

## ENERGY ENVIRONMENT AND UTILITIES

This sector is designed to provide a foundation of knowledge and skills in careers related to energy, environment, and utilities. The pathways emphasize real-world, occupationally relevant knowledge, skills, and experiences of significant scope and depth in Environmental Resources, Energy and Power Technology, and Telecommunications. The standards integrate academic and technical preparation and focus on career awareness, career exploration, preparation for entry to technical-level employment, and alignment with postsecondary programs focused on energy, utilities, and related fields.

<b>2.0 Communications</b>	<b>Acquire, and accurately use Energy, Environment, and Utilities sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats. (Direct alignment with LS 9-10, 11-12.6)</b>
2.1	Recognize the elements of communication using a sender-receiver model.
2.2	Identify barriers to accurate and appropriate communication.
2.3	Interpret verbal and nonverbal communications and respond appropriately.
2.4	Demonstrate elements of written and electronic communication such as accurate spelling, grammar, and format.
2.5	Communicate information and ideas effectively to multiple audiences using a variety of media and formats.
2.6	Advocate and practice safe, legal, and responsible use of digital media information and communications technologies.
<b>3.0 Career Planning and Management</b>	<b>Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans. (Direct alignment with SLS 11-12.2)</b>
3.4	Research the scope of career opportunities available and the requirements for education, training, certification, and licensure.
3.5	Integrate changing employment trends, societal needs, and economic conditions into career planning.
3.6	Recognize the role and function of professional organizations, industry associations, and organized labor in a productive society.
3.7	Recognize the importance of small business in the California and global economies.
3.9*	Develop a career plan that reflects career interests, pathways, and postsecondary options.

<b>4.0 Technology</b>	<b>Use existing and emerging technology to investigate, research, and produce products and services, including new information, as required in the Energy, Environment, and Utilities sector workplace environment. (Direct alignment with WS 11-12.6)</b>
4.1	Use electronic reference materials to gather information and produce products and services.
4.2	Employ Web-based communications responsibly and effectively to explore complex systems and issues.
4.3	Use information and communication technologies to synthesize, summarize, compare, and contrast information from multiple sources.
4.4	Discern the quality and value of information collected using digital technologies, and recognize bias and intent of the associated sources.
4.5	Research past, present, and projected technological advances as they impact a particular pathway.
<b>5.0 Problem Solving and Critical Thinking</b>	<b>Conduct short, as well as more sustained, research to create alternative solutions to answer a question or solve a problem unique to the Energy, Environment, and Utilities sector using critical and creative thinking; logical reasoning, analysis, inquiry, and problem-solving techniques. (Direct alignment with WS 11-12.7)</b>
5.1	Identify and ask significant questions that clarify various points of view to solve problems.
5.2	Solve predictable and unpredictable work-related problems using various types of reasoning (inductive, deductive) as appropriate.
5.3	Use systems thinking to analyze how various components interact with each other to produce outcomes in a complex work environment.
5.4	Interpret information and draw conclusions, based on the best analysis, to make informed decisions.
<b>6.0 Health and Safety</b>	<b>Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the Energy, Environment, and Utilities sector workplace environment. (Direct alignment with RSTS 9-10, 11-12.4)</b>
6.6	Maintain a safe and healthful working environment.
6.11	Comply with energy industry safety procedures and proper ways to perform work.
6.12	Use safety equipment as specified by user manuals and safety training.
6.15	Use tools and equipment in compliance with user manuals and training

<b>7.0 Responsibility and Flexibility</b>	<b>Initiate, and participate in, a range of collaborations demonstrating behaviors that reflect personal and professional responsibility, flexibility, and respect in the Energy, Environment, and Utilities sector workplace environment and community settings. (Direct alignment with SLS 9-10, 11-12.1)</b>
7.1	Recognize how financial management impacts the economy, workforce, and community.
7.3	Understand the need to adapt to changing and varied roles and responsibilities.
7.4	Practice time management and efficiency to fulfill responsibilities.
7.5	Apply high-quality techniques to product or presentation design and development.
<b>8.0 Ethics and Legal Responsibilities</b>	<b>Practice professional, ethical, and legal behavior, responding thoughtfully to diverse perspectives and resolving contradictions when possible, consistent with applicable laws, regulations, and organizational norms. (Direct alignment with SLS 11-12.1d)</b>
8.6	Adhere to copyright and intellectual property laws and regulations, and use and appropriately cite proprietary information.
<b>9.0 Leadership and Teamwork</b>	<b>Work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution as practiced in the SkillsUSA career technical student organization. (Direct alignment with SLS 11-12.1b)</b>
9.1	Define leadership and identify the responsibilities, competencies, and behaviors of successful leaders.
9.2	Identify the characteristics of successful teams, including leadership, cooperation, collaboration, and effective decision-making skills as applied in groups, teams, and career technical student organization activities.
9.3	Understand the characteristics and benefits of teamwork, leadership, and citizenship in the school, community, and workplace setting.
9.5	Understand that the modern world is an international community and requires an expanded global view.
9.6	Respect individual and cultural differences and recognize the importance of diversity in the workplace.
9.7	Participate in interactive teamwork to solve real Energy, Environment, and Utilities sector issues and problems.
<b>10.0 Technical Knowledge and Skills</b>	<b>Apply essential technical knowledge and skills common to all pathways in the Energy, Environment, and Utilities sector.</b>

10.2	Construct projects and products specific to the Energy, Environment, and Utilities sector requirements and expectations.
10.3	Coordinate with industry experts for specific technical knowledge and skills.
10.5	Identify and evaluate questions that require skilled investigation to solve current problems cited in literature or media, or observed through personal observations.
<b>11.0 Demonstration and Application</b>	<b>Demonstrate and apply the knowledge and skills contained in the Energy, Environment, and Utilities anchor standards, pathway standards, and performance indicators in classroom, laboratory, and workplace settings, and through the SkillsUSA career technical student organization.</b>
11.1	Utilize work-based/workplace learning experiences to demonstrate and expand upon knowledge and skills gained during classroom instruction and laboratory practices specific to the Energy, Environment, and Utilities sector program of study.
11.2	Demonstrate proficiency in a career technical pathway that leads to certification, licensure, and/or continued learning at the postsecondary level.
11.5	Create a portfolio, or similar collection of work, that offers evidence through assessment and evaluation of skills and knowledge competency as contained in the anchor standards, pathway standards, and performance indicators.

<b>Environmental Resources Pathway</b>	<b>The Environmental Resources pathway prepares students for employment, postsecondary education, and/or training in a variety of environmental industries. Sample occupations associated with this pathway: Air Quality Technician Climatologist Environmental Biologist/Technician/Scientist Environmental Health and Safety Officer Hazardous Waste Operations and Emergency Response Technician</b>
Technician A1.0	Identify energy resources and the effects of these resources on the environment.
A1.1	Classify energy resources by type: depletable, nondepletable, renewable, and nonrenewable.
A1.2	Discover new and emerging energy resources.
A1.3	Compare the advantages and disadvantages of energy resources in terms of the effects on the environment.
A1.4	List jobs in the community that result from, or are influenced by, processing and using energy resources.

A2.0	Identify and describe the global interactive systems and elements that create and sustain climate.
A2.1	Describe the natural elements that interact to create climate.
A2.2	Identify world climate patterns and summarize factors that affect climate.
A2.3	Analyze the impact of climate upon human activities and needs.
A2.4	Identify the greenhouse effect and climate change.
A2.5	Explain how greenhouse gases are generated.
A2.6	Assess impacts of greenhouse gases on the environment.
A 3.0	Evaluate regional interactive systems and elements that create harmful environmental effects.
A3.1	Describe the sources of, and impacts attributable to, pollution and contamination.
A3.2	Recognize the actions that cause resource depletion.
A5.0	Identify the role and impact of waste management systems and their operations on the environment.
A5.2	Explore the causes and effects of pollution linked to wastewater treatment facilities.
A5.3	Identify wastewater treatment processes that lessen environmental impacts and improve water reuse.
A5.5*	Design solid waste disposal processes that lessen environmental impacts and improve recycling.
A6.2*	Describe the composition, role, and function of ecosystems, including trends affecting viability.
A6.3*	Demonstrate the need for, and methods of, land use planning.
A6.5*	Summarize the relationship between land use planning and energy use and distribution.
A7.1	Understand the elements that create outdoor air quality.
A7.2*	Summarize the causes of air pollutants and their chemical composition.
A7.3	Research air pollutants and their threat to human health.
A8.0*	Implement processes to support energy efficiency.
A8.1	Understand the relationship between power and energy efficiency.
A8.2	Outline how domestic and industrial appliances and systems affect the environment, such as water units and heating and cooling systems.
A8.3*	Compare costs of alternate/renewable energy sources, systems, and appliances and traditional energy sources, systems, and appliances.
A8.4	Conduct an energy audit.

A9.0	Research drinking-water sources, systems, treatment, and conservation.
A9.1	Understand water reuse: issues, strategies, technologies, and applications.
A9.2	Analyze strategies for improving energy efficiencies in water collection and distribution.
A9.3*	Describe the role of environmental engineering and green energy in water systems.
A9.4*	Understand the functions and operations of water storage, reservoirs, aqueducts, and dams

<b>Energy and Power Technology Pathway</b>	<b>The Energy and Power Technology pathway provides learning opportunities for students interested in preparing for careers in the energy and power industries. Sample occupations associated with this pathway: Energy Efficiency Evaluation Specialist Energy Engineer Energy Generation/Power Distribution, Maintenance, Inspection, and Repair Technicians Energy/Building Retrofit Specialist Plant/Field Weatherization Installer</b>
B1.1	Describe the past, present, and anticipated demand for, and use of, energy.
B1.3	Explain the flow of energy from generation through distribution to the customer.
B2.0*	Identify various conventional electric power generation fuel sources and the cost and efficiency issues associated with each.
B2.1	Explain the conventional electric power generation system and process (coal, oil, natural gas, solar, wind, geothermal, and hydroelectric).
B2.2	Explain how each source was created and is used to produce electricity.
B2.3	Evaluate and list the advantages and disadvantages for each energy source.
B4.0	Understand non-nuclear power generation plant operations (coal, oil, natural gas, solar, wind, geothermal power, hydroelectric, or biofuel).
B4.2	Classify the components of electrical generating systems, including boilers, generators, alternators, turbines, motors, engines, pumps, and switchgear.
B4.3*	Discriminate the differences and similarities of power generation, including use of different fuel types and different power plant uses.

*\*partial alignment*