

## Unit Plan Overview

Name: Robin Dueweke  
Unit Title: Biofuels  
Grade Level: Kindergarten

Length: 2 weeks total - 1 week for lesson plans and 1 week for the biogas activity

### Unit Overview:

**Conceptual Lens & Generalization:** Fuels/Alternative Fuels – Students understand what fuels and alternative fuels are, where they come from, how they are used and their sustainability.

### Standards

Science: L.0L.00.12, E.ES.03.41, E.ES.03.42, E.ES.03.43, E.ES.03.52, E.SE.00.11,  
E.SE.03.32  
Language Arts: R.WS.00.12, R.CM.00.01, R.MT.00.04, L.CN.00.04, R.IT.00.04  
Math: M.GS.00.02, M.UN.00.04

### Key Topics/Lessons:

Day 1: Living/Nonliving and their needs

Day 2: Renewable/Nonrenewable and Sustainability

Day 3: Fuel and Motion

Day 4: Biofuel

Day 5: Biogas

**Culminating Projects, Performances or Exhibitions:** Living/Nonliving sorting, Drawing Living/Nonliving objects, Renewable/Nonrenewable sorting, Drawing Renewable/Nonrenewable objects, Sustainability activity, Energy/Motion worksheet, Energy picture/collage, “How Much Fuel Do You Use?” activity, Corn art, Planting corn, Biogas activity, and Journal Writing.

### Resources:

Books:

- Kalman, Bobbie, What is a Living Thing? Crabtree Publishing Company, 1998.
- Royston, Angela, Living and Non-Living. Heinemann, 2003.
- Van Allsburg, Chris, Just a Dream, Houghton Mifflin, 1990.

Websites:

- [www.eia.doe.gov/kids/](http://www.eia.doe.gov/kids/)
- [www.crayola.com/lesson-plans/details/where-are-you-going?-lesson-plan/](http://www.crayola.com/lesson-plans/details/where-are-you-going?-lesson-plan/)

## Materials:

- Construction paper
- Corn kernels – large bag
- Glue
- Laminated and magnetic backed pictures of living and non-living objects.
- Laminated and magnetic backed pictures of objects that burn fuel and objects that are powered by people
- Laminated and magnetic backed pictures of renewable and nonrenewable resources
- Laminated pictures of flowers - 19
- Laminated pictures of typical places children and their parents would go in cars to run errands during the day (car, stores, school, special activity buildings, babysitters, relative's house, restaurants, beach, etc.)
- Large picture of vehicles (cars, trucks, tractors, etc) on 8.5x11 paper- 20
- Magazines
- Magnetic board
- Markers
- Meter stick
- Poster board
- Scissors
- Seed corn kernels – enough seeds for 20 plants
- Skein of yarn
- Small pots for growing plants - 20
- Soil – large bag
- Tape

## Day 1

### Science:

Content Expectation L.0L.00.12: Students will identify and compare living and non-living things.

### Language Arts:

Content Expectation R.WS.00.12: Students will use picture clues, prediction, and other people.

Content Expectation R.CM.00.01: Students will activate prior knowledge.

Content Expectation R.MT.00.04: Students will begin to sort and order information with extensive teacher guidance.

Content Expectation L.CN.00.04: Students will use effective listening and viewing behaviors.

### Math:

Content Expectation M.GS.00.02: Students will identify, sort and classify objects that do not belong in a particular group.

Length: 30 minutes

### Objectives

1. The students will demonstrate their ability to identify and sort living and nonliving objects into categories through the use of pictures and their prior knowledge.
2. The students will demonstrate their ability to use effective listening techniques in a large group setting.

### Material/Special Arrangements/Individual Modifications

- Books
  - Kalman, Bobbie, What is a Living Thing? Crabtree Publishing Company, 1998.
  - Royston, Angela, Living and Non-Living. Heinemann, 2003.
- Magnetic board
- Laminated and magnetic backed pictures of living and non-living objects.
- Construction paper
- Markers
- Magazines
- Scissors
- Glue
- Poster board

### **Instruction:**

1. Introductory Activity
  - a. Introduce Living and non-living things to students by reading What is a Living Thing? and Living and Non-Living books in a large group setting.
  - b. Have laminated magnetic-backed pictures of living and non-living things on the board and have students sort them into their appropriate group.
2. Developmental Activities
  - a. During center time have students draw one picture of a living thing and a nonliving thing.

### **Concluding the Lesson**

Have each student cut out one living and one non-living object out of a magazine and glue them under the appropriate category on the group poster board located in the front of the classroom.

### **Follow-Up Activity**

The following day have the students tell you one living and one non-living thing to transition from large group setting to centers.

## Day 2

Science:

Content Expectation E.ES.03.41: Students will identify natural resources (metals, fuels, fresh water, farmland and forests).

Content Expectation E.ES.03.42: Students will classify renewable (fresh water, farmland, forests) and nonrenewable (fuels, metals) resources.

Language Arts:

Content Expectation R.WS.00.12: Students will use picture clues, prediction, and other people.

Content Expectation R.CM.00.01: Students will activate prior knowledge.

Content Expectation R.MT.00.04: Students will begin to sort and order information with extensive teacher guidance.

Content Expectation L.CN.00.04: Students will use effective listening and viewing behaviors.

Math:

Content Expectation M.GS.00.02: Students will identify, sort and classify objects that do not belong in a particular group.

Length: 30 minutes

### Objectives

1. The students will demonstrate their ability to identify and sort renewable and nonrenewable resources into categories through the use of pictures and their prior knowledge.
2. The students will demonstrate their knowledge of basic sustainability by participating in the sustainability activity and the subsequent discussion that follows.
3. The students will demonstrate their ability to use effective listening techniques in a large group setting.

### Material/Special Arrangements/Individual Modifications

- Van Allsburg, Chris, Just a Dream, Houghton Mifflin, 1990.
- Magnetic board
- Laminated and magnetic backed pictures of renewable and nonrenewable resources
- Laminated pictures of flowers - 19
- Construction paper
- Markers
- Magazines
- Scissors
- Glue
- Poster board

**Instruction:**

1. Introductory Activity
  - a. Introduce renewable, nonrenewable resources and sustainability to students by reading Just a Dream in a large group setting.
  - b. Have laminated magnetic-backed pictures of renewable and nonrenewable resources on the board and have students sort them into their appropriate group.
2. Developmental Activities

During center time:

  - a. Have students draw one renewable and one nonrenewable resource on construction paper.
  - b. Have each student cut out one renewable and one nonrenewable resource and glue them under the appropriate category on the group poster board located in the front of the classroom.

**Concluding the Lesson**

Have the children regroup in a circle outside with the laminated flowers in the middle. Have each child go into the middle and “pick” a flower. Explain to them that if we picked all of the flowers there wouldn’t be any more flowers left to grow.

Ask for volunteers to put their flowers back and explain that if some flowers are left growing then we won’t run out of flowers to pick in the future. That is how resources are conserved and protected for everybody.

**Follow-Up Activity**

The following day have the students tell you one renewable and one nonrenewable resource to transition from cubby area to large group.

**Day 3**

Length: 30 minutes

Science:

Content Expectation E.ES.03.52: Students will describe helpful or harmful effects of humans on the environment (garbage, habitat destruction, land management, renewable and nonrenewable resources).

Language Arts:

Content Expectation R.WS.00.12: Students will use picture clues, prediction, and other people.

Content Expectation R.CM.00.01: Students will activate prior knowledge.

Content Expectation R.MT.00.04: Students will begin to sort and order information with extensive teacher guidance.

Content Expectation L.CN.00.04: Students will use effective listening and viewing behaviors.

Math:

Content Expectation M.GS.00.02: Students will identify, sort and classify objects that do not belong in a particular group.

Content Expectation M.UN.00.04: Students will compare two or more objects by length, weight, and capacity. (E.g.: which is shorter, longer, taller?)

### Objectives

1. The students will demonstrate their ability to identify and sort objects that burn fuel and objects that require people power into categories through the use of pictures and their prior knowledge.
2. The students will demonstrate their ability to use effective listening techniques in a large group setting.
3. The students will describe the harmful effects (using more fuel) of not planning daily outings with vehicles and the helpful ways they can save fuel by participating in the “How Much Gas Do You Use?” activity.

### Material/Special Arrangements/Individual Modifications

- “How Much Fuel Do You Use?” activity modified from [www.crayola.com/lesson-plans/details/where-are-you-going?-lesson-plan/](http://www.crayola.com/lesson-plans/details/where-are-you-going?-lesson-plan/)
- Story
  - “The Tale of Fern Fossil”, [www.eia.doe.gov/kids/](http://www.eia.doe.gov/kids/)
- Magnetic board
- Laminated and magnetic backed pictures of objects that burn fuel and objects that are powered by people
- Energy worksheet, [www.eia.doe.gov/kids/](http://www.eia.doe.gov/kids/) – 20 copies
- Magazines
- Scissors
- Glue
- Poster board
- Laminated pictures of typical places children and their parents would go in cars to run errands during the day (car, stores, school, special activity buildings, babysitters, relative’s house, restaurants, beach, etc.)
- Skein of yarn
- Meter stick
- Tape

### **Instruction:**

#### Introductory Activity

Introduce fuels, a nonrenewable resource, to students by reading “The Tale of Fern Fossil” in a large group setting.

Have laminated magnetic-backed pictures of objects that burn fuel and objects that are powered by people on the board and have students sort them into their appropriate group.

#### Developmental Activities

During center time:

- b. Have students complete energy worksheet.
- c. Have each student cut out objects that require fuel energy to move and glue them onto sheets of paper to form a collage.
- d. “How Much Fuel Do You Use?” Activity –
  1. In groups of 6 or 7 have each child pick a laminated picture (car or buildings) and spread out on an 8x10 rug.
  2. The “car” student tapes the end of the yarn where he/she starts (home) out and “drives” around to different locations(laminated buildings) stringing the yarn behind them.
  3. Have each student “destination” that the car visits hold onto the piece of yarn while the “car” student moves along to a new “destination”.
  4. Have a few children make repeated trips back their house and out again and others leave their house only once and visit multiple sites before returning home. After the student reaches home the last time, cut the yarn to be compared later. This will indicate how much “gas” they used on their trip.

### **Concluding the Lesson**

Have the students come together in a large group setting with their pieces of yarn. The students will compare the yarn pieces to determine which is longest and shortest. Ask the students why they think one piece of yarn is longer than the other. Explain that if the yarn was gas that is how much gas they would have used on their trip. Have the students brainstorm how to use less fuel on their daily trips and write their responses on the board.

### **Follow-Up Activity**

The following day have the students tell you one way to conserve fuel in their daily lives as they transition from cubby area to large group.

## **Day 4**

Length: 30 minutes

Science:

Content Expectation E.SE.00.11: Students will identify Earth materials (air, water, soil) that are used to grow plants.

Content Expectation E.ES.03.43: Students will describe ways humans are protecting, extending, and restoring resources (recycle, reuse, reduce, renewal).

Language Arts:

Content Expectation R.CM.00.01: Students will activate prior knowledge.

Content Expectation L.CN.00.04: Students will use effective listening and viewing behaviors.

### **Objectives**

1. The students will demonstrate their ability to use effective listening techniques in a large group setting.
2. The students will identify the materials (air, water, soil) used to grow plants.
3. The students will describe the use of biofuel (corn - ethanol) in cars to reduce the amount of fossil fuel used.
4. The students will identify that the corn used in ethanol is a renewable resource.

### **Material/Special Arrangements/Individual Modifications**

- The Tale of Johnny Energy Seed”, [www.eia.doe.gov/kids/](http://www.eia.doe.gov/kids/)
  - Corn kernels – large bag
  - Seed corn kernels – enough seeds for 20 plants
  - Soil – large bag
  - Small pots for growing plants - 20
  - Large picture of vehicles (cars, trucks, tractors, etc) on 8.5x11 paper- 20
  - Glue

### **Instruction**

3. Introductory Activity
  - a. Introduce biofuel, a renewable resource, to students by reading “The Tale of Johnny Energy Seed” in a large group setting.
  - b. Discuss how people can use corn to make ethanol (biofuel a renewable resource) to use in vehicles instead of fossil fuels, a nonrenewable resource.
  - c. Ask students to recall what living things need to live. Write their answers on the board. Ask if corn, a plant, is a living or nonliving thing. Ask the students what plants need to grow (soil, air, and water).
4. Developmental Activities. During center time:



- a. Have students pick a picture of a vehicle.
- b. Have students use corn kernels to glue onto the picture symbolizing ethanol used to replace fossil fuels.

### **Concluding the Lesson**

Have the students recall what ethanol is made from. Ask them if corn is a renewable or nonrenewable resource. Next have them recollect the resources plants need to grow by reviewing their brainstorming from the board. Have different stations set up for the students: pot station, soil station, seed station, water station, air station (final destination - window sill). The students will go through each station and plant their corn seeds.

### **Follow-Up Activity**

Have the students monitor the corn seedlings and water their plants. Once a week discuss how the plants are changing.

### **Day 5**

Length: 30 minutes

Science:

Content Expectation E.SE.03.32: Students will describe how materials taken from the Earth can be used for heating and transportation.

Content Expectation E.ES.03.43: Students will describe ways humans are protecting, extending, and restoring resources (recycle, reuse, reduce, renewal).

Language Arts:

Content Expectation R.CM.00.01: Students will activate prior knowledge.

Content Expectation R.IT.00.04: Students will respond to multiple texts read by discussing, drawing, and/or writing to reflect, make meaning, and make connections.

Content Expectation L.CN.00.04: Students will use effective listening and viewing behaviors.

### **Objectives**

1. The students will demonstrate how materials taken from the Earth can be used for heating and transportation by producing carbon dioxide and methane gas after placing organic materials (like food) in a baggie to decay.
2. The students will describe ways they can protect, extend, or restore resources by drawing and/or writing in their journal using their prior knowledge from this past week's activities.

### **Material/Special Arrangements/Individual Modifications**

- “Biogas”, [www.eia.doe.gov/kids/](http://www.eia.doe.gov/kids/)
- Biogas Activity, [www.eia.doe.gov/kids/](http://www.eia.doe.gov/kids/)
  - zip-loc sandwich bag – one per student
  - Leaves, vegetables, or fruit
  - Yeast

- Writing journals – one for each student
- Pencils/markers/colored pencils

**Instruction:**

5. Introductory Activity

- Introduce biogas, a renewable resource, to students by reading “Biogas” in a large group setting.
- Discuss how people can use waste to make methane gas (biofuel - a renewable resource) that can be used to heat homes and cook food instead of fossil fuels, a nonrenewable resource.
- Ask students to brainstorm which wastes can be used to create biogas. Write their answers on the board. Ask the students:
  - Are these wastes renewable or nonrenewable?
  - Are fossil fuels renewable or nonrenewable?
  - Which one makes more sense to use?

6. Developmental Activities

During center time:

- Have the students fill their bags with organic material (leaves, fruit or vegetables). Be sure they fill some bags with leaves only, some with fruit only, some with vegetables only, and some with a mixture of all three so the students can compare the results of the different materials.
- Write the student’s name and contents on their bag.
- Add a little water and some yeast to each bag.
- Before sealing the bags, make sure they get out as much air as possible.
- Have the students place the bags in a warm place, like the window sill.

**Concluding the Lesson**

Have the students describe ways they can protect, extend, or restore resources by drawing and/or writing in their journal. Volunteers will sit in the author chair and share their journal entries with fellow students in a large group setting.

**Follow-Up Activity**

Have the students observe the bags once a day for one week. At the end of the week ask the students how the leaves, fruit and vegetables changed during the activity, which material decayed the most, and which bags filled with the most biogas.