Stakeholder Feedback and IESO Response

Distributed Energy Resources (DER) Potential Study – September 22, 2021

Following the September 22, 2021 engagement webinar on the DER Potential Study, the Independent Electricity System Operator (IESO) and the consultant, Dunsky supported by Power Advisory, received feedback from participants on the pre-assessment screening criteria, the pre-assessment results, and on the proposed scenarios.

The IESO received feedback from:

- Advanced Energy Management Alliance (AEMA)
- Canadian Renewable Energy Association (CanREA)
- City of London
- Electricity Distributors Association (EDA)
- Energy Storage Canada (ESC)
- EverGreen Energy
- Kelvin Thermal Energy
- Power Workers' Union (PWU)

The referenced presentation, associated MS Excel worksheet (with the full list of DER measures and the pre-assessment results), and stakeholder feedback submissions can be found on the DER Potential Study webpage. Please reference the stakeholder feedback submissions for specific feedback as the information below provides excerpts and/or a summary only.

Notes on Feedback Summary

The IESO appreciates the feedback received from stakeholders. The IESO has provided a summary below, which outlines specific feedback or questions for which an IESO and/or consultant response was required at this time.

Pre-assessment screening criteria

Five stakeholder submissions included comments on the proposed measure screening criteria. Two submissions indicated support for the identified criteria, and three submissions included recommendations for consideration. The following table summarizes these points.

Feedback	IESO/Dunsky Response
EDA commented that the key screening criteria selected are robust and capture the most important elements of DER integration.	Thank you for your feedback.
The submission from EverGreen Energy did not include any specific comments on the criteria, but did comment in general that the future technology must be made to be safe and controllable, noting that 'our weather is changing'.	This study will evaluate several controllable DER technologies, including battery storage, which can provide customer backup power in an outage situation. We will consider the incorporation of a resilience benefit of battery storage as a customer benefit in the achievable potential scenario.
CanREA sought clarity on the purpose of the "relevance to study objectives/scope" criterion, and suggested that it may be redundant.	The "relevance to study objectives/scope" criterion was applied as a high level screen based on the planned uses of the study as described on the DER Potential Study engagement page. This was further described in the definitions tab of the 'Measure List and Pre-Assessment' MS Excel file on the project website. However, the underlying factors can be reasonably captured within the remaining screening criteria. Per your suggestion, this screening criteria has been removed in the superseding 'Measure List Screening and Approach' MS Excel file that has now been added to the project webpage for the November engagement session.

Feedback	IESO/Dunsky Response
Kelvin Thermal Energy suggested the screening criteria include the responsiveness of a technology to a dispatch signal.	The responsiveness of a technology to a dispatch signal is captured in the "alignment with system needs and characteristics". For clarity, we have renamed this criterion to "alignment with / capability to meet system needs" in the superseding 'Measure List Screening and Approach' MS Excel file that has now been added to the project webpage for the November engagement session.

Feedback	IESO/Dunsky Response
PWU requested clarity on how the DER assessments metrics impact screening criteria, and suggested the consultants outline how the characterization of the technologies feeds into the ratings of the screening criteria, including the relative qualitative or quantitative weighting of these assessment metrics.	As this was a qualitative pre-assessment, the initial "low/med/high" scoring was based on the consultant's multi-jurisdiction expertise. Descriptions of the meaning of "low/med/high" can be found in the definitions tab of the 'measures list and pre-assessment' MS Excel file on the project website. Due to the qualitative nature of the screening, no weighting was applied to each screening criteria - to avoid creating a false sense that this process equated to an objective and quantitative assessment. The process for determining DER technologies that passed initial screening was through discussion between IESO and the consultant, building from the consultant's initial recommendations and further incorporating IESO project team feedback based on IESO's Ontario-relevant expertise. This process served as a reasonability check on the initial screening results. The stakeholder engagement was intended to allow the stakeholder community to provide feedback on the merit of the screening process and to identify any DER technologies that should or should not pass screening, serving as an additional reasonability check from the stakeholder perspective that the IESO and consultant can consider.

Feedback	IESO/Dunsky Response
PWU also sought clarity on the meaning of the screening criteria, commenting that significant ambiguity exists with respect to how some of the screening criteria have been applied, and suggesting the ambiguity results from the inadequate definition and separation of the issues. The following three screening criterion in particular were discussed in the feedback submission: • Alignment with System Needs and Characteristics • Expected Cost-Effectiveness • Alignment with Customer Goals	Descriptions of the meaning of "low/med/high" can be found in the definitions tab of the 'measures list and pre-assessment' MS Excel file on the project website.

Pre-assessment results

All eight stakeholder feedback submissions included comments on the pre-assessment results. Two stakeholder submissions indicated general support of the appropriateness of the short-listed technologies. A further two submissions requested clarity on aspects of the results. Four stakeholder submissions identified measures that have been screened out, and recommended they be included moving forward. The following table summarizes these points.

Feedback	IESO/Dunsky Response
The EDA commented that they believe the short-listed technologies capture all the appropriate DERs in Ontario.	Thank you for your feedback.
ESC's submission indicated they also believe the technologies capture the appropriate DERs given the 10-year time frame, and cautioned they would object to any subsequent removal of the energy storage related DERs outlined in the September presentation.	The energy storage DERs listed as passing the screening in the September presentation will be included in this study. This includes battery storage both behind and in-front-of-the-meter, but does not include other storage technologies.

Feedback	IESO/Dunsky Response
AEMA noted their members are surprised that EV telematics did not pass the BTM qualitative pre-assessment, and recommended EV telematics be further explored as a technology measure in the potential study pre-assessment, or alternatively, that the consultant elaborate on the rationale that there is a "Limited market opportunity over the study period" with respect to EV telematics.	We have reconsidered EV telematics based on this feedback, concluding that this feature is likely to be present in the EV market towards the end of the study period. As such, we will be including it in the study.
CanREA indicated they concur with the assessment that there would be limited market opportunity for new small-scale distributed wind generation. However, given the quantity and geographical distribution of wind generation under IESO contract, they suggested it would be in the interest of the grid to keep these assets operating and compensated for the provision of grid services rather than just energy, and to leverage these assets for future optimization. CanREA recommended consideration of the additional value that existing distributed wind generation assets could provide would seem highly relevant to study objectives.	The study is primarily interested in new DERs that are likely to be economic and/or emerge on the system. Based on the screening criteria applied for this study, new distributed-connected wind generation will not be studied. With respect to how existing wind facilities could be leveraged, the study will assume the continued delivery of energy from wind facilities past their contract expiry date, consistent with the reference scenario used for the IESO's forthcoming Annual Planning Outlook. This study intends to identify how load flexibility DERs and storage DERs can maneuver in a manner that optimizes the use of existing generation facilities, including variable renewable generation. This optimization includes modelling the ability to leverage these DERs to take advantage of generation that would otherwise be curtailed during surplus baseload conditions.
CanREA requested more detail on the assumptions regarding the screened-out short-duration storage technologies, including information on the impact that their exclusion or inclusion could have on study outcomes, especially with regard to the provision of services aspect.	The project team believes short-duration storage technologies are likely to play a marginal role over the study timeframe given their limited contribution to emerging systems needs such as resource adequacy, and due to their limited cost-effectiveness relative to battery storage. The exclusion of short duration storage technologies is not expected to have a material impact on the study outcomes.

Feedback	IESO/Dunsky Response
Kelvin Thermal Energy recommended Electric resistance technologies with thermal storage, for either residential (district heating) or non-residential (industrial process heating), be included as a short-listed technology, and suggested these types of technologies be viewed in the same way as Smart Electric resistance water heaters and other heating devices.	The study will attempt to incorporate the potential for thermal storage of district heating and process heating as a DER - subject to data availability.
PWU recommended BTM residential storage and all solar technologies be removed or deprioritized in the study, commenting that solar DERs provide low system value for Ontario.	Thank you for your suggestion. The IESO and our vendor believe it is appropriate to keep the identified measures within the scope of the study. Solar PV is a non-emitting technology which continues to undergo dramatic cost declines and which is roughly aligned with summer system peaks. We believe that when modelled alongside demand flexibility (such as cooling load flexibility) and residential batteries – both of which are also incorporated into this study - the variability of solar and its slight temporal mismatch with daily peak demands can be mitigated.
PWU recommend Hydrogen electrolysers be included in the study, suggesting they are one of the most cost-effective solutions.	The consultant expects that electrolysers will have a low cost effectiveness at the DER scale within the study period. The most cost effective applications and proposed or contemplated facilities are at the transmission system level versus distribution system level, thus not considered DERs per our study definition.

Feedback	IESO/Dunsky Response
The City of London inquired as to whether waste-to-energy facilities might be considered as DERs for this study.	The IESO has in the past studied Waste Energy Recovery for power generation in its 2016 Achievable Potential Study as a conservation measure. Since we've already studied this technology, and due to the bespoke nature of these facilities and the tendency for them to be most viable at large industrial facilities (which are typically transmission connected and thus not a DER per our study definition), we are not including them in this study.

Scenarios

Five stakeholder submissions included feedback on factors to be included in, and varied between, the proposed scenarios, as well as several additional points for consideration. The following table summarizes these points.

Feedback	IESO/Dunsky Response
AEMA's feedback submission included commentary on a number of perceived barriers that exist in the Ontario Demand Response (DR) market, and suggested these potential impediments warrant consideration for developing additional scenarios for the study. The following three sections in this table summarize the potential barriers identified by AEMA and their associated recommendations.	

Feedback	IESO/Dunsky Response
AEMA #1 - M&V: Residential DR aggregators do not currently have a viable pathway to participate in the capacity market, as they are unable to cost-effectively request or obtain data from the distribution utilities that would meet IESO settlement requirements. • In the short term, IESO should consider options for conducting M&V and settlement for the capacity, energy and reserve markets through the direct receipt of meter data from distribution utilities, or IESO should use its own meter data repository to perform M&V for settlement internally. • In the longer term, DER stakeholders, the OEB, Ministry, and IESO should work together to ensure that the Green Button standard is implemented uniformly across distribution utilities to streamline market participation for mass market DR aggregators.	Program costs are modelled in the economic potential scenario, and for residential DR, include costs related to aggregation and M&V based on Dunsky's DR program database. This study will consider varying participation barriers when determining adoption in the three achievable potential scenarios. The project team welcomes input into how program participation costs differ between Ontario and other jurisdictions, and how barriers could be reflected and varied in the three achievable potential scenarios. In general, for this comment and the AEMA comments captured directly below, the IESO appreciates the feedback provided on barriers to residential DR participation in the wholesale markets. We invite AEMA to participate in the DER Market Vision and Design Project engagement which is focused on introducing enhanced DER participation models and which is now underway.
AEMA #2 - 1 MW aggregation size: could be a barrier for smaller aggregators, and does not encourage competition. It also limits aggregation potential in smaller zones. • Recommend the aggregation size be lowered to 100 kW, and suggested that moving in this direction will ensure alignment with FERC's minimum aggregation size requirements for DER participation.	The IESO and consultant will consider this feedback in the development of scenarios.

Feedback	IESO/Dunsky Response
AEMA #3 - Cumbersome customer enrollment process: Requiring customers to provide an account number during sign-up, or log into their utility portal to complete Green Button authorization, create barriers that can significantly reduce enrollment rates. • Recommended IESO consider developing a centralized database of distribution utility meter/account data.	This study will consider participation barriers conceptually when modelling adoption in the achievable potential scenarios, and will explore opportunities to reduce these barriers in the recommendations section of this study. However, detailed modelling of these barriers on adoption is outside the scope of this study.
AEMA's submission included four additional recommendations for consideration: 1. Demand response baselines be established using statistical residential regression methodologies, or using control group baselines. 2. Testing events occur on high demand days to simulate a real event as best as possible. 3. Variable commitments by month. 4. Scenarios should consider sensitivity analysis relating to gas and carbon pricing.	Items 1 through 3 reflect implementation / market rule-oriented recommendations and barriers in the current capacity market construct. While these points may be discussed qualitatively in the recommendations section of the study's report, they won't impact the potential modelling exercise directly. With respect to item 4, the consultant will develop different carbon pricing scenarios that vary the price of carbon and the stringency of the federal Output Based Pricing Standard.
CanREA recommended that any scenarios considered should be in accordance with the Government of Canada's forthcoming Clean Electricity Standard to achieve a net-zero emitting electricity system by 2035.	The study will consider including a scenario with carbon pricing consistent with the expected Clean Electricity Standard for Scenario 3.
CanREA also recommended consideration of carbon pricing scenarios include the potential for all GHG-emitting gaseous fuel-fired facilities to face de-escalation of the current Output-based Allocation toward zero, in alignment with necessary electricity decarbonization targets.	The study plans to include a carbon pricing scenario (as Scenario 2) with a reduction of the federal benchmark to zero for gas generation, as per your recommendation.

Feedback	IESO/Dunsky Response
EDA recommended LDC impacts be a key factor to be considered between the different DER potential scenarios, noting the increased complexities with respect to managing the distribution systems and effectively integrating new DERs. EDA suggested highlighting the impacts to LDCs and the role that LDCs will need to play to support DER integration should be considered for all potential scenarios.	The study will model the distribution system value of DERs for different scenarios. However, the complexities with respect to distribution system management are outside the scope of this modelling exercise, but will be addressed in the recommendations section of the report.
Kelvin Thermal Energy commented that electrification represents a clear path to decarbonization across many sectors of the economy, and therefore recommended that end use electrification being considered as a factor within the considered scenarios.	We expect to vary end use electrification between scenarios.
Kelvin Thermal Energy also commented on the potential for fast acting storage DERs to make use of energy that previously has been curtailed, and therefore recommended changes in curtailment management be considered as an additional factor to be varied across the scenarios based on curtailment reduction targets.	The study will consider the system benefits DERs can provide in avoiding curtailment due to system wide surplus baseload conditions.

Feedback	IESO/Dunsky Response
PWU's submission noted that the study timeframe for assessing DER potential in Ontario is the next 10 years, and suggested criteria should be considered to assess the validity of any assumptions post 2030. The following points were included for consideration: • Ontario's emerging capacity gap will increase the use of natural gas-fired generation in the supply mix. • Electrification of the economy will change the nature and shape of demand • Incentives to DER penetration are predominantly from the net metering and/or ICI rate programs	As with any future looking assessment, there is uncertainty with this study. To address this uncertainty, three scenarios capturing a range of potential futures will be used to demonstrate the economic and achievable potential of DERs in Ontario. Varying assumptions regarding the future supply mix and rate of electrification will be considered for these three scenarios. Compensation mechanisms that drive customer adoption of DERs, including net metering and the ICI program, will be factored into the achievable potential phase of the study.
PWU also recommended the outcomes of the scenario analyses should be focused on the total system value to ratepayers, and specifically, that the scenario outcomes address the following implications: 1. Impact on total ratepayer electricity costs; 2. The role and value split between rate programs and IESO incentives; and, 3. The value to government implied by large investments in any DER technology solutions that impact trade balance, GDP and jobs.	This study intends to determine the economic potential of DERs from a system value perspective using an advanced Total Resource Cost (TRC) approach, inclusive of greenhouse gas emissions. A TRC test treats DERs as a resource and provides insights into the impact of the addition of that resource on the total cost of energy supply in Ontario. This study approach serves to provide an indication of the DERs that warrant the most attention for DER integration. While total benefits and costs are captured by this study, the impact on total ratepayer costs will not be explicitly calculated. Non-system values such as trade balance, GDP, and jobs, will not be considered as part of this study.

General Comments/Feedback

All seven stakeholder submissions included general comments and feedback for consideration. Four stakeholder submissions included comments provided their general support for the study initiative. Four submissions included additional recommendations for consideration. The following table summarizes these points.

Feedback	IESO/Dunsky Response
CanREA noted their support of a net-zero emitting electricity system by 2035 as a foundational step toward achieving Canada's legislated 2050 Net Zero objective, and commented that the DER Potential study provides an important opportunity for quantification of DERs' potential contributions to each of energy, capacity, operating reserve and regulation service, as well as their associated carbon emissions reductions, including from targeted fuel switching towards electricity.	Thank you for your feedback.
ESC voiced their support for the initiative, and offered the opportunity for additional collaboration with their Distributed Energy Storage Working Group.	Thank you for your feedback.
AEMA suggested it is important for the DER Potential Study to consider an average growth rate of installed thermostats in Ontario by aggregating data from several leading providers, and recommended Power Advisory and Dunsky meet directly with AEMA member DERMS providers to explore options and gain insights into market development.	The consultants will model a growth rate in smart thermostats using the best available information, including information that can be gathered from AEMA.
Providing commentary on the potential role of LDCs, and the perceived associated benefits, the EDA further recommended the potential study look at the LDC role in DER integration of specific technologies and highlight the impacts to existing DSPs, capacity constraints and associated regulatory changes that may be required to support future DER integration.	Some of these issues described may be touched upon in the recommendations section of the report, but the IESO expects conversations in this area will continue after the study has been published. To understand the work that is planned and/or underway on these topics, please see the Distributed Energy Resources Roadmap page, and in particular the materials from the joint OEB/IESO engagement session held in October.

Feedback	IESO/Dunsky Response
EDA also encouraged the IESO to explore all options that foster the responsible adoption of DERs, whether connected to the IAM or a distributor's infrastructure, and commented that LDCs need a voice at the table as DER regulations are developed to ensure the safe and reliable operation of our distribution systems	We welcome LDC participation in IESO-led engagements focused on DER integration, which can be found in the DER Roadmap page. These include the DER Market Vision and Design Project and the recently announced Transmission and Distribution Coordination Working Group (TDWG). The October DER Roadmap engagement session provides an overview of these initiatives.
Kelvin Thermal Energy commented that the Thermal Storage Measure Group/Category is fairly limited in scope as the non-residential applications do not include any process heat applications, and described potential benefits of certain thermal energy storage technologies. With consideration for this point, they recommended a broader definition of thermal energy storage, including technologies that leverage Ontario's clean electricity to directly displace fossil fuels used for aggregated space heating (i.e., district energy, commercial/residential towers) or industrial process heating, be adopted for the study.	Thermal energy storage for space heating and cooling of large buildings will be incorporated in this study. The study will also attempt to incorporate the electrification and thermal storage of process heating as a DER, subject to availability of data.
PWU voiced their support of the IESO's efforts to evaluate the role DER could play in the future of Ontario's electricity system, however, specified their support for investments that minimize the electricity costs for all ratepayers.	This study strives to identify DERs that are cost effective from a system perspective, in order to inform efforts to integrate DERs.