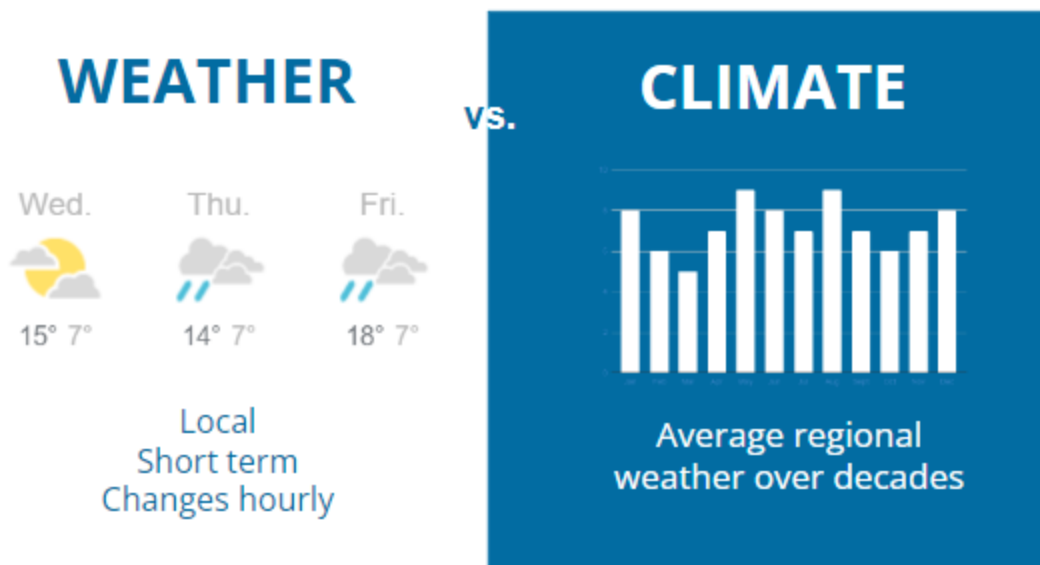


Changing Climate Impacts

Greenhouse gas emissions cause the global temperature to rise, and this causes global and regional climates and weather patterns to change. Climate change terminology can often be misused, but climate change is not weather. Weather is the current or short-term state of the atmosphere. It affects a limited area, changes rapidly and is happening now. Climate is the average weather over a long period of time. It is long-term, covers a wide area, changes gradually and is an average of weather over many years - typically assessed at 30 year intervals. Climate change is when there are long-term trends or major shifts in that climate (or average weather).



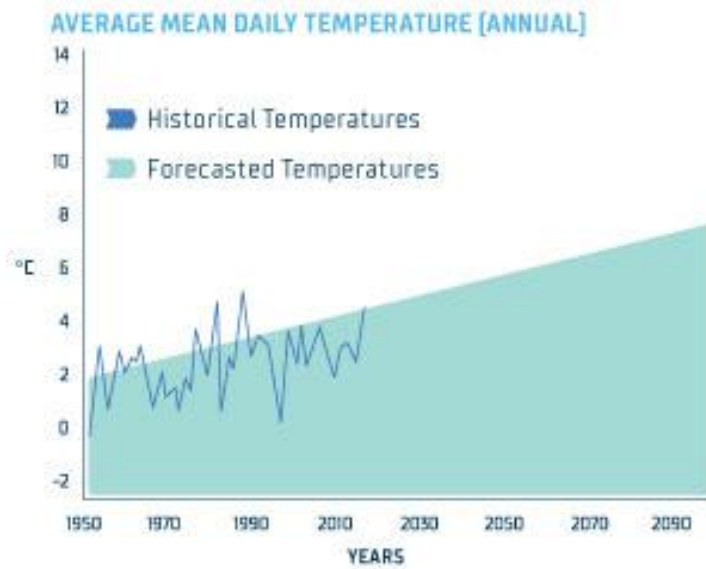
Edmonton's Changing Climate

In 2021, the Intergovernmental Panel on Climate Change (IPCC) indicated that changes are already being observed in earth's climate in every region of the world, and across the whole climate system. Climate change impacts regions around the world differently. Climate change modeling for Edmonton identifies four main categories of climate changes:

- Changing temperatures
- Changing precipitation
- Changing weather extremes
- Changing ecosystems

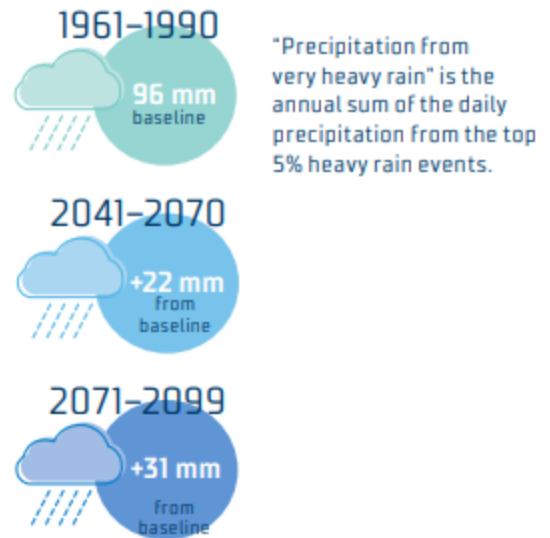
Changing Temperatures

Over the last 50 years, Edmonton has been warming at one of the fastest rates in the world. Edmonton can expect to experience continued warming in all seasons, with the biggest increase occurring in the winter months. Climate change is also impacting temperature extremes. Over the next several decades, Edmonton can expect to see heat waves become more frequent and Edmonton will likely experience unprecedented temperature highs. Extreme heat can have health implications, especially for more vulnerable populations such as the elderly, children and people with existing health conditions.



Changing Precipitation

Precipitation patterns in Edmonton are also expected to change. In general, Edmonton should expect more rain in winters, wetter springs and drier summers, with more extreme rainfall events. Short-term intensity rainfall events that contribute to urban flooding are expected to get more frequent and severe. Climate change is expected to double the chance of these types of flooding events. The North Saskatchewan River — currently Edmonton’s sole source of drinking water — has always been highly variable. Historically there have been prolonged periods of very low flow in the river, as well as prolonged periods of high flow in the river. This flow variability will continue into the future with climate change, which could impact Edmonton’s long-term drinking water supply and double the likelihood of river flooding events by the 2050s. It is important to note, however, that the likelihood



of river flooding events remains low. Increasing temperatures and moisture evaporation from soil in the Edmonton region will result in an increased likelihood of summer drought conditions. Prairie droughts are included in some of the most costly natural disasters in Canada. Climate change is expected to double the chance of multi-year droughts in the Edmonton region.

Changing Weather Extremes

Climate change is expected to change the frequency, intensity, duration and timing of extreme weather events in the coming decades, including having a longer wildfire season. Recently, Edmonton and the surrounding region have experienced record-breaking wildfire smoke, hail, and tornado warnings, as well as higher than average lightning strikes. As temperatures rise and there is more energy in the atmosphere, it is expected that these conditions will be more likely to produce more frequent and intense extreme weather events. The Prairie Provinces chapter of the federal government's Canada in a Changing Climate report indicates that, out of the 20 most costly disasters in Canada, 13 have occurred in the Prairie provinces. These costs have been related to events such as hailstorms, flooding, wildfires and drought.

Changing Ecosystems

The gradual, overall warming and drying of the climate will impact Edmonton's natural environment. With a warmer and drier climate, the Edmonton area will become more suitable for a

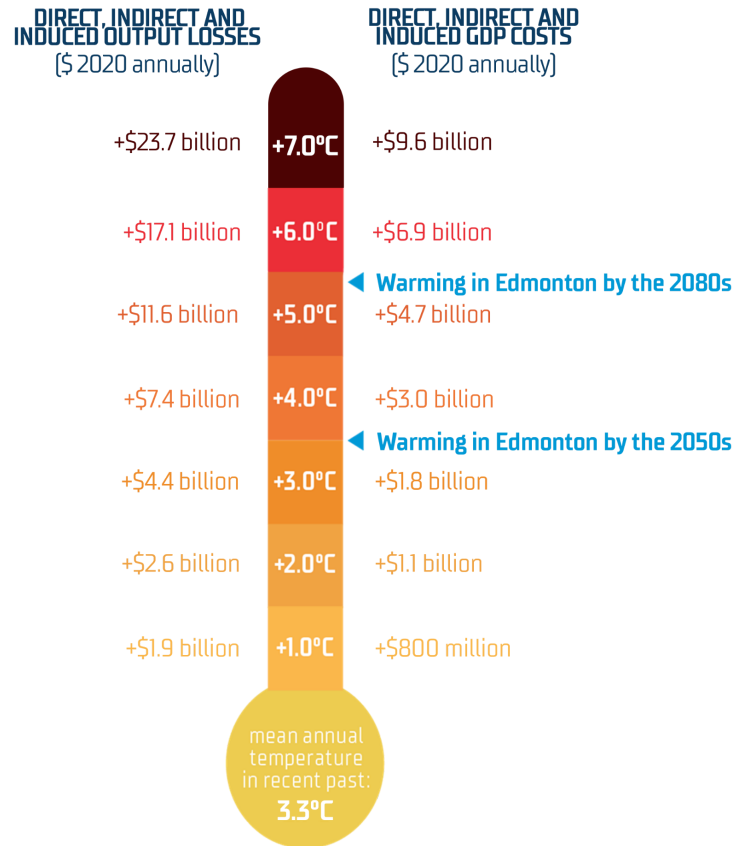


mixed grassland ecosystem. Historically, the climate has supported parkland and dry mixedwood boreal forests. Trees that are native to Edmonton may have a harder time recovering from events like drought, fires or insect outbreaks, leading to an expansion of grasslands at the expense of forests. As the habitat changes, different plant and animal species may be found in the ecosystem, including new pests.

Changing Climate Impacts

Edmonton’s changing climate will have multiple impacts, including on infrastructure, socioeconomic activity, public health and safety, and the natural environment.

To better understand what these climate change costs mean for Edmonton, a study specific to the City was conducted to model and project the economic consequences of climate change.¹ This study found that climate change could cause direct annual costs of approximately \$1.0 billion by the 2050s, and \$4.1 billion by the 2080s. These costs arise from the physical impacts of climate change, such as damage or disruption to tangible goods and services that can be monetized (ex. costs incurred to repair damaged infrastructure) as well as costs to intangible goods and services, such as travel delays due to damaged infrastructure. Annual GDP losses due to climate-related impacts on Edmonton, by the 2050s is estimated at \$2.1 billion annually, and \$6.0 billion annually by the 2080s. This economic analysis illustrates that climate change will have real economic consequences for Edmonton, and that there will be a cost incurred on future Edmontonians if climate change action is not taken. Social and GDP costs for Edmonton increase with each degree of additional warming.



In February 2022, the Intergovernmental Panel on Climate Change (IPCC) released a report that found the cumulative scientific evidence is unequivocal; that climate change is a threat to human well being and planetary health. This

¹ Boyd, R. 2022. Costs of Inaction: Economic Impacts of Climate Change on Edmonton. Prepared by All One Sky Foundation for the City of Edmonton.

report indicated that, with very high confidence, “any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all”.

Edmonton’s Climate Resilient Edmonton: Adaptation Strategy and Action Plan was developed to respond to the changing climate and build resilience. Work is underway, but additional efforts and funding are needed.

A 2020 report from the Insurance Bureau of Canada and Federation of Canadian Municipalities has estimated that building resilience and adapting cities to unavoidable climate change requires an annual investment of 0.26 per cent of GDP.² Using this analysis, an investment of approximately \$185 million per year for the next 10 years is needed for Edmonton to invest in adaptation efforts to prepare the community and corporation for a changing climate. This analysis does not include energy transition investment, which focuses on reducing emissions that are causing climate change. The United Nations has said that for every dollar invested in climate-resilient infrastructure, six dollars can be saved.

² IBC and FCM 2020. Investing in Canada’s Future: The Cost of Climate Adaptation at the Local Level, Final Report, February 2020.