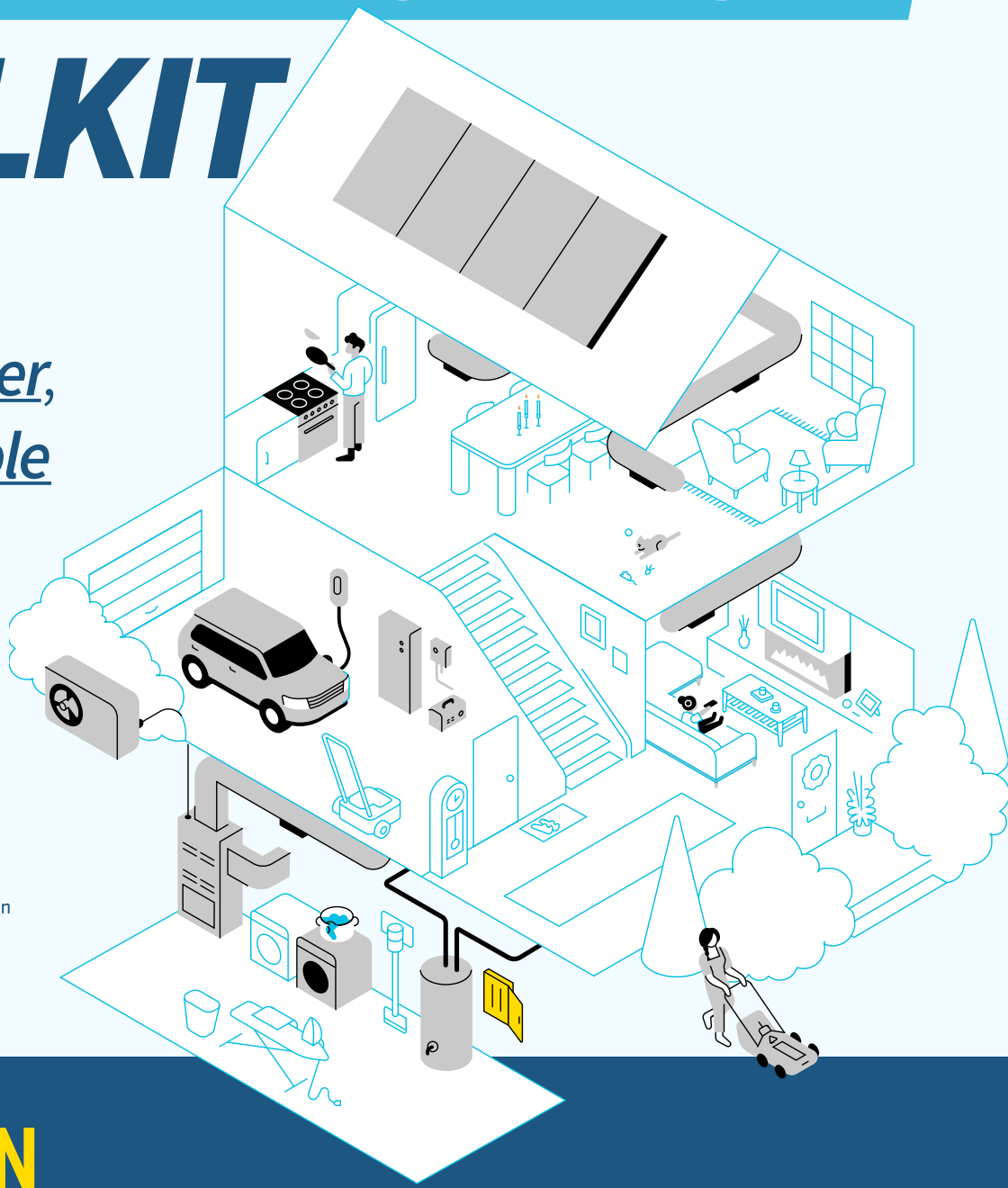
CANADA'S HOME ELECTRIFICATION TOOLKIT

Your guide to a ***cleaner, smarter, more affordable*** home

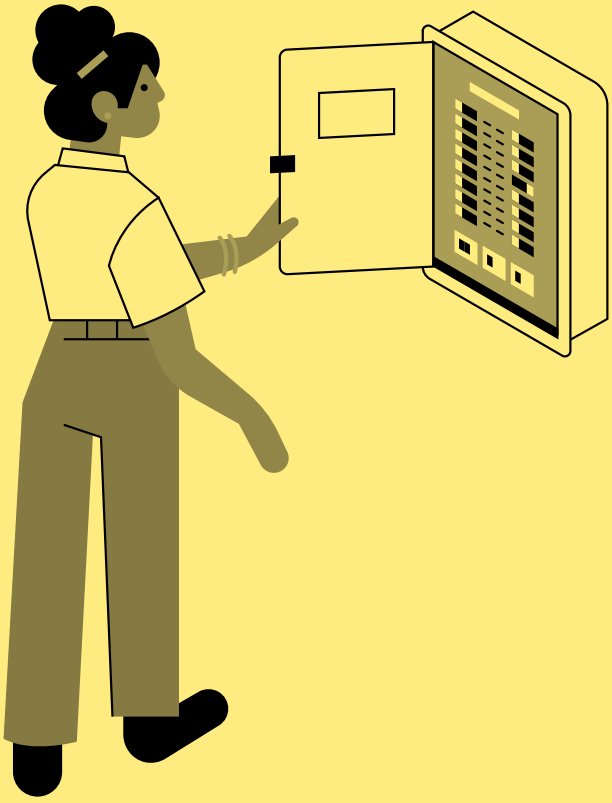


Building Decarbonization Alliance
pour la décarbonation des bâtiments

AVOIDING AN ELECTRICAL PANEL UPGRADE

Avoiding an Electrical Panel Upgrade

As we have seen, everything in and around your home can be electrified. But electrifying your home can involve more than just replacing fueled appliances with electric ones. Sometimes a home will require upgrades to wiring, to the electrical panel, and even to the electrical service. With planning, there are ways to limit the amount of work done and the associated costs.

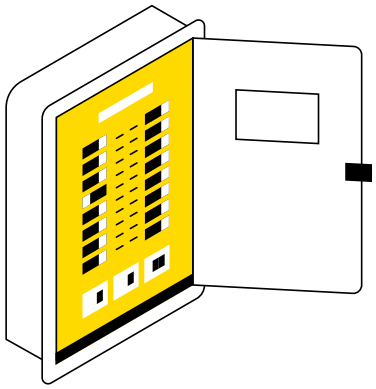


Links to further resources:

- Rewiring America, Wire your home for electrification
- Redwood Energy, Watt diet Calculator
- B2E, Home Electrification: Service Upgrade Not Required!

HOW TO AVOID AN ELECTRICAL PANEL UPGRADE

- Most homes with electrical panels of 100 amps or more won't need a panel upgrade to electrify home heating or appliances. But an upgrade may still be your best option if you plan to add more electric appliances in the future, or if your panel is constrained. Be sure to explore all your options and get quotes from your electrician before deciding.
- **Appliances that provide two functions** in one such as a combined range and stove or a combined washer-dryer will use less electrical panel space than separate appliances.
- **Consider more efficient appliances or appliances that draw less power.** For example, electric water heaters that use a 15-amp circuit rather than 20 or 30 amps are available. Similarly, a 120V condensing dryer will require a 15- or 20-amp circuit while conventional dryers require a 30-amp circuit.
- **Consider lower capacity EV chargers**. An overnight charge with a lower capacity EV charger may provide all the range you need for most of your everyday needs, freeing up electrical panel capacity. Use commercial fast chargers for those occasional situations when additional range is necessary to avoid the cost of upgrading your electrical panel or service.
- Some jurisdictions allow the total circuits on an electrical panel to exceed the panel's rated capacity if **historical load calculations** show that peak loads from those circuits will not exceed safe limits for the system (Canadian Electrical Code Rule 8-106). Talk to your electrician to find out if this is an option for you.
- **Ask your installer if a backup heater** is required with a heat pump in your area. A backup heater takes up a lot of space on an electrical panel and may not be required if the heat pump is sized and designed for your climate, or if a ground source heat pump is used. Cold climate air source heat pumps may also be able to meet heating load requirements to temperatures as low as -30°C (-22° F) and are getting better every year (see 'Space Heating' section). If a supplemental heater is required, be sure that it is not oversized for your needs.
- **Insulating and air sealing a home** can reduce the size of heat pump you need, lowering the load on the electrical panel. These investments will save money for heating and cooling and make a home more comfortable too.
- **Consider energy management systems**, including load share devices, circuit pausers, and smart panels. These maximize the available capacity on an electrical panel by controlling and prioritizing electrical demand from multiple appliances. See 'Energy Management Systems' section for more information.



- If you are out of room for more breaker switches but still have capacity on your panel (ie your breakers add up to less than your panel's capacity), ask your electrician about using skinny breakers or subpanels. **Skinny breakers** (aka tandem or twin breakers) allow two circuits to use the space of one and optimize slot management and can help with panel space limitations. **A subpanel** is typically used to separately distribute and control power to an area of a home (e.g. workshop or secondary suite). Note that skinny breakers and subpanels do not change the rated capacity of the panel.

OTHER CONSIDERATIONS

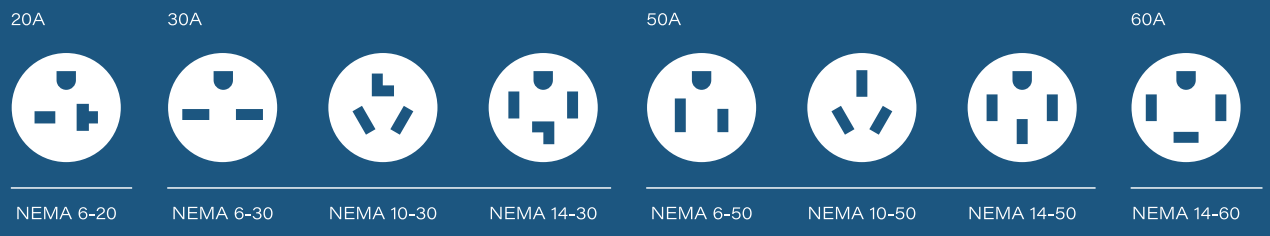
- Plan ahead and get your electrician to add circuits for all your future electrification plans. Consolidating all the work into one project can save you money and time.
- An electrical panel upgrade can cost a few thousand dollars, but if an electrical service upgrade is needed, it can add many more thousands of dollars to the cost. Contact your local utility to ask about the cost of electrical service upgrades, as these can vary significantly depending on your region.
- Upgrading your electrical service can take time so it is essential to plan ahead.
- Upgrading an electrical panel enables future electrification projects.
- When homes find efficient ways to avoid having to upgrade electrical panels and electrical service, they also help to avoid upgrades to the electrical distribution system which we all pay for through our electricity bills (and taxes).

An electrical panel (aka breaker box, fuse panel, load center, distribution box) takes electricity from the grid and distributes it to circuits in different parts of your home. Each circuit has its own breaker and typically serves all electrical needs for one area of the house, or for a single high-power appliance such as a range, dryer or heat pump. If appliances try to draw too much power, the circuit breaker will trip to protect you and your home from electrocution or electrical fires. Each circuit and associated breaker will have a voltage and amp rating. If your home still uses fuses instead of circuit breakers, it is time for an upgrade.

The electrical panel is a grey, beige or white box, often located in a basement or garage. The size of panel can be determined by looking for the number written on the main breaker switch, which is typically separated from the other breakers on the panel. The most common size is 100 amps or 200 amps. An electrician can help you to assess whether you can avoid an electrical panel upgrade using historical load calculations or load sharing devices.

The electrical service is determined by the size of the local transformer and the wiring that goes to your home. The electrical panel and electrical service ratings may not be the same. Your electrical utility can tell you what service is provided to your home and what costs would be involved in upgrading the service. If the wires are overhead, the upgrade may be low or no cost. However, if the wires are buried or if a transformer upgrade is needed, the cost can be many thousands of dollars.

240V SOCKETS TYPES



Avoiding a panel upgrade:

After buying a new EV, Colin wanted to install a level 2 home charger. The problem: his electrical panel did not have the capacity to add his 48-amp level 2 charger.

But Colin suspected that the household's peak energy use was far less than the sum of the breakers on his panel. So, he reached out to his local utility to prove it. Sure enough, historical data showed that the highest historical demand for electricity was far less than the maximum rated capacity of his 100-amp panel.

With this data in hand, he was able to work with an electrician to have his EV charger installed without a panel upgrade. He has since learned that his EV is limited to 32 amp charging and that he could have installed a lower capacity charger (definitely something to check!). But he is still happy with his EV.

“

[My EV] is quieter, more comfortable, faster, and in every way a better experience than an internal combustion vehicle

–
Colin

This section is part of the Canada's Home Electrification Toolkit. The Toolkit provides clear, concise, and up-to-date information on space heating, cooking, fireplaces, home batteries and backup options, and other household equipment. It also includes tips for renters, strategies for avoiding potentially costly electrical panel upgrades, and case studies from satisfied homeowners.

ADDITIONAL SECTIONS ARE AVAILABLE FOR DOWNLOAD BELOW:

Symbols and terms in this publication:

Upfront or operating cost (no incentives applied)

Symbol	Description
$	Up to $99
$$	$100-$999
$$$	$1,000-$9,999
$$$$	$10,000 and above

Implementation

Term	Description
Easy	Can be implemented by yourself if no electrical upgrade is required
Medium	Can be implemented by someone with DIY skills
Difficult	Generally requires a qualified electrician or other contractor

Emissions reduction potential (onsite emissions reductions using Canadian averages)

Term	Description
Low	1-9 kg CO2 per year
Medium	10-99 kg CO2 per year
High	100-999 kg CO2 per year
Very high	> 1,000 kg CO2 per year

When comparing electric to gas equipment on upfront costs, operating costs and emissions

Symbol	Description
=	Values differ by 10% or less
▽	Electric version is 10-50% lower
▼	Electric version is more than 50% lower
△	Electric version is 10-100% higher
▲	Electric version is more than 100% higher

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Visit buildingdecarbonization.ca/canadas-home-electrification-toolkit for digital downloads, updates, and other information about home electrification.

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