Brief submission for the study on non-renewable and renewable energy development including energy storage, distribution, transmission, consumption and other emerging technologies in Canada's three northern territories by the Standing Senate Committee on Energy, the Environment and Natural Resources

Submission from:
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Summary:

- Yukon needs reliable, affordable, flexible and environmentally responsible power, year round, but especially in winter during our peak load.
- In recent years, Yukon has undergone a steady increase in demand for electrical energy.
- Yukon is not connected to southern power grids.
- Next Generation Hydro project was initiated to explore, plan, design, build and commission new hydro power projects to meet Yukon's energy needs 20 to 50 years from now.
- A short list of 10 potential sites was identified for the next hydro facility.
- During winter months, Yukon supplements hydro using diesel generators. A diesel-natural gas conversion project is underway to use liquefied natural gas to replace aging diesel generation capacity and provide electrical energy at prices comparable to other jurisdictions.
- A small portion of Yukon's current electrical generation comes from wind, and from solar.
- Yukon has implemented a Micro-generation policy allowing individuals to generate solar electricity and export excess energy to the grid. An Independent Power Production Policy is under development that would allow small producers to generate power and help the territory meet power demands.
- Yukon government is developing a Biomass Energy Strategy to optimize the use of Yukon harvested wood to meet heating needs using modern biomass energy systems. Two large scale biomass heating facilities were installed in the Whitehorse Correctional Centre and the Dawson City Waste Water Treatment facility.
- Funding has been provided by the federal government to develop a series of geothermal favourability map for Yukon to support the exploration for geothermal energy resources.
- All of these initiatives support key goals found in the Yukon government's Energy Strategy and its Climate Change Action Plan.
- Yukon government offers a comprehensive suite of energy efficiency incentive programs and services to Yukon's public and businesses to reduce their electricity consumption.
- Yukon government recognize that our oil and gas sector could be a major contributor to Yukon's energy supply and economy.
- Yukon government is considering applying to the New Build Canada Fund for upgrading transmission lines in Yukon. This would improve the security of its electrical supply while contributing to regional economic growth.
- Yukon government is also in close partnership with the State of Alaska to explore the possibility of generating electricity and building electrical transmission and telecommunication lines between Yukon and nearby Skagway, Alaska.

Submission:

The following is a perspective on the energy opportunities and challenges faced by Yukon today and into the future, and a summary of the Yukon government's various initiatives to develop local renewable and non-renewable sources of energy.

Access to reliable, clean and affordable electricity is integral to the daily lives of Yukoners and Yukon's continuing economic and industrial growth.

The three northern territories face similar challenges of supplying reliable and affordable energy while being dependent on aging infrastructure to deliver the energy to small populations in remote communities while living in an extreme cold climate.

Yukoners need a lot of power in our cold dark winters. We need reliable, affordable, flexible and environmentally responsible power, year round, but especially in winter during our peak load.

In recent years, Yukon has undergone a steady increase in demand for electrical energy. This demand is expected to continue growing into the future.

While Yukon has benefitted from locally generated legacy hydro-electricity for the past half century, economic growth and population increases mean that new sources of renewable electricity need to be developed.

As a result, Yukon government issued its Yukon Hydroelectric Power Planning Directive in 2013.

The Directive tasks the Yukon Development Corporation to plan the development of one or more hydroelectric projects to ensure an adequate and affordable supply of reliable and sustainable electrical power in Yukon.

From this, the Next Generation Hydro project was born. The Next Generation Hydro project is a long-term process to explore, plan, design, build and commission new hydro power projects to meet Yukon's energy needs 20 to 50 years from now.

By adding to Yukon's existing electricity generating infrastructure with an affordable, renewable energy source, Yukon can improve the security of its electrical supply while contributing to economic growth.

The Next Generation Hydro project is a priority for Yukon government. It is not only critical to address Yukon's future energy needs and economic growth, it is also an opportunity to partner with First Nations on one or more projects that will create a positive legacy for the future.

This hydro project will also allow for much-needed improvement to Yukon's existing electrical generating infrastructure.

Until the late 1980s, most of the electrical generation facilities in the North were owned by the federal government's Northern Canada Power Commission or the NCPC.

The first of its Yukon facilities, a five megawatt hydro plant in Mayo in the central Yukon, was built in 1951. It was originally developed to supply electricity to the United Keno Hill Mine at Elsa, located about 45 kilometres north of Mayo.

Replacing the NCPC, the Yukon Energy Corporation, established in 1987, is a publicly-owned electrical utility that operates at arm's length from the Yukon government.

Yukon is not connected to southern power grids. The corporation is the main generator and transmitter of electrical energy in the Yukon and it works with its parent company, Yukon Development Corporation to provide Yukoners with reliable electricity.

There are almost 15,000 electricity customers in the territory. Yukon Energy directly serves about 1,700 of these customers, with most living around Dawson City, Mayo and Faro.

Indirectly, it provides power to many other Yukon communities through ATCO Electric Yukon, the main distributor of power, which buys wholesale from Yukon Energy and sells it to retail customers in the territory.

Yukon Energy has the capacity to generate 132 megawatts and ATCO Electric Yukon has a capacity of approximately 16 megawatts.

Hydro facilities generate 92 megawatts of power with the balance coming from diesel generators (39 megawatts) and from one wind turbine (0.66 megawatts).

In recent years, a new powerhouse was built thanks to the Government of Canada's valuable support along with a financial investment by the First Nation of Na-cho Nyäk Dun.

The Mayo B powerhouse has increased the amount of power that can be generated from the Mayo River (from five megawatts to 15.1 megawatts). Currently, Yukon's electrical energy gap is forecasted to increase anywhere from 21 megawatts in 2035 to 136 megawatts in 2065.

For comparison, this means within 20 years, Yukon could need a facility that is twice the size of Mayo, and in 50 years a facility that is approximately six times the size of the existing one in Whitehorse.

The Yukon government continues its work to ensure a continued and adequate supply of energy that improves energy security while contributing to economic growth.

The Next Generation Hydro project allows the Yukon government to examine and ensure that Yukon's future electrical energy needs are met and that future generations can enjoy an energy legacy similar to that currently provided by our legacy hydro assets.

To date, the Yukon Development Corporation has reviewed and assessed potential hydro sites in Yukon and in February, announced a short list of 10 possible sites for the next hydro facility.

The corporation is now exploring how, together with other renewable energy sources and transmission, these sites could meet Yukon's energy needs.

For most of the year, Yukon relies primarily on hydro power for our electricity supply. During the cold winter months, we have to supplement hydro using our diesel generators.

Yukon Energy has 19 generators powered by diesel oil: eight in Whitehorse, two in Mayo, six in Dawson City and three in Faro.

For financial and environmental reasons, we would prefer not to use diesel. As the demand for electricity grows, we have sought out new sources of cleaner power so that we can keep our use of diesel to a minimum.

As a result, the Yukon Energy Corporation has initiated and is implementing a diesel-natural gas conversion project. The project will use liquefied natural gas to replace aging diesel generation capacity. This will enable Yukon Energy Corporation to continue to provide the electrical energy we all use at prices comparable to other jurisdictions.

Having gone through all the appropriate assessments and licensing processes, a liquefied natural gas facility is currently under construction and is expected to be capable of producing 8 MW this Spring 2015.

Developing a robust, affordable, and flexible energy system that matches seasonal and economic variations requires a mix of several demand and supply options.

A small portion of our current electrical generation comes from wind, and an even smaller portion from solar.

Currently less than 1 per cent of Yukon's total electrical load is supplied by wind energy. Interestingly, wind speeds in Yukon are at their highest during the winter months when electricity and heating demand is also at its highest.

Based on Yukon Energy Corporation's wind modelling, 10 areas of interest together could potentially offer a total installed capacity of over 100 MW.

Additionally, the use of solar photovoltaic systems to provide electricity to the Yukon grid is growing in popularity. Solar capacity is greatest in the Yukon in late winter and early spring when hydro reserves are lowest.

Experts estimate that approximately 9 per cent of Yukon's electrical demand could be met with solar photovoltaic systems. The cost of solar photovoltaic systems has been decreasing rapidly in recent years making this local, renewable energy source an attractive option for Yukoners.

Yukon government actively supports the development of new renewable and clean energy technologies that help diversify Yukon's electrical supply.

In the last few years, we have implemented a Micro-generation production incentive program encouraging individuals to become part of the energy supply solution.

The Micro-generation Policy and Program enable individuals to connect their renewable electrical generation systems to the grid. Participants receive financial payment for surplus electricity sold to Yukon's utilities.

Since its inception, this popular program has encouraged the development and adoption of new individual renewable energy sources to offset and reduce personal energy consumption, provide local energy supply and in some cases to reduce greenhouse gas emissions.

Complementing the Micro-generation policy is our draft Independent Power Production Policy which is under development and will allow small producers to generate power and help the territory meet power demands.

Yukon government is also working on other renewable solutions to generate and use energy. Yukon's heating sector is approximately 17 per cent renewable and sourced from local wood products. Wood has the potential to be most cost effective as a heating fuel rather than a source of electricity.

As a result, the Yukon government is developing a Biomass Energy Strategy with the intent of reducing Yukon's dependence on imported fossil fuels by optimizing

the use of Yukon harvested wood to meet heating needs using modern biomass energy systems.

Most of the approximately 24,000 cords of wood harvested annually. There is significant capacity to increase the use of local wood for sustainable and renewable energy in Yukon.

Yukon government has been responsible for the installation of two large scale biomass heating facilities: one at the Whitehorse Correctional Centre and another at the Dawson City Waste Water Treatment facility. These systems are estimated to produce approximately 17 TJ of renewable energy per year.

Finally, there was a recent announcement in March by our Member of Parliament, Ryan Leef, on funding to develop a series of geothermal favourability map for Yukon to support the exploration for geothermal energy resources.

This project will build the knowledge base required for companies who have an interest in geothermal energy production. The initial mapping will significantly decrease the costs associated with geothermal exploration and help promote development of this renewable resource

All of these initiatives support key goals found in the Yukon government's Energy Strategy. Introduced in 2009, the Energy Strategy serves as Yukon's road map to energy conservation and efficiency.

Our energy policy developments also support objectives found in the Yukon Government's Climate Change Action Plan.

As part of implementing the Energy Strategy, Yukon has developed and implemented various efficiency and conservation initiatives for Yukon homeowners and businesses to reduce their electricity consumption.

Through our Energy Solutions Centre, a comprehensive suite of energy efficiency incentive programs and services is offered to Yukon's public.

These initiatives help Yukoners use electricity and heating resources efficiently and manage energy demands in the territory.

Although the territory has oil and gas reserves, our current needs for this energy source are met entirely through imports.

It is estimated that Yukon's existing natural gas resources, if developed, would be sufficient to meet Yukon's pending energy needs for many decades.

We recognize that our oil and gas sector could be a major contributor to Yukon's economy in terms of jobs, business opportunities and revenues to government. Yukon government also recognizes the importance of reliable transmission infrastructure that has sufficient capacity to handle development within the system.

The Yukon Development Corporation has initiated permitting and design work on an upgraded transmission line between Stewart Crossing and Keno City. The corporation is considering preparing an application to the New Build Canada Fund for the construction phase of the project.

By upgrading existing transmission, Yukon can improve the security of its electrical supply while contributing to regional economic growth.

Yukon government is also participating in a study, in close partnership with the State of Alaska, to explore the possibility of generating electricity and building electrical transmission and telecommunication lines between Yukon and nearby Skagway, Alaska. The final study was recently completed at the end of March 2015.

We believe that an economic development corridor between Yukon and southeast Alaska has the potential to generate and provide affordable, reliable, clean energy and may also increase hydro electricity supply and provide a market opportunity to sell surplus hydro in the summer.

The Yukon is taking a balanced and very proactive approach to energy development and management.

Thank you for the opportunity to present a snapshot of Yukon's energy situation.