

CHARGING AHEAD

Homeowner's Guide to Installing a Level 2 EV Charger



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1) Thinking About Installing a Level 2 EV Charger?

Let us help you make the right decision for your home!

Installing a Level 2 charger is a great way to charge your Electric Vehicle (EV) at home. It's fast, convenient, and usually less expensive than public charging. Before making the decision to install a Level 2 charger, it is important to assess your home's capacity to accommodate the additional electrical load. This involves understanding two key concepts:



Available Panel Space: This refers to the physical slots available for adding new circuit breakers in your electrical panel. Having empty slots does not automatically mean your system can handle more electrical load.

Loading Capacity: This is the total amount of electrical load the panel can safely support based on the utility service provided to your home, measured in amperage (Amps). This is determined by the panel's rating (e.g., 100A, 200A) and the combined demand from all connected appliances and circuits on the panel.

Without proper management, the additional demand from installing an EV charger could overload circuits so it is recommended that you work with a Licensed Electrical Contractor (LEC). LECs are the only businesses in Ontario legally authorized to do electrical work in your home. LECs hold an Electrical Contractor Registration Authority (ECRA) or Electrical Safety Authority (ESA) electrical license to ensure safe and compliant installation.

The LECs are qualified to file a notification of work and obtain an electrical permit from the ESA before starting the EV charger installation. Remember to keep a copy of those for your records.

Use the ESA's tool at findacontractor.esasafe.com to locate qualified LECs. Electricians can work for an LEC, but they cannot be hired directly in Ontario. Please refer to ESA webpage: [Finding the Right Contractor - ESA](#).

Information in this booklet will help you to make a safe and informed decision when speaking with your LEC. We want to make sure that you make the right decision for you and your home.



OPTION 1



Your electrical panel has the capacity to accommodate the additional load of a level 2 charger

Hire a Licensed Electrical Contractor (LEC) to assess if your home's electrical panel has the capacity to accommodate the additional load of a Level 2 charger. The LEC should perform an individual peak load calculation to evaluate your panel's current capacity. This process determines whether your existing electrical system can safely support the additional demand from a Level 2 charger.

While a 200-amp panel provides sufficient capacity for many homes, the existing demand from other appliances might already be using significant capacity. Each home is unique, and factors such as current electrical load, future needs, and specific usage patterns should be evaluated by a LEC to ensure you can confidently proceed with the installation.

If your LEC determines that your home panel has sufficient capacity to manage the additional electrical load, then the LEC can proceed with the installation of your charging station at your house without needing any electrical upgrades.

OPTION 2

Your electrical panel DOES NOT have the capacity to accommodate the additional load of a level 2 charger

An EV Energy Management System (EVEMS) may help avoid expensive panel upgrades.

What is EV Energy Management Systems (EVEMS)?

An EV Energy Management System (EVEMS) helps to manage your home's electrical load to prevent it from exceeding its capacity. This device monitors the incoming load and controls the EV charger to prevent the load from exceeding the panel's rating. Installing an EVEMS can be a cost-effective alternative to avoid a costly panel and/or utility service upgrade, and is recognized by the Electrical Safety Authority.

Here's how they work:

- EVEMS allows your EV charger to share circuits with other devices (such as a clothes dryer), pausing EV charging when necessary. It temporarily reduces power to the charger when the other high-demand appliance is in use to avoid an overload of the circuit.
- Most homes have lower electricity demand overnight when lights, TVs, cooking appliances and other devices are not being used. Therefore, if the EVEMS reduces charging while another appliance is in use, you'll still have many hours overnight for your EV to gain sufficient charge for the next day.



EVEMS devices are provisional solutions, as adding other high-power appliances in the future will increase your load, which may necessitate a service upgrade at that time. A qualified LEC can work with you to determine whether an EVEMS or a service upgrade is better for your home.

In Ontario, the Electrical Safety Code allows for a calculation to determine the new service rating and whether an upgrade is necessary. This calculation can be done in accordance with the Ontario Electrical Safety Code Rule 8-106(8). For a calculation example based on the demonstrated load, refer to the ESA's [Bulletin 8-3-15](#). Provide your LEC with at least the last 12 months of your [My Alectra](#) electricity data to aid in their assessment.

OPTION 3

Your electrical panel DOES NOT have the capacity to accommodate the additional load of a level 2 charger and/or an EVEMS cannot mitigate your issue.

If you have consulted with your Licensed Electrical Contractor and determined that it is not technically or economically feasible for you to install a Level 2 charger using your home's existing electrical infrastructure, you will have to upgrade your panel and/or your electrical service. The following section provides you with helpful information to help you navigate this process.

Note that this guide is provided for information only, and is not intended to replace the advice from your LEC or your judgement as a homeowner.

2) Planning an Electrical Upgrade



It is important to select service panels that meet your current and future electrical needs. The most common Levels of service for Alectra's residential customers are 100A, 125A and 200A. If you anticipate needing to power larger electrical loads in the future, an upgrade to your electrical service might be necessary. While upgrading to a larger amp panel can be costly, there are some long-term benefits:

- **More Circuits:** Accommodates more appliances without frequent breaker trips.
 - A sub-panel can add more circuits but won't increase your electrical system's total capacity. It helps organize and provide local service for areas like garages or pools, but if your home's electrical system can't handle additional demands, such as a Level 2 EV charger, an upgrade will still be necessary.
- **Futureproofing:** Supports additional devices and appliances, preparing your home for future demands.
- **Increased Home Value:** Enhancing your home's electrical capacity can improve its appeal to potential buyers, potentially increasing resale value.

What to Expect from an Electrical Panel Upgrade



The process for upgrading your electrical panel typically involves:

- **Permitting and Approval:** Electrical panel upgrades require an ESA permit and inspection, handled by the LEC. The LEC will apply to Alectra Utilities via its [portal](#). Once Alectra determines if the existing infrastructure can support the requested upgrade, your LEC can call to schedule an appointment to disconnect/reconnect the service to complete the panel change. If the infrastructure requires upgrading, a service design and costing will be provided.
- **Installation:** LEC will remove the old panel and install the new one, which can take several hours. You will experience a power outage during the installation.

If you and LEC determine that a service upgrade is the best solution to enhance your home's electrical capacity and support future needs, work with your LEC to [submit a service upgrade request](#) to Alectra Utilities.

Understanding costs:

- **Cost:** Upgrading your home from a 100A to a 200A electrical panel can cost between \$1,500 and \$3,500 or more depending on factors such as installation complexity, local labour rates and your home's specific electrical requirements. This cost does not include upgrading the electrical service to your home. To get an accurate estimate, source quotes from multiple LECs.
- **Upgrading your electrical service:** Upgrading your electrical service could involve upgrading the electrical conductor that serves your home from Alectra's local transformer. Depending on the way that this is done at

your property (above-ground wires vs. underground cables, distance from the transformer, and any infrastructure between the meter and the transformer that must be bridged, e.g., driveways), this cost can be from a few thousand to more than ten thousand dollars.

3) Installing the Charger at home

Use a Licensed Electrical Contractor (LEC) to:

- Ensure the installation meets electrical code requirements and passes ESA inspection
- If installed outdoors, verify that the charger and installation meet code for outdoor use.
- Ensure outdoor outlets are protected by a Ground Fault Circuit Interrupter (GFCI).

Practice Safe Charging Habits

- Keep the charging cables off the floor to prevent tripping and to prevent damage to the cable.
- Regularly inspect the charging equipment for any signs of wear or damage.

Get Compliance Certification from Electrical Safety Authority (ESA)



Once the EV charger is installed it should be inspected by the ESA to ensure the installation was done up to code and is safe to use. LEC will provide you with the ESA Certificate of Acceptance once the work has been completed and accepted as compliant with the Ontario Electrical Safety Code.

Key Points from the Ontario Electrical Safety Code (OESC) Bulletin

- **EVEMS Permitted:** Rule 8-500 allows EVEMS to monitor and control electric vehicle supply equipment (EVSE) loads, reducing the need for service capacity upgrades.
- **Separate Branch Circuits:** Typically, an EVSE should be on a separate branch circuit. EVEMS can allow for shared circuits if properly managed.
- **Demand Load Calculation:** With EVEMS, the demand load is limited to the EVEMS's maximum, simplifying load calculations.

Glossary of Terms

Here are some terms you may encounter when preparing your home for installing a Level 2 EV charger:

- **Amperage (A):** The measure of electrical current flowing through a circuit. EV chargers typically require 30–50 amps.
- **Circuit Breaker:** A safety device in your electrical panel that shuts off power if a circuit is overloaded.
- **Load Calculation:** An assessment of your home's electrical demand to determine if your panel can handle an EV charger.
- **Service Panel:** Also known as the breaker panel, it distributes electricity throughout your home.
- **Kilowatt (kW):** A unit of power measurement. Level 2 chargers typically operate between 3.3 kW and 19.2 kW.
- **Voltage (V):** The pressure that pushes electric current through a circuit. Level 1 chargers run on 120V which is available through a regular wall outlet, while Level 2 chargers run on 240V which are also used for ovens and electric clothes dryers.
- **Hardwired vs. Plug-in:** A hardwired charger is permanently connected to the electrical system, while a plug-in charger uses an outlet.

Protection and Compliance

- **Mechanical Protection:** The level must be protected from mechanical damage through elevation, physical barriers, or strategic placement away from vehicles.
- **Overcurrent Protection:** Ensure installations adhere to specific overcurrent protection requirements for safety and compliance.

Refer to the Ontario Electrical Safety Code [Bulletin 86-1-6](#) (Issued May 2024) for detailed information on electric vehicle charging systems.

DISCLAIMER

The information provided in this Homeowner's Guide is for informational purposes only and Aletra makes no guarantee that and is not responsible for the accuracy and completeness of such information. It is the responsibility of the customer to seek expert advice prior to making any decisions, including, but not limited to, discussing with a licensed electrical contractor and carefully assessing your home's entire electrical load, the capacity of your electrical panel and potential upgrades, and adhering to local regulations, safety requirements and applicable codes and standards. Aletra is not responsible for any issues, costs, damages, or safety concerns arising from improper installation, failure to seek professional advice or any action resulting from the information provided in this guide.

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