Batteries – Frequently Asked Questions

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OUR BATTERY PROGRAMS

What are the different batteries being connected into Queensland's distribution network?

Our investment in batteries to date has grown our confidence in the potential for network-connected battery storage to help support the Queensland's renewable energy transformation, and we now have three battery programs underway as part of our Local Network Battery Plan:

Utility-scale batteries – our first six utility-scale, 4MW/8MWh batteries were connected into the High Voltage electricity distribution in Bundaberg, Hervey Bay, Toowoomba, Townsville, and Yeppoon. The success of stage one of the plan has led to stage two getting underway. This is seeing a further 12 batteries installed across the state, in Cairns, Townsville, Mackay, Emerald, Gladstone, Wide Bay (with Mundabubbera well progressed), Toowoomba, and Brisbane. Some of these areas will host multiple sites.

Ipswich Neighborhood Battery Trial – Energex is connecting up to 30 batteries on our power poles and five ground level batteries to the Low Voltage electricity network in Raceview, Goodna, Flinders View, Silkstone, Bellbird Park, and Redbank Plains.

The $10 million trial is being undertaken by Energex in collaboration with Origin Energy as the electricity retail partner.

Community Batteries – Ergon Energy Network and Energex are also now moving to connect community batteries to the local electricity network in 12 different communities across Queensland.

This is a pilot to deliver more small-scale, local network-connected batteries, building on the lessons learnt to date from the Ipswich Neighbourhood Battery Trial.

These community batteries are being funded through the Australian Government's Community Batteries for Household Solar - Delivery of Election Commitments Stream 1 program.

Flow batteries – As part of diversifying our portfolio of batteries and supporting Queensland battery manufacturers we have committed to testing flow batteries from 3 Queensland companies, Vanadium, Zinc Bromines, and Iron. Flow batteries are fundamentally different to lithium batteries and provide different benefits. By testing flow batteries now we are in a position to pick the best technology for future battery deployments depending on the needs and the sites.

OUR BATTERY INVESTMENT 'WHY'

Why is Energex/Ergon Energy Network installing batteries across the state?

Batteries will enable more rooftop solar locally, with more homes and businesses in the community benefiting, by reducing the pressure on the electricity network.

Queensland is already leading the way in the take up of solar energy. We are now working hard to ensure Queensland's electricity networks can support potentially double today's solar energy by 2030, from well over a million rooftops.

Your local battery will allow the solar energy made locally, during the day, to be stored locally, and used locally during the evening when the demand for electricity is at its highest.

Together, the batteries will support a growing contribution from rooftop solar to the Queensland Government's renewables energy targets, outlined in the Queensland Energy and Jobs Plan, and help reduce greenhouse gas emissions.

This is just one of the ways we are enabling the transition to a renewable energy future and, ultimately, by avoiding major infrastructure investment, helping to keep electricity prices down.

As these programs scale up, they will also provide economic benefits right across Queensland, with jobs potential in battery manufacturing, as well as other flow on benefits to suppliers. There could also be opportunities to support other community benefits.

This project will deliver technical benefits throughout the energy supply chain, ensuring the stability of the electricity network, by addressing the challenges of reverse and negative power flows locally, as well as 'minimum load' at a system level.

Why is rooftop solar putting pressure on the electricity network?

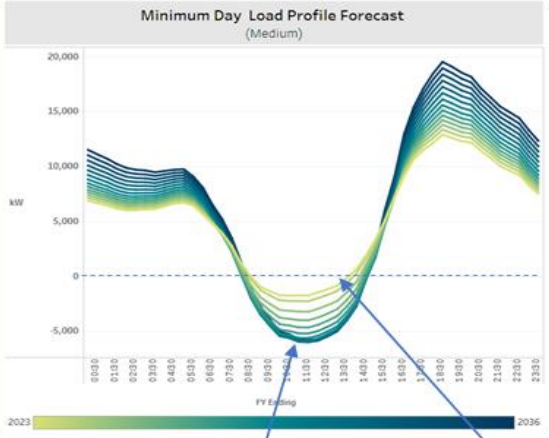
Rooftop solar is changing the way the network is being used. Gone are the days of a single-direction flow of electricity from powerlines into homes and businesses.

Now, it's two-way, with 800,000 solar energy systems state-wide feeding energy into the grid during the day, and then a rapid return to peak demand in the evening.

Batteries are now seen as an essential tool to help manage this change, addressing the challenges of reverse and negative power flows locally, as well as changing demands at the system level.

One of the alternatives to this investment would be to invest in more traditional electricity distribution network solutions, like placing extra transformers across Queensland's electricity networks.

The changing daily demand profile of the Booval Zone Substation looking out to 2035.



The minimum demand has already fallen to negative (yellow). It is forecast to fall further (blue). This means that the energy generated from the local rooftop solar is not needed, so is flowing out of the area.

However, this approach would come at a significant cost, with less benefits. The batteries can deliver a broader range of benefits and help us to avoid the cost of more traditional network solutions and prepare the network to support future technologies.

To take advantage of this, we are moving from trials to further investment, to scale up the roll out of our Local Network Battery Plan.

Will more energy storage be required?

While our battery investment will help us address the solar-related challenges on the distribution network, industry modelling shows significantly more storage will be required to maintain security of supply as we move to even higher levels of rooftop and large scales solar.

It will require storage throughout the supply chain, commercial proponents investing in large-scale batteries, and our customers putting in batteries 'behind the meter'. And even then, energy storage solutions will only be one of the many different solutions needed to manage the network going forward.

We're also taking action in other ways, with load control, tariff reform, and the introduction of dynamic connections. For new large solar installations, dynamic connections are allowing more renewable energy to be exported when the network capacity is available locally, with lower export limits able to

be active when needed to avoid overloading the network. An emergency backstop mechanism has also been introduced that will allow us to shut off new solar exports if network stability is at risk.

CUSTOMER BATTERY OFFER OPPORTUNITY

Can these batteries be ‘used’ by our customers and the community?

We will operate them in the interest of our customers, and the wider community, to efficiently manage the local electricity supply. This helps keep prices down, but it will not change what you pay for electricity compared to anywhere else.

In some areas, there will be an opportunity in the future, through our retail partners, for members of the local community to test product offers that could provide alternatives to buying a ‘residential’ or ‘behind the meter’ battery. This could help you save money.

I am in Ipswich; can I register my interest in the trial product offer?

In Ipswich, with Origin, we’re looking for locals interested in trialing a product offer. The trial product offer is currently being finalised.

It will give local households and small businesses in the Ipswich City Council area the chance to ‘subscribe to use’ a proportion of a battery. You will be able to ‘virtually’ store your excess solar in it during the day, and then draw it back for ‘free’ when the sun goes down. This is an alternative to selling your solar for a feed-in-tariff. Other product offers may also be tested.

You can register your interest on www.talkingenergy.com.au/neighbourhood-batteries, and we’ll let you know more when the final offer is available.

Those without solar can also subscribe, even renters. In this case, Origin will charge the batteries with excess power in the grid during the day, and you can then draw that energy down during the evening peak. This is like a Clean Energy product and can be used to save more with time-of-use charging.

You will not have to be an Origin customer to participate. You may just need you to supply your most recent electricity bill for Origin to check if participation is right for you and to calculate your rebate.

What happens after the product offer trial is finished?

After the trial is finished, Energex and Origin will review the data and feedback collected to understand the benefits and challenges of installing and operating neighbourhood batteries.

If it can be determined that there are benefits for customers, and all stakeholders, including lower overall system costs, it will help scale up the roll out of batteries across more parts of the network.

It will also inform how we share the direct and indirect benefits to even more customers.

THE OPERATION OF THE BATTERIES

How will the batteries be operated?

The batteries are connected into the local electricity network. They will be used to soak up the excess solar energy generated during the day from local rooftop solar systems.

Then, when the sun goes down, the stored energy will be released back into the network for use during the evening peak when demand is high.

Through partnerships with a retailer, the excess capacity in the batteries will be traded on the electricity market in order to maximise the benefits of the batteries.

We will also be working with retailer/s and the community to develop appropriate models to maximise the benefits of the batteries.

Will the batteries only be charged with renewable/solar energy?

The aim of the trial is to use the batteries to store solar energy during the day for use locally in the evening when the sun goes down and demand is high. And this solar is growing.

However, we cannot guarantee that it will always be 100% renewable energy. When your excess roof top solar energy is exported to the grid it becomes one with all the ‘electrons’ flowing through the powerlines. And at times, the sun conditions may be low, and the wholesale market or the needs of the network may influence how or when the battery is charged.

THE BATTERY TECHNOLOGY

How big are the batteries, and how many customers can they supply?

Batteries sizes are talked about in kW (kilowatts) and kWh (kilowatt hours). One way to visualise this is to think of water from a hose or in a bucket. The power available at any point in time, the kW, is the ‘size of the hose’, and the energy stored, the kWh, is the ‘size of the bucket’.

Utility-scale batteries – each of these batteries, which are connected to the High Voltage network, are 4MW/8MWh – the same capacity as the electricity required to support an average home for more than a year, through the network, or power an electric vehicle for more than 45,000kms.

Neighbourhood/community batteries – each battery module is either 30kW/60kWh or 40kW/80kWh. This means, if they are fully charged, they can supply enough power over about two hours during the evening peak, at the full discharge rate, for about 10-15 customers. That’s up to 4kWh to 6kWh of energy per customer. The ground level batteries consist of three modules; making them 90kW/180kWh in total.

What battery technology / suppliers are being used?

The batteries are Lithium-ion technology. We investigated the different batteries on the market, before moving froward with our current suppliers.

For the utility-scale batteries, we have or are installing are batteries from either Tesla, ABB Group, EVO Power, and Penske. The program has stimulated local manufacturing with several suppliers including with some or all of the assembly for the Penske and EVO Power products being performed in Queensland.

For the smaller batteries, we currently have two suppliers, Pixii and EcoJoule, who were selected based on their product specifications and their willingness to partner in developing network-connected battery solutions.

The Pixii PowerShaper battery is manufactured in Norway and assembled at Archerfield in Brisbane. The EcoJoule Eco STORE has been developed and is manufactured in Loganholme.

We are also advancing technology trials with a Vanadium Flow Battery at Energex's Berrinba Depot and a Zinc Bromine battery, which is expected to be installed at our Ipswich South substation, along with plans for an Iron Flow battery. These technologies are all from Queensland companies.

They are an alternate to Lithium-ion batteries. Flow batteries have different operational considerations to Lithium batteries and can provide some unique benefits. The three flow batteries that we are trialing are all from local Queensland companies

Our current battery program will inform the design, construction, and safety specification standards we provide the industry for any future roll out.

What is the life of the batteries, and are they able to be recycled?

The Lithium-ion batteries we are using are expected to have a minimum life of 10 years, depending on how they are operated. They could have a life of up to 15 years.

Yes, they are already being recycled. We have already engaged with an Australian recycling company.

We expect to review what is best practice, and our preferred recycler or recyclers, as our investment in battery technology begins to scale up.

We expect recycling services to evolve, potentially with economic opportunities for Queensland, as electric vehicle batteries drive demand for these services.

Europe is introducing new rules requiring greener batteries with lower associated emissions, and recycled materials. This circular economy legislation, which covers the entire lifecycle of a product, will drive innovation in battery recycling world-wide.

THE BATTERY SITES AND CONSIDERATIONS

How are the sites being selected, and where are the batteries going?

We are selecting sites that maximise the benefits that can be realised from the batteries. Some of the communities selected have been designated by the battery funding requirements.

The utility-scale batteries are being located on Ergon Energy Network / Energex land, adjacent to existing infrastructure.

The pole mounted batteries are being installed on new poles within the normal three-metre service alignment along the front of the property boundaries.

The ground level batteries will either be in the current service alignment of our electricity infrastructure, or on another site negotiated with your local council.

These sites need to be adjoining other electrical assets (substation / padmounts), in a flood free zone, with vehicle access to the ground-level small-scale batteries sites, and with a clear area approximately five by five metres.

In selecting the locations, we have been mindful of the current land use, visual amenity, and the potential for any other local impacts, as we do for all of the equipment that supplies electricity to our customers. We are engaging the immediate neighbours as part of this roll out.

What will the batteries look like?

The pole top mounted batteries being installed around Ipswich, shown here, are similar to others used by electricity distributors across Australia.

Each pole battery will be about 30kW/60kWh in capacity, approximately two metres high and 0.6 metres wide. The pole mounted batteries will sit about five metres up the electricity pole. They are being installed on new concrete poles.

The ground-level batteries being used in Ipswich and for the community battery roll out have multiple modules placed beside each other.

Each ground level battery is made up of four modules – three house the batteries and inverters and one houses the control and communication hardware. The modules sit on a concrete plinth, with a total land requirement of five-by-five metres.

The large 4MW/8MWh utility-scale batteries have rows of modern, modular battery banks, with communications and electrical switching equipment. The sites are fenced, with landscaping, as required, to maintain the amenity of the area.

Are the batteries safe?

The battery will be installed and maintained to the same high standard we would for any of our other electricity network assets. The operational practices for the batteries in the trial will also minimise the safety risks.

Like other chemical or energy infrastructure in the community, whether a petrol station or other electricity infrastructure, however, there are risks.

To address this risk the batteries will use the latest technology, be located within a clear area, and will be monitored remotely 24/7. The pole mounted batteries will be mounted the same way our transformers are mounted; on a new sturdy, fire-resistant concrete pole within the normal three-metre service alignment .

In the event an incident occurs, or smoke or fire is observed, stay well away, warn others, and call 000. Do not approach the system or attempt to put out the fire.

Queensland Fire and Emergency Services (QFES) have protocols in place to respond in the unlikely event the batteries' alarms are triggered, for example, by a vehicle impacting the power pole, or a battery malfunction. For each site, we will engage with local Fire crews, to ensure they are aware of the installations.

The Neighbourhood and community batteries have about the same energy storage capacity as an electric vehicle.

Read more here from QFES about Lithium-ion battery fire safety for mobiles phones, electric scooters, electric vehicles, etc. Lithium-ion Batteries and Powered Devices | Queensland Fire and Emergency Services (qfes.qld.gov.au)

Will the batteries be noisy?

The batteries have fans enclosed in the units that will operate to keep the battery at the required temperature for safe operation. These fans are no louder than a household's kitchen extractor fan and only operates intermittently.

In selecting the locations and designing the placement of the battery modules, we have also been mindful of the potential for noise to impact nearby neighbours, as we do for all of the equipment that supplies electricity to our customers.

We will monitor the noise levels. Care will be taken to ensure that noise impacts are minimised by ensuring that any noise is directed away from residence.

Do the batteries emit electromagnetic fields?

Electric and magnetic fields (EMFs) can be produced by anything with electric current flowing through it, including the powerlines, or your home's wiring system or electrical appliances.

The powerlines or any of the equipment on the lines, like these batteries or more commonly pole-mounted transformers, however, will generally contribute little to the electrical fields that can be measured inside a house or nearby building. This is because the walls create a shield from the electrical field. To reassure you further, all the equipment Ergon Energy Network / Energex uses and installs onto our network must comply with strict industry standards.

Further information on EMFs can be found at: https://www.energex.com.au/about-us/company-information/our-network/electric-and-magnetic-fields.

BATTERY REGULATIONS

What are the regulations around batteries?

The regulations around batteries, particularly in the context of the National Electricity Rules in Australia, are designed to ensure the safe and reliable integration of battery storage into the electricity grid. Batteries under the rules are considered as ‘generation’.

To trial and now pilot energy storage connected into the distribution network and help inform the evolution of battery-related regulations, our projects have been supported by the Australian Energy Regulator (AER), with a number of waivers allowing us to work with third parties to develop long-term sustainable models to maximise the benefit batteries can provide. This means we can share the excess capacity of the network-connected batteries with a third party (in Ipswich this has allowed the partnership with Origin to trial a product offer).

The insights we gain from these early stages in our Local Network Battery Plan will be used to discuss possible changes to rules if deemed of value.

EXTRA QUESTIONS FOR SUSTAINABLE LIVING EVENT

Why Ipswich for the trial?

In the Ipswich area over 35% of homes and businesses have rooftop solar exporting into the network, with more expected, and it’s the state’s fastest-growing city – so to reduce pressure on network and trial the technology it was a great location. This trial is an alternative to the cost of investing in more traditional electricity distribution network solutions.

In addition, the older suburbs have overhead supply, and we wanted to test the batteries on poles.

And Origin has a good customer base here, so we want to solve the challenge together with a customer-retailer-distributer partnership to keep the cost of electricity down and enable the transition to clean energy. A win-win-win all around, for customers, retailer, and the network.

Other notes to understand batteries

kW is a measurement of Power and kWh is a measurement of Energy. For example, you have a 60kW EV charging station then you use this to charge your EV for 2 hours – this means you have used 120kWh (i.e. 60kW x 2 hours).

An average Australian household uses approximately 16kWh of electricity per day. Assuming you work ‘9 to 5’ and are out of the house – that would mean about 30% of usage (5kWh) would be during the day and 70% at night (11kWh).

On average running a refrigerator uses between 1-2 kWh a day. The average power usage for one 2.5kW air-con unit running for 8 hours could be 21-28kW per day.

If you were to use a battery to power the electricity you would purchase from the grid during non-daylight hours using this average, you would need a battery with a capacity of at least 10kWh, costing between $1,000 to $2,000 per kWh.