

chapter 3 the case for governments to prepare for climate change

You may be a senior leader of government, a department staff member, or a member of the general public. At whatever level, you have many compelling reasons to begin preparing your government and community for climate change.

3.1 Why Governments Cannot Wait

Reducing greenhouse gas emissions today will play a critical role in determining how much climate change we experience in the future. However, for reasons provided below, governments cannot wait for global greenhouse gas emissions to be reduced before taking steps to prepare for climate change impacts.

- **Climate change is already in motion.** An increasing amount of physical evidence points to the fact that climate change is already in motion as a result of the greenhouse gases accumulated in the atmosphere to date, particularly since the 1950s (see Appendix A). In fact, many of the changes projected through at least the middle of the 21st century will be driven by present-day greenhouse gas concentrations. For instance, even if greenhouse gas emissions had been stabilized in 2000, we would see an additional 0.9°F or more of warming globally in the 21st century, due to the concentration of greenhouse gases in the atmosphere in 2000 and the “lag time” of the Earth’s oceans and atmosphere to warm (Hansen et al. 2005, Meehl et al. 2005, Wigley 2005, IPCC 2007a). Therefore, reducing greenhouse gas emissions will limit the severity of long term future impacts, but it will do little to alter the near-term changes already set in motion.
- **Significant reduction of greenhouse gas emissions is possible, but it is unlikely that greenhouse gas emissions will be stabilized or reversed in the near term.** Approximately 75 percent of CO₂ emissions to the atmosphere over the past 20 years are due to fossil fuel burning (IPCC 2001a). If the world’s nations move quickly and collectively towards a global clean energy economy, prospects for reducing global human greenhouse gas emissions are good. However, avoiding the worst climate change impacts will require reducing greenhouse gas emissions to the point where atmospheric concentrations stabilize and then decline. Given the dependence of global economic systems on fossil fuels and the time required for new technologies that reduce or replace fossil fuels to integrate into the global marketplace, any significant reduction in CO₂ emissions is unlikely to occur soon enough to avoid many of the projected climate impacts.
- **Climate change is expected to continue long after greenhouse gases are stabilized.** Greenhouse gases remain in the atmosphere for tens to thousands of years before breaking down (Table 3.1). Until this happens, greenhouse gas molecules will continue to trap energy, causing continued warming. Additionally, even after atmospheric concentrations of greenhouse gases are stabilized, it will take hundreds of years for global

temperature and ocean levels to reach a new equilibrium due to the physical size and characteristics of the Earth's oceans and atmosphere (IPCC 2001c, IPCC 2007b). Together, these facts mean that atmospheric greenhouse gas concentrations and global temperature are expected to increase well into – and in all likelihood beyond – the 21st century.

Gas	Lifetime
Carbon Dioxide (CO ₂)	5 to 200 years
Methane (CH ₄)	12 years
Nitrous Oxide (N ₂ O)	114 years
Sulfur Hexafluoride (SF ₆)	3,200 years
Carbon Tetrafluoride (CF ₄)	50,000 years

Table 3.1 – Examples of greenhouse gas lifetimes. The table shows some of the important greenhouse gases along with two synthetic gases (SF₆ and CF₄) that have long atmospheric lifetimes. Lifetimes refer to the average amount of time an emitted gas will spend in the atmosphere before being chemically broken down, absorbed into the ocean, or otherwise removed from the atmosphere. For CO₂, a single value cannot be assigned since there are many removal processes that occur at a range of speeds. Table source: IPCC 2001a.

- **Climate change will likely lead to irreversible losses in some areas.** If no action is taken, climate change will likely lead to irreversible losses in nature, including extinction of species and permanent loss of habitat and special historical and cultural places. As noted previously, if the global average temperature increases only an additional 2.7 to 4.5°F over pre-industrial levels, an estimated 20 to 30 percent of the plant and animal species known in the world are likely to be at higher risk of extinction (Parry et al. 2007). Avoiding these losses, if possible, will require actively managing ecosystems systems and human choices.
- **Climate change will have largely negative economic consequences, but may also create economic opportunities.** Climate change will affect a wide array of economic sectors, including: agriculture, forestry, water supply, fisheries, health, energy, coastal development, transportation, and recreation and tourism. Non-economic resources such as biodiversity, air, and water quality will also be affected. Planning for climate change and its specific regional effects may help reduce the economic costs to these sectors while also creating opportunities to capitalize on its beneficial impacts.

Given these realities, managing climate change impacts is not simply a matter of “waiting it out.” It is becoming increasingly necessary to take steps to prepare for the regional effects of climate change even as communities work together to stabilize global greenhouse gas emissions.

3.2 Reasons for Local, Regional and State Governments to be Proactive

There are several fundamental reasons for local, regional and state governments to be proactive in preparing for climate change impacts.

- **Planning for the future can benefit the present.** In assessing what the future climate holds, governments may find that many projected climate change impacts are in fact more extreme versions of what communities are already experiencing today as a result of present day climate variability and extreme climate events. Climate change, for example, will increase the risk of drought, which all communities experience periodically. Implementing a water conservation program in anticipation of this changing drought risk offers immediate benefits for managing current droughts as well as the more frequent and more intense droughts projected in the coming decades.
- **Preparing for climate change is “good government.”** Governments across the United States and the world share a common goal of ensuring the safety, health and welfare of their communities now and into the future. Meeting this goal and maintaining the integrity of essential public services requires that governments anticipate trends and changes that could affect their environment, economy, and community well-being. Because climate change will affect a broad range of community assets and government services, operations and policy areas, preparing for climate change is thus a matter of “good government” and risk management.
- **Localities, regions and states are on the front lines of climate change impacts, and have a responsibility to respond.** Climate change is a global trend, but one which localities, regions and states will experience to different degrees and in different ways. Also, by nature, public programs and policy strategies designed at the federal or international level have a limited level of specificity, whereas local, regional and state governments are in a stronger position to tailor climate change preparedness strategies to their specific circumstances, and to the unique set of climate change impacts that they expect to face. Therefore, while higher levels of government can and must provide funding and support for climate change preparedness strategies on the ground, local, regional and state governments have an equal or even greater responsibility to plan proactively as well.
- **Proactive planning is more effective and less costly than responding reactively to climate change impacts as they happen.** Taking proactive steps to be flexible and to anticipate and address expected impacts can save money and protect the well being of communities. For instance, considering the impacts of climate change on water supply and demand in design criteria for a new reservoir can help ensure that the new reservoir meets future water needs and may be less costly than having to expand the reservoir in the future (if expansion is possible at all by that time).

- **Thinking strategically can reduce future risks.** Being proactive and strategic in planning for climate change impacts can create opportunities for modifying present-day policies and practices that can increase vulnerability to climate change. For example, zoning that concentrates development in an area at risk to future sea level rise and coastal flooding can be altered before that area is built out.
- **Thinking strategically can increase future benefits.** Being proactive can create opportunities for capitalizing on some of the benefits of climate change. A longer growing season, for example, could lead to greater agricultural production (provided that adequate water supplies are available). Similarly, warmer winter temperatures could lead to cost savings from reduced winter road maintenance requirements.
- **Anticipating future changes can add value to today's investments at low additional cost.** Preparing for climate change impacts may provide opportunities to add value to existing capital projects. "Piggybacking" a reclaimed water system onto a planned wastewater treatment system expansion, for example, reduces the marginal cost of adding the reclaimed water system while providing buffering capacity against projected water supply impacts.

Climate change is unlike most other public priorities in that it directly or indirectly affects a broad range of resources and activities in the public and private sector, including water resources, energy, public health, agriculture, forests, transportation, land use planning, stormwater management, and emergency management. Taking practical steps now with the best information available enables you to reduce your future risk and also realize possible near-term benefits.

3.3 Moving Beyond Common "Barriers"

You will face obstacles in planning for climate change. You may also encounter resistance from others in your organization or region. Often, however, the barriers (both perceived and real) to planning for climate change can be easily addressed. Some of the more common barriers to planning are addressed here.

The barrier: "I don't know how climate change will affect my community."

The local impacts of climate change may not be easily understood, especially if information on regional or local climate change impacts is limited.

A response: Climate change will affect communities and community government functions in a variety of ways. More obvious impacts could include an increased risk for extreme events such as drought, storms, flooding, and forest fires; more heat-related stress; the spread of existing or new vector-borne disease into a community; and increased erosion and inundation of low-lying areas along coastlines. In many cases, communities are already facing these problems to some degree. Climate change raises the stakes in managing these problems by changing the frequency, intensity, extent, and/or magnitude of these problems.

Climate change impacts may also appear in unexpected ways. For example, some communities may have more difficulty meeting federally mandated summer air quality standards if increased

temperatures lead to higher concentrations of ground-level ozone (Shriner and Street 1997, IPCC 2001b). Lower summer streamflows could have effects not only on fish and wildlife, but also on industries discharging permitted industrial effluent to the streams. Other less obvious impacts may include increased costs for combating insect outbreaks on urban forests or agricultural crops or difficulty restoring populations of endangered species based on climate change impacts on habitat or the food web.

There are many sources of information on how climate change may affect the United States, its various sub-regions, and specific types of resources such as water supply, coasts, forests, and agriculture (see Chapter 4 and Appendix C). These sources can all be used to some degree to develop a better understanding of how climate change may affect your community even when information specific to your location is not available. Tips for reviewing these sources and organizing the information for planning are provided later in Chapter 4 and Chapter 8. Regional climate and/or resource management experts may also be good resources for finding out how climate change may affect your community.

The barrier: “Climate change action should happen at higher levels of government.”

Media attention on policies for reducing greenhouse gas emissions (e.g., the Kyoto Protocol) may contribute to perceptions that climate change is an international-scale problem to be handled through federal policies and international agreements.

A response: While national and international policies have an important role in reducing greenhouse gas emissions, it may be a half-century or more before these policies lead to any substantive reduction in atmospheric concentrations of greenhouse gases and global average temperature. More importantly, the impacts of climate change will be felt most acutely at the local scale. Managing these impacts will require developing locally-based strategies.

The barrier: “I’ll deal with climate change when I see that it is happening.”

Acute climate change may not be evident in some sectors for several decades. This time lag may contribute to the perception that climate change is an issue to address when you see that “climate change is obviously occurring” or at some other point down the road.

A response: There is considerable evidence that climate change is already underway (see Chapter 2 and Appendix A). Deferring planning until climate change is “here” could cause costly delays and increase vulnerability to climate impacts given the time required to implement some preparedness strategies. For example, expanding a water supply system to accommodate the combined impacts of population growth and climate change may take 10 to 30 years before the additional capacity is online. This delay could leave a region vulnerable to drought, higher water rates, and broader economic costs.

Climate change **mitigation** refers to activities undertaken to reduce greenhouse gas emissions.

In some cases, waiting for more obvious signs of climate change may foreclose on lower cost preparedness options, leaving you with only expensive ways out. For example, a low cost strategy for managing the risk of more frequent or intense floods might be to leave a floodplain undeveloped. Hypothetically, if you wait to plan until you have perfect information about increased flood risk and allow development to continue in the floodplain, you may need to take a more costly approach later, such as installing dikes or other major infrastructure to protect property in the most vulnerable areas of the floodplain.

The barrier: “My community wants to focus only on reducing greenhouse gases.”

Actual resource limitations – especially for projects considered to be in the category of “environmental policy” – could force you to choose between actions that reduce greenhouse gas emissions and your proposed preparedness efforts. On another note, you may also face a perception that if you focus on preparing for climate change, you are giving up the fight to reduce greenhouse gas emissions.

A response: Limiting the future damage of climate change to the world and your community requires both reducing greenhouse gas emissions and preparing for climate change impacts. If your community is already focused on greenhouse gas emissions reduction, seize the moment to start a community conversation about climate change impacts and the potential for climate change to exacerbate existing problems.

The barrier: “I’ll deal with climate change when you can tell me exactly what I need to plan for.”

Some fields (e.g., engineering and urban planning) traditionally demand precise information in order to make changes to physical structures, large-scale capital investments, or land use zoning.

A response: Climate change will require that you learn how to plan more effectively with evolving, imperfect information. Waiting for certainty can increase your vulnerability to climate change and potentially lead to high financial and social costs. You can incorporate existing information on climate change impacts into plans and designs and designs, if you write those documents to accommodate a reasonable range of projected extremes, and to be updated more frequently over time as your information improves. Where to obtain specific regional information about climate change impacts and how to deal with uncertainty are described in Chapter 4 and Chapter 11.

The barrier: “I’ll wait until I see other communities planning for climate change.”

The perception that no other “peer” communities (i.e., of your size and in your geographic area) are planning for climate change could make you, your public officials, or stakeholders in your community reluctant to invest in preparing for climate change.

A response: Many governments within the United States and elsewhere have begun to ask what climate change may mean for their communities. These efforts are being driven in part by public concern about climate change, increasing evidence that climate change is occurring, and increasing capabilities to provide information on climate impacts at the regional scale. A sample list of urban regions planning for climate change (in addition to King County, Washington) is provided in Box 3.2. It will also be useful for you to identify other “peer” communities who have invested in preparing for climate change, through networks such as ICLEI – Local Governments for Sustainability, the Center for Clean Air Policy’s Urban Leaders Initiative, or the USEPA.

The barrier: “I don’t have time or money to deal with climate change right now.”

Governments must continually juggle multiple issues of immediate importance, often making it difficult to take on “new” issues such as climate change preparedness. Financial, technical, institutional, and/or human resource constraints can also limit an organization’s ability to address climate change impacts.

A response: In many cases, climate change will exacerbate existing high priority management concerns rather than creating completely new challenges. Therefore, you may find that efforts to address existing management concerns affected by climate change may simultaneously reduce vulnerability to projected climate impacts, particularly if the projected impacts are included in the scope of today's decision making. You may also realize that the strategies used to manage both present-day concerns and projected climate impacts are similar (for a sample list of preparedness strategies, see Table 10.1). If this is true, it should be possible for you to accomplish some degree of planning for climate change by absorbing the work into your existing workplan – and using current financial, technical, institutional, or human resources. As your planning progresses, you can review your need for additional resources later, in the context of developing an overall long-term strategy.

The barrier: “I don’t have the resources or political support to act.”

Although the case for climate change action has gained public attention and political momentum in the last two years, support for climate change preparedness is not a given. You will need support from senior level management, whether an agency director, city or county manager, city or county council, or federal or state legislator, in order to create an institutional and political environment in which planning for climate change can occur. A lack of support from senior level management is a very real barrier to starting your effort – making it difficult for you to find the staff and financial resources to pursue preparedness strategies.

A response: You can make some progress in preparing for climate change with limited resources and/or political will. In some cases, you may identify the reasons why there is a lack of support, and you may be able to develop more support incrementally.

The barrier: “Our operations are based on historical statistics, not future modeling.”

Many government services such as water supply management, wastewater treatment, stormwater operations, and flood zone management are guided by historical record. Using projections of future change can be hard to “sell” to plant or system managers, not to mention ratepayers and regulators.

A response: It is critical to recognize that the past is no longer a reliable guide to the future. When relevant and possible, move away from relying exclusively on historical climate conditions as the basis for decision making. This does not mean you should exclude the past altogether, however; much can be gained from looking at the impacts of past extreme events on communities, infrastructure, and natural systems. The key now is to avoid anchoring your decisions completely in historical records. Your government regularly makes decisions based on expectations and assumptions about the future, so this way of thinking should not be entirely new.

These common mindsets are just a few of the barriers that can hold you back from preparing for climate change impacts, and the responses here are meant to help you to overcome those barriers. As the next chapter outlines, perhaps no factors are more important than strong top-level leadership and a cohesive planning team to encourage you and your internal and external stakeholders to invest in climate change preparedness.

Box 3.1 – Examples of Early Preparedness Efforts

Boston Metropolitan Region, USA

Boston has developed a major academic report on climate change impacts to that region. The report, titled *Infrastructure Systems, Services and Climate Change: Integrated Impacts and Response Strategies for the Boston Metropolitan Area* (also known as Climate's Long-term Impacts on Metro Boston or CLIMB), was published in 2004 by researchers from local Boston universities. The five-year project was "designed to provide quantitative data on how infrastructure is affected by climate change." (Penney and Wieditz 2007)

London, UK

In 2001, the Greater London Authority set up the London Climate Change Partnership (LCCP), with representatives from a wide range of governments and agencies. The LCCP has prepared several guides and strategies for areas of expected impact including transportation, buildings, and the financial sector. Mayor Ken Livingstone has also revised the London Plan to incorporate climate change mitigation and adaptation policies and appointed a senior policy officer to develop a preparedness strategy using a process of extensive stakeholder engagement. According to the Clean Air Partnership, "In an 18-month period in 2005-2006 [Mayor Livingstone] made an estimated 100 presentations and organized 15 workshops with different stakeholder groups and agencies to build awareness of how climate change might affect their services." The partnership has also published *London's Warming*, a comprehensive report on climate change impacts to the London urban region. (Penney and Wieditz 2007)

Miami-Dade County, Florida

Miami-Dade County has been a leader on reducing greenhouse gas emissions for over ten years, and has recently formed a Climate Change Advisory Task Force (CCATF) to make

recommendations regarding what actions are needed to make the community and its built environment, natural systems, health, and economy as climate resilient as possible. Miami-Dade has also agreed to be a pilot government for the ICLEI – Local Governments for Sustainability's Climate Resilient Communities Program. (ICLEI, personal communication)

New York City and the Metro East Coast Region, USA

The New York City Department of Environmental Protection established a Climate Change Task Force in 2003 for the purpose of evaluating climate change forecasts, impacts, indicators, and adaptation and mitigation strategies for water, sewage, and stormwater management in the region. The Task Force involves representatives from seven departments, including those responsible for water supply, water and sewer operations, and wastewater treatment. Task force responsibilities include: developing climate change scenarios, coordinating research, and outreach. (Penney and Wieditz 2007, CCSR 2007)

Washington State

Under Executive Order 07-02, the "Washington Climate Change Challenge," Washington State Governor Christine Gregoire has tasked the Washington Department of Community, Trade, and Economic Development (CTED) and Department of Ecology (ECY) to determine what steps Washington needs to take to prepare for the impacts of climate change. Preparation/Adaptation Working Groups (PAWGs) have been created in five key economic sectors: fresh water, agriculture, public health, coasts and infrastructure, and forests. The PAWGs will review the projected climate impacts for each sector and identify key issues and vulnerabilities, specific adaptation measures, and critical research needs. (State of Washington, personal communication)