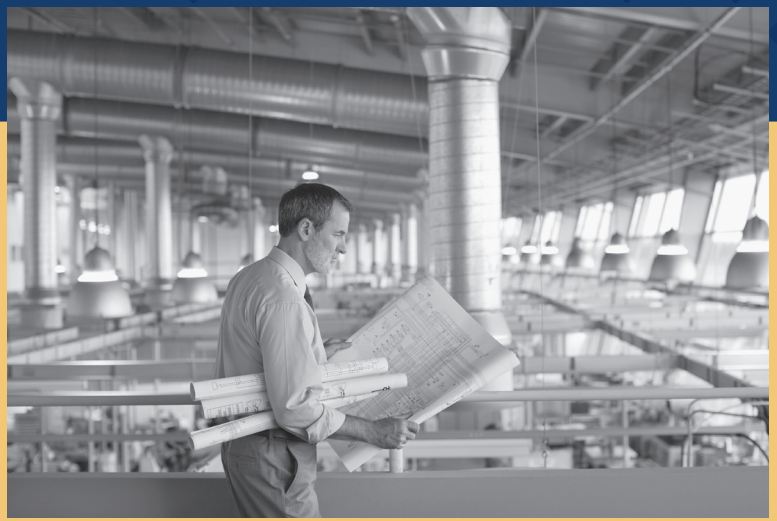
Energy
COMPETENCY MAP



#Prepared4PA

Pennsylvania's
STATE SYSTEM
of Higher Education

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OVERVIEW

Pennsylvania's State System of Higher Education (PASSHE) is building industry-education-workforce collaboratives to foster stronger connections in our state's workforce ecosystem. This report on high-demand occupations is designed to articulate the competencies, skills, and credentials required by employers to inform quality, robust, industry-validated training and education programs.

WHY COMPETENCIES MATTER

Competencies represent sets of skills, knowledge, and attitudes necessary for broad job functions. These competencies are linked to successful performance and are desirable regardless of an individual's area of expertise or role. Competencies provide a framework to help focus individuals' behavior on things that matter most to an organization and help drive success. They can provide a common way to harmonize, select, and develop talent. Competencies help define how a person should perform a role, and they are often determined in the context of workplace demands - the knowledge, and skills needed to do a specific job or task.

HOW TO USE THESE COMPETENCY MAPS AND CAREER PATHWAYS

The competency maps are meant to serve as a tool for the State System and other education and training providers to develop curricula for pilot programs that meet employer needs for identified in-demand occupations. An important note about these competency maps and career pathways is that they are not an exact science – these competency maps are meant to serve as tools for what is generally required for each occupation. Requirements for competencies vary based on many factors such as employer size, preference, location, and specific need.

CAEL collaborated with the State System to develop the following Competency Maps in Key Industries across the Commonwealth. Recognizing that adult learners are the backbone of the U.S. economy, CAEL helps forge a clear, viable connection between education and career success, providing solutions that promote sustainable and equitable economic growth. CAEL opens doors to opportunity in collaboration with workforce and economic developers, postsecondary educators, and employers, industry groups, foundations, and other mission-aligned organizations. By engaging with these stakeholders, we foster a culture of innovative, lifelong learning that helps individuals and their communities thrive. Established in 1974, CAEL, a Strada Education Network affiliate, is a nonprofit 501(c)(3) membership organization.

PENNSYLVANIA'S ENERGY INDUSTRY

At the statewide level, the following occupations within these competency maps are primarily employed within Electrical Contractors and Other Wiring Installation Contractors; Plumbing Heating, and Air Conditioning Contractors; General Freight Trucking, Long-Distance, Truckload, and Engineering Services sub-industries. Digging further at the regional level, there is a higher concentration General Freight Trucking, Long-Distance Truckload sub-industries in the Northern and Southern regions. However, in the Eastern and Western regions the more prevalent sub-industries include Electrical Contractors and Other Wiring Installation Contractors and Plumbing, Heating, and Air Conditioning Contractors.

HIGH LEVEL REGIONAL SUB-INDUSTRY COMPARISONS WITHIN ENERGY

NORTHERN

- General Freight Trucking, Long-Distance, Truckload
- Electrical Contractors and Other Wiring Installation Contractors
- Plumbing, Heating, and Air-Conditioning Contractors
- Support Activities for Oil and Gas Operations
- Engineering Services

SOUTHERN

- General Freight Trucking, Long-Distance, Truckload
- Electrical Contractors and Other Wiring Installation Contractors
- Plumbing, Heating, and Air-Conditioning Contractors
- Engineering Services
- Commercial and Institutional Building Construction

EASTERN

- Electrical Contractors and Other Wiring Installation Contractors
- Plumbing, Heating, and Air-Conditioning Contractors
- Engineering Services
- General Freight Trucking, Long-Distance, Truckload
- Commercial and Institutional Building Construction

WESTERN

- Electrical Contractors and Other Wiring Installation Contractors
- Plumbing, Heating, and Air-Conditioning Contractors
- Engineering Services
- Specialized Freight (Except Used Goods) Trucking, Local
- Support Activities for Oil and Gas Operations

The occupations included in these competency maps are the most demand energy occupations across the state, typically with varying degrees of demand at regional levels. Across all regions, Civil Engineers are in the highest current demand, with the exception of the Northern region which has a greater demand for Heavy and Tractor-Trailer Truck Drivers.

Engineering Occupations in the Energy Industry: Within the Energy industry, there are a wide variety of engineering specialties with varying levels of demand that are not covered in this competency map, but are worth consideration in the development of pilot training programs going forward.

- Mechanical Engineer: Perform engineering duties in planning and designing tools, engines, machines, and other mechanically functioning equipment. Oversee installation, operation, maintenance, and repair of equipment such as centralized heat, gas, water, and steam systems.
- Environmental Engineer: Research, design, plan, or perform engineering duties in the prevention, control, and remediation of environmental hazards using various engineering disciplines. Work may include waste treatment, site remediation, or pollution control technology.
- Water/Wastewater Engineer: Design or oversee projects involving provision of potable water, disposal of wastewater and sewage, or prevention of flood-related damage. Prepare environmental documentation for water resources, regulatory program compliance, data management and analysis, and field work. Perform hydraulic modeling and pipeline design.

REGIONAL IN-DEMAND OCCUPATIONS WITHIN ENERGY

NORTHERN

- Heavy and Tractor-Trailer Truck Drivers
- Civil Engineers
- Electrical Engineers
- Electricians
- Service Unit Operators, Oil and Gas

SOUTHERN

- Civil Engineers
- Heavy and Tractor-Trailer Truck Drivers
- Electrical Engineers
- Electricians
- First-Line Supervisors of Construction Trades and Extraction Workers

EASTERN

- Civil Engineers
- Heavy and Tractor Trailer Truck Drivers
- Electricians
- First-Line Supervisors of Construction Trades and Extraction Workers
- Heating, Air Conditioning, and Refrigeration Mechanics and Installers

WESTERN

- Civil Engineers
- Electrical Engineers
- Heavy and Tractor-Trailer Truck drivers
- First-Line Supervisors of Construction Trades and Extraction
- Electricians

INDUSTRY-WIDE FOUNDATIONAL SKILLS

Below please find a list of top foundational skills within the Energy industry. Foundational skills are defined as core skills that provide a foundation for success in school and in the world of work. Nationally, employers have identified a link between foundational skills and job performance and foundational skills are often a prerequisite for workers to learn new industry-specific skills. Foundational skills are broken down into three categories as defined below:

ENERGY: INDUSTRY-WIDE FOUNDATIONAL SKILLS

PERSONAL EFFECTIVENESS COMPETENCIES

These competencies are essential for all life roles - roles as a member of a family, a community, and a larger society. These "soft skills" are increasingly valued in the labor market.

- **Adaptability:** Displaying the capability to adapt to new, different, or changing requirements.
- **Professionalism:** Maintaining a professional presence.
- **Lifelong Learning:** Demonstrating a commitment to self-development and improvement of knowledge and skills.
- **Interpersonal Skills:** Displaying skills to work effectively with others from diverse backgrounds.
- **Integrity:** Displaying strong moral principles and work ethic.
- **Initiative:** Demonstrating a commitment to effective job performance by taking action on one's own and following through to get the job done.
- **Dependability:** Displaying responsible behaviors at work.

ACADEMIC COMPETENCIES

These are critical competencies primarily learned in an academic setting, as well as cognitive functions and thinking styles. These competencies are likely to apply to all organizations in a single industry or be represented by an industry association nationwide.

- **Science & Technology:** Using scientific rules and methods to express ideas and solve problems on paper, on computers, or on adaptive devices.
- **Mathematics:** Using mathematics to express ideas and solve problems.
- **Basic Computer Skills:** Using information technology and related applications, including adaptive devices and software, to convey and retrieve information.
- **Communication:** Listening, speaking, and signaling so others can understand using a variety of methods, including hearing, speech, American Sign Language, instant messaging, text-to-speech devices, etc.
- **Critical & Analytical Thinking:** Using logical thought processes to analyze information and draw conclusions.
- **Reading:** Understanding written sentences, paragraphs, and figures in work-related documents on paper, on computers, or adaptive devices.
- **Writing:** Using standard business English to compile information and prepare written documents on paper, computers, or adaptive devices.

WORKPLACE COMPETENCIES

These competencies represent those skills and abilities that allow individuals to function in an organizational setting.

- **Teamwork:** Working cooperatively with others to complete work assignments.
- **Problem Solving/Decision Making:** Generating, evaluating, and implementing solutions to problems.
- **Leadership:** Managing and leading team members to successful outcomes in the workplace.
- **Scheduling/Coordinating:** Making arrangements that fulfill all requirements as efficiently and economically as possible.
- **Customer Focus:** Efficiently and effectively addressing the needs of clients/customers.
- **Instruction/Teaching:** Teaching others how to do something.
- **Detail Orientation:** Being accurate and thorough in review and development of work materials/ content.
- **Creative Thinking:** Generating innovative and creative solutions.

ENERGY

ELECTRICIANS

JOB DESCRIPTION	Install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is in accordance with relevant codes. May install or service street lights, intercom systems, or electrical control systems.
KEY FOUNDATIONAL SKILLS	Problem Solving/Decision Making, Communications, Customer Focus, Professionalism, Mathematics
SAFETY AWARENESS	**Ensure Safety:** Ensure safety regulations are followed by advising management on whether continued operation of equipment could be hazardous. Provide assistance during emergencies by operating floodlights or generators, placing flares, or driving needed vehicles. Ensure conformance to building and safety codes by preparing sketches or following blueprints to determine the location of wiring or equipment.
INDUSTRY PRINCIPLES AND CONCEPTS	**Plan:** Plan layout and installation of electrical wiring, equipment, or fixtures, by consulting job specifications and local codes. Calculate and present information by providing preliminary sketches or cost estimates for materials or services. **Install & Assemble:** Install ground leads and connect power cables to equipment, test, or maintain electrical or electronic wiring, equipment, appliances, apparatus, or fixtures by using hand tools or power tools. Place conduit, pipes, or tubing, inside designated partitions, walls, or other concealed areas, and pull insulated wires or cables through the conduit to complete circuits between boxes. **Repair:** Repair or replace wiring, equipment, or fixtures, connect wires to circuit breakers, transformers, or other components, and construct or fabricate parts, by using hand tools or power tools. **Test:** Test electrical systems or continuity of circuits in electrical wiring, equipment, or fixtures, by using testing devices, such as ohmmeters, voltmeters, or oscilloscopes, to ensure compatibility and safety of systems. Utilize a wide variety of tools by using equipment such as power construction equipment, measuring devices, power tools, and testing equipment, such as oscilloscopes, ammeters, or test lamps. **Physical Labor:** Perform physically demanding tasks by digging trenches to lay conduit or moving or lifting heavy objects.
ENVIRONMENTAL LAWS & REGULATIONS	**Inspection:** Ensure compliance with codes by inspecting electrical systems, equipment, or components to identify hazards, defects, or the need for adjustment or repair. **Licensure:** Meet governmental regulations by maintaining current electrician's license or identification card.
QUALITY CONTROL & CONTINUOUS IMPROVEMENT	**Manage Personnel:** Ensure quality by directing or training workers to install, maintain, or repair electrical wiring, equipment, or fixtures **Administrative Tasks:** Perform business management duties by maintaining records or files, preparing reports, or ordering supplies or equipment.
TROUBLESHOOTING	Diagnose Problems: Diagnose malfunctioning systems, apparatus, or components, by using test equipment and hand tools to locate the cause of a breakdown and correct the problem.
KNOWLEDGE	Building and Construction, Mechanical and Electrical Principles, Mathematics, Design, Project Management

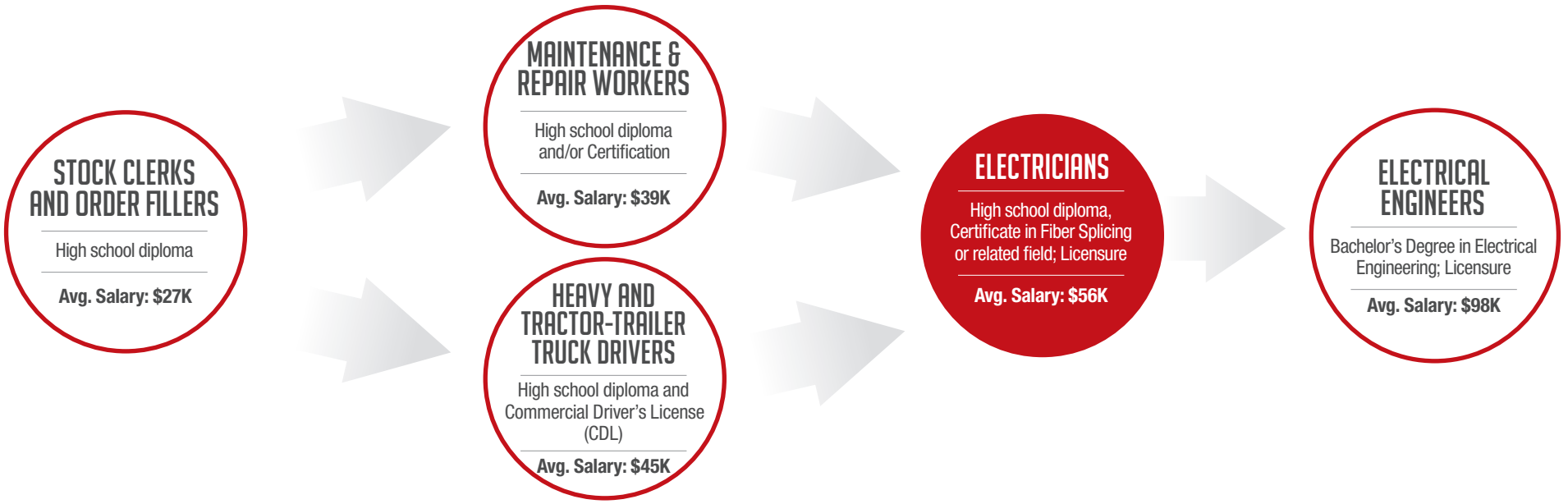
ENERGY

ELECTRICIANS

SALARY RANGE	**Entry Level:** $30,000 - $60,000 (depending on region and employer)	**Advanced Level:** $60,000 - $115,000
TECHNOLOGIES	◯ Accounting software ◯ Analytical or scientific software ◯ Computer aided design CAD software ◯ Database user interface and query software ◯ Document management software	◯ Electronic mail software ◯ Enterprise resource planning ERP software ◯ Industrial control software ◯ Office suite software ◯ Project management software
CREDENTIALS	**Required:** High School Diploma. Postsecondary Certificate in Fiber Splicing or related field; State Licensure, Ongoing Code Training; EEI testing Some required apprenticeships in specified field	**Optional/Dependent on Specialty:** Apprenticeship in specified field
WORK EXPERIENCE	2- 5 years	
OTHER JOB TITLES/ROLES	Chief Electrician; Control Electrician; Electrician; Industrial Electrician; Inside Wireman; Journeyman Electrician; Journeyman Wireman; Maintenance Electrician; Mechanical Trades Specialist, Electrician; Qualified Craft Worker, Electrician (QCW, Electrician)	

ELECTRICIANS PATHWAY

The pathway below represents a typical career pathway in the ever-changing industry of Energy. The key occupation is represented by the colored-in circle.



ENERGY

CIVIL ENGINEERS

JOB DESCRIPTION	Perform engineering duties in planning, designing, and overseeing construction and maintenance of building structures, and facilities, such as roads, railroads, airports, bridges, harbors, channels, dams, irrigation projects, pipelines, power plants, and water and sewage systems.
KEY FOUNDATIONAL SKILLS	Communications, Scheduling/Coordinating, Basic Computer Skills, Leadership, Detail Orientation
SAFETY AWARENESS	**Safety Compliance:** Ensure conformance to design specifications and safety or sanitation standards by inspecting project sites to monitor progress. Determine the adequacy and strength of foundations, concrete, asphalt, or steel by testing soils or materials.
INDUSTRY PRINCIPLES AND CONCEPTS	**Analyze Data:** Determine design specifications by analyzing survey reports, maps, drawings, blueprints, aerial photography, or other topographical or geologic data and computing load and grade requirements, water flow rates, or material stress factors. **Surveying:** Ability to work with survey data that includes installations or reference points, grades, or elevations to guide construction. **Cost Estimation:** Determine project feasibility estimating quantities and cost of materials, equipment, or labor. **Plan, Design,and Present:** Plan and design transportation or hydraulic systems or structures by using computer-assisted design or drawing tools. Create materials such as bid proposals, deeds, environmental impact statements, or property and right-of-way descriptions by preparing or presenting to the public.
ENVIRONMENTAL LAWS & REGULATIONS	**Design:** Design energy-efficient or environmentally sound civil structures. Identify environmental risks and develop risk management strategies for civil engineering projects. **Consult:** Provide technical advice to industrial or managerial personnel regarding design, construction, program modifications, or structural repairs. **Direct Operations:** Ensure smooth operation and environmental safety, or other governmental regulations are in compliance at project sites by managing and directing the construction, operations, or maintenance activities. **Prepare Studies:** Identify engineering problems and assess potential project impact by conducting studies of traffic patterns or environmental conditions. Design or engineer systems by ensuring chemical, biological, or other toxic wastes are efficiently disposed of. Develop or implement engineering solutions to clean up industrial accidents or other contaminated sites by analyzing manufacturing processes or byproducts to identify engineering solutions to minimize the output of carbon or other pollutants.
KNOWLEDGE	Energy and Technology, Building and Construction, Mathematics, Design. Project Management

ENERGY

CIVIL ENGINEERS

SALARY RANGE	**Entry Level:** $50,000 - $80,000 (depending on region and employer)	**Advanced Level:** $80,000 - $130,000
TECHNOLOGIES	⦿ Analytical or scientific software ⦿ Computer aided design CAD software ⦿ Development environment software ⦿ Graphics or photo impacing software ⦿ Financial analysis software ⦿ Map creation software	
CREDENTIALS	**Required:** Bachelor's Degree in Civil Engineering, Licensure **Preferred:** In-house training *Note:* At entry level, licensed not required.	**Optional/Dependent on Specialty:** Bachelor's Degree in Civil Engineering Technology, Master's in Civil Engineering **Certificates:** ⦿ Erosion Control (CESPCS) ⦿ Wetland Scientist ⦿ GIS ⦿ Drafting Standard (NOCTI CAD) ⦿ Safe Land Training ⦿ Basic First Aid ⦿ CPR Training
WORK EXPERIENCE	5-8 years	
OTHER JOB TITLES/ROLES	Bridge/Structure Inspection Team Leader, City Engineer, Civil Engineer, Civil Engineering Manager, County Engineer, Design Engineer, Project Engineer, Railroad Design Consultant, Structural Engineer, Traffic Engineer	

CIVIL ENGINEERS PATHWAY

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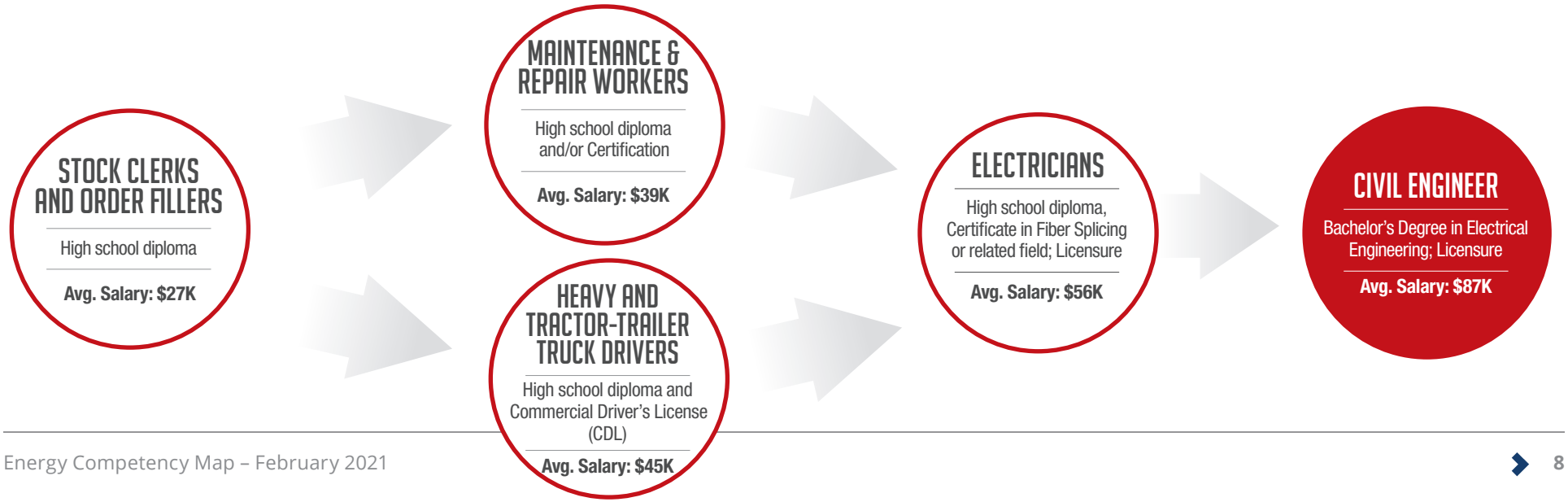

ENERGY

HEAVY AND TRACTOR-TRAILER TRUCK DRIVERS

JOB DESCRIPTION	Drive a tractor-trailer combination or a truck with a capacity of at least 26,000 pounds Gross Vehicle Weight (GVW). May be required to unload truck. Requires commercial drivers' license.
KEY FOUNDATIONAL SKILLS	Customer Focus, Communication, Leadership, Professionalism, Scheduling/Coordinating
SAFETY AWARENESS	**Ensure Vehicle Safety:** Check vehicles to ensure that mechanical, safety, and emergency equipment is in good working order. Follow appropriate safety procedures for transporting dangerous goods. Inspect loads to ensure that cargo is secure. Secure cargo for transport, using ropes, blocks, chain, binders, or covers. Crank trailer landing gear up or down to safely secure vehicles. Wrap and secure goods by using pads, packing paper, containers, or straps.
INDUSTRY PRINCIPLES AND CONCEPTS	**Loading and Unloading:** Maneuver trucks into loading or unloading positions, following signals from loading crew and checking that vehicle and loading equipment are properly positioned. Load or unload trucks or help others with loading or unloading, using special loading-related equipment or other equipment as necessary **Drive Trucks:** Drive trucks with capacities greater than 3 tons, including tractor-trailer combinations, to transport and deliver products, livestock, or other materials. Drive trucks to weigh stations before and after loading and along routes in compliance with state regulations. **Operate and Install Equipment:** Operate equipment, such as truck cab computers, CB radios, phones, or global positioning systems (GPS) equipment to exchange necessary information with bases, supervisors, or other drivers. Couple or uncouple trailers by changing trailer jack positions, connecting or disconnecting air or electrical lines, or manipulating fifth-wheel locks. Install or remove special equipment, such as tire chains, grader blades, plow blades, or sanders. **Maintain Records, Follow and Give Instructions:** Obtain receipts or signatures for delivered goods and collect payment for services when required. Read bills of lading to determine assignment details. Collect delivery instructions from appropriate sources, verifying instructions and routes. Follow special cargo-related procedures, such as checking refrigeration systems for frozen foods or providing food or water for livestock. Give directions to laborers who are packing goods and moving them onto trailers. **Inspect and Repair:** Check conditions of trailers after contents have been unloaded to ensure that there has been no damage. Perform emergency roadside repairs, such as changing tires or installing light bulbs, tire chains, or spark plugs. Perform basic vehicle maintenance tasks, such as adding oil, fuel, or radiator fluid or performing minor repairs.
ENVIRONMENTAL LAWS & REGULATIONS	**Follow Environmentally Friendly Procedures:** Plan or adjust routes based on changing conditions, using computer equipment, global positioning systems (GPS) equipment, or other navigation devices, to minimize fuel consumption and carbon emissions. Operate idle reduction systems or auxiliary power systems to generate power from alternative sources, such as fuel cells, to reduce idling time, to heat or cool truck cabins, or to provide power for other equipment. Drive electric or hybrid-electric powered trucks or alternative fuel-powered trucks to transport and deliver products, livestock, or other materials
QUALITY CONTROL & CONTINUOUS IMPROVEMENT	**Maintain Accuracy:** Maintain logs of working hours or of vehicle service or repair status, following applicable state and federal regulations. Report vehicle defects, accidents, traffic violations, or damage to the vehicles. Check all load-related documentation for completeness and accuracyInventory and inspect goods to be moved to determine quantities and conditions
KNOWLEDGE	Transportation, Public Safety and Security, Customer and Personal Service, Mechanical, Project Management

ENERGY

HEAVY AND TRACTOR-TRAILER TRUCK DRIVERS

SALARY RANGE	**Entry Level:** $30,000 - $45,000 (depending on region and employer)	**Advanced Level:** $45,000 - $65,000
TECHNOLOGIES	⦿ Analytical or scientific software ⦿ Database user interface and query software ⦿ Electronic mail software ⦿ Enterprise resources planning (ERP) software ⦿ Inventory management software ⦿ Materials requirements planning logistics and supply chain software ⦿ Office suite software	
CREDENTIALS	**Required:** High school diploma, Commercial driver's license (CDL)	**Optional/Dependent on Specialty:** CDL Endorsements: T: Double and triple trailers, P: Passenger vehicles, etc. **Certificates:** Hazardous Materials; Tanker Endorsement
WORK EXPERIENCE	0-3 years	
OTHER JOB TITLES/ROLES	Driver, Line Haul Driver, Log Truck Driver, Over the Road Driver (OTR Driver), Production Truck Driver, Road Driver, Semi Truck Driver, Tractor Trailer Operator, Truck Driver	

HEAVY AND TRACTOR-TRAILER TRUCK DRIVERS PATHWAY

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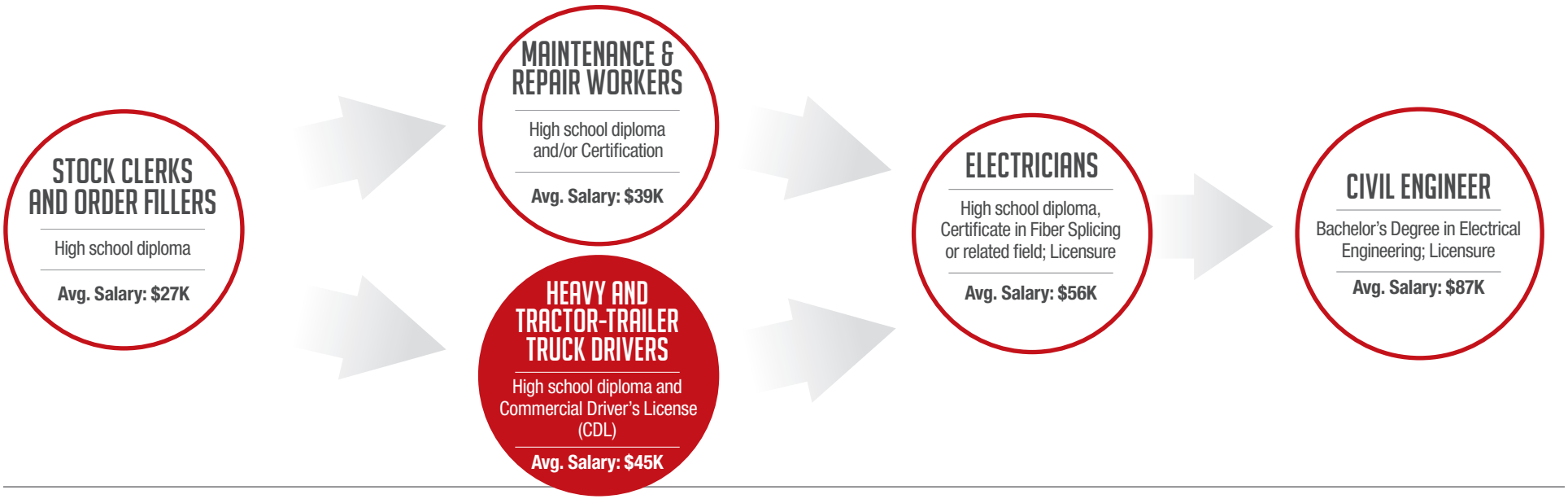

ENERGY

SERVICE UNIT OPERATORS, OIL AND GAS

JOB DESCRIPTION	Operate equipment to increase oil flow from producing wells or to remove stuck pipe, casing, tools, or other obstructions from drilling wells. Includes fishing-tool technicians.
KEY FOUNDATIONAL SKILLS	Communications, Mathematics, Basic Computer Skills, Problem Solving/Decision Making, Detail Orientation
SAFETY AWARENESS	**Safety Inspection:** Maintain and perform safety inspections on equipment and tools.
INDUSTRY PRINCIPLES & CONCEPTS	**Machinery Maintenance and Operation:** Operate controls that raise derricks or level rigs. Listen to engines, rotary chains, or other equipment to detect faulty operations or unusual well conditions. Operate pumps that circulate water, oil, or other fluids through wells to remove sand or other materials obstructing the free flow of oil. Operate specialized equipment to remove obstructions by backing off or severing pipes by chemical or explosive action. Monitor sound wave-generating or detecting mechanisms to determine well fluid levels. **Prepare Reports:** Prepare reports of services rendered, tools used, or time required, for billing purposes. **Device Installation:** Install pressure-control devices onto wellheads. Insert detection instruments into wells with obstructions. **Peer Consultation:** Confer with others to gather information regarding pipe or tool sizes or borehole conditions in wells. **Driving:** Drive truck-mounted units to well sites. **Analyze Information:** Interpret instrument readings to ascertain the depth of obstruction. **Manage Cables and Remove Obstacles:** Thread cables through derrick pulleys, using hand tools. Select fishing methods or tools for removing obstacles such as liners, broken casing, screens, or drill pipe. Close and seal wells no longer in use. Perforate well casings or sidewalls of boreholes with explosive charges. **Direct Work Crews:** Direct drilling crews performing activities such as assembling and connecting pipe, applying weights to drill pipes, or drilling around lodged obstacles. **Diagnose and Repair:** Examine unserviceable wells to determine actions to be taken to improve well conditions.
ENVIRONMENTAL LAWS & REGULATIONS	**Use Green Technology:** Apply green technologies or techniques, such as the use of coiled tubing, slim-hole drilling, horizontal drilling, hydraulic fracturing, or gas lift systems.
KNOWLEDGE	Mechanical, Mathematics, Customer and Personal Services, Engineering and Technology, Public Safety and Security, Education and Training, Project Management

ENERGY

SERVICE UNIT OPERATORS, OIL AND GAS

SALARY RANGE	**Entry Level:** $25,000 - $35,000 (depending on region and employer)	**Advanced Level:** $35,000 - $60,000
TECHNOLOGIES	⊙ Analytical or scientific software ⊙ Enterprise resource planning (ERP) software ⊙ Facilities management software ⊙ Industrial control software ⊙ Inventory management software ⊙ Office suite software	⊙ Presentation software ⊙ Project management software ⊙ Spreadsheet software ⊙ Time accounting software ⊙ Word processing software
CREDENTIALS	**Required:** High school diploma **Preferred:** Certifications in Mining/Oil Technology	
WORK EXPERIENCE	2 -3 years	
OTHER JOB TITLES/ROLES	Pulling Unit Operator, Reverse Unit Operator-Fisherman, Rig Operator, Service Operator, Service Rig Operator, Tool Pusher, Well Servicing Rig Operator, Wireline Operator	

SERVICE UNIT OPERATORS, OIL AND GAS PATHWAY

The pathway below represents a typical career pathway in the ever-changing industry of Energy. The key occupation is represented by the colored-in circle.

ENERGY

ELECTRICAL ENGINEERS

JOB DESCRIPTION	Research, design, develop, test, or supervise the manufacturing and installation of electrical equipment, components, or systems for commercial, industrial, military, or scientific use.
KEY FOUNDATIONAL SKILLS	Communications, Problem Solving/Decision Making, Leadership, Scheduling/Coordinating, Basic Computer Skills
INDUSTRY PRINCIPLES & CONCEPTS	**Design:** Operate computer-assisted engineering or design software or equipment to perform engineering tasks. Prepare technical drawings, specifications of electrical systems, or topographical maps to ensure that installation and operations conform to standards and customer requirements. Design, implement, maintain, or improve electrical instruments, equipment, facilities, components, products, or systems for commercial, industrial, or domestic purposes. Prepare specifications for purchases of materials or equipment. Design electrical systems or components that minimize electric energy requirements, such as lighting systems designed to account for natural lighting. Plan layout of electric power generating plants or distribution lines or stations. **Coordinate and Manage Operations:** Direct or coordinate manufacturing, construction, installation, maintenance, support, documentation, or testing activities to ensure compliance with specifications, codes, or customer requirements. Oversee project production efforts to assure projects are completed on time and within budget. **Analyze Data and Report:** Compile data and write reports regarding existing or potential electrical engineering studies or projects. Perform detailed calculations to compute and establish manufacturing, construction, or installation standards or specifications **Cost Estimation:** Estimate labor, material, or construction costs for budget preparation purposes. **Training:** Supervise or train project team members, as necessary. **Inspect and Repair:** Conduct field surveys or study maps, graphs, diagrams, or other data to identify and correct power system problems. Investigate customer or public complaints to determine the nature and extent of problems. Inspect completed installations and observe operations to ensure conformance to design and equipment specifications and compliance with operational, safety, or environmental standards. Assist in developing capital project programs for new equipment or major repairs. **Develop Research Methodology:** Plan or implement research methodology or procedures to apply principles of electrical theory to engineering projects. **Teamwork:** Confer with engineers, customers, or others to discuss existing or potential engineering projects or products.
KNOWLEDGE	Engineering and Technology, Computers and Electronics, Design, Mathematics, Project Management

ENERGY

ELECTRICAL ENGINEERS

SALARY RANGE	**Entry Level:** $55,000 - $95,000 (depending on region and employer)	**Advanced Level:** $95,000 - $140,000
TECHNOLOGIES	◦ Analytical or scientific software ◦ Computer aided design CAD software ◦ Computer aided manufacturing CAM software ◦ Configuration management software ◦ Database user interface and query software ◦ Development environment software ◦ Electronic mail software ◦ Enterprise resource planning ERP software ◦ File versioning software	◦ Financial analysis software ◦ Graphics or photo imaging software ◦ Industrial control software ◦ Map creation software ◦ Object or component oriented development software ◦ Office suite software ◦ Operating system software ◦ Presentation software ◦ Program testing software
CREDENTIALS	**Required:** Bachelor's degree in Electrical Engineering, Licensure through the Fundamentals of Engineering (FE) Exam	**Optional/Dependent on Specialty - Certifications:** Master's degree in Electrical Engineering, Passage of Professional PE Exam (continuing education)
WORK EXPERIENCE	5 - 8 years	
OTHER JOB TITLES/ROLES	Circuits Engineer, Design Engineer, Electrical Controls Engineer, Electrical Design Engineer, Electrical Engineer, Electrical Project Engineer, Instrumentation and Electrical Reliability Engineer (I&E Reliability Engineer), Power Systems Engineer, Project Engineer, Test Engineer	

ELECTRICAL ENGINEERS PATHWAY

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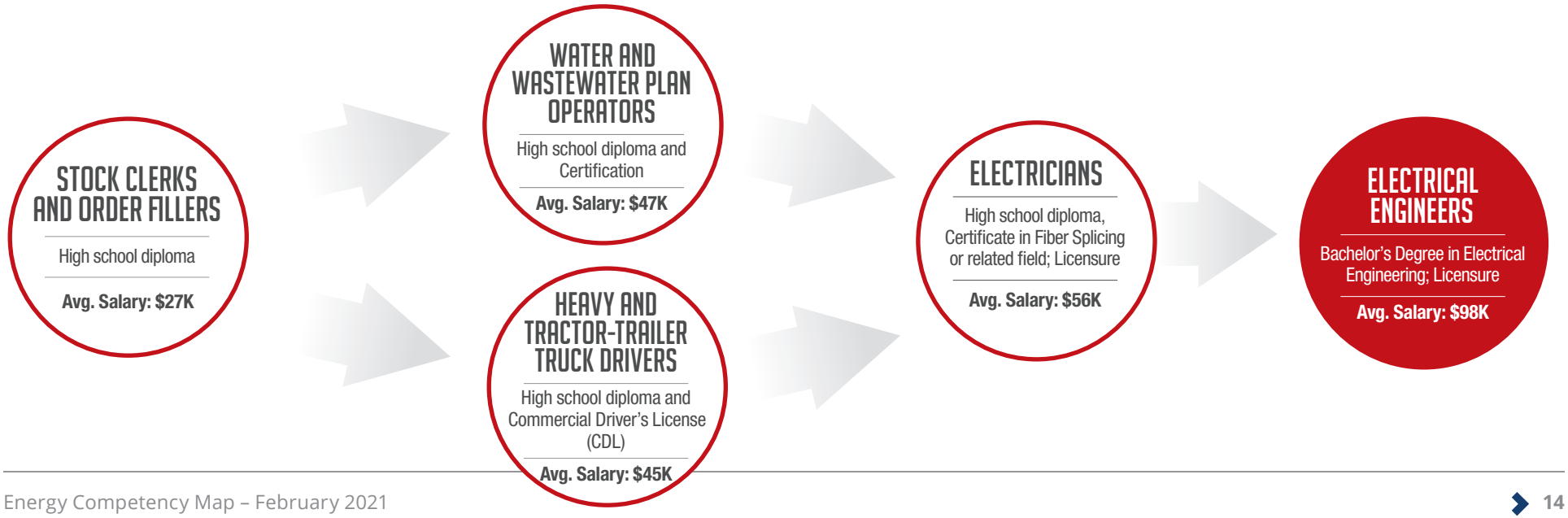

ENERGY

ELECTRICAL POWER LINE INSTALLERS AND REPAIRERS

JOB DESCRIPTION	Install or repair cables or wires used in electrical power or distribution systems. May erect poles and light or heavy duty transmission towers
KEY FOUNDATIONAL SKILLS	Communication, Customer Focus, Problem Solving/Decision Making, Initiative, Scheduling/Coordinating
SAFETY AWARENESS	**Safety Awareness:** Adhere to safety practices and procedures, such as checking equipment regularly and erecting barriers around work areas. Trim trees that could be hazardous to the functioning of cables or wires.
MAINTENANCE, INSTALLATION, AND REPAIR	**Testing & Inspection:** Test conductors, according to electrical diagrams and specifications, to identify corresponding conductors and to prevent incorrect connections. Travel in trucks, helicopters, and airplanes to inspect lines for freedom from obstruction and adequacy of insulation. Inspect and test power lines and auxiliary equipment to locate and identify problems, using reading and testing instruments. **Driving & Climbing:** Drive vehicles equipped with tools and materials to job sites. Climb poles or use truck-mounted buckets to access equipment. **Diagnose and Repair:** Identify defective sectionalizing devices, circuit breakers, fuses, voltage regulators, transformers, switches, relays, or wiring, using wiring diagrams and electrical-testing instruments. Replace or straighten damaged poles. **Install Systems and Devices:** Install, maintain, and repair electrical distribution and transmission systems, including conduits, cables, wires, and related equipment, such as transformers, circuit breakers, and switches. Install watt-hour meters and connect service drops between power lines and consumers' facilities. Place insulating or fireproofing materials over conductors and joints. Attach cross-arms, insulators, and auxiliary equipment to poles prior to installing them. Open switches or attach grounding devices to remove electrical hazards from disturbed or fallen lines or to facilitate repairs. **Dig Holes:** Dig holes, using augers, and set poles, using cranes and power equipment. **Cable Splicing, Soldering and Laying:** Splice or solder cables together or to overhead transmission lines, customer service lines, or street light lines, using hand tools, epoxies, or specialized equipment. Pull up cable by hand from large reels mounted on trucks. Cut and peel lead sheathing and insulation from defective or newly installed cables and conduits prior to splicing. **String Wire:** String wire conductors and cables between poles, towers, trenches, pylons, and buildings, setting lines in place and using winches to adjust tension. Clean, tin, and splice corresponding conductors by twisting ends together or by joining ends with metal clamps and soldering connections. **Teamwork:** Coordinate work assignment preparation and completion with other workers. **Lay Cable:** Lay underground cable directly in trenches, or string it through conduit running through the trenches. Cut trenches for laying underground cables, using trenchers and cable plows.
KNOWLEDGE	Mechanical, Customer and Personal Service, Physics, Project Management

ENERGY

ELECTRICAL POWER LINE INSTALLERS AND REPAIRERS

SALARY RANGE	**Entry Level:** $45,000 - $80,000 (depending on region and employer)	**Advanced Level:** $80,000 - $100,000
TECHNOLOGIES	◦ Computer aided design CAD software ◦ Database user interface and query software ◦ Electronic mail software ◦ Inventory management software	◦ Office suite software ◦ Spreadsheet software ◦ Word processing software
CREDENTIALS	**Required:** High school diploma, EEI Test and Physical Skills Assessment **Preferred:** Apprenticeships and/or Certifications in Electronics, Telecommunications, Electricity or related field	
WORK EXPERIENCE	1 - 4 years	
OTHER JOB TITLES/ROLES	A Class Lineman, Apprentice Lineman Third Step, Class A Lineman, Electric Lineman, Electrical Lineman (Power), Electrical Lineworker, Journeyman Lineman, Lineman, Lineworker, Power Lineman	

ELECTRICAL POWER LINE INSTALLERS AND REPAIRERS PATHWAY

The pathway below represents a typical career pathway in the ever-changing industry of Energy. The key occupation is represented by the colored-in circle.

ENERGY

WATER & WASTEWATER TREATMENT PLANT AND SYSTEM OPERATORS

JOB DESCRIPTION	Operate or control an entire process or system of machines or existing treatment facilities, often through the use of control boards, to transfer or treat water or wastewater.
KEY FOUNDATIONAL SKILLS	Communications, Mathematics, Problem Solving/Decision Making, Detail Orientation, Customer Focus
INDUSTRY PRINCIPLES & CONCEPTS	**Disinfect and Deodorize Water:** Add chemicals, such as ammonia, chlorine, or lime, to disinfect and deodorize water and other liquids. **Collect and Test Samples:** Collect and test water and sewage samples, using test equipment and color analysis standards. **Record Data:** Record operational data, personnel attendance, or meter and gauge readings on specified forms. **Operate Equipment:** Operate and adjust controls on equipment to purify and clarify water, process or dispose of sewage, and generate power. **Maintain, Repair, and Clean Equipment:** Maintain, repair, and lubricate equipment, using hand tools and power tools. Clean and maintain tanks, filter beds, and other work areas, using hand tools and power tools. **Manage Personnel:** Direct and coordinate plant workers engaged in routine operations and maintenance activities.
QUALITY CONTROL & CONTINUOUS IMPROVEMENT	**Equipment Inspection:** Determine load requirements and detect malfunctions by inspecting equipment or monitor operating conditions, meters, and gauges.
KNOWLEDGE	Chemistry,Biology,Mechanical,Mathematics,Production and Processing, Public Safety and Security, Engineering and Technology, Administration and Management,Computers and Electronics, Clerical, Education and Training, English Language, Customer and Personal Service, Project Management

ENERGY

WATER & WASTEWATER TREATMENT PLANT AND SYSTEM OPERATORS

SALARY RANGE	**Entry Level:** $30,000 - $50,000 (depending on region and employer)	**Advanced Level:** $50,000 - $75,000
TECHNOLOGIES	⦿ Compliance software technology. ⦿ Database user interface and query software ⦿ Document management software ⦿ Electronic mail software ⦿ Industrial control software	⦿ Office suite software ⦿ Presentation software ⦿ Spreadsheet software ⦿ Time accounting software ⦿ Word processing software
CREDENTIALS	**Required:** High School Diploma, Post Secondary Certificate, and/or On-the-job training	**Optional/Dependent on Specialty:** Associates/Bachelors in fields such as Environmental Science or Wastewater Treatment Technology
WORK EXPERIENCE	2 - 3 years	
OTHER JOB TITLES/ROLES	Plant Operator, Process Operator (Process Op), Relief Operator, SCADA Operator (Supervisory Control and Data Acquisition Operator), Waste Water Treatment Plant Operator (WWTP Operator), Wastewater Operator (WW Operator), Water Control Dispatcher, Water Plant Operator, Water Treatment Operator, Water Treatment Plant Operator	

WATER & WASTEWATER TREATMENT PLANT AND SYSTEM OPERATORS PATHWAY

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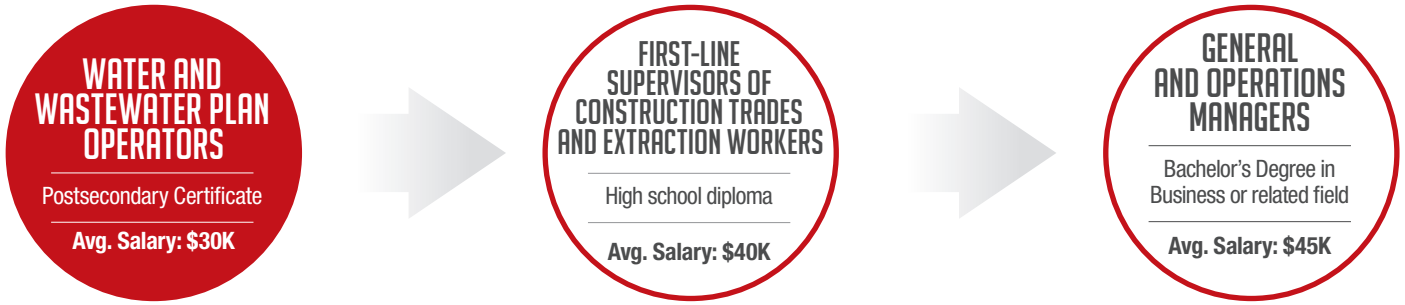

ENERGY

HVAC MECHANICS & INSTALLERS

JOB DESCRIPTION	Install or repair heating, central air conditioning, HVAC, or refrigeration systems, including oil burners, hot-air furnaces, and heating stoves.
KEY FOUNDATIONAL SKILLS	Problem Solving/Decision Making, Communications, Customer Focus, Initiative, Professionalism
SAFETY AWARENESS	Safety Compliance: Comply with all applicable standards, policies, or procedures, such as safety procedures or the maintenance of a clean work area.
INDUSTRY PRINCIPLES & CONCEPTS	**Repair & Maintenance:** Repair or replace defective equipment, components, or wiring. Perform mechanical overhauls and refrigerant reclaiming. Adjust system controls to settings recommended by manufacturer to balance systems. Repair or service heating, ventilating, and air conditioning (HVAC) systems to improve efficiency, such as by changing filters, cleaning ducts, and refilling non-toxic refrigerants. Recommend, develop, or perform preventive or general maintenance procedures, such as cleaning, power-washing, or vacuuming equipment, oiling parts, or changing filters **Installing and Connecting:** Install auxiliary components to heating or cooling equipment, such as expansion or discharge valves, air ducts, pipes, blowers, dampers, flues, or stokers.Connect heating or air conditioning equipment to fuel, water, or refrigerant source to form complete circuit. Install, connect, or adjust thermostats, humidistats, or timers. Lay out and connect electrical wiring between controls and equipment, according to wiring diagrams, using electrician's hand tools. Install expansion and control valves, using acetylene torches and wrenches. Install dehumidifiers or related equipment for spaces that require cool, dry air to operate efficiently, such as computer rooms. Cut or drill holes in floors, walls, or roof to install equipment, using power saws or drills. Install or repair air purification systems, such as specialized filters or ultraviolet (UV) light purification systems. Lift and align components into position, using hoist or block and tackle. **Brazing and Soldering:** Braze or solder parts to repair defective joints and leaks. **Customer Service:** Discuss heating or cooling system malfunctions with users to isolate problems or to verify that repairs corrected malfunctions. **Study Blueprints:** Study blueprints, design specifications, or manufacturers' recommendations to ascertain the configuration of heating or cooling equipment components and to ensure the proper installation of components. **Record Time and Work:** Record and report time, materials, faults, deficiencies, or other unusual occurrences on work orders. Keep records of repairs and replacements made and causes of malfunctions. **Mounting and Measuring:** Mount compressor, condenser, and other components in specific locations on frames, using hand tools and acetylene welding equipment. Measure, cut, thread, or bend pipe or tubing, using pipe fitter's tools. Lay out reference points for installation of structural and functional components, using measuring instruments. **Estimate and Order Materials:** Estimate, order, pick up, deliver, and install materials and supplies needed to maintain equipment in good working condition. **Scheduling:** Schedule work with customers and initiate work orders, house requisitions, and orders from stock. **Manage Personnel:** Supervise and instruct assistants.
ENVIRONMENTAL LAWS & REGULATIONS	**Environmental Compliance:** Install or repair self-contained ground source heat pumps or hybrid ground or air source heat pumps to minimize carbon-based energy consumption and reduce carbon emissions.
QUALITY CONTROL & CONTINUOUS IMPROVEMENT	**Inspection and Testing:** Test electrical circuits or components for continuity, using electrical test equipment. Inspect and test systems to verify system compliance with plans and specifications or to detect and locate malfunctions. Test pipes, lines, components, and connections for leaks.
KNOWLEDGE	BAS Building Automation System/Controls, Mechanical, Customer and Personal Service, Building and Construction, Computers and Electronics, Physics, Administration and Management, Design, Mathematics

ENERGY

HVAC MECHANICS & INSTALLERS

SALARY RANGE	**Entry Level:** $30,000 - $50,000 (depending on region and employer)	**Advanced Level:** $50,000 - $75,000
TECHNOLOGIES	⦿ Computer aided design CAD software; Customer relationship management ⦿ Database user interface and query software and document management software ⦿ Electronic mail software and Enterprise resource planning ERP software, Facilities management software	⦿ Graphics or photo imaging software, Industrial control software ⦿ Internet browser software and Office suite software ⦿ Presentation software and Spreadsheet software; Word processing software
CREDENTIALS	**Required:** High school diploma,North American Technical Excellence (NATE) Certification or HVAC Excellence, EPA Federal Certification (Type 1 - 111 or Universal); State Licensure **Preferred:** OSHA training/certification	
WORK EXPERIENCE	2-3 years+	
OTHER JOB TITLES/ROLES	A/C Tech (Air Conditioning Technician); HVAC Installer (Heating, Ventilation, Air Conditioning Installer); HVAC Mechanic (Heating, Ventilation, Air Conditioning Mechanic); HVAC Specialist (Heating, Ventilation, and Air Conditioning Specialist); Refrigeration Mechanic; Refrigeration Operator; Refrigeration Technician(Refrigeration Tech); Service Technician (Service Tech); Systems Mechanic; Transportation Refrigeration Technician (Transportation Refrigeration Tech)	

HVAC MECHANICS & INSTALLERS PATHWAY

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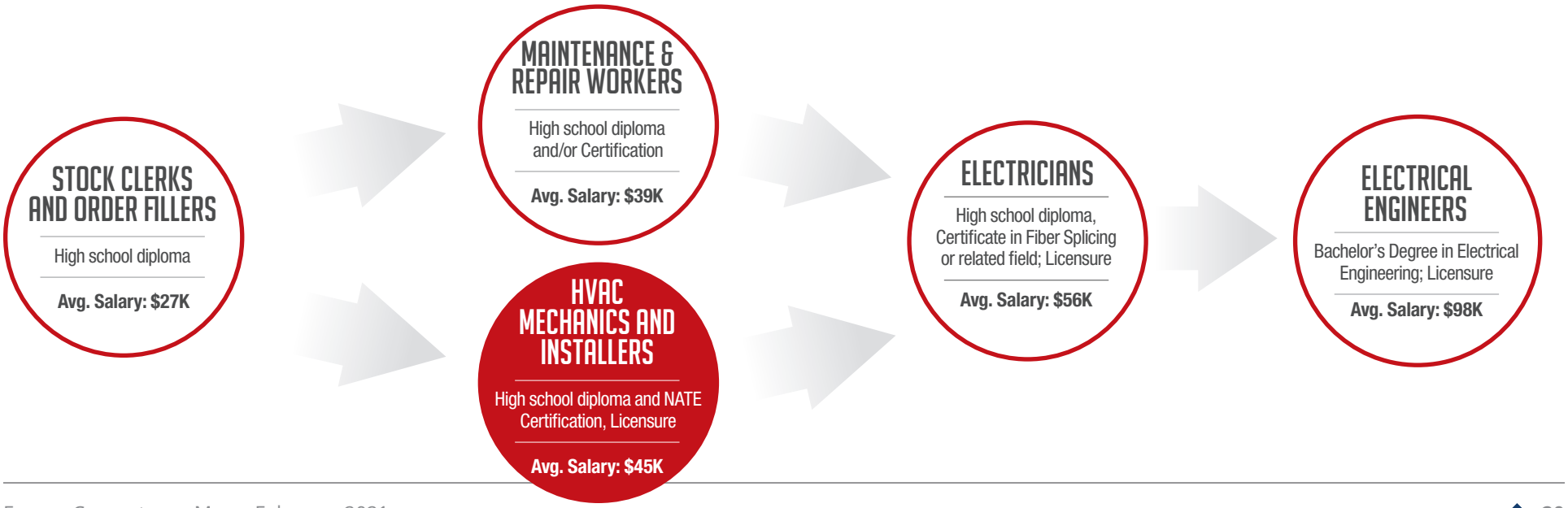

ENERGY

SOLAR PHOTOVOLTAIC INSTALLERS

JOB DESCRIPTION	Assemble, install, or maintain solar photovoltaic (PV) systems on roofs or other structures in compliance with site assessment and schematics. May include measuring, cutting, assembling, and bolting structural framing and solar modules. May perform minor electrical work such as current checks.
KEY FOUNDATIONAL SKILLS	Detail Orientation, Communications, Professionalism, Customer Focus, Problem Solving/Decision Making
SAFETY AWARENESS	Identify Safety Hazards: Identify electrical, environmental, and safety hazards associated with photovoltaic (PV) installations.
INDUSTRY PRINCIPLES & CONCEPTS	**Installation & Assembly:** Install photovoltaic (PV) systems in accordance with codes and standards, using drawings, schematics, and instructions. Assemble solar modules, panels, or support structures, as specified. Apply weather sealing to array, building, or support mechanisms. Install module array interconnect wiring, implementing measures to disable arrays during installation. Install required labels on solar system components and hardware. Install active solar systems, including solar collectors, concentrators, pumps, or fans. **Determine & Identify Installation Resource Needs:** Identify methods for laying out, orienting, and mounting modules or arrays to ensure efficient installation, electrical configuration, or system maintenance. Program, adjust, or configure inverters and controls for desired set points and operating modes. Determine connection interfaces for additional subpanels or for connecting photovoltaic (PV) systems with utility services or other power generation sources. Determine materials, equipment, and installation sequences necessary to maximize installation efficiency. **Diagram and Determine Layouts and Locations:** Diagram layouts and locations for photovoltaic (PV) arrays and equipment, including existing building or site features. Determine appropriate sizes, ratings, and locations for all system overcurrent devices, disconnect devices, grounding equipment, and surge suppression equipment. Identify installation locations with proper orientation, area, solar access, or structural integrity for photovoltaic (PV) arrays **Client Instruction & Customization:** Demonstrate system functionality and performance, including start-up, shut-down, normal operation, and emergency or bypass operations. Determine photovoltaic (PV) system designs or configurations based on factors such as customer needs, expectations, and site conditions. **Diagnose & Repair:** Identify and resolve any deficiencies in photovoltaic (PV) system installation or materials. **Test & Maintain Equipment**: Check electrical installation for proper wiring, polarity, grounding, or integrity of terminations. Test operating voltages to ensure operation within acceptable limits for power conditioning equipment, such as inverters and controllers. Visually inspect and test photovoltaic (PV) modules or systems. Perform routine photovoltaic (PV) system maintenance on modules, arrays, batteries, power conditioning equipment, safety systems, structural systems, weather sealing, or balance of systems equipment. Activate photovoltaic (PV) systems to verify system functionality and conformity to performance expectations. Measure and analyze system performance and operating parameters to assess operating condition of systems or equipment. **Examine Designs:** Examine designs to determine current requirements for all parts of the photovoltaic (PV) system electrical circuit.
ENVIRONMENTAL LAWS & REGULATIONS	**Compliance:** Select mechanical designs, installation equipment, or installation plans that conform to environmental, architectural, structural, site, and code requirements.
QUALITY CONTROL & CONTINUOUS IMPROVEMENT	**Recordkeeping:** Compile or maintain records of system operation, performance, and maintenance.
KNOWLEDGE	Mechanical, Building and Construction, Design, Customer and Personal Service

ENERGY

SOLAR PHOTOVOLTAIC INSTALLERS

SALARY RANGE	**Entry Level:** $25,000 - $35,000 (depending on region and employer)	**Advanced Level:** $35,000 - $50,000
TECHNOLOGIES	◯ Calendar and scheduling software ◯ Computer aided design CAD software ◯ Customer relationship management CRM software ◯ Electronic mail software ◯ Enterprise application integration software	◯ Office suite software ◯ Project management software ◯ Spreadsheet software ◯ Word processing software
CREDENTIALS	**Required:** North American Board of Certified Energy Practitioners (NABCEP) Certification, State Licensure	
WORK EXPERIENCE	2 - 3 years	
OTHER JOB TITLES/ROLES	Installer, Photovoltaic Installer (PV Installer), PV Design and Installation Technician, Solar Designer/Installer, Solar Installer, Solar Installer Technician, Solar Photovoltaic Installer (Solar PV Installer), Solar Technician	

SOLAR PHOTOVOLTAIC INSTALLERS PATHWAY

The pathway below represents a typical career pathway in the ever-changing industry of Energy. The key occupation is represented by the colored-in circle.

SUPPLY CHAIN MANAGER / TRANSPORTATION, STORAGE, AND DISTRIBUTION MANAGERS

JOB DESCRIPTION	Direct or coordinate production, purchasing, warehousing, distribution, or financial forecasting services or activities to limit costs and improve accuracy, customer service, or safety. Examine existing procedures or opportunities for streamlining activities to meet product distribution needs. Direct the movement, storage, or processing of inventory.
KEY FOUNDATIONAL SKILLS	Leadership, Scheduling/Coordinating, Communication, Problem Solving/Decision Making, Initiative
INDUSTRY PRINCIPLES & CONCEPTS	**Design Strategies and Procedures:** Develop procedures for coordination of supply chain management with other functional areas, such as sales, marketing, finance, production, or quality assurance. Design or implement plant warehousing strategies for production materials or finished products. Develop or implement procedures or systems to evaluate or select suppliers. Design or implement supply chains that support business strategies adapted to changing market conditions, new business opportunities, or cost reduction strategies. Implement new or improved supply chain processes to improve efficiency or performance. Define performance metrics for measurement, comparison, or evaluation of supply chain factors, such as product cost or quality. **Teamwork:** Confer with supply chain planners to forecast demand or create supply plans that ensure availability of materials or products. Participate in the coordination of engineering changes, product line extensions, or new product launches to ensure orderly and timely transitions in material or production flow. **Forecast, Strategize and Optimize:** Forecast material costs or develop standard cost lists. Monitor forecasts and quotas to identify changes and predict effects on supply chain activities. Analyze inventories to determine how to increase inventory turns, reduce waste, or optimize customer service. **Analyze & Evaluate:** Analyze information about supplier performance or procurement program success. Evaluate and select information or other technology solutions to improve tracking and reporting of materials or products distribution, storage, or inventory. Conduct or oversee the conduct of life cycle analyses to determine the environmental impacts of products, processes, or systems. Select transportation routes to maximize economy by combining shipments or consolidating warehousing and distribution. Determine appropriate equipment and staffing levels to load, unload, move, or store materials. **Manage and Monitor Purchasing Process and Supplier Activity:** Manage activities related to strategic or tactical purchasing, material requirements planning, controlling inventory, warehousing, or receiving. Document physical supply chain processes, such as workflows, cycle times, position responsibilities, or system flows. **Manage Relationships:** • **Vendors & Suppliers:** Appraise vendor manufacturing capabilities through on-site observations or other measurements. Identify or qualify new suppliers in collaboration with other departments, such as procurement, engineering, or quality assurance. Meet with suppliers to discuss performance metrics, to provide performance feedback, or to discuss production forecasts or changes. Negotiate prices and terms with suppliers, vendors, or freight forwarders. Monitor suppliers' activities to assess performance in meeting quality or delivery requirements. • **Customers:** Diagram supply chain models to help facilitate discussions with customers.
ENVIRONMENTAL LAWS & REGULATIONS	**Environmental Compliance and Monitoring:** Investigate or review the carbon footprints and environmental performance records of current or potential storage and distribution service providers. Identify opportunities to reuse or recycle materials to minimize consumption of new materials, minimize waste, or to convert wastes to by-products. Review or update supply chain practices in accordance with new or changing environmental policies, standards, regulations, or laws. **Environmental Design:** Design, implement, or oversee product take back or reverse logistics programs to ensure products are recycled, reused, or responsibly disposed. Design or implement supply chains that support environmental policies. Locate or select biodegradable, non-toxic, or other environmentally friendly raw materials for manufacturing processes.
KNOWLEDGE	Mechanical, Building and Construction, Design, Customer and Personal Service

ENERGY

SUPPLY CHAIN MANAGER / TRANSPORTATION, STORAGE, AND DISTRIBUTION MANAGERS

SALARY RANGE	**Entry Level:** $50,000 -$95,000 (depending on region and employer)	**Advanced Level:** $95,000 - $150,000
TECHNOLOGIES	⦿ Analytical or scientific software ⦿ Calendar and scheduling software ⦿ Database reporting software ⦿ Database user interface and query software ⦿ Electronic mail software ⦿ Enterprise resource planning ERP software	⦿ Financial analysis software ⦿ Inventory management software ⦿ Materials requirements planning logistics supply chain software ⦿ Office suite software ⦿ Project management software
CREDENTIALS	**Required:** Bachelor of Science in Supply Chain Management, Business, or related field.	**Optional/Dependent on Specialty:** Master's Degree in Supply Chain Management, International Society of Logistics (SOLE) or American Production and Inventory Control Society (APICS) Certification
WORK EXPERIENCE	8 - 10 years	
OTHER JOB TITLES/ROLES	Global Supply Chain Director, Material Requirements Planning Manager, Solution Design and Analysis Manager, Supply Chain Director, Supply Chain Manager, Transportation, Storage, and Distribution Managers	

SUPPLY CHAIN MANAGER/TRANSPORTATION, STORAGE, AND DISTRIBUTION MANAGERS PATHWAY

The pathway below represents a typical career pathway in the ever-changing industry of Energy. The key occupation is represented by the colored-in circle.

ENERGY

FIRST-LINE SUPERVISORS OF CONSTRUCTION TRADES AND EXTRACTION WORKERS

JOB DESCRIPTION	Directly supervise and coordinate activities of construction or extraction workers.
KEY FOUNDATIONAL SKILLS	Communications, Leadership, Coordinating/Scheduling, Customer Focus, Detail Orientation
INDUSTRY PRINCIPLES & CONCEPTS	**Inspect and Manage Equipment & Sites:** Inspect work progress, equipment, or construction sites to verify safety or to ensure that specifications are met. Arrange for repairs of equipment or machinery. **Blueprint Reading:** Read specifications, such as blueprints, to determine construction requirements or to plan procedures. **Manager, Supervise, and Train Personnel:** Assign work to employees, based on material or worker requirements of specific jobs. Supervise, coordinate, or schedule the activities of construction or extractive workers. Train workers in construction methods, operation of equipment, safety procedures, or company policies. Suggest or initiate personnel actions, such as promotions, transfers, or hires. Record information, such as personnel, production, or operational data on specified forms or reports. **Determine Site Location and Structure Placement:** Locate, measure, and mark site locations or placement of structures or equipment, using measuring and marking equipment. **Teamwork:** Confer with managerial or technical personnel, other departments, or contractors to resolve problems or to coordinate activities. Provide assistance to workers engaged in construction or extraction activities, using hand tools or other equipment. **Analyze and Optimize:** Analyze worker or production problems and recommend solutions, such as improving production methods or implementing motivational plans. **Estimate Requirements and Coordinate Work Activities:** Estimate material or worker requirements to complete jobs. Coordinate work activities with other construction project activities. S**upply Management:** Order or requisition materials or supplies.
KNOWLEDGE	Administration and Management, Building and Construction, Mechanical, Customer and Personal Service, Design, Public Safety and Security, Mathematics, Engineering and Technology, Personnel and Human Resources

ENERGY

FIRST-LINE SUPERVISORS OF CONSTRUCTION TRADES AND EXTRACTION WORKERS

SALARY RANGE	**Entry Level:** $40,000 - $70,000 (depending on region and employer)	**Advanced Level:** $70,000 - $110,000
TECHNOLOGIES	◯ Calendar scheduling software ◯ Computer aided design CAD software ◯ Database user interface and query software ◯ Development environment software ◯ Document management software ◯ Electronic mail software	◯ Facilities management software ◯ Inventory management software ◯ Office suite software ◯ Project management software
CREDENTIALS	**Required:** High school diploma	
WORK EXPERIENCE	3 - 5 years	
OTHER JOB TITLES/ROLES	Coal Mine Production Foreman, Construction Foreman, Construction Supervisor, Electrical Supervisor, Field Operations Supervisor, Field Supervisor, Insulation Foreman, Roustabout Field Supervisor, Sheet Metal Foreman, Site Superintendent	

FIRST-LINE SUPERVISORS OF CONSTRUCTION TRADES AND EXTRACTION WORKERS PATHWAY

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Pennsylvania's
STATE SYSTEM
of Higher Education