantly to meet MSS limits. Urban planned works would need to decrease by 110 SAIDI (85%), Short Rural 76 SAIDI (34%), and Long Rural 376 SAIDI (68%) to return to compliance.

While Ergon will not meet MSS SAIDI compliance that is the combined planned and unplanned SAIDI exceed the MSS Limits as provided as the Distribution Authority No. D01/99, Ergon still needs to use reasonable endeavours to minimise the impact to customers, such as the utilisation of generation.

Figure 8 Five Year MSS SAIDI and SAIFI across Feeder Categories



6.7 Customer Benefits from Provided Generation

For our revised business case, Ergon Energy has assessed the previous five years of generation events recorded in our outage management system and assessed against the Value of Customer Reliability (VCR). Some events are greater than 12 hours, and although the Value of Network Resilience (VNR) could be utilised, it was considered more conservative to use VCR.

> *VCR seek to reflect the value different types of customers place on reliable electricity supply under different conditions. VCR play an important role in ensuring customers pay no more than necessary for reliable energy, helping energy businesses identify the right level of investment to deliver reliable energy services to customers.*

https://www.aer.gov.au/industry/registers/resources/reviews/values-customer-reliability-2024

A VCR rate of $53.47/kWh has been chosen on a weighted average of actual consumption data for each consumer category.

While the intent of VCR is for unplanned outages, during planned outages customers still experience interruptions to their normal business and in some events experience food spoilage and other impacts that directly cost the customer financially. While customers have a short period to prepare for a planned outage, there is an impact or cost to the customers. For this activity the VCR rate was halved for planned outages at $26.47/kWh. It was also assumed that the average load per customer per event was 0.5kWh, which is a conservative figure as Customer Operations prioritise to larger consumers, such as shopping complexes, IGA, Foodworks, schools, medical centres, and other small businesses, which are many times the load consumption of a residential customer.

Therefore, the VCR assessed values shown in Table 6 will be lower than actual figures.

Table 6 Customer benefits derived from provided generation

Customer average use		0.5kWh	0.5kWh
VCR		26.47/kWh	$53.47/kWh
	Total	**Planned**	**Unplanned**
2019	$10,773,751	$3,251,374	$7,522,378
2020	$23,262,439	$9,100,088	$14,162,351
2021	$25,280,925	$9,263,063	$16,017,862
2022	$15,139,041	$8,395,643	$6,743,398
2023	$30,212,587	$14,523,167	$15,689,419
Average	$20,933,749	$8,906,667	$12,027,082

The customer benefit was calculated for each event and then summated for each year as:

- Planned event – Number of Customers * 0.5kWh * Number of hours generator operating * VCR $26.47/kWh.
- Unplanned event – Number of Customers * 0.5kWh * Number of hours generator operating * VCR $53.47/kWh.

For the five years, the customer benefits each year on average were $20.9m, which was made up of $8.91m from planned events and $12.03m from unplanned events.

As noted, Appendix 5 has a list of all 43 generators that were owned by the business during 2023. If these generators were all purchased new this year, their value would be $24.23M. It could therefore be considered that our customers are gaining a value of $20.9m per year on average, from an investment of $24.23m of generators. Other costs including fuel, maintenance and mobilisation would need to be considered to obtain the true cost to supply these customers.

If the customer benefits were considered against the total generation in our fleet including the hire units, of 27,950kVA, and just taking the VCR customer benefits from unplanned outages from the

existing fleet, it could be assumed that generation provides $12.03m / 27,950kVA = $430/kVA of generation.

6.8 Cost to Supply

While the calculated customer benefits suggests that generation is effective for our customers, generation is a less than economic solution for longer term supply. FeederStat (Table 7) shows that on average the number of generation hours for planned works was 24,519, and for unplanned outages, 10,590. If on average a 500kW generator is used for each event with a $1/kWh for fuel costs, this would cost Ergon $12.26m and $5.30m to run the generators for planned and unplanned works, respectively. It is expected that these figures are conservative, as multiple generators are usually used for events. As per examples in Table 2, Appendix 8, 9, 10 and 11. Customers in general are paying around $0.31/kWh or around 31% contribution to the generation costs (Table 7).

Table 7 Generator/s Running Hours

Year	Total Events	Planned Total Hours	Unplanned Total Hours	Planned Average Hours	Unplanned Average Hours
2019	437	17,301	6,872	48	97
2020	595	23,021	9,602	82	185
2021	568	15,651	13,846	28	231
2022	512	20,391	5,009	46	111
2023	547	46,232	17,621	99	263
Average	532	24,519	10,590	61	177
Average fuel Cost to Generate	$/kWh	$1.00	$1.00		
Average size of generator per event	kW	500	500		
Total Annual Fuel Cost		$ 12,259,600	$ 5,295,000		
Approx Income from Customers	$0.31/kWh	$ 3,800,476	$ 1,641,450		

7 COUNTERFACTUAL ANALYSIS (BASE CASE)

7.1 Summary

The counterfactual arrangement is to continue utilising and maintaining the existing mobile generation fleet that ranges from 5 to 15 years, with no extra units until end of this decade.

7.2 Assumptions

This option only includes the keeping the existing fleet of 43 mobile generators and hiring units for natural disasters. The running costs that include fuel and mobilisation will be covered by the projects when the generators are used. Maintenance costs are projected at 2.5% of CAPEX.

The counterfactual case is common to all three options, therefore the fuel costs, benefits and maintenance and depreciation for the existing has been left out of the analysis to derive the comparative NPVs, so as not the shadow the main comparative study between purchase vs hiring further units.

7.3 Benefits

As noted in Section 6.7 Customer Benefits from Provided Generation, the existing generators conservatively provide the VCR benefits as repeated here in Table 8.

Table 8 Customer benefits derived from provided generation

Customer average use		0.5kWh	0.5kWh
VCR		26.47/kWh	$53.47/kWh
	Total	**Planned**	**Unplanned**
2019	$10,773,751	$3,251,374	$7,522,378
2020	$23,262,439	$9,100,088	$14,162,351
2021	$25,280,925	$9,263,063	$16,017,862
2022	$15,139,041	$8,395,643	$6,743,398
2023	$30,212,587	$14,523,167	$15,689,419
Average	$20,933,749	$8,906,667	$12,027,082

7.4 Financials

Table 9 provides an overview of the existing generation fleet, estimated annual maintenance, derived customer benefits from VCR and estimated fuel costs.

Table 9 Cost overview for Base Case

	Year 1 [2025/26]	Year 2 [2026/27]	Year 3 [2027/28]	Year 4 [2028/29]	Year 5 [2029/30]	Total
Capex	**$0**	**$0**	**$0**	**$0**	**$0**	**$0m**
Opex	**$0.54m**	**$0.54m**	**$0.54m**	**$0.54m**	**$0.54m**	**$2.67m**
Planned Customer Benefits	**$8.9m**	**$8.9m**	**$8.9m**	**$8.9m**	**$8.9m**	**$44.5m**
Unplanned Customer Benefits	**$12.0m**	**$12.0m**	**$12.0m**	**$12.0m**	**$12.0m**	**$60.1m**
Planned Outage Fuel Costs	**$12.3m**	**$12.3m**	**$12.3m**	**$12.3m**	**$12.3m**	**$61.3m**
Unplanned Outage Fuel Costs	**$5.30m**	**$5.30m**	**$5.30m**	**$5.30m**	**$5.30m**	**$26.5m**

7.5 Risk analysis of not progressing this project

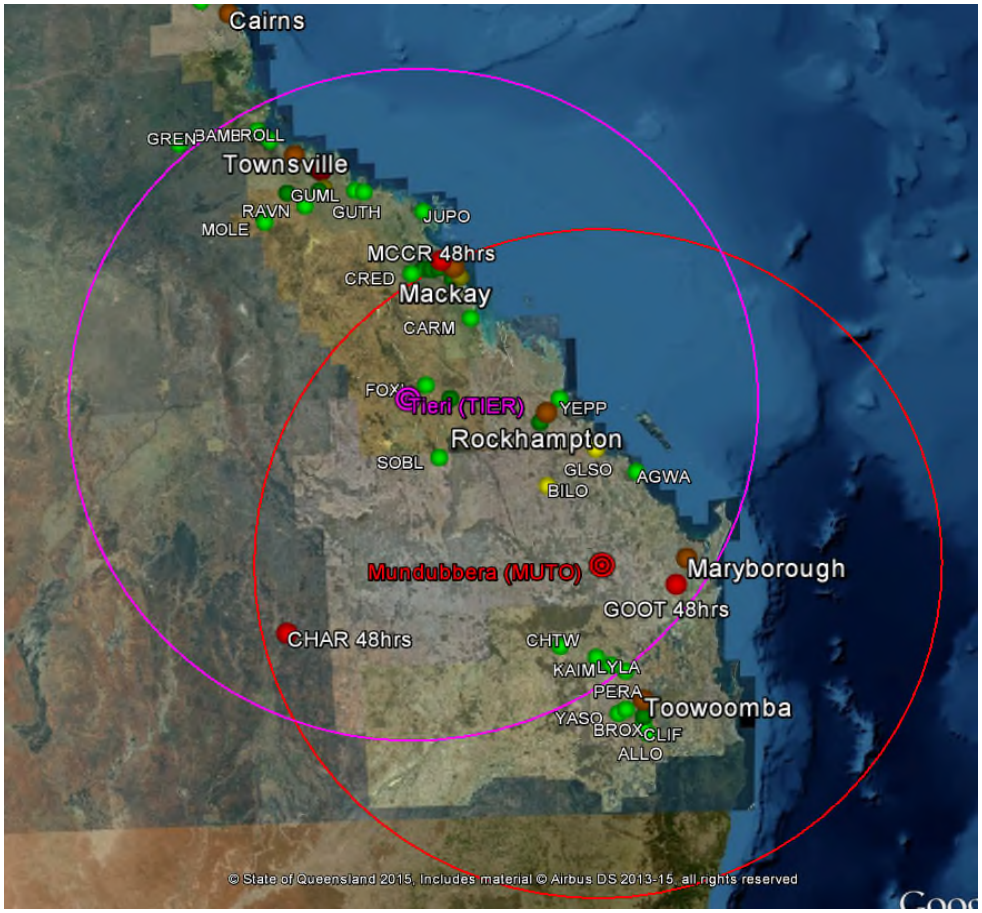
The practice of deploying mobile generators has provided value to customers while the business repairs and augments the network.

However, with the current state of generation fleets Ergon can only continue to provide limited support to a restricted number of customers.

The main risks associated with not progressing with the project are:

1. Sustained and continued power supply interruptions will be experienced by customers in the areas impacted by severe weather and natural disasters across the state due to the less mobile generators.
2. Considering the volume of REPEX, AUGEX and CONNEX works in the future, the trend of planned outages will continue to be unfavourable to MSS limits, impacting customer experiences and Ergon's legislative obligations.
3. Limited access to HV mobile generators in Wide Bay and Central (Capricornia) regions (Figure 9) and LV generators in the western, dominantly rural, areas.
    a. Due to mobilisation issues, this limits the use of 500kVA LV and 1500kVA HV generators to major disasters in Wide Bay and Capricornia and large planned outages.
4. The alternative to purchasing new generators is to hire mobile generators. Rental generators are limited by the number of hire companies, locations and size of generators, and availability. Hire generators are also limited in their connections and cannot be run in parallel with a live grid connected network due to not having the required protection systems.

Figure 9 Deployment area of two HV mobile generators located in Mackay and Toowoomba



8 OPTIONS ANALYSIS

8.1 Option 1 – Purchase Plant

8.1.1 Summary

Option 1 recommends an increase of mobile generation fleet of Ergon Energy by two 1500kVA HV Pegasus at $1.39m each and twelve 500kVA LV mobile generators at $0.41m each.

Estimations for Option 1: Capex $7.65m and NPV $18.8m

Option 1 is NPV positive to option 2 by around 10%.

8.1.2 Assumptions

This option only includes the purchase of the generators and maintenance. The running costs that include fuel and mobilisation will be covered by the projects when the generators are used. Maintenance costs are projected at 2.5% of CAPEX.

Existing costs and benefits from existing fleet has been removed from the NPV comparative study due to commonality with all options.

8.1.3 Benefits

Customer benefits were derived and highlighted in section 6.7 for the existing fleet of generators. The customer benefits each year on average for the past 5 years were $20.9M, which was made up of $8.91m from planned events and $12.03m from unplanned events.

Appendix 5 has the 43 listed generators owned by Ergon that were used for general business during 2023. There were other generators hired short term for planned and unplanned works, but have not been included in the customer benefits assessment. If the existing generators were all purchased new this year, their value would be $27.95m. It could therefore be considered that the customers are gaining a value of $20.9m per year from this $27.95m of generators. Other costs including fuel, maintenance and mobilisation would need to be considered to obtain the true cost to supply these customers.
If the customer benefits were considered against the total generation capacity of 27,950kVA for the 43 generators, just taking the VCR customer benefits from unplanned outages from the existing fleet, it could be assumed that generation provides $12.03m / 27,950kVA = $430/kVA of generation.

Therefore, if the fleet was to add 9,000kVA of generation (purchase or hire) with the same utilisation, this could equate to 9,000kVA * $430/kVA = $3.87m of annual customer benefit for unplanned outages. If planned and unplanned benefits were used this figure would be higher.

On that basis, $3.87m of unplanned customer benefits were used in the NPV assessment.

Table 10 Customer Benefits for Additional 9,000kVA of Generation

Customer average use		0.5kWh	0.5kWh
VCR $/kWh		$26.47/kWh	$53.47/kWh
	Total	**Planned**	**Unplanned**
5yr Average	$20,933,749	$8,906,667	$12,027,082
Capacity of Existing Gen Fleet (kVA)	27,950		
Customer benefits $/kVA of Generation		$319	$430
Additional Gen (kVA)	9,000		
Additional Customer benefits $/kVA of Generation		$2,867,979	$3,872,763

8.1.4 Financials

With total of 9,000kVA, the extra generation will add 32% capacity to the existing hired and owned units. In assessing financial profile of Option 1, it is proposed to increase fuel consumption proportionally for the extra generation as shown in Table 11.

Table 11 Assessed Extra Fuel for Proposed 9MVA of Generation

		Planned Events	Unplanned Events
Annual Average hrs of Generation		24,519	10,590
Average fuel Cost to Generate	$/kWh	$1.00	$1.00
Average size of generator per event	kW	500	500
Total Average Annual Fuel Cost		$ 12,259,600	$ 5,295,000
Utilised Generation in 2023	kVA	27,950	27,950
Proposed extra Generation	kVA	9,000	9,000
Proposed % extra generation		32%	32%
Proposed extra fuel cost for Outages		$ 3,947,635	$ 1,705,009

Table 12 Financial overview for Option 1

	Year 1 [2025/26]	Year 2 [2026/27]	Year 3 [2027/28]	Year 4 [2028/29]	Year 5 [2029/30]	Total
Capex*	**$7.65m**	**$0**	**$0**	**$0**	**$0**	**$7.65m**
Opex (Maintenance)	**$0.19m**	**$0.19m**	**$0.19m**	**$0.19m**	**$0.19m**	**$0.96m**
Unplanned Customer Benefits	**$3.87m**	**$3.87m**	**$3.87m**	**$3.87m**	**$3.87m**	**$20.7m**
Unplanned Fuel Costs	**$1.82m**	**$1.82m**	**$1.82m**	**$1.82m**	**$1.82m**	**$9.11m**

8.2 Option 2 – Hire Plant

8.2.1 Summary

Option 2 is an alternate where Ergon Energy instead of purchasing two 1500kVA HV Pegasus and twelve 500kVA LV mobile generators, hires the same plants for 91 days, or 25% of the year.
Day rate hire: HV Pegasus $1,996 and 500kVA LV Mobile generator $627.

Estimations for Option 2: Capex $0m Opex $4.96m and NPV $16.1m.

Option 2 is NPV negative to option 1 by around 10%.

8.2.2 Assumptions

The hire generators will only be used for 25% of the year, or 91 days each.

The running costs that include fuel and mobilisation will be covered by the projects when the generators are used.

8.2.3 Benefits

All benefits identified for counterfactual (existing generation) and Option 1 are applicable to Option 2, with $3.87m of customer benefits used in the NPV assessment.

8.2.4 Financials

Fuel costs to run generators for unplanned outages are added to the financials to show the using generators are a negative investment with respect to supplying electricity. Leaving the fuel cost out makes the operation of the generators extraordinary cost positive.

Table 13 Cost overview for Option 2

	Year 1 [2025/26]	Year 2 [2026/27]	Year 3 [2027/28]	Year 4 [2028/29]	Year 5 [2029/30]	Total
Capex	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Opex* (Hire costs)	**$1.05m**	**$1.05m**	**$1.05m**	**$1.05m**	**$1.05m**	**$5.24m**
Unplanned Customer Benefits	**$3.87m**	**$3.87m**	**$3.87m**	**$3.87m**	**$3.87m**	**$20.7m**
Unplanned Fuel Costs	**$1.71m**	**$1.71m**	**$1.71m**	**$1.71m**	**$1.71m**	**$8.53m**

8.3 Comparison of Options

Table 14 Comparison of Options

Criteria	Counterfactual (Base Case) No New Generators	Option 1 Purchase Two 1500kVA HV Pegasus Twelve 500kVA LV mobile Gen	Option 2 Hire for 91 days each Two 1500kVA HV Pegasus Twelve 500kVA LV mobile Gen
Net Present Value (investment)	$0	-$9.4m	-$12.1m
Net Present Value (include Benefits & Fuel Costs)	$0	$18.8m	$16.1m
NPV Rating		1	2
Investment cost (Capex)	$0	$7.65m	$0
Investment cost (Opex)	$0	$0.96m	$4.96m
Investment Risk	Low	Medium	High
Benefits	Medium	High	Low
Benefits - Extra *Customer Benefits for Unplanned Outages (annual)*	0.0%	$4.14m	$4.14m
Costs - extra Fuel Supply for Unplanned Outages (annual)	0.0%	$1.82m	$1.82m
Number of customers to benefit (5 years)	14,188	+34%	+34%
Delivery time	0 months	12 months	12 months
Delivery Risk	Low	Medium	High hire units may not be available when required.
Risk Scenario - Natural disaster (bushfire / flood) impacts distribution area resulting in disruption to essential services (e.g. hospitals, sewage etc)	Risk Score 16 Post Program Risk Score 16	Risk Score 16 Post Program Risk Score 16	Risk Score 16 Post Program Risk Score 16
Detailed analysis – Benefits	Counterfactual case to continue with the existing fleet of generators that are aged from 5 to 15 years.	Option 1 to purchase the machines is the more NPV cost postitive to Option2 in all scenarios. The customer benefits when utilising VCR for just the unplanned outages comes to $4.14m, and the extra fuel to serve these customers $1.82m per annum.	Option 2 to hire the machines for 91 days or 25% of the year is the NPV cost negative compared to Option1 in all scenarios. The customer benefits (is the same as Option 1) when utilising VCR for just the unplanned outages comes to $4.14m, and the extra fuel to serve these customers $1.82m per annum.
Detailed analysis – Risks		As the extra generation only picks up a small percentage extra customers, the likelihood of the risk occuring remains in the same category, with a risk score of moderate.	As the extra generation only picks up a small percentage extra customers, the likelihood of the risk occuring remains in the same category, with a risk score of moderate.

8.3.1 Cost Summary 2025-2030

Table 15 Number of Assets and Costs

Options	HV Pegasus	LV 500kVA Mobile Generation	Purchase/ Hire	HV Pegasus	LV 500kVA Mobile Generation	Capex Cost ($M)	Opex Cost ($m) Annual
Option 1 (Purchase)	2	12	Purchase Price	$1.39m	$0.41m	$7.65m	$0.19m
Option 2 (Hire)	2	12	Hire Cost/day	$1,996	$627	$0M	$0.99m

Table 16 CAPEX and OPEX cost summary 2025-30

Option	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025-30
Counterfactual (Base)	$0	$0	$0	$0	$0	$0
1	$7.84m	$0.19m	$0.19m	$0.19m	$0.19m	$8.61m
2	$0.99m	$0.99m	$0.99m	$0.99m	$0.99m	$4.96m

While the counterfactual scenario / existing fleet of generation would still require maintenance, this figure will be common to all options and therefore not included in the financial assessments.

8.3.2 Economic Analysis

A WACC of 3.5% has been used for NPV assessments and 2022 direct costs.
The first table, Table 17 includes the Capex and Opex costs for both options over the 2025-2030 regulatory period, but doesn't include the derived customer benefits of $3.87m for forecast unplanned outage as shown in Option 1 Benefits. While Option 2 considers that the hire generators are only hired for 25% of the year, or 91 days, this option less cost effective over the 15-year life of the generators by some $2.5m, or 25%.

Table 17 Option Costed with no Customer Benefits

SCENARIO A Option	Option Name	Rank	Net NPV	Capex NPV	Opex NPV	Benefits NPV
1	Purchase 2 Pegasus and 12 LV mobile generators	2	**-9,434**	-7,106	-2,328	0
2	Hire 2 Pegasus and 12 LV Mobile generators	3	**-12,067**	0	-12,067	0
3	Counterfact - keep using existing mobile generators	1	**0**	0	0	0

When the annual $3.87m of customer benefits derived from the VCR and $1.71m fuel costs for future unplanned outages are added to the NPV assessments, Option 1 is still cost positive by 10% compared to hiring the same number of generation units (Table 18).

Table 18 NPVs for Options assessed with Customer Benefits and Fuel Costs for Unplanned Outages

SCENARIO C Option	Option Name	Rank	Net NPV	Capex NPV	Opex NPV	Benefits NPV
1	Purchase 2 Pegasus and 12 LV mobile generators	1	**15,678**	-7,086	-21,840	44,604
2	Hire 2 Pegasus and 12 LV Mobile generators	2	**12,896**	0	-31,708	44,604
3	Counterfact - keep using existing mobile generators	3	**0**	0	0	0

While the VCR as provided by the AER has only been derived for customers impacted by unplanned outages, customers impacted by planned outages still have losses as recognised in Section 6.7 and assessed at half the VCR value of customers impacted by unplanned outages. The annual average customer benefit for planned outages was assessed at $8.91m for the existing 27,950kVA of generation. That is a value of $8.91m/27,950kVA = $319/kVA. Therefore, for an additional 9,000kVA of proposed generation, this would add a proposed benefits to customers at $319 * 9,000kVA = $2.87m.

If forecast planned and unplanned annual customers benefits of $2.87m and $3.87m respectively are included in the economic analysis, with $3.95m and $1.71m fuel costs respectively, the purchasing of the generators is still cost positive compared to hiring the same amount of units for more than 91days of the year. Including planned and unplanned customer benefits and all operational costs, both purchasing the generation units and hiring the units is still cost positive as shown in Table 19.

Table 19 NPV Options assessed with Customer Benefits and Fuel Costs for Planned and Unplanned Outages

SCENARIO B Option	Option Name	Rank	Net NPV	Capex NPV	Opex NPV	Benefits NPV
1	Purchase 2 Pegasus and 12 LV mobile generators	1	**3,243**	-7,086	-67,306	77,636
2	Hire 2 Pegasus and 12 LV Mobile generators	2	**462**	0	-77,174	77,636
3	Counterfact - keep using existing mobile generators	3	**0**	0	0	0

8.3.3 Dependencies

In its Draft Decision, the AER outline that their “draft decision capex forecast brings Ergon Energy’s annual capex back down to between the FY2019 & FY2020 level, (and so) we consider that the additional mobile generation is not required to meet its MSS target in the 2025-30 period”. While Ergon Energy’s Revised Regulatory Proposal in REPEX is a reduction on our Regulatory Proposal, it is still above the FY2019 & FY2020 level. Additional mobile generation will provide customer

benefits and help us manage our forecast planned outages and MSS target challenges from our REPEX program for the 2025-2030 period.

In addition, Ergon Energy has full funding for the increased distribution and subtransmission augmentation plans, and connections budget. Also, the average number of unplanned outages have been reasonably consistent over the last ten years.

Ergon Energy is currently covering 5.6% planned events and 3% of unplanned events on average each year with generation support, indicating that there are plenty of opportunities to utilise an increased generator fleet to reduce outage impacts to customers (Section 6.1 Problem and/or Opportunity).

8.3.4 Conclusions

It has been shown that the existing generation suite is only providing generation coverage to 5.6% of planned events and 3% of unplanned events, only considering events over 6 hours in duration (Table 4). This existing generation is deemed to provide $12m annually of value to customer from the unplanned outages as derived from AERs VCR. While there are still some negotiations on the size of the REPEX programs, the agreed CAPEX programs of distribution, subtransmission and connections are larger than previous submissions. Therefore, there are still thousands of events each year that would utilise generation to improve the customer experience during outages. It is also prophesised that an additional 9,000kVA will provide a further $3.87m of value to customers annually, without considering the use of generation for planned outages.

The economic comparison of options supports the business decision to purchasing Two 1500kVA HV Pegasus and Twelve 500kVA LV mobile generators over hiring the same units. The raw NPV of purchasing the units vs hiring the same units for less than 25% of the year, with no customer benefits included, purchasing the units is 25% more cost positive. When adding the value of customer benefits and the corresponding fuel usage, the NPVs were not only positive, purchasing the units were more cost positive compared to hiring the units.

Appendix 1: Alignment with the National Electricity Rules

Table 20 Recommended Option's Alignment with the National Electricity Rules

NER capital expenditure objectives	Rationale
A building block proposal must include the total forecast capital expenditure which the DNSP considers is required in order to achieve each of the following (the capital expenditure objectives):	
6.5.7 (a) (1) meet or manage the expected demand for standard control services over that period	
6.5.7 (a) (2) comply with all applicable regulatory obligations or requirements associated with the provision of standard control services;	Additional mobile generators will increase capabilities of Ergon Energy to comply with regulatory obligations, especially regarding improved management of planned outages during network and customer connection works, natural disaster responses and during network contingency events
6.5.7 (a) (3) to the extent that there is no applicable regulatory obligation or requirement in relation to: (i) the quality, reliability, or security of supply of standard control services; or (ii) the reliability or security of the distribution system through the supply of standard control services, to the relevant extent: (iii) maintain the quality, reliability, and security of supply of standard control services; and (iv) maintain the reliability and security of the distribution system through the supply of standard control services	Additional mobile generation plants will improve and increase operational capabilities of Ergon Energy regarding each of the clauses 6.5.7(a)(3)
6.5.7 (a) (4) - maintain the safety of the distribution system through the supply of standard control services.	With additional mobile plants, this investment will increase resilience in the areas impacted by natural disasters and support Ergon's networks during contingency conditions, heatwaves, and the shortfall of capacity.
NER capital expenditure criteria	**Rationale**
The AER must be satisfied that the forecast capital expenditure reflects each of the following:	
6.5.7 (c) (1) (i) - the efficient costs of achieving the capital expenditure objectives	Option 1 is recommended as lower cost of several options discussed with Operations and Mobile Generation teams.
6.5.7 (c) (1) (ii) - the costs that a prudent operator would require to achieve the capital expenditure objectives	Positive NPV results and optimally balanced needs for new HV and LV mobile generators demonstrate prudence of Option 1.
6.5.7 (c) (1) (iii) - a realistic expectation of the demand forecast, and cost inputs required to achieve the capital expenditure objectives	In general, the demand forecast is not a primary factor of this investment. However, periodic load increases in parts of the networks, like in the case of extreme temperatures, contributing to new system peaks, impact security and reliability of power grids. From that perspective, this investment provides additional opportunity (and flexibility) to manage load growth more effectively.

Appendix 2: Strategic Alignment

Alignment to Energy Queensland's Strategic Framework

This investment aligns with the following Energy Queensland 'Enable' building blocks:

Table 21 Alignment to 'Enable' Building Blocks

'Enable' Building Blocks	How this investment contributes	Impact
1. Safety The safety of our people, customers and communities is our first priority	This investment provides staff in Fleet/s Mobile Generation and Operations targeted access to safety insights relevant to their jobs	Medium
2. Keep the lights on We will design, build, and maintain a safe and reliable electricity network	During natural disasters and extreme weather events, restorations become more effective and efficient, allowing faster power supply reconnections	High
3. Financial sustainability We will ensure funds spent are done so prudently and we will grow our revenue streams	Through reduced Energy Not Supplied it is expected that our revenue streams to grow. In addition, communities would experience quicker economic recoveries and the return of local services to help sustain businesses while reducing social impacts	Medium
4. People & Culture Continue to build a capable & productive workforce to ensure we deliver EQL's electric life ambition.	This investment aligns our people and culture to a shared vision, in improving their capabilities in operating multiple mobile generators	Medium

Regulatory and Compliance Obligations (If Applicable)

The proposed investment addresses the following regulatory and compliance obligations.

Table 22 Alignment to Regulatory/Compliance Obligations

Regulatory/ Compliance Obligation	How this investment contributes to compliance	Implication	Residual Risk Level
MSS	Support Planned and Unplanned MSS SAIDI outcomes	More effective and frequent use of MGs during planned and unplanned events reducing MSS SAIDI	Sustainable to Minor
Safety Net	Support networks with Safety Net risks	When needed, MG will be used for restoration of supply following an N-1 Safety Net	Sustainable to Minor

Appendix 3: “Parent” Coded Causes of Planned Outages

Asset Inspection SWER Dist Subs/Earths
Coordinated M'tce eg lines & subs
Corp initiated line works
Customer initiated Lines works
EE Generators works
Generator Connection/Disconnection
Lines Emergency Maint (legacy use only)
National Broadband Project works
Other Lines Mtce works
P1 Lines works (GSL exempt)
P1 Lines works (where lead times are met)
P2 Lines Works
Switching Operator Training
Vegetation works
Vehicle High Load
Zsub Customer initiated works
Zsub works Corp initiated
Zsubs corrective deferred M'tce
Zsubs corrective emergency M'tce
Zsubs Preventive M'tce

Appendix 4: Unplanned Event Triggers

Animal

- Animal impact
- Animal Insects (termites/borers/white ants)
- Animal nesting/burrowing
- Animal Other

Asset Failure

- Distribution substation
- HV / LV / SUBT-Conductor Connection Failure
- HV / LV / SUBT-Leakage / Pole top fire
- HV / LV / SUBT-Unassisted failure (Apparent defect)
- HV / LV / SUBT-Underground Cable failure
- HV / LV / SUBT-Underground Cable Joint failure

- Other Zone Sub Outage
- Transformer Trip – Zone Sub

Network business

- Design Fault
- Operator error
- Protection Error
- Switching sheet error

Other

- Fuse Operated – No Trigger Found
- Generation failure – Isolated
- Load Shedding ERGON
- Service Asset Fault
- Service Fuse Blown
- Trip and Manual Reclose
- Vibration
- Forced outages (these do not have an Event Trigger)

*Overloads – are t*ypically assigned to outages where a transformer fuse blows due to overload on the transformer. e.g., during extreme summer temperatures with high air-conditioning use.

Third Party

- Dig in
- Fire (External)
- Gunfire Vandalism Terrorism Outside agents
- Unauthorised access
- Vehicle/Machinery impact

Vegetation

- Inside Rural Grow-in (NSP responsibility)
- Inside Urban Grow-in (NSP responsibility)
- Outside Rural Blow-in/Fall-in (NSP responsibility)
- Outside Urban Blow-in/Fall-in (NSP responsibility)
- Rural clearing clashed conductors
- Urban clearing clashed conductors

Weather

- Lightning
- Other Natural Disaster
- Severe Weather
- Wind borne object.

Appendix 5: 2023 List of Generators owned by Ergon

Code	Equipment Description	Date in Serevice	Size (kVA)	New Cost
PEG-1500-001	1,500 MOBILE PEGASUS	5/01/2013	1,500	$ 1,300,000
PEG-1500-002	1,500 MOBILE PEGASUS	5/01/2013	1,500	$ 1,300,000
PEG-1500-003	1,500 MOBILE PEGASUS	5/01/2013	1,500	$ 1,300,000
PEG-1500-004	1,500 MOBILE PEGASUS	3/01/2017	1,500	$ 1,300,000
PEG-1500-005	1,500 MOBILE PEGASUS	5/01/2017	1,500	$ 1,300,000
TX-1500-011	Mobile Generation - Step Up Transformer 1	7/01/2012		
TX-1500-012	Mobile Generation - Step Up Transformer 2	7/01/2012		
TX-1500-013	Mobile Generation - Step Up Transformer 3	3/01/2012		
TX-1500-014	Mobile Generation - Step Up Transformer 4	3/01/2012		
RC-001	Recloser Frame 001	4/01/2012		
RC-002	Recloser Frame 002	4/01/2012		
MB93771771	1,250KVA MOBILE GENERATOR	5/31/2010	1,250	$ 950,000
MB93771772	1,250KVA MOBILE GENERATOR	5/31/2010	1,250	$ 950,000
MB93771773	1,250KVA MOBILE GENERATOR	5/31/2010	1,250	$ 950,000
MB93771774	1,250KVA MOBILE GENERATOR	5/31/2010	1,250	$ 950,000
MB93771777	1,250KVA MOBILE GENERATOR	5/31/2010	1,250	$ 950,000
MB93771778	1,250KVA MOBILE GENERATOR	5/31/2010	1,250	$ 950,000
MB93840489	1,250KVA MOBILE GENERATOR	6/30/2010	1,250	$ 950,000
MB93840499	1,250KVA MOBILE GENERATOR	6/30/2010	1,250	$ 950,000
MB94019239	1,250KVA MOBILE GENERATOR	7/01/2010	1,250	$ 950,000
MB94718040	1,250KVA MOBILE GENERATOR	3/10/2017	1,250	$ 950,000
MB94718041	1,250KVA MOBILE GENERATOR	3/10/2017	1,250	$ 950,000
MB93771779	150KVA MOBILE GENERATOR	9/17/2009	150	$ 200,000
MB93771781	150KVA MOBILE GENERATOR	9/17/2009	150	$ 200,000
MB94182351	150KVA MOBILE GENERATOR	1/15/2013	150	$ 200,000
MB94182352	150KVA MOBILE GENERATOR	1/15/2013	150	$ 200,000
MB94182353	150KVA MOBILE GENERATOR	1/15/2013	150	$ 200,000
MB94182356	150KVA MOBILE GENERATOR	1/15/2013	150	$ 200,000
MB94182357	150KVA MOBILE GENERATOR	1/15/2013	150	$ 200,000
MB94182358	150KVA MOBILE GENERATOR	1/15/2013	150	$ 200,000
MB93771767	300KVA MOBILE GENERATOR	7/01/2010	300	$ 350,000
MB93771769	300KVA MOBILE GENERATOR	7/01/2010	300	$ 350,000
MB93771770	300KVA MOBILE GENERATOR	7/01/2010	300	$ 350,000
MB94062474	300KVA MOBILE GENERATOR	9/20/2012	300	$ 350,000
MB94062494	300KVA MOBILE GENERATOR	9/20/2012	300	$ 350,000
MB94062482	300KVA MOBILE GENERATOR	9/20/2012	300	$ 350,000
MB94062483	300KVA MOBILE GENERATOR	9/20/2012	300	$ 350,000
MB94062499	300KVA MOBILE GENERATOR	9/20/2012	300	$ 350,000
MB94062504	300KVA MOBILE GENERATOR	9/20/2012	300	$ 350,000
MB93771646	500KVA MOBILE GENERATOR	7/01/2010	500	$ 406,000
MB93771640	500KVA MOBILE GENERATOR	7/01/2010	500	$ 406,000
MB93771644	500KVA MOBILE GENERATOR	7/01/2010	500	$ 406,000
MB94515794	500KVA MOBILE GENERATOR	7/17/2016	500	$ 406,000
MB94718042	500KVA MOBILE GENERATOR	1/28/2020	500	$ 406,000
MB94515810	60KVA MOBILE GENERATOR	7/27/2015	60	$ 100,000
MB94515812	60KVA MOBILE GENERATOR	7/27/2015	60	$ 100,000
MB94517647	60KVA MOBILE GENERATOR	7/27/2015	60	$ 100,000
MB94718038	60KVA MOBILE GENERATOR	7/28/2016	60	$ 100,000
MB94718039	60KVA MOBILE GENERATOR	7/28/2016	60	$ 100,000
			27,950	**$ 24,230,000**

Appendix 6: Generator Usage in 2023 as Captured in FeederStat

	OUTAGE_NAME	Region	CUST_MINUTES	NO_OF_CUSTOMERS	DAYS	Hours	Minutes	OUTAGE_TYPE	OUTAGE_STATUS_CODE	Acivity year	START_DATETIME	END_DATETIME						COMMENTARY
1													Avg Customer Load (kWh)			0.5	0.5	
2				Average	5.40								VCR / kWh			$26.74	$53.47	
3				Max	210.18								Count		478			
4													Subtotal		$30,212,587	$14,523,167	$15,689,419	
9524	23SW0492	SW	407	1	0.28	6.78	407	planned	COMP	2023	2023-02-16T07:42:00	2023-02-16T14:29:00	GENPL	GENP	$90.68	$90.68	$0.00	Generator connected to provide supply to customers during a Planned Network OutageGenerator
9526	23NQ0331	NQ	77604	87	0.62	14.87	892	unplanned	COMP	2023	2023-01-12T02:18:00	2023-01-12T17:10:00	GENUN	GENU	$34,579.05	$0.00	$34,579.05	Refer 23NQ0328 for fault details. TVS678 on Generator due to possible failed cable pothead
9527	23NQ0452	NQ	9362	2	3.25	78.02	4681	weather relate	COMP	2023	2023-01-14T02:34:00	2023-01-17T08:35:00	GENUN	GENU	$4,171.55	$0.00	$4,171.55	11kV Ground Dist Sub TVS2349, mobile generator has been installed to fed two customers follow
9528	23FN0307	FN	26472	90	0.20	4.90	294	planned	COMP	2023	2023-01-30T09:00:00	2023-01-30T13:54:08	GENPL	GENP	$5,897.74	$5,897.74	$0.00	Generator connected to provide supply to customers during a Planned Network OutageSS8520 / S
9529	23NQ0550	NQ	4432	1	3.08	73.87	4432	unplanned	COMP	2023	2023-01-16T15:50:00	2023-01-19T17:42:00	GENUN	GENU	$1,974.83	$0.00	$1,974.83	Generator connected to TVS1121 from outage 23NQ0465.
9530	23SW0497	SW	515	1	0.36	8.59	515	planned	COMP	2023	2023-02-19T07:00:00	2023-02-19T15:35:27	GENPL	GENP	$114.84	$114.84	$0.00	Generator connected to provide supply to customers during a Planned Network OutageGenerator
9532	23SW0517	SW	450	1	0.31	7.50	450	planned	COMP	2023	2023-02-05T08:00:00	2023-02-05T15:30:00	GENPL	GENP	$100.26	$100.26	$0.00	Generator connected to provide supply to customers during a Planned Network OutageSupply cus
9533	23SW0502	SW	418	1	0.29	6.97	418	planned	COMP	2023	2023-02-22T07:59:00	2023-02-22T14:57:00	GENPL	GENP	$93.13	$93.13	$0.00	Generator connected to provide supply to customers during a Planned Network OutageSupply cus
9534	23SW0515	SW	547	1	0.38	9.12	547	planned	COMP	2023	2023-02-15T08:08:00	2023-02-15T17:15:00	GENPL	GENP	$121.87	$121.87	$0.00	Generator connected to provide supply to customers during a Planned Network OutageSupply cus
9535	23SW0518	SW	477	1	0.33	7.95	477	planned	COMP	2023	2023-02-02T08:27:00	2023-02-02T16:24:00	GENPL	GENP	$106.27	$106.27	$0.00	Generator connected to provide supply to customers during a Planned Network OutageSupply cus
9536	23SW0483	SW	460	1	0.32	7.66	460	planned	COMP	2023	2023-02-01T07:59:00	2023-02-01T15:38:34	GENPL	GENP	$102.39	$102.39	$0.00	Generator connected to provide supply to customers during a Planned Network OutageGererator
9537	23FN0312	FN	23188	75	0.21	5.15	309	planned	COMP	2023	2023-02-01T07:20:05	2023-02-01T12:29:15	GENPL	GENP	$5,165.98	$5,165.98	$0.00	Generator connected to provide supply to customers during a Planned Network OutageGenerator
9539	23SW0501	SW	414	1	0.29	6.90	414	planned	COMP	2023	2023-02-22T08:03:00	2023-02-22T14:57:00	GENPL	GENP	$92.24	$92.24	$0.00	Generator connected to provide supply to customers during a Planned Network OutageSupply cus
9540	23FN0305	FN	3672	17	0.15	3.60	216	planned	COMP	2023	2023-01-31T08:00:00	2023-01-31T11:36:00	GENPL	GENP	$818.09	$818.09	$0.00	Generator connected to provide supply to customers during a Planned Network OutageConnect G
9541	23SW0489	SW	528	1	0.37	8.80	528	planned	COMP	2023	2023-02-08T07:00:00	2023-02-08T15:48:00	GENPL	GENP	$117.63	$117.63	$0.00	Generator connected to provide supply to customers during a Planned Network OutageGenerator
9542	23SW0513	SW	444	1	0.31	7.40	444	planned	COMP	2023	2023-02-20T08:03:00	2023-02-20T15:27:02	GENPL	GENP	$98.93	$98.93	$0.00	Generator connected to provide supply to customers during a Planned Network OutageSupply cus
9543	23NQ0311	NQ	5511	3	1.28	30.62	1837	planned	COMP	2023	2023-01-23T07:50:00	2023-01-24T14:27:00	GENPL	GENP	$1,227.80	$1,227.80	$0.00	Generator connected to provide supply to customers during a Planned Network OutageConnect G

Appendix 7: Cyclone Ita Initial Generator Tracking list

Supplier	Size KVA	QTY	Total Capacity	Assett No	Make	Leads Sen	Branch
Australian Industrial Rental	1000	1	1000				Cairns
Australian Industrial Rental	60	2	120				Townsville
Australian Industrial Rental	70	1	70				Townsville
Australian Industrial Rental	200	2	400				Townsville
Australian Industrial Rental	500	4	2000				Townsville
Australian Industrial Rental	1250	1	1250				Townsville
Australian Industrial Rental	10	1	10				Mt Isa
Australian Industrial Rental	37	2	74				Mt Isa
Australian Industrial Rental	60	1	60				Mt Isa
Australian Industrial Rental	80	2	160				Mt Isa
Australian Industrial Rental	100	2	200				Mt Isa
Australian Industrial Rental	200	2	400				Mt Isa
Australian Industrial Rental	325	2	650				Mt Isa
Australian Industrial Rental	500	2	1000				Mt Isa
Australian Industrial Rental	650	1	650				Mt Isa
Australian Industrial Rental	1000	1	1000				Mt Isa
Australian Industrial Rental	1250	1	1250				Mt Isa
Australian Industrial Rental	43	1	43				Mackay
Australian Industrial Rental	60	1	60				Mackay
Australian Industrial Rental	75	2	150				Mackay
Australian Industrial Rental	100	1	100				Mackay
Australian Industrial Rental	250	1	250				Mackay
Australian Industrial Rental	500	3	1500				Mackay
Australian Industrial Rental	650	1	650				Mackay
Ergon	13.8	1	13.8	MG-13-001	Perkins		Cairns
Ergon	33	1	33	MG-33-001	Perkins		Cairns
Ergon	40	1	40	MG-40-001	Cummins G1		Cairns
Ergon	150	1	150	MG-150-002	Perkins		Cairns
Ergon	150	1	150	MG-150-003	Cummins		Cairns
Ergon	175	1	175	MG-175-001	Cummins G2		Cairns
Ergon	300	1	300	MG-300-004	Cummins		Townsville
Ergon	500	1	500	MG-500-001	Cummins		Cairns
Ergon	500	1	500	MG-500-003	Cummins		Townsville
Ergon	1250	1	1250	MG-1250-001	Cummins		Cairns
Ergon	1250	1	1250	MG-1250-003	Cummins		Townsville
Ergon	1250	1	1250	MG-1250-008	Cummins		Cairns
Ergon	150	1	150	MG-150-004	Cummins		Ingham
Ergon	300	1	300	MG-300-002	Cummins		Ingham
CIE Australia	500	2	1000		Perkins		Cairns
CIE Australia	1250	1	1250		Cummins		Cairns
CoatesHire	20	1	20		FG Wilson		Cairns
CoatesHire	30	1	30		Promac		Cairns
CoatesHire	50	1	50		Cummins		Cairns
CoatesHire	60	2	120		Promac		Cairns
CoatesHire	100	3	300		FG Wilson		Cairns
CoatesHire	300	1	300		Atlas Copco		Cairns
CoatesHire	350	1	350		Promac		Cairns
CoatesHire	40	1	40		Ingersol Rand		Townsville
CoatesHire	50	1	50		Cummins		Townsville
CoatesHire	60	1	60		Cummins		Townsville
CoatesHire	80	1	80				Townsville
CoatesHire	1250	1	1250		Cummins		Townsville
CoatesHire	60	1	60		Ingersol Rand		Townsville
CoatesHire	60	1	60		Ingersol Rand		Townsville
CoatesHire	160	1	160		Ingersol Rand		Townsville
CoatesHire	40	1	40		Doosan		Townsville
Aggreko	6	1	6	GN0006STDCAN			Townsville
Aggreko	15	2	30	GN0015STDTRA			Townsville
Aggreko	20	2	40	GN0020GHPCAN			Townsville
Aggreko	30	1	30	GN0030GHPCAN			Townsville
Aggreko	60	2	120	GN0060GHPCAN			Townsville
Aggreko	125	2	250	GN0125GHPCAN			Townsville
Aggreko	200	2	400	GN0200GHPCAN			Townsville
Aggreko	320	1	320	GN0320GHPCAN			Townsville
Aggreko	500	2	1000	GN0500GHPCAN			Townsville
Aggreko	800	1	800	GN0800GHPCSK			Townsville
Aggreko	1000	1	1000	GN1000GHPCSK			Townsville
Aggreko	1250	1	1250	GN1250GHPCON			Townsville
Energy Power Systems	20	3	60				Townsville
Energy Power Systems	20	1	20				Mt Isa
Energy Power Systems	45	2	90				Townsville
Energy Power Systems	80	4	320				Townsville
Energy Power Systems	80	1	80				Mt Isa
Energy Power Systems	100	6	600				Townsville
Energy Power Systems	150	2	300				Townsville
Energy Power Systems	200	1	200				Townsville
Energy Power Systems	350	1	350				Mt Isa
Energy Power Systems	450	3	1350				Townsville
Energy Power Systems	750	2	1500				Townsville
Energy Power Systems	750	1	750				Cairns
Energy Power Systems	1250	2	2500				Townsville
Totals		121					

Appendix 8: Examples of Using Mobile Generators During "Super Outages"

Example No 1 - Far North (18,331,000CMIN saved)

Far North	Outages to use as examples both completed recently and planned. Note that outage 1 is already completed and 2 through to 4 are planned to be completed in coming weeks. 1. Mt Garnet 66KV feeder 27/2/2023 to 13/3/2023. 430 customers were supplied for the 2 weeks via HV generation from Pegasus unit and a 500KVA generator providing Grid support. Approx. 9,280,000 customer minutes. Work completed included lines P2 work on the line and P2 works at the Mt Garnet substation. Collaborative effort by both Line and Subs. Resources have been used from multiple depots to complete the work 2. Mt Garnet 66KV feeder Planned 2/5/2023 to 14/5/2023 Again will have the 430 customers supplied via HV generation and LV generation for grid support for 2 weeks. Will be approx. 8,660,000 customer minutes Work will be to complete remainder of P2 work on the Mt Garnet 66KV feeder. Resources from Atherton and Ravenshoe will complete the work 3. Dimbulah 66KV outage Planned 15/4/2023 568 customers will be supplied by HV generation from 1000 to 1600. Approx 204,000 customer minutes Work will be to complete P2 work on the Dimbulah 66KV feeder. Resources from multiple depot will be used. 10 access permits required to complete work. Require 5 borers/excavators and crews to complete pole replacements as well crews to complete P2 line defects such as xarm and hardware replacements, 4. Bloomfield 22KV Outage Planned 13/4/2023 367 customers will be supplied by HV generation from 0730 to 1600. Approx 187,000 customer minutes Cooktown staff only. Once completed we will have reduced planned outage customer minutes by 18,331,000 customer minutes across the 4 outages.

Example No 2 – Tropical Coast (142,862CMIN saved)

Tropical Coast	Below are some examples of what we have been doing to lower our customer minutes for each outage and also the number of times the same customers are effected. The examples are all on the Tully Town No3 Fdr, as you were aware we had multiple pole replacements plus other defects to complete mostly on the radial spur line heading down to Tully Heads. We also had to work in conjunction with contractors (Zinfra) as they had the pole defects in the middle part of the of the spur line between LT.21 & TH.2 and we had the standard defects within the same area. We identified early on at the bundling stages that this was going to be difficult for us to deliver, so we set out to seek assistance from Cairns & Innisfail for the upcoming mega outages we were planning. Unfortunately we were only able to lock in Pegasus for one of the outages but by doing this we were able to reduce the customer minutes from 156240 min to 13378 min. Examples • Engaged the help from Cairns & Innisfail to complete 5 Mega outages completing all pole's and standard defects within the outage area. This prevented us having to turn the same section of line off again later to complete the standard defects. • Lock in Pegasus for one of the mega outage's to keep the majority of the spur on. By doing this we reduced the customer minutes by 142862 minutes. We would of liked to have kept Pegasus for another outage but unfortunately it was in high demand at the time. • Installed HV inline links so that other spur lines with their own isolation could be completed by themselves on separate outages (not going off twice) • Communicated with the contracts officer in charge of Zinfra (Azzo) as to what & where they would require outage's to complete their pole replacement. We then identified the standard defects within the contractor outages we could capture, brought them forward in into our plan so that we could complete them on the same outages while we are there switching for the contractors. • Engaged the help of Innisfail Live line to assist our live line crew to complete all as many defects as possible along the back bone to reduce the amount of work on the outage days or in some cases not have to have an outage at all.

Appendix 9: Examples of Unplanned Use of Mobile Generators

Example 1 – Curra Feeder

- Booking - 23-25 November 2021
- Feeder – 11kV Curra/Woolooga, Wide Bay region
- Running generator time – 36 hours (2,160 minutes)
- Customer supplied – estimated 300
- Customer minutes savings – estimated 648,000 CMIN

Example 2 – Meandarra Feeder

- Booking – 14-24 February 2022
- Feeder – 22kV Meandarra/Southern region
- Running generator time – 8 days, 24/7 (11,520 minutes)
- Customer supplied – 219
- Customer minutes savings – 2,522,880 CMIN

Example 3 – Peachy Feeder

On the 20/12/2020 a lightning strike damaged 11kV overhead bundle on the Peachy Feeder at Hampton (Large Vegetation Area). Due to the construction, age and condition of the conductor it was not possible to make repairs. With the aid of mobile generation, the decision at the time was to do a redesign and replace the conductor with single wire Covered 11KV conductor which needs a larger vegitation gap then HV bundle.

The 441 customer ran on our mobile generation from the 21/12/2020 until the 11/01/2021. Saved customer minute of 12,488,627.

Example 4 – Millmerran Town Zone Substation

On the 29/11/23 a storm damaged 3 poles on then 33KV radial feed into the Millmerran Town sub. The Sub feeds 1,252 customers as well as a local hospital, aged care facility, town water and sewage plant.

The location of the poles was on the edge of a black soil paddock near the Condamine River, and it was feared that the restoration could take a few days due to access issues with the waterlogged ground.

With the aid of mobile generators, it was identified we could restore supply to the town via our 11kV system. This meant that we restored supply to all the 1252 customers at 17.47 on the 30/11/23 as where the damaged poles were not finished until late afternoon the following day and system back to normal.

The generator outage was all part of the unplanned switching as it was supporting the 11kV network.

Saved customer minutes of 1,802,880 (1252 customer for 24hr).

Millmerran Zone Substation Generation Plan:

1. Expected peak load at MILM:
a. Town Fdr = 60A (approx. 1.1MVA) after partial load transfer to Yandilla Fdr at PAMP by closing RC777497 and opening AB614990.
b. Bringalily Fdr = 80A (approx. 1.5MVA)
c. Rocky Ck Fdr = 15A (approx. 0.3MVA)

2. Required generation to supply only Town Fdr and Rocky St Fdr:
a. 1 x Pegasus unit is proposed to connect between pole 3196063 and 3196062 on Town Fdr in islanded mode.
b. LV generators/ peak loppers are proposed at the following locations on Town Fdr:
- 1 x 300kVA at GE00505
- 1 x 300kVA at GE01237
- 1 x 300kVA at PE03850
- 1 x 300kVA at PE04424

Example 5 – Transformer GW01052

On the 21/02/2024 at 4.40am we got a notification that the 22kV Transformer GW01052 has no supply to the Charleville meat works. It was identified by a local crew that it had blowen 2 HV fuses but also damaged the underground cable and associated switch gear.

It was easy identified that it couldn't be repaired by local crew and a hire generator was sent out from Brisbane and supply was restored later that same day.

It wasn't until 03/03/24 that the repairs were completed on the damaged equipment due to new plant being available onsite and an underground crew.

It only supplied 1 customer, but it is a large employer in the town and wouldn't have been able to operate for the 11 days it took to make repairs.

Appendix 10: Examples of Planned Use of Mobile Generators

Example 1 – Bowenville 11kV Feeder

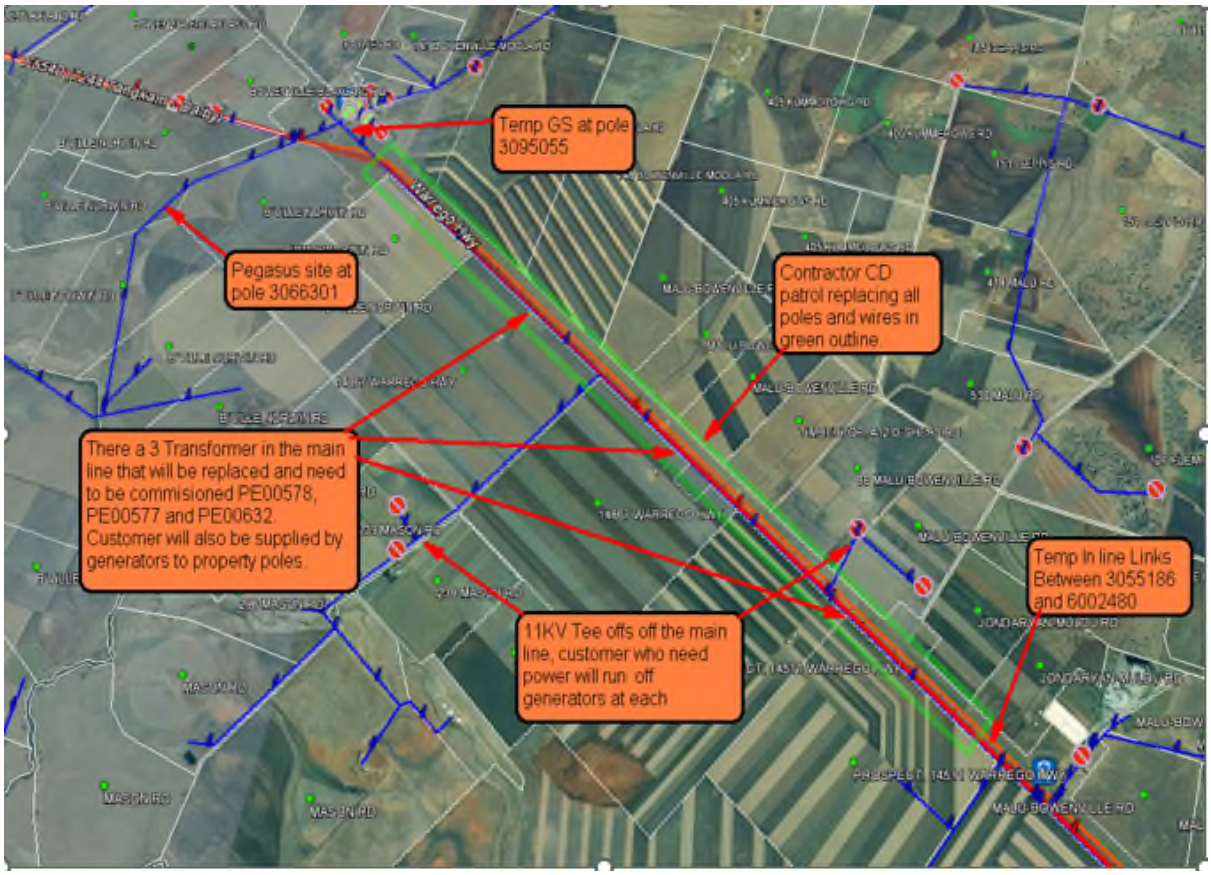
After a maintenance zone on the 11kV Bowenville feeder (radial feed) was inspected by pole tester. It was identified that the section of line was near end of life and was riddled with pole/conductor defects.

As a result, it was decided that the best option was to replace the 7.5km of line, both conductor and pole, but due to 2 x 110kV lines and a high-pressure underground gas main on the road reserve the 11kV line could only be in its existing alignment. (Could not be built next to existing line)

The only available resources were a contract crew with no other work in the area. To limit costs and to meet defect times, it was decided to use mobile generators to supply all customer for a 2-week outage meaning the contractor were not wasting time with 1 outage every fortnight for 5 months. (Extra travel, switching and other lost time)

A total of 8 generator were used on this job. 8 hire and 1 of our Pegasus units.

The mobile generators supplied 138 customers and saved them from 10 x 8hr outages. Saved customer minutes of 662,400.



Example 2 – Gooburrum 66kV Feeder

The project was to complete several defects and some cooper replacement on the Gooburrum 66KkV feeder which supplies 2 small substations feeding 1054 customers with no 66KV tie points.

To maintain supply for the outage 1 x Pegasus and 6 x 500kVA's were used to help support back feed via the 11kV network.

Saved customer minutes of 4,644,240.

Example 3 – Mitchell Zone Substation

The work was to upgrade Mitchell 33kV/11kV substation from Feb to Sept 2023. There were several Generator events used to supply the customers fed from the sub during the upgrade. The event below was the largest single event for the job. A Pegasus and 2 x 300kVA's and 1 x 500kVA were used to supply all 807 Mitchell residents for the 11hr full bus outage.

Some of the Generators were onsite from Feb 23 until Sept 23 on small events.

Saved customer minutes for just this one outage of 383,635.

Appendix 11: Glossary

Term	Definition
The Act	The Electricity Act 1994
Distribution Authority	Authority No. D09/99 held by Ergon Energy Corporation Limited
Emergency	A sudden and unexpected event that disrupts the normal operating functions, capabilities, resource and/or people of the organisation and requires an immediate response to prevent escalation of its scale or severity
Long Rural Feeder (Ergon)	Feeder which is not an urban feeder or isolated feeder and has a total feeder route length of greater than 200km.
Interruption	Loss of electricity supply to either customer or asset (outage).
OPEX	Operational Expenditure
Pegasus	HV mobile generator capable of injecting high voltage into a select area of the 11kV and 22kV network
Resilience	The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform, and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management
SAIDI	System Average Interruption Duration Index - Is the sum of the duration of each sustained customer interruption (in minutes) divided by the total number of distribution customers (averaged over the financial year).
SAIFI	System Average Interruption Frequency Index - The total number of sustained customer interruptions divided by the total number of distribution customers (averaged over the financial year)
Single Wire Earth Return (SWER)	SWER is a single-wire transmission line which supplies single-phase to remote areas. Its distinguishing feature is that the earth is used as the return path for the current, to avoid the need for a second wire (or neutral wire) to act as a return path
Short Rural Feeder	Feeder which has a total feeder route length less than 200km and is not an urban feeder or isolated feeder
STPIS	Service Target Performance Incentive Scheme - Ergon and Energex submit data about unplanned SAIDI and SAIFI on an annual basis, relative to its performance under the AER's DNSP STPIS. The scheme rewards or penalises a DNSP, in the form of an increment or reduction on Annual Revenue Requirement
Urban Feeder	A feeder which is not a CBD feeder and has a three-year average maximum demand over the three-year average feeder route length greater than 0.3MVA/km