BioenergizeME Infographic Challenge

2017 Annual Update

"Exploring the Future American Energy Landscape"

The 2017 Annual Update contains the deadlines and prompts for the 2017 BioenergizeME Infographic Challenge. In this Challenge, student teams research, interpret, apply, and then design an infographic that responds to one of five bioenergy topics. The students' infographics are submitted to the U.S. Department of Energy's Bioenergy Technologies Office (BETO) for a chance to compete in a national social media campaign. Selected infographics are promoted on the Challenge website. The winning team is invited to travel to Washington, D.C., to participate in the Bioenergy Technologies Office's (BETO's) annual conference. Download the BioenergizeME Toolkit for more information about the Challenge structure and resources.

INSTRUCTIONS

Generally, the goal of an infographic is to help visually convey data or information that might be difficult to understand solely through text. A well-developed infographic will present a clear story or message using accurate data and making sure to provide the appropriate source citations. The topic areas, prompts, and questions below are designed to help guide teams in developing a linear visual narrative. Please see the BioenergizeME Infographic Challenge Map for some examples.

Each infographic should respond to one of five research topics provided in this 2017 Annual Update. Each topic area includes prompts (in bold) that are foundational, broad, and open-ended to foster student-centered discovery. Included with the prompts are a series of questions that will help students develop their visual story. Thorough and well-developed infographic submissions typically address the questions within a given topic area.

BETO has compiled a comprehensive list of resources organized by topic area, to provide a foundation for students to begin their research. These sources can be found in the BioenergizeME Research Resource Guide and include timely peer-reviewed publications, fact sheets, and reports from a variety of organizations on the leading edge of science and technology research. Teams are welcome to use sources not included in this guide, so long as they are peer-reviewed, academic, or professional sources (e.g., local, state, and federal government agencies, national laboratories, academic institutions, scientific journals).

REASEARCH TOPIC AREAS AND PROMPTS

TOPIC AREA 1 - HISTORY OF MODERN BIOENERGY

Discuss the progression of first generation bioenergy feedstocks to next-generation or advanced bioenergy feedstocks.

- What is bioenergy? What is biomass?
- What is a feedstock? What is a first generation feedstock? What is a next-generation or advanced feedstock?
- Why have researchers expanded our biomass resources to include next-generation feedstocks?
- What are the benefits and challenges associated with next-generation feedstocks?

TOPIC AREA 2 - SUSTAINABILITY

In general terms, sustainability is the capacity of systems and processes to endure and thrive. Sustainable development seeks to balance economic development, social development, and environmental protection equally. Discuss the concept of sustainability as it applies to the development of bioenergy systems.

- How would you define sustainability in the context of bioenergy?
- What natural resources should be considered when planning and implementing a sustainable bioenergy landscape?
- What are potential benefits (environmental, social, and economic) of growing sustainable biomass resources?

TOPIC AREA 3 - BIOENERGY AND SOCIETY

A sustainable transportation system is one that is accessible, affordable, efficient, and achieves the highest practical standards for safety, human health, and environmental quality. Discuss the role of bioenergy in the overall vision of sustainable transportation.

- What role does bioenergy play in the development of sustainable transportation systems?
- How can bioenergy technologies help meet sustainable transportation goals?
- Discuss/illustrate whether our current transportation system is sustainable in the context· of energy consumption, environmental· impact, and the national/ global economy.

TOPIC AREA 4 - WORKFORCE AND EDUCATION

The "bioeconomy" is an emerging part of the U.S. economy that relies on renewable biological resources to produce fuels, power, and biobased products. For this industry to thrive, it will require the development of a diverse and skilled workforce. Discuss bioenergy-related educational programs as well as the characteristics of the workforce needed to support this growing industry.

- Which fields of study could lead to a career in bioenergy?
- Research a bioenergy-related higher education program or job training institution in your state. How can the skills or knowledge gained from this program/ institution apply to a career in the bioenergy industry?
- What are some non-traditional fields of study that could lead to a career in bioenergy?

TOPIC AREA 5 - SCIENCE & TECHNOLOGY

There are a variety of technology pathways used to convert algae, diverse cellulosic resources, and other emerging feedstocks into final products. Please choose one pathway from the list below and describe/illustrate the progression from feedstock to finished product.

1. **Algae and Biochemical Processing**

   Algae Biomass → Harvesting → Dewatering → Extraction → Fractionation → Upgrading → Finished Fuel Product

2. **Algae and Hydrothermal Liquifaction**

   Algae Biomass → Harvesting → Dewatering → Hydrothermal Liquefaction → Upgrading → Finished Fuel Product

3. **Cellulosic Biomass to Ethanol**

   Cellulosic Biomass → Pretreatment → Hydrolysis → Fermentation → Distillation → Ethanol

4. **Cellulosic Biomass to Renewable Hydrocarbon Fuels (Biochemical)**

   Cellulosic Biomass → Pretreatment → Deconstruction with Microorganism or Biological Molecule → Sugar → Chemical Upgrading → Hydrocarbon Fuel

5. **Cellulosic Biomass to Renewable Hydrocarbon Fuels (Thermochemical)**

   Cellulosic Biomass → Pyrolysis/ Gasification → Bio-oil/Synthesis Gas → Chemical Upgrading → Hydrocarbon Fuel