

2016 Resource Plan

Technical Advisory Committee

13 January 2017

Attendees

- Anne Middler – Yukon Conservation Society
- David Ince - Advisor
- Bryar Young - YDC
- Shane Andre – Yukon Government, Energy Branch
- Matthew Ooms – Yukon Government, Energy Branch
- Juergen Korn – Yukon Housing
- John Maissan - Independent

Discussion

- Does the record peak just recorded effect the load forecasting or big picture? YEC forecasted that peak in the load forecast.
- Noting that there will be a presentation on micro-generation. Looking at projected growth of the program. Invitations will be sent out by Yukon government's Energy Branch shortly.
- In terms of the micro-gen program, is it factored into the load forecast as a reduction in demand? Yes.

Portfolio Analysis

- Is there any need for government to adapt different planning criteria? The government is not involved in developing this planning criteria. This is technical.
- How does surplus hydro show on the graphs included in the portfolio analysis material? YEC has surplus energy at the current load level. This graph assumes a higher load case which eliminates the surplus.
- Need to think about how the energy gap is communicated, particularly when communicating with potential IPPs. The firm graph shows YEC needs to meet energy requirements with thermal. Need to ensure the public understands that under average water conditions, thermal is not used.
- What is the discount factor used for the total cost? 5.45%
- Do you have an estimate for the rate increases that would be needed to implement the projects proposed in the action plan? No, not at this time. That would come in a later step.
- IPPs are committed for all scenarios – assumed they would provide intermittent power (wind, solar) so did not give any capacity credits to IPPs.

- Do the DSM programs include capacity? Not at the moment. The ones in the model are updated from the Conservation Potential Review, have coincident peak reduction factors which is what you see as the peak reduction. There might be options for capacity programs but you have to investigate? Capacity DSM is risky; curtailment is most reliable. We excluded industrial loads from the scenarios, which is a form of curtailment. In addition, we are going to explore capacity targeted DSM, but did not in this analysis as it is fairly risky and we do not have enough experience to count on it. We have to come up with a balanced portfolio.
- Why is capacity DSM risky? People may go off the program and we do not know what the uptake would be. The only dependable capacity is we can count on is what YEC can control. Not sure if people be willing to allow YEC to do that.
- Should consider SCADA control of Yukon government diesel backup systems? There are secondary systems in several institutions.
- Capacity based DSM should look at institutions instead of individual homes. Economics are not good. But industrial and institutional customers will need conditions on turning off power.
- There could be some emergency measures for N-1 when Aishihik goes down that do not cost \$200M. As an example the base load for the Yukon government's Main Administration Building is very high and could potentially be curtailable. Note that the back-up generation in facilities are not set up to run parallel to grid.
- Can you explain the financial numbers in the portfolio analysis? We summed all capital expenditures and used it in the optimization model, which aims at minimizing the total over the 20 year planning period and is then discounted back to 2017 dollars.
- The capital cost assumes that everything is built right now. This could be misleading and causes a sticker shock number.
- For the Mayo Hydro Refurbishment project, I thought it was being retired? Mayo Hydro is oldest hydro plant in territory, a lot of investment is required. We assume in the load resource balance that the plant would be retired. Refurbishing Mayo Hydro, instead of retiring it, is a resource option that was considered in the portfolio analysis.
- For the capital cost over the life of project, has there been a comparison of how you lock in rates today compared to the long term? Are you looking at rates for energy purchase over long term? What would be the rate impact? Haven't calculated the rate impact on our revenue requirements. This would be done in a later stage of the planning process
- Have you done Levelized Cost of Energy (LCOE) calculations? LCOE is used by optimization model.
- I did some back of napkin calculations for medium load cases and renewable is 60% more expensive. Let's assume the rate increase would be 3% per year for balanced and 5% for renewable. 3% includes the ratio between new and old.
- What is the implication of getting a lump sum contribution in today's dollars? That would be a much greater impact in getting the money now instead of in the future.
- For geothermal – the recent letter to the Ministers indicated no fracking. Would geothermal require fracking? If the fault system that is supplying the well with water is not working fracking might be needed, but you never know if it is required. Not sure about this from a policy standpoint. I don't think anyone has asked that question. In some cases fracking is needed.

- Where is the geothermal project proposed? MacArthur Springs and Vista Mountain (near the Takhini substation) are the top two choices.
- In the three scenarios with only new renewable energy projects, when a diesel unit is retired it would not be replaced? Correct. Not even replacing retiring diesels.
- Do you pay a penalty if you don't have capacity criteria? There is a cost that is included in optimization model. Don't actually pay a cost, this is just part of the model at a fictitious \$5000 per KW year. In some cases it is worth taking the risk to have a gap if you could curtail something.
- How does the penalty work? The cost forces the model to pick the best option.
- It's the most renewable portfolio I have ever seen in working in this field for many years.
- When Faro mine was running we were generating 90 GWh diesel, way higher in non-renewable during that period.
- Look at ratio of cost of diesel vs LNG. From capital cost standpoint, diesel is picked up before LNG. If energy costs were equal, then would be a toss-up as to what would be picked. Also have to account for cost of carbon. Overall the GHG life cycle analysis is close between the two. Even with cheap natural gas, diesel is preferred because these portfolios do not burn a lot of fossil fuels.

Portfolio Attributes Analysis

- In terms of economic benefits, there are some people who feel any economic development is bad. Red ranking for economic development is from the perspective of someone who would like to see some economic development.
- For biomass, that resource option has the greatest potential for economic opportunity.
- Community wellbeing for Aishihik Hydro refurbishment and Whitehorse Hydro uprate, why would it not be good? Hard to see it as red. Why is community wellbeing negatively affected at all? In community wellbeing there are potential two negative attributes. Public safety and the impact on infrastructure as well as the opportunity for community growth. If there are fewer benefits it would come through as negative. There are little opportunities for local work on the uprating projects.
- Different interpretations of what community wellbeing means. Not having a divisive project would be a good thing for community wellbeing.
- As an example, for the LNG third engine, workers from outside would be coming to Whitehorse but would not have a negative impact on infrastructure. But smaller centers, having workers coming in could have an impact. In Mayo for example. There are 30+ metrics and this is a roll-up of the results for all the metrics.
- Were the results of the value survey incorporated into the ranking of resource options for the portfolio analysis? The options were not ranked by any attributes except the technical and financial in the portfolio analysis. This analysis was done after the portfolio analysis model.
- Is there something here that tells us we should substitute options? We looked at things beyond the economics. The model gave us good results that we don't think we have to do any substitute.
- I have never seen a utility go beyond adding a cost to anything except of carbon because it becomes so subjective. Too much judgement is required and there is little agreement.

- Social cost of carbon in analysis is higher than what the current government is proposing. Yes, this was the best information we had at the time the work was completed.
- Interested in looking at diesel backups and not freaked out by this or using thermal for new capacity
- People see refurbishment as not being as negative as building a greenfield plant.

Action Plan

- Doesn't this suggest that the action plan should start on small hydro now? Yes.

Key findings

- We only get wind and solar if we get a large mine like Casino? Wind and solar would come on as an IPP soon because of the standing offer program. IPP target is 10% of new energy demand or 10GWh/year.
- Even though government policy say need to meet gap by IPP might be more than 10% in the end. That was in addition to all our options.

Wrap-up

If you have any time to email us with respect to how the process works to help us make the TAC better next time.

Are all studies are they going to be public on the website? Nearly finalized and they will be uploaded soon. Everything will also be made public when the report comes out.

Meeting adjourned: 12:25pm