HEAR FROM PROFESSIONALS. LEARN FROM EXPERIENCE.

nebraska CAREER CLUSTERS

ENERGY & ENGINEERING

This career cluster prepares for careers in planning, managing, providing scientific research & development, professional & technical services (including laboratory & testing services), and problem solving for the challenging & ever-changing fields of energy and engineering.

CTE®
Learning that works for Nebraska

WHAT TO EXPECT IN THIS GUIDE

INTERVIEWS

Each video contains interviews with employees and business representatives discussing work requirements, education levels, salary and job prospects.

TOURS

Experience virtual industry tours that provide a unique opportunity to get a glimpse inside Nebraska-based companies without leaving your home or classroom.

INFORMATION

Throughout the videos you will find valuable information regarding job markets, salaries, and educational requirements to help you identify a possible career path.

www.education.ne.gov/nce/nebraska-career-tours

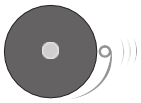
NOTE TO INSTRUCTOR:

These are suggested activities and questions to accompany the virtual industry tour. Each component may be used individually or modified to fit the needs of the classroom. Use these websites for more information on this career cluster:

- **www.education.ne.gov/nce/career-clusters**
- **https://www.education.ne.gov/nce/careerdevelopment/**
- **Nebraska H3 Reports**
- **www.nebraskacareerconnections.org**

In addition, NEworks has an array of resources, including Nebraska Workforce Trends magazine, Labor Market Regional Reviews, Occupational Profiles, and Career Ladder Posters, available at **https://neworks.nebraska.gov** under Labor Market Information>Additional Services>Publications.

BELL RINGER:



Post the following prompt for students to answer as they enter the room. Each will respond individually in their notes.

List all professionals that would have been involved in building our school.

Have students share responses with the class. Be sure they consider everything from the architecture and design to surveying and leveling the ground for the foundation.

ANTICIPATORY SET:

Point out that the Energy and Engineering Career Cluster prepares students for careers in planning, managing, and providing scientific research and professional and technical services including laboratory and testing services, and research and development services. Many of the careers involved in the construction of our school fall into this cluster. These careers are essential to our everyday life.

Guide students to think about necessary skills for careers in the Energy and Engineering Career Cluster by facilitating a design competition. Supplies needed: flexible plastic drinking straws (10 per group), roll of tape (one per group), scissors (one pair per group) and a tennis ball (one per group). Divide students into groups of three. Give these instructions:

- **This is an engineering competition.**
- **As a group, build a tower that can hold a tennis ball using only the supplied materials.**
- **You have ten minutes to brainstorm and build.**

After ten minutes, bring students back together. To see which tower can hold the ball the longest, have each group place the tennis ball on their tower. While observing, facilitate a group discussion by asking these questions:

- **What steps did your group go through to build the tower?**
- **What ideas did not work?**
- **What ideas worked the best?**
- **When do you think "out of the box" at home? In school? In the workplace?**

After the discussion, acknowledge the towers that are still standing. Point out that Energy and Engineering careers focus on finding solutions to problems and literally design the world around **us**.

INTRODUCTORY QUESTIONS:

Ask the following questions to students and have them respond in journals or aloud. If asking aloud, have students share with a partner first, then ask two or three students to share. Responses will vary and are based on the students' knowledge prior to watching the virtual tour.

- **When you think of Energy and Engineering, what types of jobs come to mind?**
- **Are these careers YOU might be interested in? Why or why not?**

CONTENT:

Show the 19-minute virtual industry tour located at https://bit.ly/ENEGCTour, which features three businesses, Olsson Associates, NPPD, and Strobel Energy. Or have students individually view the video online.

Students will complete the Student Viewing Guide worksheet as they learn about the Career Cluster.

Introduce the virtual tours by saying:

- **Today we are studying careers in the Energy and Engineering Career Cluster. Each professional in the video will describe their involvement in the industry, as well as the skills necessary for success.**

FOLLOW-UP QUESTIONS:

Pose the following questions to students after they view the virtual industry tour. Questions can be given as journal questions or asked aloud. Questions can also be assigned individually or in groups.

1. How would you define this Career Cluster?

- Careers in planning, managing, and providing scientific research and professional and technical services including laboratory and testing services, and research and development services.

2. What types of careers are included in this Career Cluster?

- Civil engineer, director of engineering, electrical engineer, energy efficiency consultant, engineering manager, HR director, landscape architects, lineman, manager of sustainable energy, mechanical engineer, project managers, region leader, scientists, structural engineer, team leader, technician designers, technicians and wind turbine service technician.
- Other careers not mentioned in the video: Aeronautical engineer, architectural engineer, architectural and engineering manager, biochemist and biophysicists, biologist, biotechnology engineer, chemist, computer and information research scientists, computer hardware engineer, conservation scientist, cost estimator, dietician and nutritionist, drafter, environmental engineer,
- Financial analyst, geoscientist, industrial engineer, lab/research technician, life, physical, and social science technician, market research analyst, mathematician, mathematics teacher, medical scientist, quality technician, science teacher, social science research assistant, statistician, surveyor and technical writer.

Note to instructor: This would be a good time to explain to students that this Career Cluster can be divided into two Career Pathways including:

- Engineering and Technology
- Energy

- Each Career Pathway has a narrower skill set for the occupations within this Career Cluster.
- For more information about Skilled and Technical Sciences (STS) careers and education pathways, go to: http://bit.ly/ENERGY-ENGccPDF.
- For more information and downloadable tools for each career cluster, follow the link below: https://bit.ly/CTECFCC and For more information, visit http://bit.ly/Energy-EngineeringCC.

- Additionally have students access Nebraska Career Connections at www.nebraskacareerconnections.org.
- Nebraska Career Connections provides education and career planning resources to bring Nebraskans together – students, parents, educators, adults, and employers.
- Whether you're planning for life after high school, exploring career options, or creating a portfolio of materials for a job search, this system can provide you with the tools needed.
- Sign up for your account by clicking on Create An Account – it's fast and easy!

3. Which careers and jobs in this Career Cluster could be obtained immediately after high school graduation?

- Most careers in this cluster require some type of postsecondary education. Many require certification beyond a four-year degree.
- For more information, visit http://bit.ly/ENERGY-ENGccPDF and http://bit.ly/Energy-EngineeringCC.

4. List and describe the pathways of this Career Cluster?

- Engineering and technology: Applies mathematics, science and technology concepts to solve problems quantitatively in engineering projects involving design, development or production in various technologies.
- Engineers and technologists are involved with advancing technology and continually improve and update product designs and optimize the manufacturing process.
- They are involved in improving or building new roads, bridges, water, pollution control systems and other public facilities. Energy:
- Energy careers in the 21st Century lean toward "green" energies such as solar and wind power.
- Skills needed for energy careers include problem solving, the ability to look at and propose solutions to a problem through multiple approaches, inquiry skills, math and science skills, engineering-design thinking, critical thinking, and collaboration.
- Energy jobs can include engineers, researchers, and developers. Generation technicians, plant operators, lineworkers, natural gas service technicians, engineers, are example careers available in the energy field. (Source: https://stem.getintoenergy.com/why-a-stem-career/)
- Depending on what type of job you take you might find yourself working in an office, a lab or even an industrial plant.

5. **The virtual industry tour video mentioned traits employers seek when hiring.**

   Which Career Readiness Skills should a desirable Energy and Engineering applicant possess?

- Answers will vary.
- For more information, visit: https://bit.ly/necrstandards.
- Have copies of the Nebraska Career Readiness Standards poster visible around the classroom
- And/or provide a copy of the Nebraska Career Readiness Standards Checklist to each student as a way to help them understand and identify what is meant by "career readiness skills."

6. **Many of the professionals featured in the virtual tour manage or oversee groups of employees.**

   Which Career Readiness Skills are essential for team leaders?

   What challenges might he or she face?

- Answers will vary but should include: Models ethical leadership and effective management and works productively in teams and demonstrates cultural competency.
- Answers will vary for challenges, but might include:
  - facilitating the combination of several ideas into one cohesive solution,
  - facilitating conflict resolution between employees, preventing employee burnout,
  - putting others' needs before your own,
  - ensuring everyone shares one vision,
  - keeping employees engaged,
  - minimizing negativity,
  - gaining the respect of employees,
  - and creating a nurturing work environment.

7. Katie Underwood, team leader and civil engineer, mentioned an internship. What is an internship?

Why are internships beneficial?

- An internship is a period of work experience offered by an organization for a limited period of time. The internship may be a paid or unpaid experience.
- Internship benefits include work experience to include on a resume and for future jobs, increased knowledge and experience, exposure to real tasks of the job to help determine if this is a future career.
- Some internships are paid, there may be a potential to earn college credit, and there are opportunities to network with professionals in the career field and develop confidence.
- The benefit for the business is that it is very expensive to hire people for jobs. Companies like the opportunity to "try out" an employee without having to fully hire them. If the intern fits into the culture of the company, they are more likely to hire them.

8. What can be done to best prepare for a career fair?

What should be done the day of the career fair?

What should be done after the career fair?

- Answers for pre-fair preparations will vary, but should include: Pre-register for the fair, which might include submitting a resume, research companies that will attend, decide which companies to visit, prepare and print resumes and create and practice a quick introduction of yourself.
- Answers for what you should do during the fair will vary, but should include: Be confident, take notes, collect business cards and network with others including company representatives and other job seekers.
- Answers for after the fair actions will vary but should include: Follow up with any companies you talked to with a quick thank you note and continue to network with those you met.
- For more information, visit https://www.topresume.com/career-advice/job-fair.

9. What types of energy production are used in the U.S.? How has this changed in the past fifty years?

- Coal, petroleum, natural gas, natural gas plant liquids, nuclear, hydroelectric, biomass (corn), wind, solar, and geothermal.

- Energy consumption and production are up worldwide. Coal production had an upward trend, but now has decreased to levels equivalent to 50 years ago. Natural gas has increased due to cost-effective drilling and larger availability has lowered prices. Renewable energy is at record highs, but still a significantly small part of the energy sector.
- For more information, visit the U.S. Energy Information page at https://www.eia.gov/energyexplained/us-energy-facts/.

10. Core academic skills include reading, written communication, listening, speaking, mathematical reasoning and problem solving. Academic skills and technical skills complement one another. Academic attainment is an important Nebraska Career Readiness Skill. How might these core academic skills be used in this Career Cluster?

- Answers will vary.
- Here are a few examples: A landscape architect must read well and understand work documents, including local policies and ordinances. They oversee and work with written estimates and proposals. Wind turbine technicians must document work completed and submit written reports.
- Listening and speaking are essential for leaders and managers as they oversee a group of employees and must combine several ideas and opinions into one cohesive solution.
- A civil engineer uses basic arithmetic to calculate water flow over a basin and algebra or geometry to calculate an acceptable roadway curve.
- Mechanical engineers analyze problems to see how mechanical devices might help solve a problem such as controlling the temperature on an airplane or creating a robot to detect smell.

11. Two engineering licensure and certifications were discussed in the Strobel Energy tour. Why do some positions require a professional licensure or certification in addition to a four-year degree?

- Any professions, including engineering, law, and medicine, understand that a degree may not sufficiently demonstrate the desired level of competency.
- There are fundamental differences between success in a formal education program and the ability to practice a profession involving the public's health, safety, and welfare.
- A licensure examination tests technical knowledge, understanding of ethics, professional concepts, and the application of principles to practice. An examination provides a standard for all, regardless of educational background, extent of schooling, and experience.
- For more information, visit the National Society of National Engineers website at https://www.nspe.org/.

12. Demonstrates innovation and creativity is one of the Nebraska Career Readiness Skills mentioned in the industry tour. When have you demonstrated innovation and creativity?

- Answers will vary.
- Explain to students that this is a sample behavioral interview question that they may be asked in a job interview.
- Employers use past experiences as a way to predict future performance.
- One technique used to respond to behavioral questions is the STAR response: situation, task, action, and result.
- Example sources for more information, include: https://bit.ly/STAR_technique1 and https://bit.ly/STAR_technique2.

EXTENDED LEARNING ACTIVITIES:

The following are suggested activities to increase student learning and exposure to this Career Cluster

- Join a Career and Technical Student Organization such as FBLA, FFA, SkillsUSA, DECA, or FCCLA. Student members have the chance to apply lessons and information learned in the classroom in real hands-on experiences.
- Have each student put together a portfolio of tangible materials that showcase his or her skills and work experience. Use the digital portfolio available at www.NebraskaCareerConnections. org under the Students Tab in the High School section.
- Attend a career fair to see a variety of careers and opportunities. If a local event does not exist, collaborate with other student groups to create an opportunity for students and adults.
- Engage in a team activity such as a sports team, competition team, school newspaper, Career and Technical Student Organization program of work activity or other team experience.
- Take a business class to help understand contracts, income statements, and other business-related topics.

EXTENDED LEARNING ACTIVITIES CONTINUED

- Conduct a research project. Identify a problem, research and propose a solution. Present your findings to the class and other appropriate audiences.
- Explore the Nebraska Public Power District website and use the Energy Cost calculator to see how energy use affects electricity bills at home and in the school facilities: https://c03.apogee.net/mvc/home/hes/land?utilityname=nppd.
- Meet with the school counselor to discuss classes that would help prepare a student for careers in Energy and Engineering. Also, discuss valuable certifications that can be obtained during high school.
- Identify a postsecondary institution that is offering certifications or degrees that would help prepare a student for a career in Energy and Engineering. Obtain and complete admissions and scholarship applications for the school or program.
- Explore career opportunities with Strobel Energy using their website https://www.strobelenergy.com/careers. Notice the requirements for each position.
- Tour the local power plant. If this is not feasible, several tours are available online. Select a power plant tour that relies on the same resources as your local operation.
- Identify and work with a mentor locally or participate in the ACE Mentor Program for architecture, construction, and engineering, https://www.acementor.org/ for more information.

THERE ARE MANY RESOURCES THAT CAN BE USED BY TEACHERS, PARENTS AND JOB SEEKERS FOR CAREER EXPLORATION. Some resources are tailored for Nebraska and some are national, but all provide valuable information and many incorporate information from the Nebraska Department of Labor Market Information (LMI). This list is not comprehensive, and only represents a sampling of the many resources available. Share the Career Exploration/ Planning resources table with students and have them do a review of what each offers them as a tool for finding the right career fit. Nebraska Career Connections is a totally FREE resource that is highly recommended for use by career and technical education students and teachers.

CAREER EXPLORATION & PLANNING		
Website	**Type of Resources Available**	**Produced & Sponsored By**
Nebraska Career Connections www.nebraskacareerconnections.org	Education and career planning resources for students, parents, educators, adults and employers. Students can explore career options, search for colleges, find out about applying for college, tuition, scholarships & financial aid, and create an e-portfolio and resume.	Nebraska Departments of Education and Labor, Nebraska VR, and Partnerships for Innovation.
Nebraska H3 Reports: https://bit.ly/neH3	Information on High Wage, High Demand, High Skill jobs in Nebraska. Top H3 occupations are identified on the home page.Reports can be generated by each Nebraska Economic Development Region and also statewide. Reports include H3 Report, Nebraska Economic Industry Report and All Career Clusters Report, Jobs can be searched by Job Title or SOC Code.	Nebraska Departments of Education, Labor and Economic Development
O*NET OnLine www.onetonline.org	Occupation information: knowledge, skills, abilities, Career Interest profile, job outlook and wages	U.S. Department of Labor, Employment and Training Administration (sponsor) Developed by the National Center for O*NET Development
My Next Move www.mynextmove.org/	Condensed version of information from O*NET OnLine	
Occupational Outlook Handbook www.bls.gov/ooh/	Nationwide data on occupation pay, work environment, job outlook, similar occupations, and more	Bureau of Labor Statistics
Nebraska Reality Check https://www.education.ne.gov/nce/career-readiness-videos/	Lifestyle cost information and occupations in corresponding wage range	Nebraska Department of Education

IN-DEPTH		
Website	**Type of Resources Available**	**Produced & Sponsored By**
CareerOneStop www.careeronestop.org	Variety of resources related to career planning, job training, and job searches	U.S. Department of Labor, Employment and Training Administration (sponsor)
GetMyFuture (section of the CareerOneStop website) www.careeronestop.org/GetMyFuture	IResources tailored to students and young adults such as career exploration, information on finding education and training programs, and how to conduct a successful job search.	U.S. Department of Labor, Employment and Training Administration (sponsor)

NEBRASKA CAREER TOURS: STUDENT VIEWING GUIDE ANSWER KEY
ENERGY & ENGINEERING

*Instructions: Questions 1 and 2 should be answered after watching **all** three sections of the virtual industry tour.*

1. List six careers mentioned during the virtual industry tour:

1. **Region leader**
2. **Mechanical engineer**
3. **Team leader**
4. **Civil engineer**
5. **Landscape architect**
6. **Technician designer**

Skilled & technical sciences educator, manager of sustainable energy, engineer, architect, accountant, lineman, technician, scientist, wind turbine service technician, energy efficiency consultant, electrical engineer, HR (human resources) director/manager, director of engineering, engineering manager and structural engineer

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Instructions: The following questions are specific to the Olsson Associates section of the virtual industry tour.

2. What does Olsson Associates do?

- **Olsson Associates is a design engineering firm.**
- **They provide services to make the world around us better (roads, drinking water, waster water, and more).**
- **Their services include planning and design, engineering, field services, environmental solutions, and technology**

3. What is the job description of the Nebraska Region Leader with Olsson Associates?

- **Works with all Nebraska offices and makes sure the engineering works.**
- **Ensures they are doing a good job for the clients.**
- **Ensures they are turning out quality designs.**

4. What is the job description of the Team Leader with Olsson Associates?

- **Oversees a team of 25 including civil engineers, landscape architects and technician designers**
- **Oversees the workload and makes sure it goes smoothly**
- **Oversees the hiring**

5. Which type of engineer plans, designs, and oversees construction and maintenance projects?

Civil engineer

6. List three career exploration opportunities?

1. **Internships**
2. **Career fairs**
3. **Job shadowing**

Instructions: The following questions are specific to the NPPD section of the virtual industry tour.

7. What does NPPD stand for?

Nebraska Public Power District

8. What does NPPD do?

Generates electricity and delivers it to customers throughout Nebraska

9. How many full-time and part-time employees work for NPPD?

2,100 full-time and 40 part-time

10. Which occupation is the fastest growing at 90.83%?

Wind turbine service technicians

11. How does the job of Energy Efficiency Consultant differ from typical engineering jobs?

- **Works with people all of the time.**
- **Gets out and helps people directly rather than being office-bound.**
- **Focuses on customer service.**

Instructions: The following questions are specific to the Strobel Energy section of the virtual industry tour.

12. What does Strobel Energy do?

Strobel Energy Group specializes in Engineering, Procurement, and Construction (EPC) solutions for the energy industry. The Strobel team of engineers and construction specialists listens to the client's needs and manages every aspect of a project with dedication and adherence to industry standards. Rigorous quality control and assurance practices guide each area of work they perform. The business development team meets with clients that need to store and move resources. They often write and draw on napkins.

13. What Strobel Energy process is described as "napkin to turnkey"?

Their engineers and construction professionals listen closely to their customers' needs and manage every aspect of a project, from napkin sketches to the completed facility. The company prides itself on innovative problem-solving and attention to detail while taking a practical, common-sense approach to every component of design and construction.

14. Which type of engineer plans and designs tools, engines, machines, and mechanical equipment?

Mechanical engineer

15. What two professional licensures did the Director of Engineering hold?

1. **PE (professional engineer)**
2. **PMP (project management professional)**

Instructions: Respond to Question 16 after watching all three sections of the virtual industry tour.

16. Which of the careers introduced in the virtual industry tour best fit your skill set and interests? Explain.

Answers will vary

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ABOUT THIS PROJECT

The virtual industry tours provide a unique opportunity for students, parents and job-seekers to experience Nebraska-based industries without leaving the home or classroom.

The videos showcase different businesses and industries in each of the sixteen Career Clusters plus Entrepreneurship in the Nebraska Career Education Model. In addition to the tour of the business or industry, the videos also contain interviews with employees and managers discussing work requirements, education levels, salary and job prospects. The videos provide an accurate picture of today's workplace, breaking down stereotypes and assumptions while emphasizing the knowledge and skills required to be successful.

The teacher and student guides are designed to enhance student learning for each virtual tour. For the students, a guided notes worksheet is included to help them record important information about the career cluster. The teacher's guide includes a lesson plan complete with anticipatory set, introductory questions, and discussion questions to follow the virtual tours.

Discussion Guides and Career Readiness Resources are available at:
WWW.NEBRASKACAREERCLUSTERS.COM/RESOURCES

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NEBRASKA DEPT. OF ECONOMIC DEVELOPMENT

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