Portland General Electric

Energy for Today and Tomorrow
Teacher's Guide

Introduction
The *Energy for Today and Tomorrow* student activity booklet can be used to teach students the basic principles of energy conservation. This booklet is appropriate for students in grades K-3.

This booklet supports the following Oregon Common Curriculum Goals and Academic Content Standards in the areas of mathematics, English language arts, science, and economics.

Kindergarten
Science
K.2 Interaction and Change: Living and non-living things move.
K.2P.1 Examine the different ways things move.
K.3 Scientific Inquiry: Science explores the natural world through observation.
K.3S.1 Explore questions about living and non-living things and events in the natural world.

Mathematics: Calculations and Estimations
Numbers: Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
MA.00.CE.04 Use objects or pictures to decompose whole numbers.

Grade 1
Science
Structure and Function: Living and non-living things have characteristics and properties.
1.2 Interaction and Change: Living and non-living things interact.

English Language Arts: Reading
Listen to and Read Informational and Narrative Text: Listen to, read, and understand a wide variety of informational and narrative text across the subject areas at school and on own, applying comprehension strategies as needed.
EL.01.RE.21 Listen to, read, and understand a wide variety of grade-level informational and narrative (story) text including children's magazines and newspapers, dictionaries, other reference materials, online information, classic and contemporary literature, and poetry.

Mathematics: Calculations and Estimations
Computation and Estimation: Compute fluently and make reasonable estimates.
MA.01.CE.12 Estimate number of objects and check reasonableness of answers by counting up to 20 objects.

Grade 2
Science
2.2 Interaction and Change: Living and non-living things change.

English Language Arts: Reading
Listen to and Read Informational and Narrative Text: Listen to, read, and understand a wide variety of informational and narrative text across the subject areas at school and on own, applying comprehension strategies as needed.

EL.02.RE.10 Listen to, read, and understand a wide variety of grade-level informational and narrative (story) text including children's magazines and newspapers, dictionaries, other reference materials, online information, classic and contemporary literature, and poetry.

Read to Perform a Task: Find, understand, and use specific information in a variety of texts across the subject areas to perform a task.

EL.02.RE.22 Read written directions, signs, captions, warning labels, and informational books.
EL.02.RE.24 Interpret information from diagrams, charts, and graphs.
EL.02.RE.26 Follow two-step written instructions.

Informational Text: Demonstrate General Understanding: Demonstrate general understanding of grade-level informational text across the subject areas.

EL.02.RE.27 Read informational texts for answers to specific questions or for specific purposes.

Informational Text: Develop an Interpretation: Develop an interpretation of grade-level informational text across the subject areas.

EL.02.RE.29 Pose possible answers to how, why, and what-if questions.
EL.02.RE.29 Connect the information in text to life experiences, text, and world.

Mathematics: Mathematical Problem Solving
Conceptual Understanding: Select, apply, and translate among mathematical representations to solve problems.

MA.02.PS.01 Interpret the concepts of a problem-solving task and translate them into mathematics.

Grade 3
Science
3.2 Interaction and Change: Living and non-living things interact with energy and forces.

Social Sciences: Economics
Understand that resources are limited (e.g., scarcity).

SS.03.EC.01 Understand that limited resources make economic choice necessary.

This guide provides background for teachers on the concepts contained in the booklet. It also includes ideas for further discussion and exploration

MOTIVATION & LESSON DEVELOPMENT
Show the children different pictures of objects that use energy (television, calculator, music box, etc.). Ask them to identify each object and tell what it is used for. Elicit what is needed to make each of the objects work. Use the following questions and teacher notes to present each page of the booklet.

Cover Page
1. What kind of animal is shown on the cover?
2. How many children are pictured?
3. What does this picture show? (Point to each circle.)

Tell the children that they will be using this booklet to learn about energy. Explain to them that dinosaurs lived on the earth millions of years ago. Have the children name the dinosaur.

Page 2

4. What are the boy and girl doing in the top left picture?
5. What helps the children run?
6. What is the man riding on in the bottom left picture?
7. Where would you see a tractor?
8. What is a tractor used for?
9. What makes the tractor go?
10. What makes the car run?
11. In the bottom right picture, what is the man doing?
12. What is heating the fuel?

The pictures show that energy is used in many different ways. Ask the students how they use energy.

Page 3

13. What is the picture on the girl's sweatshirt?
14. How does the sun help us?
15. What is the picture on the boy's sweatshirt?
16. What makes a light bulb work?
17. How does electricity help us?

Discuss with the children examples of the different forms of energy mentioned in the USER NOTES.

Page 4

18. What is the picture in the top left box?
19. Where do we get oil? (Below the ground—it is pumped to the surface using an oil well.)
20. What do we use oil for?
21. Do you know what we use coal for?
22. Where have you seen the burners in the bottom left picture?
23. What is natural gas used for?
24. Have you ever seen lightning?

Vocabulary

Oil—a liquid taken from the earth and used as a form of energy.
Coal—a black mineral that burns and gives off heat.
Natural gas—a fuel that comes from the ground and burns. It is used to produce heat for furnaces, water heaters, and ranges.
Lightning—a flash of electricity in the sky.

Page 5

25. Where is electricity made?
26. How does electricity get from the power plant to the house?

Electricity is produced in a power plant. It then goes through a transformer where the voltage is raised. The voltage pushes electricity over wires. Before it gets to homes, another transformer at the substation lowers the voltage.

Page 6
27. Why does the dinosaur (use the name you have given him) need sunglasses?
28. What kind of weather is it?
29. What helps the plants and fruit grow?

Vocabulary
Sun—the source of heat and light that the earth revolves around.

Page 7
30. What is each picture at the top of the page?
31. How does each of these objects help us?
32. What would your life be like without these things?

Discuss with the children how they stay cool in hot weather. Ask them how they stay warm in cold weather.

Page 8
34. What makes the television work?
35. What makes the radio work?

Have children name other things at home and at school that need electricity to work.

Page 9
36. Do you know which one is the penny?
37. Do you know which one is the nickel?
38. Do you know which one is the dime?
39. Do you know which one is the quarter?
40. How can you save electricity at home?

Teach the children that they can turn off lights and the television when they do not need them. Doing this will save electricity and save money.

Page 10
41. What is the largest object in the top row called?
42. What is the largest object in the middle row called?
43. What is the largest object in the bottom row called?
44. Why do we need transportation that carries a lot of people?
45. Why would riding a bicycle save money that you would spend riding in a car?

Vocabulary: Transportation—a way of getting from one place to another.

Discuss the different types of vehicles that are pictured on this page. Explain that most of them require fuel that costs money. Talk about how carpooling saves money.

Page 11
46. What is the girl holding in her hand?
47. Where is she going?
48. What does the girl have in the basket of her bicycle?
49. Where is she going on her bicycle?
50. What does the boy have in the wagon?
51. Where is he going to play?

Talk about what type of transportation each child is taking. Explain that it would be cheaper to use these methods rather than a vehicle that requires fuel.

Page 12

52. Can you count from one to seven?
53. What is this picture of?
54. What does the light switch turn on and off?
55. Why should you turn off a light when you leave a room?

Teach children this song (to the tune of "I'm a Little Teapot")
"I'm a little light bulb, short and stout. When you don't need me, put me out!"

Page 13

56. Which picture comes first?
57. What is the next picture?
58. Which is the last picture?
59. What helps the boy see his toys?
60. How does using sunlight save money?

Have the children make up stories using the correct order of the three pictures. Explain to them that natural light is sunlight.

Page 14

61. What is the girl holding in her hand?
62. What is the boy holding?
63. Where are the children going to put these things?
64. Why is it important to put milk in the refrigerator?
65. What makes the refrigerator work?
66. Why should children put these things back at the same time?
67. What would happen if the refrigerator door were left open?

It is important for the children to understand that the refrigerator will use much more energy the longer the door is kept open and the more frequently it is opened.

Page 15

68. What is pictured in the top row?
69. What is coming out of the faucet?
70. What is shown in the second row?
71. What is in the middle washing machine?
72. What is the boy doing in the bottom row?
73. What is happening in the first bathtub?
74. How can you save water?

Help the children make a poster showing the different ways water can be saved at home.

Page 16

75. Can you write your name on the line?
76. Tell one way in which you can save energy.

Assist the children with writing their names on the certificate. Go over the different reasons energy is important and how to use it wisely.