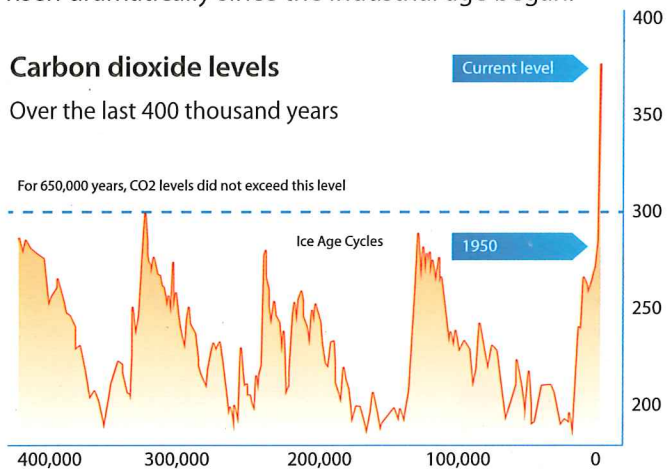
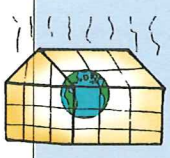
Climate change in Minnesota

The world's climate is changing due to increasing levels of greenhouse gases in the atmosphere. Shifts in climate have happened throughout Earth's history due to natural factors. Changes occur in temperature, precipitation patterns, snow and ice cover, and sea level. But what's different now is how fast these changes are happening.

Almost all climate scientists agree that recent changes are primarily from human activities. Studies of ice cores from glaciers show that CO_2 levels in the atmosphere have risen dramatically since the industrial age began.



This graph, based on the comparison of atmospheric samples contained in ice cores and more recent direct measurements, provides evidence that atmospheric CO2 has increased since the Industrial Revolution.

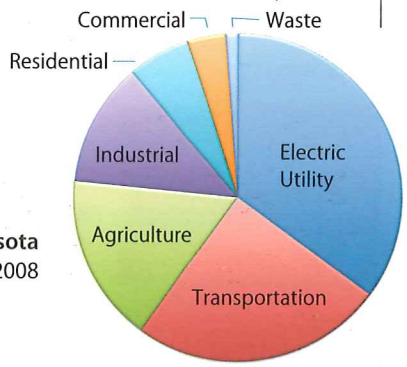


How does climate change happen?

The earth's atmosphere acts like a pane of glass in a greenhouse, trapping the sun's heat in the lower atmosphere and causing the earth's surface to warm. Heat-trapping greenhouse gases (GHGs) include water vapor, carbon dioxide, methane and perflurocarbons.

What are sources of greenhouse gas emissions in Minnesota?

Most greenhouse gases come from burning fossil fuels (oil, coal, and petroleum) to run our cars, power plants, and factories.

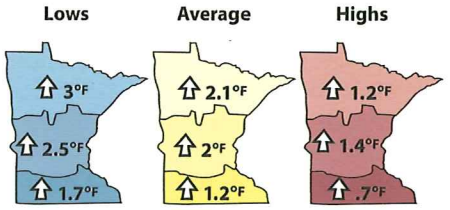


GHG Emissions for Minnesota
by economic sector, 2008

What can we expect?

The earth's surface temperature has warmed during the last century. Since 1900, the average temperature of the Earth's surface has increased by about 1.2 to 1.4 degrees F. That may not sound like much. However, on a long-term scale, it is significant.

Here in Minnesota, effects from a changing climate are already happening. This figure shows how average temperatures have changed in Minnesota over time.



Increase in year-round daily lows, highs, and average temperatures in Minnesota, 1862–2009. Minimum temperatures (daily lows) have increased at an even faster rate than average temperatures.
(Source: Minnesota State Climatology Office)

Another change is the amount of annual precipitation in Minnesota has increased by about 3 inches per year. Along with that has come a change in the intensity of storms. Southeastern Minnesota has had 3 large rainstorms (with 6 or more inches of rain) since 2002. Having such large storms that often is very unusual compared to historical rainfall amounts. These large storms have damaged hundreds of

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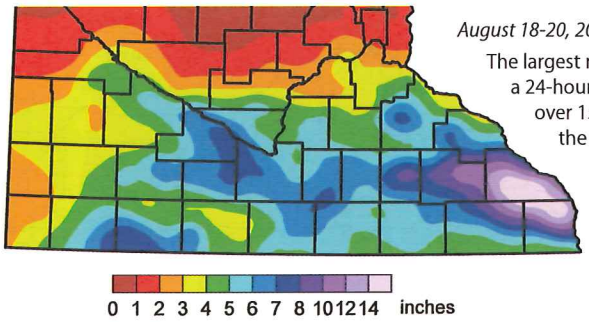
homes and businesses through flooding and mudslides.

Scientists are looking at what other changes might happen in Minnesota in the future based on what we know about the greenhouse gases that are already in the atmosphere.

- There could be shifts in the location of Minnesota forests and grasslands, changing the types of plants and animals that live in the state.
- There may be less habitat for trout, whitefish, and other coldwater species.
- We might experience more days with poor air quality (smog) in the summer.
- Minnesota might have a shorter season of snow and ice cover, resulting in less winter recreational opportunities.

2007 record-breaking rainfall event in southeast Minnesota



August 18-20, 2007

The largest rainfall ever recorded in a 24-hour period in Minnesota, over 15 inches, occurred near the town of Hokah.

State Climatology Office - DNR Waters

Climate vs. Weather

Weather is a local or regional event that lasts for days or weeks. Climate is the large-scale pattern of weather over a long period of time – decades or longer.

Rainfall extremes

Some areas of the state will have to deal with more frequent severe drought, while others will face a rise in extreme rainfall and flooding.

Heatwaves and smog

Minnesotans will experience more extreme heat in the summer, and more days with poor air quality.

Too warm for trout

The warming of our lakes, combined with increased runoff from storms and development, will mean more algae-green water and fewer lakes with trout and other coldwater fish.

Pine forests leave

It is likely that our north woods of pine, fir, aspen, and birch will not survive the warming climate. They will eventually be replaced by a mix of other trees like oaks and ash.

bryanhansel.com

Hurricane in Grand Marais?

A "landicane" occurred when extremely low pressure caused winds to accelerate to near hurricane speeds. This is typically a tropical weather phenomenon.

State of Minnesota

Addressing the impacts of climate change

Minnesota is working to reduce emissions and adapt to changes. Minnesota passed the Next Generation Energy Act in 2007. This law includes specific goals to reduce greenhouse gases in the state. For example, utility companies must make at least 25 percent of their electricity from sources like wind or solar energy by 2025.

division of energy resources
Minnesota Department of Commerce
www.energy.mn.gov

State agencies are also working on climate change. The Minnesota Pollution Control Agency (MPCA) has developed an Inventory of greenhouse gas emissions in Minnesota. The MPCA also sponsors programs like GreenStep Cities and Minnesota GreenCorps to help local governments and schools conserve resources. The Minnesota Department of Commerce, Division of Energy Resources can provide you with resources to help you save energy and make your home, business or school more energy efficient. The Minnesota Department of Natural Resources is evaluating the health of lakes in the Sentinel Lakes program, which monitors and records changes in lakes from development and climate change.

Minnesota DEPARTMENT OF NATURAL RESOURCES

The MPCA and DNR have also worked with other agencies to assess how the state can adapt to the impacts from climate change on agriculture, health, wildlife, transportation and other sectors of the economy.

Minnesota Pollution Control Agency

What can you do?

According to U.S. EPA, almost 9,000 pounds of CO_2 per person per year are emitted from people's homes. Take steps to reduce your electricity use, heating, cooling and trash. Reduce, reuse, and recycle to save even more resources, energy, and money. If you need to buy a different car or appliance, get the most efficient one you can. About a third of greenhouses gases emitted in the U.S. come from transportation. If you want to do even more to save resources and reduce pollution, walk, bus or carpool.