



Monday, March 27, 2017

To Goran Sreckovic and the Integrated Resource Planning team:

Please accept this document as the Yukon Conservation Society's comments on Yukon Energy Corporation's draft 2016 Resource Plan. Thank you for accepting it after the two weeks initially granted for review and feedback.

## **Background**

The Yukon Conservation Society (YCS) has participated in public consultations associated with Yukon Energy Corporation's 20 Year Resource Plan since the public utility developed its first in 2006. Electricity resource planning in the Yukon has come a long way since then, and we would like to acknowledge and congratulate Yukon Energy Corporation for its new approach for this 2016 update.

In the previous two resource plans, non-Yukon consultants completed much of the work. Over the years, YCS has urged Yukon Energy to move this important planning in-house. We are pleased that Yukon Energy put together an internal team to build capacity within its organization and get this done.

The process and product are better than anything we have previously participated in and seen from the public utility. YCS was happy to join other stakeholders on the Integrated Resource Planning Technical Advisory Committee. YCS attended all of the Whitehorse public meetings and some in Carcross.

Despite worthy praise for the work that went into this process and plan and efforts to improve energy literacy in the Yukon, YCS has concerns with YEC's vision for the future and its plan to meet our electricity needs over the next twenty years.

YCS reserves the right to state opinions and facts beyond this submission when the final plan is presented to the Yukon Utilities Board at YEC's General Rate Application later this year.

## **Executive Summary**

YCS is glad that "The Resource Plan is a living process and is updated every five years with the energy and peak demand forecasts scheduled for updating in 2018."

In time for the next round of forecasting, YCS hopes that Yukon Government will have updated its stale energy policy documents: Energy Strategy for Yukon and Climate Change Action Plan. Flowing from those new plans we hope will be guidance and goals for fossil fuel displacement through electrification, so that YEC can envision and plan for a future different from the scenarios.

The load forecasting in this planning exercise has resulted in a plan for new fossil fuel capacity. YCS is extremely concerned with existing and future fossil fuel capacity assets being run to meet baseload energy needs.

### **Load forecasting: industrial extraction, not electrification, driver of demand**

The first exercise in resource planning is to forecast the load to understand what the needs will be prior to planning how they can be met.

Load forecasting is an attempt to predict the future. But what happened in the past does not necessarily inform what is yet to come. Even the BC Hydro load forecasting expert that YEC invited to sit on the TAC joked about the fact that load forecasts are consistently wrong. But we do appreciate the efforts to get it right.

YCS has taken issue with load forecasting in previous resource plans because it can be used to justify a desired course of action. The load forecast in the December 2011 dated (but curiously not publicly released until August 2012) YEC Resource Plan would have more accurately been titled: The Case For LNG. From the anti-renewable bias and mostly the simplistic load forecast in that plan, LNG was concluded to be the only near term resource supply option for *energy* – not for backup *capacity* it was repackaged as the following year.

Needless to say that experience made YCS wary of load forecasting this time around.

One common area of frustration that YCS experienced and observed during this resource planning process was that the load forecasting exercise considered economic activity in the form of industrial resource extraction as the main driver of demand, but missed the bigger and more stable market opportunity.

The load forecast did not include electrification of currently fossil fueled sectors. YEC was forced to reiterate several times at several public meetings that the load forecasts did not speculate with respect to possible future government policies.

About its forecasts, the plan reads: “The potential effects of electric vehicles and the conversion of space heating to electricity has been considered in this forecast, with the results being this is a relatively small impact on future YEC electricity requirements. Future policy changes could have an effect on these outcomes.” (4-4)

The new government's election platform, and the mandate letter for the relevant Minister, suggest that increasing renewable energy and reducing fossil fuels will guide future policy. Electrification is key to achieving those goals.

Electrification of space heating would mean replacing oil or propane heating appliances with electric heating appliances. Electrification of transportation would mean replacing gas and diesel powered vehicles with plug in electric vehicles.

Electrification must be done in concert with efficiency and conservation programs, to reduce the overall energy requirements as we switch from fossil fuels and strive to have renewable energy sources meet our needs.

As well as an essential component of efforts that the Yukon makes towards reducing our greenhouse gas emissions, electrification will have co-benefits as well. These include: building resilience, strengthening energy security, and developing a local economy based on renewable energy.

The public utility's prediction of future electrification of space heating and transportation were very conservative because of the absence of any visionary policy goal setting by the previous Yukon government.

It is fair to say there is a great deal of consensus among energy stakeholders in the community that space heating represents a large market opportunity to increase renewable energy and reduce the economic leak that purchasing imported fossil fuels results in. Transportation is considered more challenging, but also presents a large market opportunity to replace imported fossil fuels with local renewable energy while meeting climate change mitigation goals.

YCS hopes that between now and the next public utility load forecasting exercise, Yukon Government will have updated its Energy Strategy and Climate Change Action Plan and directed the utility and/or Independent Power Producers (IPPs) to plan for and develop renewable energy projects to meet needs currently met by fossil fuels. It is important to send a signal that renewable energy projects are in fact needed so let's get on it.

### **LNG and Diesel are both bad. Please don't burn either for baseload energy.**

Disappointing for many Yukoners is that the load forecasting predicts that no energy projects are required under most of the scenarios – only new fossil fueled capacity projects. YEC first plans to purchase the third gas engine at the LNG facility for 2019, and then a 20 MW diesel facility in 2021.

It is curious that after the completion of the Whitehorse Diesel-Natural Gas Conversion project (LNG facility) with the addition of the third gas engine, YEC has decided to invest in diesel for capacity rather than more LNG.

“The LNG third engine is common for all base scenarios because it is the cheapest source of incremental capacity as being an addition to an existing plant. For additional capacity beyond this, diesel was preferred over LNG because of its lower levelized cost of capacity (LCOC).” (22)

YCS strongly opposed the LNG facility when it was proposed for myriad very good reasons. YCS argued that if the LNG facility was in fact a capacity project as YEC said it was, diesel would be a better option. Diesel is more stable in storage and complements the addition of renewables and efficiency/conservation efforts better than LNG. Further, environmental “benefits” of LNG compared with diesel are overblown and arguable, when methane’s potency as a greenhouse gas and the upstream activities and impacts from natural gas production are considered.

This plan does not diminish YCS’s long-standing fear that the LNG facility will be operated as a baseload energy project. The “optimized supply” discussed in 6-10 suggests that alternative supply arrangements for LNG (a Ferus LNG plant in Fort Nelson) will result in a significant drop in cost. Again, if LNG is backup, by definition it is rarely fired up, and the alternative supply should not result in a *material* fuel cost decrease – unless the public utility is burning a lot of it.

There is a problematic conclusion of the evaluation of the technical and financial attributes in this plan – that four of the five load forecast scenarios, “YEC is expected to have sufficient firm energy without introducing new resources, as long as it is acceptable to run YEC’s existing thermal resources.” (8-53)

Of course, it is completely unacceptable for YEC to run its existing thermal resources for energy. The draft plan goes on to say: “Despite of the fact that there is sufficient firm energy for those scenarios, new renewable resources that are cheaper to operate than thermal resources are proposed to provide lower cost energy when needed.” (8-53)

What is the financial benchmark to be considered lower cost energy than thermal? Displaced LNG fuel costs from the predicted optimized supply? Again, one of the reasons YCS opposed the LNG facility was that YCS did not want this \$50+ million dollar investment in a new, controversial, fracking-requiring and climate-destabilizing fossil fuel to be a barrier to the development of renewable energy.

Later in the plan it is repeated that thermal assets – both LNG and diesel – would have to be relied upon to meet forecasted energy requirements, which would in turn lead YEC to incur material fuel costs. YCS argues the costs are more than financial.

YCS does not want YEC to burn LNG/natural gas or diesel for the Yukon’s energy needs. It is not acceptable that capacity assets be used for baseload energy. YCS recognizes the capacity shortfall and that there are requirements to ensure we are covered in an N-1 event. YCS accepts that this requirement will in part be met with fossil fuels.

But if the Yukon must consider such vast investments in backup thermal assets, let YEC also plan to ensure these assets can fulfill a secondary role in increasing the allowances for intermittent renewable integration on the grid. If a limitation for adding renewable energy is that it needs equivalent backup, can a 20 MW diesel plant enable the development of a 20 MW wind project?

As for peak demand dictating our fossil fuel capacity requirements, YCS would also like to point out our longstanding and ongoing support for “capacity DSM” (which YCS refers to as “load management”) to reduce the ever growing peak demands on our system.

YCS hopes that together, through smart load management programs, YEC and YG can achieve peak reductions to reduce the Yukon’s need to utilize fossil fuel backup for peaking.

### **Demand Side Management (DSM) shift to Capacity DSM or Load Management**

YEC’s load forecasting shows an existing capacity shortfall growing into the future. This is why fossil fuel capacity projects are proposed.

When YEC proposed the LNG facility to meet peak capacity requirements, YCS argued that YEC should be working to reduce peaks and thereby capacity requirements. YCS also made that case previously in our comments on ATCO Electric Yukon (at that time Yukon Electrical Company Limited, YECL) and YEC’s Demand Side Management Plan during our intervention in YECL GRA during which the utilities’ DSM plan was submitted.

At that time, YCS was told that any DSM measure would have incidental peak reductions because the actions would reduce overall energy consumption. However, as has been experienced this winter, despite any incidental peak reductions resulting from DSM programs, the Yukon’s capacity demands continue to increase.

Demand Side Management appears in the Short Term Action Plan regardless of whatever load scenario materializes. YCS asks again for the utility(ies) to focus on Capacity DSM or Load Management.

One example that would fit within a capacity DSM/load management framework would be a wind project connected to utility-controlled Electric Thermal Storage (ETS) heating devices in homes. The heaters would charge when wind energy is available, and would distribute heat when needed without necessarily simultaneously drawing from the grid.

The heating load from electric baseboards adds to peak demand, whereas electric heat from ETS does not. Wind-ETS has other benefits aside from peak reduction: grid optimization and full utilization of an intermittent renewable energy source,

and fossil fuel displacement in homes and on the grid, and all the economic and environmental benefits that flow from that.

YCS hopes that the Yukon government and utilities can work together with other partners such as First Nation Development Corporations, to emulate how Wind-ETS works well elsewhere and capitalize on the Yukon's ample winter wind resources to heat indoor spaces when energy demands are highest.

YCS will support any coordinated efforts between the utility, government and other stakeholders to invest in and implement technologies or strategies that shift demand from times of peak use to off-peak times and reduce fossil fuel use.

This capacity DSM or load management should be a focus for the new government that has explicitly stated that its energy goals are to:

1. Increase renewables
2. Reduce fossil fuels and
3. Reduce energy use.

Capacity DSM/load management should be jointly designed and implemented with the utilities and government, and be funded by the latter. The Yukon Utilities Board does not currently take an approach to understand or appreciate the importance and value of these kinds of investments, so asking it to approve capacity DSM may be risky and a wasted effort. These should be public infrastructure investments that are part of climate change mitigation and economic development strategies.

Another example of capacity DSM that in the early 2000s was predicted to reduce capacity demand by 2 MW is hot water heater timers. This is a simple, non-utility-controlled solution that defers the reheating of water in tanks until off peak times. The Penguin Hot Water Tank Timers can be over-ridden by consumers if they need peak hot water recharging, but for the most part consumers do not need hot water immediately after they have used what is in their tanks. Other jurisdictions have utility controlled water heaters that achieve similar outcomes to the timers but like Wind-ETS systems, can be charged when renewable energy is available, not just during pre-determined off-peak times.

### **Mayo Lake and Southern Lakes Enhanced Storage Concepts**

The Resource Plan suggests that both these enhanced storage projects requiring water license and management regime changes will be approved and implemented. YCS intends to participate in formal assessments of these projects, as with all projects proposed in this plan.

Yukon Energy states that: "The [Mayo Lake Enhanced Storage] project also includes a detailed monitoring and adaptive management plan that was co-developed, and would be implemented, with the First Nation of Na-Cho Nyak Dun." (5-20)

That is good, considering the significant negative environmental impacts that the increased drawdown is anticipated to cause. Local indigenous participation and knowledge will be integral to establishing thresholds, and YCS is grateful that First Nation of Na-Cho Nyak Dun will be on the land to monitor effects if the Mayo Lake Enhanced Storage Concept goes ahead.

Does the Southern Lakes Enhanced Storage Concept include that level of involvement in monitoring and adaptive management planning as well? YCS suspects that local and indigenous people – who are more familiar with the Southern Lakes system than consultants and proponents who conclude that no significant effects are predicted – have a different perspective and more concerns.

YCS appreciates the firm winter energy that increased water storage would provide for the Yukon Power System (YPS), but has yet to conclude whether the global benefits justify the local impacts of these projects. YCS would like to see YEC consider the existing effects of the water management regime and the Whitehorse Rapids hydroelectric facility operation on the lakes, shore and wetlands.

### **Space heating projections not ambitious**

YCS mentioned the Wind-ETS renewable energy solution for space heating, and electric baseboards, furnaces, and heat pumps are also great technologies that reduce carbon monoxide poisoning risk, fossil fuel tank leaks and flammability risk, and provide a market for local renewable electrons instead of imported fossil fuels.

During and since the election, YCS has seen an increased focus on increasing renewable energy, reducing fossil fuels, and reducing overall energy consumption. Space heating is the Yukon's second most greenhouse gas intensive sector after transportation. YCS is hopeful that the new government will spend \$30million/year (from the Yukon Liberal Party election platform and Premier Silver's mandate letter to Minister Pillai) on energy efficiency wisely to help buildings waste and need less energy for heating.

YCS is hopeful that a target for reduced fossil fuel consumption for space heating will be set within the next two years.

Meeting the heating load with renewable energy (from sustainably harvested local biomass, imported pellets, to local solar, wind, and small hydro) will provide economic development opportunities for IPPs or a new project for YEC.

It is unfortunate that Yukon Energy did not have direction to undertake planning with the intention of meeting the space heating market in mind. The 10% of households with existing fossil fuel heating that would change to electricity represented 4 MW, so presumably 100% would represent 40 MW (minus reductions from efficiency upgrades and biomass).

## **Electric Vehicles Study also uninspiring**

Many Yukoners were disappointed that the Electric Vehicle (EV) report forecast such pessimistic rates of uptake. YCS felt that *disincentive* programs would need to be in place for even the report's predicted high scenario to be realized.

From the study, YEC concluded that: "EVs are not expected to have a significant impact on the Yukon Power System." (4-25)

YEC does concede that: "If a significant breakthrough in EV technology occurs with respect to the cold weather performance of batteries, or the driving range of EVs or the price of EVs drops to a point that they are within reach of the average customer, the adoption rates could be significantly higher." (4-25)

It is worth noting that there are and have been a number of electric cars currently operating successfully in the Yukon year round for several years now. So, winter limitations are not the barriers that they are assumed to be in this study.

Another distinct possibility that would increase adoption rates would be incentive and rebate programs to influence peoples' consumer choices when buying a new vehicle. As transportation is the Yukon's highest fossil fuel intensive sector, and renewable energy in the form of solar and hydro is plentiful in the summer, it seems like a perfect and obvious fit to encourage the adoption of electric vehicles to replace imported fossil fuels with local renewable energy sources.

Time of use rate structures could also encourage people to power their transportation with electricity rather than fossil fuels and ensure that the EV load doesn't compete with other peak demands.

Aside from the huge market for electricity that EVs offer, EVs will likely have another significant impact on the Yukon Power System: distributed storage with thousands of batteries around the grid.

YCS hopes that in partnership with Yukon Government, Yukon Energy will commit to grid impact studies to identify ways that will maximize the accommodation of renewable projects to meet our energy needs, that include the benefit that distributed storage afforded by EVs can provide.

## **Solar and Wind, and how much intermittent renewable can the grid integrate**

Solar doesn't factor prominently in the resource plan. However, YEC does identify a key finding that "solar irradiance in the Yukon is quite high in the late winter and spring months when hydro generation is at its lowest." (5-61)

YEC states that hydro's mismatch of supply and demand is a constraint. As an intermittent renewable resource, solar has constraints too. But when looking to



build a strong and diverse portfolio, solar will play an important role in the Yukon to meet our energy needs.

YEC said: "Creating diversity in intermittent generation adds some degree of firmness." (2-50) YCS agrees and would like to see more effort in putting this into action.

YCS is disappointed that wind only appears as a viable option in the high industrial scenario. The environmental and socio-economic disaster that would be the Casino mine actually materializing surely is not the only feasible way that the Yukon can take advantage of our vast wind potential. YCS does not accept the Casino mine, nor the idea that we need it to drive economic growth in order to utilize wind power in the Yukon.

The high industrial scenario is the only one that includes new renewable generation (above the Standing Offer Program (SOP)) with wind and small hydro. YCS would like to see how that high industrial scenario would compare with an ambitious electrification scenario – what signals would be sent to renewable energy developers. YCS looks forward to seeing that in the updated load forecast in 2018.

In the public input chart why a 10 MW wind project was contemplated rather than a 20 MW wind project, YEC said that 10 MW could be integrated to the system.

Later in the document when explaining its System Optimizer Model, YEC states that 20 MW is the intermittent limit on our system. (8-11) Presumably, the SOP and a wind project would constitute that intermittent allowance.

Is 20 MW an intermittent cap? How was this arrived at? We need to understand the thinking behind this, and influence thinking on how we can increase any limit placed on the allowance of intermittent renewables on the YPS.

YCS would like to see a robust grid impact study to see how much intermittent renewable energy the Yukon can safely and reliably integrate. Maximizing the addition of renewable energy to the grid, through diverse and distributed generation and storage, should be the goal of government and both utilities.

Can the planned capacity projects serve double duty as enablers to allow for more wind and solar on a diverse grid?

Page 2-6 of the draft plan reads: "The nature of the Yukon grid places a cap on the absolute amount of installed capacity of intermittent resources that can be integrated without incurring additional backup (storage) costs."

When can the Yukon's existing and proposed new capacity resources be counted as backup for intermittent power sources?

## **Independent Power Production policy, Standing Offer Program**

Presumably, the only solar being added to the grid (outside the Microgen program that YEC says it accounts for in the load forecast) is the 10GWh/yr from the Standing Offer Program (SOP). It's not a given that this would be all solar, as those electrons could be from any kind of renewable energy project.

If YEC and ATCO Electric Yukon are in fact “actively working with the government to structure the Standing Offer Program (SOP), which is a key element of the IPP (Independent Power Production) Policy,” as it says in this plan on page 1-7, why does the SOP's 10GWh/yr only appear in distant 2022?

IPP regulations and rate structures were meant to be finalized by the utilities and Government in October 2016. If the election contributed to that process stalling, surely things can get back on track promptly – especially considering the mandate letter from the Premier to the Minister of Energy, Mines and Resources, Economic Development, Yukon Energy Corporation and Yukon Development Corporation, stating that the focus is to increase renewable energy solutions and reduce fossil fuel use, with a specific goal to provide stable pricing mechanisms for renewable energy projects.

YCS hopes the new government will reconvene the parties with new stringent timelines to get the work done to structure the IPP SOP.

As micro-generation clients know, solar PV is providing usable energy for the YPS now. Solar will benefit the Yukon's grid and off-grid communities by displacing fossil fuels in electricity generation, so we encourage utilities and government to not stand in the way of solar PV development.

## **Conclusion**

YCS is pleased that new leadership provided challenging opportunities for YEC staff to design and deliver this process and create this plan. YCS prefers this approach to what our public utility did in the past: outsourcing planning to expensive outside consultants with very little public involvement or buy in.

This process brought the public and stakeholders along the timeline of an unfolding story providing building blocks of learning that many people appreciated.

Even so, many people are disappointed with the outcome. People feel like our public utility has continued to turn its back on renewable energy despite pledges to the contrary. Granted, a policy void, load forecasting and system optimization models are the reason for discouraging results. We appreciate this is a living document and that load and peak demand forecasting will be done to incorporate new information and policies starting in 2018.

This is the first time that YCS has formally engaged with YEC since the construction of the LNG facility after a long effort opposing it. It is hard not to feel that YCS's fears about the LNG facility being normalized as an energy project are being realized.

It stings to have the public utility now provide evidence about capacity cost comparisons between LNG and diesel that supports YCS's arguments for diesel rather than LNG for backup, when this was disputed by YEC to the YUB.

YCS hopes that the LNG facility can someday be repurposed and transform into a useful hydrogen storage facility to further increase the grid's ability to integrate renewables. We watch with great anticipation technology developments in hydrogen that can utilize the LNG facility for direct renewable energy storage.

YCS hopes that the new government will show that it is serious in meeting its three overarching energy goals of increasing renewable energy, reducing fossil fuels and reducing energy use.

The plan states that YEC's core business and strategy goal is to minimize the use of nonrenewable sources due to their higher variable costs and environmental impacts. The results of the values survey YEC conducted as part of this process prove the public supports this goal.

YCS looks forward to future work where we can find more ways to minimize the use of non-renewables, because a sustainable future depends on it.

### **Questions and comments:**

1. What is the "winter load schedule" at Eagle Gold that "reduces the winter peak contribution from this project" (4-47)?
2. InterGroup, authors of former YEC resource plans, tasked with environmental and socio-economic attributes for this resource plan, included the Gladstone Diversion in Chapter 8. Is this project still on the table? Or was InterGroup not aware that YEC has committed to a respectful relationship with Champagne and Aishihik First Nations, and that CAFN signed a motion against Gladstone diversion?
3. Why isn't the report on the Whitehorse Rapids hydroelectric uprates in the public domain? The Aishihik uprate report is online. The Whitehorse Rapids dam is decades older than the Aishihik dam, so why would YEC conclude that a 4% increase in efficiency be estimated for both? Replacing or refurbishing turbines at the Whitehorse Dam has long been discussed by the public. What did Hatch, who did the study on Whitehorse uprates, conclude?
4. Were the water management constraints at Mayo Hydro and Mayo B understood prior to the proposal and construction of Mayo B? It seems that the net loss of

installed capacity for Mayo Hydro would be 2.7 MW rather than 0.2 MW. Mayo B's net gain to the system has been consistently overstated if this is the case.

5. What is the reason for the cost for the third LNG engine to be \$5.8million when it was originally quoted at \$4.4million?

6. Why in the system optimizer model did YEC only model two portfolios – one being “renewables only”. It is confusing not to anticipate policy about electric car or heat incentives influencing load forecasting, but then explicitly state on 8-10 to choose the renewables portfolio, “to account for potential future government policy mandating the development of only renewable future resource options.”

7. Why are portfolio summaries against load scenarios are at average water when earlier in the process it was low water?

8. 8.8% line loss seems significant. What can be done to reduce this?

9. In “existing resources” YEC's generating capacity includes ATCO diesels on the YPS. Why did YEC not include YG's? It may be an idea to communicate with YG to determine how much backup capacity it has. It is prudent to limit reliance on external assets, but it may be complementary for YG and YEC to have awareness of backup generation – even if it is to shut down YG and have them self generate during an outage and restoration.

10. In Table 2, Portfolios for Five Major Industrial Scenarios on page 24, for Very Low 2025 it reads: “Aishihik re-running”. Is that the same as the “Aishihik uprate” that appears in the remaining four scenarios?

11. The Geothermal section has a confusing statement about Selkirk First Nation and its interest in Ddhaw Ghro. “The site is located within the Ddhaw Ghro Habitat Protection area, an area that has significance to the local first nation and which is designated for mineral exploration development by Selkirk First Nation.” (5-55) There is an Order in Council (2011-131) to remove Ddhaw Ghro from staking.

If you have any questions, please contact the undersigned.



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