

Climate Change and Projected Temperature Changes for Chicago

Chicago has four main seasons. January is the coldest month, with an average high of 31°F and an average low of 16°F. There are frequent storms in the winter, with cloudy skies, wind, and snow or rain. On average, Chicago receives 38 inches of snow each winter. Summers are hot and humid, with an average high of 84°F during the day, and an average low of 66°F at night.

Current Changes in Chicago's Climate

Chicago's annual average temperature has warmed by more than 2°F since 1945. The increase in temperature is particularly noticeable during the winter. Other temperature-related changes have also been observed, including:

- Fewer cold waves, and a number of major heat waves in the last few decades
- Lengthening growing seasons
- Ice on Lake Michigan forming later in the year, and lasting for shorter periods of time, with some years having almost no lake ice
- A warmer and wetter growing season, increased risk of potato late blight, gypsy moths, and other pests

Changes over the Coming Century

Warmer temperatures, more extreme heat events, and

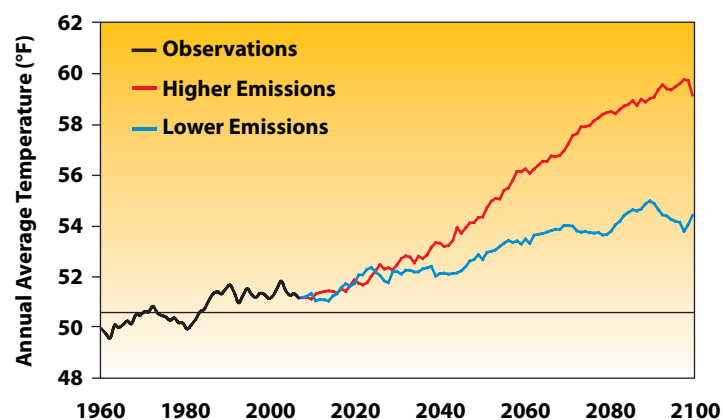


Figure 1 The red and blue lines show projected increases in temperature over the next century. The black line shows observed changes up to the present day.

“There will likely be more very hot summers. The number of extremely hot days (over 100°F) is likely to increase.”

more extreme precipitation events are projected for the Chicago area. However, the amount of change depends on choices we and the rest of the world make about our emissions of heat trapping gases. **Figure 1** shows the projected changes in temperature for two different future scenarios. In the higher emissions scenario, humans continue to depend on fossil fuels as their primary energy source, do not make their homes and workplaces more efficient, and continue to expand their vehicle miles traveled and emissions grow unabated. In the lower emissions scenario, humans transition to alternative energy sources, and also conserve energy.

Notice that even the lower emissions scenario in **Figure 1** results in an increase in temperature. This is because even a lower emissions scenario involves some emissions of heat-trapping gases. However, the lower emissions scenario results in a much smaller temperature increase than the higher emissions scenario.

Specific Changes Expected for the Chicago Region

Researchers expect the following temperature-related changes:

Temperature increases: By the end of the century, Chicago could expect an annual average temperature increase ranging from 3-4°F under lower emissions to 7-8°F under higher emissions. The greatest increases would likely occur during summer.

Impacts of this change: Snow and ice would melt more quickly, and surface water would evaporate more rapidly. Plants would flower earlier in the spring, and the growing season would continue to lengthen.

Hotter summers: There will likely be more very hot summers. By the end of the century, the number of extremely hot days (over 100°F) could increase from

the current 2 days per year to 8 days per year under lower emissions, or as many as 31 days per year under higher emissions.

Impacts of this change: Hotter summers would put young children, the elderly and ill members of the population at risk for heat stress, cardiovascular problems, and even death. Hotter summers would strain the public health and emergency-preparedness systems and also lead to increased energy use for air conditioning.

More heat waves: Climate change could bring more frequent, longer, and more intense heat waves to Chicago. The heat wave in 1995 claimed almost 700 lives. Under higher emissions, there could be several heat waves like that of 1995 **each** year by the end of the century. Under lower emissions, the number

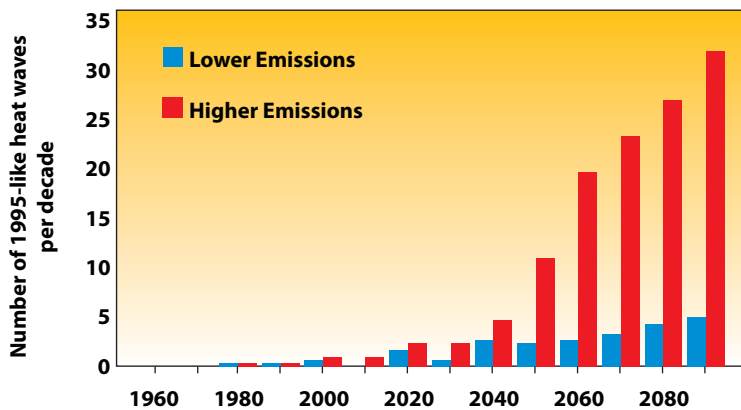


Figure 2 Increases in the number of heat wave events per decade

of such severe heat waves would be significantly reduced to only one every other year (**Figure 2**).

Impacts of this change: More illness due to heat-stress would be expected in the future.

More humidity: In a warmer climate, the increased evaporation of surface water would result in increased humidity.

Impacts of this change: The combination of temperature and humidity is known as the “heat index,” a mea-

Picturing Chicago’s New Climate

By the end of the century, a Chicago summer could feel like Mobile, Alabama under higher emissions, with an average Heat Index of more than 105°F. Under lower emissions, it could feel like Atlanta, Georgia, with an average Heat Index of more than 93°F. Such intense summer heat would be uncomfortable for residents, and reduce the city’s attraction to tourists.

sure of how hot the temperatures really **feel**. With higher humidity, hot days will feel even hotter.

Longer growing season: The last spring frost would occur from 20 days earlier under lower emissions to about 30 days earlier under higher emissions by the end of the century.

Impacts of this change: Longer growing seasons would benefit agriculture and gardening, although prolonged high temperatures can damage crops and other plants.

Less frost: Fewer frost days would be likely each year. *Frost depth* is a measure of the depth to which the soil freezes each winter. It is likely that the annual frost depth will decrease.

Impacts of this change: A change in frost depth would affect building codes in the Chicago area, as well as load limits on roads. Frost depth is also important in agriculture.

Fewer extremely cold days and cold spells: The average coldest day of the year could warm by 4-6°F through this century. There could be from about 30% (lower emissions) to 70% (higher emissions) fewer extremely cold days each year.

Impacts of this change: Winters would feel warmer, and heating costs would likely drop. However, because winter precipitation is projected to increase, the total amount of snowfall isn’t expected to change much.



Climate Change and Chicago: Projections and Potential Impacts

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