June CMD WG Sessions – Day 3 Session Summary

Date: 6/14/2018 **Time:** 9:00 AM - 3:00 PM

Location: Telus Convention Center **Attendees :** DCWG

Time	Agenda Item	Presenter
9:00 – 9:15	1.0 Welcome, Introductions and Housekeeping	Jordan
9:15 – 10:30	2.0 CONE ○ Draft bottom-up engineering cost estimates ○ Including ATWACC ○ Annual process to update Gross CONE ○ Process to select reference technology ○ EA&S Offset calculation methodology	Adam / Dave
10:30 – 10:45	Break	
10:45 – 11:30	2.0 CONE (Continued)	Adam / Dave
11:30 – 12:00	3.0 Resource Adequacy Modeling ○ Cogeneration modeling approach ○ Further result validation ○ Procurement volume calculation	Steven
12:00 – 12:30	Lunch	
12:30 – 1:30	3.0 Resource Adequacy Modeling (Continued)	Steven
1:30 – 2:55	4.0 Demand Curve ○ Simulation analysis – shock validation ○ Proposed demand curve ○ Next steps	Nicole / Adam / Brattle
2:55 – 3:00	Session Close Out	Jordan

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(#)	Name	Company	Attendance Status (A) Attended / (R) Regrets
1.	Nicole Leblanc	AESO	A
2.	Kevin Dawson	AESO	A
3.	Colette Chekerda	Alberta Direct Connect	A
4.	Surendra Singh	Alberta Newsprint Company	A
5.	Hao Liu	AltaLink Management Ltd.	A
6.	Kurtis Glasier	ATCO	A
7.	Ricardo Rangel Ruiz	Capital Power	A
8.	Edmond de Palezieux	Depal Consulting	A
9.	Kelly Cantwell	Emera Inc.	R
10.	Molly Jerrard	EnerNOC	A
11.	Chris Joy	ENMAX	A
12.	Derek Skeet	Husky Oil Operations Limited	A
13.	Vittoria Bellissimo	IPCAA	A – Richard Penn (Proxy)
14.	Guido Bachmann	Kineticor Resources Corp	A
15.	Todd Cole	MEG Energy	A
16.	Dan Chapman	NRStor	R
17.	Doug Simpson	Office of the Utilities Consumer Advocate	A
18.	Kris Aksomitis	Power Advisory	A
19.	Danny O'Hearn	PowerEx Corp	A
20.	Leonard Olien	Solas Energy Consulting	A
21.	Akira Yamamoto	TransAlta Corporation	A
22.	Lars Linder	TransCanada Energy Ltd.	A
23.	Tory Whiteside	URICA Energy Management	A
24.	Jordan Ludwig	Stack'd Consulting	A
25.	Dustin Anderson	Stack'd Consulting	A
26.	Maria Gray	AESO – Observer	A
27.	Adam Gaffney	AESO – Presenter	A
28.	Steven Everett	AESO – Presenter	A
29.	David Johnson	AESO – Presenter	A
30.	Hannes Pfeifenberger	The Brattle Group – Presenter	A – Phone
31.	Michael Tolleth	The Brattle Group – Presenter	A – Phone
32.	Kathleen Spees	The Brattle Group – Presenter	A
33.	Martha Caulkins	The Brattle Group – Presenter	A
34.	Patrick Daou	Sargent and Lundy – Presenter	A

Meeting Minutes

Discussion Topic: CONE

Overall WG members believe that the cost estimates are in line for the AERO reference technology but question the validity of the other Frame CT and CC units

- **CC unit costs seem very low given the comparable project completed in Alberta**
- **CC unit should consider the risk of water rights**
- **Applicability of Frame unit is questioned as a reference technology given environmental requirements, availability performance assessment**

- **AESO Design Clarification:**
  - Net CONE
    - Net CONE establishes prices points on the demand curve
      - Net CONE will not determine the market clearing price of capacity
    - LM6000PF Sprint
      - One reason for this being chosen was based on discussions with GE that several developers in Alberta are considering this technology for future projects
    - Cost of Capital
      - Dr. Villadsen has been a subject matter that provided quality assurance and guidance on the proposed approach for the project, but did not conduct or influence the analysis
      - Use a forecasted exchange rate – do not adjust over the life of the project as part of the estimate for CONE; result should be symmetrical as the risk is bi-directional
    - Frame was assumed only as a peaking unit based on environmental regulations (which implies that it will only operate ~30% of hours)

- **WG Commentary:**
  - Brattle CONE Study:
    - Overall, the AERO CT costs appear to be in line with estimates, while the Frame CT and CC costs seem unrealistic
      - It seems unrealistic that the AERO CT is assumed to be running baseload
      - CC costs do not align with the reference project completed in Alberta (Shepard)
        - While there were some unforeseen difficulties on this project impacting the cost, this would be similar to any other project in Alberta
        - Shepard was $1600/kW; data is part of the public record
      - Modeling the AERO CT as a peaking facility vs. base load has significant impact on the performance and results of the reference technology
    - Net CONE will have a direct correlation on the clearing price due to the proposed market power mitigation framework

- Have the appropriate technologies been selected based on the operational requirements of the Alberta market (e.g. need for ramp)?
- Specific comments on the validity of estimates:
    - OEM quotes used in the estimate seem low and may not be indicative of the cost over the long-term
    - Clarification is required on what was included for OH rates (e.g. scaffolding, union fees, etc.)
    - Doesn't appear that the generator cost contribution in the tariff was included
    - Clarification is required on if the number of units were accounted for in the Gas Interconnection costs
    - It appears that the hard costs for interconnection seem correct but are missing the Transmission Operator costs (e.g. ATCO, AltaLink) that will support a participant with the interconnection which could double the costs that were included
    - There is a significant risk in getting a water license in AB (most water rights taken by the petrochemical plants) and this should be considered in the analysis
    - Clarification is required on if transmission losses are included as part of the variable cost estimates
    - Clarification is required on property tax and insurance rates seem very low (estimate should be around $0.01 – 0.025 per $1000)
    - Clarification is required on the minimal stable generation for the proposed units to validate if the units are realistic given AB operating environment
    - Sales tax shouldn't be included as it flows through (nets out to zero as long as its accounted for in the revenue side of the equation too)
- Would be valuable to see the model that has been used in formulating the bottom up estimates to better identify where variances exist from WG members estimates

- Cost of Capital Discussion:
    - One participant's opinion is that the cost of equity as a merchant project in AB would need to be 20% – 25% for their financing partners to support a project in AB
        - The cost of equity at 11% – 13% would likely work for a contracted asset but that isn't the case in the proposed market
    - Perception is that the difference is about doing large market balance sheet financed projects versus project financed in a small market (e.g. AB)
    - Would like Brattle to collect financing information from banks / capital providers that actively operate and finance projects in AB
    - When it comes to the Canadian sample of companies, they have a large amount of contracted assets and this is bringing the cost of capital downwards
    - A company will not invest based on the company's cost of capital, they will only invest if they expect to receive returns higher than their cost of capital based on risk and value expectations

- Annual Updating Methodology
    - Comments are to be provided through the matrix

- Reference Technology Selection Criteria:
  - Majority of WG participants are supportive of selection criteria
  - Supportive of flexibility being a criterion but how will pricing in the markets support flexibility (i.e. flexible units)?
    - There is no ramp product, so how do you measure the value of ramp?
      - Incentives for flexibility should be in the Energy and AS markets (in the future there may be a point where a ramp product is required) however some participants don't believe the energy market will provide the necessary returns

- Energy and AS Offset:
  - Participants continue to hold diverse opinions on the best approach to calculate the EAS offset
  - Comments from participants supportive of the forward market approach:
    - It is pragmatic and is as good as you are going to get
    - It is a simple, and transparent approach
    - Forward market could be good in the transitory state of the capacity market
  - Comments from participants that don't support the forward market approach:
    - Are unsophisticated participants setting the price in the forward markets?
    - Has the forward market figured out what to expect from in a capacity market environment?
    - The forward market is thinly traded. Can large participants impact the forward curve which will impact Net CONE in their favor?
      - MSA will not investigate all trades in the forward market
      - Alternative opinion – a participant may be able to impact in the short-term but likely wouldn't actively trade all year to impact the price
    - Forwards are driven by participants with a portfolio, and doesn't reflect a new entrant
  - Participants that support simulation:
    - Simulation would allow for best available information to be considered, see the range of views from participants, and develop the forecast
    - Simulation should occur at a dispatch level (considering NDV, planned outages, etc.)
    - Is the AESO doing an evaluation in a similar manner as a developer?
    - If the AESO is tasked with buying capacity, the AESO should be developing a forecast and making it transparent (e.g. similar to the LTO)
      - Modeling will help identify some more of the uncertainties that you won't see in the forwards
  - Further clarification is required on how the AESO will use the forward curve in the calculation of the E&AS offset
  - If the AESO was to consider SCED it would be easier to forecast energy prices
  - Could there be bounds on the prices that are selected in the forward market?

- **Outstanding Questions:**
  - Can Brattle and the AESO confirm that these plants qualify for CCA Class 53?

- **Actions:**
    - Participants are encouraged to provide Brattle and/or AESO empirical evidence that can be used as input in the CONE study for the specific areas that they do not trust the results
        - All information will be held confidential if shared by participants (given commercial sensitive nature)
    - Brattle to clarify specifics around CONE estimates including:
        - Historical trends on OEM quotes for the turbines
        - Additional information on went into OH cost estimates
        - Review data used in the calculation of gas interconnection costs
        - Confirm if transmission losses are included in variable cost estimates
        - Confirm property tax and insurance rates for the proposed reference technologies
        - Confirm minimum stable generation rates for the proposed reference technologies (AESO Support)
    - AESO to confirm how the forward curve will actually be used to set EAS offset in the calculation of net-CONE

Discussion Topic: Resource Adequacy Modeling

Working group members generally believe the RAM has improved since last presented, subject to the proven convergence of UCAP and RAM results

- **AESO Design Clarification:**
    - The profile for new wind units will have a different profile / shape and this needs to be considered in the analysis
    - The AESO does not believe there is a reliability concern to meet winter peak considering the thermal fleet will not be derated in the winter

- **WG Commentary:**
    - Is there a disconnect with the RAM and how Cogen AF/CF is being calculated for UCAP purposes?
    - The numbers seem to suggest that the AESO is expecting a greater contribution to reliability from the interties than the UCAP they are willing to pay
        - AESO to confirm the values include BC, MATL, and SASK in the calculation (which eliminates the concern)
    - Is there a reliability concern that the reserve margin is large in your initial analysis and it still says that the AESO needs additional volume to meet peak load in the winter?
    - Why is the monthly EUE so high in December when historically the market hasn't been tight in December?

- **Outstanding Questions:**
    - How is price responsive load (as DR) captured in the RAM?
        - Will it matter for which existing price responsive loads decide to participate in the capacity market vs. those that don't?

- **Actions:**
    - Display fleet UCAP values vs. the fleet values from the RAM to test the alignment of the two approaches

Discussion Topic: Demand Curve

Working group members continue to push back on elements within the design of the demand curve, specifically, the supply and demand shocks used in the assessment, the shape of the supply block (relative to the shape of Alberta's supply block), and the limits of a single-year assessment (vs. a multi-year assessment).

- **WG Commentary:**
    - Is it appropriate to be using the PJM curve as a starting point, given the markets are very different?
    - Why are we using historical energy only market shocks, when we should expect that there is more orderly entry / exits with the capacity market?
        - How much of the historical exits were truly 'shocks', or were they known in advance?
    - Belief that 'shape block' should be flatter and that the illustrative curve shown is too steep. In AB there should be the potential to get new / additional supply which would result in a flatter supply curve
    - Concerned that the load forecasting errors don't appear to follow a normal distribution (i.e. they are skewed to one side of the tail), and therefore should we adjust the distribution of the economic forecast error for the demand shocks (which results in shifting the demand curve to the right)?
        - In addition, if the AESO has stated that a change in methodology in load forecasting will improve the results, why is historical data being used?
        - It was also stated that this data wouldn't be used in the RAM because of the improvement in the forecast approach, so this seems inconsistent
    - Translating to a target metric from EUE to % of time that capacity market doesn't clear the minimum EUE in the base auction, makes it more difficult for participants to perform their own modeling
    - Targeting a 5% failure to procure the minimum standard of EUE feels like fairly expensive insurance policy:
        - 5% feels fairly conservative; what would the increased cost of this demand curve performance be to consumers?
        - Does the base auction have to result in the AESO being above the minimum value? How can the rebalancing auctions be used to meet the targets?
            - Can the market pursue a 10% or a 20% rate and rely on the rebalancing auctions?
            - There are resources, such as demand response, that can commit close to real time
    - Some participants don't believe the shape of the demand curve will be the issue of a market clearing the right amount of volume
        - Issues could relate more to CONE (Net CONE), government risk,etc.

- **Outstanding Questions:**
  - Is the target metric of 5% below minimum procurement overstated due to the data that is being used to complete the analysis?
  - What are the implications of the proposed capacity market mitigation alternatives on the demand curve shape?

Meet (#)	(#)	WIG Action Items	Action by	Due Date
4	1	Complete WG #4 feedback matrix	All WG members	June 18
4	2	All participants are encouraged to provide Brattle and/or AESO empirical evidence / project data to be used as input in completing the CONE estimates	All WG members	July 3
4	3	Brattle to clarify specifics around CONE estimates including: • Historical trends on OEM quotes for turbines • Additional information on went into OH cost estimates • Confirm if transmission losses are included in variable cost estimates • Confirm property tax and insurance rates for the proposed reference technologies • Confirm minimum stable generation rates for the proposed reference technologies (AESO Support)	Brattle	June 29
4	4	AESO to confirm how the forward curve will actually be used to set EAS offset in the calculation of net-CONE	AESO	Next DCWG Session (To be scheduled)
4	5	Display fleet UCAP values vs. the fleet values from the RAM to test the alignment of the two approaches	AESO	Next DCWG Session (To be scheduled)