



5

FACTS ABOUT YOUR
ELECTRICITY

WHAT POWERS OUR LIVES?



⚡ MORE ELECTRICITY IN NORTH DAKOTA IS GENERATED WITH COAL
THAN WITH ANY OTHER FUEL.

1.

More than two-thirds of the electricity used in our region is produced from coal.

2.

You pay less for electricity because power companies use coal.

3.

Lignite coal provides many economic incentives.



► *The Lignite Energy Council is a regional trade association representing mining companies that produce 30 million tons of lignite annually. The council also represents utilities that generate affordable, reliable, and clean electricity for 2 million people in the Upper Midwest, as well as businesses that serve the mines and plants.*

4.

North Dakota's lignite industry is a leader in protecting the environment.

5.

Coal is critical today and in transitioning to a clean energy future.



More than two-thirds of the electricity used in our region is produced from coal.

More electricity in North Dakota is generated with coal than with any other fuel.

Where does coal come from?

North Dakota is one of the country's top 10 coal-producing states, mining approximately 30 million tons every year since 1988.

▶ **Eight generating plants**

Much of the region's electricity is generated from lignite at seven power plants in North Dakota and one in eastern Montana. Lignite also fuels the nation's only coal-to-natural gas coal gasification plant in west-central North Dakota.

▶ **Canadian lignite**

Westmoreland Coal Company operates two lignite mines in southern Saskatchewan that annually produce about 10 million tons of coal. This coal is converted into electricity by three power plants operated by SaskPower, a Canadian Crown Corporation.

What do we use it for?

Nearly 80 percent of the lignite coal mined annually is used to generate affordable, reliable electricity, serving more than 2 million people in the region; about 13 percent is used to make synthetic natural gas that is delivered to 400,000 homes and businesses in the eastern United States; 7 percent is used to produce fertilizer products containing anhydrous ammonia and ammonium sulfate.

COAL PRODUCES:

44%

OF ELECTRICITY USED IN MN

75%

OF ELECTRICITY USED IN ND

34.2%

OF AMERICA'S ELECTRICITY

U.S. coal reserves represent the world's largest single unit of energy secure within the borders of one country.

COAL IS ABUNDANT:

25 billion tons of recoverable lignite reserves in ND

2nd largest known reserves of lignite in the world

Enough to last 800 years

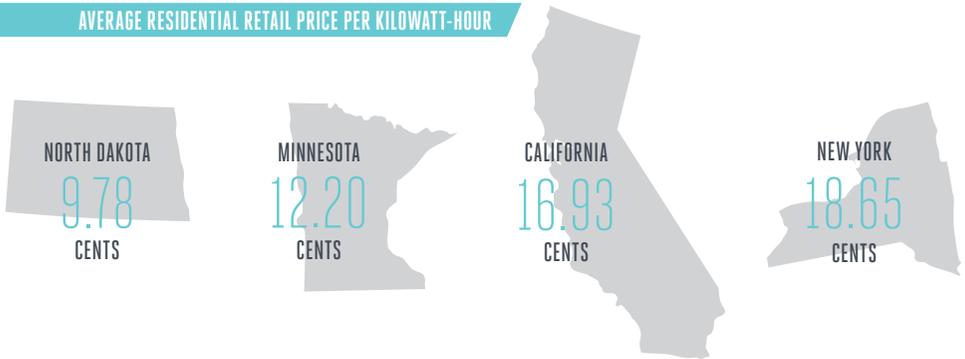
25% of the world's coal reserves are in the U.S., containing more energy than the Middle East's known oil reserves



2.

You pay less for electricity because power companies use coal.

AVERAGE RESIDENTIAL RETAIL PRICE PER KILOWATT-HOUR



2 million regional customers enjoy some of the lowest commercial electrical rates in the country.

Lignite-based power plants supply affordable, reliable electricity around the clock

The average price of electricity in 2015 from North Dakota's lignite-based power plants was \$22.93 per megawatt-hour. That compares with \$33.02 for all U.S. coal-based power plants and \$32.36 for U.S. natural gas-based plants.

Lignite is a valuable domestic resource that contributes to our energy security

The energy value of North Dakota's tremendous lignite reserves is equal to almost three times the entire proved reserve of oil in the United States. The United States has one-fourth the world's coal reserves. On an energy equivalency, the U.S. coal reserves are equal to about four times the oil reserves of Saudi Arabia.

The 28.7 million tons of lignite produced by North Dakota's four lignite mines in 2016 powered 2 million homes in the Upper Midwest and made synthetic natural gas for another 400,000 homes and businesses.

We did the math

A ton of lignite coal has the same amount of energy as 1 barrel of oil. The average car in the United States consumes 580 gallons of gasoline annually.

- ▶ On a BTU basis, the 28.7 million tons of lignite would produce enough energy to run 5.5 million cars for a year.

The North Dakota lignite industry represents an \$8.1 billion investment in mining and generation facilities.



⚡ Without the country's readily accessible coal deposits, electricity prices would be higher, causing an uncertain and less competitive U.S. economy.

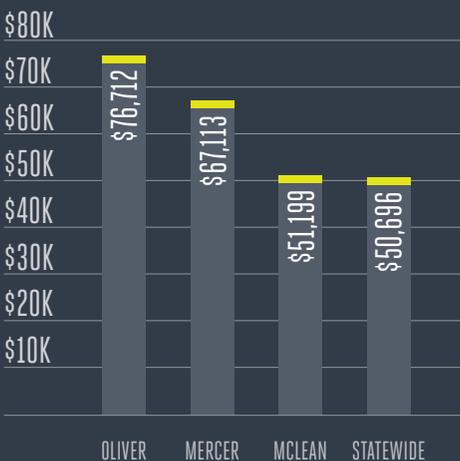
Lignite coal has a huge economic impact.

For more than 100 years, lignite has brought jobs, economic growth, energy and tax revenue to our region.

Well-paying jobs

- ▶ 15,400 North Dakotans and their families depend on the lignite coal industry for their livelihoods.
- ▶ A hypothetical 500-megawatt lignite-based power plant provides \$174 million in total business activity annually.
- ▶ Average salaries are above the state average in the three counties that are home to North Dakota's four lignite mines, six power plants, and the nation's only coal-to-natural gas coal gasification plant.

AVERAGE WAGE BY COUNTY IN 2015



COAL SUPPORTS

3,900

WORKERS DIRECTLY EMPLOYED

11,500

SECONDARY EMPLOYEES

\$100 MIL

STATE TAX REVENUE



Tax Revenues

- ▶ Total annual taxes, including sales, personal and corporate income taxes were estimated at about \$100 million in 2015.
- ▶ Lignite severance and coal conversion taxes since 1975 have generated in excess of \$1 billion in tax revenue for the state of North Dakota through 2015.

Business Development

- ▶ A stable supply of affordable electricity generated by regional coal attracts business, investments and jobs.

4,

North Dakota's lignite industry is a leader in protecting the environment.

PROTECTING THE ENVIRONMENT

\$1 billion in new technologies to operate plants more cleanly since 2006.

ND one of 7 states to meet all federal air quality standards.

54,000 acres of reclaimed land since 1970.

Emissions from U.S. coal-based energy production have decreased by over 80% the past 40 years.

3 ways we're lowering emissions and increasing efficiency regionally:

1. A \$410 million wet scrubber project at the Basin Electric Power Cooperative's Leland Olds Station removes emissions of sulfur dioxide and allows the plant to operate for an additional 20 to 30 years.
2. A \$425 million upgrade at the Minnkota Power Cooperative Milton R. Young Station has resulted in a 95 percent removal of sulfur dioxide and more than 60 percent reduction in nitrogen oxides.
3. Innovative coal drying and refining technology at Great River Energy's Coal Creek Station uses less coal to generate the same amount of electricity – leading to lower emissions of mercury, sulfur dioxide, nitrogen oxides and carbon dioxide.

New technology captures and reduces carbon dioxide emissions

The **world's largest carbon dioxide sequestration project** at Basin Electric Power Cooperative's Great Plains Synfuels Plant near Beulah, ND, captures and transports 8,500 tons of CO₂ per day for use in secondary oil recovery.

A \$1.24 billion SaskPower project has transformed Unit 3 at the Boundary Dam Power Station in southern Saskatchewan into one **of the first existing power plants to capture carbon dioxide** and will extend the life of the plant by approximately 30 years.

Mississippi Power built a new, 582-megawatt Integrated Gasification Combined Cycle (IGCC) plant in Kemper County, Mississippi. The new **clean coal plant** uses Gulf Coast lignite mined by the North American Coal Corporation.

The Plains CO₂ Reduction (PCOR) Partnership involving the Lignite Energy Council and many of its members, was selected by the U.S. Department of Energy for a **10-year, multimillion dollar** program that includes a commercial-scale carbon sequestration project in the Montana oil fields.

The Lignite Energy Council and Canadian public and private stakeholders are working on **CO₂ reduction strategies**. One example: the Canadian Clean Power Coalition is conducting research on coal gasification and post-combustion technologies that will help capture CO₂.

The Lignite Research Council is studying Allam Cycle technology, which could lead to a near-zero emissions power plant fueled with lignite.



The Glenharold Mine near Stanton is North Dakota's largest lignite mine to complete the final bond release process. About 20,000 acres or 30 square miles of mined land in the state have gone through final bond release.



54,000 acres of mined land in North Dakota have been fully reclaimed since 1970.

Reclaimed land is as good or better than it was before

After mining, companies have up to three years to reclaim the land. They spend an average of \$30,000 to reclaim one acre of land (although costs can run as high as \$60,000 an acre). And they're using new technologies such as global positioning systems (GPS) to make the process even more efficient.

The mines keep the land under performance bond for at least 10 years to prove that the reclaimed land produces crops or forages as good or better than before the land was mined.

Coal combustion products are used for beneficial uses

The North Dakota lignite industry produces more than 8,000 tons per day of CCPs or nearly 3 million tons per year. 40 percent is used for beneficial purposes:

- ▶ Cement replacement, road base and sub base applications
- ▶ Sand blasting, roofing shingles and winter ice control on roads
- ▶ Soil stabilization applications, liquid solidification and to enhance haul roads at ND lignite mines

Reclamation research

A research project is now underway to identify reclamation techniques that reduce soil compaction. North Dakota's lignite mines are participating in the study along with soil scientists from North Dakota State University to further improve upon mined land reclamation.

40% of coal combustion products (CCPs) serve beneficial purposes.

Fly ash is recycled and used as a cement replacement for a variety of regional construction projects.

Flexcrete, a building product made with fly ash, was used for the interior of the National Energy Center of Excellence on the Bismarck State College campus.

Cultured stones containing fly ash were used on the exterior and interior of the Headwaters Fort Mandan Visitor Center near Washburn, ND.

Fly ash was used in Great River Energy's Bismarck Office concrete, replacing about 70 percent of the cement in the concrete parking lot and 40 percent of the cement in the building's concrete. Fly ash concrete is lighter in color so it helps keep the building cooler, and parking surfaces require less lighting.

For every ton of fly ash used in concrete, one less ton of carbon dioxide is produced.



5,

Coal is critical today and in transitioning to a clean energy future.

Current projects demonstrate how lignite can be used more cleanly, economically and efficiently.

North Dakota is investing in lignite research:

- ▶ For every state dollar invested in R&D, a total of nine dollars is invested by other sources.
- ▶ ND receives \$3 million for R&D each year from a 10-cent per-ton coal severance tax.
- ▶ The ND Industrial Commission has invested more than \$60 million in lignite research funds since 1987.

Research and development is focused on:

- ▶ Employing the latest clean-coal technology to provide energy for a rapidly growing region and support a vibrant economy.
- ▶ Preserving existing plants and mines by concentrating on ways to convert coal into electricity that is more efficient and more environmentally compatible.
- ▶ Demonstrating the benefits of coal-based electricity through the Coalition for a Secure Energy Future, a broad-based coalition that supports affordable, reliable and increasingly clean electricity from coal.

Our region has relied on coal for generations and maintains the greatest quality of life in the nation, in terms of both opportunities and clean air. An “all-of-the-above” energy strategy – including clean coal – is essential in providing electricity for millions of consumers and growing our regional economy.

COAL IS CRITICAL

15 Lignite Energy Council R&D projects underway

\$650 MIL invested by industry in 200+ projects

Focus on reducing, capturing and storing CO_2



