

Charging electric buses

Key considerations



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As you take steps to transition your bus fleet from diesel to electric vehicles, these considerations will help you understand the network connection process for an electric bus charging station at your depot. This information will inform your initial enquiry with your relevant electricity distributor, Energex or Ergon Energy Network, depending on the location of your bus depot in Queensland.

The electricity demand of electric buses will present bus operators with a range of challenges and investment choices, but also opportunities to reduce costs and inefficiencies and differentiate your business. Energex and Ergon Energy Network representatives are experienced in guiding customers through the process of upgrading the network connection of their site. Please engage with us as early as possible as there are potentially long timeframes and notable costs to upgrade your network connection, as well as your electrical installation.



Images of C12E Battery Electric Bus supplied by VDI Australia

Here are nine aspects of bus fleet electrification that we recommend you consider:

1. Engaging a bus electrification delivery partner

We recommend that you seek out and engage an experienced bus electrification delivery partner. Use your industry network to help you find organisations with the appropriate expertise in identifying the specific needs of your business, designing optimal solutions for your site(s) and ensuring your initial enquiry to your electricity distributor is informed and complete.

2. Depot electricity capacity

If you have a single bus depot where you would like to incorporate electric bus charging, the number of variables is reduced. If you have multiple sites at which your electric buses could, or will, be charged, the variables increase notably. Either way, a fulsome assessment of the existing electrical installation at each site and the nature of electricity distribution network serving each site is essential.

At a minimum, you will need to understand each site's peak electricity capacity, or connection capacity. This is a measure of the real power capacity, in kilovolt amperes (kVA), able to be delivered to a site. You'll also need to define how much of that capacity is already used at peak times of the day and the year, and at other times.

Potentially, the capacity needed to charge even one electric bus could exceed your site's spare electricity network capacity and an upgrade of your network connection and associated local electricity network may be necessary.

Spare network capacity will vary by site and can be influenced by emerging developments and network upgrades in your area. If your planned level of bus charging requires your connection assets and/or local network to be upgraded, you may incur costs in line with your electricity distributor's Connection Policy. See section 8 for more details.



3. Load flexibility

Charging electric buses at your depot will likely increase the peak electricity demand of the depot and accordingly require changes to your network connection, and to your retail electricity tariff(s), which incorporates a network tariff (see section 7 below). Consider how flexible your bus charging can be to minimise charging during peak pricing periods and maximise charging during lower pricing periods. You may be able to use solar photovoltaic (PV) generation and/or battery storage (section 5) to offset some of your demand from the grid, and other demand management technologies (section 6) to manage your charging.

4. Preparing for future charging

It's ideal to consider your foreseeable bus charging needs so that you only need to upgrade your electrical installation and/or network connection once over the next several years rather than more often. It may be that the upgrades needed to charge one bus may be adequate to charge three buses. But once you want, say, five electric buses, you may need to pay to upgrade your electricity supply again. We recommend that when implementing your fleet replacement plan, you consider and fully understand your future charging and electricity needs as well, in line with your bus replacement schedule. However, upgrading the capacity of your network connection higher than immediately necessary could impact your network tariffs prematurely. Energex or Ergon Energy Network can assist you to strike the optimal balance.

Most electric bus charging equipment can modify the timing and kilowatt rate of bus charging to reduce the electrical load, and costs, during your site's peak demand times. By planning your needs and futureproofing your electricity supply where cost-effective, you could make considerable savings in time, effort and money over the long term.

5. Renewable energy generation and battery energy storage

The concept of powering electric vehicles on solar PV or other on-site renewable energy generation can be appealing. However, installing a large enough solar PV system to meaningfully offset your bus charging is a significant investment, and requires your buses to be charging when the sun is shining, particularly in the middle of the day. If that's not feasible, a battery energy storage system could form part of your electrical energy ecosystem. Again, the investment may or may not justify the savings and benefits. We encourage careful consideration of the financial and electricity load impacts. Such systems could influence your electricity tariff options and associated charges.

6. Demand management

Carefully planning how and when your electric bus fleet will be charged will minimise your upfront electrical infrastructure and ongoing electricity costs. Understanding how your electricity tariff is structured and managing your demand accordingly is critical. While charging as much as feasible when tariff rates are lower is sensible, the peaks of your electricity demand also need to be managed. Some tariffs have a demand component that incentivises customers to minimise, and ideally avoid, spikes in electricity use.

To help achieve this, technologies such as solar PV systems, battery storage systems and sophisticated energy management systems can be used individually or in combination to achieve the optimal charging solution for your fleet.

7. Electricity tariffs

Your retail electricity tariff rate is composed of a network tariff, generation costs, an electricity retail margin and other minor costs. You will typically pay for the kilowatt hours (kWh) you use – at different rates at different times of the day – as well as a demand charge based on the maximum demand your site makes on the grid each day or each month (typically measured in kVA, depending on your tariff – see explanation of terms at end).

Exploring options to minimise that demand charge is important. Your bus fleet electrification delivery partner, electricity retailer and potentially a specialist energy consultant can help you understand your tariff options and create the optimal combination of tariff, demand management, renewable energy, energy storage, and charging configuration and timing for your specific needs.

8. Network connection upgrade

Once you have researched the potential influences on the maximum electrical capacity of your depot, and the technologies and solutions you could deploy to reduce both the initial capacity and your ongoing peak demand, you're ready to lodge a Connection Enquiry Application Form in the Ergon Network or Energex portal as relevant. You'll find information here:

Ergon Energy Network – www.ergon.com.au/network/connections/business-connection

Energex – www.energex.com.au/home/our-services/connections/business

We will work with you to tailor a network connection solution for your site(s) and will provide an estimate of costs.

If you decide to proceed with a formal application, application fees will apply. We will provide an Offer for connection that will outline the conditions, timeframes and costs in line with our relevant Connection Policy to establish a suitable connection point to our network. Remember, you are responsible for all electrical works behind the designated network connection point, i.e. within your site.

Once you accept our Offer, the timeframes to design and construct the necessary network upgrades will depend on the scope and complexity of the works. A straightforward connection solution can take six months to complete, while more complex upgrades can take up to 12 months, or longer, to complete.

9. Working with your electricity retailer

Throughout the network connection process, you will need to work with your electricity retailer of choice to establish the final connection, metering and ongoing electricity account arrangements. We are experienced in liaising with electricity retailers as necessary to facilitate the connection; however, the key relationship around tariffs and related aspects is between you and your retailer.

Like every industry, the electricity industry has its own set of abbreviations. This list may help you understand the information you receive in future:

- **kW – kilowatt** – a measure of the electrical power at a point in time
- **MW – megawatt** = 1,000 kW
- **kV – kilovolt** – a measure of electric potential difference, i.e. voltage. Using a plumbing pipe analogy, voltage is equivalent to the water pressure.
- **MV – megavolt** = 1,000 kV
- **kWh – kilowatt hour** – a measure of electrical consumption over time, e.g. 1 kW of demand maintained for one hour equals 1 kWh. In the plumbing pipe analogy, kWh is the volume of water delivered.
- **MWh – megawatt hour** = 1,000 kWh
- **kVA – kilovolt ampere** – a measure of apparent power in an electrical circuit. This has a relationship to kW.
- **MVA – megavolt ampere** = 1,000 kVA
- **Amps – Amperes** – a measure of electrical current. In the plumbing pipe analogy, current is equivalent to the rate of flow as dictated by the diameter of the pipe.
- **NMI – National Metering Identifier** – This is a 10 or 11 digit metering location number unique to every premises and metering point and is used throughout the electricity industry to define exactly which location is being referred to. It can be found on your electricity bill.

For more information visit
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