



CLIMATE CHANGE SCIENCE UPDATE: FACTS AND SOURCES

SASKATCHEWAN ENVIRONMENTAL SOCIETY

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When the Paris Agreement was adopted by all countries in November 2015, the aspirational goal was to hold the rise in global average temperature to 1.5 degrees Celsius above the temperature in the pre-industrial era (1850-1900). In large parts of the world, including here in Saskatchewan, the necessary actions have not been taken to achieve this goal.

EVIDENCE

- Carbon dioxide accounts for approximately two thirds of the heating influence of all human-produced greenhouse gases. Methane and nitrous oxide, two very potent greenhouse gases, are also on upward trajectories.ⁱ
 - Methane levels in the atmosphere have risen from 1773 parts per billion in 2000 to 1911 parts per billion in 2022.ⁱⁱ
 - Nitrous oxide emissions have risen from approximately 316 parts per billion in the year 2000 to over 335 parts per billion in 2022.ⁱⁱⁱ
- 2023 was the hottest year on record and the magnitude of the jump in global average temperature is extremely worrisome: 1.45 degrees Celsius above the pre-industrial average, an increase of 0.16 degrees Celsius over the previous high in 2016. Usually, high temperature records are broken by much smaller margins.^{iv}
- In 1990 the concentration of carbon dioxide in the atmosphere was about 354 parts per million. By 2023 it had risen to 419 parts per million, a jump of 65 parts per million.^v
- In 2023, glaciers in western North America lost ice at a rate 5 times higher than they had during 2000 to 2019. From 2020 to 2023, a stunning 9% of their 2020 volume has been lost due to ice melt.^{vi}

IMPACTS

- **Extreme Weather:** There has been a five-fold rise in extreme weather events compared to 50 years ago.^{vii}
- **Climate Refugees:** UNICEF places the daily average number of child displacements from extreme weather events at 20,000 children, and over the period 2016 to 2021 at 43 million children.^{viii}
- **Forest Fires:** In Canada an unprecedented 18.4 million hectares of forest burned in 2023 (about the size of North Dakota), and over 200,000 residents had to evacuate their homes. In Saskatchewan an area 5 times the size of Prince Albert National Park burned.^{ix}
- **Drought:** By the autumn of 2023 drought stretched over vast portions of B.C., Alberta, Saskatchewan, Manitoba, and Ontario. In Saskatchewan, extreme drought conditions extended from Leader north to Lloydminster and west to Saskatoon.^x Drought has driven up insurance claims by Saskatchewan's agriculture producers: in the last three years, the Sask. Crop Insurance Corporation has provided more than \$6 billion in insurance claims and benefits.^{xi}
- **Oceans:** Up to now at least 90% of the extra heat trapped by rising greenhouse gas levels in the atmosphere has been taken up by the oceans.^{xii}

- The world's oceans were record-warm in calendar year 2023 and in January and February of 2024, sea surface temperatures continued to spike, setting dangerous new records.^{xiii}
- Amid an extended marine heat wave, millions of corals reefs are bleaching due to heat stress."^{xiv}
- Sea water expands as it warms, and a warmer atmosphere is increasing melt rates on the Ice Sheets in Greenland and Antarctica. This ice melt water makes its way into the world's oceans, adding to sea level rise. The rate of sea level rise has more than doubled since the start of the satellite record in 1993.^{xv} Communities in many low-lying countries are feeling severe impacts.
- **Water Security:** Widespread glacier loss in the Rocky Mountains in the century ahead is certain to negatively affect future water flows on the North and South Saskatchewan Rivers during the summer and autumn months.

THE WAY FORWARD

By 2021 the European Union had achieved a 30% reduction in GHG emissions compared to 1990.^{xvi} The EU is targeting to achieve a 55% reduction below 1990 emissions by 2030.^{xvii} The European Union's positive record contrasts sharply with Saskatchewan's record.

- Canada's 2023 *National Inventory Report* cites Saskatchewan's 1990 greenhouse gas emissions at 42,500,000 tonnes (carbon dioxide equivalent) and 2021 emissions at 67,100,000 tonnes carbon dioxide equivalent.^{xviii}
- With 3% of Canada's population, Saskatchewan accounts for 10% of Canada's greenhouse gas emissions.^{xix}

Here in Saskatchewan, we must collectively take responsibility for what happens in our own part of the world, while encouraging others to do the same where they live. At a global level, those living now are the last ones able to prevent catastrophic climate change impacts from occurring on a widespread basis. If we fail to act, future generations will suffer the consequences without being able to prevent a great many of them.

ⁱ <https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide>

ⁱⁱ <https://climate.nasa.gov/vital-signs/methane/?intent=121>

ⁱⁱⁱ <https://www.noaa.gov/news-release/greenhouse-gases-continued-to-increase-rapidly-in-2022>

^{iv} <https://wmo.int/news/media-centre/climate-change-indicators-reached-record-levels-2023-wmo>

^v <https://research.noaa.gov/2018/05/30/noaas-greenhouse-gas-index-up-41-percent-since-1990/>

^{vi} <https://wmo.int/news/media-centre/climate-change-indicators-reached-record-levels-2023-wmo>

^{vii} <https://wmo.int/topics/early-warning-system>; <https://news.un.org/en/story/2021/09/1098662>

^{viii} <https://www.unicef.org/press-releases/weather-related-disasters-led-431-million-displacements-children-over-six-years>

^{ix} <https://earthobservatory.nasa.gov/images/151985/tracking-canadas-extreme-2023-fire-season>;

<https://www.cbc.ca/news/canada/saskatoon/saskatchewan-wildfires-2023-1.7001990>

^x <https://www.saskatchewan.ca/-/media/news-release-backgrounders/2023/nov/2023-conditions-at-freezeup-report-final.pdf>

^{xi} <https://leaderpost.com/news/saskatchewan/estimated-1-8b-in-insurance-claims-to-be-paid-to-producers-for-2023-growing-season>

^{xii} <https://www.climate.gov/news-features/understanding-climate/climate-change-ocean-heat-content>

^{xiii} <https://www.theguardian.com/environment/2024/mar/07/february-warmest-on-record-globally-copernicus-climate-change-service>

^{xiv} <https://www.cbc.ca/news/science/warmest-february-climate-change-1.7136294>

^{xv} <https://wmo.int/sites/default/files/2023/11/WMO%20Provisional%20State%20of%20the%20Global%20Climate%202023.pdf>

^{xvi} <https://www.eea.europa.eu/en/analysis/indicators/total-greenhouse-gas-emission-trends>

^{xvii} https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2030-climate-targets_en

^{xviii} <https://unfccc.int/documents/630776>; https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/inventory.html?utm_campaign=not-applicable&utm_medium=vanity_url&utm_source=canada-ca_ghg-inventory (Part 3, Table A11-16 'GHG Emission Summary for Saskatchewan, Selected Years')

^{xix} <https://www.saskatchewan.ca/business/environmental-protection-and-sustainability/a-made-in-saskatchewan-climate-change-strategy/emissions-in-saskatchewan>