



November 30, 2015

Industrial Commission of North Dakota  
Attn: Karlene Fine and Brent Brannan  
State Capitol 14<sup>th</sup> Floor  
600 E Boulevard Avenue Dept 405  
Bismarck, ND 58505-0840

**RE: Contract No. G-031-061 Monthly Report for December 1, 2015**

Dear Karlene and Brent:

Please find a summary of project progress, below.

I've had several opportunities over the past few months to network with and present to teachers and administrators regarding the energy curriculum, including:

- North Dakota Teacher Resource Coalition Summer Teacher Institute
- North Dakota Lignite Energy Council Teachers Seminar
- North Dakota Petroleum Council Teachers Seminar
- North Dakota Department of Career and Technical Education Professional Development Conference
- North Dakota Council of Educational Leaders Annual Conference

I developed and distributed an *ENERGY: Powered by North Dakota* newsletter that was delivered to more than 10,000 teachers and administrators around the state in October (a copy of which is enclosed). After that newsletter was released, I had more than 20 requests from teachers around the state for more than 800 copies of the energy curriculum booklet to be mailed to them for classroom use.

I've started working with Katie Heger, an experienced teacher and administrator from the Underwood area, to develop a comprehensive two-week lesson plan for 4<sup>th</sup> and 8<sup>th</sup> grade energy curriculum. The goal of the project is to have a ready-made product that teachers, many of which may be unfamiliar with the energy industry, can easily access and put to use in their classroom. It would also be an easy tool for teachers to use with substitutes throughout the



year. The lesson plan packages have been submitted in rough draft format at this time and are undergoing review and editing. The lesson plan package will be available on the website once complete, and a copy of the materials will be sent to all ND Studies teachers if budget allows.

I'm currently working with the State Historical Society of North Dakota to maximize the impact of the two-week lesson packages by developing smartboard lessons and teacher activity kits that build upon the concepts in the lesson plans and the online curriculum. This project is in its early stages and is currently being reviewed by the ND Industrial Commission before commencing.

In addition to the above work outlined, I am developing a plan to market these enhancements of the energy curriculum through targeted outreach and, if budget allows, an additional newsletter to teachers and administrators. I will also be connecting with the Home Schoolers Network of North Dakota at their February convention to reach that audience as well.

Please accept this letter as my monthly report for June 1, 2015. If you'd like additional information on the project or clarification, please contact me at 701-224-2410 or [emily.mckay@bismarckstate.edu](mailto:emily.mckay@bismarckstate.edu). Thank you for your time!

Respectfully,

A handwritten signature in black ink that reads 'Emily McKay'.

Emily McKay, Principal Investigator and Project Manager  
Energy Curriculum Project

Enc: Energy curriculum newsletter, October 2015



# ENERGYND

*great plains energy corridor*

Great Plains Energy Corridor  
Bismarck State College  
1200 Schafer Street  
Bismarck, ND 58501

Do you have questions about the curriculum? Do you want to order a set of the **ENERGY: Powered by North Dakota** curriculum books free of charge? Contact project lead Emily McKay at emily.mckay@bismarckstate.edu or 701-224-2410.

First Last Name  
Company Name  
Address Line  
City, State ZIP

## ENERGY: POWERED BY NORTH DAKOTA





# ONLINE CURRICULUM LAUNCHED FOR 4TH AND 8TH GRADE



NDstudies.gov

An in-depth look at North Dakota's energy resources has recently been added to the North Dakota Studies curriculum for 4th and 8th grade students. The **ENERGY: Powered by North Dakota** curriculum, was developed through a partnership between the North Dakota EmPower Commission and Bismarck State College's Great Plains Energy Corridor. The curriculum was funded through the North Dakota Industrial Commission's Lignite Research and Oil and Gas Research Programs and donations from energy industry stakeholders. The curriculum is web-based and covers various sectors of North Dakota's energy economy, including coal, petroleum, biofuels and other renewable energy sources.

"The energy industry is already an interesting topic, but using an online platform gives us the chance to incorporate videos, photos, maps and graphics that make the material interactive and, I hope,

really interesting for students," said Emily McKay, the energy curriculum project manager. "Students will be able to watch a time-lapse video of drilling an oil well, zoom in on a US map of solar energy potential, and click through an animation of how water through a hydro dam produces electricity."

The Energy Curriculum Project idea sprouted more than two years ago in the Workforce Subcommittee of the EmPower North Dakota Commission. The commissioners, appointed by North Dakota Governor Jack Dalrymple, represent all of the state's energy industries and were keenly aware of the need to get young students interested in energy.

"North Dakota is changing the landscape of energy production in the United States. We are a state rich in natural resources and innovation, and it's surprising how few students have an understanding of how important the energy economy is to

our state," said Ron Ness, president of the North Dakota Petroleum Council. "This curriculum highlights how each sector impacts North Dakota – from all energy sources including ethanol, wind, oil, and coal and the potential to produce value added energy products from our energy resources that can benefit our citizens across the state."

John Weeda, director of North Dakota Generation for Great River Energy, backed the energy curriculum project with a particular goal in mind – workforce. "Our homegrown, North Dakota employees are the best of the bunch. If we can get our young people interested in energy at an earlier age, they'll be aware of career potential in an almost endless variety of energy jobs."

Weeda said. "It helps our local youth prepare to land jobs in stable, high-wage industries and grow as our future leaders."

Weeda and Ness were the driving force on the Workforce Subcommittee that rallied support and brought all energy sectors to the table to fund the energy curriculum. Grants through the Lignite Research Council and the Oil & Gas Research Council were made via matching dollars from 12 energy companies for a total of \$250,000. More than 30 organizations contributed over \$150,000 worth of in-kind resources. The result is online modules which include interactive content, course activities, career information, and teacher resources. The curriculum is located at [NDstudies.gov](http://NDstudies.gov).

# HANDS-ON ENERGY KITS AVAILABLE FOR TEACHERS

Teachers exploring renewable energy in the classroom now have access to hands-on materials and lessons plans through the Suitcase Exhibits for North Dakota (S.E.N.D.), a program of the State Historical Society of North Dakota.

Valley City State University developed the trunk for K-12 classroom use, which offers hands-on experiences for learners of all ages. Through the trunk components and online educational materials, students learn:

- Electrical generation, electricity and magnetism, electric motor construction, physics concepts
- Integrative STEM practices, Engineering Design, artistry
- Renewable and sustainable energy practices, resources



Students use materials from the Wind Energy S.E.N.D. Trunk to build a wind turbine. Photo by Amanda Fickes, VCSU, Great Plains STEM Education Center.

A comprehensive web site that describes trunk contents and use is available at <http://tiny.cc/WindTrunk>.

SEND trunks are made available at no cost throughout North Dakota at the eight teacher centers <http://www2.edutech.nodak.edu/tcn/> or

at the Heritage Center in Bismarck, ND by contacting Danielle Stuckle at [dstuckle@nd.gov](mailto:dstuckle@nd.gov) or by calling 701-328-2794.

Demonstrations of the kits and educator workshops are available upon request.

## Examples from **ENERGY: Powered by North Dakota**

Cool dragline trivia for math problems at any grade level! <http://tiny.cc/draglinetrivia>

News story on how a wind turbine is built in North Dakota! <http://tiny.cc/basinwind>

### Dragline Trivia (Freedom Mine)

- Each dragline:
  - weighs 12 million pounds.
  - stands 205 feet tall on top of 17th floor of the ND Capitol.
  - has a boom 228 feet long (approximately length of a football field).
  - has a base of 49 feet (approximately size of a basketball court).
  - moves 158 tons of earth per minute (more than would fit into a railroad car).
  - has 12,000 horsepower (about the same as 30 soccer fields).
  - excavates 134 cubic yards of earth (could fit 4 Chevy Subarans or 1.5 million golf balls).
  - working shovels are 14 ft. by 12 ft. (equal to many shoe size 22s).
  - works at a speed of 170 feet per hour (could take approximately 81 days to walk around from Bismarck to Fargo).
- Dakota Westernland (Dakota Mine, south of Bismarck, is a 5,000-acre lignite mine.
  - This mine produces approximately 2.8 million tons of lignite annually.
  - It supplies Coyote Station and Hecla Station for electricity generation.
- BNSF Coal Mine near Center serves about 6.3 million tons of lignite annually.
  - This mine has reserves of about 600 million tons.
  - It supplies Minn. St. Young electric generating stations Unit 1 and 2.
  - The electricity produced from BNSF's coal goes to eastern North Dakota and northern Minnesota.
- Fulton Mine, south of Lunderwood, produces nearly 8 million tons of coal per year.

### History of wind power in North Dakota:

- Early settlers in North Dakota used windmills on farmsteads to pump water from wells for livestock and household use.
- In the early 1900s, before North Dakota residents began using wind chargers to get wire electricity for home lighting and small electrical devices.
  - Generating electricity from wind chargers had some limitations.
    - Not enough power was generated to operate large electrical devices.
    - Batteries were needed for electrical storage during times the wind was not blowing but had to be charged frequently to prevent loss of power.
    - Some systems needed to use gasoline generators for additional backup power.
- In the 1940s, electricity was brought to North Dakota by the Rural Electrification Administration (REA).
  - By 1954, almost all of the farms in North Dakota had electricity brought by the REA.

### Wind power in North Dakota today:

- In recent years, wind power is again being used to generate electricity in North Dakota.
  - The Bismarck-Bellevue-Bismarck (BBB) wind energy plant is the state's.
  - In 1987, they installed two Silver Eagle turbines that are still in use today.
- Presently, North Dakota obtains 15.6 percent of its power from wind resources.
  - In 2013, North Dakota ranked 8th in the United States for percentage of electricity derived from wind.



## ENERGY CURRICULUM USED IN CROSS-CURRICULAR PROJECT



Students from Liberty Elementary visit the Falkirk Mine near Underwood, N.D. Photo by Michael Jacobson.

After seeing the ENERGY: Powered by North Dakota curriculum, Liberty Elementary School teachers Michael Jacobson, Nicole Schaff, Alicia Overbeck and Jana Detwieler saw an opportunity for a cross-curricular project for their 100 fourth grade students. The Bismarck elementary emphasizes school-wide project-based learning and by pairing ENERGY: Powered by North Dakota with the Habitats of North Dakota, students answered a driving question: "How can we as citizens of North Dakota harvest energy while protecting animals and habitat?"

Students started the project with a trip to Great River Energy's Coal Creek Station and neighboring North American Coal Corporation's Falkirk Mine. After seeing the facilities firsthand, Jacobson said, the students were ready to jump into the project.

"The students thought the tour was awesome! It got them excited about what they might be able to do as an adult and provided real

world applications of what they learn in class," Jacobson said.

Liberty fourth-graders made a list of their top five habitats, and students formed small groups based on their interests and figured out what they needed to know and do to answer their driving question. Not a question that could be "Googled," it required collaboration and critical thinking across multiple subjects – reading, science, social studies, and math. After reading about their chosen habitat and animals in North Dakota, it naturally led students to the resources and content on the energy curriculum website.

"The energy curriculum provided videos that gave them first-hand knowledge from the experts. They were analyzing the maps online and in the booklet to identify their resource and where it was located in the state," Jacobson said. "Everything was right at their fingertips."

Each group formed their own business to develop a North

Dakota energy resource while protecting their chosen habitat and combined with other groups to form a cooperative. The end product was a VoiceThread presentation that was delivered by the students to local energy experts, who helped students consider other factors with the resource. After students edited their presentations to incorporate feedback and troubleshoot technical glitches (another real world application!), students presented their final work to their families at the North Dakota Heritage Center.

"We got so many people involved with the tour, speakers and experts, that the students felt like it was really important and more than just a grade," Jacobson said. "Project-based learning was new for us, but this project was a very dynamic way to get each student involved and let them show us [teachers] what they are capable of. How cool it is as a teacher to just step back and see them run with it."