Carbon Cycle Activity

Objectives

Learners will:

1. trace carbon as it cycles through Earth’s spheres during the production and consumption of biofuels.
2. identify carbon sources and sinks involved in the production and use of biofuels.
3. identify the processes that connect carbon sources and sinks.
4. construct a graphic representation that illustrates how carbon cycles through Earth’s spheres during the production and consumption of biofuels.
5. discuss the links between biofuels and carbon flows.

Carbon Cycle Activity

(Due Wednesday, June 12, 2013)

As a class we will investigate the carbon cycle by doing a simulation in which participants behave as carbon atoms in various molecules during pre- and post-industrial eras. We will compare the carbon cycles that we generate for these two eras and use lessons from these activities to consider future scenarios. Participants will break into small groups and construct carbon cycle diagrams that illustrate the role of biofuels production and consumption.

Instructions:

1. As a class, complete the Carbon Cycle Simulation from the National Energy Education Development Project Module *Exploring Climate Change*.
2. Arrange learners in groups of 3 or 4.
3. Assign each group the task of constructing a diagram that is set 20 years in the future and involves the use of biofuels as an energy source.
4. Students should identify two or more carbon sources (where carbon is released) related to the production and consumption of biofuels on the diagram.
5. Students should identify two or more carbon sinks (where carbon is absorbed) related to the production and consumption of biofuels.
6. Students should explicitly label the processes that connect the carbon sources and sinks.
7. Each group should illustrate the connections between the carbon sources and sinks, as well as the relevant processes, in the form of a diagram that illustrates the carbon cycle.
8. Each group will post an image/photo of its carbon cycle diagram on Blackboard.
9. Include a brief statement (2-5 sentences) that describes how biofuels are linked to carbon flows as represented in your group’s diagram.
10. If additional information sources are used in the construction of the diagrams they should be cited and included in the Blackboard post. Inclusion of citations will be graded as part of your diagram. If you do not use outside information sources in the construction of your diagram, please include a statement to that effect on your diagram.

National Energy Education Development Project (NEED). (2011). *Exploring Climate Change.* Available: <http://www.need.org/Curriculum-Guides-Title>

Adapted from Daniels, K. & Millar, T. (2012) Lifecycle Analysis of Biofuels Activity- Carbon and Energy Flows. Retrieved from <https://stemedhub.org/resources/1456> .

Carbon Cycle Activity Rubric

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| --- | --- | --- | --- | --- | --- |
| Learning Objective | Learner Product | 0 | 1 | 2 | Score |
| Learners will identify carbon sources and sinks involved in the production and consumption of biofuels | List carbon sources involved in the production of biofuels | No carbon sources are identified | Fewer than two carbon sources are identified or the sources are not relevant to biofuels production/consumption | 2 or more carbon sources are identified | \_\_\_\_/2 |
| Learners will identify carbon sources and sinks involved in the production and consumption of biofuels | List carbon sinks involved in the production of biofuels | No carbon sinks are identified | Fewer than two carbon sinks are identified or the sources are not relevant to biofuels production/consumption | 2 or more carbon sinks are identified | \_\_\_\_/ 2 |
| Learners will identify the processes that connect carbon sources and sinks | List processes that connect carbon sources and sinks | No processes are labeled | Some processes are unlabeled or incorrectly labeled | All processes are correctly labeled | \_\_\_\_/ 2 |
| Learners will construct a graphic representation that illustrates how carbon cycles through Earth’s spheres during the production and consumption of biofuels | Create a carbon cycle diagram that illustrates carbon sources and sinks and the processes that connect them. | No diagram | Diagram is incomplete or incorrect. This may include lack of citations or a statement indicating that no outside information sources were used. | Diagram is complete and correctly shows the processes that connect carbon sources and sinks. Diagram includes outside information sources or an statement that no outside sources were used. | \_\_\_\_/ 2 |
| Discuss the links between biofuels and carbon flows | Statement describing the links between biofuels and carbon flows | No statement | Statement is incomplete or does not correctly reflect relationships in diagram. | Statement is complete and correctly reflects relationships in the diagram. | \_\_\_\_ / 2 |
|  |  |  |  | Total | \_\_\_\_/ 10 |