

FINDING THE NEXUS

Exploring Climate Change Adaptation and Mitigation



'Tree on a penthouse' Dreamstime.com/© Afagundes

INTRODUCTION

Climate change is a growing concern around the world and its effects are already being felt in communities across Canada. As the level of government closest to residents, municipalities are well-positioned to prepare for a changing climate, and many municipalities have already begun responding to this challenge. In the past, climate change response strategies have too often focused on mitigation alone; however, adaptation is a crucial component of a comprehensive climate action plan. While mitigation is necessary to reduce the rate and magnitude of climate change, adaptation is essential to reduce the damages from climate change that cannot be avoided.¹ Together, mitigating greenhouse gas emissions and adapting to unavoidable impacts are

necessary to reduce future risks and plan for a changing climate.

This Nexus document briefly describes climate change mitigation and adaptation planning; discusses opportunities for local governments to integrate adaptation and mitigation efforts; provides examples of measures that address both; and highlights synergies between adaptation and mitigation measures, as well as potential contradictions. Mitigation and adaptation are not mutually exclusive and should be seen as a two-pronged approach to managing the short and long-term disturbances to the climate.

“Canada needs a national long-term climate change strategy — one that will allow us to mitigate and adapt to changes to cover the costs and to engage Canadians in adjusting both their attitudes and their activities.”

- Auditor General Sheila Fraser (2011)

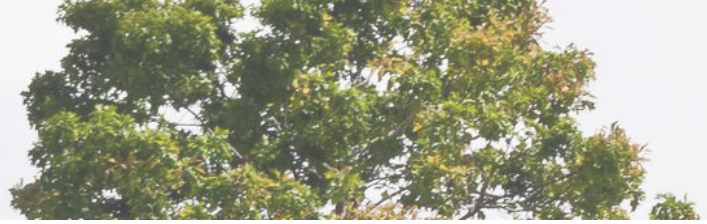
ABOUT NEXUS SERIES

The Nexus series is an ICLEI Canada publication that provides guidance and key information on how climate change adaptation can be linked to important municipal issues such as climate change mitigation, biodiversity, public health, water, planning and economic development. The nexuses will provide examples of actions that have been taken at the local level to address the multiple challenges facing local governments.

The focus of these publications is to showcase the importance of integrated action on climate change, and will help municipal staff understand how climate change adaptation is not exclusive from other key municipal issues. The series will highlight win-win scenarios by providing detailed examples of various local initiatives from within Canada and around the world.

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RESPONDING TO CLIMATE CHANGE



There are two predominant policy responses to climate change: mitigation and adaptation. Mitigation addresses the root causes of climate change, by reducing greenhouse gas emissions, while adaptation addresses the symptoms, by reducing the risks posed by the consequences of climatic changes. Both approaches are necessary and needed. Even if emissions were to be dramatically decreased in the immediate future, adaptation is still required to manage the global climatic changes that have already been set in motion.²

Many of the climate actions currently being undertaken by local governments are intended to reduce greenhouse gas emissions by lowering energy use, cutting vehicle kilometers traveled, reducing waste, and so on. These mitigation actions slow the rate of climate change by reducing the amount of new greenhouse gas emissions being added to the atmosphere. Due to the transboundary nature of climate change, the benefits of cutting emissions will be realized on a global level. While mitigation is a crucial part of climate action, it cannot be the sole focus for local governments if they want to protect and improve the long-term resilience of their community.

Canadian communities are becoming increasingly vulnerable to a range of climatic changes which are already being felt across the country. Average temperatures are rising, precipitation patterns are becoming more erratic, snow and ice cover is declining, and the frequency of natural disasters, such as storms, wildfires and floods is growing. If left unchecked, the impacts of further warming on human and environmental systems will be profound.



Important Definitions



Mitigation - The promotion of policy, regulatory and project-based measures that contribute to the stabilization or reduction of greenhouse gas concentrations in the atmosphere³.

Adaptation - Any initiatives or actions in response to actual or projected climate change impacts and which reduce the effects of climate change on built, natural and social systems⁴.

An effective response to climate change requires both mitigation and adaptation actions. The climate is changing, and while it is important to continue our mitigation efforts, it is equally important to take action to reduce the now unavoidable effects of climate change on our communities today and in the future. Adaptation planning is not meant to supplant or undermine mitigation efforts; rather, adaptation compliments local government efforts to preserve and enhance long-term sustainability.

Businesses and all levels of governments are observing changes to the climate and are developing plans to prepare for them and there are a variety of opportunities to integrate both adaptation and mitigation planning into a broader climate change response strategy. As the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report notes: "There is high confidence that neither adaptation nor mitigation alone can avoid all climate change impacts; however, they can complement each other and together can significantly reduce the risks of climate change."³

Adaptation and mitigation are not mutually exclusive.

ROLE OF LOCAL GOVERNMENTS



Responding to climate change must occur at all levels of government, including local governments. The impacts of a changing climate, such as reduced water availability and infrastructure loss, will be experienced at the local level first. Therefore, local governments have a need and a responsibility to take a leadership role in responding to these changes.

Local governments have jurisdiction over important service sectors such as land use planning, transportation infrastructure, buildings, waste management, and water services, making them well-positioned to develop policies that meet specific environmental, economic, and social goals. As municipalities work to address climate change, it is important to note the ways in which mitigation and adaptation can be integrated together into planning processes. Due to the far-reaching nature of climate change, municipal staff may also need to work across their own organizational boundaries and partner with other levels of government.

Traditional planning frameworks are based on the assumption of a constant climate and cheap energy. However, there is an urgent need to update these frameworks to include both mitigation and adaptation considerations. Strategic planning is a powerful tool to guide future action, identify implementing roles, and monitor outcomes.

There are many mechanisms available to local governments to act on these challenges (see Table below). Using these

mechanisms local governments can support and foster sustainable and resilient communities.

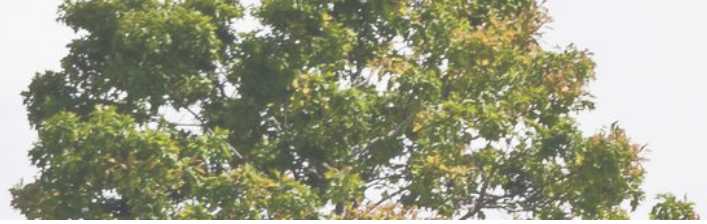
Decision-making processes will need to consider the variety of future climate impacts. Science can give some clues about what changes can be expected in the local climate, but local decision-makers still need to make policy and investment choices. The decisions that are made today regarding the built form, natural systems, and social structures will commit our communities to a certain way of life for years to come. This “lock-in” effect is an extremely important consideration as municipal staff and elected officials strive to prepare our cities, towns, and regions for the future. These choices will need to take into account the scale, rate, and complexity of the risks presented by a changing climate.

By taking the lead and responding to climate change now, local governments can use this opportunity to raise their profile, reinforce responsible policies, and create more sustainable and resilient communities. Taking action on climate change can improve the health, safety, and well-being of residents through the reduction of risk exposure and greenhouse gas emissions, while spurring economic development by creating jobs in the community, ensuring the productivity of sustainable industry, and promoting Canadian communities as desirable destinations for people from across the country and abroad.

LOCAL GOVERNMENT ACTION MECHANISMS

Land Use and Urban Planning	A key role of local government is to manage local places in a coordinated, planned way that reflects a community’s shared vision of adapting to climate change.
Licensing and Regulation	Local governments can use the local regulatory environment through assessment and approval processes, the use of surcharges and rebates, and through the enforcement of local laws, to implement and enforce climate change policies.
Facilitation, Advocacy, and Leadership	Local governments are in close contact with community organizations, businesses, residents and other stakeholders at the local level. This influence can be used to develop shared understandings and encourage whole community responses to climate change.
Community Service Delivery, Development, and Civic Engagement	Local governments are committed to preserving the safety, health and wellbeing of residents and visitors, and to ensuring active civic participation.
Workforce Development	As responsible corporate citizens, local governments can lead the way in ensuring good occupational health and safety systems including the reduction of workplace risks.

SYNERGIES AND TRADE-OFFS

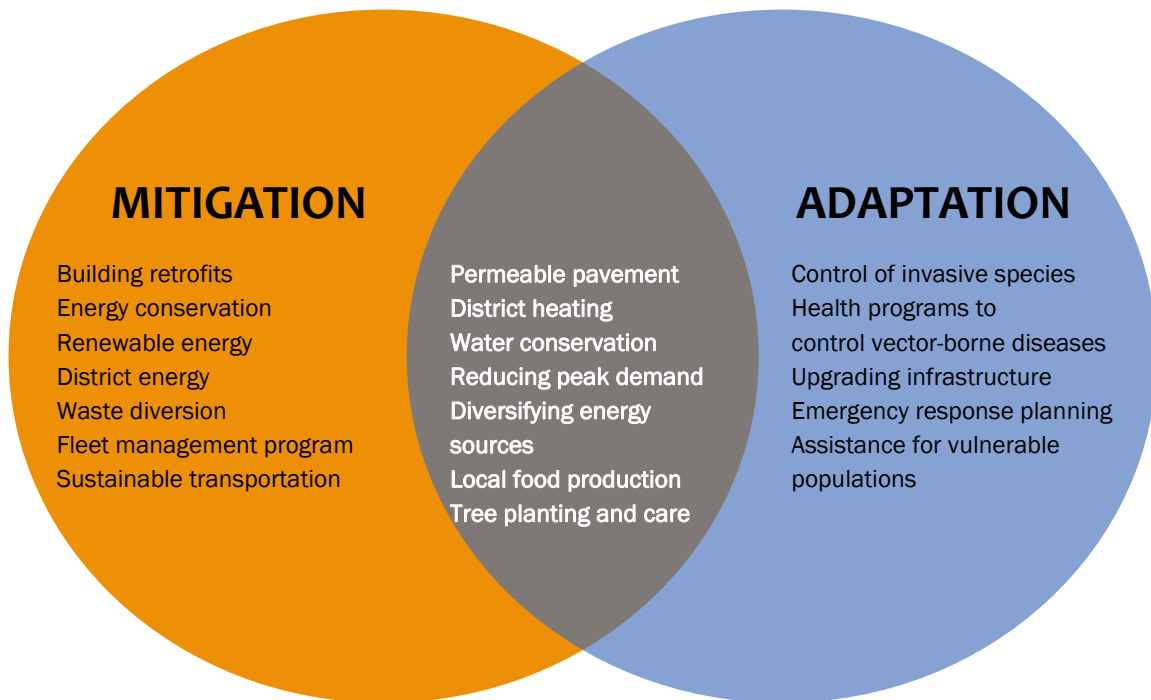


SYNERGIES

There are more synergies with mitigation and adaptation than there are significant differences (see Table of p. 5). Actions that aim to mitigate climate change often have adaptation benefits and vice versa. Such actions can work synergistically to reduce vulnerability to climate risks and greenhouse gas emissions. A comprehensive climate action plan should have a balance of mitigation and adaptation actions as they are complimentary and targeting strategies that accomplish both will reap the greatest long-term benefits.

“The change we need to make with the environment and the climate has to be led by the cities now.”

- City of Vancouver Mayor Gregor Robertson (2011)



This diagram provides examples of mitigation and adaptation initiatives and demonstrates how taking certain actions can both contribute to the reduction of emissions (mitigation) and the preparation for climate changes (adaptation).

TRADE-OFFS

Despite the many synergies, mitigation and adaptation measures can conflict with one another (i.e. using air conditioning to protect against extreme heat also increases GHG emissions). If considered in isolation, mitigation measures can increase local vulnerability to climate impacts; likewise, adaptation measures can increase local greenhouse gas emissions. There are several factors that may lead to trade-offs between mitigation and adaptation efforts, including:

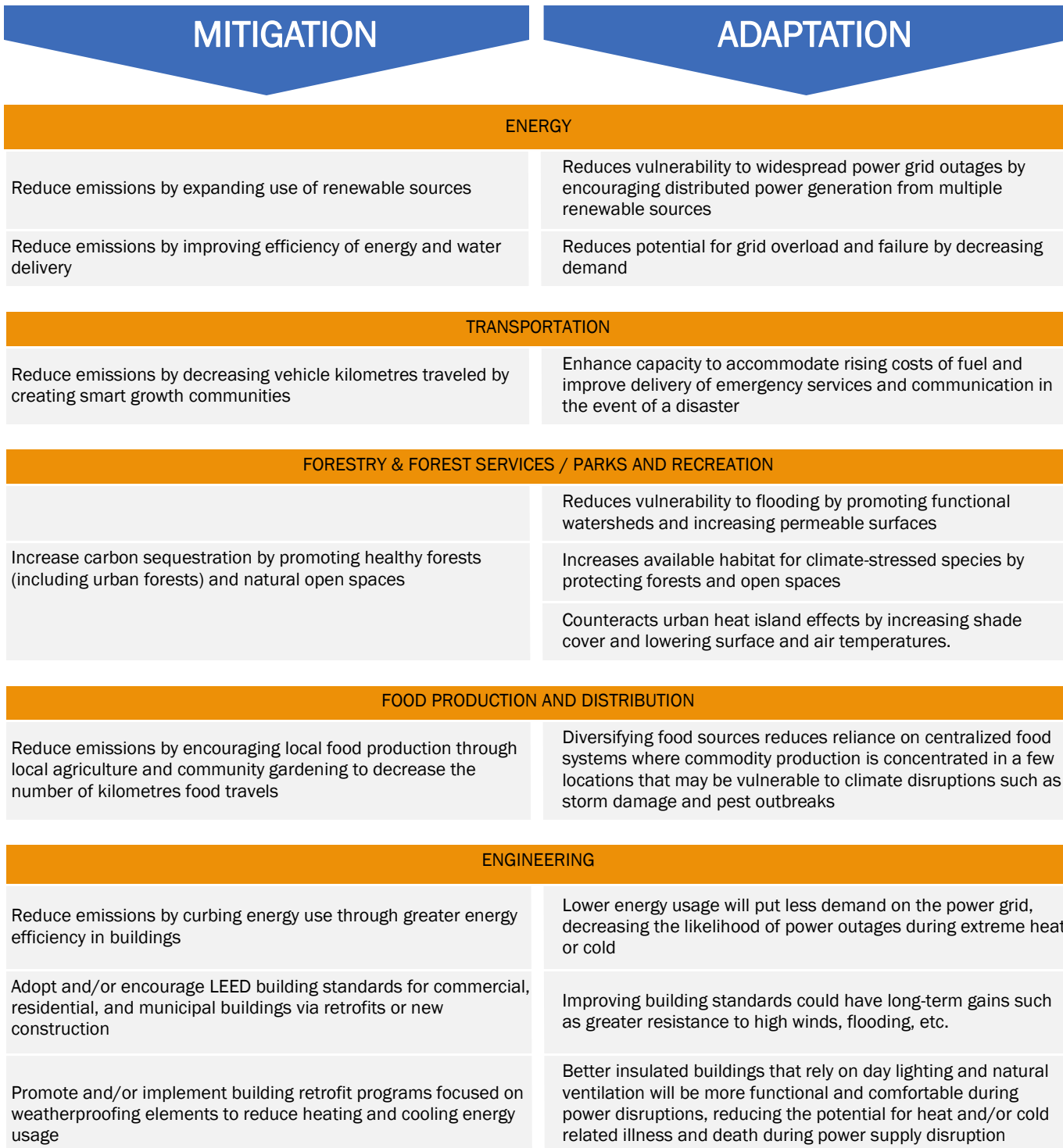
- Different cost savings associated with adaptation and mitigation – adaptation strategies lead to cost avoidance

(e.g. reduced or no damage to infrastructure from extreme weather), whereas mitigation measures are generally associated with more immediate and attributable savings (e.g. reduced energy bills); and

- Competing priorities of responses (e.g. cooling centers which combat heat exposure in vulnerable populations but which increase local energy consumption).



The following figure identifies some of the synergistic actions that work to achieve greenhouse gas reductions while simultaneously increasing a community's resilience to climate change impacts.





Below are a few possible trade-offs that may arise and which deserve consideration as local governments develop climate change response strategies:

Land use planning: Promoting compact development and increasing building density in urban areas can be an effective mitigation action as it reduces transportation emissions and is conducive to public transportation infrastructure; however, increasing density may also lead to a loss of trees, parks and permeable surfaces, which can prevent floodwater absorption and increase flood damage.

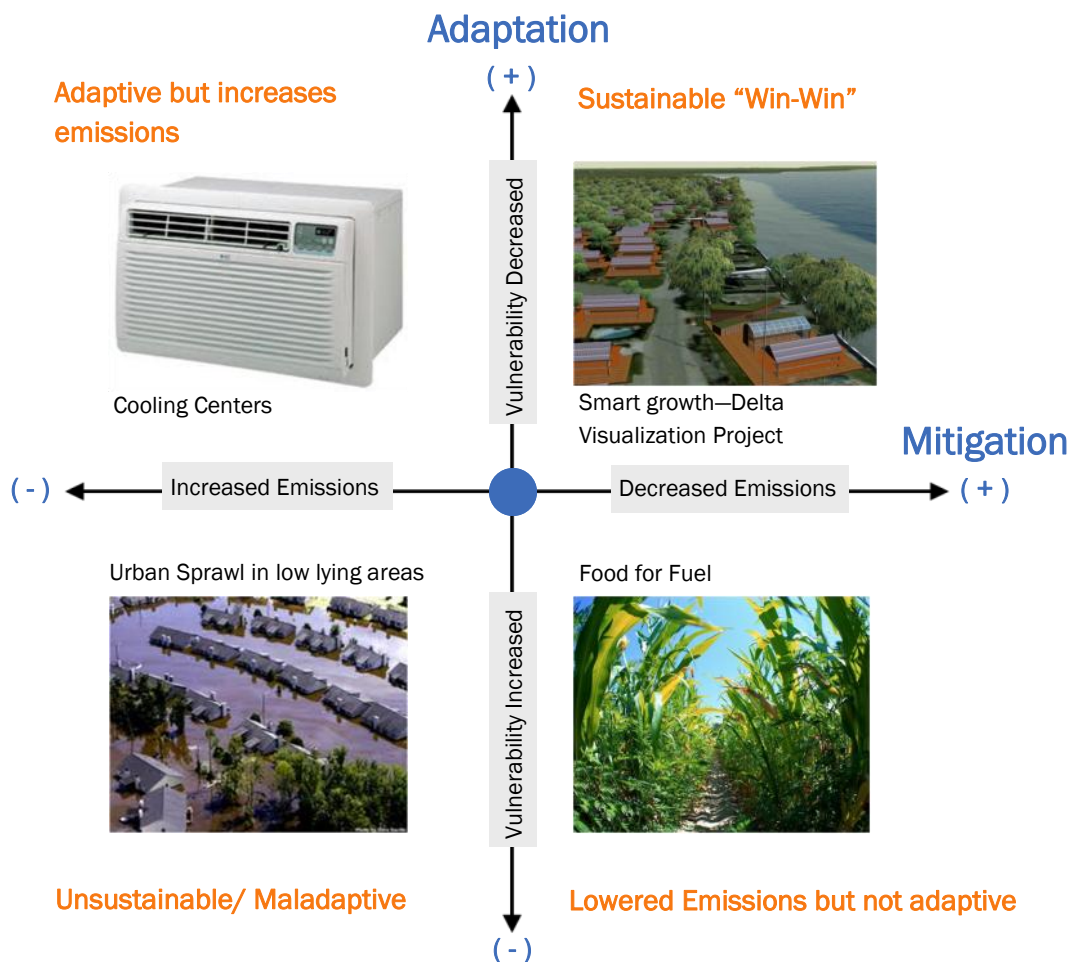
Sea level rise: As coastal communities look to adapt to more intense storm surges and sea level rise, they may increasingly rely on pumps to keep critical infrastructure (such as subways and water treatment systems) operational. While greater use of pumps is a proactive adaptation measure, with it comes increased energy use which contradicts mitigation efforts.

Water supplies: With higher temperatures and escalating demands from growing populations, communities are

increasingly required to diversify their water supply. Building up the capacity to transport water over long distances could be an effective way to adapt to this issue; however, moving large volumes of water results in increased delivery related emissions, which works against mitigation efforts.

Infrastructure: Upgrading infrastructure to cope with increased floods, via larger culverts or bridges, may be a good adaptation strategy but it requires more materials such as steel and concrete which generate greenhouse gases through their production, delivery and installation.

It is important for local governments to understand the reality of these trade-offs, the challenges that are associated with adaptation and mitigation planning and the relationship between greenhouse gas emission and reducing risk. Where possible, local governments should prioritize actions that reduce vulnerabilities and GHG emissions safely and sustainably.



This diagram illustrates some of the positive and negative linkages between adaptation and mitigation actions.

WHERE TO TURN



Adaptation and mitigation actions include a variety of technological, institutional and behavioural options. The introduction of economic and policy instruments to encourage the use of these options will enable their implementation. Furthermore, research should be conducted prior to implementation to reduce uncertainty and to enhance an option's effectiveness and efficiency.

Networks can also be a valuable tool for local governments that are encountering limited capacity and resources. Many local governments have already begun to implement climate change actions and have faced and overcome a variety of challenges along the way. There are several networks and partnerships in Canada that are bringing local governments together to collaborate and share experiences and ideas.

ICLEI ADAPTATION INITIATIVE

The ICLEI Adaptation Initiative offers municipalities from across Canada the opportunity to implement *Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation* in real-time with facilitation and technical support from ICLEI staff. ICLEI is working with municipalities to enhance the knowledge and capacity of staff and stakeholders, interpret the affects of climate change,

assess local vulnerability and risk to climate change, effectively implement adaptation strategies, and integrate adaptation planning with other key planning processes. The Initiative fosters a flexible approach that brings communities from across the country together to work through a five milestone framework to assess vulnerability and risk, implement adaptation actions, and monitor success.

PARTNERS FOR CLIMATE PROTECTION

The Partners for Climate Protection (PCP) program is a network of Canadian municipal governments that have committed to reducing greenhouse gases and acting on climate change. PCP is a partnership between the Federation of Canadian Municipalities (FCM) and the Canadian office of ICLEI - Local Governments for Sustainability.

PCP is the Canadian component of ICLEI's Cities for Climate Protection (CCP) network, which involves more than 1,000 communities worldwide. The program currently engages over 200 Canadian municipal governments. The PCP program provides technical to support Canadian municipalities as they work their way through a five milestone framework to measure energy and GHG emissions, set reduction targets, create plans, and implement mitigation measures.

CASE STUDY

Green Roof Bylaw - City of Toronto, ON

Toronto is the first North American city to have a bylaw to require and govern the construction of green roofs on new developments. Adopted by Toronto City Council in May 2009, the Green Roof Bylaw affects all new residential, institutional, commercial, and industrial building developments with over 2,000 m² of gross floor area.

There are many benefits to having green roofs in an urban setting. They reduce stormwater runoff by retaining water and delaying the timing of any runoff that does occur. Green roofs also reduce the intensity of the urban heat island effect, enhance air quality and public health by capturing airborne pollutants, provide enjoyable green spaces, improve biodiversity and create habitats for birds, bees, and other animal life. They have also been shown to decrease the energy needed to heat and cool buildings, thereby reducing emissions and energy costs.

More information: <http://www.toronto.ca/greenroofs/>



'MEC's green roof among others' Flickr/416style

CONCLUSIONS

The infrastructure of 2050 is being built today, yet the world of 2050 will be very different from today.

- Inger Anderson, Vice President of the Sustainable Development Network at the World Bank (2010)

Climate change presents a unique challenge to people and the communities in which they live. Many are feeling the impacts of climate change now, while others are worrying about the impacts to come. Despite best efforts to mitigate, historic emissions will continue to persist in the atmosphere for thousands of years and the response to this challenge will determine the future for communities in Canada and around the globe.

Fortunately, there are many actions that local governments can take to reduce the impact of climate change. Limiting the future damage to communities requires both reducing greenhouse gas emissions and preparing for climate change impacts. Adaptation and mitigation are not mutually exclusive. In fact, these complementary approaches are necessary to preserve the health, prosperity, and well-being of local governments in Canada.



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3. *Ibid*
4. Bizikova, L., Neale, T., Burton, I. (2008). Canadian Communities' Guidebook for Adaptation to Climate Change: Including an approach to generate mitigation co-benefits in the context of sustainable development. 1st ed. Environment Canada and University of British Columbia, Vancouver.

UPCOMING ISSUES:

Adaptation and Biodiversity
Adaptation and Water
Adaptation and Planning

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ICLEI - Local Governments for Sustainability is an association of local governments in Canada and worldwide. ICLEI's mission is to build and serve a worldwide movement of local governments and regional governments that are committed to achieving tangible improvements in environmental sustainability.

CONTACT US

401 Richmond Street West,
Studio 204
Toronto, Ontario M5V 3A8
www.iclei.org/canada
1-647-728-4308
iclei-canada@iclei.org

