IESO Stakeholder Advisory Committee: Challenge Statement

Re. System Management: Modernization and Efficiency of the Electricity System / Grid

Challenge Statement:

- Today, electricity is already an essential service that customers - homes, businesses, hospitals, and other institutions – rely on to power their daily needs.
- Customer expectations, technological advancements, and public/energy policy are converging around three key drivers of change in the ways electricity is produced, delivered, and used:
    - **Decarbonization**: demand for electricity will increase (potentially exponentially), and more electricity must be produced to meet that demand;
    - **Grid Modernization**: more technology must be incorporated into the electricity system to improve the efficiency and operability of the grid and respond to changing customer needs and expectations; and
    - **Demand-Side Tools**: the same factors which drive decarbonization and modernization mean that demand side tools, including distributed energy resources ("DER"), will increasingly become part of the electricity system.
- The electricity system/grid must adapt to address these drivers of change. However, the pace of each of these drivers of change remains dynamic, and above all, highly uncertain.
- The familiar imperatives of serving customers and providing safe, reliable, and clean electricity at a fair price will persist.
- **The challenge then, is this**: the electricity system/grid must modernize and adapt to address potentially significant and uncertain drivers of change in a way that continues to deliver on familiar customer and system imperatives.

Supportive Facts and Rationale:

The path to decarbonization has begun, but how and when it is achieved remains uncertain

- Decarbonization will shift electricity demand from a stable steady state seen in recent decades to a dynamic and uncertain future of (potentially exponential) growth. Bulk system demand forecasts in successive IESO Annual Planning Outlooks have increasingly tended towards a higher demand scenario identified in the 2016 Ontario Planning Outlook.[1]
- What remains uncertain is by how much, when, and in what ways demand will increase, and correspondingly by how much, when, what types, and in what ways supply will ramp up to meet that demand, as there many inputs to demand (and supply) both global and local, which will affect the pace of change.[2] Sector decoupling between technology, such as transportation and buildings, and prominent fuel type, namely petroleum and natural gas, can unfold independently, contributing to the uncertainty that faces system planners and operators.

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[1] IESO, *Ontario Planning Outlook,* September 2016 – "Scenario C". IESO, *Annual Planning Outlook*, December 2021.

[2] Demand depends on changing consumer preferences that are subject to a broad set of global drivers: technological innovation (e.g., EVs, heat pumps, industrial innovation), government policy (e.g. fiscal policy, inflation), global supply chain constraints (e.g., materials, commodities and equipment), global pandemics (e.g. COVID-19) and global energy prices. Demand for electricity also depends on energy policy choices here at home: supply-side factors such as bulk system capacity, demand-side tools (e.g., CDM, ICI and DERs), as well as rate design (e.g., low overnight RPP rate, GA rate design, net metering).

- *Working Group Recommendation: while there are multiple potential paths to net zero, a good plan now is better than a perfect plan later*. To this end, Ontario is working to identify plausible forecasts and decarbonization plans for electricity demand and electricity supply[3] and this work is critical to enable stable market conditions that drive investment and business growth in Ontario.

Customers and technology are driving change to how the electricity system operates

- There is emerging public consensus on the need to decarbonize the economy.[4] Customers are increasingly turning to technologies, such as EVs and demand-side resources such as storage and solar panels, to reduce their environmental footprint.[5] However, customers also require visibility and assistance in accessing and deploying these opportunities.
- While there remain short-to-medium-term supply chain, cost and policy challenges for some demand-side technologies that make uncertain the precise timing and extent of their proliferation,[6] technological advancement, decarbonization imperatives will tend to make DERs more prevalent as a demand-side tool to manage customer energy costs, reliability, power quality and environmental footprint.
- While it is likely that safety, reliability (including grid resiliency), service and price, outcomes customers expect the electricity system to deliver may evolve during the energy transition and the relative importance of those outcomes may become increasingly heterogeneous among customer classes, customer segments, industries and individually.
- *Working Group Recommendation: sector must undertake "complete picture" analysis and stakeholder/customer engagement on the costs and values of decarbonization activities and alternatives (including pace)*. Those engagements should be robust and look beyond the bulk system, a particular technology, and even electricity alone, to take an all-in approach that enables meaningful analysis and engagement in the discussion about choices and trade-offs, including customer preferences and price tolerances. Engagement with municipalities and Indigenous communities to support the transition underway in the electricity sector is critical. Sector efforts on engagement must be coordinated, and not competitive or disconnected.

The electricity system must incorporate more technology to optimize its operations and enable change that customers expect

- The electricity grid has provided one-way flow of electricity for over 100 years. Actions taken to build and operate the electricity grid more efficiently to meet relatively consistent customer expectations over that period have been consistent with that century-old paradigm.

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[3] The IESO is currently undertaking a Pathways to Decarbonization Study, which will explore the potential pathways for reaching a reliable, affordable, decarbonized electricity system in Ontario. And The Ontario Government has launched an Electrification and Energy Transition Panel to provide advice on potential demand curves and coordinating long term planning.

[4] Building on the international consensus arrived at through successive Conferences of the Parties (most recently COP26 in Glasgow), federal, provincial and municipal governments in Canada are investigating and adopting climate change mitigation targets and actions consistent with deep levels of decarbonization of the economy, including some striving to achieve Net Zero by as early as 2040.

[5] Electric Autonomy Canada reports that electric vehicles (battery electric, plug-in hybrid, hybrid electric and fuel cell vehicles) made up 11.8% of all vehicle registrations in Canada in 2021, up from 7.6% the year prior. See: https://electricautonomy.ca/2022/02/15/ihs-markit-zev-adoption-canada-2021/.

[6] See for example: https://www.utilitydive.com/news/energy-storage-soars-despite-international-supply-chain-lithium-challenges/625865/

- The availability of new technologies and changing customer expectations plus decarbonization means that the grid must now evolve to incorporate more capabilities: eg. automation, enhanced observability and control, two-way flow of (more) electricity, and increased electronic transactional and information-sharing processes with customers.
- As DERs proliferate over time, there are increasing expectations for utilities to play a greater role connecting and integrating supply and demand side resources into new, varied, and concurrent opportunities.[7]
- The grid must be there for customers when they need to "plug in", which will require investment in grid, systems, people, and partnerships ahead of when the demand materializes.
- *Working Group Recommendation: align planning, coordination, and incentives*. Modernization will require an evolution to system operational processes and plans (e.g., bulk procurement, energy markets, regional planning, local utility planning, etc.) to better incorporate the needs of customers (individually and in aggregate). Some elements of modernization present challenges to conventional market and regulatory incentives, such as funding energy transition-driven investments, and treatment of DER-backed non-wires alternatives.[8]

IESO Role:

- Respond to future uncertainty by developing tools to undertake modernization planning and procurement that include multiple potential options (depending on how the future materializes).
- Issue bulk system demand and supply forecasts that incorporate consumer trends on electrification and are consistent with an Ontario plan for decarbonization (in coordination with the Province and Electrification and Energy Transition Panel).
- Maintain bulk system reliability through the transition to decarbonization.
- Operate and evolve efficient energy markets, including as part of Market Renewal. Develop coordination protocols in collaboration with utilities to better integrate DERs into energy markets, leveraging groups like the Transmission-Distribution Coordination Working Group and pilot projects testing models aggregating DERs. Design DER-oriented market rules such that they remain agnostic to the role of utilities in order to enable different paths of grid modernization (e.g., DSOs).
- Evolve procurement mechanisms to better integrate value-stack opportunities presented by DERs connected to the distribution system; partner with utilities (remaining agnostic on their role) to leverage local information and incorporate local distribution considerations in procurement design.

OEB Role:

- Maintain a baseline of regulatory stability and strong consumer protections during the transition to net zero, evolving specific regulatory mechanisms in a targeted fashion to address specific and identified barriers or emerging needs (e.g. improving incentives for NWAs/DERs, reconciling timing

[7] For example, utilities need to invest in short-term forecasting, planning, and dispatching capabilities that together will allow for the active, real-time management of DER value as it relates to highly dynamic and complex system needs.

[8] Some utilities are already implementing DER-backed Non-Wires Alternatives (e.g., Toronto Hydro Local DR) as an engineering tool, however evolutions to frameworks and incentive regimes are needed to more broadly enable these approaches.

between investment and when demand materializes, enabling scenario planning by utilities to address an uncertain future, etc.).

- Maintain an outcomes orientation in its approach to regulation, having regard for changes in the relative importance of those outcomes (and potential introduction of incremental outcomes) and the potential need for a wider lens for benefit-cost analysis (eg. beyond the meter and upstream) and cost performance during a period of intense change.
- Monitor, review and relevant policies promptly in response to emerging trends: eg. following the Framework for Energy Innovation Working Group output, develop a non-wires alternative framework.

Local Distribution Companies' Role:

- Develop, review and revise grid expansion plans that best anticipate customers' incremental electrification requirements (develop scenario plans), with a base of investments that support the widest range of credible demand scenarios (e.g. safe bet and least regret investments).
- Modernize distribution systems to incorproate the operational benefits of technology, and prepare for decarbonization and demand-side tools such as DER-backed non-wires alternative opportunities.
- Work collaboratively with the OEB, the IESO, each other, and third parties on emerging issues, such as the integration of behind-the-meter DERs into bulk system opportunities.
- Engage directly and proactively with customers to support their own individual paths through the energy transition, including actions motivated by climate change mitigation and adaptation.