

# Climate Change and Impacts on Chicago Area Infrastructure

**A**s the climate changes, the number of heavy rainfall events and heat waves in the Chicago area would probably increase. These events could impact roads, bridges, highways, rail systems, buildings, fleets, green infrastructure, water infrastructure and power infrastructure systems.

## Changes in Energy Use

One of the most significant changes for Chicago's infrastructure would be an increase in energy consumption from electricity during heat waves. Because most of our energy comes from fossil fuel combustion, increases in energy consumption will worsen the problem of climate change (**Figure 1**), including heat waves.



**Figure 1** Burning fossil fuels sends CO<sub>2</sub> into the atmosphere, increasing the problem of global warming, also referred to as climate change.

**Increased need for air conditioning:** Even if people switch to alternative sources of energy and conserve energy (a “lower” emissions scenario), the number of days per year requiring air conditioning could double by the end of the century. If humans continue to rely on fossil fuels (a “higher” emissions scenario), the number of days requiring air conditioning could triple.

**Decreased need for heating:** The number of days

per year requiring heating could decrease by a similar amount.

## **More energy use in summer and less in winter:**

There would be a decreased demand for natural gas in the winter, and an increased demand for electricity during the summer.

**More brown-outs or black-outs:** More frequent, severe, and longer heat waves increase the likelihood of electricity shortages, leading to brown-outs or black-outs.

## **Other Infrastructure Impacts**

Researchers also expect the following impacts on infrastructure in the Chicago area:

**More stressed police, fire, and medical response systems:** A potential doubling in the number of very hot days could result in 5–10% more fires in the Chicago area; more heat-related illnesses; and an increase in police emergencies, which generally occur when Chicago hits a “heat trigger” of 98 or 99°F.

**Higher-cost maintenance for roads and transit:** Road repairs and maintenance costs could double under a higher emissions scenario because of surface damage to roads caused by increased heat and more severe storms. Costs also could rise for managing flooding of parking lots. Bus and other vehicle maintenance costs would increase because of stress on engines from higher heat and on tires from more potholes. Emergency vehicles—fire engines, police cars, and ambulances—would need to be replaced more often due to heavier usage and more wear.

**Higher building capital and maintenance costs:** Costs for cooling buildings and roof and facade repairs are expected to rise as temperatures rise. Research based on City of Chicago buildings suggests that costs under the higher emissions scenario could be ten times higher than under the lower emissions scenario. Buildings would need better insulation and high performance windows to block the sun's heat and hold in cooling. Roofs would have higher repair costs

due to the sun breaking down petroleum-based roofing materials, and facades may need more maintenance and repairs. Building losses due to damage from heavy rainstorms and flooding could be a much larger expense.

**Higher landscaping costs:** Chicagoans take great pride in their award-winning gardens, lovely lakefront, and well-maintained park systems that provide beauty and respite for residents. As temperatures warm and rainfall patterns shift, these gardens and parks will be affected. The Chicago area would experience a longer blooming season and, at the same time, a greater loss of trees and plants due to heat stress and invasive insects and weeds. Landscaping costs related to maintenance of trees, plants, and flowers would increase as temperatures warm. For example, landscaping costs are projected to be five times higher for the Chicago Park District under a higher emissions scenario as compared to a lower.

**Higher harbor dredging costs:** Due to falling water levels in Lake Michigan, towns and cities could see harbor dredging costs that are twice as high under a higher emissions scenario than a lower emissions

scenario. They also could experience higher costs for algae treatment due to increased water temperatures in the lake.

**Higher business costs due to staff absences:** As temperatures warm, people who work outside will become increasingly vulnerable to heat stress and worsening respiratory diseases.

**Higher property insurance costs:** Researchers expect to see increasing insurance premiums for coverage applicable to weather-related events; potential exclusions for certain losses such as flooding, hail damage, or business disruption; and higher deductibles or risk sharing.

**Less tourism:** The Chicago area may have a longer summer season, but under the higher emissions scenario, it would be a much hotter and more humid summer too. This more uncomfortable climate, combined with the risk of more “bad air” days, could lead to a decrease in the number of summer entertainment events held in Chicago as it becomes increasingly difficult to attract non-resident attendees.

## Avoiding Negative Impacts on the Chicago Area Economy

Research shows that there is a compelling economic advantage to pursuing activities that lower emissions. As temperatures and extreme precipitation rise, so will the economic costs. These costs will only be partly offset by savings due to warmer winters. For Chicago’s city government alone, the projected infrastructure costs of climate change are nearly four times higher under the higher emissions scenario than they are under the lower emissions scenario.

Even under the lower emissions scenario, government, residents, and businesses need to take steps to avoid higher summer electric bills and threats to service; more vehicle repairs; more wet basements needing clean up; and damage to gardens and lawns.

### Reducing Our Energy Use

We can avoid higher infrastructure costs by joining others around the globe in burning less fossil fuels.

For example, if we use fans and better ventilation for more efficient cooling, the amount of energy required for air conditioning could decrease significantly. We also need to switch to alternative sources of energy, such as wind and solar electricity generation. These energy sources can meet the need for cooling without increasing our emissions of heat-trapping gases.



## Climate Change and Chicago: Projections and Potential Impacts

Katharine Hayhoe, Donald Wuebbles, and the Climate Science Team  
Summary prepared by Christy Hayhoe