



Biodiesel History & Production

Lesson Plan

Nebraska AFNR:

Standard 3: Students will recognize the historical, social, cultural, and potential applications of biotechnology.

- Benchmark 7.1: Define “biotechnology” and explore the historical impact it has had on agriculture.

Nebraska AFNR Environmental Science:

Standard 4: Students will differentiate non-renewable and renewable energy sources.

- Benchmark 4.1: Classify energy sources as non-renewable and renewable.
 - Performance Indicator 4.1.1: Brainstorming energy sources
 - Performance Indicator 4.1.2: Describe how the energy sources are formed

Objectives:

- The student will understand the history of biodiesel production with relation to U.S. and global events.
- The student will understand the biodiesel cycle.
- The student will understand the challenges and opportunities within biodiesel production.

Materials:

Paper, writing utensils, blank cycle sheet (one per student), biodiesel cycle sheet (one per student), optional lesson extension materials for 3D biodiesel cycle construction

Additional Enrichment Resources or Source Files:

- Biodiesel.org

History of Biodiesel

Students will enter this lesson with varying backgrounds and knowledge pertaining to biodiesel. If relevant, begin with this short video to acclimate the students to the product and process. (As with all content on the internet, please preview it prior to viewing with the students.)

Option 1: Pacific Biodiesel Promo: <https://youtu.be/MNqAGJ-U9eY>

Option 2: Green Science Oregon (OSU): <https://youtu.be/XtIKCnE8uQM>

Option 3: Methes Energies “How It’s Made”: <https://youtu.be/xLa83KlaEyw>

1. To prepare, draw a horizontal timeline on the whiteboard or Smartboard, large enough for student input after the first activity.
2. Give students (or small groups of students) one of the topics within the chart below. Have students spend 10-20 minutes researching the topic, looking for specifics such as: the date the event occurred (year), any people relevant to the event, where the event took place, the relation to biodiesel, significant outcomes, etc. Students will record their topical data for the next part of the lesson.





Diesel engine developed	Energy Policy Act passed	Clean Air Act	Europe establishes biodiesel industry	9/11 terrorist attacks
National Biodiesel Board	USDA	Alternative-fuel vehicles	Petroleum	Global warming
Steam engine developed and in use	World War II	International Conference on Plant and Vegetable Oils	Pacific biodiesel	2022

3. After gaining insight on the topic, the student or small group of students will summarize their topic on one sheet of paper with words or short sentences.

4. Students will be called at random to briefly present their topic, focusing on the year and the relevance to biodiesel. After presenting, they will attach their summary sheet to the appropriate spot to the class timeline. Once all of the groups have presented and organized their topics chronologically, provide a quick overview of the timeline.

Lesson Extension:

1. To continue the activity, ask students to reflect on the future of biodiesel. Provide a few minutes for students to write their thoughts, then open up to sharing and class discussion.

Production of Biodiesel

1. Without looking at the biodiesel production cycle, hand out the blank cycle sheet and give students approximately 5 minutes to complete a "biodiesel cycle."

2. Once students finish, bring up the answer key or a sample cycle. Talk through the steps, having students compare their cycle to the answer key.

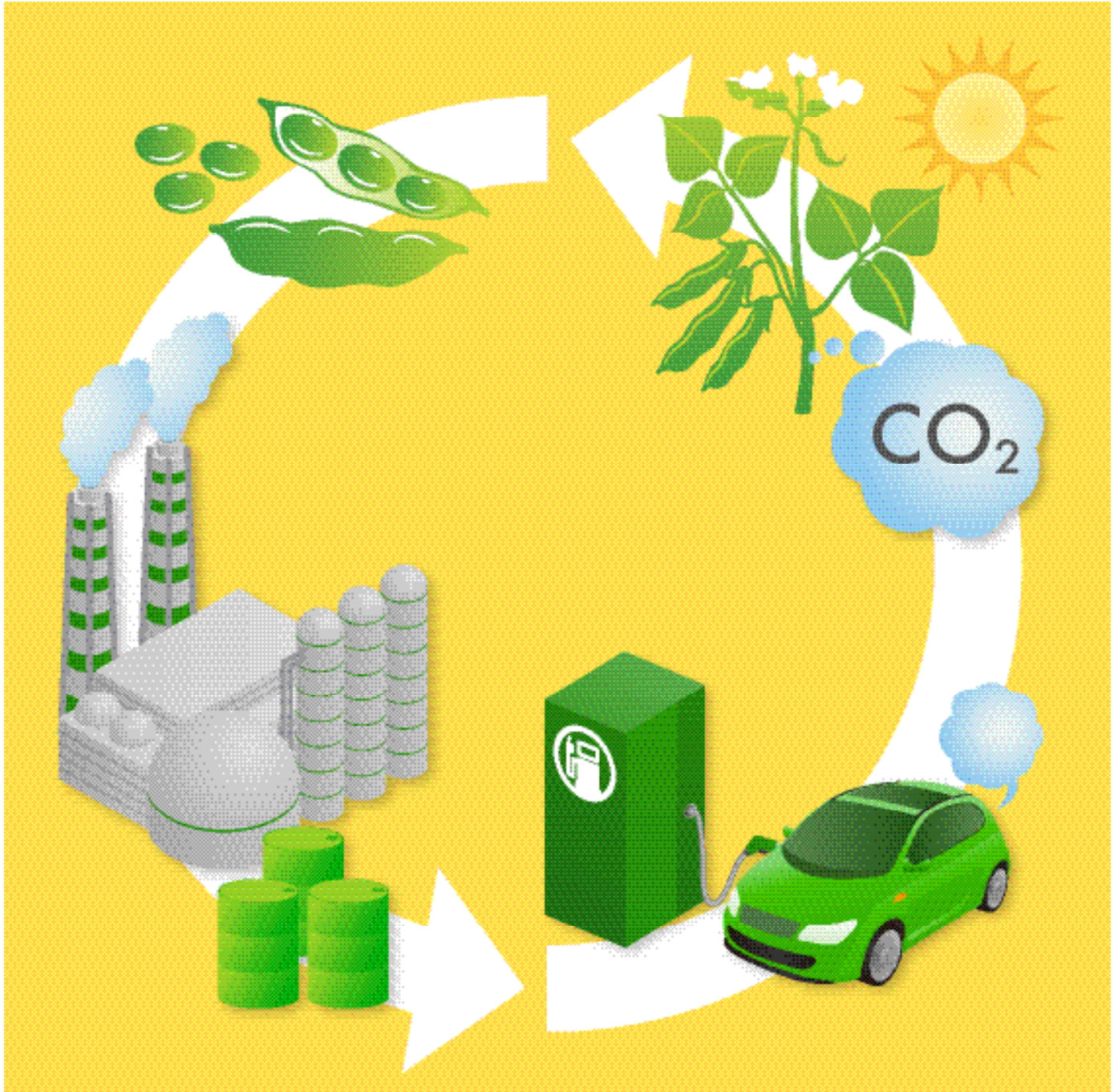
3. Address any glaring omissions or additions on the student cycles.

Lesson Extension:

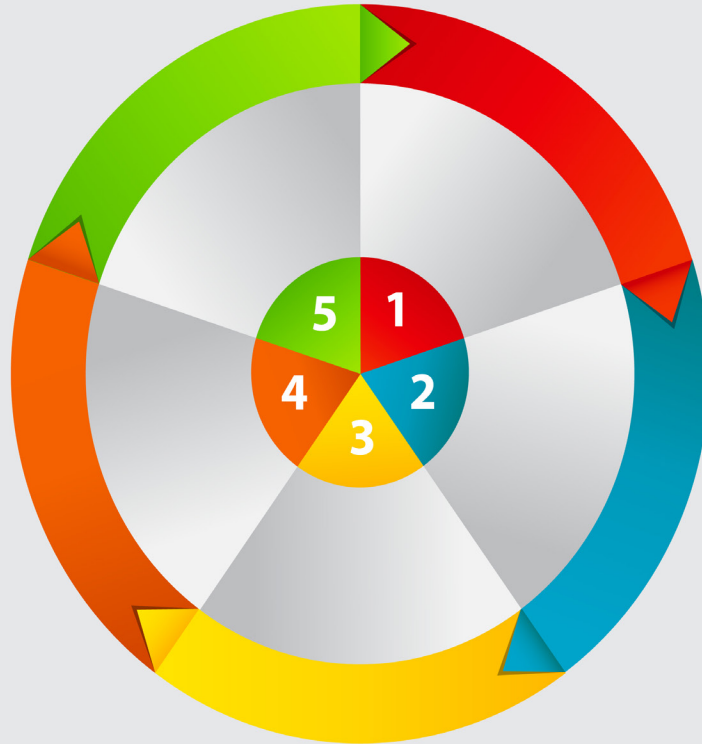
1. Using the biodiesel cycle, assign small groups of students to each section of the cycle. Have them create a 3D interpretation of their section of the cycle. Collaborate with other groups to collectively complete and present a 3D biodiesel cycle model.



Biodiesel Production Cycle Sample



Biodiesel Production Cycle



1

2

3

4

5



Optional:

Reflections on the History and Production of Biodiesel

Facilitate a class discussion or reflective activity with the following statements and questions:

1. Perform a SWOT analysis of producing biodiesel in the U.S. today. (SWOT = Strengths, Weaknesses, Opportunities, and Threats)
2. What is the level of ease of producing biodiesel? How does this relate to the use (or non-use) in today's society?
3. What can we do as students to communicate the benefits of biodiesel?

