

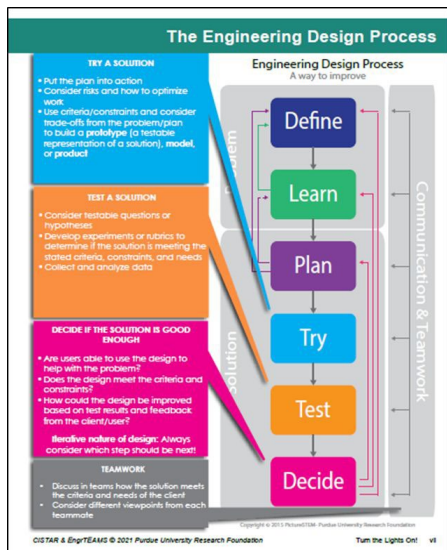
## Nine-Session Unit Exposes Middle School Students to Complete Engineering-Design Process

**Outcome/accomplishment:** Incorporating a design challenge, a nine-session unit teaches eighth-grade students mathematical and scientific concepts related to electrical energy and renewable resources in lessons developed at the Center for Innovative and Strategic Transformation of Alkane Resources (CISTAR), an NSF-funded Engineering Research Center (ERC) based at Purdue University.

**Impact/benefits:** The lessons expose students to the complete engineering-design process, including problem scoping, solution generation, redesign, and communicating the final design to a client. Students learn about maintaining an engineering design notebook, teamwork, communication, data analysis, and iteration.

**Explanation/ background:** CISTAR developed the curriculum with INSPIRE Research Institute for Pre-College Engineering at Purdue. At the outset of the unit, students are introduced to power generation and the client—the members of Indiana Office of Energy Development—who need to determine a new power-generation system that will effectively reduce contamination of chemical releases in the environment. Students use what they know about electrical energy and renewable resources to develop a strategy to test for electrical power generating systems. Finally, students write a final letter, including their designs and design justifications, to pitch their experimental design to the client.

Videos explaining the curricula and step-by-step instructions for implementation are available on the nanoHUB website and on Teachers Pay Teachers. Also, curriculum kits with the required materials for implementing the activities can be checked out.



A poster that describes the engineering-design process. (Credit: CISTAR)