Developing future leaders who will determine the bioenergy landscape of tomorrow

BioenergizeME Infographic Challenge Toolkit

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy
BIOENERGY TECHNOLOGIES OFFICE

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1 INTRODUCTION

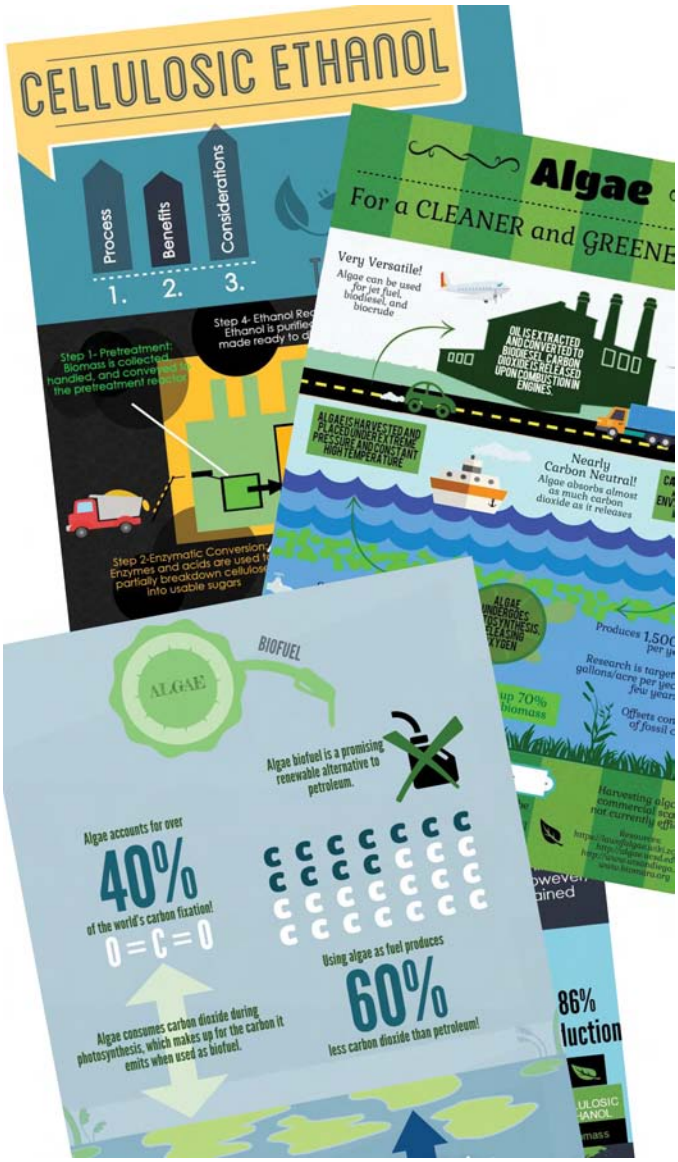
Welcome to the U.S. Department of Energy (DOE) BioenergizeME Infographic Challenge, where high school students use technology to learn about bioenergy.

In this challenge, student teams research, interpret, apply, and then design an infographic that responds to one of four bioenergy topics. Their infographics are submitted to the DOE 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 will be invited to present their infographic at BETO's annual conference in Washington, D.C.[a]

The purpose of the challenge is for participants to gain foundational knowledge about bioenergy and to educate others about what they have learned. As energy literacy increases, students will be better equipped to form educated opinions about energy information that they encounter in the media and from other sources. Students of today will be the future leaders of tomorrow. This understanding will be important to their future professions and communities as they make decisions about the changing energy landscape and how bioenergy can play a part.

To make student research easy and effective, the DOE and the Library of Congress have provided a resource guide with steps for doing research, along with valuable links and references to help students learn about their bioenergy topics. Rubrics and guides for creating infographics and designing social media campaigns are also provided.

Check out the interactive BioenergizeME Infographic Challenge Map to see past submissions from schools across the country. Put your school or organization on the BioenergizeME map by participating in the BioenergizeME Infographic Challenge.



Finalists of the Spring 2015 BioenergizeME Infographic Challenge

[a] DOE will sponsor up to six students and two chaperones (one female and one male).

WHY BIOENERGY? WHY NOW?

Bionenergy has come a long way since wood, dung, and other organic matter was first burned for light and heat by early human civilization. There are many ways to capture bioenergy from organic materials, and technologies are advancing continually to use bioenergy more efficiently and cleanly.

In the United States, biomass provides just a portion of the variety of resources used to meet America's energy needs. As our awareness increases about the uncertain availability of energy resources and the environmental effects of producing and using them, it is more important than ever to understand the following:

- Basic energy principles
- Energy resource and technology options available
- Benefits and challenges of various energy resources
- How students and their peers can play an important role in shaping America's energy future.

Many young people haven't thought much about bioenergy as an option for power, transportation fuels, and other products. That's understandable, because the variety of information available about bioenergy, including its benefits and challenges, can be confusing.

The BioenergizeME[b] Infographic Challenge is designed to help young people and team advisors better understand this important energy resource topic.

BRINGING BIOENERGY INTO THE CLASSROOM

The BioenergizeME Infographic Challenge is suitable for both classroom and independent educational use, and follows the Global Literacy XPRIZE model[c] to "rethink learning by harnessing innovation and technology and by placing the capability and desire to become educated into the hands of the learner."

In the challenge, teams present their BioenergizeME project in the form of an infographic, which is an interesting and quick way to communicate ideas and educate others. BioenergizeME infographics should convey a well-focused message that is predominantly image-led and that a general audience can understand in just a few minutes.

For a good introduction to exciting things related to bioenergy production, see the video *Bioenergy: America's Energy Future*
Full version:
http://youtu.be/GU0Cu45cLT4
or Short version:
http://youtu.be/VskQZAvbjGE.

2 CHALLENGE DETAILS

Team advisors are encouraged to integrate the challenge into their curriculums where it fits best for them, but keep in mind the submission deadlines and the social media campaign schedule.

[b] OPERATION BioenergizeME is the U.S. Department of Energy Bioenergy Technologies Office's educational "base camp", providing resources and activities to help engage younger stakeholders in bioenergy. OPERATION BioenergizeME supports the Energy Department's Energy Literacy Framework (see energy.gov/eere/education/energy-literacy-essential-principles-and-fundamental-concepts-energy-education)—an initiative to increase the public's understanding of the role of energy in the world and in their daily lives, and to help them apply this understanding to answer questions and solve problems.

[c] http://www.xprize.org/prize-development/learning

STRUCTURE

The BioenergizeME Infographic Challenge is designed for teams of two to six high school students (grades 9-12). Team advisors can adjust team size as needed for their teaching situation, but only six students from the winning infographic team will be hosted at BETO's annual bioenergy conference in Washington, D.C.

Each infographic should respond to one of the research topics and prompts provided in the annual update. Students should make sure their infographic communicates a well-focused thesis.

The challenge has two phases:

PHASE 1

Task 1 — Students research a prompt from the list found in the annual update.

Task 2 — Students create an infographic to communicate their research.

Task 3 — Team advisors review infographics based on the provided rubric (Section 7), then submits those that meet the challenge requirements as directed in Section 3: Challenge Rules.

Optional task — Team advisors may return infographics that do not meet the challenge requirements to the teams for revision before submitting to BETO.

PHASE 2

Task 4 — BETO evaluates entries for objectivity and well-referenced content, then selects finalists for the social media campaign.

Task 5 — Students whose infographics have been selected for the social media campaign develop and execute their own social media campaign strategies (See Appendix A).

ELIGIBILITY

The following eligibility requirements must be met in order for infographics to be included in the social media campaign:

- All entrants must be U.S. citizens or legal residents.
- A team advisor must approve each submission.
- A participant may not have reached his or her 19th birthday as of January 1 of the year in which the challenge winners are selected. However, the BioenergizeME Team may grant a special authorization to compete for youth with developmental disabilities who exceed the upper age limit.

3 CHALLENGE RULES

- Each submission must be submitted by the deadline stated on the website.
- Infographics must exclude personal identifiable information (e.g., names, emails).
- Each submission must be in either JPEG or PNG format with a minimum width of 825 pixels.
- All infographics must reference at least one source from the Library of Congress Resource Library.
- Each infographic must respond to one research prompt found in the annual update.

- Each infographic must be image-led, using illustrations and/or graphics to communicate the team's research findings.
- Infographics must include a source citation for all facts and numbers. Sources should be referenced as footnotes at the bottom of the infographic.
- Each submission must be the contestants' original work and must not plagiarize, infringe, misappropriate, or otherwise violate any intellectual property rights, privacy rights, or any other rights of any person or entity.
- Each infographic must be reviewed by a team advisor and receive at least three points for the research content section of the rubric provided in Section 7.
- Infographics must be suitable for general audiences (i.e., contain no explicit language, crude/suggestive humor, drug innuendo, or mature/suggestive themes).
- Students may not reference infographics previously submitted to the BioenergizeME Infographic Challenge.
- Each team may only submit one infographic.
- Any submission that has previously advanced to the top 10 finalists may not be resubmitted.
- Infographics may not endorse a particular company or entity, nor display a trademarked product, without the explicit permission of the DOE.
- Each contestant grants to DOE a royalty-free, non-exclusive, worldwide license to use, and copy for use, all parts of its submission, for purposes of evaluation of its entry or promotion of the competition.
- The winner of the competition will, in consideration of the prize to be awarded, grant to DOE a perpetual, non-exclusive royalty-free license to use any and all intellectual property in the winning entry for any purpose.
- Failing to meet submission requirements or other submission screenings will result in a submission being deemed disqualified.

4 REVIEW AND JUDGING

PHASE 1: INFOGRAPHIC CONTENT AND DESIGN

TEAM ADVISOR'S REVIEW PRIOR TO SUBMISSION

Each infographic should be reviewed and scored by the team's advisor using the rubric provided in Section 7. **To ensure accuracy of information and help with reducing distribution of misinformation, team advisors should only submit infographics receiving at least three points in the research content category.** The team advisor may provide feedback on infographics receiving less than three points and give student teams the opportunity to rework and resubmit those infographics for a qualifying score.

BIOENERGY TECHNOLOGIES OFFICE REVIEW

BETO will review all submitted infographics. Finalists for the social media campaign will be selected based on an evaluation of the objectivity and well-referenced content of the submissions.

The team advisor for selected finalists will be contacted to inform teams to proceed with planning their social media campaign strategy. The selected infographics will be posted on the BioenergizeME Infographic Challenge Map, and a link to the infographics will be provided to the team advisors.

PHASE 2: SOCIAL MEDIA CAMPAIGN

Infographics selected for the social media campaign will be shared via the team's personal social media outlets. When the social media campaign time period is complete, BETO will perform Web analytics to determine the top 10 infographics based on number of unique page views for each infographic's page. At the discretion of BETO leadership, infographics that demonstrate excellence in content and design but do not qualify among the top 10 infographics in the social media challenge may be awarded honorable mention certificates. Honorable mention awards do not qualify for the grand prize.

The Social Media Guide at the link below and in Appendix A was developed specifically for the BioenergizeME Infographic Challenge to provide tips and guidance to students for planning and executing their social media campaigns.

- Social Media Guide

GRAND PRIZE WINNER SELECTION

The top 10 infographics will be selected based on the number of unique page views for each infographic's Web page. BETO leadership will review the finalists and select an overall winner based on content and design.

5 AWARD DETAILS

Awards:

- National promotion of selected infographics on BETO's BioenergizeME website.
- Recognition of the top finalists with official letters of recognition and certificates.
- Recognition of the first-place team at BETO's annual conference held in Washington, D.C.

6 RESEARCH TOPIC AREAS AND PROMPTS

To ensure that teams have the flexibility to develop their ideas and conduct their own research, topic areas are provided via the BioenergizeME website and Annual Update. The topic areas help students explore the role of biomass in the context of an energy landscape that has changed many times throughout human history. Within each topic area are prompts that are foundational, broad, and open-ended to foster student-centered discovery.

To help students get on topic quickly and focus on bioenergy basics, keep the following considerations in mind when researching and developing infographics:

WHAT BIOENERGY IS, AND ISN'T

Bioenergy is produced from organic materials that contain stored energy from the sun. This organic material is called biomass, and it is preprocessed into bioenergy feedstocks that are ready for chemical or thermal conversion to energy. Bioenergy can be produced from a variety of organics resources, including

- Agricultural grains such as corn and wheat
- Non-grain agricultural residues such as corn stover (stalks, leaves, and cobs) and grain straws
- Processing wastes such as sugar cane bagasse, distillers dried grains
- Energy crops such as soybean, switchgrass, miscanthus, or energy cane
- Animal manures
- Woody plantation crops
- Algae
- Municipal solid waste.

Bioenergy can be in the form of

- Electricity and processing heat
- Transportation fuels
- Bioproducts that help enable production of biopower and biofuels.

> *(**Note:** Although not necessarily a form of bioenergy, bioproducts can be produced using the same biomass resources as used for bioenergy and include byproducts of the bioenergy process, such as soil amendments. Bioproducts also include plastics, chemicals, and other products that are typically produced using fossil energy sources.)*

Bioenergy does not include solar, wind, water, geothermal, or nuclear energy.

Bioenergy does not include non-renewable fossil energy sources, like coal, oil, or natural gas.

STICKING TO BIOENERGY BASICS

This challenge is designed to help students gain a science-based, foundational understanding of the benefits and challenges of bioenergy.

Student teams should work under the following assumptions:

- Bioenergy is one of several renewable energy resource options for the United States.
- Bioenergy itself is neither good nor bad—it needs to be produced in ways that provide benefits and overcome challenges.

Avoid controversial messages that often lack context or endorse a particular company or entity. Focus messages on understanding the conditions that need to be considered for bioenergy production to enhance food and feed production, the environment, and economic development.

7 RUBRIC

Infographic Rubric				
		3	2	1
Research Content	• Evidence based • Clear analysis and explanation • Logical flow	• The data and facts presented are evidence based from reliable sources. All sources are referenced. All content is accurate. • There is clear analysis and explanation of the research prompt selected. • The information and messages present a logical flow.	• The content contains one inaccuracy, and content is partially cited with credible sources. • The analysis and explanation are incomplete. • One of the elements of the infographic does not logically flow with the subject matter.	• The content contains more than one inaccuracy, content is occasionally cited, and/or credible sources are visibly lacking. • Lacking analysis and explanation. • More than one of the elements of the infographic does not logically flow with the subject matter.
		3	2	1
Design	• Aesthetics (font, color, shape) • Correct use of data visualization • Relevance of graphics	• The infographic is highly attractive in terms of layout, design, and neatness. The color choices enhance the visibility of the infographic, and the fonts used are readable and complement the content. • The chosen data visualization formats make the data presented clear and simple for the viewer to understand. • The images and illustrations match the tone and subject matter of the infographic.	• The infographic is adequately attractive in terms of layout, design, and neatness. Color and font choices do not add or detract from the infographic. • The chosen data visualization formats illustrate the data correctly, but some may be difficult for the viewer to understand. • The images and illustrations are relevant but may distract attention away from the content of the infographic.	• The infographic lacks attractiveness in terms of layout, design, and neatness. Fonts used are difficult to read, and color choices are distracting. • Data visualizations are seen, but other formats could have been chosen to better illustrate the data for the viewer. • The images and illustrations used do not match the subject matter of the infographic and take away from the content of the infographic.
		2	1	
Mechanics	• Grammar • Guideline/ format	• The writing is free of errors.	• The writing contains one or more errors.	

8 RESOURCES

The Bioenergy Technologies Office collaborated with the Library of Congress to develop a collection of quality resources for the BioenergizeME Infographic Challenge. These resources were compiled to provide a solid foundation of credible information covering various aspects of bioenergy.

LIBRARY OF CONGRESS

The Library of Congress is the world's largest library by number of items catalogued and serves as the research library for the U.S. Congress. For the BioenergizeME Infographic Challenge, the Library of Congress put together the Research Strategy Guide and Resource Library for students to use as a starting point for their research. The Research Strategy Guide provides students with guidance on developing a successful research strategy. The Resource Library provides students with references and links to various sources such as books, fact sheets, and publications. Both documents are currently available on the Library of Congress website and via the links below:

- BioenergizeME Research Strategy Guide
- BioenergizeME Resource Library

The Library of Congress is a valuable resource for researchers at any level, and the "Ask a Librarian" function is a great way to get research assistance from Library of Congress librarians.

GOVERNMENT

Government agencies such as the DOE, U.S. Department of Agriculture (USDA), and Environmental Protection Agency (EPA) are on the leading edge of science and technology research and produce valuable publications, fact sheets, and reports that are available to the public for free. BETO compiled the following list of bioenergy-related resources from various government agencies to provide a foundation for students to begin their research:

- Bioenergy Technologies Office website
  - Biomass Basics
    - Biofuels Basics
    - Bio-Benefits
    - Bioproducts
    - Biopower
  - Field-to-Fuel Gateway to BETO
  - EERE Education Toolbox—Allows the user to view and search educational resources from DOE's Office of Energy Efficiency and Renewable Energy.
- Bioenergy Knowledge Discovery Framework—A resource providing access to a variety of data sets, publications, and collaboration and mapping tools that support bioenergy research, analysis, and decision making.
- Alternative Fuels Data Center—Provides information, data, and tools to help fleets and other transportation decision makers find ways to reduce petroleum consumption through the use of alternative and renewable fuels, advanced vehicles, and other fuel-saving measures.
- USDA "Ask the Expert"—Visitors can click "Submit a Question" to submit a question to USDA subject matter experts.

NATIONAL LABORATORIES

The DOE provides funding to national laboratories across the United States that provide valuable bioenergy-related research:

- National Renewable Energy Laboratory (NREL)
  - Biomass Energy Basics
  - Biomass Research Homepage
  - The NREL Library
- Oak Ridge National Laboratory (ORNL)
  - Biomass Energy Data Book
  - ORNL Research Library
- Pacific Northwest National Laboratory (PNNL)
  - PNNL Publications
- Argonne National Laboratory (ANL)
  - ANL Research Library
- Idaho National Laboratory (INL)
  - INL Research Library

BIOENERGY RESEARCH CENTERS

The DOE established three bioenergy research centers in 2007 to help to address the challenges of biofuel production:

- Great Lakes Bioenergy Research Center
- BioEnergy Science Center
- Joint BioEnergy Institute

INFOGRAPHICS

BETO compiled the resources in the following sections to assist students with developing their infographics. The Infographic Guide at the link below was developed specifically for the BioenergizeME Infographic Challenge to provide tips and guidance for creating an infographic.

- Infographic Guide

EXAMPLES

The infographics found below provide great examples of high-quality infographics that were produced for the DOE and may provide useful examples for students in designing their own.

- POET-DSM: Project LIBERTY
- Abengoa Biorefinery
- Alpena Biorefinery
- INEOS-New Planet
- Warding Off Energy Vampires and Phantom Loads

Visit the Challenge Winners page to view the winning infographics from past challenge sessions.

IMAGE RESOURCES

The following resources provide free image galleries that can be used to find bioenergy-related photos and graphics:

- Pacific Northwest National Laboratory—PictureThis
- National Renewable Energy Laboratory—Image Gallery
- United States Department of Agriculture
  - Agricultural Research Service Image Gallery
  - Photography Services

SOCIAL MEDIA GUIDE

GOAL: Share what you have learned about bioenergy through an 11-day social media campaign!

HOW TO DO IT:

Assign team roles

Determine what role each person will play in the campaign.

1. Team Director

Lead and organize your team, keep your team on schedule, and monitor progress (views, likes, and shares) during your social media campaign.

2. Content Manager

Determine key messages you want to convey to your audiences about your infographic, and write text to engage viewers.

3. Engagement Manager

Identify the various social media networks (Twitter, Instagram, Facebook, etc.) for your campaign. Respond to questions and comments from followers.

Plan a strategy & timeline

Plan ahead by preparing a strategy and timeline. This is necessary to design a successful campaign.

Tasks

- Choose the social media networks you will use.
- Write content (catchy text—just a sentence or two) that promotes your infographic.
- Schedule the days and times your team will send out your posts in the various social media networks, and make plans about how you will respond to comments.
- Be sure your schedule does not interrupt your classes!

Deadlines

You will have one week to prepare your social media strategy and 11 days to carry it out.

Start your campaign & monitor progress

Social media campaigns start April 11, 2016, 5:00 p.m. central time.

Posting Social Media

Be creative to bring attention to your infographic and encourage audiences to share your infographic across their social media networks.

Responding to Comments

Reply quickly and courteously to comments about your infographic. See how your viewers react and what they are learning about bioenergy.

Monitor Progress

Measure your success by tallying likes, shares, and comments, and consider adjusting your outreach strategy based on your progress.

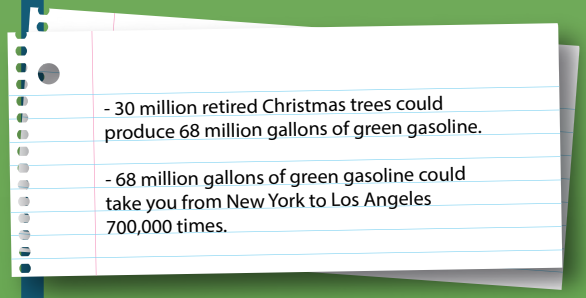
Tips:

- Stay positive and be thoughtful towards your audience. They may not be familiar with your topic. "Thank you for checking out my infographic" is a good backup response.
- If you receive aggressive or hostile comments, you may ignore or delete them. If this continues tell your team advisor.
- Be active. Like, share, and comment on others' posts, and they may do the same for you.

5 STEPS FOR BUILDING AN INFOGRAPHIC

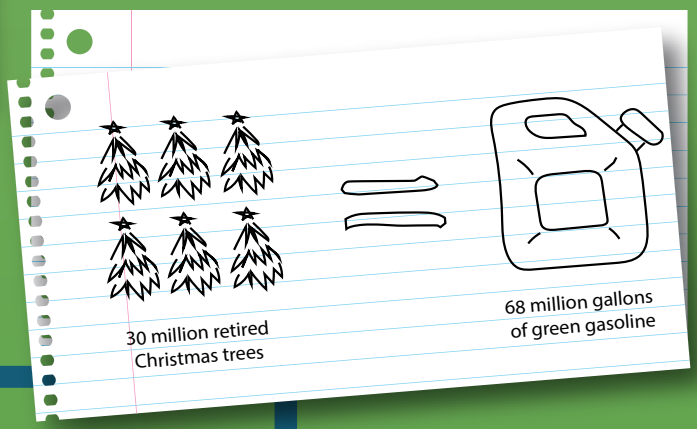
1 RESEARCH

Research your topic fully. Pull together a list of thought-provoking facts that you think are important. Make sure to use credible sources, such as those found in the Library of Congress Resource Library.



2 SKETCH

Ultimately, you are going to share facts and data that tell a story. Outline the story, and draw a sketch for each key point.



3 DESIGN

Now it's time to bring everything together in one cohesive design. Create the layout, and choose a color scheme. Bring your sketches to life with hand-drawn or digital illustrations and icons. Be sure to use a consistent design style throughout the infographic.

4 TEST

Share your infographic with others and ask them for feedback.

5 FINALIZE

Consider the feedback that you receive, and implement constructive changes as you see fit to produce a final version of your infographic.

INFOGRAPHIC RULES

1. Do not include student names in the infographic.
2. Include a source citation for all facts and numbers.
3. Sources should be referenced as footnotes at the bottom of the infographic.
4. Infographics must be a minimum width of 825 pixels.
5. Infographics must be in JPEG or PNG format.

CONTACT

To ask questions or receive more information, email BioenergizeME@ee.doe.gov with subject: #BioenergizeME.

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Updated July 2015

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DOE/EE-1139 September 2015