Guidelines for Retrofitting EV Chargers in Existing Apartment Buildings

Introduction

With the ever-increasing encouragement for vehicle owners to make the switch to electric vehicles, retrofitting electric vehicle charging into existing apartment buildings can present new challenges.

These include electrical infrastructure redesign and cost, navigating the current building infrastructure, cost allocation (i.e. which budget pays for the upgrade?) and how to recoup the cost of electricity used. There is a lack of accurate data on the retrofitting of existing buildings. There is extensive misinformation online about the hazards of EV charging and the fire safety impact on buildings.

Suggested Guidelines for Retrofitting for EV Charging

The purpose of these guidelines is to identify as many of the considerations that a Body Corporate Committee (**BCC**) should take into account as possible when contemplating retrofitting their existing building for electric vehicle (**EV**) charging, and concurrently, to highlight some of the risks that need to be mitigated along the way.

There are some key steps and factors to consider. They are set out below in chronological order, where appropriate, so that the BCC can address each one in turn.

1. **Assess Electrical Capacity:** Determine whether the existing electrical infrastructure can support the additional load required for EV charging. Existing electrical distribution boards need to be assessed by an electrical engineer, electrical inspector or electrician to verify the capacity of each board, as well as safety circuits and incoming mains.

   The building's electrical capacity must be evaluated; this can be done either in consultation with an electrical professional or a competent Charge Point Operator (**CPO**). Evaluation should be completed either using electricity retailer ICP metered data, if this is available, or by adding temporary power loggers to the system. This will measure the actual electrical load of the site so that it can be compared to the design capacity of the system.

Evaluation will find capacity for EV charging during off-peak times and will ensure the current infrastructure can handle this increased demand. If EV charging can be managed to keep within the available capacity, an expensive upgrade to the electrical system may be avoided, so it's worth getting this part right.

This is an important first step in the process and ensures that the load on the building's electrical system can accommodate EV charging.

2. **Determine Charging Needs:** The BCC should identify the anticipated demand for EV charging in the building. Consider factors such as the number of EV users, their charging patterns, and the desired charging speeds. This will help determine the number and type of charging stations required.

   There are three EV charging modes: Mode 2, Mode 3, and Mode 4. Mode 2 charging involves the use of a standard power plug and is not recommended for use in apartment buildings as it cannot be monitored and, may present a fire risk where underrated plugs or adaptors are used.

   Mode 4 charging is primarily used for fast charging along highways and major routes. Mode 4 relies on high-powered charging stations and is also not recommended for use in apartment buildings due to the size of the power connection required and the cost of the charging hardware.

   Mode 3 charging is the preferred mode for use in apartment buildings for the following reasons:

   - It is a safer option than Mode 2 charging.
   - It enables variable charging speeds and dynamic (electrical) load management within the building.
   - It enables monitoring and cost reporting of individual power usage.
   - It provides security of supply, and chargers can require authentication to use, which will protect against unauthorised use.

   When a Mode 3 charger is selected, it must be a Smart Charger that allows dynamic load control, remote control and reporting. The principal benefit Smart Chargers offer is they can communicate together as a group, allowing the chargers to adjust the speed of charging in real time. This guarantees the overall electrical load is within capacity limits at all times, thereby ensuring that the building's supply is never overloaded.

   The charger should also communicate via the Open Charge Point Protocol (**OCPP**), as this will allow the chargers to be connected to an internet-based CPO platform to monitor, report, and remotely support the EV charger installation.

3. **Design Charging Infrastructure:** An expert in EV charging infrastructure should be contracted to develop a plan for the installation and layout of the charging infrastructure; this is usually done by your charging supplier. If the design is based on Mode 3 Smart Chargers, new electrical energy meters will not be required because the Smart Chargers will themselves log all power usage. This information can be pulled from the CPO platform and power usage on-charged to the vehicle owner.

The BCC will need to determine the location of EV chargers; are they for communal or individual use? Also to be considered are accessibility, parking space availability, and proximity to electrical panels. There may be significant savings if charging locations can be close to electrical infrastructure. Ensure compliance with building codes, safety regulations, and accessibility guidelines.

The configuration of the system is an important feature for owners in the Body Corporate to understand. The most typical arrangement is for the Body Corporate to own the electrical infrastructure, i.e., switch gear, mains cabling, sub-boards and cabling to each carpark, which enables the owner to connect their smart charger to the system. The charger itself will be owned by the unit owner.

The BCC should specify one or more EV chargers (make, model, and brand) that can be installed by unit owners, to ensure that load management can be configured for all EV chargers onsite for energy control. Each EV owner will own their Smart Charger but must agree to install the specified unit, to be allowed to connect to the BCC's infrastructure. The EV charger must be installed by an Electrical Inspector or Electrician. The commissioning of the EV charger on the relevant CPO platform will require input from the CPO. The BCC should consider a new Operational Rule to cover these requirements.

There are a variety of different systems for billing mechanisms. For example, the electricity may be drawn from an individual's metered supply, which the owner/user pays directly without the need for the Body Corporate to on-charge costs. Otherwise, if the electricity is from a common Body Corporate supply, the billing mechanism can be configured to allow Building Manager or BC Manager oversight, and costs can be on-charged to unit owners. Most charge point management software (**CPMS**) will allow this to be done in various ways, as follows:

- EV charger users could be charged a fixed monthly fee for EV charger access.
- EV charger users could be charged a variable monthly fee based on the energy used by the EV chargers. This reporting will be available through the CPMS.
- Some CPMS will allow users to pay directly for EV charging at the time of the transaction, similar to public chargers. This revenue can then be paid back to the Body Corporate every month.

4. **Additional Electrical Capacity:** If the existing electrical system cannot accommodate the increased load, BCCs could consider a single communal EV charging unit and/or work with an electrical contractor or engineer to upgrade the electrical infrastructure. This may involve installing additional circuits, upgrading transformers or electrical panels, or improving wiring and distribution capacity.

   The upgrading of the connection to the local electrical distribution network (including transformer upgrades) should be avoided where possible, as it can add significant cost and time. An upgraded network connection can also increase monthly electricity costs.

   Dynamic Load Control can often provide significant off-peak charging capacity without the need for electrical upgrades. Residential charging, where vehicles are parked overnight, can provide significant range to a vehicle of approximately 40km per hour off a single-phase 7.4 kW/32A charger.

5. **Permits and Compliance**: Obtain the necessary permits and ensure compliance with local building codes, zoning regulations, and any specific requirements for EV charging installations. Engage with local authorities and utility companies to ensure adherence to relevant regulations and standards.

   It is recommended that all charger installations be inspected as per WorkSafe Charging Safety Guidelines. Whilst not explicitly a requirement of private charge stations, it is strongly recommended they are inspected weekly by a Building Manager or equivalent, and annually by an electrician (typically the installer).

6. **Ongoing Maintenance and Support:** A plan must be developed by the BCC with its installation provider for regular maintenance, monitoring, and support of the EV charging infrastructure. As stated above, it is recommended that there be an annual WorkSafe inspection. This may include routine inspections, troubleshooting, software updates, and customer support services. Consider partnering with a reputable EV charge point operator or engaging with qualified technicians for ongoing support. If the building is connecting the chargers to a CPO platform, then this will allow the chargers to be monitored remotely by users, the Body Corporate and service providers and also allows remote support for any issues.

7. **User Education and Communication:** The BCC should provide information and resources to building occupants and users regarding the availability, usage, and guidelines for EV charging stations. Promote responsible charging practices (see Fire Risks section regarding a charging site usage poster), share billing mechanisms (if applicable), and any relevant policies or procedures.

   Unit owners and tenants should not be allowed to install a charger without agreeing to comply with Operational Rules relating to EV charging, and sign an indemnity in favour of the BC for any problems that might occur when the owner or tenant is using their charger.

It is important to consult with professionals familiar with EV charging, such as an electrical engineer and/or CPO, to ensure a successful and efficient upgrade of the building for EV charging. Considerations will vary based on the specific needs and characteristics of the building and its occupants.

There are other key considerations to be investigated by the BCC before retrofitting an EV to charge your building, including:

Fire Risks

1. **EV Battery Fires:** Global data from Australian company EV FireSafe indicates electric vehicle battery fires are rare*, however pose new challenges to emergency responders and may require additional firefighting resources when they do occur. They have found the leading causes of EV battery fires are road traffic collision, submersion in water, exposure to another fire, or a battery fault during manufacture.

   ** EVs studied include battery electric vehicles (BEV) and plug-in hybrid electric vehicles (PHEV). The data is not exhaustive. For the latest data, visit evfiresafe.com.*

Globally, around 15% of all EV battery fires occur when connected to charging; however, charging is not always the cause of the fire. It's an important point that a normally operating EV, connected to an electrically compliant charging unit that has been installed to ASNZ 3000 App P by a qualified person, CANNOT cause the battery fire to occur, due to multiple safety checks completed upon connection.

There have been no charging-connected EV battery fires in New Zealand at the time of publication of this guide, other than an unexplained fire in a home-converted truck at a ChargeNet charging station in May 2025.

Charging connected EV battery fires can occur due to:

- The EV being connected to a charger during natural disasters, such as flooding, where the EV may be submerged.
- Battery faults.
- Another fire, such as a building fire, that spreads to the EV.

Additionally, an increasing number of EV fires are occurring globally due to poor charging practices, such as overloading old electrical wiring, or using underrated extension cords or adaptor plugs. As previously mentioned, to mitigate risk, the professional installation of a Mode 3 charging station is preferred.

Charging related fires may pose additional risks to emergency responders, therefore, it is important to follow sensible advice, such as installing EV charging in areas with fire protection systems (such as sprinklers and ventilation) to reduce fire spread and support efficient incident management.

To support BCCs in designing, installing and maintaining EV charging, EV FireSafe has the following resources available:

- A Free, downloadable EV Charging Site Safety poster and information about the Australian Building Code Board Advisory Notice. Visit evfiresafe.com.
- Access to a comprehensive EV Safer Charging System. This resource provides data, case studies, global EV charging regulations, and a range of materials such as fire safety checklists, a pre-incident plan template, placarding, signage, maintenance plans, and an EV charging fire safety plan to provide to your fire engineer, fire agency and insurer. The EVSCS attracts a fee and is presented as an online course which can be completed in steps; it can be found at https://www.evfiresafe.training/course/ev-fire-apartments.

BCCs should also keep up to date with vehicle recalls due to fire risk for both EVs and internal combustion engine vehicles, and consider banning any impacted vehicles until the owner has carried out actions as provided by the vehicle manufacturer.

2. **Increased Electrical Load:** Older buildings may not have been designed to handle the additional electrical load from EV chargers due to the age of the existing electrical infrastructure. This can lead to overheating and potentially cause electrical fires. These risks will be managed through the design process described above, starting with Assessing Electrical Capacity.

3. **Aged Fire Rating:** The existing fire rating of the building might not be sufficient to contain, or slow down fires caused by electrical faults in EV chargers.
4. **Compromised Fire Compartments:** If the fire compartmentation is not up to current standards, a fire could spread more rapidly, endangering occupants and property.
5. **Likelihood of Incidents:** The likelihood of an electrical fire which may spread to an EV increases if the building's electrical infrastructure is not adequately assessed and upgraded to support the new load from EV chargers. These risks can be managed through conducting detailed engineering designs of these systems, as detailed above.

   Without proper installation and maintenance, the risk of electrical faults leading to fires is heightened.

Insurance Implications

1. **Non-Compliance with Safety Standards:** If an EV charger is installed without a proper fire safety assessment, it may be considered non-compliant with current safety standards.
2. **Voided Policies:** Insurers may not cover claims for fire damage if the installation of EV chargers is found to have been done without due diligence regarding fire safety.
3. **Increased Premiums:** Even if insurers do not outright deny a claim, premiums may increase due to the perceived higher risk.

Increased Risk to Life and Property

1. **Threat to Occupants:** Inadequate fire safety measures can lead to serious injury or loss of life in the event of a fire.
2. **Property Damage:** A fire can cause significant damage to the building structure and personal property, leading to substantial financial losses.

Recommendations

1. **Fire Safety Assessment:** Conduct a thorough fire safety assessment before installing EV chargers, to identify necessary upgrades to the fire safety systems.
2. **Fire Safety Data:** For data and resources on EV charging site fire safety, review EV FireSafe resources:
   - Free downloadable EV Charging Site Safety poster.
   - EV Safer Charging System for Apartments (online training course).
3. **Insurance Consultation:** Consult with your insurance providers to understand the implications of installing EV chargers on your insurance policy and coverage.
4. **Compliance with Regulations:** Ensure that the installation complies with the Building Code and Electrical (Safety) Regulations.

5. **Installation:** Use qualified electricians and fire safety engineers to ensure that the installation is carried out correctly.

Conclusion

While it is inherently safe to park and charge normally operating EVs in your apartment building, careful consideration should be given to fire safety risks, not just for EVs but for all modern vehicles. It is crucial to assess current fire safety systems to reduce risk and ensure compliance with insurance requirements, and to install EV charging by the advice provided in this document and that received from your fire engineer, fire agency or insurer. Failure to do so may endanger lives and also risk significant financial loss due to potential non-coverage by insurers.

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