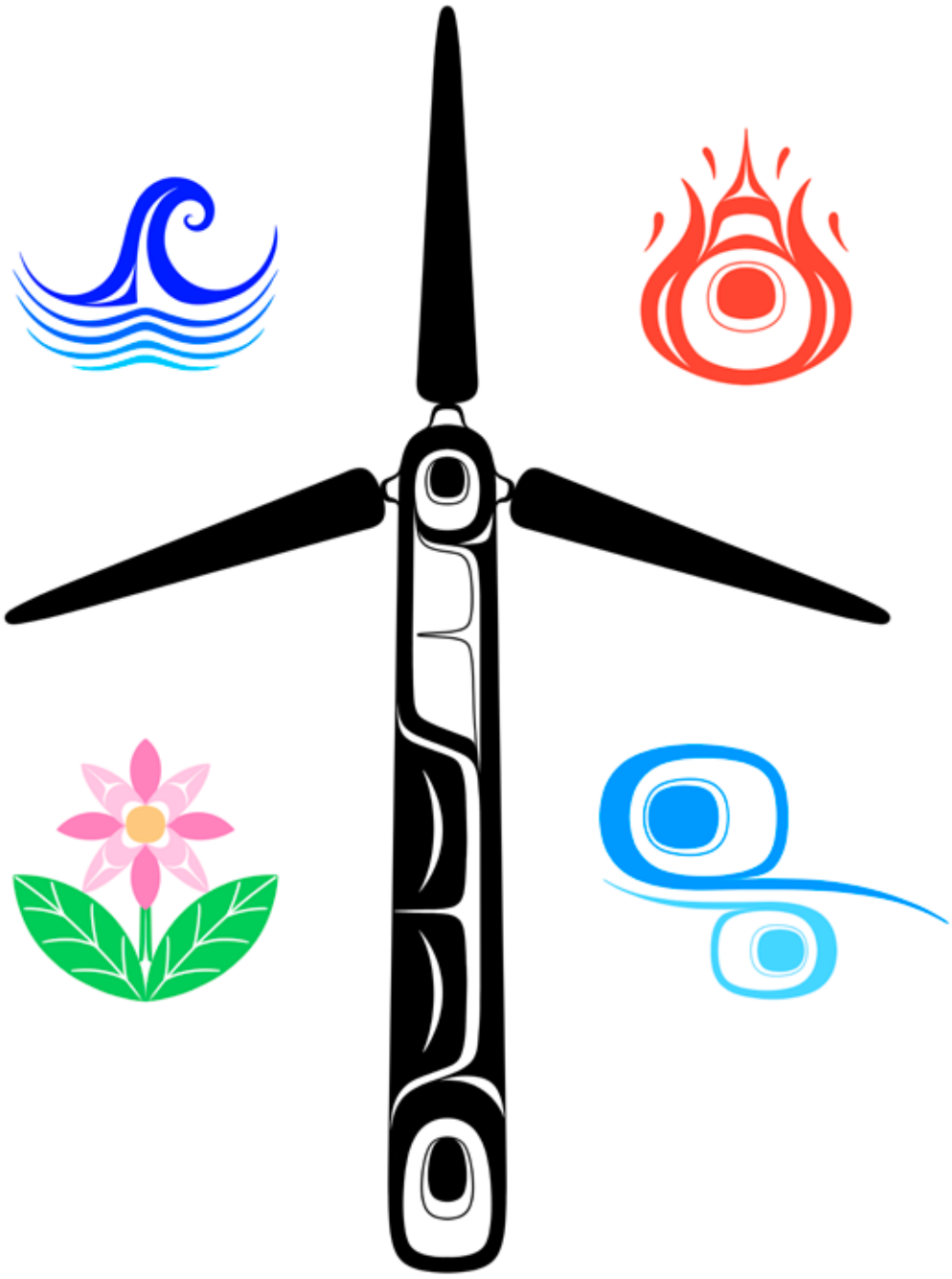


Community Context Report

Bella Coola

APRIL 2026

BC Hydro
Power smart

Forging a new path

BC Hydro is introducing Community Context Reports (CCRs) as a new tool for energy resource planning in the Non-Integrated Areas (NIAs). CCRs represent an evolution in how we plan in the NIAs: they provide a community-focused approach that reflects local priorities, unique circumstances, and the voices of First Nations and community residents. This approach was approved by the British Columbia Utilities Commission (BCUC) as the appropriate framework for energy resource planning in the NIAs, ensuring that planning decisions are transparent, collaborative, and tailored to each community's needs.

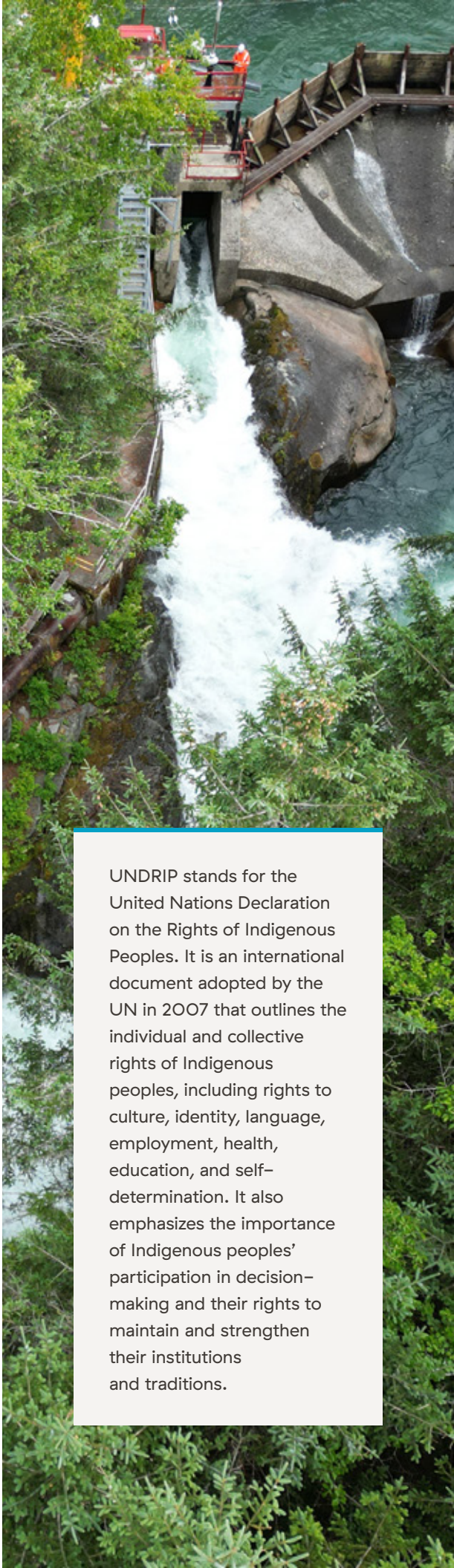
Many of the communities served by BC Hydro's NIAs are primarily First Nations and this new approach to energy resource planning is a way to advance truth and reconciliation with First Nations. The Truth and Reconciliation Commission defines reconciliation as "an ongoing process of establishing and maintaining respectful relationships" between Indigenous and non-Indigenous peoples and calls for governments and organizations to adopt the United Nations Declaration on the Rights of Indigenous People (UNDRIP) as the framework for reconciliation.

BC Hydro has also adopted UNDRIP as the framework for reconciliation. BC Hydro's UNDRIP Implementation Plan outlines the concrete actions we have taken—and will continue to take—in collaboration with the Nations we work with and serve to advance truth and reconciliation within our business. The Plan is organized under five key themes:

1. **Respectful relations**
2. **Social and cultural well-being**
3. **Decision-making**
4. **Water, land, and the environment**
5. **Economic relations**

This approach is grounded in collaboration and relationship-building, with a commitment to walking forward together in mutual respect and support. BC Hydro affirms its intent to build relationships with First Nations and Indigenous peoples based on the recognition and exercise of title and rights, self-determination, and self-governance.

The development of this CCR is a collaborative effort, aligned with UNDRIP principles and the Truth and Reconciliation Commission's Calls to Action. UNDRIP principles consistent with BC Hydro's UNDRIP Plan, are applied throughout this process to foster respectful relationships with First Nations, enabling them to fully express their values, objectives, and strategic priorities. These reports include energy resource planning efforts for the community and involve First Nations participation in decision-making that is designed to seek First Nations' free, prior, and informed consent to BC Hydro's projects and initiatives. This approach supports self-determination and inclusion in decision-making, as described in UNDRIP.



Aerial photo of Clayton Falls. Photo: BC Hydro

UNDRIP stands for the United Nations Declaration on the Rights of Indigenous Peoples. It is an international document adopted by the UN in 2007 that outlines the individual and collective rights of Indigenous peoples, including rights to culture, identity, language, employment, health, education, and self-determination. It also emphasizes the importance of Indigenous peoples' participation in decision-making and their rights to maintain and strengthen their institutions and traditions.

Contents

Nuxalk artist contribution

A Special thanks to Jade Hanuse for contributing her artwork to this report.

Anuximana– Jade Hanuse is a Nuxalk and Kwagu'ɬ artist raised between Bella Coola and Port Hardy, B.C. Her work is deeply influenced by the knowledge and legacy of her ancestors, whose teachings continue to guide her creative path. Each piece she creates reflects the stories, colours, and cultural richness of her Nuxalk heritage.

In 2020, she completed the First Nations Fine Arts Diploma at the Freda Diesing School of Northwest Coast Art in Terrace, B.C., following in the footsteps of many Nuxalkmc artists before her. Her practice continues to grow through projects that honour land, culture, and community.

1

Executive summary

The Bella Coola Community Context Report (CCR) serves as a strategic roadmap for meeting the region's electricity needs over a 20-year planning horizon (2023–2043). As an energy resource planning document, this CCR provides the framework necessary to ensure that infrastructure investments and energy resources keep pace with community growth.

Developed through a collaborative partnership between BC Hydro and the Nuxalk Nation—with input from the broader Bella Coola community—this report ensures that energy supply is proactively managed to meet long-term demand. By aligning technical requirements with community priorities, the CCR supports a transition toward a cleaner, more resilient, and more affordable energy future for the Bella Coola Non-Integrated Area.

Current state and energy resource planning considerations

The Bella Coola microgrid currently serves approximately 1,277 customer accounts throughout the Bella Coola Valley. Electricity is supplied by two BC Hydro-owned facilities: the Ah-Sin-Heek Diesel Generating Station and the Clayton Falls Run-of-river Hydroelectric Station. In recent years, diesel generation has accounted for approximately 60% of the microgrid's energy supply, with Clayton Falls contributing the remainder.

Electricity demand in the region is projected to increase from a weather-normalized baseline of 21,331 MWh in 2023 to 29,963 MWh by 2043—an approximate 40% increase. While actual metered demand in 2023 was lower due to an unusually warm winter, this normalized baseline is used for planning to ensure the system remains resilient during standard cold weather conditions. Without proactive infrastructure upgrades, the microgrid faces significant reliability challenges and an increased reliance on diesel generation to meet these peak demands.

Reliability refers to the consistent delivery of electricity without unexpected interruptions. This means ensuring that power is available when needed including during peak demand periods. It also involves maintaining stable voltage and frequency levels to protect equipment and support customer needs.

Energy planning objectives

To address this challenge, BC Hydro has the following energy planning objectives:

- Ensuring the microgrid provides electricity safely;
- Providing reliable electricity that meets community needs and development plans;
- Providing clean energy (this means reducing the reliance on diesel generation in the Non-Integrated Areas); and
- Managing ratepayer costs.

Advancing truth and reconciliation with First Nations, in alignment with BC Hydro's UNDRIP Implementation Plan and the Truth and Reconciliation Commission's Calls to Action, is an overarching consideration that informs each planning objective.

Photo: Nuxalk Nation

Highlights

To meet growing electricity demand while reducing diesel reliance, BC Hydro will pursue a number of activities in the coming years:

- **Purchase electricity from Nooklikonnic Creek Hydropower Project:** Once it is operating, BC Hydro will purchase renewable energy from the Nuxalk-owned Nooklikonnic Creek Hydropower Project, which is expected to displace over 1.5 million litres of diesel annually at its outset, increasing to 2.2 million litres as load in the community grows.
- **Transforming the microgrid:** Investments in Ah-Sin-Heek and installation of a new microgrid control system will enable integration of intermittent renewable energy while maintaining system reliability.
- **Demand-Side Management:** BC Hydro and Nuxalk Nation are implementing energy efficiency programs, including residential retrofits and community-scale solar projects, to reduce energy consumption and peak demand. Bella Coola customers can also access a number of energy efficiency programs that BC Hydro offers.
- **Self-generation:** BC Hydro's current practice is to allow up to 15% rooftop solar penetration within the microgrid to enable community-led renewable energy installations while ensuring grid stability and reliability.
- **Reliability investments:** Planned upgrades to diesel generation capacity and distribution infrastructure will ensure firm capacity and improve system reliability to 2043 and beyond.

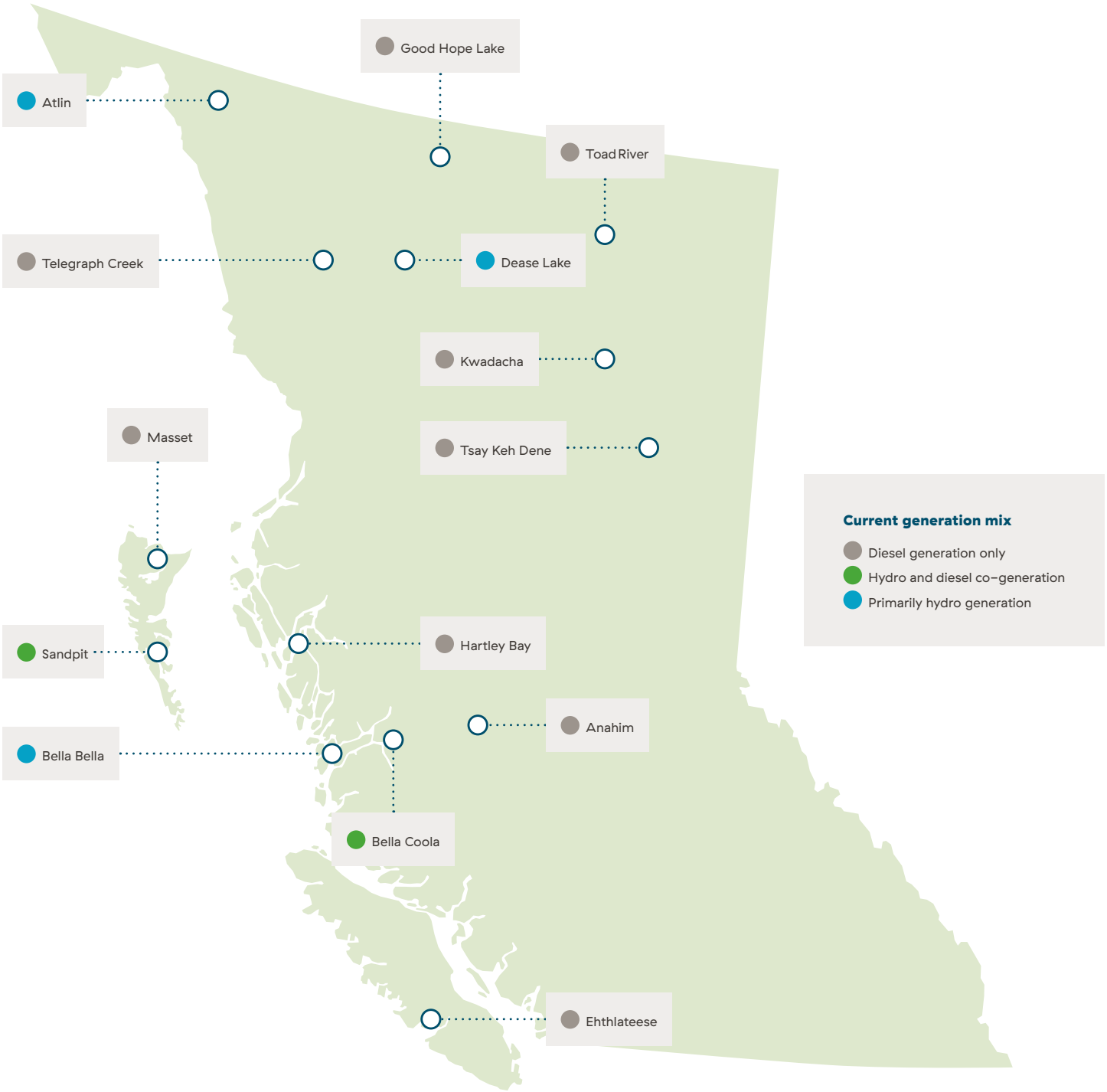
This CCR represents a snapshot in time and a commitment to ongoing collaboration. Through strategic investments and partnerships, BC Hydro is investing in the microgrid and supporting community growth, environmental stewardship, and Indigenous leadership in energy planning.

Sputc pole on River Road, downtown Bella Coola. Photo: BC Hydro

2

Introduction

BC Hydro's mission is to safely provide our customers with clean, reliable, and affordable electricity. BC Hydro generates and provides electricity to 95 percent of B.C.'s population, serving most customers through a province–wide integrated system of generation plants, substations, and transmission and distribution lines. BC Hydro also serves customers in 14 Non–Integrated Areas (NIAs).



WHAT IS A NON-INTEGRATED AREA?

BC Hydro serves 14 remote areas that are not connected to the integrated system, which are known as Non-Integrated Areas (NIAs). NIAs are standalone microgrids made up of electrical generation and distribution systems. These systems are powered by a combination of diesel and renewable energy sources.

In some NIAs, diesel is the primary power source, while in others it serves as a co-generation or backup source. Overall, in the NIAs, approximately 45% of the energy generated comes from renewable energy sources. Diesel is used to generate the remainder. Collectively, the 14 NIAs serve nearly 7,500 customer accounts in 28 communities and 12 First Nations, with a total annual load of approximately 120,000 megawatt hours (MWh).

Due to their geography and remoteness, these communities sometimes experience more frequent and longer outages compared to customers on the integrated system. The Bella Coola area is served by one of these standalone microgrids and is described in more details in section 2.1 below.

> A standalone microgrid is a small, localized energy system that operates independently and is not connected to an integrated system. It includes one or more power sources and is designed to supply electricity to a specific area.

WHAT IS A COMMUNITY CONTEXT REPORT?

A Community Context Report (CCR) is BC Hydro's summary of activities for meeting the future electricity needs of an NIA over a 20-year planning horizon. It is a snapshot of the current state of the microgrid, emerging challenges for the electricity supply and the activities, both underway and planned, that will address these challenges.

This CCR for the Bella Coola microgrid has been prepared by BC Hydro, in collaboration with Nuxalk Nation, with input also sought from the broader Bella Coola community. This report reflects several years of collaborative energy planning for the microgrid to ensure a reliable supply of electricity and reduce reliance on diesel generation.

EV charging station in Bella Coola. Photo: Nuxalk Nation

2.1 Community and microgrid

The Bella Coola microgrid serves Nuxalk Nation and the communities of Bella Coola, Hagensborg and Firvale. These communities are located in the Central Coast region of British Columbia, at the mouth of the Bella Coola River, flowing into North Bentinck Arm and the Pacific Ocean. The area is approximately 450 km west of Williams Lake, with road access via Highway 20, and air access via the Bella Coola airport. Bella Coola is also served by a BC Ferries terminal that provides seasonal service from Port Hardy.

BC Hydro has been providing electricity service to the area for approximately 70 years.

Customers: The Bella Coola microgrid serves about 1,277 residential and commercial customers.

Generation: BC Hydro's Ah Sin–Heek diesel generating station came into service in December 1955. Ah–Sin–Heek consists of seven diesel generators with a firm capacity of 5.5 megawatts (MW). In 1962, the Clayton Falls hydroelectric generating station, a run–of–river facility with a generating capacity of 2.2 MW, came into service. Clayton Falls is an intermittent energy source and cannot be relied upon for firm capacity. In 2024, the Bella Coola microgrid had a weather–normalized peak power demand of 5.7 MW and an annual energy consumption of 21,331 MWh. The microgrid peak demand now exceeds the firm capacity, which represents an increasing reliability risk that electricity will not be available when needed. Section 7 describes the actions BC Hydro is taking to address this risk.

Renewable/diesel generation balance: These two BC Hydro owned facilities co–generate to provide power to the microgrid. Over the past five years, the Clayton Falls hydroelectric generating station provided approximately 45% of electricity on average and Ah–Sin–Heek provided approximately 55%. However, the reliance on Ah–Sin–Heek has been increasing in recent years due to load growth in the Bella Coola area. The generation output of the Clayton Falls facility is also impacted by annual precipitation levels. In the past two years, Ah–Sin–Heek has provided about 60% of the energy for the microgrid. Ah–Sin–Heek requires approximately 3.2 million litres of diesel annually, or 18% of BC Hydro's total diesel fuel needed for generation in the NIAs. Section 5 describes the actions BC Hydro and Nuxalk Nation are taking to reduce the reliance on diesel generation.

Distribution: Electricity is distributed through two 25 kV distribution lines with a combined length of approximately 65 km. Section 7 describes the actions BC Hydro is taking to improve reliability of the distribution system.

2.2 Objectives and criteria to guide energy resource planning

BC Hydro's mission is to safely provide our customers with clean, reliable, and affordable electricity. Advancing truth and reconciliation with First Nations is an important goal for BC Hydro, and First Nations' interests are considered within our energy planning objectives.

ENERGY PLANNING OBJECTIVES

BC Hydro's energy planning objectives for our service areas, including the Bella Coola microgrid, are to:

- Ensure the microgrid provides electricity safely;
- Provide reliable electricity that meets community needs and development plans;
- Provide clean energy (this means reducing the reliance on diesel generation in the NIAs); and
- Manage ratepayer costs

Snootli Creek Fish Hatchery. Photo: BC Hydro

ENERGY PLANNING CRITERIA FOR A RELIABLE SUPPLY OF ELECTRICITY

This criteria (known as N–1) ensures that the system has the required redundancy to ensure uninterrupted service even in the case of equipment failure. The N–1 reliability criteria is met when there is enough firm capacity to serve the annual peak demand even if the largest generating source is unavailable due to mechanical failure or scheduled maintenance.

- **Firm capacity:** Predictable and "dispatchable" sources of energy (like diesel or storage hydro) that can be turned on at any time to follow community needs. Unlike intermittent resources (wind/run–of–river), these provide the reliable base needed to satisfy the N–1 criteria.
- **Peak demand:** The highest amount of electricity used by the community at any single moment. In Bella Coola, this typically occurs on winter evenings when heating and lighting requirements are at their maximum.

BALANCING RELIABILITY AND DIESEL REDUCTION OBJECTIVES

Reducing the reliance on diesel generation in the Bella Coola microgrid is a shared goal between Nuxalk Nation, BC Hydro, the broader community, as well as the provincial and federal governments. There are several activities underway to reduce the use of diesel generation which are discussed in Section 5.

Despite efforts to reduce diesel usage, there will still be an ongoing need for diesel resources in Bella Coola into the future for the following reasons:

- The only renewable sources of firm capacity are storage hydro (which requires a large water reservoir) or geothermal, neither of which are currently available energy options in the Bella Coola area.
- Further, none of the diesel reduction activities discussed in Section 5 will provide firm capacity generation.
- As a result, the only available option to provide firm capacity to the Bella Coola microgrid is through diesel generation. BC Hydro will need to continue to invest in, maintain and increase the capacity of the diesel generating station as the load grows to ensure there is sufficient firm capacity to serve the Bella Coola area in the future.

Future energy supply from run-of-river facilities, such as Clayton Falls and the Nooklikonnic Creek Hydropower Project, is subject to variation based on annual precipitation and watershed health (these are intermittent resources). This reality underscores the need for proactive management. BC Hydro's operational objective, aligned with the Nuxalk Nation, is to leverage both run-of-river generation facilities to displace the maximum possible volume of diesel, even as river conditions and load needs fluctuate. To do this, BC Hydro will work collaboratively with Nuxalk Nation to coordinate the operations of the Nooklikonnic Creek Hydropower Project within the broader microgrid to work towards maximizing the integration of renewable energy.

2.3 Current and future electricity demand in the Bella Coola NIA

Load forecasts are an important tool for energy planning as they help to predict the volume of energy and capacity that is needed to power a community in the future. These forecasts help guide decisions on what supply-side and demand-side activities should be undertaken to meet community future needs for electricity.

Supply-side activities include adding generation resources. "Demand-side" activities refer to things customers can do to reduce their energy consumption, such as installing energy efficient lighting and appliances. BC Hydro offers tips and rebates for a variety of these activities.

Ximkila Totem Pole by artist Silyas (also known as Arthur Saunders) in Bella Coola. Photo: BC Hydro

The process to create a load forecast includes analyzing historical trends and reviewing a community's plans for future initiatives and developments to estimate how much energy and capacity will be needed. BC Hydro looks at a 20-year period and develops baseline forecasts plus low and high load scenarios to be able to consider a range of potential futures.

Current electricity usage

The Bella Coola microgrid load forecast, developed in 2023 and updated in 2024, forecasts energy consumption and peak demand through 2043. To inform the forecast, BC Hydro sought input from Nuxalk Nation and the Central Coast Regional District to understand planned growth and timelines for installation of new housing, commercial buildings and community facilities in the region.

Figure 1: Historic actual generation and peak demand

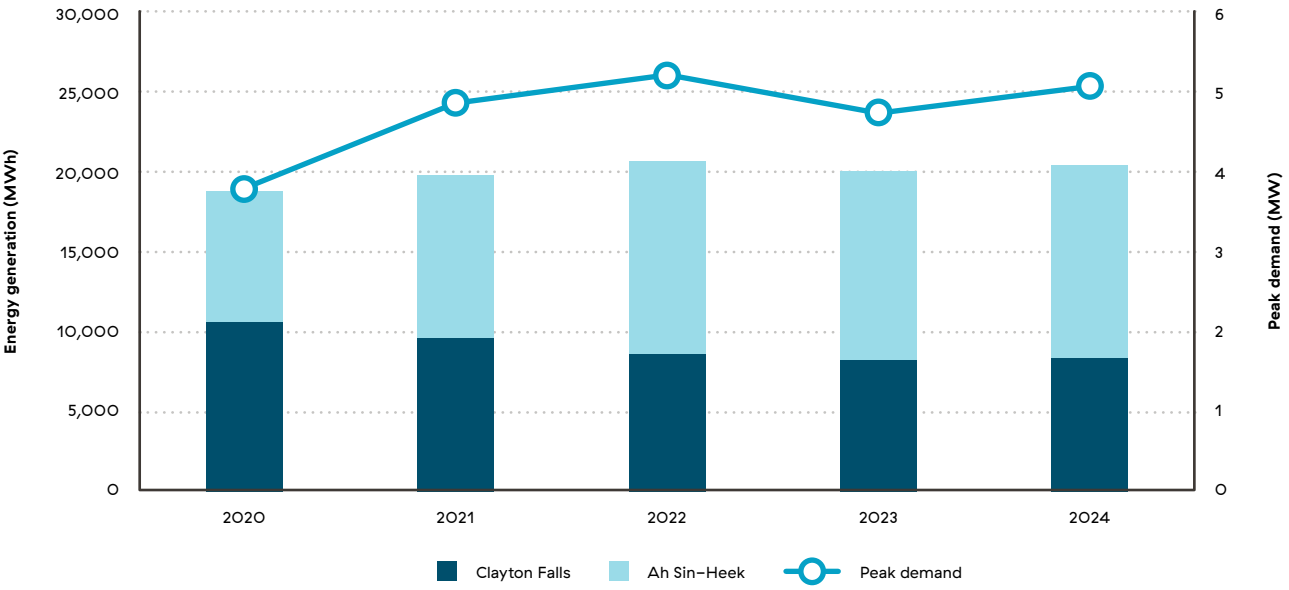


Table 1: Historic actual generation and peak demand

Units	Description	2020	2021	2022	2023	2024
MWh	Clayton Falls	10,541	9,545	8,531	8,146	8,377
	Ah-Sin-Heek	8,078	10,108	12,016	11,789	11,916
MW	Peak demand	3.6	4.8	5.3	4.7	5.1

Load forecast summary

The 20-year forecast is grounded in a weather-normalized 2023 baseline (21,331 MWh / 5.7 MW). Although 2023 actual metered data was lower due to a winter that was 9% warmer than typical, this normalized starting point ensures that the load forecast reflects the capacity needed for reliable service during a standard winter.

Below are some key highlights of the load forecast:

- The electricity loads served by the Bella Coola microgrid are predominantly residential (48%) and commercial (47%). Nuxalk Nation institutional and community services account for 5%.
- Housing development is the single largest driver of expected increases for electricity in the coming years. Like other Indigenous communities in British Columbia, Nuxalk Nation faces a housing crisis and an aging housing stock in need of renewal and revitalization. Nuxalk Nation has been advancing the development of the Elders' Village housing project, new housing subdivisions, and an emergency shelter, in addition to several additional housing projects planned over the forecast term. New housing accounts for nearly half of the expected increase in electricity consumption under the baseline scenario.
- Adoption of heat pumps is increasing in the community as residents and businesses switch from other heat sources like oil–fired heating systems. This accounts for approximately 15% of the expected increase in electricity consumption under the baseline scenario.
- There are numerous infrastructure developments planned to support the growing community. Nuxalk Nation plans to construct a new wastewater collection, treatment, and disposal system to service the Bella Coola town site which will account for approximately 15% of the expected increase in electricity consumption under the baseline scenario.

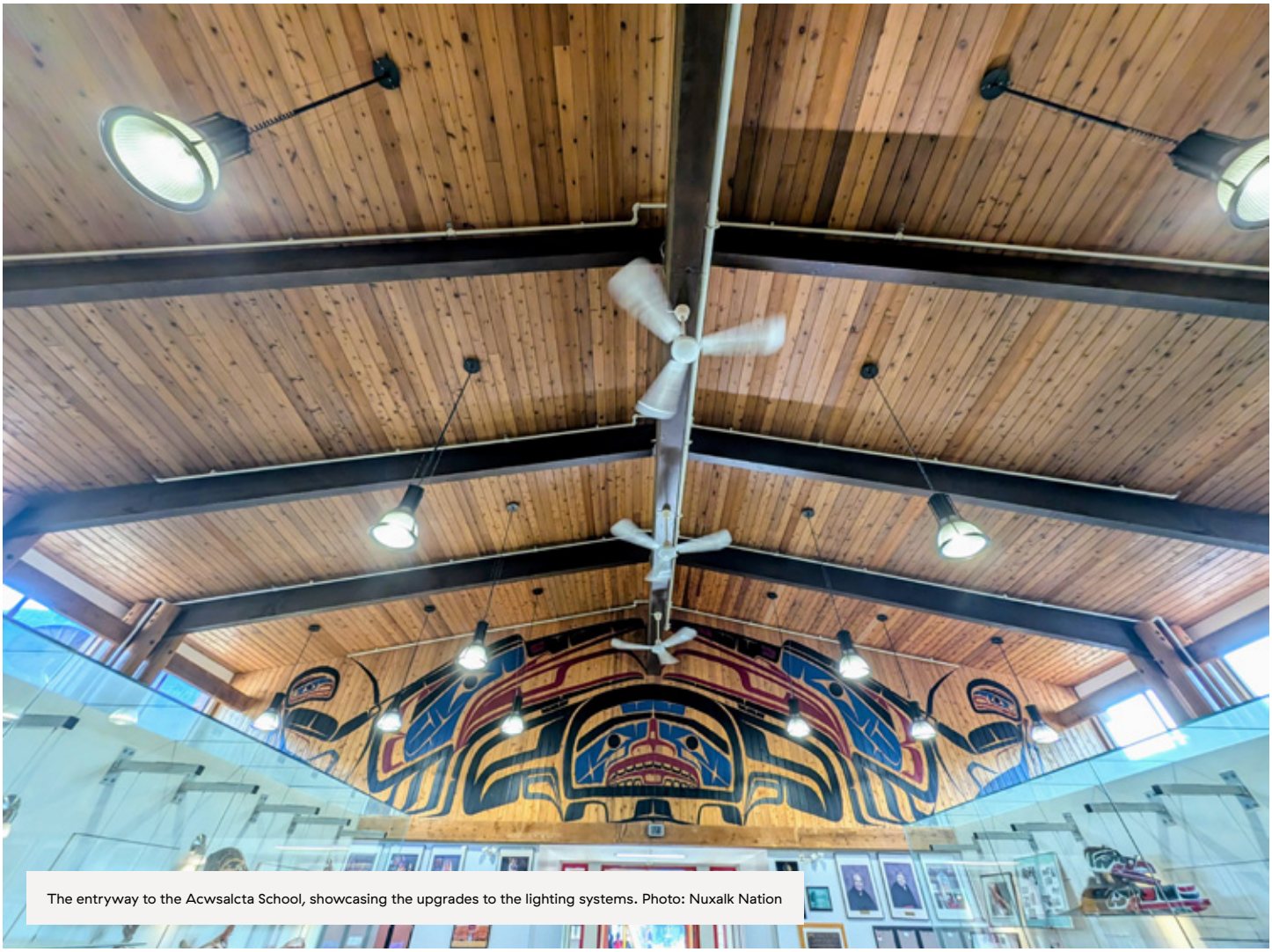
Looking south 'up' the Nooklikonnic Creek, a site where Nuxalk have been studying and developing for a hydroelectric run–of–river facility. Photo: Nuxalk Nation

Scenario analysis

There are uncertainties with projecting electricity usage into the future. So, BC Hydro develops low and high load scenarios to help prepare for a range of outcomes. These scenarios are developed to account for planned projects and developments' likelihoods, along with considerations like:

- Impact of climate change on electricity use,
- High and low population growth outlooks,
- Adoption of electric vehicles in the community,
- Energy efficiency in new and existing buildings,
- Installation of heat pumps and electrification of heating systems.

A sensitivity analysis completed for the load forecast projected that the impact of climate change will likely decrease winter heating loads but increase summer cooling loads due to rising temperatures. While the increase in cooling degree days can be significant as a percentage change, the overall expected impact on total electricity use for cooling in the community remains small given the current energy profile.



The entryway to the Acwsalcta School, showcasing the upgrades to the lighting systems. Photo: Nuxalk Nation

Figure 2: Energy consumption—actual and forecast (MWh)

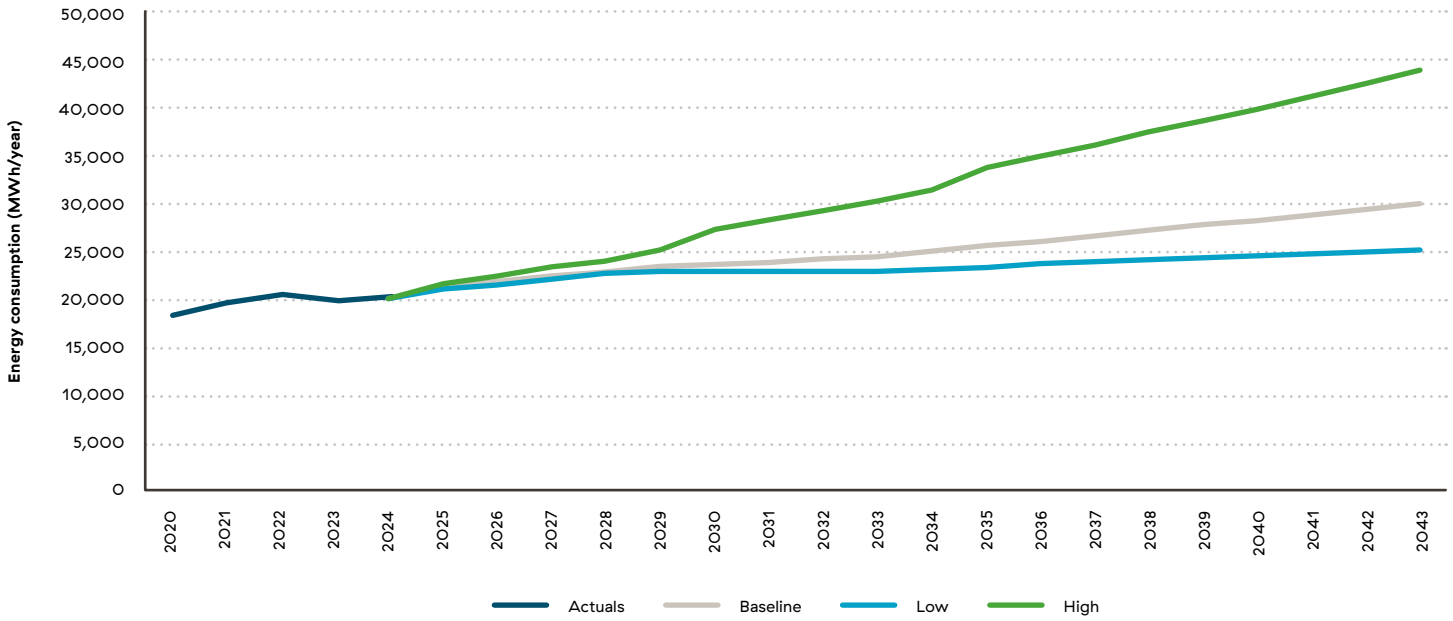


Table 2: Energy consumption—actual and forecast (MWh)

	2023	2028	2033	2038	2043
Baseline	19,932	23,045	24,612	27,211	29,963
Low load	19,932	22,794	23,080	24,107	25,134
High load	19,932	24,164	30,408	37,468	43,952

Figure 3: Peak demand—actual and forecast (MW)

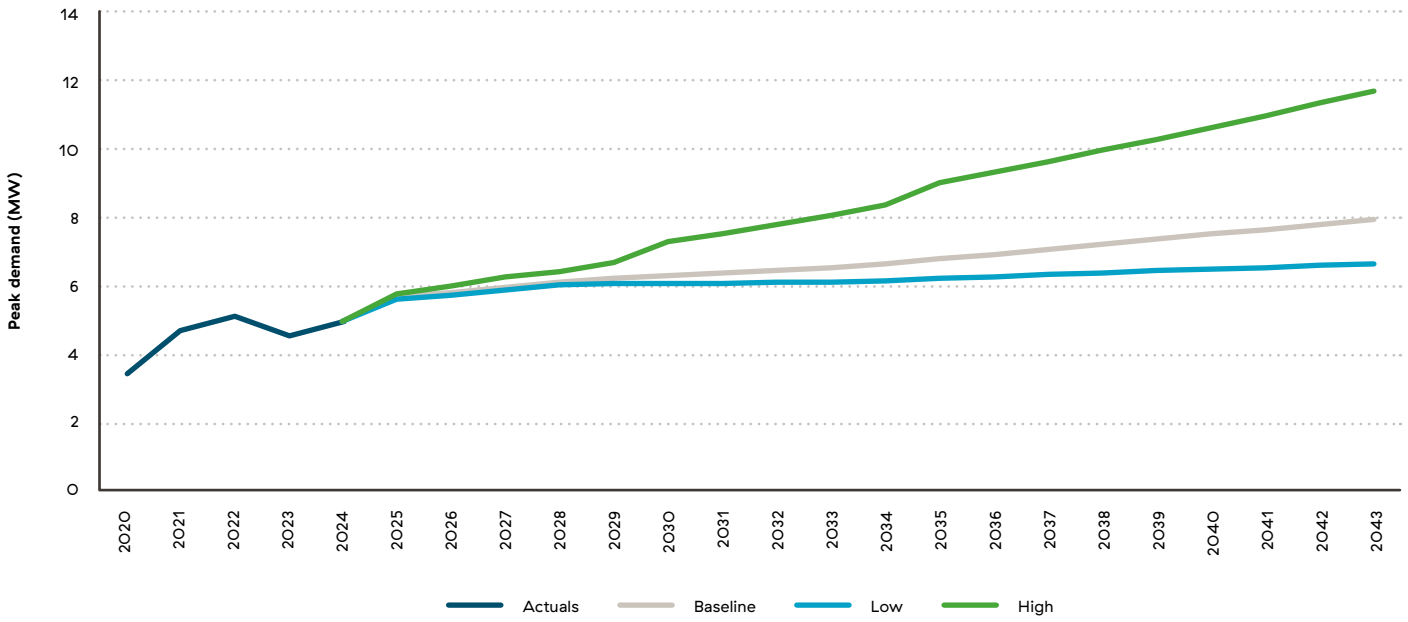


Table 3: Peak demand—actual and forecast (MW)

	2023	2028	2033	2038	2043
Baseline	4.7	6.2	6.6	7.3	8.1
Low load	4.7	6.2	6.2	6.5	6.8
High load	4.7	6.5	8.2	10.1	11.8

The three scenarios described below reflect a range of potential outcomes that are reflected in the above Figures 2 & 3 and the tables below:

Baseline scenario: Assumes moderate population growth and implementation of high-likelihood planned projects, as detailed in the forecast summary above. It is aligned with the growth seen in recent years.

Low load scenario: Assumes slower development and higher energy efficiency adoption. Consumption reaches 25,134 MWh and peak demand 6.8 MW by 2043.

High load scenario: Assumes aggressive development and limited energy efficiency. Consumption could reach 43,952 MWh and peak demand 11.8 MW by 2043.

Overall, the Bella Coola load forecast demonstrates that without action, the Bella Coola microgrid faces increasing reliance on diesel generation and challenges with meeting the electricity demands of the communities served by the microgrid.

Section 5 discusses the actions BC Hydro and Nuxalk Nation are taking to reduce the reliance on diesel generation. Section 7 discusses the investments BC Hydro is making to address load growth and improve reliability for the long-term.

3

Nuxalk Nation community context

Authored by Nuxalk Nation Clean Energy Department

Riverside Energy Systems worker's and SPV–101 students install mounting rails on the Acwsalcta Schools "Baby Longhouse Photo: Nuxalk Nation

Nuxalk's "Vision 2030"

"Nuxalk owns and operates a 100% renewable energy power system (from generation to distribution) that creates meaningful, lasting, and sustainable benefits to the Nuxalk Nation.

These benefits are directly sourced from the Nation's energy sovereignty and elimination of its historical reliance on diesel–generated electricity purchased from BC Hydro."

Due to Nuxalk's remote location, the community is not connected to BC Hydro's main provincial distribution network. Much of Nuxalk's electricity is generated by the Ah–Sin–Heek diesel generating station, while the other portion of the community's electricity is provided by Clayton Falls. These are both owned and operated by BC Hydro.

The Nation's longstanding reliance on diesel–generated electricity has resulted in several socio–economic and environmental concerns for Nuxalkmc, in addition to the broader impacts of diesel generated power beyond the Territory. In fact, the diesel generating station is within 125 meters of Nuxalkmc homes which cause noise and air pollution concerns and impacts. This troubling experience has driven the Nation to investigate and advance alternative options for electricity generation in the Territory and demand–side management initiatives.

Ensuring that Nuxalk Nation has access to a stable, reliable and affordable energy supply has become a top priority for our Stataltmc and elected leaders. This priority is driven by the need to support the economic and social vibrancy of the Nation, and to further enhance the Nation's sovereignty and stewardship of Nuxalk Territory. A continued reliance on diesel generated power is unacceptable. To confirm this priority the Nation has adopted Vision 2030—an aspirational vision to transform and modernize the Territory's energy system.

To realize Vision 2030, Nuxalk has developed and initiated efforts to implement the 2023 Community Energy Plan, which builds from the previous plan developed in 2014. Since its formal adoption Nuxalk has led the completion of several community–led energy sustainability initiatives to demonstrate the Nation's commitment to Vision 2030, and remains steadfast in advancing the Nooklikonnic Hydropower Project and other renewable energy projects throughout the Kulhulmcilh. One particular project Nuxalk is particularly proud of is the recent installation of three community scale solar projects which included installations on the Administration Office, the Acwsalcta School and the Baby Longhouse Daycare Centre.

Additionally, the Nation has led a series of other projects to support diesel reduction goals. For example, BC Hydro has completed a series of energy efficiency improvements at the Acwsalcta School, including lighting system improvements and minor enhancements to the school's mechanical system, the installation of an electric vehicle (EV) charger, and various capacity and skills development initiatives—including having a local Nuxalkmc member becoming a Certified Energy Advisor.

Nuxalk's recent and planned investments into the Bella Coola valley represent the principal means to reduce diesel generated power and will have a meaningful and beneficial impact on the Territory, the communities of the Bella Coola valley and all Nuxalkmc. The following highlights Nuxalk's key clean energy and resiliency priorities for the coming 5 years:

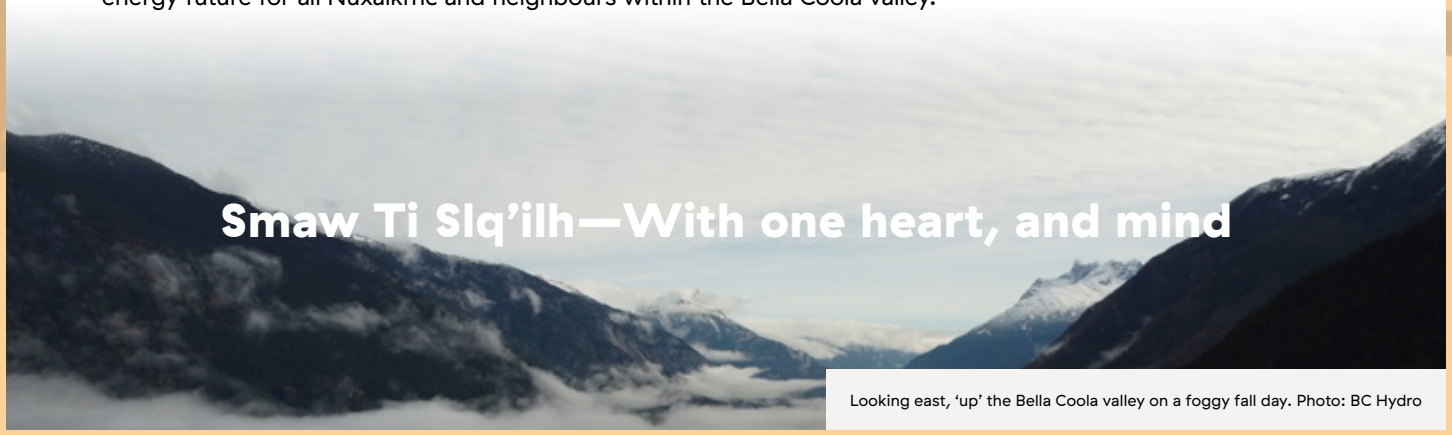
1. Advance the development and construction of the Nooklikonnic Creek Hydropower Project
2. Continue the Nuxalk Energy Empowerment Program to support the wise use of electricity in Nuxalkmc homes.
3. Advance a widespread home energy assessment and implement a retrofit program to improve the energy performance of Nuxalkmc homes
4. Install additional solar PV projects on new developments such as the Elders' Village, Big House and so on
5. Implement sustainable transportation initiatives, including launching an EV public transit service via Qw'xmtmcwilh Transit Society for Nuxalkmc and valley residents.
6. Advance the pre-development activities for a second run-of-river project on Noosgulch River
7. A joint study with BC Hydro and Nuxalk to explore the potential impact of energy storage in the microgrid.

Community-scale solar project—Indigenous Clean Energy Initiative:

- Historically known as "Sunny Town."
- Developed with New Relationship Trust.
- Produces 83.7 MWh annually, covering 9% of Nuxalk community's energy needs.
- Capacity-building: Partnered with Riverside Energy Systems and Nicola Valley Institute of Technology for upgrades and local training, providing residents with accredited skills.

Building on the foundation of the Community Energy Plan and successful initiatives like the recent solar installations, Nuxalk Nation is actively advancing its multifaceted energy strategy. Key priorities for the near future include progressing the Nooklikonnic Creek Hydropower Project, expanding residential energy efficiency through assessments and retrofits via the Nuxalk Energy Empowerment Program, and strategically deploying further solar projects on new developments. These coordinated efforts represent tangible steps towards realizing the ambitious goals outlined in Vision 2030.

This continued investment in renewable generation and energy conservation underscores the Nation's unwavering commitment to move beyond diesel dependency, strengthen Nuxalk sovereignty, and enhance stewardship over the Territory. Nuxalk Nation is paving the way for a resilient, self-sufficient, and sustainable energy future for all Nuxalkmc and neighbours within the Bella Coola valley.



Looking east, 'up' the Bella Coola valley on a foggy fall day. Photo: BC Hydro

4

Assessment of resources to provide clean & reliable energy to the Bella Coola microgrid

Looking west over Nuxalk Nations and Bella Coola's townsite, with the estuary in the background. Photo: Nuxalk Nation

BC Hydro assessed the options to safely and reliably meet the growing energy needs of the Bella Coola microgrid over the next 20 years, while increasing the amount of renewable energy, reducing the use of diesel, and keeping affordability in mind.

- In Bella Coola, as in other NIAs, options for providing firm energy and capacity—needed for reliable and clean supply—are limited. Diesel generation provides the firm power needed for reliability; however, it has negative social, economic, and environmental consequences.
- Connecting Bella Coola to the integrated system would require building hundreds of kilometers of lines and is therefore extremely challenging due to the geography of the area. There are also significant technical and reliability issues associated with the power quality and reliability of long lines. The technical limitations, financial costs and environmental impacts make the option of grid connection not feasible.

Comparison of resources available in the Bella Coola microgrid area

Energy planning objectives	Measure	Diesel generation	Connection to the integrated system	Local intermittent[1] renewable energy
Provide reliable electricity	Firm capacity	Yes	No[2]	No
Reduce diesel generation	Energy from clean or renewable generation	No	Yes	Yes (subject to availability)
Keep ratepayer costs down	Current cost of service	Similar to current	Very high compared to current	Similar or slightly higher compared to current

1 As there is no storage hydro energy options available in the Bella Coola area, the only renewable energy options are intermittent or non–firm.

2 While a grid connection would normally provide firm power, technical issues with long distribution lines over hundreds of kilometres in remote areas with dense vegetation means that grid connection often does not have the reliability needed to be considered 'firm capacity'

The options analysis shows that local generation along with keeping diesel generation for co–generation offers the most practical balance of the energy planning objectives for the Bella Coola microgrid. This approach is the most technically, environmentally and cost–effective way to reduce reliance on diesel generation while maintaining reliability.

Based on this high–level assessment of resource options, BC Hydro's long–term strategy for the Bella Coola microgrid is to purchase renewable energy from locally owned facilities and invest in capital upgrades to the microgrid, including installing additional diesel generators. These upgrades will enable the integration of renewable energy projects while also ensuring there is sufficient energy supply to meet growing demand.

ASSESSING FEASIBILITY OF A RUN–OF–RIVER HYDROELECTRIC FACILITY

Nuxalk Nation led the study and assessment of local renewable energy options. Run–of–river hydro was determined to be the best option for the area when compared against other sources of renewable energy. Nuxalk Nation commissioned a multi–phase study that explored various local watersheds to determine the best site for a run–of–river facility which identified the Nooklikonnic Creek site as the best potential viability.

A penstock route is the planned path for a large pipe that carries water from a high point, like a reservoir, down to a turbine to make electricity. The water flows with strong pressure to help generate power. When planning the route, engineers also consider how to reduce environmental impacts, like protecting wildlife and natural areas.

Nuxalk Nation then initiated a review to study the feasibility of the Nooklikonnic Creek Hydropower Project. Analysis was conducted to determine the optimal site for project infrastructure and the penstock route. Energy modelling and financial modelling were conducted to determine optimal sizing and energy deliveries. Based on the analysis completed, the Nooklikonnic Creek Hydropower Project was determined to be the most technically and financially viable project.

5

Planned activities for diesel reduction

BC Hydro is committed to a multi-year strategy to reduce the reliance on diesel generation within the NIAs. For Bella Coola, this objective is met through a combination of supporting advancement of First Nation owned community renewable energy projects, purchasing renewable energy from these projects and transforming the microgrid to integrate renewable energy. By coordinating these efforts, we can maximize the integration of renewable energy while ensuring the microgrid remains safe and reliable for all customers. The following sections detail the specific activities and partnerships currently underway to achieve these diesel reduction goals for the Bella Coola microgrid.

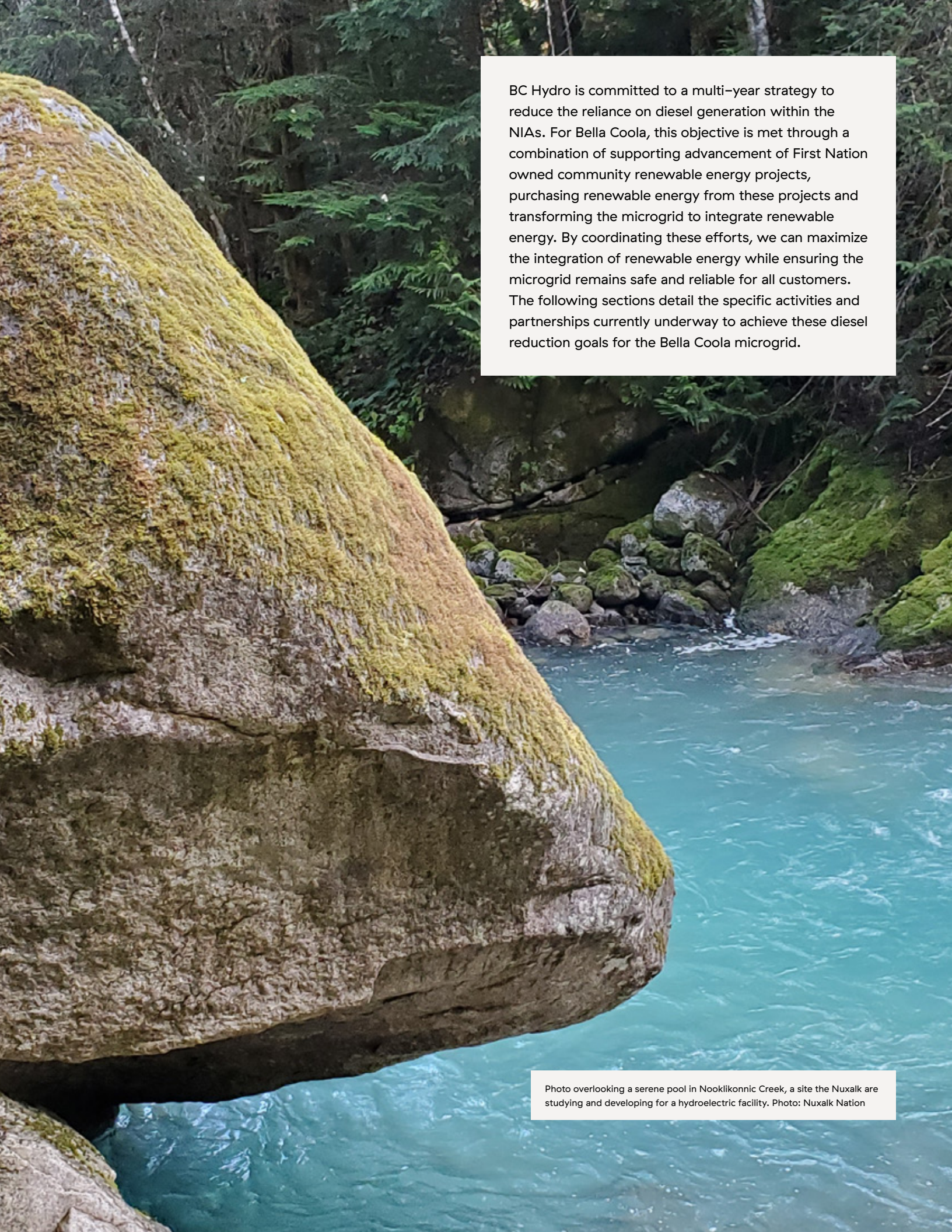


Photo overlooking a serene pool in Nooklikonnic Creek, a site the Nuxalk are studying and developing for a hydroelectric facility. Photo: Nuxalk Nation

5.1 Nuxalk Nation to construct and operate run-of-river generating station to provide a source of renewable energy

Nuxalk Nation is leading the development of the Nooklikonnic Creek Hydropower Project, and this project is a keystone project that will accelerate the displacement of diesel-generated power in the microgrid.

This project will be 100% owned and operated by Nuxalk Nation, and all Nuxalkmc (Nuxalk people) will directly and indirectly accrue benefits associated with the project. Other residents of the valley will also benefit from reduced diesel use and local economic benefits linked to Nuxalk's leadership and investments in clean energy.

The Nooklikonnic Creek Hydropower Project is expected to deliver approximately 238,000 MWh of clean electricity to the Bella Coola microgrid over a 30-year period. On an annual basis this means providing approximately 6,000 MWh of energy into the Bella Coola microgrid once the facility is operating, increasing to approximately 9,300 MWh over the next 30 years. The facility will generate enough power to displace 1.5 million litres of diesel annually, with the capability to provide additional diesel displacement as community energy consumption increases.

This means that when it begins operations, the project will generate enough energy to power approximately 500 homes per year and over time, as demand increases, it will power up to 800 homes per year.

Nuxalk Nation will sell energy to BC Hydro through an interconnection to the Bella Coola microgrid and a Community Electricity Purchase Agreement. BC Hydro and the Nooklikonnic Creek Hydropower Project team will work closely together through the design and construction phases to ensure the safe and efficient integration of the project into the microgrid.

A Community Electricity Purchase Agreement is a special type of energy purchase agreement designed for community-led renewable energy projects in the NIAs. Under the agreement, BC Hydro and First Nations will work together to ensure coordinated operations of the generation facilities within the microgrid.

To foster close collaboration, the Nooklikonnic Creek Hydropower Project will be guided by a joint operating committee composed of representatives from both Nuxalk and BC Hydro. Once it is operating, this committee will facilitate information sharing and coordinate decision-making to ensure the safe, reliable, and efficient operation of both the community renewable energy plant and the microgrid.

Clayton Falls. Photo: BC Hydro

Figure 4: Bella Coola load energy balance 2020–2043*

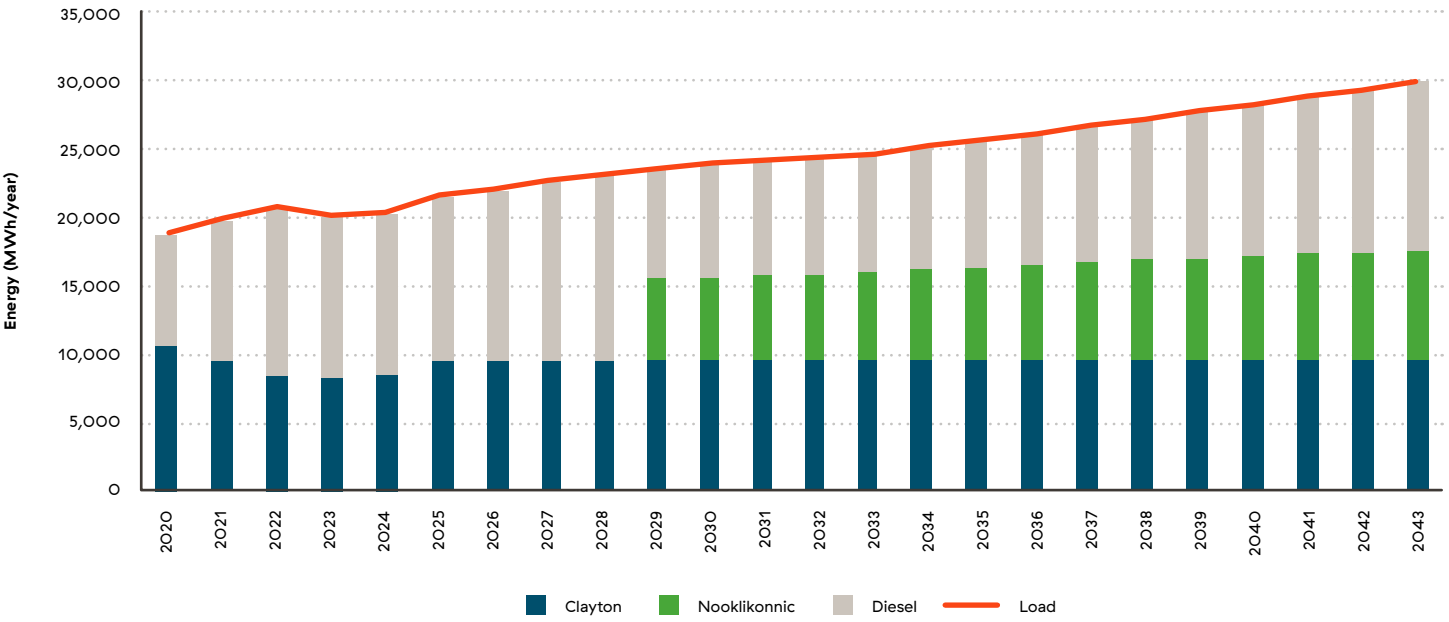


Table 4: Bella Coola load energy balance 2020–2043*

Energy (MWh)	2023	2028	2033	2038	2043
Baseline energy consumption forecast	19,932	23,045	24,612	27,211	29,963
Ah-Sin-Heek	11,787	13,503	8,606	10,379	12,415
Clayton Falls	8,146	9,542	9,542	9,542	9,542
Nooklikonnic Creek			6,464	7,291	8,006

5.2 BC Hydro is investing in the microgrid to integrate renewable energy

To support the integration of renewable energy from the Nooklikonnic Creek Hydropower Project, changes need to be made to the existing microgrid because operating non-integrated, standalone microgrids is inherently different than a large integrated system. Even small, minute-to-minute changes in electricity usage can have a substantial impact on the stability of the microgrid. Generation needs to be load following so it can be ramped up or down quickly to respond to these fluctuations in electricity use and keep the lights on.

The system in Bella Coola is designed to co-generate with Ah-Sin-Heek and Clayton Falls, but some modifications will be needed to integrate a run-of-river generation facility. This includes the design and installation of new equipment—such as the microgrid control system described below—along with upgrades to the Ah-Sin-Heek diesel generation station and distribution system to enable the integration of local renewables, optimize for higher levels of renewable energy penetration, and achieve greater displacement of diesel generation, all while ensuring and improving grid reliability.

*The projected energy supply shown for Clayton Falls and Nooklikonnic Creek are based on the long-term Baseline Forecast under Base Water Year assumptions. For illustrative purposes, this represents a constant annual quantity, but actual generation for both facilities will vary year-to-year depending on precipitation and water flow.

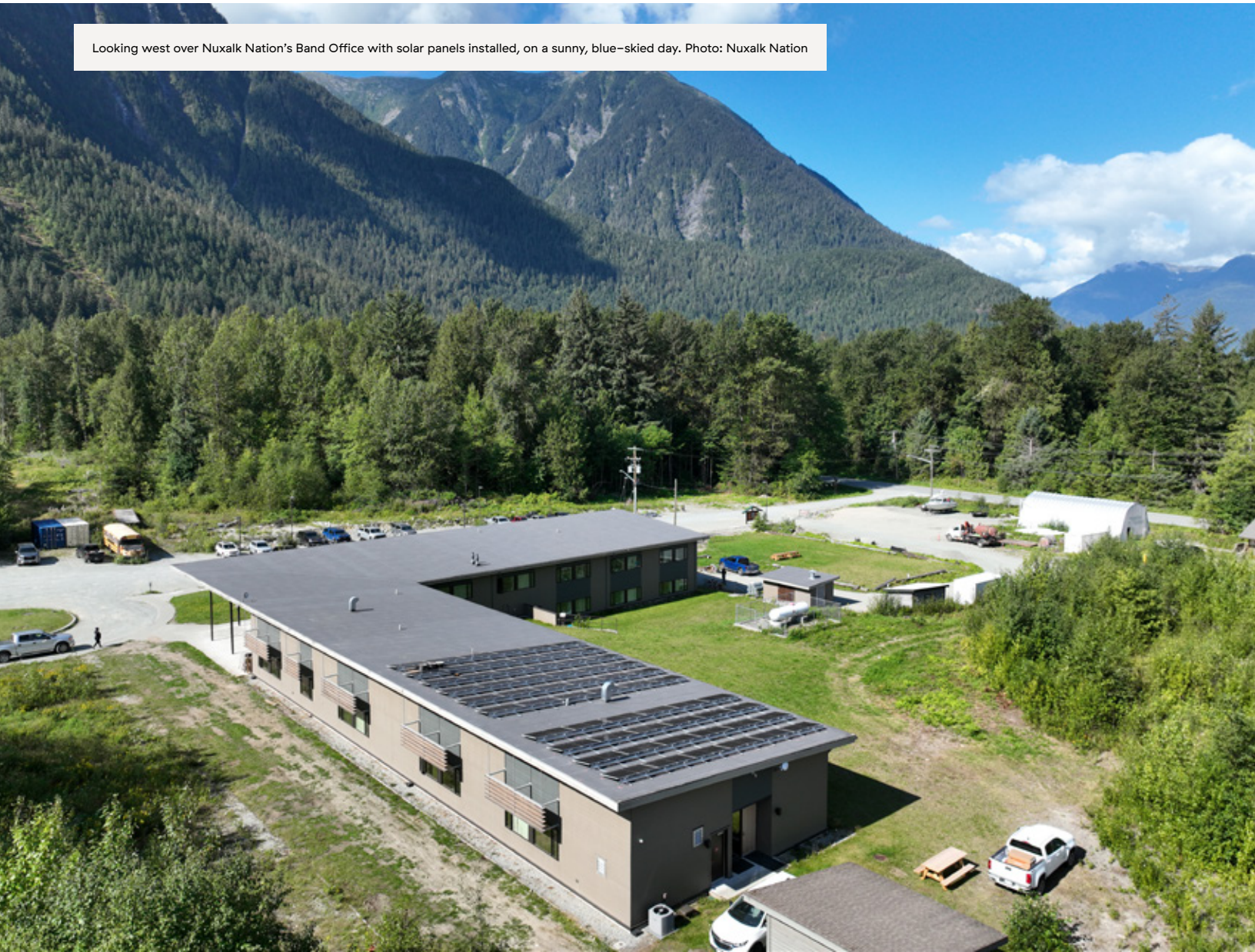
A MICROGRID CONTROL SYSTEM WILL SUPPORT THE INTEGRATION OF RENEWABLE ENERGY

BC Hydro will install a new microgrid control system which will support the integration of renewable energy into the power system by dispatching and controlling the diesel generators and renewable resources. It will essentially operate as the 'brains' of the microgrid — responsible for sensing the load, making decisions to control complex scenarios of which energy resource to use when, and being able to react instantly to any changes to keep the grid stable. The microgrid control system will be programmed with parameters and use cases to enable decisions to be made automatically and instantaneously to optimize the system.

The microgrid control system will also keep track of operations and provide detailed, digital data. This is a significant improvement from the relatively simple electrical/mechanical, analog system that is currently in use. The information it will provide can help BC Hydro to improve operating efficiency, guide maintenance schedules, and determine when equipment needs to be repaired or replaced.

Additional upgrades to the existing station will include:

- Upgraded diesel genset controls, plus station and distribution system automation for connection to the microgrid control system;
- Added protection and control equipment, and transformers;
- Upgraded communication networks to meet higher digitization/data requirements and allow for remote monitoring; and
- Distribution system upgrades if required.



Looking west over Nuxalk Nation's Band Office with solar panels installed, on a sunny, blue-skied day. Photo: Nuxalk Nation

6

Supporting energy efficiency

Energy efficiency programs allow customers to reduce their energy bills and improve home comfort. In some cases, energy efficiency measures can also work to reduce reliance on diesel generation depending on the daily and seasonal availability of the intermittent renewable resource, like run-of-river in Bella Coola, and whether the diesel generators are required to co-generate.

Demand-side management initiatives in Bella Coola

Demand-side management options reduce energy use and peak demand through conservation. They include programs, codes and standards, and rate structures designed to increase energy efficiency on the 'demand side' of the energy grid—for example, by being more energy efficient at home or in a business.

Nuxalk Nation is implementing several demand-side management initiatives to support energy efficiency and conservation measures. BC Hydro is working directly with Nuxalk Nation to determine energy efficiency initiatives for several commercial buildings. Demand-side management measures are an energy management priority within Nuxalk Nation's Community Energy Plan and include energy efficiency measures for both community and residential buildings.

Nuxalk Nation has applied for two projects within the Community Energy Diesel Reduction Demand-Side Management funding stream administered by New Relationship Trust, which is a program supported by BC Hydro. Nuxalk is in the process of retrofit enabling approximately 150 homes, and once this project is finished, they will proceed with EnerGuide assessments on these homes.

"EnerGuide assessments" are home energy audits and the first step to improving the overall energy efficiency of homes. An EnerGuide assessment report provides recommendations for upgrades that will have the most impact.

Nuxalk has hired a Climate Action Coordinator through the Coastal First Nations Great Bear Initiative's Indigenous Climate Action Network, which is a program supported by BC Hydro, the Province of BC and the Government of Canada. The Climate Action Coordinator plays a key role in coordinating initiatives that contribute to climate resilience and sustainable energy practices within the community, including demand-side management.

Heat pump at the Snootli Creek Hatchery. Photo: BC Hydro

Solar panels on Nuxalk Nation's Band Office. Photo: BC Hydro

Additionally, the following BC Hydro offers are available to support customers within the broader community in implementing energy efficient upgrades:

- **Energy Savings Kits:** free energy saving products are offered to NIA residential customers that they can install in their homes;
- **Home Renovation Rebates:** NIA residential customers are offered rebates on eligible home energy upgrades; and
- **Business Energy Savings Incentives:** NIA commercial customers are eligible for cost-saving incentives through this program.

Self-generation through solar/battery installations

BC Hydro's self-generation program (previously called net metering) allows customers to power their home or business with their own privately generated renewable energy source to help reduce their energy bills.

Customers on the Bella Coola microgrid have installed or have applied to install approximately 0.3 MW of solar generation on homes and businesses in the community. Nuxalk Nation has three community scale solar projects with installations on the Administration Office, the Acwsalcta School and the Baby Longhouse Daycare. Collectively, these three projects are estimated to have contributed to a 9% reduction in consumption across Nuxalk government and school operated accounts, demonstrating a high level of energy self-sufficiency.

In order to ensure grid stability, BC Hydro limits the amount of self-generation in any microgrid to 15% of the average annual load on the microgrid. In 2025, the Bella Coola microgrid reached the allowable limit for self-generation projects at the microgrid's current size.

Capacity for self-generation projects is limited in the NIAs due to the small size of the microgrids and the balance required between various energy sources to ensure system reliability. For instance, when there is solar self-generation on a non-integrated microgrid and a cloud comes over the local area, self-generation can drop by as much as 80% within seconds and that load will then need to be quickly met by another generation source. In a scenario where a large percentage of load is being met by self-generation, a running utility generator (diesel or hydro) may not be able to ramp up fast enough to pick up a sudden, large fall in self-generation and the result will be a brownout on the microgrid.

Recognizing that this is a nascent and evolving area for all utilities and communities, BC Hydro plans to closely monitor grid performance over time, take learnings and be prepared to adjust the self-generation limit as we gain more experience with self-generation in the NIAs including the Bella Coola microgrid.

7

BC Hydro is investing to address load growth and improve reliability

To support Bella Coola's continued growth and enhance its economic development, BC Hydro is investing in the local microgrid. These improvements aim to increase reliability and reduce the frequency and duration of power outages, helping to create a more resilient community.

Ah–Sin–Heek provides the firm generating capacity for the microgrid, currently consisting of seven diesel generators with a firm capacity of 5.5 MW. To meet growing demand, BC Hydro is implementing a phased upgrade plan:

2026: One generator will be replaced with two larger units, increasing firm capacity to 6.9 MW.

2027: An additional generator will be added, bringing the total firm capacity to 8.2 MW.

As shown in Figure 5, this 8.2 MW capacity is sufficient to provide the community with reliable electricity until 2043 under the Baseline forecast. By completing these upgrades in the next few years, BC Hydro maintains the flexibility to react quickly if electricity demand increases faster than anticipated.

Figure 5: Peak demand load resource balance 2020—2043

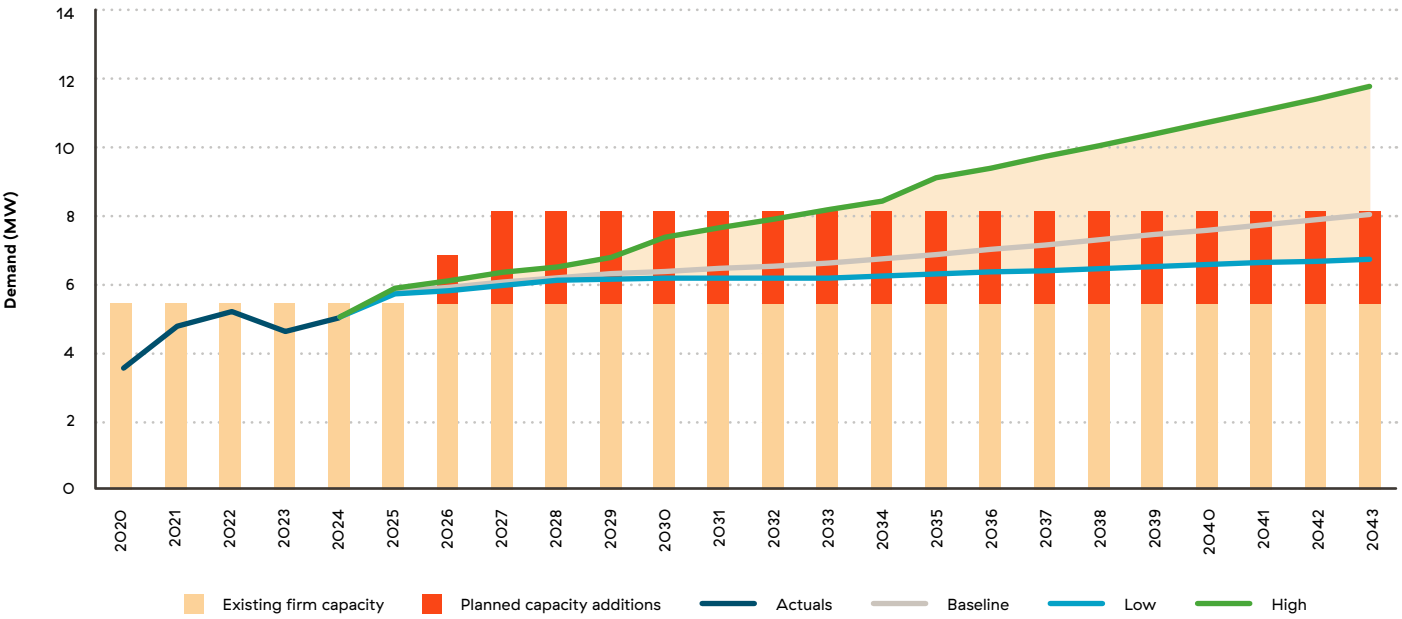


Table 5: Peak demand load resource balance 2020—2043

Demand (MW)	2023	2028	2033	2038	2043
Actuals	4.7				
Baseline		6.2	6.643	7.3	8.1
Low		6.2	6.2	6.5	6.8
High		6.5	8.2	10.1	11.8
Existing firm capacity	5.5	5.5	5.5	5.5	5.5
Planned capacity additions		2.7	2.7	2.7	2.7

Photo: BC Hydro

Some of the assets on the microgrid are approaching the end of their useful life which can increase the risk of assets failing and causing outages. BC Hydro is currently upgrading the Ah–Sin–Heek switchyard to replace the wood pole structures and end of life equipment at the Ah–Sin–Heek substation with a skid–mounted modular substation. The project is planned to be completed in Winter 2025/2026.

Several system reliability improvement measures are being implemented at Bella Coola with a targeted completion date of December 2026, including end–of–life pole replacements, installation of new protection devices and addition of bird mitigation measures at various locations along the distribution feeders servicing Bella Coola. In 2025, BC Hydro initiated a project to enhance the operation of the protection scheme for distribution feeders originating from Ah–Sin–Heek. Enhanced protection schemes mean that customer interruptions during fault events may be reduced through improved coordination of protection devices. Trees and branches falling onto the distribution feeders is one of the most common reasons for customer outages. Routine vegetation maintenance for the Bella Coola area was last completed in 2022. A full maintenance cycle is currently planned for 2027, with targeted hotspotting and hazard tree removal occurring in 2026 to maintain reliability in the interim.

Protection devices are assets used to keep the electrical grid safe and reliable. They detect problems like short circuits, overloads, or equipment failures and automatically disconnect or isolate parts of the system to prevent damage and outages. Examples include circuit breakers, relays, and fuses, which help maintain power quality and reduce the impact of faults on customers.

As a result of previous investments to improve reliability for the Bella Coola microgrid there has been a gradual improvement with reduced customer interruptions and customer hours lost. In the figures below lower values of interruptions mean higher reliability for customers on the Bella Coola microgrid. In the last five years there has been a 45% reduction in the number of customer interruptions and 77% reduction in the number of customer hours lost.

Figure 6: Customer interruptions (top) and hours lost (bottom).

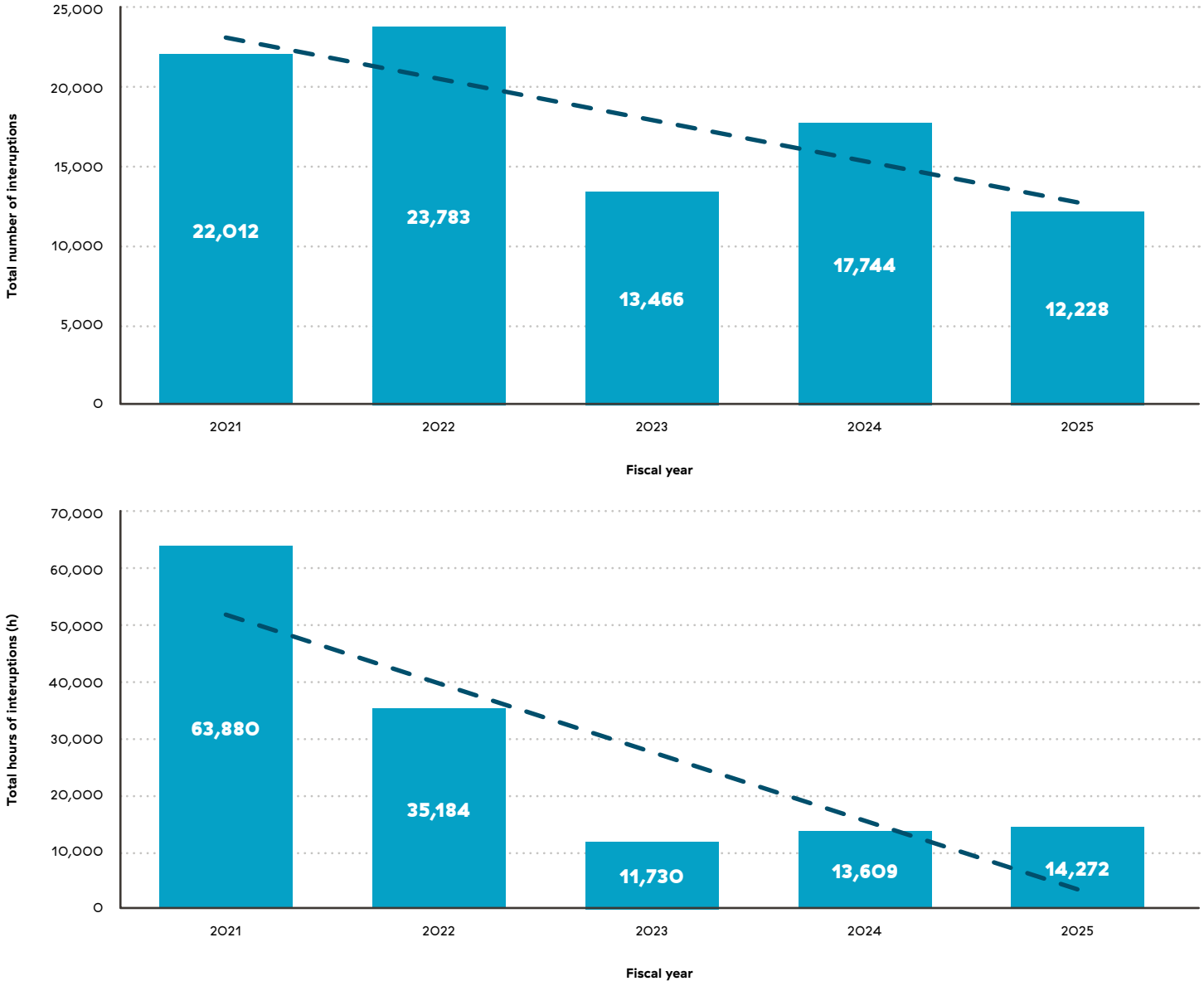


Table 6: Customer interruptions and hours lost.

Year	Customer interruptions	Customer hours lost
2021	22,012	63,880
2022	23,783	35,184
2023	13,466	11,730
2024	17,744	13,609
2025	12,228	14,272

BC Hydro monitors the performance of the distribution system and the load forecast in Bella Coola on a regular basis and plans to initiate projects to improve reliability or add capacity when needed in the future.

8

Conclusion

This Community Context Report represents a snapshot in time of BC Hydro's energy planning for the Bella Coola microgrid. It outlines the actions BC Hydro is taking to meet growing electricity demand, reduce reliance on diesel generation, and improve system reliability—while supporting truth and reconciliation and Indigenous leadership in energy planning.

Electricity demand in the Bella Coola region is expected to grow steadily from 21,331 MWh annually in 2023 to 29,963 MWh by 2043, with peak winter demand rising from 5.7 MW to 8.1 MW. The system in its current state will not be able to meet this future demand, and without proactive measures, the Bella Coola microgrid will face increasing reliability challenges and a greater dependence on diesel generation.

Currently, diesel generation is the only technically viable option for providing firm capacity to this microgrid. As a result, BC Hydro will need to continue investing in, maintaining, and expanding the capacity of Ah-Sin-Heek to ensure reliable service as demand increases.

However, BC Hydro can mitigate the use of diesel in the Bella Coola microgrid through purchasing energy from the Nooklikonnic Creek Hydropower Project, which is an intermittent energy source being developed by the Nuxalk Nation. This action represents a meaningful step toward integrating renewable energy into the microgrid and enhancing long-term sustainability.

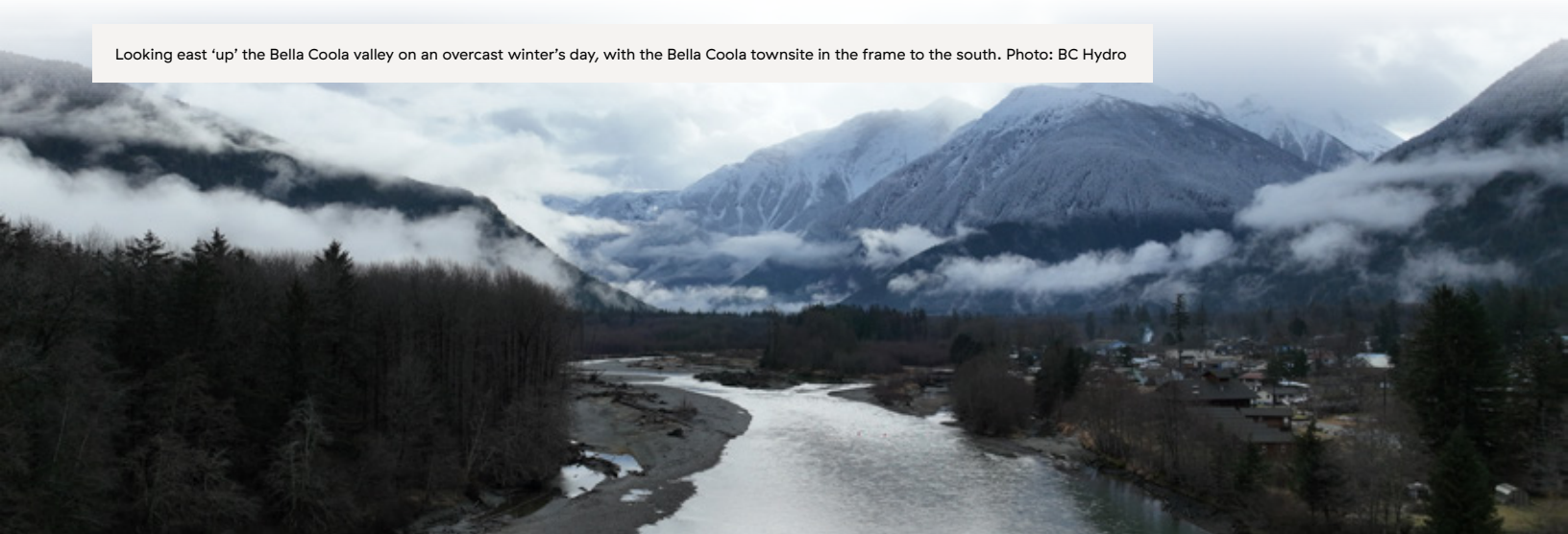
In summary, BC Hydro's overall key actions include:

- Purchasing renewable energy from Nuxalk Nation's Nooklikonnic Creek Hydropower Project.
- Transforming the microgrid, including upgrades to the diesel generating station and installation of a microgrid control system.
- Supporting demand-side management initiatives, such as residential retrofits.
- Allowing up to 15% rooftop solar penetration which will enable community-led self-generation and help affordability while ensuring the grid is stable and reliability.
- Investing in reliability improvements, including capacity upgrades and distribution system enhancements.

BC Hydro will continue to monitor and assess whether the planned actions remain the right ones by:

- Tracking actual energy consumption and peak demand to validate the load forecast and refresh the analysis as needed.
- Monitoring the renewable energy delivered from the Nooklikonnic Creek Hydropower Project to quantify diesel displacement.
- Tracking customer reliability metrics to determine where there may be opportunity for additional improvements.
- Once all self-generation applications are installed, monitoring the grid to see if the self-generation limit can be increased without impacting grid stability and reliability.
- Exploring emerging renewable energy technologies to identify future opportunities for additional reduction on the reliance of diesel generation.

Through ongoing collaboration with Nuxalk Nation and the broader community, BC Hydro remains committed to delivering safe, reliable, and clean electricity to the Bella Coola valley, now and into the future. This work will support the implementation of the principles of UNDRIP and advance the Truth and Reconciliation Commission's Calls to Action to ensure that energy initiatives uphold Indigenous rights and foster collaborative decision-making.



Looking east 'up' the Bella Coola valley on an overcast winter's day, with the Bella Coola townsite in the frame to the south. Photo: BC Hydro

CX-6873