

# LOW CARBON AND RENEWABLE ENERGY WORKSHOP

Summary & Report



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# WORKSHOP DETAILS

- **What:** SSHRC Connections grant funded workshop to surface barriers and find solutions for meeting Toronto's TransformTO 2030 goal – 50% of Toronto's community-wide energy to derive from renewable or low carbon sources – while achieving co-benefits that align with the Sustainable Development Goals (SDGs).
- **Where:** Canoe Landing Community Recreation Centre (45 Fort York Blvd.)
- **When:** Friday, June 16, 9 AM to 1 PM



# IMPORTANCE OF WORKSHOP

- To meet the City's net zero by 2040 goal, renewable or low carbon energy sources need to be mainstreamed.
- Multi-sectoral solutions, dialogue, and swift collaborative action are needed to take the critical step of increasing local renewable energy and storage.

**50%**   
**of energy comes from  
renewable or low-carbon sources**

  
**Increase local renewable  
energy & storage**

# HOSTS

- Urban Climate Action Project (UCAP)
- In partnership with:
  - Climate Positive Energy (CPE) ISI
  - SDGs ISI
  - City of Toronto
  - Laszlo Energy Services



# PARTICIPANTS

- Energy services & industry professionals
- Urban planners
- Clean energy advocates
- Energy researchers

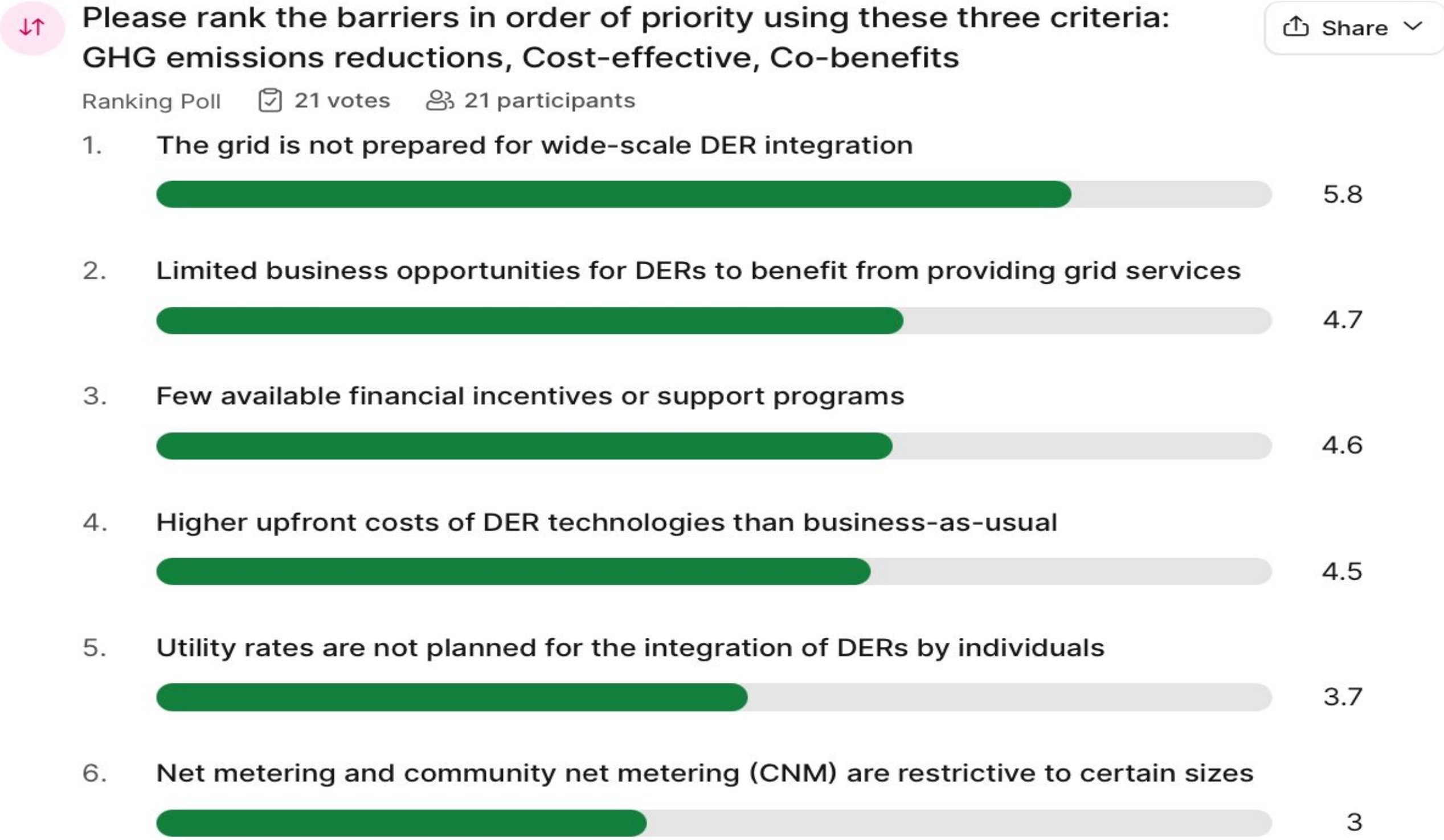
# WORKSHOP FORMAT

- Half-day, in-person event with two plenary and two breakout sessions.
- Throughout the workshop, Slido was used as an engagement and feedback tool with participants.
- **Plenary #1, Prioritizing the Barriers:** Presentation on research summarizing barriers that affect low carbon and renewable energy deployment within Toronto. Participants discussed and ranked which barriers to prioritize in the workshop.
  - Pre-research on barriers was circulated in advance to help inform the discussion.
- **Breakout #1, Developing Solutions:** Participants breakout into assigned groups to analyze the barriers and develop potential solutions to overcoming these challenges.
- **Breakout #2, Next Steps and Roles and Responsibilities:** Participants identify short-term (within 12 months) and long-term (within 5 years) actions that correspond to the developed solutions. Participants identify actors that can assume responsibility of these next steps.
  - Note synergies, trade-offs, co-benefits
- **Plenary #2, Reporting out, Reflections and Cross Cutting Themes:** Breakout groups summarize and report key findings, synergies, trade-offs, and co-benefits of developed solutions and next steps.



# BARRIERS PRIORITIZATION

Workshop participants ranked the researched barriers in order of priority (shown below). Other important barriers were brainstormed and discussed as a group.



# BARRIERS ANALYSIS AND SOLUTIONS DEVELOPMENT

**Six breakout groups analyzed six different barriers challenging low-carbon and renewable energy development within Toronto and developed solutions for each:**

1. Grid not prepared for wide-scale DER Integration
2. Ontario's electrons: keeping clean energy within the province
3. Limited business opportunities for DERs to benefit from providing grid services
4. Higher upfront costs of DER technologies than business-as-usual
5. Economic development of supply-side issues
6. Few available financial incentives or support programs

# 1. Grid not prepared for wide-scale DER Integration

Barrier Factors	Proposed Solutions
<ul style="list-style-type: none"><li>● Local distribution companies (LDCs) have difficulty planning/budgeting for grid-readiness due to five-year process for rate applications to the Ontario Energy Board (OEB).</li><li>● New DER applications cannot be approved due to grid capacity and infrastructure (i.e., short circuit capacity).</li><li>● Distribution System Code (DSC), <i>Electricity Act, 1998</i>, and other electricity regulatory rules are historical, antiquated, and not inclusive of allowing more DER adoption.</li><li>● Lack of collaboration and consensus between the different levels of governments, agencies, and stakeholders.</li><li>● Difficult for LDCs to plan/budget for getting grid ready through 5-year rate applications</li><li>● Need better integration between city climate plan, regional energy planning, and LDC rate cases</li><li>● Energy planning becoming over politicized</li><li>● Potentially Ontario LDCs are overly conservative in evaluating short-circuit capacity and other grid readiness elements</li></ul>	<ul style="list-style-type: none"><li>● Raise the limit for microgeneration (from 10 kW to 20 kW)</li><li>● Streamline connection impact assessment and costs &amp; avoid duplication of regulatory reviews</li><li>● District system operator (DSO) – LDC can apply to be a DSO and set local electricity costs.</li><li>● Need more transparency, research, and dialogue on how grid capacity and capability is assessed.<ul style="list-style-type: none"><li>○ Compare with best practices in other jurisdictions</li><li>○ Scope for Ministry of Energy (MOE) guideline</li><li>○ Potential changes to Distribution Code</li></ul></li><li>● Two ways to mitigate:<ul style="list-style-type: none"><li>○ Invest in upgrading grid infrastructure</li><li>○ Maximize the use of existing infrastructure through modernizing guidelines</li></ul></li><li>● Are there some grid readiness investments that should be covered by tax-base instead of rate base?<ul style="list-style-type: none"><li>○ Opportunity to mobilize private investment</li></ul></li></ul>



## 2. Ontario's electrons: keeping clean energy within the province

Barrier Factors	Proposed Solutions
<ul style="list-style-type: none"><li>● Ontario generated electricity doesn't stay in Ontario</li><li>● Business case challenges</li><li>● Conservative nature of our systems allows for only incremental changes</li><li>● No common vision across levels of government</li><li>● Outdated equipment</li></ul>	<ul style="list-style-type: none"><li>● Multifaceted approach needed to address storage, moving energy, and demand-side management</li><li>● Modernize infrastructure and software; need for transformational change to the electricity system</li><li>● Generate support for transformational change rather than incremental</li><li>● Create a common vision across the system (multistakeholder) and all levels of government</li><li>● Finance and integrate smart and networked equipment (e.g. chargers)</li><li>● Need electricity market and carbon market in ON</li></ul>



### 3. Limited business opportunities for DERs

Barrier Factors	Proposed Solutions
<ul style="list-style-type: none"><li>● No virtual power plants</li><li>● Net metering – Community net metering<ul style="list-style-type: none"><li>○ Interconnection costs high</li><li>○ No business case</li><li>○ Energy hubs</li><li>○ No interoperability standards</li><li>○ Difficulty of forecasting of electrification and load forecasting</li><li>○ Microgrids are still immature</li><li>○ Low cost of electricity undermines innovation</li><li>○ Toronto Green Standards are too low</li><li>○ Limited financing options</li><li>○ No incentives for condo developers</li></ul></li></ul>	<ul style="list-style-type: none"><li>● Improve community net metering<ul style="list-style-type: none"><li>○ Lower interconnection costs</li><li>○ Research and publicize case studies that illuminate business cases</li><li>○ Create energy hubs – Pearson airport</li><li>○ Seed funding and incubators for innovation</li><li>○ Raise Toronto Green Standards</li><li>○ Diversify and expand financing options by mobilizing a mix of public and private capital</li><li>○ Offer incentives to condo developers</li></ul></li></ul>



## 4. Higher upfront costs of DER technologies

Barrier Factors	Proposed Solutions
<ul style="list-style-type: none"><li>● Upfront causes shouldn't be isolated</li><li>● Valuation methodology – externalities not included</li><li>● Electricity is currently subsidized – B.A.U. is affordable</li><li>● Antiquated/not aligned regulatory structures</li><li>● No economies of scale</li><li>● Technology development is not as mature as B.A.U.</li><li>● Equity – DERs are only an option for higher earners</li></ul>	<ul style="list-style-type: none"><li>● Reverse approval process of DERs by utilities</li><li>● Update evaluation methods to consider external costs of carbon-based energy and savings from renewables</li><li>● Standardization of DERs and integration</li><li>● Regulatory reform</li><li>● Market opportunities for DERs</li><li>● Remove/income-based subsidies (Ontario Electricity Rebate – <u>O.E.R.</u>); implement income test</li></ul>



## 5. Economic development of supply-side issues

Barrier Factors	Proposed Solutions
<ul style="list-style-type: none"><li>● Lack of demand<ul style="list-style-type: none"><li>○ Small industry</li><li>○ Lack of voice</li><li>○ Lack of numbers</li></ul></li><li>● Global competition<ul style="list-style-type: none"><li>○ Competing jurisdictions<ul style="list-style-type: none"><li>■ Made in America</li></ul></li><li>○ Lack of local manufacturers</li><li>○ Legislation</li></ul></li><li>● Regulation<ul style="list-style-type: none"><li>○ Codes and standards</li><li>○ Slow moving</li></ul></li><li>● Collaboration between institutions.</li><li>● Workforce<ul style="list-style-type: none"><li>○ Knowledge dissemination/education → manufacturers</li><li>○ Attraction</li></ul></li></ul>	<ul style="list-style-type: none"><li>● Improve community net metering<ul style="list-style-type: none"><li>○ Lower interconnection costs</li><li>○ Research and publicize case studies that illuminate business cases</li><li>○ Create energy hubs – Pearson airport</li><li>○ Seed funding and incubators for innovation</li><li>○ Raise Toronto Green Standards</li><li>○ Diversify and expand financing options by mobilizing a mix of public and private capital</li><li>○ Offer incentives to condo developers</li></ul></li></ul>



## 6. Few available financial incentives

Barrier Factors	Proposed Solutions
<ul style="list-style-type: none"><li>● Local/individuals connecting DER not encouraged; expensive for individuals</li><li>● Capital costs to utilities; cost concern; grid failure; some neighborhoods less accessible to the renewable infrastructure</li><li>● Infrastructure not built for two-way</li><li>● No clear way to connect and install; connecting cannot be subsidized by lower income households</li><li>● Soft costs not going down (e.g., marketing)</li><li>● Misaligned incentives and lack of coordination between all 3 levels of government</li></ul>	<ul style="list-style-type: none"><li>● Solarize campaigns: community level event to learn how it works; utility to support (e.g., in Connecticut); co-benefits: community building</li><li>● Updating public knowledge: solar very different from beginning</li><li>● City-school partnerships to install DERs</li><li>● Purchasing solar/turbine as a memory (e.g., park bench)</li><li>● Investing in storage; big battery network; then can begin to upgrade the infrastructure for two-way current</li><li>● Coordination between municipalities to petition government for federal funding/subsidies for renewables</li></ul>



# PROPOSED ACTIONS

<b>BARRIER #1 The grid is not prepared for wide-scale DER integration.</b>	<b>BARRIER #2- Ontario's Electrons</b>	<b>BARRIER #3- Limited business opportunities for DERs to benefit from providing grid services.</b>	<b>BARRIER #4 Higher upfront costs of DER technologies than business-as-usual.</b>	<b>BARRIER #5 Economic Development of Supply-Side Issues</b>	<b>BARRIER #6 Few available financial incentives or support programs.</b>
<p><b>Immediate - within the next 12 months</b></p> <ul style="list-style-type: none"> <li>City and DER industry advocate to MOE and OEB to update the Distribution Code to be friendlier to DERs <ul style="list-style-type: none"> <li>Increase microgeneration limit above 10 kW</li> <li>Connection Impact Assessment process improvement → introduce a different CIA process for residential DER compared to commercial DER</li> </ul> </li> <li>City and stakeholders to advocate for greater transparency and modernization of methods for assessing grid readiness (e.g., short-circuit capacity). <ul style="list-style-type: none"> <li>Review of best practices from other jurisdictions.</li> </ul> </li> <li>City and Toronto Hydro to explore potential for Toronto Hydro to apply to be a DSO and set local rates/prices for local generation and grid services (CDM, demand response) through IESO/OEB Sandbox.</li> <li>Improve processes for cost benefit analysis (CBA) <ul style="list-style-type: none"> <li>OEB developing DER CBA method</li> <li>City and Toronto Hydro could characterize cost of B.A.U. to better illustrate case for investing in grid readiness</li> <li>Integrating community benefits (local economic/job benefits, resiliency benefits through diverse supply mix)</li> </ul> </li> <li>Toronto Hydro and City to collaborate more with industry in identifying new technology that can help with grid readiness.</li> <li>Industry, City, and Toronto Hydro to work on improving user experience for DER hosts (regulatory, program supports, billing).</li> </ul>	<p><b>Immediate - within the next 12 months</b></p> <ul style="list-style-type: none"> <li>Smart inverters/EV chargers/technology → MOE → OEB <ul style="list-style-type: none"> <li>Require all new installs</li> </ul> </li> <li>Multi-stakeholder consensus → Uber panel to integrate → Mark Carney → Drive stakeholdering</li> <li>Clean electricity regulation → in progress</li> <li>Service sizing for electrification → MOE → OEB → Hydro → ESA → Gov reg <ul style="list-style-type: none"> <li>Review now</li> </ul> </li> <li>Expand data availability → MOE → OEB → IESO → Green Button → MDR <ul style="list-style-type: none"> <li>Granularity</li> </ul> </li> <li>Distribution System Operators <ul style="list-style-type: none"> <li>Plan</li> </ul> </li> </ul> <p><b>Medium term- within 2-5 years</b></p> <ul style="list-style-type: none"> <li>Electricity market → W vs VA; PF/Freq Reg/etc.</li> <li>Proper carbon market</li> <li>Lead data exchange/interchange standards</li> </ul>	<p><b>Immediate - within the next 12 months</b></p> <ul style="list-style-type: none"> <li>Need provincial regulations to drive virtual power plants</li> <li>Rather than create new pilot projects, learn from other countries' experience</li> <li>Need penalties and incentives for buildings (existing and new construction)</li> <li>Need more stringent green standards for buildings (currently only 2% renewables)</li> <li>Toronto Hydro needs faster approvals and lower costs for connections</li> <li>Building permit process needs to be faster</li> <li>Modify net metering program to allow virtual/community net metering</li> <li>Incentives needed for all stakeholders</li> <li>Banks need to step up to support renewables</li> </ul>	<p><b>Immediate - within the next 12 months</b></p> <ul style="list-style-type: none"> <li>Government of Ontario to remove (or at least income-base) the O.E.R.</li> <li>Joint advocacy push from multiple utilities to Ontario Energy Board (OEB) for long-term (NOT Sandbox) regulatory reform (CLD, EDA, Quest)</li> <li>Utilities need to identify ideal locations to host DERs <ul style="list-style-type: none"> <li>Next step is outreach to customers and streamlining program design.</li> </ul> </li> <li>Research RFPs (provincial, federal) for: <ul style="list-style-type: none"> <li>Technology development</li> <li>Feasibility, scalability, and implementation studies</li> <li>Battery costs (recycling, mining e-waste, process)</li> </ul> </li> </ul> <p><b>Medium term- within 2-5 years</b></p> <ul style="list-style-type: none"> <li>Don't screw up the deployment of investment tax credits (ITCs) and Clean Electricity Regulation (CER)</li> </ul>	<p><b>Immediate - within the next 12 months</b></p> <ul style="list-style-type: none"> <li>Collaboration <ul style="list-style-type: none"> <li>between municipalities</li> <li>Partnerships with Association of Municipalities of Ontario (AMO)</li> <li>Across Canada (federally)</li> </ul> </li> <li>Incentive programs to increase demand <ul style="list-style-type: none"> <li>Tax incentives for local manufacturing</li> <li>More incentives for skilled trades</li> <li>Participate in regional planning process</li> <li>Scoping of rooftops</li> <li>Consumer education, installer education</li> <li>Sector councils, funding</li> </ul> </li> </ul> <p><b>Medium term- within 2-5 years</b></p> <ul style="list-style-type: none"> <li>Codes and standards <ul style="list-style-type: none"> <li>Engagement from industry - how do we speed this up?</li> <li>Industry associations</li> <li>The federal government needs to be involved <ul style="list-style-type: none"> <li>Funding</li> <li>Targeted programs</li> </ul> </li> </ul> </li> <li>Develop industry strategy for clean energy</li> </ul>	<p><b>Immediate - within the next 12 months</b></p> <ul style="list-style-type: none"> <li>Step program of incentives (early adopters get biggest incentives)</li> <li>Procurement/Buying</li> <li>Incentivize Trades</li> <li>Business Models</li> <li>Government of Ontario + Federal</li> <li>Municipalities to pool together with industry and petition government</li> <li>Toronto to create fund to buy the equipment to be distributed</li> <li>Toronto in partnerships with universities and colleges</li> <li>Provincial and federal government commitment</li> <li>City and industry leaders (e.g. FEO) to create one-stop shop/knowledge database for DERs</li> <li>City can find existing funding streams</li> <li>Different playbooks to navigate renewables installation (Municipalities &amp; Industry) <ul style="list-style-type: none"> <li>Identify what the barriers are and demonstrate/state work arounds</li> </ul> </li> <li>City to have standardized/list of registered/licenses contractors</li> <li>City to integrate 'How to get solar' into SolarTO</li> <li>Create standardized place for all records associated with one address</li> <li>Universities → uncover all the existing resources/tools in Toronto other than financial (e.g., employment, equipment)</li> <li>Expand Betterhomes TO</li> <li>City partnerships with home energy advisors for roadshows in communities</li> <li>Doors Open Toronto</li> <li>Generating Market demand for renewables</li> <li>Identify &amp; educate the 3 steps: 1) Building envelope, 2) heat pump, 3) install renewables → City of Toronto/Betterhomes TO</li> </ul>

## Sharing your answers:

# WHAT IS ONE STEP YOU OR YOUR ORGANIZATION CAN TAKE TO ADVANCE THE SOLUTIONS WE HEARD TODAY?

- At Mitrex, our studies and products aim to enhance the building's R-value to an almost infinite level, resulting in zero energy loss through the building envelope.
- Advocate for solutions. Development of playbooks. Demonstration projects
- Build partnerships to convene energy stakeholders and help smooth the collective activities with the research community at the University of Toronto to support acceleration and adoption
- Continue to advocate and share our experience with agencies, government and utility sector – however as a private business my organization has limited ability to solve the identified barriers ourselves
- QUEST Canada is actively working on establishing a better platform for energy decision makers (particularly the regulator, system operator, and electrical/NG utilities) to collaborate and explore better energy planning processes (i.e. integrated resource planning, bottom-up community energy planning, etc.)
- Empower the development of technology and smart ideas for the grid modernization and DER integration
- Leverage pilots to deploy impactful solutions
- Analyzing successful cases of deployment, presenting best practices to key stakeholders (UofT researcher)
- Engage MPPs to empower MOE to issue policy guidance to OEB to review and amend DSC
- Continue to move discussions forward with other other stakeholders

Sharing your answers:

# WHAT IS ONE STEP YOU OR YOUR ORGANIZATION CAN TAKE TO ADVANCE THE SOLUTIONS WE HEARD TODAY?

- Community scale net zero or climate positive building retrofits
- Awareness on high performance buildings at the same cost
- Integrate goals and definitions with other levels of government and institutions. Make sure goals are aligned.
- Cost-effectively electrify heat for large buildings, district energy and industry.
- Coordinate with stakeholders to come up with solutions.
- Integrate these ideas into our submission to Ontario's electrification and energy transition panel (comment due end of June!)
- Grid / testing center at UofT
- Bring smart solutions to the market
- Regulatory structure and framework for DSOs.
- Collaborating with stakeholders to drive net zero goals
- Local playbook for Oakville for residential, commercial and vendors for installations
- Share information with as many stakeholder as possible to break barriers
- Talk to more people who are on the ground doing DER work
- Keep pushing to advance good projects
- Advancing building performance standards



# WHAT DID WE LEARN ABOUT NATURE OF BARRIERS?

POLITICAL/REGULATORY	ECONOMIC	SOCIAL/CULTURAL	TECHNOLOGICAL/ INFRASTRUCTURE
<ul style="list-style-type: none"> <li>● Difficult for LDCs to plan/budget for getting grid ready through 5-year rate applications</li> <li>● Over politicization of energy planning</li> <li>● Inertia</li> <li>● Historical, Antiquated/not aligned regulatory structures</li> <li>● Permitting</li> <li>● Municipal, provincial, and federal government consensus</li> <li>● Lack of collaboration between governments / agencies / stakeholders</li> <li>● Small industry means small voice /advocacy</li> </ul>	<ul style="list-style-type: none"> <li>● Getting grid ready in neighborhood can be costly for local distribution companies (LDCs), especially with uncertain demand for DER connections</li> <li>● Cost of grid readiness and impact on rates</li> <li>● High upfront costs, lack of business case and financial incentives</li> <li>● Valuation methodology – externalities not included</li> <li>● Electricity is currently subsidized – B.A.U. is affordable</li> <li>● No number for suppliers and technicians.</li> <li>● Insufficient demand growth to fuel change</li> </ul>	<ul style="list-style-type: none"> <li>● Potentially Ontario LDCs are overly conservative in evaluating short-circuit capacity and other grid readiness elements</li> <li>● Equity – DERs are only an option for higher earners</li> </ul>	<ul style="list-style-type: none"> <li>● Not all DERs can be approved due to local grid capacity/infrastructure</li> <li>● Tech, availability / immature tech</li> <li>● Data integration</li> <li>● Data availability</li> <li>● Consensus</li> <li>● Interoperability</li> <li>● Signalling</li> <li>● Modernization</li> <li>● Software</li> <li>● GRID</li> <li>● IESO Software</li> <li>● Concern re: grid failure</li> </ul>

# GENERAL LEARNINGS & FINDINGS

## Barriers are:

- complex
- exacerbated by uncertainty
- inertia, resistance to change and ease of business-as-usual, have perverse incentives
- multi-jurisdictional, multi-sectoral in scope
- conditioned by a mix of real and perceived constraints
- a need for examples / demonstration projects to serve as catalysts

## Solutions should:

- be multi-pronged (regulatory change + financing + infrastructure + supply chain)
- be depoliticized
- be transparent
- apply best practices
- be scalable
- mobilize private investment
- entail regulatory change (distribution code)
- be integrated across municipal, provincial, federal plans, policies rate cases
- help to mature technologies, supply chain, grid
- overcome inertia
- be backed by a strong business case
- be data-driven



# SIGNIFICANCE OF FINDINGS TO THE CITY

- Collaboration (between different levels of government and industry) is at the heart of many of the solutions proposed
- Advocacy and lobbying is needed to induce swift action by the provincial and federal governments
- A desire for better data sharing and reporting of research between groups/ sectors
- Incentives for all stakeholders are essential, especially those that reward early adoption.
- There are opportunities for streamlining and standardizing processes and policies (e.g., records that follow a building)



# CONCLUDING COMMENTS

- Toronto Hydro: is already enacting many of the solutions identified; “all the themes already in play: improve user experience, make it faster, expecting to release new solar standards by the fall”
- OEB: framework for energy and innovation and easier connection, there is progress but a lot more work to be done, regulator is listening and will take action
- City of Toronto: challenge is how do all the pieces come together in a pathway forward, there is clarity on what the outcomes should be, but continued collaboration needed; different timelines are a challenge, need coordination and ensure we are still all trying to get to the same outcome
- Ontario: lots of stakeholder consultations are happening about DERs, Ministry to release “a plan for longer term”; they are focused on DER; adverse to red tape at the Ministry right now





## NEXT STEPS & RESPONSIBILITIES

- UCAP to share this report with all participants and the City of Toronto
- UCAP and partners will integrate discussion points from this workshop into comments for the Government of Canada's design details for clean energy investment tax credits (Clean Technology, Clean Electricity and Hydrogen) [via email](#) by end of July 2023
- All interested parties are encouraged to review [upcoming funding opportunities through NRCan](#)

Sharing your answers:

# WHICH OF THE SOLUTIONS YOU HEARD TODAY ARE YOU MOST EXCITED ABOUT?

- DSOs as a local option for communities
- Learning from other jurisdictions (that have done it well)
- Standard playbooks to reduce friction
- Standardized playbooks for various solutions
- Distributed System Operators (DSOs)
- Local competitive advantage
- DER as not only an energy supplier for the grid but also a solution to reduce locally the energy demanded from the grid
- Deploying and integrating existing technologies in a position of leadership
- Better local manufacturing and procurement
- Green tape
- New and streamlined financial incentives
- A new group for a distribution level system operator for electricity.
- Transformation not incrementalism. End the pilots.
- Streamlined approvals for DER
- BIPV and energy generation from building material instead of typical solar panels and smart grid
- Higher building standards



Sharing your answers:

# WHICH OF THE SOLUTIONS YOU HEARD TODAY ARE YOU MOST EXCITED ABOUT?

- Reverse approval process
- Collaboration and coordination of stakeholders to align as much activity as possible!
- Get utilities to identify ideal DER hosting sites and reach out to consumers – reversing the process
- Review and amend Distribution System Code to facilitate a greater amount of DER connections at lower/no cost in a short timeframe and more efficient manner.
- Revise distribution code to better support DERs (and reduce red tape for DERs)
- Excited about progress
- Better coordination between entities and better information for homeowners/business owners/tenants
- Changes to hydro processes. Third party ownership of DERs
- Collaboration between the 3 levels of government to speed up reduction of barriers.
- User experience improvements.
- Public education and engagement to improve DER awareness
- Requiring smart grid asap
- Collaboration at all levels
- Income-base the OER
- Requirements for smart tech
- All



# THANK YOU



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