

Career & Technical Education (CTE) Standards Revision Project

Cluster: Energy

Pathways: Fossil Energy Extraction, Processing & Distribution, Electromechanical Generation & Maintenance, Electrical Energy Transmission & Distribution, Renewable Energy Production, Energy Efficiency & Environmental Technology

The standards for this cluster area a result of a compilation of Energy standards from State CTE Standards developed in Ohio and California and introductory course standards from Colorado community colleges. The attached standards for each of the pathways identify links to Colorado core content standards which have been validated by content specialists in each of the core content areas.

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Career Cluster/Cluster Grouping:	Energy
Pathway(s):	Electrical Energy Transmission & Distribution
Prepared Completer Competencies: ENY 04. Understand electrical transmission and distribution through public and residential systems	
High School Expectations	
Concepts and skills students know include: ENY 04.01 Understand and analyze the process of energy generation and transmission	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>ENY 04.01 A Comprehend the basic principles of electricity and electrical power, including how electricity is generated and used as a power source.</p> <p>(SCI 1.6a SCI1.6b SCI1.6c)</p> <p>ENY 04.01 B Understand the basic electrical science and pragmatic and theoretical applications of voltage, amperage, resistance, and heat transfer and flow in electrical and electronic circuits and equipment.</p> <p>(SCI1.5a SCI 1.5d)</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI1.5.a-Science, Physical Science, Energy exists in many forms (mechanical, chemical, electrical, radiant, thermal, and nuclear) that can be quantified and experimentally determined - Develop, communicate, and justify an evidence-based scientific explanation regarding the potential and kinetic nature of mechanical energy</p> <p>SCI1.5.b-Science, Physical Science,. - Use appropriate measurements, equations and graphs to gather, analyze, and interpret data on the quantity of energy in a system or an object</p>

<p>ENY 04.01 C Understand scientific principles (including mechanical, fluid, and thermodynamic) and chemical functions common to energy conversion processes and energy transmission systems.</p> <p>(SCI1.5a)</p> <p>ENY 04.01 D Perform the mathematical functions, including measurement scales, tables, and systems, used for safe energy conversion processes and energy transmission systems.</p> <p>(SCI1.5b SCI1.5d)</p> <p>ENY 04.01 E Interpret the basic principles of electricity and electrical power required of safe and economical energy conversion processes and energy transmission systems.</p> <p>ENY 04.01 F Apply the principles of electrical codes, wiring applications, and circuit and device troubleshooting techniques in circuit fabrications.</p> <p>ENY 04.01 G Understand the principles of natural gas codes, distribution applications, and troubleshooting techniques in distribution systems</p>	<p>SCI1.5.d-Science, Physical Science, - Identify different energy forms, and calculate their amounts by measuring their defining characteristics</p> <p>SCI1.6.b-Science, Physical Science, When energy changes form, it is neither created not destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases - Evaluate the energy conversion efficiency of a variety of energy transformations</p> <p>SCI1.6.c-Science, Physical Science,- Describe energy transformations both quantitatively and qualitatively</p> <hr/> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>
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High School Expectations	
Concepts and skills students know include:	
ENY 04.02 Understand the effects of financial, technical, and economic trends on the past, current, and future technology in public & residential utility industries	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>ENY 04.02 A Analyze the effects of financial, technical, and economic trends on the past, present, and future of the public utility industries.</p> <p>(RWC 4.2.a; RWC 4.2.b RWC 4.2d; RWC 4.11.i; RWC 4.11.m; RWC 4.11.a; RWC 4.11.b; RWC 4.11.c; RWC 4.11.d; RWC 4.11.e; RWC 4.11.f; RWC 4.11.g; RWC 4.11.h; RWC 4.11.i; RWC 4.11.j; RWC 4.11.k; RWC 4.11.l; RWC 4.11.m)</p> <p>ENY 04.02 B Explore the public utility industry's role in the local, state, and national community infrastructure.</p> <p>(RWC 4.11.a; RWC 4.11.b; RWC 4.11.c; RWC 4.11.d; RWC 4.11.e; RWC 4.11.f; RWC 4.11.g; RWC 4.11.h; RWC 4.11.i; RWC 4.11.j; RWC 4.11.k; RWC 4.11.l; RWC 4.11.m)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC4.2.a-Reading, Writing and Communicating, Research and Reasoning, Analyze and develop a logical argument that distinguishes facts, opinions, evidence and inferences. - Synthesize information logically: distinguish among facts opinions, evidence, and inferences; identify false premises or assumptions; and detect potential bias and “loaded” language (e.g., sarcasm, personal attack, appeal to pity)</p> <p>RWC4.2.b- Summarize ideas including alternate views, rich detail, well-developed paragraphs, and logical argumentation.</p> <p>RWC4.2.d- If the presentation is or oral a visual product: Prepare notes and visuals for clarity of content and effect, grammatically correct use of language, spelling, and mechanics.</p>

RWC4.11.a-Reading, Writing and Communicating, Research and Reasoning, Use quality reasoning and effective problem solving strategies. - Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking.

RWC4.11.b- Assess strengths and weaknesses of their thinking and thinking of others by using criteria including: relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision.

RWC4.11.c- Articulate goal and purpose

RWC4.11.d- State the problem clearly and precisely.

RWC4.11.e- Identify the type of problem at hand.

RWC4.11.f- Determine what parts of the problem are solvable.

RWC4.11.g- Determine the information needed to solve the problem.

RWC4.11.h- Analyze and interpret information.

RWC4.11.i- Make inferences after considering information.

	<p>RWC4.11.j- Identify and evaluate options for advantages and disadvantages.</p> <p>RWC4.11.k- Determine appropriate forms of action.</p> <p>RWC4.11.l- Monitor the implications of actions.</p> <p>RWC4.11.m- Be prepared to revise strategy if situation requires it.</p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>
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High School Expectations	
Concepts and skills students know include: ENY 04.03 Understand the role and function of tools and machines in energy distribution industries:	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>ENY 04.03 A Select and safely use hand and power tools, equipment, and machines common to residential and commercial energy and utilities systems.</p> <p>ENY 04.03 B Understand how tools, equipment, and machines may be used to safely measure, test, diagnose, and analyze relationships between voltage, current, resistance, power, and gas and fluid pressure and flow rate.</p> <p>ENY 04.03 C Know how tools, equipment, and machines may be used to safely measure, test, diagnose, and analyze tuned circuits, sine wave, and resonant and related characteristics of alternating current in alternating current applications.</p>	Academic Content Knowledge Alignment:
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include: ENY 04.04 Understand the value and necessity of practicing occupational safety in residential and commercial energy and utility industries:	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>ENY 04.04 A Know the basic fire hazards in the energy and utility industry.</p> <p>ENY 04.04 B Apply the elements of combustion, fire classifications, and fire-fighting equipment and techniques specific to the residential and commercial energy and utility industry.</p> <p>ENY 04.04 C Explain the basic theory and concepts of electrostatics.</p>	Academic Content Knowledge Alignment:
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):