

# 2016 Resource Plan

## Technical Advisory Committee

### 5 August 2016

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#### Attendees

- Erin Light – Yukon Government, Water Resources
- Anne Middler – Yukon Conservation Society
- Juergen Korn – Yukon Housing Corp.
- John Williams – ATCO
- David Ince – Advisor
- Luke DeCoste – Yukon Development Corp.
- John Maissan – Independent
- Carson Andrews – Chamber of Mines
- Peter Turner – Chamber of Commerce
- Shane Andre – Yukon Government, Energy Branch

#### Environmental, Social and Economic Attributes Methodology

- Is the relative flooding in comparison to other projects in the Yukon or Canada? The relative flooding is in relation to the size of the waterbody before any flooding.
- How would you treat a resource that uses a piece of land than cannot be used for anything else (ex. A large array of solar panels) but is not a linear disturbance. Would it still be considered “lost”?
  - For large areas such as a large solar array, the area of land would be deemed lost.
- How does solar and wind rate for dependable capacity? Dependable capacity of wind and solar is considered 0.
- How does the energy availability of the resources fit with the energy requirements on a seasonal basis? The resources are presented under full utilization and the next step will be to match the load requirements with what the various resource options are able to generate in the portfolio analysis.
- When referencing ice related processes, are you referring to air as well as land?
  - Ice related processes are included in Ec2-4 and pertain to air. The permafrost attribute deals with land issues.
- What are the options for decommissioning or moving some of the resource options if the load changes?

- None of the resource options we are studying are easily decommissioned or moved. The implied assumption is that once a resource option is built, it remains until it reaches end of life.
- Has YEC considered assigning weights to the various attributes for comparison or modelling? We have not assigned weights but could use the results of the values survey to help guide that process if needed. This is a very complex part of utility planning as there is little agreement on what is more important. Anything that can be monetized can be more easily considered. After that it is a discussion of tradeoffs with other attributes.
- Can the economic model used look at the spillover effects from the choice of one resource over another?
  - The CAPEX model would consider the energy spillover resulting from the choice of one resource option over another.
- How do these attributes consider changes to evaporative losses and groundwater impacts?
  - Effects to groundwater and evaporative losses were not assessed.
- How are you considering other projects from IPPs? The microgeneration program is taken into account in the load forecast. IPPs will be considered as part of the portfolio analysis. As per the IPP policy, 10% of the gap between the current generation and future needs will be filled by IPPs.
- Why is nuclear power not considered? The Energy Strategy for the Yukon states that we will not consider nuclear at this time. It would only come back on the table with after extensive public consultation. Also, there are no nuclear plants that are small enough for our needs.
- Comment that nothing in the attributes methodology jumps out as a problem.

## Life Cycle Analysis of Greenhouse Gas Emissions from Resource Options

- Why were downstream emissions not considered? Contributions less than 1% were not carried forward in the analysis.
- How does biogenic CO<sub>2</sub> emissions calculations consider the emissions from degrading wood waste? The biomass used for the Biomass project and Waste to Energy (that included Biomass) is derived from waste products such as logging residues, sawmill waste and standing dead trees. Because of this these options are considered carbon neutral. The small hydro and pumped storage options do take into account the CO<sub>2</sub> release from the inundation and decomposition of trees. Biomass decomposition is a slow process that lasts several years during which forest may be re-grown in other parts of the territories and recapture CO<sub>2</sub> from the atmosphere.
- How is the offsetting of landfill methane emissions considered in the analysis of Waste-to-energy? It is not included in the analysis. David Ince will send a study completed at BC Hydro.
- Does the upstream emissions include fuel extraction activities? Yes.
- Does the study consider the fuel source used in the manufacturing of parts? Yes. Also the sensitivity analysis will show the difference in choosing material from different locations such as wind turbine parts manufactured in Germany using renewable power in comparison to China using coal power.

- A biomass plant would most likely have a targeted harvest? The plant in the study is very small and would only use waste from existing harvesting. No additional harvesting would be required.
- Would there be a carbon credit for the heating fuel displaced for heat and power combo resources like biomass? No there is not.

## Resource Options

### DSM

- Comment that DSM is not all about conservation. It can be about increasing demand at times that we have more energy available and decreasing demand when we do not have energy available.
- How does the inCharge performance compare to the projected upper and lower achievable potential forecast in 2011? The design of the programs are slightly different than the measures shown in the CPR, but are roughly between the upper and lower achievable potential.

### Biogas

- How do these prices compare to our current electricity rate? The current electricity rate is around \$0.14/kWh

### Biomass

- If a biomass plant was run by an IPP, they could sell the heat and only run the plant when the heat and power were required.
- An IPP would need to find a heat load they would need to meet, it could be a very large amount of heat.

### Waste-to-Energy

- Are the fuel (waste) numbers post diversion? Yes, these are after the diversion targets set by the City.
- Can you store waste in the summer to use in the winter and what would that monthly distribution look like? The waste would continue to decompose and lose energy. Emissions would be released into the atmosphere if stored. These systems try and use the waste as soon as it arrives to site instead of storing it to gain optimum efficiency. Also space is required to store this material. This scenario was not researched in great detail due to these factors.

### Geothermal

- Is the 3% loss a year the same for all wells? This is a rule of thumb and may vary at different locations
- Is this just simple drilling of a straight well or is there fracking involved? You do need to have a productive well, so in the cast that the well is not productive, fractures may be created.
- Are these confirmed sites? We have done a lot of work on this resource and this is the best we know. Drilling a test well is extremely expensive as the well would need to be kilometers long and this has not been done.

- Did you include the new NRCan data on geothermal? Yes and we also shared a lot of Yukon Energy's information with them.

## Wind

- Why are the capital costs of the projects not shown? The Levelized Cost of Energy (LCOE) is used to illustrate the cost of the project.
- Are the effects of rime icing taken into consideration with the generation numbers? Yes
- Is there any difference between the wind regimes geographically, for example north to south? John Maissan – no variation geographically, more effected by elevation.
- Is there any difference between the wind regimes and temperature? Alberta gets high chinook winds and warm temperatures and then cold temperatures and no wind, which is the opposite of the load. John Maissan – this does not happen to a great extent in the Yukon. Will pass data on this to the TAC.

## Solar

- The generation is very dependent on the angle of the panels.
- Cadmium Tellurite panels could be controversial because of the hazardous waste it could produce.

## Small Hydro and

- Why were sites that were very far from existing transmission corridors get screened in?
  - The assessment assumed a project boundary at the point of interconnection. In areas not served by existing transmission lines, the point of interconnection was assumed to be a planned transmission line. Part of the screening included an assessment

## Pumped Storage

- Is pumped storage actually expensive? Yes, the capital costs are quite high.
- Are these numbers net of the energy requirements for pumping? Yes

## Storage

- No questions

## Transmission

- Are the transmission numbers going to be combined with the resource options that require transmission to connect to the grid? Yes

## Thermal – LNG and Diesel

- No questions

## Mayo Hydro Enhancement

- One of the units was refurbished recently. Is there other equipment that would need to be replaced? Yes.
- Why is the life 40 years instead of 65 years like the other hydro projects? There are other parts that will wear out in 40 years.

- Does your agreement with the First Nations allow for refurbishment?
  - The project agreement between the First Nation of Na-Cho Nyak Dun and YEC only dealt with Mayo B related activities.
- It is very interesting to see there is so much of an improvement in the gains from refurbishments from even a few years ago.
- These projects seem like no brainers and should be strongly considered.
- Should these energy numbers be presented as incremental?
  - No, the existing plant is end of life. The alternative to the project is decommissioning, thus decreasing the power benefit to zero.

### Southern Lakes Enhanced Storage

- Capacity numbers should be included to show how this project can help meet the winter peak.

### Mayo Lake Enhanced Storage

- Why is the life of the water license used and not the life of the hydro unit? This seems inconsistent with other resources.
  - The Mayo Lake Enhancement project is not a change to the power plant but rather a modification of the water license. For this reason, YEC decided to link the life of the project to the duration of a water license
- The additional winter capacity of these enhancements should be included.

### Resource Option Summary Charts

- How do you value energy vs capacity? We need to meet both. We will use an optimization model for capacity expansion that will consider costs and then factor the environmental, social and economic attributes.
- Are you looking at the base case or including a few of the scenarios as well? We are going to model all of the scenarios both with and without a cost of carbon. We will then look at all the results and try and find the commonalities.

### Energy Values Survey

- Question regarding using LNG as future back-up fuel may have been responded to assuming there is no new assets required and just referred to the generators already installed. YBS will look if there were any comments recorded for this question.
- The high refusal rate on the LNG back-up question is very telling that the issue is politically charged and the public doesn't have the information they need to make a decision.
- People's willingness to pay a few more cents per kWh as compared to paying thousands of dollars out of pocket for their own investment may not be a contradiction, but a result of the scale and timing of that spending.
- Seeing a lot of people considering electric when their furnaces need replacement, but many are going with propane instead of oil or electric.
- Suppliers survey conducted each year shows that furnace suppliers are still doing a lot of business replacing oil and propane furnaces.

## Next Steps

- We will not be doing any further public engagement work until after the election is over.
- Our next meeting will be in September or October and will cover the Load Resource Balance, the results of the GHG life cycle analysis and the results of the environmental, social and economic attributes.
- The following meeting will cover the portfolio analysis.