How Are Coal-Fired Plants Doing?

Statewide, coal-fired power plants in Minnesota generate 60 percent of all sulfur dioxide pollution, 27 percent of all carbon dioxide pollution, 35 percent of all mercury pollution and 10 percent of all nitrogen oxides pollution. All other generation sources contribute a small amount of pollution.

1 Pollution is emitted from other sources such as industrial and commercial sources, cars, trucks and home heating.

How Minnesota Power is Doing
Compared to MPCA Regional Average Emissions

<table>
<thead>
<tr>
<th>Emissions Source</th>
<th>Lower Emissions</th>
<th>Regional Average 100%</th>
<th>Higher Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen Oxides</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Particulate Matter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mercury</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What You Can Do

You can participate in Minnesota Power’s Power of One® energy conservation programs. To learn more visit our Power of One® Web site at www.mnpower.com/powerofone or call 218-355-2843.

How Customer Conservation Helps

Minnesota Power’s customer energy conservation programs have reduced our need to generate electricity by 642,452,444 kWh, a 5.1 percent savings. These savings resulted from both new and ongoing customer participation in Minnesota Power’s energy conservation programs. This equates to a reduction in air emissions of:

- Carbon Dioxide: 499,345 tons
- Nitrogen Oxides: 307 tons
- Sulfur Dioxide: 261 tons
- Particulate Matter: 40 tons
- Mercury: 5.92 lbs

What You Can Do

You can participate in Minnesota Power’s Power of One® energy conservation programs. To learn more visit our Power of One® Web site at www.mnpower.com/powerofone or call 218-355-2843.

Where You Can Learn More

The Minnesota Public Utilities Commission requires electric utilities to provide customers with information on the costs, reliability and air emissions related to the fuels used to generate electricity.

Contact Minnesota Power at 218.722.2625 or 800.228.4966, or visit www.mnpower.com.

Contact the Minnesota Pollution Control Agency at www.pca.state.mn.us, or call 651.296.6300 or 800.657.3864 for additional information about air emissions.

Contact the Department of Commerce at www.mn.gov/commerce, or call 651.539.1886 or 800.657.3710 for more ideas on saving energy.
Electric System Components

The three components of an electric system are:

- **Generation**
- **Transmission**
- **Distribution**

Utilities produce electricity at power plants by burning fuels (such as coal, natural gas, oil, and biomass fuels like wood) and by operating hydroelectric and wind facilities. Utilities also purchase electricity from other utilities or power suppliers.

High-voltage electricity travels from power plants along transmission lines to distribution substations and directly to industrial customers.

At distribution substations, the voltage is reduced and low-voltage electricity is delivered to customers. The amount of electricity is metered to measure customer usage levels.

### Electric Service Costs

Minnesota Power charges customers for the costs of providing electric service, including investments in power plants, transmission and distribution lines, and operating and maintaining Minnesota Power’s electric system.

The 2017 Component Cost table shows average percentages of monthly service costs related to the generation, transmission and distribution of electricity for four major customer categories:

- **Residential (Res)**: household and farm usage;
- **Commercial (Comm)**: small to medium service industries and manufacturing businesses;
- **Industrial (Indust)**: large manufacturing and processing facilities; and
- **Lighting (Light)**: outdoor/area and street/highway lighting

The average percentages are calculated by dividing Minnesota Power’s total cost to provide electric service among the generation, transmission and distribution components.

### How Your Electricity Needs Are Met

- **Hydro**: 9.8%
- **Wind**: 20.0%
- **Purchases**: 22.0%

### Energy Savings

- **Total**: 5.9%

- **Coal**: 42.3%
- **Utilities**: produce electricity at power plants by burning fuels (such as coal, natural gas, oil, and biomass fuels like wood) and by operating hydroelectric and wind facilities. Utilities also purchase electricity from other utilities or power suppliers.

- **High-voltage electricity travels from power plants along transmission lines to distribution substations and directly to industrial customers.**

- **At distribution substations, the voltage is reduced and low-voltage electricity is delivered to customers. The amount of electricity is metered to measure customer usage levels.**

Choose Renewable Energy

Wind-generated electric energy is available through Minnesota Power’s WindSense program in 100 kWh blocks for a small surcharge of $2.50 per block.

To learn more about renewable energy, visit [https://www.mnpower.com/Environment/WindSense](https://www.mnpower.com/Environment/WindSense).

You will learn about our WindSense and SolarSense Renewable Programs.

### Electric Service Costs

<table>
<thead>
<tr>
<th></th>
<th>Res</th>
<th>Comm</th>
<th>Indust</th>
<th>Light</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generation</strong></td>
<td>57%</td>
<td>68%</td>
<td>87%</td>
<td>38%</td>
</tr>
<tr>
<td><strong>Transmission</strong></td>
<td>7%</td>
<td>9%</td>
<td>12%</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Distribution</strong></td>
<td>36%</td>
<td>23%</td>
<td>1%</td>
<td>56%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Your monthly bill also displays a pie chart showing the average percentages for your specific customer category. Individual monthly percentages may vary from the average.

### How Air Emissions Affect the Environment

Carbon dioxide is the principal greenhouse gas linked to global warming.

Nitrogen oxides and sulfur dioxide contribute to acid rain; nitrogen oxides also contribute to smog.

Particulate matter (sometimes called soot) contributes to asthma attacks and other respiratory illnesses.

Mercy accumulates in some fish to levels exceeding current health department guidelines.

The Minnesota Pollution Control Agency is responsible for ensuring that emissions from utilities meet air quality standards for nitrogen oxides, sulfur oxides and smog.

### Air Emissions by Fuel Type

For the year ending December 31, 2017 (measured in pounds per MWh)

<table>
<thead>
<tr>
<th></th>
<th>Carbon</th>
<th>Nitrogen</th>
<th>Sulfur</th>
<th>Particulate</th>
<th>Mercury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchases</td>
<td>0.011</td>
<td>0.169</td>
<td>0.082</td>
<td>0.000008626</td>
<td></td>
</tr>
<tr>
<td>Coal</td>
<td>1.220</td>
<td>2.396</td>
<td>0.005</td>
<td>0.000000000</td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td>1.268</td>
<td>2.095</td>
<td>0.008</td>
<td>0.000000000</td>
<td></td>
</tr>
<tr>
<td>Biomass</td>
<td>3.744</td>
<td>6.410</td>
<td>1.760</td>
<td>0.510</td>
<td>0.0002066</td>
</tr>
</tbody>
</table>

Wind and solar power produce none of these air emissions. Large hydro power may alter ecosystems and cultural resources depending upon the location and design of the facility.

Nuclear energy does not produce these air emissions but does produce both high- and low-level nuclear waste.

1 Approximately 0.33 to 4.09 percent of your total monthly electric bill represents Minnesota Power’s capital and operation costs to control mercury emissions at Boswell Unit 3 and Boswell Unit 4.

2 Biomass CO₂ emissions attributable to combined heat and power resource.