CANADIAN INSTITUTE OF PLANNERS

MODEL STANDARD OF PRACTICE FOR CLIMATE CHANGE PLANNING

CANADIAN INSTITUTE OF PLANNERS | INSTITUT CANADIEN DES URBANISTES
Shaping our Communities Sustaining Canada's Future | Bâtir nos communautés Pour un Canada viable

Natural Resources Canada | Ressources naturelles Canada
Canada

gladki planning associates

ACKNOWLEDGEMENTS:
The Model Standard of Practice was prepared for the Canadian Institute of Planners by Andrew Davidge and John Gladki of Gladki Planning Associates. A peer review group was formed to provide comments on earlier drafts. The peer review group included Jennifer Penney (Clean Air Partnership), William Rees (University of British Columbia), Elisabeth Arnold (Sustainable Community Planning), and Paul Jordan (New Brunswick Department of Environment). Members of the CIP Task Group on Climate Change also made suggestions for the improvement of the document. The authors would like to express their gratitude to these two groups for their comments and insights. Any faults with the final document are the responsibility of the authors alone.

Mainstreaming Climate Change Tools for the Professional Planning Community is a project of the Canadian Institute of Planners, in partnership with Natural Resources Canada and the Atlantic Planners Institute.

Table of Contents

Introduction 1
Statement of Principles 2
Framework Organization 10

LAYER 1 12
The Core Issues: Mitigation and Adaptation 14
Summary of Key Elements 21

LAYER 2 23
1 Creating a Roadmap 24
2 Institutional Arrangements 44
3 Consultation, Communications and Education 31
4 Assessing Impact 21
5 Assessing Response 23
6 Implementation 45
7 Monitoring and Evaluation 45

LAYER 3 69
Resources 80

Introduction

Planners across Canada are grappling with the challenge of climate change. Surveys of CIP members indicate that while there is widespread acknowledgement of climate change as a planning issue, this awareness does not always translate into an effective or comprehensive response.

The purpose of the CIP Model Standard of Practice for Climate Change Planning ("the Standard") is to allow planners to move from recognition of the challenges of climate change – and their professional responsibility to address it – to effective action on both climate change mitigation and adaptation. The Standard includes two elements:

- A statement that establishes principles of responsible professional practice for addressing climate change.
- A framework to serve as a model to planners as they consider climate change in their professional practice.

The diversity among the planning profession is great. Planners work in many sectors (public, private and non-profit), at many scales (international, national, regional, community, project), and in many aspects of community (physical, social, cultural and economic). The CIP also recognizes that different conditions prevail in different jurisdictions, and that among communities there is great variety in the level of work already accomplished on climate change.

The Standard aims to be a resource to planners in whatever circumstances they find themselves. Therefore, the Standard presents a framework for addressing climate change that is flexible and meant to be tailored to meet local conditions. It can be drawn on at a number of levels: it can serve as a tool kit for a comprehensive approach to climate change, or the principles it presents can be drawn on in a more selective way. At the very least, even for planners working in situations where the conversation on climate change has been limited to date, the Standard will help planners start thinking about the implications of climate change for their work and serve as a gateway to further information.

The goal of the CIP is to help planners take action to address climate change mitigation and adaptation, to incorporate it into their day-to-day practice and, vitally, to get started right now.

Statement of Principles

PURPOSE

The Statement builds on the CIP Policy on Climate Change and establishes principles of responsible professional practice for addressing climate change.

PRINCIPLES

1. Climate change is real and immediate and will impact on planners' responsibility to advance the public interest through the promotion of a sustainable future and better communities.
2. Climate change presents a dual challenge, requiring a response toward two objectives:
    - There is a high degree of certainty that anthropogenic sources of greenhouse gases are causing climate change. Mitigation efforts are interventions that decrease the rate of climate change by reducing sources or enhancing sinks of greenhouse gases.
    - It is now certain that, even with effective mitigation, some degree of climate change will occur and is, in fact, already occurring. Adaptation efforts are interventions to minimize the negative impacts of climate change and take advantage of any opportunities it brings.
3. Mitigation and adaptation are different kinds of challenges, but cannot be considered in isolation from each other or from broader sustainability objectives, be they environmental, economic or social. Pursuing these objectives in a linked and coordinated manner will allow conflicts between them to be recognized and rectified, and potential synergies exploited.
4. Planning for climate change is an essential part of ethical and responsible planning practice. Planners are well suited to this challenge. Our profession has long been concerned with balancing present needs and future requirements to ensure the long term prosperity of our communities. Planning rarely occurs in circumstances of perfect information and planners are accustomed to developing adaptable and flexible responses to deal with uncertainty. For these reasons, planners must play a leadership role in enabling a climate-neutral society and preparing our communities for climate change impacts.
5. Solutions to mitigation and adaptation challenges are not the preserve of any one group or profession. The scale of the climate change challenge requires a comprehensive response and an evaluation of the full range of options. An effective response requires cooperation and coordination between different professions, between different levels of government, between jurisdictions and between the public, private and non-profit sectors. Planning is part of an interdisciplinary response that must work to make the connections necessary to achieve the best possible outcomes.
6. The impacts of climate change as well as the consequences of responses to climate change will be borne unequally by different segments of our communities. Already vulnerable groups are likely to feel these impacts most acutely. Planners must pay special attention to issues of equity and environmental justice in the formation of responses to climate change.

7. Just as in other areas of practice, public involvement in planning decisions on climate change will create a better informed and more resilient response. Planners will use public processes to inform, educate, gather information and opinions and learn from community members. In so doing it will make the public, stakeholders and political officials partners in developing climate change solutions.

8. Planners' responsibility to address climate change extends beyond our duty to the communities we directly serve to our ethical responsibilities to the global community impacted by our actions, as well as the integrity of the biosphere as a whole, its component ecosystems and species.

Framework Organization

The framework is organized into three layers:

LAYER 1 – EXPLANATION OF CORE ISSUES AND SUMMARY OF KEY ELEMENTS

Layer 1 presents a conceptualization of climate change's core issues in an effort to help planners understand their differences and similarities from the issues they already address in their day-to-day practice. A summary of Key Elements provides a snap shot of the organization of the rest of the Standard.

LAYER 2 – KEY ELEMENTS

Layer 2 expands on the Key Elements identified in Layer 1. Further detail is provided on the considerations to be addressed in advancing each Key Element. Examples of how jurisdictions have addressed Key Elements in practice are included in text boxes.

LAYER 3 – RESOURCES

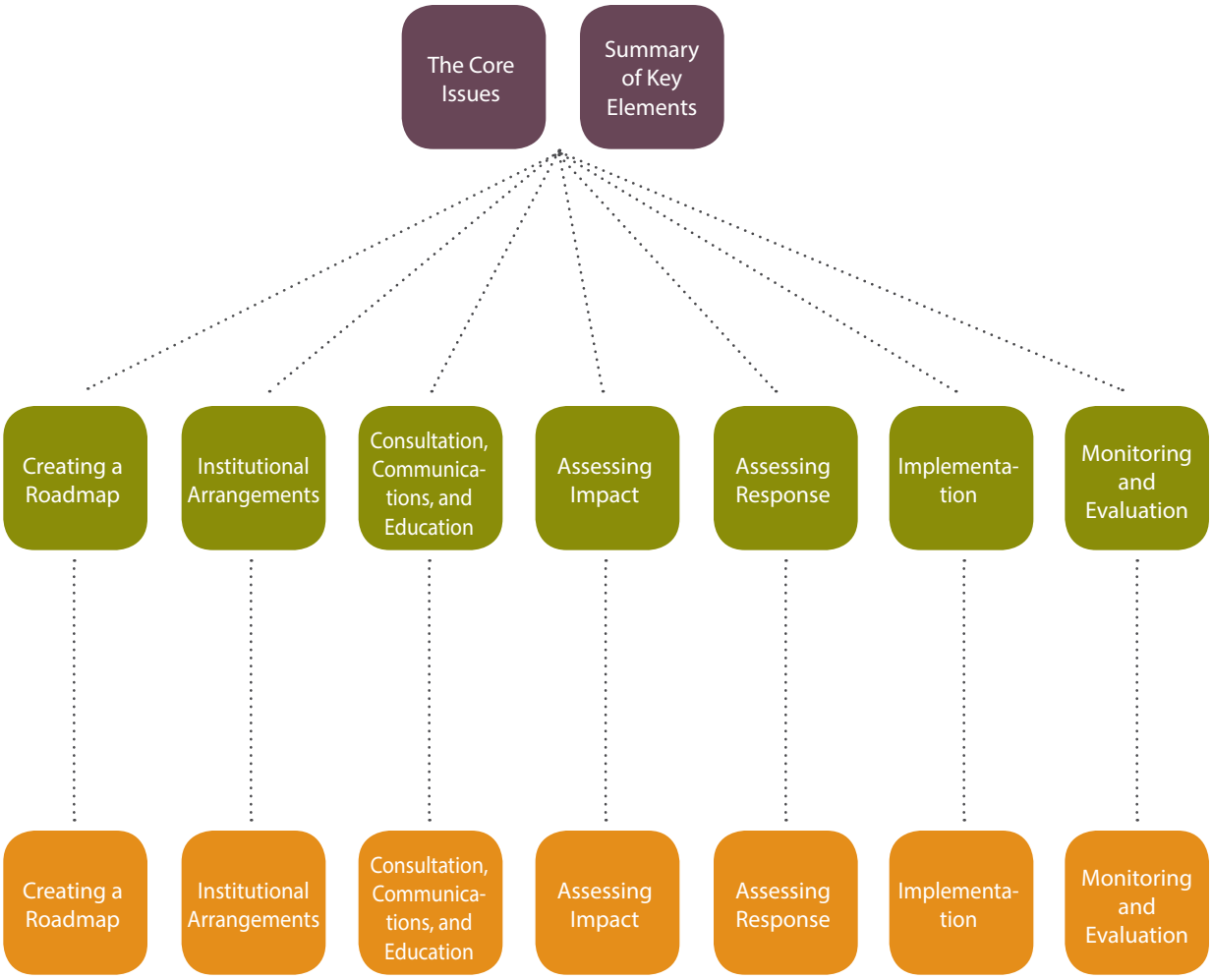
Layer 3 is an annotated list of documents and web pages that planners can draw on for further detail on the issues discussed in the Standard. They are organized by Key Element. Documents and web pages referenced elsewhere in the Standard are included here. The documents in Layer 3 range from climate change plans and strategies, to resources on effective process, to descriptions of practical implementation ideas.

Statement of Principles

LAYER 1

LAYER 2

LAYER 3



Layer 1

The Core Issues: Mitigation and Adaptation
Summary of Key Elements

The Core Issues: Mitigation and Adaptation

The Standard addresses both planning for climate change mitigation and adaptation. In many plans and strategies, they are considered separately. There is some justification for this approach, as mitigation and adaptation are different kinds of challenges in some essential ways: their objectives; the nature of the motivation to address them; and the relationship between action and impact. Despite their differences, at a practical level, strategies to address them share some similarities and responses often overlap and can impact on each other positively or negatively. Therefore they are presented in the Standard together. However, before key elements to advance climate change mitigation and adaptation are detailed, a short discussion of their differences is provided.

MITIGATION

Mitigation has been the focus of many of the efforts to address climate change to date. There is a high degree of certainty that climate change is being caused by anthropogenic activities which have increased the levels of GHGs present in the atmosphere. Mitigation actions aim to either reduce GHG emissions at source, or capture and store them where they will not contribute to climate change.

Climate change is a global problem requiring a global response. However, the specific level of intervention will range from the macro to the micro; national action is essential to establish a policy regime that achieves across-the-board reductions in GHG emissions, but many actions on the local scale will also have a cumulative positive impact.

Action on climate change mitigation requires us to acknowledge two related motivations:

- Mitigation is an example of enlightened self-interest – In short, we can only benefit by benefiting everyone: communities want to avoid the impacts of climate change; they initiate a mitigation response; the impacts of reducing local emissions or preserving carbon sinks benefit the global community; only the cumulative impacts of many similar responses will achieve the desired effect.
- Mitigation is an ethical responsibility – As well as holding promise for addressing climate change mitigation, the cumulative impacts of many local actions are also the cause of increased concentrations of GHG in the atmosphere. Our actions have had and will have a negative impact not only on our own communities, but on communities around the world. Different communities have contributed unevenly to the problem; different communities will be affected unevenly by climate change; there is no just relationship between the two. In circumstances where local actions have global impact, our actions hold the potential to negatively impact others. In a country such as Canada, with high per capita GHG emissions, this reality emphasizes our responsibilities to our fellow global citizens – and beyond, to our ethical responsibilities to the other species with which we share the biosphere and which are impacted by climate change as well.

These motivations may be strong, but they have yet to bring about climate change mitigation on a national level which would allow us to meet our international obligations. The lack of progress is in part due to the nature of the climate change challenge: the requirement for a collective response, the need for a radical departure from business-as-usual and the perceived conflict with other societal goals. Tinkering with the status quo will not create the scale of impact required. A more substantial change is necessary.

ADAPTATION

On the face of it, climate change adaptation is in some ways a more straightforward challenge for planners than mitigation:

- Whereas mitigation is motivated by enlightened self interest and ethical responsibility, adaptation is motivated by direct self interest, since the core question it addresses is, "How can we protect ourselves from new vulnerabilities?";
- Whereas mitigative actions are in part local but their impacts are only meaningful at the global scale, adaptation consists mostly of local actions that have direct local impacts;
- Whereas mitigation seems to require a departure from the status quo, the tools needed for some aspects of adaptation may already be in place and simply need to be recalibrated to meet new requirements; for example, municipalities already have systems for identifying and limiting development on flood plains and regulating storm water requirements for infrastructure.

If adapting to climate change is more straightforward than addressing mitigation in some ways, it raises larger challenges as well:

- Communities may have to face entirely new challenges for which they currently do no planning;
- The potential impacts of the most severe projections of climate change are cataclysmic (see sidebar). The magnitude of change may overwhelm traditional means of dealing with problems and, more significantly, overwhelm our capacity to adapt altogether;
- Existing infrastructure may be damaged because it was built to the specifications of a different climate reality;
- Economic disruption may result from changes to local environments, such as declining fish stocks, new invasive species such as the pine beetle, and increased extreme weather events;
- Climate change and adaptive responses may cause increased inequality as some groups are more vulnerable to their impacts than others;
- Impacts directly caused by climate change will be accompanied by a host of side effects which will increase the burden of adaptation; for example, scarce resources may lead to international conflicts.

These adaptive challenges are daunting. What links these potential complications is the core challenge of climate change adaptation: how to assess and plan for vulnerabilities, as well as any opportunities climate change brings, in the face of uncertainty.

The potential impacts of climate change are large and they are long term. Climate change is already occurring and, even with effective mitigation, will take some time to reverse. While short- and medium-term adaptation requirements are understood to some extent, long-term adaptation requirements cannot be predicted with absolute certainty because mitigation efforts today and in the future will alter the range and scale of impacts. Part of responsible planning is to project future risks and requirements and ensure our communities are prepared to meet them. Climate change makes this task even more vital, while, at the same time, more difficult to accomplish.

A summary of the differences between mitigation and adaptation is included in the table below.

SUMMARY OF FEATURES: MITIGATION AND ADAPTATION

	Mitigation	Adaptation
Motivation	Enlightened self interest Ethical responsibility	Direct self interest
Action/Impact	Action at various levels/Global impact	Local action/Local impact
Key Challenges	Challenge to the status quo	Uncertainty Adaptive Capacity

WHY PLAN FOR MITIGATION AND ADAPTATION NOW?

The reason to plan for climate change is straightforward: to limit harm. The reasons to begin right now are also clear. The decisions planners make today will have impacts far into the future: on our ability to prevent climate change and to adapt to it. The changes required are significant and will take time to accomplish; getting started now is imperative if they are to take effect when we need them.

On mitigation, the need for immediate action is particularly strong. Calls for action are at least 20 years old, yet progress to date has been inadequate. Past emissions are already causing climate change and will persist in the atmosphere for years to come. Climate change has its own momentum, meaning that once put in motion by emissions, a certain amount of climate change is inevitable. Any delay in reducing emissions to sustainable levels adds force to climate change's trajectory and increases the severity of its impacts (see text box Canadian Communities and Climate Change).

The rate at which climate change will occur is not clear. It is possible that specific effects of climate change will in turn accelerate its pace in examples of positive feedback. For example, thawing permafrost caused by rising temperatures will release significant amounts of methane, a GHG, into the atmosphere, thereby acting as an accelerant of further climate change. As the full extent of the impacts of climate change are uncertain, it would seem prudent to limit our liabilities. Effective mitigative action now will allow us to limit climate change and therefore its impacts. Economists have demonstrated that effective mitigation in the present will be cheaper and easier to achieve than adaptation later (see Stern Report in Layer 3).

In considering the urgency of adaptation, it must be recognized that, even with effective mitigation, the scientific community has confidence that some climate change will continue to occur. Again, the argument for taking action now is strong. Proactive adaptation in anticipation of climate change is likely to be cheaper than reactive adaptation once major impacts have occurred. In some cases, proactive adaptation will not represent a significant increase in required resources, only new parameters for planning. In others, costs will be higher than planning for the status quo but reduce future exposure to risk. Proactive planning for climate change may also help identify and take advantage of beneficial aspects of climate change.

Both climate change mitigation and adaptation require immediate action by planners. The remainder of the Standard serves as a framework for developing an appropriate response to these challenges.

Canadian Communities and Climate Change

WHAT KINDS OF CLIMATE CHANGES CAN CANADIAN COMMUNITIES EXPECT?

Changes in the Canadian climate will differ in variety and intensity in different parts of the country, and include:

RISING TEMPERATURES

The Canadian Coupled Climate Model shows average temperatures rising by 1-2°C by 2020, 2-4°C by 2050 and 5-10°C by 2090 in most parts of Canada, with the exception of the Arctic which is projected to face higher increases. Higher average temperatures will increase the number of extreme heat events and decrease air quality, especially in urban areas already impacted by the Urban Heat Island effect and air pollution. Permafrost conditions will be altered and further reductions will be seen in snow cover and sea ice. A changing climate will alter eco-systems, shift the range of species, allow pests and diseases such as the pine beetle to thrive and increase the potential for the spread of vector-borne diseases. Rising temperatures are also likely to lengthen the growing season and thereby benefit agriculture and forestry.

CHANGES IN PATTERNS AND LEVELS OF PRECIPITATION

Climate change is predicted to increase precipitation, although not necessarily during the growing season, and increase heavy precipitation events. Higher temperatures will be accompanied by higher rates of evapotranspiration and therefore increased aridity. Drought and wildfires will occur with greater frequency. River and lake levels will fall and water resources may be compromised.

EXTREME WEATHER EVENTS

Changing weather patterns will include more extreme weather events. Flooding and weather-related damage to communities will increase. In coastal regions, these effects will be compounded by extreme weather-related storm surges.

RISING SEA LEVELS

Parts of Atlantic Canada could see a sea level rise of 50 to 70 cm by 2100; over the same period, sea level could rise from 18 to 59 cm in British Columbia and the Western Arctic. Sea level rise will lead to coastal erosion and increased vulnerability to flooding. Rising sea levels may also result in saltwater intrusion into the water table, thereby salinating supplies of water for drinking and irrigation.

WHAT ARE THE POSSIBLE IMPACTS OF THESE CHANGES?

Impact on eco-systems – Climate change could cause profound changes to marine and terrestrial eco-systems. Some species will thrive and expand their range; others, especially those already vulnerable, such as varieties of Pacific Salmon, could further deteriorate or disappear. Resource-dependent communities – those that rely on agriculture, forestry, fishing and hunting as a primary source of their livelihood – will be particularly impacted by climate change.

Impact on infrastructure and built environment – Climate change will have dramatic impacts on infrastructure maintenance and design: roads and housing built on permafrost may be damaged; existing coastal flood defences may have to be enhanced; stormwater systems will need to be upgraded to new extreme weather specifications; and energy generation and transmission will be put under stress.

Impact on human health – Past experience indicates that extreme heat and other extreme weather events have consequences in terms of human mortality. As the frequency of these events increases so does the threat to human health. These threats will be compounded by other health risks associated with climate change: deteriorated air quality, vector- and rodent-borne diseases, and food and water contamination.

Impact on economy – Adapting to climate change will be costly and involve climate-proofing infrastructure and the built environment. It is likely that failing to prepare will be many times more costly. Previous extreme weather events have been estimated to cost communities hundreds of millions, if not billions, of dollars. The stresses climate change puts on other systems, such as the energy grid, may also have negative economic consequences. Resource dependent industries, including fishing, forestry, and agriculture, are especially vulnerable to climate change impacts. Given the truly global nature of the world economy, impacts on industries in one part of the world may cause disruptions of trade flows which will lead to economic reordering at a global scale.

Impact of a world under stress – Compared to many parts of the world, Canada has a high capacity to adapt to climate change; we live in a society characterized by high levels of technology and education which prepare us better than most to find solutions and dedicate resources to adaptation. However, even if Canada manages to limit the direct negative consequences of climate change, it is uncertain how effective we will be at insulating ourselves from climate change's consequences in less well prepared parts of the world, where climate change might bring widespread suffering, economic collapse, conflict and displacement.

For more:
From Impacts to Adaptation: Canada in a Changing Climate (2007). Natural Resources Canada.

Summary of Key Elements

The framework presented in the Standard is organized into a series of key elements, each essential in developing a well-supported approach to climate change planning. While the Standard is a model of good practice, it is also intended to be a practical tool. The key elements are well-suited to shaping a comprehensive strategy for climate change, but can also be drawn on strategically to meet specific needs.

In using the framework, it is important to keep several points in mind:

- Although presented as a linear progression, it is likely that the actual process of developing an approach to climate change will be iterative in nature and require planners to circle back to various key elements during the formation of a response.
- Climate change is not an issue that can be "solved" before moving on to other priorities. Strategies will need to be re-evaluated as new information is available and progress is assessed. Ideally, climate change will become a filter through which planners view their responsibilities and the range of choices they make everyday in their professional practice.
- The scale of the climate change response must be proportional to the scale of the problem. Attention must be paid to this fundamental calculus. The danger of ignoring it is that climate change is given superficial treatment, actions are window dressing and communities fail to meet their mitigation and adaptation obligations.

Below is a summary of the key elements of climate change planning. Together they form a framework which serves as the organizing principle for the rest of the Standard. Subsequent sections address each key element in detail and provide examples and further resources.

Key elements are:

1. CREATING A ROADMAP

A logical starting point in addressing any issue is to frame the challenge, establish broad objectives, and map out an approach to determine a response. In this, planning for climate change is not fundamentally different from planning that already goes on in communities across the country. The steps are the same: evaluating the A logical starting point in addressing any issue is to frame the challenge, establish broad objectives, and map out an approach to determine a response. In this, planning for climate change is not fundamentally different from planning that already goes on in communities across the country. The steps are the same: evaluating the present, projecting future needs, outlining a vision, establishing a course of action, implementation and evaluation.

The Standard itself can serve as a roadmap for addressing climate change issues. This element addresses strategic approaches to the climate change challenge and links to other models and resources.

2. INSTITUTIONAL ARRANGEMENTS

The planning function is a powerful tool in preparing a community response to climate change. However, at the local government level, planning is one avenue of response among many. For an approach to climate change to be most effective, it must be "joined up" and the product of significant inter-departmental and, possibly, inter-jurisdictional cooperation and coordination.

This element considers the institutional arrangements necessary to enable a response to climate change, including: mechanisms and structures to facilitate interdepartmental collaboration; the role of organizational change in more deeply incorporating climate change into

all public sector activities; and the issue of organizational leadership.

3. CONSULTATION, COMMUNICATIONS AND EDUCATION

Planning is public decision-making and, as such, public and stakeholder involvement is a critical component for a number of reasons: to access local knowledge and opinion, to inform and educate, to build consensus on possible directions and approaches, to enhance the legitimacy of the end product and create partners in implementation. Planners involve the public in much of their work. In the case of climate change, because the response may require a shift from the status quo and action on climate change may compete with other widely validated societal goals, extra effort will be required through communications and education to build popular support. This element examines examples of successful public processes focussed on climate change.

4. ASSESSING IMPACT

In planning for climate change, a core task is to use scientific and technical evaluations to assess impacts. Evaluations are needed for both mitigation and adaptation, although they differ in their requirements. In the case of mitigation, an evaluation assesses an organization's or community's impact on climate change. This is most often done through a GHG inventory which acts as a benchmark against which targets can be set for corporate or community reductions. For adaptation, an evaluation assesses climate change's impacts on our communities. An analysis of adaptation requirements entails a multi-step process: first a forecast of the range of impacts; then an assessment of vulnerabilities. Combined these assessments allow planners to carry out the principal function of adaptation planning: the analysis and management of risk. The section on this element discusses the requirements of these evaluations and possible approaches.

5. ASSESSING RESPONSE

If assessing impacts allows planners to understand the nature and scale of the climate change challenge, assessing the response is about examining, tailoring and selecting solutions. Planners work to shape their communities in the short and long term. Their response to climate change will depend on the tools at their disposal, the capacity within existing systems to change, and an analysis of the costs and benefits of overhauling existing systems or shaping new ones. This element is also one of the core tasks of planning for climate change. It is the process of selecting the best means to meet the climate change challenge and the point at which a case is made for implementation. The section on this element explores the range of responses open to planners.

6. IMPLEMENTATION

Once planning approaches are finalized they must be implemented and, where necessary, supported through allocation of resources. This element deals with the challenges of putting planning tools and approaches into action and realizing results.

7. MONITORING AND EVALUATION

Many planning tools are presumed rather than proven to effectively address specific issues. Performance measurement against identified goals should be the basis for a periodic re-evaluation of climate change objectives and approaches. Evaluation will help determine the on-the-ground results of planning approaches and identify the need for additional efforts or resources. Because of the nature of climate change, ongoing monitoring and reassessment is especially important. As forecasts become more precise and the effectiveness of initiatives is determined, climate change plans will need to be re-examined.

Layer 2

1. Creating a Roadmap
2. Institutional Arrangements
3. Consultation, Communications and Education
4. Assessing Impact
5. Assessing Response
6. Implementation
7. Monitoring and Evaluation

1. Creating a Roadmap

The purpose of creating a road map is to determine where you are, where you want to go and how to get there. The framework presented in this Standard is intended to give shape to this process. Creating a roadmap is important because it is the moment to look at the big picture, determine overall direction and root the process with clear objectives. Climate change planning is a challenging mandate, one that involves grounding decisions on environmental, social and economic matters in scientific and technical knowledge. Creating a road map will help establish the steps necessary to support informed and well-reasoned decision-making.

The road map analogy, while broadly useful, is not a perfect description of the climate change planning process. Unlike a road map, the process of developing an approach to climate change is not likely to be linear. Some elements, like Institutional Arrangements and Consultation, Communications and Education, will enter into the process at different times to serve different functions or may be involved in shaping and guiding other elements of the process. These other elements – Assessing Impact, Assessing Response, Implementation and Monitoring and Evaluation – might better be understood as a cycle or as parts of an iterative process where elements are revisited and altered based on the findings or results of later stages of the process. This applies to the Creating the Roadmap element as well; objectives and targets will be re-evaluated based on improved information, and progress to date. The road map might need to be redrawn.

The development of a comprehensive, well-researched strategy to address climate change is an essential task for every community in Canada. The framework provides guidance on how to go about that process. However, given the pressing nature of the climate change challenge, many communities have found it necessary to pair work on a comprehensive approach with the development of actions that can be initiated immediately. These "quick start" actions can begin achieving results in the near term and signal a community's commitment to climate change as a priority. The framework presented in the Standard can work at different scales; a preliminary abbreviated round through the framework elements can be used to identify immediate action items; a slower more thorough process can develop a comprehensive strategy that includes a mix of short-, medium- and long-term actions and work to improve the community's understanding and buy-in for addressing climate change.

What the quick start approach makes up for in immediacy, it lacks in in-depth analysis; what the comprehensive approach may mean in terms of a temporarily delayed response, it compensates for in breadth and well-grounded policy. These approaches, when advanced in coordination, can complement each other.

The framework presented here for developing a response to climate change shares much in common with approaches being employed with success in Canada and abroad. Examples and resources below discuss other frameworks for climate change planning that address both mitigation and adaptation.

See examples on pages 17, 18 and 19.

King County,WA

King County has been an early leader in developing a comprehensive response to climate change. The County is located on Puget Sound in Washington State and incorporates both rural and metropolitan areas, including Seattle and its surrounding suburbs. In 2005, King County hosted a conference on preparing for climate change, "The Future Ain't What It Used to Be". The conference brought together a cross-section of Washington State governments, businesses, Native American tribes, farmers, non-profits, and the community-at-large in a dialogue about climate change impacts and potential adaptations. These deliberations produced a road map for local governments as they anticipate and adapt to challenges caused by climate change. The conference addressed areas including agriculture, coastal areas, fisheries and shell-fishing, flooding, stormwater and wastewater, forestry, hydropower and water supply.

Emerging from the conference, King County created an internal team to start planning for climate change. In response to demand from conference participants for additional knowledge, resources and strategies on climate change adaptation, King County produced a guidebook that recorded their experiences. The guidebook, Preparing for Climate Change: A Guidebook for Local, Regional and State Government, outlines a step-by-step process to aid public sector organizations as they plan for climate change impacts.

Work on preparing for climate change fed into the creation of the King County 2007 Climate Change Plan. The Plan addresses both mitigation and adaptation, particularly focusing on the County's authority and influence on other layers of government concerning land use and growth management, transportation, water/environmental management, and clean energy. The Plan outlines broad goals and actions, with the acknowledgement that technical implementation plans will follow based on the direction set forward in the plan.

For more:
Preparing for Climate Change: A guidebook for local, regional and state governments (2007). King County and the Center for Science in the Earth System (The Climate Impacts Group), Joint Institute for the Study of the Atmosphere and Ocean, University of Washington, in association with ICLEI – Local Governments for Sustainability.

2007 King County Climate Plan (2007). King County.

City of Toronto

In 2007, the City of Toronto approved its Climate Change, Clean Air and Sustainable Energy Action Plan. In terms of climate change, the plan primarily addressed mitigation, while identifying the development of an adaptation plan as a key action. The Clean Air Partnership has produced a report, Climate Change Adaptation in the City of Toronto: Lessons for the Great Lakes Communities, that documents the process of producing a framework for addressing climate change adaptation in Toronto. The framework itself, called Ahead of the Storm...: Preparing Toronto for Climate Change, sets out a process for developing a comprehensive approach while also enabling immediate action. The document provides a rationale for action and describes programs and actions already underway that reduce vulnerabilities. It goes on to identify actions that can be realized in the short term, while recommending a process to systematically assess the risks of climate change to Toronto, prioritize areas of action and develop strategies to reduce the impacts and protect the city.

For more:
Change is in the Air – Climate Change, Clean Air and Sustainable Energy Action Plan: Moving from Framework to Action, Phase 1 Highlights. June 2007. City of Toronto.

Ahead of the Storm...: Preparing Toronto for Climate Change. Development of a Climate Change Adaptation Strategy, April 18, 2008. City of Toronto.

Climate Change Adaptation in the City of Toronto: Lessons for the Great Lakes Communities. December 2008. Clean Air Partnership.

Partners for Climate Change

The Partners for Climate Protection (PCP) program is a network of 200 Canadian municipal governments that have committed to reducing greenhouse gases and acting on climate change. It is coordinated by the Federation of Canadian Municipalities (FCM) in partnership with ICLEI-Local Governments for Sustainability. PCP is based on the ICLEI Cities for Climate Protection Campaign which uses a five milestone framework to guide municipalities to reduce greenhouse gas emissions. The five milestones are: 1) Creating a greenhouse gas emissions inventory and forecast; 2) Setting an emissions reductions target; 3) Developing a local action plan; 4) Implementing the local action plan or a set of activities; and 5) Monitoring progress and reporting results. These steps can be used to reduce both corporate and community emissions. The five milestone process is a performance-based model which remains flexible; milestones do not need to be completed in sequential order. The PCP web site is a source of information on approaches to climate change mitigation.

For more:
Partners for Climate Protection (PCP) Program Web Site

http://gmf.fcm.ca/Partners-for-Climate-Protection/

2. Institutional Arrangements

Climate change is a demanding issue for public sector organizations: public policy and planning approaches need to be informed by scientific and technical knowledge often not held internally; its implications cut across departmental responsibilities requiring the participation of different parts of an organization; links with other levels of government, other jurisdictions and external stakeholders are required to deal with it effectively. Most importantly, climate change can not be treated as a discrete self-contained issue that can be "solved" before moving on to other priorities; it will need to be integrated into many aspects of organizational activity in the long term. Cross-cutting issues are always a challenge for government. Special care must be paid to the institutional arrangements for addressing climate change if the response is to be adequate and effective.

Leadership

Organizations, especially public sector ones, have many priorities that compete for attention and resources. Therefore, the first issue to consider is how climate change gets put on the agenda. In most cases where a rigorous response has been formed and initial phases of assessment and planning have been followed with a strong program of action, a senior political figure has provided leadership and marshalled resources to address the issue in a comprehensive manner.
The Greater London Authority, King County, WA and the City of Toronto are all examples of the impact of strong leadership.

Even in cases where a top political figure has not taken on the climate change mantle, an initiative to address climate change will be more successful if championed by a senior manager who is well-informed on climate change issues and able to communicate the range of choices and their implications to decision-makers. The Clean Air Partnership's study of six urban regions (a full reference of which is included in Layer 3) indicates that a strong champion is a principal difference between initiatives that have thrived and those that have foundered.

In the absence of a strong champion, action on climate change is more difficult. It is then imperative for planners to make a convincing case for action and establish links to other priorities as they try to influence decision-makers.

Mechanisms for Collaboration

Addressing climate change requires mechanisms and structures to facilitate interdepartmental collaboration and allow an organization to take a broad approach to climate change using all the tools at its disposal. The most common mechanism is an interdepartmental working group created to bring key people together from across an organization to develop an approach and see it through. Groups can be formed to work on the issue at different levels. An interdepartmental group of senior managers might be created which combines decision-making authority and high-level coordination. Other working groups might be formed at lower levels to address technical issues or coordinate implementation.

Leadership and coordination within these interdepartmental mechanisms are important in moving the issue forward. To complement these mechanisms, some local governments have created dedicated and fully resourced positions or teams to advance action. A team might form a specially-dedicated office within a lead department or be attached to a senior executive's office. Dedicated staff well-connected to decision-makers are one of the better ways of maintaining momentum on climate change planning initiatives.

One further mechanism used by public sector organizations to strengthen their approach to climate change is a structure that allows collaboration and coordination with other levels of government and other stakeholders in the private and non-profit sectors and academia. Mechanisms for involving these groups allow access to expert knowledge and advice, foster buy-in and commitment to action from other sectors, and coordinate action.

The institutional arrangements discussed above can be permanent or temporary. The process might also lead to recommendations on how existing permanent institutional arrangements can be altered to more effectively address climate change. Institutions could be established to take on a caretaker role to ensure that implementation and monitoring and evaluation receive the priority attention they need to succeed in the long term.

Organizational Change

Climate change and the broader issue of sustainability, if taken on sincerely, are a direct challenge to business-as-usual. At their most conventional, they are about identifying challenges and responses. In this manner, they are not dissimilar to other priority areas. At their most challenging, they are a new filter for evaluating all priorities and the options to address them. If meaningful action on climate change and sustainability is to occur, they must become top issues, not for just one team, department or designated coordinator, but for an entire organization.

Change on this scale requires enormous political and organizational will. In this shift, leadership is necessary, but it is not enough. Managing Change, a guide to shifting organizations to resource efficiency and corporate responsibility produced by the Government of Office for the South West (UK), emphasizes the importance of creating a shared vision in bringing about a new organizational culture that employees can identify with and embrace. For climate change concerns to permeate an organization and therefore its practice, some level of organizational change must be fostered (see Layer 3 for full reference).

See page 22 for example.

London Climate Change Partnership, UK

The London Climate Change Partnership (LCCP) is a stakeholder group formed in 2001 to help London better understand and prepare for the impacts of climate change. The Partnership is comprised of 30 organizations with representation from the government and London's leading sectors. It is co-ordinated by the Greater London Authority and chaired by a high profile businessman. The Partnership's objectives are: to commission research and disseminate information on preparing for climate change; to promote awareness of appropriate adaptation measures; to assist in the development of London's climate change adaptation strategy and other strategies and policies; to engage the media in the issue; to work with other organizations and cities with similar aims and objectives; and to assess and monitor London's preparedness for climate change. A steering group of 15-20 members meets on a bi-monthly basis. Subgroups are formed to work on particular issues, such as transportation, planning and development, and the Olympics. The Partnership is supported by a full-time staff person, paid for by the Greater London Authority and based in the Mayor's Office. The Partnership has been successful in raising the profile of climate change adaptation, producing a number of documents and resources which better inform London's adaptive response to climate change, and including climate change considerations into the policies of government. (CAP 2007)

For more:
London Climate Change Partnership web sitehttp://www.london.gov.uk/lccp/

Cities Preparing for Climate Change: A Study of Six Urban Region. Clean Air Partnership (2007).http://gmf.fcm.ca/Partners-for-Climate-Protection/

3. Consultation, Communications and Education

Planners have an important role to play in helping the communities they serve address climate change. This task is technically challenging, but cannot be treated as a technocratic exercise. As is the case in much planning work, developing a response to climate change is a process of public decision-making. Outcomes will be stronger and more resilient through public and stakeholder involvement.

The techniques and approaches used to involve the public and stakeholders in the climate change discussion will not be greatly different from those used to address other issues. However, the characteristics that make climate change problematic for planners and policy makers in general, also make it a complicated conversation to have with the public: the technical and scientific information needed to understand climate change; uncertainties about the exact scale and nature of climate change impacts; and the challenge to the status quo of a meaningful response.

The public discourse on climate change has only served to complicate matters further. The discussion on climate change to date, especially in North America, has been highly politicized and polarized. The debate on the significance of the issue, although resolved from the standpoint of the scientific community, has given climate change deniers a platform and led to inaction. The failure to determine a unified way forward at the national and international levels leave many to question the value and impact of the local response. Interestingly, in Canada, the strongest response to climate change has come from municipal governments (with the exception of select Provincial governments, such as British Columbia and Quebec's support of the Ouranos Consortium), seeming to indicate that the issue has most traction when framed at the local level.

The complications surrounding the public debate on climate change indicate that extra effort will be required by planners to communicate basic climate change information to the public and stakeholders. Messaging must be strong, consistent and accessible. The climate change challenge can seem insurmountable. Planners can work to empower communities to take action on climate change by demystifying its core elements, clarifying responsibilities and choices, and acknowledging local action as meaningful.

In consulting the general public, processes can be shaped to achieve different objectives: to raise the profile of an issue; to inform and educate; to access local knowledge, opinion and preferences; to generate locally appropriate solutions; to secure buy-in for a course of action; to build partnerships and secure outside resources; and foster behavioural change. The resources listed below will help planners identify their objectives in engaging the public and use public consultation to achieve strategic outcomes.

Although the development of climate change strategies and plans often involves some level of consultation with the general public, many also target specific stakeholders to become more deeply engaged in the process. This kind of stakeholder involvement allows public sector organizations to link with other levels of government, and other organizations in the private and not-for-profit sector, as well as academia. Participants contribute their knowledge and perspectives, but also, through their involvement in the process, become co-producers of the strategy or plan. Consultations along these lines are effective at developing cross-sectoral strategies with commitment to joint action and allocation of resources.

See examples on pages 24 and 25.

EarthCare Sudbury Local Action Plan

Sudbury used a combination of targeted stakeholder engagement and public consultation to develop its EarthCare Local Action Plan 2003, a strategy for climate change mitigation and sustainability. Once an internal steering committee was formed, City staff met one-on-one with potential community partners to secure their participation in the development of the Local Action Plan. At the time of the launch of the EarthCare Sudbury process, 38 organizations had signed a Declaration of Community Partners which committed them to help develop the plan for a greener, more sustainable community. These partners included provincial and federal government departments and agencies, school boards, universities and colleges, businesses and industries, utility companies, and non-profit community organizations.

At the first event, an open day-long meeting, participants discussed vision, values and the goals of the Local Action Plan, and confirmed the proposed process and schedule. Following the session, 100 participants volunteered to take part in one of five working groups to concentrate on particular sections of the plan: the residential sector; the industrial, commercial and institutional sector; the municipal sector; public education and outreach, and the business plan. The working groups identified 13 distinct areas for action and developed economic, environmental, and social objectives for each. The areas included land use planning, energy, transportation, air quality, solid waste, water and wastewater, eco-procurement, food, pesticides and soil. Working Groups met over a half year period and recommended strategies and actions relevant to their group's topic. The draft goals and objectives of the plan were presented at a public forum, where participants gave strong support to the work done to date and suggested other actions and ideas for inclusion in the plan. After being finalized and adopted by city council, EarthCare Sudbury Local Action Plan was launched and a second declaration signed by 93 community partners. An updated version of the action plan was finalized in 2010.

For more:
EarthCare Sudbury Local Action Plan 2003
http://www.greatersudbury.ca/cms/index.cfm?app=div_earthcare&lang=en&currID=9704

FCM-CH2M Hill Sustainable Community Awards – 2004 EarthCare Sudbury Local Action Plan
http://www.collectivitesviables.fcm.ca/FCM-CH2M-Awards/db/en%5C54.pdf

2010 EarthCare Sudbury Action Plan
http://www.greatersudbury.ca/earthcare/actionplan/english/index.html

BC Climate Action Secretariat – A4CP Apps 4 Climate Action contest

In March 2010, the BC Climate Change Secretariat launched a contest challenging software developers to create web and mobile applications that build awareness and inspire action to reduce carbon pollution. The contest, called Apps 4 Climate Change, coincided with the creation of the Climate Change Data Catalogue, a data warehouse populated with provincial climate change data. The catalogue houses climate change data sources in a centralized location, giving software developers a one-stop access point to over 500 data sets and supporting documents on which their applications can draw. The contest has more than $40,000 in cash and prizes spread across five categories: best mobile app, best web app, people's choice, best of B.C. and overall best app. The public will be able to access the apps and vote for their favourite. The contest is presented through a partnership of the Climate Action Secretariat, GeoBC and the Ministry of Citizen's Services and is supported by eight corporate sponsors.

For more:
A4CP Apps 4 Climate Action contest
http://www.apps4climateaction.gov.bc.ca/

4. Assessing Impact

Human activities have caused a global climate crisis. The extent of the crisis and the failure to act quickly to avert it means that communities must now prepare for the realities of an altered climate. It is the responsibility of planners and other policy makers to act on these challenges simultaneously by: reducing our production of GHG to a level that the biosphere can absorb without causing further climate change; and understanding and responding to the challenges and opportunities unavoidable climate change will bring.

It is not possible to adequately address climate change without grounding decision-making in the science of the issue. However, nor is it possible to treat climate change as a purely physical problem that simply requires a technical or technological solution. The root causes of climate change are deeply embedded in our societies, in how we produce and consume, in our relationship to the natural environment, in what we strive to achieve as individuals and societies. The impacts of climate change, although primarily physical in nature, will lead to secondary consequences – economic, social, and cultural – that are equally, if not more, troubling. Likewise, our response must move beyond technical solutions to physical problems and address root causes and the full range of impacts.

The Assessing Impact element is intended to establish the base of technical and scientific knowledge needed to evaluate primary impacts and determine the extent of their consequences. This evaluation will outline the performance requirements for the actions to follow. Although the nature of the task is very different for mitigation and adaptation, it is necessary for both.

Mitigation

Assessing impact in the context of mitigation refers to understanding an organization's or community's impact on climate change. The first step is to develop a GHG inventory to benchmark current emissions. The inventory is often broken down into key sectors or sources to allow for a more complete picture of major sources of emissions – for example, transportation, industry, and buildings – which might be broken down into their sub-components to give a finer grained analysis. The inventory may also identify carbon sinks (a carbon sink is something such as organic matter found in forests that captures and stores carbon dioxide, the principal GHG). Current levels of GHG production are used to set corporate or community reduction targets. Through the Federation of Canadian Municipalities' Partners for Climate Protection program, 200 municipalities have already committed to mitigation targets.

Adaptation

Although a global reduction of GHG emissions will slow and eventually stop climate change caused by human activities, the GHGs already emitted into the atmosphere make climate change a present reality and one that will continue until at least the end of the current century. Climate change will impact our communities. Planners must understand these impacts and develop an appropriate adaptive response.

The task of preparing for climate change is centred around the analysis and management of risk. The key feature of risk is uncertainty. There are many areas of uncertainty that make planning for climate change a challenge. The extent to which climate change is projected to occur is dependent on mitigation measures taken today and in the future. Further, the biosphere is a complex system that we do not fully understand. There is likely to be a great deal of regional variation in how climate change manifests itself. We can make educated

estimates of how climate change will impact localities, but can not make these predictions with perfect accuracy.

Forecasting Range of Impacts

The first step in preparing for climate change adaptation is to forecast possible impacts. Impact assessment uses the best available information and addresses uncertainty by developing scenarios that cover the full range of possibilities. The IPCC has generated scenarios that cover both low emissions and high emissions futures. Climate modelling is advancing quickly and is capable of converting these scenarios into potential climate impacts.

Local governments often do not have in-house resources that will allow them to analyze climate futures. Many have created partnerships with local universities, not-for-profits and senior levels of government to turn the findings of the research community into "actionable science" that can be fed into public decision-making processes. These partnerships can be helpful in downscaling the results of existing climate models to develop scenarios at a local scale. Layer 3 includes links to groups leading regional modelling in different parts of Canada, including Ouranos in Quebec and the Pacific Climate Impacts Consortium in British Columbia.

Determining Vulnerabilities and Opportunities

The next step is take these scenarios of how climate change will manifest itself at the local level and determine the vulnerability of existing systems and sectors to these impacts; for example, the ability of the existing stormwater system to handle more extreme weather events, the consequences of drought on agricultural production or the extent of damage to a road system built on melting permafrost. In examining the resilience of existing systems, a vulnerability assessment will have to address the likely extent of their exposure to climate change and the point at which these systems will no longer be able to deal with climate change impacts in a satisfactory way. A vulnerability assessment can also look at the capacity of existing systems to be adapted to meet new requirements caused by climate change. Key concepts relating to vulnerability are identified in text box below.

Vulnerability – Three Concepts:

Sensitivity – The degree to which built, natural or human systems (or portions thereof) are likely to be affected by climate change.

Resilience – The ability of a system to endure stress without compromising its essential function. Resilient systems have a high tolerance to withstand stresses and tend to be diverse, flexible and have redundant components that offer multiple ways of dealing with similar problems and therefore overlap should one component fail.

Adaptive Capacity – The ability of a system to adapt to meet new strains and requirements.

An assessment of vulnerability must go beyond an evaluation of systems (be they built, natural or human) to recognize diversity within systems. In our communities, some groups are more vulnerable than others to the impacts of climate change. In many instances, this vulnerability is a present reality and not only a projection based on future scenarios. The same characteristics that make groups vulnerable today (poverty, exclusion, economic dependence, lack of resources, lack of capacity), expose them to even greater vulnerability as the impacts of climate change begin to be felt. Acknowledging and understanding the societal roots of vulnerability are an essential part of Assessing Impact.

(See J Penney, Approaches to Assessing Climate Impacts and Adaptation Planning).

The impacts of climate change will not all be negative; a warmer climate could bring a longer growing season or decrease the heating requirement of the building stock. An assessment of climate change impacts will help to identify opportunities that can be realized as well.

Risk Assessment

The potential losses caused by climate change are severe, and can include a full range of social, economic and environmental consequences: increased mortality and morbidity, property damage, economic disruption, ecosystem damage, and species extinction. A risk assessment helps to prioritize threats in an environment of uncertainty. At its simplest, RISK can be summarized as PROBABILITY X CONSEQUENCE. Highest risks are those most likely to happen that will cause the most damage. Lowest risks have the lowest probability of occurring and will have the least grave consequences. A full understanding of the risks associated with climate change is essential for good public decision making and building a case for adaptation.

Current risks will give a good indication of what risks will need to be planned for in the future, but do not provide a complete picture. For instance, planners know the impact of a one-in-a-hundred-years storm event; and will therefore have some idea of how to prepare for more frequent occurrences. However, there may be consequences of climate change that are currently not planned for. Planners must scan for these kinds of risks and be prepared for challenges that require new approaches.

See examples on pages 29 and 30.

Community Energy and Emissions Inventory, British Columbia

Provincial legislation and other initiatives in British Columbia over the past several years have required and enabled local government to tackle climate change mitigation. Bill 27, The Local Government (Green Communities) Statutes Amendment Act (2008), requires local governments to include GHG emission reduction targets, policies and actions in Official Community Plans and Regional Growth Strategies. The B.C. Climate Action Charter, a voluntary agreement sponsored by the Province and the Union of B.C. Municipalities, requires municipal signatories to develop strategies and actions to become carbon neutral in their corporate operations by 2012, measure and report on their community's GHG emissions and work to create complete, compact and energy efficient communities. As of January 2010, 177 local governments had signed the Charter.

To provide a source of basic data to local governments as they meet their climate change obligations, the BC Ministry of the Environment created the Community Energy and Emissions Inventory (CEEI). The CEEI reports on energy consumption and greenhouse gas emissions at the community level, breaking down emissions by source: on-road transportation, buildings and solid waste, and, at the Regional District level, land-use change from deforestation activities.

For more:
Local Government (Green Communities) Statues Amendment Act, (Bill 27) 2008
http://www.cd.gov.bc.ca/LGD/intergov_relations/green_communities_legislation.htm

BC Ministry of Community and Rural Development – BC Climate Action Charter
http://www.cd.gov.bc.ca/ministry/whatsnew/climate_action_charter.htm

BC Ministry of the Environment – Community Energy and Emissions Inventory
http://www.env.gov.bc.ca/cas/mitigation/ceei/index.html

Ouranos – Consortium on Regional Climatology and Adaptation to Climate Change

Ouranos is a non-profit consortium and network of 250 scientists and professionals developing and disseminating knowledge on regional climatology and adaptation to climate change in order to inform and enable local and regional adaptation strategies.

Ouranos acts as an interface between public-sector decision-makers and the research community. Full organizational members include multiple provincial ministries and one federal government department, several universities as well as paragovernmental and private partners. The membership establishes priority areas and sets the organization's research agenda. Based on this direction, Ouranos develops and secures funding for programs and projects that aim to address key adaptation challenges. Program committees and user groups related to individual projects provide a further venue for agenda setting and the dissemination of findings through the involvement of a variety of stakeholders, including researchers, Provincial government staff, representatives from local government, and professional or citizen groups. This approach, and access to steady sources of funding for an evolving research agenda, has pushed Ouranos to the forefront of climate change adaptation research in Canada and ensured that Quebec has access to pertinent actionable science in considering their response to climate change.

Core funding and in-kind support for Ouranos comes from its partners and affiliated members. In-kind contributions and expertise may come in the form of seconded employees or material resources to Ouranos projects. Seconded employees are an important source of staffing resources and facilitate the transfer of information back to lending organizations. Other funding for specific initiatives also help to meet the organization's financial needs and ensure the research program is as comprehensive as possible.

For more information:

Ouranos web site www.ouranos.ca

5. Assessing Response

Assessing Impact will ground deliberations on climate change in the scientific and technical aspects of the issue. On the mitigation side, planners will know the impact on climate change of the community or organization for which they work and have quantified the reduction in GHGs which must be made. On the adaptation side, planners will know the range of impacts possible with climate change, understand the vulnerability of existing systems and have a method for identifying particular risks as high priority.

Concerning both mitigation and adaptation, Assessing Impact establishes the objectives and performance requirements of potential responses. The Assessing Response element is therefore about choosing the best way to satisfy them. The task is to match the scale of the response to the scale of the problem.

Planning is a future-looking activity. Much of what planners do is establish the principles that shape systems to best serve our communities. Planners create land use frameworks that shape building and growth. They set rules for the wise use and management of resources. They identify and work with under-privileged groups and set standards for community services and facilities. They work with other professions to create integrated systems that service communities. The planning response to climate change will involve integrating new requirements into the principles that shape the future.

The impact of many planning responses to climate change will take time to be felt. Just as we are living in communities that were built along planning principles of previous generations, the planning decisions we make today will affect the impact our communities have on climate change and their ability to withstand climate change impacts for years to come. While this is a potent mandate, it means that planners need to use different strategies and approaches for achieving results in the short term while setting the long term course for more climate-friendly communities.

In considering a range of possible responses to the requirements of climate change impacts, the most straight-forward approach is an analysis of costs and benefits. A cost-benefit analysis brings to mind totalling up a ledger or tally sheet. However, in public sector organizations, a cost-benefit analysis must go beyond dollars and cents to give weighting to not easily quantifiable costs and benefits as well. What price can we put on social equity? Habitat and species protection? The preservation of heritage features? It is not an easy task, yet planners and decision-makers need some way of evaluating whether efforts are worth their attendant results. A full calculation of costs includes the resources required, as well as unintended impacts. Benefits can be evaluated based of their efficacy, sustainability and societal value.

The Three Regions Climate Change Group, a collaboration between the Greater London Authority and surrounding regions, has produced Adapting to Climate Change Impacts – A Good Practice Guide for Sustainable Communities. It lists the attributes of effective responses to climate change, which include:

An ability to meet multiple objectives simultaneously – The co-benefits of reducing corporate GHG emissions, such as reduced energy costs, have helped win support for addressing climate change in many municipalities. Another example, growth management to encourage intensification, transit oriented development and a mixture of uses advances a number of objectives related and unrelated to climate change: it promises to reduce GHG emissions, preserve agricultural land, make better use of infrastructure and address the health issues related to urban sprawl. However, conversely, it

is possible that actions on climate change may conflict with the advancement of other goals. The possibility of conflict should be kept in mind so the right balance can be established and any negative impacts offset.

Maintains flexibility in the system – Responses to climate change will evolve over time. Wherever possible, present responses should not diminish the range of options available in the future. For example, buildings could be designed to allow for the incorporation of improved energy saving technologies throughout their lifetime.

No/low regrets – Some responses make sense in the present and in any climate change scenario. For example, green parking lot standards reduce surface parking's contribution to the Urban Heat Island effect and improve stormwater management; these features provide benefits in the present and make the community more resilient to future climate change. Setting high standards in the present can provide a greater buffer of protection at present and reduce more costly measures in the future. In this way, a proactive approach is preferable to reacting to climate impacts as they happen. Another example, flood zones could be established at present using the most cautious forecasts, preventing inappropriate building that would be vulnerable to extreme events in the future.

Returning to the consideration of key concepts relating to vulnerability in adapting to climate change, responses should reduce sensitivity to climate change impacts, increase the resilience of systems and groups and therefore their ability to weather stress, and enhance our capacity to adapt.

A cost/benefit analysis is a framework for comparing all possible responses. The inter-departmental arrangements discussed above will help planners and their colleagues consider the full range of options without being limited by boundaries between disciplines. In some instances, the best response will be related to planning powers; in others, the most effective response might be coordinated from another department.

The cost/benefit analysis can serve as the foundation of a business case for action to decision-makers. The business case can be bolstered by building an evidence base that supports the cost/benefit analysis. For instance, models now exist that allow planners to assess GHG emissions related to certain patterns of urban form; these models allow decision makers to quantify the impact of urban form decisions on emissions targets. Another source of evidence on the efficacy of particular measures is success from elsewhere. In developing responses to any number of priority issues, communities often look for inspiration from best practice. Evidence of this nature can help bolster a business case as well.

See example on next pages 33 and 34.

Halifax Regional Municipality – ClimateSMART

ClimateSMART (Sustainable Mitigation and Adaptation Risk Toolkit) is the Halifax Regional Municipality's (HRM) integrated approach to climate change mitigation and adaptation. ClimateSMART was launched as a public-private initiative between HRM and local firms with climate change knowledge and expertise. The goal was to better incorporate climate change into decision-making processes and secure resources for adaptation and mitigation activities. Throughout the ClimateSMART process, HRM has successfully linked to the private sector, senior levels of government and funders, like the Federation of Canadian Municipalities' Green Municipal Fund, to access expertise and resources. The ClimateSMART toolkit includes a risk management tool that assesses the vulnerability of HRM assets to climate impact, a community-based vulnerability and risk management tool that anticipates vulnerabilities in the community as a whole and a cost-benefit tool to assess the suitability of climate adaptation planning and management measures.

For more:
Halifax Regional Municipality – ClimateSMART web site
http://www.halifax.ca/Climate

FCM – CH2MHill – Sustainable Community Awards – Case Studies – Halifax Regional Municipality
http://www.collectivitesviables.fcm.ca/FCM-CH2M-Awards/db/en%5C63.pdf

Dawson Climate Change Adaptation Plan

The Dawson Adaptation Plan is an example of integrating traditional/ local knowledge with scientific/technical expertise. Its starting point was that an examination of existing conditions and historic experience is the best way to identify vulnerabilities to future stresses. To access this knowledge, community members were involved in the plan development in a number of ways: advisory committees, open houses, interviews, community input sessions. Members of a local advisory committee were selected to include community stakeholders perceived to be most vulnerable to climate change. In identifying vulnerabilities, emphasis was placed on known problems for which an immediate response was required – for example, flooding, increased risk of forest fires and threats to local food sources – rather than unprecedented impacts associated with large degrees of uncertainty. Once a long-list of consequences of climate change were identified, a resilience evaluation framework was used to prioritize them based on the potential level of impact, the likelihood of impact and the adaptive capacity of the community to deal with them. Priority adaptations were characterized by a current low capacity of the community. For each adaptive action, institutional partners, such as the City, the Yukon Territorial Government and Tr'ondëk Hwëch'in (a First Nation) were identified to help the community prepare an adequate response in the short and long term.

For more:
Dawson Climate Change Adaptation Plan
http://www.taiga.net/nce/adaptation/Dawson_Plan_Final.pdf

Northern Climate ExChange – Dawson Adaptation Project
http://www.taiga.net/nce/adaptation/dawson.htmlhttp://www.greatersudbury.ca/earthcare/actionplan/english/index.html

6. Implementation

The purpose of the Standard of Practice is to enable planners to realize actions that will help communities reduce their impact on climate change and prepare themselves for possible climate change impacts. All other elements included in this Standard are intended to support, inform and organize implementation.

The development of strategies and plans are an important step in a well-considered response to climate change, but they are not an end in and of themselves. They must be shaped with implementation in mind and focussed on how to ensure momentum is maintained to achieve the strategic objectives they document.

All strategies should include specific actions, with well-defined deliverables. A firm timeline should be established for their achievement and responsibilities should be allocated to particular parts of an organization or to stakeholders. Regular reporting and a framework for evaluation (detailed in the next element) will keep climate change on the agenda and allow for periodic assessment of progress and a re-evaluation of the adequacy of the approach and its objectives.

New priorities constantly emerge that risk drawing energy and resources away from issues of long-term importance. Adequate climate change planning will require long term commitment that is appropriately resourced.

See example on page 36.

Toronto Green Standard

The Toronto Green Standard (TGS) is a tool to promote new development that is environmentally friendly, implemented through City Planning's development review and approvals process. The TGS consists of a set of performance measures with supporting guidelines for sustainable site and building design that correspond to Toronto's environmental pressures. Climate change adaptation and mitigation are addressed through many of the TGS elements, such as measures to reduce the Urban Heat Island effect, standards of minimum energy performance, stormwater infiltration and evapotranspiration and protection and enhancement of the urban forest.

The TGS has been in place since 2006 as a voluntary standard. In 2010, the TGS was divided into two tiers of performance. Tier 1 is mandatory for all new developments. Tier 2 is a voluntary higher standard. Developments that meet Tier 2 requirements are eligible for a 20% refund of development charges.

In 2010, the City of Toronto collaborated with the Canadian Green Building Council to produce a Toronto LEED Supplement to help developers understand the similarities and differences between the TGS and LEED® Canada-NC, version 1.0. The Supplement outlines TGS development features that correspond to LEED credits and contribute towards LEED certification, and also notes where LEED documentation can be accepted by the City of Toronto. The TGS will next be updated starting 2011, in anticipation of the 2012 Ontario Building Code changes concerning energy efficiency.

For more:
City of Toronto web site – Toronto Green Standard
http://www.toronto.ca/planning/environment/greendevelopment.htm

7. Monitoring and Evaluation

The purpose of ongoing monitoring and evaluation is to ensure that activities are having their intended consequences. This element can be divided into three components. The first is to assess the level of activity. Have activities kept pace with the original schedule for their realization? Periodic reporting on a fixed timeline is an effective way of focusing attention on the issue of climate change beyond the period of strategy creation and plan making into the implementation stage. An assessment of the level of activity might identify organizational issues that need to be addressed or recalibrate resources dedicated to their achievement.

The second component is evaluating results, often referred to as performance measurement. The main challenge of performance measurement is linking cause and effect in complex systems. At the most general level, performance measurement can be done across the board and evaluate how a suite of measures has caused change across a number of indicators. It is likely that during preliminary phases of strategy or plan creation, data was collected to inform deliberations: for example, GHG emissions by sector or vulnerability to climate change impacts. This information can serve as a baseline against which progress can be monitored. Setting indicators in advance will allow for consistent collection of data throughout the implementation phase.

A more finely grained approach to performance measurement attempts to attribute results to particular activities. This task is more difficult to accomplish in some instances than others. For example, engineering works to improve stormwater management clearly better prepare a community for extreme weather events. But in another example, is increasing transit ridership the result of improved levels of service, an increase in fuel prices, or high-density development around transit stations? A lack of measurability or problems with direct attribution do not mean an activity is not worth pursuing. Performance measurement should allow a narrative of impact to be told, backed up with empirical data wherever possible. Measuring results allows assumptions to be tested and unintended consequences to be identified. As such, monitoring and evaluation should be built into every implementation plan.

A final component of monitoring and evaluation is re-evaluation. The information base on which climate change decisions are made is constantly changing and becoming more refined. Innovations in approaches and a growing body of best practice in climate change planning provide new options in developing a response. Re-evaluation will allow for a review of basic assumptions based on new information, and combine this with experience to date to recalibrate implementation measures and strategies.

See examples on pages 37 and 38.

Whistler2020 Monitoring Program

The Whistler2020 Comprehensive Sustainability Plan is a vision and plan for achieving a successful and sustainable future for the Resort Municipality of Whistler, British Columbia. The plan is organized into five priorities and sixteen strategies. Each strategy addresses a particular topic (examples include Food, Built Environment, and Energy) and is the focus of a community task force that coordinates cross-sectoral action. Whistler2020 addresses climate change through its sustainability objectives and actions associated with strategies.

As well as establishing a vision and a path to achieve it, Whistler2020 also incorporates a monitoring program that tracks and reports on progress. Core Indicators help the community understand how it is advancing toward its broad goals. A separate group of Strategic Indicators measure progress toward a "Description of Success" included in the plan for every strategy area. Including indicators in the plan has allowed Whistler to establish a baseline and report on progress in a manner that is transparent to the public and helps task force members evaluate actions and alter strategic approaches.

For more:
Whistler2020 Moving Toward a Sustainable Future web site
http://www.whistler2020.ca

BC's Climate Action Toolkit – Success Story – Whistler's Integrated Approach
http://www.toolkit.bc.ca/community-stories/whistler-integrated-approach

Nottingham Declaration Partnership – Comprehensive Area Assessments

A Comprehensive Area Assessment (CAA) is an across the board annual assessment of local areas in England to determine local governments' performance on priority issues and the prospects for sustainable improvement in the future. CAAs draw on available evidence, including: a national indicator set; self evaluations by councils and other public bodies; and the views of users, residents and other local organisations. Three national indicators relate directly to climate change: N185 (CO_2 reduction from Local Authority operations), N186 (Per capita reduction in CO_2 emissions in the Local Authority area), N188 (Planning to adapt to climate change). The Nottingham Declaration Partnership has created a Climate Change Adaptation and Mitigation Self Evaluation tool that helps local governments assess their progress on climate change issues and feeds into a broader CAA.

For more:
Nottingham Declaration on Climate Change – Performance Measures
http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/Performance-Measures

Climate Change Self Evaluation
http://www.energysavingtrust.org.uk/Media/node_54450/Climate-Change-Self-Evaluation

http://www.taiga.net/nce/adaptation/dawson.htmlhttp://www.greatersudbury.ca/earthcare/actionplan/english/index.html

Layer 3

Resources

Resources

The Model Standard of Practice is an introduction to climate change planning and a framework for organizing an effective response. It is also a guide to finding further information. Layer 3 points planners to the best resources in the field of climate change planning, which include documents and web sites. Resources are organized by Key Element, and supplemented with further resources that provide a more exhaustive overview of the climate change issue and a list of existing climate change strategy documents from leading local governments. A brief annotation is included for each resource.

Climate Change Planning is a quickly evolving field, with new resources being created all the time. The Canadian Institute of Planners will update resources through the Climate Change Resource Library section of its website, www.planningforclimatechange.ca.

Key:
(Adaptation) – resource discusses adaptation to climate change

(Mitigation) – resource discusses climate change mitigation

(Process) – resource addresses the process of developing an approach or strategy to climate change

(Tools) – resource discusses specific tools or approaches that can be used to address climate change

(Case Studies) – resource includes case studies

Overview

IPCC Fourth Assessment Report: Climate Change 2007 (AR4)
http://www.ipcc.ch/publications_and_data/publications_and_data_reports.htm#2

The Intergovernmental Panel on Climate Change (IPCC) was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) to provide the world with a clear scientific view on the current state of climate change and its potential environmental and socio-economic consequences. The IPCC completed its Fourth Assessment Report in 2007. The report consists of four volumes that address: the physical science base of climate change; impacts, adaptation and vulnerability; mitigation of climate change; and a synthesis report. A summary for policy makers is provided for each report. (Adaptation)(Mitigation)

Stern Review on the Economics of Climate Change (2006)
http://www.hm-treasury.gov.uk/sternreview_index.htm

An independent review commissioned by the British government to estimate the effect of climate change on the world economy. Named after Sir Nicholas Stern, its lead author. The review's main finding is that the benefits of strong action to prevent climate change outweigh its costs due to the large-scale economic dislocation that unmitigated climate change will cause. (Adaptation) (Mitigation)

From Impacts to Adaptation: Canada in a Changing Climate (2007)
Editors: DS Lemmen, FJ Warren, J Lacroix and E Bush
Published: Natural Resources Canada, 2007
http://adaptation.nrcan.gc.ca/assess/2007/index_e.php

An assessment of current and future risks and opportunities that climate change presents to Canada, with a focus on human and managed systems. Findings are presented by region. (Adaptation)

1 CREATING A ROAD MAP

Cities Preparing for Climate Change: A Study of Six Urban Regions (2007)

Authors: J Penney and I Wieditz
Published: Clean Air Partnership, May 2007

A report that looks at the process of developing an adaptation response through the experience of six urban regions – Greater London, New York, the Boston Region, Greater Vancouver Regional District, Halifax Regional Municipality and King County, WA. A distillation of lessons from the experience of early adapters, with a particular emphasis on stakeholder involvement and internal institutional organization. (Adaptation)(Process)

Preparing for Climate Change: A Guidebook for Local, Regional and State Governments (2007)

Authors: King County and the Center for Science in the Earth System (The Climate Impacts Group), Joint Institute for the Study of the Atmosphere and Ocean, University of Washington, in association with ICLEI – Local Governments for Sustainability
Published: The Climate Impacts Group, King County, Washington, and ICLEI – Local Governments for Sustainability, 2007

This guidebook outlines a step-by-step process for how local, regional, and state governments can prepare themselves for climate change. The document focuses on the process of climate change adaptation, rather than discussing specific adaptive responses. (Adaptation) (Process)

Adapting to Climate Change Impacts – A Good Practice Guide for Sustainable Communities (2006)

Authors: Land Use Consultants in association with Oxford Brookes University, CAG Consultants and Gardiner & Theobald

Published: Defra, 2006

The guidance sets out the climate change adaptation issues that planners and developers should consider at each stage in the development process and ways to respond to them. The document discusses a process for developing a response to adaptation challenges and integrating climate change considerations into planning policy. Three case study areas are discussed. (Adaptation)(Process)(Case Studies)

Risk, Uncertainty and Decision Making Framework (2003)

UKCIP Technical Report

Editors: RI Willows and RK Connell

Published United Kingdom Climate Impacts Programme (UK CIP), 2003

Although not specifically focused on planning, this technical report outlines a general decision-making framework for determining a response to climate change adaptation that is applicable across the public sector. A primer on incorporating an evaluation of risk and uncertainty into decision-making. (Adaptation)(Process)

ICLEI Canada – Municipal Climate Adaptation Guide and Workbook for Canadian Municipalities Anticipated release: Summer 2010

A guide and workbook for municipal governments that provides an integrated framework to adaptation planning. The guide details the methodology and description of the planning process and includes a collection of 17 worksheets/tools for following the methodology. The integrated approach incorporates the environmental, economic, technical, social and health implications of climate change as well as providing guidance on obtaining scientific data. (Adaptation)(Process)

Ahead of the Storm...: Preparing Toronto for Climate Change (2008)

Development of a Climate Change Adaptation Strategy

Issued: City of Toronto, April 18, 2008

Presents a process to systematically assess the risks of climate change, prioritize areas for action, and develop strategies to reduce the impacts and protect Toronto. The document includes an inventory of current policies and program that will reduce vulnerabilities and a list of recommendations on the steps necessary to develop a comprehensive strategy. (Adaptation)(Process)

Adapting to Climate Change – An Introduction for Canadian Municipalities (2006)

Editor: B Mehdi

Published: Canadian Climate Impacts and Adaptation Research Network (C-CIARN), 2006

Provides a concise introduction to climate change impacts and adaptation and how these issues might be incorporated in municipal decision-making. Followed by six examples of initiatives that respond to climate change-related vulnerabilities in Canadian municipalities. (Adaptation)(Case Studies)

Approaches to Assessing Climate Impacts and Adaptation Planning (2010)

Author: J Penney

Published: A presentation given on January 19, 2010, Clean Air Partnership (the presentation is currently not publicly available, but can be obtained from Jennifer Penney at jpenney@cleanairpartnership.org)

A survey of six broad approaches to assessing climate change impacts and adaptation planning: impact approach, natural hazards vulnerability approaches, social vulnerability approach, resilience approach, integrated approaches, and adaptation policy approach. The presentation discusses the strengths, weaknesses and overlap of the approaches and explores examples of each. (Adaptation)(Process)

Web Sites:

Partners for Climate Protection (PCP) Program
http://gmf.fcm.ca/Partners-for-Climate-Protection/

The Partners for Climate Protection (PCP) program is a network of 200 Canadian municipal governments that have committed to reducing greenhouse gases and acting on climate change. PCP is based on the ICLEI Cities for Climate Protection Campaign which uses a five milestone framework to guide municipalities to reduce greenhouse gas emissions. The five milestones are: 1) Creating a greenhouse gas emissions inventory and forecast; 2) Setting an emissions reductions target; 3) Developing a local action plan; 4) Implementing the local action plan or a set of activities; and 5) Monitoring progress and reporting results. These steps can be used to reduce both corporate and community emissions. The five milestone process is a performance-based model which remains flexible; milestones do not need to be completed in sequential order. The PCP web site is a source of information on approaches to climate change mitigation. (Mitigation)(Process)

BC Climate Action Toolkit
http://www.toolkit.bc.ca/

The BC Climate Action Toolkit it intended to inspire action in BC's local governments to rapidly advance deep emission reductions in corporate operations and community-wide activity. The site focuses exclusively on mitigation. The toolkit summarizes approaches, discusses a variety of tools and provides links to case studies, funding sources and other resources. Although focused on BC, the site is a valuable resource for municipalities across Canada. (Mitigation) (Process) (Case Studies)(Tools)

BC Toolkit – Situational Analysis
http://www.toolkit.bc.ca/community-wide-situational-analysis

United Kingdom Climate Impacts Programme (UKCIP) Adaptation Wizard
http://www.ukcip.org.uk/index.php?option=com_content&task=view&id=147&Itemid=298

The UKCIP Adaptation Wizard is an on-line tool and a 5-step process to assess vulnerability to current climate and future climate change, identify options to address key climate risks, and help to develop a climate change adaptation strategy. The site also includes useful resources and principles of good adaptation for each step. (Adaptation)(Process)

The Nottingham Declaration on Climate Change
http://www.energysavingtrust.org.uk/nottingham

An initiative of local government in the UK, the Nottingham Declaration pledges signatories to systematically address the causes of climate change and to prepare their community for its impacts. The web site is the gateway to climate change information and advice for English local government, including resources on developing an action plan. (Adaptation)(Mitigation) (Process)

Green Playbook for Buildings + Neighborhoods
http://www.greenplaybook.org/

The Playbook provides strategies, tips and tools that elected officials and their senior managers and staff can apply toward building green and taking immediate action on climate change. Each section – Green Buildings, Green Neighborhoods, and Green Infrastructure – contains practical program guidance, policies and regulatory levers that flesh out each topic to guide local governments in taking rapid and effective action to reduce greenhouse gas emissions stemming from buildings and neighbourhoods. The strategic overview component of the Playbook provides the overarching rationale for action, and offers a strategic approach for establishing new programs and building momentum in green development. (Mitigation)(Adaptation)(Process) (Tools)

Action Planning Model – from the Green Playbook
http://www.greenplaybook.org/strategic/action/index.htm

2 INSTITUTIONAL ARRANGEMENTS

Resource Efficiency and Corporate Responsibility – Managing Change: How to Manage Change in an Organisation (2007)

Published: Government Office for the South West, January 2007

http://www.oursouthwest.com/SusBus/mggchange.html

Managing Change is a guide to help organizations become more sustainable through resource efficiency and assume corporate responsibility for their effects on the wider community. The guide isolates key factors to success in organizational change as well as examining examples of ineffective practice and common mistakes. (Process)

Climate Change Adaptation in the City of Toronto: Lessons for Great Lakes Communities (2008)

Author: J Penney

Published: Clean Air Partnership, December 2008

Many Canadian municipalities have developed climate change strategies that address mitigation issues. These municipalities are now beginning to think about planning for climate change adaptation. The City of Toronto has been one of the first to address this issue in a comprehensive manner. This report summarizes Toronto's work toward a climate change adaptation strategy and draws lessons from their experience to date. (Adaptation)(Process)

3 CONSULTATION, COMMUNICATION AND OUTREACH

Community Engagement and Climate Change: Benefits, Challenges and Strategies (2009)

Authors: J Fritze, L Williamson and J Wiseman

Published: A Report for the Department of Planning and Community Development, Victorian Government, Australia, January 2009

The report draws on international research, the evaluation literature and learning and feedback from recent Victorian community engagement projects to strengthen understanding of the ways in which community engagement strategies can be used to support climate change mitigation, adaptation and structural adjustment outcomes. (Mitigation) (Adaptation)(Process)

Climate Change Planning Tools for First Nations Guidebooks (2006)

Published: Centre for Indigenous Environmental Resources, August 2006

http://www.cier.ca/information-and-resources/publications-and-products.aspx?id=412

The Centre for Indigenous Environmental Resources has created six guidebooks to provide user-friendly and culturally appropriate climate change and adaptation advice to help First Nations to avoid, minimize or adapt to impacts caused by climate change through planning. The Guidebooks outline a planning process and framework for decision making with particular focus on effective community consultation. (Adaptation)(Process)

Web Sites:

International Association for Public Participation (IAP2)http://www.iap2.org/index.cfm

IAP2 is an international association of members who seek to promote and improve the practice of public participation. Their web site is a valuable source of practitioner tools to help planners conceptualize and realize effective public participation. (Process)

Climate Change North
www.climatechangenorth.ca

Recognizing that climate change will have an especially large impact on the lives of people in northern communities, this web site provides information, lesson plans and resources that link directly to northern experience and northern curricula. Materials are targeted at students and teachers and are provided for different literacy levels and age groupings. (Adaptation)

4 ASSESSING IMPACTS

Adapting to Climate Change: A Risk-based Guide for Ontario Municipalities (2006)
J Bruce, IDM Egener and D Noble

Published: December 12, 2006

A guide to help municipalities take a risk-based approach to shape efforts to adapt to climate change in the short-, medium- and long-term. The guide presents a risk management process, illustrated by examples. (Adaptation)(Process)

Developing Inventories for Greenhouse Gas Emissions and Energy Consumption: A Guidance Document for Partners for Climate Protection in Canada

Published: FCM-ICLEI Partners for Climate Protection

A handbook to assist local government staff in developing GHG emissions inventories and forecasts in order to achieve Milestone One of the Partners for Climate Protection program. (Mitigation)

City of Vancouver 2008 Greenhouse Gas Emissions Inventory Summary and Methodology

Published: City of Vancouver, December 2008

This inventory document provides a breakdown of greenhouse gas emissions for the City of Vancouver's municipal operations and for the community. It describes sources of information and methodologies used to estimate or quantify GHG emissions based on 2008 inventory data. (Mitigation)

Growing Cooler: The Evidence on Urban Development and Climate Change (2007)

Authors: R Ewing, K Bartholomew, S Winkelman, J Walters and D Chen with B McCann and D Goldberg
Published: Urban Land Institute, 2007

This report examines the relationship between urban development, travel and C02 emitted by motor vehicles. It provides evidence on the magnitude of CO2 emissions reductions that are the result of compact development, and how smart growth strategies can further reduce emissions through more efficient building types, the preservation of carbon sinks, and transportation pricing strategies, like tolls and parking charges. (Mitigation)

Human Health in a Changing Climate: A Canadian Assessment of Vulnerabilities and Adaptive Capacity (2008)

Editor: J. Séguin

Published: Health Canada, 2008

A comprehensive assessment of health vulnerabilities to climate change in Canada. It provides a synthesis of knowledge on how the health of Canadians is affected by our climate today, and what may lie ahead under future climate change. (Adaptation)

Adapting Infrastructure to Climate Change in Canada's Cities and Communities: A Literature Review (2006)

Published: Infrastructure Canada, December 2006

The report provides an overview of literature related to climate change adaptation and infrastructure in Canada. The report's objective is to improve knowledge and understanding around climate change adaptation for infrastructure in Canadian cities and communities. (Adaptation)

Web Sites:

Ouranos – Consortium on Regional Climatology and Adaptation to Climate Change
http://www.ouranos.ca

Ouranos is a non-profit consortium and network of 250 scientists and professionals developing and disseminating knowledge on climate change in order to enable local and regional adaptation strategies. Ouranos' work is primarily targeted on Quebec but it contributes to the Canadian Regional Climate Model (CRCM). (Adaptation)

Canadian Climate Change Scenarios Network (CCCSN)
http://www.cccsn.ca

The CCCSN is Environment Canada's interface for distributing climate change scenarios and adaptation research. Canada-wide and regional ensemble scenarios indicate seasonal temperature and precipitation projections for the 2050s relative to the 1961-1990 period. (Adaptation)

Pacific Climate Impacts Consortium – Plan2 Adapt
http://plan2adapt.ca/

Plan2Adapt is an on-line tool designed to generate regional climate change scenarios covering British Columbia. The site allows users to construct a map showing patterns of future climate, including variables such as temperature and precipitation, over the 21st century. (Adaptation)

5 ASSESSING RESPONSE

Climate Change Adaptation by Design: A Guide for Sustainable Communities (2007)

Authors: R Shaw, M Colley, and R Connell

Published: Town and Country Planning Association, 2007

A guide to climate change adaptation aimed at developers, architects, planners and urban designers created by the Town and Country Planning Association. The guide includes a brief section on how climate change can be integrated into planning policy before concentrating on how to implement adaptation through design and development. It looks at different climate change adaptation problems and strategies to address them at the conurbation, neighbourhood and building scale. (Adaptation)(Tools)(Case Studies)

Urban Planning Tools of Climate Change Mitigation (2009)

Authors: PM Condon, D Cavens and N Miller

Published: Lincoln Institute of Land Policy, 2009

Survey of existing tools to model and evaluate the relative benefits of alternative land use patterns and development approaches in cities, at different scales: project, neighbourhood and metropolitan area. (Mitigation) (Tools)

Toward a Climate-Friendly Built Environment (2005)

Authors: MA Brown, F Southworth, and TK Stovall

Published: Pew Center on Global Climate Change, 2005

Although primarily focussed on GHG mitigation at the building-level, the report links this discussion into a broader one on urban form and the role smart growth can play in mitigation efforts. (Mitigation)(Tools)

Climate Change Adaptation Actions for Local Government (2009)

Author: SMEC Australia

Published: Australian Greenhouse Office, Department of the Environment and Water Resources, Australian Government, 2009

The report looks at the range of climate adaptation actions that can be implemented by local governments in Australia based on predicted climate impact risks. (Adaptation)(Process)(Tools)

Inventories, Targets, and Actions: Implementing GHG and Energy Reduction Measures for Bill 27 and More (2009)

Released: Ministry of Community and Rural Development, Province of British Columbia, 2009

A set of modules to help local governments meet their climate change planning obligations related to Bill 27 and other Province of British Columbia climate initiatives. The modules are structured around three questions: Where are we now? Where do we want to be? How do we get there? (Mitigation)

6 IMPLEMENTATION

Adapting to Climate Change: A Checklist for Development (2005)

Author: Three Regions Climate Change Group (consists of the South East Climate Change Partnership, Sustainable Development Round Table for East of England, and the London Climate Change Partnership)

Published: London Climate Change Partnership, Greater London Authority, November 2005

A checklist and guidance for new developments to promote long-term resilience to climate change adaptation challenges. The document is primarily targeted at developers and professionals that shape the built environment, but will also be of use to planners and public officials. The checklist incorporates issues of site layout, building structure and materials, ventilation and cooling, drainage, water, outdoor spaces and connectivity. (Adaptation)(Tools)

ClimateSMART Climate Change: Developer's Risk Management Guide 2007

Published: Halifax Regional Municipality, August 2007

The guide takes developers through a step-by-step process of risk identification and management for buildings and developments. It includes a checklist to assist in developing an appropriate climate change adaptation plan for proposed developments. (Adaptation)(Tools)

Web Site:

Federation of Canadian Municipalities Green Municipal Fund
www.sustainablecommunities.fcm.ca

The site provides information on how to access GMF financing for municipal projects and a database of case studies, as well as other tools and resources on improving environmental performance and reducing greenhouse gas emissions. (Tools)(Case Studies)

7 MONITORING AND EVALUATION

Web Sites:

Nottingham Declaration – Performance Measures
http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/Performance-Measures

The Nottingham Declaration web site includes discussion of performance measures to assess progress toward climate change goals. (Mitigation)(Adaptation) (Process)

Homes and Communities Agency – Demystifying Climate Change
Climate Change and Performance Measurement
http://climatechange.homesandcommunities.co.uk/strategic-responses/performance-measurement

The Homes and Communities Agency, the national housing and regeneration delivery agency for England, has created a web site, Demystifying Climate Change, to discuss practical solutions to climate change at the community level. The section on Strategic Responses includes discussion of performance measurement. (Mitigation)(Adaptation)(Process) (Tools)

Strategy Documents

The Draft Climate Change Adaptation Strategy for London (2010)
Public Consultation Draft
Jurisdiction: Greater London Authority
(Adaptation)

Delivering London's Energy Future (2010)
The Mayor's Draft Climate Change Mitigation and Energy Strategy for Consultation with the London Assembly and Functional Bodies
Jurisdiction: Greater London Authority
(Mitigation)

2007 King County Climate Plan (2007)
Jurisdiction: King County, Washington
(Mitigation)(Adaptation)

Change is in the Air – Climate Change, Clean Air and Sustainable Energy Action Plan: Moving from Framework to Action, Phase 1 Highlights (2007)
Jurisdiction: City of Toronto
(Mitigation)

Change is in the Air: Toronto's Commitment to an Environmentally Sustainable Future (2007)
Framework for Public Review and Engagement
Jurisdiction: City of Toronto
(Mitigation)(Adaptation)

ClimateSMART Climate Change Risk Management Strategy for Halifax Regional Municipality (2007)
Jurisdiction: Halifax Regional Municipality
(Adaptation)

The Climate Friendly City: A Community Climate Change Action Plan for the City of Vancouver (2005)
Jurisdiction: City of Vancouver
(Mitigation)(Adaptation)

Chicago Climate Action Plan
Jurisdiction: City of Chicago
(Mitigation)(Adaptation)

Calgary Climate Change Action Plan Target 50 (2006)
The City of Calgary Corporate and Community Outlook on Climate and Air Quality Protection
Jurisdiction: City of Calgary
(Mitigation)

White Paper on Climate Change and the Official Plan Review (2007)
Jurisdiction: City of Ottawa
(Mitigation)(Adaptation)

City of Portland and Multnomah County Climate Action Plan 2009
Jurisdiction: City of Portland and Multnomah County
(Mitigation)(Adaptation)

Dawson Climate Change Adaptation Plan
Jurisdiction: Dawson City, Yukon
(Adaptation)

WARMING OF THE CLIMATE SYSTEM IS UNEQUIVOCAL, AS IS NOW EVIDENT FROM OBSERVATIONS OF INCREASES IN GLOBAL AVERAGE AIR AND OCEAN TEMPERATURES, WIDESPREAD MELTING OF SNOW AND ICE, AND RISING GLOBAL AVERAGE SEA LEVEL.

IPPC Fourth Assessment Report