## Welcome!

### from Electricia, Surge & their pup Lumen

*We're electricity superheroes. Our mission is to wisely generate and deliver electricity safely to you.*

*We're powerful, reliable and versatile with a current that flows at close to the speed of light.*

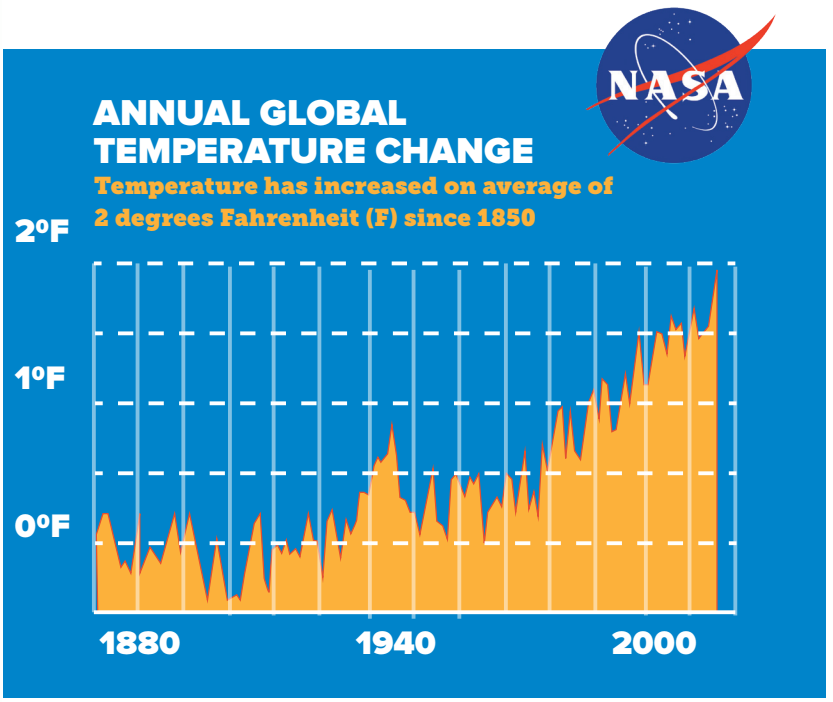
*You don't see us, but you depend on us to recharge your cell phone, keep the lights on and power appliances. We're here for you 24/7!*

*Keeping electricity flowing is a team effort and we'd like your help. To join our power squad, read on.*

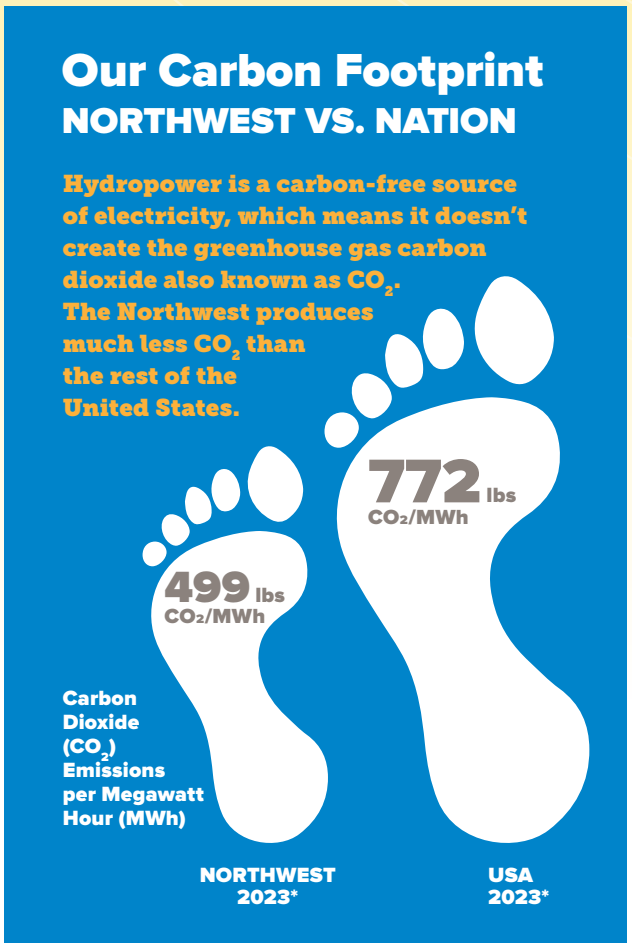
# CLIMATE CHANGE & Carbon-Free Electricity Generation

**Earth's climate is constantly changing. 20,000 years ago, for example, the United States was covered in glaciers.**

Scientists are observing the earth's average temperature going up quickly. The average temperature in the Northwest rose 2°-3° Fahrenheit (F) since 1900; and temperatures are projected to continue increasing over the next century. You now live in a climate with more wildfires and droughts, melting glaciers, and changes in when and how much it rains and snows.



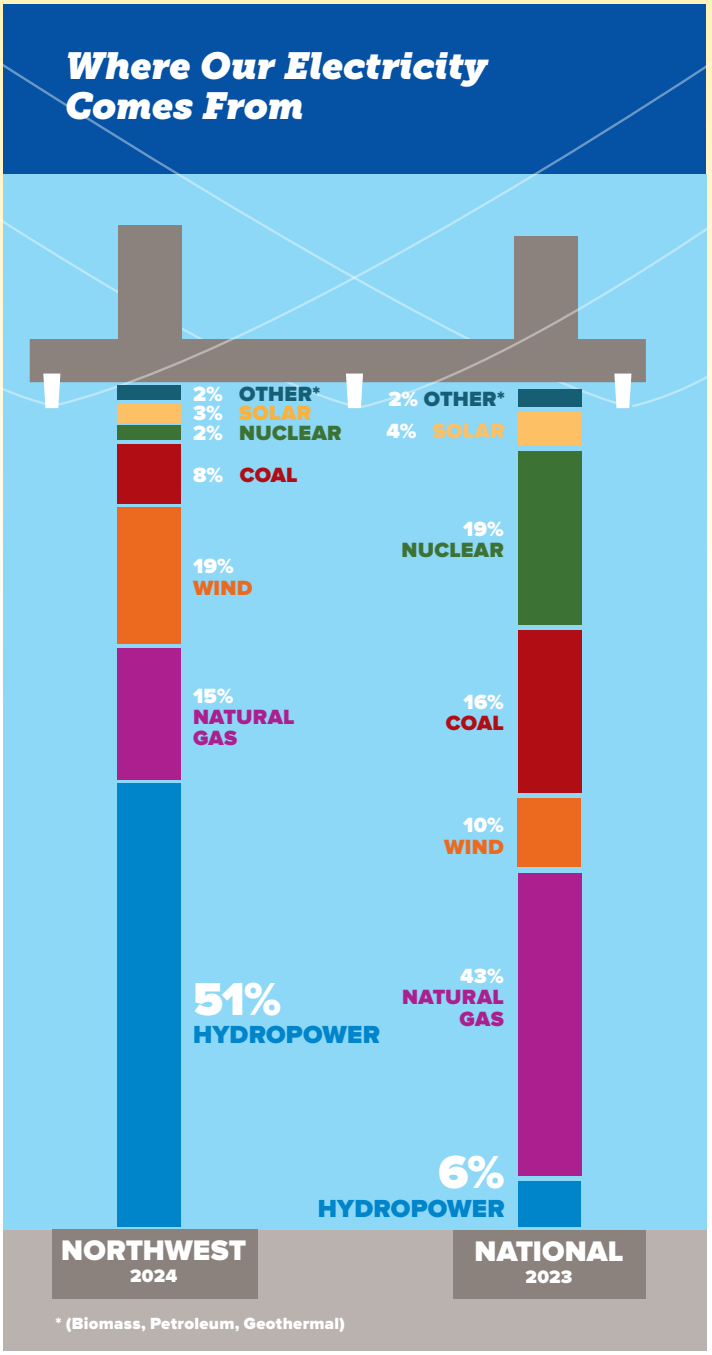

*Source: NASA's Goddard Space Flight Center*




*Source: EPA eGRID*

Humans contribute to climate change when our actions add certain gases to the Earth's atmosphere. These gases block heat from escaping and keep the planet warmer. Scientists call this the greenhouse effect.

In 2022, the Environmental Protection Agency (EPA) found that carbon dioxide ($CO_2$) accounted for 80% of all U.S. greenhouse gas emissions from human activities. Further, about 24% of greenhouse gas emissions result from the generation of electricity.




*Sources: Northwest Power and Conservation Council, U.S. Energy Information Administration*

Moving to carbon-free electricity, meaning no carbon dioxide ($CO_2$) emissions are released into the atmosphere, is a critical way to reduce greenhouse gas emissions. In the Northwest, we are lucky. Thanks to hydropower and other renewables, over 75% of our capacity to generate electricity is already carbon-free.

# Generating Electricity

**Every time we turn on a light switch or plug in a computer or other device, we are using electricity.** The power grid delivers this electricity to our homes, businesses, and farms 24-hours a day, seven days a week. The supply of electricity from power plants must always match demand because the power grid cannot store electricity.

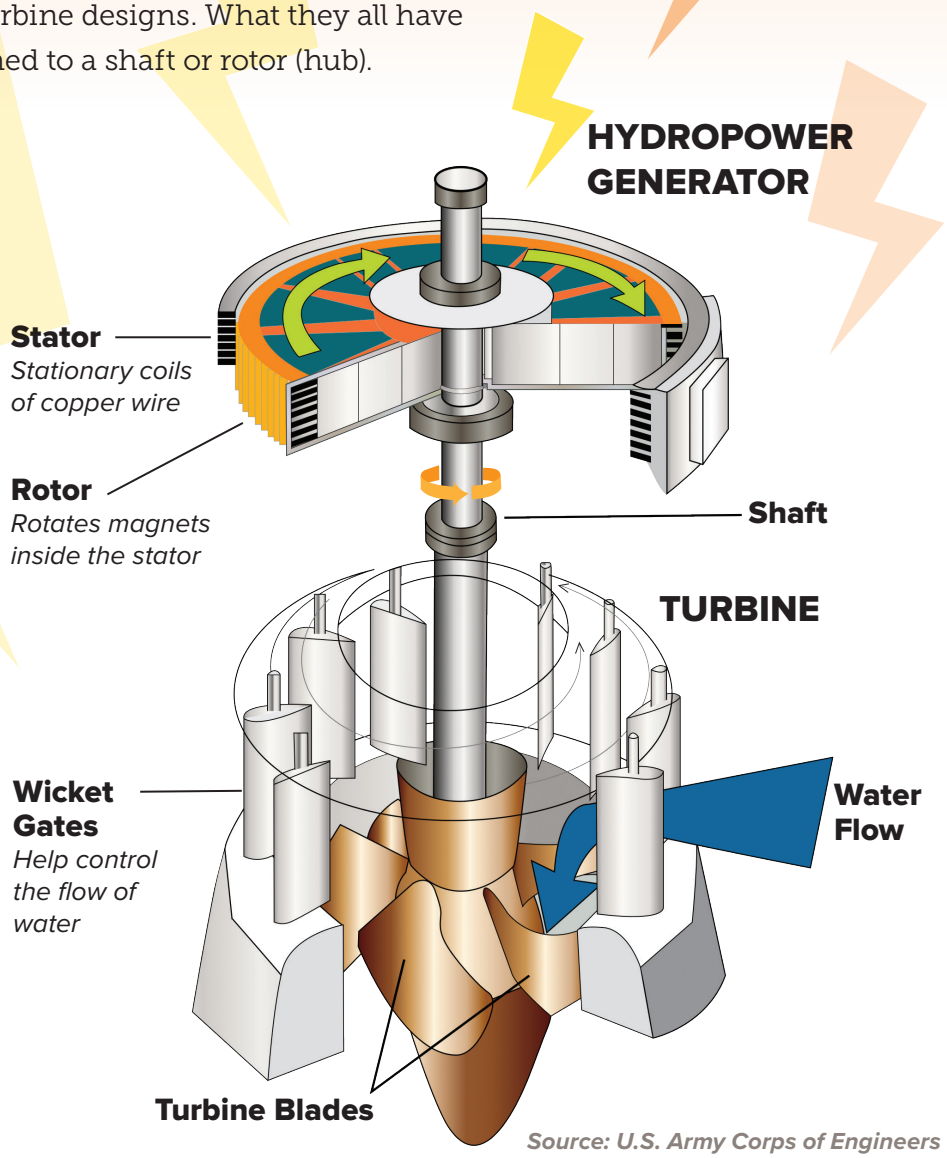
Sometimes called the largest machine in the world, the U.S. power grid has over 12,800 power plants and over 5.7 million miles of power lines. Just as amazing, its reliability is 99.9%.

At power plants, turbines and generators are often used to produce electricity.

## Here's a simple explanation of how turbines and generators work.

**Turbine:** There are many types of turbine designs. What they all have in common are blades that are attached to a shaft or rotor (hub). Each energy source has a unique way of forcing the turbine to rotate (turn). For instance, hydropower uses the force of moving water to turn a turbine. Natural gas power plants use heat, by burning gas, to turn a turbine.

**Generator:** The shaft or rotor being turned by a turbine spins coils of wire inside stationary magnets that are arranged in a circular ring. Alternatively, magnets can spin inside stationary coils of wire. This creates a magnetic field that causes electrons in the wire to move. The small electric currents created in each section of wire coil are combined to produce electricity that can be added to the power grid.

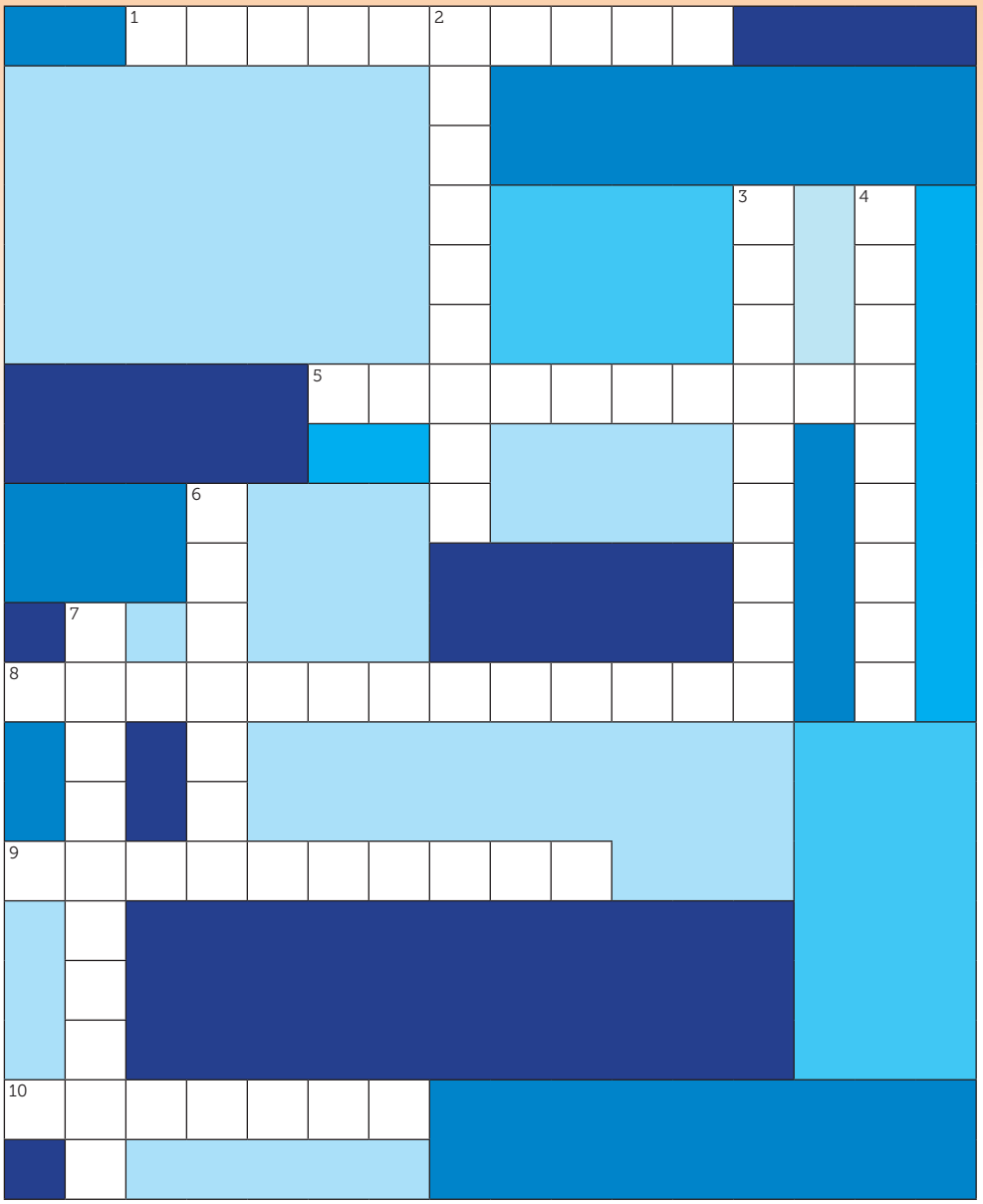



*Source: U.S. Army Corps of Engineers*

# CLIMATE CHANGE & ELECTRICITY GENERATION CROSSWORD PUZZLE

Use the information you've learned so far to complete this crossword puzzle.

The word bank helps you solve the clues. Do not use spaces between words.



## Word Bank

POWER GRID

CARBON FREE

THIRTY ONE

RENEWABLE

TURBINE

MAGNETS

NATURAL GAS

HYDROPOWER

CARBON DIOXIDE

GREENHOUSE

*ANSWERS ON BACK*

## ACROSS

1) The Northwest's largest electricity generation source.

5) _____ means no carbon dioxide ($CO_2$) emissions are released to the atmosphere.

8) Accounts for 80% of all U.S. greenhouse gas emissions from human activities.

9) Gas emissions that block heat from escaping the atmosphere and keeps the planet warmer.

10) _____ spin inside stationary coils of wire to generate electricity.

## DOWN

2) The _____ delivers electricity to our homes, businesses, and farms 24-hours a day, seven days a week.

3) Nationally, the percent of greenhouse gas emissions that result from generating electricity.

4) Type of electricity generation source that is carbon free and is constantly replenished.

6) Fitted with blades, it uses steam, air currents or the force of water to turn.

7) Nationally, the largest electricity generation source.