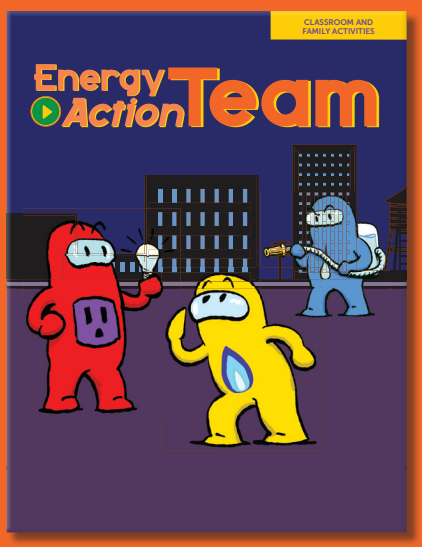
TEACHER GUIDE

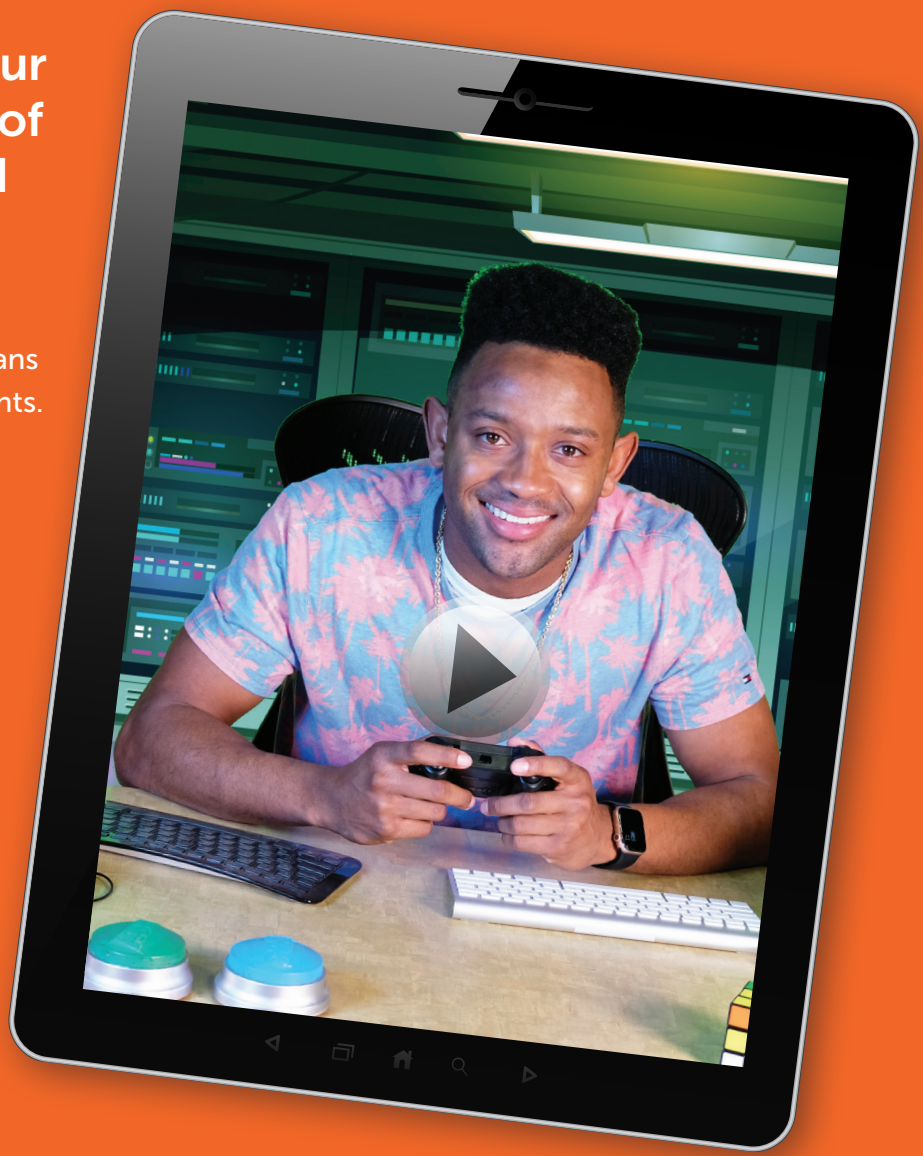
Energy Action Team

Use this teacher guide along with the student playbook to engage your students on the topics of energy, natural gas and water conservation!

Inside you will find four exciting and educational energy-related lesson plans for your 3rd through 5th grade students.

Don't forget to distribute the free energy-saving kits to your 5th grade students today so their families can start saving energy and resources at home!





PARTNERS FOR ENERGY EFFICIENCY

comed AN EXELON COMPANY | Energy Efficiency

Nicor Gas | Energy Efficiency Program

This program is funded by ComEd and Nicor Gas customers in compliance with state law.

Who Turned Out the Lights?

Objective
Students will take part in a simple scenario in which the classroom lights are out and all electronic devices/equipment are off. They will ask questions about how this would affect their lives and how it is affecting them right now.

Materials
- Classroom with electric lights
- Student sheet

Purpose of Activity
Read or Listen, Apply Skills

21st Century Skills
Critical Thinking

Cognitive Level
Strategic Thinking, Extended Thinking, Skills and Concepts

Class Time
20 minutes

Procedure

1. Turn all of the lights off in the classroom along with all other electronic devices (except for computer carts). Students will come into a dark room. Hand them the student sheet upon entering the classroom. Tell them that we cannot have the lights on today because we are pretending there is no electricity in the room.
2. Ask students for questions that they have about why the room is dark and what it might mean. Students record them on their student sheet.

Critical Thinking Questions

Why is electricity important in our everyday lives?
- *We use it for lighting, communication, entertainment, etc.*

What are ways we can save energy?
- *Turn off lights when we are not using them, use energy-efficient light bulbs, etc.*[1]

Energy Action Team
844-452-1160 • www.EnergyActionTeam.org

Who Turned Out the Lights?

Name _____

Scenario: When you walked into the classroom today, you found a dark room with no electricity and no electronic devices working. Write down your observations or questions about this situation below. Write two observations and two questions.

Observations:

1. _____

_____

2. _____

_____

Questions:

1. _____

_____

2. _____

_____

The lights were off today to help us see how not having electricity would affect our learning environment. What would happen if the lights did not come on for the whole period? Give three ideas:

1. _____

_____

2. _____

_____

3. _____

_____

Organic Matter and Natural Gas

Objective
Students will recognize that natural gas is a product of decomposing organic material.

Students will identify natural gas as a nonrenewable energy resource.

Purpose of Activity
Read or Listen, Identify Details, Apply Skills

21st Century Skills
Critical Thinking, Collaboration

Cognitive Level
Strategic Thinking, Extended Thinking, Skills and Concepts

Class Time
1 hour

Materials

- Two plastic soda bottles (2 liter size) or gallon plastic milk containers
- Sand
- Soil
- 2 extra large balloons (equal in size and color)
- Plant pieces (outside plants work best)

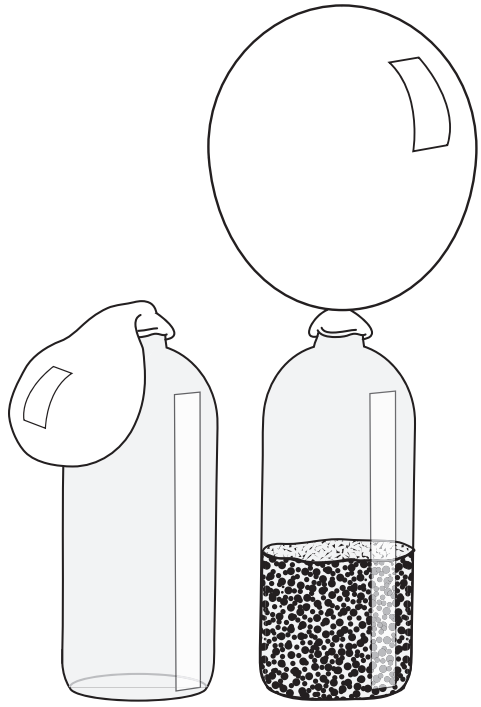
Procedure

Review the term "organic," which means matter derived from plants and/or animals.

Cover the top of one empty bottle with a balloon. This container will be the "control" of the experiment.

Fill the second bottle 1/3 of the way with plant pieces. Drop sand and soil on top of plant pieces to create a thin layer. Cover the top of the bottle with the second balloon. Set in a warm, sunny location for one week or more. Have students observe and compare any gas collection in balloons. Discuss observations and ideas.

Relate activity to how natural gas is formed: organic matter decomposes and is buried deep in mud or sand. Intense heat and pressure over time causes gas (primarily methane) to form.



Critical Thinking Questions

Why does the bottle with organic matter fill up the balloon?

- *As the organic material decomposes gas is released into the balloon.*

How does this relate to natural gas found underground?

- *As plants and animals decompose underground, natural gas is released into the ground.*[2]

Let's Build a Pipeline

Objective
Students will understand how pipelines work to bring natural gas to our homes, businesses and schools.

Purpose of Activity
Apply Skills, Create

21st Century Skills
Critical Thinking, Collaboration

Cognitive Level
Strategic and Extended Thinking

Class Time
45-60 minutes

Materials *(for each group)*
- 5-10 drinking straws (bendy straws work best)
- ½ pint milk (in carton)
- Clear tape

Procedure

1. Designate one person to be the milk drinker. (To avoid spreading germs, allow only one milk drinker for each set of straws and be sure the milk drinker is not lactose intolerant.)
2. Put the first straw in the milk and have the drinker take a sip. Easy, right?
3. Now attach some more pipeline by slightly squeezing one end of a second straw and inserting it into the first.
4. Have the drinker take a sip of milk using this much longer straw.
5. Now place a piece of clear tape over the seam where you connected the two straws. Sip again. Does this make it easier or harder to drink the milk?
6. Add a third, fourth and fifth straw. Use the bend in the straws to make angles and corners as your pipeline travels across the room.
7. Continue until you are out of straws or milk.

Critical Thinking Questions

What did you notice as the pipeline became longer?
- *It took more suction to drink from a longer straw.*

What happened if the tape didn't make an airtight seal?
- *It makes it harder to sip when extra air gets in the straw.*

Did any groups have a milk (natural gas) leak? How did you fix the problem?
- *Make sure the tape seals up the gaps between straws.*

How would this activity change if the straws were bigger or smaller around?
- *Narrow straws are easier to drink with, but you get less milk. Straws that are bigger around give you more milk but make it harder to create suction, especially over longer distances.*

Role of Plants in Water Filtration

Objective
This experiment is a very simplified way to show whether plants will absorb certain kinds of materials from water moving relatively quickly through their root systems.

Purpose of Activity
Review, Identify Details, Communicate, Create

Cognitive Level
Strategic and Extended Thinking

Class Time
45 minutes

Preparation
Set up the potted plants, each in its own cup. Slowly pour six to eight ounces of clean water through the pot. Adjust the soil so that water percolates through at about one ounce per minute.

Materials

- Six potted plants in 6-8" diameter pots with holes in the bottom (soil needs to be moderately dry)
- Six clear containers, such as cups, which will support the plants and allow drainage to be viewed
- Soil
- Unsweetened powdered drink mix, grape or cherry for color
- Vegetable oil
- Two different household cleaners, one liquid and the other powder

Procedure

1. Place the potted plants into the top of their cups. Pour clean water slowly through the first pot and watch it trickle down through the bottom of the pot into the clear cup. The water should look as clean as what was poured.
2. Add a gram or so of soil to 6-8 oz. of water and stir. Pour slowly into the second flower pot. The "dirty" water should look much cleaner once poured.
3. Add about one ounce of vegetable oil to 6-8 oz. of water, stir (they won't mix completely) and pour into a third pot. See if the vegetable oil percolates through.
4. Add some powdered drink mix to 6-8 oz. of water and pour through a fourth pot. See if the water retains the color.
5. Add some powdered cleanser to 6-8 oz. of water and pour through a fifth pot. Is the cleanser retained in the soil?
6. Add some liquid soap to 6-8 oz. water. Does the soap percolate through the soil?
7. Using the "contaminated" plants, pour some clean water at the same rate through each one. Is more of the "pollutant" rinsed away from the soil by the clean water?

Critical Thinking Questions

In what ways can plants and soil benefit drinking water quality?

- *They filter out some pollutants.*

What is the role of rainwater moving through contaminated soil?

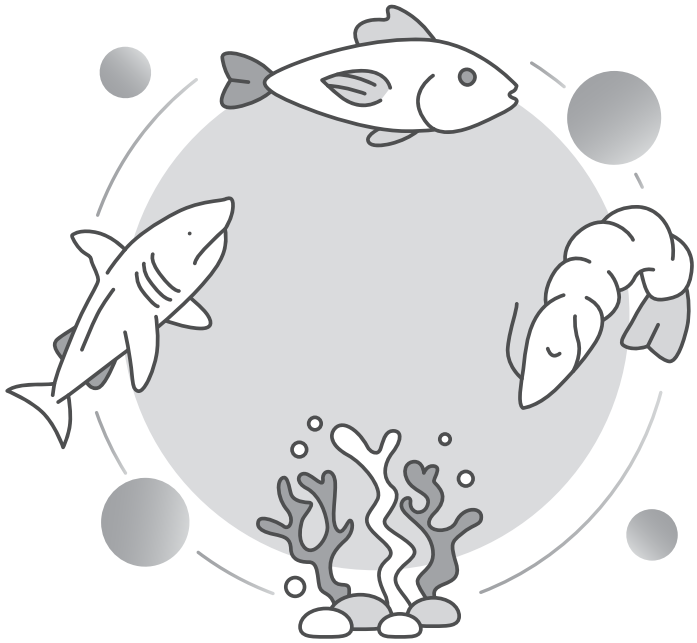
- *It washes the pollutants through the root system as well as deep underground.* [3]

Underwater Food Chain

Plankton is defined as floating plants and animals that cannot move against the current under their own power. We usually refer to any floating, small or microscopic organism (plant or animal) as plankton.

Plankton is divided into phytoplankton (plant plankton) and zooplankton (animal plankton). Phytoplankton is made up of single-celled and multi-cellular green organisms that use photosynthesis to live and grow from solar energy, in much the same way plants do on land. Phytoplankton lives and dies floating around on the currents of the world's oceans, bays and estuaries. Zooplankton includes a vast array of tiny animals that feed on phytoplankton and one another. Zooplankton includes many animals that never get very large, eggs of fish and marine invertebrates and many larval forms of familiar sea creatures (crabs, lobsters, jellyfish) that leave the plankton as they mature.

Many types of marine animals feed by forcing sea water through filters to remove edible particles from the water. This method of capturing food is known as filter-feeding. Bivalves such as clams and mussels draw water into their body through a siphon, pass it through a series of filters and expel the water, digesting the microscopic organisms that were floating in the water. Baleen whales use their brush-like teeth to strain small shrimp, krill and fish from the sea water. Barnacles use a fan-like tail to scoop plankton from the water like a child might use a butterfly net on insects. All of these methods are types of filter-feeding.[4]



1 **Adapted from:** energy.utah.gov/who-turned-out-the-lights/

2 **Source:** www.ttfwatershed.org/fi les/MarcellusShale2010.pdf

3 **Source:** www3.epa.gov/safewater/kids/pdfs/activity_grades_4-8_plantsinwaterfiltration.pdf

4 **Adapted from:** www.dec.ny.gov/docs/administration_pdf/lpplankton.pdf

5th grade teachers: Complete the teacher survey to receive $50 mini-grant!

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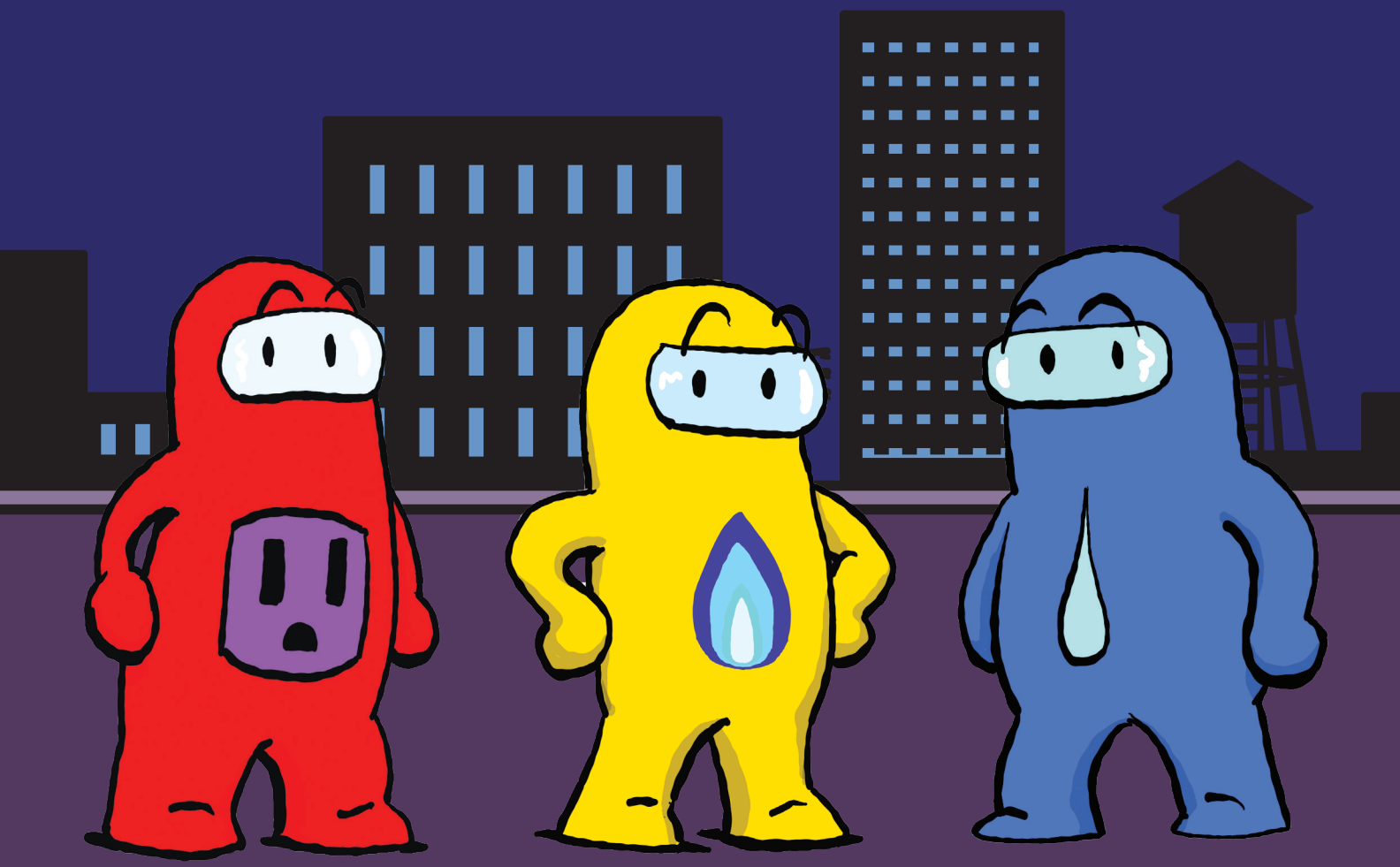

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