



Climate Atlas  
of Canada

# Canada's Cities AND CLIMATE CHANGE



Across ten provinces and three territories, over 80 percent of Canadians live in cities and towns. Our communities and municipalities have diverse landscapes, cultural experiences, and economic interconnections. All regions of Canada will be affected by climate change, yet the specific ways that individual cities and their surroundings will be impacted largely depends on geography and local conditions.

This series of reports offers a summary of projected climate changes for Canada's major cities, an overview of some important national, regional and local impacts, and ideas and approaches that can be used to take meaningful climate action across the country.

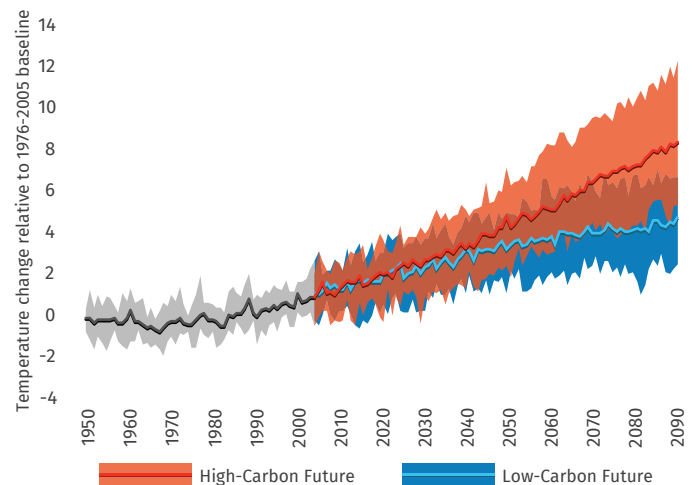
The data in these reports come from the interactive Climate Atlas of Canada ([climateatlas.ca](http://climateatlas.ca)), which provides much more detailed information and resources. The Atlas is designed to enable citizens and local leaders to learn about anticipated climate impacts so they can promote climate action and resilience in their communities.

## Canada's Changing Climate

Climate determines almost everything about how we design, build, and live in our cities and towns. With our climate changing, Canadians from coast to coast to coast need to re-think important aspects of how we live our urban lives.

Climate records in Canada go back to the 1800s and reveal a long-term and accelerating warming trend. Scientists use computer models to assess how much future warming will occur under different greenhouse gas emission scenarios. These models clearly show that Canada faces a significantly warmer and potentially much more unstable climate in the future.

## How much warmer might Canada get?



This graph demonstrates how much Canada's climate is projected to warm under two carbon emission scenarios\*. The **'high-carbon future'** assumes that humanity will continue to emit more and more greenhouse gas emissions well into the future. The **'low-carbon future'** assumes the international community will act collectively to drastically reduce greenhouse gas emissions.

Presently, our current and projected emissions are closely following the path to a high-carbon future. Under this scenario, Canada is expected to face serious impacts, which will vary across the country.

# Projected Climate Changes\*

High-Carbon Future  
2051-2080



This map shows selected changes directly relevant to various cities across the country. It is evident that dramatic changes are expected in the future under the high-carbon future scenario. And this is just a small sample of the many kinds of data available online in the Climate Atlas.

Cities that already experience hot summers will face large increases in both daytime and nighttime temperatures, while many historically cooler cities will have to start coping with dangerous heat for the first time. Canada's north faces an especially dramatic rate of warming that will have serious consequences for communities, ecosystems and infrastructure. Changes in seasonal patterns of precipitation will affect all provinces and territories.

Climate change will affect our seasonal experience of place, identity, and community as well as our built environment, governance, and economy. However, solutions to this pressing global problem do exist, and when they incorporate local perspectives, expertise, and commitment we can take meaningful and effective adaptation and mitigation measures where we live.

## Projected Temperature Changes for Canada's Cities

This table shows five temperature indicators that are important for understanding the implications of climate change within and across cities. These indicators demonstrate how climate change could transform the seasonal conditions that are the basis of many of Canada's cultural and economic activities.

The table allows you to compare values for the recent past (1976-2005) with values for 2051-2080 for both a "high-carbon future" scenario and a "low-carbon future" scenario.\* The dramatic difference between the two possible outcomes shows just how important it is that we act now to mitigate greenhouse gas emissions in an effort to reduce the societal and environmental risks associated with climate change.

These data also show the need to adapt to moderate changes even if we avoid a worst-case level of warming. Understanding possible climate futures such those summarized here is the first step to taking meaningful climate action.

| Cities        | Average hottest temperature of the year |                   |                    | Average coldest temperature of the year |                   |                    | Average number of days per year above 25 °C |                   |                    | Average number of below-zero days per year |                   |                    | Average length of the frost-free season |                   |                    |
|---------------|---|-------------------|--------------------|---|-------------------|--------------------|---|-------------------|--------------------|--|-------------------|--------------------|---|-------------------|--------------------|
|               | Recent Past                             | Low-Carbon Future | High-Carbon Future | Recent Past                             | Low-Carbon Future | High-Carbon Future | Recent Past                                 | Low-Carbon Future | High-Carbon Future | Recent Past                                | Low-Carbon Future | High-Carbon Future | Recent Past                             | Low-Carbon Future | High-Carbon Future |
| Calgary       | 31.6 °C                                 | 34.9 °C           | 36.6 °C            | -33.2 °C                                | -28.2 °C          | -26.0 °C           | 34  | 65                | 80                 | 193  | 160               | 144                | 124                                     | 149               | 161                |
| Charlottetown | 29.9 °C                                 | 32.8 °C           | 34.2 °C            | -23.4 °C                                | -17.6 °C          | -15.2 °C           | 26  | 57                | 72                 | 153  | 115               | 99                 | 170                                     | 201               | 215                |
| Edmonton      | 31.1 °C                                 | 34.4 °C           | 36.0 °C            | -35.0 °C                                | -29.7 °C          | -27.2 °C           | 31  | 61                | 76                 | 189  | 158               | 145                | 131                                     | 156               | 170                |
| Fredericton   | 33.1 °C                                 | 36.1 °C           | 37.7 °C            | -29.9 °C                                | -24.2 °C          | -21.4 °C           | 48  | 80                | 95                 | 169  | 138               | 123                | 141                                     | 169               | 185                |
| Halifax       | 29.6 °C                                 | 32.4 °C           | 33.6 °C            | -21.3 °C                                | -16.7 °C          | -14.6 °C           | 18  | 48                | 66                 | 145  | 107               | 92                 | 170                                     | 202               | 217                |
| Iqaluit       | 18.9 °C                                 | 21.7 °C           | 23.1 °C            | -40.9 °C                                | -34.9 °C          | -31.5 °C           | --  | --                | --                 | 271  | 243               | 228                | 74                                      | 104               | 118                |
| Montréal      | 33.1 °C                                 | 36.3 °C           | 37.9 °C            | -27.4 °C                                | -21.7 °C          | -18.9 °C           | 61  | 96                | 111                | 143  | 126               | 103                | 175                                     | 201               | 217                |
| Ottawa        | 33.7 °C                                 | 37.0 °C           | 38.6 °C            | -29.5 °C                                | -23.8 °C          | -21.0 °C           | 62  | 97                | 112                | 152  | 124               | 111                | 160                                     | 187               | 203                |
| Québec        | 31.6 °C                                 | 34.8 °C           | 36.5 °C            | -34.6 °C                                | -26.0 °C          | -23.2 °C           | 38  | 71                | 88                 | 174  | 145               | 130                | 143                                     | 170               | 187                |
| Regina        | 35.1 °C                                 | 38.4 °C           | 40.1 °C            | -36.6 °C                                | -31.6 °C          | -28.9 °C           | 58  | 89                | 101                | 197  | 171               | 160                | 123                                     | 146               | 156                |
| St. John's    | 26.9 °C                                 | 29.3 °C           | 30.3 °C            | -17.8 °C                                | -13.8 °C          | -12.0 °C           | 8   | 23                | 33                 | 163  | 123               | 103                | 154                                     | 183               | 200                |
| Toronto       | 33.6 °C                                 | 37.0 °C           | 38.4 °C            | -21.4 °C                                | -15.7 °C          | -13.4 °C           | 60  | 98                | 112                | 122  | 87                | 72                 | 189                                     | 215               | 232                |
| Vancouver     | 29.3 °C                                 | 32.3 °C           | 33.7 °C            | -8.3 °C                                 | -3.8 °C           | -2.1 °C            | 18  | 53                | 72                 | 31   | 8                 | 5                  | --                                      | --                | --                 |
| Victoria      | 28.8 °C                                 | 31.7 °C           | 32.8 °C            | -6.3 °C                                 | -2.4 °C           | -1.0 °C            | 12  | 35                | 55                 | 23   | 6                 | 4                  | --                                      | --                | --                 |
| Whitehorse    | 27.4 °C                                 | 30.9 °C           | 32.3 °C            | -43.6 °C                                | -38.6 °C          | -36.1 °C           | 7   | 23                | 34                 | 239  | 204               | 187                | 82                                      | 118               | 135                |
| Winnipeg      | 34.4 °C                                 | 37.9 °C           | 39.5 °C            | -35.9 °C                                | -30.8 °C          | -28.0 °C           | 57  | 89                | 102                | 188  | 161               | 149                | 131                                     | 154               | 169                |
| Yellowknife   | 27.9 °C                                 | 30.4 °C           | 31.9 °C            | -43.5 °C                                | -38.4 °C          | -35.3 °C           | 10  | 23                | 35                 | 226  | 205               | 195                | 111                                     | 133               | 144                |

## Four out of Five Canadians Live in Urban Areas

Cities are hotspots for climate impacts and solutions. They sustain large, growing, and diverse communities with shared needs for transportation, energy, prosperity, and security. With creative and forward-thinking planning, we can serve those needs in ways that also take meaningful action on climate change. Climate action requires a combination of:

- **Technical know-how:** to find solutions that allow us to effectively transition to low-carbon sources of energy, to provide data and analysis to understand global warming and its consequences, to create innovative adaptation tools and methods.
- **Political will:** to realize new forms of multi-level governance necessary to tackle climate change, supporting market incentives such as carbon taxes that reduce our collective reliance on high-carbon fuels, and mandate climate-smart laws and regulations in the face of resistance and denial.
- **Personal responsibility:** to recognize the importance and urgency of the global warming threat, to make changes in our own lives, and to empower community, government and business leaders to take a key role in our communal effort, so we can creatively rise to the collective economic and social challenge.

Climate change solutions start close to home, with simple actions in our own homes and families, but also involve new ways of thinking, planning, and acting in our workplaces, neighbourhoods, cities. Smart climate action can make our cities less polluted, more livable, and more productive.



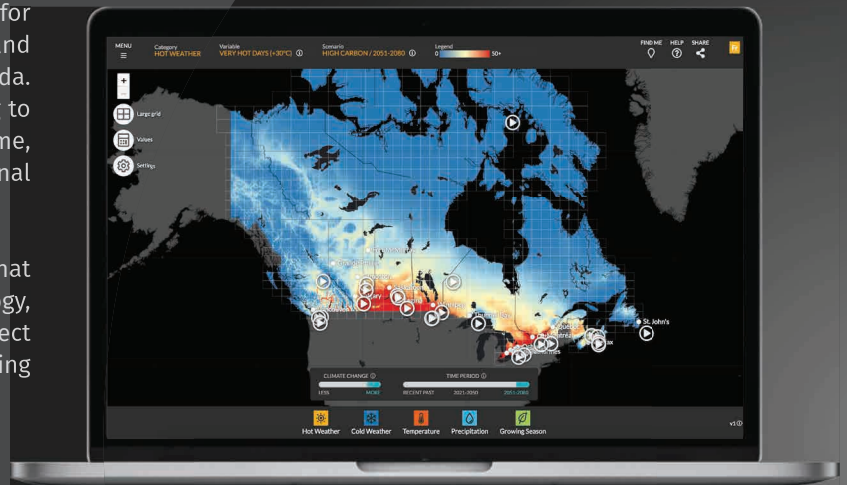
The Prairie Climate Centre is committed to making climate change meaningful and relevant to Canadians of all walks of life. We bring an evidence-based perspective to communicating the science, impacts, and risks of climate change through maps, documentary video, research reports, and plain-language training, writing, and outreach.

## The Climate Atlas Of Canada

The Climate Atlas of Canada is an interactive tool for citizens, researchers, businesses, and community and political leaders to learn about climate change in Canada. It combines climate science, mapping and storytelling to bring the global issue of climate change closer to home, and is designed to inspire local, regional, and national action and solutions.

The Atlas is one of the only tools in the world that integrates interactive web design with climatology, cinema, and cartography to geovisualize and connect scientific data with personal experience in compelling and easy-to-use ways.

Learn More at: [climateatlas.ca](http://climateatlas.ca)



\* The Climate Atlas of Canada presents climate indices derived from 24 downscaled global climate models obtained from the Pacific Climate Impacts Consortium (PCIC; [pacificclimate.org](http://pacificclimate.org)). For each model, values for two future time periods (2021-2050 and 2051-2080) are computed under two emissions scenarios. The 'high carbon future' emissions scenario (RCP8.5) assumes greenhouse gas emissions will continue to increase at current rates for the foreseeable future. The 'low carbon future' scenario (RCP4.5) assumes emissions will peak mid-century and then rapidly decrease. The graph of Canada's future temperature shows the mean and the 90th and 10th percentiles of the 24 models; the map and table provide the ensemble mean.

The information disseminated by the Prairie Climate Centre including but not restricted to maps, tables, statistics and interpretations, is provided as a public service. It is provided without any warranty or representation, express or implied, as to its accuracy or completeness. Any reliance you place upon the information contained here is your sole responsibility and strictly at your own risk. In no event will the Prairie Climate Centre be liable for any loss or damage whatsoever, including without limitation, indirect or consequential loss or damage, arising from reliance upon the data or derived information.