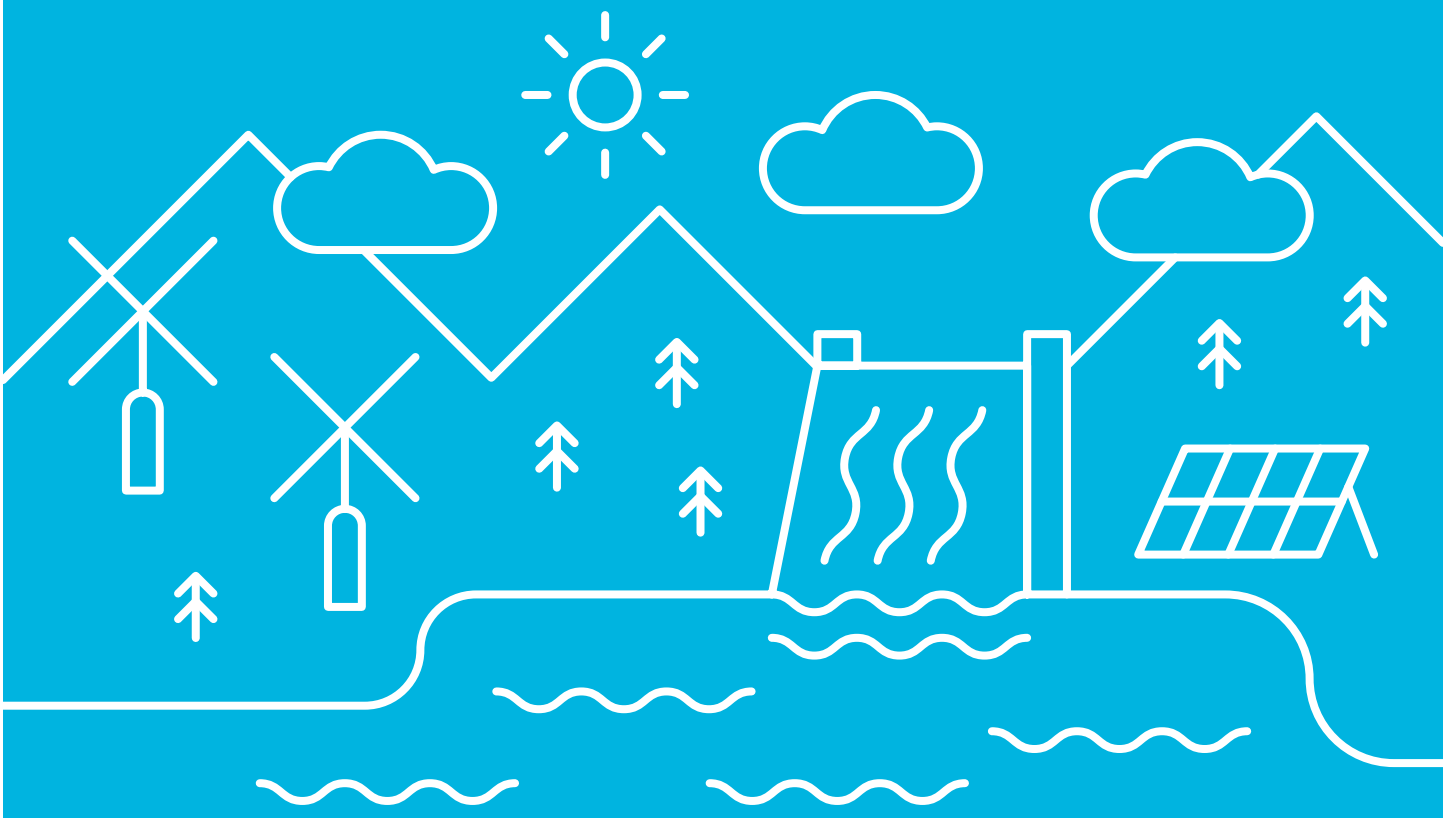
Clean misconceptions:

Why replacing hydroelectricity with other renewables will not have the carbon saving impact most British Columbians expect



Report
September 2021

BC Hydro
Power smart

Clean misconceptions: Why replacing hydroelectricity with other renewables will not have the carbon saving impact most British Columbians expect

Most British Columbians think using renewables such as wind or solar to power their homes and businesses is the answer to reducing their carbon footprint. Yet, the majority do not know the electricity they currently use to power their everyday lives is already clean. BC Hydro is number one in clean energy generation in western North America. Contrary to popular belief, switching to renewables in B.C. will not result in a significant reduction in personal greenhouse gas emissions. It is more effective to switch to an electric vehicle or install a heat pump.

Highlights

- 2021 rankings show B.C. is leader in western North America in generating clean electricity.
  - About 98 per cent of the power generated by BC Hydro comes from clean or renewable resources—most comes from large hydroelectric facilities.
- A new survey conducted for BC Hydro found about 15 per cent of British Columbians think their power comes from dirty sources like coal.
- 45 per cent of respondents think solar generation provides cleaner power than hydroelectricity, and 22 per cent think wind generation is the cleanest option.
- This misconception about solar has about 40 per cent of British Columbian households thinking solar panels would be the most effective way to reduce their carbon footprint when compared to buying an electric vehicle or installing a heat pump to replace a gas furnace.
  - Of this group, about 85 per cent of those without solar panels indicated they are interested in installing them.
- Of those with solar panels already, almost half installed them to reduce their carbon footprint.
- For those interested in solar, their budget expectations do not match the actual cost.
  - Solar cost can vary depending on size, but the average residential system installed in B.C. costs between $12,000 and $30,000.
  - Yet only 13 per cent said they would pay more than $10,000, and more than half said they would not be willing to pay more than $5,000.
- British Columbian households with an interest in solar panels suggested that solar would need to replace at least half of the power they are using now.
  - Unlike hydroelectricity, which is always available, solar is an intermittent resource—it is only available when the sun is shining. As a result, it requires a battery storage system to bridge the gap when it is not available.
- Solar works best in areas where there is a lot of sunlight for long periods of time, which is not true for many parts of B.C. In fact, B.C. has low photovoltaic potential compared to other populous areas in North America. This is especially true in urban centres like Vancouver.
  - Solar is still a viable option in these areas, but lower levels of sunlight could mean less of a return on investment for capital costs, and less system efficiency than one would see from use in areas with higher photovoltaic potential.

Solutions

Because 98 per cent of British Columbia's power is generated through clean, renewable resources, switching to solar will not have the impact most British Columbians would expect; instead, those looking to reduce their carbon footprint should consider the following actions:

- Go electric: Choose an EV instead of a fossil fuel powered vehicle; it will significantly reduce carbon emissions compared to a similar sized gas-powered vehicle over a year, while saving 80 per cent in fuel costs. Provincial and federal rebates of up to $8,000 are available for the purchase of a battery electric EV, and working with BC Hydro, CleanBC also has home charger rebates up to $350 for single family homes, and thousands in rebates available for multi-unit buildings.
- Get pumped: Replacing a gas furnace with an air-source electric heat pump to cool in the summer and heat in the winter will be a huge step in reducing the average household's carbon footprint. BC Hydro customers can receive a $3,000 rebate top-up if switching from heating your home with natural gas, oil or propane. When combined with the provincial CleanBC rebate and federal rebates customers could save up to $11,000. Some local governments also have additional rebates for their residents.

British Columbia gets an 'A' for clean energy

From mountains and forest to rivers and the sea, British Columbia is full of natural wonders—hence its tagline 'Supernatural British Columbia.'

In order to protect B.C., it is vital that a balance is maintained between energy and environmental needs. Fortunately, 2021 rankings show B.C. is the western North America leader in generating clean electricity. About 98 per cent of the power it generates comes from clean or renewable resources—the majority of this power comes from its large hydroelectric facilities.

BC Hydro's 98 per cent clean status means it holds the number one spot in western North America according to the Clean Energy Report Card rankings for delivering the cleanest electricity, followed by Washington State at 85 per cent and Idaho in third at 78 per cent clean.

Rank	Region	% clean
1	BC Hydro	98
2	Washington	85
3	Idaho	78
4	Oregon	69
5	Montana	45
6	California	39
7	Arizona	39
8	Nevada	24
9	Colorado	21
10	New Mexico	17
11	Wyoming	11
12	Alberta	10
13	Utah	9

However, despite its clean energy leader status, a new survey[1] commissioned on behalf of BC Hydro found about 15 per cent of British Columbians think their power comes from dirty sources like coal—and 45 per cent view solar as a cleaner way to generate power than hydroelectricity.

This report will examine why British Columbians think solar is the best way to reduce their carbon footprint, despite the clean power B.C. already enjoys, and provide solutions for a better, greener way forward.

1 Online survey conducted by Majid Khoury of 800 British Columbians from Aug 20 and Aug 24, 2020

British Columbia's energy profile

BC Hydro generated 98 per cent of its power from clean or renewable resources on average between 2015 and 2019, mostly from its large hydroelectric resources. In fact, about 91 per cent of electricity in B.C. is produced by hydroelectric sources.

Hydroelectricity means generating power by harnessing the power of moving or falling water to produce mechanical/electrical energy. BC Hydro generates over 43,000 gigawatt hours of electricity annually to supply more than 1.9 million residential, commercial and industrial customers. This power is delivered using an interconnected system of over 73,000 kilometres of transmission and distribution lines.

BC Hydro also gets a small portion of its power from other clean sources like wind, which accounts for about 4 per cent of B.C.'s electricity generation capacity. With more than 700 MW of installed wind capacity, B.C. ranks 4th in Canada for wind generation.[2] Other clean generation sources include solar (1 per cent) and biomass (5 per cent). Two per cent of BC Hydro's power comes from natural gas.

As a result, BC Hydro ranks the highest in the West when it comes to clean and renewable generation. When looking at how other regions compare Washington ranks second at 85 per cent clean and Idaho in third at 78 per cent clean. However, Alberta and Utah rank the lowest at 10 per cent and 9 per cent respectively.

Overall, power generated in Canada is much cleaner than the power generated in the United States. The abundance of hydroelectricity is the primary reason for this. For example, Canada has four provinces that generate more than 90 per cent of their power from non-emitting resources. Manitoba and Quebec both generate 99 per cent of their power from clean or renewable resources with BC Hydro coming in just behind them at 98 per cent.

Good intentions and renewable misconceptions

Most British Columbians have the best intentions when it comes to the environment. About 90 per cent said they spend some time thinking about the impact their electricity use has on the environment, with many taking steps each day to reduce their carbon footprint.

89% recycle

59% compost

41% buy local

26% try to eat less red meat

23% bike or walk when possible

Although environmentally conscious, most British Columbian households do not know that the power they use to run their homes and businesses comes from clean, renewable resources—mostly hydroelectricity. In fact, about 15 per cent think most of the power generated in B.C. is from unclean sources like coal.

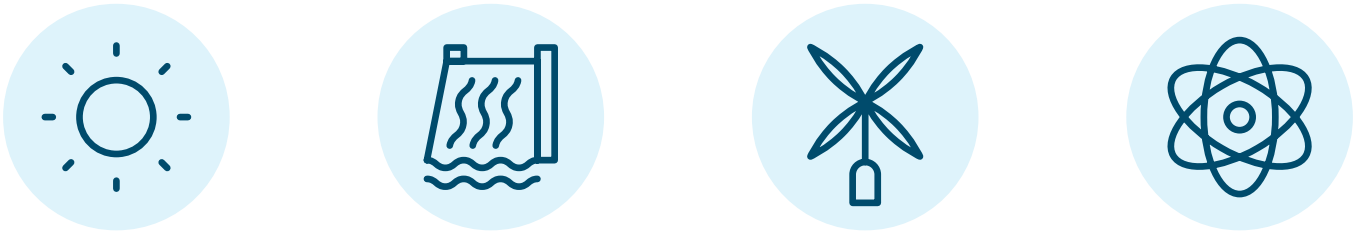
This misconception about how power is generated in B.C. might be why so many are interested in renewables such as wind and solar. In fact, 22 per cent think wind power is the cleanest way to generate electricity, while about 45 per cent think solar is the cleanest way. This is likely why 85 per cent said they are somewhat interested in replacing their current electricity source with solar panels—with a quarter saying they are definitely interested.

Of those interested in installing solar panels 36 per cent indicated reducing their carbon footprint as the main reason for wanting to do so. Of those that already have solar panels installed, the primary driver for nearly half (44 per cent) was reducing their carbon footprint.

2 Canada Energy Regulator—British Columbia profile
https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-british-columbia.html

Overall, about 40 per cent of BC households think installing solar panels would be the most effective way to reduce their carbon footprint when compared to buying an electric vehicle or installing a heat pump to replace a gas furnace. This is contradictory considering BC Hydro is western North America's clean electricity leader.

We asked B.C. households—what is the cleanest way to generate electricity?



45% solar **24% hydroelectricity** **22% wind** **10% nuclear**

Although solar is a great source of low-carbon energy, the downside with renewables such as wind and solar is that they are intermittent and cannot be relied upon to meet electricity demand around the clock (e.g. if the sun is not shining or the wind is not blowing). Hydropower on the other hand is a more reliable source than solar power because it can be ramped up or down as needed, and is available at any time of day or night.

And because hydropower is clean, the best change British Columbians can make to decrease their carbon footprint right now is swapping their gas-powered vehicle for an electric one, or installing a heat pump to replace a gas furnace. Both changes would have a significant impact on individual GHG emissions.

The true cost of switching power sources

On top of reducing their carbon footprint, one of the main reasons British Columbian households want to install solar panels is to go off the grid and save money. One third of those that have already installed solar panels indicate going off the grid and saving money as their primary reason for installing and 54 per cent of those considering solar panels cited money savings and going off the grid as primary motivation for wanting to make the switch.

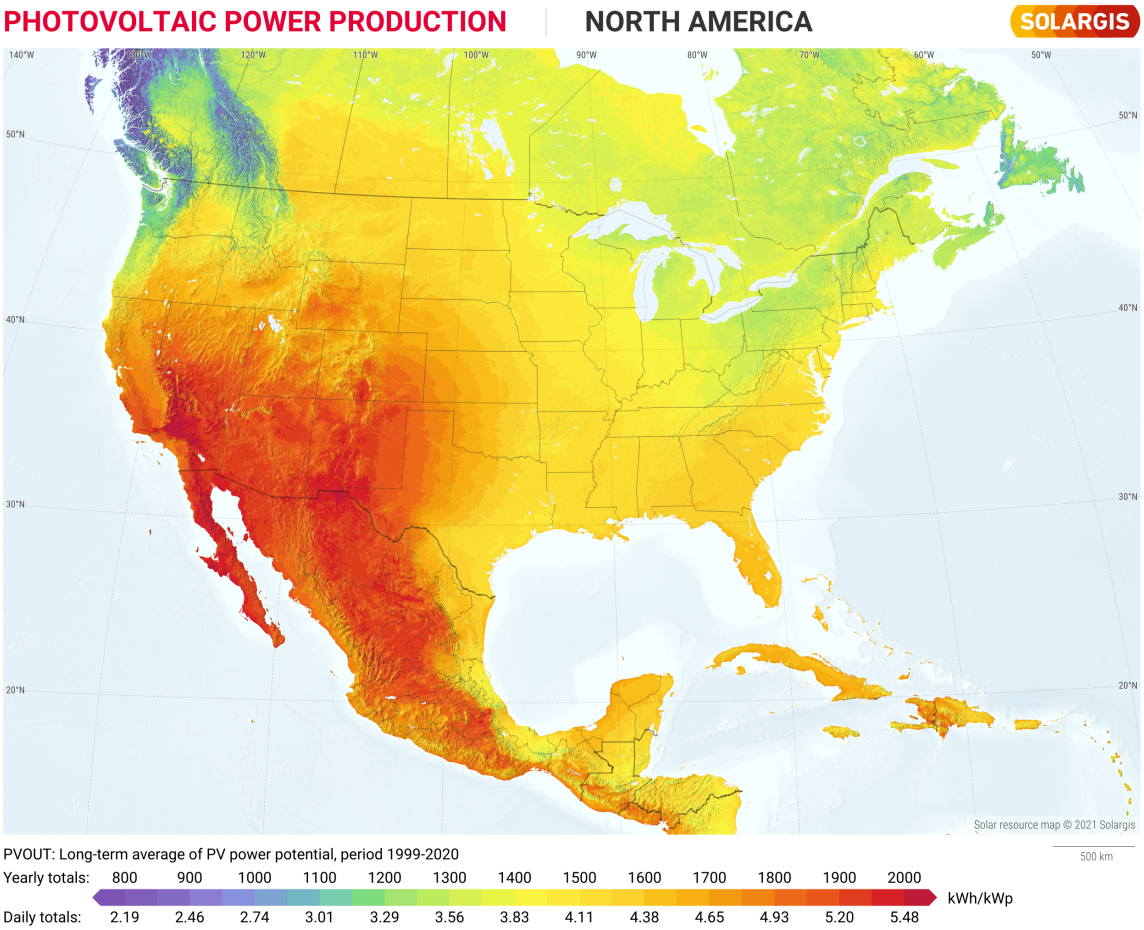
However, many are not willing to pay or are unaware of the actual cost of installing solar panels, and most would not see the return on investment that they would expect—especially if going off the grid. The survey found that more than half of B.C. households would not be willing to pay more than $5,000 to install solar panels, and only 13 per cent indicated that they would pay more than $10,000.

While costs can vary depending on size of solar array, the average cost to install a grid connected solar panel system is about $12,000 to $30,000—well above what most households indicated their potential budget would be, which means their budget does not match the typical cost of installed panels in B.C.

Installing an off grid solar system is comparable in upfront price, but energy battery storage is required for it to operate without a grid tie. For example, because solar is intermittent, in order for energy needs to be met when the sun is not shining, energy storage is crucial to ensure continuous power supply.

Of the large chunk of B.C. households that are interested in replacing their current electricity source with solar, 66 per cent indicated any investment they made in solar panels would need to result in replacing at least half of the power they are using now. This would be difficult as solar is an intermittent resource—it is only available when the sun is shining. As a result, for a large-scale solar power project to work, it needs a supplemental energy supply such as hydroelectricity to serve as a backup source and to help when demand is high and supply low.

Solar energy has its advantages and works best in areas where there is a lot of sunlight for long periods of time. Unfortunately, this is not true for some parts of B.C.—especially in Vancouver and Vancouver Island which are rainforest climates with limited sun in the fall and winter. In fact, B.C. has low photovoltaic potential compared to other populous areas in North America, and most of the higher photovoltaic areas in the province are in areas outside of population centres. Solar is still a viable option in these areas, but lower levels of sunlight can mean less of a return on investment for capital costs, and less system efficiency than one would see from use in areas with higher photovoltaic potential.



Map source: Solar resource map—Solargis 2021

Overall, tapping into the sun's power is relatively expensive in B.C., especially considering BC Hydro has some of the least expensive rates in North America.

How to go low carbon

Because 98 per cent of British Columbia's power is generated through clean, renewable resources, switching to solar will not have the impact most British Columbians would expect; instead, they should be considering switching to an electric vehicle or installing a heat pump to reduce their greenhouse gas emissions.

For example, switching from a gas-powered vehicle to a comparably sized electric model will significantly reduce carbon dioxide emissions, and fueling an electric vehicle costs about 80 per cent less than fueling a gas-powered vehicle. For example, commuting 20 kilometres a day in a Nissan Leaf costs about $2 a week, less than the average British Columbian spends on a cup of coffee at $3.60. To make the deal even better, provincial and federal rebates of up to $8,000 are available for the purchase of a battery electric EV, and working with BC Hydro, CleanBC also has home charger rebates up to $350 for single family homes, and thousands in rebates available for multi-unit buildings.

Electrification rebates

ELECTRIC VEHICLES AND HOME CHARGING

CleanBC/BC Hydro	Provincial	Federal	Municipal and other
Up to $350 rebate for installation of a home charger.	$3,000 off the after-tax vehicle price of an EV, through the **CleanBC Go Electric program.**	Up to $5,000 in federal incentives for the purchase of a new EV.	The BC **SCRAP-IT program** offers incentives up to $6,000 to use towards the cost of an EV or other low-carbon form of transportation when you scrap your existing gas-powered vehicle.
Apartment/condo EV charging rebates ○ Up to $3,000 for creating an EV Ready plan for a building ○ Up to $600 per parking stall to installing the electrical infrastructure to implement the plan. ○ Up to $1,400 per charger for purchasing and installing the chargers to implement the plan. ○ Standalone EV charger rebate, where customers can get up to $2,000 per charger.	Up to $2,000 in provincial incentives for the purchase and installation of eligible EV chargers at workplaces.		Indigenous communities and some local governments are offering **enhanced rebate offers.** If your application is eligible for an enhanced offer, the value of your rebate payment will be adjusted automatically.

HEAT PUMPS

CleanBC/BC Hydro	Provincial	Federal	Municipal and other
$3,000 rebate top-up to provincial rebate if switching from heating your home with natural gas, oil or propane.	$3,000 rebate if switching from heating your home with natural gas, oil or propane.	$5,000 in additional rebates from the **Canada Greener Homes Grant.**	Municipal rebates ranging from $350 up to $6,000 for converting from a fossil-fuel space heating system.

Remote Community Energy Strategy and Net Metering

Many remote communities still rely on 'dirty' sources of electricity generation such as diesel. In fact, there are at least 50 remote communities in B.C. not connected to the provincial electricity grid. This is where the CleanBC Remote Community Energy Strategy (RCES) comes in. This initiative aims to reduce the greenhouse gas emissions from diesel electricity generation and heating in remote communities by 80 per cent by 2030.

The strategy will achieve this goal through capacity building, efficient and low carbon buildings, and clean energy generation.

In addition, replacing a gas furnace with an air–source electric heat pump to cool in the summer and heat in the winter will be a huge step in reducing the average household's carbon footprint. According to the Community Energy Association, heat pumps are ideally suited for B.C.'s climate and can reduce a typical home's greenhouse gas emissions up to two tonnes per year. Through its Electrification Plan top–up BC Hydro customers can save up to $3,000 per household on the installation of a heating system that replaces a furnace. When combined with the provincial CleanBC rebate and federal rebates customers could save up to $11,000. Some local governments also have additional rebates for their residents.

BC Hydro has developed an Electrification Plan to help the Province meet its climate goals. Electrification refers to switching from fossil fuels like gasoline, diesel and natural gas to clean electricity. The Electrification Plan will encourage and incentivize residents and business to switch from fossil fuels to clean electricity while encouraging economic development and is expected to result in an additional 3,100 gigawatt hours of load and greenhouse gas emission reductions of 930,000 tonnes per year by the end of fiscal 2026. This is the equivalent of taking about 200,000 cars off the road. To get there, BC Hydro's $260 million Electrification Plan focuses on attracting new customers and encouraging existing customers to make the switch from using fossil fuels to clean electricity in three keys areas: buildings, transportation and industry.

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