

Clean Power 2040

Powering the future



Integrated Resource Plan—Indigenous Input

Name of Indigenous
Nation:

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Introduction

Clean Power 2040 is BC Hydro's province-wide, long-term resource planning process. BC Hydro's Integrated Resource Plan is a long-term (20 year) plan for the power system to ensure future customer electricity needs are met with clean, reliable and affordable power. The plan is expected to be submitted to the British Columbia Utilities Commission in late 2021.

We've been carefully studying B.C.'s electricity outlook for the next 20 years and coming up with various options to meet our customers' changing needs.

We want to hear what matters to you and hear your input on what we should be prioritizing as we develop our plan.

We expect to have enough power to meet our needs for at least the next 10 years, which means our immediate focus is on whether to continue with or make changes to our Power Smart programs and whether to renew electricity purchase agreements with Independent Power Producers as they expire, as well as what to do with some of our smaller hydroelectric facilities that are reaching end-of-life.

In the later 10 years of our plan, we may need additional electricity. Acquiring or building new resources, expanding our existing infrastructure, and introducing optional time-varying rates are some of options we're considering.

What's in this workbook

We want to hear from you and have developed this workbook for you to use, to help us find out what matters to you. The workbook is comprised of four sections:

- Planning objectives
- Planning for the next 10 years – 2020 to 2030
- Planning for the next 20 years – 2030 to 2040
- Thank you, and closing question

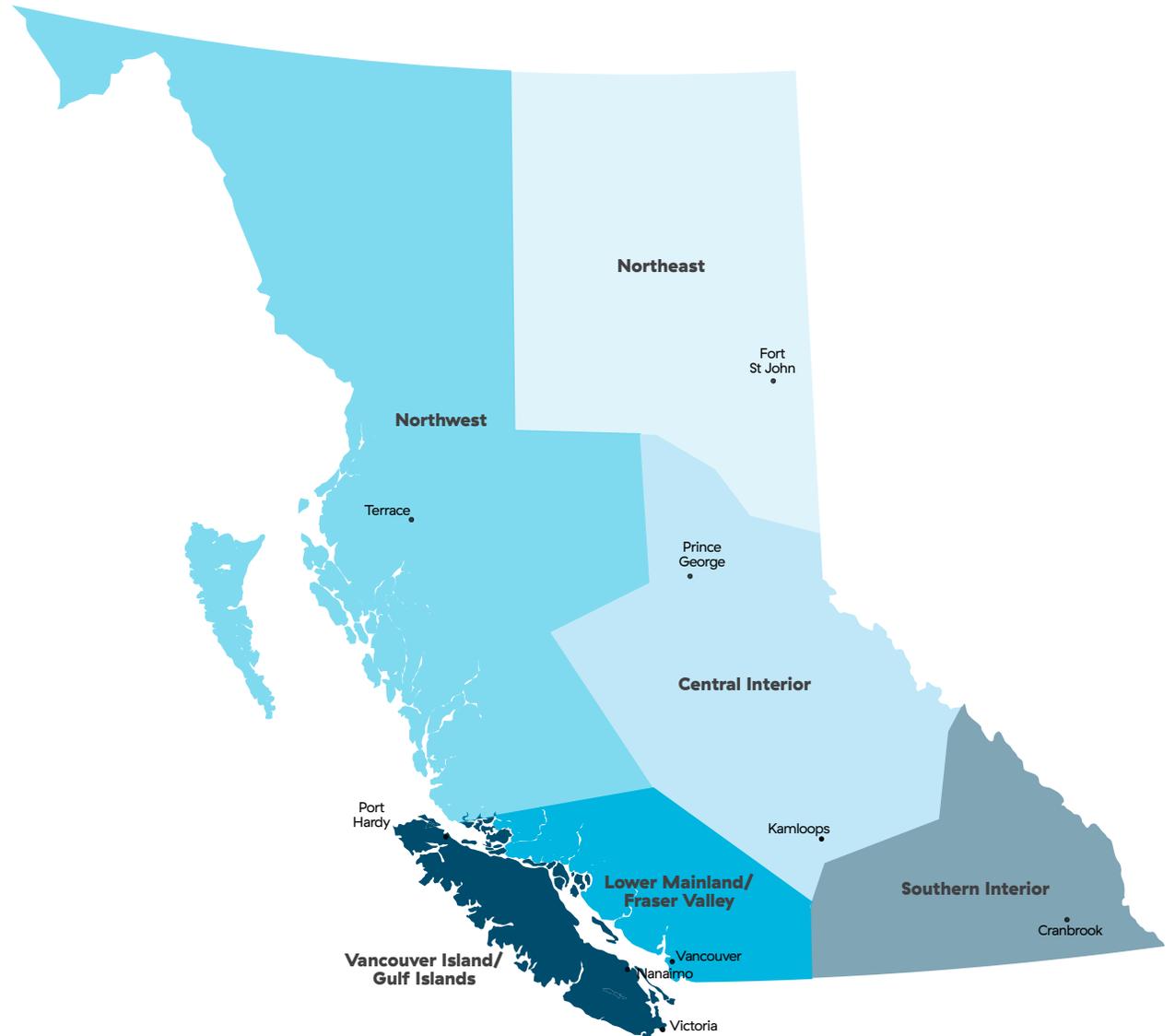
Each section contains questions for you to answer about our planning choices. We want to know what matters to you about these planning topics. We'll consider your answers alongside the results of our technical analysis and input from the public and stakeholders as we prepare a draft plan. A summary of what we heard will be released in the new year. In the spring of 2021, we'll come back to you seeking feedback on our draft plan.

Please provide your responses to the questions in this workbook by February 1, 2021 so they can inform the development of a draft plan. Your responses can be provided either by filling out the online survey sent via email link or by emailing a completed survey to CP2040.Indigenous@bchydro.com.

We welcome any further input or questions by writing to us at the same email address or calling us at **1 877 461 0161** (extension 3).

Please tell us what region are you from.

- Northwest
- Northeast
- Central Interior
- Southern Interior
- Lower Mainland / Fraser Valley
- Vancouver Island / Gulf Islands



Key concepts in planning: energy and capacity

As we think about the future of our system and continuing to meet the electricity needs of B.C., we must consider both the demand for energy and the capacity of our system.

To understand the concepts of energy and capacity and the role they play, it's helpful to think of our electricity system as a 10-lane freeway. The number of lanes on the freeway determine how much space is available for cars at any time. This is capacity. The number of cars on the highway over a period of time is energy. While not all lanes are needed all the time, they're needed during the morning and evening rush hours.

Like that 10-lane freeway, the capacity of our system is limited by the amount of electricity our system can generate and transmit at one time. While we don't need to operate at full capacity all the time, we must ensure we have enough capacity to meet our customers' needs when demand is highest – like during cold, dark evenings in the winter months.

Load forecasting and how we plan for uncertainties

Our Integrated Resource Plan will be developed around our 20-year load forecast, which will provide us with an idea of how much energy and capacity we expect to need to meet the needs of our customers.

Our load forecast is developed by estimating the amount of electricity our residential, commercial and industrial customers will use over the next 20 years. As it's difficult to predict future trends, this long-term forecasting is inherently uncertain, which is why we develop our forecast with various scenarios.

While the COVID-19 pandemic has reduced overall electricity demand in the province in the short term, electricity demand is expected to recover over time. Additional increases could come from B.C.'s efforts to reduce its greenhouse gas emissions by encouraging fuel switching through future electrification of the transportation, home heating, and the industries dependent on fossil fuels.

We'll be updating our long-term demand forecast in the new year, which will include a re-evaluation of the impacts of COVID-19 over the short and long term. Our draft actions for our Integrated Resource Plan we'll be developed based on this updated load forecast, which will then share with you for input this spring.

OPTIONS TO CONSIDER

While we expect to have enough supply in our system to meet demand for at least the next 10 years, we need to prepare now to ensure we can meet increased demand over the longer-term and in case that demand comes sooner than we expect. We're considering many options to ensure enough supply is in our system over the next 20 years to meet our capacity and energy needs:

Our energy efficiency programs:

Our Power smart programs can help our residential, business and industrial customers reduce their electricity use and save on their bills, while also being an effective way to defer the need for new supply. We can continue with our programs as they currently are, reduce or discontinue our offers, or add new options and increase incentives to achieve more savings.

Introducing voluntary time-varying rates:

Many utilities outside B.C. use time-varying rates to help shift electricity use away from peak demand times by offering a lower rate for using power at off-peak times, and a higher rate for electricity used during peak times. This can be an effective way to reduce the need for costly new projects.

Implementing voluntary electricity demand response programs:

New technology can manage space and water heating and electric vehicle charging on your behalf, which can help shift your electricity use to off-peak times. An example of demand response could be shifting the heating of a hot water tank to earlier in the day or later in the evening. Demand response can be encouraged through a program designed to support customers' ability to reduce or shift the use of electricity and usually involves either an incentive or a specific rate.

Contracts with Independent Power Producers:

Around 25% of our generation is purchased from Independent Power Producers in the province, which provide us with additional clean, renewable energy. A number of these contracts are expiring in the next few years and we must decide if we should renew them. When making these decisions we must consider a number of factors, including cost, the location of the facility, and its ability to generate electricity during peak demand periods.

The future of our small hydro plants reaching end of life:

Five of our small hydro plants built 50 to 70 years ago are reaching end of life and we must decide what to do with each of them. This could include redeveloping, temporarily or permanently shutting down the facility, or selling the facility. When deciding what to do with each, we'll take into account a number of factors, including cost, safety, environmental impacts, and system reliability.

New power sources:

To meet customer needs beyond the next ten years, we'll need to add to our power supply and fill the expected capacity and energy gaps.

To help with this, we're analyzing options, which could include:

- Looking at ways that new technology, such as utility-scale batteries and pumped storage could help to store electricity for when customers need it.
- Upgrading our existing system, including expanding some of our larger facilities, like adding an additional generating unit at the Revelstoke Generating Station, and upgrading our power lines to help meet demand from customers.

The plan will have a 20-year outlook and include potential projects and the timing of those projects, which will each have separate consultation and approval processes.

SECTION 1 – PLANNING OBJECTIVES

Building upon clean and reliable power

We're fortunate in B.C. to have a large hydroelectric system that provides clean power to homes and businesses in the province. Continuing to provide clean, reliable power is a key priority for us as we plan for the future. As we plan, we look at the lowest cost options to meet new demand and also consider other planning priorities to make choices on how to best meet future need.

Question:

As we plan our clean electricity future, which of our planning priorities are most important to you?

Rank the following by how important each priority is to you. Number 1 being the highest priority.

- Keeping costs down for customers
- Reducing greenhouse gas emissions through clean electricity
- Limiting land and water impacts
- Supporting reconciliation with Indigenous Nations
- Supporting the growth of B.C.'s economy

Tell us why you ranked them the way you did.

Is there another priority that is important to you that is not listed here?



SECTION 2 – PLANNING FOR THE NEXT 10 YEARS: 2020 TO 2030

We have enough resources to meet B.C.'s energy needs for many years. However, we have to prepare to meet future changes in the need for electricity.

Planning for the next 10 years: 2020 to 2030

We have enough resources to meet B.C.'s energy needs for the next 10 years. We'll be managing resources over the next 10 years and will be analyzing our choices for new power supply to fill the gap in the following 10 years.

Saving energy and money with energy conservation programs

For more than 30 years, our energy conservation programs have played a key role in helping British Columbians reduce their energy use through energy efficiency education, providing customers with tools and support to manage their energy use and providing incentives for purchasing energy-efficient products.

When you try to be energy-efficient at home by doing things like turning off lights, washing your clothes in cold water and installing energy-efficient products, you reduce your electricity use and keep your bills down.

In addition to helping you save, our energy conservation programs have also proven to be an effective way to reduce demand on our power system, helping to avoid or postpone the cost of new infrastructure and resources and their associated impacts on the environment.

These programs can help to reduce our overall costs; however, when we have enough power to meet our needs, higher cost initiatives may need to be scaled back for the programs to remain cost effective.

We expect to have enough power to meet demand for at least the next 10 years. We're exploring whether to maintain or reduce our program offers during this time and we want your input.

Question 1:

When thinking about the future of our energy conservation programs, choose up to three priorities that are important to you?

- Reducing some program offers until we need the electricity savings
- Continuing to provide education and incentives for customers to reduce their energy use, and costs
- Ensuring there's flexibility to ramp up programs as demand for power increases in the future
- Supporting industry by promoting conservation opportunities for some of the biggest energy users
- Providing targeted opportunities to customers who need it most
- Avoiding or deferring the need to build new infrastructure

Question 2:

How much do you support our energy conservation programs? (Please select)

- No support
- Little support
- Neutral
- Some support
- Strong support

Question 3:

Is there anything else you'd like to add about what's important to you?

Managing your costs, shifting power demand with time varying rates (e.g. time of use)

Time varying rates are an effective way to shift electricity use patterns by charging customers a lower rate for electricity used during ‘off-peak’ times of day and a higher rate for electricity used during ‘peak’ times of day. We don’t currently have time varying rates in B.C. but they’re common among other utilities in North America.

For example, in B.C. we often see the highest demand for power on weekday evenings as British Columbians are cooking dinner, watching T.V. and running their dishwasher. By charging a lower rate for electricity during other times of the day, we can encourage British Columbians to shift some of their energy-consuming activities, such as doing laundry or charging their electric vehicle away from peak demand periods.

By reducing the demand on our power system during peak periods, we can help to defer or avoid the need for new or upgraded infrastructure and resources, resulting in lower costs for customers.

Time varying rates can be optional (where you have to opt-in), default (where you have the option to opt-out) or mandatory. Mandatory rates are not common. At this time, we are exploring the future use of optional and default time varying rates and we want your input.

		Optional: anyone can sign up for the rate	Default: anyone can choose to opt out
	Performance	Limited ability to shift electricity use away from peak demand times due to lower participation.	Much greater ability to shift electricity use away from peak demand times as it’s assumed most customers will participate.
	Infrastructure	May delay new costly infrastructure.	Greater ability to delay new costly infrastructure.

Question 1:

When thinking about the time varying rates, choose up to three priorities that are important to you:

- Have the choice to opt-in (or to opt-out)
- Keep costs as low as possible
- Accumulate peak demand reductions quickly
- Avoiding or deferring the need to build new infrastructure
- Offer rates that suit my lifestyle needs

Question 2:

How much do you support time varying rates? (Please select)

- No support
- Little support
- Neutral
- Some support
- Strong support

Question 3:

Is there anything else you'd like to add about what's important to you as we build our plan?

Using smart home technology to reduce electricity demand

Many utilities in North America work with customers directly to help them reduce their electricity use at peak times (when power use is the highest) by using devices to control when electricity is used. This is known as demand response and is enabled through home automation, commonly known as 'smart home' technology. You may be familiar with smart home tools, such as connected programmable thermostats, control switches or automated timers that can be managed through a device (e.g. a smartphone).

Introducing this type of home automation would also allow us to provide you with more personalized advice, incentives and tips to help you reduce your electricity use, while also optimizing our electricity grid.

By reducing electricity use and optimizing our electricity grid, we can help to avoid the need for new or upgraded infrastructure and resources, resulting in lower costs for customers.

As a customer, demand response programs may be operated in different ways to help you save. Devices can be managed by you or managed by BC Hydro to optimize your electricity use and bill savings.

Question 1:

When thinking about introducing demand response in B.C., rank the following by how important each aspect is to you:

- Adding new smart technology into my home
- Saving money on my electricity bills
- Convenience of managing my electricity use through a device (e.g. a smartphone)
- Reducing BC Hydro's costs by avoiding or deferring the need to build new infrastructure

Question 2:

How much do you support introducing demand response technology to help you manage your electricity use? (Please select)

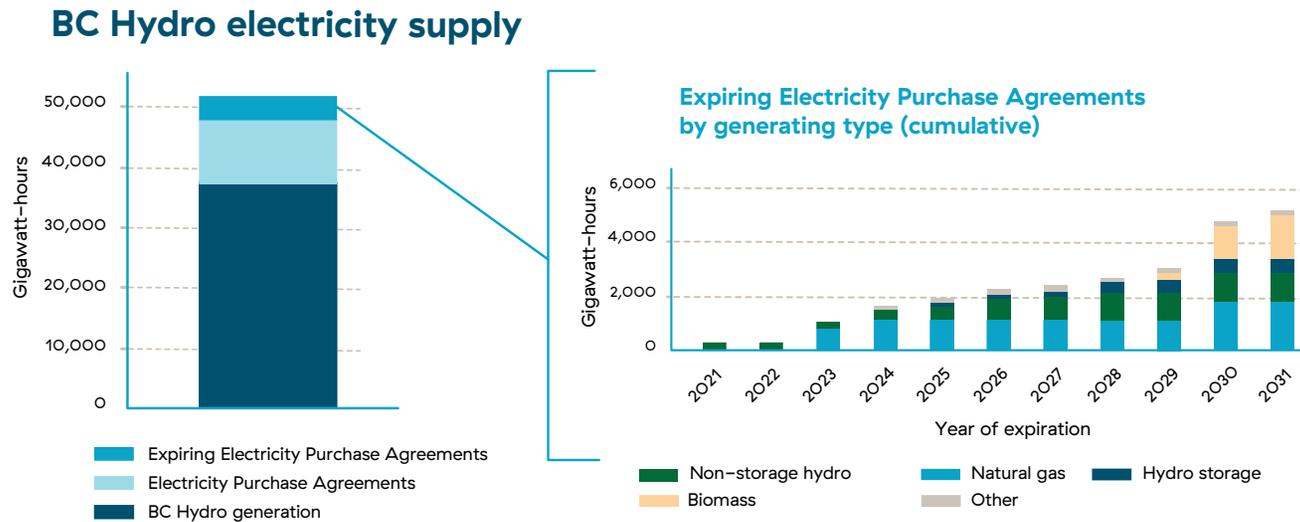
- No support
- Little support
- Neutral
- Some support
- Strong support

Question 3:

Is there anything else you'd like to add about what's important to you as we build our plan?

Expiring Electricity Purchase Agreements with Independent Power Producers

We have agreements with around 130 Independent Power Producers (IPPs), many of which also generate clean power to help meet our customers' needs. These producers generate about 25% of our electricity today. About 40 of these electricity purchase agreements expire over the next 10 years and another 30 expire in the following 10 years. These facilities vary by the type of generating resource (e.g., wind, run of river hydro, biomass, solar), the energy and capacity they provide, and their location within the province.



Question 1:

When thinking about whether BC Hydro should renew electricity purchase agreements, rank the following by how important each aspect is to you:

- Keep costs as low as possible
- Maintain those contracts that supports reconciliation and support economic opportunities with Indigenous Nations
- Maintain those contracts to have flexibility to respond to future needs
- Continues to foster a private energy sector in the province

Question 2:

Is there anything else you'd like to add about what's important to you?

Small BC Hydro plants reaching end of life

We have several smaller hydroelectric facilities in the province. This includes some that are more than 70-years old that are still generating power today. As you can imagine, many of these are at or approaching their end of life. Examples of these plants include Shuswap and Spillimacheen along the Columbia, Walter Hardman near Revelstoke, and Elko near Fernie.

Together, these facilities generate less than 1% of our average energy on a yearly basis and are much smaller, in aggregate, compared to our expiring electricity purchase agreements. As you can imagine, just like an old car, maintaining these plants requires ongoing investment, and redeveloping or upgrading these plants could be more costly than developing new alternative sources. Decommissioning these facilities could avoid these costs and restore environmental habitat. However, this would also mean these facilities aren't available to generate electricity in the future.

As part of our plan, we need to consider what to do with these smaller plants.

Question 1:

When thinking about these small hydro plants that are at, or reaching end of life, rank the following by how important each aspect is to you:

- Continue pursuing opportunities that support reconciliation with Indigenous Nations
- Decommission facilities and restore the environmental habitat
- Maintain the option to use power from these facilities even if it is more costly than new supply
- Keep costs as low as possible

Question 2:

Is there anything else you'd like to add about what's important to you?



SECTION 3 – PLANNING FOR THE NEXT 20 YEARS: 2030 TO 2040

As shown in Section 2: Planning for the next 10 years: 2020 to 2030, we have enough resources to meet B.C.'s energy needs for the next 10 years. We will be analyzing our choices to prepare for new power supply to fill the gap in the following 10 years, from 2030 to 2040.

Continuing to power the future with clean electricity

When we think about the future of the province's power system, there are many things to consider.

Ten to twenty years from now, we may see a gap between how much electricity we can generate with our existing clean electricity resources and how much electricity we're going to need to meet the needs of our customers. To ensure we can continue to provide clean, reliable power to our customers, we are planning for this possibility now.

We're fortunate in B.C. to have a large hydroelectric system that is powered by water that we can ramp up or ramp down almost instantaneously in response to changes in the demand for power from our customers. Our large reservoirs also allow us to store water for when demand is the highest, like in the colder, darker winter months.

Looking ahead, we want to ensure we continue to rely on clean, renewable resources and look at other options beyond hydroelectricity, such as wind or solar. However, the challenge with this type of generation is that it's intermittent, meaning it only generates when the sun is shining, or the wind is blowing.

Below are three different options for meeting new demand. While the long-term plan may be some combination of these, we've grouped similar options together to find out what's most important to you.



Greater conservation and customer involvement



New local power sources (batteries or pumped storage)



Upgrading the BC Hydro system

Giving more power to you through greater conservation and customer involvement

What this could look like.

Customers will have more options to reduce their electricity use, which would help limit the need for new energy and capacity supply. This could include options like further expanding time varying rates, smart home technology, and energy efficiency programs.

This would also include opportunities for customers to provide additional supply to our system through generating their own electricity, such as with rooftop solar panels.

		Things to consider
	Cost	Investment would be required to expand our energy efficiency programs, however this would likely be less than building new infrastructure. Expanding these programs could help avoid or delay the need to build new electricity infrastructure.
	Environmental	Avoids or delays any environmental impacts.
	Socio-economic	New job opportunities could be created throughout the province through energy efficiency and home automation programs.

Question 1:

How much do you support introducing more conservation initiatives and opportunities for customer involvement? (Please select)

- No support
- Little support
- Neutral
- Some support
- Strong support

Question 2:

Tell us why you chose this level of support.

Introducing new local power sources

What this could look like.

As technology advances, it opens the doors for us to explore new ways to meet the need for new capacity supply. Two of these areas are utility-scale battery storage and pumped hydro storage. Both of these provide new options to store electricity for when customers need it, and they can be located closer to our major customer load centres.

Utility-scale batteries operate just like the battery you use in your car but at a much larger scale. These batteries connect directly to our system and are used to meet short-term power demand. When demand from customers is low, like overnight, they're able to charge up and store power to be used when customer demand is high.

Pumped hydro storage is another option to store power at the utility level. When customer demand is low, it pumps water from one reservoir into another reservoir that is at a higher elevation. When demand from customers increases, this water can then be released from that reservoir and travel through a turbine to the lower reservoir to generate power.

Along with these capacity resources, we could acquire local renewable power, like wind and solar, close to customer load, to meet the need for new energy supply.

		Things to consider		
		Battery storage with renewables	Pumped storage with renewables	
	Cost	<ul style="list-style-type: none"> ○ Currently very expensive, however, may be on par with pumped storage by 2030 ○ Shorter lead time to deploy, and may provide added local reliability benefits ○ Local renewables may be more expensive but may avoid power line upgrade costs to bring electricity from other parts of the province 	<ul style="list-style-type: none"> ○ Currently more cost effective than batteries ○ Longer lead times to build ○ Local renewables may be more expensive but may avoid power line upgrade costs to bring electricity from other parts of the province 	
		Environment	<ul style="list-style-type: none"> ○ Battery storage has a small environmental footprint, however, there are concerns over battery creation and disposal ○ Renewables will have some environmental impacts 	<ul style="list-style-type: none"> ○ Environmental footprint and impacts to aquatic habitat as water is pumped up to a higher elevation and stored in a reservoir ○ Renewables will have some environmental impacts
			Socio-economic	<ul style="list-style-type: none"> ○ The construction of a battery storage facility would create construction jobs ○ Renewable energy projects would create construction jobs and could provide opportunities that support reconciliation with Indigenous Nations

Question 1:

How much do you support: (Please select)

Batteries

- No support
- Little support
- Neutral
- Some support
- Strong support

Pumped storage

- No support
- Little support
- Neutral
- Some support
- Strong support

Question 2:

Tell us why you chose these levels of support.

Upgrading our system

What this could look like.

The main option we're exploring to upgrade our system and increase the capacity we have to meet our customers' needs is adding a sixth generating unit to the Revelstoke Generating Station.

This would add an additional 500 megawatts of capacity to our system and provide a significant amount of electricity when our customers need it most – during dark, cold winter days when demand for power is the highest.

Along with this new capacity, renewable energy sources could be acquired from around the province, with upgrades to the transmission system to bring that energy from where its generated to where its needed.

In addition to this new energy and capacity supply, we'd upgrade our transmission system so that power can get from where its generated to our major load centres in the Lower Mainland and Vancouver Island.

		Things to consider
	Cost	<ul style="list-style-type: none">○ Adding a sixth generating unit to the Revelstoke Generating Station is likely the lowest cost option for new capacity.○ If power line upgrades are required, this would increase the cost, but this option could remain cost effective. Any upgrades may take a number of years for permitting and consultation.○ Acquiring new renewable energy supply from around the province is likely more cost effective than only acquiring supply that is close to load; however, power line upgrades to get this energy where it needs to be could make this option more expensive.
	Environment	<ul style="list-style-type: none">○ The Revelstoke Generating Station is already designed to accommodate six units.○ Renewable energy resources and the associated transmission upgrades required to get the power from where its generated to where it's needed would have some environmental impacts.
	Socio-economic	<ul style="list-style-type: none">○ Provides economic development opportunities through the construction phase of the upgrades.○ Renewable energy projects would create construction jobs and could provide opportunities that support reconciliation with Indigenous Nations.

Question 1:

How much do you support upgrading the existing BC Hydro system? (Please select)

- No support
- Little support
- Neutral
- Some support
- Strong support

Question 2:

Tell us why you chose this level of support.

Planning for uncertainties: What if demand is lower or higher?

In the future, demand could be lower than expected. For example, if the economy takes a long time to recover from the COVID-19 pandemic, we would need to manage costs and the need for new supply would be pushed out further into the future. In this future, we may consider:

- Reducing energy efficiency programs
- Not moving forward with home automation or time varying rates
- Not renewing electricity purchase agreements with Independent Power Producers that are expiring

Question 1:

If demand is lower and BC Hydro has less revenue, choose up to three priorities that are important to you:

- Continue to invest in technology for the future like home automation
- Continue to provide customers with choices like time varying rates
- Reduce costs as much as possible
- Continue pursuing opportunities that support reconciliation with Indigenous Nations
- Continue to foster a private energy sector in the province
- Maintain a base level of energy efficiency programs

Question 2:

Is there anything you'd like to add about what's important to you as we prepare for lower demand?

In the future, demand could also be higher than expected.

We've included known measures to reduce greenhouse gas emissions by replacing fossil fuels with clean electricity in our reference electricity demand forecast. If additional actions are taken to fight climate change, there could be even more need for electricity. This may mean acquiring additional electricity.

If industry in the north of the province makes the switch from fossil fuels to clean electricity, additional upgrades or new power lines to deliver clean electricity could be needed in the first 10 years of our plan.

If we make early investments now to be ready to supply industry, we could secure additional revenues to help take pressure off electricity rates in the future and could avoid greenhouse gas emissions. However, if we spend money and the electricity service is never requested, existing customers will have to cover the additional costs.

Question 1:

Choose the priority that is important to you:

- Make early investments (design, planning, consultation, permitting, land acquisition) before electricity service is requested in order to be ready,
- Focus on keeping costs low now by waiting even if it means not being fully ready to electrify rapid industrial development

Question 2:

Is there anything you'd like to add about what's important to you as we prepare for higher demand?



SECTION 4 – THANK YOU AND CLOSING QUESTION

Thank you for your interest in BC Hydro's Integrated Resource Plan (IRP) and for taking the time to answer the questions in this Consultation Workbook. The input of Indigenous Nations is important to us. We want to hear what matters to you with respect to the IRP.

Question:

Is there anything else you'd like to share that you think is important for us to consider as we build our plan?

Your input and ideas will help shape our plan. We look forward to sharing a draft of the plan with you in Spring 2021 for your feedback.

