



## Grades 9–12

### 3.5.9-12.D Technology and Engineering: Applying, Maintaining, Assessing, and Evaluating Technological Products and Systems

**Students who demonstrate understanding can** *critique whether existing or proposed technologies use resources sustainably.*

**Clarifying Statement:** By applying the evaluative tools described above, students can investigate ways that resources used to create and operate a given technology can be improved to enhance the sustainability of the technology. For example, they could evaluate how students are currently transported to and from school and devise ways to reduce fuel use. Strategies could include promoting bike riding by installing covered bike racks, re-routing vehicles to avoid long wait times, shifting school bus schedules to prevent extended idling times, and so on.

**Assessment Boundary:** N/A

Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Technology and Engineering Practices (TEP)
<b>Engaging in Argument From Evidence</b> Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science. <ul style="list-style-type: none"> <li>Respectfully provide and/or receive critiques on scientific arguments by probing reasoning and evidence, challenging ideas and conclusions, responding thoughtfully to diverse perspectives, and determining additional information required to resolve contradictions.</li> </ul>	<b>Defining and Delimiting an Engineering Problem</b> <ul style="list-style-type: none"> <li>Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.</li> </ul>	<b>Attention to Ethics</b> <ul style="list-style-type: none"> <li>Assesses technological products, systems, and processes through critical analysis of their impacts and outcomes.</li> </ul>

**Pennsylvania Context:** Examples of Pennsylvania context include but are not limited to Pennsylvania's food production and packaging industries.

**Pennsylvania Career Ready Skills:** Evaluate a situation to identify skills and strategies to prevent and resolve conflicts.

## Connections to Other Standards Content and Practices



Standard Source	Possible Connections to Other Standard(s) or Practice(s)
<b>PA Core Standards: Reading and Writing in Science and Technical Areas</b>	<p>CC.1.2.3.G: Use information gained from text features to demonstrate understanding of a text.</p> <p>CC.1.2.4.G: Interpret various presentations of information within a text or digital source and explain how the information contributes to an understanding of text in which it appears.</p> <p>CC.1.2.5.G: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p> <p>CC.1.4.3.V: Conduct short research projects that build knowledge about a topic.</p> <p>CC.1.4.4.V: Conduct short research projects that build knowledge through investigation of different aspects of a topic.</p> <p>CC.1.4.5.V: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.</p> <p>CC.1.4.3.W: Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.</p> <p>CC.1.4.4.W: Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.</p>
<b>PA Core Standards: Reading and Writing in Science and Technical Areas (continued)</b>	<p>CC.1.4.5.W: Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.</p>
<b>PA Core Standards and Practices: Math</b>	<p>N/A</p>
<b>Integrated Standards for Science, Environment &amp; Ecology, and Technology &amp; Engineering Standards Grades K–12</b>	<p>3.3.9-12.Q: Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.</p>