

Back-Up Power Strategies

#	Strategies	Overview			Evaluation			
		How the Strategy Works	Constraints and Conditions	Evaluation Rationale	Budget Friendliness	Ease of Implementation	Capacity	Climate Friendliness
1	Home standby generators	Home standby generators are permanently installed on-site and directly connected to a home's wiring system. When a power outage occurs, an automatic transfer switch activates the generator, which then supplies electricity to the entire home or critical load circuits. These generators are typically fueled by natural gas or propane.	<ul style="list-style-type: none"> Space requirements: Limited space available on the property may be a concern as the placement of generators requires a dedicated outdoor space. Fuel availability: These generators rely on a consistent fuel supply and constraints arise if there are shortages or disruptions in the fuel supply chain, such as the shutdown of natural gas pipelines. Noise level: The decibel level (dB) of a generator varies depending on its size, fuel type, and the distance of the listener. Home standby generators produce 60 to 70 dB during operation, equivalent to the noise level of a washing machine or dishwasher. 	<p>Cost: Depending on the size of the unit, home standby generators cost between \$3000 and \$10,000, with installation costs ranging from \$800 to \$2,500.¹</p> <p>Ease of implementation: Operating home standby generators is relatively straightforward, especially with automatic transfer switches that automate the transition to generator power during outages. Some models are also equipped with self-diagnosis capabilities, notifying users when maintenance is required. However, professional technicians are needed for proper installation.</p> <p>Capacity: Standby generators are designed to meet the essential power demands of an entire home for prolonged use, with power output ranging from 8 kW to over 20 kW.</p> <p>Impact on operational emissions: Home standby generators are powered by fossil fuels and will emit GHG emissions during the combustion process for electricity generation.</p>	Low	High	High	Low
2	Portable generators	Portable generators, like their stationary counterparts, convert fossil fuels such as gasoline, diesel, or propane into electrical power. However, portable generators are more mobile, facilitated by features like wheel kits and	<ul style="list-style-type: none"> Carbon monoxide poisoning: The operation of portable generators can lead to the buildup of CO gas, so they must be only operated outdoors and at a location where the 	<p>Cost: Portable generators offer lower upfront costs, ranging from \$500 to \$2,500, with no installation expenses. However, opting for a transfer switch or generator interlock will incur an additional \$500 to \$1,500.</p>	High	High	Medium	Low

¹ Backup Generator Canada Buying Guide: Things to Consider, Top Brands, Installation & FAQs (2023). Available: <https://www.furnaceprices.ca/home-appliances/backup-generator-canada-buying-guide/#>

		<p>fold-down handles. This mobility comes with the obligation of needing to start the generator manually. Users also need to decide on power distribution and manually connect electrical devices to the generator's outlets to meet specific demands during power outages.</p>	<p>exhaust cannot enter into homes and buildings.</p> <ul style="list-style-type: none"> • Storage and maintenance requirements: Storing properly, ensuring fuel stability, and performing essential maintenance tasks, such as oil changes, air filter and spark plug replacement, are crucial to prevent portable generators from wearing out and ensure they are ready to use when needed. • Noise level: Portable generators tend to be louder than stationary generators, with noise levels ranging from 60 to 90 dB, equivalent to a power mower. • Powering a home's electrical circuit: The function can be realized by installing a transfer switch, which automatically or manually switches between grid and generator power for smooth transitions, or an interlock, which acts as a manual barrier, ensuring that only one power source can be active at any given time. 	<p>Ease of implementation: Manual starting, refueling, and regular maintenance are necessary for portable generators, which may pose challenges for inexperienced users.</p> <p>Capacity: Portable generators offer a power range from 1kW to 9.5kW, which is ideal for running devices plugged into the generator rather than a home's electrical circuit. They are typically used to meet temporary power requirements.</p> <p>Impact on operational emissions: Portable generators will emit GHG emissions as a result of burning fossil fuels.</p>				
3	<p>Inverter generators</p>	<p>An inverter generator operates on the same mechanical principles as portable generators with an internal combustion engine fueled by gasoline, diesel or propane to produce alternating current (AC) as backup power for homes during power outages. Notably, inverter generators can provide more stable and reliable power, safeguarding sensitive electronics and medical devices. This is achieved through a process of converting the AC output into direct current (DC) and subsequently inverting it back to AC, thereby ensuring a consistent voltage and frequency.</p>	<ul style="list-style-type: none"> • Outdoor operation: Like other portable generators, inverter models should only be used outdoors to prevent the accumulation of carbon monoxide. • The trade off between lower power production and higher upfront cost: Despite their quieter operation and fuel efficiency, inverter generators often have lower power output, which may restrict their ability to power multiple high-demand appliances simultaneously. Achieving higher power output through parallel operation requires homeowners to 	<p>Cost: The upfront costs of inverter generators are often higher than those of traditional generators, with average prices ranging between \$400 and \$5,000.</p> <p>Ease of implementation: Although inverter generators are designed to be more compact and portable, enhancing user convenience, they still require manual starting and regular refueling, same as the portable generators.</p> <p>Capacity: Inverter generators provide power outputs ranging from 1kW to 7kW, which is generally lower compared to traditional portable generators.</p>	Medium	Medium	Medium	Low

			invest in additional units and a parallel kit, adding to the initial capital costs.	<p>However, some inverter generators have parallel capacity, enabling users to connect two or more units together to increase the overall power output.</p> <p>Impact on operational emissions: Inverter generators can adjust internal combustion engine speed to match the power demands, leading to less fuel consumption and emissions. Nonetheless, they still rely on fossil fuels, resulting in increased GHG emissions.</p>				
4	<p>Grid-tied solar systems with inverters designed to disconnect from the grid during power outages</p>	<p>Solar panels convert sunlight into direct current electricity, which is then converted into usable alternating current electricity. The electricity generated powers homes directly, with excess electricity flowing back to the grid.</p> <p>Grid-tied solar systems typically shut down automatically during power outages to prevent back feeding electricity into the grid and ensure the safety of workers repairing the grid. However, solar systems equipped with certain types of inverters enable homeowners to switch to off-grid mode during outages, disconnecting the system from the grid and allowing electricity to flow continually to meet energy demands at homes.</p>	<ul style="list-style-type: none"> • Installing BC Hydro-approved inverters: Specially designed inverters are essential in enabling solar systems to remain operational during power outages. It is important to choose inverter models equipped with this capability from BC Hydro's approved list to effectively implement this strategy. • Equipment compatibility: Compatibility issues may arise when integrating inverters with existing solar systems. Professional assistance is necessary to ensure compatibility and proper installation. 	<p>Cost: The cost of solar systems varies depending on the size and number of panels. A grid-tied solar system in BC can range from \$10,000 to \$30,000. As a benchmark, a 5kW solar system cost around \$13,000 - \$16,500.²</p> <p>Ease of implementation: Inverters that have the function of islanding the solar system from the grid are readily available and commonly employed within the industry. Once installed, the systems are relatively easy to use, as they automatically switch between grid-connected and standalone modes during power outages.</p> <p>Capacity: Expanding the size and quantity of solar panels can increase electricity generation. However, solar systems produce electricity that fluctuates throughout the day and across seasons, resulting in uncontrollable power output. Despite designing the system size based on required energy use, mismatches between supply and demand are very likely to occur without the incorporation of energy</p>	Low	High	Medium	High

² How Much to Install Solar Panels: The Comprehensive Guide (2023). Available: <https://solarbc.ca/how-much-to-install-solar-panels/#:~:text=BC%20Solar%20Power%20Incentives%201%20Federal%20Solar%20Tax,Utility%20Company%20Incentives%20...%205%20Tax%20Breaks%20>

				<p>storage technologies, such as batteries.</p> <p>Impact on operational emissions: Solar power generation does not release any GHG emissions. In addition, by reducing reliance on grid electricity, homes with solar systems contribute to emissions reduction.</p>				
5	Stand-alone solar systems	<p>A stand-alone solar system operates independently of the electrical grid. During power outages, it continues to supply electricity when consistent sunlight is available.</p>	<ul style="list-style-type: none"> • Installation complexity: Compared to grid-tied systems, stand-alone systems entail more intricate component integration and require the expertise of solar professionals for installation. • Exclusion from utility net metering programs: The net metering program allows utility customers to connect a small electricity-generating unit to the distribution system and receive credits to offset future consumption. Without a connection to the grid, stand-alone solar systems are unable to capitalize on net metering incentives for solar energy production. • Off-grid limitations: Stand-alone solar systems are often used in remote areas where grid connectivity is unavailable. In most practical scenarios, these systems are paired with battery banks to store excess energy for later use. However, in regions where grid access is present, regulatory restrictions may prohibit homes from disconnecting from power services. In such instances, a stand-alone solar system without batteries may be employed to power a portion of the home, with 	<p>Cost: Stand-alone solar systems share similar capital costs for solar panels as their grid-tied counterparts but would incur slightly higher installation expenses due to additional components needed.</p> <p>Ease of implementation: Due to their independence from the grid, stand-alone systems are unaffected by power outages. Also, little manual intervention is required after installation.</p> <p>Capacity: While smaller solar systems may offer limited capacity, larger ones have the potential to provide sufficient backup power when sunlight is abundant. However, maintaining consistent electricity production over extended periods can be challenging for systems without energy storage.</p> <p>Impact on operational emissions: By harnessing solar power, these systems replace energy sourced from the grid or fossil fuels, contributing to overall emissions reduction.</p>	Low	High	Medium	High

			the rest of home relying on grid power. While this concept is conceivable, it is rare in real-world applications and largely remains theoretical.					
6	Portable solar-charged batteries	Portable solar-charged batteries consist of four main components: solar panels, a charge controller, an integrated battery, and an inverter. The solar panels take in sunlight and turn it into direct current to charge the battery. When devices are plugged into the generator during power outages, the inverter converts the stored DC into usable AC to power these devices for continued operations.	<ul style="list-style-type: none"> • Storage capacity and restrictions: Unlike generators fueled by fossil fuels, this portable system provide power from stored energy, making the capacity of internal battery a critical factor in determining how much power a generator can deliver before needing to recharge. Due to its nature as a solar-charged battery system, it could be subject to Technical Safety BC regulations and the BC Electrical Code. • Sunlight availability and recharge time: The recharge time of the portable batteries is impacted by available sunlight. During cloudy days, the generators may not receive sufficient solar input, leading to longer recharge times and affecting the overall output performance. 	<p>Cost: Costs range between \$150 and \$5,000, depending on the output capacity of the models. Rebates are available.</p> <p>Ease of implementation: The setup process is straightforward and requires minimal assembly. Users can deploy the solar panels and set up the units quickly without specialized tools or knowledge.</p> <p>Capacity: Small units typically have an output range of 100-500 W, while larger models can provide 3 kW to 4 kW of power output with up to 10.8 kWh of capacity. Assuming critical loads require 1,000 watts of power, a system with a storage capacity of 10 kWh can sustain operation for 10 hours. Multiple portable solar-charged batteries can be paired up to offer increased battery storage capacity over more extended periods.</p> <p>Impact on operational emissions: A solar generator has a minimal environmental impact during its operation, with no GHG emissions generated.</p>	Medium	High	Medium	Medium
7	Home battery backup systems	Backup batteries store excess energy from the grid or alternative energy sources like solar panels and generators. When the power goes out, the system automatically switches to battery power. An inverter then converts the DC stored	<ul style="list-style-type: none"> • Compliance with energy storage system regulations: The size of storage batteries in BC is subject to Technical Safety BC regulations and the BC Electrical Code. These regulations are expected to 	<p>Cost: The upfront cost of a home battery backup system can be substantial, with the median cost estimated at \$1,300 USD per kilowatt-hour. In this case, a typical 10 kWh battery that can power home electric load of 1,000 watts for 10 hours could cost around</p>	Low	High	High	High

		<p>in the battery to usable AC to power homes.</p> <p>Battery systems are often paired with solar panels, resulting in hybrid solar systems that enhance the resilience of both the battery and solar components. When utilized as a standalone backup system, the battery is limited by its energy storage capacity and is unable to recharge until the grid is restored. However, when integrated with a solar system, the battery can recharge whenever sunlight is available, allowing it to sustain home power for extended durations. When a power outage occurs, the battery storage automatically activates, enabling the continuous operation of the solar system to generate energy and store excess power for later use.</p>	<p>be updated with the new Canadian Electrical Code (CEC). In the updated CEC, batteries intended for use in residential dwellings must either be certified to UL9540A standards or be installed in a room that complies with the BC Building Code. Upon meeting the requirement, a single energy storage system is limited to a storage capacity not exceeding 20 kWh, and the aggregate capacity of multiple energy storage systems must not exceed 40 kWh.</p>	<p>\$13,000 USD.³ Rebates are available.</p> <p>Ease of implementation: With automated power outage detection, switching, operation, and recharging, minimal user intervention is required for home battery backup systems. Also, most systems feature user-friendly interfaces for monitoring and control, enhancing ease of use.</p> <p>Capacity: Large battery systems have the capacity to fulfill the requirements of whole-home backup power for extended durations. However, the capacity of home battery backup systems varies depending on the size and model, and it may also be subject to local regulations.</p> <p>Impact on operational emissions: The operation of battery backup systems does not generate any emissions. By enabling homeowners to store excess solar energy and utilize it during power outages or peak demand periods, they can help reduce emissions.</p>				
8	<p>Vehicle-to-Home (V2H) charging</p>	<p>In the event of a power outage, bidirectional charging technology leverages EVs as mobile battery storage for homes. An EV equipped with bidirectional charging capabilities discharges energy back into a designated charging unit, which then converts the DC stored in the EV battery into AC, providing backup power.</p>	<ul style="list-style-type: none"> • Compatibility issues: Bidirectional EV charging is limited to specific EV models equipped with this technology, and the bidirectional charging feature may only work with homes with specific systems. For instance, the Ford Charge Station Pro can only be used in conjunction with Ford's Home Integration System.⁴ These compatibility requirements could hinder widespread adoption. 	<p>Cost: The estimated cost for the bidirectional charging unit is around \$4,000 USD. While this may appear high compared to typical home EV chargers, it is more affordable than installing a dedicated home battery backup system.</p> <p>Ease of implementation: The bidirectional charging equipment provides user-friendly interfaces for monitoring and control. However, a V2H system could be complex for users to manage and operate as it involves the interaction of multiple systems, including EV battery, home electrical</p>	Medium	Medium	High	High

³ What are the best batteries for whole home backup? (2022) Available: <https://www.energysage.com/energy-storage/best-batteries-for-whole-home-backup/>

⁴ The Best Bidirectional EV Chargers (2023). Available: <https://switchingtoelectric.com/blog/Best-Bidirectional-EV-Chargers#ford-charge-station-pro>

				<p>panels, the grid, and potentially the solar systems.</p> <p>Capacity: The average useable battery capacity of electric vehicles is around 71.8 kWh, which can power a home with electric loads of 1,000 watts for three days.⁵</p> <p>Impact on operational emissions: V2H charging systems do not generate direct emissions during operation, as they rely on the stored energy in the EV's battery. Additionally, their ability to power homes during peak hours and compatibility with solar systems can help reduce emissions.</p>				
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⁵ Useable battery capacity of full electric vehicles. (2024). Available: <https://ev-database.org/cheatsheet/useable-battery-capacity-electric-car>

Back-Up Heating Strategies

#	Strategies	Overview			Evaluation			
		How the Strategy Works	Constraints and Conditions	Evaluation Rationale	Budget Friendliness	Ease of Implementation	Capacity	Climate Friendliness
1	Wood-burning appliances	Wood-burning appliances, including fireplace inserts, woodstoves, pellet stoves, open hearth fireplaces, masonry heaters, and wood burning furnaces, generate heat by burning wood within an enclosed compartment known as the firebox. The heat is then radiated out into the surrounding space, offering reliable space heating.	<ul style="list-style-type: none"> Impacts on air quality and health: Wood-burning appliances emit harmful fine particles during operation. These fine particles in wood smoke are linked to respiratory and cardiac issues, especially for vulnerable populations such as infants, the elderly, and individuals with existing heart and lung conditions. Bylaw requirements: Under Metro Vancouver's residential indoor wood burning bylaw, burning is prohibited from May 15 to September 15 unless the appliance serves as the sole source of heat in a residence, is in an off-grid residence outside the Urban Containment Boundary, or during emergencies, such as power outages lasting for three hours or more. The bylaw also requires the registration of appliances. Eligible appliances must meet emissions criteria, provide the sole source of heat in a home, or use only manufactured fire logs.⁶ Safety concerns: Improper use of wood-burning appliances can pose fire hazards, so users should 	<p>Cost: Typically ranges from \$2,000 to \$4,000, covering both the appliance and installation expenses.</p> <p>Ease of implementation: The supply market for wood-burning appliances is well-developed. However, using the appliances may require a learning curve involving proper fueling, fire management, and regular maintenance, including cleaning of ashes and chimneys.</p> <p>Capacity: Wood-burning appliances are powerful enough to heat average-sized, modern homes.</p>	Medium	High	High	Low

⁶ About the Residential Indoor Wood Burning Bylaw. (2024). Available: <https://metrovancover.org/services/environmental-regulation-enforcement/air-quality-regulatory-program/about-the-residential-indoor-wood-burning-bylaw>

			<p>adhere to safety guidelines, such as keeping flammable materials away from the stove and using a fire screen. In addition, it is important to ensure proper ventilation, conduct regular maintenance, and install carbon monoxide detectors capable of operation during power outages when using wood-burning appliances.</p> <ul style="list-style-type: none"> • Fuel availability: Homeowners relying on wood stoves as a backup heat source need to ensure access to an adequate supply of seasoned firewood. 	<p>Impact on operational emissions: During combustion, wood-burning appliances will emit GHG emissions. Catalytic wood stoves and EPA-certified units are more efficient and produce less emissions.</p>				
2	<p>Gas fireplaces</p>	<p>Gas fireplaces that have a standing or vertical pilot light can continue to operate during a power outage because they do not require electricity to start the pilot flame. Although some models require electricity to trigger the pilot flame, most of them come with a battery backup system that allows them to function as an alternative heat source during power outages.</p>	<ul style="list-style-type: none"> • Carbon monoxide poisoning: Proper ventilation and regular maintenance are important to ensure safe operations of gas fireplaces during power outages to prevent the buildup of carbon monoxide. • Loss of gas supply: Gas furnaces depend on gas supply to function, and natural gas infrastructure is equally challenged by extreme weather events. When gas outages happen, gas furnaces will no longer be able to provide heating. 	<p>Cost: A new residential gas furnace including installation, will cost between \$4,000 – \$6,500 on average.</p> <p>Ease of implementation: Gas furnaces are widely available in the market, with various brands and models to choose from, and they are easy to operate once installed by professionals. However, performing routine maintenance tasks is essential to ensure safe operation of the furnace.</p> <p>Capacity: Although gas fireplaces vary in size and efficiency, most of them can provide significant heating capacity to the entire home. However, it is worth noting that the fireplace blower uses electricity to circulate heat around the room. During power outages, the blower will not operate. Although the fireplace will continue to warm up the room with radiant heat, the radius will be smaller.</p> <p>Impact on operational emissions: Operating gas fireplaces results in releasing GHG emissions, contributing</p>	<p>Medium</p>	<p>High</p>	<p>Medium</p>	<p>Low</p>

				to an increase in a home's overall operational emissions.				
3	Solar air heaters	<p>Solar air heaters function by utilizing sunlight to generate warmth for indoor spaces. The heater consists of an absorber plate that converts sunlight into heat energy. Behind the plate, a network of channels or tubes, often coated with materials to enhance heat absorption, is positioned. As the plate heats up, the air within these channels also becomes warmed. A fan or blower then circulates cold air from the room through these heated channels, warming it in the process.</p>	<ul style="list-style-type: none"> • Sunlight availability: Like other solar backup systems, solar air heaters rely on sunlight to generate heat, making them less effective during periods of low sunlight, such as cloudy days or nighttime. 	<p>Cost: The average cost of whole-home solar air heaters exceeds \$15,000 USD, with additional installation expenses ranging from \$900 USD to \$5,000 USD.</p> <p>Ease of implementation: Solar air heaters are easy to use once installed, requiring minimal user intervention. However, solar air heaters are uncommon and are rarely used in Canada. The limited market feasibility of this option makes it less appealing for BC homeowners.</p> <p>Capacity: The heating capacity of solar air heaters depends on multiple factors, such as the size and efficiency of the absorber plate and consistent sunlight availability, and due to the reliance on local climate conditions, they may offer less reliable heating supply compared to wood stoves.</p> <p>Impact on operational emissions: Solar air heaters operate using renewable solar energy and produce no emissions during the process.</p>	Low	Low	Medium	High
4	Catalytic heaters	<p>Catalytic heaters employ a catalyst, often a platinum-coated plate, to accelerate a chemical reaction with natural gas, propane, or butane. This reaction is a flameless heat source that breaks down molecules and produces heat, warming the surrounding space.</p> <p>Catalytic heaters have been utilized in industrial applications since they were first introduced several decades ago. For example,</p>	<ul style="list-style-type: none"> • Maintenance needs: Dust particles can diminish the efficiency of the catalytic process. So, it is important to cover the heater when not in use and perform regular cleaning to maintain optimal performance. • Ventilation is still necessary: While catalytic heaters are safe in terms of emitting no carbon monoxide, they can deplete ambient oxygen 	<p>Cost: The cost of catalytic heaters ranges between \$400 and \$2,000, representing a moderate upfront investment compared to other alternative heating methods.</p> <p>Ease of implementation: Catalytic heaters are straightforward to use. The process of starting the heater includes ensuring the fuel supply, opening the valve to allow the fuel to flow to the heater, and using the ignition system for ignition. Once started, the heater provides</p>	Medium	Low	Medium	Medium

		<p>they are commonly used in the natural gas industry in situations where traditional forms of heating are not suitable due to safety concerns about explosive gases in the environment. Catalytic space heaters, which can be wall-mounted or placed on the floor for targeted heat distribution, are employed to maintain a comfortable environment for people or to prevent equipment from reaching critical temperatures.</p>	<p>levels, potentially leading to hypoxia. Therefore, adequate ventilation is essential when operating catalytic heaters.</p>	<p>heat output with minimal user intervention required.</p> <p>Capacity: Catalytic heaters come in different sizes to accommodate heating needs, but they are primarily designed for small to medium-scale space heating.</p> <p>Impact on operational emissions: Catalytic heaters produce heat through a chemical reaction with fuel, releasing minimal emissions compared to traditional combustion methods.</p>				
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Back-Up Cooking Strategies

#	Strategies	Overview			Evaluation			
		How the Strategy Works	Constraints and Conditions	Evaluation Rationale	Budget Friendliness	Ease of Implementation	Capacity	Climate Friendliness
1	Wood cook stove	A wood cook stove uses wood as its heat source and features a firebox designed to trap and transfer the heat to a cooking surface and oven. In addition to serving as an alternative cooking method, it can also fulfill space heating needs.	<ul style="list-style-type: none"> • Space preparation and installation requirements: Homeowners opting to install a wood cook stove in their homes need to either remove or cover all combustible materials in the designated area for the stove. Additionally, all wood cook stoves should be installed per the manufacturer's guidelines to ensure maximum safety. Local fire and building codes should also be followed when installing a wood cook stove. • Indoor air quality concerns: The combustion process of wood cook stoves can increase indoor particulate matter and hazardous air pollutants, resulting in reduced indoor air quality and potential health hazards for occupants. 	<p>Cost: The initial capital cost for a wood-burning cook stove ranges between \$2,000 to \$5,000.</p> <p>Ease of implementation: Wood cook stoves are readily accessible on the market, offering homeowners plenty of brands and models to select from. A wood cook stove needs to be manually fired up and do temperature control, which would demand a certain level of skill and experience.</p> <p>Capacity: Wood cook stoves offer a high cooking capacity, enabling versatile cooking and the simultaneous preparation of multiple dishes with the cooking surface, which provides an efficient method of meal preparation for households.</p> <p>Impact on operational emissions: Wood cook stoves emit particulate matter and emissions during the combustion of wood fuel.</p>	Medium	High	High	Low
2	Camp stove	A camp stove operates using canisters of butane, propane, or isobutene and offers a portable solution for cooking,	<ul style="list-style-type: none"> • Risk of CO poisoning: Indoor use of camp stoves could lead to CO poisoning, particularly 	Cost: Camp stoves are relatively affordable options, with prices ranging from \$20 to \$200.	High	High	Medium	Medium

		boiling water, and heating food during power outages.	<p>during power outages when electric CO monitors may be non-functional and unable to alert of reaching any dangerous levels. Therefore, camp stoves should only be used outdoors.</p> <ul style="list-style-type: none"> • Fuel availability: It is important to maintain an adequate compatible fuel supply to ensure continued operation of camp stoves, especially during prolonged power outages. 	<p>Ease of implementation: Camp stoves are easy to operate, equipped with simple ignition mechanisms and intuitive controls.</p> <p>Capacity: Camp stoves are also versatile and capable of preparing a wide range of meals, but they are primarily designed for small-scale cooking.</p> <p>Emissions impact: Camp stoves rely on propane, butane, or other liquid fuels, resulting in emissions production, but the impact is relatively minimal due to small-scale operation.</p>				
3	BBQ grills	A BBQ grill allows users to prepare hot meals outdoors using charcoal, propane, or natural gas as fuel, offering an alternative cooking solution when electric ranges and appliances are inoperative.	<ul style="list-style-type: none"> • Outdoor use only: BBQ grills are designed for outdoor use only and should never be operated indoors due to the risk of carbon monoxide poisoning and fire hazards. • Fire risks: When using BBQ grills, users should follow safety guidelines, take precautions to prevent flare-ups, grease fires, and accidental burns, and keep a fire extinguisher nearby. 	<p>Cost: Small models are available for under \$500, though the majority are priced between \$500 and \$1,500.</p> <p>Ease of implementation: BBQ grills often feature easy-to-use ignition systems, although some experience may be needed to achieve desired cooking results.</p> <p>Capacity: BBQ grills often have spacious cooking surfaces and multiple burners, accommodating different food needs and facilitating the efficient preparation of large quantities of food.</p> <p>Impact on operational emissions: By burning charcoal, propane, or natural gas for operation, BBQ grills will contribute to GHG emissions.</p>	Medium	High	High	Low
4	Induction stove with built-in battery	This type of induction stove combines induction cooking with battery storage. It can plug into a standard 120V wall outlet, storing the energy to drive the induction cooking when needed. The	<ul style="list-style-type: none"> • Battery lifetime: The built-in battery has an estimated lifespan of around ten years. • Compatibility: The induction technology 	<p>Cost: Stoves can be priced at several thousand dollars before rebates are applied, representing a significant upfront investment compared to other cooking equipment.</p>	High	Low	High	Low

		<p>stove uses an electromagnetic field that transfers currents directly to the cookware placed on the glass surface.</p>	<p>requires cookware made from magnetic stainless steel, cast iron, enameled iron, or nickel-based materials. If the current cookware isn't compatible, additional costs are incurred to purchase new pieces.</p>	<p>Ease of implementation: Installing an induction stove is as straightforward as setting up a new fridge or washing machine. However, they are not yet widely available in the Canadian market. Two leading U.S.-based companies, Impulse Labs and Channing Street Copper, currently offer shipping only within the United States.</p> <p>Capacity: Battery-powered induction stoves come equipped with a 3 kWh to 5 kWh battery, depending on whether they feature a cooktop alone or include an oven as well. This storage can provide enough power to prepare between three to five meals.</p> <p>Impact on operational emissions: Induction stoves are up to three times more energy-efficient than gas stoves and about 10% more efficient than conventional smooth top electric ranges.⁷ Coupled with the use of electricity, it has low operational emissions.</p>				
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⁷ Making the Switch to Induction Stoves or Cooktops. (2023). Available: <https://www.energy.gov/articles/making-switch-induction-stoves-or-cooktops>