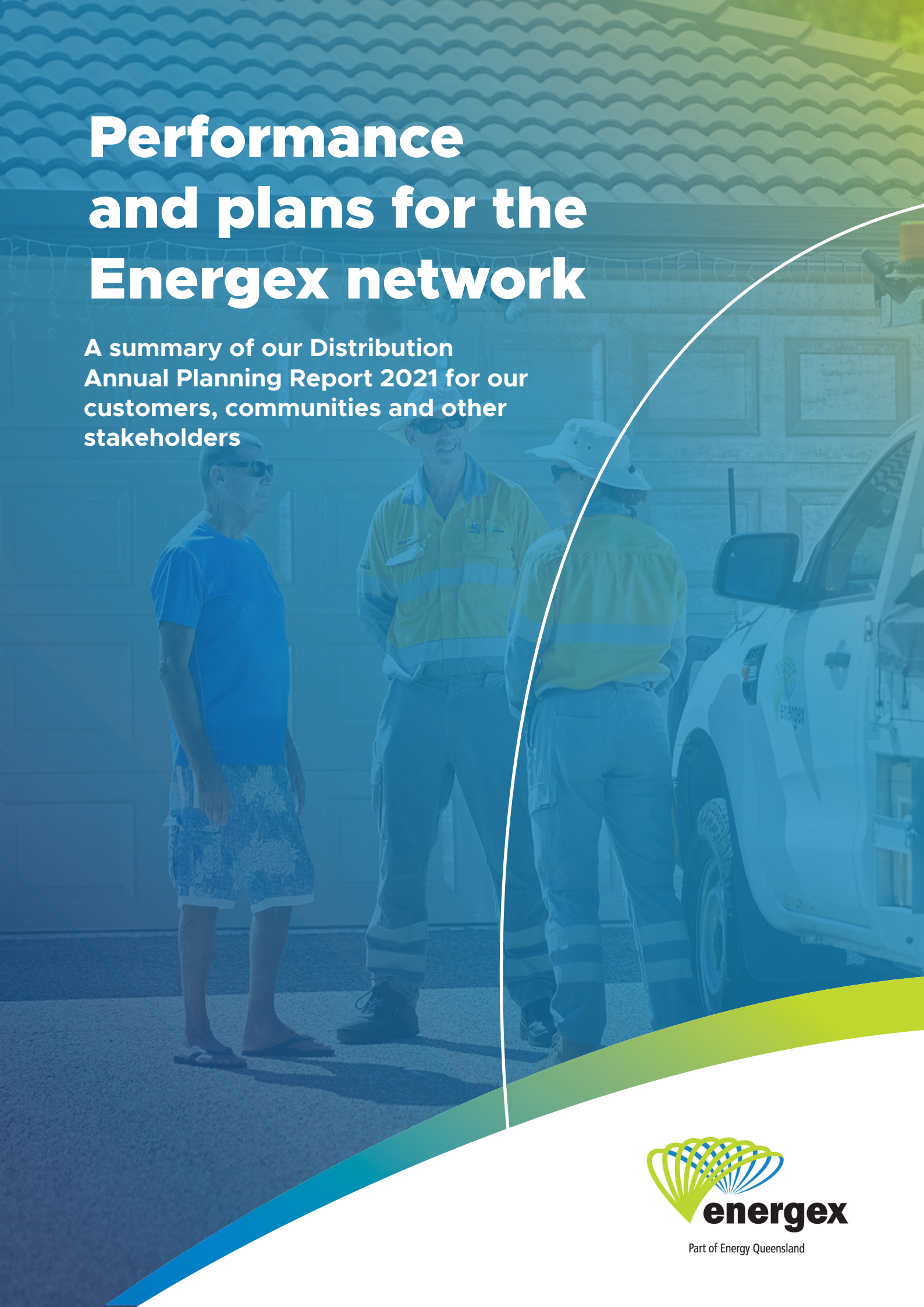
Performance and plans for the Energex network

A summary of our Distribution Annual Planning Report 2021 for our customers, communities and other stakeholders



energex

Part of Energy Queensland

Purpose

Energex's Distribution Annual Planning Report (DAPR) explains how we are continuing to safely and efficiently manage the electricity distribution network in South East Queensland.

This summary outlines the content in our planning report with links to specific chapters you can refer to for more information.

The full report details the network's performance in 2020-21 and our plans for 2021-22 to 2025-26.

It provides insights into the key challenges we face and our responses to them, highlighting the areas where we are seeking to work closely with our customers, the community and different industry partners. It provides information to assist interested parties to:

- understand how the electricity network works
- provide input to the future development of the network
- identify locations that would benefit from significant electricity supply capability or demand side management and non-network initiatives
- identify locations where major industrial loads would be best located.

This information is also supported by our online interactive map of the electricity network and information provided in our Demand Management Plan and Demand Side Engagement Strategy.

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Message from our Executive

I am pleased to share this summary of Energex's Distribution Annual Planning Report for 2021.

Each year we publish our plans to build on the dialogue we have with our many different stakeholders. They cover the key factors shaping our plans, the current and forecast electricity demand, the state of our networks and service performance trends, as well as our investment intentions for the coming years.

Many of our customers are telling us their primary concern is affordability and that we shouldn't spend any more than is necessary on maintaining, operating and upgrading our network. Through the many customer advocate groups we engage with, we know this means we must work more closely together with all of our stakeholders to balance affordability with other critical customer and community outcomes that need to be achieved.

Engagement has become even more important with the impact of COVID-19 restrictions and subsequent downturn in the economy. This has brought 'energy inclusion and vulnerability' and 'economic development and jobs' to the fore.

At all times, these issues must be balanced while continuing to ensure the safety of the communities we serve across South East Queensland, including our employees, by managing the risks associated with the electricity network.

Enabling greater choice and control

Across the 1,500,000 homes and businesses connected to the Energex network, many are taking greater control over their electricity solutions by investing in solar and other emerging technologies. Our challenge in managing the network is to leverage this growing level of customer-led investment to improve and complement our own efficient investment.

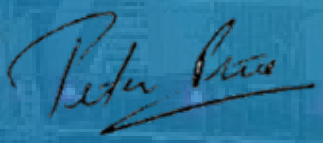
In response to this, we have developed Future Grid plans anticipating an energy environment characterised by rapid technological change, as well as ongoing high penetrations of renewable energy resources.

These factors are shaping our plans as we work to ensure the efficient investment in, and operational use of, the South East's electricity networks for the long-term interests of our customers and the broader community.

Thanks. You're part of a bright future

I would like to thank all of the customers and other stakeholders who have engaged with us on our plans over the past year, and participated in our programs, especially the industry partners who are central to our demand management program and enabling network connections.

I look forward to continuing to work together as we evolve our investment and operational programs to best deliver a bright future for Queensland.



Peter Price
Executive General Manager
Engineering

Our network

246
zone substations

51,693
distribution transformers

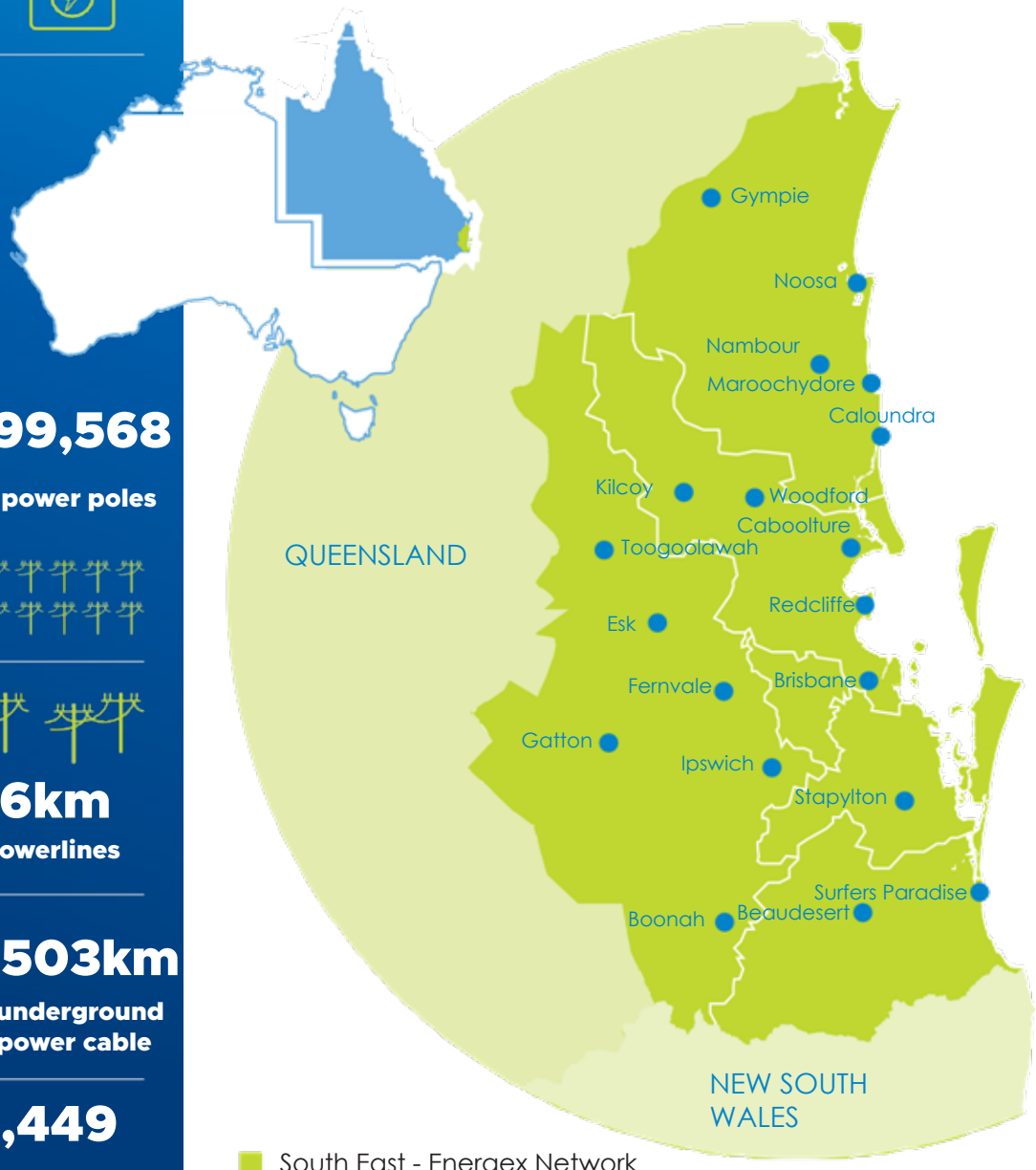
699,568
power poles

35,066km
Overhead powerlines

20,503km
underground power cable

1,545,449
connected customers

Our Service Area



South East - Energex Network

What is shaping our plans?

We continue to hear that safety should never be compromised and that electricity affordability remains the core overriding concern for many. At the same time, in addition to keeping the lights on, it is clear our customers want greater choice and control around their energy solutions, with a strong interest in renewables and other energy-related technologies.

These insights are shaping our plans.

Our engagement program

To ensure we're meeting the unique and diverse needs of our communities and customers, in a period where our industry is undergoing rapid transformation, a coordinated, performance measured, multi-channel community and customer engagement program is required.

Most recently, we have refreshed our understanding and prioritisation of the economic, governance, social and environmental topics that matter most to our different stakeholders – building on our extensive engagement undertaken previously as well as ongoing work since 2020-21, while focusing upon the network businesses' investment plans; the Regulatory Determination for 2020-25, plus our network tariff reform program.

As part of our planning process for our Regulatory Determination, we responded to our community and customer insights with a set of commitments for 2021 and beyond.

Our Customer Commitments:

- Affordability – we continue to seek ways to make electricity more affordable
- Security of supply – we're here to keep the lights on -providing the peace of mind of a safe, reliable electricity supply
- Sustainability – we support you in the selection of your energy solutions.
- Prioritisation – we continue to prioritize our investment plans, including the strategies and specific investments reflected in this report.

For more on our engagement program go to: Chapter 3 Community and Customer Engagement

Safety first - a no compromise approach

Safety is a key priority for Energex and the community. As our networks age and the risk of equipment failure towards end-of-life increases, our focus on maintaining safety outcomes for our staff, customers and communities is paramount.

We are taking a no compromise approach to community and staff safety, leveraging innovative solutions that enable continuous improvement. We're continuing to focus on improving safety in our asset maintenance, replacement and other program of works delivery practices. We also continue to invest in new technology trials that have the potential to deliver improved, safer or more efficient outcomes for our customers.

Making electricity more affordable

Our customers have told us that affordability is their primary concern – for both cost of living and business competitiveness. Affordability is more than part of our purpose statement, it is a fundamental consideration in how we manage our network.

Under the 2020-21 Pricing Proposal, majority all of our customers experienced a decrease in distribution charges in 2020-21, from 2019-20 (the main component of the network charge). This has supported lower retail electricity prices.

Our forward investment program, in the current regulatory period, remains focused on minimising costs to customers, while still ensuring that we meet the outcomes that our customers expect.

Our asset management strategies aim to balance our customers' need for a safe, secure and reliable electricity supply, as well as their desire for this service to be provided at minimal cost.

A key part of this process is to optimise the economic benefits of network improvement, while always considering the potential for non-network solutions, such as demand management.

The growth in solar energy

Energex has one of the highest levels of residential rooftop solar energy systems per household of any electricity network in the world. Forty per cent of detached homes in South East Queensland have chosen to have a solar energy system installed. The average inverter capacity is 4.5kVA. This desire for greater control through the connection of solar energy continues to grow. During 2020-21, the solar PV technology was being connected to our South East's network at a rate of approximately 4,200 per month compared to 4,100 systems in 2019-20.

At the end of June 2021, there were over 490,619 systems connected to the distribution network, with a total generation capacity of 2,518MVA. We have also supported the connection of large-scale renewable energy projects to the network.

For further information please refer to:

- Chapter 4 Strategic Forecasting
- Chapter 10 Power Quality or
- Chapter 11 Emerging Network

4,200
new solar energy connections per month

490,619
small-scale solar energy systems connected to the network

2,518 MVA
solar generation capacity on the network

43%
of all South East residential detached houses have a solar PV system connected

The changing use of the network

The increase in the distributed solar energy resources is changing the way the network is used with two-way energy flows and new daily load profiles emerging across the network.

In some areas this has been quite significant with the 'hollowing out' of demand at the substation level during daylight hours and a reduction in traditional afternoon electricity peak demands, as represented in the demand profile graph below.

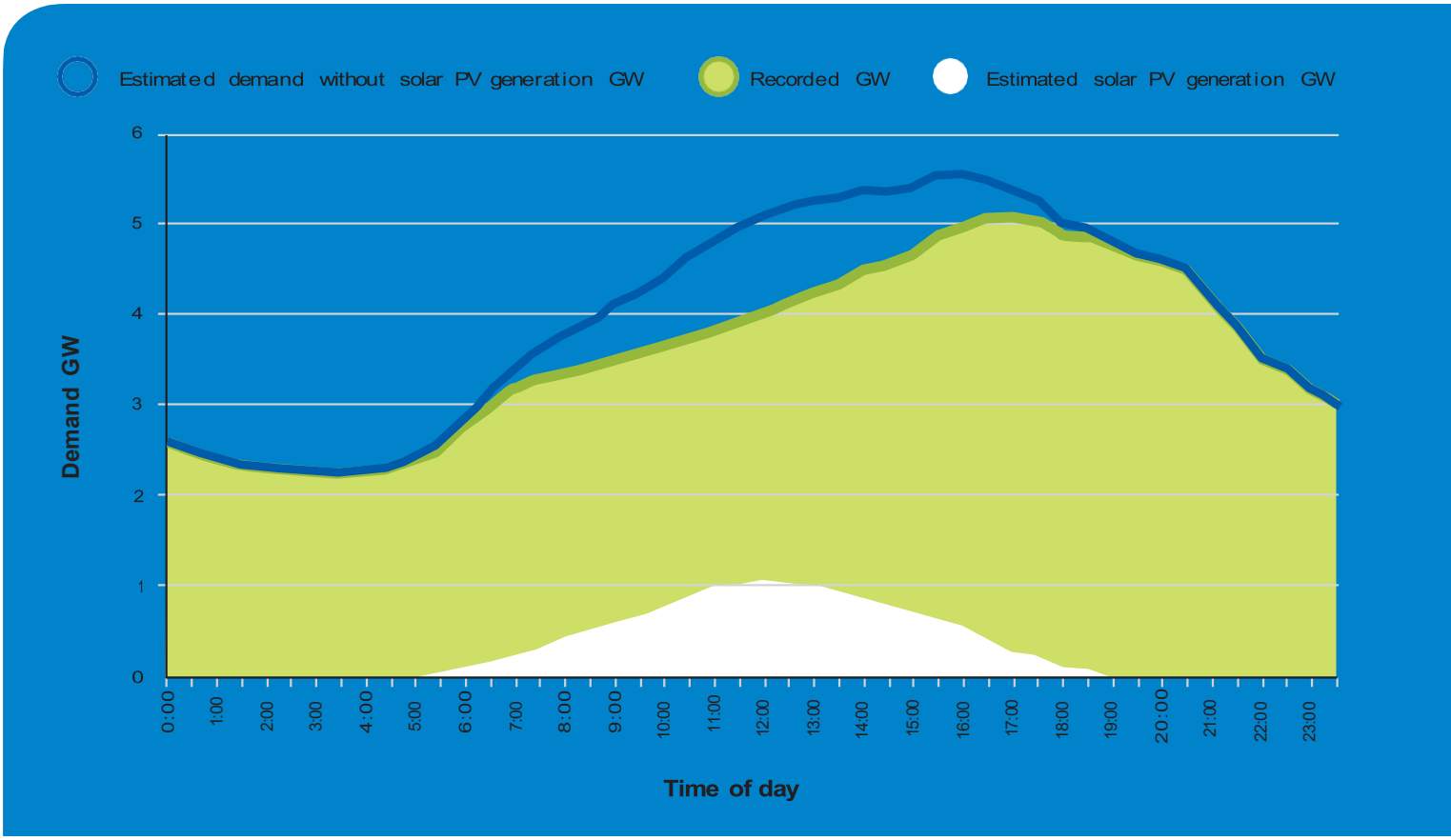
When this occurs, significant two-way flows of electricity along local 'poles and wires' are experienced in residential areas as homes and businesses share their energy output to meet the community's energy needs, which continues to peak as 'school gets out' and 'mealtime' begins.

Also shown in the demand profile graph below, is how generated solar PV energy helps address the network peak in early afternoons. As the sun and solar generation fades later in the day, however, a 'de facto' peak presents itself (albeit lower than what it would have been earlier without the benefit of solar).

It is important to understand that this effect can be very different on a day-to-day basis with demand on the network returning, often dramatically, when cloud cover reduces the local solar energy output. Where there are high levels of solar, quality of supply or voltage issues also need to be addressed. These challenges are also shaping our network plans.

For further information please refer to:

- Chapter 4 Strategic Forecasting
- Chapter 10 Power Quality or
- Chapter 11 Emerging Network Challenges and Opportunities



Looking at trends in electricity use

We expect the growth in electricity supply that is delivered throughout the South East's electricity network will remain relatively stable over the coming years, with a growth rate of 0.6% per annum due to increases in customer numbers.

This expectation is based on the economic outlook, scenario modelling that anticipates ongoing growth in the take up of solar energy systems and an ongoing shift to more energy efficient appliances.

In the medium-to-long-term however, the trend in energy usage from the network will depend on the uptake of other emerging technologies – like battery storage, electric vehicle and the next generation of home and commercial energy management systems.

Electric Vehicles

The growth of Electric Vehicles (EVs) in Queensland as a new class of electrical load presents both challenges and opportunities. Our aim is to ensure we're enabling the charging of Plug-in Hybrid Electric Vehicles (PHEVs) and Battery Electric Vehicles (BEVs) or EVs by our customers, while leveraging them to enhance network utilisation (avoiding peaks in demand by charging at times when there is extra capacity available on the network) and place downward pressure on electricity prices.

Currently, EV uptake in Australia is among the lowest between developed countries. On 30 June 2021, EVs accounted for only 0.2% of all registered cars in Queensland, and 1.0% of cars sales over the previous 12 months. The uptake rate of EVs has recently risen dramatically, and will rise further in 2022 due to a number of new models being released, the increased availability of public EV fast and ultra-fast charging stations and growing consumer appetite.

The rapid development, and resulting lower costs, of lithium-ion and other battery technologies will also make EVs increasingly attractive to more customers. Accordingly, Energex is collaborating with relevant stakeholders to create access to optimal private and public charging solutions based on the affordability and convenience priorities of EV owners.

EVs are at the heart of our 'Electric Life' strategy. We are implementing EV specific activities around buyer education and research, engaging with the EV industry, connecting EV charging stations and monitoring the impacts of this new technology on the network. All of these efforts encourage a safer, more efficient and environmentally cleaner transport option for Queensland.

For more on the emerging challenges go to: Chapter 11 Emerging Network Challenges and Opportunities

How is the network performing? Where are we focusing?

We're always ready for whatever Queensland's challenging summer season delivers. We're continually maintaining and if needed renewing our network to ensure the safety, security and reliability of electricity supply.

We're also focusing on using technology to do things smarter, more safely and efficiently while delivering great customer experiences.

Last summer South East Queensland experienced mild weather conditions

South East Queensland experienced mild weather conditions throughout the 2020-21 summer months. This resulted in a maximum system-wide peak for electricity in demand of 4,570MW on Wednesday 6 January 2021 at 4:30pm.

The network's maximum demand has been 4,893MW on average over the last five summers with an average growth of -0.14% per annum.

While growth in peak demand is relatively flat from a whole-of-network perspective, there remain pockets across the network that have new developments come on-line or experiencing other increases in demand.

Our plans focus on reinforcing constrained sections of the network as well as using demand management to maintain a secure, reliable electricity supply.

For more on our network forecast go to: Chapter 4 Strategic Forecasting

Did you know

We supply power to over
70 hospitals and 600 schools

In January 2021,
the system peak was 4,570MW
rooftop solar reduced the peak by 313MW

In August 2021,
Energex recorded the most recent minimum demand of 697MW

Every week we connect around
500 new residential customers
to our network

Our network, stretched out, would
exceed the perimeter of the Earth

Network reliability improved

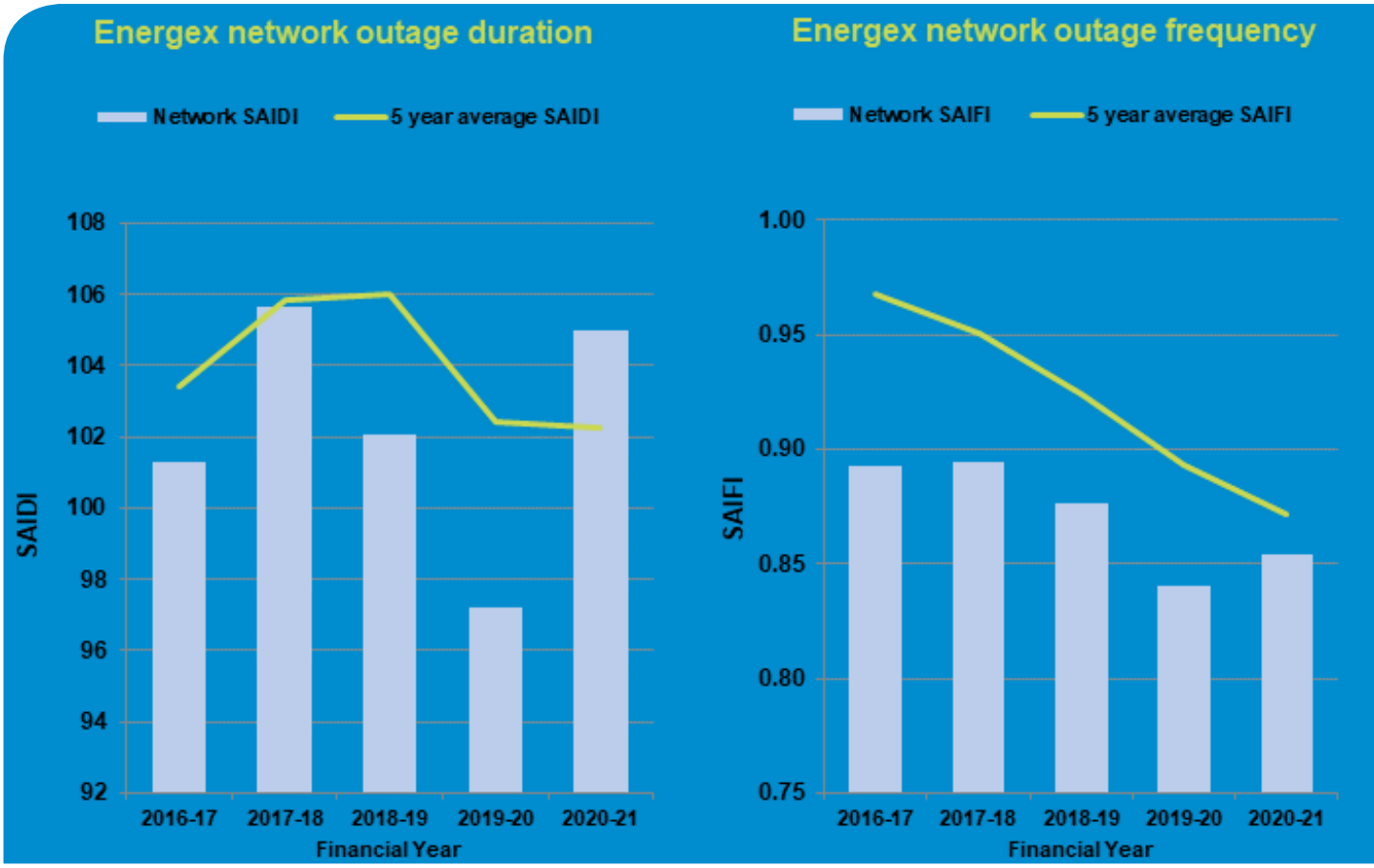
The overall frequency and duration of supply interruptions across Energex's network improved compared to the previous year.

The network's performance for 2020-21 compared favourably to the six Minimum Service Standards (MSS) targets related to duration (System Average Interruption Duration Index, SAIDI) and frequency (System Average Interruption Frequency Index, SAIFI) of power outages. These standards are set as part of Energex's Distribution Authority.

Our response capability is constantly tested by major weather events with each incident unique in terms of scale and impact. Last year, the network was exposed to six severe storms affecting 365,446 customers.

Comprehensive post event reviews are conducted to identify further opportunities to enhance our plans, processes, technology, resourcing and overall response capability. These assessments are critical to reducing the negative impact of large-scale disasters in Queensland and ultimately meet our communities' expectations.

Our commitment is to maintain the improvements in reliability achieved over recent years and to continue to improve the customer experience for those being impacted by outages. Our investment and planning criteria look at the reliability benefits for the customer and our need to meet the MSS as well as Safety Net requirements. The graphs below show the five year trend in outage duration and frequency For more on our network's performance go to: Chapter 9 Network Reliability



Managing an ageing network

To maintain the safety and reliability of the network we need to continually refurbish and replace ageing assets. This investment is targeted to deliver sustainable value for our customers.

The age profile of some parts of the electricity network across South East Queensland is a significant issue requiring regular inspections and condition monitoring to ensure the safety, security and reliability of supply.

Energex employs condition and risk-based asset inspection, maintenance, refurbishment and replacement strategies in line with its asset management policies and strategies. End-of-economic-life replacement and life-extension refurbishment decisions are informed by risk assessments considering safety, history, performance, cost and other business delivery factors.

Our assets are inspected at scheduled intervals to detect physical indications of degradation that lead to impending failures. Typical examples of inspection and condition monitoring activities include:

- Analysis of power transformer oil to monitor for issues
- Inspection of customer service lines for safety concerns
- Assessing the timber power poles and cross-arms for signs of decay
- Electrical testing of circuit breakers for performance.

As part of the program of preventative works, we also invest in major vegetation management projects and address other network issues.

Over the coming years the most significant investment in the renewal of Energex's infrastructure is planned for our overhead distribution network. Here the network's exposure to storms has significant community safety implications. In addition, we are also addressing newly identified powerline clearance issues (showcased below), as well as a range of other issues.

For more on our maintenance approach go to: Chapter 8 Asset Life-Cycle Management

Using technology to deliver smarter solutions

Energex is building its capability with an ongoing investment into technologies that deliver smarter solutions, improved risk outcomes and efficiency.

These efforts include utilising LiDAR data from the aerial asset and vegetation monitoring management technology. This aircraft-based laser and imaging capture system provides spatial mapping of the entire overhead line network. The data captured is processed to enable identification and measurement of the network and surrounding objects, such as buildings, terrain and vegetation. This system creates a virtual version of the real world to allow the fast and accurate inspection and assessment of the physical network and the surrounding environment, particularly vegetation (see above). The integration of this information into our decision framework and works planning processes is increasingly delivering productivity and efficiency improvements for vegetation management and other network analytics such as clearance to ground, clearance to structure, pole movement and leaning poles analysis. Other innovative identification systems are also being developed.

For more on our maintenance approach go to: Chapter 8 Asset Life-Cycle Management

Major projects 2020-21

During the year, we commissioned the following major projects:

Palmwoods to West Maroochydore

132kV dual-circuit powerline

Clayfield Substation

Replacement of transformers

Alexander Headland

Aged asset replacement

Finding the best solutions together

To move to a more sustainable energy system we know our network needs to enable customer choice in electricity supply. This requires an intelligent grid and a focus on making it easier to connect to the network.

Sustainability – the future is in an intelligent grid

We continue to transform our networks into an intelligent grid so that our customers can leverage the many benefits of digital transformation, distributed energy resources such as including solar, and other emerging technologies, like battery storage, electric vehicle and the next generation of home and commercial energy management systems. We see this as fundamental to our role in the future. This has been supported by recent customer engagements and the strong opinions across the community for renewable energy.

More importantly, we see ourselves collaborating increasingly with our customers and market proponents to help leverage the benefits of this new technology across our network and to help deliver overall improved outcomes for customers.

For more information go to: Chapter 11 Emerging Network Challenges and Opportunities

Improving our connection process

During 2020-21 we continued to align the connection process for Energex and Ergon Energy to deliver consistent customer experiences and increased efficiencies.

This has included a major system investment and administration reviews focused upon improvements to the customer experience which will enable customer and industry partners access to information and improve the network connections process.

We are also working with stakeholders to evolve regulations around connection requirements to enable innovation for new electricity supply solutions that deliver balanced outcomes.

For more information go to: Chapter 11 Emerging Network Challenges and Opportunities

Customer-led technologies

Demand management and other non-network solutions

Our Demand Management program forms part of an integrated approach that also includes our forecasting, planning, intelligent grid and tariff strategies to help lower electricity charges for our customers. When it is efficient to do so, the implementation of non-network solutions will replace or complement the need for network investment.

This involves working with end use customers and our industry partners to reduce demand to maintain system reliability in the short term and over the longer term, improve and complement efficient investment in the network. The implementation of a non-network alternative is commonly referred to as demand management. Through our Demand Management Plan customers are incentivised to reduce demand.

For more on Demand Management go to: Chapter 7 Demand Management Activities

We are open to exploring the alternatives

Before investing in significant network projects, we explore if non-network options could provide an efficient alternative solution by engaging the market through a Regulatory Investment Test for Distribution (RIT-D) process.

The following projects are being taken through this process:

- Caloundra
- Coomera-Pimpama Network Limitation
- Feeder Limitations -2021/22 Summer Peak
- Kallangur
- Kilcoy
- Logan Village
- Maleny
- North Stradbroke Island
- Nudgee Zone Substation

The Final Project Assessment Reports for these projects are on the Energex website under Current Consultations.

Energex's longer-term program of work includes other major projects (costing more than $6 million) that have been scoped to address network limitations. We will be presenting these to the market through the RIT-D process to test if there are more efficient solutions.

For more on our recommended solutions go to: Chapter 6 Overview of Network Limitations and Recommended Solutions

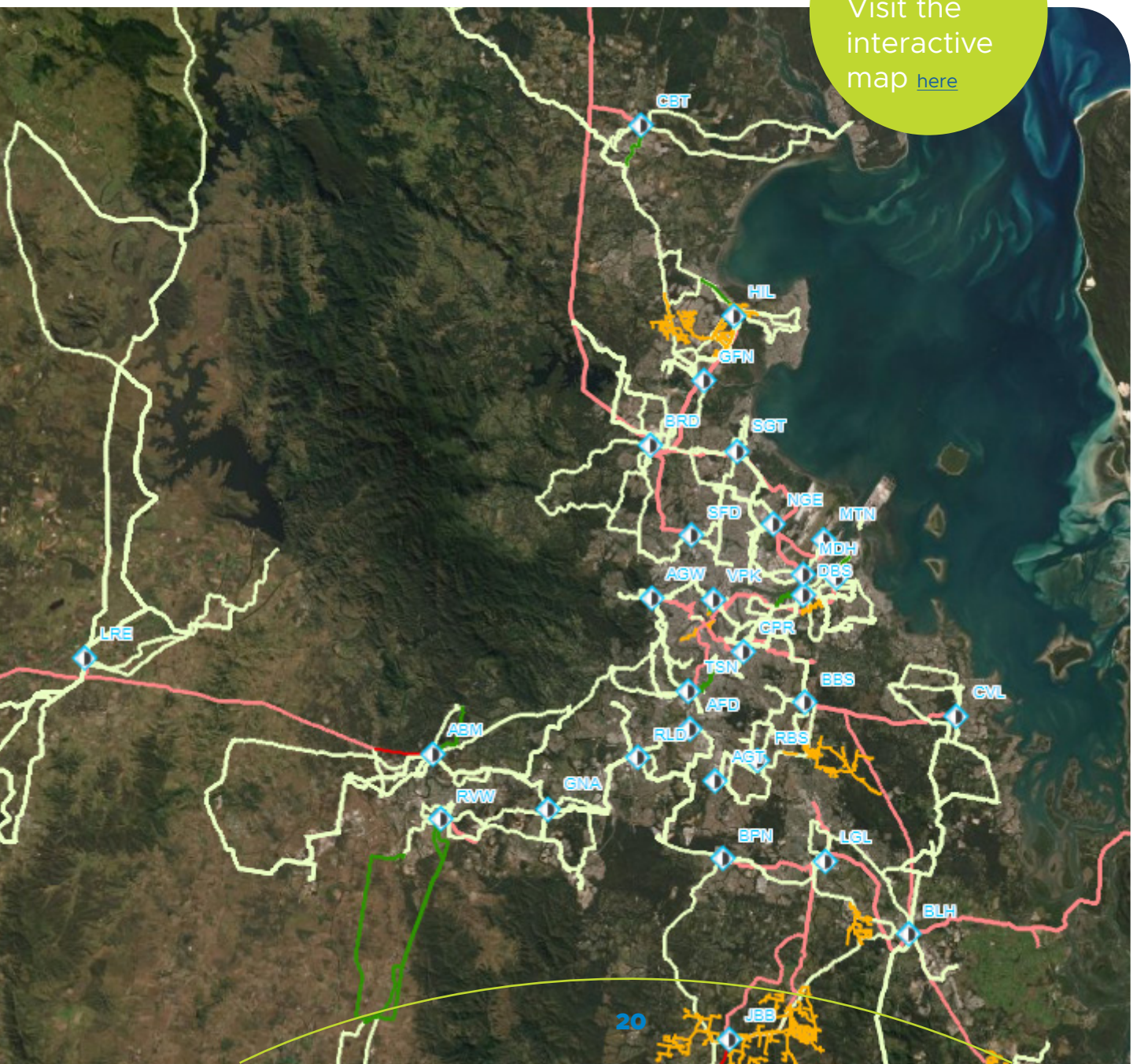
Our online interactive network map

Energex's Emerging Network Limitations Map shows the distribution network and the areas forecast to have emerging network limitations.

This tool enables interested parties to understand how the electricity supply system supports customer and participant needs as well as provide input into future development plans. Also shows stakeholders where significant electricity supply capability or demand side and non-network initiatives could assist, or where major industrial loads would be best located. Energex's DAPR and Interactive Network Limitations Map are prepared and made available solely for information purposes, to support effective engagement around our network planning processes. Importantly, they do not show how the network is operated electrically.

All information should be independently investigated, reviewed, analysed and verified, and must not be relied upon in connection with any investment proposal or decision.

Visit the interactive map here



Our belief

We believe our customers are part of the solution to the challenges we face together. The DAPR provides our stakeholders with the opportunity to review our plans and engage with us on our path forward. It is only through collaboration that we will be able to properly target our future investments and be able to work together to deliver the best outcome for South East Queensland.

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