# Communicating Transformational Climate Actions: Final Report

A University of Toronto and SI Canada Collaboration and

Funding through a Mitacs Accelerate grant

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# ACKNOWLEDGMENTS


## Territory

I gratefully and respectfully acknowledge that I live, work, and play on the ancestral and unceded territories of the Lil'wat and St'at'imc Nations. In my work and travels throughout Turtle Island, I acknowledge the ancestral and unceded territory of all the Inuit, Métis, and First Nations peoples who call this land home.
Furthermore, I acknowledge the land on which much of the student work was undertaken was on the traditional territory of many nations including the Mississaugas of the Credit, the Anishnabeg, the Chippewa, the Haudenosaunee and the Wendat peoples and is now home to many diverse First Nations, Inuit and Métis. We also acknowledge that Toronto is covered by Treaty 13 with the Mississaugas of the Credit.

## Gratitude to Funders, Partners and Workshop Participants

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# INTRODUCTION

## Background

Like many cities that have declared a climate emergency, Toronto has accelerated its targets to significantly cut greenhouse gas (GHG) emissions, while also addressing the impacts of climate change. These commitments are articulated in the City's climate action strategy: TransformTO, which was unanimously approved by City Council in July 2017, and has been updated several times since then. The plan includes a set of long-term, low-carbon goals and strategies to reduce local greenhouse gas emissions and improve health, grow the economy, and improve social equity.

Achieving these targets will require "transformational changes in how we live, work, commute, and build" (TransformTO, 2019) and a Herculean effort across the wide array of sectors, industries, and levels of government that shape Toronto's urban environment. Transformational change is understood here as deep, systemic, and sustainable changes with large-scale impacts in a significant area of concern.

The Urban Climate Action Project (UCAP) brings the expertise and capacities of the University of Toronto (U of T) to the table by strengthening a burgeoning partnership between the university and city to tackle the challenges of implementing TransformTO. The vision for such a partnership is one of symbiosis whereby the unique capabilities of the university (e.g., students, faculty, research funding, campus infrastructure, etc.) are leveraged to help the City achieve its climate goals, while university students - future generations of architects, planners, engineers, policy analysts, communications specialists, and so forth- become better versed in sustainability thinking and climate action. This Toronto-based effort echoes efforts at the national scale via the Urban Climate Action Network (UCAN), a research cluster of the pan- North America University Climate Change Coalition (UC3) that is likewise focused on building city/university collaboratives for decisive climate action. As a UCAN and UC3 member, we envision identifying and sharing best practices and lessons learned to support rapid scale-up of implementation efforts.

To realize UCAP's vision, the UCAP Team at the University of Toronto (U of T) is undertaking multiple place-based, and context-specific activities in collaboration with the City of Toronto and other civil society partners. One such effort, and the

focus of this research project, is to harvest and share research findings drawn from U of T's community engaged learning (CEL) courses (Available on U of T's database of sustainability projects).

Many of these projects, notably those produced by students in a sequence of living lab courses from 2016 to 2022, offered through the Munk School of Global Affairs and Public Policy, focused on the City of Toronto's climate action strategy. In 2022, in one such course, GLA2029H, Sustainability in the World, a Living Lab Course, groups of 4 or 5 students acted as researcher-consultants, meeting regularly with their "clients", and undertaking research (e.g. jurisdictional, and environmental scans) that identified low carbon and equity-based solutions (see Appendix B for 1-page summaries of GLA2029H projects and other CEL courses reviewed) for advancing the TransformTO goals. The end products were 12 research reports containing rich qualitative data, analysis, and sets of recommendations for the clients.

In collaboration with SI Canada, and with the generous support of a Mitacs Accelerate Grant (2022), a Mitacs Intern / Research Assistant (RA) (Kim Slater) harvested insights gleaned from GLA2029H research projects and other CEL course projects with salience for advancing climate action in Toronto. Working with members of U of T's research community, local government, and civil society partners Dr. Slater evaluated the recommendations proposed by students to identify those with high potential as real-world low carbon solutions. Finally, to help mobilize and translate knowledge from this body of student research, Dr. SLater prepared one-page case studies for each report, shared findings in a published paper in the journal *Buildings & Cities and* developed a communications plan for communicating findings with a variety of academic and practitioner audiences.

On Jan 16, 2023, the results of this work were then shared with colleagues from the City of Toronto, The Atmospheric Fund, and Social Innovation Canada in the backcasting workshop that is the subject of this report.

The overall purpose of undertaking this project is to derive as much value as possible from student research in service of advancing the TransformTO goals. By sharing solutions and learning across UCAN and SI Canada networks, the aim is to play a role in building a community of practice for mainstreaming transformational climate action in urban centres across Canada and beyond.

## Project Objectives

1. Harvest and synthesize lessons and insights from community-engaged learning projects (e.g., GLA2029) to inform potential "transformational climate actions" for the City, TAF and other partners to consider pursuing

2. Support the engagement of current partners in reviewing and prioritizing transformation climate actions (e.g., via a workshop and interviews)
3. Identify new partners (e.g., community members and industry representatives) in advancing solutions around the priority climate actions
4. Work with all partners to determine what's feasible and contribute to the co-design plans, events, strategies, and funding proposals for advancing low carbon interventions, as well as research projects for the 2023 GLA2029 student cohort
5. Develop a communications plan for sharing insights and high-impact climate actions across SI, U of T and partners' platforms and publications, to reach diverse local, national, and international audiences.

## Research questions

1. What collective insights might be drawn from student research undertaken through U of T's community engaged learning courses, particularly on behalf of "clients" at the City and TAF, over the past six years?
2. Which of the recommendations and ideas proposed have the greatest potential for realizing the City's climate action goals, notably those articulated through TransformTO?
3. How might a backcasting approach enable exploration and steps to prototype high-potential ideas?
4. How might knowledge be mobilized and translated through a communications plan and communications products targeting key audiences?
5. What are the next steps to disseminate and amplify findings, notably who should be engaged next?

# METHODOLOGY

## Overview of CEL courses sampled

UCAP is an initiative of The President's Advisory Committee on the Environment, Climate Change, and Sustainability (CECCS). CECCS was created in 2017 with the following overall goals: to make sustainability a key component of the University of Toronto (U of T) identity, to achieve international leadership in the integration of operational and academic sustainability, and to coordinate disparate sustainability activities across the three campuses. A continuing partnership with the Centre for Community Partnerships has helped to incorporate sustainability in community-engaged learning (CEL) courses. Projects reviewed here were drawn from the following CEL courses (note author details are contained therein):

- 12 GLA2029 projects (2022)
  - Understanding the Social Equity Implications of Decarbonization in Existing Buildings
  - Neighbourhood & Community-Led Solutions to Building Retrofitting
  - Innovative Retrofit Programs Jurisdictional Scan
  - Understanding the Qualitative and Quantitative Benefits of the City's PollinateTO Community Grants Program
  - Investigating Incentives and Disincentives in the Transition to Zero Emission Vehicles in Toronto
  - Scaling and Delivering Climate Solutions
  - Communicating Transformational Change
  - Sustainable Procurement
  - Zero Emissions Construction Product and Knowledge Gaps
  - Integration of Climate in Asset Management Processes
  - Jurisdictional Scan of Retrofit Initiatives
  - Indoor Health Co-Benefit of Building Retrofit Projects

- 17 GLA2000Y (2016-2022)
  - TransformTO: Green Infrastructure
  - TransformTO: 100% Renewable Energy in Cities

- Switching the Current: Incentivizing EV Adoption
- Consumption-based Emissions Inventory for Toronto
- Energy Efficiency, Conservation, and Sustainability for Toronto Buildings
- Financing Low Carbon Resilience Options for Toronto
- Diverting Textiles from Toronto's Waste and Garbage Streams
- Exploring Carbon Pricing for Toronto Projects and Initiatives
- Energy Systems Integration: A Review and Analysis of District Energy for Ontario
- Divestment and the City: How 8 Global Cities Reacted and How Toronto Could Implement a Divestment Decision
- Valuing Climate Resilience in Ontario's Electrical Grid
- Sustainable Commuting: Workplace Supports
- Dedicated Financing Mechanisms for Climate Action
- Conceptualizing a Toronto Green Bank
- Understanding the Impact of Sustainable Finance on Ontario's Energy Sector
- Recommendations for a Home Energy Rating and Disclosure (HERD) Program for Toronto
- Decarbonization through Electrification: A Business Case for Air-Source Heat Pumps

- 3 GLA2000H (2021)
  - Cracking the Cleantech Adoption Barrier for Cities & Communities
  - Coordination: Climate Policy in Ontario
  - Applications of Hydrogen in Support of TransformTO

- 4 EESC34H3 (2020)
  - Environmental Sustainability Evaluation of Electronic Waste Management in Toronto, Ontario
  - Solar and Storage Solutions for Three Building Archetypes in the City of Toronto
  - Improving the Urban Agriculture Landscape in Toronto
  - Assessment of the Management Plan at Rouge National Urban Park

- 3 MIE490Y1/491Y1
    - Power Response: Using Renewable Energy in Disaster Response
    - Desert to Oasis - Rainwater-Harvesting Tank Optimized
    - Decision Support System for Weather Stations' Operation Plan

- 1 RSM417
    - Decarbonizing Cities Through the Use of Private Investments in Micro Mobility

**40 Total**

Of these, 35 had the highest relevance to the acceleration of TransformTO and lent themselves to the creation of one-page summaries (see appendix). The following, while reviewed, were not developed into one-page summaries: Assessment of the Management Plan at Rouge National Urban Park; Power Response: Using Renewable Energy in Disaster Response; Desert to Oasis - Rainwater-Harvesting Tank Optimized; Decision Support System for Weather Stations' Operation Plan and Decarbonizing Cities Through the Use of Private Investments in Micro Mobility

## Document analysis to synthesize findings

Over eight months (June 2022- Jan 2023), Dr. Slaterundertook a document analysis to summarize and synthesize findings of the 40 CEL research reports. Through this process, she identified jurisdictions most frequently scanned, commonly recommended climate interventions /action, bundled components of transformative climate action, as well as common obstacles and opportunities for action. She also identified apparent gaps and suggestions for a future research agenda for future CEL student cohorts and the broader research community.

## Evaluation

To initiate a process of identifying recommended actions / interventions with a seemingly high degree of potential for realizing the City's climate goals, Dr. Slater devised an evaluation framework drawn from the evaluation literature and common

approaches for measuring transformative change, as well as a prior evaluation framework she developed with peers for evaluating the contributions of small-scale climate action interventions for sustainability transitions.

### Framework

- Feasibility
    - Can the recommended action/intervention be implemented with available resources, time, training, and materials?

- Support/Validity/Relevance
    - Do key actors view the recommended action/intervention as relevant, appropriate, fair, and potentially effective?

- Successful Cases
    - Is there evidence of the intervention producing /deep / wide / durable changes in other contexts?

- Co-benefits/SDGs
    - Do the actions tackle multiple issues, co-benefits, SDGs, and interrelated systems? (“full cost accounting” and “complex systems framing”)

- Adaptability
    - Is there sufficient flexibility built into intervention procedures to accommodate diverse needs and learning, while being nimble in the context of complexity /uncertainty? Are proposed recommendations applicable across multiple domains /emissions producing sectors? (“DEI” and “adaptive sustainability”)

- Scalable / Potential Impact
    - Is there evidence that the proposed intervention can be scaled out /up / deep? (“transformation fidelity” “interconnectedness momentum”)

### High-Potential Recommendations

The result of that evaluation was a set of 10 recommended actions or interventions, three of which the UCAP team felt were particularly promising (marked with an asterisk), that were then presented to partners at the City, TAF and SI Canada in a three- hour workshop (Jan.16, 2023):

- One stop shop*
    - An information hub for all climate action programs in the city.
    - Could include user-centered decision-trees, pathways, and a concierge service to help users navigate and access rebates, grants, and related goods and services.
    - A gateway to incentive packages that include financial benefits/ subsidies + convenience incentives (e.g., free, or subsidized installation of a heat pump).

- Equity-focused training program for contractors*
    - An equity-focused program for contractors that includes skills and ambassador training (e.g., re: types of heat pumps on the market, how to install, and information on rebates to share with clients)
    - Supported through public-private or quadruple helix partnerships (E.g., City / TAF/ Unions / Building industries / TCBN / Humber / U of T).

- Municipal green finance*
    - Develop and pilot a range of financial products to support green infrastructure, as well as equity-targeted lending and granting schemes supporting lower income folks in retrofitting their dwellings.

- Net zero retrofit passports, roadmaps, tech primers
    - Mandate or incentivize owners to conducting energy audits and tune-ups
    - Documents stay with building and inform the resale value

- Bulk purchasing program with fast-tracking of permits

    - Wholesale pricing of a large quantity of heat pumps, EV bikes
    - Supported through a public-private partnership

- EV sharing economy venture
    - Launch peer-to-peer platform to allow EV drivers to sell the use of their at-home charging stations to the public on a per charge basis.

- Parking cash out and commuter benefits laws
    - Offer incentives to businesses to convert parking spots to support low emissions vehicle (LEV) / secure bike storage and provide commuter benefits (e.g., free / discounted transit passes) to employees

- Social equity indicators and evaluation embedded in all climate programs
    - Creation of a citizen advisory committee to oversee results and recommend changes

- Broaden and strengthen data ecosystems for better decision-making
    - Bring together diverse datasets to better understand synergies and trade-offs, and inform communication strategies that build awareness
    - Set up data sharing agreements for interagency data sharing

- Legal and organizing strategies inducing stronger regulations by Province
    - EG Building Code, broaden grid electrification, phase out natural gas

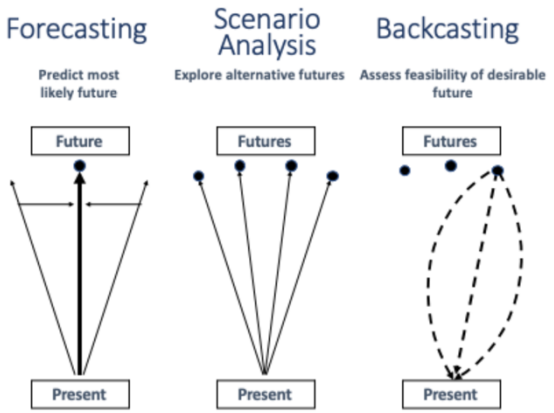
## Workshop

On Monday January 16, 2023, the UCAP team hosted a hybrid (in-person and virtual) workshop of representatives from SI Canada, the Environment and Climate Division (ECD) of the City of Toronto, and The Atmospheric Fund (TAF) at the University of Toronto. A total of seven people participated. See list of participants in Appendix C.

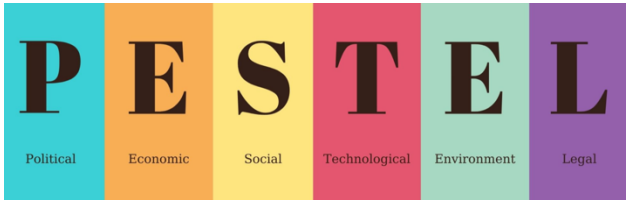
## Objectives

- Inform participants (City staff, SI Canada) of Mitacs project and progress
- Review actions & recommendations drawn from student projects
- Choose top priority actions and recommendations
- Guide participants through a backcasting exercise to determine how one of those actions / recommendations could best be implemented
- Evaluate this approach to exploring implementation issues
- Identify next steps, and additional actions to pursue this agenda

**Process** (See Appendix A for Facilitators' Agenda detailing the proceedings)




- Dr. Slatershared a workshop brief with participants prior to the workshop. The brief contained project objectives, progress, top recommendations, and a subset of representative student work.
- The workshop opened with a PowerPoint presentation providing an overview of the project and backcasting approach
- Participants discussed the list of 10 recommended actions, and explored opportunities for tweaking, combining and/or adding ideas. Each participant voted on their preferred idea(s), and one was selected for the backcasting exercise: *Financial mechanisms that embed social equity programming and indicators.*
- Participants were guided through a backcasting exercise whereby they were invited to:
    - Paint a picture of the future (2040) contemplating external factors (e.g., political, economic, social, technological, environmental, and legal- PESTEL) and a fully operational and



effective social-equity focused green bank contributing to the realization of the TransformTO goals.
- Explore how to realize that future, identifying essential steps along the way.
- Conversation was captured by Kim on a Miro board.

## Discussion

***Rationale for selecting intervention- a municipal bank embedding social equity programming and indicators***

- While there was general support for all three of the top ranked recommended ideas / actions ("interventions"), ultimately participants selected the idea they felt had the greatest potential for advancing social equity, while aggregating and accelerating climate action at scale.

***Backcasting Session #1: Paint a picture***

- **Future goal: Innovative Financing System with Social Equity indicators deeply embedded**
  - Communities most vulnerable to climate impacts in Toronto are benefiting financially and socially from investments in climate action. What climate is shaped by those goals...what kind of future would work for vulnerable communities (that has climate action built in that fits their aspiration)?
  - Normalize what now seems risky
  - Financing innovation that changes the rules of the game
  - Need a systems-perspective
  - Need large financial institutions to invest in small / local OR find ways of aggregating smaller projects...or create intermediary orgs to help...need to be organizing
  - Getting stuck - a public bank is a tactic/ tool

- **Big Questions:**
  - how do we invest in a more equitable future?
  - Infrastructure bank: can't find projects to finance AND banks still invest in fossil fuels...how to de-risk / re-incentivize right action?
  - How to overcome the (perceived) barrier of risk?

- What's the criteria for success? Money doesn't flow.

- **Potential Obstacles:**
  - Feds struggle to think at municipal scale
  - A lot of work needed to make an innovation "financeable" There's a need to make investments investment-ready

- **Potential Opportunities**
  - 500 b non-profit fund...most interesting. For profit (40 years affordable) CHMC only needs 10...something around impact...impact / outcomes financing. Valuing impact. Money is about returning social environmental value to society. ***Toronto doesn't need much money to make money***
  - What about green equity bonds for individuals?
  - Need to seed levy and then scale

***Backcasting Session#2: How do we get there?***

**5 key things for getting there:**

1. Look at demand side (more important than supply side: sources / availability of capital); need to make investments ready to receive funding (as fossil fuel investments typically are), to de-risk and normalize equity-based climate investments (other side of the coin would be to make fossil investments riskier)
2. Find ways to scale and aggregating smaller initiatives; CIB has had trouble getting money out the door: it operates at the wrong scale for municipal climate action: there is a need for municipal-scale funding systems and programs
3. Allow for public availability fund
4. Recognize that not everything should be seen as an investment, requiring a return, some things are simply part of government expenditures, which are financed by taxes ; an example would be a large government program to install heat pumps;
5. Need continual assessment of who benefits from policies and programs? In principle, there should be an equity return that goes to communities (wealth to community)-> shift power to

**Enablers:**

1. Narratives:
    - Communicate - no you won't freeze to death in the winter, stranded on the highway with an EV
    - Communication actions: eg. with respect to Feed in tariffs (FITs) - narrative really spun negatively...rather than an investment in the future. Need to better tell the story of the benefits. Best to think in advance of policy driven opportunities...need mechanisms for creating community wealth. Understand the barriers for getting financially involved.
    - Objective around which a narrative gets formed: EG Community-scale energy systems better than Feed In Tariff...need stories that appeal to people
    - Crucial implementation piece= constructing narratives that bring people together (neighbourhood and city scale)...of what doing these 4 things would look like and play out in their lives
    - Compelling narrative - we can invest now and create wealth. Strengthen community resilience to climate impacts - specifically around power outages. Save our neighbours during power outages.
    - Transition is going to be a lot of work. Market transformation will have some bumps and require adaptations and learning...need tenacity to persevere...political commitment
    - Pay attention to resident concerns. Noisy heat pumps, etc. These are real issues for people. Need to be dealt with + push through. Narrative -> climate is changing, and this is needed.
    - How to counter residents appropriating environmental narratives. Multi-community to research project to address concerns
    - (green financing for] Affordable housing narrative offers a frame for a narrative around these issues...

2. Social Capital: Partnerships, Multi-sectoral Collaborations
    - Building the social capital necessary to enact change
    - SI Canada community labs: 2 different stages of innovation (local pilot + scale). Different type of entity/ dual prong approach
    - Building relationships + institutional innovation
    - GTHA- United Way Purpose Financing- working in these realms- Sandra
    - TCBN model worth exploring: community benefits agreements
    - There is a feasible community energy system scheme arising in St. Jamestown - great opportunity
    - Building community wealth in St. Jamestown ...connect with key players
    - Leadership piece to engage mutual funds -> they have a lot of data > how to cut through data smog? Insurance

3. New evaluative measures
    - Need to change our measuring sticks (e.g., climate leaders should reflect community diversity)
    - The way we measure climate actions need to make visible new kinds of leadership and community capacity
    - What are the signposts?
    - Need additional indicators to capture things like community capacity
    - Criteria: what is the appetite / possibilities for success? Look at whole system interactions...Need to recognize assumptions and orthodoxies...criteria for investment that weaves PESTEL

4. Other - Complementary policy bits and pieces and tools (e.g., social and spatial mapping)

**Considerations and Questions**

- City is costing out impacts of different climate scenarios on city infrastructure / and response (operational)
- We might align some of this work with the new federal Retrofit Accelerator program - intermediaries to accelerate retrofit of affordable housing
- Investing a mid-term or future impact? Refer to Impact Canada work -> what happens if we do an upstream intervention-> what's it going to cost if we "DON'T do it? Climate action is getting more expensive...Retrofits you can link revenue source with impact
- Existing green bonds do try to convey social benefits as well as climate....(e.g., investment in libraries-> warming spaces)ESG = risk reduction NOT impact
- Where do we need municipal green finance?
- What role should CAG be doing? Redo exercise _> how do we connect to challenges of today?
- Where are the fleshy areas where we can drive equity + climate?
- People don't get excited about things they can't see-> retrofits? What would be very tangible, applied, tactical? Solar rooftops
- so much to be worked out there. For example, housing that provides a suite of services. E.gA community housing provider I'm aware of has about 100 residential properties - how do you finance upgrades to these properties that achieves the following aims: resilience, cost savings, communicates the benefits?

**Models + Multi-solving Ideas**

- Raven- transitioning housing on reserve to heat pumps...driver of community wealth Toronto Community Housing Models are a great place to start. Subsidize the transition for low income
- 20-year commitment re: SolarShare helped to de-risk?
- Affordable housing in areas where new immigrants are residing...NIA great opportunity for helping vulnerable pop and community wealth by energy system backup and job benefits. Imagine if we had a community bond for ESG interested investors would invest in buying community energy system in NIA half of equity would be reinvested into community
- We could be ganging up distributed energy resilience, back-up power, and EV capacity in vulnerable neighbourhoods.
- Back-up energy benefit - energy resilience - for vulnerable populations is a great theme
- Should think about internet back up as a resilience piece too
- Model: a community bond, invested through a philanthropic org. goes to equity investments in the community, for vulnerable, climate, resilience, etc.
- System nudges
- Investment vehicle needed

**Next steps**

- Need a stakeholder map and their roles in enabling or implementing intervention (scenario underneath it) and description of how it's going to impact people
- Create "How might we statements..." for each stakeholder
- Another workshop?
- Development of narratives to enable new financial mechanisms
- Strengthening / expanding social capital and partnerships work with other actors / researchers / practitioners working on community wealth and in related areas

## FINDINGS

In reviewing the 40 student research projects, many of which were informed by the City and TAF's research questions and needs, several themes as well as gaps emerged that are briefly synthesized below.

**Jurisdictional Leaders and Most Frequently Scanned:**

While the research projects covered an array of topics such as building retrofits, commuting, and procurement to name a few, many of the same jurisdictions were repeatedly referenced as leading or piloting novel climate solutions in those areas. While this perhaps reflects a prior knowledge bias of the instructor and "clients" at the City and TAF (i.e., jurisdictions that were frequently scanned may have been suggested to students by the instructor or "clients"), the following list of frequently scanned jurisdictions also suggests that some cities are indeed advancing bold climate action across the board.

- Vancouver, BC
- New York City, NY
- San Francisco, CA
- London, UK
- Seattle, WA
- Copenhagen, DK
- Washington, DC
- Oslo, NO
- Paris, FR

The papers spoke to how these jurisdictions were able to advance climate solutions and reduce emissions through such approaches as adding a climate lens to municipal plans and budgeting processes, reframing their role or adopting new roles (e.g., as lenders in novel green municipal bank structures, or as buyers with the power to shape and nudge markets), engaging and partnering with community and private sector actors (i.e., to achieve buy-in and enhance capacity and access to resources), and by embedding data collection and evaluation approaches for better decision-making. Consistently, leading jurisdictions demonstrated strong political will, a willingness to spend where needed, and an ability to integrate climate solutions in municipal functions regarding land use, community development, and infrastructure upgrades and maintenance.

### PESTLE Contextual Factors Shaping Climate Action

Despite the diversity of jurisdictions scanned around the globe, similar political-economic-social-technological-legal-environment (PESTLE) contextual factors were cited by students as significantly shaping the propensity and effectiveness of urban climate action initiated by local governments; either constraining them or enabling them (individually or in combination). Such factors may exist largely outside the purview of a local government or be factors over which a local government has some influence.

| Political | Economic | Social | Technological | Legal | Environmental |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| • Terms of office<br>• Current and<br>• future regulations and policies<br>• Jurisdictional scope<br>• Other regulatory bodies<br>• Other (competing) priorities<br>• Rise of populism<br>• Wars and conflicts<br>• Lobbying / advocacy groups | • Supply chains Overseas' economies<br>• Price of energy / commodities<br>• Availability of funding and grants Budgets, incentives, taxes, rebates<br>• International and domestic trade<br>• Skilled labour<br>• Specific industry factors | • Lifestyle trends<br>• Demographics<br>• Consumer attitudes<br>• Media portrayals<br>• NIMBYISM<br>• Cultural attitudes, values, beliefs to climate action<br>• Understanding/ awareness of climate smart options<br>• Convenience factors<br>• Behaviours, norms | • Availability of (affordable) low carbon technologies<br>• Rate of technology change<br>• Spending on research and development<br>• State of infrastructure<br>• Technology legislation<br>• Date integration and role in decision-making | • Consumer protection<br>• Health and safety laws<br>• Privacy and data protection laws limit data sharing between agencies<br>• Employ-ment laws<br>• Legal cases (class action climate suits)<br>• Ethics | • Weather and climate impacts on global supply chains<br>• Increasing frequency and intensity of climate events- risks and opportunities<br>• Availability of raw materials<br>• Waste / pollution management<br>• Environmental regulations<br>• Cumulative effects<br>• Carrying capacity |

### Obstacles

The most prevalent obstacle for deeper / accelerated climate action in Toronto according to this collection of papers is the absence of more stringent provincial and federal mandates for climate action, notably with respect to the building code, EV registration, and natural gas in the provincial energy grid. Limited jurisdictional scope is a related barrier that many papers referenced, as is local government actors' understanding of what they can and cannot do. Capital-intensive actions such as district energy systems, retrofit incentive programs, renewable energy systems, and upgrading and expanding transit infrastructure require significant pools of funding, without which the City is extremely hampered in implementing the necessary actions for meeting TransformTO's ambitious emission reduction targets and avoiding the most severe impacts of climate change. While still in use by many of the jurisdictions scanned, the papers demonstrated that the primary financing

tools used for climate mitigation are insufficient to overcome capital barriers and achieve deep and widespread emission reductions. While grant-based funding programs have been essential in the piloting and early phases of action, they are inherently selective in the types of projects funded and are limited in the amount of funding available. Other common tools such as user fees, property taxes and development charges are politically sensitive and often require other crucial services — which again means funds are limited. Limited risk acceptability has been another key constraint for municipalities. Furthermore, incentive programs that are repeatedly introduced and removed can suffer from funding uncertainty and instability and can be confusing for residents to navigate.  What is needed, instead, are stable, scalable solutions that help local governments deliver the initiatives required to meet national and international targets. Indeed overall, the cost of low carbon approaches and technologies still remains a key barrier. In the context of a four-year term in office and juggling competing priorities, the public opposition to large investments or unpopular climate actions (e.g., density, low emission car or pedestrian-only zones, bike lanes) can constitute a serious barrier. Internal capacity, a lack of staff time and resources within the City, are additional barriers. Nascent or underdeveloped markets lacking in skilled labour and robust supply chains, notably around air source heat pumps and materials recycling / recovery, are other impediments to advancing climate action in Toronto. Uncertainty and a lack of data also inhibit smart climate decisions and can arise from a lack of communication and coordination between government agencies, in turn reducing the transparency of communication between government and the public. The dearth of a strong equity-lens on processes and outcomes of city-led climate interventions is another serious concern. Cultural norms (e.g., pursuit of a single-family suburban home, car culture, dwelling temperature and sense of comfort, consumerism, and waste practices) may seriously constrain climate action. Finally, the need for systems change, and the complexity and magnitude it entails, poses significant challenges to meeting the TransformTO targets.

### Opportunities

Despite the barriers, opportunities for advancing bold climate action exist. New low carbon technologies like EV vehicles and heat pumps present exciting avenues to reduce emissions, albeit requiring investment, supportive infrastructure, and broad uptake by the public to fully realize their potential. Other opportunities students mentioned include advantageous moments – like when there is political will at multiple levels of government to advance a bold climate agenda- or tailwinds – like mounting public support for climate initiatives, partnerships, synergies with other community priorities or new federal or provincial grants- that can increase the political feasibility of climate initiatives. Inflation and the rising price of carbon, mean the cost of inaction is growing, and is another compelling force for swift and decisive action. In the private sector, efforts to quantify climate risk (and requirements to disclose said risk) are on the rise, as are business cases and demonstrated successes of

climate initiatives that produce profitable returns. Together, these factors are shaping investment decisions and corporate responsibility in ways that are carving new opportunities for financing and scaling climate solutions. The availability of political, social, and/or economic capital, along with new technologies, legal frameworks and public readiness/appetite for climate solutions present opportunities for advancing climate solutions that Toronto should seek out and take advantage of wherever possible. Finally, Toronto should take advantage of lessons learned by other cities, and adopt the policies, strategies and tactics that would be most effective in the local context.

### Recommended Climate Actions (Interventions / Initiatives)

The students' recommended climate interventions feature creative ways of overcoming the barriers and leveraging the opportunities mentioned above. Initiatives commonly recommended are discussed below, followed by a cross-cutting synthesis of their characteristics.

**Promising Climate Actions Recommended by Students**

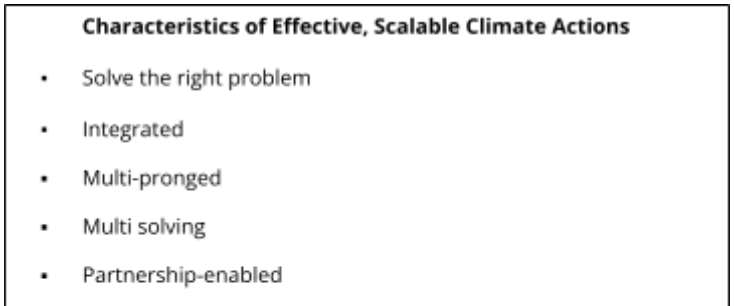
- One stop shop of bundled incentives and support
- Equity-focused training program for contractors
- Municipal green finance mechanisms
- Net zero retrofit passports, roadmaps, tech primers
- Bulk purchasing program with fast-tracking of permits
- EV sharing economy venture
- Parking cash out and commuter benefits laws
- Social equity indicators and evaluation embedded in all climate programs
- Broaden and strengthen data ecosystems for better decision-making
- Legal and organizing strategies inducing stronger regulations by Province

The student papers suggest that municipalities across the globe are turning to very similar policy instruments and financial tools to promote EV uptake, retrofits, waste diversion and many other climate initiatives. Many involve financial incentives with upfront f incentives deemed more effective than back-end ones. Other kinds of incentives, such as fast-tracked development permit processing for green buildings, free / priority parking spots for EVs are increasingly being used to increase the appeal of adopting low carbon approaches. The creation of comprehensive incentive bundles, made available through a one-stop shop approach for instance, is showing promise, but only when they are well communicated and cross promoted. Otherwise suites of uncoordinated incentives (e.g., retrofit rebates) can be confusing and cause cognitive overload in potential users. Other suggested approaches for building awareness in target audiences and harmonizing climate initiatives include retrofit passports and tech primers that help residents and industry folks navigate and advance climate solutions respectively.

Many papers identified opportunities for municipalities to take advantage of private and community investment in climate action initiatives, as well as new mechanisms for financing and ultimately scaling up climate action (e.g., through local improvement charges, energy performance contracts, green and ESG focused bonds, green revolving funds/ revolving loan funds, bulk purchasing / leveraging group purchasing power). Operationalizing such mechanisms through the creation of a green municipal bank is a solution that shows a great deal of promise. Working with citizen groups, financing institutions, utilities, industry and other governments and municipalities, which may take the form of citizen advisory committees, public-private partnerships or quadruple helix partnerships, was repeatedly mentioned as essential for establishing or facilitating the development of such mechanisms, for applying a social equity-lens to ensure the benefits and costs of such mechanisms are equitable and for overcoming resource and capacity limitations to scale up climate action and achieve the deep emission reductions necessary to meet TransformTO targets. Such multi-sectoral collaborations and partnerships require time, care and relationship and trust building to function well, and ultimately take advantage of funding and innovation opportunities that may emerge down the road. Alliances with community organizations, and by extension their constituents, can build up the social and political capital needed to pass difficult climate-friendly policies and programs. Finding ways of working with higher levels of government, and the kinds of organizing and legal strategies that are effective for influencing the Provincial government in particular to pass stronger climate regulations is an important facet of many recommended actions. Finally, communicating with and engaging key stakeholders, notably in the private sector, is essential for alerting them to coming changes (e.g., moving from voluntary to mandatory building requirements) and giving them an opportunity to prepare and adapt. Partnering with industry by helping them incentivize low carbon mobility use by employees or supporting EV sharing ventures was suggested in multiple papers, Nudging markets through cautious involvement, for instance by supporting or contributing to skills development and training of a low carbon workforce, were also suggested avenues for Toronto to explore. Training programs (e.g., trades) are a way of addressing labour shortages, creating a force of ambassadors for communicating climate  and realizing co-benefits, particularly when they centre equity in their design.

Finally, many papers spoke to the importance of data driven decision-making and the powerful role that evaluation can play in shaping improvements to climate programs and initiatives. The importance of evaluation for illuminating/quantifying the value of co-benefits and advancing social equity was repeatedly mentioned.

### Characteristics of Effective and Scalable Climate Actions



Many of the most promising climate interventions discussed in the research papers share common characteristics. Through conversation generated at the Jan. 16th workshop, additional characteristics were identified which are deemed important for scaling in particular. To address multiple barriers, be cost effective, have potential for scale-up, and address the systems dimensions of urban climate challenges, recommended actions tend to have the characteristics discussed below.

As discussed at the workshop, it's vital that interventions target the right problem. An investment into a one-stop-shop for helping homeowners retrofit their homes, while showing promise for tackling many of the convenience and information barriers they face, may not be as effective a solution as local government spending what it takes to retrofit all homes (treating the challenge as an infrastructure spending issue rather than a behaviour change issue). Spending time on framing challenges, and exploring alternative pathways and solutions is an important exercise for decision-makers to undertake early on to maximize potential of a given intervention to solve the challenge at hand.

Integrated climate actions strive to realize mitigation and adaptation climate priorities (i.e., low carbon resilience), as well as co-benefits (e.g., for human health and wellbeing, livelihoods, and/or affordability) are appealing to broad swaths of the community and address multiple priorities at once. Community energy projects and community wealth projects are a couple of examples of integrated approaches suggested.

Multi-pronged and multi-solving solutions address multiple barriers at once ideally through a single investment. The one stop shop with concierge service is an example of a multi-pronged solution.

Partnerships were a common characteristic of many proposed interventions, featuring multi-actor, multi-sectoral, and multi-level government collaborations that bring sufficient resources and cost sharing, knowledge, and ideas to the solutions table and overcome departmental and sectoral siloes that prevent systems change.

Social equity is a fundamental tenet of climate action and was the focus of several papers. Equity-focused solutions entail authentic engagement, decision-making mechanisms and targeted approaches that include and center the needs of vulnerable communities and equity-denied individuals

Regardless of the specific intervention recommended, it must be clearly communicated to all parties involved or affected. Embedding values-based messaging and the value of climate action (i.e., speak to co-benefits) are important strategies for connecting with target audiences

Many students identified the need for data-driven and evaluation-informed approaches to decision-making and climate action. Evaluation that fosters learning is needed and is essential for streamlining and improving current climate action programs and for assessing their address of equity (e.g., there is a need for social equity indicators)

### Apparent Gaps

While this group of papers is by no means exhaustive, some gaps are apparent that might suggest a future research agenda for the CEL classes to cover.

While the emissions producing sectors of buildings, transportation, and energy are well covered, there is relatively less coverage of how to reduce emissions in the waste sector. Given the openness of the City's circular economy waste target, there could be a need for student research on appropriate targets and indicators for advancing circular economy, as well as strategies for increasing waste diversion. Some of the on-campus research on waste reduction and diversion might be highly applicable.

While social equity was a prominent theme across this corpus of papers, BIPOC-led solutions were conspicuously absent. This suggests a need for further research and perhaps a stronger intersectional lens.

While partnerships figured prominently in these papers, there was a notable absence of how to initiate and sustain effective partnerships, particularly when partners come from different disciplinary and lived backgrounds. More work on partnership approaches, perhaps drawing from some of the learning of Partnership Brokers would be valuable.

Relatedly, some work on the kinds of lobbying strategies that are effective in influencing higher levels of government would be worthy of some investigation.

# NEXT STEPS

## Communicating Findings and Accelerating Action

Based on the research findings and input from partners, Dr. Slater developed communications products for translating and mobilizing knowledge with a variety of academic and non-academic audiences. These products included:

- A peer-reviewed research paper co-produced with City of Toronto staff in the Environment and Climate Division (ECD) and published in the journal *Buildings & Cities.* Communication suitable for academic audiences.
- Forty one-page report summaries, distilling key insights and recommendations, for each of the projects. Communication suitable for professionals / practitioners
- Two case studies based on the one stop shop idea and the community wealth idea explored in the workshop. Ready for publication on channels like Canadian Climate Institute
- A communications plan containing "how might we" statements and messages for target audiences to support next engagement steps and this project's objectives.

## Communications Plan

The following is a simple plan and step-by-step process for communicating the findings of this project.

1. **Define goals and objectives:** The identification of a clear set of communications goals and objectives are a first step in developing a communications strategy and are needed to determine who the target audiences are, what the messages are and how to best reach them. A communications goal and set of objectives for this project might be:

    **Goal:** To help accelerate implementation of TransformTO, and urban climate action generally, by communicating student CEL findings that inform and prompt action by key stakeholders and contribute to a research agenda that advances climate action.
    **Objective 1:** To inform City of Toronto staff (in ECD and Planning) of successful climate interventions and lessons learned in leading jurisdictions; to provide feedback on the City's existing interventions and opportunities for improvement; and through a variety of analytical approaches, provide valuable input to the City regarding climate interventions it may be considering.

**Objective 2:** To translate and mobilize knowledge between multi-sectoral actors (e.g., private sector actors in the building, energy and waste sectors, civil society leaders advocating for progressive climate action) in order to bridge and leverage diverse understandings and approaches for advancing climate interventions, and in the process, seed possible collaborations.
**Objective 3:** To communicate findings with partners and their networks, as well as the research community, to inspire climate action that integrates Toronto's learnings

2. **Define and understand audiences**: this step focuses on clearly defining the target audiences derived from the objectives defined in Step 1. This step includes developing personas for each audience, identifying their needs/desires, typical activities, challenges and expectations, and day-to-day decisions (see Table 1, also see list of groups to engage).

**Target audiences for this project are** Partners (SI Canada, City staff and TAF) who have been well engaged throughout. Secondary audiences to be engaged next are:

1. the City of Toronto (council and additional staff)
2. Private Sector and Civil Society Actors in Toronto deeply invested in implementation of climate interventions
3. Members of the research community who are interested in taking up and sharing learnings from this project and seeding opportunities for greater implementation of urban climate actions in Toronto and beyond.
4. Climate champions (residents and grassroots organizations)

3. **Develop and test key messages and frames:** this step focuses on determining what might motivate target audiences toward achieving the objectives determined in Step 1. General principles for compelling and effective messages are that they are simple, unexpected, concrete, credible, emotional, and often tell a story. The language, format and channels used should be those used by the target audience. For example, if the goal of the City is to encourage private sector actors to explore opportunities for investing in a heat pump market, the City should adopt the language and communication style of industry (i.e., succinct and uses industry-specific terms) and disperse messages via channels used by industry (e.g., dedicated meetings of industry leaders, presentations at professional association conferences, community of practice webinars, industry magazines and newsletters). Messages relayed must resonate with industry actors, be both easily accessible and readily available, and communicate clear policy signals and opportunities afforded by the City. The use of negative or positive framing will also have to be weighed against one another to determine an appropriate strategy.

4. **Develop a Timeline**: this might include a timeline of critical milestones in achieving TransformTO goals and supportive interventions identified here, with messaging developed to support each milestone. Those groups with key roles to play in rolling out interventions (investors, industry actors, *et al*) should be engaged early on (advisory groups) and help test the messaging to ensure it is effective.

5. **Identify channels:** this step involves determining the appropriate channels of conducting communication over a broad range of platforms. For example, communications over the City of Toronto website could be useful for requesting feedback on potential policy options or reduction strategies informed by this project. However, alternative platforms (e.g., social media, backcasting workshops, fireside chats) may be more appropriate for different purposes.

6. **Select methods and trusted messengers:** the City of Toronto should identify and work with trusted messengers to share findings from this project and explore how they might be further amplified and support concrete actions.

**Table 1 – Target Audiences, Personas, Messages, Channels**

| Target Audience | Personas<br>Key characteristics of audiences that messaging should address | Messages | Channels |
|---|---|---|---|
| City council and staff (beyond ECD) | **Activities**: passing and enforcing policy decisions and managing city infrastructure affecting the lives of all residents. Responding to constituents and higher levels of government<br><br>**Needs**: tried and tested, cost effective, political palatable solutions, for which public buy-in is relatively easy to get and realize multiple co-benefits at once; enhanced capacity and legitimacy borne of partnerships; enabling Provincial and Federal legislation. | Don't underestimate the cost of inaction on climate change. The time to take swift and decisive action is now.<br><br>Leaders in other jurisdictions *are* acting and making change- there are ample demonstrated successes and lessons learned to build local cases of support<br><br>Not everything is an investment; some things are a spend (infrastructure and roads).<br><br>Regulatory change is the most significant enabler of climate action, but industry needs time to | ▪ Peer to peer conferences (Ontario Big City Mayors, Mayors Caucus)<br>▪ Advisory meetings<br>▪ Backcasting and design workshops<br>▪ White papers<br>▪ Benchmarking (inducing competition |

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| | **Challenges:** limited capacity and power to directly implement solutions; spending necessary funds can be politically unpalatable<br><br>**Potential target audience questions:**<br><br>*With so many pressing issues, can't we just wait a little longer on some of the bigger / more expensive climate actions?*<br><br>*How might we make politically palatable decisions that don't alienate constituents?*<br><br>*What can we do about a lack of climate regulations and investments by other levels of government?*<br><br>*Neighbouring jurisdictions aren't acting- why should we?*<br><br>*How can we better support the private sector in bringing low carbon goods/services to market and scaling them?*<br><br>*How might we apply lessons learned from other jurisdictions in Toronto and avoid some of the mistakes early adopters made?*<br><br>*How can we meet the diverse needs and priorities of the community (e.g., for affordable housing, convenient transit, abundant livelihood opportunities, equitable and safe and thriving neighbourhoods) while meeting the climate imperative?*<br><br>*How might public funds/investment be leveraged most effectively?* | adjust to new mandates. Offer step programs (voluntary to mandatory or tiered programs) and communicate policy directionality.<br><br>You're stronger together; aggregating and scaling climate action will require multijurisdictional collaboration, policy standardization, and investments in shared/ regional infrastructure. Multi-city collectives/coalitions are a potential source of lobbying strength for influencing higher levels of government to enact necessary policy change and levels of investments.<br><br>Public-private and quadruple helix partnerships (academia, community groups, businesses, and local government) offer avenues for accessing and mobilizing capital, enhancing capacity, and attending to the needs and priorities of key stakeholders, and mitigating reputational risks to large investments.<br><br>Complex challenges require multipronged and multi-actor solutions. Deep and authentic community engagement has never been more important in the identification and implementation of such solutions.<br><br>Climate solutions increasingly require the Integration of mitigation and adaptation priorities, as well as priorities for social equity, affordability, and wellbeing, with Council needing tools and approaches for reflecting integration in their plans and decision-making processes. | and shame-avoidant action) |

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| | *How might we more effectively communicate progress and next steps on advancing TransformTO?* | | |
| Business community (industry actors in the building, waste, energy and transportation sectors, financial institutions, insurance agencies) | **Activities**: investing, innovating, testing, and bringing to market and scaling low carbon goods and services. Also employing workers.<br><br>**Needs**: reliable business cases, social licence to operate, enabling regulations and demonstrated business cases. Skilled workforce.<br><br>**Challenges:** overcoming institutional inertia, mobilizing capital for necessary investments to make a low carbon solution profitable<br><br>**Potential target audience questions:**<br><br>*Climate change isn't part of my business plan, why should I act?*<br><br>*Do shareholders and consumers really want climate solutions if they are more expensive?*<br><br>*How might I make climate solutions more cost effective and profitable?*<br><br>*How might I position or reconfigure my business to withstand and even leverage climate change issues, which are likely to affect my business', operations, and value creation in the foreseeable future?*<br><br>*Governments don't care or understand how my business works, and don't realize the* | Climate change is one of the biggest risks facing businesses, economies, and societies around the world today, in terms of both likelihood and severity of potential impact. The physical effects of climate change are clearly evident, and these have implications for a business's strategy, competitiveness, risk management, reputation, and resilience.<br><br>Increasingly, shareholders are looking at climate readiness and future proofing of businesses in their investment decisions. You have a fiduciary duty to act on climate change.<br><br>While consumers may not profess deep concern about climate change, they inevitably care deeply about the quality of their day-to-day lives, which will be disrupted by climate change to some extent (whether they admit it or not). Taking action is a way of protecting your business and positioning yourself as a leader with community interest at heart.<br><br>Long view plans are needed to respond in a timely fashion to the ways climate change might affect your business: continuity of business operations and supply chain interruptions; changes in demand for products and services; access to and cost of capital; access to and cost of insurance; new capital expenditure considerations; and inter-jurisdictional operating complexity mergers, acquisitions, and divestitures. | ▪ Advisory meetings supported by slide decks<br>▪ Workshops targeting key industry players<br>▪ Professional / practitioner conferences<br>▪ Business magazines and reports<br>▪ LinkedIn<br>▪ Webinars |

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| | *regulatory barriers I face in trying to advance solutions.*<br><br>*Beyond reducing my business' carbon footprint, what else can I do to support climate action in my community ?* | Local governments need to hear your pain points to make the necessary regulatory changes (or lobby higher levels of government to pass supportive policies) and investments.<br>Businesses may need to become more involved in workforce training to ensure they have access to a workforce with the necessary skills for supporting a low carbon transition. Funding (re)training programs and working with groups can be avenues to overcome the skills gap and contribute to community benefits, thus enhancing social license to operate.<br>Businesses can play an important role in educating their clients / customers about low carbon solutions, as well as shaping and sharing climate-friendly narratives | |
| Think Tanks (e.g., Pembina), research community | **Activities**: research, knowledge mobilization, convening, evaluating, building capacity<br><br>**Needs**: robust relationships with private sector and civil society, funding, effective community-engaged approaches / models, leading by example<br><br>**Challenges:** producing actionable knowledge (high value for addressing real world challenges and sustainability issues), undertaking non-extractive research, maintaining social legitimacy / reputation<br><br>**Potential target audience questions:**<br><br>*Where are the leading edge / knowledge gaps in need of research?* | Climate solutions that centre Indigenous leadership and knowledges are needed and underdeveloped<br><br>Climate solutions developed with and for communities, particularly racialized, low income and other historically marginalized communities are needed, and have the highest chance of attending to society's greatest challenges. Climate solutions must lead with social equity and the expressed needs and priorities of the communities and individuals they deem to help.<br><br>Beyond research, academia and think tanks can play important roles in advancing climate actions by convening diverse stakeholders, actors and knowledge keepers, support experimentation and piloting of solutions, evaluating action and progress and building capacity of students for applied research the capacity of organizations | ▪ Peer reviewed papers/ journal articles<br>▪ Academic conferences<br>▪ Workshops<br>▪ UCAP activities |

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| | *How might research help to address society's greatest challenges (e.g., have a high degree of relevance and applicability)*<br><br>*What other roles or values might the research community play/have with respect to advancing climate action?*<br><br>*How can our research approaches serve rather than harm communities?* | and local government for whom they might intern or undertake a piece of research.<br><br>Transdisciplinary co-production, which involves the deep involvement of community members in all phases of the research, is one way of undertaking less-extractive research. | |
| Climate Champions (residents and civil society organizations) | **Activities**: running programs / projects, fundraising, engaging constituents largely at the neighbourhood / local scale<br><br>**Needs**: funding, capacity, political allies, organizational sustainability<br><br>**Challenges:** overcoming / avoiding staff burnout, organizational sustainability, having voice heard, scaling up interventions<br><br>**Potential target audience questions:**<br><br>*How can we grow our capacity and ability to serve our communities?*<br><br>*How can we access necessary funding and resources to undertake programs as we deem fit, without contorting our programs to fit funders' ideas of success?*<br><br>*Our group is small and focuses on our neighbourhood- what is our value proposition for contributing to transformational change and low carbon transition?* | Partnerships are a pillar of transformational climate action. Non-profit organizations and grassroots groups can grow their capacity, access resources, and increase their influence through strategic and mutually beneficial partnerships- with local government, private sector, and other grassroots groups.<br><br>Increasingly philanthropic organizations are shifting to trust-based giving approaches that lift some of the burden of completing onerous funding applications or reports and acknowledge community-group's leadership and expertise in designing and leading programs. Civil society groups should assert their leadership, push for flexibility by funders, and work with them to identify meaningful indicators of success.<br><br>Community-based organizations supply essential social capital (trust-based relationships with community members) and voice community concerns and priorities. Such relationships provide the connective tissue that enables narratives to be transmitted and cultural change to unfold.<br><br>Sustainability transitions and transformations theories, systems-change, impact evaluation and | ▪ Kitchen table conversations<br>▪ Social media / blogs<br>▪ Webinars<br>▪ Non-profit gatherings and communities of practice |

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| | *How can we mobilize communities and be a force for change?*<br>*What opportunities exist for scaling our community / neighbourhood program up/ out/ deep?* | scale-inflected theories of change (among others) offer frameworks for mapping and understanding avenues for scaling programs and deepening impact. | |

## Published paper and editorial

Drawing on insights from the student papers, the following communications products were created and published in the journal *Buildings & Cities*.

Buildings & Cities, Special Collection: Transformational Climate Actions by Cities

Slater, K. R., Ventura, J., Robinson, J. B., Fernandez, C., Dutfield, S., & King, L. (2022). Assessing climate action progress of the City of Toronto. *Buildings and Cities*, 3(1), 1059–1074. DOI: http://doi.org/10.5334/bc.248

Slater, K. and J. Robinson, (2023) Transformational climate actions by cities, *Buildings and Cities*, 4(1), 74–82. DOI: http://doi.org/10.5334/bc.285

## Conceptual Case Studies

The following detailed case studies are drawn from the student projects and workshop proceedings and reflect concepts that will be communicated to the City for further consideration and potentially advancement.

### One Stop Shop

**Description:** A program that helps residents undertake low-carbon home retrofits and take advantage of rebates offered by governments and utility providers. Not only does this act as an information hub for all climate action programs in a city, a concierge service helps users navigate and access rebates, grants, and related goods and services. The one stop shop is a gateway to incentive packages that include financial benefits and subsidies, and potentially convenience incentives (e.g., free, or subsidized installation of a heat pump).

**How it might work:** the program connects homeowners to an "energy concierge" who helps residents understand all the rebates available to them and aid them through other decisions in their energy retrofit journey. After participants fill out a form with details about their home, goals, and the upgrades they're pursuing, they'll be contacted by the concierge to have a one-on-one conversation about their home. Based on this, the homeowner will then get a report summarizing how to take the next steps with their energy improvements. The concierge will also be available throughout the entire renovation process.

**What's needed?** Bundles of incentives tailored to users that have a strong social equity lens and go beyond information and small financial subsidies to remove as many barriers as possible associated with undertaking a home retrofit.

**Where is this being trialed?** The Capital Regional District in British Columbia is among several BC municipalities that has launched energy concierge programs, the CRD's is called the Home Energy Navigator Program, to help streamline upgrades to single-family homes.

**Why:** Buildings are one of the few sources seeing an increase in greenhouse gas emissions locally, so stemming those is a central part of most city's plans to combat climate change.

**What's the value:** This service helps homeowners make sense of the many home energy programs and rebates available to them and get individualized support throughout a retrofit process. The program will help residents do home energy evaluations, find contractors and quotes, apply for rebates and more.

**Potential drawbacks:** This program targets individual homeowners who have the means to undertake a retrofit project. Even with rebates, many lower-income residents are not able to afford a home retrofit, so there are equity dimensions that this approach misses. Also, to achieve the necessary emissions reductions to achieve the net zero targets, an aggregated approach is needed that scales and accelerates emissions reductions. Rather than sink resources into trying to change individual homeowner behaviour, approaching building performance as an infrastructure spend issue could be a more effective approach.

### Generating Community Wealth for Thriving, Climate-Resilient Communities

**Description:** financial mechanisms, potentially overseen by a municipal "green" bank with social equity at its core, that help communities that are most vulnerable to climate impacts benefit financially and socially from investments in climate action. Community-scale projects are made financeable (e.g., through aggregation) so large financial institutions are able to invest in them. To

**How it might work:** A suite of equity-focused financial products for advancing low carbon solutions and community wealth would be operationalized under a green bank and/or through public private partnerships, diverse funding sources, diverse financial products, market development, projects and objectives, good governance, and would embed mechanisms for measuring and verifying social equity. Focus on bonds, philanthropic grants, and private investments when adding to their initial capital.  products such as co-investment loans, credit enhancements, warehouse loans, direct loans, or the specialized loan programs PACE. An example of a single financial product might be a community bond for ESG-interested investors who could invest in a community energy system or high-performance affordable housing project in a neighbourhood improvement area (NIA) with half of the equity reinvested into the community (e.g., via a philanthropic organization or non-profit-led community grant program)**.**

**What's needed:** key enablers include supportive/compelling narratives that bring people together (neighbourhood and city scale), lateral and vertical social capital (partnerships, multi-sectoral collaborations) to enact change, and recognition of community leadership, new evaluative measures (that capture things like community capacity), complementary policy bits and pieces and tools (e.g.,  social and spatial mapping).

**Where are community bonds and green banks being piloted?** Some examples include London's Mayor's Energy Efficiency Fund, Connecticut's Green Bank, New York Green Ban, and Montgomery County Green Bank.

**Value of the approach:** Financial products that focus on social equity and community wealth offer a way of returning social environmental value to society, while strengthening community resilience to climate impacts. Green banks are able to scale solutions by leveraging additional private capital at ratios as high as 8:1 and on average at ratios of 4:1. Large and small banks, and the municipal, provincial, and federal governments would likely have the highest impact and influence on a potential Toronto green bank.

**What's the value:** Setting up a municipal green bank could better position cities to overcome the governance and operational challenges they typically face for mainstreaming and scaling climate action while addressing other priorities for thriving communities. while allowing it to scale solutions to get closer to investing the required capital to meet 2050 net zero targets. how do we invest in a more equitable future?

**Potential drawbacks:** This kind of intervention will require a lot of work, and because it's new, there will be bumps along the road. It will require adaptations and learning, a need for tenacity to persevere and a strong political commitment.

## Sample platforms

The following is a non-exhaustive list of potential platforms where the findings discussed here could be communicated with target audiences in the research, social innovation, local government, and practitioner communities. Platforms and channels and messaging should be carefully selected according to the target audience.

- Partner websites / webpages (SI Canada; TAF; City of Toronto; UCAP)
- Websites of organizations in partner networks (Pembina, Canada Green Building Council, Sustainable Buildings Council, One Earth, Clean Air Partnership, The Centre for Active Transportation)
- Local government magazines (e.g., Municipal World)
- Journals (e.g., Journal of Climate Action, Research, and Policy; Buildings & Cities; Climate Action; Climate Research in Action; Climate Action Hub; Pathways Alliance).
- Climate communications platforms for practitioners and lay audiences (Canada in a Changing Climate; Climate Institute; Climate Initiatives Platform)
- Conferences and gatherings (Adams Sustainability Celebration at U of T, Low Carbon Workshop Series)
- Social media platforms (Twitter, LinkedIn, Facebook) of partners and stakeholders

## Groups to Engage - Key Stakeholders and Sustainability and Climate Leaders by Sector

As we look ahead to sharing the findings with target audiences and engaging them in solutions-focused conversations (e.g., via a low carbon workshop series), the following list comprises sectors and organizations we will likely engage.

### Business, Finance, Insurance

- Toronto Board of Trade
- Big Five Banks (TD, RBC, Montreal, Scotia, Canada Imperial Bank of Commerce)
- IG Wealth Management
- Investors Group
- Toronto Invest Group
- ETC Invest
- Toronto Globe
- Manulife
- Citi
- State Street
- Sunlife
- J.P. Morgan
- Morgan Stanley
- Fidelity Investments
- Goldman Sachs
- Great-West Lifeco
- Fairfax Financial
- iA Financial
- Intact
- Desjardins
- Empire Life
- Co-operators

### Buildings

- Multiplex
- Entuitive
- KingSett Capital
- Entuitive
- EQ Building Performance
- RDH
- Entuitive
- Dunsky
- Energy-Efficiency
- Hammerschlag & Joffe
- First Service Residential
- WSP
- RWDI
- Minto

- Mantel Development
- Dream
- Sustainable Buildings Canada
- Dorsay Development Corp.
- BDP Quadrangle

### Transportation

- Metrolinx
- TTC
- The Centre for Active Transportation
- Uber
- Lyft
- GOTransit
- Pearson International
- Toronto Islands Ferry
- Bike Share Toronto
- Zipcar
- Communauto Car Toronto
- Maven
- Enterprise CarShare
- Turo

### Energy

- Ontario Sustainable Energy Association (OSEA)
- Canadian Urban Sustainability Practitioners (CUSP) Network
- Ontario Network for Sustainable Energy Policy
- Quality Urban Energy Systems of Tomorrow (QUEST)
- Ontario Climate Consortium (OCC)
- Alectra
- Bullfrog Power
- Toronto Region Board of Trade
- Enbridge Gas
- Toronto Hydro

### Waste

- Greenbelt Environmental Services
- We-Haul
- Junk it
- EMCO Disposal Bin Service
- Transfer Stations
- Garage Buddy
- Binners Waste Removal
- Junk Removal Toronto
- Toronto Food Policy Council
- Toronto Youth Food Policy Council
- Toronto Region Conservation Authority (TRA)
- Food Waste Hub

**Climate-focused grassroot, non-profit and/or civil society organizations**

- Association for Canadian Educational Resources (ACER)
- Canadian Association of Physicians for the Environment (CAPE)
- Canadian Climate Challenge
- Citizens' Climate Lobby — Toronto Chapter
- Climate Action for Lifelong Learners
- Climate Change Toronto
- Climate Pledge Collective
- ClimateFast
- Community Resilience to Extreme Weather (CREW)
- Council of Canadians (Toronto chapter)
- David Suzuki Foundation
- Drawdown Toronto
- Ecologos/Water Docs
- Enviromentum
- Etobicoke Climate Action
- For Our Grandchildren
- For Our Kids
- Fridays For Future Toronto
- Green 13
- Green Majority
- Green Neighbours 21
- Green Thumbs Growing Kids
- Green Wave West
- Greenpeace Canada
- Inwit
- Just Earth
- Kids Right To Know & Gen-Earth Event
- Leap U of T
- Metstrat
- MobilizeTO
- Music Declares Emergency Canada
- Naturopathic Doctors for Environmental and Social Trust
- Noor Cultural Centre
- Ontario Clean Air Alliance
- Our Place Initiative
- Parkdale-Highpark 4 Climate Action
- People's Climate Movement
- Project Neutral
- Rethink Sustainability
- Rise To Zero
- Saint Aidan’s Anglican Church In The Beach
- Seniors Climate Action Now
- StopPlastics
- Sustainability and Environmental Justice Portfolio @ Engineers Without Borders University of Toronto
- T.O. the Good Swap
- TTCriders
- The Climate Reality Project
- Toronto East End Climate Collective
- Toronto Environmental Alliance
- Toronto350
- Transition Toronto
- Women's Healthy Environments Network (WHEN)

## Research Agenda

With no time to lose in advancing bold climate action, there are many important roles the research community can plan. These include providing clear evidence that serves to reassure and persuade policymakers and other leaders, and identify the processes and steps needed for radical change. Research can help overcome institutional silos and inertia through action research, facilitation, alliance-building, giving voice to marginalized communities, identifying and mitigating risks, and many more avenues. Finally, research can help develop and test new positive visions, imaginaries, narratives for living in cities. This section identifies apparent gaps in the research and suggestions for a future research agenda for future CEL student cohorts and the broader research community.

### CEL Student Research and Ideas for Projects

The following is a list of potential topics for future CEL projects to explore in each emission producing sector, which builds on the insights and gaps emerging from the student research. This list also aligns with the Environment and Climate Division's (ECD) research priorities:

**Cross-cutting**

- BIPOC-led solutions and intersectional priorities in change making and climate agendas. Exploring and deepening differentiated climate action approaches for equity-denied individuals/groups are needed.
- Indigenous climate action engagement.
- Mechanisms and approaches for important climate action enablers (e.g., for advocacy, partnerships). For instance, frameworks for relational approaches, like how to broker and maintain partnerships, effective networks, especially with other levels of government over the long run would be valuable.
- Leverage points for systems-change with an exploration of how to accelerate social and technological innovation and uptake of those solutions
- and triggers for regulatory change (strategic, tactical, and relational approaches for stronger regulations)

- Hybrids / synergies/ integrated approaches (climate adaptation and mitigation, natural assets and asset management approaches, carbon budgeting)
- Decision-making approaches in the face of trade-offs, contestations, unpopular choices. Competing priorities, populism, and misinformation. Approaches for proceeding in the face of uncertainty (de-risking the future).
- Exploring opportunities for leveraging climate risk financial disclosures for capital mobilization.
- Collective impact climate initiative
- Learning from pandemic re: behaviour change (e.g., how to trigger new norms)?
- Impact of COVID on climate action & priorities?
- Targeted communication of necessity of climate action to key audiences

**Buildings**

- Legal avenues and regulations (e.g., making GHG emissions performance targets mandatory)
- Baselines for SFH and MURB building performance
- Communicating “net-zero”
- Business case for deep retrofits verification of incentive levels. Appropriate incentive levels and types, how to effectively target and taper incentives over time.
- Small business electrification pilot
- Qualitative Benefits of Green & Cool Roofs
- Evaluating sector specific challenges in MURBs justifying loans
- Policy Recommendations and Incentivizing Biodiverse Green Roofs
- Supporting deep retrofits in MURBs

**Transportation**

- Life Cycle assessment of EVs
- Assessment of anticipated technology changes in EVs & charging stations
- Exploration of e-micro mobility options & accessibility
- Feasibility study of a Transportation Demand Management (TDM) pilot
- Expected GHG emissions reduction of active transportation infrastructure
- Active and Safe School Travel research

**Waste**

- Jurisdictional scan of circular economy pilots
- Identification of useful circular economy targets and indicators and approaches for monitoring and evaluation
- Lessons from zero waste communities with recommendations for increasing waste diversion
- Scan of industrial ecology models and feasibility of applicability to Toronto

**Broader Research Community**

Leveraging its unique capabilities for research (e.g., supplying much needed empirical studies of climate solutions), convening, experimenting, evaluating, and building capacity, the research community can play multiple roles in facilitating the kinds of alliances and research agendas described above. Across these functions, this editorial recommends applying a transdisciplinary co-production approach that engages and respects the knowledge, wisdom, and experiences of diverse academic and non-academic actors to expose and tackle multifarious aspects of the climate challenge. Deepening understanding of how to undertake research in ways that are reciprocal and non-extractive should inform this research agenda, with evaluation efforts supporting ongoing reflexivity and learning. Building on a current research agenda of critiquing and evaluating climate policy and interventions, researchers might deepen exploration of opportunities for lending capacity to

societal actors in pursuit of climate solutions (e.g., opportunities for community-engaged research programs, exchanges, and university–city–civil society partnerships).

# CONCLUSION

This report details the process and results of synthesizing 40 student research reports derived from multiple University of Toronto community-engaged learning courses.

From the synthesis, common themes emerged regarding jurisdictional climate leaders (i.e., those most frequently scanned) contextual factors, bundled components of transformative climate action, as well as common obstacles and opportunities for action. The synthesis also revealed some gaps in the research out of which a future research agenda for future CEL student cohorts and the broader research community is proposed.

Finally, this report identifies opportunities and approaches for communicating insights born of these projects, who to engage next, and how to further develop top ideas into concrete actions.

# APPENDICES

### Bullets of Findings - for PowerPoints

## Insights

**Jurisdictional Leaders and Most Frequently Scanned:**

- Vancouver, BC
- New York City, NY
- San Francisco, CA
- London, UK
- Seattle, WA
- Copenhagen, DK
- Washington, DC
- Oslo, NO
- Paris, FR

**Policy and Political Context**

- Municipalities across the globe are turning to very similar policy instruments to promote EV uptake, retrofits, waste diversion
- Limited jurisdictional scope is a major barrier. Weak provincial and federal regulations (e.g., vehicle registrations, building code) pose significant barriers to climate action. More work on how to effectively lobby, influence, and partner with other levels of government to strengthen regulations would be valuable. Alignment creates a powerful moment to act, a “window of opportunity”
- There is a need for cities to understand their own jurisdictional fiscal and institutional capacity and enlist federal and provincial help where possible.
- Technology and practices for the material design of energy efficient buildings, vehicles, waste systems already exist, but need regulation, financing, and uptake (i.e., by way of narratives) to become the norm.
- Political difficulties (mandating unpopular actions like density, a low emission car zone or pedestrian only zone, bike lanes) and fiscal realities of municipal governance are other barriers to overcome. The City should be realistic and

tactical about which policy options it chooses to pursue in order to use funds efficiently, avoid jurisdictional disputes, and mitigate community backlash.
- There is a need for appointment of more civil society experts and inclusion of other stakeholders, notably residents and equity-denied groups in decision-making processes
- The coming years will see changes in the costs, standards, and architecture of Toronto's residential construction industry. If building standards are properly defined, coordinated well, phased-in, and enforced, the market will grow and adapt
- Important to give industry advance notice of coming regulations
- Privacy and data sharing (b/w levels of government, public and private) are challenges

**Fiscal Instruments, Incentives, Leveraging Capital**

- Primacy of financial incentives. Incentives or policies which address the relative financial costs of EVs, or retrofits are by far the most effective. Upfront financial incentives work better than back-end ones. Consumers are known to value smaller-sooner rewards over larger-later rewards.
- Other kinds of incentives can also be effective (free / priority parking spots) BUT only if they are well cross promoted / communicated and combined in a comprehensive package of solutions
- Bulk buying has shown some success in reducing costs (solar setups, heat pumps, EV chargers) but requires multi-stakeholder commitments and other supports (e.g., installation).
- Municipal green bank

**Economic Implications of Climate Action & Co-Benefits**

- Importance of quantifying climate risk and benefits of action (the latter requires costing of co-benefits
- Training programs (e.g., trades) are a way of addressing labour shortages and realizing co-benefits
- Nascent markets (e.g., textile waste) requires cautious involvement and partnering

**Multi-prong Solutions**

- Targeted approaches, (policy, financial and engagement "packages") are needed to ensure equity-denied communities are not left behind or even harmed by "green" policies and these should be accompanied by engagement mechanisms and evaluation frameworks to ensure they meet needs.
- A suite of "multi prong" solutions that cut across multiple domains helps to scale climate action. This necessitates involvement by multiple city departments and sectors and often levels of government (e.g., EV uptake is conditioned by

density of charging infrastructure network and relatedly urban density and should be accompanied by investments in and promotion of active mobility options and public transportation).
- When solutions are not coordinated as suites, myriad solutions can however impose a heavier cognitive load on residents. Having concierges to help navigate options could be valuable, with a need for close attention to user-level experience. Top down and bottom-up coordination is needed to avoid confusion.
- Alternatively, shifting solutions away from individuals or individual households, as in the case of big spending on infrastructure like roads, would remove many of the barriers and costs of trying to socialize solutions. Rather than convincing and incentivizing homeowners to install a heat pump for example, a wholesale effort by the City to mandate and methodically install heat pumps in all buildings would be more effective and ensure the action happened at the pace and scale needed to realize the TransformTO goal of retrofitting close to half a million buildings by 2030.

**Partnerships**

- Scope and scale of climate challenges requires multi-sectoral, multi-level government solutions in turn necessitating partnerships (cost sharing, richness of ideas and accountability)

**Community Engagement & Communication**

- There is a need for appointment of more civil society experts and inclusion of other stakeholders, notably residents and equity-denied groups in decision-making processes
- The coming years will see changes in the costs, standards, and architecture of Toronto's residential construction industry. If building standards are properly defined, coordinated well, phased-in, and enforced, the market will grow and adapt
- Understanding and communicating the co-benefits of climate action is vital. There is a need for tools that enable quantification/ costing of such values to build them into cases for support.

**Data Availability, Integration, Monitoring and Evaluation**

- There is a need for evaluation approaches and monitoring systems that are user-friendly (accessible), integrate various values, inform decision-making and enable the communication of progress
- Understanding and communicating the co-benefits of climate action is vital. There is a need for tools that enable quantification/ costing of such values to build them into cases for support
- Evaluation that supports learning is essential for streamlining and improving current climate action programs and for assessing their address of equity (e.g., there is a need for social equity indicators)

**Obstacles / Barriers**

- Jurisdictional limitations
- Cost and lack of dedicated funding pool (e.g., to finance retrofits)
- Lack of coordination/governance challenges (b/w City depts., with other levels of government, across sectors)
- Limited capacity / operational challenges (of City)
- Limited risk acceptability (e.g., re: energy cost savings payback window, loan defaults)
- Lack of awareness / understanding of solutions
- Privacy, data sharing
- Inconvenience of change / systemic inertia
- Social norms, mental models
- Lack of certainty & inability to predict the future
- Lack of skilled labour (contractors, assessors)
- Difficulty quantifying or communicating benefits
- Nascent markets, supply chain challenges
- Competing priorities (affordability, COVID); politicization of priorities (rise of populism

**Opportunities / Enablers**

- Regulatory change
- Financial and social incentives
- Public–private, multi-sectoral, multi-level government partnerships (for cost sharing, coordinated action, capacity building)
- Community engagement; resident-informed policy and oversight (tools and approaches for embedding TD-co-production in city programs, engaging missing perspectives (Indigenous, racialized, low income, newcomers, non-English speakers), improving convenience and multi-solving
- Workforce / skills development (realizes co-benefits and solves key barrier)
- Values-based, targeted communication strategies for reaching key audiences
- Accessible, easy to understand information at transition points (labels, rating systems, guidebooks)
- Social embedded solutions that are responsive to real needs (convenient, affordable, align with values)
- Integrated and accessible data collection for real-time monitoring, program streamlining / improvements/learning, and more informed and transparent decision-making

- Evaluation approaches for measuring social equity and co-benefits
- Integrated climate solutions that necessitate coordination b/w City depts
- Aggregated approaches are needed to achieve scale
- Multi-prong solutions (packages of policy, financial, infrastructure and education tactics-> “social practice informed”)
- Attention to and targeted solutions for equity-denied groups; Indigenous-led
- Phased approaches that give market time to react (voluntary to mandatory measures)
- Quantification and costing of risks and impacts of climate change and benefits of climate action
- Mechanisms for better anticipating the future and designing for complexity (scenarios and decision-making tools, pilots for testing solutions, evaluation)

## Workshop plan

# Prioritizing Transformational Climate Actions
# Backcasting Workshop

**January 16, 2022**
**TIME (2 hr. hybrid workshop + lunch)**

Zoom: https://munkschool-utoronto-ca.zoom.us/j/91379388763?pwd=SUhFbjRjT1NOQlllV2RZbkRXQlJUQT09

Meeting ID: 913 7938 8763  Passcode: 444343
Room 208N, Munk School, 1 Devonshire Pl
Miro: https://miro.com/app/board/uXjVP3iy0-I=/

**Workshop objectives**

- Inform participants (City staff, SI Canada) of Mitacs project + progress, objectives
- Review actions & recommendations drawn from student projects
- Choose top priority actions and recommendations
- Guide participants through a backcasting exercise to determine how one of those actions / recommendations could best be implemented
- Evaluate this approach to exploring implementation issues
- Identify next steps, and additional actions to pursue this agenda

**Detailed Agenda**

| TIMING | ITEM | DESCRIPTION |
|---|---|---|
| 10:00 – 10:10 AM | WELCOME<br>Land acknowledgement<br>Review workshop purpose and agenda<br>Introductions (30 seconds)<br><br>RSVPs<br>ECD (Cecilia Fernandez, Stewart Dutfield<br>TAF (Mary Pickering)<br>SI Canada (Jo Reynolds, Andrea Nemtin)<br>John<br>Kim | (if meeting by Zoom) **RECORD MEETING<br>Make John a co host<br><br>**S1: Title**<br>● Welcome, thank you for your time, energy, and ideas<br><br>**S2.Land acknowledgement:**<br>● We acknowledge the land we are meeting on is the traditional territory of many nations including the Mississaugas of the Credit, the Anishnabeg, the Chippewa, the Haudenosaunee and the Wendat peoples and is now home to many diverse First Nations, Inuit and Métis. We also acknowledge that Toronto is covered by Treaty 13 with the Mississaugas of the Credit.<br><br>**S3. Gratitude**<br>● I'd like to acknowledge with gratitude the funding we received for this 8-month project from Mitacs. I'd also like to express gratitude for the efforts of SI Canada to secure the funding and provide incredible learning offerings that deepen my understanding of social innovation. A big thanks to our partners at the City and TAF and to John Robinson<br><br>**S4. Purpose / Agenda** |

| | | |
|---|---|---|
| | | • Offer a recap of Mitacs project objectives and progress<br>• Review actions and recommendations drawn from student projects<br>• Choose top priority action(s) /recommendation(s)<br>• Move through a backcasting exercise to determine how one of those actions / recommendations could best be implemented<br>• Evaluate this approach to exploring implementation issues<br>• Identify next steps, and additional actions to pursue this agenda<br><br>**Questions**<br>• I think we mostly know one another, but let's take a moment to introduce ourselves and our organization.<br><br>(If meeting by Zoom) Explain we will be recording for our own review, and will delete afterwards<br><br>**Introductions**<br>• Round of introductions: please take **30 sec** to introduce yourself and your organization |
| 10:10 – 10:25 AM | PROJECT OVERVIEW<br>· Mitacs project objectives, approach, outcomes<br>· Ideas<br>· Questions | **Project Objectives + Approach (3 ppt slides)**<br>• ***What –*** harvest and share lessons and insights from CEL (GLA2029+GLA2000Y/H) project reports<br>• ***Why –*** to derive value from student research by synthesizing, evaluating and prioritizing transformation climate actions,<br>- to test and evaluate this backcasting approach to exploring implementation issues for TTO |

| | | |
|---|---|---|
| | | • ***How*** – literature review, document analysis and synthesis, evaluation and backcasting workshop<br><br>**S5**. **Overview**<br>● The project objective was to harvest and share insights drawn from student research on U of T's database of sustainability projects) and move some of the most potent ideas off of the page and into the world. Most of the projects under review were produced by Master's students in a community-engaged learning course called Sustainability in the World: A Living Lab Course, run by John Robinson. In these courses, typically in groups of 4 or 5, the students acted as researcher-consultants, meeting regularly with their "clients" at the City and TAF and undertaking research (e.g., jurisdictional, and environmental scans) that identifies low carbon and equity-based solutions for advancing the TransformTO goals.<br><br>● Over the past few months, I've been summarizing and synthesizing the findings of 40 reports, developing a published paper for the journal buildings and cities, creating case studies that draw on findings, and identifying top recommendations. Some of this work is presented in the workshop brief you received in advance of this workshop, with a final report to follow.<br><br>**Projects:** |

| | | |
|---|---|---|
| | | • 40 projects synthesized<br>• 35 l-page case studies created<br>• 2 in-depth case studies created<br>• 1 paper published in *Buildings & Cities*<br>• 1 backcasting workshop to move actions / recommendations off of the page and into the world<br>• 1 final report containing the above + suggestions for next steps<br><br>**S6. Ideas (see brief for details)**<br>1. One stop shop (info hub + concierge service with packages of financial + convenience incentives)<br>2. Net zero retrofit roadmaps + tech primers (mandate or incentivize owners conducting energy audits and tune-ups)<br>3. Equity-focused training program for contractors (heat pump install + ambassadors) via a public-private or quadruple helix partnership (city / TAF/ union / building industries / TCBN / Humber / U of T)<br>4. Bulk purchasing program (heat pumps, EV bikes) + partnership<br>5. EV sharing economy venture – launch peer-to-peer platform to allow EV drivers to sell the use of their at-home charging stations to the public on a per charge basis.<br>6. Parking cash out and commuter benefits laws |

| | | |
|---|---|---|
| | | 7. Social equity indicators and monitoring / evaluation embedded in all climate programs<br>8. Systematic data collection (bike counts, retrofits undertaken, pollinator garden experience, neighbourhood energy use /competition, asset management) + communications to build awareness<br>9. Legal and organizing strategies for pressuring the Provincial government to strengthen Building Code, broaden grid electrification, phase out natural gas etc.<br>10. Municipal green bank with a range of financial products to support green infrastructure + equity-targeted lending and granting schemes supporting lower income folks in retrofitting their dwellings<br><br>Note core components / supports of each idea:<br>● Regulation<br>● Financing<br>● Data collection<br>● Evaluation<br>● Communications<br>● Partnership<br><br>**Questions** (5 min) |
| 10:25 - 10:35 AM | SELECT IDEAS TO DIVE INTO TODAY | **Invitation to add/tweak ideas**<br>● 3 minutes to add new/tweak ideas<br><br>**Roundtable vote of which idea to explore today**<br>● 7 minutes to choose one idea |

| | | |
|---|---|---|
| 10:35 – 10:55 AM | BACKCASTING SESSION #1 | **Backcasting 101**<br>● Introduce backcasting exercise (why, what, how, including rules for the exercise)<br>● Review TTO target / goals for 2040<br><br>**Step 1: "Paint a picture of 2040"**<br>● "Paint a picture of what (each of) the idea(s) optimally looks like in 2040 (focus on the outcomes and impact each idea is having in the future)"<br>● Open discussion captured by Kim in Miro<br>● What must be in place, so these 1-3 ideas help us meet the TTO goals?<br>● What positive and negative trends or factors (i.e., political-economic-social-technological-legal-environmental) will these ideas need to be responsive to?<br>● Open discussion |
| 10:55 -11:00 AM | BREAK | *Prompt remote participants (Mary + Jo) to put in food order to UberEats |
| 11:00 – 11:45 AM | BACKCASTING SESSION #2 | **Step 2: "How do we get there?"**<br>● Focus on the necessary steps and inputs (investments, funding, resources), processes, and outputs<br>● Question prompts:<br>○ What <u>obstacles and opportunities</u> can we anticipate encountering along the way?<br>○ What <u>new/modified governance arrangements</u> are needed? (e.g., new gov't agency, private sector coalition, partnerships etc.) |

| | | |
|---|---|---|
| | | ○ How do we engage and center leadership of <u>those missing from today's conversation</u> (private sector and civil society, citizens at large)<br>○ How will we know we're on the right path? (<u>signposts</u>)<br>● Open discussion<br>● Use Miro board to visualize steps and capture ideas (Kim to take notes) |
| 11:45- 11:55 AM | NEXT STEPS | **Questions for the group**<br>● Is this a useful approach to exploring implementation issues?<br>● If so, how best can we pursue it (e.g., CAG?)<br>● Who else should be part of the process?<br>● How should we share the results of the synthesis and this workshop? |
| 11:55 AM – 12:00 PM | WRAP-UP | **Wrap-up**<br>● Summary of what we heard today<br>● Thank you<br>● How + when you'll hear from us next<br>*End recording if on Zoom |
| 12:00 – 1:00 PM | LUNCH | **Informal conversation**<br>· Return to unanswered questions<br>· Kim to capture discussion points |
| | FINISH | Clean up, lock room |

## One-Page Summaries of Student Projects

The project summaries are available on Canva, from where the summaries can shared on social media, and also below:

# ENERGY EFFICIENCY, CONSERVATION, AND SUSTAINABILITY FOR BUILDINGS

GLA2000y - 2017

## OBJECTIVE

To recommend best practices of retrofitting policy in other cities with similar governance frameworks as the City of Toronto. A jurisdictional scan informs recommendations regarding other potential programs and regulations that could contribute to the energy efficiency of buildings in this sector. Particular attention is paid to how benchmarking systems in other cities interact with their energy efficiency policies for large commercial buildings.

## AT A GLANCE

### Barriers

- Abatement and lack of common base year
- Risk

### Opportunities

- Co-benefits
- Mandatory benchmarking
- Mandatory regulations, tiered requirements
- Mix of financial and convenience incentives
- Partnerships with industry
- Leverage Cleantech innovation

### Jurisdictions Scanned

- Vancouver, BC: Existing Building Upgrade Mechanism Model
- Boston, MA: Greenovate Boston
- Denver, CO: Energize Denver
- New York City, NY: One City Built to Last

### Insights

- Using retrofits to achieve leadership in a certain industry, aside from the reduction of emissions linked to buildings is a novel and exciting prospect
- A green bank could supply some of the capital and financial backing needed to support progressive retrofit programs

Read the full report here.

## BACKGROUND

TransformTO, the City of Toronto's collaborative project and climate action plan, has set the ambitious goal of reducing the City's greenhouse gas emissions by 80% by 2050 (since accelerated to 100% by 2040). A primary component of Toronto's strategy to reduce emissions from the commercial building sector going forward will be the Energy and Water Reporting and Benchmarking (EWRB) requirement for large buildings (greater than 50,000 square feet), which will be enacted by Ontario's Ministry of Energy starting in 2018.2

## METHODS

- Literature review (academic + grey)
- Jurisidictional scan

## RECOMMENDATIONS

**Pursue a strategy like what is seen in Vancouver.**

In addition to strengthening the working relationship with the building industry, Toronto could experiment with making energy efficiency upgrades a requirement for the issuance of building permits for renovations, retrofits, change of major tenant, etc. The City has already pushed the envelope in this area and should consult its legal counsel to advise on the practicality of such upgrade requirements.

**Combine ideas over the long-run**

IEnforced benchmarking, step programs toward increasing building performance, expanding incentives and leveraging clean tech innovation are some of the ideas that the City of Toronto might adopt from other jurisdictions in its own sustainable buildings programs.

# CONSUMPTION-BASED EMISSIONS INVENTORY FOR TORONTO

GLA2000y - 2017

## OBJECTIVE

To Identify what methodologies are most applicable and practical for Toronto in measuring a consumption-based inventory (CBEI) system, and how such can be best communicated.

## AT A GLANCE

### Barriers

- Lack of consumption data
- Lack of resources/capacity for CBEI
- Higher cost of CBEI

### Benefits

- Provides a way of capturing the full life-cycle of emissions associated with the production, use, and disposal of a good or service.
- Provides data on the impact of consumer behaviour on GHG emission
- A new platform for the development of policies aimed at emissions abatement.
- Consumption-based emissions measurement, which can take a multi-regional approach, provides a wider scope for measuring GHG emissions,

### Jurisdictions Scanned

- London, UK
- Portland, OR
- San Francisco, CA
- Seattle, WA

### Insights

- The choice of an accounting methodology, consumption-based or production-based, is an inherently political decision. GHG
- An approach to GHG emissions accounting that incorporates both production-based emissions measurement and consumption-based emissions measurement can provide a more complete picture of each city's carbon footprint on the world's climate.

Read the full report here.

## BACKGROUND

Currently, the City of Toronto uses a greenhouse gas inventory approach based on the Global Protocol for Community-Scale Greenhouse Gas (GHG) Emission Inventories (GPC). This is a "production-based" emissions inventory approach using Scope 1 (direct emissions from combustion of fuels for heating, transportation etc.) and Scope 2 (indirect emissions from purchased electricity, heat or steam etc.) emissions measurements. However, the City wishes to explore the possibility of a "consumption-based" emissions inventory approach. This approach could reflect all GHG emissions (direct and product lifecycle) associated with the goods and services consumed by city's residents.

## METHODS

- Literature review (academic + grey)
- Jurisidictional scan

## RECOMMENDATIONS

**Pursue a consumption-based emissions inventory approach in parallel with their current production-based emissions inventory approach.**

Adopting a consumption-based emissions inventory approach in addition to measuring production-based emissions would make the City of Toronto a leader among the world's major cities, including the C40, and could help spearhead this approach worldwide.

**Calculate a consumption-based inventory in a way that is accessible to the public and positioned as a response to public concern.**

Define objectives and target audiences, develop and test key messages, develop a timeline, identify channels, and select trusted messengers.

# SOLAR AND STORAGE SOLUTIONS FOR THREE BUILDING ARCHETYPES IN THE CITY OF TORONTO

EESC34H3 - 2021

## OBJECTIVE

To explore various solar and storage technologies and their feasibility, costs, and considerations of installation in three different building archetypes in the City of Toronto.

## AT A GLANCE

**Barriers**

- Costs
- Lack of knowledge in residents, building owners/ operators, and contractors

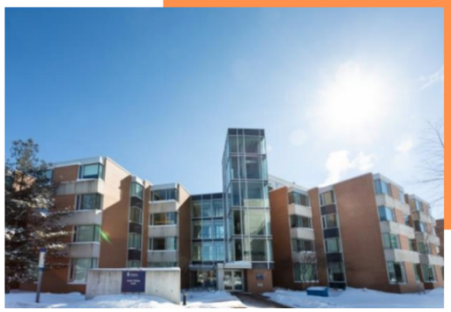
**Benefits**

- Improve resiliency in unplanned outages
- Contribute renewable energy to the grid
- Reduce or remove the need for emergency gas or diesel generators, and associated emissions.

**Insights**

- All things being considered, the sustainability impacts of solar energy cannot be understated.
- A comprehensive solar+storage plan for a single unit detached/ semi- detached home is feasible, although somewhat cost-prohibitive depending on the household.
- 72-hour backup, grid-tied, solar+storage solutions for mid-rise MURB's are feasible, but likely to be cost-prohibitive in most applications.
- For high-rise MURB's, it is highly likely that a solar+storage solution is not feasible, and completely cost-prohibitive in almost all applications.
- Given that solar PV's can be installed on otherwise non-productive surfaces, solar PV solutions alone are feasible in almost all applications, but not necessarily for purpose-built backup power.

Read the full report here.



## BACKGROUND

Presently, many multi-unit residential buildings (MURBs) are outfitted with backup energy conventional diesel or neutral gas generators for emergency backup in the event of a power outage. Yet, these generators come at an environmental cost, emitting $CO_2$ and other emissions, and require routine maintenance, even during downtime, and require refueling which can come with significant considerations. An alternative to these generation methods is solar PV technology, which uses solar cells to convert sunlight directly into electricity to generate energy. The City of Toronto seeks to better understand the affordances of solar as a backup energy supply.

## METHODS

- Literature review
- GIS approach and visualization of solar potential
- Use of ESRI ArcGIS Pro to calculate solar irradiance, aspect, and slope, to build a tessellation of suitable panel locations.

## RECOMMENDATIONS

Overall, solar + storage solutions for MURB's should be assessed on a case-by-case basis for feasibility. However, certain actions should be taken to encourage solar solutions for single-family homes and MURB's:

**Create incentives to purchase these systems**

particularly for the storage components, in order to offset some costs in favour of sustainable energy and resilient cities

**Offer municipal rebates, or special financing programs to offset the up-front costs of PV's alone**

that way interested residents can install solar solutions, and realize long-term benefits, without the significant short-term acquisition and installation costs

**Conduct a study on the feasibility of installing solar + storage technologies at institutional or municipal buildings**

to improve community or neighbourhood response to emergency outages through sustainable and resilient energy

# TRANSFORMTO: 100% RENEWABLE ENERGY IN CITIES

GLA2000y - 2016

## OBJECTIVE

To examine the issue of city-wide renewable energy (RE) through a broad policy lens, looking into best practices, and formulating effective approaches for Toronto.

## AT A GLANCE

### Barriers

- Political process
- Lack of RE in the current energy mix
- Minimal availability of RE sources
- High costs

### Opportunities

- Framing
- Leveraging resources
- Community involvement
- Financing

### Jurisdictions Scanned

- Copenhagen, DK
- Munich, DE
- Vancouver, BC
- New York, US
- Oxford County, VT
- Burlington, VT

### Insights

- RE should be framed around co-benefits (economic diversity, resilience, affordability, quality of life)
- The social and political narrative developed around a policy is a key determinant of its success, both in council and with the broader public.
- Offering a stake in RE projects is one way of overcoming negative public perception
- Investing in RE overseas is another avenue for meeting targets through import
- RE can be integrated into broader long term climate resilience or energy plans.

Read the full report here.

## BACKGROUND

With climate change becoming a greater global threat, cities like Toronto have been identified as major GHG emitters but also areas of great potential for action. As such, several cities around the world are looking to decrease their carbon outputs by making a transition to renewable energy sources, with some committing to 100% renewable energy. They face an unprecedented challenge to reform our energy systems, and renewable energy (RE) - energy derived from naturally renewing sources like wind, rain, geothermal heat, and tides - presents a compelling possibility for reducing GHG emissions.

## METHODS

- Literature review
- Comparative jurisdictional scan and benchmarking
- Semi-structured interviews

## RECOMMENDATIONS

### Obtain granular data

More detailed information should be collected on energy consumption and energy trends, which should be broken down into different sectors, including commercial, industrial, residential and transport. This would allow for careful evaluation and setting of priorities. Furthermore, when possible, data should be broken down even further to identify the end use of the energy.

### Upgrading infrastructure

Transitioning to a RE city will require significant infrastructure upgrades not only in terms of distributing energy but also in terms of storing renewables, which is more difficult than storing traditional sources of energy.

### Secure a champion.

Toronto should engage a 'spokesperson' or champion. Cities that have solidified early support from key influencers have gained and maintained traction throughout the approvals process.

# ENERGY SYSTEMS INTEGRATION: A REVIEW AND ANALYSIS OF DISTRICT ENERGY FOR ONTARIO

GLA2000Y - 2018

## OBJECTIVE

To research if and how district energy could be used in Ontario in order to reach its goals of energy resilience and support climate change mitigation efforts.

## AT A GLANCE

### Challenges

- Lack of clear policy
- Diversity of stakeholders increases complexity
- Cost and finding funding

### Opportunities

- Advance co-benefits for resilience, livability, and local economic development.
- Innovation (e.g., solutions in energy storage, delivery, and integration, improving overall energy efficiency)

### Jurisdictions Scanned

- Barcelona, ES
- Brescia, IT
- Hamburg (HafenCity), DE
- Copenhagen, DK
- Gram, DK
- Manheim, DE
- Stockholm, SE

### Insights

- District energy systems have been highly successful in a variety of jurisdictions with variable environmental contexts, different policy frameworks, and distinct ownership schemes.
- Successful district energy systems were most often initiated by distinct district energy policy. Those jurisdictions operating under national level policy were observed to have the most expansive district energy systems.
- Initial investment costs in district energy were high regardless of existing energy mix.
- District energy systems have been a key enabler in the integration of innovative de-carbonization solutions, including renewable energy use, thermal storage implementation, and smart grid initiatives.

Read the full report here.

## BACKGROUND

Across Ontario, district energy systems have been developed by municipalities, universities, and corporations. Ontario does not have a district energy policy comparable to those in place in Denmark and Sweden, but a range of government funding opportunities are in place that can support appropriate district energy projects. While policies that are successful in Europe may not translate effectively into the North American context, there are opportunities to improve the provincial approach to district energy.

## METHODS

- Literature review
- A jurisdictional scan
- Stakeholder interviews

## RECOMMENDATIONS

### Create a provincial district energy framework

- This will facilitate widespread adoption of district energy systems. Ontario can learn from other jurisdictions to adopt policies that support its goals in climate change mitigation and community resilience.

### Improve collaboration in government and across sectors

- The development of a district energy system is a major project that involves a wide range of stakeholders and policies. The Ministry of Energy could support district energy in Ontario by facilitating cooperation between a range of stakeholders.

### Highlight which funds are available for district energy projects

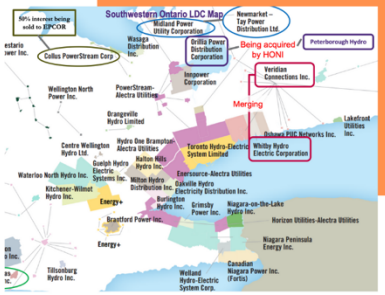
- This will also provide clarity to municipalities in regards to where they can access these resources.

# VALUING CLIMATE RESILIENCE IN ONTARIO'S ELECTRICAL GRID

GLA2000Y - 2019

## OBJECTIVE

To produce a guidebook on how Ontario can value climate resilience in facilitating cost-effective planning and incentivizing smarter investments in its electrical grids.




## AT A GLANCE

### Challenges

- Lack of clear policy
- Complex stakeholder relations
- Determining highest locational value
- Cost-effectiveness

### Opportunities

- Realize co-benefits for avoided public and private cost of power outages, leading to greater efficiencies in energy use, and protecting families and businesses in Ontario.
- Adopt and refine indicators according to best practices to facilitate stronger estimates for damage costs and more precise valuations for resilience that can be further used to incentivize smarter investments in resilient electrical-grid systems.

### Jurisdictions Scanned

- Anaheim, CA
- New Orleans, LO
- New York, NY

### Insights

- Indicators are valuable tools to measure changes in the electrical grids' state, operations and their impact on end-users, before and after major disruptions caused by severe weather.
- Ontario lacks a standardized set of indicators that can be used to value climate resilience
- Without standardized indicators to account for resilience in cost-benefit analyses, energy utilities and other stakeholders in Ontario may be less likely to identify and prioritize investments in resilience-focused grid technologies.

Read the full report here.

## BACKGROUND

Ontario's electrical utilities are facing new risks as a result of climate change that require building a more resilient system that can detach from the major electrical grid and operate during and even after a power outage. Basic reliability measures, which cover expected outages under normal conditions are increasingly insufficient to characterize future electrical outages from natural disasters caused by climate change and that utilities must effectively plan for. To encourage energy utilities to invest in climate resilient technologies, there is a need for standardized method for valuing their benefits.

## METHODS

- Literature review
- A jurisdictional scan

## RECOMMENDATIONS

### Develop resilience indicators and net present value

- Suggested indicator "buckets" include: critical impact economic impact, and recovery impact

### Ontario resilience valuation process

- To effectively employ resilience indicators, the Ontario Ministry of Energy should develop an "Ontario Resilience Valuation Process" - a resilience analysis and valuation process that engages different stakeholders as well as meaningfully applies these indicators to identify and prioritize resilience- enhancing policies and investments.
- The five steps of this process would consist of identifying shocks and stresses of key infrastructures; selecting assessment and data collecting methods; assessing infrastructure performance under shocks and stresses; assess regional performance; and resilience enhancing investments.

### Create a ResilientON Funding Program

- This will also provide clarity to municipalities in regards to where they can access these resources.

# EXPLORING CARBON PRICING FOR THE CITY OF TORONTO PROJECTS AND INITIATIVES

GLA2000y

## OBJECTIVE

To explore opportunities and approaches to carbon pricing through a jurisdictional scan, and advise the City of Toronto on determining the appropriate level of carbon pricing for its projects and initiatives.

## AT A GLANCE

### Challenges

- Public uptake
- Choosing the best carbon pricing model
- Modifying accounting practices

### Benefits

- More accurate assessments of project consequences
- Making externalities visible
- Transparency in communications
- Better decision-making

### Jurisdictions Scanned

- Metro Vancouver Regional District (MVRD)- Carbon Price
- New York City Social Cost of Carbon
- Canadian Corporate Practices (CDP), CN railways

### Insights

- Carbon pricing can have positive spillover effects on neighbouring municipalities
- Carbon pricing can be a tool to communicate decisions in a transparent manner, as well as to provide sound rationale for the decisions made.

Read the full report here.

## BACKGROUND

The Environment and Climate Division (ECD) of the City of Toronto is interested in understanding how carbon pricing can best inform sound decision-making on the climate file. In particular, there is interest in understanding the impact of the proposed level of shadow pricing in the case of Geothermal installation on Waterfront Neighbourhood Centre Project.

## METHODS

- Literature review
- Jurisdictional scan
- Project example analysis to observe the impact of shadow pricing.

## RECOMMENDATIONS

**Establish a shadow price of $170/tonne.**

Even if the shadow price only makes a different in a small number of projects, it is still worth doing, because the carbon price is a cost that the city will eventually have to bear, so taking it into account from the beginning should result in better-informed decisions regarding the feasibility of various projects and procurements.

**Involve key partners and stakeholders from the early stages of a project.**

The mindset of using a shadow price has to be something that is tackled jointly, so engaging groups such as the finance department, utility department, and engineering, could help to make the whole endeavour run more smoothly.

**Regularly increase the shadow price.**

Establishing a regular increment based on inflation and projected SCC increase would help keep the shadow price at a level which is realistically reflective of the true price.

**Review the shadow price every 1-2 years.**

To keep up with evolving research and pricing.

# DIVESTMENT AND THE CITY

GLA2000y - 2018

## OBJECTIVE

To examine the global fossil fuel divestment movement, particularly in the public sector and identify the process by which eight public sector municipalities have assessed their exposure, chosen to divest, and implemented this decision, and ultimately determine the financial, environmental, and economic impact of divestment.

## AT A GLANCE

### Challenges

- Legal requirements to follow the Province's prudent investor standard
- Political risk
- Media misrepresentation

### Opportunities

- Deepen ESG
- Social currency and seismic shift of divestment movement

### Jurisdictions Scanned

- London, UK
- Oslo, NO
- Melbourne, AU
- Sydney, AU
- Vancouver, BC
- Seattle, WA
- San Francisco, CA
- Washington, DC

### Insights

- Nearly 100 municipalities have made divestment commitments.
- Most cities do not have a specific method to assess their exposure to fossil fuel assets beyond knowing how much is invested directly in fossil fuel companies
- Cities that have opted to divest their pension funds have pursued a targeted and incremental divestment approach,
- Cities that have focused on divesting their directly controlled investments have not actually divested any funds, but have implemented exclusion policies, creating ESG screening criteria that prevent them from acquiring any fossil fuel-related assets in the future.
- Divestment has had limited financial, environmental, and economic impacts- but social impacts could spill over into policy and market impacts.

Read the full report here

## BACKGROUND

Over the past seven years, the fossil fuel divestment movement has grown from a small group of activists at an American college to a global network claiming to have inspired institutions worth USD $6 trillion to divest. Amongst the hundreds of institutions that have announced divestment commitments, dozens of cities have pledged to rid themselves of any investment in 200 major fossil fuel companies. As the City of Toronto implements its new investment policy2which will allow an Investment Board to invest in equities for the first time2there has been some interest by council and by staff to learn more about the divestment movement and how cities like Toronto have reacted it. Specifically,

## METHODS

- Literature review (academic and grey)
- Jurisdictional scan
- Semi-structured interviews

## RECOMMENDATIONS

**The City of Toronto's new Investment Board should follow the ESG model used by Melbourne,**

This would involve adding explicit anti-fossil fuel language to the City's investment policy, screening all new assets using a clear and transparent scorecard, and making annual divestment/exclusion decisions based on a firms performance on this scale.

**1. Update ESG criteria**

in the new investment policy using the UNPRI scorecard method developed by the City of Vancouver. If the City wanted to make a stronger statement of principle and identify itself as the first Canadian city to make a divestment commitments it could follow the lead of the City of Sydney and the City of Melbourne and include explicit language in its ESG policies stating that it will not invest in coal, oil, or gas companies.

**2. Assess assets**

using the ESG scorecard, including both new investments under consideration and any assets currently under management. Include ESG scoring during periodic / annual reviews of investments, and put any "failing" investments on notice. that they will be divested from if they do not improve their performance within a certain window of time.

**3. Invest, divest, or exclude**

A centralized data sharing strategy that emphasizes open, continuing communication is of the best interest to any municipality due to the highly collaborative nature of this type of policy project

# FINANCING LOW CARBON RESILIENCE: OPTIONS FOR THE CITY OF TORONTO

GLA2000y - 2017

## OBJECTIVE

To identify alternative financing mechanisms to fund low-carbon resilience initiatives, beyond tax and user fee-based financing mechanisms. Specifically, to examine three main strategies the City of Toronto may choose to consider: Green Bonds, Community Bonds, and Public-Private Partnerships (P3s), and how to operationalized in Toronto.

## AT A GLANCE

### Challenges

- High cost of green-bond certification
- Potential increase to City debt loads
- Political will (e.g.,to raise debt ceiling)
- Risk (reputation, financial, delays)
- Loss of control in P3 arnangements

### Opportunities

- High market demand for green bonds
- Certification of bonds
- Use existing corporate finance structures
- Public-private partnerships (P3) value-delivery
- Public consultation / engagement

### Jurisdictions Scanned

- Mexico City, MX
- Hawaii, US
- California, US
- Iowa, US
- Johannesburg,SA
- Madrid, ES
- Fayette Country, US
- New York, US
- Colorado, US
- Ontario, CA

### Insights

- Green bonds, community bonds or community crowdsourcing, and public-private partnerships (PPPs) are good alternative financing mechanisms for the EED to use to finance TransformTO.
- The three financing mechanisms lend themselves well to different projects over different timelines.

Read the full report here.

## BACKGROUND

Recognizing the limitations associated with austerity, risk aversion, and the existing budget process, the City of Toronto, Environment and Energy Division (EED) seeks to leverage its position (low risk of natural disasters, high political stability) to attract investment from private capital to fund TransformTO initiatives that offer resilience co-benefits.

## METHODS

- Literature review (gray literature)
- Jurisdictional scan
- Semi-structured interviews with experts
- Creation and use of an evaluation framework

## RECOMMENDATIONS

**Green bonds are most suitable for large-scale (> $50m) green projects (e.g., install distributed energy storage).**

Timeline of projects can vary, but if it is a revenue bond, financial returns from project should match interest/coupon payments of bond.

**P3 are most suitable for individual large-scale infrastructure projects (> $100 mil) of an environmental or social nature (e.g., develop offshore wind)**

Timeline of projects can vary according to P3 agreement.

**Community bonds are most suitable for small-scale projects with a demonstrable community impact Suitable for both environmental and social projects (e.g., support safe cycling and walking)**

Timeline of projects can vary, but if it is a revenue bond, financial returns from project should match interest/coupon payments of bond.

# SWITCHING THE CURRENT: INCENTIVING EV ADOPTION

GLA200Y - 2016

## OBJECTIVE

To draw on learnings from other cities to make recommendations to the City of Toronto to promote and incentivize electric vehicle uptake among city residents, with a focus on passenger plug-in electric vehicles.

## AT A GLANCE

### Barriers

- Grid capacity
- Prohibitive cost of EVs
- Range anxiety, climate factors
- Lack of rapid charging infrastructure
- Opportunity cost (EVs contribute to congestion, traffic accidents, require road maintenance, parking etc.

### Opportunities

- EV market is growing, more options at different price points
- Funding from prov. and fed gov't
- Leverage TGS and local policy tools

### Jurisdictions Scanned

- Berlin, DE
- Chicago, IL
- Los Angeles, CA
- New York City, NY
- Oslo, NO
- Seattle, WA
- Vancouver, BC

### Insights

- Offer supply and demand side solutions (charging stations, incentives, shared models, leading by example)
- In the absence of Building Code changes, other regulations are needed to enable EV uptake
- Integration / intermodal projects like integrating EV car share into public transport have demonstrated success

## BACKGROUND

To meet its GHG emissions reductions target of net zero by 2040, the City of Toronto has set a goal of 30 per cent of registered vehicles in Toronto being electric by 2030. As of 2020, about 33% of the City's total emissions result from transportation, the majority of which are emissions from single passenger vehicles. A broad-based switch to EVs, could lead to substantial emissions reductions, among other benefits.

## METHODS

- Assess the feasibility of increased EV adoption in the city.
- Assess Toronto's current EV policy suite in order to understand the context in which any of the proposed policies might take place.
- Survey global EV policies at the municipal level.
- Assess the appropriateness of the policies from a survey of global policies in the Toronto context.

## RECOMMENDATIONS*

**Update the TGS requirements for EV charging infrastructure**

Use TGS Tier 1 and Tier 2 to require new mid- and high-rise residential buildings to 'rough-in' increasingly higher % of EV Ready infrastructure

**Offer congestion management incentives**

Offer parking convenience incentives for EVs, including possible fee reductions or exemptions. Explore integration of EVs with existing plans for autonomous/connected vehicles and commute time-shifting.

**Explore option of an EV sharing economy venture**

Launch a competing proprietary platform to allow EV drivers to sell the use of their private charging stations to the public on a per charge basis.

*Recommendations were updated as follows: 1) current TGS requirements surpass recommendation and 2) green fleet recommendation was removed as it has already been met

Read the full report here.

# DEDICATED FINANCING MECHANISMS FOR CLIMATE ACTION

GLA2000y - 2019

## OBJECTIVE

To explore three revenue-generating climate action mechanisms in London, Portland, Logan City, and Seattle as lessons for Toronto in facing the political palatability, ease of implementation, and policy impacts .

## AT A GLANCE

### Barriers

- Industry opposition
- Media treatment
- Opposition by public
- Governance and legal challenges

### Opportunities

- "City Building Fund", an existing earmarked tax in the City of Toronto, demonstrates the legal feasibility of earmarking.
- Partnerships with community groups
- Engagement workshops

### Jurisdictions Scanned

- London, UK
- Portland, OR
- Logan City, AU
- Seattle Park District, WA

### Insights

- There are benefits and challenges to all the financial mechanisms explored here.
- To avoid loss of core budgetary resources, it is imperative that the benefits of the earmarked fund are clearly demonstrated by explicit communication and monitoring of results.,
- Building financial flexibility is key to the success of earmarking residential property taxes

Read the full report here.

## BACKGROUND

The City of Toronto has outlined an ambitious strategy for a low carbon future. To help meet the long-term transition goals outlined within TransformTO, the City will require approximately $60 billion. Considering funding constraints, the City can learn from other jurisdictions by exploring revenue generating mechanisms to achieve both its climate goals and broader community benefits.

## METHODS

- Literature review
- Perform a jurisdictional scan
- Informational interviews with jurisdictional experts
- Select case studies based on relevance for the City of Toronto
- Conduct primary and secondary data collection to explore revenue generation, political palatability and the administrative costs associated with each case study

## RECOMMENDATIONS

**Careful planning and research are needed to establish a dedicated financing tool to support climate transition and fulfill the goals of TransformTO**

In particular, to ensure the long-term flexibility and adaptability of revenue generating mechanisms.

**Community engagement supported by effective communications is vital for securing buy-in**

Community workshops and partnering with local organizations are opportunities to share information, address concerns, and overcome resistance.

# DIVERTING TEXTILES FROM THE WASTE AND GARBAGE STREAMS

GLA2000Y - 2017

## OBJECTIVE

To undertake a jurisdictional scan of government programs and private sector organizations currently involved in textile recycling to ultimately recommend a pilot textile diversion program for the City of Toronto.

## AT A GLANCE

### Barriers

- The novelty of such programs globally
- The lack of mechanisms and complementary regulatory framework
- Inability to track downstream use of collected textiles.

### Opportunities

- Partnerships with charitable organizations in particular
- Pilots
- Growing public awareness

### Jurisdictions Scanned

- New York, NY
- San Francisco, CA
- London (Borough of Bexley), UK
- Markham, ON

### Insights

- Building partnerships with charitable organizations is one of the most commonly adopted textile diversion programs across jurisdictions.
- Some municipalities also cooperate with private businesses, but the scope of such partnership tends to be limited.
- Investment in bins equipped with sensors can be an effective way to track the weight of textiles deposited and manage the collection bins when they are full.
- Evaluation of the performance of these municipal programs is important, but faces obstacles.

Read full report here.

## BACKGROUND

Textile waste is now estimated to be the fastest growing waste stream in many countries, yet the textile recycling industry is very much in its infancy across the globe. In the City of Toronto ("the City"), recent single family and multi-residential audit data shows that approximately 42-44 pounds of textiles are discarded per household every year. As a response, the City's Solid Waste Management Services ("SWMS") identified textile diversion (a 72-75% reduction per household by 2026) as a goal in its Long Term Waste Strategy ("LTWS").

## METHODS

- Produce an evaluation criteria framework
- Conduct a jurisdictional scan of existing programs

## RECOMMENDATIONS

### Short-term

- Select a socially responsible charitable organization and run 6-month-long pilot program in four distinct neighbourhoods in Toronto
- Run a education and communication strategy to inform the public about the adverse impacts of textile waste and raise awareness about the pilot program

### Long-term

- Adopt a policy framework that aligns with Extended Producer Responsibility – the idea that manufacturers should be responsible for the entire life-cycle of the products they produce/import –that the Government of Ontario is currently considering implementing
- Institute a ban on the disposal of textile waste in landfill sites
- Investment in new technologies to help streamline the textile recycling process and make it increasingly economical.

# ENVIRONMENTAL SUSTAINABILITY EVALUATION OF ELECTRONIC WASTE MANAGEMENT IN TORONTO, ONTARIO

EESC34H3 - 2021

## OBJECTIVE

To research and evaluate possible effects to air, soil, water, and human health caused from the method or pathway by which electronic waste is handled in Toronto.

## AT A GLANCE

### Barriers

- Lack of monitoring and reporting of third party E-Waste collectors (potential for improper disposal)
- Political economy of E-Waste, and pathways for E-waste to be sent overseas

### Opportunities

- Increased collaboration and longterm planning by organizational partners
- Sharing economy
- Enhanced producer responsibility

### Insights

- OES is no longer in operation and WEEE regulation has now turned into EEE; effective as of Jan 1, 2021. The City of Toronto now directly reports to EPRA and due to transition, no data is available from year 2019-2020
- End of life electronics are collected from drop off sites and transport to consolidation and repackaging centers for energy efficiency, and operated with 58 Ontario Electronic stewardship (OES) transport partners and 33 OES repackagers.
- The life cycle assessment and analysis of the methods used in the handling of E-waste, suggests that pollution from the manual and mechanical dissembling process was limited from the years 2015 to 2019 since the recyclers were audited and approved by Recycler Qualification Office (RQO) under the national recycling requirements to operate under Electronic Products Recycling Association (EPRA).

Read full report here..

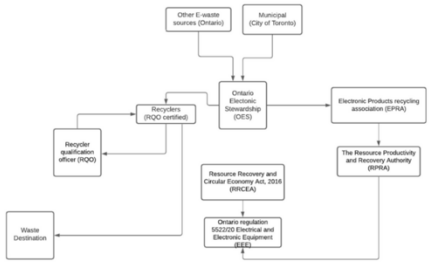



Figure 1 : Life Cycle Assessment (LCA). Ontario, Toronto connection of organization and regulations to E-waste management.

## BACKGROUND

The City of Toronto has its goal set to keep electronic waste out of landfill sites into either recycled or safely processed (Toronto 311, n.d.). The city provides electronic collection services free of charge. Items collected are sent to Electronic Products Recycling Association (EPRA) for processing. An examination of the E-waste management system in Toronto, Ontario from 2015-2019, using a life cycle analysis offers insight into environmental effects and overall sustainability of the system.

## METHODS

- Literature review and document analysis
- Life cycle assessment (LCA)
- Material flow analysis (MFA)
- Semi-structured interviews

## RECOMMENDATIONS

**Conduct an in site exploration /audit**

- This will add value to the LCA performed compared to only looking at annual reports.

**Conduct a provincial study of E-waste management**

- To deepen understanding of E-waste handling and processing

**Undertake an LCA of privately owned operations.**

- This will add value to the LCA performed compared to only looking at annual reports.

**Publicize or make readily available online national electronic recycling standards (ERS).**

- To improve monitoring and reporting

# JURISDICTIONAL SCAN OF RETROFIT INITIATIVES

GLA2029 - 2022

## OBJECTIVE

To assess progress of Vancouver, New York, and Copenhagen in meeting their retrofit targets, and identify best practices and lessons that are helping them work towards or accelerate building retrofits to ultimately determine whether these strategies or best practices can inform or be applied to the City of Toronto's strategy for building retrofits.

## AT A GLANCE

### Challenges

- Lack of data
- Jurisdictional limitations (Building Code)
- Lack of incentives / fiscal limitations
- Workforce development for retrofits

### Opportunities

- Advance multiple co-benefits (equity, employment)
- Leverage partnerships with organizations and educational insitutions
- Create user-friendly tools and tailored solutions
- Communicate steps and pathways
- Retrofitting networks / alliances

### Jurisdictions Scanned

- Vancouver, CA
- New York, US
- Copenhagen, DK

### Insights

- Allowing jurisdictions to make their own decisions with regards to energy retrofit work is beneficial
- Funding from federal and provincial orders is a necessity
- Having exemplary pilot projects is imperative to demonstrating to owners and residents what is possible when retrofits are done properly.

Read the full report here.

## BACKGROUND

The City of Toronto (CoT), with support from The Atmospheric Fund (TAF), is working on an ambitious plan to reduce GHG emissions to net zero by 2040. Guided by technical modelling, stakeholder engagement and a review of policies and best practices related to energy and emissions reductions from other jurisdictions, the Net Zero Existing Buildings Strategy (July 2021) provides a pathway to decarbonize existing buildings.

## METHODS

- Literature review (academic + grey)
- Jurisdictional scan
- Evaluation

## RECOMMENDATIONS

**TAF should assist the City of Toronto in developing retrofit roadmaps for various building typologies and tech primers to explain prominent retrofit technologies.**
A detailed guide that explains the path to implement retrofits in various buildings such as a home built in the 1960s or a condominium building built last year would be beneficial.

**TAF should support the development of a 'one-stop shop' for easier access to information and support tools regarding the implementation of retrofits.**
A 'one-stop shop' where building owners and other clients can access program information and financial support is beneficial and it can be modelled after the NYC Accelerator or Vancouver's CleanBC.

**TAF should get involved in advocacy**
Collaboration with state and national governments have been critical to the progress of the adoption of retrofits.

**TAF should assist the City of Toronto to develop more grant-based programs to support retrofit projects for low-income neighbourhoods and buildings/homes.**
Providing grants rather than low-interest financing options can be beneficial to increase uptake in implementing retrofits.

# APPLICATIONS OF HYDROGEN: IN SUPPORT OF TRANSFORMTO

GLA200 - 2021

## OBJECTIVE

To explore the feasibility of green hydrogen - produced through electricity generated from renewable sources- in helping the City of Toronto achieve it's emissions reductions goals.

## AT A GLANCE

### Barriers

- Maturity of hydrogen technology
- Supply of green hydrogen
- Hydrogen efficiency
- Prior investments into alternatives
- Logistical and infrastructure costs

### Opportunities

- Long haul transit
- Use in generators to add resilience to grid
- Niche industry applications

### Jurisdictions Scanned

- Aberdeen, SC
- Copenhagen, DK
- San Francisco, US
- Tokyo, JPN
- Oslo, NO
- Seattle, US
- Vancouver, CA

### Insights

- Ontario's energy grid is becoming increasingly dirty, as natural gas replaces more sustainable energy sources.
- Given Toronto's unique context and geography, there is simply not a strong case to be made for the large-scale integration of hydrogen technologies in the city.
- At this point in time, investments into hydrogen should not be prioritized. Rather, opportunities to electrify GHG emitting processes should be pursued to fulfill the city's larger TransformTO goals.

Read the full report here.

## BACKGROUND

Hydrogen has become a potential new weapon in the fight against climate change – a fuel touted by many governments, Canada included, as a major solution in their respective emissions reductions' goals. Ontario is also eager to release a provincial hydrogen strategy and has been engaging in discussions with stakeholders to determine the shape that such a strategy would take.

## METHODS

- Literature review (academic + grey)
- Interviews with subject matter experts
- Jursidictional scans

## RECOMMENDATIONS

**Lobby the provincial government for broader grid greenification.**

The province's move away from a clean and sustainable energy production system presents a hurdle for City to realize its climate goals. Opportunities to advocate for the phase out of natural gas should be explored.

**Collaborate with the federal and provincial governments on investments into the small application areas described here**

Toronto should leverage potential co-investment opportunities with the federal and provincial governments, both of which are interested in embedding hydrogen in Canada's energy make-up, to provide incentives for these industries to make the switch to hydrogen. This could come in the form of negotiated subsidies for on-site electrolyzers, joint infrastructure investments, or policy and regulatory support.

# SUSTAINABLE COMMUTING: WORKPLACE SUPPORTS

GLA2000Y - 2019

## OBJECTIVE

To gain a better understanding of how companies and organizations located in Toronto are incentivizing their employees to use more sustainable modes of transportation, and what motivates them to do so.

## AT A GLANCE

**Barriers**

- Lack of shower / changing infrastructure
- Small businesses rent -> no control over infrastructure
- Provision of free parking
- Lack of incentives
- Lack of employee engagement
- In office working

**Opportunities**

- Engage landlords -> convert parking space to bike/shower /changinginfrastructure
- Corporate discounts for green commute
- Flexible /hybrid work

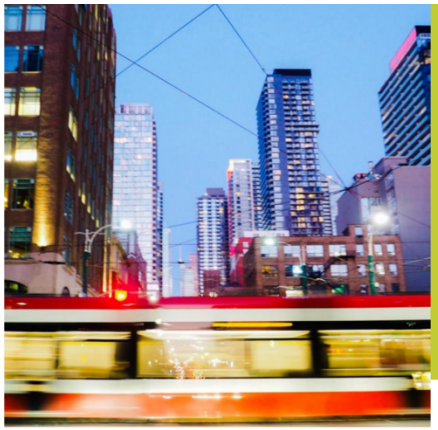
**Companies + Jurisdictions Scanned**

- Blackberry
- California 1992 Parking Ordinance
- San Francisco 2008 Commuter Benefits
- Seattle, WA
- Calgary, AB

**Insights**

- Best to take a holistic approach, which is cross-mode and includes multiple actors
- Better incentives and infrastructure are not enough as long as free parking remains
- Incentives and infrastructure need to be complemented with continuous engagement

Read the full report here.



## BACKGROUND

In Toronto, transportation generates approximately one-third of all local greenhouse gas emissions, and the City seeks to significantly decrease this number over the next 30 years. Also, a vast majority of 'Torontonians' describe transportation as one of the most salient issues, and congestion is one of the primary reasons contributing to this perception. Toronto's congestion issues can be explained by the inefficient use of the roads, as 56% of people commute by car alone

## METHODS

- Survey + interviews to glean Toronto-based employers' practices of incentivizing their employees to use sustainable modes of transportation
- Identification of local best practices
- Recommendations based on the main findings/key takeaways of the survey and online research

## RECOMMENDATIONS

**An Integrated Approach: Infrastructure, Incentives and Engagement**

Getting the individual out of the car-, combination of offering the right infrastructure, incentives as well as engagement

**Adoption of Parking Cash Out and Commuter Benefits Laws**

Decrease employer-offered free parking + increase number of employees recieving commuting benefits

**Increasing the visibility of biking as a relevant mode of transportation with systematic data collection**

Collect data to help with planning and managing of bicycle infrastructure and to observe trends

# DECARBONIZATION THROUGH ELECTRIFICATION: A BUSINESS CASE FOR AIR-SOURCE HEAT PUMPS

GLA2000H - 2020

## OBJECTIVE

To assess the feasibility of a financial incentivization program that prompts the retrofitting of building heating units from fossil fuel systems (i.e. natural gas furnaces and boilers) to electric heating technologies (i.e. air-sources heat pumps) for low rise commercial buildings in Toronto.The focus of our program was to incentivize the upfront capital cost of switching from natural gas to heat pump technology, understanding that natural gas comes with an additional annual operation charge which is expected to make switching favourable for low-rise commercial units.

## AT A GLANCE

### Barriers

- Split-incentive issue
- Cost (to consumer)

### Opportunities

- Policy options which incorporate property tax tools can be effective if implemented properly (e.g., PACE)

### Jurisdictions Scanned

- New York
- Northeast United State

### Insights

- Smaller buildings are the ideal target for the incentive program in terms of user financial savings, specifically due to the upfront cost of the unit and the annual operational payment.
- Larger buildings account for more carbon emissions so it is important that they are also targeted.
- Older gas units provide a better business case for switching, as people are already preparing for investment in a new unit.
- Delivering incentive programs through contractors has been successful elsewhere.

## BACKGROUND

In Toronto, buildings and homes are responsible for roughly 52% of the GHG emissions, primarily from natural gas used for heating indoor spaces and water. Electrification of heating systems would decrease the emissions of commercial buildings and provide a significant contribution to TransformTO's building emission reduction target, as well as support co-benefits for improved indoor and outdoor air quality, increased resilience and thermal comfort in extreme weather events, avoided weather damage costs, and increased property value.

## METHODS

- Literature review (academic and grey)
- Design of a financial model and rebate scenarios
- Analysis of four case studies

## RECOMMENDATIONS

**A tiered incentive program delivered through certified contractors which targets consumers with aging furnaces and boilers at the end of their lives delivered through certified contractors.**
An online platform or in person training course that would support contractors getting accredited in heat pump installation and becoming program advisors.

**Apply to funding programs like IESO28 Grid Innovation Fund and the FCM29 Green Municipal Fund.**
We estimate the cost of the training and educational programs for contractors to be roughly $50,000 CAD.

**Adopt a midstream approach for the rebate program through a network of trained and approved contractors.**
The reasons are twofold: First, contractors are often advising their clients and can influence their purchasing choices, essentially, they ultimately sell the program for the city. Second, by making the sale of the rebate conditional to completion of training and certification, this program will create competition between contractors who are motivated to receive and pass along the incentive and ensure only trained contractors are part of the program.

https://drive.google.com/file/d/1XvdBMprH7vSqmY2rCyTshHVJWsl6W_4Q/view

# UNDERSTANDING THE IMPACT OF SUSTAINABLE FINANCE ON ONTARIO'S ENERGY SECTOR

GLA2000Y - 2020

## OBJECTIVE

To conduct research on government-industry reporting and comparative jurisdictional scans to understand the impact of sustainable finance on Ontario's energy sector.

## AT A GLANCE

### Challenges

- Limited capital mobilization
- Social risk and unrest
- Limited asset protection
- Voluntary adherence

### Opportunities

- Demonstrate proactivity and leadership
- Delayed rate of change
- Increased investor confidence
- Greater resilience and opportunities for innovation
- Improved energy access for remote communities

### Jurisdictions Scanned

- Denmark
- Germany

### Insights

- Current and emerging drivers of change that represent the most relevant shifts in political, economic, social, technological, and environmental trends that will affect the ENDM and its stakeholders within 5 years are:
- I. Energy Emissions
- II. Demographics
- III. Electrification of Public Transportation Networks
- IV. Innovation
- V. Changing Perception of Climate-Related Risks
- VI. Sustainable Finance Taxonomy

Read the full report here.

## BACKGROUND

This report assesses the impact of sustainable finance developments on Ontario's energy sector over a 5-year time horizon, between 2020-2025. Using scenario analyses that explore alternative trajectories for sustainable finance in Canada, the analysis considers possible implications for the Ontario Ministry of Energy, Northern Development and Mines (ENDM) and Ontario's energy sector.

## METHODS

- Literature review
- Comparative jurisdictional scan and benchmarking
- Semi-structured interviews

## RECOMMENDATIONS

**Scenario A: Low Adoption of Taxonomy**

- Demonstrate leadership
- Stay ahead of disruption and change

**Scenario B: High Adoption of Taxonomy**

- Develop initiatives parallel to the taxonomy
- Support public-private partnerships to provide cleaner electricity to remote communities
- Increase support to clean tech funds

**Consider (2020-2030)**

- Establish an Ontario Sustainable Finance Committee (SFC) comprising energy stakeholders in Ontario, including ENDM
- Power-charging innovation by boosting contributions to Ontario-based clean tech funds in the form of financial and technical support are a means of driving social, economic, and environmental impact within the province.
- Proactively embrace change and ensure the province is positioned to receive capital flows by embracing change early on.

# CONCEPTUALIZING A TORONTO GREEN BANK

GLA2000y - 2020

## OBJECTIVE

To explore the opportunity for and associated challenges of leveraging capital to scale climate solutions through an official municipal green bank.

## AT A GLANCE

### Barriers

- Operational and governance barriers related to City debt levels, risk acceptability, and project criteria
- A limited amount of long-term debt finance available for climate change projects and an insufficient flow of capital to achieve the necessary rate of retrofitting in the existing buildings sector.

### Opportunities

- Partnership
- Diverse finance streams (e.g., bonds, carbon taxes, system benefit charges private funding)

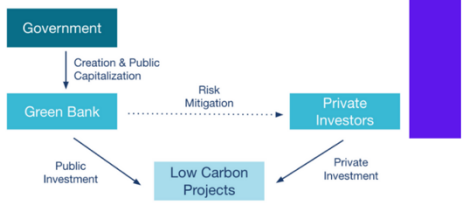
### Jurisdictions Scanned

- London's Mayor's Energy Efficiency Fund
- Connecticut's Green Bank
- New York Green Bank
- Montgomery County Green Bank

### Insights

- Green banks are able to scale solutions by leveraging additional private capital at ratios as high as 8:1 and on average at ratios of 4:1.
- Large and small banks, and the municipal, provincial, and federal governments would likely have the highest impact and influence on a potential Toronto green bank.
- Setting up a municipal green bank in Toronto will better position the City to overcome the governance and operational challenges that the City currently faces, while allowing it to scale solutions to get closer to investing the required capital to meet 2050 net zero targets.

Read the full report here.




Generalized Structure of a green bank.

## BACKGROUND

TransformTO is Toronto's climate action strategy, under which the City supports efforts to retrofit buildings through loan programs and local improvement charge financing. As the need to accelerate the pace of retrofitting increases, the City is interested in understanding opportunities that exist to resolve the constraints and barriers to improve and scale current efforts.

## METHODS

- Jurisdictional scan and review of best practices

## RECOMMENDATIONS

**To allow for program and incentive stability, the City should set up a green bank via a legislative mandate**
A legislative mandate allows for the fund to be written in the constitution, preventing it from short-term political preferences.

**The Toronto Green bank would benefit from operating as a quasi-public corporation.**
This would help to dissolve tensions in public-private development arrangements, and create a framework where a capacity for understanding both market and regulatory mechanisms exists.

**Focus on bonds, philanthropic grants, and private investments when adding to their initial capital.**
This would help to overcome applicability constraints

**Utilize a minimum of three financing products**
Depending on the current gap in the financing landscape, a green bank has the potential to offer several different products such as co-investment loans, credit enhancements, warehouse loans, direct loans, or the specialized loan programs PACE.

**Adhere to three pillars for market development**
They are: User Friendly Product Design, Transparency and Simplicity, and Centralized Administration

**Apply best practices across the nine design elements proven to be successful for green bank creation.**
They are: bank creation, partnerships, diverse funding sources, diverse financial products, market development, projects and objectives, good governance, embedding mechanisms for measurement and verification, sustainability.

# RECOMMENDATIONS FOR A HOME ENERGY RATING AND DISCLOSURE PROGRAM (HERD)

GLA2000Y - 2020



## OBJECTIVE

Evaluate the feasibility of and identify the necessary implementation mechanisms for a Home Energy Rating and Disclosure (HERD) program in Toronto. Deepen understanding of how the City of Toronto could roll-out the HERD program in a way that results in higher energy efficiency in residential homes and supports broader socio-economic impacts for all residents, specifically for vulnerable populations (e.g. low-income, seniors, etc.), and achieve co-benefits (e.g., job creation, and improved health outcomes).

## AT A GLANCE

### Barriers

- Stakeholder will
- Financial costs
- Privacy
- Delayed impact on the housing market
- Industry capacity
- Consumer awareness/ motivation
- Income inequality

### Opportunities

- Energy performance labels
- Coordinate with bill payment assistance
- Partnerships
- Incentives to publicaly disclose rating

### Jurisdictions Scanned

- European Union
- Vancouver, BC
- Edmonton, AB
- Portland, OR

### Insights

- Energy performance labels are an effective signalling tool that influence prices in the real estate market, create local jobs, and deliver crucial information to policy makers,
- Energy performance labeling should be complemented by regulations and financial incentives as well as communications/ disclosures that are inclusive and enhance credibility, and homeowner energy efficiency education
- HERD programs must transition from voluntary to mandatory

Read the full report here.

## BACKGROUND

TransformTO is the City of Toronto's climate action plan to establish an ambitious city-wide target to reach net zero greenhouse gas (GHG) emissions by 2050. A possible TransformTO initiative under evaluation is the Home Energy Rating and Disclosure (HERD) program; an effort to reduce residential emissions and promote retrofitting of Toronto's 455,000 residential homes.

## METHODS

- Produce an evaluation criteria framework
- Conduct a jurisdictional scan of existing programs

## RECOMMENDATIONS

**The start year of the HERD program will depend on the nature of the program, whether it is mandatory or voluntary, and the relevant infrastructure.**
If voluntary, we recommend the HERD program begin immediately after program infrastructure is set up. Conversely, if mandatory, the HERD program should be rolled out after relevant City by-laws have been passed by Toronto City Council and program infrastructure is set up.

**Eligible single-family homes for the HERD program should include homes at the time of listing and/or homes undergoing renovations above a specific cost.**
An energy rating and disclosure would occur pre- and post- renovations or at the time of listing.

**The HERD program must be accessible to homeowners of all socioeconomic backgrounds.**
We recommend the City of Toronto integrate existing home energy programs that protect low-income populations, including: (1) Hydro One's Home Assistance Program (HAP), and (2) Enbridge Gas Inc.'s Free Home Winterproofing Program.

**The HERD program should advocate to implement mandatory energy ratings immediately after a transition period.**
We recommend mandatory energy ratings in the City of Toronto for single-family homes at the time of listing and/or for those being renovated above a specific cost.

**The HERD program should advocate for immediate disclosure of energy ratings to the City of Toronto immediately after a transition period.**
We recommend the creation of a building rating registry, by and only available to the City of Toronto initially, which includes mandatory rating disclosure of renovated homes and homes at the time of listing, as described above, in a means that is transparent to potential homebuyers

# CRACKING THE CLEANTECH ADOPTION BARRIER FOR CITIES & COMMUNITIES

GLA2000H - 2021

## OBJECTIVE

To examine the strategies that cities and cleantech companies can jointly implement in order to overcome barriers to cleantech adoption in the buildings sector, raise consumer awareness, and catalyze uptake in the short term, in support of MaRS Discovery District's work to assist and advocate for cleantech companies.

## AT A GLANCE

### Barriers

- Limited sectoral collaboration between stakeholders
- The flawed design of regulatory
- frameworks
- The lack of awareness of buildings cleantech solutions.

### Opportunities

- Small-scale experiments and pilot projects are useful and even necessary in facilitating collective learning.
- Public-private partnerships
- Government support
- Awareness building, and enhanced
- Collaboration among stakeholders.

### Jurisdictions Scanned

- Copenhagen's Nordhavn Energy Lab
- Vancouver's Building Codes and ZEBx Collaboration Hub
- New York City's Local Law 97
- Singapore's BCA Green Mark Scheme

### Insights

- Increased collaboration, stronger regulatory frameworks, and enhanced education of key actors are needed in overcoming barriers and leveraging opportunities to catalyze rapid adoption of buildings cleantech in Toronto.

Read the full report here.

## BACKGROUND

In order for Canada to meet its climate commitments as laid out under the Paris Agreement, the adoption of buildings clean technology solutions within municipalities is critical, particularly as cities account for over 70% of global carbon emissions.2Increasingly, cleantech solutions are becoming an important part of Toronto's efforts to increase energy efficiency and decrease the emissions of its existing and new buildings.

## METHODS

- Literature review
- Semi-structured interviews with industry experts
- Analysis of four case studies

## RECOMMENDATIONS

### Facilitate collaboration through sectoral partnerships

Actions include: creating an independent advisory group, a partnerships framework, developing investments,

### Enhance regulatory frameworks and financial incentivization

Actions include: enhancing enforcement of TGS, developing a financing program that could offer low-cost loans (like Home Energy Loan Program (HELP), creating an intermediary service that could assist homeowners, commercial building owners, or cleantech companies in applying for financial incentives for which they are eligible, and minimizing bureaucratic barriers that are preventing higher uptake.

### Increase awareness and education

Actions include: providing relevant information to all stakeholders involved in retrofitting and procurement processes to update them on existing resources available, providing a training and certification program for construction and retrofit intermediaries, broadening support for non-traditional buildings cleantech firms, including those working on nature-based solutions, passive houses, and Indigenous designs, modernizing the "Energy & Water Reporting and Benchmarking (EWRB) – Large Buildings" data disclosure by making it visually engaging as well as easy to understand and to compare.

# UNDERSTANDING THE SOCIAL EQUITY IMPLICATIONS OF DECARBONIZATION IN EXISTING BUILDINGS

GLA2029 - 2022

## OBJECTIVE

To deepen understanding of the anticipated equity impacts of the ExB Strategy, particularly with respect to equity-deserving/denied groups; Persons with disabilities, women, racialized groups, Indigenous peoples, LGBTQ2S+,undocumented workers, immigrants, refugees, persons with low income, youth, vulnerable populations such as seniors, victims of violence, persons with low literacy, persons who are homeless and under-housed and residents in Neighbourhood Improvement Areas

## AT A GLANCE

### Challenges

- Affordability
- Split incentives
- Retrovictions and forced displacements
- Workforce development for retrofits

### Opportunities

- Co-benefits
- Empower tenants and building owners
- Partnerships with community groups

### Jurisdictions Scanned

- Vancouver, BC
- New York City, NY
- Los Angeles, CA
- St. Louis, MO
- Washington, DC
- Boulder, CO

### Insights

- The consideration of how the ExB's nine Key actions impact the livelihood of equity-deserving groups should be incorporated at each stage.
- Risks of co-benefits must be mitigated
- Informational barriers and few financial incentives for retrofits are problems that contribute to the landlord-tenant dilemma.
- Many landlords and equity-deserving groups lack awareness of the long-term cost-savings and co-benefits retrofits offer, or the financial support available to them.

Read the full report here.

## BACKGROUND

To meet City Council's climate policy of achieving net zero GHG emissions by 2040, the Environment and Energy Division (EED) developed the Net Zero Existing Building (ExB) Strategy containing nine actions to improve equitable access to sustainable, safe, and durable buildings. While The City of Toronto has an Equity Lens policy, more work is needed to prioritize equity-deserving groups and groups with the highest needs and ensure that fairness and inclusiveness are considered when designing and implementing the programs and policies of the Strategy's nine key actions.

## METHODS

- Literature review (academic + grey)
- Jurisdictional scan
- Feasibility Analysis

## RECOMMENDATIONS

**Adopt a simple and transparent methodology to track sustainability and equity measures**

Go beyond mandatory reporting requirements within the ExB Strategy Action #1 (e.g., GHG reductions) and measure sustainability and equity.

**Implement a targeted approach to the grants and financial programs offered to equity-deserving homeowners and building-owners of low-income housing**

The city should consider grants and finance options that are specifically marketed towards equity-deserving groups to increase program uptake.

**The City of Toronto should partner with unions and other relevant organizations to provide green job training and other relevant skills.for equity-deserving groups**

This would foster skill development to improve employability in the ever-growing green economy.

**Ease the retrofit process by creating a reliable Retrofit Accelerator Program that provides a "one-stop-shop" for landlords and/or buildings owners**

Similar to Vancouver's Landlord BC, The City should partner with existing landlord advocacy groups such as the Ontario Landlords Association to create a reliable and trusted "one-stop-shop" Retrofit Accelerator Program.

**Create a Sustainability Tenant Advocacy Board**

To help mitigate the risk of retrovictions and unlawful tenant displacement.

# INNOVATIVE RETROFIT PROGRAMS JURISDICTIONAL SCAN

GLA2029 - 2022

## OBJECTIVE

Using a matrix and risk scale, scan jurisdictions with innovative retrofit programs, determine feasibility, and identify ways Toronto could adapt and adopt key learnings.

## AT A GLANCE

### Barriers

- Lack of homeoner awareness and capacity
- Confusion regarding programs and rebates

### Opportunities

- Advance multiple co-benefits (e.g., equity, employment)
- Leverage partnerships with organizations and educational institutions
- Create user-friendly tools and tailored solutions
- Communicate steps and pathways
- Retrofitting networks / alliances

### Jurisdictions Scanned

- St. Johns, NFL
- New York, NY
- Singapore
- United States
- Germany
- Ireland

### Insights

- Consistent and clear communication between government programs and external private sector partners is vital
- Collecting and compiling accessible exemplary data on existing building retrofit projects is crucial to monitoring program efficiency.
- Important to coordinate and connect retrofit programs to avoid overlapping efforts and to make offerings less overwhelming to navigate.
- Ensure disadvantaged communities are included in Toronto's retrofit strategy

Read the full report here.

## BACKGROUND

Existing buildings represent 57% of greenhouse gas (GHG) emissions in the City of Toronto. To achieve the Net-Zero target by 2040, Toronto must leverage existing, evidence-based solutions to reduce GHG emissions from existing buildings.

## METHODS

- Literature review (academic + grey)
- Jurisdictional scan
- Constructed a matrix to rank cases and determine which ones are most relevant to Toronto
- Interview with subject-matter expert

## RECOMMENDATIONS

**Require building owners to conduct energy and emissions audits and tune-ups to inform net zero retrofit roadmaps**

To be effective, integrate long-terms perspectives, provide concrete details for each step, tailor solutions to homeowners and user-friendly tools.

**Provide support to reduce the complexity, costs and time associated with building retrofits**

Increasing support and resources for retrofit projects should be prioritized

**Build awareness and capacity of building owners to undertake emissions reduction measures**

This can be supported through networks or alliances (of local businesses), toolkits, partnerships and win-win style campaigns.

**Support workforce development and training**

Train for Trades provides an innovative framework that can inspire a similar retrofit program focused on social justice, equity and inclusion.

# INDOOR HEALTH CO-BENEFIT OF BUILDING RETROFIT PROJECTS

GLA2029 - 2022

## OBJECTIVE

To investigate the quantification and monetization of health co-benefits from deep retrofits to the existing housing stock in various jurisdictions around the world.

## AT A GLANCE

### Challenges

- Measurement of non-energy benefits is novel (lack of standard n measures)

### Opportunities

- Build case for support for retrofits by quantifying non-energy benefits (e.g., curb the emergence of chronic diseases, economic benefits and reflecting health valuations).
- Derive metrics re: thermal comfort and its impact on health, which can be quantified as mortality and morbidity

### Jurisdictions Scanned

- The U.S. Department of Energy's (DOE) Weatherization Assistance Program (WAP)
- Improved Insulation & Home Heating in New Zealand

### Insights

- Co-benefit metrics vary across jurisdictions
- Health co-benefit metrics from home retrofits are not exclusive to improvements in thermal comfort and declines in morbidity and mortality, but also improvements to mental and physical health. This provides important insight into future research at the nexus of energy, housing, and health
- Home retrofits and renovations of homes for energy efficiency can produce huge health benefits sometimes offsetting or even outweighing the cost of the retrofits

Read the full report here.

## BACKGROUND

The Atmospheric Fund (TAF) is a regional climate agency that finances and supports initiatives in low-carbon solutions for the Greater Toronto and Hamilton Area and helps scale them up for broad implementation. TAF is involved in TransformTO, an initiative aiming to secure a low-carbon, healthy, equitable, and prosperous city for residents and visitors. To achieve this goal, scaled climate action needs to be undertaken to reduce GHG emissions and to achieve other social and economic co-benefits. It is also necessary to measure and report the achieved health co-benefits of climate action to assess success and communicate the connection between the climate plans and health impacts. While research has evolved significantly over the last few years, there is no standardized method for quantifying health co-benefits.

## METHODS

- Literature review (academic and grey)
- Jurisdictional scans
- Semi-structured interviews

## RECOMMENDATIONS

**Build Health Co-Benefits into the Design of Retrofit Projects**
Policy makers in sectors aimed at combating climate change should ensure that new technologies and strategies for greenhouse-gas mitigation are subject to health impact assessment before being disseminated

**Value Both Qualitative Findings to Quantitative Findings**
Further studies can build on existing literature to understand the implications of different energy-retrofit actions and to better understand where discrepancies occur between hygrothermal metrics, standard thermal comfort models, and occupant perceptions.

**Understand That Health Co-Benefits are Context-Specific and May Not be Universally Applicable**
Caution must be taken when applying potential public health cost savings across jurisdictions. However, all stakeholders should adopt an equity lens when designing, implementing, or evaluating home retrofit projects and studies, understanding that the improvement of access to affordable housing that is energy efficient and possesses high indoor air quality and thermal comfort can benefit disadvantaged populations the most.

**Continue to Quantify & Monetize Health Co-Benefits in the Future**
A multi-sector approach to the building retrofits can contribute to a reduction in the risk of dangerous climate change while improving health, reducing poverty, and supporting development

# INTEGRATION OF CLIMATE IN ASSET MANAGEMENT PROCESSES

GLA2029 - 2022

## OBJECTIVE

To undertake a jurisdictional scan of local governments and identify best practices with respect to incorporating climate change into the management of water, waste and transport-related assets. Recommendations are intended to support the development and implementation of the City of Toronto's corporate-wide Climate Lens program.

## AT A GLANCE

### Challenges

- Department siloes
- Lack of public data
- Cost

### Opportunities

- Integrating mitigation and adaptation actions
- Co-benefits (e.g., increase asset lifespan)
- Circular Economy
- Nature-based solutions (e.g., urban forests)

### Jurisdictions Scanned

- Barrie
- Chicago
- Auckland
- Sweden
- Hong Kong
- Berlin
- Germany
- Prince Edward Island
- Australia

### Insights

- There is a need to integrate climate goals into level of service reports, and adapt infrastructure to meet climate-induced challenges.
- Significant investments are needed to upgrade Toronto's infrastructure
- Many metrics used to evaluate levels of services are not indications of success, but merely completion.

Read the full report here.


## BACKGROUND

The City of Toronto's Environment and Climate Division (ECD) seeks to facilitate the development and implementation of a corporate-wide Climate Lens program that helps equip city asset managers with the necessary training, information, tools and resources to create plans that address greenhouse gas (GHG) emissions and risks city assets will face due to the effects of climate change. Asset management (AM) planning as defined by the government of Ontario is "an ongoing and long-term process that allows municipalities to make the best possible investment decisions for their infrastructure needs." Through this Climate Lens, the City hopes to spark an organisational culture shift to ensure climate considerations are present in capital projects and AM planning, to ensure their compliance with Toronto's GHG reduction goals and climate risk adaptation needs.

## METHODS

- Literature review (academic and grey)
- Jurisdictional scan and review of best practices

## RECOMMENDATIONS

**More collaboration between partners and stakeholders across the public, private and non-profit sectors is necessary to bridge the gap between ambition and action.**
Multi-level collaboration between municipal departments, private corporations and civil-society, is needed to prevent reductionism and address the multi-dimensional challenges that climate change brings.

**Anticipate future needs of the city and its citizens is a crucial aspect of forming climate sensitive AM plans.**
Toronto should work to incorporate climate and population projections into its climate-related levels of service standards, as laid out in various reports published by the city.

**Implement more rigorous data collection strategies to core asset systems in Toronto**
This will allow the city to better implement, enforce and track progress on service levels and climate initiative, as well as adapt strategies, better react to unforeseen events, and evaluate if the ultimate outcomes were achieved.

# SCALING AND DELIVERING CLIMATE SOLUTIONS

GLA2029 - 2022

## OBJECTIVE

To provide the City of Toronto with key considerations and recommendations for scaling up the delivery of clean heating solutions to 400,000 single family homes in Toronto through an equitable approach.

## AT A GLANCE

### Challenges

- Lack of awareness
- Difficulty quantifying financial benefits
- Lack of trained contractors and assessors
- Nascent market

### Opportunities

- Provincial and federal funding support
- Public-private partnerships
- A role for the City in coordinating scaling.

### Jurisdictions Scanned

- New York City, NY

### Insights

- A market-based approach is the best option to scale and deliver climate solutions.
- To establish a market for clean heating solutions, the City should work with suppliers, contractors, and other stakeholders to build a local supply chain for different green technologies.
- Establishing green technologies as the norm, rather than the alternative, is essential to increase demand.
- Financing mechanisms must be available from all levels of government to ensure energy transition is equitable.
- A robust communications strategy is needed to provide information and encourage homeowners to undertake retrofits

Read the full report here.

## BACKGROUND

The City of Toronto has committed to reach 65 percent emissions reductions by 2030 and net zero by 2040. To reach this target, close to half a million buildings need to be retrofit to achieve higher performance. Current retrofit programs run by the city, though delivering both environmental and economic benefits, must be greatly scaled up to realize all their potential.

## METHODS

- Literature review (academic + grey)
- Interviews with subject matter experts in the building industry

## RECOMMENDATIONS

### A multi-pronged approach: a bulk buying program

The bulk purchasing program (i.e., purchase 100,000 over 4 years) must be supported by and work in tandem with other policies such as sunset clauses, the existing building strategy, and new building regulations, and might entail pressuring the Province of Ontario to alter the building code to require green mechanisms to be invested in and implemented.

### Establish a bulk purchasing program through public-private partnerships

This would ensure the supply of heat pumps is available for single family homeowners that are interested in transitioning to clean heating solutions in a way that also bolsters demand and eases financial constraints. A fast track program that will enable developers and homeowners to receive the permits necessary for their home retrofits, especially to achieve their target by 2040.

### Implement a subsidization program

Supporting lower income family homeowners.

### Undertake a comprehensive communications strategy

This would provide information and resources on the bulk purchasing program and financing mechanisms to the public.

# COORDINATION: CLIMATE POLICY IN ONTARIO

GLA2000H - 2021

## OBJECTIVE

To identify the best practices and recommendations in order to efficiently increase climate policy integration within the provincial government of Ontario.

## AT A GLANCE

### Barriers

- Political will
- Legislative gap
- Lack of financing

### Opportunities

- Cross-departmental/ ministry coordination
- Advisory committee

### Jurisdictions Scanned

- British Columbia, CA
- Sweden
- California, US

### Insights

- Independent expert advisory bodies are effective because they can help inform government decisions and monitor progress.
- A joint approach to policy development and coordination can help create recommendations and achieve milestones across multiple sectors.
- Placing climate personnel in key government offices can result in increased pursuance of climate initiatives.

Read the full report here.

## BACKGROUND

A 2020 Ontario Auditor General report found that the Ministry of Energy, Northern Development and Mines' mandate was not aligned with the broader climate goals of the Ontario government, particularly emissions reduction. This report identifies best practices and recommendations to increase climate policy integration within the provincial government of Ontario. In order to do so, the following is considered: how to coordinate policies across government stakeholders, the implications for decision-makers and how to manage the need to support cross-government climate targets.

## METHODS

- Literature review
- Comparative jurisdictional scan and benchmarking
- Semi-structured interviews

## RECOMMENDATIONS

**Establish an independent expert body to provide increased clarity over policy direction**

It would serve as a knowledge hub for climate policy in the province. assist parliamentarians in overcoming political hurdles related to climate policy and communicate key facts and findings. The committee would also play a role in the development of climate policy options,

**Utilize a network approach**

Adopting a joint approach to policy making would enable better coordination of climate objectives across ministries and agencies, and would enhance communication across stakeholder groups and create broader, cross-ministry solutions.

**Increase the number of climate policy personnel across government to embed climate considerations in policy making.**

Climate personnel located centrally in a government structure are able to assist with coordinating policy objectives between different ministries, and the establishment of climate policy offices in key ministries will provide an added salience to climate objectives in government considerations.

# TRANSFORMTO: GREEN INFRASTRUCTURE

GLA2000y - 2016

## OBJECTIVE

To investigate the current state of Toronto's green infrastructure and researching policies in other cities, in order to identify opportunities for Toronto to improve its own programs and projects.

## AT A GLANCE

### Barriers

- Lack of standard measures for benchmarking
- Cost
- Lack of effective incentives

### Opportunities

- Mitigate risk of flood and urban heat island effects
- Improve livability and desirability of city
- Enhance capacity through partnerships and volunteer programs

### Jurisdictions Scanned

- Chicago, IL
- Portland, OR
- Washington, DC
- Austin, TX

### Insights

- The city's performance in public green spaces is difficult to compare with other cities, since there are no widely used metrics for evaluating public green spaces.
- Many of the proposed solutions to threats to the urban forest rely heavily on public involvement through education campaigns and encouraged community participation in sustainability programs.
- People who perceive their communities to be very environmentally friendly, adjust their behaviour to also be more environmentally conscious.
- A mix of programs targeting private property and residential tree planting have proven effective in some cities.

Read full report here.

## BACKGROUND

The City of Toronto has a goal of being the most livable city in the world. To achieve this goal, the city seeks to increase green infrastructure. Green infrastructure refers to "natural and human-made elements that provide ecological and hydrological functions and processes" and may include natural heritage features and systems, parklands, stormwater management systems, street trees, urban forests, natural channels, permeable surfaces, and green roofs. The City of Toronto identified three categories of green infrastructure to focus on here as they are especially relevant based on these concerns and existing policies within Toronto: green roofs, trees and canopy coverage, and public green spaces.

## METHODS

- Literature review and document analysis
- Jurisdictional and landscape scans

## RECOMMENDATIONS

**A Competitive Toronto**

increase green infrastructure programs and incentives to make Toronto competitive among North American cities.

**A Visibly Green Toronto**

Improve marketing strategies to brand Toronto as a green city and fuel behaviour.

**An Equitable Toronto**

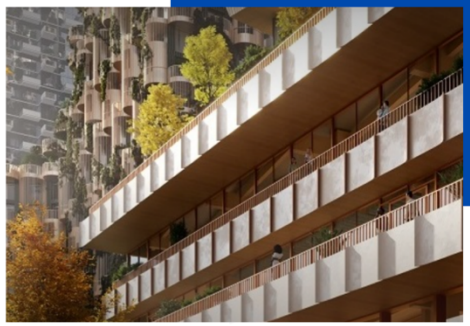
Focus on specific communities to improve equitability of green infrastructure projects throughout the city.

# CRACKING THE CLEANTECH ADOPTION BARRIER FOR CITIES & COMMUNITIES

GLA2000H - 2021

## OBJECTIVE

To examine the strategies that cities and cleantech companies can jointly implement in order to overcome barriers to cleantech adoption in the buildings sector, raise consumer awareness, and catalyze uptake in the short term, in support of MaRS Discovery District's work to assist and advocate for cleantech companies.



## AT A GLANCE

### Barriers

- Limited sectoral collaboration between stakeholders
- The flawed design of regulatory
- frameworks
- The lack of awareness of buildings cleantech solutions.

### Opportunities

- Small-scale experiments and pilot projects are useful and even necessary in facilitating collective learning.
- Public-private partnerships
- Government support
- Awareness building, and enhanced
- Collaboration among stakeholders.

### Jurisdictions Scanned

- Copenhagen's Nordhavn Energy Lab
- Vancouver's Building Codes and ZEBx Collaboration Hub
- New York City's Local Law 97
- Singapore's BCA Green Mark Scheme

### Insights

- Increased collaboration, stronger regulatory frameworks, and enhanced education of key actors are needed in overcoming barriers and leveraging opportunities to catalyze rapid adoption of buildings cleantech in Toronto.

Read the full report here.

## BACKGROUND

In order for Canada to meet its climate commitments as laid out under the Paris Agreement, the adoption of buildings clean technology solutions within municipalities is critical, particularly as cities account for over 70% of global carbon emissions.2Increasingly, cleantech solutions are becoming an important part of Toronto's efforts to increase energy efficiency and decrease the emissions of its existing and new buildings.

## METHODS

- Literature review
- Semi-structured interviews with industry experts
- Analysis of four case studies

## RECOMMENDATIONS

### Facilitating Collaboration Through Sectoral Partnerships

Actions include: creating an independent advisory group, a partnerships framework, developing investments,

### Enhancing Regulatory Frameworks and Financial Incentivization

Actions include: enhancing enforcement of TGS, developing a financing program that could offer low-cost loans (like Home Energy Loan Program (HELP), creating an intermediary service that could assist homeowners, commercial building owners, or cleantech companies in applying for financial incentives for which they are eligible, and minimizing bureaucratic barriers that are preventing higher uptake.

### Increasing Awareness and Education

Actions include: providing relevant information to all stakeholders involved in retrofitting and procurement processes to update them on existing resources available, providing a training and certification program for construction and retrofit intermediaries, broadening support for non-traditional buildings cleantech firms, including those working on nature-based solutions, passive houses, and Indigenous designs, modernizing the "Energy & Water Reporting and Benchmarking (EWRB) – Large Buildings" data disclosure by making it visually engaging as well as easy to understand and to compare.

# COMMUNICATING TRANSFORMATIONAL CHANGE

GLA2029 - 2022

## OBJECTIVE

To examine what the underpinnings are of a successful, behaviour-changing communication plan. It has been prepared for the City of Toronto's Environment and Energy Division in conjunction with the Munk School of Global Affairs.

## AT A GLANCE

### Challenges

- Resource intensity of engagement
- Attributing behaviour change to specific interventions
- Social relations and material dimensions of behaviour change might be out of scope

### Opportunities

- Creating partnerships
- Resource platforms
- Technology
- Peer to peer

### Jurisdictions Scanned

- Florida - Truth Campaign (anti-smoking)
- Berkeley- Residential Energy Conservation Ordinance (RECCO)
- Toronto - COVID messaging

### Insights

- Communication strategies are improved with engagement tactics.
- Behaviours change when people see how sustainability aligns with their pre-existing
- goals.
- Meaningful change might also require system-wide changes.

## BACKGROUND

The City of Toronto's Environment and Energy Division (EED) is implementing a city-wide climate action campaign. Communicating Transformational Change is an analysis of the theoretical underpinnings of a successful behaviour-changing communications plan. Retrofitting existing buildings was chosen as the focal point because they are one of Toronto's biggest energy emitters.

## METHODS

- Literature review (academic and grey)
- Jurisdictional scan
- Semi-structured interviews

## RECOMMENDATIONS

**Modify existing City of Toronto programs to incorporate engagement opportunities.**
Engaging with individuals about their goals and connecting those aims to TransformTO's Net Zero sustainability targets is an effective, proven way of bringing about changed behaviour.

**Build a sustainable engagement infrastructure.**
Changing our social structures is the best– likely only– way of ensuring broad societal changes. To avoid harming vulnerable populations through measures that disproportionately impact them, legislation should be clear and can target moments of transition.

**Leverage technology to incorporate values, norms, and incentives into programs.**
This could take the form of websites and apps. One example of this could be an app that tracks a user's energy usage over time and allows them to compete with participating houses in their community or against other neighbourhoods.

https://drive.google.com/file/d/1HZyvqf6WagPZbdqiRCDGLvH7tqCAl54D/view

# SUSTAINABLE PROCUREMENT

GLA2029 - 2022

## OBJECTIVE

To create a sustainable procurement framework for the Purchasing and Materials Management Division at the City of Toronto. A jurisdictional review throws light on how leading governments create, utilize and verify procurement-related GHG emissions data.

## AT A GLANCE

### Challenges

- Novel initiatives
- Lack of public data
- Consistency

### Opportunities

- Co-benefits
- Grow local markets

### Jurisdictions Scanned

- Vancouver
- Sacremento
- Canada
- United Kingdom

### Insights

- Reducing greenhouse gas emissions is a priority for government procurement.
- Initiatives to verify, collect and measure emissions data vary
- Pros and cons to both centralized and decentralized approaches to sustainable procurement Methods employed by jurisdictions to enhance sustainable procurement ranged from internal supplier data verification to employee and stakeholder education.
- Key components of a sustainable procurement program are: policymaking, educate, collaborate, measure, reward, practice.

Read full report here.

## BACKGROUND

Local governments have the ability to influence other sectors in becoming more aware of their carbon footprint while encouraging value chains to become increasingly carbon neutral by reducing their overall 'Scope 3', i.e. GHG emissions. The creation of an informed framework for sustainable procurement can help drive policies and initiatives that position the City of Toronto as a catalyst of larger market-driven change.

## METHODS

- Literature review (academic and grey)
- Jurisdictional scan and review of best practices
- Semi-structured interviews

## RECOMMENDATIONS

**Publish annual procurement reports**

Reports should focus on reporting which contracts were acquired to meet the City's climate goals.

**Ensure comprehensive employee training framework**

Training programs can increase knowledge of sustainability, best practices and methods for motivating stakeholders.

**Use third party companies to collect supplier GHG data**

The City should require collection of GHG data from suppliers, at their expense, prior to entering or renewing procurement contracts.

**Internally verify emissions data within set time frame**

Strong oversight of the program can prevent costly and time intensive legal battles that may occur if fraudulent activity is detected.

**Run policy pilot programs for a set duration of time**

Testing and adapting programs to incorporate employee needs, market demands, and city expectations will inevitably highlight further areas that need to be included in training modules and reveal the most effective way to implement new procurement policy standards.

**Create a communication strategy**

A centralized data sharing strategy that emphasizes open, continuing communication is of the best interest to any municipality due to the highly collaborative nature of this type of policy project

# INVESTIGATING INCENTIVES AND DISINCENTIVES IN THE TRANSITION TO ZERO EMISSION VEHICLES IN TORONTO

GLA2029 - 2022

## OBJECTIVE

To examine what approaches leading municipalities around the world have taken to incentivize residents and businesses to switch from internal combustion engine (ICE) vehicles to zero-emission vehicles (ZEVs) and to discourage the use of ICE vehicles in favour of active transportation and public transit.

## AT A GLANCE

### Barriers

- Limited jurisdictional scope
- Cost
- Political risk
- Potential to exacerbate inequality

### Opportunities

- Apply a comprehensive and interconnected mix of electric vehicle promotion actions.

### Jurisdictions Scanned

- Paris, FR
- Amsterdam, NL
- Oslo, NO
- Los Angeles, US
- Shanghai, CHIN
- Montreal, CA
- Vancouver, CA
- London, UK
- New York, NY
- Beijing, CHIN

### Insights

- High degree of policy convergency between cities scanned
- Financial incentives remain the most common and most important policy measure for promoting ZEV uptake.
- Significance of dense charging networks
- Alternative transportation methods will need to play a substantial role in decarbonizing transportation in Toronto.

Read the full report here.

## BACKGROUND

In December 2021, Toronto City Council adopted the TransformTO Net Zero Strategy, with a goal of achieving net zero emissions by 2040. According to the City's most recent (2020) GHG Inventory, the transportation sector generates the second-highest emissions levels and approximately 73% of transportation emissions come from personal vehicles.

## METHODS

- A jurisdictional scan of leading municipalities
- A review of academic and grey literature concerning incentives for ZEV adoption.
- An original analysis/evaluation of different incentives and disincentives based on their feasibility and applicability in the case of Toronto and their implications for principles of social equity
- Policy recommendations

## RECOMMENDATIONS

**Make EVs financially attractive by reducing their relative cost.**

Upfront cost supports are the most effective policy tool for promoting EV uptake.

**Expand focus beyond EVs.**

EVs are not sufficient to meet the city's net-zero goals. Prioritize alternative modes of transportation, especially public transit and active mobility.

**Work smart with federal and provincial partners.**

Other orders of government are better suited to deliver many policy incentives. Focus on the city's realistic fiscal and institutional capacity and enlist federal and provincial help where possible.

# UNDERSTANDING THE QUANTITATIVE AND QUALITATIVE BENEFITS OF THE CITY'S POLLINATETO COMMUNITY GRANTS PROGRAM

GLA2029 - 2022

## OBJECTIVE

To design a methodology for the City's PollinateTO Community Grants Program that deepens understanding of the quantitative and qualitative benefits, notably reductions in greenhouse gas emissions, diversion of stormwater and biodiversity enrichment in the City, of the City's pollinator gardens.

## AT A GLANCE

### Challenges

- Data collection
- Measurement

### Opportunities

- Co-benefits
- The City of Toronto has an opportunity to set the standard for how this data can be collected in smaller community-organised gardens and for how local community members can participate in collecting this data with citizen science methods.

### Insights

- Despite the prevalence of community garden grant programs across North America, few jurisdictions are doing the work to measure the environmental or social benefits of these gardens.
- The gardens funded by PollinateTO have clear and quantifiable environmental benefits that contribute to the City of Toronto's Pollinator Protection Strategy, Biodiversity Strategy and TransformTO Net Zero Strategy.
- The gardens funded by PolliateTO have significant social benefits in terms of both individual well-being and community engagement.

Read the full report here.

## BACKGROUND

To meet City Council's climate policy of achieving net zero GHG emissions by 2040, the Environment and Energy Division (EED) developed the Net Zero Existing Building (ExB) Strategy containing nine actions to improve equitable access to sustainable, safe, and durable buildings. While The City of Toronto has an Equity Lens policy, more work is needed to prioritize equity-deserving groups and groups with the highest needs and ensure that fairness and inclusiveness are considered when designing and implementing the programs and policies of the Strategy's nine key actions.

## METHODS

- Literature review (academic and grey)
- Identification of evaluation criteria (GHG reductions, stormwater diversion, biodiversity, individual benefits)
- Creation of data collection and measurement approach

## RECOMMENDATIONS

**As the program grows in size, it is recommended that the proposed methodologies be reevaluated.**
The collection of more specific and robust datasets on the gardens would allow the program to more accurately quantify and analyse both the environmental and social benefits of the gardens.

**As the program grows in size, it is recommended that data be collected on public and private pollinator gardens in the city that are not part of the PollinateTO program.**
This will enable alignment with the goal of engaging with Neighbourhood Improvement Areas.

# NEIGHBOURHOOD & COMMUNITY-LED SOLUTIONS TO BUILDING RETROFITTING

GLA2029 - 2022

## OBJECTIVE

To examine the practices of international jurisdictions regarding community-based retrofitting and, upon undertaking a feasibility assessment, make recommendations for how these findings can be translated into the Toronto context.

## AT A GLANCE

**Barriers**

- Costs to homeowner
- Lack of knowledge (homeowner / contractor)
- Split incentive
- Jurisdictional scope
- Supply chain
- Lack of skilled labour / contractor shortages

**Opportunities**

- Bulk purchasing (heat pumps, not solar)
- Community outreach (multiway)
- Measure and communicate co-benefits
- Combine multiple sources of funding

**Jurisdictions Scanned**

- Ann Arbor, US
- Washington, US
- New York, US
- London, UK
- Amsterdam, NL
- New Zealand

**Insights**

- Importance of health messaging
- Leveraging community partnerships, neighbourhood champions, and local activism, enabled projects to engage with their target demographics, provide targeted services and encourage participants to orient themselves in the larger cause.
- Accessible information eases the sometimes-daunting process of sustainable retro-fittings and allows a larger audience to become involved.

Read the full report here.

## BACKGROUND

Community groups and individuals will be instrumental in helping the City achieve its goal of halving emissions from existing buildings (from 2008 levels) by 2030 and ensuring inclusive and lasting change. Community-led initiatives can motivate action on the grassroots level, reaching individuals in ways institutions cannot. Since single family homes make up 30% of the City's building emissions, finding ways to increase retrofits of single-family dwellings is a priority of the City.

## METHODS

- Literature review (academic + grey)
- Jurisdictional scans
- Analysis of Feasibility

## RECOMMENDATIONS

**Adopt health messaging and assessment**

Retrofitting for health benefits,, as well as economic and other personal benefits, is a powerful narrative that the City should utilize. Such messaging can be conveyed or enabled through house assessments and by making financial incentives more readily available.

**Find and work with community champions**

Have community leaders lead outreach efforts in their neighbourhoods to provide a more individualized approach to recruitment and awareness. This would include initial outreach and promotion, communication during the process, or follow-up to ensure participants feel supported through a retrofit.

**Make resources available and accessible**

Ensure resources that promote energy efficient renovations and other sustainability projects are accessible in terms of reading level, format, and language. It is also important to provide clear links and pathways between resources, to ensure a simplistic process on the part of the user.

# ZERO EMISSION CONSTRUCTION PRODUCT AND KNOWLEDGE GAPS

GLA2029 - 2022

## OBJECTIVE

To identify the main barriers to achieving net-zero construction in Toronto's multi-unit residential building (MURB) sector and propose recommendations to overcome those barriers.

## AT A GLANCE

### Barriers

- Heat loss and thermal resilience in building envelopes.
- Usage and energy inefficiency in heating and cooling.
- Instability of incentives in the market and a lack of coordinated response
- High start-up cost

### Opportunities

- Capitalize on 'green' industry trends

### Jurisdictions Scanned

- Vancouver, BC
- British Columbia, CA

### Insights

- Re: building envelope systems - air leakage is the biggest barrier to net-zero construction
- Re: energy-natural gas for heating is the largest contributor of greenhouse gas emissions in buildings.
- Re: regulatory action and marketing signalling, increasing standards and regulation with incentives will spur industry growth.
- Coordinating building standards across the province will help achieve economies of scale and attracting talent.
- Communicating forecasted industry growth and market opportunities will be essential in attracting market activity.
- Increased regulation needs investment in monitoring and enforcement to be fully effective and hold developers accountable.

Read full report here.

## BACKGROUND

To achieve the Net-Zero target by 2040, all new homes and buildings must be designed and built to be near zero greenhouse gas emissions. Reaching net-zero construction in the MURB sector by 2028 will require consideration of the building envelope, mechanical systems, and regulatory action

## METHODS

- Literature review (academic + grey) / jurisdictional scan
- Semi-structured interviews with 5 firms in the sustainable buildings sector

## RECOMMENDATIONS

**Encourage adoption of highly efficient building envelopes is to incorporate regulation of these systems into building code.**
technology and practices for the material design of energy efficient buildings exist, but need regulation to become the norm.

**Reduce the City's reliance on natural gas for heating**
Higher taxes on natural gas, mandatory feasibility tests of geothermal systems for MURBS, and working with the province more closely for greater regulation of net zero buildings could help

**Strengthen Regulations and Market Signalling**
By: coordinating city and provincial building standards to spur economies of scale and attract local suppliers and talent; asking the Ontario government for funding research and development grants and programs to provide incentives and encourage innovative solutions in the net-zero construction sector; using a communications campaign to communicate industry growth potential in the Greater Toronto Area and Ontario; and creating a plan for enforcing building efficiency standards to hold developers accountable.

# IMPROVING THE URBAN AGRICULTURAL LANDSCAPE IN TORONTO

EESC34H3- 2020

## OBJECTIVE

To investigate the City of Toronto's efforts in promoting urban agriculture, and examine the rate of effectiveness of the city's various urban agriculture projects, plans, and initiatives.

## AT A GLANCE

### Barriers

- Lack of economies of scale- a need for greater investment, incentives and subsidies
- High cost of inputs and labour
- Escalating cost of land
- Land use pressures (e.g., to house a growing population)
- Exclusivity
- Misallocation or lack of allocation of resources.

### Opportunities

- Resolve food insecurity issues
- Green space affords co-benefits for human health and wellbeing, air quality an

### Insights

- Financial incentives are needed to encourage and promote urban agriculture (UA). Presently, UA operations are very small scale
- While farmers markets usually sell food derived from local and community farmers, they are usually more expensive than regionally-commercially produced goods, making them inaccessible to lower income groups
- Many farms had to shut down during Covid 19, which speaks to a need for greater protections and effort ti improve the resiliency of the urban agriculture sector.

Read full report here.

## BACKGROUND

Despite there being many farms in Toronto and in neighbouring municipalities, there are many factors that jeopardize the future of urban agriculture. To make urban agriculture in Toronto more sustainable, there is a need for support from the public and private sectors, and involvement of civil society organizations and residents to demonstrate the importance of local agricultural production.

## METHODS

- Literature review and document analysis

## RECOMMENDATIONS

**Implement policies that dedicate funding and land to urban agriculture**

Land provision is essential in order to encourage large-scale urban agriculture. Funding in this case could be in the form of subsidies in which agricultural tools and products could be paid by the government.

**Subsidize lower socioeconomic groups so they can access farmers markets, or other certified locally produced high-quality food.**

The funds for this subsidy could be obtained from implementing a tariff or tax on international food. This will firstly, dissuade people from buying international food which is less sustainable, whilst encouraging people to buy local food which is more sustainable and secondly, fund for the lower socioeconomic group if people still choose to buy international food.

**Allocate sufficient resources to ensure urban food sustainability.**

This requires longer-term equity-focused plans targeting impact.