Yukon Renewable Electricity Panel

REPORT TO THE MINISTER OF ENERGY, MINES AND RESOURCES

January 2020

MESSAGE TO THE MINISTER

Dear Minister Pillai,

Please accept the enclosed report as the culmination of our assignment to advise the Government of Yukon on future directions for renewable electricity generation in the territory. Our week of discussions with the public, energy stakeholders, First Nation groups, students, and government and utilities staff underscored both the scope of the clean energy challenge and a broadly shared vision and commitment to meet it. We learned an immense amount from our time with Yukoners, and hope that our perspectives and "best advice" serve as useful contributions to this vital conversation.

Sincerely,

John Maissan | Christopher Henderson | Michael Ross | Ravi Seethapathy

From left to right: Panel members John Maissan, Chris Henderson, Michael Ross, and Ravi Seethapathy (Credit: Vince Federoff, Whitehorse Star)

ACKNOWLEDGEMENTS

The Yukon Renewable Electricity Panel would like to thank all of the individuals and organizations that shared their valuable time and ideas during its November sessions. The Panel would also like to thank Jane Koepke of Groundswell Planning for providing facilitation and secretariat support.

TABLE OF CONTENTS

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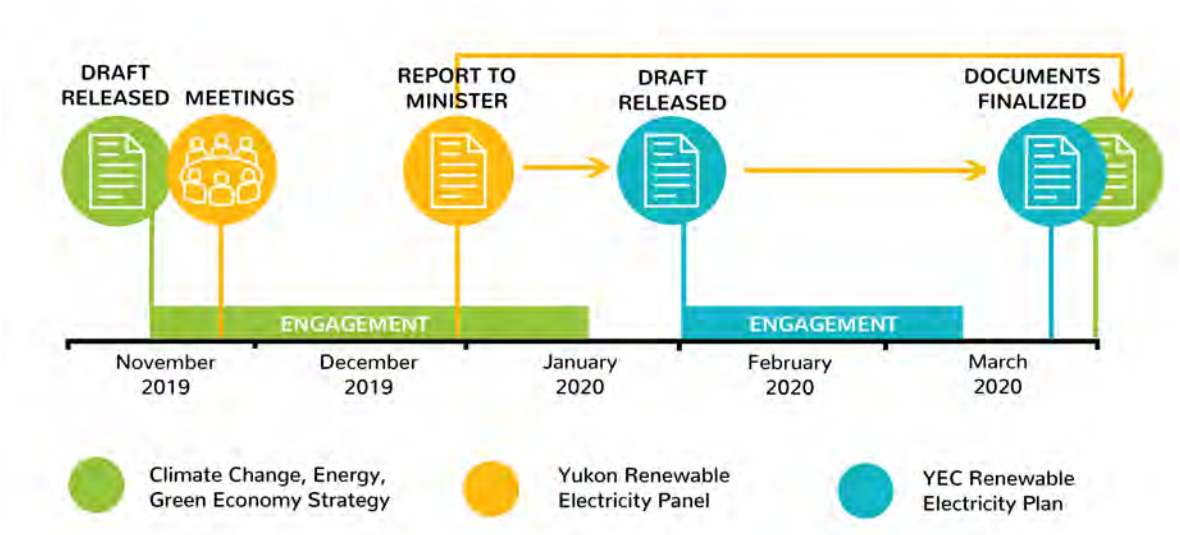
INTRODUCTION

The Yukon Renewable Electricity Panel ("Panel") was established in November 2019 to advise the Minister of Energy, Mines and Resources (EMR) in regards to meeting the Government of Yukon's target of providing at least 93% of Yukon's electricity demand through renewable sources, recently articulated in *Our Clean Future: A Yukon Strategy for Climate Change, Energy, and a Green Economy*. The four panelists – Chris Henderson, John Maissan, Michael Ross, and Ravi Seethapathy – brought a diversity of local and Outside technical, policy, research and project-based experience in the areas of renewable energy, community and First Nation energy projects, Smart Grid, and energy integration in small, remote jurisdictions[1].

During the week of November 18-22, 2019, the Panel visited Whitehorse, Watson Lake, and Haines Junction to share information with and hear from the public, energy stakeholder groups, and students[2]. The panel was also briefed by staff from EMR, Yukon Energy Corporation (YEC), Yukon Development Corporation (YDC), and ATCO Electric Yukon (ATCO). These conversations, along with a review of relevant background information, helped the Panel ultimately formulate its "best advice", contained in the following report, to the Minister. This document is intended to serve two purposes:

1. Assist the Yukon public and stakeholder groups in understanding challenges and opportunities and support active and informed input into Our Clean Future and YEC's pending plan; and,
2. Provide an impartial, third-party, expert perspective to be factored into the draft and final versions of the aforementioned documents



YREP and Associated Government of Yukon Processes

[1] Panel bios are included in Appendix A.

[2] The complete list of participants is included in Appendix B. The Panel was scheduled to visit four communities but inclement weather prevented the Team from traveling to Dawson City.

WHAT WE REVIEWED

Institutional History

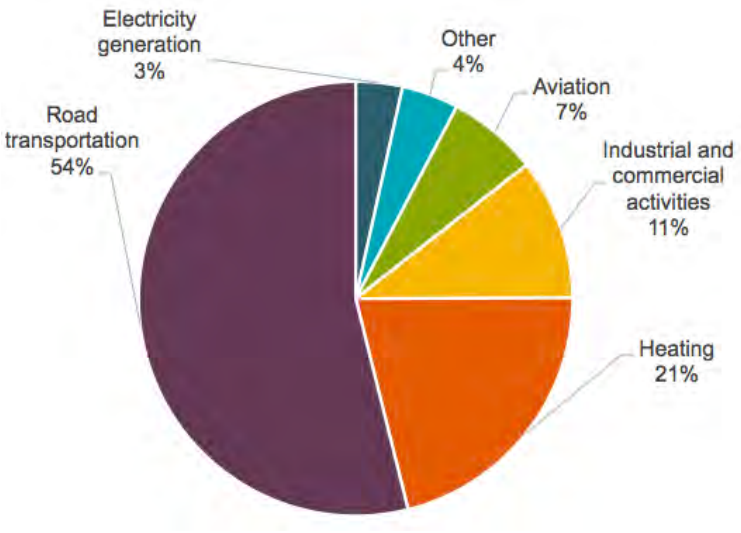
The origins of Yukon's electricity generation dates back to the establishment of the Yukon Electric Company (now ATCO) in 1901 in Whitehorse. The Northern Canada Power Commission (NCPC) spearheaded Yukon's legacy hydro infrastructure, starting in the 1950s with the Mayo hydro plant and followed up by the Whitehorse Rapids and Aishihik plants and associated transmission lines.

YEC was established in 1987 with the intention of operating at arms-length from government. YEC reports to YDC, a Crown Corporation established to hold NCPC's assets. Today, YEC sells wholesale power to ATCO for retail distribution and serves industrial customers (with electrical demand greater than 1 MW) directly. YEC also has retail distribution in the communities of Mayo, Dawson City, and Faro as well as some outlying areas. ATCO provides its own thermal (diesel) generation in off-grid communities in Yukon and owns the 1.4 MW capacity Fish Lake hydro facility in Whitehorse.

Yukon's electrical utilities have always been subject to regulation by the Yukon Utilities Board (YUB), a quasi-judicial board established under the *Public Utilities Act*. The Act (and YUB) provides for economic (i.e., price) regulation of both ATCO and YEC electricity rates.

Current Yukon Energy Context

Currently, 95% of the territory's population is connected to Yukon's hydroelectric grid. More than 90% of electricity generated on the Yukon grid is renewable, coming primary from hydro resources generated at YEC's Whitehorse, Mayo and Aishihik facilities. This high renewable component has helped keep the greenhouse gas (GHG) emission contributions from electricity generation at 3%, significantly lower than those of road transportation and heating. *Our Clean Future* commits to achieving 93%[3] renewable electricity through to 2030 as part of the territory's strategy to reduce emissions.



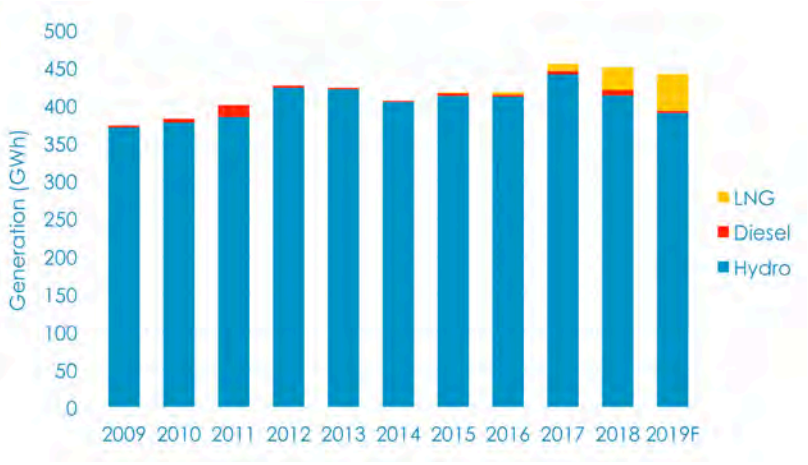
Yukon's Source of GHG Emissions (2017) (Source: YG)

However, recent and future anticipated trends raise the question of whether this 93% target is realistic. YEC's use of thermal (i.e. the fossil fuels diesel and liquefied natural gas) inputs to add firm capacity to the hydroelectric grid has steadily increased over the past several years. This is due to a

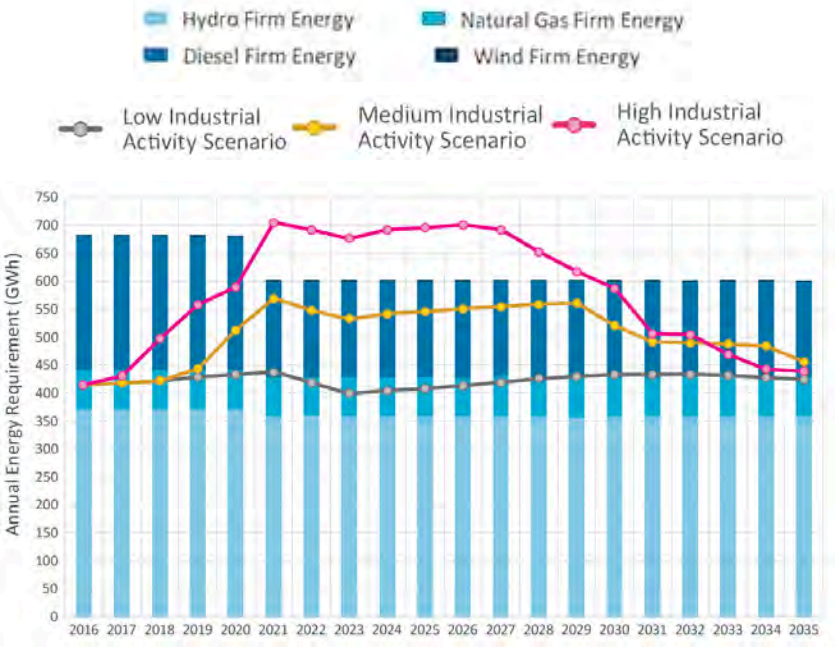
[3] This goal is stated as a long-term rolling average versus annual target.

combination of factors, including:

- Population growth;
- Increasing electrification of energy sources for the residential, commercial and institutional heating sector;
- The system's inherent mismatch between renewable energy capacity and demand (wherein demand peaks in colder winter periods when firm capacity is at its lowest level);
- Variability in generating capacity due to drought conditions in recent years;
- The addition, as well as the variability of large "lumped" loads from larger-scale mining projects; and,
- A lack of substantive progress on new renewable energy supply over the past several years.



2009-2019 YEC Generation Profile (Source: YEC, 2019)



2016-35 YEC Forecast - Energy (Source: YEC 2016 Resource Plan)

Looking to the next several decades, the trend line of relying on is fossil fuels for the supplying new electricity demand may persist due to:

- Continued shifting of energy sources away from fossil fuels and towards electrification, particularly in heating and the transportation sector;
- Continued steady population growth resulting in a projected 45,500 residents by 2025, up about 11% from 2018[4]; and
- Potential new mining projects.

[4] Yukon Bureau of Statistics. 2018. "Population Projections 2018". http://www.eco.gov.yk.ca/stats/pdf/Projections2018.pdf

Over the past five years, YEC, YDC and the Government of Yukon have undertaken several major planning exercises aimed at adding renewable firm capacity to the grid through new large-scale hydro and enhanced storage of lakes that supply existing hydro generation facilities, among others. The Panel concludes however that there is a high social license for these and other energy projects and initiatives. Passing the test of social license is clearly very challenging and may well require a new way of developing, leading and implementing energy projects to achieve Yukon's clean electricity vision.

Given all of these factors, it is the Panel's observation that there is a very daunting pathway by which Yukon can secure a reliable, affordable, and renewable electrical energy future in the next 10-15 years. Overcoming such challenges should consider that achieving a clean electricity future is a means to an end: a more prosperous, cleaner, competitive and climate-friendly Yukon economy and society. As such, relegating clean electricity to an energy "box" or "silo" would be limiting, and effectively compromise the attainment of multiple social, environmental and economic objectives that reflect a profound embrace of sustainable development for Yukon. It may be more powerful and likely more impactful to realize a vision of a 21st century clean energy infrastructure for Yukon with such a broader, more strategic and multi-dimensional strategy.

YEC's Liquified Natural Gas (LNG) electrical generating plant

WHAT WE HEARD: YUKON PERSPECTIVES

Who We Met With

During the week of November 18-22, 2019, the Panel met with a broad spectrum of Yukoners and Yukon organizations. Grassroots energy advocacy groups, First Nation, environmental and business non-governmental organizations, high school students, and members of the public in Watson Lake, Whitehorse, and Haines Junction[5] – all provided us with a deeper understanding of Yukoners' hopes, concerns and priorities for renewable electricity and energy.

The format for each session was adapted to meet the particular circumstances of the group and/or audience involved. Typically, the sessions involved a two-way exchange of knowledge; Yukoners providing local context, information, and – in some cases – positions to panelists, and the Panel offering information and/or clarification around various aspects of renewable electricity. A complete

The Panel meets with representatives from Council of Yukon First Nations and Assembly of First Nations – Yukon Region in Whitehorse.

[5] A fourth community meeting was scheduled for Dawson City but was canceled due to weather.

Top to bottom: Sessions with Watson Lake residents, Vanier Catholic Secondary School students, and Yukoners Concerned.

list of organizations, sample questions and answers from the public session, and written submissions to the Panel are included in the appendices.

Session Highlights

Public

Whitehorse (~65 people)

After a Q&A round, audience members were tasked with small group discussion around "renewable, reliable, and affordable" electricity. Participants reiterated the challenge of achieving all three, with some concluding that a multitude of approaches - including policy and new fiscal tools (i.e., carbon tax revenues) - will be required. A diversity of energy sources in terms of type and scale (i.e., from grid to household) were viewed by some as being central to the solution.

There was general agreement that there should be more pressure on the affordability front to achieve the levels of renewable and reliable desired, with energy efficiency and incentivization of independent power production cited as key tactics. The need for major capital investments and associated cost implications was seen as both inevitable and necessary.

Watson Lake (8 people)

Residents of Watson Lake shared their desire for local clean energy solutions but noted some unique challenges from the rural Yukon context, including affordability, capacity, and isolation (i.e., inhibiting adoption of electric vehicles). Better public education around the relationship between electricity generation and fossil fuels, along with rates that reflect the "true" cost of power, were seen as necessary ways to help Yukon households make better choices. Attendees stressed that the potential impact of local energy generation is very different in rural Yukon; new employment for a half dozen

people could have significant positive benefits. Biomass was seen as a logical fit for Watson Lake and there is precedent for it; however, government forestry policy was cited as a major impediment to harvesting at the scale required.

Haines Junction (12 people)

Haines Junction residents also emphasized the importance of local action and cited past examples of price-oriented regulatory policy hindering community efforts. Government financial support to adopt expensive clean energy technology was seen as necessary. The proposition of biomass as a potential solution garnered mixed reactions; while some felt that it would be an ideal fit with local skills and capacity, others commented that spruce beetle killed wood was largely unsalvageable now and cited the long growth period of Yukon forests and limited government management capacity as constraints.

Top to bottom: Haines Junction and Yukon Conservation Society sessions.

Schools

In Whitehorse, the Panel met with a large group of Grade 9/10 students relatively new to energy issues and a smaller group of Grade 11/12 students with experience in renewable energy technology and a high energy "literacy".

The Panel used an interactive challenge to introduce renewable energy concepts and get the larger group thinking about what an ideal future energy mix might look like. The smaller group utilized the Panel's expertise to better understand some of the technical issues and future career opportunities related to the clean energy sector. Both sessions highlighted the importance of early education around energy, and the enthusiasm and aptitude young people show for the topic.

First Nations

First Nations organizations told the Panel that their efforts and capacity are "ramping up" in the clean energy arena, reflecting its growing importance to Canada and Yukon's Indigenous peoples. Food security, wildfires, alienation from traditional subsistence areas, drought, and invasive species – all

were cited as key concerns for Yukon First Nations people. Negative experiences from past energy projects is a barrier to participation for Elders, in particular, and the broader question of how the energy regulatory environment meshes with the Umbrella Final Agreement needs careful consideration. Limited capacity, particularly in rural areas, was acknowledged as an ongoing challenge but some First Nations are making substantive progress on the housing and energy production fronts. Youth training is an another positive development but longer-term, hands-on leadership and mentoring opportunities are needed to ensure these efforts aren't one-offs.

Environmental NGOs

Environmental organizations challenged the cultural/philosophical underpinnings of the climate crisis and a perceived attitude among some residents and leaders that the Yukon is too small to "make a difference". Biomass and wind were cited as the "low hanging fruit" of renewable energy options available to Yukon and priority areas for action. Local economic opportunities, training, and capacity building were seen as integral elements of a clean energy future. Some viewed the institutional culture within government and energy agencies as an impediment and opined that First Nation ownership and management of renewable energy infrastructure was vital to making progress. The government's carbon tax rebate was questioned, and there was a desire for stronger action from the mining industry.

Business/Consumer NGOs

The Panel heard that Yukon's strong economy is driving power demand, but "Not In My Backyard" attitudes and a lack of political will to make difficult and/or unpopular decisions has resulted in little substantive progress. Government policy promoting electric heat was felt to be an avoidable contribution to the problem. The need for combined energy-economic development solutions was stressed, with a local biomass industry seen as an obvious starting point with the potential for 120-150 direct jobs. Clean energy innovation involving key industries (i.e., transportation and mining) was also envisioned. Utilities were felt to be less suited to leading cost-effective energy conservation than government due to their "bottom-line" mandate. Consumer protection and an updated regulatory framework that reflects the cost of carbon and levels the playing field for renewables were felt to be simultaneously achievable. Tactics such as DSM and potential income-geared carbon tax rebates would require careful review from a cost-effectiveness and administrative standpoint before adoption.

Our Big "Takeaways"

During our numerous discussions, it became very evident to the Panel that Yukoners are firmly committed to a clean energy future. We found a deep and broad desire for concerted action and consensus that future energy needs should be met in a fashion that protects Yukon's abundant natural wealth. Further, we heard a desire among Yukoners, and their household, community, commercial and institutional entities, to be active partners in shaping and contributing to this clean energy future.

Public and stakeholder consultations also revealed deep frustration among Yukon residents and stakeholders with the current energy policy and planning system. There is a prevailing view that the

goal of a clean, affordable and sustainable electricity system cannot be realized through a "business as usual" approach. The Panel would describe the dimensions of this energy "disconnect" as follows:

- Genuine concern that existing regulatory, policy and fiscal tools and instruments for energy planning and engaging and empowering Yukoners, including Yukon First Nations, are insufficient to forge a robust pathway for a renewable energy future. This is not to say that the government and energy agencies lack commitment or have not made commendable efforts, but rather that the planning and implementation framework needs redesign and additional tools and resources;
- The potential fallacy trap in promoting "clean" electric baseboard heat when the power is increasingly sourced from thermal generation (rather than renewable energy) in the winter (see Appendix E for further discussion);
- Insufficient attention being given to energy efficiency, especially with regards to heating, and the potential of moderating the demand peak for electric heating during winter;
- Advocacy for energy objectives to be achieved in a holistic manner that advances social and economic development and job and enterprise creation across the territory, but particularly in smaller and remote communities;
- Frustration with the perceived lack of real progress on stated renewable projects with needs being met by "temporary" thermal generation that instead becomes long-term;
- Pent-up unease with the lack of progress on developing a new renewable energy baseload and a desire to "break the logjam" on a long list of projects lacking a clear path to implementation;
- Absence of an ongoing and collaborative process that would accommodate public inputs more meaningfully and unlock the potential and passion of Yukoners, Yukon businesses and institutions to be part of the clean energy "solution". As just one example, Yukon youth possess the skills and talent to be clean energy innovators, and are forthright in calling for real climate action; and,
- The critical need for consultation with First Nations as a pre-condition to exploring technical feasibility of renewable energy projects and leadership and collaborative inclusion with First Nations governments and entities in actually constructing new clean energy capacity.

November 18th public session in Whitehorse

OUR BEST ADVICE

After careful review and consideration of the information and perspectives gleaned from stakeholder and public meetings, briefings, and relevant documentation, the Panel has elected to present its "best advice" to the Government of Yukon in four strategic, "cross-cutting" areas. This approach attempts to reflect the intersecting and strategic policy, regulatory and technical elements at play and address issues at a higher level than is typically afforded by Yukon's regulatory electricity/energy rate framework.

In formulating these four key areas, the Panel kept numerous key intertwining policy and strategic issues "top of mind", including:

- Cost implications versus economic opportunities;
- Electricity rates versus taxation effectiveness;
- Carbon tax revenue uses;
- Territorial-federal dialogue; and
- High-level energy planning that balances the broader, long-term needs of Yukon, versus a focus on short-term necessities and a cost-oriented regulatory framework.

> *"The greatest thing in this world, is not so much where we stand, as in what direction we are moving."*
> Oliver Wendell Holmes

Our four broad areas and their respective objectives encompass the broader energy situation (i.e., electricity, heat, and transportation) and are as follows: