

Beyond the Grid: BC's All-Electric Home Frontier

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All-electric net zero homes are rapidly becoming a symbol of sustainable living in Canada. Electrification is the move away from energy-consuming devices, systems or sectors from carbon-based sources of energy to electricity. Electrification is at the heart of achieving carbon neutrality, with homes powered by clean, renewable energy sources such as wind and solar.

Net zero homes are designed and built to produce as much energy as they consume, making them up to 80% more energy efficient than homes built to conventional building codes. In BC, net zero policy is being championed by the CHBA Net Zero Home Labelling Program and BC Energy Step Code.

What is an all-electric net zero home?

Unlike traditional homes that rely on a mix of electricity, natural gas, or oil, these homes operate entirely on electricity, sourced

heat gain.

temperatures.

economically attractive.

wastage.

to mass adoption.

energy availability.

neighbourhood.

higher prices compared to standard homes.

primarily from renewable energy systems such as solar panels or wind turbines. Net zero homes are designed to first minimize energy consumption and then meet their low energy requirements with renewable energy.

in summer. It ensures stable indoor temperatures with less reliance on the home's heating and cooling systems.

Energy-efficient windows and doors: High-performance windows and doors minimize heat transfer through low U-values, triple pane glass, and insulating between the glass panes with a gas such as argon. They further reduce winter heat loss and summer

Superior insulation: High-performance continuous insulation significantly reduces your home's heat loss in winter, and heat gain

Air tightness: Meticulous detailing of the building envelope, and properly sealed of windows and doors with durable gaskets, prevent air leakage. Airtightness of the building envelope reduces energy loss and drafts, helping to maintain consistent indoor

Renewable energy systems: Renewable energy systems, such as solar photovoltaic (PV) panels and wind turbines, generate electricity on-site to meet your household's energy needs. By relying solely on renewable energy, your all-electric net zero home totally eliminates the need for fossil fuels. This significantly reduces your home's greenhouse gas emissions and contributes to a carbon-neutral footprint.

Energy storage and/or grid backup: Energy storage batteries and grid-tied solutions are crucial in helping families achieve energy independence. Batteries allow your household to store surplus energy generated by your renewable sources for later use. This reduces your reliance on the power grid and shields your family from fluctuating energy prices.

During periods when renewable energy production is low – during the night or on cloudy days – the stored energy ensures continuous power availability. Battery storage systems also provide a dependable source of electricity during grid outages.

Efficient electric heating and cooling systems: Electric air-source and ground-source heat pumps efficiently transfer heat, rather than generating it through combustion, achieving efficiencies of 100%—400% while eliminating the need for separate fossil fuel-based furnaces and air conditioners. Heat pump water heaters (HPWHs) use electricity to extract heat from the surrounding air to heat your water.

Environmental sustainability: The primary advantage of all-electric net zero homes is their contribution to reducing carbon

What are the benefits of all-electric net zero homes?

footprints. They align perfectly with Canada's climate commitment to achieving net-zero emissions by 2050.

and then discharge electricity at optimal times. <u>BC Hydro's Self-Generation Program</u> (previously called Net Metering) is designed for homeowners who want to reduce their electricity bills and gain energy independence by generating their own electricity. Your home is powered privately with your renewable energy source, but you have the flexibility to rely on BC Hydro's grid if you need it. Using electricity when it is cheapest, at night when demand is lowest, or when excess solar is available, allows BC Hydro to reduce their cost of generating power at peak times.

Energy independence: Electrification technologies serve as grid resources, delivering operational flexibility to store on the grid

With the addition of battery storage, your solar panels generate power when the sun's out, and the extra energy is stored in the battery. When the battery is fully charged, the excess energy is fed to the power grid for a credit. The energy stored in the

battery is available during the night or in the event of a power outage. If the battery runs down, you can always draw from the

When you generate more electricity than you need, it's fed back to the grid, and you receive generation credit toward future

requirements. Then, when your system isn't generating enough to meet your household's needs, you draw from those credits off

Cost savings: Building a net zero home typically costs 10-20% more than a conventional home of the same square footage. The upfront costs are higher, but the long-term financial benefits will be substantial. Government incentives and rebates for renewable energy systems, breaks on insurance, and reduced energy bills for the life of the building, make these homes

Switching to all-electric can often be more energy efficient than fossil fuels, and may result in a decrease in energy bills, depending on the regional cost of electricity. All-electric HVAC systems also require less maintenance, making them a cost-effective option in the long run. In most cases, an electric vehicle will also be cheaper in the long run, as a component in an all-electric lifestyle..

and water heaters.

Electric heat pumps, radiant heat systems and furnaces eliminate the risk of carbon monoxide leaks and toxic emissions

Enhanced comfort and wellbeing: All-electric HVAC and hot water systems offer several advantages over natural gas furnaces

associated with natural gas. Carbon monoxide leaks can stem from cracks in heat exchangers, resulting from fuel combustion, but gas furnaces can also be safe if regularly maintained. Heat pump water heaters (HPWHs) also avoid backdrafting risks, while reducing exposure to low-level pollutants.

Heat pumps provide even heating and cooling in every room, avoiding the temperature fluctuations that can result with traditional

forced air natural gas systems. They are highly energy-efficient, transferring heat rather than generating it directly, resulting in

significant energy savings compared to gas systems. Heat pumps can also dehumidify indoor air as they operate, improving your

comfort while preventing mould.

A heat-traced hot water system has heating cables wrapped around the hot water supply pipes to maintain a consistent water temperature. Electric heat-traced systems deliver nearly instant hot water, eliminating waiting times while reducing water

fresh, filtered outdoor air, reducing indoor pollutants, allergens, and odours. They also precondition air by recovering heat from the outgoing air stream in winter, and pre-cooling it in the summer, which helps maintain stable indoor temperatures year-round.

Increased property value: Net zero homes are the future of real estate. As sustainability becomes a higher priority for

homebuyers, net zero homes are being seen as an investment in future-proofing a house, so these properties generally sell for

HRV (Heat Recovery Ventilation) and ERV (Energy Recovery Ventilation) systems continuously exchange stale indoor air with

Research from the Canadian Home Builders' Association (CHBA) indicates that <a href="https://example.com/homes.com/h

government incentives, such as mortgage insurance rebates, further enhances the market value of net zero homes.

Higher upfront costs: Net zero homes require advanced technologies such as high-performance building envelopes, heat pumps, and solar photovoltaic (PV) systems, which represent a modest increase in initial construction costs. Homeowners who

Challenges facing the adoption of all-electric net zero homes

prioritize visible upgrades over energy efficiency and reduced operating costs, may be deterred by the absence of ostentatious curb appeal.

Despite the numerous advantages and widespread adoption of all-electric and net zero homes in Canada, there are more hurdles

High climatic demands and technical issues: Designing net zero homes for colder Canadian winters can be challenging due to higher heating demands during long winters, or in higher altitudes like those in Whistler, often corresponding with reduced solar

Limited awareness and education: Many potential homeowners are still unaware of the long-term benefits of net zero homes,

such as reduced operating costs, with improved comfort and air quality. They may also have concerns about the maintenance,

Snow and ice can accumulate on the solar panels, or snow on trees can shade the panels, reducing their efficiency. In addition to shorter days and reduced sunlight, and covered panel surfaces, cold temperatures can decrease the voltage output of solar panels. The good news is that solar panel designs can be adapted for colder climates, and snow often helps by cleaning the panels as it melts.

Infrastructure and grid integration: Integrating renewable energy systems into the existing grid infrastructure can be

complicated in some communities due to the variability of renewable energy, the need for infrastructure upgrades to

energy sources can create grid instability, requiring constant balancing to ensure a consistent supply of power to each

accommodate the shift towards energy self-sufficiency, and the impact on local grid stability. Transitioning to all-electric homes does increase the demand on the power grid, which may not currently have the capacity to support widespread adoption without significant upgrades.

Solar and wind power production depends on weather conditions. This means that renewable energy sources will always be intermittent, and that may lead to frequency and voltage fluctuations when they are unavailable. This variability of renewable

Regulatory and policy barriers: The <u>BC Energy Step Code</u> represents a significant step towards achieving net zero in British Columbia. It offers a pathway for local BC governments to mandate increasingly energy-efficient building construction practices, with the goal of having all new buildings "net zero energy ready" by 2032. Inconsistent regulations and building codes across Canada's other provinces and territories, however, is complicating the construction of net zero homes. Streamlining regulations nationwide will be essential to facilitate widespread adoption.

Supply chain and workforce limitations: The availability of key materials and technologies, such as energy-efficient components

or building-integrated solar products, is currently limited or costly due to supply chain issues. In some regions of BC, subsidized

natural gas or electricity prices are reducing the financial incentive for homeowners to invest in net zero technologies.

Architects, designers and builders are leading the field in BC, working closely with cities and local municipalities, and

organizations and programs such as the [CMHC Net Zero Home Labelling Program](CMHC NetZero Home, BuiltGreen Canada and Passivehouse Canada, to move the construction industry towards electrification, net zero and a cleaner future.

The takeaway

The rise of all-electric net zero homes is not just a trend in British Columbia but has become a necessary step toward building a

sustainable future. As technology advances, costs decrease, and awareness grows, we can expect all-electric net zero homes to

Resources BC Hydro Self Generation CHBA Net Zero Home Labelling Program

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gradually become the standard for new construction across Canada.

Affordable Net Zero Construction in BC: Making Sustainability Accessible in 2025

Sustainable Living: Your Essential Guide to a Net Zero Renovation

The Human Factor: Bridging the Design Gap Between Net Zero Goals and Lifestyle

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