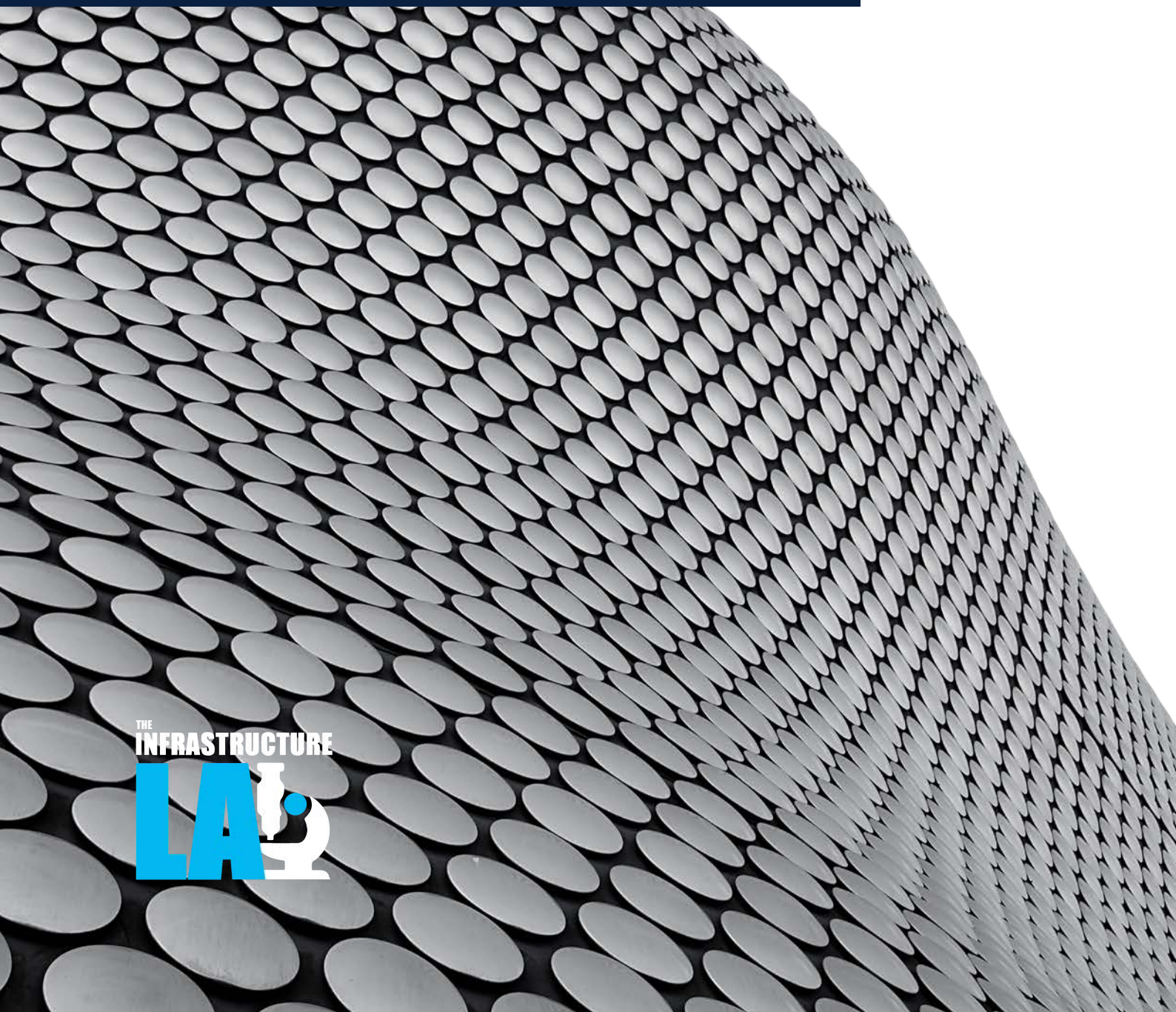
Infrastructure Exchange

CITIES TO NET ZERO

Designing Cities to Reduce Emissions



THE INFRASTRUCTURE LAB

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ABOUT THE INFRASTRUCTURE LAB

The Infrastructure Lab brings together organizations, businesses, government and academia to discuss solutions for infrastructure challenges. With Canada making unprecedented investments, our goal is to promote constructive dialogue, and draw on shared experiences, to ultimately help drive the most value for communities, and governments, and a healthy maket for the sector.

2021

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With thanks to session participants from the following organizations:

- Arrival
- Arup
- Benoy
- Broadway Malyan
- Canada Infrastructure Bank
- Canadian Institute of Planners
- City of Calgary
- City of Belfast
- City of Birmingham
- City of Glasgow
- City of Toronto
- City of Victoria
- Leeds Climate Commission
- The Atmospheric Fund
- Turner & Townsend
- Royal Town Planning Institute

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CITIES TO NET ZERO

Designing Cities to Reduce Emissions

Cities are responsible for 70 percent of carbon emissions and are significantly impacted by the effects of climate change. Here are some of the key themes raised at the Canada-UK roundtable on Cities and Net Zero:

1

Vision & Leadership:

Cities need to adapt a systems-based approach with an equity lens to examine urban planning, building performance, transportation use, and sources of energy. Ambitious approaches succeed when progress on the ground is clearly communicated to residents generating local buy-in, and work is completed collaboratively across levels of government.

2

Implementation:

Cities must look at the biggest sources of emissions from their infrastructure delivery and operations. The planning process is one such area that cities can effectively address the urgency of climate change and indirectly impact the wider community in driving change. Early engagement with broad, representative cross-sections of the community help understand how to plan equitable communities.

3

Financing:

There are a variety of financing solutions that can garner private interest and help accelerate the transition to net zero. At the national levels, both the UK and Canada have established Infrastructure Banks to fill the gap and establish integrated thinking. Cities have also been innovative in funding net zero solutions that target building retrofits, efficient waste management, and other cost-effective measures through local partnerships with the private sector to catalyze and scale low-carbon solutions.

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INTRODUCTION

Cities around the world are responsible for 70 percent of carbon emissions and are significantly impacted by the effects of climate change. The additional infrastructure costs for climate change mitigation and adaptation are anticipated to continue to rise as towns and cities continue to grapple with the impacts.

Decisions made at the local level have a major impact on cutting emissions and meeting national goals of reaching net zero by 2050 with many cities setting more ambitious timelines to reach this goal. Taking action on addressing climate change is good for municipal finances too. An analysis by the City of Leeds in the UK showed that taking action to reach net zero would cut the city's energy bill by £651 million a year, as well as creating 1,500 jobs for the next decade.

When it comes to infrastructure local government has a big impact. Local levels of government are responsible for planning and permitting, running transit systems, and maintaining roads, provide housing, delivering public services, and in the case of Canada often running public utilities. Local governments may only be directly responsible for up to 10% of emissions using the example of Mississauga in Ontario, they have an indirect impact on 40%. The UK's Climate Change Committee estimated that local authorities are directly responsible for 2-5% of emissions, but can have control over indirect emissions of 40-80%.

The convergence of people and infrastructure requires a systematic approach to cutting emissions that factors in these interdependencies. This approach must look at policies, urban planning, building performance, public service delivery, and community engagement.

1 **Vision & Leadership:** comprehensive plans, collaborative partnerships, coherent national frameworks, communicate progress and benefits

2 **Implementation:** early engagement, place-based approach, transit-oriented communities, natural infrastructure, active transportation, retrofits

3 **Financing:** expand mandates, partnerships to drive innovation, cost-effective charting, evidence-based, agile approaches

VISION AND LEADERSHIP

Cities have set the benchmark on climate leadership with ambitious goals and comprehensive plans to reach net zero. London set a goal to be net zero by 2050, as did Toronto. Glasgow, Leeds, and Bristol set a target of 2030. Cities bring together buildings, transportation networks, power and heating, and waste collection and treatment, they also shape the behaviour of citizens, businesses and other organizations. A vision is needed to break down siloes across city departments and with other levels of government.

Cities are using climate plans to meet a number of broader policy goals around health, economic growth and attracting investment, unlocking housing, and driving social equity. Better public transport reduces emissions and improves access to employment opportunities for example. The Place-Based Climate Action Network provides recommendations for local government on how to ensure climate commitments and plans translate into actions and results. Recommendations include adopting a partnership-based approach, developing financing strategies, having a coherent national framework, and tackling institutional and policy barriers. Local context is important in mobilizing local investment for local solutions, accelerating community buy-in, and improving access to local net-zero sources and resources.

Central government can support change at the local city-level through three key principles according to Benoy:

1. Government needs to set a regulatory framework based on outcomes, and not be too strict on how cities gets there based on technology or specifications.
2. Central government can set procurement standards that help establish the marketplace and help local government become a smart client.
3. Central government should ensure best practices are shared to ensure that cities can build on success and learn from failures to avoid unnecessary costs.

TORONTO, CANADA

TransformTO which is Toronto's climate action strategy approved by City Council in July 2017, lays out a set of long-term, low-carbon goals and strategies to reduce local greenhouse gas emissions and improve health, grow economy, and improve social equity. Currently, Toronto is developing a Net Zero Strategy by 2050 which is due late 2021. In Toronto 55% of emissions come from buildings, 36% from transportation and 9% from waste. In implementing TransformTO, the city has carefully considered the equity implications across the goals, such as providing viable alternatives to private vehicle use like investing in electric transit.

The goals outlined in TransformTO state that by 2030:

- **Homes & Buildings:** Retrofits will improve environmental, social and health outcomes for all residents. In Toronto, all new buildings will be built to produce near-zero GHG emissions. By 2050, all existing buildings will have been retrofitted to achieve net zero emissions.
- **Energy:** By 2050, 100 per cent of energy will come from renewable or low-carbon sources.
- **Transportation:** By 2050, 100 per cent of vehicles in Toronto will use low-carbon energy; 75 per cent of trips under 5 km will be walked or cycled.
- **Waste Diversion:** By 2050, Toronto will have advanced towards a zero-waste circular economy.

GLASGOW, SCOTLAND

Glasgow aspires to be one of Europe's most sustainable cities and released their own Climate Emergency Implementation Plan in 2020. The plan is driven by two fundamental principles: actions to address climate that do not further disadvantage people and communities already experiencing significant inequalities, and that actions to create a safer, more sustainable city should build a just and more equal city. Glasgow Council will be using Scotland's benchmarking tool to measure progress as the plan proceeds as Council is conscious of the need for a just transition.

Glasgow's Plan outlines these key goals:

- **Homes & Buildings:** Glasgow will invest in low carbon infrastructure that will be future proof and provide affordable housing and energy. Local Heat and Energy Efficiency Strategy, City Development Plan and will also work with the UK's national innovation centre on energy systems.
- **Energy:** Installing LED lighting, building energy management systems, solar panels, aims for City as an organization to be carbon neutral by 2030.
- **Transportation:** Glasgow Transport Strategy and City Centre Transformation Plan, Livable Neighbourhoods plan and the first in Scotland, City Centre low emission zone (LEZ).
- **Waste Diversion:** Implementing a circular economy strategy to reduce waste.

Building a Roadmap

Leeds, UK

A best practice approach is to start with a group made up of different departments, the community, and experts. Leeds set up an independent Climate Commission in 2017 and was the first of its kind at the local level. It brought together all the key actors, developed a shared responsibility for action, and expanded the capacity of the city council. The Commission started with a Climate Action Readiness Assessment to identify priorities and restructured itself to focus on these areas and promote climate action around housing, transport, and finance and investment.

The City of Leeds in Northern England has a population of 792,500 and is committed to becoming carbon neutral by 2030 through their Best Council Plan. The City established the independent Leeds Climate Commission in 2017 and was the first of its kind. It has since been replicated elsewhere with a vision of creating shared ownership and a positive understanding across Leeds of what carbon neutrality means.

The structure of the Climate Commission has evolved to include as many different sectors as possible. In 2021, the Commission has established panels of 8-10 individuals on a volunteer basis with a focus on housing, transportation, finance and investment. The Commission then meets with these panels on a quarterly basis in addition to working with other existing commissions and working groups throughout Leeds.

The Climate Commission prepared an updated Net-Zero Carbon Roadmap for Leeds in January 2021 which outlines areas of opportunities for low carbon action that delivers benefits for health, equality, travel, housing and the environment. The work done by Leeds shows that the city could save £651 million per year and create 1,500 jobs in the next decade by tacking climate change.

The roadmap assesses 130 measures. The most cost-effective, impactful options identified include retrofits in homes and businesses for heating, lighting and insulation, and focusing on the transportation sector shifting to non-motorized transportation options like biking or walking. As a next step the city is preparing policy briefs on the barriers to investment and is preparing an investment prospectus to accelerate transition.

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COMMUNICATE

Mississauga in Canada built a comprehensive Climate Change Action Plan around Action Pathways covering buildings and clean energy, resilient and green infrastructure, accelerating discovery and innovation, low emissions mobility, and engagement and partnerships. The city notes that municipalities are directly responsible for 5-10% of emissions from municipal operations, they also indirectly control 40% of emissions in the community. A particular challenge in Mississauga is the reliance on cars and taxis, accounting for 85% of journeys, a figure that should drop with the major investments in a new light rail and bus rapid transit.

People also respond to seeing changes on the ground. Communicating progress, outlining goals and objectives is key to gaining community buy-in and acceptance of any net-zero plans. Cities must be clear about the changing cityscape, additions of bus lanes, and bikes lanes and why they are necessary or important to individuals.

Cities need more natural infrastructure space like trees, gardens, wildflowers, and green space but the central theme involves outlining why the work is being done and how it benefits the person. Making benefits obvious to people's daily lives is a focus for Glasgow, it also emphasizes reporting on success against targets, especially if they have been met early.

Climate change negatively affects marginalized groups in society disproportionately and COVID-19 has exacerbated this gap. Glasgow's Climate Emergency Implementation Plan is driven by two fundamental principles: actions to address climate do not further disadvantage people and communities already experiencing significant inequalities; and actions to create a safer more sustainable city should build a just and more equal city. To achieve real change there needs to be a systems-based approach with an equity lens examining urban planning, building performance, transportation use, and sources of energy. Further, the implementation of plans is also critical to achieving carbon neutrality and improving the lives of all citizens.

IMPLEMENTATION

In driving outcomes cities must look at the biggest sources of emissions from their infrastructure delivery and operations. The biggest potential comes in the planning process. As demonstrated by the work done in mapping the sources of emissions by cities such as Leeds and Mississauga, and the urgency of climate change, it requires an approach that addresses all areas. This includes where cities have a direct impact of emissions through operations, and can have an indirect impact through the wider community in driving behaviour change and catalyzing change.

PLANNING

Understanding an area's density of homes workplaces and community spaces, use of greenery, installation of well-lit wide pedestrian pathways, safe crossings, and connections to mass transit is key to shaping a community that serves everyone well and helps to reduce emissions. A national framework is helpful, but local consent is essential. This requires effective early engagement with a broad and representative cross section of the community to lay out the options as done in places like Haringey, Lambeth, and Manchester.

At a city level this also requires a system or place-based approach given the interconnectedness of the urban fabric. This also helps to align planning with other departments within the city, notably procurement. The UK's Royal Town Planning Institute provided recommendations on driving greater collaboration between different local government departments to address climate change. National planning policy in the UK sets expectations that the planning system should deliver development that mitigates climate change, can be resilient and improves biodiversity. This can sometimes create contradictory priorities given the need for more houses.

Place-Based Approach to Net Zero

Although a large proportion of emissions come from infrastructure within cities, local governments often do not have the power to directly impact these emissions. Within cities the number of stakeholders involved also requires that cities use a systems approach to identify where progress is being stalled and the best places to drive action.

A report from Mott MacDonald working with Leeds City Council and the UK Collaboratorium for Research on Infrastructure and Cities highlights the need for collaboration between different levels of government in four key areas:

1. **Powers:** There needs to be a common and consistent remit for city action, and the mandate to facilitate low carbon interventions where cities are best placed to accelerate change.
2. **Partnerships:** New forms of partnership are required, within national and local government and with the private sector, with the common goal of long-term resilience that comes with investment in local sustainable approaches.
3. **Platform:** System-level data must be used to improve integrated planning, the transparency and replicability of decision-making and to track outcomes such as carbon reduction, health and economic benefits.
4. **People:** New skills must be developed within local authorities to manage these new powers and partnerships, and to act on new data insights.

TRANSPORTATION

As transportation is a major source of emissions around the world, walkable cities are an important aspect for happier, healthier citizens and a more sustainable city. Those who live in compact developments in walkable areas where everything they need is accessible in 10-15 minutes, have shown people to drive 20-40% less than unwalkable communities centered on the car.

Building location and proximity to transit and mobility options are important in reducing emissions. According to Foster + Partners, for a location close to transit, 20-25 percent of the overall carbon can come from travelling to and from the building. When a building is located away from transit that figure can rise to three times that amount. Major investments in transit Canada in the UK spurring development around stations to address this issue. Developments such as Royalmount in Montreal that provides a mixed-use development on brownfield land connected into the transit network are becoming more attractive to businesses, residents, and investors. Ontario has developed a Transit Oriented Communities plan around its network to ensure that investment have a broader impact in unlocking further development and particularly much needed housing.

Cities like Toronto, Glasgow and Manchester are putting greater emphasis on natural infrastructure. Toronto estimates that the value of natural assets such as the ravine system alone is worth $822 million per year. Arup worked with Manchester on the City Re-Leaf program that focused on creating green space in the city centre, and identifying high impact streets where trees could be planted.

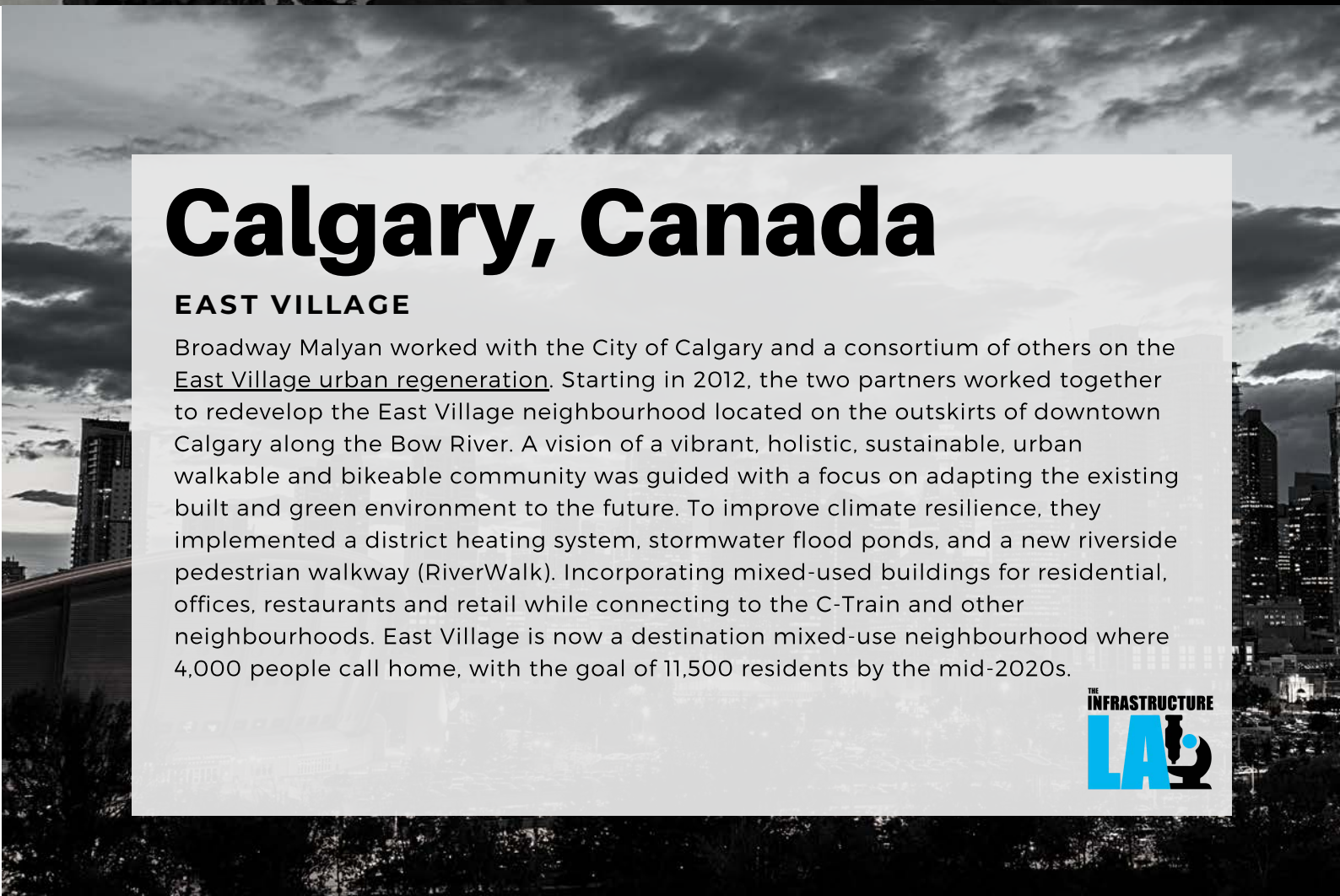
Working with professional associations can help reinforce the role that professions like planning can play in reaching net-zero. For example, the Canadian Institute of Planners requires planners to maintain their core competency designations with clear links back to climate action plans.

COVID-19 and rapid technological changes have provided an exciting opportunity for cities to become more agile in their approaches to implement flexible interventions and temporary measures while achieving net zero emissions climate goals. Technology has also enabled the development of visual data that can go a long way in drawing out information such as the quality of the environment, energy, infrastructure, and demographics. Cities can then map out the data and pair it with trend forecasts 10-15 years ahead for planning. Ultimately cities need to be able to retool the planning process to reflect the current reality.

Birmingham, England

ROUTE TO ZERO

Birmingham City Council is the largest in Europe with many unique circumstances including a constrained city and the youngest population in Europe. Birmingham shaped their approach to city regeneration of the city core and city centre with a "brownfield first" policy, consolidating sites and working with developers to deliver thousands of homes on derelict land. There was previously a big city plan after the 2008 economic crash, but as time moves forward, things change and now the plan is driven to zero carbon development. The Route to Zero program cuts across all council services and is focused on replacing the planning policy framework for the city centre. The city also used a "people first" approach to guide public realm improvements to improve the experiences for pedestrians, cyclists, and improving public transport connectivity.



Calgary, Canada

EAST VILLAGE

Broadway Malyan worked with the City of Calgary and a consortium of others on the East Village urban regeneration. Starting in 2012, the two partners worked together to redevelop the East Village neighbourhood located on the outskirts of downtown Calgary along the Bow River. A vision of a vibrant, holistic, sustainable, urban walkable and bikeable community was guided with a focus on adapting the existing built and green environment to the future. To improve climate resilience, they implemented a district heating system, stormwater flood ponds, and a new riverside pedestrian walkway (RiverWalk). Incorporating mixed-used buildings for residential, offices, restaurants and retail while connecting to the C-Train and other neighbourhoods. East Village is now a destination mixed-use neighbourhood where 4,000 people call home, with the goal of 11,500 residents by the mid-2020s.

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IMPACTS OF COVID-19

COVID-19 has sped many projects up in cities around the world that had to adapt swiftly to the impacts of the pandemic. Cities overnight needed to provide safe, distanced spaces for citizens that could have a positive legacy for the environment and emissions reduction. There was increased demand for outdoor spaces and active transportation methods. Both Canada and the UK introduced measures and provided funding to encourage active travel in local communities to provide greater travel options around the pandemic, to reduce emissions, and to improve health.

- Canada announced the development of its first National Active Transportation Strategy, along with $400 million of funding in a first tranche for local governments to add pathways, bike lanes, trails and widen sidewalks.
- The UK committed £2 billion for active travel along with additional funding for buses to help reduce congestion and emissions. The funding and fast-tracked statutory guidance encouraged councils to reallocate road space for cyclists and pedestrians.

Toronto, Ontario

ACTIVETO

The City of Toronto used COVID to accelerate the existing Cycling Network Plan, but also thought quickly to implement the new ActiveTO plan to improve mobility. ActiveTO involved closing major roads, expanding the pedestrian, and cycling network, and creating quiet streets in key connecting neighbourhoods. The city installed nearly 72km of new cycling infrastructure and upgraded 49km of cycle paths. Data from the project showed that 38,000 cyclists and pedestrians used ActiveTO at its peak in 2020 and 75% said the program made them more active. Toronto is now looking to implement more temporary bike lane projects in 2021 as an expansion of the program.

Change can be difficult. In Waltham Forest, London, plans to rollout bike lanes were faced with a large petition and a legal challenge. By engaging online in combination with pop-up events and community meetings the borough was able to turn opinion around with a shift to 70% approval. More human-centred consultation also helps to design systems for all users. A report by Arup found that 85% of people over 65, 76% of women, and 75% of people from ethnic minorities never cycle but many would like to start. It also provided guidance for planning and designing cycling infrastructure to be more inclusive.

New technologies and business models, including electric bike sharing and e-scooters and other electric vehicles, has also made an impact on cities. Cities are figuring out how to respond and harness these changes for positive ends. The UK introduced e-scooter trials in Birmingham and British Columbia set up a pilot involving six municipalities to better understand safety considerations and build appropriate regulations.

In 2018, Glasgow introduced the first low emissions zone in Scotland where they set targets starting with ensuring buses that came through the city centre had to be zero-emissions (ZEBs) to start building momentum and support for the policy. Transportation, specifically buses, were the largest source of pollution, the city worked with operators to green and electrify their fleets. That demonstrated to people what a low emission zone could do for them. It is difficult to argue against clean air improvements for those with underlying health conditions. A second phase starting in 2023 will roll out incrementally and include other forms of transport like vans and cars.

Manchester, UK

STREETS FOR ALL

In Manchester, the city launched a process to develop its Streets for All Strategy that looks beyond the city core and aims to overcome five major issues: high car use and dependency; limited space; unattractive alternatives; place needs; and unfriendly pedestrian environment. As well as reduced environmental impact Streets for All is designed to stimulate regeneration and enhance access to jobs, education and health services. With a goal of a million more sustainable journeys per day by 2040 Manchester is partnering with organizations like Broadway Malyan, Steer, and Mott MacDonald to use data to provide recommendations based on different types of streets and locations.

Electrification

Canada

ELECTRIC VEHICLE FLEETS

British Columbia gets 95% of its electricity from renewables and the province has some of the highest rate of EV adoption in the world. The City of Victoria in BC has a focus on transitioning not only their fleets, but citizens' vehicles to electric. In attempting to understand the high EV-adoption rates trend and its effect on climate goals,

Victoria is completing an EV strategy. The focus of the strategy will be to define the gap between the baseline use and future trends to put a business case forward to expand the charging network. They have been working with local utility providers to figure out where the market is proceeding and stepping in where the gaps exist as things change.

UK

LOCAL PARTNERSHIPS

As cities put forward different plans around electrification of their transit and fleets, the private sector is also helping cities overcome challenges, specifically, cost-prohibitive issues, as people and fleets switch to electric. Arrival is an electric vehicle (EV) company partnering with cities looking to become more sustainable, focusing on commercial vehicles, providing a lineup of electric buses and vans.

Working with Royal Mail and UPS on the development of delivery vehicles modified for different urban environments. The company has also launched trials with nationwide bus operator First Bus to test the bus across UK routes. They use a decentralized production process through microfactories in the local supply chain and developing local customized vehicles to reduce the environmental impact of manufacturing.

BUILDINGS

Reducing emissions of buildings is a common feature across cities' climate action plans. Toronto estimates buildings are responsible for 55 percent of emissions in the city, and estimated at 40 percent of emissions in the UK. Both Canada and the UK have schemes in places nationally to support local government to retrofit residential and commercial properties, and encourage greener buildings. There is a growing emphasis on retrofits over new builds with the construction sector producing 35-40 percent of national emissions and 63 percent of waste. Hackney Town Hall was updated, with UK's Hawkins\Brown appointed to carry out the restoration of the building, adding 70 percent occupancy and introducing intelligent building controls, and durable easier to maintain materials.

Scotland uses a common investment hierarchy that starts by looking at future need if for example, new technologies will change how services are delivered, it then looks at maximizing use of existing assets, then repurposing or co-locating, and finally replacement or new builds. An example of how this worked in practice is the Waid Academy in Scotland designed by BDP. It is a community school that includes a high school, police station, library and a community hub.

The British Columbia Energy Step Code which is an optional compliance path in the BC Building Code has helped encourage energy efficiency in new developments. As part of the Energy Step Code, a council was established to bridge the gap between governments, industries, and utilities to identify barriers, issues and provide support. Toronto also has a Green Standard providing sustainable design requirements for new private and City-owned developments. Calgary's Climate Resilience Strategy focuses on improving building performance beyond building codes by enabling innovative financing, having a residential labelling program, and including renewable and low carbon systems as part of the building approval process.

An innovative scheme is Greater London Authority Retrofit Accelerator. The government funded programme managed by Turner & Townsend helps bring together a pipeline of retrofit work on social housing and other public sector estates. The idea is that multiple suppliers collaborate, and they all help pay for research and development at a price that is economically feasible. This aggregates demand in an area whereby it can be taken to market, the supply chain can be invested in and ultimately presented to local government seeding the idea to decarbonize.

FINANCING

Innovative financing solutions can garner private interest and help to accelerate the transition and meet net zero targets. It can also act as a catalyst to drive more integrated thinking. Both the UK and Canada have established Infrastructure Banks to help fill this gap. The Canadian Infrastructure Bank's goal is to improve the economy and reduce GHG emissions. Within the climate and net zero realm, the bank has a mandate to invest in zero emissions buses, electrification, and retrofits.

At the local level Toronto was a pioneer establishing The Atmospheric Fund in in 1991 to help improve air quality in Toronto and assist with financing climate initiatives. It has catalyzed investments in building retrofits, turning waste into renewable natural gas, and installing heat pumps to help the city reduce emissions. The Atmospheric Fund has played a central role in adapting its model for use in other cities through Low Carbon Cities Canada (LC3) a partnership between seven regions and the Federation of Canadian Municipalities and funded by the Federal Government. Most recently the City of Ottawa used this program to launch the Ottawa Climate Action Fund in 2021 after receiving seed funding from the Canadian government to catalyze and scale low-carbon solutions in the local region.

Belfast in Northern Ireland, developed in their Net Zero Carbon Roadmap a cost-effective measures chart to help hone focus across different departments and organizations in the city. Within Belfast, it was identified that the retrofit of existing buildings was key in addition to lowering transport emissions as Belfast has a high population of car owners.

The city produced the cost-effective chart to present to banks and investment companies outlining the benefits of investing in retrofits against cost savings on Belfast's energy bill of up to £263 million per year as well as creating 4,779 years of extra employment.

The top five cost-effective impactful measures in Belfast included insulating domestic buildings, petrol car to bicycles, upgrading heat controls in domestic buildings, petrol car to walk and electrical upgrades. By outlining benefits and savings of making these switches to businesses, it creates buy-in and spurs financing options through retrofit programs and organizations taking proactive action to reduce costs and make better net zero decisions over the long run.

Bristol City Council launched a City Leap Prospectus with the goal of attracting £1 billion of private investment over 10 years in energy and infrastructure investments to meet the city's goals to become greener, healthier, and fairer more quickly. This approach to financing supports Bristol's One City Climate Strategy developed together with Arup which sets out five key principles: that outcomes would be transformative, fair, evidence-based, collaborative, and able to evolve. To help local authorities the Association of Directors of Environment, Economy, Planning and Transport and Amey worked together to develop a Green Finance Toolkit based on experiences from Bristol, Swindon and Cambridge. As an example Cambridge invested £11 million in local schools to reduce energy costs by £750,000 each year and reduce emissions.

Accelerating Change

The Atmospheric Fund, Toronto

The Atmospheric Fund (TAF) was established by the City of Toronto in 1991 to help improve air quality in the city and assist with financing climate initiatives. The Fund has evolved and grown considerably over the years, and it has become a model for other cities. TAF continues to help invest in low-carbon solutions to benefit the Toronto Region by assisting with scale-up of green projects and technology in preparation for implementation.

Investing in retrofits directly creates jobs, but more importantly creates public benefits like building resilience, reducing carbon emissions, health benefits and avoided energy system costs. Additionally, TAF has also shown the private benefits including increasing asset value, savings in utility costs, and savings through avoided repairs and maintenance costs. TAF calculated that a $1.7 billion investment in retrofits would result in a minimum of 30,000 jobs. However, it is important that public funds are provided that can be stacked with private resources in order to hit net-zero targets.

TAF was successful on making a return on investment from every Energy Savings Performance Agreement (ESPA). The ESPA is a funding solution provided by TAF where building operators can apply for capital to finance their energy retrofits. TAF pays for the retrofit up front and the operator pays the performance agreement back through cost-savings.

Through the TAF Retrofit Accelerator Program, TAF demonstrated that 20-30% energy savings are highly profitable and have shared this data and experience with governments in Canada at all levels. By taking an integrated design approach through all the phases of the projects, they have brought all the players together so that all equity, social, health and economic benefits can be maximized. Through a comprehensive approach, more people's lives can be improved while achieving carbon reductions. In Toronto, TAF has helped retrofit 10 buildings housing 1,600 low-income residents. During these projects, TAF found the following savings occurred due to retrofit investment:

- Buildings saved $721,000 on utilities annually
- 83 million litres of water were conserved annually
- Fresh air supply increased by 100% through proper ventilation
- 27,600 tonnes of carbon was reduced.

SUMMARY

Overall, as cities sit at the forefront of tackling climate change and adapting their cities to achieve net-zero emissions by 2050, local governments and key stakeholders have recognized the value in shaping plans and policies for the entire community. Social, economic and health benefits can be demonstrated to the public and private sector to gain buy-in and approval of plans and investments into innovative emissions reducing projects. Investments in reducing emissions also deliver returns.

Local governments and their partners must be able to deliver efficient solutions for their residents. Net-zero can be achieved, but as outlined in the roundtable and report, it is imperative that for a faster, fairer transition, best practices must be shared as demonstrated by these plans, projects and lessons-learned in Canada and the UK.

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