
Climate Change Projections and Possible Impacts for Saskatoon

Recommendation

That the report of the Acting General Manager, Utilities & Environment Department, dated April 1, 2019, be forwarded to City Council for information, and a copy of the report be forwarded to the Saskatoon Environmental Advisory Committee for information.

Topic and Purpose

This report summarizes the expected climate change projections and possible impacts to the Saskatoon region and the risks these changes pose to the City of Saskatoon's (City) infrastructure, programming and service delivery.

Report Highlights

1. Climate change "mitigation" involves the reduction of emissions and stabilizing the levels of heat-trapping greenhouse gases in the atmosphere. "Adaptation" addresses the impacts of climate change already in progress. Both are necessary in responding to the prevention and consequences of climate change.
2. Climate projection data featured in this report comes from the Canadian Centre for Climate Services and the Climate Atlas of Canada.
3. The Saskatoon region can expect to see temperature and precipitation increases in addition to more extreme weather fluctuations and events.
4. The three high-risk impacts anticipated for the Saskatoon region are: 1) increased demand on the water and waste water, storm water, and power utilities; 2) heat stress on outdoor staff and plants/trees; and 3) increased populations and diversity of pests as consequences of climate change.
5. Next steps include further analysis of risk assessment, prioritizing items for risk management, and developing plans to reduce climate risk into the future.
6. Research indicates that early investment in climate change adaptation and mitigation efforts are likely to be at a lower cost than investments that are delayed or happen reactively.

Strategic Goals

Climate modeling and projections are a part of the climate change strategy, including a Corporate Climate Adaptation Strategy and a valuation for natural assets. These projects directly support the Strategic Goals of Environmental Leadership and Asset and Financial Sustainability and are specifically related to "proactively addressing the effects of climate change" and "key civic infrastructure assets are maintained and funded to minimize total life cycle cost". Additionally, the Corporate Climate Adaptation Strategy directly addresses the Strategic Risk Register entry "The City may not be prepared for the effects of climate change."

Background

City Council, at its Regular Business Meeting held on August 27, 2018, the Standing Policy Committee on Environment, Utilities and Corporate Services considered the following item and resolved:

- “1. That information pertaining to the Corporate Adaptation Strategy be received; and
2. That \$32,000 from Capital Project No. 2183, Energy and Greenhouse Gas Management Plan, in addition to \$125,000 of Federation of Canadian Municipalities grant funding, be designated to a new Adaptation Capital Project to support the development of the Corporate Adaptation Strategy.”

Additional detail is provided on the history of the project in Attachment 1 - Additional Decision Background.

Report

Climate change is a complex issue facing Saskatoon, and responding to climate change involves a two-pronged approach. “Mitigation” involves the reduction of emissions and stabilizing the levels of heat-trapping greenhouse gases in the atmosphere.

“Adaptation” involves addressing the impacts of climate change already in progress. Current research and best practice focuses on both mitigation and adaptation as being necessary to address the causes and effects of climate change.

Understanding Climate Projection Data

In order to proactively plan for both climate change adaptation and mitigation, further data has been gathered and analyzed from the Canadian Centre for Climate Services and from the Climate Atlas of Canada.

Climate projection data gathered by the Administration works with three scenarios: “status quo emissions production”; “moderate emissions reduction”; and “major emissions reduction”. The data indicates that global surface warming is likely to exceed a 2^o C rise over pre-industrial levels by 2100 in the status quo, minor reduction and moderate reduction scenarios, resulting in non-compliance with the Global Covenant of Mayors and the Paris Agreement.

For an illustration of global surface temperature change under all four scenarios, descriptions of each scenario’s assumptions, and connections to global climate agreements, see Attachment 2 - Climate Simulations under each Emissions Scenario.

Uncertainty is present in climate modeling from natural variability in climate, inaccuracies with assumptions underlying the climate model, such as population growth rates or energy and land use trends, and future production rates of greenhouse gas emissions.

Projected Climate Changes in Saskatoon by 2100

Local data has been gathered and analyzed from the Canadian Centre for Climate Services and the Climate Atlas of Canada (see Attachment 3 - Looking Ahead: Climate

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Projections for Saskatoon contains additional details on climate projection data). According to these findings, Saskatoon can expect the following climate change impacts under status quo emission rates:

Warmer	<ul style="list-style-type: none">• a nearly 7⁰ C increase in average annual temperature;• large increases in the average number of days per year warmer than 30⁰ C and 25⁰ C;• a reduction in the number of very cold days per year (-30⁰ C or less); and• a 47-day increase in the average length of the frost-free season.
Wetter	<ul style="list-style-type: none">• a 12% increase in average annual precipitation totals;• a 24% increase in precipitation coming between March and June (some of which will be snow, sleet, and freezing rain);• an 8% reduction in precipitation coming between July and September annually; and• a slight increase in the frequency of 1-in-10 year extreme rain events.
Wilder (<i>Events and Greater Variability</i>)	<ul style="list-style-type: none">• Climate models are not yet able to reliably predict extreme weather events for Saskatoon, however generally climate scientists agree that warmer and wetter settings increase the likelihood of severe and extreme weather events.• The combination of warmer average annual temperatures and reduced precipitation in late summer and early fall months may increase the likelihood of drought conditions and instances of forest/brush fires.• The combination of warmer average annual temperatures, and increased precipitation in early spring may increase the likelihood of late winter storm conditions, and/or rapid spring melting/flooding.

Considering only average annual temperature and precipitation totals, the research shows that projected changes will liken Saskatoon's future climate to what Wisconsin and Michigan experience today. It is important to note that climate change trends do not mean Saskatoon will not experience variability from year-to-year.

Research findings summarize the relationship between emission rates and adaptation requirements in which higher emission rates result in greater temperature increases. The "value of action", or the cost of inaction, is defined where larger temperature increases, in turn, increase changes and impact on the environment due to weather variability resulting in increased cost and magnitude of need for adaptive actions over the long term.

Climate Risk and City Infrastructure, Programs, and Services

Risk analysis workshops were held with City staff from: storm water management; corporate risk; asset management; parks management and design; emergency management and preparedness; sustainability; facilities management; and power generation.

The intent of the risk analysis was to connect each of the climate change impacts on civic operations with estimated consequence severity and likelihood of occurrence over the next 25 years. These estimates were then put together to form an overall risk level on a four-point scale from high to very low. Generally, warmer climate conditions returned the highest risk rankings overall. Three notable high risk impacts include:

1. Increased demand on the water and waste water, storm water, and power utilities;
2. Heat stress on outdoor staff and plants/trees; and
3. Increased populations and diversity in pests.

The Administration noted all risk estimates for identified climate impacts would likely increase over time if actions to address conditions were delayed or avoided.

Attachment 4 - Climate Risk and Civic Operations presents a table overview of the complete risk analysis.

Next Steps

The next steps for the Corporate Climate Adaptation project will focus on detailed analysis of the risk assessment results, prioritizing items for risk management, and developing a plan to reduce or manage climate risk into the future. This work will be collaborative in nature including both internal stakeholders and key external stakeholders through a co-design event, small round-table discussions, and individual meetings.

Stakeholder Involvement

The scope of the Corporate Climate Adaptation Strategy project is internal. As a result, stakeholder involvement is focused mainly on a wide range of internal work groups. The project is incorporating internal stakeholders through individual meetings and working sessions. To date, eight sessions have involved 20 internal staff.

Climate research involved a number of local and national insurance providers and research organizations.

In the second quarter of 2019, a co-design event to focus on generating ideas to build the City's adaptive capacity will be held with a wider range of internal staff. Key external stakeholders will be engaged after this event in the third quarter, through invitational round table discussions and individual meetings aimed at refining co-design ideas and adding ideas from existing best practices.

Communication Plan

As part of the Communication Plan, a brand has been developed along with mission and vision statements to guide toward project objectives. A number of internal updates are planned for stakeholders and administrative leaders in 2019 and a marketing strategy is in development to focus on community education and awareness.

Policy Implications

The Local Actions Strategy will outline policies that may be affected in October 2019.

Financial Implications

Research indicates that early investment in climate change adaptation and mitigation efforts is often at a lower cost than investments that are delayed or happen reactively. A report on funding options for sustainability initiatives is expected to be presented in June 2019, with the Low Emissions Community report on climate change mitigation. Full financial implications related to projected climate change for Saskatoon will be included in the Local Actions Strategy in October, 2019, with short and long-term investment recommendations. Additionally, a number of short-term options are expected to be included for consideration in the 2020-2021 budget.

Environmental Implications

This report outlines projected climate change for Saskatoon and the risk these changes pose to civic services and infrastructure. This information is the first stage of understanding what environmental implications projected climate change may have on Saskatoon. The Local Actions Strategy will more fully discuss this concept and provide potential actions to limit negative environmental implications and increase the likelihood of positive implications.

Total corporate Greenhouse Gas emissions in 2014 were approximately 106,000 tonnes Co₂e. In order to meet the corporate emissions reduction target of 40% by 2023, 42,600 tonnes of Co₂e or 10,650 tonnes per year over the next four years are needed to be reduced from 2014 levels.

Other Considerations/Implications

There are no privacy or CPTED considerations at this time.

Due Date for Follow Up

The Local Actions Strategy will be presented to City Council in October 2019.

Public Notice

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

Attachments

1. Additional Decision Background
2. Climate Simulations under each Emissions Scenario
3. Looking Ahead: Climate Projections for Saskatoon – Executive Summary
4. Climate Risk and Civic Operations – Executive Summary

Report Approval

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