yukon energy

AN UPDATE TO OUR
Future-Focused Portfolio

electricity for 2030

An introduction to Yukon Energy's draft 10-year renewable electricity plan

January 2020

the big picture

Yukon Energy currently meets over 90% of Yukon's electricity needs each year with clean renewable power because of our large supply of hydroelectricity.

In July 2019, we released our 5-year strategic plan with a bold 10-year vision to be a Canadian leader in sustainable energy by 2030. Later that year, based on the input of Yukoners, we also decided not to move forward with the development of a new 20-megawatt thermal generation facility to supply electricity during emergency conditions.

In November 2019, Yukon government released a draft of its *Our Clean Future* strategy, with a vision for addressing climate change by building thriving, resilient communities powered by clean energy and supported by a sustainable green economy. In it, the government proposes an average of 93% of electricity generated on the grid be produced from renewable sources, and includes specific actions to electrify the territory's transportation and heating sectors.

Yukon needs more renewable electricity

As Yukon's economy and communities grow, and as Yukoners increasingly invest in electric vehicles and electric heating technologies – particularly in new buildings – demand for electricity will also grow.

In order to continue providing most of our electricity from renewable sources, we must invest in new dependable renewable electricity sources that add firm winter capacity to our grid. This will allow us to continue meeting Yukoners' growing demands for renewable power – even on the coldest and darkest of days – while also supporting government's emission reduction targets.

Key goals outlined in the Yukon government's draft *Our Clean Future* strategy include reaching the following milestones by 2030.

1. Produce an average of 93% renewable electricity on the Yukon grid.
2. Have 6,000 zero-emission vehicles on the road.
3. Replace fossil fuel heating systems with electric heat pumps in 1,500 buildings.

The Yukon government's Our Clean Future *strategy also proposes to reduce the amount of diesel used to generate electricity in communities not connected to the grid by 30% by 2030. While this action also increases the need for renewable electricity solutions in Yukon, Yukon Energy does not generate power in these communities. ATCO Electric Yukon does. For this reason, actions to increase the use of renewable electricity in off-grid communities are outside the scope of this plan.*

Both the Yukon government and our own plans align with Yukoners' vision for reliable, sustainable electricity and a clean, unspoiled environment.

The pages that follow show how, together, the visions of the Yukon government, Yukon Energy and Yukoners themselves can be interlocked in a way that will bring about the Yukon we all envision.

It's a big plan that features opportunities for individuals, communities and First Nations. It's a plan that features innovation and challenges.

It's a plan that depends on all of us for ultimate success.

The Yukon of the future – one where renewable electricity continues to fuel our lives, work and economy – is within our reach. But we must act now and we must act together.

Join us in building the Yukon of the future.

Our plan to support a green future

Our draft 10-Year Renewable Electricity Plan presents a once-in-a-lifetime opportunity for Yukon to invest in the critical renewable electricity projects needed to fuel our lives, our work and our economy with clean energy. It creates opportunities for our corporation, First Nations governments and development corporations, the Yukon and federal governments, and Yukoners to jointly shape our electricity future.

Our plan outlines the portfolio of key projects and partnerships needed by 2030 to address the substantial demand for renewable electricity that will result from the policies and actions outlined in the Yukon government's draft *Our Clean Future* strategy. The projects are based on the science behind our 2016 Resource Plan and account for updated electricity load forecasts.

The result is our updated Future-Focused Portfolio. In addition to the new supply projects we already have in place or under development – such as battery storage, hydro uprates and storage enhancements, electricity purchases from Independent Power Producers, micro-generation, demand-side management programs, and the replacement of end-of-life thermal generation – we are proposing three key new projects.

All three new projects are located primarily in the Southern Lakes region, an area rich with potential for hydro power and pumped storage. The three projects are as follows.

1. **Construct a new pumped storage facility on Moon Lake.**
2. **Source renewable electricity from the planned expansion of the Atlin hydro plant owned by the Taku River Tlingit First Nation.**
3. **Expand and upgrade the transmission network in the Southern Lakes region.**

The proposed pump storage facility would add the dependable renewable capacity that our territory urgently needs. This would allow surplus renewable electricity currently being generated in summer to be stored and then used to decrease dependency on fossil fuel power generation in winter.

Sourcing renewable electricity from Atlin would allow us to tap into an existing renewable project. This is a quicker and more cost-effective solution than building a new hydro plant. If the cold snap in January 2020 reinforced anything for us, it is that we need more renewable sources of power that can be available mid-winter, at the flip of a switch.

The expanded Southern Lakes transmission network would serve to connect the Atlin hydro plant and Moon Lake pumped storage facility to the Yukon grid, as well as potential First Nation-owned renewable projects in the Southern Lakes region. The transmission network would also create the opportunity for future sales of surplus renewable electricity to Skagway.

Plans for each of these projects are in very early stages. Our work with First Nations governments and development corporations to explore partnership opportunities and to further assess the projects are critical to success.

Projects in this plan will cost in excess of $500 million, our largest investment ever made in Yukon's electricity system. Federal funding of this plan will be key to keeping the plan affordable for customers and minimizing risks.

The projects in this plan will take time. That's why it's a 10-year plan. And there can be no picking and choosing. Every project in this plan is needed. Further, until the projects can be fully implemented, we will have little to no choice but to continue to rent back-up diesel generators each winter to ensure reliability of power service.

However, when complete in 2030, the projects in this plan set us up to be, on average, greater than 97% renewable.

A clean future is ahead.

Filling the capacity gap

As the chart demonstrates, demand for electricity is growing in Yukon. In order to meet the need for more renewable electricity, all projects in the portfolio are needed. Remove any of the planned projects and we will need to rent more costly diesel generators to meet future peak demands for electricity. To implement each of the projects in our plan will require close partnerships with First Nations governments and development corporations, federal funding, and the support of Yukoners.

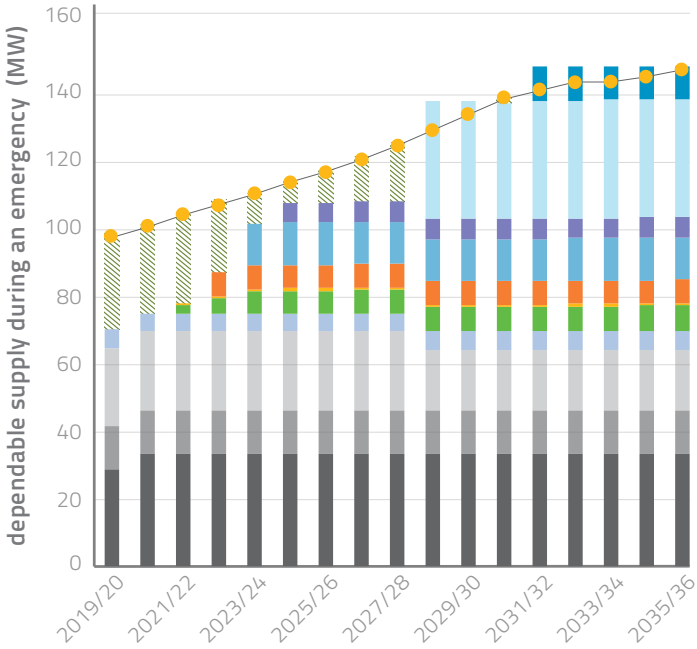
peak demand (without mines)

planned projects

- temporary rental diesel
- Moon Lake pump storage possible expansion
- Moon pump storage phase 1
- Electricity purchase from Atlin expansion
- incremental diesel replacements
- battery storage
- Whitehorse #2 uprate
- demand side management programs

existing resources

- ATCO Electric Yukon dependable thermal
- Yukon Energy dependable diesel
- Yukon Energy dependable LNG
- Yukon Energy dependable hydro



Understanding the difference between capacity and energy

Capacity is how much is available at a point in time.

Energy is how much you use over time.

When you only need a little energy, having extra capacity is fine.

But when you need a lot of energy and your vessel isn't big enough, you can't get what you need. The result, power outages.

key projects

Project Benefits

The projects proposed in this plan are the best mix of projects because they:

- promote energy conservation;
- maximize the amount of renewable electricity generated at existing hydro facilities;
- connect new sources of First Nation-owned renewables to the grid;
- store and use excess renewable power generated in the summer to decrease dependency on fossil fuels during the winter;
- open new markets for surplus renewable electricity generated during the summer; and
- ensure enough back-up liquefied natural gas and diesel resources are available to provide reliable electricity when renewables are not available.

Key Projects in our 10-Year Plan

EXISTING RESOURCES

- All current assets except for three diesel engines set to retire before 2030.

PROJECTS UNDER DEVELOPMENT

- Whitehorse Hydro #2 Uprate
- Battery Storage
- Electricity purchases from Independent Power Producers
- Micro-Generation Program

PLANNED PROJECTS (BASED ON APPROVALS)

- Whitehorse Hydro #4 Uprate
- Southern Lakes and Mayo Enhanced Storage Projects
- Incremental Diesel Replacement
- Demand Side Management Programs

For details and project descriptions on any of these projects, visit **yukonenergy.ca**.

The Southern Lakes transmission network expansion

legend

- existing transmission line
- proposed transmission upgrade and expansion
- project connections
- future sales opportunities

Future potential projects

What Yukon needs even more than increased energy is increased capacity. The combination of these three future potential projects not only stores and uses excess renewable power generated in the summer to decrease dependency on fossil fuels during the winter, but also makes connecting potential sources of First Nation-owned renewables in the Southern Lakes region more viable, and creates opportunities for future sales of surplus renewable electricity to Skagway.

MOON LAKE PUMPED STORAGE

- A reversible hydroelectric facility where water is pumped uphill into a reservoir.
- Water flowing back down the hill is harnessed to generate electricity in the same way as a conventional hydro plant when needed.
- Adds much-needed renewable capacity required to meet demand during the winter and in emergencies.
- Provides a way to store excess renewable electricity in the summer to decrease dependency on fossil fuels during the winter.

ELECTRICITY PURCHASES FROM THE ATLIN EXPANSION PROJECT

- Sourcing renewable energy from the planned expansion of the Atlin hydroelectric facility owned by the Taku River Tlingit First Nation.
- Capitalizes on an already existing project.
- Presents a near-term opportunity to make more dependable renewable electricity available in Yukon.
- Its close proximity to existing transmission infrastructure keeps project costs reasonable.

SOUTHERN LAKES TRANSMISSION NETWORK

- An upgraded transmission line between Whitehorse and Tutshi–Moon to deliver excess renewable power to the pumped storage facility in the summer to make that power available on the Yukon grid during the winter.
- An upgraded transmission line to Jakes Corner allows the Atlin hydro plant to connect to the Yukon grid.
- Enables the connection of future community-based renewable projects in southern Yukon to the grid.
- Creates the opportunity for future sales of surplus renewable electricity to Skagway.

what does success look like?

Ultimately, the success of our 10-Year Renewable Electricity Plan hinges on everyone working together. With full participation we can implement our plan and reduce our reliance on fossil fuels. Without the complete plan, we will have little choice but to build more diesel and liquefied natural gas plants to meet the growing demand for electricity. We don't want this, and we know Yukon doesn't either. Let's work together to meet Yukon's climate goals.

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LEARN MORE

To learn more about each of the projects outlined in this draft plan, as well as to provide your feedback, visit **yukonenergy.ca.**

Feedback collected will be used to inform our final 10-Year Renewable Electricity Plan that will be released in June 2020.

Keys to success

Federal funding requirement

As outlined in this document, every project in this plan is needed. We cannot pick and choose. The cost of projects in this plan are estimated to cost in excess of $500 million, our largest investment in the electricity system. Federal funding for the plan will be key to keeping the plan affordable for customers and minimizing risks.

First Nations partnerships

First Nations governments, development corporations and Citizens will have a key role in helping us shape and deliver this plan over the next 10 years. We recognize First Nations as governments and potential energy proponents, partners and investors. In developing this plan, we will work proactively and collaboratively with First Nations governments and development corporations to forge partnerships and create opportunities for investment, contracting, employment and training. First Nations will also be at the forefront of assessments, permitting and approval stages.

Your support and participation

Everyone has a role to play in helping build Yukon's sustainable energy future. First Nations governments and development corporations, and local communities can participate by way of Independent Power Production, while individuals can participate in programs like Peak Smart, InCharge and the Micro-Generation program. We must work together to achieve the clean future we want.