State Energy Research Center

EXPLORATORY, INNOVATIVE, AND TRANSFORMATIONAL RESEARCH

EERC
UND UNIVERSITY OF NORTH DAKOTA

Putting North Dakota at the Forefront of Innovation

The EERC was designated as the State Energy Research Center by the 66th legislative assembly (SB 2249). This designation funds research focused on advancing future energy opportunities and benefiting the state's economy and environment.

Through SERC funding, researchers at the EERC identify and develop new technologies and strategies that have the ability to directly benefit the state of North Dakota, the industries operating in North Dakota, and the citizens of North Dakota.

> THIS RESEARCH IS PRODUCING **RESULTS** THAT COULD EASILY HAVE **BILLION-DOLLAR EFFECTS** ON NORTH DAKOTA'S ECONOMY.
>
> **Thomas Erickson**
> Director of Exploratory Research

NEW INVENTIONS
INNOVATIVE PROJECTS
STUDENT OPPORTUNITIES
INCREASED COLLABORATION

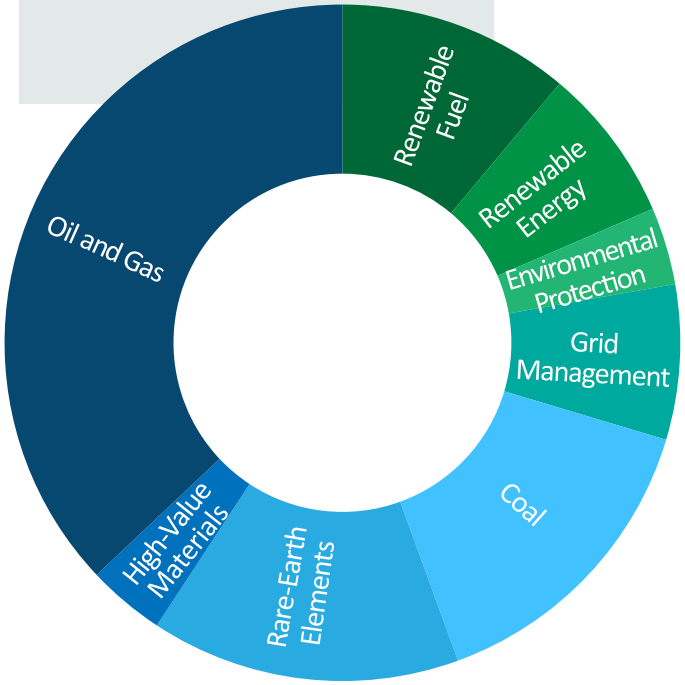
ADVANCING
FUTURE ENERGY
OPPORTUNITIES
& BENEFITING
THE STATE'S ECONOMY
AND ENVIRONMENT

Research for FUTURE GROWTH

The biennium's funding has been completely allocated to SERC activities, including over 25 exploratory projects, ensuring the state's energy resources and products remain accessible, affordable, environmentally responsible, and clearly understood by all.

SERC exploratory research is the first step in the research and development (R&D) process. Successful concepts are then advanced utilizing additional R&D, demonstration, and commercialization through separate funding sources and collaboration with North Dakota's public and private sector partners.

RESEARCH INNOVATIONS ACROSS ALL FACETS OF NORTH DAKOTA ENERGY

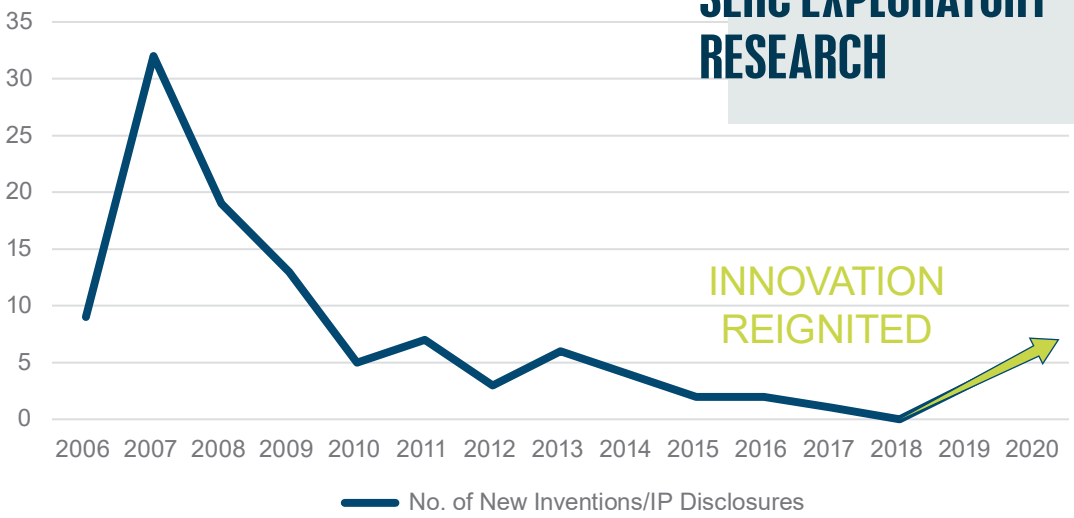


INNOVATION Is Born

Several research projects were completed within the first year of SERC activities. Highlights from these projects include:

- Collaborated with UND's Research Institute for Autonomous Systems to develop new method of identifying pipeline leaks that may one day better protect North Dakota's environment at lower cost while tapping its natural resources.
- Advanced analytical techniques created under SERC help us better understand the Bakken and how to get more oil out of existing wells.
- Produced the first-ever graphene dots from North Dakota lignite.
- Developed a new method of separating rare-earth elements from lignite ash.

NEW INVENTIONS FROM SERC EXPLORATORY RESEARCH



SUPPORTING NORTH DAKOTA

A Statewide SUSTAINABILITY STUDY

began under SERC funding in April 2020. Initiated by NDIC, the project focuses on identifying the challenges and opportunities related to achieving energy, economic, and environmental sustainability and growth for the state of North Dakota within the next 5 to 20 years.

ENERGY EDUCATION & OUTREACH

The North Dakota E-Portal website brings together information and resources on North Dakota energy—such as documentaries, fact sheets, and videos—for public and educational use. Developed with the support of SERC funding, E-Portal was created through collaboration with postsecondary educational institutions in North Dakota and invites participation from all levels of educators.

Energy Hawks is a summer internship for graduate and undergraduate students from a wide range of disciplines. These students study the opportunities and challenges of the energy industry in North Dakota and develop initiatives for further research and consideration. Established in 2018 with seed funding from UND and the EERC, the Energy Hawks program has blossomed under SERC to include interns from NDSU and Bismarck State College. To date, 30 interns have developed ten value-added concepts for North Dakota energy. In 2021, the program will reach students from UND, NDSU, Bismarck State College, Minot State University, and Williston State College.

Inspiring NEW IDEAS

Researchers at the EERC have historically had many ideas for new ways to serve North Dakota but have had a lack of funding to do the work. Since 2019, the funding through SERC designation has produced promising results.

Dr. Alex Azenkeng | Senior Scientist

SERC funding allowed us to extract carbon from coal to make **graphene—a high-value product** with a potential new market for North Dakota lignite.

PROUD TO SERVE NORTH DAKOTA

Dr. Bruce Folkedahl | Senior Research Engineer

Through SERC funding, we developed a new method of **separating rare-earth elements from lignite ash.** One day, by-product from coal-fired power might provide the components that enable SMART grids, wind turbines, and other electronics.

Josh Strege | Principal Process Engineer

Wind turbine blades have a limit on the number of years in their useful life. Our SERC-funded study on r**ecycle/reuse of wind turbine blades** could benefit North Dakota's wind energy industry by providing an innovative way to manage the blades.

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