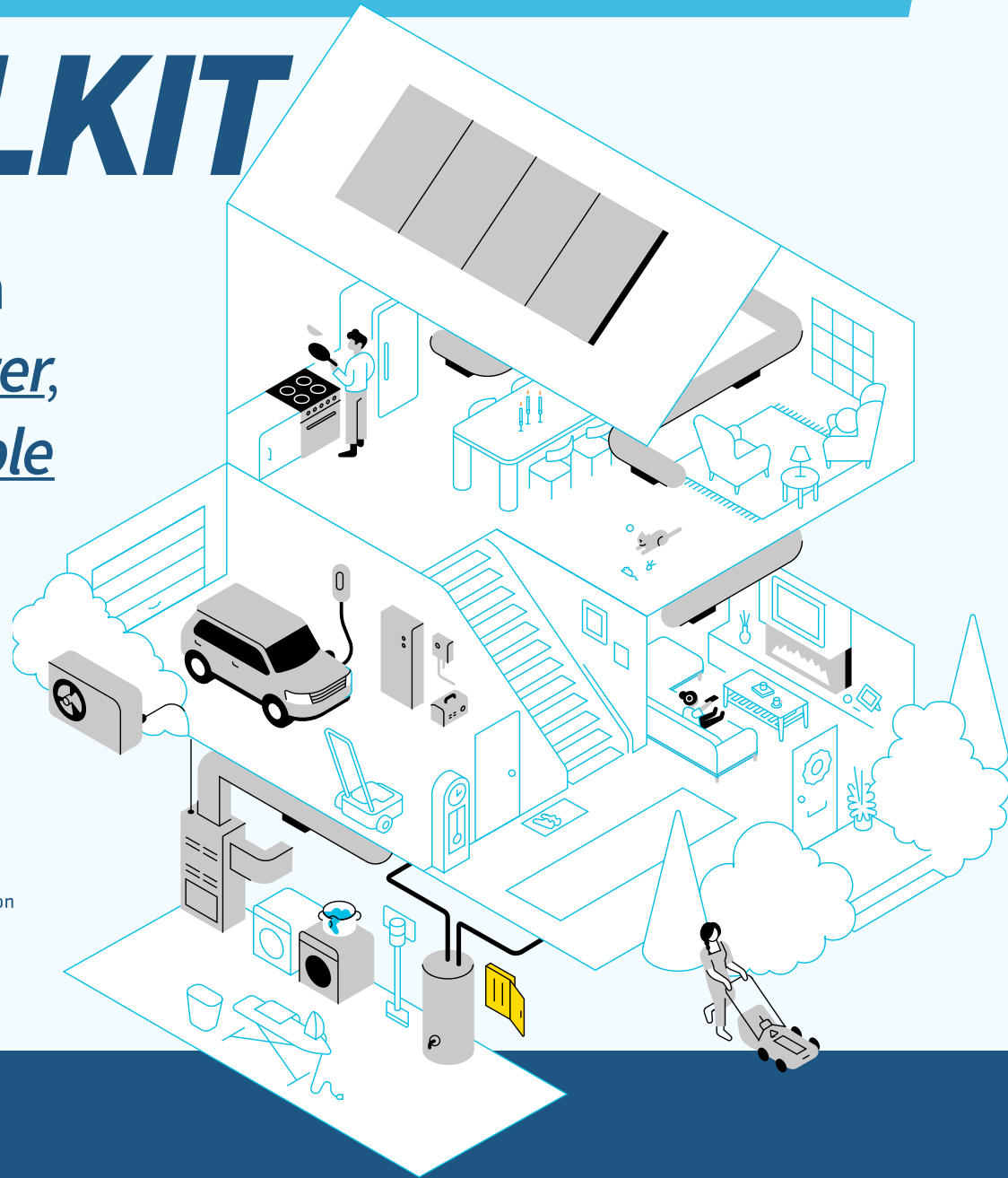


CANADA'S HOME ELECTRIFICATION TOOLKIT

Your guide to a
cleaner, smarter,
more affordable
home



ENERGY MANAGEMENT SYSTEMS

Energy Management Systems at a glance

Load share devices, circuit pausers and smart panels:

COST

Upfront costs:
\$\$-\$\$\$

IMPLEMENTATION

Difficult

BONUS

These can help you to avoid an electrical service and panel upgrade.

Smart thermostats and appliances:

COST

Upfront costs:
\$-\$

IMPLEMENTATION

Easy

BONUS

Opportunities to save money with time-of-use rates efficient than alternatives

EMISSIONS REDUCTION IMPACT

Low to medium

For more information

- [Rewiring America Circuit Breakers: debunking electrification myths](#)
- [B2E Home Electrification: Service Upgrade Not Required!](#)

Energy Management Systems

“

**...the more we share,
the more we have**

—
Leonard Nimoy

With electrification, the more we share, the more electrical capacity we have. Energy management systems play an essential role in facilitating this sharing. These systems are designed to provide more flexibility in directing energy to circuits.

WHAT IS A ENERGY MANAGEMENT SYSTEMS

Rather than treating all electrical uses equally in a home, an energy management system allows you to prioritize some uses over others, allowing electrical panel capacity to be shared—and letting you use a smaller electrical panel to accommodate more loads. Energy management systems are evolving rapidly as competitors develop new features and applications.

The most basic energy management systems consist of load share devices and circuit pausers that allow two circuits to share space on the electrical panel. Today, one of these circuits will typically connect to an EV charger. If more than two circuits are to be shared or if you want better control of the electrical loads in a home, smart panels should be considered.

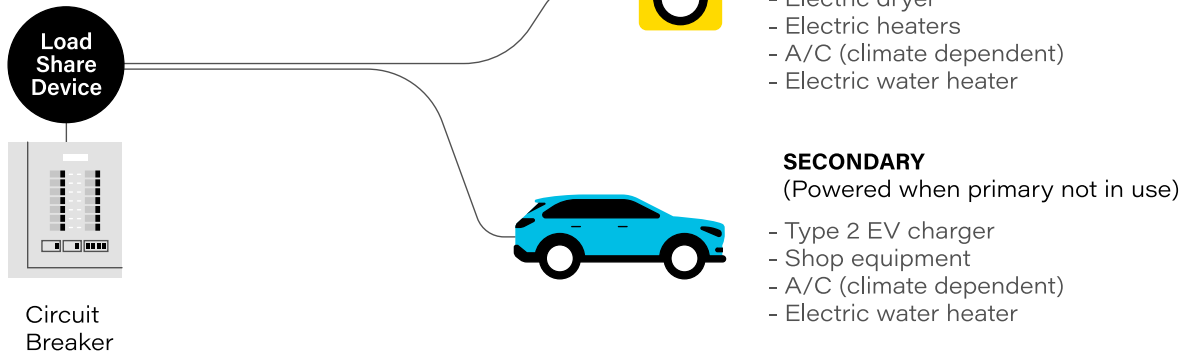
Smart thermostats and appliances are another way to manage energy use more directly through the appliance itself.

ENERGY MANAGEMENT SYSTEMS

OPTIONS

Load share device

Two appliances can share one circuit on the electrical panel but only one appliance can work at any given time

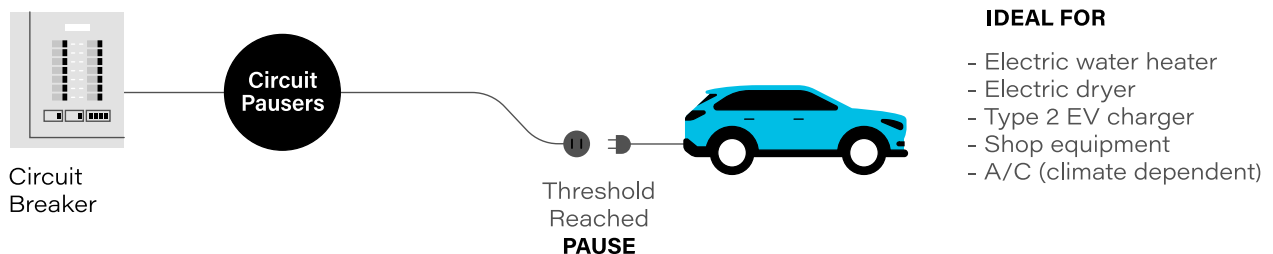


Load share device with primary and secondary loads allow two appliances to share one circuit and one breaker on the electrical panel. Only one of the appliances can be in use at one time. The primary load has the power by default and the secondary load can only draw power when the primary load is off. For example, a stove may be

the primary load and an EV charger can be a secondary load that is only used at night after cooking is done. Some load share devices will provide a small current to both appliances to ensure internal clocks and displays continue to operate.

Circuit pausers:

The connected appliance will be paused only when the total output of the electrical panel is above a threshold



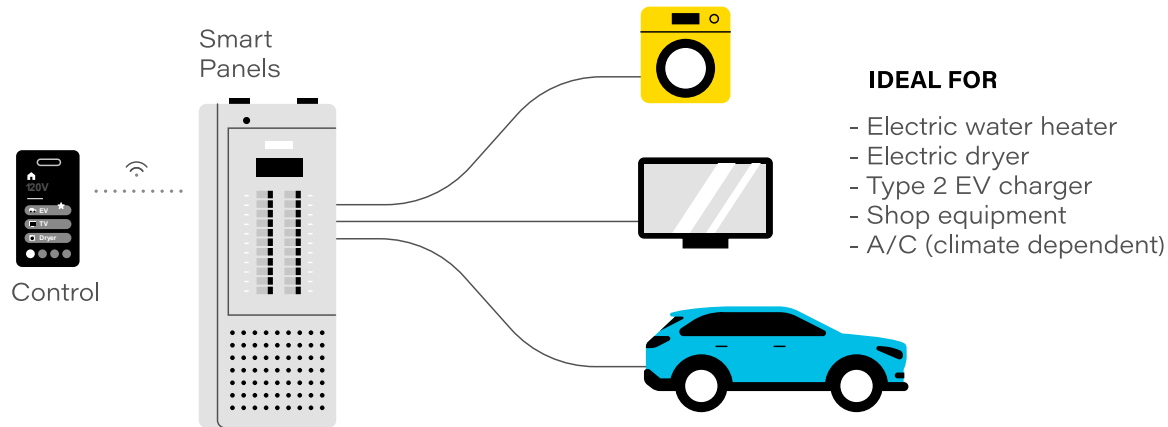
With circuit pausers, the connected appliances will only draw power when the demand from all devices in your home is below a threshold. If the threshold is reached, power to the connected appliance is paused

until demand falls back below the threshold for a set amount of time (often 15 minutes). EV chargers are ideal for circuit pausers because interruptions to their power draw are unlikely to have noticeable effects.

ENERGY MANAGEMENT SYSTEMS

Smart electrical panels:

Balances loads to accommodate more electric appliances and optimizes energy use



Smart electrical panels monitor power use in real time and use software to allow for load management across multiple circuits. They generally replace the existing panel. Where permitted, homeowners can program the panel to fit more electrical loads on the panel by prioritizing some appliances over others. Smart panels also help optimize when energy is used to save money in

areas with time of use rates or to use electricity generated by solar panels. Some systems will use machine learning to recommend changes that reduce energy use or maximize bill savings. During an outage, smart panels can help extend the power available from batteries by prioritizing only essential loads.

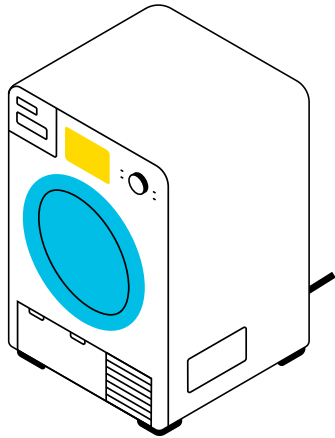
ENERGY MANAGEMENT SYSTEM FEATURES:

Equipment	Cost	Number of circuits managed
No change	NA	
Panel upgrade	\$\$\$	None
Load share	\$\$-\$\$\$	Two
Circuit pauser	\$\$-\$\$\$	One
Smart panel	\$\$\$	Multiple

Smart thermostats:

Allow for monitoring and control of your heating and cooling systems through internet-connected devices. Since heat pumps are more efficient when home temperatures are maintained at a relatively steady temperature, there are fewer opportunities to save energy with a programmable or smart thermostat. Where smart thermostats may be valuable is in minimizing the use of backup (auxiliary) heaters, allowing for remote temperature control (while on vacation for example), and providing maintenance reminders. Be sure that your smart thermostat is compatible with your heat pump and with the backup heater.

Smart appliances



Also available and can remotely set oven temperatures and monitor cooking progress, schedule laundry cycles for convenience or to avoid times when electricity generation relies heavily on fossil fuels, or set your water heater to only run during low time-of-use rates. They add convenience and will sometimes reduce overall energy use but expect to pay more for smart appliances.

OTHER CONSIDERATIONS

- Before investing in energy management systems, consider ways to avoid electrical panel upgrades, including using appliances with lower power draws and having an electrician calculate panel capacity using historical load calculations. See '[Avoiding an Electrical Panel Upgrade](#)' section for more information.
- Upgrading to a smart electrical panel enables future electrification projects and can help avoid upgrades to the electrical distribution system.
- Some smart panels have an automatic transfer switch integrated which will automatically shift your home from drawing power from the grid to drawing power from a battery during a power outage.
- Energy management systems are evolving rapidly. Be sure to seek out electricians who are familiar with current models and regulations.
- Some energy management systems require additional software or hardware with separate costs. Be sure to always ask about the full upfront and operational costs of the system.

CASE STUDY

Net-zero-emissions home:

Heather and Eric started investing in low-carbon upgrades to their 1992 semi-detached Southern Ontario home out of a desire to do what they could to build a more climate-safe future for their children.

It started in 2010 when they replaced a leaking gas water heater with a more efficient electric water heater set on a timer to take advantage of lower overnight electricity rates in Ontario.

After some insulation upgrades to the attic and foundation floor, they installed a cold climate air source heat pump in 2021 and disconnected from the gas line.

The last part of the journey was the installation of 8.16 KW of solar panels that generate enough electricity in a year to offset their household's annual electricity use.



“

I have been so much more comfortable in our home since installing the heat pump, I would never go back to a gas furnace!

—
Heather

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:

- [Space Heating](#)
- [Electric Thermal Storage](#)
- [Water Heaters](#)
- [Dryers](#)
- [Cooking](#)
- [Fireplaces](#)
- [Outdoor Equipment](#)
- [EV Chargers](#)
- [Home Batteries and Backup Generators](#)
- [Solar Power](#)
- [Avoiding an Electrical Panel Upgrade](#)
- [Electrification Incentives](#)
- [Options for Renters](#)
- [Amplifying the Impact Through Conversations](#)
- [Ways Community Groups Can Help](#)
- [Appendices](#)

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



CREDITS AND COPYRIGHT

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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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