IESO's Preliminary Base Case Assumptions for the 2017 Long Term Energy Plan - Confidential

Prepared by: IESO Date: February 7, 2017

As a follow up to the meeting on February 3, the IESO committed to providing a list of assumptions related to demand, conservation, supply and cost to reflect recent developments that will serve as the basis for the updated "base case" for the 2017 Long Term Energy Plan.

The updated "base case" is derived from the 2016 Ontario Planning Outlook (OPO).

The assumptions for the "base case" are as compared to OPO. Please confirm all items below by **February 14.**

Item	IESO Assumptions	Ministry of Energy to Confirm and Provide Comments
1	Net demand outlooks are consistent with those assumed in OPO. The IESO is aware that Union Gas and Enbridge have put forward documents suggesting the impact of heat pumps would be peakier than in the IESO's initial projections. The IESO has met with Union and Enbridge and reviewed their analysis. Broadly, while Union and Enbridge have likely overstated the impacts, the IESO is nonetheless developing a second generation heat pump impact analysis to reflect further information, in cooperation with heat pump vendors and relevant associations. The IESO will work with Union and Enbridge as appropriate in this regard. While this work proceeds, Outlook B is assumed for the base case in the meantime.	**Question** Will 2016 or 2017 be the first year in the base case forecasts? Will 2016 actuals be included? **Confirmation** Agree on the need to review heat pump impact on peak generation capacity under electrification scenarios.
2	Conservation outlook is consistent with OPO, which incorporates the targets established in 2013 LTEP of 30 TWh by 2030 and the near term target set in the Conservation First Framework and Industrial Accelerator Program of 8.7 TWh by 2020. We recognize that LTEP may establish new targets or require further analysis to be undertaken re: new targets for Outlooks C and D.	**Analysis Request** At the January 19th Achievable Potential Briefing, our Minister's Office and Deputy expressed an interest in understanding the achievable potential for electricity conservation under OPO's electrification scenarios (Outlooks C and D). The OPO document notes that "more study is required to identify incremental conservation under different demand outlooks" Understanding the achievable potential under higher electrification scenarios is a crucial input to the LTEP 2017 planning process.

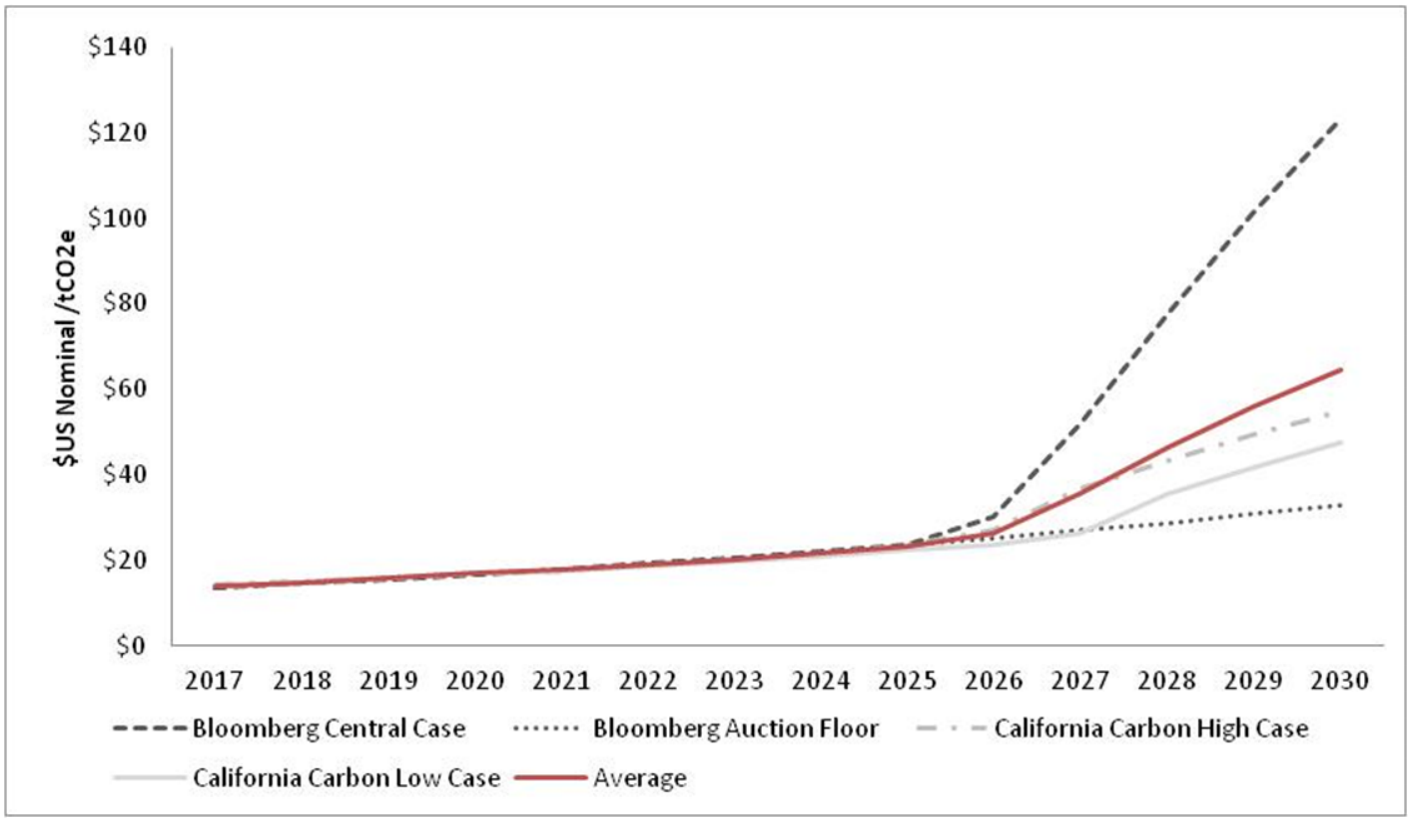
		Could the IESO update the APS analysis to reflect the demand outlooks in the OPO: Of specific interest are Outlooks B, C and D. In the updated analyses, could the IESO capture expected electricity savings and expected costs for each scenario. Could the IESO also provide ENERGY with the avoided cost assumptions under the three outlooks for the APS analysis. ENERGY recognizes that this is a significant task and may require IESO to procure Nexant. What steps are required to assess the achievable potential under Outlooks B, C and D? Our understanding is that the avoided cost assumptions would need to be updated. Would it be possible to complete this analysis by March 1, 2017?
3	Demand Response outlook is consistent with OPO. TOU, ICI, and DR auction combined will be able to meet 10% of peak demand by 2025. We recognize that LTEP may or may not establish DR targets.	**Confirmation** There are currently no plans to establish a new DR target through the 2017 LTEP. ENERGY staff recommend that IESO continue to assume the 2025 DR target in its OPO analysis.
4	Updated status of the recent NUG negotiations between IESO and OEFC as a result of the December 2016 direction.	**Question** Will higher contracted price information, following the recent Jan 19, 2017 SCC decision, be applied to affected existing NUG contracts and the base cost outlook? If not currently contemplated, please include in outlook if change is considered material.
5	Nuclear schedule used in OPO consistent with OPG Business Plan and Bruce inputs: a. Bruce as per the schedule in the finalized ABPRIA b. Pickering continued operations to 2022/2024 c. Darlington as per the finalized refurbishment schedule.	

6	Inclusion of the October 2016 Ontario-Quebec Electricity Trade Agreement. Includes: 1. Energy 2.3 TWh per year (2017 to 2022 inclusive) Quebec to Ontario 2. Capacity 500 MW per winter Nov to March (2016/17 to 2022/23 inclusive) Ontario to Quebec 3. 500 GWh cycling energy per year (2017 to 2022 inclusive) Ontario to Quebec 4. 500 MW capacity Quebec to Ontario, assumed in year(s) during capacity deficit in Ontario, in return for delivery of 500 MW to Quebec in 2015/16 as part of original capacity swap	**Direction** Overall: The finalized agreement has Dec 31, 2023 as the contract end date On point 2: Understood the capacity sharing was for December – March On point 3: should specify that only 60% of the energy comes back On point 4: Remove the plural off of "year(s)" – it is for one year only
7	Suspension of Large Renewable Procurement II and Energy From Waste Procurement as a result of the September 2016 direction	
8	FIT 5 and microFIT 4 are the remaining renewable programs to be procured that are not yet online or contracted.	
9	Elimination of hydro and non-hydro renewable "fillers" to meet capacity targets set in 2013 LTEP to reflect that no further renewable procurement programs will be pursued to meet capacity targets. 2013 LTEP renewable capacity targets were 10.7 GW for non-hydroelectric by 2021 and 9.3 GW for hydroelectric by 2025. These targets are assumed no longer in effect. Current projections for non-hydro resources are tracking to 9.4 GW by 2021, and for hydro resources, 9.0 GW by 2025, assuming all contracted resources come into operation.	**Question:** What is the cut-off date for determining currently contracted resources (e.g. Dec 31, 2016)? For example, will the base case include the new Chaudiere Falls Gatineau No.1 and Hull No.2 waterpower contracts? **Analysis Request:** IESO to reflect anticipated uptake of net metering. Modeling to consider recent Part 1 regulatory amendments and potential part 2 changes (i.e. enabling virtual net metering and third party ownership). Modeling should consider uptake driven by potential CCAP incentives.
10	Minor updates to reserve margins requirements as a result of changes to the supply outlook, revised modelling assumptions and continual improvements to the reserve margins methodology.	
11	Updated contract price information for procurements of new NUG contracts and the updated 2016 Ontario-Quebec Electricity Trade Agreement.	**Question:** Will higher contracted price information, following the recent Jan 19, 2017 SCC decision, be applied to affected *existing* NUG contracts and

		the base cost outlook? If not currently contemplated, please include in outlook if change is considered material.
12	OPG regulated single bundled nuclear rate applied equally to both Darlington and Pickering production (assumed cost of service methodology for OPO) and hydro rates as per the 2016-2018 business plan consistent with item 5 above. IESO will use the business plan smoothed nuclear rates in the update – which is consistent with the methodology proposed by OPG in OEB filing. The nuclear and hydro regulated rates in the business plan are not the rates in OPG's current OEB rate filing – To use the OPG rates as filed, the Ministry would need to obtain the updated data from OPG to ensure consistency between prices and production/outage plans and forward to IESO.	
13	Natural gas and fuel price forecast in OPO dated January 2016. IESO will be updating to the January 2017 Sproule forecast.	**Confirmation** Agree with use of Sproule forecast.
14	Updating assumptions regarding the mix and cost of supply following contract expiry to represent the potential for market participation. In OPO, upon contract expiry, the facilities were replaced one for one and assumed that all the variable and on-going fixed cost components of the original contract remain plus a percentage of the NRR fixed cost (i.e., capital) is required to maintain the operation of the facility. We are exploring a similar but more generic approach by generation resource types to avoid "picking winners".	**Question:** Can IESO clarify meaning of "generation resource type"? Does this mean service provision (i.e. baseload, peaking, etc.) or technology type? **Analysis Request:** Assumptions should consider potential for extended life of existing resources and continued cost declines for new build projects. OPO assumes LRP I low weighted prices for wind and solar both new build and re-contracted.
15	Updated to reflect Throne Speech directions that were issued after OPO was developed: a. 8% Rebate (no rebate in OPO) b. Expansion to ICI of > 1 MW (OPO assumed > 3MW) c. Increased Rural or Remote Rate Protection program to $0.0021/kWh (OPO assumed $0.0013/kWh)	**Direction** Pause until end of next week (w/c 13-Feb) to allow for announcement on further rate mitigation measures which can then be incorporated into assumptions.

	No attempt at this time to incorporate impacts of further rate mitigation initiatives currently being contemplated by government.	
16	Carbon cost assumptions in OPO is the Bloomberg auction floor price projection (see graph below for the carbon price forecast used). Seeking update from Ministry of Energy.	**Direction** Average forecast should be used.
17	Proceeds recycling to be included, if available.	**Direction** Proceeds recycling should not be included.
18	Update for actual 2016 residential billing data.	

Regarding item 16, the carbon price projection used in the OPO is the Bloomberg Auction Floor Price as shown in the chart below:



MOECC and MOE used the average of the various carbon price forecasts as shown by the red line for the cap and trade cost analysis with EnviroEconomics. However, the cost impacts after 2025 were not made public.