Climate Action & Innovation in Canadian Municipalities

Policy Relevant Highlights from an Evaluation of the Municipalities for Climate Innovation Program (MCIP) (2016-2022)

August 2022

FLIPSIDE SUSTAINABILITY

FCM FEDERATION OF CANADIAN MUNICIPALITIES FÉDÉRATION CANADIENNE DES MUNICIPALITÉS

Canada

This resource was developed for the Municipalities for Climate Innovation Program (2017-2022). This program was delivered by the Federation of Canadian Municipalities and funded by the Government of Canada.

Background

From 2021-2022, FlipSide Sustainability developed four briefing notes showcasing the policy relevant highlights from the Municipalities for Climate Innovation Program (MCIP). MCIP distributed $55 million over a five-year period (2016-2021) to municipalities across Canada to work on climate action through eight MCIP program areas. The goal of the following four briefing notes is to identify both common and innovative forms of adaptation and mitigation planning and action that can support the acceleration of effective climate action in municipalities across Canada.

The foundational evidence for these briefing notes is based on detailed evaluation work done by ACT – Action on Climate Team at Simon Fraser University between 2020-2022. The ACT team developed an evaluation methodology, including a coding architecture and analysis protocols, to identify key municipal climate action, success factors and best practice, and climate innovation in 322 funded projects, that included 395 municipalities, across all eight MCIP programs. The resulting Technical Report titled, *MCIP's Role in Mobilizing Municipal Climate Action*, was used as the technical basis for the data in these briefing notes. The three briefing note authors contributed to the development of this technical report. We'd also like to thank two other contributors, Jordan Brears and Julianne Barr, for their underlying data contributions, which have provided the basis for this briefing note series.

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PROJECT OVERVIEW

Municipalities across Canada are bracing for projected increases in flooding, wildfires, heat events, and drought caused by climate change. They are also increasingly responsible for addressing the sources and causes of climate change – greenhouse gas emissions. Programs that both build resilience and lower emissions in municipalities and other orders of government are critical to advancing and scaling climate action in Canada and keeping our communities safe and sustainable under rapidly changing conditions.

Between 2016 and 2021, the Municipalities for Climate Innovation Program (MCIP) provided funding opportunities for 322 projects including 395 municipalities to adapt to climate risks or reduce emission sources. MCIP distributed $55M through eight granting programs (see descriptions in Appendix 1):

- Adaptation & Mitigation Plans (Plans)
- Climate Adaptation Partner Grants (CAPG)
- Climate Asset Management Network (CAMN)
- Feasibility Studies (Studies)
- Operational Studies (Studies)
- Staff Grants
- Capital Projects
- Transition 2050 (T2050) Grants

"Five years later the evaluated MCIP outcomes highlight common actions, effective approaches, and innovations needed to increase learning, refine approaches, and accelerate climate action in other municipalities across Canada."

Municipal climate action and innovation resulting from this extensive funding program provides incredible opportunities to examine what effective actions and outcomes look like at the local scale that can be used to accelerate climate action in municipalities across Canada.

Flipside Sustainability distilled highlights from the evaluation report titled, *MCIP's Role in Mobilizing Municipal Climate Action,* produced by ACT - Action on Climate Team at Simon Fraser University. These highlights are developed into four, sequenced Briefing Notes to mobilize policy relevant information, innovation, and learning to contribute to the acceleration of effective climate action in Canadian municipalities.

- **Briefing Note 1** – *CLIMATE ACTION IN CANADIAN MUNICIPALITIES: Understanding Common Adaptation & Mitigation Responses*
- **Briefing Note 2** – *EFFECTIVE MUNICIPAL CLIMATE ACTION: Identifying Key Success Factors & Best Practices*
- **Briefing Note 3** – *CO-BENEFITS OF CLIMATE ACTION: Prioritizing Climate Solutions That Multi-Task*
- **Briefing Note 4** – *TRANSFORMATIVE CLIMATE ACTION IN CANADIAN MUNICIPALITIES: Monitoring Progress & Promoting Innovation*

BRIEFING NOTE 1

CLIMATE ACTION IN CANADIAN MUNICIPALITIES: Understanding Common Adaptation & Mitigation Responses

1. INTRODUCTION

This briefing note evaluates municipal climate action planning from Municipal Climate Innovation Program's (MCIP) Plan and Staff Grants programs. It highlights the common adaptation and mitigation actions and indicators being planned and/or applied in municipalities across Canada to:

- Minimize exposure and risk to seven projected climate hazards,
- Identify and prioritize adaptation actions across areas of vulnerability and risk (infrastructure, populations, and eco- and agri-systems),
- Identify emissions sources across seven main sectors,
- Identify and prioritize mitigation actions, and
- Identify indicators to monitor progress on actions and on real and anticipated opportunities for reducing climate risks and emissions.

"Leading municipalities Integrated climate adaptation and mitigation planning, streamlining capacity and resources, and identifying climate actions that multi-task - reducing climate risk and emissions, while also advancing sustainability co-benefits."

Common adaptation and mitigation actions highlight practical and replicable strategies that can be used to guide other municipalities. They are defined as climate actions that are being planned in three or more municipalities. It is important to note that plans and associated actions only reduce risk and emissions if they are implemented and measured over time. For our purposes here, a municipalities' identification and/or use of indicators to monitor and measure progress on actions, is viewed as a proxy for a municipality's intent to move into implementation.

For a list of most common municipal actions across each program type, please refer to Appendices 2 and 3.

2. ADAPTATION PLANS: COMMON ACTIONS, INDICATORS & HIGHLIGHTS

Canada is an economically and geographically diverse country. Consequently, the impacts of and responses to climate change will vary across regions as municipalities confront seven main climate hazards – extreme temperature, flooding, extreme weather, drought, wildfire, geologic events such as erosion and landslides, and sea level rise.

A lack of preparedness for such cumulative events has huge costs for residents, municipalities, and provinces moving forward. For instance, climate-related disasters in 2021 in Canada are estimated to have cost $9.1 billion in damages (IBC, 2021).[1] British Columbia experienced the worst series of climate disasters on record, ranging

[1] 'Severe Weather in 2021 Caused $2.1 Billion in Insured Damage'. Insurance Bureau of Canada, 2022. http://www.ibc.ca/ns/resources/media-centre/media-releases/severe-weather-in-2021-caused-2-1-billion-in-insured-damage

from a heat dome, to drought, to wildfires, to flooding and landslides. Northern Canadian communities are experiencing the most rapid climate changes in the world[2], resulting in seasonal changes and permafrost melt.

The risks to infrastructure, people, and eco-/agri-systems are real, and the need to adapt now to avoid damages and compounding costs into the future is more urgent than ever. Anticipating and prioritizing existing vulnerabilities and projected risks under a changing climate helps municipalities prioritize and plan adaptation solutions. This is imperative for the safety of residents, preparing now to avoid damages and costs into the future, but also for sustainable service delivery, professional reliance, and municipal fiduciary responsibility moving forward.

Understanding common adaptation actions and indicators being applied in municipalities across Canada can better equip other municipalities to accelerate their own actions to address rapidly changing climate conditions.

2.1. COMMON ADAPTATION ACTIONS

MCIP funding supported adaptation planning in 41 municipalities through the Plans program and 23 through the Staff Grants program. Adaptation planning provides opportunities to: 1) better understand projected climate impacts and hazards for their region; 2) explore anticipated vulnerabilities and risks for their community; and 3) prioritize adaptation actions over the short and longer term. Common actions demonstrate a high level of coherence in municipal adaptation action planning.

2.1.1 Municipalities across Canada are preparing to adapt to seven main climate hazards: extreme temperature, flooding, extreme weather, drought, wildfire, geologic events, and sea-level rise.

- Of the 41 MCIP adaptation plans analyzed from the Plans program, 81 common adaptation actions were identified. Seventy-eight percent of the adaptation plans included at least one common action that was identified in adaptation plans from other municipalities.
- Of the 23 adaptation plans analyzed from the Staff Grants program, 40 common adaptation actions were identified. Ninety-six percent of the adaptation plans included at least one common action that was identified in adaptation plans from other municipalities.
- Table 1 below provides highlights of common adaptation actions being planned across the top three hazard types from the Plans and Staff Grants programs, and the number of municipalities using that action.

[2] 'Canada's Top Climate Change Risks: The Expert Panel on Climate Change Risks and Adaptation Potential'. Council of Canadian Academies, 2019. https://cca-reports.ca/wp-content/uploads/2019/07/Report-Canada-top-climate-change-risks.pdf

Table 1: Top three common adaptation actions to address top three climate hazards (number of plans using this action)

1. **EXTREME TEMPERATURE**
   - Provide cooling/warming centers (20)
   - Upgrade existing infrastructure through building standards (20)
   - Use green infrastructure and expand the urban tree canopy (19)

2. **FLOODING**
   - Incorporate green infrastructure in design and community (21)
   - Review the effectiveness of stormwater infrastructure and management (18)
   - Reinforce and protect natural spaces for flood protection (14)

3. **EXTREME WEATHER**
   - Update and improve communications for emergencies and weather events (17)
   - Collaborate to improve disaster recovery and service provision (12)
   - Provide back-up generators to address potential grid impacts (10)

2.1.2 Most municipalities are addressing infrastructure risks under projections of extreme temperature, flooding, and extreme weather.

- Most municipalities are planning upgrades and retrofits or changes to building standards in city-owned buildings to withstand extreme temperature, flooding, and/or extreme weather. Many are identifying facilities to be retrofitted as cooling shelters to keep residents safe in heat events. Procuring back-up generators is a common action to ensure redundancy in power supply and service delivery under extreme weather events, where local power grids may be affected.

2.1.3 Many municipalities are planning to bolster extreme weather communications for residents to ensure community preparedness, while also building strategies to improve emergency planning and disaster recovery.

- Leading municipalities are applying an equity lens to their climate-action planning. In the City of Toronto (ON), for instance, low-income neighbourhoods and other vulnerable populations are being mapped using GIS to better anticipate the disproportionate impacts of climate change (such as the urban heat island effect) on already-vulnerable citizens to target communications and actions accordingly.

2.1.4 Many municipalities are applying nature-based solutions in response to both extreme temperature and flood hazards.

- Nature-based solutions (NbS) are increasingly common adaptation actions used both moderate temperatures and minimize flood damages.
- NbS are a low carbon resilience strategy as they help to minimize climate risks, store and sequester carbon, avoid emissions-intensive infrastructure expansion, and contribute to other priorities such as biodiversity, equity, and health and well-being.
- NbS strategies are organized differently across disciplines and funding regimes. Terms ranging from green infrastructure, nature-based solutions, ecosystem services, green space, natural space to natural assets are used as areas and opportunities to promote NbS. For our purposes here NbS comes in two forms: 1) protecting, restoring, and enhancing existing natural assets that are already providing services, such as flood and heat protection, and need to be accounted for in municipal asset management planning and accounting (e.g. urban forests, wetlands, riparian areas, shorelines, etc.; or 2) promoting hybrid or engineered green infrastructure to support and amplify these services under climate projections over time (e.g., bioswales, green roofs, retention ponds, tree shading, xeriscaping, etc.).
- Nature-Action Québec, for instance, focused adaptation plans in four municipalities entirely on using NbS to absorb excess rainfall and heat under a changing climate.

LEADING MUNICIPALITIES…

- ✓ ***Apply adaptation actions across multiple hazards***
- ✓ ***Use multi-hazard assessments to understand risks to infrastructure, population, and eco-/agri-system***
- ✓ ***Use nature-based solutions for extreme temperature and flood hazards***
- ✓ ***Include indicators to measure progress***

2.1.5 Few municipalities are addressing risks to eco/agri-systems.

- Neither ecosystem health, biodiversity, nor agriculture and food security were included in the program design, but for those municipalities that are addressing these areas as key risks, common adaptation actions tend to protect or restore natural areas to mitigate the impacts of extreme events.
- As municipalities begin to apply NbS as an adaptation strategy, ecosystem health, biodiversity, and agricultural and food security goals can also be advanced.

2.1.6 Most communities are engaging in culture change actions focused on awareness-raising, engagement, and collaboration.

- Increasing awareness of climate risks, by developing strategic climate communications and fostering public and private sector engagement through collaborations and committees, helps to build community momentum, capacity, and shared responsibility for climate action.

2.2 COMMON ADAPTATION INDICATORS

Indicators provide guidance on how to track and monitor progress once an action or plan is implemented. For our purposes here, the identification of indicators is a proxy for a municipality's intention to move toward implementation. While indicators measuring emissions reduction are well-developed and quantifiable, adaptation indicators focused on reducing future climate vulnerability and risk have been historically less

developed in municipalities. The evaluation of common adaptation indicators below provides initial examples of how municipalities in MCIP's Plan and Staff Grants programs are measuring progress on adaptation.

2.2.1 Adaptation indicators are important for moving actions and plans toward implementation.

- Less than half (40%) of reviewed adaptation plans identified indicators. For the remaining 60% this suggests that, at best, planning and implementation are done in two separate processes, and, at worst, there is limited capacity and resources for moving the plan toward implementation.
- Table 2 below shows the top three common indicators being used to track adaptation progress across top three climate hazards in the Plans and Staff Grants programs: extreme temperature, flooding, and extreme weather.

Table 2: Common adaptation indicators to address top three climate hazards

HAZARD	INDICATOR (# OF MUNICIPALITIES)	MUNICIPALITIES
EXTREME TEMPERATURE	Use of vegetation in urban areas or new developments (# or %) (8)	**Plans program:** Cities of Barrie, Cambridge, Coquitlam, Kawartha Lakes (M)**, Nanaimo, District of North Vancouver (M), Region of Waterloo, Town of Halton Hills
	Availability/use of cooling/warming centers (#) (7)	**Plans program:** Cities of Cambridge, Kawartha Lakes (M), Nanaimo, Region of Waterloo **Staff Grants program:** Municipalities of Clarington and South Huron, City of St. Catharines
	Residential, commercial, institutional, city owned buildings that have implemented green infrastructure (#) (3)	**Plans program:** Cities of Barrie, Cambridge, Kawartha Lakes (M)
FLOODING	Upgrades of existing buildings to accommodate GI/LID* or retrofit with new building code standards, public and private (#) (7)	**Plans program:** Cities of Barrie, Cambridge, Kawartha Lakes (M), Region of Waterloo **Staff Grants program:** Towns of Essex, Orangeville, Municipality of South Huron
	New buildings that incorporate GI/LID or revised building code standards, public and private (#) (4)	**Plans program:** Cities of Kawartha Lakes (M), Barrie, Town of Halton Hills, Region of Waterloo **Staff Grants program:** Town of Orangeville
	Emergency management incorporated in business, commercial or municipal buildings (#) (4)	**Plans program:** Cities of Barrie, Cambridge, Kawartha Lakes (M), Region of Waterloo
EXTREME WEATHER	Communications and engagement with public on weather events and information (#) (9)	**Plans program:** Cities of Barrie, Coquitlam, Beaconsfield, Kawartha Lakes (M), Saskatoon, Region of Waterloo **Staff Grants program:** Town of Pelham, Municipality of South Huron, Town of Orangeville
	Number of municipal service interruptions	**Plans program:** Cities of Barrie, Cambridge,

	due to extreme weather events (#) (9)	Saskatoon, Town of Halton Hills, Region of Waterloo **Staff Grants program:** Municipalities of Clarington and South Huron, Towns of Lincoln and Orangeville
	Annual cost of upgrades versus avoided damage from projected damage to infrastructure ($) (4)	**Plans program:** Cities of Cambridge, Kawartha Lakes (M), Saskatoon, Town of Halton Hills

** GI = green infrastructure; LID = low-impact development*

***M = mitigation plan that included this adaptation indicator*

2.2.2 The most common adaptation indicators relate to increases in NbS through naturalization, green spaces, green infrastructure, and low-impact development to minimize extreme temperature and flood risks.

- Other common indicators relate to increasing the numbers of publicly accessible cooling/clear air shelters and increasing numbers of outward-facing public communications about extreme events.
- Improved monitoring of service disruptions from extreme weather was another common indicator (e.g., power outages, businesses closed, supply chains disrupted).

2.3 HIGHLIGHTS IN COMPREHENSIVE ADAPTATION PLANNING

Comprehensive adaptation plans account for all relevant climate hazard types and identify vulnerabilities and risks across three primary risk areas: infrastructure, population, and eco/agri-system. Municipalities that conducted multi-hazard risk assessments also had a high number of common adaptation actions demonstrating common responses across hazard types.

2.3.1 Eight municipalities in Ontario (5), BC (2), and New Brunswick (1) conducted multi-hazard risk and vulnerability assessments and had the most common adaptation actions across multiple climate hazards (see Figure 1).

- Eight municipalities from the Plans and Staff Grants programs across Ontario, BC, and New Brunswick are highlighted for their comprehensive adaptation planning across multiple sectors and for having the most common adaptation actions (see Figure 1).
- Figure 1 shows a high number of common adaptation strategies per climate hazard, with all eight municipalities addressing extreme weather, extreme temperature, and flooding, six addressing wildfires, five addressing drought, four focused on geologic events, and three on sea level rise.
- The City of Nanaimo (BC) performed a multi-hazard plan, addressing all seven hazard types. The Region of Waterloo (ON) identified actions across six of the seven climate hazards (sea-level rise is not relevant to this municipality). This is important for developing a systemic awareness of climate impacts, hazards, and risks. It can also be important for building systemic awareness of cascading climate impacts (where two or more hazards occur in succession or all at once) and/or synergies in adaptation solutions across hazard types.

- Across the 42 common adaptation actions, the Region of Peel (ON) had eight common adaptation actions for extreme weather. The City of Cambridge (ON) had seven common adaptation actions related to flooding, and the City of Nanaimo (BC) had six related to sea-level rise.
- See Table 3 below to better understand common actions being used across the top three hazard areas.

Figure 1: Eight municipalities with the greatest number of common adaptation actions in their plans

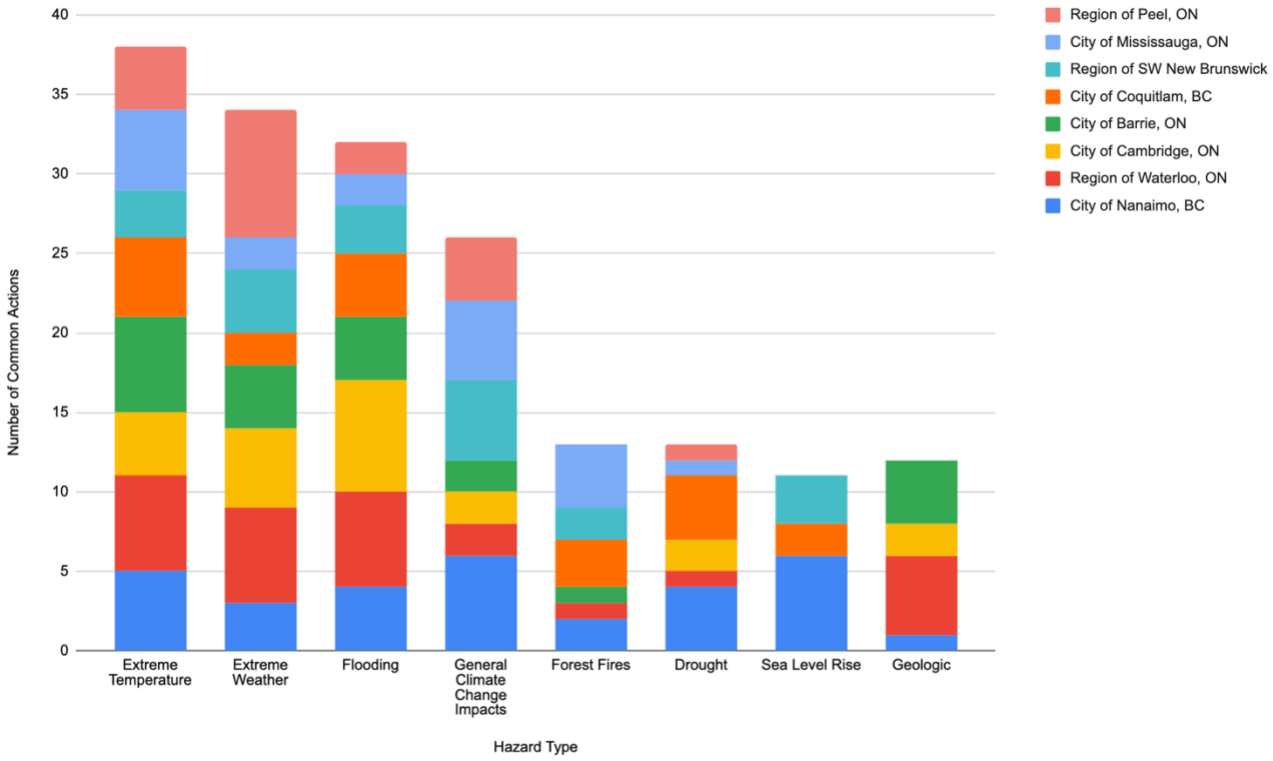


Table 3: **Common adaptation actions from leading municipalities addressing top three climate hazards**

EXTREME WEATHER ACTIONS ***- Region of Peel Climate Change Master Plan***	Improve green infrastructure
	Identify centers for shelter after extreme weather events
	Assess and upgrade infrastructure with climate and weather resiliency in mind
	Ensure provision of backup power/generators during outages or weather events
	Update and improve communications for emergencies and weather events
	Consider vulnerable populations as part of policy and emergency preparedness
	Generate collaborations to improve disaster recovery and service provision
	Improve access and communication of policies related to extreme weather events
FLOODING ACTIONS ***- City of Cambridge Climate Adaptation Plan***	Reinforce and protect natural spaces for flood protection
	Upgrade infrastructure to be flood resilient
	Incorporate green infrastructure in design and community
	Update plans/policies/bylaws with consideration of flood projections
	Review effectiveness of stormwater infrastructure and management

	Undertake floodplain/risk mapping
	Educate and engage public on flood risks
SEA-LEVEL RISE ACTIONS - ***City of Nanaimo Climate Change Resilience Strategy***	Undertake restoration projects
	Acquire high-risk land
	Map areas vulnerable to flooding and sea-level rise
	Establish policies and bylaws to reduce impact on infrastructure
	Update documents to account for adaptation to sea level rise
	Engage in collaborative information-sharing with partners and other municipalities

3. MITIGATION PLANS: COMMON ACTIONS, INDICATORS & HIGHLIGHTS

Municipalities across Canada account for more than 50% of national emissions.[3] Despite having limited authority, regional and local governments are increasingly responsible for reducing emissions and moving the dial toward Canada's zero-carbon targets by mid-century.

Practical and cost-effective energy efficiency, alternative energy, and decarbonization strategies are critical. Identifying common actions and indicators being applied in Canadian municipalities provides crucial guidance for other municipalities to accelerate their mitigation and decarbonization efforts.

3.1 COMMON MITIGATION ACTIONS

Funding from FCM's MCIP helped participating municipalities better understand: 1) corporate and/or community energy and emissions inventories; 2) corporate and/or community energy and emissions forecasts and targets, and 3) priority mitigation actions both over the short and longer term.

3.1.1 Municipalities across Canada are preparing mitigation actions across six main emissions sectors: transportation, buildings, infrastructure, waste, energy systems, and agriculture.

- Of the 59 mitigation plans analyzed from the Plans program, 64 common mitigation actions were identified. Eighty-seven percent of plans included at least one common action that was identified in mitigation plans from other municipalities.
- Of the 27 mitigation plans analysed from the Staff Grants program, 40 common mitigation actions were identified. Eighty-one percent of the plans included at least one common action that was identified in mitigation plans from other municipalities.
- Table 4 below highlights common mitigation actions being planned across the top three emissions sectors from both the Plans and Staff Grants programs.

[3] 'Municipalities for Climate Innovation Program', Federation of Canadian Municipalities https://fcm.ca/en/programs/municipalities-climate-innovation-program

Table 4: Top three common mitigation actions to address top three emissions sectors (number of plans using this action)

1. **TRANSPORTATION**
   - Campaigns, policies, or bylaws for anti-idling (43)
   - Supporting shared mobility services (30)
   - Expanding transit (22)

2. **BUILDINGS**
   - **Existing Buildings**
     - Recommended or mandatory energy efficient retrofits (38)
     - Engagement, capacity building, training, education or behaviour change campaigns for building owners, developers, landlords, tenants, or city staff on energy efficiency (9)
     - Incentivizing high efficiency heat pumps (9)
   - **New Buildings**
     - Building or encouraging low carbon or net-zero buildings (22)
     - Constructing new buildings to meet green building or energy efficiency standards (19)
     - Encouraging best practice development based on certifications such as LEED (10)

3. **INFRASTRUCTURE**
   - **Transportation Infrastructure**
     - The installation and expansion of electric vehicle (EV) charging infrastructure (20)
     - Walking and cycling infrastructure (5)
     - Policy requiring EV charging infrastructure in new developments (3)
   - **Green Infrastructure**
     - Protection, restoration or requirement of green space and natural assets (11)
     - Expansion of urban tree planting programs (9)
     - Increase urban tree canopy coverage (9)
   - **Grey Infrastructure**
     - Marketing and education around water conservation for residents, businesses, and wastewater facility operators (6)

3.1.2 The top three sectors for municipal mitigation action are in transportation, buildings, and infrastructure.

- The most common mitigation actions in the *transportation* sector promote culture and behaviour changes through policy measures such as anti-idling bylaws, and advance shared mobility services such as active transportation networks for walking, cycling, and e-mobility options.
  - Other areas relate to electrifying commercial and municipal vehicles and working with other orders of government to promote expanded transit services and infrastructure, which will vary in effectiveness depending on urban/rural contexts.

- The most common mitigation actions in the *building sector* are broken down into new buildings – promoting stringent net-zero standards, and existing buildings – improving efficiency in existing buildings.
    - The main actions for *new buildings* include incentivizing low-or zero-carbon building standards, meeting green building and energy efficiency standards, and encouraging the use of best practices such as Leadership in Energy and Environmental Design (LEED) for new construction.
    - The main actions for *existing buildings* are performing energy efficiency retrofits, engaging with stakeholders to build energy awareness, and creating incentives for owners to install high-efficiency heat pumps.
- The most common mitigation actions in the *infrastructure sector* relate to increasing electric vehicle infrastructure, electrifying fleets, increasing active transportation infrastructure, and increasing the uptake of EVs among residents.
    - In addition, the protection and expansion of natural assets to replace costly and emissions-intensive stormwater infrastructure is being applied to minimize and reduce municipal emissions over time.

3.1.3 Cohort-based mitigation planning promoted collaboration, peer exchange and learning, and enabled municipalities who otherwise lacked the capacity for a mitigation plan.

- Eco-West Consulting provided mitigation planning services for six municipalities in Saskatchewan and six municipalities in Manitoba.
- The Association Francophone des Municipalités du Nouveau-Brunswick (AFMNB) was resourced to develop mitigation plans for nine municipalities in New Brunswick.

3.1.4 Most municipalities emphasized culture change actions to reduce emissions, focusing on building climate awareness and encouraging behaviour changes.

- Culture change actions focus on awareness raising programs, community engagement, education, capacity-building, and the development of incentives to encourage practices and behaviour that reduce emissions (e.g., anti-idling bylaws, priority EV parking, etc.).

3.2 COMMON MITIGATION INDICATORS

As mentioned, indicators provide guidance on how to track and monitor progress on actions and plans. For our purposes, they are used here as a proxy for the intention of a municipality to advance a plan toward implementation. Implementation and monitoring of plans and actions is necessary to track municipal progress toward municipal emissions-reduction targets.

Indicators for mitigation are well-developed due to the quantitative aim of reducing overall greenhouse gas emissions (reductions of tonnes of CO_2 eq per year) and the decades spent investigating these approaches.

3.2.1 Mitigation indicators are important for moving plans and actions toward implementation and tracking progress on emissions reductions targets.

- Less than half (33%) of the 86 reviewed mitigation plans from the Plans and Staff Grants programs identified indicators. Twenty-four percent had common indicators. There is a similar trend in the lack of inclusion of indicators in adaptation and mitigation planning.

3.2.2 Common mitigation indicators are being identified to track emissions-reductions targets in transportation, buildings, and infrastructure.

- Table 5 below shows common indicators identified in mitigation plans from the Plans and Staff Grants programs.

3.2.3 The top three common indicators being used to track emissions reductions goals are in infrastructure and transportation.

- Tree canopy coverage in the green infrastructure sector is the most common mitigation indicator.
- Total or reduction in greenhouse gas emissions, increases in transit ridership, and commuting mode share are other common ways to measure mitigation progress.

Table 5: Top three measures of mitigation progress by top emissions sectors (A = adaptation plan that included this mitigation indicator)

EMISSIONS SECTOR	INDICATOR (# OF MUNICIPALITIES)	MUNICIPALITIES
TRANSPORTATION	Transit ridership (#) (7)	**Plans program:** Cities of Kawartha Lakes, Leduc, Sudbury, Windsor, District of North Vancouver **Staff Grants program:** Town of Canmore, City of Sault Ste. Marie
	Commuting mode share (%) (7)	**Plans program:** Cities of Kawartha Lakes, Leduc, Sudbury, Windsor, District of North Vancouver **Staff Grants program:** District of Kitimat, Town of Canmore
	Total GHG emissions from transportation or transit (tCO_2e /year) (6)	**Plans program:** Cities of Devon, Leduc, Sudbury, Windsor, District of North Vancouver, Sustainable Severn Sound
BUILDINGS	Reduction in GHG emissions from buildings (tCO_2e/year) (5)	**Plans program:** Cities of Kawartha Lakes, Sudbury, Mississauga (A), District of North Vancouver **Staff Grants program:** Town of New Glasgow
	Increase in density of buildings or residences (per hectare) (4)	**Plans program:** Cities of Leduc, Sudbury, Beloeil (A) **Staff Grants program:** Municipality of North Perth
	Costs saved from energy performance ($) (3)	**Plans program:** Township of Huron-Kinloss, Cities of Kawartha Lakes, Sudbury
INFRASTRUCTURE	Tree canopy coverage (%) (7)	**Plans program:** District of North Vancouver, Sustainable Severn Sound, District of Summerland, City of Mississauga (A) **Staff Grants program:** District of Kitimat, Municipality of North Perth, City of Sault Ste. Marie
	Reduction in GHG emissions (tCO_2e/year) (4)	**Plans program:** Cities of Kawartha Lakes, Sudbury, Sustainable Severn Sound **Staff Grants program:** Town of Orangeville

	EV charging stations (#) (3)	**Plans program:** Township of Huron-Kinloss, Districts of North Vancouver and Tofino

3.3 HIGHLIGHTS IN COMPREHENSIVE MITIGATION PLANNING

Comprehensive mitigation plans account for relevant emissions reduction actions across seven emissions sectors. Municipalities that identify actions across all relevant sectors are also more likely to identify key synergies and trade-offs. In addition, a high number of common mitigation actions demonstrates a high number of practical solutions being identified by municipalities.

Examining these common actions and indicators, wherever possible, can be useful for advancing practical and effective climate action across six emissions sectors at the municipal scale (see Table 6 below).

3.3.1 Eight municipalities addressed transportation, buildings, and infrastructure sectors as key areas for mitigation action.

- Eight municipalities from the Plans and Staff Grants programs across Ontario, BC, Alberta, and Saskatchewan are highlighted for their comprehensive mitigation planning across multiple sectors and for having the most common mitigation actions (see Figure 2).
- All eight municipalities addressed transportation, buildings, and infrastructure sectors as key areas for mitigation action.
- The District of North Vancouver (BC) and the City of Kawartha Lakes (ON) performed comprehensive plans identifying actions across the six emissions sectors, including culture change actions.

3.3.2 The greatest number of common actions are in the transportation sector.

- Common actions identified by the City of Kawartha Lakes (ON) in the transportation sector can be found in Table 6.
- The City of Kawartha Lakes (ON) has the greatest number of common actions in the buildings sector; the City of Sudbury (ON) has the greatest number of common actions in the infrastructure sector.

Figure 2: Eight municipalities with the greatest number of common mitigation actions in their plans

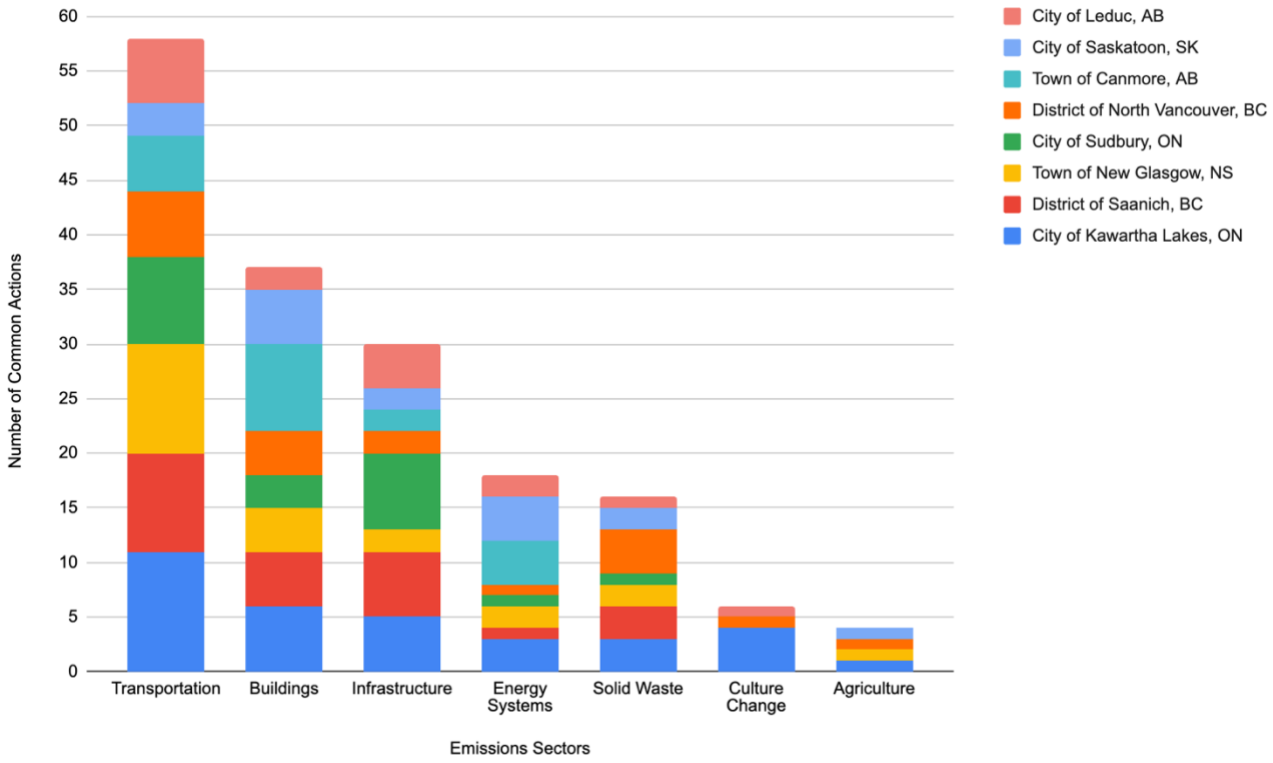


Table 6: Common mitigation actions from leading municipalities in top three sectors (EV = electric vehicle; LEED = Leadership in Energy and Environmental Design)

TRANSPORTATION ACTIONS ***- City of Kawartha Lakes Healthy Environment Plan***	Encourage and advocate for adoption of EV's through dealer access, service locations and financial incentives
	Enhance reach, use, and maintenance of active transport infrastructure
	Enhance education campaigns or programs supporting active transport and public transit
	Support rideshare, bike share, carpooling programs, or other shared mobility services
	Improve public transit (e.g., Wi-Fi, wheelchair access, bike racks, real-time schedule app)
	Electrify commercial vehicles
	Monitor new and emerging technologies that improve fleet efficiency
	Introduce anti-idling campaign, policy, or bylaw
BUILDING ACTIONS ***- City of Kawartha Lakes Healthy Environment Plan***	Implement, incentivize, mandate, or encourage energy efficient retrofits
	Implement or advocate for energy benchmarking, voluntary or mandatory
	Engagement, capacity building, training, education, or behaviour change campaign for building owners, developers, landlords, tenants, city staff on energy efficiency
	Municipal building lighting retrofits
	Encourage, raise awareness, or adopt ecological construction and development techniques, based on certifications such as LEED
	Build or encourage efficient and low carbon or net-zero new buildings
INFRASTRUCTURE ACTIONS	Install or expand green infrastructure or naturalization
	Protect, restore, or require green space, natural assets, or green infrastructure

- City of Sudbury Community Energy and Emissions Plan	Encourage or require integration of Low Impact Development and green infrastructure in new development projects and/or retrofits
	Marketing and education around water conservation, for residents, businesses, and wastewater facility operators
	Install or expand EV charging infrastructure
	Create policy requiring EV charging infrastructure in new developments
	Implement walking and cycling infrastructure

4. ADAPTATION & MITIGATION IN OTHER MCIP PROGRAMS

4.1 ADAPTATION IN OTHER MCIP PROGRAMS

Actions identified from the Climate Adaptation Partner Grant (CAPG) and Climate Asset Management Network (CAMN) programs were similar to outcomes from the Plans program. Feasibility and Operational Studies addressed multiple climate risks at a more specific scale.

4.1.1 The most frequently addressed climate hazards in the CAPG program related to extreme weather, extreme temperature, and flooding.

- For instance, the International Council for Local Environmental Initiatives (ICLEI) Canada was funded to lead eight municipal adaptation plans, helping municipalities identify risks and priority actions, secure infrastructure funding, and build community awareness.
- The inclusion of indicators by six of the eight municipalities highlights the intention of moving toward implementation.

4.1.2 The most frequently addressed climate hazards in the CAMN program emphasized asset conditions under projected extreme weather, extreme temperature, and flooding.

- Phase One of CAMN emphasized data collection. For instance, the Cities of Guelph (ON) and Selkirk (MB) planned upgrades to stormwater infrastructure using projected changes in rainfall over time.
- Phase Two focused on actions to reduce climate risk. The Township of Langley (BC) identified cross-cutting connections between heat and drought for instance, encouraging multi-hazard thinking in asset management planning. The City of New Westminster (BC) identified key performance indicators to monitor asset condition and areas of risk under climate changes. These are: 1) corrosion or cracking (physical condition); 2) overloading or under-utilization (demand condition); and 3) technological/economic/ functional/ legal obsolescence (functional condition).

4.1.3 The most frequently addressed climate hazards across Feasibility and Operational Studies were drought, extreme temperature, and flooding.

- Areas of data collection and analysis primarily related to nature-based solutions such as natural assets, green infrastructure, and water conservation actions. A few studies investigated upgrades to stormwater drainage assets based on projected increases in rainfall under climate change. Other studies or reports related to watershed mapping aimed at understanding the resilience benefits of watershed protection.

- Other areas of analysis related to the feasibility of passive building design to address extreme temperatures, and strategic opportunities to integrate climate risk into emergency response and services.

4.1.4 Almost all adaptation-focused Capital Projects addressed extreme temperature and/or flooding.

- Twice as many capital projects emphasized green infrastructure compared to grey infrastructure in responding to these hazards.
- Green infrastructure strategies ranged from blue-green alleys to earthen dykes, greening projects (e.g., green parking lots and tree planting), and low-impact development.
- Grey infrastructure strategies were focused on improving stormwater management infrastructure and in one case, relocation of a public swimming pool.

4.2 MITIGATION IN OTHER MCIP PROGRAMS

Mitigation data, actions, and indicators in T2050, CAMN projects and Feasibility and Operational Studies help identify areas and actions to reduce emissions in asset management and other operational areas.

4.1.1 The most common emissions sectors addressed in the T2050 program related to buildings, infrastructure, and transportation.

- For instance, the Newfoundland and Labrador Environmental Industry Association Inc was funded to lead six municipal mitigation plans, helping municipalities create and implement local climate action plans in a collaborative way to benefit municipalities across Newfoundland.
- ReThink Green produced a regional plan to support municipalities to achieve emissions reductions in the transportation and energy sectors, with a focus on behaviour change in energy consumption.
- West Kootenay EcoSociety formalized a collaborative structure that committed to reduce community level GHGs for transportation, heating and cooling in buildings, waste management, and electricity use.

4.2.2 Actions in the CAMN plans focused on infrastructure, waste, energy, and transportation.

- Eight municipalities engaged in either Phase One or Phase Two of the CAMN program. These were the Cities of Saint John (NC), Corner Brook (NL), Prince George (BC), Guelph (ON), Selkirk (MB); the Cowichan Valley Regional District (BC); the District of Summerland (BC); and the Township of Langley (BC).
- In the eight plans, 27 common mitigation actions were identified.
- Most common actions in CAMN related to infrastructure upgrades such as identifying opportunities to replace end-of-life assets with energy-efficient and low-emission replacements and increasing EV infrastructure. Other actions related to the development of natural-asset inventories and the role of NbS in support of municipal drainage services.
- In the waste sector, common actions related to the expansion of recycling, efficiency improvements in waste collection systems, and diversion of waste streams (e.g., composting).
- In the energy sector, there were actions related to resource tracking including costs to modify, rehabilitate, maintain, and operate assets and cost savings over time on low carbon and renewable energy sources.

- In the transportation sector, conversion of city fleets to electric, and improved data collection and monitoring of transportation emissions, were all identified as critical areas to reduce municipal asset and operational emissions.

4.2.3 Municipalities who received funding to develop Feasibility and Operational Studies gathered data and investigated the feasibility of reducing emissions mainly in the building and transportation sectors.

- In the building sector, energy efficiency upgrades, energy modeling, and energy conservation measures in buildings were the primary focus. Both technologies (e.g., heat pumps) and behaviour change (e.g., conservation) were investigated. Green infrastructure opportunities in new buildings (e.g., green roofs) and alternative energy systems in municipal facilities and operations (e.g., biomass or waste heat) were also explored.
- In the transportation sector, common areas studied focused on fleet conversion to EV and strategic increases in active transportation infrastructure (e.g., cycling, walking).

4.2.4 Mitigation-focused Capital Projects related to either transportation or existing buildings.

- Ten capital projects were part of a regional car-sharing program in Québec called Projet SAUV^{é}R – SSé. The program aims to reduce GHG emissions by providing car-sharing services to communities that have little or no public transit or taxi service, optimizing the use of municipal vehicles, reducing the size of the municipal fleets, reducing transportation and fuel costs, creating a sense of community, and promoting smart and green technologies.
    - Two projects focused on municipal fleet electrification.
    - The remaining projects focused on broader transportation infrastructure: one pertained to EV charging infrastructure, one to active transportation infrastructure, one to public transit improvements, and one to a multi-use path.
- In the buildings sector, six capital projects related to existing buildings, designing energy efficiency retrofits for public buildings, and in one case, a home energy retrofit program.

5. KEY CONSIDERATIONS FOR CLIMATE ADAPTATION & MITIGATION

Five considerations emerged as key for more effective and systemic adaptation and mitigation action planning.

5.1 Use the best available climate projections and climate data.

- Using best available climate projections to assess risk and vulnerability helps to ensure that municipalities are informed about multiple impacts (e.g., precipitation, temperature) and hazards, which then inform the potential risks to the municipality and community.
- The Region of Waterloo (ON) collaborated with the University of Waterloo and the Interdisciplinary Centre for Climate Change to develop localized climate-change projections. The Town of Halton Hills (ON) used visuals to better communicate climate-change hazard information to the public in a transparent and accessible format using infographics.

5.2 Undertake a comprehensive assessment of vulnerabilities and risks across all hazard types.

- Projected climate impacts and hazards and their influence on the municipality should be done across the seven hazards (e.g., extreme heat, flooding, etc.) and include considerations for cascading hazards (e.g., severe flooding after wildfire) to capture the complete picture of risks to a community.

- For example, the Town of Halton Hills (ON), the City of Coquitlam (BC), and the Region of Waterloo (ON) used a multi-hazard approach for assessing and prioritizing vulnerabilities and risks.

5.3 Conduct systemic assessments across all three areas of vulnerability and risk (infrastructure, population, and eco/agri-systems).

- Municipalities tend to emphasize vulnerabilities and risks in assets and infrastructure. However, accounting for existing vulnerability and future risks in populations and agriculture/ecosystems provides a more systemic understanding of risks and solutions over time.
- Both the City of Waterloo (ON) and the Town of Halton Hills (ON) identified disproportionate impacts for vulnerable populations and groups, and then engaged consultants to work with local NGOs to build adaptive strategies to help minimize climate risk over time. The Town of Halton Hills (ON) and the City of Coquitlam (BC) provide many actions that target these three areas of vulnerability and risk.
- The City of Surrey (BC) collaborated with Ducks Unlimited to create a national sea-level rise outreach campaign that emphasizes risks for both populations and ecosystems.

5.4 Co-evaluate both community and corporate inventories across six emissions sectors.

- Typically, mitigation is performed within the bounds of corporate management, focusing on facilities, buildings, fleets, and waste. Expanding into community energy and emissions inventories provides a comprehensive picture of community emissions sources and clarifies opportunities for municipalities to collaborate with partners to intervene and reduce those emissions. This can be done either directly (e.g., through land-use and transportation planning), or indirectly (e.g., through awareness raising and support of community action).
- For example, the District of Saanich (BC) performed a community energy and emissions inventory to supplement its corporate planning and developed a home energy retrofit financing pilot program to support its mitigation efforts.

5.5 Plan for implementation using indicators as a proxy for movement toward action.

- Identifying key indicators to monitor progress on climate actions and plans helps municipal leaders better understand the goals.
- For example, the City of Windsor (ON), the City of Prince George (BC), and the Township of Huron-Kinloss (ON) provided monitoring and evaluation processes within their plans, including indicators, key roles and departments, financing, and timelines, all facilitating the implementation of their action(s).

6. CONCLUSION

Both adaptation and mitigation strategies are important for minimizing the overall impacts of climate change. This briefing note details common adaptation and mitigation actions and indicators with the goal of providing baseline climate action for other municipalities to apply and learn from, preventing reinvention while also inspiring innovation moving forward. Briefing Note 2 builds on this work by emphasizing key success factors in climate action planning in municipalities across all eight MCIP programs, and highlights key innovations and best practices that can support accelerated climate action in municipalities across Canada.

The five main findings from Briefing Note 1 are:

6.1 MCIP's support of climate adaptation and mitigation planning in Canadian municipalities has been crucial for catalyzing climate action and for generating common examples.

- All eight MCIP programs analyzed – Plans, CAPG, CAMN, Operational Studies, Feasibility Studies, Staff Grants, Capital Projects, T2050 – have contributed significantly to the integration of climate change into areas of municipal planning and asset management.
- Actions and indicators aimed at reducing climate risks and emissions are extensive, and the common actions across seven hazard types and six emissions sectors demonstrate areas where consistent and practical actions are being planned in municipalities across the country.

6.2 Using multi-hazard assessment to understand climate vulnerability and risk to infrastructure, populations, and ecosystems is key to building effective municipal climate action plans.

- MCIP funding related to adaptation has significantly helped municipalities prepare for projected climate impacts and hazards.
- Comprehensive adaptation plans apply best-available climate data, develop comprehensive risk and vulnerability assessments across all seven hazard types (e.g., extreme temperature) and three areas of vulnerability and risk (infrastructure, populations, and eco/agri-systems), and prioritize adaptation strategies based on anticipated resilience gains.

6.3 Comprehensive energy and emissions inventories help inform new opportunities for overall community emissions reductions.

- Most municipalities focused on actions to reduce emissions in transportation, buildings, and infrastructure across all program types.
- Few municipalities performed corporate and community energy and emissions inventories to identify more systemic opportunities for overall community reductions, such as land-use and transportation planning.

6.4 NbS are used as a common adaptation and mitigation solution.

- Adaptation plans that include NbS in their actions to reduce the impacts of extreme temperature and stormwater run-off simultaneously achieve mitigation goals through carbon sequestration, and vice versa.
- Municipalities that intentionally incorporate NbS actions in this way are streamlining their planning processes by achieving both adaptation and mitigation goals within the same plan.

6.5 MCIP-funded plans must be implemented to minimize the overall impacts of climate change by promoting community resilience gains while also reducing emissions over time.

- Municipalities will need funding to implement climate action plans. Key indicators of progress are critical to better understand actions and areas that reduce municipal risk and emissions.

7. APPENDICES

Appendix 1: MCIP funding programs

PROGRAM TYPES	DESCRIPTION
Adaptation and Mitigation Plans	Funding directed at municipalities to develop plans that address climate adaptation or mitigation, either at the community/regional level, or corporate plans.
Climate Adaptation Partner Grants (CAPG)	Funding for non-municipal organizations that coordinate cohorts of municipalities to implement programs, create resources, or offer training or information-sharing activities for municipalities for adaptation, mitigation, natural assets, and risk and vulnerability assessments.
Climate Asset Management Network (CAMN)	Development of a new asset management plan or revision of an existing asset management plan that incorporates adaptation and natural asset goals. Cohort program where training, webinars and resources are shared between municipalities.
Feasibility & Operational Studies	Feasibility Studies: Funding for municipalities to assess whether initiatives are technically and financially feasible, as well as its potential environmental, social, and economic impact.
	Operational Studies: Funding for municipalities to address future climate risk, best practice and mitigation and adaptation through a municipality initiative, such as a program or policy.
Capital Projects	Funding for capital projects in municipalities that relate to energy transportation, waste, water, and brownfields that improve air, water, land, and reduce GHG emissions.
Staff Grants	Grants that have been distributed to partner organizations to assist municipalities in creating adaptation or mitigation plans
Transition 2050 (T2050)	Cohort groups of municipalities that have been supported by organizations to help develop plans and reports that address emission reduction.

Appendix 2: Top three common adaptation actions across seven climate hazards (M = mitigation plan that included this adaptation action)

HAZARD	ACTION (# OF MUNICIPALITIES)	MUNICIPALITIES
Extreme Temperature	Use and provision of warming and cooling centers/amenities (20)	**Plans program:** Cities of Barrie, Cambridge, Edmonton, Nanaimo, Vancouver, Waterloo, Kawartha Lakes (M), Town of Halton Hills, Township of Langley, Regions of Peel (M), Waterloo and Southwestern New Brunswick **Staff Grants program:** Municipalité de l'Anse-Saint-Jean, Town of Bruderheim, Municipality of Clarington, Town of Orangeville, City of Owen Sound, Town of Pelham, Municipality of South Huron, Town of Okotoks (M)
	Existing buildings upgraded to reflect standards for extreme temperatures (20)	**Plans program:** Cities of Barrie, Cambridge, Coquitlam, Edmonton, Mississauga, Nanaimo, Saskatoon, Toronto, Waterloo, Milton (M), Kawartha Lakes (M), Quatsino First Nation (M), Town of Halton Hills, Oakville, Region of Peel (M), District of North Vancouver (M) **Staff Grants program:** City of Nelson, Town of Churchill, MRC des Sources, Ville de Joliette
	Improve existing GI/Tree canopy (19)	**Plans program:** Cities of Barrie, Coquitlam, Edmonton, Mississauga, Nanaimo, Toronto, Vancouver, Waterloo, Kawartha Lakes (M), Regions of Waterloo and Peel (M), Districts of Saanich (M) and North Vancouver (M), Quatsino First Nation (M) **Staff Grants program:** Town of Bruderheim, County of Norfolk, City of Owen Sound, Municipality of South Huron, County of Dufferin
Drought	Use and establishment of green infrastructure (GI) (5)	**Plans program:** Cities of Cambridge, Coquitlam, Nanaimo, Saskatoon, Pembina Valley Water Cooperative
	Establishment of Best Practices through agricultural or green infrastructure implementations (4)	**Plans program:** Cities of Coquitlam, Nanaimo, Kawartha Lakes (M), Nottawasaga Valley Conservation Authority
	Monitor and collect data on health of natural ecosystems, water resources (3)	**Plans program:** Cities of Coquitlam, Nanaimo, Rural Municipality of Springfield
Extreme Weather	Update and improve communications for emergencies and weather events (17)	**Plans program:** Cities of Barrie, Nanaimo, Toronto, Waterloo, Kawartha Lakes (M), Town of Halton Hills, Regions of Peel (M) and Waterloo **Staff Grants program:** Cities of St Catharines, Owen Sound, Municipalities of Clarington, South Huron, Rural Municipality of East St. Paul, County of Norfolk, Towns of Orangeville, Pelham, New Glasgow (M)
	Generate collaborations to improve disaster recovery and service provision (12)	**Plans program:** Cities of Barrie, Edmonton, Toronto, Vancouver, Waterloo, District of Saanich (M), Regions of Peel (M), Waterloo and Southwestern New Brunswick **Staff Grants program:** District Municipality of Muskoka, Towns of Orangeville, New Glasgow

	Provision of backup power/generators during outages or weather events (10)	**Plans program:** Cities of Cambridge, Coquitlam, Nanaimo, Waterloo, Kawartha Lakes (M), Town of Halton Hills, Regions of Peel (M) and Waterloo **Staff Grants program:** Municipalité de l'Anse-Saint-Jean, Municipality of Clarington
Flooding	Incorporate green infrastructure in design and community (21)	**Plans program:** Cities of Barrie, Cambridge, Coquitlam, Mississauga, Nanaimo, Toronto, Vancouver, Waterloo, Kawartha Lakes (M), Dauphin (M), Region of Peel, Town of Stony Plain, District of Saanich (M) **Staff Grants program:** Towns of Bruderheim, Churchill, Lincoln, Orangeville, Ville de Joliette, District Municipality of Muskoka, City of Peterborough, County of Dufferin
	Reviewing effectiveness of stormwater infrastructure and management (18)	**Plans program:** Cities of Barrie, Cambridge, Coquitlam, Edmonton, Golden, Mississauga, Waterloo, Plessisville, Beaconsfield Kawartha Lakes (M), Towns of Halton Hills, Stony Plain, District of Saanich (M), Nottawasaga Valley Conservation Authority, Township of Langley **Staff Grants program:** District Municipality of Muskoka, County of Norfolk, City of St. Catharines
	Reinforce and protect natural spaces for flood protection (14)	**Plans program:** Cities of Barrie, Cambridge, Coquitlam, Edmonton, Nanaimo, Toronto, Waterloo, Kawartha Lakes (M), Nottawasaga Valley Conservation Authority **Staff Grants program:** Brazeau County, District Municipality of Muskoka, Ville de Mont-Tremblant, County of Norfolk, City of Peterborough,
Forest Fires	Development of a response plan (5)	**Plans program:** Cities of Mississauga, Vancouver, Kawartha Lakes (M), Region of Waterloo, District of Saanich (M)
	Mapping and identification of vulnerable populations (5)	**Plans program:** Cities of Mississauga, Vancouver, Kawartha Lakes (M), Region of Southwestern New Brunswick, District of Saanich (M)
	Implement building design and materials that reduce impacts from fires (3)	**Plans program:** District of Saanich (M), Quatsino First Nation (M), Region of Southwestern New Brunswick
Geologic Events	Use of natural systems and nature-based systems to mitigate geologic hazards (9)	**Plans program:** Cities of Barrie, Campbell River, Waterloo, Kawartha Lakes (M), Nottawasaga Valley Conservation Authority **Staff Grants program:** Town of Orangeville, City of St. Catharines, Ville de Mont Tremblant, Municipalité de l'Anse-Saint-Jean
	New communities use LID and GI practices/development to address geologic hazards (5)	**Plans program:** Cities of Barrie, Cambridge, Waterloo, Kawartha Lakes (M), Nottawasaga Valley Conservation Authority
	Establish plans/management practices to reduce sedimentation/erosion (4)	**Plans program:** Cities of Barrie, Nanaimo, Surrey, Nottawasaga Valley Conservation Authority

Sea-level Rise	Update documents to account for sea level rise adaptation (6)	**Plans program:** Cities of Campbell River, Coquitlam, Nanaimo, Surrey, Districts of North Vancouver and Saanich (M)
	Policies and bylaws established to reduce impact on infrastructure (5)	**Plans program:** Cities of Campbell River, Coquitlam, Nanaimo, Surrey, Region of Southwestern New Brunswick
	Collaborative information sharing with partners and other municipalities (4)	**Plans program:** Cities of Campbell River, Nanaimo, Vancouver, District of North Vancouver

Appendix 3: Top three common mitigation actions across six emissions sectors, plus culture change actions (A = adaptation plan that included this mitigation action)

EMISSIONS SECTOR	ACTION (# OF MUNICIPALITIES)	MUNICIPALITIES
Agriculture	Support local food production (10)	**Plans program:** Cities of Kawartha Lakes, Prince George, Saskatoon, Village of Zenon Park (Eco-West SK), District of North Vancouver, Ucluelet, Region of Peel **Staff Grants program:** City of Nelson, County of Wellington, District of Kitimat
	Support opportunities for farmers to reduce greenhouse gas emissions of agricultural practices (6)	**Plans program:** City of Kawartha Lakes, District of Saanich, Municipality of North Cowichan **Staff Grants program:** County of Dufferin, MRC de Vaudreuil-Soulanges, County of Wellington
Buildings - a) Existing	Implement, incentivize, mandate, or encourage energy efficient retrofits (38)	**Plans program:** Towns of Atholville (AFMNB), Beresford (AFMNB), Caraquet (AFMNB), Grande-Anise (AFMNB), Neguac (AFMNB), Saint-Léonard (AFMNB), Maisonnette (AFMNB), Rural Municipality of Haut-Madawaska (AFMNB), Village of Riviere-Verte (AFMNB), Towns of Aurora, Banff, Baie-Saint-Paul, Cities of Charlottetown, Guelph, Kawartha Lakes, Leduc, Prince George (M), Saskatoon, Sudbury, Mississauga (A), Regions of Peel and Waterloo (A), Sustainable Severn Sound, District of Ucluelet **Staff Grants program:** Town of Canmore, Drayton Valley, Okotoks, County of Dufferin, Wellington, Township of West Lincoln, City of Nelson
	Engagement, capacity building, training, education, or behaviour change campaign for building owners, developers, landlords, tenants, city staff on energy efficiency (9)	**Plans program:** Town of Devon, City of Kawartha Lakes, Districts of North Vancouver, Saanich, Quatsino First Nation, Municipality of Russell-Binscarth **Staff Grants program:** City of Brantford, Quesnel, Town of Canmore
	Incentivize, encourage, or develop strategies for use of high efficiency heat pumps (9)	**Plans program:** Cities of Charlottetown, Guelph, Mississauga (A), Saskatoon, Varennes (A), Districts of North Vancouver, Ucluelet, Quatsino First Nation **Staff Grants program:** City of Nelson

Buildings – b) New	Build or encourage efficient and low carbon or net-zero new buildings (22)	**Plans program:** Towns of Aurora, Atholville (AFMNB), Beresford (AFMNB), Caraquet (AFMNB), Cartier (Eco-West MB), Grande-Anse (AFMNB), Saint-Léonard (AFMNB), Maisonnette (AFMNB), Neguac (AFMNB), Village of Riviere-Verge (AFMNB), Rural Municipality of Haut-Madawaska (AFMNB), Cities of Thunder Bay, Kawartha Lakes, Mississauga (A), Sudbury, Districts of Saanich, North Cowichan, Rural Municipality of Springfield (Eco-West MB), Communauté Maritime des Îles-de-la-Madeleine **Staff Grants program:** Town of Canmore, Town of New Glasgow (Corporate), Wolfville, City of Nelson (A), Resort Municipality of Whistler
	Construct or support all new City buildings to meet green building or energy efficiency standards e.g., Passive House and Zero Carbon Building Standards (19)	**Plans program:** Towns of Aurora, Carrot River (Eco-West SK), Cities of Charlottetown, Leduc, Saskatoon, Sudbury, Region of Peel, Corporation of Loyalist Township **Staff Grants program:** Town of Canmore, New Glasgow (Community and Corporate plan), County of Dufferin, City of Port Colborne, Red Deer, Nelson (A), Resort Municipality of Whistler, Municipality of Clarington, District Municipality of Muskoka
	Encourage, raise awareness, or adopt ecological construction and development techniques, based on certifications such as LEED (10)	**Plans program:** Town of Baie-Saint-Paul, Cities of Beloeil (A), Kawartha Lakes, Saint-Zotique (A), Varennes (A), Gatineau (A), Region of Southwestern New Brunswick (A), Municipality of Russell-Binscarth **Staff Grants program:** City of Nelson, Town of Okotoks
Culture Change	Education, awareness, and behavioural change campaigns on energy efficiency (14)	**Plans program:** Towns of Atholville (AFMNB), Beresford (AFMNB), Maisonnette (AFMNB), Neguac (AFMNB), Saint Léonard (AFMNB), Rural Municipality of Haut-Madawaska (AFMNB), City of Kawartha Lakes, Region of Peel, Communauté Maritime des Îles-de-la-Madeleine **Staff Grants program:** County of Dufferin, Town of Falher, Portugal Cove-St. Philips, Municipality of North Perth, MRC de Pontiac
	Climate change community engagement and awareness strategy (13)	**Plans program:** Town of Carrot River (Eco-West SK), Cities of Humboldt (Eco-West SK), Kawartha Lakes, Vancouver (A), Region of Peel, Sustainable Severn Sound, District of Summerland, Municipality of Russell-Binscarth **Staff Grants program:** Town of Falher, Essex (A), New Glasgow (Corporate), County of Wellington, City of Nelson (A)
	Develop programs to raise awareness on sustainable practices (11)	**Plans program:** Cities of Charlottetown, Kamloops, Guelph, Humboldt (Eco-West SK), Town of Eston (Eco-West SK), Region of Peel, Sustainable Severn Sound, Corporation of Loyalist Township **Staff Grants program:** Town of Essex, Municipality of North Perth, City of Port Colborne
Energy Systems	Explore options to shift to renewable	**Plans program:** Towns of Atholville (AFMNB), Beresford

	energy sources (36)	(AFMNB), Caraquet (AFMNB), Grande-Anse (AFMNB), Maisonnette (AFMNB), Neguac (AFMNB), Saint-Léonard (AFMNB), Gravelbourg (Eco-West SK), Tisdale (Eco-West SK), Rural Municipality of Haut-Madawaska (AFMNB), Village of Riviere Verte (AFMNB), Cities of Charlottetown, Dauphin, Guelph, Kawartha Lakes, Leduc, Thunder Bay, Kamloops, Mississauga (A), Prince George, Township of Huron-Kinloss, Rural Municipality of Lorne (Eco-West MB), Wallace-Woodworth (Eco-West MB), Municipality of Norfolk Treherne (Eco-West MB), Sustainable Severn Sound, Rural Municipality of Springfield (A) **Staff Grants program:** City of Brantford, Town of Canmore, New Glasgow (Corporate), Okotoks, Wolfville, County of Dufferin, Wellington, District of Kitimat, District Municipality of Muskoka (A), Municipality of Clarington (A)
	Implement or investigate pursuing district energy system (15)	**Plans program:** Towns of Aurora, Devon, Cities of Guelph, Kawartha Lakes, Leduc, Mississauga (A), Saskatoon, Thunder Bay, Kamloops, Municipality of Russell-Binscarth, District of North Cowichan **Staff Grants program:** Town of Canmore, Yarmouth, County of Wellington, Municipality of Clarington (A)
	Explore or expand opportunities for renewable electricity/energy storage (14)	**Plans program:** Towns of Banff, Cartier (Eco-West MB), Cities of Guelph, Kawartha Lakes, Mississauga (A), Prince George, Saskatoon, Sudbury, Thunder Bay, District of Summerland **Staff Grants program:** County of Dufferin, District Municipality of Muskoka, Town of New Glasgow, County of Wellington
Infrastructure – a) Green	Protect, restore, or require green space, natural assets, or green infrastructure (11)	**Plans program:** Cities of Cambridge (A), Sudbury, Nottawasaga Valley Conservation Authority, Municipality of Norfolk Treherne (Eco-West MB), District of Saanich, Regional Municipality of Wallace-Woodworth (Eco-West MB), West Interlake (Eco-West MB), Region of Waterloo (A) **Staff Grants program:** Town of New Glasgow, Municipality of Clarington (A), Ville de Joliette
	Increase urban tree canopy coverage (9)	**Plans program:** Cities of Barrie (A), Mississauga (A), Prince George, Vancouver, Kamloops, Region of Peel, District of Summerland **Staff Grants program:** City of Brantford, Municipality of North Perth
	Implement, expand or encourage tree planting program (8)	**Plans program:** Township of Huron-Kinloss, Cities of Leduc, Nanaimo (A), Thunder Bay, Region of Peel, Region of Waterloo, Corporation of Loyalist Township, Rural Municipality of Cartier (Eco-West MB) **Staff Grants program:** Town of New Glasgow
Infrastructure –	Marketing and education around water	**Plans program:** Town of Devon, Cities of Kawartha Lakes,

b) Grey	conservation, for residents, businesses, and wastewater facility operators (6)	Saskatoon, Sudbury **Staff Grants program:** City of Brantford, MRC de Pontiac
Infrastructure – c) Transportation	Install or expand EV charging infrastructure (20)	**Plans program:** Towns of Aurora, Oakville, Cities of Charlottetown Dauphin, Kawartha Lakes, Leduc, Sudbury, Districts of North Vancouver, Saanich, Tofino, Ucluelet, Summerland, Sustainable Severn Sound, Rural Municipality of Cartier (Eco-West MB) **Staff Grants program:** Town of Deer Lake, New Glasgow (Corporate), Ville de Joliette, Municipality of North Perth, City of Quesnel, District Municipality of Muskoka
	Implement walking and cycling infrastructure (5)	**Plans program:** Town of Banff, Cities of Kawartha Lakes, Saskatoon, Sudbury, District of North Cowichan
	Create policy requiring EV charging infrastructure in new developments (3)	**Plans program:** Cities of Kawartha Lakes, Leduc, Sudbury
Waste	Implement, improve, or expand recycling and organics collection (29)	**Plans program:** Towns of Carrot River (Eco-West SK), Devon, Rural Municipalities of Wallace-Woodworth (Eco-West MB), West Interlake (Eco-West MB), Cartier (Eco-West MB), Lorne (Eco-West MB), Springfield (Eco-West MB), Towns of Eston, Tisdale (Eco-West SK), (Eco-West SK), Township of Huron-Kinloss, Cities of Humboldt (Eco-West SK), Kawartha Lakes, Prince George, Thunder Bay, Gatineau (A), Shawinagan (A), Districts of North Vancouver, Ucluelet, Summerland, Village of Zenon Park (Eco-West SK) **Staff Grants program:** City of Brantford, Quesnel, Town of Canmore, Falher, County of Dufferin, District of Kitimat, Municipality of North Perth, Town of Okotoks, MRC de Vaudreuil-Soulanges
	Improve or expand waste diversion services (21)	**Plans program:** Rural Municipalities of Springfield (Eco-West MB), Wallace-Woodworth (Eco-West MB), Cartier (Eco-West MB), Lorne (Eco-West MB), City of Humboldt (Eco-West SK), Township of Huron-Kinloss, District of North Vancouver, Municipality of Russell-Binscarth, Corporation of Loyalist Township **Staff Grants program:** Cities of Brantford, Quesnel, Port Colborne, Nelson, Towns of Falher, Okotoks, Counties of Wellington, Dufferin, District of Kitimat, Municipality of Clarington (A)
	Waste reduction education, awareness, or engagement (16)	**Plans program:** Towns of Eston (Eco-West SK), Gravelbourg (Eco-West SK), Township of Huron-Kinloss, Cities of Kawartha Lakes, Kamloops, Shawinagan (A), Leduc, Humboldt (Eco-West SK), Shawinagan (A), District of Ucluelet, North Cowichan, Municipality of Russell-Binscarth, Corporation of Loyalist Township **Staff Grants program:** City of Brantford, Town of Canmore, Falher, County of Dufferin, Wellington
Transportation	Anti-idling campaign, policy, or bylaw (43)	**Plans program:** Towns of Atholville (AFMNB), Baie-Saint-Paul, Beresford (AFMNB), Caraquet (AFMNB), Grande-Anse

		(AFMNB), Maisonnette (AFMNB), Neguac (AFMNB), Saint Léonard (AFMNB), Village of Riviere-Verte (AFMNB), Rural Municipality of Haut-Madawaska (AFMNB), Cities of Beaconsfield (A), Shawinagan (A), Kawartha Lakes, Mississauga (A), Charlottetown, Humboldt (Eco-West SK), Towns of Devon, Eston (Eco-West SK), Gravelbourg (Eco-West SK), Region of Southwestern New Brunswick (A), Sustainable Severn Sound, District of Ucluelet, Summerland, Village of Zenon Park (Eco-West SK), Municipality of Russell-Binscarth, Communauté Maritime des Îles-de-la-Madeleine **Staff Grants program:** City of Brantford, Port Colborne, Quesnel, Nelson (A), Towns of Canmore, Deer Lake, Falher, New Glasgow (Community), Portugal Cove-St. Philips, County of Dufferin, Wellington, District of Kitimat, Municipality of North Perth, Clarington (A), MRC de Pontiac, Vaudreuil-Soulanges,
	Support ride share, bike share, carpooling programs, or other shared mobility services (30)	**Plans program:** Towns of Atholville (AFMNB), Banff, Beloeil (A), Beresford (AFMNB), Caraquet (AFMNB), Grande-Anse (AFMNB), Maisonnette (AFMNB), Neguac (AFMNB), Saint Léonard (AFMNB), Village of Rivere Verte (AFMNB), Rural Municipality of Haut-Madawaska (AFMNB), Cities of Guelph, Kawartha Lakes, Thunder Bay, Kamloops, Saint-Zotique (A), Varennes (A), Districts of North Vancouver, Saanich, Summerland, Tofino, Quatsino First Nation, Municipality of Russell-Binscarth, Corporation of Loyalist Township **Staff Grants program:** Town of New Glasgow (Community), Okotoks, Canmore, City of Port Colborne, District of Kitimat, County of Wellington
	Expand transit (22)	**Plans program:** Towns of Atholville (AFMNB), Banff, Beresford (AFMNB), Caraquet (AFMNB), Saint Léonard (AFMNB), Cartier (Eco-West MB), Devon, Grande-Anse (AFMNB), Rural Municipality of Haut-Madawaska (AFMNB), Wallace-Woodworth (Eco-West MB), Maisonnette (AFMNB), Neguac (AFMNB), Village of Riviere Verte (AFMNB), District of Saanich, Cities of Guelph, Saskatoon, Sudbury **Staff Grants program:** District of Kitimat, MRC de Pontiac, Vaudreuil-Soulanges, Resort Municipality of Whistler, City of Nelson (A)

BRIEFING NOTE 2

EFFECTIVE MUNICIPAL CLIMATE ACTION: Exploring Key Success Factors & Best Practices

1. INTRODUCTION

This briefing note is the second in a series of four, reporting on key outcomes of funding from the Municipalities for Climate Innovation Program (MCIP) in municipalities across Canada. It highlights research findings from the eight MCIP programs: Adaptation & Mitigation Plans, Climate Adaptation Partner Grants (CAPG), Climate Asset Management Network (CAMN), Feasibility Studies, Operational Studies, Staff Grants, Capital Projects, and Transition 2050 (T2050).

"This briefing note emphasizes key success factors and innovations in climate action planning that can be replicated and scaled in other municipalities."

Briefing Note 1 outlined planned actions and indicators arising from MCIP funding. Briefing Note 2 emphasizes key success factors in climate action planning and key innovations that can be replicated and scaled in other municipalities. These include:

- Six key success factors identified by project proponents, and
- Five municipal innovations and best practices flagged in the qualitative analysis.

2. KEY SUCCESS FACTORS ACROSS ALL MCIP PROGRAMS

Key success factors are elements that either contributed to or hindered successful climate action plans and/or outcomes. Depending on the MCIP program, project proponents were asked to complete a list of 24 to 31 questions upon completion of their project. These completion reports are self-assessments of each project, ranging from uses of funding, project initiation, project participants, process and key innovations, anticipated results, and key outcomes.

Six key success factors were identified across all MCIP climate action plans, studies, and reports. Ranked according to frequency cited across 294 completion reports, these are: 1) interdepartmental collaboration; 2) use of consultants; 3) stakeholder engagement; 4) senior support; 5) framework/methodology development; and 6) data and information sharing (see Table 1 for full breakdown).

This preliminary analysis from the completion reports provides critical insights from project proponents about their need to develop effective climate action. This information can be used to leverage the effectiveness of climate action frameworks and funding into the future.

Table 1: Frequently cited success factors in analysed completion reports across all MCIP programs

FUNDING PROGRAM (# OF COMPLETION REPORTS)	INTER-DPMT. COLLABORATION	USE OF CONSULTANTS	STAKEHOLDER ENGAGEMENT	SENIOR SUPPORT	FRAMEWORK/ METHODOLOGY	DATA & INFO SHARING
PLANS (78)	30	31	34	25	15	10
CAPG (13 COHORTS)	1	1	2	2	2	5
CAMN (20)	13	5	3	13	5	4
STUDIES (78)	15	29	11	16	20	14
STAFF GRANTS (53)	24	4	21	11	5	9
CAPITAL PROJECTS (36)	4	16	9	10	20	0
T2050 (10 COHORTS)	0	0	6	1	2	5
TOTAL (294[4])	**87**	**86**	**86**	**78**	**69**	**47**

1.1 Interdepartmental collaboration builds literacy, awareness, and accountability for climate risk and emissions data and its influence across all areas of the municipal organization.

- Thirty percent of municipalities identified the need to shift from silos to interdepartmental or cross-organizational collaboration, to build more meaningful support for, and accountability to, climate action goals.
- Complex challenges like climate change require more systemic approaches. Engaging with other departments to build climate knowledge, share resources, and develop more comprehensive priorities and mandates helps to mainstream climate action across the municipal organization.
- Twenty-eight of 53 municipalities created permanent positions out of the positions borne from the Staff Grants, while three municipalities made the climate committees that arose from the program permanent.

2.2 Support for and use of quality climate change consultants ensures better planning by filling gaps in municipal capacity and expertise.

- Thirty percent of project proponents identified onboarding quality consultants as crucial.
- This was particularly important in the Feasibility and Operational Studies and Plan programs, where dependence on consultants to frame relevant questions, perform robust analysis, and make recommendations was a strategic tool to guide municipal climate readiness and investment decisions over the short and long terms.
- CAPG and T2050 supported consultants for cohort-oriented planning as an inherent part of the programs; and these programs were viewed as relevant and useful.

[4] 294 completion reports were submitted, although only 286 projects were submitted.

2.3 Public and stakeholder engagement and support is vital for building momentum toward relevant municipal climate-action efforts.

- Thirty percent of project proponents used stakeholder engagement to promote municipal climate action commitments, especially in the Plans program. Engagement opportunities were created using steering committees, workshops, and open houses.
- Proactive public communication and engagement builds short-term support and long-term buy-in and funding for municipal plans, policies, and actions.
- Building broader community awareness of climate risks and emissions sources, while also gathering public inputs about strategic opportunities to reduce climate risks and emissions, is necessary to build broad community support in both adaptation and mitigation planning.

2.4 Senior-level support is required for project approval and to encourage momentum on climate action.

- Twenty-seven percent of project proponents identified senior-level support as key for moving projects forward.
- Engagement with municipal leaders and decision-makers to ensure they are well informed, regularly updated, and wherever possible, integrated into the policy or plan development process, helps obtain and build support for projects.
- In the CAMN program, where asset management decisions, both for built and natural assets, require strategic prioritization and investment, support from senior leaders is crucial for prioritizing sustainable asset and service-delivery investments to secure municipal services under changing climate conditions over time.

2.5 A robust framework or methodology for integrating climate action provides structure and ensures effectiveness.

- Twenty-three percent of project proponents identified the need for frameworks and more standardized methodologies to set timelines, keep staff on track, and maintain momentum as plans, studies, and reports unfold.
- Standardized methodologies can save time, provide baseline support, prevent reinvention and contradiction, and encourage greater innovation in the climate-action landscape.
- This was of particular importance in the Capital Projects program.

2.6 Sharing climate data and information provided opportunities for climate action that otherwise may not have occurred, contributing to accelerated regional climate-action planning.

- Sixteen percent of municipalities noted the importance of data- and resource-sharing among municipalities.
- Thirty three percent, or 14 of the 43 cohort-oriented completion reports, noted the value of data sharing and peer exchange. Cohort programs such as CAPG, CAMN and T2050 encouraged municipal learning and the sharing of expertise.
- Joint procurement in these programs supported climate action among smaller communities that otherwise lacked capacity and resources for climate action.

- Regionally based cohort programs optimized data development, sharing of resources, and learning through action planning due to geographic proximity and similar projected climate impacts and hazards.
- Cohort programs involving municipalities across Canada were generally less effective. Differences in geographies, climate hazards, and regulatory environments created complexities for peer learning, in addition, time zones and travel time created scheduling difficulties.
- In-person meetings were noted as important to maintain engagement and momentum.
- In the Staff Grants program, forty-six (87%) of municipalities found the Communities of Practice peer-learning experience extremely beneficial, due to knowledge sharing and peer exchange. This was particularly helpful for staff who were the only ones working on climate change in their municipality, as peer-learning allowed them to learn from each other's struggles.

3. BEST PRACTICES FROM ACROSS ALL MCIP PROGRAMS

Best practices emerge from practical, common approaches and solutions (e.g., climate actions outlined in Briefing Note 1) or from novel approaches, methods, or data that contribute to innovative outcomes.

In this analysis, novel approaches, methods, and data were flagged as best practice, based on their innovation potential and anticipated scalability. For example, if applied elsewhere, would this best practice advance effective climate action in municipal planning and decision-making?

The following five best practices offer innovative and potentially scalable opportunities for municipalities to learn from, helping to inform and advance next step approaches for municipal climate innovation in Canada.

3.1 Integrated and low carbon resilience planning approaches promote climate action that multi-tasks.

3.2 Nature-based solutions reduce projected flood and heat risks, store and sequester carbon, avoid expansion of emissions-intensive and costly grey infrastructure, and advance co-benefits.

3.3 Equity considerations are fundamental to assess the disproportionate impacts of climate change, prioritize risks, and ensure the equitable distribution of benefits of climate strategies.

3.4 Innovative tools that track emissions build staff capacity and catalyze community support, accelerating momentum toward climate targets.

3.5 Cohort-based climate action planning makes sense for jointly procuring expertise, expediting climate data across multiple municipalities in a region, and promoting collective learning, exchange, and solutions-building.

For greater detail on municipal best practices across the five MCIP programs see highlights in Appendix 1.

3.1 Integrated and low carbon resilience planning approaches promote climate action that multi-tasks.

Adaptation and mitigation both aim to minimize climate impacts; therefore, it is important to prevent contradictory climate-action solutions between the two. Coordinating and/or integrating adaptation and mitigation planning approaches and processes aims to: 1) ensure that adaptation actions will not increase reactive emissions (e.g., air conditioning in heat waves which leads to additional emissions) or adaptive emissions (e.g., emissions intensive materials to build higher dikes and sea walls) over time; and 2) ensure that mitigation actions are resilient to changing climate conditions over time (e.g., advanced zero-carbon buildings located in high-risk floodplains will have a compromised life cycle).

Three approaches were used to integrate adaptation and mitigation. First, **a co-benefits approach**, where an adaptation plan identified co-benefits for emissions reduction, or where a mitigation plan identified co-benefits for resilience (see Briefing Note 4 for more detail on strategies that outline co-benefits). Second, **a coordinated approach**, where adaptation and mitigation actions were included in one climate action plan. Third, **a low carbon resilience approach,** where adaptation and mitigation planning processes are streamlined into one planning process, rather than two, saving time and money, preventing contradictions, and identifying synergies, trade-offs, and co-benefits with other community priorities.

Table 2 shows municipalities from across five MCIP programs that expanded the scope of their funding to coordinate adaptation and mitigation co-benefits or to integrate adaptation and mitigation planning processes, resulting in one integrated, low carbon resilience plan.

Table 2: Municipalities including both adaptation and mitigation actions in one plan across all MCIP programs

FUNDING PROGRAMS (# of projects)	*MUNICIPALITIES*
PLANS (27)	**Adaptation plans (11):** City of Mississauga*, Region of Peel, City of Saskatoon, City of Beloeil, City of Varennes, City of Waterloo, City of Cambridge, Nottawasaga Valley Conservation Authority, City of Nanaimo, City of Saint-Zotique, City of Barrie, Ville de Gatineau **Mitigation plans (16):** City of Kawartha Lakes, District of Saanich, District of North Vancouver, Quatsino First Nation, Eco-West Manitoba cohort (6/6: Rural Municipalities of Cartier, Lorne, Norfolk Treherne, Springfield, West Interlake, Wallace-Woodworth), Eco-West Saskatchewan cohort (1/6: Town of Carrot River), Sustainable Severn Sound, District of Summerland, Municipality of Russell-Binscarth, Corporation of Loyalist Township, City of Kamloops
CAMN (3)	Township of Langley, City of Guelph, City of Selkirk
CAPG (1 COHORT)	**Adaptation plans (1):** ICLEI Canada (Town of Caledon)
STAFF GRANTS (17)	**Adaptation plans (9):** Town of Orangeville, City of Nelson, Ville de Mont Tremblant, County of Huron, District Municipality of Muskoka, Town of Essex, Municipalité de Chelsea, Township of Bonfield, Municipality of Clarington, **Mitigation plans (8):** County of Dufferin, Town of Okotoks, Town of New Glasgow, Municipality of North Perth, Town of Falher, County of Wellington, Town of Wolfville, Resort Municipality of Whistler
T2050 (2 COHORTS)	Newfoundland & Labrador Environmental Industry Association Inc (Town of Bauline, Town of Channel-Port aux Basques, Town of Paradise, Town of Stephenville, Town of Torbay), ReThink Green (Region of North Shore (ON) and District of Manitoulin)

***** Underlined municipalities pursued integrated, low carbon resilience approaches that both streamlined and reduced costs in the climate action planning process.*

3.1.1 Plans, studies, and reports that consider both adaptation and mitigation are best practice.

- The plans in table 2 show the municipalities that applied a coordinated climate action planning approach in their plans. They addressed the need to reduce both risk and emissions by producing plans that aim to address both. This was done in two different ways:
- **A coordinated approach:** The adaptation plans from the Town of Caledon (ON, CAPG ICLEI cohort) and the City of Barrie (ON), for example, identify mitigation or carbon sequestration as a co-benefit. The Cities of Waterloo (ON) and Edmonton (AB) and the Municipality of Clarington (ON) included mitigation co-benefits as part of their adaptation action prioritization matrix. Mitigation plans from the City of North Vancouver (BC) and the District of Summerland (BC) identify anticipated resilience co-benefits of certain mitigation actions.
- **A low carbon resilience (LCR) approach:** Four municipalities in the Staff Grants program (City of Nelson (BC), County of Dufferin (ON), Town of Orangeville (ON), and Town of Okotoks (AB)) and two municipalities in the Plans program (Cities of Mississauga and Kawartha Lakes) went further than coordinated planning by applying a low carbon resilience framework, using one planning process to coordinate, evaluate, and prioritize low carbon, resilient actions that multi-task with the goal of reducing climate risk and emissions, and advancing other sustainability co-benefits (see right sidebar).
- Certain municipalities referenced a coordinated approach, showing movement toward integration. These are: the County of Huron (ON), Town of Clarington (ON), District Municipality of Muskoka (ON), Municipality of North Perth (ON), Township of West Lincoln (ON) and the Town of Essex (ON) from the Staff Grants program, and the Town of Halton Hills (ON), Corporation of Loyalist Township (ON) and Township of Langley (BC) from the Plans program.
- The municipal cohort working with the Columbia Basin Rural Development Institute at Selkirk College, through the CAPG program, produced a Low Carbon Resilience and Asset Management Knowledge Brief. This brief explains how rural municipalities can use an LCR strategy in asset management to promote strategies, like nature-based solutions, that reduce vulnerability to climate change (e.g. flood and heat risks) and emissions, while also minimizing costs and advancing other sustainability goals over time.

EXAMPLES OF INTEGRATED CLIMATE ACTION IN THE COUNTY OF DUFFERIN

- ✓ ***Supporting retrofit, energy, and resilience upgrades for rental homes and apartments*** *reduces emissions and increases energy efficiency of existing buildings while reducing vulnerability to climate hazards such as extreme weather, temperatures, and flooding.*
- ✓ ***Encouraging green infrastructure*** *and low-impact development (e.g., rain swales, permeable surfaces, rain gardens, green roofs) supports stormwater management while sequestering carbon, reducing run-off and flooding impacts, and building biodiversity and health.*

3.1.2 Integrated and systemic approaches identify 'bigger win' actions to reduce climate risk and emissions and transition toward resilience and sustainability over time.

- These approaches shows that municipalities are exploring important climate innovation, recognizing the interdependence of climate risk and emissions, and developing more streamlined and systemic frameworks for climate action planning.
- Doing so develops both collaborative opportunities across departments and sectors and expands collaborative funding opportunities for climate action (for more information see ACT's *Low Carbon Resilience Planning Handbook*).

- Briefing Note 3 addresses how these approaches help situate the co-benefits of integrated climate action alongside other community goals and priorities.

3.2 Nature-based solutions reduce projected flood and heat risks, store and sequester carbon, avoid expansion of emissions-intensive and costly grey infrastructure, and advance co-benefits, such as equity, biodiversity, human health and well-being.

- Nature-based solutions (NbS) are identified as critical adaptation and mitigation strategies across all eight MCIP programs (see Appendices 2-4). See Appendix 2 for a full list of common NbS being applied in both adaptation and mitigation planning.
- NbS range from natural asset protection and expansion to engineered green infrastructure that support and/or advance ecosystem services.

3.2.1 Protecting and expanding natural assets to absorb projected rainfall over time can be a more cost-effective strategy than expanding drainage infrastructure.

- In adaptation plans prepared by Nature-Action Québec, NbS were identified to adapt to projected rainfall and heat events in four municipalities (Cities of Beloeil (QC), Saint-Zotique (QC), Varennes (QC), and Saint-Jean-sur-Richelieu (QC)).
- For example, solutions to increase tree canopy coverage included bioretention structures, permeable pavements, all of which minimize urban heat island effects and are cost-effective alternatives to expanding drainage infrastructure.

3.2.2 The protection and restoration of natural assets and/or requirement for green infrastructure can be a strategy to store and sequester carbon and reduce emissions and pollution.

- Three municipalities from the Eco-West Manitoba cohort (Rural Municipalities of Norfolk Treherne, Wallace-Woodworth and West Interlake), the City of Cambridge (ON), District of Saanich (BC), City of Sudbury (ON), Nottawasaga Conservation Authority (ON), County of Dufferin (ON), and the Town of Okotoks (AB) used natural assets as a strategy to sequester carbon and reduce emissions and air pollution.

3.2.3 NbS is used to advance both adaptation and mitigation goals.

- Seventeen plans from the Plans program, eight plans from the Staff Grants program, three CAPG cohorts, four CAMN plans, four studies, three capital projects and four T2050 cohorts used NbS strategies to achieve both adaptation and mitigation goals (see Table 3).
- For example, the Corporation of Loyalist Township Climate Action Plan (ON) developed a goal to plant 20,000 trees over the next 10 years, acknowledging the carbon sequestration benefits as well as the adaptation benefits to the impacts of extreme heat and weather.
- Villes de Rivière-du-Loup, Boucherville and Laval in Québec received funding to produce adaptation-oriented capital projects to green parking lots. The main goal of the projects was to reduce stormwater runoff and heat-related to albedo, while achieving emissions reductions through carbon sequestration.

Table 3: Municipalities using NbS to advance both adaptation and mitigation goals across all MCIP programs

FUNDING PROGRAMS (# of muni's)	*MUNICIPALITIES*
PLANS (17)	**Adaptation plans (9):** Nottawasaga Valley Conservation Authority, City of Barrie, City of Nanaimo, City of Surrey (Coastal Flood Adaptation), City of Vancouver, City of Mississauga, Region of Waterloo, City of Waterloo, City of Campbell River **Mitigation plans (8):** Loyalist Township, District of Summerland, City of Kamloops, City of Kawartha Lakes, District of Saanich, District of North Vancouver, Quatsino First Nation, Township of Huron-Kinloss
STAFF GRANTS (8)	**Adaptation plans (3):** County of Huron, District Municipality of Muskoka, City of Nelson **Mitigation plans (5):** Town of Lincoln, Municipality of North Perth, County of Dufferin, City of Brantford, Town of Okotoks
CAPG (3 COHORTS)	ICLEI Canada adaptation plans (Town of Caledon, Town of Conception Bay South, City of Peterborough, Town of Portugal Cove-St. Philips, City of Prince George, Town of Qualicum Beach, District of Ucluelet, and City of Windsor), Smart Prosperity Institute & Municipal Natural Assets Initiative natural asset technical reports (City of Courtenay, District of Sparwood, Town of Florenceville-Bristol, Village of Riverside-Albert, Town of Riverview and City of Oshawa) Ontario Parks Association Green Infrastructure for Climate Adaptation
CAMN (4)	City of Prince George, City of Selkirk, Cowichan Valley Regional District
STUDIES (4)	Credit Valley, City of Saskatoon, Town of Collingwood, City of Winnipeg
CAPITAL PROJECTS (3)	Ville de Rivière-du-Loup, Ville de Boucherville, Ville de Laval
T2050 (4 COHORTS)	Newfoundland & Labrador Environmental Industry Association Inc (Town of Bauline, Town of Channel-Port aux Basques, Town of Paradise, Town of Stephenville, Town of Torbay), ReThink Green (Township of Billings, Town of Gore Bay, Municipality of Central Manitoulin, Northeastern Manitoulin & the Islands, Town of Spanish), West Kootenay EcoSociety Renewable Energy Plan, Vivre en Ville (Ville de Candiac, Ville de Plessisville, Ville de Nicolet, Ville de Victoriaville, Ville de Longeuil, Ville de Quebec)

3.2.4 Five of the nine cohorts in the Canadian Adaptation Partner Grants (CAPG) included NbS (see Appendix 3).

- All eight municipal adaptation plans guided by ICLEI Canada and all five municipal adaptation plans guided by Conservation Corps Newfoundland & Labrador included NbS.
- The Municipal Natural Assets Initiative (MNAI) worked with six municipalities to perform natural asset inventories of forests, foreshores, and riparian areas, evaluating ecosystem services that supplement and support municipal stormwater drainage and flood- and erosion-protection services. For instance, the Town of Florenceville-Bristol (NB), the City of Oshawa (ON), and the District of Sparwood (BC) used catchment areas, riparian areas, and natural ponds to minimize soil erosion.
- The six municipalities working with the Ontario Parks Association included green infrastructure solutions for site-specific systems such as rain gardens, green roofs, and street trees. For instance, the City of

Brampton proposed to convert its Riverside Golf Club into a recreation facility, re-naturalizing the golf course to create a naturalized floodplain and wetland area with educational features and a conservation and recreation area featuring a significant urban forest (10,000 trees).

- Three municipalities from the Nature Québec cohort considered greening projects such as green alleys and greening public spaces, to green parking lots and urban parks.

3.2.5 Eight of the twenty Climate Asset Management Network (CAMN) plans included NbS (see Appendix 4).

- Natural assets were identified as helping to build resilience in municipal drainage infrastructure and stormwater services while also supporting ecosystem protection and carbon sequestration. For instance, the City of Corner Brook (NL) investigated using natural assets in stormwater management, developed a natural asset policy, and updated design standards to include natural assets and green building/infrastructure in their asset-management planning.

3.2.6 Twelve of the 77 Operational and Feasibility Studies analysed identified NbS related to green infrastructure (see Appendix 5).

- Studies using NbS focused on stormwater management, natural asset capital valuation, stream daylighting, urban forestry management, eco-roofs, and the preservation of wetlands and aquifers.
- The Saskatoon Natural Capital Asset Valuation Pilot (SK) assessed three asset classes (natural assets such as wetlands, enhanced natural assets such as parks, and engineered assets such as permeable pavements), accounting for and valuing the ecosystem services they provide. The study also linked ecosystem services to additional community co-benefits such as the “constituents of well-being” for the community.

3.2.7 Thirty-three of the 49 adaptation and mitigation plans analysed from the Staff Grants program used NbS in their actions (see Appendix 6).

- The most common NbS strategies in the Staff Grants program were tree planting to expand the tree canopy cover and the protection and restoration of ecological areas.
- Six municipalities (District Municipality of Muskoka (ON), Town of Orangeville, (ON), City of St. Catharines, (ON), Brazeau County (AB), Town of Churchill (MB), Ville de Joliette (QC), and Municipality of North Perth, (ON)) have stated intentions to create a natural assets inventory.

3.2.8 Seven of the 38 Capital Projects used green infrastructure to reduce stormwater flooding and the urban heat island effect (see Appendix 7).

- For example, the City of Saint John (NB) added wetland features to their new sports, wellness & recreation facility’s grounds to adapt to stormwater flooding and sea-level surge occurrences, while also enhancing the existing wetland and its existing ecosystem services.
- The City of Kitchener (ON) and the Ville de Montréal-Bâtiment 7 (QC) implemented low impact development strategies such as rain gardens and bioswales to absorb excess stormwater.

3.2.9 Two of the ten T2050 cohorts analysed integrated NbS in their projects (see Appendix 8).

- Vivre en Ville cohort provided a workshop on green infrastructure and stormwater management to six municipalities in Québec (Villes de Candiac, Plessisville, Nicolet, Victoriaville, Longeuil, and Québec).

- The Newfoundland and Labrador Environmental Industry Association adaptation plans included actions towards reviewing or updating municipal plans and development regulations to encourage tree planting and green roofs.

3.2.10 Indicators measure progress on NbS actions

- As mentioned in Briefing Note 1, the use of indicators is a proxy for the intention of a municipality to advance a plan toward implementation.
- Implementation and monitoring of plans and actions is necessary to track municipal progress toward adaptation and emissions reductions from nature-based solutions. Table 4 shows common indicators (used by three municipalities) across all MCIP programs.
- The most commonly used indicators relate to actions to increase tree canopy coverage, develop low impact development projects, and planting trees.

Table 4: Commonly used measures of NbS progress (A = adaptation plan; M = mitigation plan)

INDICATOR (# OF MUNICIPALITIES)	MUNICIPALITIES
Tree canopy coverage (%) (16)	**Plans program (11):** Region of Peel (A), Town of Halton Hills (A), District of Kitimat (M), City of Barrie (A), City of Nanaimo (A), Ville de Beloeil (A), Ville de L'Islet (A), Township of Huron-Kinloss (A), City of North Vancouver (M), City of Kawartha Lakes (M), City of Sault Ste. Marie (M) **CAPG program (3):** Town of Qualicum Beach (A), City of Peterborough (A), City of Windsor (A) **Staff Grants program (2):** Municipality of North Perth (M), Municipality of South Huron (A)
Number of low impact development (LID) projects (#) (12)	**Plans program (6):** Region of Peel (A), Town of Halton Hills (A), Region of Waterloo (A), City of Barrie (A), Township of Huron-Kinloss (A), City of Kawartha Lakes (M) **CAPG program (1):** City of Peterborough (A) **Staff Grants program (5):** Municipality of South Huron (A), Town of Essex (A), Municipality of North Perth (M), Town of Lincoln (A), Town of Pelham (A)
Number of trees planted (#) (12)	**Plans program (5):** City of Beaconsfield (A), Region of Peel (A), Town of Halton Hills (A), City of Barrie (A), Ville de Saint-Jean-sur-Richelieu (A) **CAPG program (2):** Town of Conception Bay South (A), City of Peterborough (A) **Staff Grants program (4):** Town of Orangeville (A), City of St. Catharine's (A), Town of Pelham (A), City of Sault Ste. Marie (M), Ville de Joliette (A)
Percentage of green infrastructure or natural assets included in asset management plan or in the municipality (%) (5)	**Staff Grants program (4):** Town of Pelham (A), Town of Orangeville (A), City of St, Catharine's (A), Town of Lincoln (A) **program (1):** City of Peterborough (A)
Number of green roofs (#) (4)	**Plans program (2):** Region of Peel (A), City of Barrie (A) **Staff Grants program (2):** Town of Okotoks (M), City of St. Catharine's (A)
Budget or funds allocated to green infrastructure ($) (4)	**Staff Grants program:** Town of Pelham (A), Town of Orangeville (A), City of St, Catharine's (A), Municipality of South Huron (A)
Number or percentage of restored or renaturalized areas projects (# or %) (4)	**Plans program (1):** City of Nanaimo **Staff Grants program (2):** Town of Orangeville (A), Town of Okotoks (M) **CAPG program (1):** City of Peterborough (A)
Number of native plant species (#) (3)	**Staff Grants program:** Municipality of North Perth (M), Town of Lincoln (A), Town of Orangeville (A)

3.3 Equity considerations are fundamental to assess the disproportionate impacts of climate change, prioritize risks, and ensure the equitable distribution of benefits of climate strategies.

Assessing the disproportionate risks to more vulnerable residents and populations within communities is critical to help prioritize risks and discern who is benefitting from adaptation and mitigation solutions. Further, involving people from underserved populations and/or high-risk areas helps ensure that equitable solutions-building meets the needs of the most impacted and those with the least capacity to adapt.

Promoting equity in data collection, engagement, and methods, and in solutions seeking includes compiling and reporting vulnerability and equity data, nurturing relationships with equity-seeking groups in the community to inform action, and explicitly attending to historical power and inequities in project and program design. This can avoid further contributions to inequity in process while advancing equitable relations and actions that improve adaptive capacity and resilience for all community members.

3.3.1 Evaluate existing vulnerabilities and climate risks for different populations.

- Vulnerable populations such as elderly, low-income, marginalized, and Indigenous residents, as well as those with limited access to power, already face disproportionate risks under current and projected climate changes. For instance, those without appropriate housing will be disproportionately impacted by extreme weather and smoke from wildfires compared to those with appropriate housing.
- The Cities of Vancouver (BC) and Toronto (ON) applied an equity lens in their climate planning processes. Vancouver's Climate Risk Plan for Vulnerable Populations identifies priority climate-change concerns for specific populations, such as seniors, Indigenous people, and marginally housed or homeless individuals of the Downtown Eastside. The City of Toronto Resilience Plan uses an equity lens to help staff identify existing community vulnerabilities and barriers to adaptive capacity, and to weave equity across all climate action considerations.
- The Regional District of Central Kootenay's Regional Energy Efficiency Program (REEP) includes a public campaign to support energy efficient home retrofits and new residential home construction which focuses on low-income residents, who often live in energy inefficient housing. The utilities Energy Conservation Assistance Program (ECAP) was developed, particularly for low-income residents, to address energy costs and insecurity and significantly upgrade living conditions, while also performing retrofits to reduce community emissions. The Seniors Energy Efficiency Program was also established as a pilot for Nelson Hydro customers and found to be very successful.

3.3.2 Evaluate proposed adaptation and mitigation actions using an equity lens.

- Strengthening overall community resilience to climate changes and identifying climate action as a tool to advance equity is the basis of the District of Saanich Climate Plan (BC). Procedural, distributional, structural, and transgenerational equity guided the development of the integrated plan, aiming to improve resilience of already-vulnerable residents, and to equitably share the benefits of climate actions.
- The District of North Vancouver (BC) hired a consultant to perform a population assessment identifying vulnerable people, groups, and communities in the district with the goal of ensuring identified mitigation actions do not disproportionately impact vulnerable populations. For example, ensuring that

residents of all incomes can benefit from emissions-reductions strategies, for instance applying non-market housing requirements in walkable, mixed-use neighbourhoods. Equity, health, and sustainability lenses were applied to anticipate and troubleshoot any unintended and/or inequitable outcomes of climate mitigation actions.

- In the City of Windsor Active Transportation Plan (ON), equity was one of the five strategies under the 'Quality of Life' theme, ensuring that mobility actions to reduce transportation emissions are also accessible and equitable for all community members regardless of individual circumstances or geographic location within the city.

3.3.3 Include Indigenous reconciliation in climate plan development and implementation.

- The Town of Churchill (MB) *Climate Change Adaptation Strategy* included four actions to strengthen relationships and build toward reconciliation: 1) strengthening Indigenous self-determination in climate change decisions, policy making, and assessment processes, 2) supporting regional Indigenous climate change and stewardship strategies, 3) promoting Indigenous-driven climate change research and monitoring while also attributing credit, and 4) ensuring climate information is available to all indigenous stakeholders to inform evidence-based decision-making. These actions, when implemented, are likely to serve as best practice to be emulated for advancing equitable climate action with Canada's Indigenous governments and communities.

3.3.4 Indicators measure progress on equity actions.

- Few indicators measuring equity in actions were found. Municipalities typically incorporated equity considerations into plan development processes rather than actions.

Table 5: Commonly used measures of equity progress

INDICATOR (# OF MUNICIPALITIES)	MUNICIPALITIES
Number of emergency kits distributed (#) (4)	**Adaptation plans (1):** Region of Peel **CAPG program adaptation plans (3):** City of Peterborough, Town of Portugal Cove-St. Philips, Town of Conception Bay South
Number of "check/know your neighbour" programs developed (#) (4)	**Adaptation plans (4):** Region of Peel, Region of Waterloo, Township of Huron-Kinloss, City of Vancouver

3.4 Innovative tools that track emissions build staff capacity and catalyze community support, accelerating momentum toward climate targets.

New tools that easily track emissions help to support staff capacity and promote community support, accelerating momentum toward climate targets.

- To stay on top of corporate emissions-reductions, the Township of Huron-Kinloss (ON) applied a corporate tracking template to tabulate and record GHG emissions data monthly for all municipal owned facilities, assets, and operation.
- The District of Saanich (BC) developed a carbon calculator in 2019 and implemented it as part of their climate plan release, to engage residents in measuring and understanding their influences on GHG emissions.

3.5 Cohort-based climate action planning is logical for jointly procuring expertise, expediting climate data across multiple municipalities in a region, and promoting collective learning, exchange, and solutions-building.

- **Jointly procuring expertise:** Cohort-based programs such as CAPG, CAMN and T2050 encouraged shared access to expertise, peer exchange and learning, and building capacity toward completion of plans. This model ensured quality expertise was used to help collect data: it increased capacity and optimized resources, especially in small municipalities, and, where there was a regional cohort, expedited awareness and solutions-building through peer learning and exchange.
- **Expediting climate data across multiple municipalities in a region:** The Fraser Basin Council's adaptation planning cohort included five municipalities located in northeastern BC. The Cities of Chetwynd, Dawson Creek, and Fort St John, the Town of Tumbler Ridge, and the Northern Rockies Rural Municipality are all located within the same province and geographic area; therefore, the Fraser Basin Council was able to develop one *Climate Projections Report*, using best available regional climate data, that all municipalities used in their risk and vulnerability assessments. Though tailored to the specific vulnerabilities of each community, many municipalities shared similar vulnerabilities and risks, which increased peer exchange and learning about potential adaptation actions.
- **Promoting collective learning, exchange, and solutions-building:** In the T2050 program, most municipalities found that the cohort experience was the most beneficial part of the program, due to the networking, partnerships and knowledge acquisition that resulted, as well as the savings in time and cost. The peer learning aspect of the cohort approach led to effective collaboration, networking, and unique partnerships, allowing staff to learn from each other and share their struggles.
- Though the Staff Grants program was not cohort-based, the 'Community of Practice' peer-learning extension was viewed as extremely supportive and helpful by almost all participants. This was developed to build the capacity of staff funded through the program to undertake climate action work, and to promote peer learning and exchange.

4. CONCLUSION

This briefing note identifies *six key success factors* and *five best-practice innovations* to inform future municipal frameworks and methodologies, expedite learning and innovation, and advance municipal climate action across Canada.

Leading municipalities are accelerating climate action by addressing both adaptation and mitigation planning efforts, implementing nature-based solutions, ensuring procedural and distributional equity in climate action planning, engaging proactively with the public, using tracking and monitoring tools to their full advantage, and optimizing expert-sharing, peer-learning, and collaboration opportunities.

Municipalities that are promoting systemic linkages between risks (adaptation) and emissions (mitigation) at the local level are also overcoming siloes to address cross-departmental opportunities and 'bigger win' climate action, avoiding contradictions and identifying synergies and trade-offs with other community goals.

Briefing Note 3 'Co-benefits of Climate Action: Prioritizing Climate Solutions that Multi-Task' explores the importance of identifying the co-benefits of climate action and how it can be used to advance other community sustainability goals.

5. APPENDICES

Appendix 1: Highlights of municipal best practices found across eight MCIP programs

FUNDING PROGRAM	MUNICIPALITY/ COHORT	BEST PRACTICES
Plans - Adaptation	Town of Halton Hills Climate Change Adaptation Plan	• Includes some actions that address both mitigation and adaptation • Accounts for vulnerable populations, which are more impacted by climate change related hazards. • The Plan is part of an umbrella framework for low carbon resilience, tying it into the Region's overarching climate change plans. • Uses historical climate analysis, projection of climate conditions to 2100 and assessment of historical and future climate. • Provides for identification of potential co-benefits and interconnection between goals. • Contains a comprehensive list of indicators for each goal section.
	City of Toronto Resilience Strategy	• The City of Toronto has a previously developed Equity Lens which is used to guide staff in equity analysis, and is a suggested tool to achieve plan goals and actions. • Incorporates resilience in asset management, including the use of natural assets, and development and land use planning (which can strategically guide future community development with resilience intertwined). • Has emphasized the inclusion of equity through decision making processes to address vulnerable people/populations. • In addition to action identification, the plan includes leaders/roles responsible for addressing actions.
	Cities of Beloeil, Saint-Zotique, Varennes, and Saint-Jean-sur-Richelieu Adaptation Plans (prepared by Nature-Action Québec)	• Use green infrastructure to adapt to heavy rain events and the urban heat island effect. • Include an explanation of the benefits of using green infrastructure as an adaptation strategy as well as co-benefits beyond climate.
Plans - Mitigation	District of North Vancouver Community Energy and Emissions Plan	• Adaptation and mitigation approaches are recognized in the plan as part of cohesive climate change action, where the District's mitigation plan complements its existing climate change adaptation strategy. • Eight well-being co-benefits, two of which are resilience and equity co-benefits, are applied to each emissions reduction sector, using the Happy City's Urban Happiness framework. • Best practice example of setting a GHG emissions reduction target and identifying how that fits with regional, provincial, and national goals. Illustrates transparency and accountability. • Identifies actions that are outside of the municipality's jurisdiction while still recognizing their supporting role. • Uses a great set of indicators. Primary applicable to the plan while secondary indicators are applicable for each sector area and are

		comprehensive (considers community impacts like sense of belonging, mental health, and other physical health effects).
	City of Kawartha Lakes Healthy Environment Plan	• Implementation for each action includes financing options, lead departments, and anticipated timeframe of action. • Includes adaptation and mitigation co-benefits for each action. • Includes thematic area for cross-cutting actions to improve plan effectiveness. • Includes both education actions and financing options. • Indicators associated with each action area. • Includes an opportunity map to align with internal plans and identify potential partners. • Updating plan strategy is every 4 years and the year following the last municipal election. This is a good practice to remove some of the political pressures that may sideline climate action where benefits are more long-term oriented.
	District of Saanich Climate Plan	• Goals incorporate GHG reduction, climate adaptation, and energy priorities. • Includes a comprehensive climate change overview that makes the linkages between mitigation and adaptation work and vice versa. • Introduces 'climate equity' components that were considered in the development of the plan: procedural, distributional, and structural/transgenerational. • Associates mitigation and/or adaptation impacts for each action.
CAPG	Fraser Basin Council cohort (Chetwynd, Dawson Creek, Fort St John, Tumbler Ridge, Northern Rockies Rural Municipality) Vulnerability Assessments and Regional Climate Projections Report	• One Climate Projections Report for the specific region was produced, which used best practice climate projections. It filled a knowledge gap for the communities involved, which otherwise lacked capacity to perform such an assessment due to their small size. • Being in the same local area meant that one regional climate projections report was produced and able to be used by all municipalities, saving time and resources. • A Gap Analysis for each municipality meant that the project was both tailored to the specific vulnerabilities of the municipality while using data and resources that all could use.
CAMN	City of Prince George Asset Management Strategy	• Sustainability, adaptation, and mitigation visions are interwoven within the plan's goals and objectives which is then reflected in the strategies and actions developed in the plan. • Includes monitoring, evaluation, and communication components in the asset management planning process to keep track of progress and provide transparency and accountability for the implementation of asset management. • The use and integration of natural assets outside of parks and recreation was also considered in the actions, bringing attention to the full spectrum of assets in a community.

	City of New Westminster Asset Management Strategy	• Includes a monitoring process for tracking and improving the asset management strategy. • Includes natural assets as part of their asset inventory and asset management. • Uses 'triple bottom line' for understanding trade-offs in decision making.
	District of North Vancouver Asset Management Strategy	• Integrates natural assets as part of the asset management framework in addition to the built infrastructure assets. • The plan's long-term vision includes mandates to reduce carbon emissions and adapt to climate change (Low Carbon Resilience approach).
Feasibility & Operational Studies	City of Saskatoon Natural Capital Asset Valuation Pilot	• Includes three Asset Classifications: Natural assets (e.g., Wetlands), enhanced natural assets (e.g., Parks or bioswales), and engineered assets (e.g., green roofs or permeable pavement). • Looks at four classifications of ecosystem services: Supporting, provisioning, regulating, and cultural. • Linked ecosystem services to "constituents of well-being" for the community. • Combines the vulnerability assessments for various municipal natural assets into one ranked table to allow for quick reference and prioritization. • Suggested next step actions include linking the results of this study to other existing city plans.

	City of Ajax Risk and Resilience Study	• Special attention is paid to emergency preparedness (including climate change hazards arising from extreme temperatures), natural systems (including biodiversity), and stormwater flooding and erosion.
		• Includes a strategic focus on objectives and implementation strategies centered around achievable and impactful goals with the aim of creating a climate ready Ajax.
		• Encourages
		  ○ the creation of municipal policies and programs that support the vision of a climate ready Ajax;
		  ○ the incorporation of climate change considerations into all levels of municipal and community services;
		  ○ both individual and community action;
		  ○ an action-oriented approach that builds on past success to advance current actions;
		  ○ a continuous focus on building a community that is resilient to climate hazards and can return to normal operations quickly after a climate hazard event occurs.
		• Includes provisions for measuring and monitoring progress (indicators included in action titles) as well as a timeline for iteratively updating the implementation plan every five years.

Staff Grants – Adaptation Plans	City of Nelson	• Follows Low Carbon Resilience framework, which integrates the adaptation and mitigation planning processes into one, links actions to wider community co-benefits, and includes equity considerations as part of its decision-making criteria and plan development.
	Town of Churchill	• Included actions for indigenous reconciliation, recognising that equity cannot happen without reconciliation and ensuring the restoration of

		Indigenous people's health, wellness, self-determination and sovereignty, which were eroded through historical and ongoing colonization.
	City of St. Catharines	• Identifies emissions reductions as a co-benefit of some adaptation actions. • Includes actions using nature-based solutions. • Plan aims to achieve a "green recovery" after the impact of COVID-19, which supports the flow of economic stimulus into the local economy, supports diversity and equity, creates sustainable jobs, supports mental and physical health and long-term well-being, and protect and restore the natural environment while increasing biodiversity and ecological value. • Actions are paired with a description, lead department, supporting department, current practice, anticipated start, duration, estimated resources and staff effort required, possible metrics, and a milestone progress plan.
Staff Grants – Mitigation Plans	Town of New Glasgow (Community)	• Includes adaptation and mitigation actions. • Emphasizes the business case of using co-benefits • Emphasizes the health impacts of climate change throughout plan. • Has a focus on social equity, which provides for gender and racial sensitivity training, two equity assessments for priority Town-wide transformation climate actions, engagement with equity- and reconciliation-seeking groups, and raise awareness about vulnerable populations and climate impacts and the need for collaboration, equity and a just transition.
	Municipality of North Perth	• Used the UN SDGs to guide actions in plan development by considering how each action meets an SDG. • Identifies co-benefits of actions, including those related to adaptation or resilience building

	Town of Okotoks	• Integrates adaptation and mitigation planning into one plan.
		  ○ Contains sections on "Health, Wellness and preparedness", "Water Conservation and Management" and "Ecosystems and Local Food"
		  ○ Aims for low carbon, resilient building design.
		• Each action includes a target, a timeline, and a description.
		• Each action has been selected to achieve multiple co-benefits under the One Planet Living Framework.
		• Includes an equity lens in the development of the plan and most notable in transportation actions.
		• Includes indicators with associated source document.

Capital Projects	Ville de Montréal (Bâtiment 7)	• Led a blue-green alley project which experimented with a shared governance structure between the public and private domain as well as a participatory planning approach for sustainable stormwater management. • The participatory design meant that five local organisations worked with residents of the property on which the project was being conducted. Residents were included in the design, conceptualisation and management of the project through a series of workshops. Some of the designs were

		left purposefully undesigned so that the community could spontaneously plant, design and ideate. • The designs themselves were innovative in that they made the stormwater management visible while being interesting to look at, promoting reconnection with the urban landscape. This included a walkable path, rain gardens and a boardwalk, as well as childcare services overlapping with the alley. • Integrating community organisations led to projects that are closer to the needs of the community itself.
	City of North Bay	• Used emerging microgrid technology to build the first utility-scale microgrid in Canada, the North Bay Community Energy Park. • This was the first resiliency hub in North America, combining distributed energy resources, energy storage solutions, and a cutting-edge microgrid control system. This microgrid represents the forefront of energy resiliency solutions. • The creation of a local development, implementation and support team that can now expand their knowledge and support of micro-grid integration into other Northern Ontario municipalities and utilities has been a particularly major advancement.
	Projet SAUVéR – SSé (Communauté maritime des Îles-de-la-Madeleine, Ville de Mercier, Ville de Varennes, Ville de Carleton-sur-Mer, Ville de Maniwaki, MRC de Pontiac, Municipalité de Saint-Charles-sur-Richelieu, Municipalité de Saint-Constant, and Municipalité de Saint-Siméon)	• Projet SAUVéR – SSé is a regional EV car sharing program with ten partner municipalities in Québec. • The program not only reduces emissions for municipal and community transportation, but also provides more sustainable transportation options to communities that have little or no public transit or taxi service, as well as improve and create a sense of community. • One of the goals of the project is to establish a functional basis for a green electric road in Québec.
T2050	Reep Green Solutions cohort (City of Cambridge, City of Kitchener, City of Waterloo, Region of Waterloo, Township of North Dumfries, Township of Wellesley, Township of Wilmot, Township of Woolwich)	• Leveraged community input, technical advice, and collaboration with municipal partners to guide the Region's 30-year transition to a low carbon future that that is equitable, prosperous, and resilient. • Brought together four townships into the collaborative for the first time and has benefitted them in terms of peer learning, and equity is featured as a key part of the strategy's vision and equity-seeking groups were specifically sought to inform the strategy from their perspective. • Showcases a promise of a flourishing community that sees economic and social prosperity as fundamentally connected to ecological health. • Emphasises community engagement, with 1600 community members informing the work from a variety of backgrounds, ages, sectors, job titles and education levels. • Clearly laid out, with principles and visions guiding the strategy, providing inspiration and instilling a sense of community.

		• Actions are targeted towards community, businesses and organisations as well as individuals. • Includes companion documents and toolkit resources, and the two pilot projects provide an example for the role that municipalities can play regarding innovation and GHG emissions reductions related to transportation and the existing building stock.

Appendix 2: Key uses of nature-based solutions in adaptation and mitigation planning in the Plans program

ACTIONS AND STRATEGIES	MUNICIPALITIES
Incorporate natural assets or green infrastructure in stormwater management or development projects to reduce flood risk and/or sequester carbon (22)	**Adaptation:** Nottawasaga Valley Conservation Authority, Cities of Barrie, Nanaimo, Surrey, Edmonton, Vancouver, Mississauga, Toronto, Virden, Waterloo, Cambridge, Coquitlam, Victoriaville, Town of Stony Plain, Regions of Peel and Waterloo **Mitigation:** Cities of Sudbury, Kawartha Lakes, District of Saanich, Eco-West Manitoba (Rural Municipalities of Norfolk Treherne, Wallace-Woodworth, and West Interlake)
Improve existing green infrastructure/tree canopy to reduce risk of extreme temperature and extreme weather (20)	**Adaptation:** Cities of Barrie, Cambridge, Coquitlam, Edmonton, Mississauga, Nanaimo, Toronto, Vancouver, Waterloo, Regions of Peel, Southwestern New Brunswick and Waterloo, Town of Halton Hills **Mitigation:** Cities of Kawartha Lakes and Kamloops, Districts of North Vancouver, Saanich and Summerland, Quatsino First Nation, Township of Huron-Kinloss
Encourage or require integration of LID and green infrastructure in new development projects and/or retrofits (10)	**Adaptation:** Regions of Peel and Waterloo, Cities of Barrie, Cambridge, Nottawasaga Valley Conservation Authority, Gatineau, Plessisville **Mitigation:** Township of Huron-Kinloss, Cities of Kawartha Lakes and Sudbury
Expand tree planting (10)	**Adaptation:** Cities of Nanaimo and Gatineau, Regions of Peel and Waterloo **Mitigation:** Eco-West Manitoba (Rural Municipality of Cartier), Town of Huron-Kinloss, Cities of Leduc and Thunder Bay, District of Saanich, Loyalist Township
Use and establishment of green infrastructure to reduce risk of drought (7)	**Adaptation:** Cities of Cambridge, Coquitlam, Nanaimo, Saskatoon, Vancouver **Mitigation:** City of Kawartha Lakes, Loyalist Township
Use of natural systems and nature-based systems to mitigate geologic hazards and/or coastal flooding (6)	**Adaptation:** Cities of Barrie, Campbell River, Nottawasaga Valley Conservation Authority, and Region of Waterloo, District of North Vancouver **Mitigation:** City of Kawartha Lakes
Low-impact development and green infrastructure practices/development (5)	**Adaptation:** Cities of Barrie, Cambridge, Nottawasaga Valley Conservation Authority, and Region of Waterloo **Mitigation:** City of Kawartha Lakes
Green or white roofs to reduce need for cooling in buildings (4)	**Adaptation:** Cities of Beloeil, Saint Zotique, Varennes and Plessisville
Protection or expansion of urban forest (3)	**Adaptation:** City of Waterloo **Mitigation:** City of Prince George and District of Saanich
Minimize hazardous land acquisition to prevent flood risk, sea level rise, or erosion (3)	**Adaptation:** Cities of Campbell River, Nanaimo, and Surrey

Appendix 3: Examples of nature-based solutions in five Climate Adaptation Partner Grant (CAPG) cohorts

3.1 Adaptation Plans by ICLEI Canada and Conservation Corps Newfoundland & Labrador

ACTIONS AND STRATEGIES	MUNICIPALITIES
Incorporate natural assets or green infrastructure in design and stormwater management or development projects to reduce flood risk (8)	**ICLEI:** Town of Caledon, Conception Bay South and Qualicum Beach, District of Ucluelet, Cities of Peterborough, Prince George, and Windsor **Conservation Corps NL:** City of Mount Pearl
Expand tree planting to reduce extreme temperatures and stormwater risk (7)	**ICLEI:** Towns of Caledon, Conception Bay South and Portugal Cove St Philips, Cities of Prince George, Peterborough, and Windsor **Conservation Corps NL:** City of Mount Pearl, Portugal Cove-St. Philips
Minimize hazardous land acquisition to prevent flood risk, sea level rise, or erosion (5)	**ICLEI:** Cities of Peterborough, Windsor and Prince George, District of Ucluelet, Town of Caledon
Improve existing green infrastructure/tree canopy to reduce risk of extreme temperature and extreme weather (4)	**ICLEI:** Town of Caledon and Ucluelet, Cities of Prince George and Windsor
Low-impact development and green infrastructure practices/development to address geologic and flooding hazards (5)	**ICLEI:** Cities of Peterborough and Windsor, Town of Qualicum Beach **Conservation Corps NL:** Conne River – Miawpukek First Nation, Town of Port Blandford
Create edible landscapes to increase food security (2)	**ICLEI:** Cities of Peterborough and Prince George
Plant native trees (3)	**ICLEI:** Towns of Conception Bay South and Qualicum Beach, City of Windsor
Vegetation impact around interface zones to reduce impact from large scale fire (1)	**Conservation Corps NL:** Town of Grand Falls-Windsor
Wetlands on private properties adjacent to river and tributaries (1)	**Conservation Corps NL:** City of Mount Pearl
Green infrastructure inventory and assessment (1)	**Conservation Corps NL:** City of Mount Pearl, Portugal Cove-St. Philips

3.2 Natural Asset Technical Reports by the Municipal Natural Assets Initiative & Smart Prosperity Institute

ACTIONS AND STRATEGIES	MUNICIPALITIES
Reduce flood risk using floodplain	City of Courtenay
Reduce soil erosion using catchment areas	Town of Florenceville-Bristol
Erosion control from more frequent storm events using riparian area and stream banks	City of Oshawa
Increased water storage capacity using two interconnected watersheds	Village of Riverside-Albert
Stormwater management using watershed	Town of Riverview
Erosion and sediment discharge control using natural pond at the outlet of a culvert	District of Sparwood

3.3 Green Infrastructure for Climate Adaptation by the Ontario Parks Association

ACTIONS AND STRATEGIES	MUNICIPALITIES
Site and neighbourhood-specific systems that feature living and engineered elements designed to manage stormwater and provide other benefits, such as rain gardens, green roofs, and street trees (6)	Cities of Barrie, Brampton, Guelph, London, Toronto, and Waterloo

3.4 Milieux de vie en santé (MVS) program by Nature Québec

ACTIONS AND STRATEGIES	MUNICIPALITIES
Green alleys Greening public spaces (urban oasis)	Ville de Québec
Greening parking lot	Ville de Victoriaville
Green alleys Green parking lots Urban parks	Ville de Lévis

Appendix 4: Key areas where municipalities are integrating nature-based solutions into asset-management planning

ACTIONS AND STRATEGIES	MUNICIPALITIES
Use of green buildings/Infrastructure (3)	Cities of Corner Brook, New Westminster, and Yellowknife
Integration of natural assets into asset management plan and service delivery (e.g., stormwater management) (6)	Cities of Prince George, Saskatoon, Corner Brook and New Westminster, Selkirk, Districts of North Vancouver and Summerland
Development of Natural Asset plan and/or Green Infrastructure plan (3)	Cities of Prince George and Saskatoon, District of Summerland
Inclusion of natural assets in principles, goals, or objectives for asset management plan (3)	Cities of New Westminster and Yellowknife, District of North Vancouver
Updates to existing design standards or development regulations to include natural assets (2)	Cities of Prince George and Corner Brook

Appendix 5: Key areas where nature-based solutions are explored through Operational and/or Feasibility Studies

ACTIONS AND STRATEGIES	MUNICIPALITIES
Stormwater management (3)	City of Brandon, City of Montreal (Borough of Ville Marie), Athabaska (Victoriaville and Princeville)
Natural asset capital valuation (2)	Credit Valley Conservation (Region of Peel), City of Saskatoon
Stream daylighting (1)	City of Montreal (CEUM)
Urban forestry management (2)	Conseil Régional de l'Environnement et du Développement Durable de l'Outaouais (CREDDO), Town of Collingwood
Eco roof guide (1)	City of Edmonton
Marsh renewal project (1)	City of Winnipeg
Aquifer recharge (1)	Ville de Lévis
Preservation of wetlands (1)	MRC de La Côte-de-Beaupré

Appendix 6: Key uses of nature-based solutions in adaptation and mitigation planning from the Staff Grants program

ACTIONS AND STRATEGIES	MUNICIPALITY
Tree planting/canopy target (14)	**Adaptation:** County of Norfolk, Town of Pelham, Municipality of Clarington, City of St. Catharines, Town of Essex, City of Owen Sound, Rural Municipality of East St Paul, Municipality of South Huron **Mitigation:** Dufferin County, Town of Falher, Town of Okotoks, Town of Yarmouth, Municipality of North Perth, City of Sault Ste Marie
Habitat/ecological area restoration and creation/protection of ecological networks (11)	**Adaptation:** County of Norfolk, Orangeville, City of Nelson, Town of Essex, Ville de Mont Tremblant, Ville de Joliette **Mitigation:** Dufferin County, Town of Falher, Wellington, Town of Okotoks, City of Sault Ste Marie
Explore incorporating green infrastructure into asset management plan (9)	**Adaptation:** County of Huron, County of Norfolk, Town of Pelham, Town of Orangeville, Municipality of Clarington, City of Nelson, Municipality of South Huron **Mitigation:** Town of New Glasgow, Dufferin County
Protect and conserve water resources or wetlands (9)	**Adaptation:** District Municipality of Muskoka, County of Norfolk, Town of Orangeville, City of St. Catharines, MRC des Sources **Mitigation:** Dufferin County, City of Brantford, Town of Okotoks, District of Kitimat
Low impact development/permeable pavements (9)	**Adaptation:** Town of Lincoln, County of Norfolk, Town of Pelham, City of St. Catharines, Town of Essex, Ville de Joliette **Mitigation:** Dufferin County, City of Brantford, Municipality of North Perth
Increase or conserve green spaces (8)	**Adaptation:** Town of Pelham, Municipality of Clarington, Town of Essex, Ville de Joliette **Mitigation:** Dufferin County, Town of Okotoks, District of Kitimat, Municipality of North Perth
NbS for stormwater management (7)	**Adaptation:** District Municipality of Muskoka, Town of Orangeville, City of St. Catharines, Brazeau County, Town of Churchill, Ville de Joliette **Mitigation:** Municipality of North Perth
Urban forest and/or biodiversity plan (7)	**Adaptation:** City of Nelson, St. Catharines, Town of Churchill, MRC des Sources, Municipality of South Huron **Mitigation:** Dufferin County, Town of Okotoks
Natural assets inventory (6)	**Adaptation:** District Municipality of Muskoka, Town of Lincoln, City of Nelson, Brazeau County **Mitigation:** Town of New Glasgow, Town of Okotoks
Tree protection (6)	**Adaptation:** City of Nelson, Town of Essex, MRC des Sources, Ville de Joliette **Mitigation:** Town of New Glasgow, Dufferin County
Expanding green infrastructure on roadsides, parking lots and/or school yards (4)	**Adaptation:** County of Huron, Ville de Mont Tremblant, Ville de Joliette **Mitigation:** Town of Okotoks

Green roofs (4)	**Adaptation:** Town of Pelham, City of Nelson, MRC des Sources **Mitigation:** City of Brantford
Plant native vegetation (4)	**Adaptation:** District Municipality of Muskoka, County of Norfolk, Town of Essex, Town of Churchill
Green infrastructure in new and existing development (4)	**Adaptation**: Town of Orangeville, Municipality of Clarington **Mitigation:** County of Wellington, Town of Okotoks
Naturalization through restoration and greening (4)	**Adaptation:** Municipality of South Huron **Mitigation:** Town of New Glasgow, Town of Okotoks, Municipality of North Perth
Citizen science program to collect biodiversity data (3)	**Adaptation:** City of Nelson, Town of Churchill **Mitigation:** Town of Okotoks
Community gardens (3)	**Adaptation:** Town of Lincoln **Mitigation:** Town of Falher, Okotoks

Appendix 7: Key areas where municipalities are integrating nature-based solutions into Capital Projects

ACTIONS AND STRATEGIES	MUNICIPALITIES
Wetland features added to the facility's grounds to adapt to stormwater flooding and sea-level surge occurrences will result in the enhancement of an existing wetland, which will ultimately result in the provision of a more natural ecosystem service to the region's communities (1)	City of Saint John
Low impact development strategies for stormwater management: rain gardens, infiltration galleries, bioswales, oil/grit separators for road treatment (1)	City of Kitchener
Greening parking lots (3)	Ville de Rivière du Loup, Municipalité de Saint Charles Borromée, Ville de Laval
Greening roads (1)	Ville de Beloeil
Blue-green alleys (1)	Ville de Montréal (Bâtiment 7)

Appendix 8: Examples of nature-based solutions in two Transition 2050 (T2050) cohorts

ACTIONS AND STRATEGIES	COHORT
Workshop on green infrastructure and stormwater	Vivre en Ville
Review/update municipal plan and development regulations to ensure no preclusions to, or to encourage or require: tree planting, green roofs	Newfoundland and Labrador Environmental Industry Association Inc

BRIEFING NOTE 3

CO-BENEFITS OF CLIMATE ACTION: Prioritizing Climate Solutions That Multi-Task

1. INTRODUCTION

This briefing note is the third of a series of four, reporting on key outcomes of the funding provided by the Municipalities for Climate Innovation Program (MCIP) for municipalities across Canada. It highlights where and how co-benefits are being identified and used to build support for climate action by making linkages with social, environmental, and economic community priorities. This briefing note examines the types of linkages being made across all eight MCIP Programs: Adaptation & Mitigation Plans, Climate Adaptation Partner Grants (CAPG), Climate Asset Management Network (CAMN), Feasibility Studies, Operational Studies, Staff Grants, Capital Projects, and Transition 2050 (T2050).

"This briefing note highlights where and how co-benefits are being used to build support for climate action and what types of linkages are being made."

The co-benefits of climate action are those beneficial outcomes from adaptation and/or mitigation actions that advance other social, environmental, and economic community priorities. This briefing note outlines how:

- Linking climate adaptation and mitigation actions in one planning process streamlines municipal resources and identifies important synergies and trade-offs between climate risk and emissions.
- Linking climate action with other community goals helps to embed climate action into municipal decision-making relating to areas such as livability, biodiversity, equity, and cost savings, and can expand the range of funding opportunities.
- Decisions and actions that multi-task provide a more systemic lens from which to advance municipal resilience and sustainability over the long-term.

Understanding how co-benefits are being considered in MCIP climate plans, reports, and studies clarifies how municipalities are and can continue to link climate action to broader sustainability goals.

2. THE USE OF CO-BENEFITS IN MCIP CLIMATE ACTION PLANNING

Co-benefits are the positive social, economic, and ecosystem benefits that result from climate policies or actions aimed at reducing climate risks and/or greenhouse emissions**.** For example, reducing the number of vehicles on the road reduces emissions, but it also reduces congestion, the number of local vehicular accidents, and air pollution.

Leading municipalities are linking climate actions to co-benefits or other community goals and, in doing so, are providing a more systemic framing of the overall benefits and value of municipal climate action across departments and sectors. Put simply, identifying the co-benefits of climate action helps municipalities identify strategies that multi-task, helping them do more with limited resources.

2.1 Leading municipalities identified the co-benefits of climate action planning.

- Of the 286 plans, studies, and reports analyzed across eight MCIP programs, 29% directly linked co-benefits with climate actions or project goals.
- Nineteen percent referenced co-benefits as an important consideration but did not link them to actions.
- The co-benefits lexicon was expanded to include references to triple-bottom-line (TBL) approaches and actions, which include the social, environmental, and economic benefits of climate action.

Table 1: Number of municipal plans, reports, and studies with direct linkages to co-benefits (the most commonly identified for each funding program are highlighted in grey

CO-BENEFITS IDENTIFIED IN MCIP FUNDING PROGRAMS								
CO-BENEFITS	**PLANS**	**CAPG**	**STUDIES**	**CAMN**	**STAFF GRANTS**	**CAPITAL PROJECTS**	**T2050**	**TOTAL**
COST SAVINGS	21	2	6	2	9	16	3	**59**
HUMAN HEALTH	27	3	3	1	15	7	3	**59**
AIR QUALITY	25	3	3	0	10	4	1	**46**
JOB CREATION	17	0	2	0	11	8	3	**41**
LIVABILITY	5	3	7	3	11	9	1	**39**
GREEN SPACES & RECREATION	19	3	2	2	4	5	0	**35**
BIODIVERSITY	6	5	2	1	10	1	0	**25**
CONGESTION	13	0	0	0	5	0	0	**18**
EQUITY	5	0	2	2	4	4	0	**17**
WATER QUALITY	7	3	1	0	6	0	0	**17**
CARBON STORAGE	8	2	0	1	3	0	0	**14**
PROPERTY VALUE	2	3	3	0	2	2	0	**12**
FOOD SECURITY	3	0	2	0	4	0	0	**9**
REDUCE WASTE	1	1	0	0	2	0	2	**6**
POLLUTANT CAPTURE	3	1	1	0	0	0	0	**5**
WATER EFFICIENCY	1	0	3	1	0	0	0	**5**
CLEAN ENERGY	0	0	1	0	1	0	0	**2**

2.2 Seventeen co-benefits were identified across all program types.

- Table 1 shows types of co-benefits identified across MCIP programs.
- The top four cited co-benefits are cost savings, human health, air quality, and job creation.
- Other common co-benefits related to opportunities for climate action to advance livability, green spaces and recreation, and biodiversity, for instance.
- Table 1 highlights opportunities where climate adaptation and/or mitigation advance other community goals, identifying actions that multi-task.

3. TOP CO-BENEFITS ACROSS MCIP PROGRAMS

3.1 Cost savings is the most cited co-benefit that can be advanced by climate action.

- Cost savings is identified as a co-benefit of both adaptation and mitigation actions. For example, actions that increase resilience aim to avoid damages over time –minimizing emissions, reducing strain and costs to health care systems, air pollution and vehicular accidents. Meanwhile, improving energy and resource efficiency minimizes energy costs per hour and over time.
- Cost savings are a co-benefit of buildings that are energy efficient and resilient over time. Retrofits and/or standards that promote energy conservation, efficiency standards, and renewable energy strategies, also help building owners and occupants save energy costs over the longer term.
- Key assets such as buildings and infrastructure are susceptible to flood and heat risks, both of which are projected to increase over time. Certain actions, such as planting shade trees and increasing permeable surfaces and vegetation to minimize these climate risks, ensure that investments made now avoid flood and heat damages and costs over time, thereby increasing returns on investment.

Table 2: Adaptation and mitigation actions that are cited as supporting cost savings across MCIP programs.

CO-BENEFIT	ACTIONS	MUNICIPALITIES
COST SAVINGS	Examining advanced energy and water conservation measures to help reduce greenhouse gas emissions provide cost savings for the municipality	Town of Placentia Energy, Sustainability and Facility Renewal Project (Feasibility Study)
	Increasing energy efficiency and clean, renewable energies can provide affordable energy and stabilize energy pricing	City of Charlottetown Community Energy Plan
	Looking at land acquisition for the consideration of potential sea level rise impacts, avoids asset losses for city and homeowners over time	City of Campbell River Sea Level Rise Action Plan

3.2 Human health is a co-benefit of emissions reduction and resilience actions.

- Climate actions such as enhancing active transportation infrastructure, encouraging local food production to reduce transport emissions, and planting trees for carbon sequestration and storage have health benefits through increasing physical activity, improving access to fresher, healthier food, and reducing respiratory-related illnesses from air pollution.

- Increasing the number of and accessibility to warming/cooling centres reduces health impacts caused by extreme temperatures, enhancing emergency preparedness actions.

1.3 Air quality is a co-benefit of emissions reducing and greening actions.

- Emissions reducing actions, particularly in the buildings and transportation sectors, improve air quality in the municipality by reducing airborne concentrations of carbon dioxide and other pollutants.
- Nature-based solutions (NbS) sequester carbon while improving air and water quality through filtration of pollutants.

4. CLIMATE ACTIONS THAT MULTI-TASK IN ADAPTATION & MITIGATION PLANS

When adaptation and mitigation actions are linked to co-benefits or other community priorities, it helps municipalities do more with limited resources, expanding opportunities to embed climate actions into broader sustainability goals and priorities (as listed in Table 1).

4.1 Municipalities that directly link adaptation actions to co-benefits primarily advance areas of green space and recreation, human health, and water quality.

- Of the 41 adaptation plans analysed, 20% referenced the importance of co-benefits while 22% provided direct co-benefits linkages in the plan/project.
- The three most cited co-benefits of adaptation actions related to advancing green spaces & recreation, human health, and water quality goals. For example, increasing the amount of green space in the municipality provides areas for recreation while decreasing flood risk and the urban heat island effect.
- Protecting and enhancing vegetation helps to retain and absorb water more efficiently in soil, rather than in expanded drainage systems.

4.2 Municipalities that directly link mitigation actions to co-benefits advance air quality, human health, and cost savings.

- Of the 59 municipal mitigation plans analysed, 28% referenced the importance of co-benefits, while 30% provided direct co-benefit linkages in the plan/project.
- The three most-cited co-benefits related to air quality, human health and cost savings.
- Energy-efficiency improvements in buildings have the co-benefit of improving ambient air quality. Reducing transportation emissions by increasing public transit ridership, increasing modal share, and advancing electric vehicles also reduces air pollution, enhancing air quality and improving human health by decreasing air pollution related illnesses.
- Ensuring complete, walkable neighbourhoods encourages walking and biking, increasing human health and reducing transportation costs to consumers and municipalities.

4.3 Mitigation actions can have resilience co-benefits; adaptation actions can have emissions reduction co-benefits; and integrated climate action can have sustainability co-benefits.

- Of the 286 projects analysed, only 8% explicitly identified co-benefits between adaptation and mitigation actions (see Briefing Note 4 for which municipalities). Examples of how adaptation and mitigation co-benefits can be used to evaluate actions are provided in the right sidebar.
- Two municipalities, the City of Barrie (ON) and the Region of Peel (ON), identified adaptation actions that enhance green space and green infrastructure. Increased vegetation also minimizes the energy load needed for cooling buildings over hotter summers and during heat events, reducing energy emissions and costs.
- The Cities of Mississauga (ON) and Kawartha Lakes (ON) coordinated adaptation and mitigation planning, co-evaluating actions to prevent contradictions and prioritize more systemic solutions. This low carbon resilience approach streamlines limited resources and capacity for climate-action planning across the organization and builds the systemic thinking needed to identify climate actions that multi-task to advance community sustainability goals (for more information see ACT's *Low Carbon Resilience Decision Tool* and *Co-benefits Tool*).
- Table 3 shows the systemic thinking done by the City of Kawartha Lakes (ON) as it assessed each action's influence on both adaptation and mitigation to develop priorities.

ADAPTATION & MITIGATION AS CO-BENEFITS

- ✓ *The **City of Barrie (ON)** created a specific category to address where adaptation actions can provide mitigation co-benefits throughout the goals and actions in the plan.*
- ✓ *The **Region of Peel (ON)** emphasized both emissions reductions and adaptation in its plan, identifying a series of co-benefits categorized into financial, health, social, and environmental themes.*
- ✓ *The **Cities of Edmonton (AB)** and **Waterloo (ON),** and the **Municipality of Clarington (ON)** used emissions reductions as part of their evaluative criteria in identifying and prioritizing adaptation actions.*

Table 3: Systemic thinking about adaptation and mitigation actions in the City of Kawartha Lakes (ON)

ACTION	ADAPTATION CO-BENEFITS	MITIGATION CO-BENEFITS
Implement best practices for agricultural management systems	Reduction of water use, increasing flood and drought preparedness, reduction of runoff and erosion	Improve energy efficiency
Enhance the protection of natural assets and ecosystems	Air filtration, nutrient cycling, and climate regulation, water storage and filtration, flood protection, biodiversity.	Carbon sequestration
Increase energy reliability and security to buildings and assets that deliver critical service	Resilience increased to extreme weather impacts	Emission reduction

4.4 Biodiversity is cited as a co-benefit of NbS.

- Protecting natural assets, such as forests, wetlands, and foreshores, is a critical climate action approach to help municipalities reduce flood and heat risks, store and sequester carbon, and avoid emissions-intensive drainage and flood protection infrastructure over time.
- Nature-based solutions, when adopted with a systemic lens, can advance biodiversity goals at the local scale. Encouraging ecosystem connectivity, health, and resilience helps support community climate action and helps investments go further.
- The City of Campbell River (BC) assessed risks of sea-level rise over time and is considering purchasing high-risk coastal lands to restore the naturalized shoreline, aiming to minimize damages and costs to public and private assets over time, avoid costly sea-wall construction, protect, and restore biodiversity, and to encourage resident access.

5. CLIMATE ACTIONS THAT MULTI-TASK ACROSS OTHER MCIP PROGRAMS

Whereas the term "co-benefits" arises from climate change scholarship as beneficial outcomes from adaptation and mitigation planning, tethering climate actions with broader social, environmental, and economic or triple-bottom-line goals can help to transition communities toward sustainability.

Clearly, MCIP-funded municipalities have started thinking about the broader benefits of climate action, but more is needed to strengthen these interdependencies (see ACT's *Low Carbon Resilience Resources and Tools* for best practice in this area).

5.1 Biodiversity is the most cited co-benefit of climate action in six of fifteen CAPG cohorts.

- Five organizations leading CAPG cohorts explicitly identified the co-benefits of climate adaptation actions and projects.
- The *Ontario Parks Association's Green Infrastructure for Climate Adaptation, Nature Québec's Milieux de Vie en Santé program, Selkirk College's Knowledge Briefs on Natural Asset Management,* and the *Municipal Natural Assets Initiative Plan and Smart Prosperity Institute's Natural Asset Technical Reports* all supported and encouraged co-benefit thinking and solutions that multi-task. These cohorts emphasized natural assets and green infrastructure to reduce climate risk and promote climate-readiness, identifying benefits for biodiversity and human health.
- Ouranos Inc. produced a cost-benefit analysis tool for land use planning professionals called *PANACÉES - Plateforme pour l'ANalyse Avantages-Coûts en Érosion et Submersion* (Cost-Benefit Analysis Platform in Erosion and Submersion), to reduce the vulnerability of communities to the risk of erosion impacts and geologic events under projected climate change. Ecosystem services are included as well as the cost of adaptation measures and projected social and economic impacts.
- See Briefing Note 2 for more detailed information on co-benefits in the CAPG program.

5.2 Livability, equity, cost savings, and green space are cited as the main co-benefits of climate action in the CAMN program.

- Six out of 20 municipalities in the CAMN program identified social, environmental, and economic benefits that are advanced with adaptation or mitigation actions.
- The Cities of New Westminster (BC), Saskatoon (SK), Corner Brook (NL), Kenora (ON), Town of Halton Hills (ON), and Capital Regional District (BC) explicitly identified co-benefit linkages.

- Increased community livability and cost savings are cited co-benefits of natural assets that aim to minimize flood risks and sequester carbon in asset management.
- For example, the City of New Westminster (BC) uses a triple-bottom-line framework to rank options based on how well they rate against a chosen set of objectives. This prioritization framework helps the city identify and assess solutions that multi-task, ensuring climate-ready infrastructure and assets and other sustainability goals. The economic analysis is being extended to include future estimates of avoided costs of climate risks, such as flood, heat, and extreme weather events over time.

5.3 Livability and cost savings are cited as the main co-benefits of climate action in the Feasibility and Operational Studies program.

- More detailed climate analyses relating to emissions reductions in transportation, resilience benefits of green infrastructure solutions, and flood- threshold considerations in existing infrastructure cited livability and cost savings as co-benefits.
- For instance, the City of Saint John (NB) pursued a water study, *An Urban Blueprint for Water: Securing Our Shared Water Future in Saint John, New Brunswick,* to better understand climate vulnerabilities and risks to populations, public health and safety, ecosystems, and infrastructure.
- Actions to reduce the impact of climate hazards such as extreme weather and sea-level rise mainly related to natural-asset protection and low-impact development, with livability and cost savings cited as additional benefits.

5.4 Human health, job creation and livability are the main co-benefits of climate action identified in the adaptation and mitigation plans from the Staff Grants program.

- Enhancing natural areas and other actions to protect from flood and heat risk and other hazards are viewed as job creation opportunities.
- Adaptive buildings, walkable neighbourhoods, and accessible green space are viewed as a way to advance community livability relating to home comfort, community vibrancy and connection, aesthetic beauty and ease of living.
- Human health is also viewed as a co-benefit of both adaptation and mitigation actions relating to active transportation that encourages healthier lifestyles, protection of natural assets and green spaces increase well-being and mental health, increasing access to local, fresh produce, and cleaner air from reduced emissions.

5.5 Cost savings are the most commonly cited co-benefit in the Capital Projects program.

- Capital projects relating to building energy efficiency retrofits and alternative transportation methods such as car-sharing cite cost savings as a co-benefit.

5.6 Cost savings, human health and job creation are the most commonly cited co-benefit in the T2050 program.

- Cost savings and human health are viewed as co-benefits from sustainable transportation and energy efficiency actions/projects.
- Local contractors and building suppliers will benefit from an increase in demand for energy efficient building structures and sustainability-led technologies, leading to job creation.

6. CONCLUSION

This briefing note outlines how climate action can be used to catalyze and advance other community sustainability opportunities and goals. Developing climate actions that multi-task aligns climate action with other goals, helping to streamline limited community capacities and resources, mainstream climate action across different areas of work and mandates, expand funding opportunities, and encourage and enable more systemic climate resilience and decarbonization gains at the municipal scale.

Three key highlights from Briefing Note 3 on the co-benefits of climate action planning:

6.1 Leading municipalities are identifying and applying co-benefits in their assessments of adaptation and mitigation actions.

- Seventeen social, environmental, and economic co-benefit themes were found across the eight MCIP funding programs. Cost savings is identified as the most frequently cited co-benefit, followed by human health, air quality, and job creation.
- The inclusion of co-benefits in climate planning demonstrates how reducing risk, vulnerability, and emissions is not a discrete activity but can positively influence many other areas of municipal strategy and community planning.
- Building upon the triple-bottom-line language already being used in municipal decisions helps to cultivate the systemic thinking needed to identify the co-benefits of climate action but also to consider how climate risk and emissions relate to every municipal decision.

6.2 Thinking more systemically about co-benefits helps to embed climate risk and emissions reduction across community priorities and goals.

- Leading municipalities are coordinating adaptation and mitigation actions. This not only streamlines climate-action planning, but also increases systemic thinking, identifying critical synergies and trade-offs between risk and emissions reduction, while aiming to advance other community goals.
- Connecting climate projects, plans, and actions with co-benefits helps to cross siloes and departments, leading to greater collaboration toward beneficial outcomes, and engages disciplines and departments that typically would not make the connection between climate action and overall sustainability in infrastructure, populations, ecosystems, and economy and investment.

6.3 Identifying climate actions that multi-task helps to accelerate toward greater community resilience and sustainability.

7. APPENDIX

Appendix 1: Linkages between climate actions and the most cited co-benefits

CO-BENEFITS	ACTIONS	MUNICIPALITIES
Cost Savings	Examining advanced energy and water conservation measures to help reduce greenhouse gas emissions provide cost savings for the municipality	Town of Placentia Energy Sustainability and Facility Renewal Project (Feasibility Study)
	Increasing energy efficiency and clean, renewable energies can provide affordable energy and stabilize energy pricing	City of Charlottetown Community Energy Plan
	Looking at land acquisition for the consideration of potential sea level rise impacts, avoids asset losses for city and homeowners over time	City of Campbell River Sea Level Rise Action Plan
Human Health	Working with local partners to explore opportunities for tree planting, tree maintenance, and other strategies to improve tree coverage in urban areas, which also improves social and psychological well-being	Region of Waterloo Community Climate Adaptation Plan
	Supporting capacity-building opportunities to ensure building industry professionals are knowledgeable in construction of energy efficient buildings, which have better ventilation	City of Prince George, Climate Change Mitigation Plan
	Integrate the transportation system with land use planning to minimize the need for travel by motor vehicle, which improves health and community connections	Resort Municipality of Whistler Climate Action Big Moves Strategy
Air Quality	Communicate, synthesize and scale up ongoing City efforts to advance a system of green and blue infrastructure, to filter pollutants	City of Toronto First Resilience Strategy
	Promote and ensure the availability of safe active transportation options in the community, which also reduces emissions and other pollutants	Township of Huron-Kinloss Climate Change and Energy Plan
	Retrofit municipal facilities to increase cooling and air filtration capabilities	District of Saanich Climate Plan
Job Creation	Support sustainable diversification compatible with the tourism economy	Resort Municipality of Whistler Climate Action Big Moves Strategy
	Low impact development (LID) can act as a catalyst for the creation of green jobs in Ontario. As LID practices increase, the demand for related products, materials and skills will also increase	Region of Peel Low Impact Development & Stormwater Project (Capital Project)
	Undertake pilot projects to naturalize sections of municipal parks by replacing grass with native plants	Loyalist Township Climate Action Plan

BRIEFING NOTE 4

TRANSFORMATIVE CLIMATE ACTION IN CANADIAN MUNICIPALITIES: Monitoring Progress & Promoting Innovation

1. INTRODUCTION

This is the final briefing note in a series of four, focusing on the Municipalities for Climate Innovation Project (MCIP) Climate Resilience Reporting Framework (CRRF) and evaluation parameters used identify effective and innovative municipal climate action across Canada.

MCIP Climate Resilience Reporting provides an overview of key indicators and recommendations for future funding.

Funding is an effective way to catalyze climate action, yet it is important to evaluate and refine what constitutes effective climate action and best practice. This series of briefing notes offers insights into MCIP highlights over five years (2016-2021), pointing to key areas and innovations that are leading communities toward increasingly effective municipal climate action. This fourth and final briefing note synthesizes elements from Briefing Notes 1-3, examining areas of success across the eight MCIP programs: Adaptation & Mitigation Plans, Climate Adaptation Partner Grants (CAPG), Climate Asset Management Network (CAMN), Feasibility Studies, Operational Studies, Staff Grants, Capital Projects, and Transition 2050 (T2050).

By identifying common actions, indicators, and co-benefits in climate action planning, and procedural and/or technical innovations, MCIP can play a critical role in identifying and mobilizing best practices advancing effective municipal climate action. These features have been added to MCIP's reporting framework helping to establish baseline approaches and practices for monitoring whether and how municipalities are building resilience to projected climate changes and/or reducing emissions, while advancing other sustainability goals. Continually refining this information will only help to encourage more effective and accelerated opportunities for municipalities to meet the climate change challenge in Canada.

2. OVERVIEW OF MCIP FUNDING OUTCOMES

MCIP provided funding for 322 projects including 395 municipalities across eight program types: Adaptation and Mitigation Plans, Climate Adaptation Partner Grants (CAPG), Climate Asset Management Network (CAMN), Feasibility Studies, Operational Studies, Staff Grants, Capital Projects, and Transition 2050 (T2050).

Table 1 highlights the scale of this MCIP analysis with both deliverables and completion reports being submitted by participating municipalities. Over 2020/21, COVID-19 disrupted timelines and delayed planning and reporting timelines, but most plans, projects, and studies were completed by June 2022; therefore, this analysis presents findings from 286 projects.

It is important to note that MCIP's criteria for distributing climate innovation funds initially accounted for geographic distribution across Canada. Due to this previous criterion, we do not consider in any detail the equitable geographic distribution of the plans, studies, and reports.

Table 1: Summary of number of English and French projects per program

MCIP DELIVERABLES	TOTAL EXPECTED	NO. OF DELIVEABLES ANALYZED	NO. OF COMPLETION REPORTS ANAIYSED	PROPORTION OF DELIVERABLES ANALYZED
ADAPTATION PLANS	32 E* 10 F	32 9	30 8	97%
MITIGATION PLANS	32 E 11 F	32 (37)** 8 (13)	32 8	95%
FEASIBILITY STUDIES	36 E 25 F	35 24	36 24	97%
OPERATIONAL STUDIES	17 E 1 F	17 1	17 1	100%
CAMN	20 E 0 F	20 0	26 0	100%
CAPG	12 E 3 F	11 2	11 2	87%
CAPITAL PROJECTS	25 E 18 F	20 16	20 16	95%
STAFF GRANTS	54 E 10 F	43 6	46 7	76%
T2050	11 E 2 F	9 1	9 1	77%
TOTAL PROJECTS (322)	322 239 E 83 F	286 219 E 67 F	294 227 E 67 F	

** E = English; F = French*

*** Parentheses illustrate that three cohort-based mitigation planning used one planning process for multiple municipalities resulting in 18 additional municipal mitigation plans for analysis*

3. MCIP'S THREE-TIER REPORTING FRAMEWORK

The Climate Resilience Reporting Framework (CRRF) is one of the mechanisms used to gauge the effectiveness and impact of MCIP funding on municipal climate action. Indicators developed for this framework are intended to provide guidance on key areas for MCIP to evaluate municipal climate adaptation and mitigation action, and to encourage and accelerate progress on municipal climate action across Canada.

The framework is designed into three tiers used to determine MCIP's role in catalyzing effective municipal climate action:

- **Tier 1: Common actions** relating to data collected, actions prioritized, and co-benefits and indicators identified in municipal adaptation and mitigation plans, reports, and studies.
- **Tier 2: Key results** from *process changes* (relating to changes in municipal governance, policy, collaborative arrangements, etc. from the development of the plans, reports, and studies) and/or *performance-based changes* (relating to changes to municipal climate resilience and/or emissions from the implementation of the plans, reports, and studies).

- **Tier 3: Overall impacts** of MCIP funding for municipal resilience-building and emissions reductions in Canada.

Within each tier, indicators are divided into primary and supplemental indicators for evaluation. 'Primary indicators' provide a broad understanding of how municipalities are acting on climate change and measuring progress; 'supplemental indicators' provide additional detail on tracking and monitoring opportunities.

See Table 2 for a brief snapshot of the updated CRRF and relevant areas and indicators to be used to evaluate MCIP's influence on climate actions, results, and overall impacts on climate change in municipalities, based on the analysis of all eight MCIP programs (and Table 6 in the Appendix for a larger snapshot).

Table 2: Snapshot of MCIP's updated Climate Resilience Reporting Framework for climate actions, results, and impacts in municipalities

TIERS	PRIMARY INDICATORS	SUPPLEMENTAL INDICATORS	MCIP PROGRAM TYPE
TIER 1: ACTIONS Effective adaptation and mitigation actions	Number of common actions identified	Number of common adaptation actions across seven hazard types Number of common mitigation actions across six emissions sectors	Plans, CAPG, CAMN, Studies, Capital Projects, Staff Grants, T2050
TIER 2: RESULTS Process or performance-based	Number of municipalities with approved adaptation and/or mitigation plans Number of municipalities with resilience and/or efficiency standards for new buildings	Number of municipalities with an approved integrated climate action plan Number of climate plans (adaptation, mitigation, or integrated) that include both resilience and efficiency in buildings	Completion Reports Plans, CAPG, CAMN, Staff Grants, T2050
TIER 3: IMPACTS Outcomes for municipal resilience and emissions reduction	Number of hectares of natural assets protected in municipalities across Canada Proportion of greenhouse gas emissions reduced per year (tonnes of CO2(eq)/year)	Number of municipalities that have nature-based solutions in their plans Number of municipalities with emissions reduction targets that match or exceed national targets	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050

The following three sections provide key areas for MCIP to monitor using indicators across the three tiers of the CRRF. Developing key indicators for relevant climate actions, results, and impact indicators helps to advance practical, procedural, and impactful municipal climate solutions, and acts as guidance for future opportunities to accelerate learning, action, and innovation in municipalities across Canada.

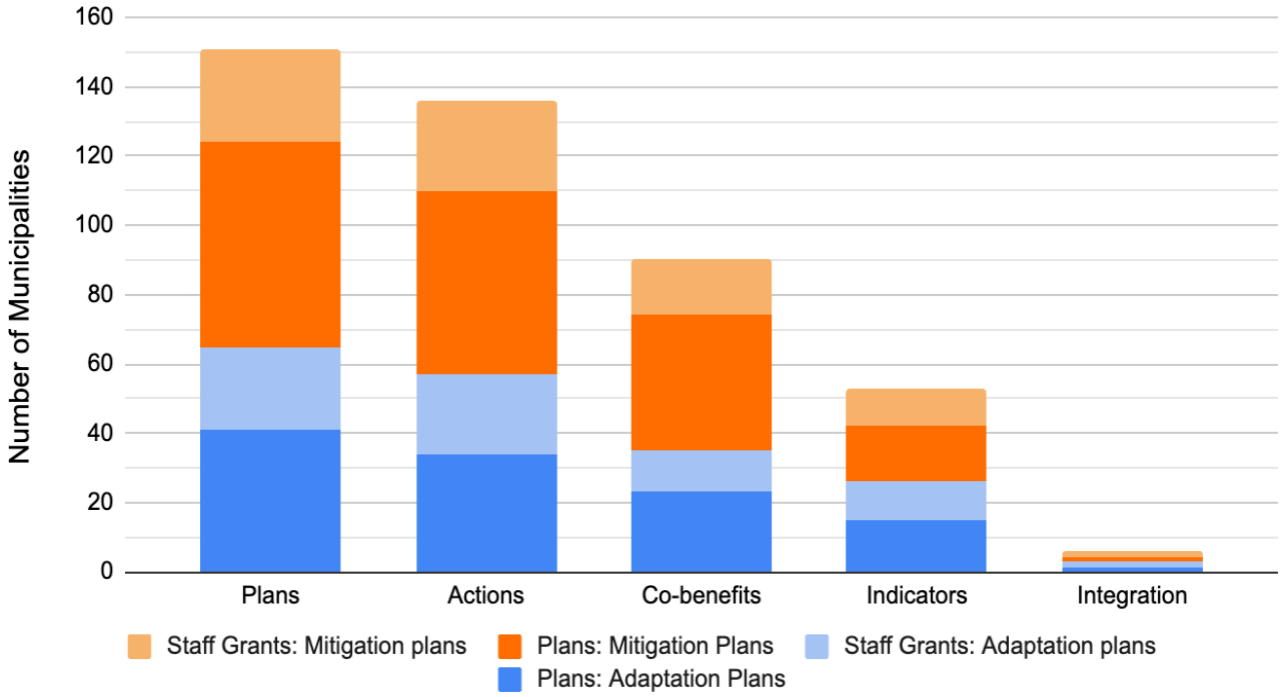
4. TIER 1: COMMON ADAPTATION & MITIGATION ACTIONS AND INDICATORS AS PRACTICAL MUNICIPAL CLIMATE SOLUTIONS

In Briefing Note 1 we explored common adaptation and mitigation actions and indicators catalyzed by MCIP funding. The focus was on common and, therefore, practical adaptation and mitigation actions being identified in municipalities to guide climate action in other municipalities.

The identification of actions, co-benefits, indicators, as well as the use of integrated planning emerged from the analysis as effective climate action planning at the municipal scale. Indicators in Tier 1 of the CRRF can be used to monitor the effectiveness of these key areas.

Figure 1 shows that the number of municipalities involved in adaptation or mitigation planning through the Plans and Staff Grants programs. Most, but not all, municipal climate plans included actions (91%), more than half included co-benefits (60%), less than half included indicators (35%), and very few integrated their adaptation and mitigation planning (4%). See more details about these key areas of analysis below.

Figure 1: Key elements of effective climate-action planning in municipal contexts



4.1 Monitoring common adaptation and mitigation actions in MCIP plans, reports, and studies provides a baseline for action that other municipalities can apply and build upon.

- One hundred and nine common adaptation actions were identified addressing seven main climate hazards (extreme temperature, flooding, extreme weather, drought, wildfires, geologic events, and sea-level rise) across the Plan and Staff Grants programs.
- Seventy-one common mitigation actions were identified across six main emissions sectors (transportation, buildings, infrastructure, waste, energy systems, and agriculture) and culture change actions across both programs.

- Understanding common actions and indicators establishes a baseline for practical, common actions for municipalities to consider and use across Canada, ideally preventing reinvention and encouraging the refinement and innovation needed to accelerate municipal climate action.

4.2 Monitoring plans, studies, and reports that identify the co-benefits of climate action, help mainstream climate data and advance adaptation and mitigation actions alongside other community goals.

- Figure 1 illustrates that more than half (60%) of the climate plans identified co-benefits, by either referencing their value or explicitly linking them to actions. More municipal mitigation plans drew linkages to co-benefits than adaptation plans.
- Plans that identify co-benefits and aim to synergize climate-adaptation and -mitigation actions with other community priorities encourage greater collaboration across disciplines, departments, and conventional silos. Identifying climate actions that multi-task can help build cross-departmental support and develop the shared accountability for implementation.
- Identifying co-benefits extends the reach of climate data and action across other areas of municipal decision-making.

1.3 Monitoring the use and application of adaptation and mitigation indicators helps to develop priorities to measure, demonstrating momentum toward implementation.

- The results of climate plans for overall municipal resilience and emissions reduction targets requires that actions be implemented and monitored. Indicators encourage thinking about implementation and ways to measure progress and are therefore viewed as a proxy for a municipality's intent to move toward implementation.
- Fewer than half the plans (35%) included indicators for measuring progress on actions. This could be because implementation planning is typically viewed as a separate planning process, requiring additional resources.
- The most effective climate action planning included key aspects of implementation in their climate action plans, including roles and responsibilities, budget/funding opportunities, indicators, and timelines. This was viewed as best practice for rapidly mobilizing climate action into municipal decision-making and budgets.

4.4 Monitoring plans that coordinate and/or streamline adaptation and mitigation actions help prevent climate action contradictions, and identify key interdependencies, synergies, and trade-offs between climate risks, emissions, and other community goals.

- Figure 1 shows that only six municipal plans (4%) integrated their adaptation and mitigation planning. This prevents contradictory decision-making, for instance by minimizing adaptation actions that contribute to emissions over the short and long terms (e.g., air conditioning as a response to heat events), or energy efficiency and emissions reduction actions that may not be resilient over the long-term (e.g., efficient buildings developed in a high-risk floodplain).
- The six municipalities - Cities of Nelson (BC), Mississauga (ON), Kawartha Lakes (ON), Towns of Orangeville (ON) and Okotoks (AB), and the County of Dufferin (ON) - stand out for exploring integrated and streamlined adaptation and mitigation planning by co-evaluating and prioritizing both risk and

emissions data in one, rather than two, planning processes. This approach furthered MCIP resources, building one cross-departmental team to co-evaluate risk and emissions data and prioritize actions that multi-task.

- Table 3 highlights 24 municipalities that aim to understand these interdependencies and are taking initial steps to identify the synergies and trade-offs between adaptation and mitigation actions, thereby increasing the effectiveness and longevity of their climate actions over time.
- Adaptation and mitigation both aim to minimize the impacts of climate change over time and can either be contradictory or mutually reinforcing. It is critical best practice to consider more systemic planning approaches. For more information on integrated planning, see ACT's *Low Carbon Resilience Planning Handbook* and other resources and tools.

Table 3: Municipalities that identified adaptation co-benefits in mitigation plans, mitigation co-benefits in adaptation plans; or pursued integrated, low carbon resilience plans

PROGRAM	MUNICIPALITIES THAT INCLUDE ADAPTATION AND MITIGATION AS CO-BENEFITS
PLANS (12)	**Adaptation:** City of Mississauga*, City of Waterloo**, City of Edmonton**, Region of Peel, City of Barrie **Mitigation:** City of Kawartha Lakes, District of Saanich, District of North Vancouver, City of Saskatoon, District of Summerland**,** Corporation of Loyalist Township, City of Kamloops
CAPG (2 COHORTS)	Ontario Parks Association (Green Infrastructure for Climate Adaptation) ICLEI Canada (Town of Caledon Adaptation Plan)
STAFF GRANTS (9)	**Adaptation:** City of Nelson, Town of Orangeville, Municipality of Clarington**, City of St. Catharines, County of Huron **Mitigation:** County of Dufferin, Town of Okotoks, Municipality of North Perth, Town of Wolfville
T2050 (1)	West Kootenay EcoSociety (Renewable Energy Plan)

* Underlined municipalities pursued integrated, low carbon resilience plans.

** These municipalities included adaptation and/or mitigation co-benefits as part of their plans' action prioritization matrix or evaluation criteria

5. TIER 2: MONITORING KEY PROCESS-BASED CHANGES AND/OR PERFORMANCE-BASED RESULTS

The emphasis of Tier 2 is on monitoring process-based changes that occur due to the integration and/or implementation of climate action in planning and decision processes and/or performance-based results from climate change-oriented decisions. Monitoring these results can help MCIP better understand where the opportunities are to leverage adaptation and mitigation progress and/or key areas to iteratively revise to advance climate innovation over time.

- *Process-based changes* result from the planning processes used to develop climate action plans or to integrate climate action in other decision processes. Key success factors include changes in municipal

governance, policy, innovative collaborative and/or governance arrangements, staff, stakeholder, and public engagement, etc.

- *Performance-based* results are those changes in climate vulnerability and risk, emissions, and co-benefits and/or trade-offs that stem from the implementation of climate plans, studies, and reports. Monitoring includes changes to overall municipal climate resilience and/or emissions.

The following key areas emerged from the analysis and can be leveraged to catalyze effective process-based changes and/or performance-based results in climate action planning at the municipal scale. Indicators in Tier 2 of the CRRF can be used to monitor the effectiveness of these key areas.

5.1 Increasing municipal engagement and outreach builds awareness and literacy about climate change among staff, leaders, and residents.

- Climate change communications (e.g., via website, workshops, open houses, campaigns) was important for increasing knowledge and understanding among staff, stakeholders, and residents. For instance, the Region of Peel (ON) used extensive engagement processes and techniques targeting climate- change communications to a range of stakeholders. This was reported as crucial for developing shared ownership and responsibility for implementing climate actions.

5.2 Increasing inter-departmental and cross-sector collaboration builds coherent learning opportunities, accessing shared climate data, co-identifying and prioritizing actions, helping to promote shared responsibility for implementation.

- Initiating cross-departmental and cross-sector teams to develop action plans is critical to overcome disciplinary silos, and build the shared accountability for implementation across the organization.
- Cited benefits include increasing staff climate literacy, awareness, and understanding of climate change risks and sources of emissions for their municipalities. For instance, the City of Montreal (QC) initiated a cross-departmental and cross-sectoral team that contributed to the effective development and transition toward implementation of a micro-mobility study.

5.3 Increasing adaptation plans that apply multi-hazard assessments across relevant hazard areas and perform vulnerability and risk assessment across infrastructure, population, and eco-/agri-systems, helps advance opportunities for community resilience.

- Municipal risk and vulnerability assessments need to comprehensively consider climate impacts across the seven hazard types and the potential sudden and cumulative impacts, and/or cascading impacts between two or more hazards (e.g., extreme heat, drought, wildfire, flood). Engaging emergency preparedness and disaster management departments is imperative.
- To advance municipal and community resilience requires avoiding climate damage and/or being able to rebound quickly after climate-related events. Developing greater resilience requires more systemic consideration of climate risks across infrastructure, populations, and eco/agri-systems over time.
- Most municipalities are focusing climate action, both adaptation and mitigation, on infrastructure retrofits and new design standards. This is crucial for avoiding damage and disruption and maintaining municipal services under a changing climate.
- It is also crucial, however, to avoid more systemic impacts relating to vulnerable populations (e.g., seniors, low income, First Nations, homeless, etc.) who will be disproportionately impacted by climate change and the impacts to eco/agri-systems on which communities and species depend.

5.4 Increasing mitigation plans that coordinate between corporate and community energy and emissions inventories identifies relevant cross-sector partnerships and bigger mitigation wins.

- Co-assessing and evaluating from corporate (re: municipal) and community emissions inventories and forecasts across six key emissions sectors helps to identify more systemic reduction opportunities, brings in relevant cross-sector partners, and ensures 'bigger win' solutions that cross public and private sectors.

5.5 Increasing integrated climate action planning that streamlines climate risk and emissions data into one planning process advances co-benefits and other community priorities (i.e., low carbon resilience approaches).

- Comprehensive guiding frameworks and methodologies that integrate adaptation and mitigation goals into municipal planning and decision processes are being used to prevent contradictions, streamline limited resources, and identify more systemic synergies and actions.
- Mobilizing these innovations will be crucial for advancing effective climate action, not only for identifying actions that multi-task, but also for building collaborative planning and implementation teams that share accountability for implementation, monitoring, and reporting.

5.6 Increasing the number of municipalities involved in cohort-based programs helps jointly procure experts, share resources, build capacity, and promote peer learning.

- Three cohort-based MCIP programs - CAPG, CAMN and T2050, were effective for accelerating municipal adaptation planning and integrating climate change into asset-management planning across multiple municipalities. Table 4 highlights positive outcomes of a cohort-based approach.
- Using one service provider to support climate-action planning across multiple municipalities was particularly effective for smaller communities that may not otherwise pursue climate planning.
- Cohorts within similar geographies, regulatory environments, and time zones shared regional climate data and learned from one another, creating the possibility for accelerating regionalized climate action approaches.
- Support for implementation was viewed as a necessary next step cited by several T2050 cohorts.

Table 4: Top positive outcomes of the cohort experience for CAPG, CAMN and T2050

CAPG	CAMN
1. Development of collaboration, networking, and partnerships 2. Creation of forums and committees that otherwise would not have existed 3. Greater implementation, and policy and planning benefits 4. Knowledge acquisition, filling knowledge gaps, and greater knowledge sharing 5. Access to advice and resources	1. Networking with other Canadian municipalities and communities 2. Webinars and workshops were beneficial for learning and connecting 3. Increase in knowledge amongst staff and Council on asset management through network participation 4. Exposure to innovative tools for local governments

T2050	
Same as above with the following additions: 1. Promotion of regional alignments 2. Prevention of project duplication 3. Saving resources	

6. TIER 3: MONITORING OVERALL MUNICIPAL CLIMATE RESILIENCE AND EMISSIONS REDUCTIONS IMPACTS IN CANADA

The distribution of MCIP funds has placed climate action and innovation squarely in the foreground of 322 projects across 395 municipalities. Funds were distributed based on balanced geographic criteria across provinces and territories, and have been allocated to municipalities large and small. It is important to note that this funding was the most critical factor in mobilizing climate action across Canadian municipalities.

Tier 3 aims to identify the overall impact of climate action plans, studies, and reports across MCIP's eight funding programs. This requires tracking indicators of progress on key measures of municipal resilience-building over the short and long terms, and overall reductions in tonnes of greenhouse gases per year, helping to advance toward Canada's net-zero climate targets.

The following key areas that emerged from the analysis can catalyze effective resilience and emissions reduction impacts in climate action planning at the municipal scale. Indicators in Tier 3 of the CRRF can be used to monitor the effectiveness of these key areas.

6.1 Increasing the number of municipalities implementing adaptation and mitigation planning and solutions into various areas of municipal work is vital for mobilizing more systemic climate action and promoting innovation.

- MCIP funded 322 projects across all provinces and territories in Canada, encouraging leaders from 395 municipalities to integrate climate change into diverse decision areas. Implementation is now required to achieve resiliency and mitigation results.
- Promoting the identification of co-benefits and indicators helps move plans, studies, and reports toward implementation.

6.2 Increasing the amount of climate funding ($) available for planning and implementation is critical to accelerate effective municipal climate action.

- In general, the eight MCIP programs were successful at embedding climate action across key municipal decision areas such as asset management and operations as well as encouraging the development of climate adaptation and mitigation plans and actions.
- It was noted across all eight programs that MCIP funding encouraged greater buy-in from senior leadership, unlocking additional operational and capital budget and generating new funding opportunities, where otherwise this may not have occurred.

6.3 Increasing integrated frameworks and uptake of streamlined planning approaches is crucial to advance municipal climate solutions that multi-task and reduce municipal climate risk and emissions, while advancing other community goals.

- Integrated climate-action planning is quickly emerging as an area of opportunity to streamline resources and consider strategic interdependencies between adaptation and mitigation planning.
- More systemic thinking is required to minimize and avoid damages and costs from climate impacts over time, reduce emissions, and transition municipalities toward sustainable development.
- Low carbon resilience approaches are being advanced as ways to optimize limited resources and capacity and build more systemic thinking about climate action at the municipal scale. The City of Nelson, County of Dufferin, Town of Orangeville and Town of Okotoks applied this approach (for more information see ACT's *Low Carbon Resilience Planning Handbook*).

6.4 Increasing both the assessment and implementation of nature-based solutions is important to address municipal climate risk and emissions reduction goals, and usher in opportunities to advance biodiversity, health, livability, and cost savings.

- Nature-based solutions (NbS) protect and expand municipal natural assets such as forests, wetlands, riparian areas, and foreshores, and promote the use of green infrastructure such as bioswales, green roofs, and raingardens.
- NbS are viewed as key adaptation and mitigation strategies.
- This type of systemic strategy can be used in municipalities to support stormwater management, minimizing flood risks, and to promote neighbourhood shading and evapotranspiration to minimize heat risks. NbS also store and sequester carbon, avoids emissions-intensive and costly infrastructure expansion (e.g., drainage), avoid damages and save costs over time, while ideally advancing other community co-benefits, such as biodiversity, health, and equity.
- Identifying regional opportunities to promote healthy ecosystems and biodiversity also has the potential to provide coherent NbS management across multiple municipalities.

6.5 Increasing equity approaches and strategies is vital for effective climate-action planning.

- Promoting and tracking equity in climate-action frameworks is critical for climate-action planning.
- Equity considerations emerge in two ways. First, with the need to understand the disproportionate risks of climate change for vulnerable populations (e.g., elderly, low income, homeless). For instance, mapping vulnerable neighbourhoods (e.g., low income) and groups (e.g., elderly, First Nations), helps better understand contextual climate risks and adaptation needs, avoiding damages and deaths in communities over time, and prioritizing equitable climate resilience measures. Second, all climate actions, both adaptation and mitigation, must be prioritized based on the equitable distribution of benefits.
- Advancing equitable climate solutions advances municipalities toward the development of inclusive, resilient, and sustainable communities.

7. CONCLUSION

MCIP's 2016-2021 funding has expedited municipal climate action planning and the development of key innovations and best practices over the past five years.

- The funding provided through organizations such as the Federation of Canadian Municipalities (FCM) and their Municipalities for Climate Innovation Program (MCIP) is crucial for helping Canadian municipalities grapple with the increasingly visible and costly impacts of climate change, and the need to decarbonize quickly.

The next step is to support advancement and implementation of plans, studies, and reports and to regularly evaluate outcomes and refine and mobilize findings to accelerate municipal climate action across Canada.

- The investments made in 2016 are coming to fruition now. It is therefore an opportune time to ensure effective implementation of this work, building in funding for implementation, monitoring resilience and emissions results over time, sharing lessons learned, and scaling best approaches for other municipalities to learn from, refine, and innovate from.
- MCIP has been a significant catalyst for developing climate awareness and climate preparedness in municipalities across Canada.
- Streamlining approaches and leveraging existing actions, indicators, and co-benefits that aim to reduce climate risk and emissions, while advancing other community goals, is critical for catalyzing more systemic approaches to ensure that Canada's communities are resilient and sustainable under rapidly changing climate conditions.
- An important next step will be to provide municipalities with systemic and rigorous frameworks and methodologies to help municipal efforts go further faster.

8. APPENDIX

Appendix 1: Snapshot of the Updated Climate Resilience Reporting Framework

	PRIMARY INDICATORS	SUPPLEMENTAL INDICATORS	MCIP PROGRAM
Adaptation & Mitigation Actions (Tier 1)	Number of actions identified across risk areas and emissions sectors	Number of actions that address drought, extreme temperature, extreme weather, flooding, forest fires, geologic and sea-level rise Number of actions that address GHG reductions in agriculture, buildings, energy systems, infrastructure, waste, and transportation	Plans, CAPG, CAMN, Studies, Capital Projects, Staff Grants, T2050
	Number of mechanisms identified which could potentially fund adaptation and/or mitigation	Municipalities that invest in program development to enhance and inform about emissions saving and green practices	Plans, CAMN, Studies, Staff Grants, T2050
	Key areas where climate is integrated into development planning	Number of studies that develop resources to address climate change impacts Number of studies that develop resources to address emissions	Studies
Results (Tier 2)	Next steps that municipalities have taken to move their plan forward	Number of municipalities that have Council approval for their plan	Completion Reports
	Adaptation and/or mitigation best practice for municipalities	Number of plans that directly connect or integrate their plan, study, report to other existing strategies and documents	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
	Performance indicators used by municipalities to monitor and evaluate over time (proxy for anticipated benefits)	Number of municipalities that provide evaluative and monitoring strategies in their plans	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
Impacts (Tier 3)	Number of municipalities influenced	Number of municipalities that have developed new plans Number of municipalities that have revised GHG emissions Number of hectares of municipal land protected from climate hazards	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
	Dollar value of climate-related impacts avoided	Dollar estimates of avoided costs of damage and other benefits over short and long-terms	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
	Municipalities fostering collaboration and involvement with	Number of municipalities that have partnered with key stakeholders, or	Completion Reports

	internal staff, stakeholders, and industry leaders to produce streamlined climate change action	industry leaders to promote implementation of the plan, or to develop the plan	