

Northern Territory Power System Performance Review

2023-24



Disclaimer

The Northern Territory Power System Performance Review (NTPSPR) is prepared using information sourced from participants in the electricity supply industry, Northern Territory Government agencies, consultant reports and publicly available information. The NTPSPR is in respect of the financial year ending 30 June 2024. The Utilities Commission understands the information received to be current as at December 2024.

The NTPSPR includes analysis and statements based on the Commission's interpretation of data provided by Territory electricity industry participants. The Commission has sought to align its data reporting with the other Australian jurisdictions where possible, to enable comparison. However, there are some differences and any comparisons should only be considered indicative.

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Any questions regarding the NTPSPR should be directed to the Utilities Commission, utilities.commission@nt.gov.au or by phone 08 8999 5480.

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About this review

The Utilities Commission of the Northern Territory (Commission) publishes the NTPSPR annually, providing an overview of the performance of the Darwin-Katherine, Alice Springs and Tennant Creek power systems. Since its first publication in 2018, the NTPSPR has tracked and assessed the overall performance of these power systems, including network and generation services, and has provided insights through comparisons with historical data and relevant industry benchmarks.

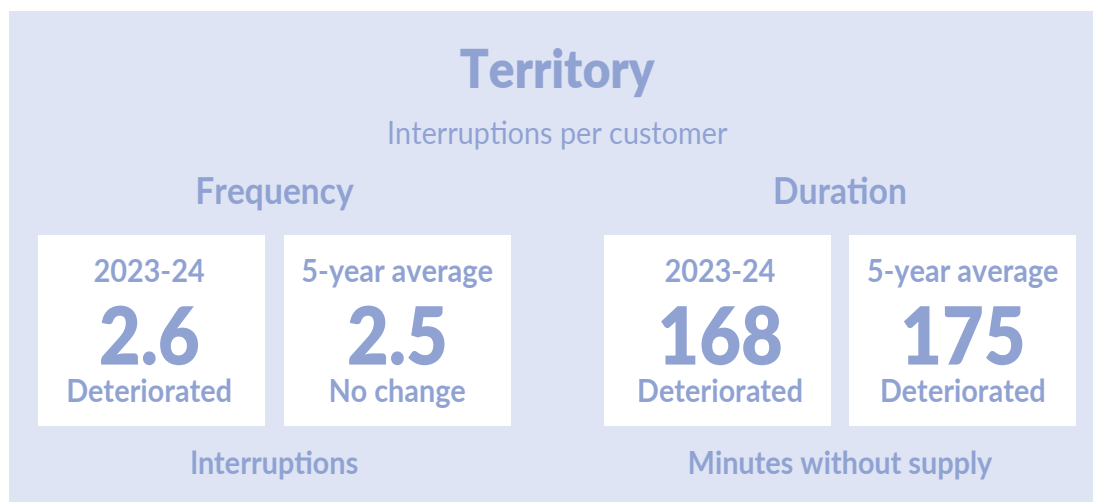
The NTPSPR is intended to inform a broad range of stakeholders, including the responsible minister, government, electricity licensees and industry participants, about the key outcomes in the Territory's electricity supply industry. By assessing performance in 2023-24, the report highlights any areas of concern, trends, and emerging issues in the power systems, enabling better planning, investment decisions, and value-for-money assessments for consumers. This regular reporting plays a critical role in promoting transparency and accountability, ensuring electricity licensees are held responsible for their operational decisions and performance, which ultimately impact customers.

Prepared under section 45 of the *Electricity Reform Act 2000*, the 2023-24 NTPSPR focuses on the Darwin-Katherine, Alice Springs and Tennant Creek power systems. For some indicators, the Darwin-Katherine power system is further segmented into the Darwin and Katherine regions, reflecting the unique challenges in each region. The report has been developed with valuable input from licensees through stakeholder consultation.

Over recent years, the NTPSPR has shifted from a broad technical analysis to a more focused assessment of standards of service and outcomes that directly affect customers. This change aligns the NTPSPR more closely with the Commission's role as an economic regulator, focusing on aspects of service that matter most to consumers. While the report's scope is now more targeted, the Commission will continue to conduct issue-specific reviews as necessary, including technical aspects, either within this report or as part of other work.

As the NTPSPR continues to evolve, the Commission remains committed to ensuring the performance of the Territory's power systems is transparent, providing stakeholders with the information they need to understand and improve electricity services for the long term.

Key findings and recommendations



The overall power system performance in the Territory in terms interruptions per customer showed deterioration in 2023-24, however the 2023-24 NTPSPR identifies some performance improvements across the Territory's power systems, particularly over the longer term. These improvements are uneven across the regions though, with significant regional disparities. Customers in some regions face considerably higher disruption levels than others.

In 2023-24, customers in the Territory experienced an average of 2.6 interruptions and 168 minutes without supply. These results generally align with the five-year averages of 2.5 interruptions and 175 minutes without supply. A significant outage in February 2024 that was due to a gas supply issue at the Channel Island power station impacted overall performance, contributing to an increase in customer minutes without supply reported for 2023-24. Although this incident was less severe than a similar gas supply-related event in 2020-21, it is important to note that single large-scale interruptions such as this can skew performance data and customer experiences.

The Darwin region maintained a relatively stable level of performance, with 2.2 interruptions and 160 minutes without supply per customer, close to its historical averages. This consistency reflects more robust network and generation performance compared to other regions.

The Katherine region continued to experience challenges, ranking as the worst performing region. In 2023-24, customers faced an average of 6.7 interruptions and 501 minutes (over eight hours) without supply, a stark disparity compared to the Darwin region, noting both regions are part of the Darwin-Katherine power system. This long-standing underperformance emphasises the need to consider whether this is fair and reasonable for Katherine customers, acknowledging the specific challenges with Katherine, being located at the end of a 300 kilometre single-circuit 132 kilovolt (kV) line.

While performance has fluctuated, Alice Springs maintained a generally positive trend compared with earlier years, which were marked by widespread disruptions. In 2023-24, the region recorded 2.7 interruptions and 106 minutes without supply per customer.

Tennant Creek experienced its best performance in the last seven years, with improvements in both network and generation performance contributing to better outcomes. The region recorded 2.8 interruptions and 67 minutes without supply per customer, a marked improvement compared with past averages. Historically, Tennant Creek has had more frequent interruptions than other regions, often due to a combination of network and generation-related issues.

Performance across the Territory remains inconsistent, with Katherine and to a lesser extent Tennant Creek, lagging behind the more stable service levels observed in Darwin and Alice Springs. These discrepancies in reliability raise important questions regarding the balance between investment, service standards and customer expectations across regions. Further, challenges highlighted by feeder-specific performance, such as ongoing issues with the Florina feeder in Katherine, underline the potential need for targeted initiatives to address chronic underperformance and maintain reasonable service across the Territory.

Except for the average time for new connections steadily deteriorating to now be consistent with the guaranteed service level (GSL) of five days set by the Commission, the Commission has not identified any noteworthy concerns in 2023-24 in terms of broader network-related standards of service, such as those in relation to GSLs, customer service and complaints.

Details regarding the overall power system, network and generation performance in the Darwin, Katherine, Alice Springs and Tennant Creek regions can be found in the respective regional summaries and chapters.

NTPSPR recommendations

The Commission has made a number of recommendations in the NTPSPR since 2017-18 and is tracking the progress of these recommendations in subsequent NTPSPRs. Some progress was made during 2023-24 in response to these recommendations, with three assessed as complete (or closed) as part of this review.

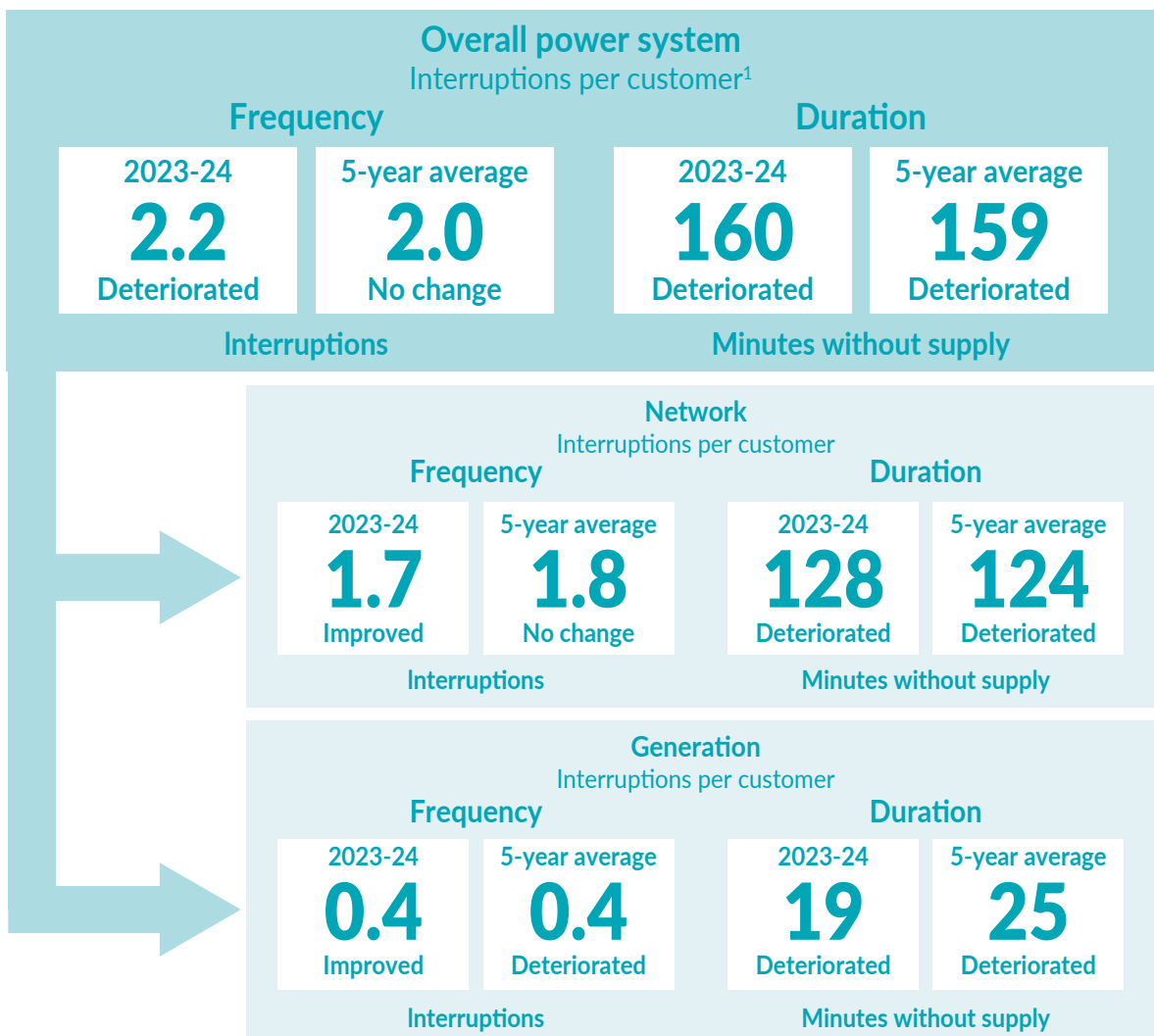
The Commission has not made further recommendations in this 2023-24 NTPSPR, noting it has made recommendations in previous NTPSPRs regarding the performance of the Katherine and Tennant Creek regions and these have been assessed as still in progress.

More information regarding outstanding recommendations from previous NTPSPRs can be found in the *Previous NTPSPR recommendations* chapter.

Darwin

In 2023-24, customers in the Darwin region (of the Darwin-Katherine power system) experienced an average of 2.2 interruptions and 160 minutes without supply. These results are close to the five-year averages of 2 interruptions and 159 minutes without supply, indicating relatively consistent performance. However, these numbers reflect a slight increase compared with 2022-23.

The Darwin region consistently has fewer and shorter interruptions compared with other regions, due to its relatively stronger system reliability and security. A notable contributor to this consistency is the minimal impact of non-network-related interruptions such as generation-related issues, which have been relatively low in frequency and severity over the last seven years.



¹ The sum of network and generation-related interruptions may not equal overall power system interruptions, which may include additional interruptions due to system control, safety or weather.

Network

Network-related performance in the Darwin region remained good, with customers experiencing 1.7 interruptions and 128 minutes without supply due to network issues in 2023-24. This performance aligns closely with the five-year averages (1.8 interruptions and 124 minutes without supply), indicating consistent performance. The Darwin region's network outperformed all other regions over the last seven years except Alice Springs, which matched the Darwin region's performance levels over the same period.

Ongoing efforts to enhance network performance have resulted in steady improvements, though some feeders, such as the 11ML02 Larrakeyah, have faced recurrent issues attributed to equipment failures.

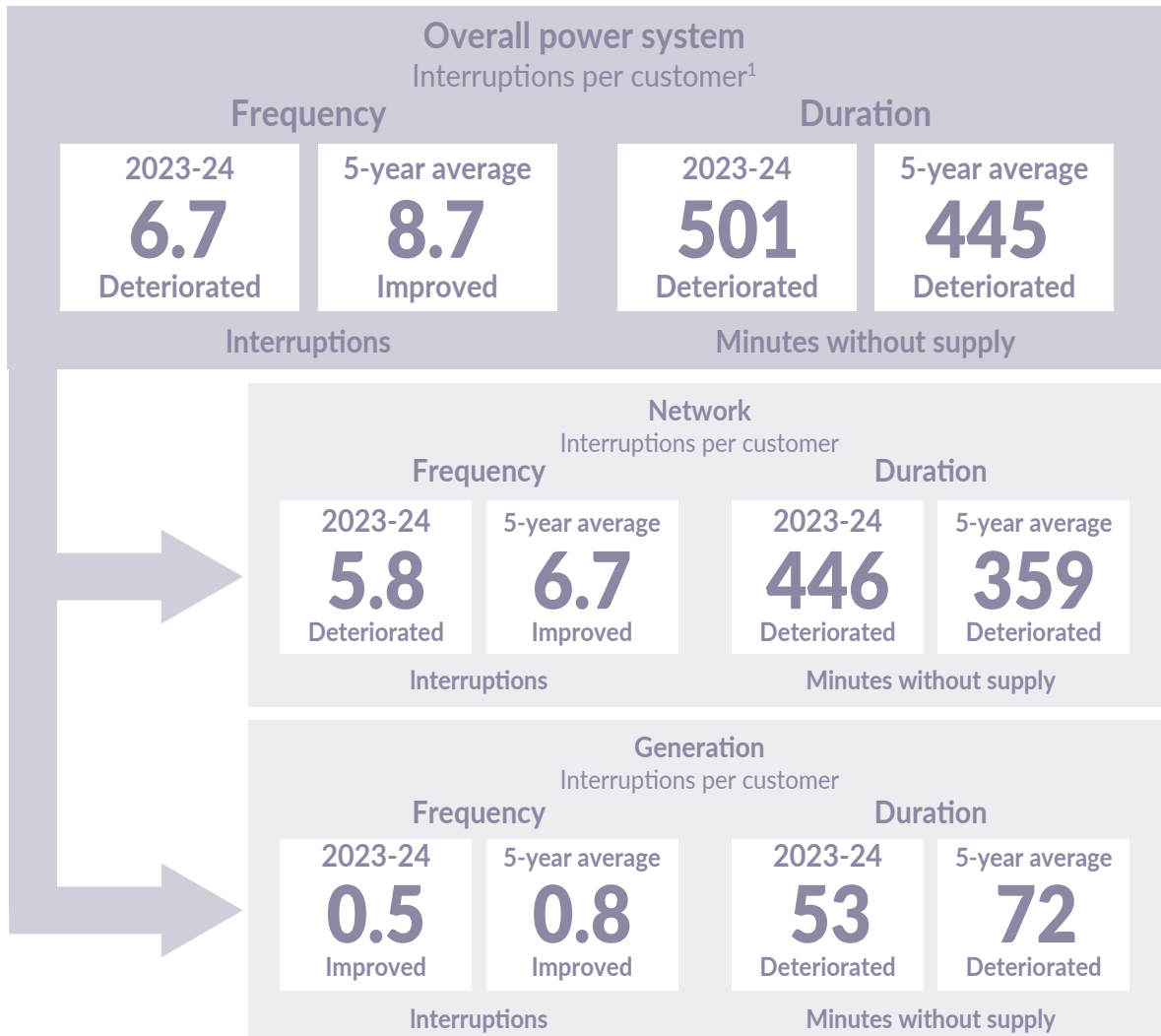
Generation

Generation reliability in the Darwin region was relatively strong in 2023-24, with customers experiencing 0.4 interruptions and 19 minutes without supply, in line with the five-year averages of 0.4 interruptions and 25 minutes. This indicates consistent performance despite past challenges such as the significant gas supply-related outages at Channel Island power station in 2020-21 and 2023-24.

Power and Water Corporation (PWC) System Control's operational changes in previous years, including adjustments to under-frequency load shedding and dispatch constraints, have contributed to improved generation performance. These measures, while likely increasing operational costs, have effectively minimised the impact of generation outages on customers. Nonetheless, with the aging infrastructure at key power stations, particularly Channel Island, investments in new or existing generation assets remain critical for sustaining long-term reliability, noting any action should be informed by a robust cost-benefit analysis.

Katherine

The performance in the Katherine region (of the Darwin-Katherine power system) experienced a notable decline in 2023-24, with customers facing an average of 6.7 interruptions and 501 minutes (over eight hours) without supply per customer. This is the second highest level of interruptions when compared with other regions in the Territory over the past seven years, noting the highest was also Katherine in 2020-21. Although the five-year average shows improvement in the frequency of interruptions, this is offset by an increase in the duration of outages. Over the last seven years, the Katherine region has consistently been the poorest performing region reported on in the NTPSPR.



¹ The sum of network and generation-related interruptions may not equal overall power system interruptions, which may include additional interruptions due to system control, safety or weather.

Network

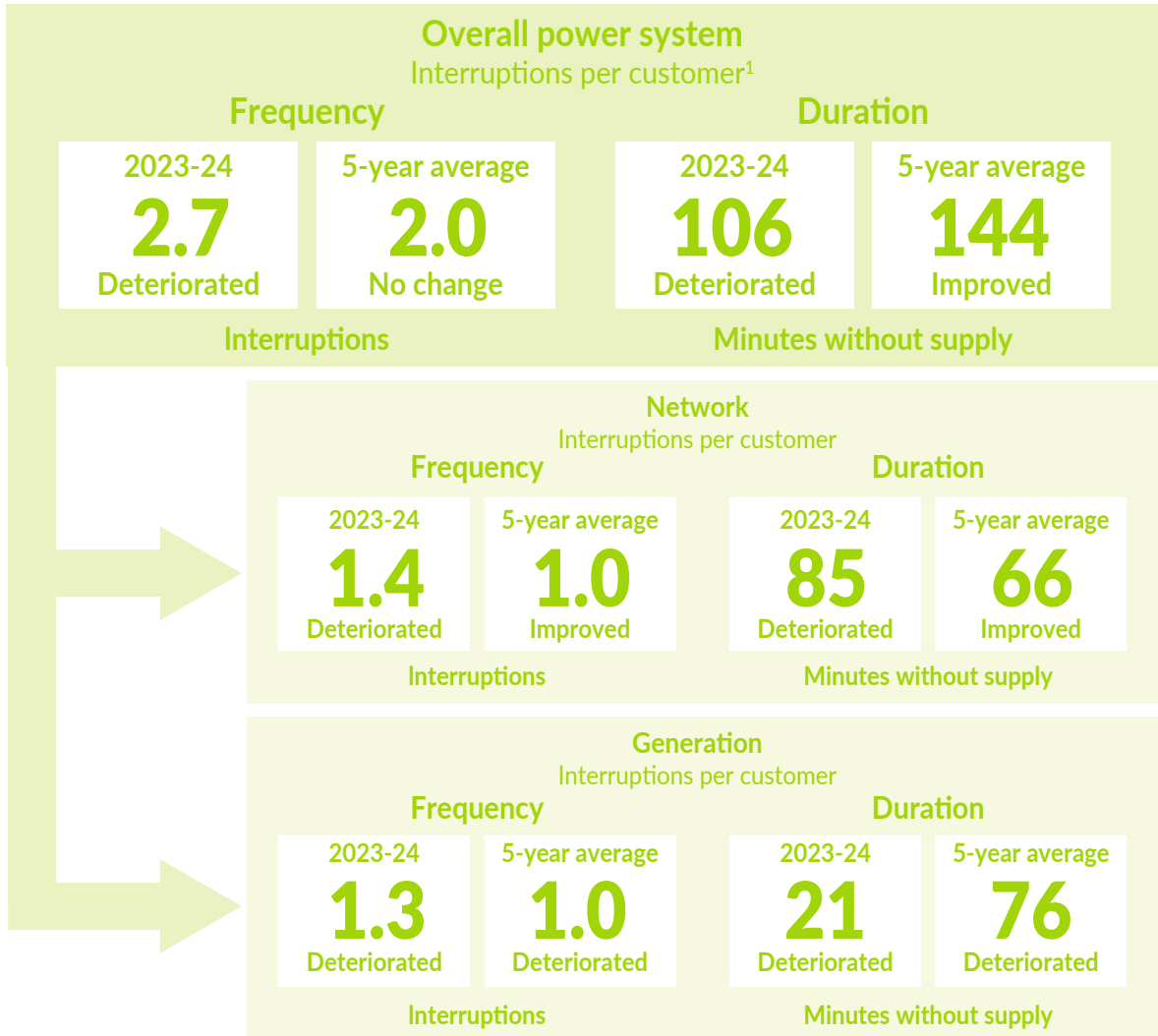
The deterioration in overall performance is largely attributed to network-related issues. In 2023-24, customers in Katherine experienced 5.8 network-related interruptions and 446 minutes (over seven hours) without supply, representing significant underperformance compared with other regions. The persistent challenge of maintaining reliability and security in the Katherine network highlights the impact of its singular transmission line connection to the broader Darwin-Katherine power system. The Florina feeder continued to underperform, again featuring among the worst feeders with 839 minutes (over 13 hours) without supply during 2023-24.

Generation

The impact of generation performance in the Katherine region has been comparatively less than network issues. The five-year average for generation-related outages stands at 0.8 interruptions and 72 minutes without supply per customer. While the region's local generation is not frequently utilised due to its higher running costs, system-wide generation issues, such as those in the Darwin region, can result in interruptions in Katherine.

Alice Springs

In 2023-24, the Alice Springs region experienced a deterioration in performance with a deterioration in both generation and network-related interruptions. The frequency of interruptions increased to 2.7 per customer, while the duration of interruptions increased to 106 minutes per customer, however this result is better than the five-year average of 144 minutes. Although the performance fell short of last year's results, it remained significantly better than those observed between 2017-18 and 2020-21.



¹ The sum of network and generation-related interruptions may not equal overall power system interruptions, which may include additional interruptions due to system control, safety or weather.

Network

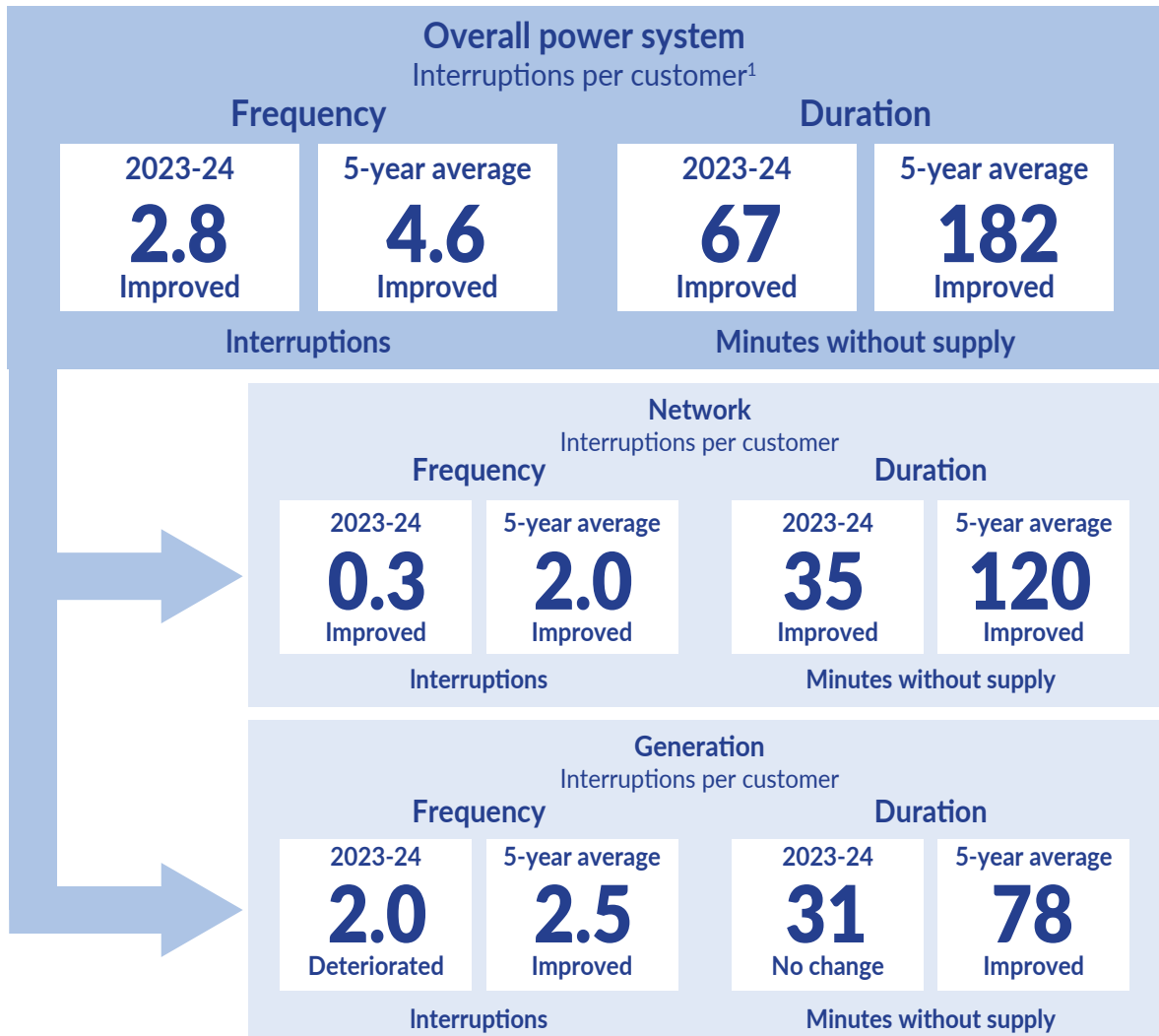
The Alice Springs network has performed well over the past seven years. In 2023-24, customers experienced 1.4 interruptions and 85 minutes without supply due to network-related performance. While slightly worse than last year's result, this performance is in line with the five-year average of one interruption and 66 minutes without supply, demonstrating consistent performance when compared with the other regions.

Generation

Generation performance has played a large part in the results of the Alice Springs region over the last seven years, particularly in 2017-18 and 2019-20 when there were system blacks. While the 13 October 2019 Alice Springs system black weighed down the five-year average, which stood at one interruption and 76 minutes without supply in 2023-24, generation performance in the region over the last four years has generally been much better than the five-year average. The generation availability improved to 82%, the highest level in seven years, driven by better maintenance practices at both the Owen Springs and Ron Goodin power stations. However, the 69% availability at Ron Goodin power station still lags behind due to its aging infrastructure.

Tennant Creek

The Tennant Creek region showed a notable improvement in power system performance during 2023-24, continuing the positive trend observed over the past few years. The region recorded 2.8 interruptions and 67 minutes without supply per customer, marking its lowest levels in the last seven years. This improvement brings the region's performance well below its five-year average of 4.6 interruptions and 182 minutes without supply. Although the region's performance is better than in previous years, customers in Tennant Creek still experience more frequent interruptions compared with the Darwin and Alice Springs regions.



¹ The sum of network and generation-related interruptions may not equal overall power system interruptions, which may include additional interruptions due to system control, safety or weather.

Network

Network performance in the Tennant Creek region has historically lagged behind the Darwin and Alice Springs regions but remained better than Katherine. However, 2023-24 saw significant improvements, with customers experiencing just 0.3 interruptions and 35 minutes without supply on average due to network-related issues. This represents a significant improvement over the five-year average of 2 interruptions and 120 minutes without supply. This is an encouraging shift in network performance for Tennant Creek residents.

Generation

Generation in Tennant Creek has been the most problematic among the Territory power systems over the past seven years, reflected in the region's five-year averages of 2.5 interruptions and 78 minutes without supply per customer. Despite this, generation performance has improved over the last two years, and 2023-24 recorded two interruptions and 31 minutes without supply per customer. The continued reliance on Unit 15, a larger and more stable generator mandated by a PWC System Control direction in late 2022, has supported system security but comes at increased costs. Any strategy to reduce reliance on Unit 15 would likely involve investment in supporting technologies and should be supported by a comprehensive cost-benefit analysis.

Introduction

The 2023-24 NTPSPR provides an assessment of the performance of the Darwin-Katherine, Alice Springs and Tennant Creek power systems. The review evaluates overall Territory and regional power system performance, as well as the performance of network and generation services. In addition, it tracks the status of recommendations from previous reviews. Where relevant, performance is compared with historical data to identify trends and relevant benchmarks to provide context for the results.

Power system description

The Darwin-Katherine, Alice Springs and Tennant Creek power systems are the largest in the Territory and subject to the highest levels of regulatory oversight. These power systems are not interconnected with each other, nor connected to any other power system, such as the National Electricity Market (NEM), which serves the east coast of Australia. Consequently, the Territory's power systems are smaller and face unique challenges due to their isolation and lack of interconnectedness.

Each of the three power systems has distinct characteristics, and varies in size, customer density and geographical conditions. These differences create unique operational challenges.

Darwin-Katherine power system

This is the largest power system in the Territory, serving the major urban centres of Darwin and Palmerston, as well as the township of Katherine and surrounding rural areas. Its transmission network includes key lines such as the double-circuit 132 kV line from Channel Island to Hudson Creek, which supplies the Darwin area, and the 300 km single-circuit 132 kV line extending south to Manton Dam, Batchelor, Pine Creek and Katherine.

Electricity is primarily generated from Territory Generation's Channel Island, Weddell and Katherine power stations, and EDL NGD (NT) Pty Ltd's (EDL) Pine Creek power station.

Alice Springs power system

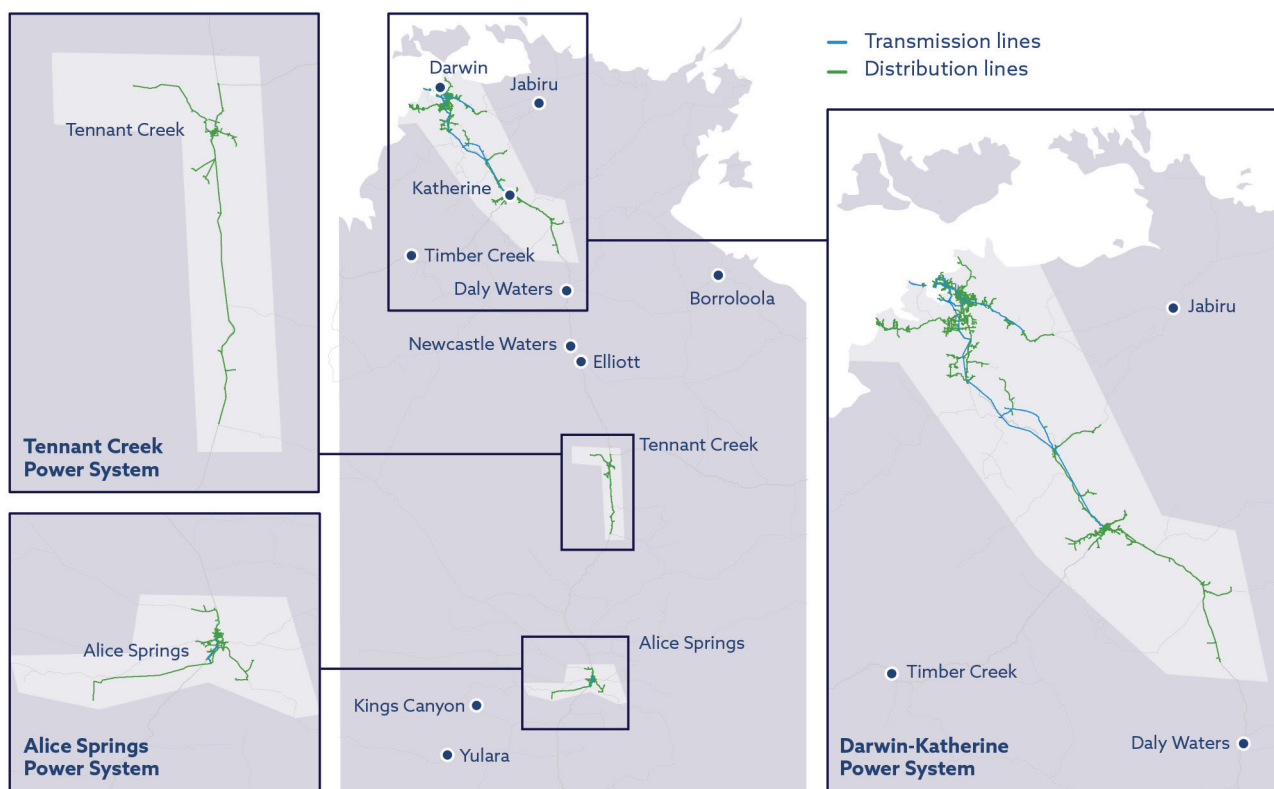
This is the second-largest power system, and supplies Alice Springs and nearby rural areas. Electricity is primarily generated from the Owen Springs, Ron Goodin, and Uterne (solar) power stations.

Tennant Creek power system

The smallest of the three power systems, Tennant Creek's network serves the township and surrounding rural areas, and is supplied by a centrally located power station.

Figure 1 provides a visual representation of the location and relative size of the three power systems in the Territory.

Figure 1: Visual representation of the location and size of the Darwin-Katherine, Alice Springs and Tennant Creek power systems



Source: Power and Water Corporation

Each of these power systems operates in distinct environments, from the tropical climate of the north to the arid desert conditions of central Australia. These geographic and climatic factors influence the performance of the power systems.

Table 1 highlights some of the differences between the Darwin-Katherine, Alice Springs and Tennant Creek power systems, and the NEM, to provide context on the scale of the Territory power systems.

Table 1: Differences between the Darwin-Katherine, Alice Springs and Tennant Creek power systems, and the NEM (based on 2023-24 data)

	NEM	Power System		
		Darwin-Katherine	Alice Springs	Tennant Creek
Customer numbers	7 580 000 ¹	74 000	13 000	1 800
System consumption (GWh)	188 600 ²	1 520	200	39
Demand (MW)	11 009 – 32 973 ³	65 – 282	7 – 55	1 – 7

GWh: Gigawatt hours; MW: Megawatts

1 AER Schedule 2 – Retail Performance Data Q3 2023-24 spreadsheet: <https://www.aer.gov.au/documents/schedule-2-quarter-3-2023-24-retail-performance-data>.

2 AER Annual electricity consumption – NEM: <https://www.aer.gov.au/wholesale-markets/wholesale-statistics/annual-electricity-consumption-nem>.

3 Quarterly Energy Dynamics reports – <https://aemo.com.au/energy-systems/major-publications/quarterly-energy-dynamics-qed>.

Power system

This chapter focuses on the overall performance of the Darwin-Katherine, Alice Springs and Tennant Creek power systems. The overall performance is assessed by considering the duration and frequency of customer interruptions. These interruptions may be a result of issues related to the electricity network, generation, system control, safety or weather. The Commission notes this is the level of performance a customer experiences, with the customer often unaware or not necessarily interested in the cause of an interruption. The level of overall performance is shown by the green line and columns in Figure 2.

In terms of reporting, relevant licensees record the frequency and duration of customer interruptions, and two indices are then derived to show the average frequency and duration of interruptions per customer in the given power system and period of time, which enables fair comparisons to be made between power systems and time periods. The two indices are system average interruption frequency index (SAIFI) and system average interruption duration index (SAIDI), which show frequency (average interruptions per customer) and duration (average customer minutes without supply per customer), respectively.

The frequency and duration of customer interruptions as a result of all outages in the power system are referred to as unadjusted, or unadjusted SAIFI and SAIDI. These outages can be due to numerous issues, including those listed above. Again, this level of performance is shown by the green line and columns in Figure 2.

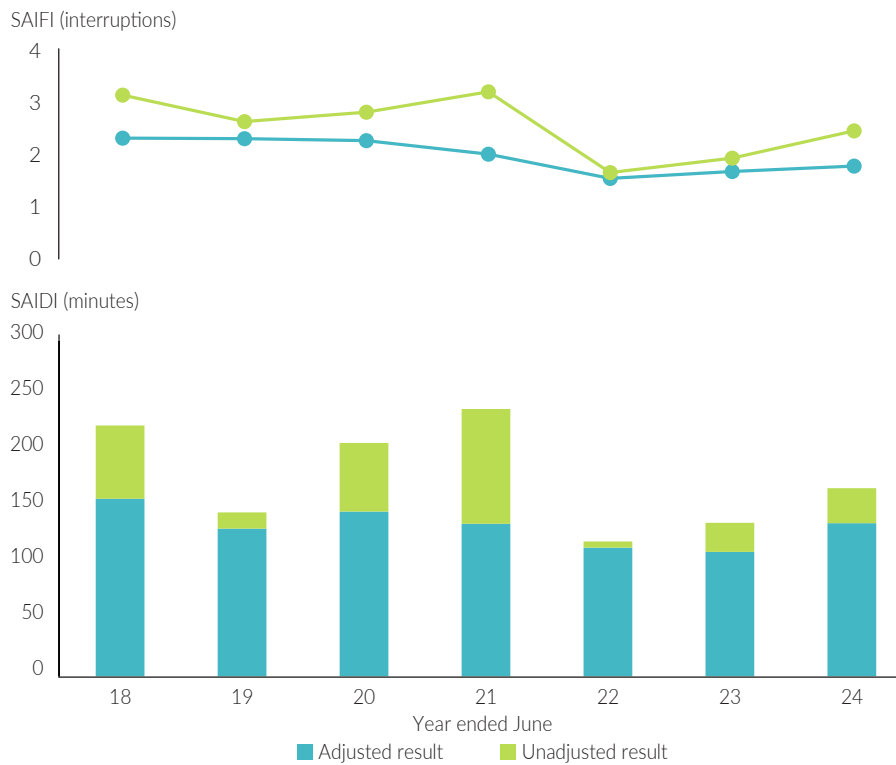
To separate out and understand what contribution network performance has to the overall level of performance experienced by customers (unadjusted SAIFI and SAIDI), interruptions that are not a direct result of network performance are excluded. Once these are removed, the remaining interruptions are referred to as the adjusted result, or adjusted SAIFI and SAIDI. Adjusted SAIFI and SAIDI provide insight into the performance of the network (shown by the blue line and columns in Figure 2), and this performance is assessed in more detail in the *Network* chapter.

As discussed above, another important contributor to the overall level of performance experienced by customers, and one that is assessed in this review, is the performance of generation. Some of this is accounted for in the difference between the unadjusted and adjusted SAIFI and SAIDI, or the difference between the green and blue lines and columns in Figure 2, respectively. A more detailed assessment of generation performance is included in the *Generation* chapter.

Territory

Figure 2 shows the level of power system performance (measured as interruptions) experienced by customers in the Territory over the last seven years (unadjusted SAIFI and SAIDI), represented by the green line and columns, which includes customers in the Darwin-Katherine, Alice Springs and Tennant Creek regions. Figure 2 also shows adjusted SAIFI and SAIDI (blue line and columns), which as discussed above, is the level of interruption due to network-related performance. This is discussed further in the *Network* chapter.

Figure 2: Territory unadjusted and adjusted SAIFI and SAIDI



The frequency and duration of interruptions experienced by customers in the Territory increased a second consecutive year in 2023-24, with customers on average experiencing 2.6 interruptions and 168 minutes without supply. The frequency and duration of interruptions experienced by customers in the Territory during 2023-24 was around the five-year average of 2.5 interruptions and 175 minutes without supply.

The Commission notes there was a gas supply-related outage to the Channel Island power station on 5 February 2024 that impacted about 27,000 customers and resulted in about 1,541,000 customer minutes without supply. While this was a notable outage, it was relatively small compared to a large gas supply-related outage to the Channel Island power station in 2020-21, which impacted about 49,000 customers and resulted in about 7,712,000 customer minutes without supply. The 2020-21 outage was the second largest customer interruption in the Territory since the start of 2015, with the largest associated with Cyclone Marcus in Darwin in March 2018 (191,842,000 customer minutes without supply).

The Electricity Industry Performance (EIP) Code, which requires reporting of performance data from relevant licensees (used in this report), allows outages associated with a natural event that are identified as a statistical outlier against an international standard methodology (major event day) to be excluded from reporting. Unlike the outage associated with Cyclone Marcus, a gas supply-related outage is not excluded from the data in this review as a major event day as it does not meet the criteria to be considered a natural event.

Accordingly, the gas-related outages, and in particular the outage in 2020-21, have a large impact on the results shown in this review, including in the relevant reporting period results and historical averages of unadjusted SAIFI and SAIDI (and generation SAIFI and SAIDI) at a Territory level, and at the Darwin and Katherine regional level. While it could be argued the root causes of these interruptions are not directly related to the electricity supply industry and therefore do not reflect underlying power system performance, as discussed above, customers are often unaware or not necessarily interested in what caused an electricity supply interruption.

On 30 November 2023, there was a major event day in Alice Springs that has been excluded from the analysis in this report. The outage was associated with a severe weather event that caused extensive damage to vegetation and in turn damaged the distribution network. The outage affected about 6,000 customers and resulted in about 1,756,000 customer minutes without supply. With the outage included in the unadjusted SAIFI and SAIDI result, the number of interruptions remains similar, however the duration of interruptions increases from 168 to 191 minutes without supply.

The frequency and duration of interruptions experienced by customers in the Territory can be volatile from year to year, such as in 2020-21, and as shown by the green line and columns in Figure 2. However, although not shown in Figure 2, the five-year rolling average illustrates the overall performance experienced by customers has improved over the last seven years.

Australian Energy Regulator comparison

To contextualize the Territory's performance regarding customer interruptions, the Commission collated data from the Australian Energy Regulator (AER) to create a benchmark (AER benchmark).

The Commission collated SAIFI, SAIDI and customer number data from regulatory information notices for the 13 distribution network service providers (DNSPs) the AER regulates outside the Territory. The Commission used the data published by the AER to create a customer number weighted unadjusted (and adjusted) SAIFI and SAIDI average for the 13 DNSPs from 2017-18 to 2023-24 (blue line and columns in Figure 3).

While the Commission acknowledges not all distribution networks regulated by the AER are directly comparable to the Territory, there is a high level of diversity in the AER-regulated distribution networks and on this basis, the Commission considers the AER benchmark to be a useful one.

Figure 3 shows the Territory and AER benchmark unadjusted SAIFI and SAIDI results from 2017-18 to 2023-24. The Territory unadjusted results are represented by the green line and columns, and the AER benchmark unadjusted results are the blue line and columns.

Figure 3: Territory and AER benchmark unadjusted SAIFI and SAIDI

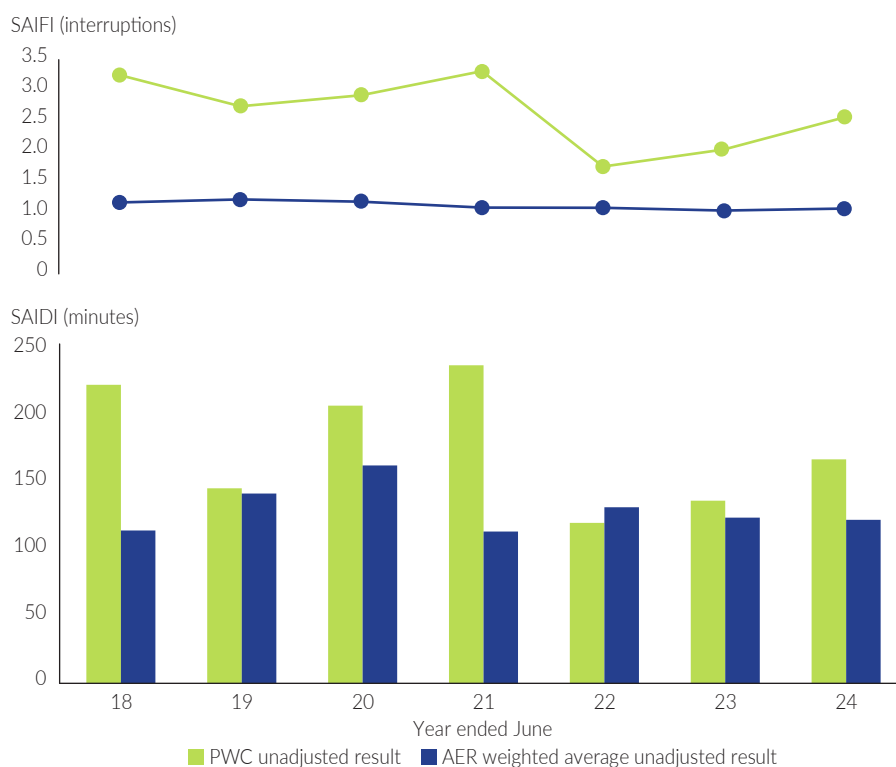


Table 2 shows the average frequency and duration of interruptions (unadjusted SAIFI and SAIDI, respectively) per customer in the Territory and the weighted average of the 13 DNSPs regulated by the AER in 2023-24, and a five-year average.

Table 2: Territory and AER weighted average unadjusted SAIFI and SAIDI in 2023-24, and five-year average

	SAIFI (interruptions)		SAIDI (minutes without supply)	
	2023-24	5-year average	2023-24	5-year average
Unadjusted (all interruptions)				
Territory	2.6	2.5	168	175
AER weighted average	1.1	1.1	123	132

In terms of the frequency and duration of interruptions in 2023-24, there was a continuation of deterioration from the last year when compared with the AER benchmark, as shown in Figure 3.

When considering the five-year average, in 2023-24 a customer in the Territory is likely to experience over two times more frequent interruptions and 43 more minutes without supply than the AER benchmark.

Although not shown in Figure 3, when comparing the five-year rolling averages in the Territory with the AER benchmark over the last seven years, there is a greater contribution in the Territory to the overall level of performance from non-network-related interruptions (which includes generation) than in the 13 other DNSPs regulated by the AER. The Commission has discussed in previous publications that generation performance has a bigger impact on overall performance in the Territory than in other, interstate power systems or regions, such as the NEM. This is due to the relative size of the generation compared with the power systems in the Territory, and lack of redundancy and interconnectedness in those systems. This observation supports those statements.

The level of performance experienced by customers in the Territory is inconsistent across power systems, or regions within those power systems, as in the case of Darwin-Katherine. The next section assesses those differences and, at a high-level, the main driving forces behind the performance level in each region. Further details on network and generation-related performance are provided in the following chapters.

Regional

Figure 4 shows the average frequency and duration of interruptions (unadjusted SAIFI and SAIDI, respectively) per customer in the Darwin-Katherine, Alice Springs and Tennant Creek power systems, with the Darwin-Katherine power system further segmented into the regions of Darwin and Katherine.

Figure 4: Regional unadjusted SAIFI and SAIDI

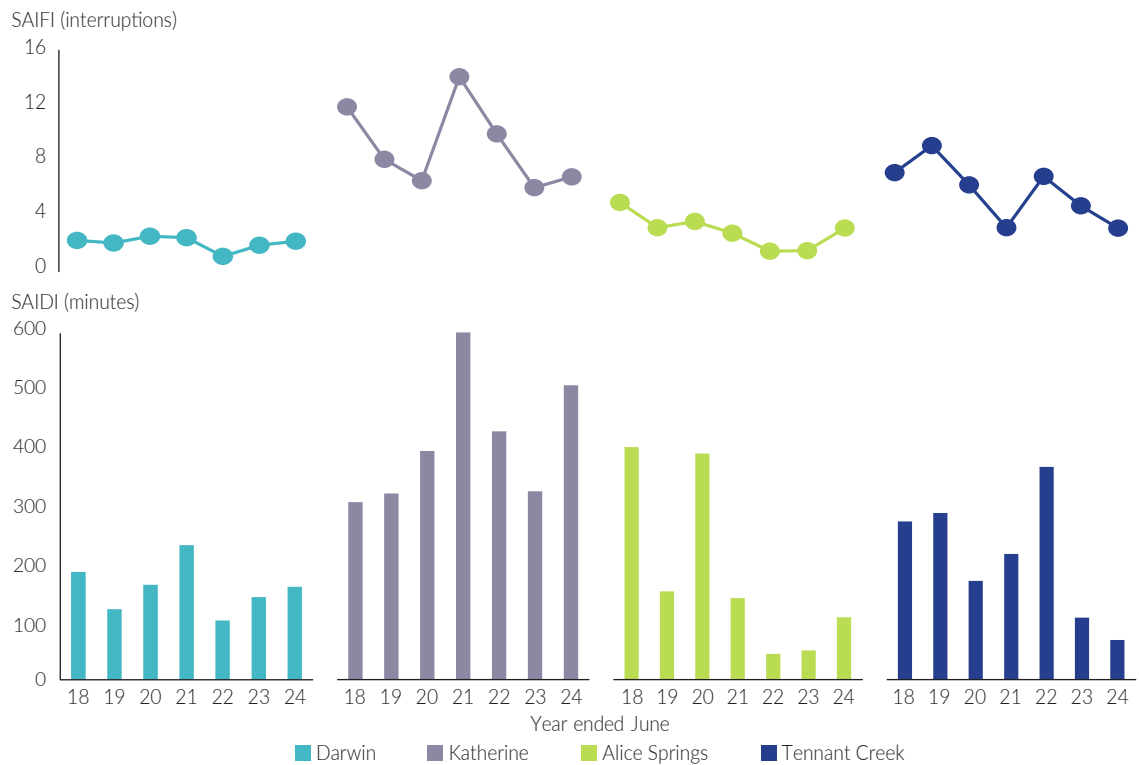


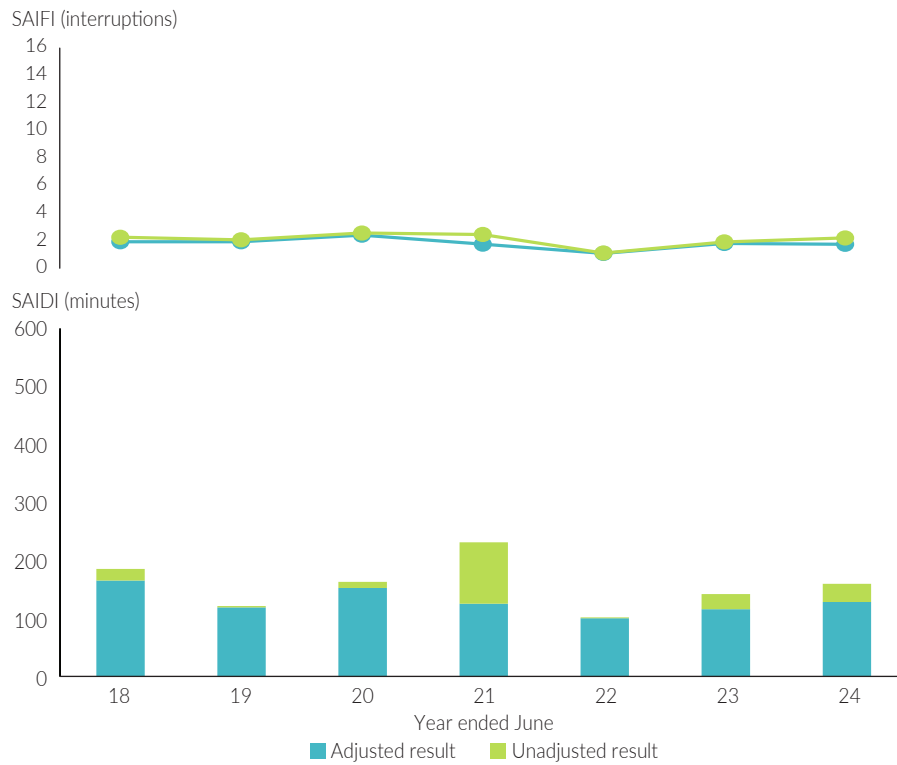
Table 3 shows the average frequency and duration of interruptions (unadjusted SAIFI and SAIDI, respectively) per customer in 2023-24, and the five-year average by region.

Table 3: Regional unadjusted SAIFI and SAIDI, 2023-24 and five-year average

	SAIFI (interruptions)		SAIDI (minutes without supply)	
	2023-24	5-year average	2023-24	5-year average
Darwin	2.2	2.0	160	159
Katherine	6.7	8.7	501	445
Alice Springs	2.7	2.0	106	144
Tennant Creek	2.8	4.6	67	182

Darwin

Figure 5: Darwin region unadjusted and adjusted SAIFI and SAIDI



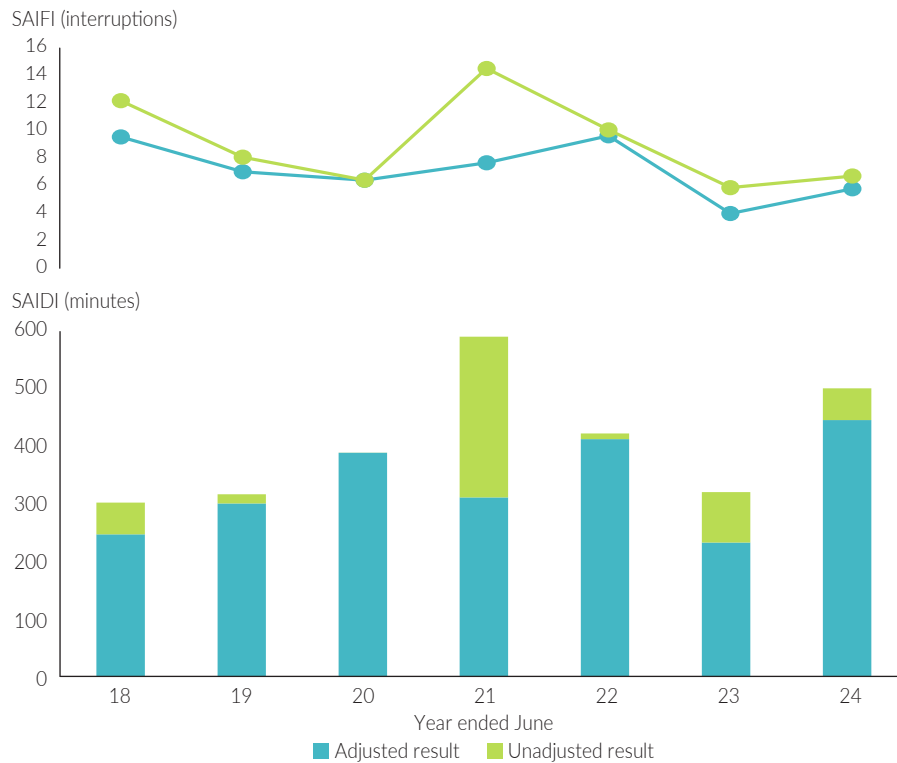
The frequency and duration of interruptions experienced by customers in the Darwin region of the Darwin-Katherine power system increased in 2023-24 compared with the previous year, with 2.2 interruptions and 160 minutes without supply per customer. This is largely consistent with the five-year average of two interruptions and 159 minutes without supply per customer.

Generally, over the last seven years, the frequency and duration of interruptions in the Darwin region is lower than the other regions in the Territory (discussed below).

While improving, on average the majority of interruptions in the Darwin region over the last seven years are network-related. Non-network-related interruptions, which include those related to generation, have also reduced over the last seven years.

Katherine

Figure 6: Katherine region unadjusted and adjusted SAIFI and SAIDI



The frequency and duration of interruptions experienced by customers in the Katherine region of the Darwin-Katherine power system deteriorated in 2023-24 compared with the previous year, to a level of 6.7 interruptions and 501 minutes (over eight hours) without supply per customer. Both the frequency and duration of interruptions are high when compared with the other Territory regions, with the duration of outages reaching the second highest of any of the regions over the last seven years, noting the highest was also in Katherine in 2020-21. On average, customers in Katherine experienced 4.5 more outages and 341 more minutes (over five hours) without supply than customers in the Darwin region during 2023-24.

This disparity between regions is not isolated to 2023-24, with the Katherine region more often than not being the worst performing region in the Territory over the last seven years. The current five-year average for the frequency and duration of interruptions in the Katherine region is 8.7 interruptions and 445 minutes without supply (over seven hours) per customer, which is about seven more outages and 286 more minutes without supply than experienced by customers in the Darwin region. Positively, the five-year rolling average SAIFI continued to improve in 2023-24, but this was offset by a consistent deterioration in the five-year rolling average SAIDI.

The 2021-22 NTPSPR discussed how the poor performance in the Katherine region is being driven by network-related outages, rather than non-network-related outages. Further, the Commission has raised power system performance in the Katherine region as an issue in several NTPSPRs, and made a number of associated recommendations as far back as 2017-18 (three recommendations directly related). Through tracking these recommendations, licensee reporting, regular interactions with licensees and general monitoring of power system performance, the Commission is aware work has been completed or is underway that attempts to improve performance in the Katherine region.

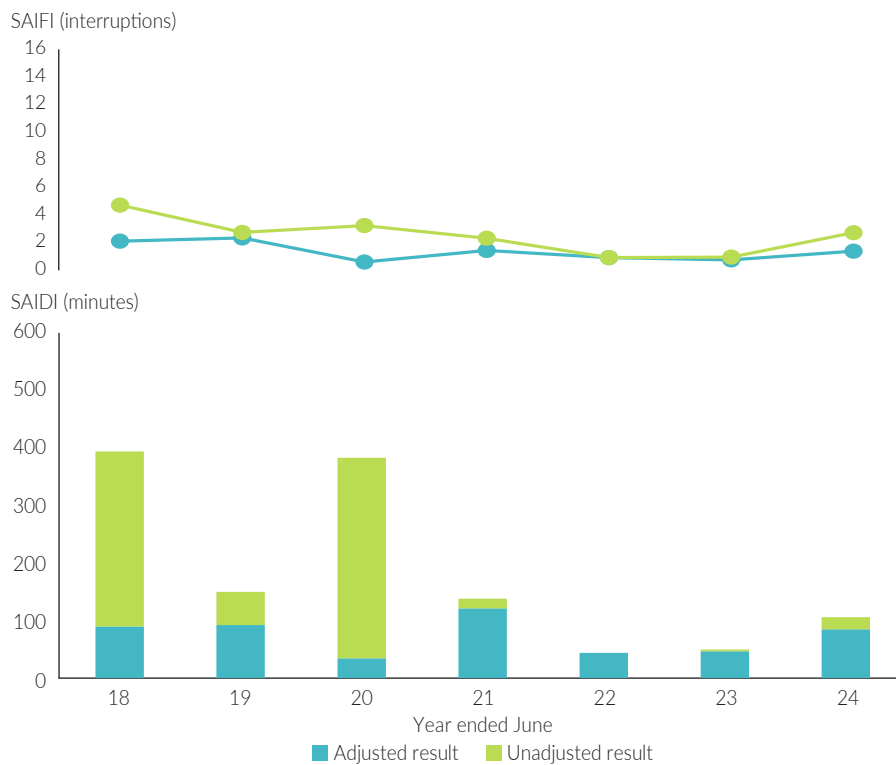
PWC System Control incident reporting shows one occasion during 2023-24 when the entire Katherine region went without power, which is consistent with the previous year, and an improvement on the three occasions in 2021-22 and nine occasions in 2020-21. Notwithstanding this improvement, the Commission suspects the level of interruptions and overall poor power system performance in Katherine would not be tolerated in the Darwin or Alice Springs regions.

Katherine is a regional economic centre, has access to local generation and is connected to the rest of the power system by a transmission line, albeit a single transmission line. Accordingly, while the Commission acknowledges there is no formal reliability standard in the Territory for any of the power systems, given the disparity between performance in Katherine and the other regions as stated in previous reviews, the fundamental question for the Territory Government and relevant stakeholders is whether customers in the Katherine region should receive a level of service more comparable to the other regions.

Further, as stated in the 2021-22 NTPSPR, should the Territory Government and relevant stakeholders conclude that the Katherine region should receive a level of service more comparable with the other regions, investment and or a fundamental shift in how the power system operates in the region may need to be investigated. Any investigation should consider the balance between costs, standard of service and customers' willingness to pay, noting increased costs that do not flow through to the majority of customers (due to protections under the electricity pricing order) flow through to government and ultimately taxpayers by way of the associated community service obligation payment to retailers.

Alice Springs

Figure 7: Alice Springs region unadjusted and adjusted SAIFI and SAIDI



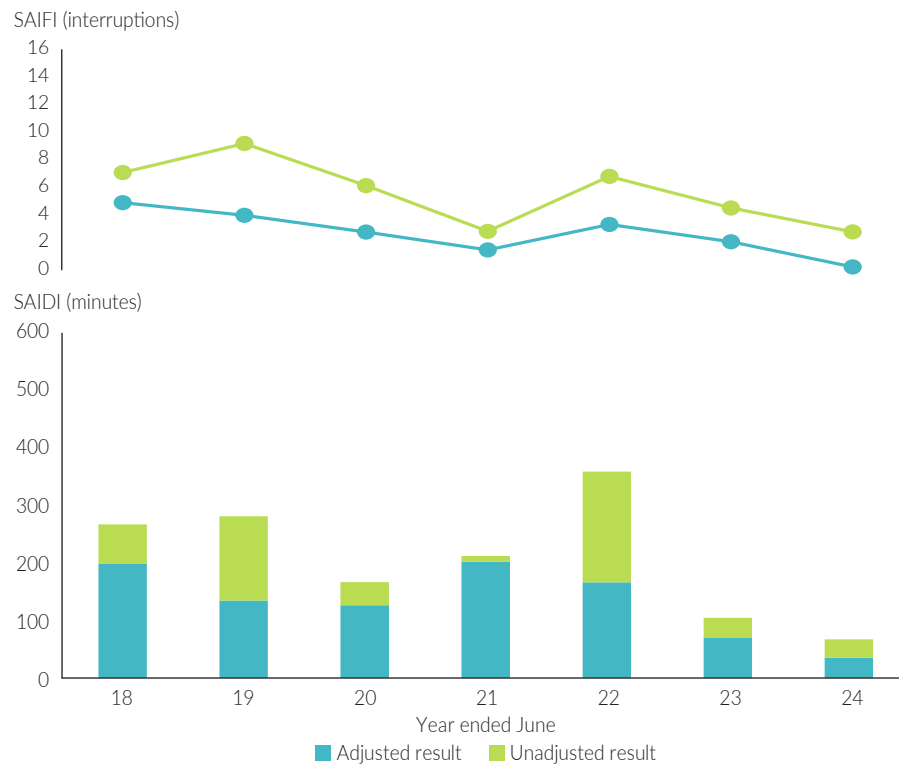
Performance in the Alice Springs region deteriorated in 2023-24, with the frequency and duration of interruptions doubling to 2.7 interruptions and 106 minutes without supply per customer, compared with the previous year. However, this level of performance is still considered good when compared with levels seen between 2017-18 and 2020-21.

The level of performance in 2023-24 was better than the five-year average in terms of the duration of interruptions (144 minutes without supply) but worse in terms of frequency of interruptions (two interruptions). The five-year average is similar to the one seen in the Darwin region, which is encouraging given the widespread and prolonged outages experienced in the Alice Springs region in 2017 and 2019.

In terms of the driving force behind the improved performance over the last seven years, this has come from a decrease in both network and non-network-related outages. Towards the start of the last seven years, when considering the five-year rolling average, non-network-related interruptions accounted for over half of the total frequency and duration of interruptions experienced by customers in the Alice Springs region. However, the five-year rolling average has reduced to a more even contribution between network and non-network-related causes in 2023-24.

Tennant Creek

Figure 8: Tennant Creek region unadjusted and adjusted SAIFI and SAIDI



The frequency and duration of interruptions in the Tennant Creek region continued to improve during 2023-24 when compared with previous years to its lowest level over the last seven years of 2.8 interruptions and 67 minutes without supply per customer.

The level of performance in 2023-24 was better than the five-year average of 4.6 interruptions and 182 minutes without supply. While performing well in 2023-24, the five-year average is 2.6 more outages and between 23 and 38 more minutes without supply for a customer in Tennant Creek compared with customers in the Darwin and Alice Springs regions.

PWC System Control incident reporting shows there were two occasions during 2023-24 when the majority of customers in the Tennant Creek region went without power, which is an improvement on five occasions in each of the two previous years. Similar to the Commission's comments relating to the Katherine region, the Commission suspects this level of interruption would not be tolerated in the Darwin or Alice Springs regions.

It has generally been the frequency of interruptions in the Tennant Creek region that concerns the Commission, noting electricity is often restored and the power system returned to a normal operating state relatively quickly after an event that impacts the majority of customers. However, there is a notable improvement in the frequency of interruptions over recent years.

The lower level of performance in the Tennant Creek region and in turn, higher number of interruptions experienced by customers when compared with the Darwin and Alice Springs regions, appears to be driven by network and generation performance, and coordination between these assets.

PWC Power Services' reporting continues to show the majority of excluded events in 2023-24, those that account for the gap between the green (unadjusted) and blue (adjusted) line and columns, are related to under frequency load shedding. From PWC System Control incident reporting over recent years, the Commission has noted when the newer high-efficiency generators at Tennant Creek power station are dispatched in favour of other generators, a disturbance in the power system leads to a decline in frequency and is often unable to be stopped by the generation. This results in an interruption to customers in the region through automatic under frequency load shedding. Under frequency load shedding is intended to reduce the likelihood of a cascading failure, which may result in a system black (large scale black out of the power system). The inability of the newer high-efficiency generation to stop a decline in system frequency appears to be due to the generators' slow response or lack of inertia, noting these capabilities could also be provided by other technologies.

The Commission made a recommendation in the 2019-20 NTPSPR in relation to coordinating generation and network requirements, which mainly relates to Tennant Creek. The Commission is aware that following this recommendation, work has been completed or is underway that attempts to improve performance in the Tennant Creek region. However, as discussed in previous NTPSPRs, investment and or a change in how the power system is operated may need to be investigated if performance is to improve to a level more consistent with the Darwin and Alice Springs regions.

As with the Katherine region, any such investigation should consider the balance between cost, standard of service and customers' (or taxpayers in relation to customers protected by the electricity pricing order) willingness to pay.

Network

This chapter focuses on network performance at the Territory, regional and feeder category level in the Territory’s three largest power systems, Darwin-Katherine, Alice Springs and Tennant Creek. The chapter also considers network performance in terms of customer connections, guaranteed service levels, customer service and complaints.

Table 4 details the maximum voltage, line lengths and number of zone substations in each Territory region to provide context on the size of the networks.

Table 4: Maximum voltage, line length (including underground cables) and zone substations by region in 2024

Network	Maximum voltage (kV)	Line length (km)			Zone substations
		Transmission (132 and 66 kV)	Distribution (22 and 11 kV)	Low voltage	
Darwin-Katherine	132	717	3 435	1 648	22
Alice Springs	66	47	594	224	3
Tennant Creek	22	0	357	45	1

Network performance

Similar to overall power system performance (and generation performance), one way to assess the level of network performance is to consider the impact on the frequency and duration of interruptions experienced by customers as a direct result of that performance. Again, this is achieved through the reporting of SAIFI and SAIDI.

Territory

Figure 9 shows the frequency and duration of customer interruptions as a direct result of network performance (adjusted SAIFI and SAIDI, respectively). This is shown by the blue line and columns in Figure 9.

As with overall power system performance, to provide context to the Territory result in terms of the frequency and duration of interruptions experienced by customers, the Commission has collated data from the AER in relation to the 13 DSNPs that it regulates, excluding PWC, to create a benchmark from 2017-18 to 2023-24 (AER benchmark). This is shown by the purple line and columns in Figure 9. Again, due to the high level of diversity in the AER-regulated distribution networks, the Commission considers the AER benchmark to be a useful benchmark.

Figure 9: Territory adjusted and AER weighted average SAIFI and SAIDI

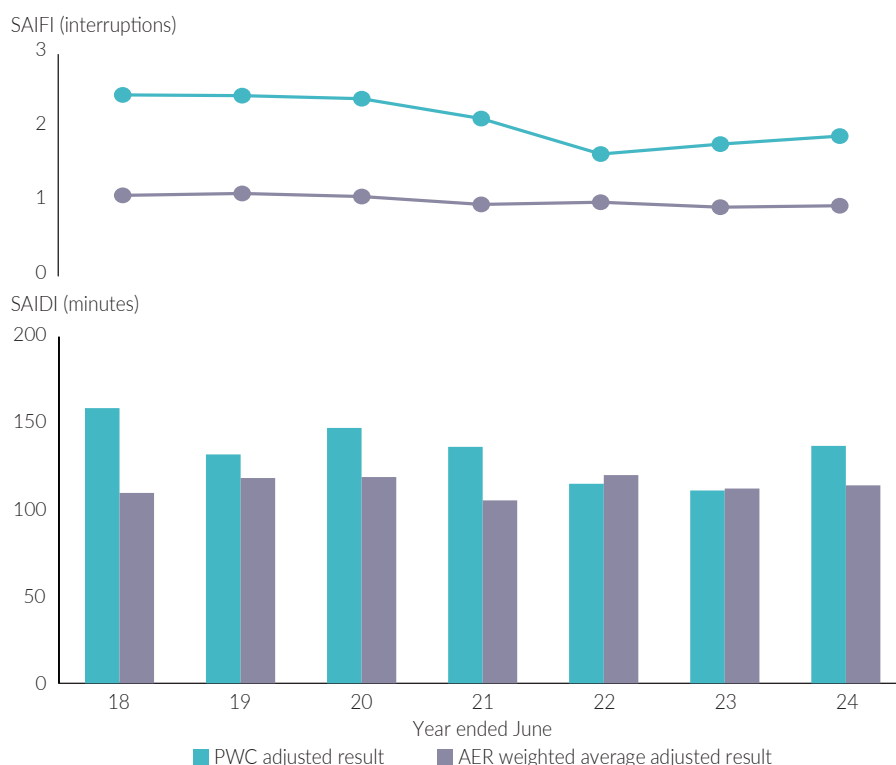


Table 5 shows the average frequency and duration of interruptions (adjusted SAIFI and SAIDI, respectively) per customer in the Territory and the weighted average of the 13 DNSPs regulated by the AER in 2023-24, and a five-year average.

Table 5: Territory and AER weighted average adjusted SAIFI and SAIDI in 2023-24, and five-year average

Adjusted (network-related)	SAIFI (interruptions)		SAIDI (minutes without supply)	
	2023-24	5-year average	2023-24	5-year average
Territory	1.9	1.9	137	129
AER weighted average	1.0	1.0	114	114

Network performance in the Territory has improved over the last seven years both in terms of frequency and duration of customer interruptions. However, there was an increase in the frequency and duration of interruptions in 2023-24 compared with the previous year, with customers on average experiencing 1.9 interruptions and 137 minutes without supply due to network performance. The result in 2023-24 is largely consistent with the five-year average of 1.9 interruptions and 129 minutes without supply per customer due to network performance.

When compared with the AER benchmark, network performance in the Territory deteriorated over the last year. Comparing the five-year averages in 2023-24, network performance in the Territory resulted in one more interruption and 15 more minutes without supply than in the networks of the 13 DNSPs regulated by the AER.

As with overall power system performance in the Territory, network performance varies across regions within the Territory. The next section looks at these regional differences.

Regional

Figure 10 shows the average frequency and duration of interruptions per customer in the Darwin-Katherine, Alice Springs and Tennant Creek regions directly due to network performance (adjusted SAIFI and SAIFI, respectively), with the Darwin-Katherine network further segmented into the regions of Darwin and Katherine.

Figure 10: Regional adjusted SAIFI and SAIDI

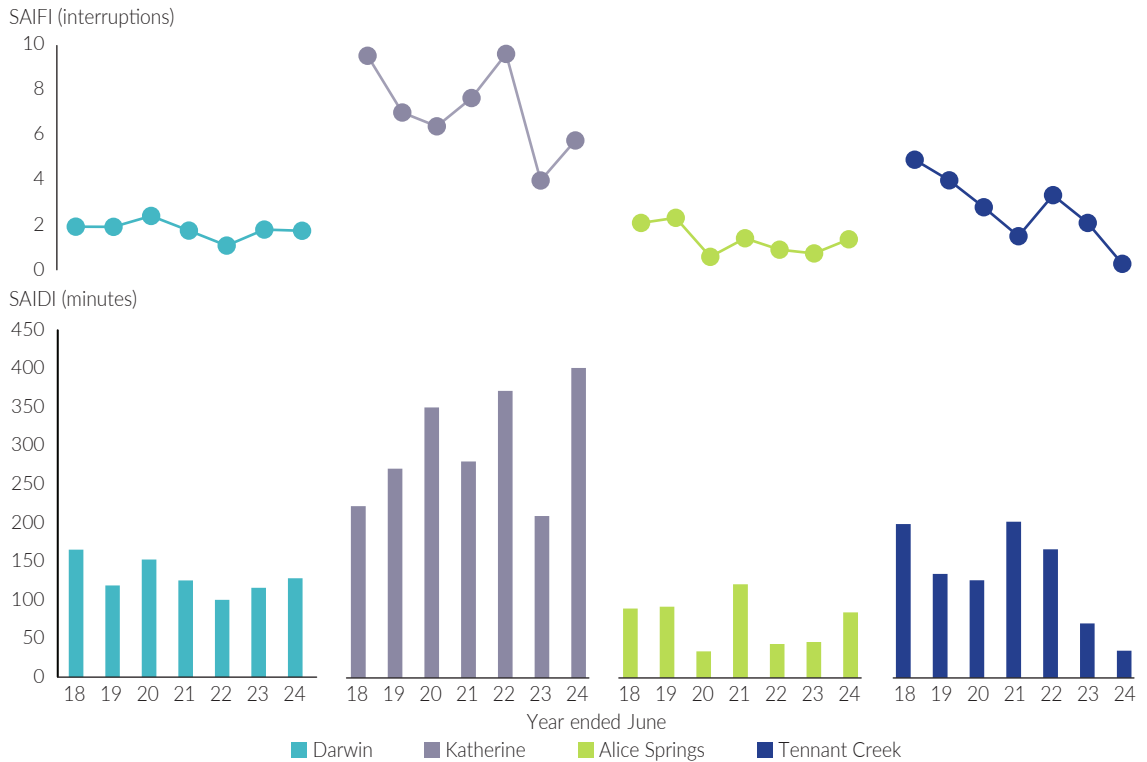


Table 6: Regional adjusted SAIFI and SAIFI, 2023-24 and five-year average

	SAIFI (interruptions)		SAIDI (minutes without supply)	
	2023-24	5-year average	2023-24	5-year average
Darwin	1.7	1.8	128	124
Katherine	5.8	6.7	446	359
Alice Springs	1.4	1.0	85	66
Tennant Creek	0.3	2.0	35	120

Darwin

The Darwin region has seen a general trend of improvement in network performance over the last seven years (Figure 10), with customers in 2023-24 experiencing on average 1.7 interruptions and 128 minutes without supply due to network performance. The level of performance in 2023-24 is largely consistent with the five-year rolling average of 1.8 interruptions and 124 minutes without supply per customer due to network performance. The Darwin region compares well with the other regions in the Territory, although was outperformed by the Alice Springs region over the last five years.

Katherine

The 2022-23 notable improvement in performance in the Katherine region was more than reversed in 2023-24, particularly in terms of the duration of interruptions, with the worst performance over the last seven years. In 2023-24, customers in the Katherine region experienced on average 5.8 interruptions and 446 minutes without supply (over seven hours) due to network-related performance. This level of performance is better than the five-year rolling average in terms of interruptions (6.7 interruptions) but worse in terms of minutes without supply per customer (359 minutes).

Network performance in the Katherine region compares poorly with the other Territory regions. As a result of network performance, in 2023-24 customers in Katherine experienced four more interruptions and over five more hours without supply compared to those in Darwin, despite being part of the same Darwin-Katherine power system.

The issues facing the network in the Katherine region are discussed in more detail in the *Power system* chapter of this review and the 2021-22 NTPSPR.

Alice Springs

The Alice Springs network has performed well over the last seven years when measured by customer interruptions. Despite a dip in performance compared to the previous year, Alice Springs maintained a good level of network performance in 2023-24, with customers in Alice Springs experiencing on average 1.4 interruptions and 85 minutes without supply due to network performance. This level of performance is however worse than the five-year average of one interruption and 66 minutes without supply per customer due to network performance.

Tennant Creek

In terms of customer interruptions, historically the network in Tennant Creek has performed worse than the Darwin and Alice Springs regions, although better than the Katherine region. However, there was a dramatic improvement in 2023-24, with customers experiencing on average 0.3 interruptions and 35 minutes without supply due to network performance. The level of performance in 2023-24 is significantly better than the five-year average of two interruptions and 120 minutes without supply per customer due to network performance. This marked improvement is a positive outcome for Tennant Creek customers.

Feeder

As well as by region, PWC Power Services record and report network performance against feeder categories. Feeders from across the Territory's Darwin-Katherine, Alice Springs and Tennant Creek networks are grouped together into the feeder categories of central business district (CBD), urban, rural short and rural long.

PWC Power Services is required under the EIP Code to develop and submit network target standards for each feeder category for Commission approval, applicable over each regulatory control period. The current target standards apply for the five-year period from 1 July 2019 to 30 June 2024. PWC Power Services must use its best endeavours to meet the target standards.

PWC Power Services developed and submitted network target standards for the next regulatory control period (1 July 2024 to 30 June 2029) in December 2022. These were approved by the Commission in March 2023, and see the target standards remain consistent for CBD and rural short feeders, however strengthen for urban and rural long feeders.

PWC Power Services is also required to report on the top five worst-performing feeders in each feeder category over the year, as determined by the SAIDI performance of the feeder. The Commission acknowledges that feeders will perform poorly from time to time due to unforeseen issues, and therefore has limited its focus to those that have performed worse than the feeder category target standard over multiple years.

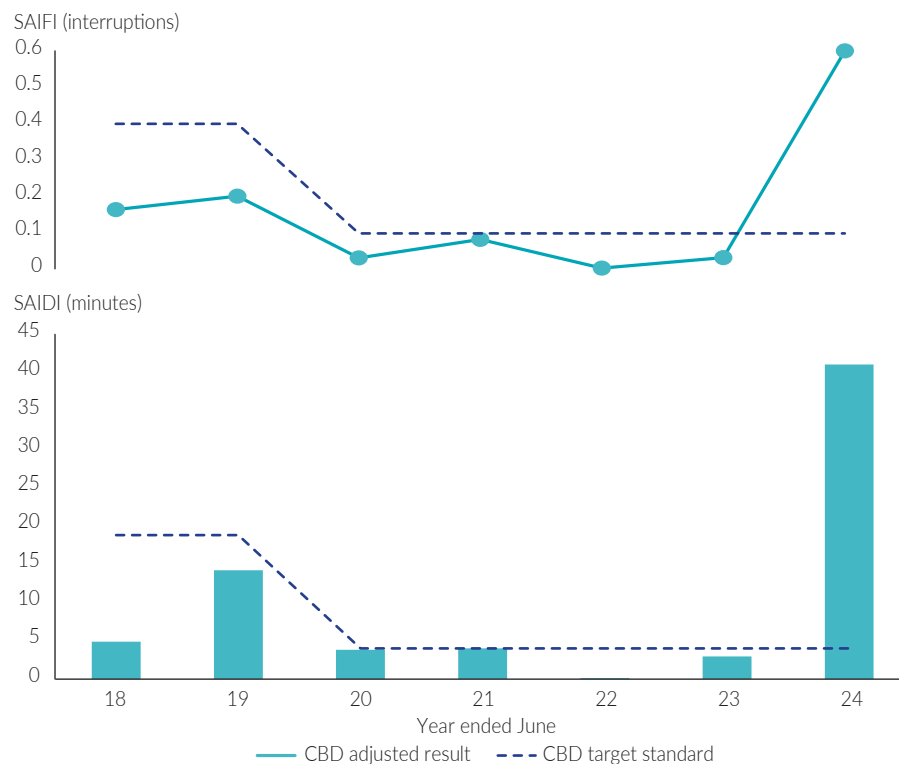
CBD

A CBD feeder is defined as a feeder mostly supplying commercial high-rise buildings predominantly through an underground distribution network that contains significant interconnection and redundancy when compared to urban areas. CBD feeders account for around 12% of feeders in the Territory.

Figure 11 shows the frequency and duration of CBD customer interruptions as a direct result of network performance (adjusted SAIFI and SAIDI, respectively) and the approved target standard. This is shown by the light blue line and columns (SAIFI and SAIDI, respectively) and dark blue dotted lines (approved target standards) in Figure 11.

The current Commission-approved PWC target standard for CBD feeders is 0.1 interruptions and four minutes without supply per year.

Figure 11: CBD feeder category adjusted SAIFI and SAIDI¹



¹ The Commission approved new network target standards in 2018, which apply to PWC between 2019-20 and 2022-23

Feeders in the CBD category performed well outside the Commission-approved target standard during 2023-24. PWC Power Services has attributed the poor performance primarily due to three outages related to cable faults and asset failures. PWC Power Services has advised there are currently no plans for improvement tasks associated with CBD feeders. The Commission will assess the performance of CBD feeders again in the next NTPSPR to identify whether this was a one-off poor year or an issue potentially requiring attention.

Although not shown in Figure 11, previous five-year rolling averages had indicated the performance of CBD feeders was improving, however the poor performance in 2023-24 has had a large negative impact on the five-year average, which is now again worse than the Commission-approved target standard.

Five individual CBD feeders (11ML09 Daly, 11WS02 Litchfield, 11WS04 Lindsay 1, 11WS03 Dashwood and 11ML01 DPAC) were reported as performing worse than the category target standard during 2023-24. While no individual feeder has consistently performed worse than the category target standard over the last seven years, the 11WS04 Lindsay 1 feeder has been worse than the target standard for the last two years.

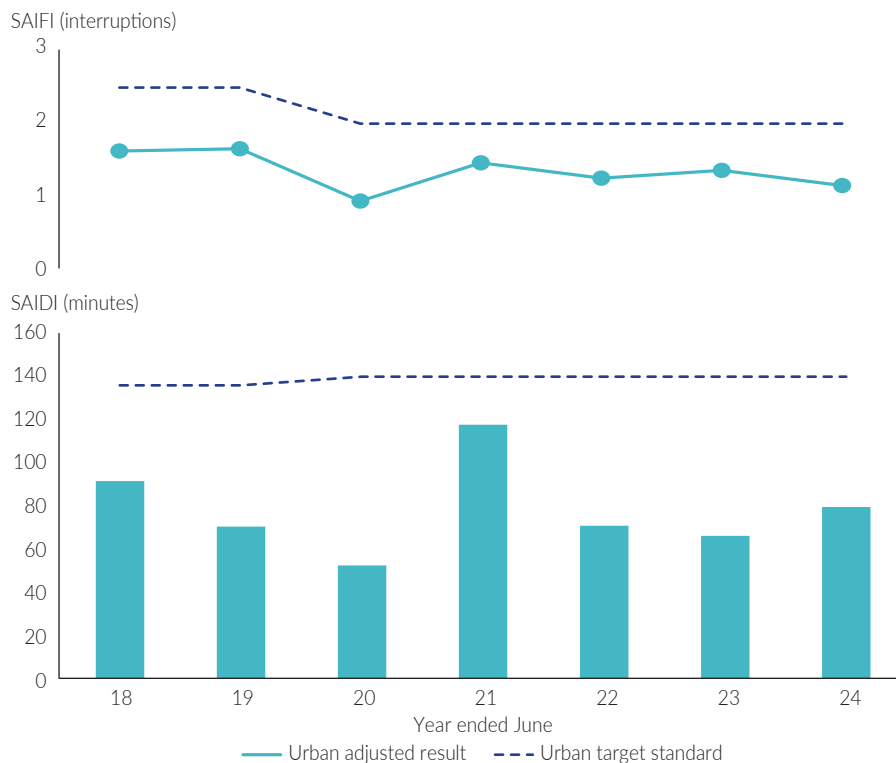
Urban

An urban feeder is defined as a feeder that is not a CBD feeder and has a maximum demand over the feeder route length greater than 0.3 megavolt ampere (MVA)/km. Urban feeders account for just over 40% of all feeders in the Territory.

Figure 12 shows the frequency and duration of urban customer interruptions as a direct result of network performance (adjusted SAIFI and SAIDI, respectively) and the approved target standards. This is shown by the light blue line and columns (SAIFI and SAIDI) and dark blue dotted line (approved target standard) in Figure 12.

The current Commission-approved PWC target standard for urban feeders is 140 minutes without supply and two interruptions per year.

Figure 12: Urban feeder category adjusted SAIFI and SAIDI¹



¹ The Commission approved new network target standards in 2018, which apply to PWC between 2019-20 and 2022-23.

Urban feeders met the Commission-approved target standard over the last seven years in terms of both SAIFI and SAIDI. When considering the five-year rolling average, there has been a slight improvement in the level of performance over the last seven years.

While the Commission has noted in previous NTPSPRs that some individual urban feeders have consistently performed poorly, this appears to have improved when considering the result in 2023-24.

The 11ML02 Larrakeyah feeder is the only feeder to have been worse than the feeder category target standard for the last two years. In 2022-23, PWC Power Services advised this was primarily due to a single outage caused by failure of 'high voltage droppers' and in 2023-24 it was primarily due to a single outage caused by failure of 'high voltage bridges'.

The Commission-approved target standard for urban feeders sees a higher level of performance required for 2024-25, with the target for SAIDI strengthening from 140 minutes to 80 minutes and for SAIFI strengthening from 2 interruptions to 1.4 interruptions.

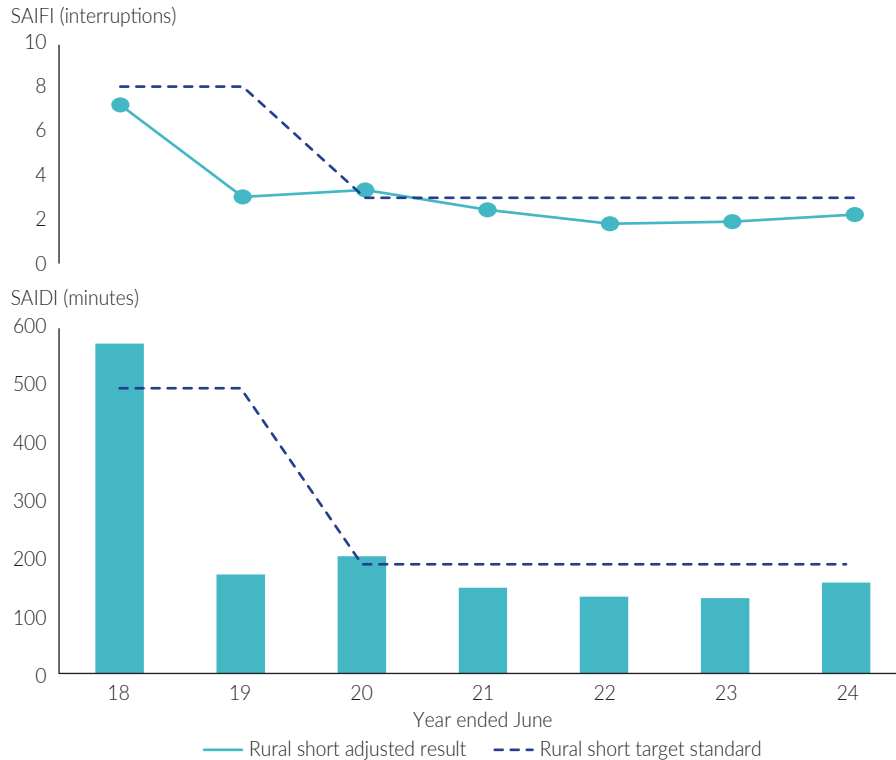
Rural short

A rural short feeder is defined as a feeder that is not a CBD or urban feeder and has a total feeder route length of less than 200 km. Rural short feeders account for just over 45% of all feeders in the Territory.

Figure 13 shows the frequency and duration of rural short customer interruptions as a direct result of network performance (adjusted SAIFI and SAIDI) and the approved target standard. This is shown by the light blue line and columns (SAIFI and SAIDI) and dark blue dotted line (approved target standard) in Figure 13.

The current Commission-approved target standard for rural short feeders is 190 minutes without supply and three interruptions per year.

Figure 13: Rural short feeder category adjusted SAIFI and SAIDI¹



1 The Commission approved new network target standards in 2018, which apply to PWC between 2019-20 and 2022-23.

Feeders in the rural short category performed within the Commission-approved target during 2023-24.

When considering the five-year rolling averages, the performance of rural short feeders over the last seven years has improved, with both SAIFI and SAIDI five-year averages better than the Commission-approved target standard. Relevantly, based on PWC Power Services' reporting, the rural short feeder category has received the most capital expenditure over the last five years when compared with the other feeder categories.

However, some individual rural short feeders have consistently performed poorly during the last seven years. For example, the Commission has highlighted the 22KA03 Florina feeder in the Katherine region multiple times and it continued to perform poorly in 2023-24. It was one of the top five poorly performing rural short feeders for five of the last seven years (including in 2023-24). Customers on the feeder experienced the following minutes without supply in those five years:

- 2018-19 - 730 minutes (or over 12 hours)
- 2020-21 - 697 minutes (or over 11 hours)
- 2021-22 - 1,358 minutes (or over 22 hours)
- 2022-23 - 847 minutes (or over 14 hours)
- 2023-24 - 839 minutes (or over 13 hours).

This compares very poorly against the feeder category target standard of 190 minutes (or around three hours) without supply.

PWC Power Services continued to report the 22KA03 Florina feeder as being impacted by transient faults and suggests bat-related activity in the region may be the cause. PWC Power Services has installed electrostatic animal protection on parts of the feeder to address the issue and, consistent with last year, advised no other upgrades are currently planned.

While only being reported as worst performing feeders in 2023-24 for the first time in the last seven years, the 22TC09 Warrego (Tennant Creek) and 22BR104 Hermannsburg (Alice Springs) feeders performed particularly poorly during 2023-24, and well in excess of the feeder category target standard. On average during 2023-24, customers on the feeders experienced 2,570 and 1,425 minutes without supply, or over 42 and 23 hours, respectively.

In terms of the 22TC09 Warrego feeder, PWC Power Services advised the feeder serves a limited number of customers, with some of the industrial customers having the capacity to utilise their own generation in the event of an outage. Further, in 2020-21 some projects were initiated that focused on insulator upgrades and overhead switch installation to improve the performance of the feeder, however PWC Power Services considers no reliability-related upgrades are currently necessary.

In terms of the 22BR104 Hermannsburg feeder, PWC Power Services advised, as a part of its feeder performance study to explore potential network upgrades, a bypass switch is being installed on a recloser to increase reliability of the feeder.

The Commission will review the performance of these feeders in the next NTPSPR to identify any ongoing issues.

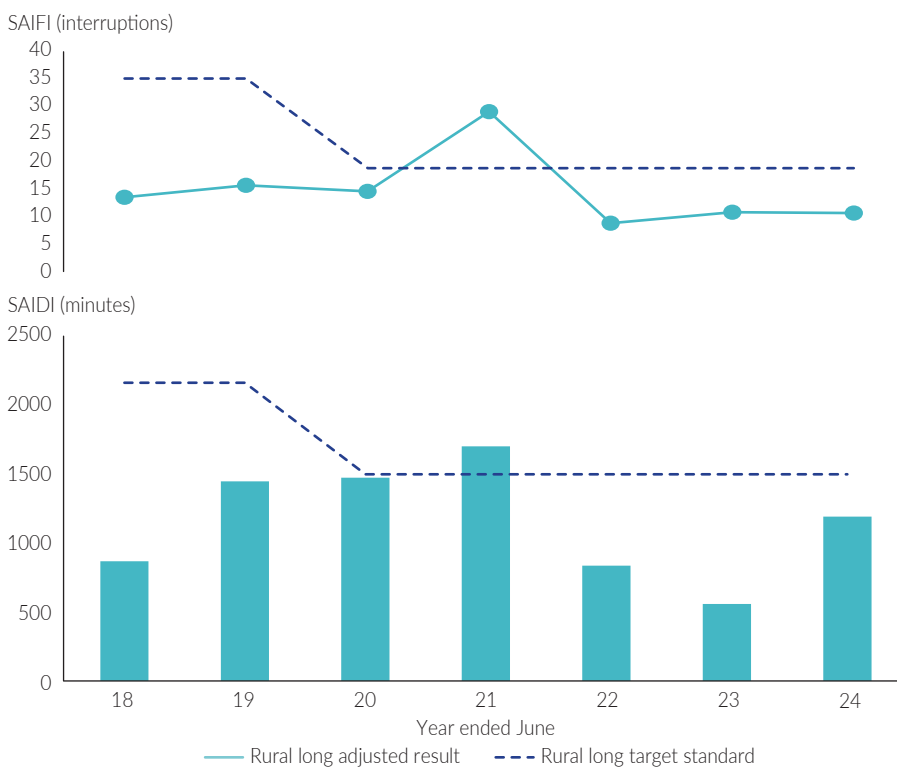
Rural long

A rural long feeder is defined as a feeder that is not a CBD or urban feeder and has a total feeder route length greater than 200 km. There are only three rural long feeders in the Territory, which account for under 2% of feeders. These are 22KA10 Mataranka 1, 22SY04 Dundee and 22TC01 Ali Curung.

Figure 14 shows the frequency and duration of rural long customer interruptions as a direct result of network performance (adjusted SAIFI and SAIDI, respectively) and the approved target standard. This is shown by the light blue line and columns (SAIFI and SAIDI) and dark blue dotted line (approved target standard) in Figure 14.

The current Commission-approved PWC target standard for rural long feeders is 1500 minutes without supply and 19 interruptions per year.

Figure 14: Rural long feeder category adjusted SAIFI and SAIDI¹



1 The Commission approved new network target standards in 2018, which apply to PWC between 2019-20 and 2022-23.

Feeders in the rural long category performed within the Commission-approved target during 2023-24 and have done so over the last seven years, except for 2020-21.

When considering the five-year rolling averages, the performance of rural long feeders over the last seven years has improved slightly in terms of the frequency and duration of interruptions, and both SAIFI and SAIDI five-year averages are better than the Commission-approved target standard.

All three rural long feeders continued to perform better than the feeder category target standard of 1500 minutes without supply during 2023-24.

The Commission-approved target standard for rural long feeders sees a higher level of performance required for 2024-25, with the target for SAIDI strengthening from 1500 minutes to 1260 minutes, and the target for SAIFI strengthening from 19 interruptions to 15 interruptions.

Notifications

Figure 15 shows the percentage of customers in the Territory notifying PWC of supply quality issues, including in relation to no power, and part, fluctuating or low power.

Figure 15: Territory quality of supply notifications per customer, by notification type

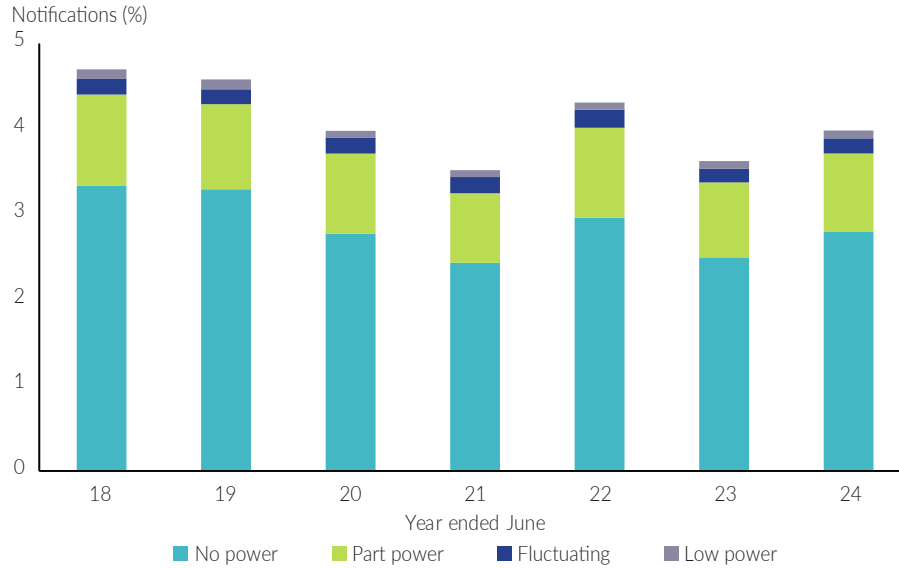
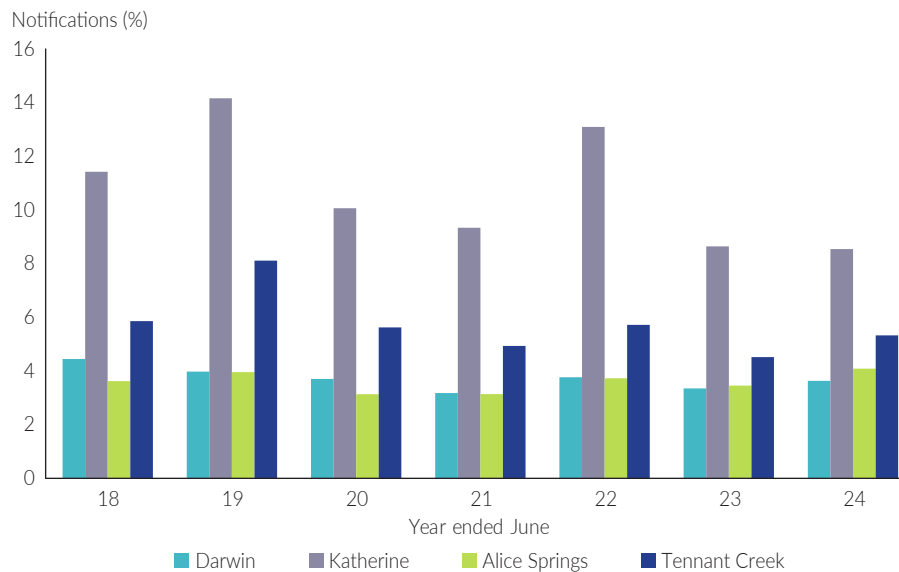


Figure 15 shows that over the last seven years, notifications to PWC Power Services on the quality of supply were mostly related to no power rather than part, fluctuating or low power. In 2023-24, 2.8% of customers in the Territory notified PWC Power Services of no power, compared with 1.2% of customers notifying of other quality of supply issues. However, notifications regarding the quality of supply are not evenly distributed across regions, as shown in Figure 16, which shows the same total customer notifications regarding supply quality issues as Figure 15 but by the percentage of customers in each Territory region.

Figure 16: Quality of supply notifications from customers (as a percentage of total customers, by region)



Over the last seven years, as a percentage of total customers in the relevant region, more notifications regarding the quality of supply have been from customers in the Katherine region and to a lesser extent Tennant Creek, than the Darwin and Alice Springs regions. This is consistent with the generally higher duration and frequency of interruptions reported in those regions, as discussed earlier in this chapter and elsewhere in this review.

Customer connections

Figure 17 shows the number of new connections (segmented by region) and the average time to complete those connections across the Territory. Under the EIP Code, the Commission has set a standard of service of within five business days for new connections of premises (excluding connections requiring network extension or augmentation).

Figure 17: Territory average new customer connection time and total connections, further segmented by region

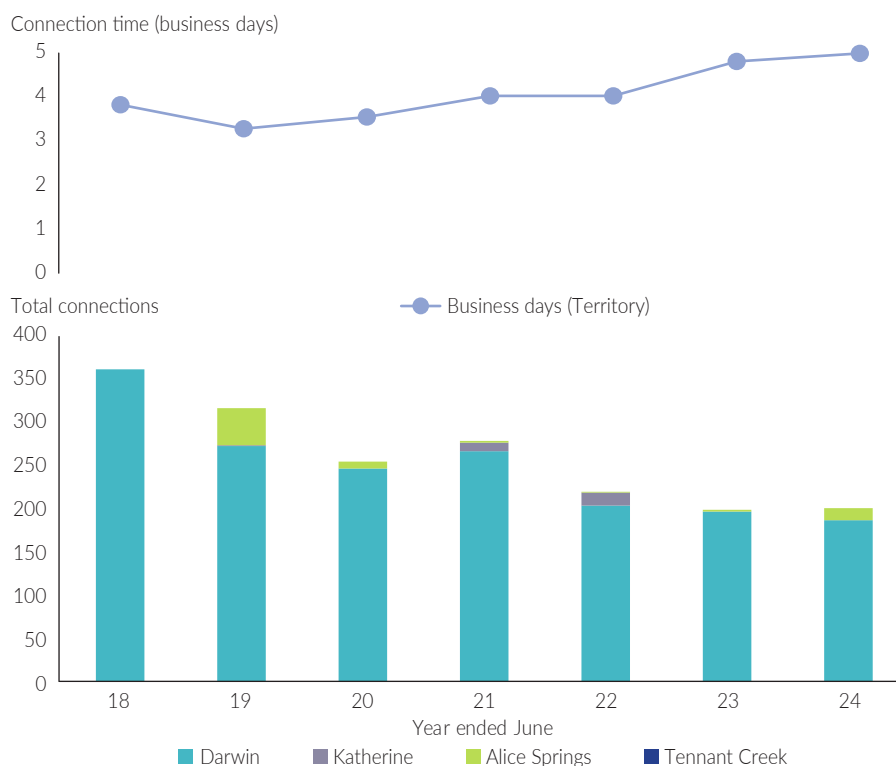


Figure 17 shows the number of new connections in the Territory has fallen over the last seven years, with around 200 new connections in 2023-24. The majority of new connections over the last seven years have been in the Darwin region.

The average time to establish a new connection in the Territory has increased over the last seven years to the current average of five days, which is consistent with the Commission's standard of service of within five business days. However, as shown in the next section in relation to GSL payments, the number of new connections not completed within the required five business days drastically reduced during 2023-24, with 34 payments made, down from a high of 142 in 2022-23. New connections that take longer than five business days now account for around 17% of the total new connections across the Territory in 2023-24 (down from 71% in 2022-23).

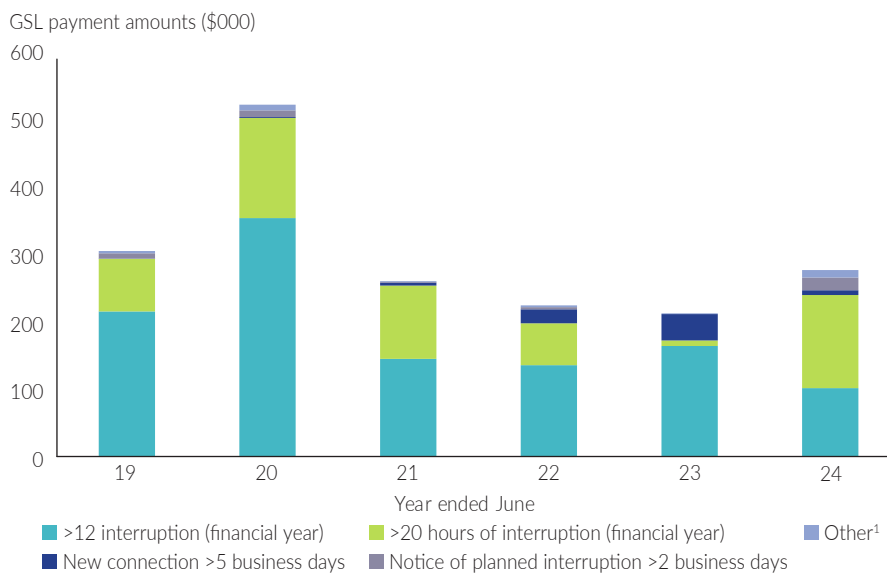
Guaranteed service levels

GSLs provide for payments to eligible customers when performance does not meet the defined standard of service. The Commission sets these payment amounts and standards of service in the EIP Code.

GSL payment amounts are intended to acknowledge the inconvenience eligible customers experience due to interruptions associated with network performance, and act as an incentive for the network entity to provide an appropriate level of service. Importantly, GSL payments are not intended to provide insurance-style compensation for any loss or damage a customer may suffer from an interruption, noting the costs for making GSL payments to eligible customers are ultimately borne by all customers (and taxpayers in relation to the majority of customers protected by government's electricity pricing order) through network charges.

Figure 18 shows the dollar amount of GSL payments PWC made over the last six years for not meeting the required standard of service across the Territory, segmented by GSL.

Figure 18: Guaranteed service level payment amounts, by guaranteed service level^{1,2}



1 The 'other' category includes the following GSLs: >12 and <20 hours of interruption (single event); >20 hours of interruption (single event); re-connection of existing premises >24 hours; and >30 minutes late for appointment.

2 Total GSL payments in 2021-22 and 2022-23 were higher than required by the EIP Code due to PWC errors identified through an audit of compliance.

The number and amount of GSL payments increased in 2023-24 to 3,723 payments totalling just under \$280,800 following a five-year low in the previous year. Over the six years shown in Figure 18, the majority of GSL payments have been in relation to customers experiencing more than 12 interruptions and greater than 20 hours without supply over a financial year. This continued to be the case in 2023-24, however GSL payments related to more than 12 interruptions decreased to its lowest level, while GSL payments related to greater than 20 hours without supply reached its highest amount.

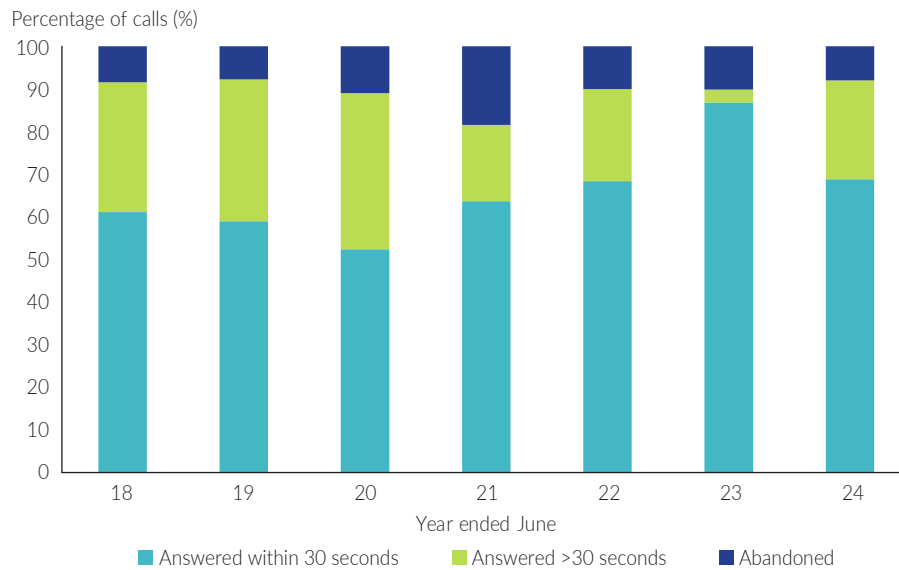
There was quite a large increase in the number of GSL payments related to the duration of single events (included in the 'other' category), with six-year highs of 82 for single events between 12 and 20 hours, and 17 for single events more than 20 hours. There was also a relatively large increase in the number of GSL payments for not giving 2 business days' notice of planned interruptions (a six-year high of 307).

Customer service

The EIP Code (S.3.6.3) requires licensees providing network services in the Darwin-Katherine, Alice Springs and Tennant Creek power systems to report on customer service performance indicators, which include telephone answering-related indicators. As the only licensee providing network services in the Darwin-Katherine, Alice Springs and Tennant Creek power systems, Figure 19 shows PWC Power Services' telephone answering performance (during business hours) at a Territory level over the last seven years.

Figure 19 shows the percentage of calls answered within 30 seconds (light blue sub-bars) and calls abandoned (dark blue sub-bars), and the percentage of calls answered but fall outside of those criteria (green sub-bars).

Figure 19: Network telephone answering performance



Changes in the total number of calls to a network provider may be an indicator of the level of customer satisfaction with the standard of service. The percentage of calls answered within 30 seconds, average waiting time before a call is answered and percentage of calls abandoned before being answered provide an indication of how long a customer has to wait to speak to the network operator, and whether this wait is considered reasonable by a customer. The Commission considers it is not always reasonable for a customer to expect to speak to an operator within 30 seconds, especially during periods of high call volumes. However, the Commission considers it reasonable to expect a customer's call to be answered before the point where a customer feels the need to abandon their attempt to speak to the network operator, potentially leading to issues going unresolved, which may cause distress. Accordingly, the Commission is particularly interested in the percentage of calls being abandoned before being answered.

PWC Power Services reported an increase of about 1500 in the total number of calls received in 2023-24, to about 11,500. The level of performance in terms of calls answered within 30 seconds deteriorated, while the percentage of calls abandoned before being answered improved.

As a useful benchmark, the AER uses a rating system in its 2023-24 Annual Retail Markets report¹ to provide an overview of retailers' performance in call centre responsiveness-related indicators. In terms of calls abandoned before being answered, PWC Power Services' performance of 8% achieves the AER's 'range' category, which includes retailers that achieved 6 to 9%. This is an improvement on the previous year in which PWC Power Services was at 10%, within the AER's 'lowest' category.

Relevantly, in its submission to the Commission's 2024 EIP Code review, PWC Power Services noted challenges in meeting telephone answering performance indicators due to its role as a multi-utility provider serving electricity, water and sewerage customers. Call handling complexities arise from guiding customers through prompts to reach appropriate service queues, affecting metrics like calls answered within 30 seconds. Additionally, categorising abandoned calls is difficult when many relate to non-network services, potentially distorting network-specific performance data.

PWC Power Services suggested the Commission consider revising the performance indicators to start measuring from when a customer reaches the relevant service queue, ensuring a more accurate assessment of network-related call performance. The Commission will consider this as part of its current review of the EIP Code.

Complaints

The EIP Code requires PWC Power Services to report on the percentage and total number of complaints it receives that are associated with network-related activities. Figure 20 shows the percentage of Territory customer complaints to PWC by complaint category, including complaints related to administration processes and customer service, reliability of supply, customer connections, technical quality of supply and other.

Figure 20: Territory network complaints per customer, by complaint category

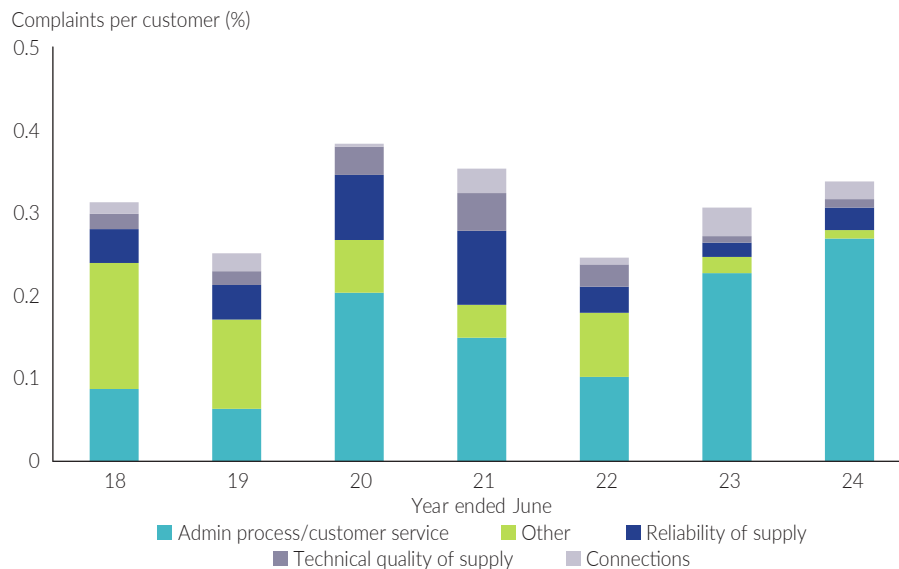


Figure 20 shows, as a percentage of total customers in the Territory, relatively few customers are making complaints to PWC. Further, there has been little change in the level of complaints over the last seven years.

¹ <https://www.aer.gov.au/system/files/2024-12/Annual%20Retail%20Market%20Report%202023%E2%80%9324%20-%2030%20November%202024.pdf>

The Commission notes the Ombudsman NT has discussed in a number of its annual reports, including its 2023-24 Annual Report, that both PWC and Jacana Energy are heavily involved in the consumer experience in the Territory through their respective roles as network provider and retailer. Accordingly, it is possible customers may contact their electricity retailer regarding a network-related complaint, and this may contribute to the low level of complaints reported by PWC.

Figure 21 shows the same total customer complaints as in Figure 20, however segmented by region and as a percentage of customers in the respective regions.

Figure 21: Regional network complaints per customer

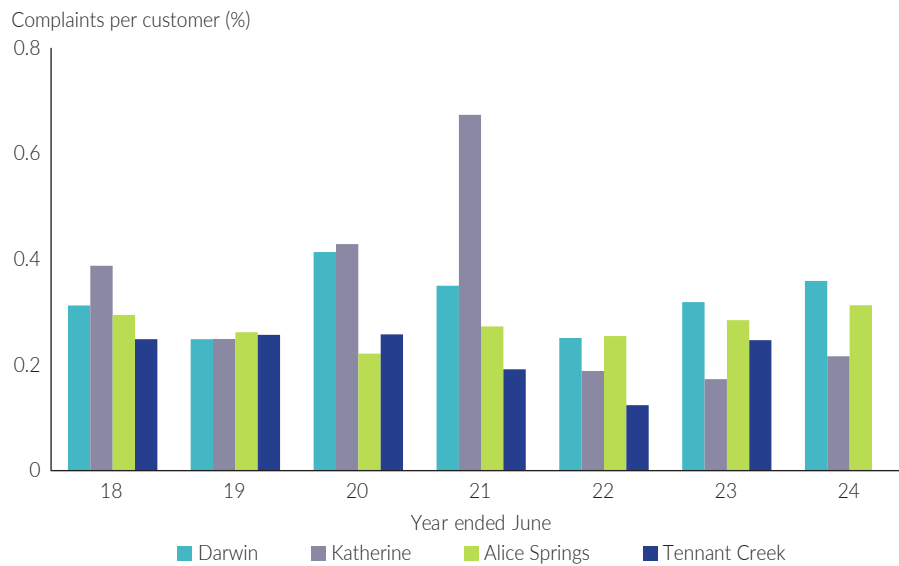


Figure 21 shows, while few customers in each region are making complaints to PWC, the complaints are not always evenly distributed across regions.

An example of the disparity between regions is seen in the Katherine region in 2020-21. The higher level of complaints in the Katherine region during 2020-21 (when compared with other regions) coincided with Katherine region customers experiencing poor performance when compared with the other regions. While performance in the Katherine region is still generally poorer than the other regions in 2023-24, the number of complaints has remained low.

Over the seven years shown in Figure 21, 2023-24 is the first year that no complaints from customers in Tennant Creek were reported, which coincides with a notable improvement in performance in the region.

Generation

This chapter focuses on the performance and availability of generation in the Darwin-Katherine, Alice Springs and Tennant Creek power systems. More specifically, it covers generation at Territory Generation's Channel Island, Weddell, Katherine, Owen Springs, Ron Goodin and Tennant Creek power stations, and EDL's Pine Creek power station. While there were other generators operating in or connecting to the power systems during 2023-24, they were not required to report against the EIP Code because they were not fully operating and or operating commercially, or exempt under a Commission-issued direction², therefore the Commission's assessment of generator performance and availability in this chapter does not include them.

For generators that reported against the EIP Code, their power station location, fuel type and capacities are shown in Table 7.

Table 7: Generator power station locations, fuel type and capacities, as reported by the licensee in EIP Code reporting

	Fuel type	Capacity (MW)
Darwin-Katherine		494.4
Territory Generation		
Channel Island	Gas/diesel and heat recovery steam	301.4
Weddell	Gas	129.0
Katherine	Gas/diesel	37.0
EDL		
Pine Creek	Gas and heat recovery steam	27.0
Alice Springs		119.2
Territory Generation		
Owen Springs	Gas/diesel	80.9
Ron Goodin	Gas/diesel	38.3
Tennant Creek		21.9
Territory Generation		
Tennant Creek	Gas/diesel	21.9

Generation performance

Similar to overall power system and network performance, one way to assess the level of generation performance is to consider the impact on the frequency and duration of interruptions experienced by customers as a direct result of that performance. Again, this is achieved through the reporting of SAIFI and SAIDI.

² The Commission issued a direction on 26 June 2024 that generator entities are not required to comply with clause 5.1.1 of the EIP Code (version 2) in relation to their intermittent generation (including solar PV systems) and or batteries for the 2023-24 reporting period and subsequent reporting periods until a variation to the EIP Code is made or advised otherwise by the Commission.

The Commission has discussed the limitations of assessing generation performance using the metrics of SAIFI and SAIDI in previous NTPSPRs. One of the main limitations is associated with the potential for unplanned interruptions being negatively impacted by the performance of power system assets not directly related to the root cause such as generation. These assets are not allocated a 'share' of SAIFI and SAIDI. This is related to another limitation as there is no explicit responsibility in apportioning the impact between power system assets or licensees. In some cases, it may be unclear or too complex to apportion SAIFI and SAIDI between licensees.

These limitations may result in licensees under or over reporting, and double counting across licensees.

The Commission is considering SAIFI and SAIDI generation performance reporting as part of its current review of the EIP Code, with a consultation paper published on 11 September 2024 and stakeholder feedback under consideration. In the interim, the Commission made a recommendation in the 2020-21 NTPSPR for PWC System Control to clearly identify and apportion the customer impact for customer interruptions between relevant licensees in each major incident report as appropriate. However, this recommendation is not enforceable and the Commission is yet to see evidence that it has been implemented.

Regardless of the limitations, the Commission still considers SAIFI and SAIDI reporting insightful regarding generator performance. Figure 22 shows the average frequency and duration of interruptions per customer, respectively, due to generation performance in the Darwin-Katherine, Alice Springs and Tennant Creek power systems, with the Darwin-Katherine power system further segmented into the regions of Darwin and Katherine.

Figure 22: Generation SAIFI and SAIDI performance by region

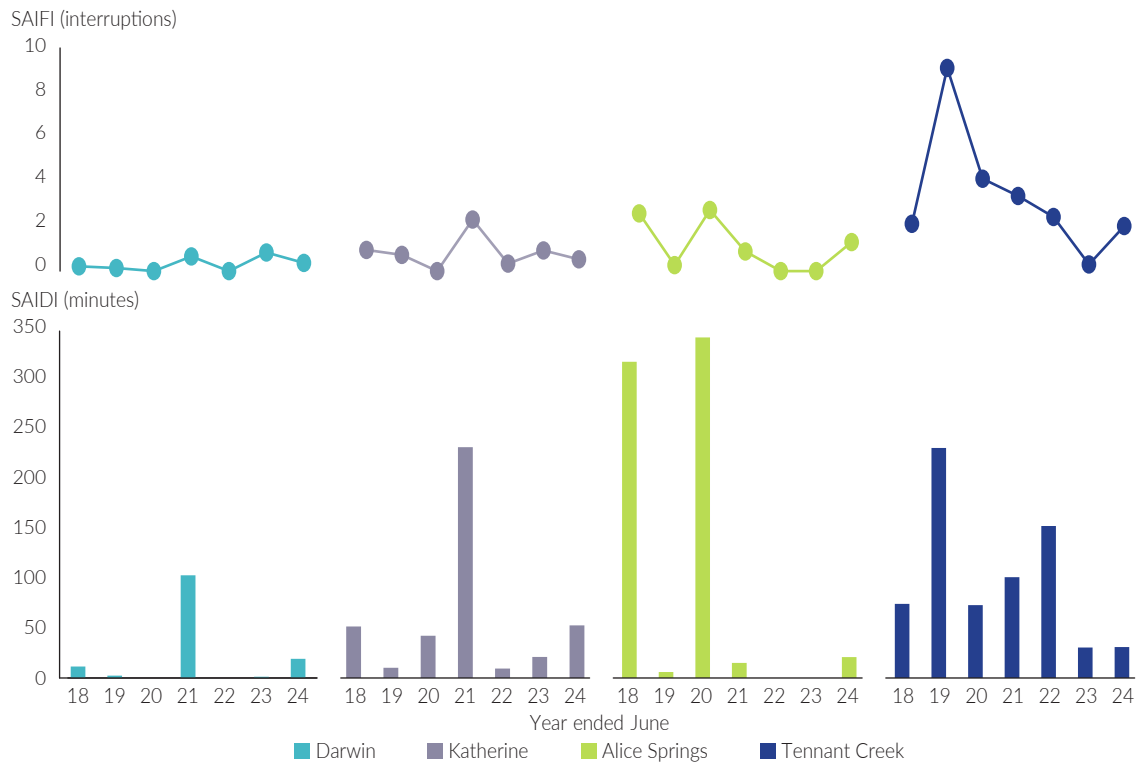


Table 8 presents the average frequency and duration of interruptions (SAIFI and SAIDI, respectively) per customer due to generation in 2023-24 and the five-year average by region.

Table 8: Generation SAIFI and SAIDI performance by region, 2023-24 and five-year average

	SAIFI (interruptions)		SAIDI (minutes without supply)	
	2023-24	5-year average	2023-24	5-year average
Darwin	0.4	0.4	19	25
Katherine	0.5	0.8	53	72
Alice Springs	1.3	1.0	21	76
Tennant Creek	2.0	2.5	31	78

Darwin

As discussed earlier in this review, there was a major gas supply-related outage to the Channel Island power station in 2020-21. Without this outage, generation performance over the last seven years would have had very little impact on customers in the Darwin region in terms of interruptions.

Notwithstanding the inclusion of the 2020-21 gas supply-related outage in the generation performance reporting and noting the February 2024 gas supply-related event did not have a material impact on the data, when generation performance is measured in terms of impact on customer interruptions, it performed well in the Darwin region, especially compared with other Territory power systems or regions. This is highlighted by the current five-year average of 0.4 interruptions and 25 minutes without supply per customer in the region due to generation performance.

The Commission has noted in previous NTPSPRs that historically the Darwin-Katherine power system was dispatched in such a way that under frequency load shedding (interruptions to some customers) was inevitable to protect the overall power system following a trip of most large generating units in the region. PWC System Control has made changes in an attempt to improve power system performance through, among other things, changes to the under frequency load shedding scheme settings, generation dispatch constraints and spinning reserve levels.

PWC System Control's changes have achieved a stark reduction in interruptions due to generation performance, however has likely increased costs, particularly for Territory Generation, although this would be difficult to quantify. Relevantly, under the current framework there is no competitive provision of essential system services to put downward pressure on these costs and limited regulatory requirements or oversight to ensure the efficient dispatch of essential system services by PWC System Control. While this is the current situation, the Commission is aware the previous Territory Government was reviewing essential system service arrangements.

Katherine

Similar to the Darwin region, if not for the gas supply-related outage to the Channel Island power station in 2020-21, generation performance over the last seven years would have had little impact on customers in the Katherine region in terms of interruptions when compared with the poor overall performance in the region over recent years, as discussed in the earlier chapters.

The five-year average in the Katherine region in 2023-24 was 0.8 interruptions and 72 minutes without supply per customer due to generation performance, with this result remaining relatively consistent with the previous year. This level of generation performance is not unexpected as the Commission understands generation located in the Katherine region is rarely dispatched (online) due to its higher running costs. It is the Katherine region's unreliable connection to the rest of the power system, or management of the region once islanded, that has caused the poor performance over recent years, not generation.

It is important to note generation issues in the Darwin region can result in interruptions in the Katherine region due to the application of power system protection settings. While less likely, the reverse is true, although this may become a greater risk as more generation connects to the region and flow on the 132 kV transmission line reverses at times in the direction of the Darwin region.

Alice Springs

When the last seven years are considered, generation performance has significantly contributed to customer interruptions in the Alice Springs region due to system blacks in 2017-18 and 2019-20. The 2019-20 system black negatively impacted the five-year rolling average in the region, which is one interruption and 76 minutes without supply per customer due to generation performance in 2023-24.

However, generation performance in the region over the last four years has generally been much better than the five-year rolling average.

This level of improved performance is contributing to the overall improvement in the region discussed earlier in the *Power system* chapter, and is reassuring given the issues in the region in previous years.

Tennant Creek

Generation performance in the Tennant Creek power system has consistently been poor when compared with the other Territory power systems or regions over the last seven years.

The five-year average in 2023-24 was 2.5 interruptions and 78 minutes without supply per customer due to generation performance, which is higher than the other Territory power systems (and regions) covered in the NTPSPR. However, there has been an improvement in the five-year average over the last two years, noting generation performance had previously been on a deteriorating trend.

PWC System Control issued a direction in December 2022 (through a Risk Notification) requiring Territory Generation to dispatch unit 15 at the Tennant Creek power station at all times, when available. Unit 15 is a larger and 'heavier' generator compared with the others in the region and while it improves system security, which is likely behind the improved generation performance in the region, it comes at an increased cost when compared with running the newer, 'lighter' and more efficient generation in the region.

Based on discussions with stakeholders, it appears further investment in supporting technologies may be needed in the region if the power system is to move away from its reliance on unit 15 to greater utilise the newer and more efficient generation investments already made, while maintaining system security. Any consideration of investment should include a robust cost benefit analysis that considers options including continuing to use unit 15 against investment in new assets, and an acceptable level of reliability in the region, noting not all interruptions can be or should be avoided.

Generation availability

A range of indices are used to assess the availability of generating units, and to some degree, provide insight into the adequacy of condition monitoring and preventative maintenance. These include:

- availability factor
- unplanned availability factor
- equivalent availability factor
- forced outage factor
- equivalent forced outage factor.

These metrics, when combined, offer a view of the overall reliability of the Territory's generation fleet, as well as the impact of planned and unplanned outages on generation availability.

Territory

Figure 23 shows the capacity-weighted generation availability across the Territory over the last seven years, incorporating planned maintenance and forced outages. Capacity weighting is used to reflect the actual contribution of each power station to the overall system, ensuring larger stations, which have a greater impact on the system's performance, are properly accounted for.

In an ideal scenario, planned maintenance (shown as green sub-bars) is optimised to ensure maximum generation availability (light blue sub-bars), while forced outages or unplanned maintenance (dark blue sub-bars) are minimised. Although unplanned events cannot be entirely eliminated, reducing their frequency and duration is important in maintaining system reliability and security.

Maximising generation availability is essential for both generators and system controllers, as it provides greater operational flexibility and improves system reliability. Planned maintenance, while essential, can be scheduled and managed. In contrast, unplanned outages or forced outages due to faults can pose serious risks to system reliability and security, and should be minimised wherever possible.

Figure 23: Generation availability weighted by capacity, Territory

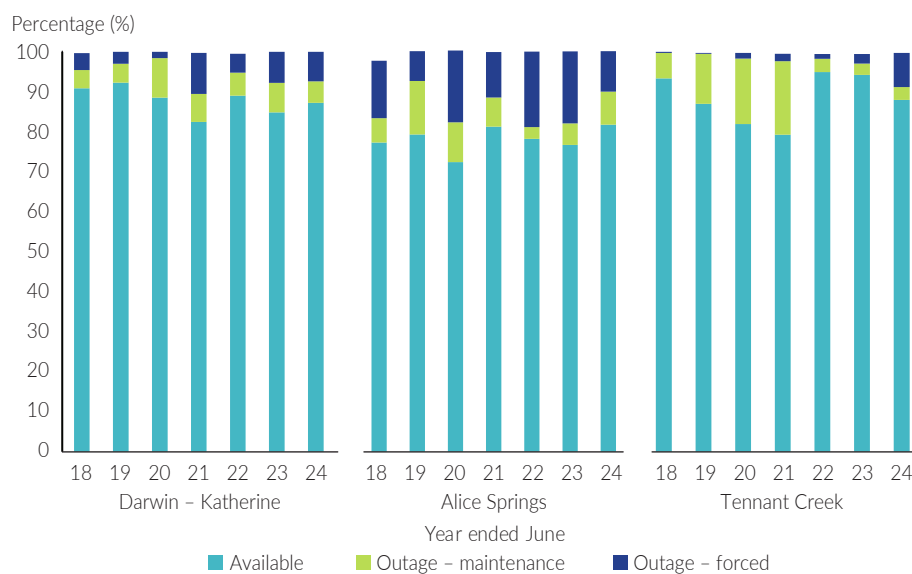


Generation availability in the Territory improved slightly in 2023-24, increasing from 84% to 86%. However, the five-year rolling average continued its gradual decline, reaching 85%, down from a high over the last seven years of 90% in 2018-19. Over that same period, the two lowest availability periods were observed in 2020-21 and 2022-23 (at 82% and 84%, respectively), driven by elevated levels of forced outages at major power stations such as Channel Island, Katherine and Ron Goodin. Further, there were challenges associated with industrial action in 2022-23, which had a notable impact on availability levels.

Regional

As with Figure 23, Figure 24 combines generators' reported indices but segmented by power system to show the capacity-weighted generation availability in the Darwin-Katherine, Alice Springs and Tennant Creek power systems over the last seven years, including the level of both planned maintenance and forced outages.

Figure 24: Generation availability weighted by capacity, by region



Darwin-Katherine

Given its larger share of generation capacity, the Darwin-Katherine power system heavily influences the Territory-wide results. In 2023-24, the region experienced an improvement in generation availability from 85% to 87%. Despite this, the five-year rolling average for the region has declined over the last two years, dropping from 89% in 2021-22 to 87% in 2022-23 and to 86% in 2023-24.

The decline in generation availability can largely be attributed to an increase in forced outages (as highlighted above), with significant disruptions in 2020-21 and 2022-23.

Notably, the Channel Island power station, the largest in the region, continues to show a steady deterioration in availability. As discussed in previous NTPSPRs, Channel Island power station's generators are aging, and this raises concerns about the power station's ability to maintain reliable service in the coming years (unless work is carried out to effectively extend the life of the generators or new investment is made).

PWC System Control reporting indicates several operational constraints now apply to generation at the Channel Island power station, including those scheduled for retirement in the medium term. These constraints reduce the system controller's flexibility in dispatching generation to meet customer demand. Given Channel Island power station's critical role in the Darwin-Katherine power system, the Commission emphasises its recommendation in the 2023 Northern Territory Electricity Outlook Report (NTEOR) for urgent investment in new generation, storage and or demand response capabilities. The Commission notes the NTEOR assumes these near end-of life generators at the Channel Island power station remain serviceable and available until their retirement, however should this not occur, the recommendation becomes even more urgent.

Alice Springs

Generation availability in Alice Springs improved in 2023-24, rising from 77% to 82%, the highest level in the last seven years. This improvement occurred despite an increase in planned maintenance, as a substantial reduction in forced outages more than offset the impact of scheduled work. The five-year rolling average for Alice Springs improved slightly to 78%, though it remains below the averages for Darwin-Katherine (86%) and Tennant Creek (88%).

Notable improvements were observed at both the Owen Springs and Ron Goodin power stations. Territory Generation has credited these results to improved condition monitoring and increased maintenance expenditure, alongside improved management of maintenance durations. However, availability at the Ron Goodin power station remains low at 69% in 2023-24.

The performance disparity between the Owen Springs and Ron Goodin power stations reflects the difference in their life cycles. Owen Springs, with its newer infrastructure, has been subject to higher levels of planned maintenance, while Ron Goodin's aging generation has experienced higher levels of forced outages over the past seven years. Despite its low availability, the Ron Goodin power station remains a backup for the region while the newer generators at Owen Springs, along with the battery energy storage system at Ron Goodin, operate under constraints.

Looking forward, the Commission expects that Ron Goodin power station's availability will continue to be low (or decline) as it nears the end of its operational life, likely continuing to weigh down the region's overall performance.

Tennant Creek

In 2023-24, Tennant Creek saw a decrease in generation availability, dropping from 95% to 88%, primarily due to an increase in forced outages. Nevertheless, the power system's five-year average remained steady at 88%, consistent with the results of the past three years.

Territory Generation attributed the increase in forced outages to a unit being out of service for over 10 months, though this unit has since returned to service. Planned maintenance levels have remained low, following a peak in 2020-21 when several older generators at the Tennant Creek power station were retired. Despite the decline in availability, the Tennant Creek power system continues to perform relatively well in terms of generation availability compared to the Darwin-Katherine and Alice Springs systems.

Previous NTPSPR recommendations

This chapter provides the status of recommendations from previous NTPSPRs assessed as not complete in the 2022-23 NTPSPR. Some progress has been made against these recommendations during 2023-24, with three noted as completed (or closed) as part of this review.

Importantly, the recommendations are those of the Commission and if a recommendation is not related to non-compliance, such as licence conditions or relevant legislation, it is not enforceable.

The Commission has grouped the recommendations to highlight related issues or overlapping recommendations, where possible.

Table 9 provides a summary of the Commission's assessment of the status of previous NTPSPR recommendations in terms of whether the recommendations are considered as open or complete (or closed).

Table 9: Summary of assessed status of recommendations in previous NTPSPRs

	NTPSPR						Total
	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	
Open	2	4	2	1	0	0	9
Complete/closed	8	2	4	5	0	0	19

Katherine region operation

In addition to the two recommendations below, which are related to the operation of the Katherine region of the Darwin-Katherine power system, the Commission made a recommendation in the 2017-18 NTPSPR regarding Katherine and Pine Creek island management, however this was closed as an overlapping recommendation was made in the 2018-19 NTPSPR (shown below).

Recommendation: Review and improve the operation of the Katherine/ Pine Creek island

NTPSPR: 2018-19

Page: vi

Accurate and reliable islanding identification and clear and robustly implemented protocols are required.

Relevant licensee or stakeholder: PWC System Control

PWC Power Services

Territory Generation

EDL

Status:

In progress

Recommendation: Katherine island operation

NTPSPR: 2020-21

Pages: v and 22

It is recommended that PWC System Control investigates how generating units in the Katherine region could be normally operated in both voltage and frequency droop modes to assist power system recovery from a separation event.

Relevant licensee or stakeholder: PWC System Control

Territory Generation

EDL

Status:

Closed (covered by the recommendation above from 2018-19)

PWC System Control advised that progress on the first recommendation is part of PWC's integrated plan for renewables. The work focuses on three main areas:

- ensuring signals can be sent and received as needed
- confirming appropriate generator responses during islanding events
- designing a replacement islanding scheme, as the existing Darwin-Katherine transmission line islanding scheme is at the end of its life.

To improve islanding signal identification, PWC Power Services is implementing a tone-relay replacement project. Collaborative efforts between PWC System Control, EDL and Territory Generation are ongoing to establish suitable control modes for generators at Pine Creek and Katherine power stations. This also addresses the second recommendation.

PWC Power Services advised that work is underway to develop an islanding scheme for the Darwin-Katherine transmission line, which will trip affected generators upon circuit breaker operation. A functional specification is being prepared, with the business case expected to be completed by the end of 2024. A design tender for upgrading control and protection systems across 132kV substations connected to the Darwin-Katherine transmission line has been issued, enabling future integration of generation technologies for more reliable islanded operations.

Territory Generation reiterated its commitment to assisting PWC and noted the Commission's view that consistent performance improvements across multiple years are yet to be observed.

EDL advised it has installed data recording units at its Pine Creek power station to enhance data provision to PWC System Control and has completed improvements in islanding signal receipt. Efforts continue to support better data visibility and coordination with PWC.

Progress is ongoing in addressing the operation of the Katherine/Pine Creek region, but the region's performance continues to lag behind other regions. Upon review, the Commission considers the second recommendation is a subset of the first recommendation, which covers the broader scope of islanding management. Thus, the second recommendation can be closed, while the first recommendation remains in progress and will continue to be tracked by the Commission. This approach aligns with closing a 2017-18 recommendation, which was superseded by the broader first recommendation above.

Generation asset management

Recommendation: Balance pro-active and reactive system improvement strategies

NTPSPR: 2018-19

Pages: v and 15

Good electricity industry practices, such as in relation to condition monitoring and preventative maintenance, and visibility and knowledge of plant limits, should be adopted by generators, with more formal auditing.

Part A – Improved condition monitoring and preventative maintenance practices.

Part B – Better visibility and knowledge of plant limits, in particular where these plant limits vary.

Relevant licensee or stakeholder: Territory Generation (part A and B)

EDL (part A and B)

PWC System Control (part B)

Status: In progress

In relation to part A of the recommendation, Territory Generation reported industrial action impacting availability in 2022-23 was no longer a factor in 2023-24, which will be reflected in its reporting. Territory Generation also acknowledged the Commission's intent to monitor improvements in condition monitoring and preventative maintenance practices over a longer period of time before considering the recommendation complete.

EDL advised it continues to maintain equipment under an Equipment Health Management Agreement with the original equipment manufacturer. In 2023, EDL proactively replaced both gas turbines at its Pine Creek power station upon reaching replacement running hours, aligning with the manufacturer's recommended practices. EDL expressed satisfaction with its condition monitoring and preventative maintenance practices, which it considers to meet industry standards, as demonstrated by the historical reliability of the Pine Creek power station.

While generation availability across the Territory improved slightly in 2023-24, the broader trend since the onset of this recommendation has shown a gradual decline in availability and an increase in forced outages. This trend could signal areas for improvement in condition monitoring and preventative maintenance practices. The Commission will continue to track this recommendation and expects a consistent, long-term improvement before considering it complete.

Reporting

Recommendation: Incident reporting – clarity on generation SAIFI and SAIDI apportioning in incident reports

NTPSPR: 2020-21

Pages: vi and 29

It is recommended that PWC System Control clearly identify and apportion the customer impact for a particular event between the relevant licensees in each major incident report, noting the EIP Code requires generators to report on their SAIFI and SAIDI performance.

Relevant licensee or stakeholder: PWC System Control

Status: In progress

PWC System Control has advised that it has updated its reporting templates to include the apportioning of outages to licensees, however the Commission is yet to see evidence of this, due to no final report being issued since the template was updated.

While the Commission acknowledges PWC System Control's reported efforts to update its templates, as it has yet to receive evidence that incident report templates have been finalised and implemented whereby they explicitly identify and apportion the customer impact (SAIDI and SAIFI) of an event among relevant licensees. Therefore, the Commission considers this recommendation to be in progress. The Commission will continue to monitor incident reporting for demonstrated improvements in the clarity of generation SAIFI and SAIDI apportioning.

Further, as discussed earlier, the Commission is considering generation reporting requirements, informed by stakeholder feedback, as part of its current review of the EIP Code.

Planning and coordination

The following recommendations relate to the lack of or inadequate frameworks and structures in the Territory's electricity supply industry, or overall explicit responsibility, accountability and authority for coordination in the Territory.

Recommendation: Planning and modelling

NTPSPR: 2017-18

Page: vi

Better planning, including modelling of system changes and associated operations, by PWC Power Services in consultation with PWC System Control and licensees.

Relevant licensee or stakeholder: PWC System Control

PWC Power Services

Territory Generation

Status:

In progress

Recommendation: Ensure generation and demand changes are planned for with a view to efficiency and robustness

NTPSPR: 2018-19

Pages: v and 35

Detailed planning work is required to understand the operability of the three power systems with increased variable renewable energy penetration. This should include consideration of frequency and voltage control and regulation.

Relevant licensee or stakeholder: PWC System Control

PWC Power Services

Northern Territory Government

Status:

In progress

The Commission considers there is some overlap between the two recommendations above from the 2017-18 and 2018-19 NTPSPRs, and has therefore grouped them together.

PWC System Control advised addressing the recommendation is part of a PWC integrated approach to managing the transition to renewables, overseen by a committee led by the PWC CEO. Key tasks include system model governance, validation and priority studies, such as recent voltage management studies in the Darwin-Katherine and Alice Springs power systems. PWC System Control (or Northern Territory Electricity System and Market Operator (NTESMO)) also stated it was tasked by (the former) Department of Industry, Tourism and Trade to develop a 10-year Regulated Electricity System Investment Plan (RESIP). As part of the process, System Control advised it is developing, through systems modelling, a 10-year plan for what is required to maintain a stable system.

PWC Power Services advised it made significant progress on completing recommendations to achieve a robust Model Governance Framework, with an independent review showing an improvement in completing recommendations, from 28% to 90% between November 2023 and September 2024. The framework aims to enhance planning by formalising processes for incorporating project data and engaging technical teams in studies. PWC Power Services also conducted voltage management studies for each power system and completed system strength studies through to 2031, with results shared with stakeholders in March 2024.

Territory Generation advised it is actively involved in the RESIP and Alice Springs Future Grid initiatives, supporting collaborative planning efforts.

While the licensees have made progress in planning, modelling, and developing governance structures, significant work remains, particularly around coordination, accountability and robust frameworks. NTESMO's ongoing development of the RESIP, which includes comprehensive system modelling, underscores continued effort in this area. Given the work still underway and the ongoing need for a coordinated approach across the Territory's power systems, these recommendations remain in progress.

The following recommendations under the 'planning and coordination' heading relate to specific power systems or regions in power systems, rather than all three power systems.

Recommendation: Managing Ron Goodin power station retirement

NTPSPR: 2017-18

Pages: iv and 43

Care should be taken to ensure a robust set of operating protocols is developed to allow for safe and secure operation of the Alice Springs network without the support of the Ron Goodin power station.

Relevant licensee or stakeholder: Territory Generation

PWC System Control

Status:

In progress

Territory Generation reported it is currently working with PWC on new assets and strategies for safe and secure operation of the Alice Springs power system post-retirement of the Ron Goodin power station.

PWC System Control advised it is working alongside Territory Generation and PWC Power Services on a coordinated plan to transition the Ron Goodin power station into standby mode as a precursor to full retirement. This involves four key focus areas:

- voltage management – a study completed in November 2024 suggests the Ron Goodin power station can be placed in standby with some operational changes. Medium-term plans include installing a reactor bank at the Lovegrove zone substation to manage voltage, with future battery capabilities planned to enhance system stability
- network constraints – addressing high-load issues involves reconfiguring the Alice Springs distribution network and shifting 22kV load to the Lovegrove zone substation to resolve constraints by late 2024. Protocols are being developed to handle potential overloads
- generation capacity – Territory Generation is exploring short-term thermal capacity expansions at the Owen Springs power station and long-term battery installations to support peak demand

- system black start capability – black start procedures have improved with a load bank at the Owen Springs power station, enabling stable generator operation during system energisation. Testing is ongoing to bolster confidence in the process, with the Ron Goodin power station still available as a backup black start station.

The retirement of the Ron Goodin power station is also being factored into a RESIP, which is being developed by NTESMO and includes Alice Springs.

The Commission acknowledges the progress and detailed planning undertaken by Territory Generation and PWC System Control to ensure a smooth transition away from reliance on the Ron Goodin power station. These efforts include comprehensive studies, and consideration of infrastructure upgrades and strategic investments to address key operational challenges. However, since the process of decommissioning or removing the Ron Goodin power station from service has not yet commenced, the Commission considers this recommendation to remain in progress. Continued monitoring and implementing the outlined plans will be essential for ensuring long-term system reliability and security in Alice Springs.

Recommendation: Coordination of generation protection and network requirements

NTPSPR: 2019-20

Pages: vi and 48

The setting of protection limits for over and under voltage and frequency on generating units should always represent the capability of the generation units themselves rather than the power system limits. This recommendation relates mainly to Tennant Creek.

Relevant licensee or stakeholder: PWC System Control

PWC Power Services

Territory Generation

Status:

In progress

This recommendation relates to the Tennant Creek power system. PWC System Control reported it continues to monitor and make recommendations aimed at enhancing system performance, accounting for both network and generation needs. The number of reportable incidents in Tennant Creek decreased by half in 2023-24 compared to the previous year. The installation of additional high-speed data recorders at the Tennant Creek power station is expected to improve the analysis of generator performance during system events. Discussions with PWC Power Services and Territory Generation remain active to support system stability and customer service.

PWC Power Services noted Territory Generation has reviewed protection settings with the generation units' capabilities in mind and confirmed the proposed changes align with relevant sections of the Network Technical Code.

Territory Generation advised it has completed its protection study and received feedback from PWC. However, due to availability of specialist contractors, implementing the new protection settings is scheduled to start in early to mid-2025, in coordination with PWC.

Although progress has been made in assessing and planning protection setting changes for the Tennant Creek power system, implementing these changes is yet to begin.

The Commission acknowledges the collaborative efforts between the licensees and improvements in system analysis capabilities. However, since the updated protection settings are not in effect, this recommendation is still considered in progress.

Recommendation: Unusual system conditions – islanding investigation

NTPSPR: 2020-21

Pages: v and 22

It is recommended that PWC System Control, in consultation with PWC Power Services and relevant licensees, investigates the possible island or weakened areas of the network that can form in the aftermath of a contingency event and uses a risk-based approach to determine which of these scenarios require planning actions. Planning actions may take the form of constraints, network investment or localised ancillary service requirements, among others.

Relevant licensee or stakeholder: PWC System Control

Status: Complete

PWC System Control advised that outside of the Katherine/Pine Creek region, it identified two plausible islanding scenarios:

- Alice Springs power system – potential islanding of Ron Goodin-Sadadeen from Lovegrove-Owen Springs on loss of the two 22kV Lovegrove-Sadadeen ties. This scenario is relevant only when the Ron Goodin power station is generating, which is typically limited to one machine and will soon transition to standby status. Once in standby, this islanding scenario ceases to be relevant. Therefore, PWC System Control does not plan further investigation
- Weddell power station – potential islanding involving Weddell power station and associated substations (Palmerston, Strangways, Weddell, Archer) on the simultaneous loss of both Hudson Creek-Palmerston and Hudson Creek-Archer 66kV lines. PWC System Control does not consider this a credible contingency. Risk notices are issued by PWC System Control during planned maintenance to ensure output at Weddell power station matches the radial supply load, allowing for a balanced island if a line trips. No further investigation is proposed for this scenario.

PWC System Control also noted potential weakened supply areas on radial feeders (Dundee, Mataranka, Hermannsburg) fall within the distribution network and are considered network reliability issues, not system security concerns.

The Commission finds the rationale provided by PWC System Control to be reasonable. The key remaining area of concern is related to the Katherine/Pine Creek region, and this is addressed by other recommendations that continue to be tracked. Given this, the Commission considers the recommendation to be complete as related concerns are being managed under separate, ongoing recommendations.

Network low voltage supply

Recommendation: Management of low voltage supply voltages in Darwin-Katherine network

NTPSPR: 2018-19

Pages: vi and 28

The voltage quality statistics for the Darwin-Katherine network, and more specifically in the Katherine region, show supply voltages are trending towards the high end of the allowable spectrum.

Relevant licensee or stakeholder: PWC Power Services

Status: In progress

PWC Power Services reported a project to install two 5 megavolt ampere of reactive power (MVAR) reactors at the Katherine terminal substation is in the delivery phase. However, challenges related to reactor specifications and integration design have delayed the project, with the new forecasted completion date set for 1 October 2025. Additionally, the design and construction contract for the Trevor Horman zone substation was awarded in early 2024, with completion initially planned for late 2025. Coordination with large connection projects at the site has introduced potential delays but these adjustments will enhance the substation's ability to integrate additional 66kV connections.

The Commission notes that while both projects aimed at managing low voltage supply voltages in the Darwin-Katherine network are progressing, delays have pushed their expected completion dates further out. The Katherine terminal substation reactors are now expected to be operational by October 2025, and the Trevor Horman zone substation is still anticipated for late 2025, albeit with possible delays. Given work is ongoing, this recommendation remains in progress.

Recommendation: Management of voltage in Alice Springs

NTPSPR: 2019-20

Pages: vi and 42

A need for investigation of, and potential investment in, managing supply voltages in the low voltage parts of the distribution network in the Alice Springs power system.

Relevant licensee or stakeholder: PWC Power Services

Status: In progress

PWC Power Services reported a project to install switched inductive compensation (two reactors, 5.5 MVAR) at the Lovegrove zone substation is currently in the delivery phase. The reactors and associated switchgear have been ordered, with site delivery expected in October 2025. The contract for design and installation is nearing finalisation and the reactors are forecasted to be operational by December 2025.

The Commission acknowledges that while progress is being made, a project aiming to address the recommendation remains in the delivery phase with completion and operational timelines pushed to December 2025. As a result, this recommendation remains in progress.

Process

Recommendation: Manage testing and abnormal plant conditions

NTPSPR: 2018-19

Page: vi

Outage protocols including switching sheets, isolations and workspace delineation need greater focus from plant owners to ensure the number of inadvertent trips and faults are minimised.

Relevant licensee or stakeholder: Territory Generation

PWC Power Services

Status: Complete

Territory Generation reiterated its commitment to minimising inadvertent trips and faults, emphasising the continued focus on compliance and adherence to robust outage protocols.

PWC Power Services reported it is continuing to monitor, investigate and refine switching processes through system event investigations. Its most recent review of switching error impacts indicated measurable improvement, with a three-year rolling average of SAIDI contribution decreasing from about 3.52 minutes in 2021-22 to 1.91 minutes in 2023-24. PWC Power Services reaffirmed its commitment to continuous process enhancement.

The Commission acknowledges the improvements and continuous improvement processes implemented by Territory Generation and PWC Power Services. While operational error-related interruptions occurred in 2023-24, the overall number and customer impact were relatively low. Notably, there were no generation-related operational errors that led to interruptions and while an event involving a system black in the Katherine/Pine Creek region occurred, it was linked to network switching managed by PWC System Control.

Given the demonstrated progress, data indicating improvement in operational performance and understanding that complete elimination of human error is impractical, the Commission considers this recommendation complete.

Appendix: Glossary

AER	Australian Energy Regulator
CBD	central business district
Commission	Utilities Commission of the Northern Territory
Customer minutes without supply	Number of minutes customers are without supply, calculated by multiplying the number of customers impacted by the duration of the incident
DNISP	distribution network service provider
EDL	EDL NGD (NT) Pty Ltd
EIP Code	Electricity Industry Performance Code
GSL	guaranteed service level
GWh	gigawatt hours
kV	kilovolt, 1 kV = 1 thousand volts
MVA	megavolt ampere
MVAr	megavolt ampere of reactive power
MW	megawatt, 1MW = 1 million watts
NEM	National Electricity Market
NTEOR	Northern Territory Electricity Outlook Report
NTESMO	Northern Territory Electricity System and Market Operator
NTPSPR	Northern Territory Power System Performance Review – this review
PWC	Power and Water Corporation
RESIP	Regulated Electricity System Investment Plan
SAIDI	system average interruption duration index
SAIFI	system average interruption frequency index