Energy Efficient Coffee Making

How much energy does it take to make one cup of coffee?

(1) Brainstorm (2 min)

Individual Reflection

(2) Discuss (3 min)

Team work

Consider:
- How do you define and measure energy?

Task

- Your task is to come up with a <u>more energy efficient way of making a cup of coffee</u>.
  - Use science, mathematics, (possibly) engineering concepts that you know
  - Produce a <u>visual</u> to explain your design
  - Make a <u>list of (1) what you know, (2) what you don't know and is important for you to find out</u> and <u>(3) larger questions you might have</u>

(1) Individual Brainstorm (5 min)

Individual Reflection

(2) Share and develop (10 min)

Team work

(3) Discuss (5 min)

Class Discussion

Standards Alignment

Grade Level(s): 11th-12th (can be adjusted to 9th and 10th) **Lesson Duration (Hours/Sessions):** 3-4 Days

Science

(A) In all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;
(B) Communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;
(C) Draw inferences based on data related to promotional materials for products and services;
(D) Evaluate the impact of research and technology on scientific thought, society, and the environment;

Biology

10 (C) Analyze the levels of organization in biological systems and relate the levels to each other and to the whole system.
12 (D) Recognize that long-term survival of species is dependent on changing resource bases that are limited;
12 (F) Describe how environmental change can impact ecosystem stability.

Chemistry

(11) Energy changes that occur in chemical reactions. (A-E)

Earth and Space Science

(12) Solid Earth. Earth contains energy, water, mineral, and rock resources and that use of these resources impacts Earth's subsystems. (A-E)

Environmental System

(4) Interrelationships among the resources within the local environmental system (A-F)
(5) Sources and flow of energy through an environmental system (A-E)

Integrated Physics and Chemistry

(5) Multiple forms of energy, the impact of energy transfer and energy conservation in everyday life (A-I)

Physics

(5) (F) design, construct, and calculate in terms of current through, potential difference across, resistance of, and power used by electric circuit elements connected in both series and parallel combinations;
(6) Changes occur within a physical system, applies the laws of conservation of energy and momentum (F-G)

Mathematics

111.44 Advanced Quantitative Reasoning

Various CTE Standards (STEM; Agriculture Food and Natural Resources; Transportation, Distribution, Logistics)

English Language/Arts

110.53 Research and Technical Writing; 110.57 Public Speaking

Key Vocabulary Terms/Academic Language: