Envision Energy

Is your future in Energy?

If you're interested in learning more about the field of Energy, the North Dakota University System has options for you.

North Dakota has a long history with Energy, from the coal and oil fields to hydro-electric dams and wind turbine fields. For as long as there will be a need for energy production exists, North Dakota will be providing the best graduates to help meet that need. You'll find plenty of details inside to learn which of our 11 public colleges and universities - and their many Energy programs - are right for you.

Details about Energy-related programs can be found inside that provide real-world examples of what types of courses are available, how schools partner with business and industry to deliver them, who teaches them and what students can do once they graduate with these new sets of knowledge, skills and abilities.

Energy & Higher Education

North Dakota has a long history as an energy-producing state, a history almost as rich as that of agriculture.

Energy has been intertwined with higher education throughout the equally rich and diverse history of North Dakota's public colleges and universities.

That intersection of Energy and Higher Education has never been more present than it is today. All of North Dakota's sources of energy – coal, hydroelectric, natural gas, oil, solar and wind – all provide the fuel our society needs to function.

Many power cooperatives have seen the promise of all these sources of power and have adopted an All-Of-The-Above policy, meaning that if it serves as a power source, they'd look into it.

The North Dakota University System has also taken that to heart. From Bismarck State College's National Energy Center of Excellence to University of North Dakota's Energy and Environmental Research Center to Williston State College's Petroleum Production Technology courses, our university system will likely have something for any student looking to become an employee of the energy sector. For those already employed there, programs at our campuses could help expand their knowledge, skills and abilities to successfully move up the career ladder or transition to exciting new opportunities.

For instance, the Bakken U initiative under our five westernmost colleges and universities – BSC and WSC, and also Dakota Collage at Bottineau, Dickinson State University and Minot State University - has taken steps to provide more opportunities to prospective students.

That initiative helps workers displaced from the oil industry come back to school through scholarship opportunities. Elsewhere in our system, other opportunities flourish.

At Lake Region State College, the Wind Technician Program provides the necessary, hands-on training with wind power that's essential for workers in that growing field.

At UND, opportunities abound for students wanting to enter into the field soon after graduating with a degree in engineering, and options are plenty for those wanting

to come back and do graduate research on new ways to make a positive impact on the energy field while expanding their own career options.

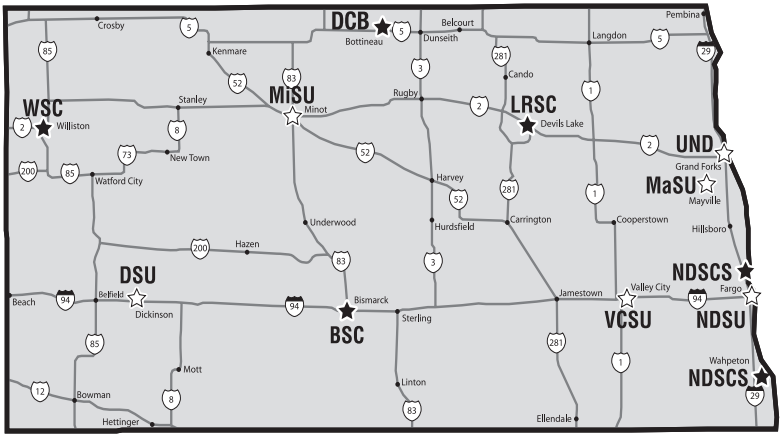
Workforce studies have shown through the past few years that with the rise in technology across sectors – especially energy – employees who remain have to know industry-specific skills, be able to think on their feet and be able to keep up with ever-changing technology.

Throughout the university system, our campuses have heard that loud and clear. Industry partnerships ensure our students are as up-to-date as possible on new industry standards and skills.

What's the major goal of those partnerships?

To create well-rounded graduates who can take on the challenges of the Energy Sector in North Dakota, those who can chase down opportunities and create success for themselves.

Through the "Envisioning" of the future of Energy and Higher Education, we're aiming to create a more stable foundation, so that our students interested in energy can find that success, right here at home.



Key: ★ = Two-Year Colleges

Bismarck State College (BSC)
Dakota College at Bottineau (DCB)
Lake Region State College (LRSC)
North Dakota State College of Science (NDSCS)
Williston State College (WSC)

☆ = Four-Year Universities

Dickinson State University (DSU)
Mayville State University (MaSU)
Minot State University (MiSU)
North Dakota State University (NDSU)
University of North Dakota (UND)
Valley City State University (VCSU)

Why Envision?

Envision 2030 set out in 2016 to learn what our university system needed to do to make sure our graduates were getting the educations they desired for themselves and that were required to become successful in their fields. Ten Advisory Teams were created. The Energy-focused team, made up of representatives from business and industry and with faculty input through ongoing discussions, narrowed down the needs where higher education and energy intersect.

The team noted that North Dakota is the sixth largest energy producer in the U.S. We're the second largest crude oil producer, sixth largest producer of electricity from wind, ninth largest producer of coal, 10th largest producer of ethanol, and 11th largest producer of natural gas. We are also the third largest user of energy per capita in the U.S.

The team found that as the state's energy infrastructure and development evolve, new technologies and new methodologies will be essential to continued economic success. The university system is aiming to create more research and educate tomorrow's energy workforce by giving current, incoming and prospective students the best information to make their own success here.

Our colleges and universities have been educating students in energy-related fields for decades. Recently, new programs and initiatives have laid the groundwork for even more student success. The Energy Team found one such example especially bright (and it's highlighted in this booklet): University of North Dakota's (UND's) Petroleum Engineering Program, which has grown from its first class in 2010 to nearly 250 students enrolled at the beginning of the 2017/2018 academic year.

Feel free to check out the following pages to learn more about some of the programs that our campuses offer, and some of the news they've made recently.

ENVISION 2030

A few things changing the Energy industry:

- Global economics/trade agreements
- Technological revolution
- Growing consumer interest in energy production
- Increasing regulation

Skills that Energy graduates need:

- Technical expertise
- Critical thinking skills
- Problem solving skills
- Communication/interpersonal skills
- Financial/marketing skills
- Ability to adapt to change
- Emphasis on lifelong learning

Finding the right fit for you

Eleven possible colleges and universities to choose from may seem like a big decision. It's likely that you may already be settling on a few top choices - either in institutions or the programs that you want to go into. But, if you're having trouble deciding, here's some more information.

Our institutions are split up into two-year colleges and four-year universities, each with a unique mission and character. You can learn more about each individual school at NDChoose.com/colleges/. Why so many options? It takes a diverse set of campuses, programs and instructors to deliver to our huge energy needs.

A growing population means more consumers, more homes and apartments, more business and more automobiles. All of that equals more energy needs.

So how do you narrow it down? We can help, and so can the North Dakota Department of Career and Technical Education, which keeps track of career outlooks across all industries on websites like RUReady.nd.gov. Feel free to take a look at some of the options to get a good idea of what jobs are available and what programs the university system has to get you started. From coal to petroleum to wind and more, the North Dakota University System has the best trained faculty and most up-to-date programs to ensure that no matter what type of energy you want to work with, you'll be able to get an education on it, right here at home.

Plenty of energy at BSC

At Bismarck State College, there's an abundance of energy-related program options to choose from, including a Bachelor of Applied Science program that is the only one of its kind in the nation.

Offered entirely online, the four-year BAS in Energy Management degree is designed to fill industry demand for supervisors and managers. The program enables energy students and current workers to maximize their potential for advancement in the industry. Curriculum contains technical, energy management and general education courses. Students study accounting, project management, organizational behavior, human resource management, communications, facility management, workforce safety, ethics, energy markets, and emerging energy technologies.

In addition to the unique Energy Management program, students can choose from these other great options!

Electric Power Tech
This industry-driven online program addresses critical employment needs in the electric utilities work force. The ELPW program provides students with a core set of skills and competencies and a broad knowledge of the industry. After completion of the core courses, students choose a specialization area to pursue. Areas of choice include Line Construction, Metering, Substation and System Design.

Energy Services & Renewable Tech
This program prepares graduates for field service technician careers in the rapidly expanding energy industry. Students will gain broad technician skill-sets required in the conventional and renewable energy industry and other industries that employ automated processes. Students receive a broad background in electrical and mechanical fundamentals, equipment and systems, instrumentation, automation and print reading. Coursework emphasizes theory and hands-on applications of applied electronics, mechanics, hydraulics, electric motor control, programmable logic controllers, SCADA, wind turbine systems, solar photovoltaic systems, and safe work practices.

Nuclear Power Tech
Established with the Energy Providers Coalition for Education (EPCE), Nuclear Power Technology is designed for current and future nuclear power employees. Students gain fundamental skills and knowledge required for non-

licensed operator, maintenance and chemistry along with a degree specialized for non-licensed operator and health physics positions in nuclear generation systems. This program is also a great opportunity for present nuclear station employees in non-technical areas, and all employees who are seeking a degree and/or additional training.

An agreement between Exelon and Bismarck State College will allow Nuclear Power Technology students an opportunity to substitute their education for training. Students completing specific requirements of the agreement will receive a National Academy for Nuclear Training Certificate. The certificate states that the student has successfully completed nuclear fundamental training objectives and allows certified students to bypass fundamental training once employed in a nuclear facility.

Petroleum Production Tech
Working in the petroleum industry provides a high paying career and exciting opportunities for employment throughout the world. The need for trained operators and technicians continues to increase along with oil and gas production volumes and reserve estimates.

This online* and on-campus program is designed to provide students with a broad background to operate and maintain the equipment used in the oil extraction and services industry in a safe and responsible manner. Graduates will have the foundation to enter the industry in a number of capacities.

The Petroleum Production Technology program will help meet a high need area in the Bakken region and elsewhere by increasing student knowledge of the petroleum industry. Graduates will be more readily employable in this high need industry.

Process Plant Tech
A career in Process Plant Technology (PTEC) provides excellent pay and employability for years to come. High demand is expected for process plant operators as the existing workforce retires and as the industry evolves and expands especially in the Bakken region.

This online* and on-campus program prepares students for employment in operating refineries, ethanol plants, gasification plants, petrochemical plants, and natural gas processing plants. Students learn the technical and safety aspects of plant operations, the responsibilities of plant operators and the mechanical and chemical technology needed for working in related industrial operations.

Wind Turbine Tech at Lake Region State College

The Wind Energy Technician Program at Lake Region State College is the first of its kind in the state of North Dakota. Rapid growth in the wind energy industry has sparked a burgeoning need for technicians. Lake Region State College has anticipated this emergence of workforce need and has worked closely with industry representatives to design wind energy technician training courses that will prepare students for careers in the wind energy industry.

Students in the Wind Energy Technician program have the option of completing a one-year certificate program or continuing to the second year to earn an Associate in Applied Science degree. Students in the program will learn how to fix and maintain wind turbines and get a hands-on educational experience by working on the actual turbines. Students must be comfortable with heights, have the ability to climb and have good manual dexterity. Wind energy technicians must also be able to work in confined spaces. Work on wind towers may be indoor or outdoor in a variety of weather conditions.

Lake Region
State College

Engineering at NDSU

While it may not be directly focused on energy, the engineering field and its many specialties is essential for the extraction, production and transmission of energy. Engineers from nearly all fields can find use for their unique skillsets within the energy sector, from coal mines and coal-fired power plants to the oil fields, from hydroelectric dams to nuclear power facilities, from wind turbine farms to the electric grids that connect them all with the end user. Although not limited to the following programs, these are just a few of the options an energy-focused engineer student may find helpful.

Civil & Environmental Engineering - plan and design the infrastructure that supports modern living. This includes planning and design for airports, canals, harbors, roads, bridges, railroads, water and wastewater treatment facilities, water supply and solid waste disposal facilities. Civil engineers are often involved with architectural projects by providing structural system and foundation designs for buildings. In addition to consulting engineering firms, civil engineers are commonly employed with cities, state departments of transportation and federal agencies such as the Corps of Engineers.

Electrical Engineering - create products and services for society out of materials that exist in nature using principles of science and common sense. The profession is broad, encompassing products valued by society in many technical specialties from electric power and energy utilization to our current Information Age.

Industrial Engineering and Management - design, create, and implement more productive systems and processes. Industrial engineers are responsible for developing and maintaining integrated engineering systems that include people, machines, material, information, and energy, which are necessary for accomplishing the desired function. Industrial engineers often are responsible for managing several functions such as supply-chain management, project management, facilities design, quality and reliability improvement, healthcare management, process involvement using lean and six sigma concepts, system integration, and managing operations of organizations. Whether it's streamlining an operating room, managing a world-wide supply chain, manufacturing and designing automobiles, or solving quality and reliability problems, industrial engineers play critical roles in these functions. The industrial engineers are hired in every industry type such as manufacturing, health care, hotel, banking and finance, food processing, chemical and oil industry, distribution and logistics, and more.

University of North Dakota

University of North Dakota has a wealth of energy options. Considering that the four-year university serves as the home to both the Energy and Environmental Research Center and the Institute for Energy Studies, it's no wonder then that options exist here for students at the undergraduate, graduate and doctoral levels.

As is the case with its sister university to the south at NDSU, UND offers numerous engineering opportunities. Two of those that energy-focused students may find more suitable are the Geological and Petroleum Engineerring programs.

Geological
Geological Engineers are specialists in designing and building structures that involve soil, rocks and bedrock. Examples of these structures include dams, bridges, tunnels and mitigation of landslides. Geological Engineers also solve problems related to water, such as ground water pollution, flooding, effects of freezing on earthen structures and snow accumulation.

This program equips students with the engineering, social and environmental knowledge needed to make their career as an engineer successful. With the state Core and Sample Library on campus, and research conducted in everything from enhanced oil recovery to land-sliding, a student's skills and interests will find a place in this prestigious program. The program also has the smallest class sizes of any engineering discipline on campus.

Students will gain expertise in:

- Exploration and extraction of mineral and energy resources
- Geomechanics / geotechnics
- Hydrogeology and water resources
- Reclamation and contaminant remediation
- Environmental site assessment
- Natural hazard investigation

These areas of expertise incorporate geology with elements of civil, environmental, mining and petroleum engineering. To meet these demands, the curriculum contains a broad background in physical and social sciences, humanities, communications, mathematics, geology and engineering.

Petroleum
Enroll in the only on campus and online petroleum engineering degree

program in the state. With direct access to the state's only Core and Sample Library and experience in labs and internships, you'll learn the latest trends and developments in the oil industry. UND is on a progressive path to be a leading educator of petroleum engineers.

Petroleum engineering students will gain a thorough knowledge of the scientific and industrial side of petroleum engineering as well as business

Sample courses include:

Introduction to Petroleum Engineering
Drilling Engineering
Petroleum Property Management
Well Logging
Reservoir Engineering

Join one of the fastest-growing majors at UND to start a career in:

Petroleum Exploration
Geologic Formation Characterization
Drilling and Fracturing
Computer Simulation
Equipment and Process Design
Production/Process Monitoring

And, for those interested in sustainable energy production, UND offers a minor in sustainability studies. The Earth System Science and Policy Minor in Sustainability Studies will help future leaders acquire knowledge and develop skills in building a sustainable stewardship of our planet, by seeking balance between the three sustainability pillars (environment, society, economy). The integrated curriculum promotes critical thinking and problem solving through a combination of classroom learning and studies of research and management of Earth system resources. Core objectives include:

Upon completion of the program students will have acquired the fundamentals of sustainability and sustainability science; a multidisciplinary approach to problem solving for sustainability and sustainability-related issues; a set of skills and tools pertinent to solve problem within the coupled human-environment.

Power Plant Technology program turns 40

Students entering Bismarck State College's Power Plant Technology program in the fall of 2017 marked the 40th incoming class for this pioneering program.

Power Plant Technology was established at BSC in 1976, with strong support from local power generating facilities. The program was developed in response to demand for a skilled workforce to fill positions in the growing energy economy.

"This program has been at the heart of our reputation as a partner in the energy industry in the region," says Larry C. Skogen, BSC President & Interim Provost & VP for Academic and Student Affairs. "We have built a strong education and training ground that provides good careers and a strong economy."

The program can be completed in two years or less and prepares graduates for entry-level positions in the power generation sector of the energy industry. Graduates are trained to step into operator positions and have an immediate impact on their facility.

"In the 40 years the Power Plant Technology program has been in existence, thousands of graduates have contributed to the energy success of our country while providing a good life for themselves and their families," says Dan Schmidt, Department Chair.

According to Schmidt, as industry and technology have evolved, so has the program. Today, state-of-the-art labs are filled with equipment, plant systems, simulators and much more ensuring students gain the highly technical skill sets required in the workplace.

In 1999, BSC, in partnership with the industry and the Electric Power Research Institute, secured a National Science Foundation award and began moving some of the program courses online. Industry and

student response to the online offerings was strong, so BSC continued to build the rest of the program into an online offering coupled with hands-on competencies.

Today, BSC has ten online energy degree and certificate programs, and has students and graduates in every state. The Department of Energy (DOE) named BSC the National Power Plant Operations Technology and Education Center on May 18, 2007.

This official designation recognizes BSC as the premier national center of education and training for operators and technicians in the energy industry.

The program is housed with 11 other energy programs in the National Energy Center of Excellence on the BSC campus.

For more information about BSC's energy programs, visit bismarckstate.edu/

BISMARCK
STATE COLLEGE

Front door to collaboration

The power of collaboration is bringing new energy to the University of North Dakota College of Engineering & Mines.

More than 200 attended the dedication of the Collaborative Engineering Complex dedication (CEC), on Friday, Oct. 14. The outdoor ceremony was packed with students, faculty, staff, donors and business and government representatives. All represented groups that worked together to power the project and make it a reality.

"Without government, legislators, the North Dakota Industrial Commission, Hess, donors and others, we wouldn't be here," said UND President Mark Kennedy.

The new front door to the College of Engineering & Mines opens into a bright atrium and collaboration areas, study spaces, active learning classrooms, new labs and a skywalk to the Wilson M. Laird Core and Sample Library. The Complex contains more than 37,000 square feet of research and teaching labs as well as collaboration areas and a first-of-its-kind Engineering Student Success Center.

The CEC connects to formerly separate engineering buildings, uniting the College's civil, geological, electrical, mechanical, chemical and petroleum engineering departments, as well as geology.

That was important to lead donor Bob Solberg, an engineering alum who spent his career with Texaco.

"This building will help all the engineering students get to know each other and work together," he said. "That will help the University and its students better understand how industry works."

Steve Burian, Steve McNally, Mark Kennedy, Hesham El-Rewini and Bob Solberg From left to right, Steve Burian, UND alum and co-founder of Advanced Engineering and Environmental Services, Inc.; Steve McNally, a general manager with Hess Corp.; UND President Mark Kennedy, UND College of Engineering and Mines Dean Hesham El-Rewini and Bob Solberg, a UND alum and former executive with Texaco, cut the ribbon on UND's new Collaborative Energy Complex on Friday, Oct. 14.

The CEC also unites donors, industry, business and the state of North Dakota, said Kennedy, and demonstrates the power of One UND, One Grand Forks, N.D. and One USA.

Donors and industry leaders funded the project, and their contributions were matched by the

North Dakota Higher Education Challenge Fund. For every $2 given, the Challenge Fund provided another $1.

"The Challenge grant program was so successful," said North Dakota Lt. Gov. Drew Wrigley, whose father is a member of the UND Engineering Hall of Fame. The program and donors, he said, helped Engineering take a huge step forward, keeping North Dakota on the cutting edge of energy development.

"We are very grateful to everyone who believed in our vision," said Hesham El-Rewini, dean of the College of Engineering & Mines.

"This is more than a building, and it's not just for engineers," said El-Rewini. It's a core for collaboration, innovation and exploring big things in the area of energy, between students and industry, business and the state, donors and supporters, all of whom invested in our students and the future.

"It's about people and about collaboration."

A main occupant of the CEC is UND's Institute for Energy Studies, which will work with UND's Energy & Environmental Research Center, School of Law, College of Business & Public Administration, Arts & Sciences and other academic areas to advance energy from an economic, legal and health perspectives.

"The UND way is the Hess way," said Steve McNally, general manager for Hess Corp. in North Dakota, which sponsored three research labs in the new building. "Through collaboration, we believe we can make North Dakota an even better place."

Alumnus Steve Burian, who helped found Advanced Engineering and Environmental Services, Inc., and was one of the first donors to the project, said that UND is critical to the city, state, region and beyond.

"UND graduates are smart, hard-working, well-educated," he said. They want to stay in North Dakota, and he said he's proud to be part of the College's progress.

Burian and his wife also donated to the project for personal reasons, he said, showing a hint of emotion. UND was generous with scholarships, and he's glad to help pay back.

"The state match was a great incentive," he added.

"I love that the title includes collaboration," said U.S. Rep. Kevin Cramer, who focused on the collaboration with state and federal government, donors and industry to make the project a reality. "It shows how special UND is."

For more information about any of the 11 campuses that make up the North Dakota University System, contact the college or university at:

Bismarck State College
Bismarck, ND 58506
701.224.5429
800.445.5073
www.bismarckstate.edu

Dakota College at Bottineau
Bottineau, ND 58318
701.228.5488
800.542.6866
www.dakotacollege.edu

Dickinson State University
Dickinson, ND 58601
701.483.2175
800.279.4295
www.dickinsonstate.edu

Lake Region State College
Devils Lake, ND 58301
701.662.1514
800.443.1313
www.lrsc.edu

Mayville State University
Mayville, ND 58257
701.788.4842
800.437.4104 ext. 34842
www.mayvillestate.edu

Minot State University
Minot, ND 58707
701.858.3350
800.777.0750
www.minotstateu.edu

North Dakota State College of Science
Wahpeton, ND 58076
701.671.2521
800.342.4325
www.ndscs.edu

North Dakota State University
Fargo, ND 58108-6050
701.231.8643
800.488.6378
www.ndsu.edu

University of North Dakota
Grand Forks, ND 58202
701.777.3000
800.CALL UND (225.5863)
www.und.edu

Valley City State University
Valley City, ND 58072
701.845.7101
800.532.8641 ext. 7101
www.vcsu.edu

Williston State College
Williston, ND 58802
701.774.4200
888.863.9455 ext. 4220
www.willistonstate.edu

NORTH DAKOTA
UNIVERSITY SYSTEM