

Renewable Energy Resources for Texas



RENEWABLE ENERGY
THE INFINITE POWER
OF TEXAS

For Grades 6, 7 and 8

OVERVIEW

In this unit students will learn about renewable energy and the various resources that are available in Texas. Students will engage in an Internet-based activity in which they will research an assigned renewable energy resource and make a presentation on the resource to the class.

OBJECTIVES

See Middle School Teacher Resource Guide for TEKS objectives and additional information regarding this and other middle school units.

SUGGESTED TIMEFRAME

Teacher will need to determine how many class periods to devote to each activity, based on the suggested timeframe and length of classes.

| Time | Activity | Content Area |
|--------------------------|--|--|
| 10 minutes | Activity 1 – Teacher Introduction | |
| 15 minutes | Activity 2 – Assessment of Current Student Knowledge | Science |
| 45 minutes | Activity 3 – Reading Passage and Vocabulary Homework Assignment – Sentences with Vocabulary | Reading Vocabulary Language Arts |
| 30 minutes 60 minutes | Activity 4 – Pre-Lab Activity 5 – Internet Research | Science Technology |
| 60 minutes | Activity 6 – Group Presentations | Science Language Arts |
| 30 minutes | Activity 7 – Assessment | Science |
| 90 – 120 minutes | Activity 8 – Follow Up Activity | Technology |

REQUIRED MATERIALS

- copy of the Reading Passage and Student Data Sheets (includes reading comprehension questions, vocabulary and Lab Activity) for each student
- copy of the Assessment Questions for each student
- Internet access
- a website composition program such as Netscape Composer program (a part of Netscape Navigator, free download online at www.netscape.com) Note: the instructions contained in the activity were written for Netscape Composer but can be adapted for other web page creation programs
- a presentation software program such as Microsoft PowerPoint or equivalent

SUMMARY OF ACTIVITIES

Activity 1 – Teacher Introduction (10 minutes)

Explain to the class that for the next unit of study, they will be learning about renewable energy and the resources available in Texas. If resources are available, have some solar-powered gadgets on hand to capture the students' attention. Hobby, home, electronic and sports supply stores and catalogs offer a variety of items from solar-powered toys, calculators and battery chargers to garden lights, flashlights and radios. These will provide hands-on attention getters. The purpose of this unit is to introduce to students various forms of renewable energy that will be explored in detail during the Internet research activity. The class will be divided into several groups and assigned a particular renewable energy technology. Each group must research their topic using suggested guidelines for content. Each group will compile information including graphics and tables and make a presentation on their assigned topic.

TEACHER OVERVIEW

Activity 2 – Assessment of Current Student Knowledge (15 minutes)

To assess what students already know, prompt a class discussion based on the 3 questions listed below. Based on this discussion, create and display a graphic organizer of the points that were discussed, which can be displayed throughout the unit of study. Refer to the Teacher Resource Guide for sample organizers.

1. What is renewable energy? What are fossil fuels?
2. Is anyone familiar with or has anyone seen applications of any of the following types of energy: solar, wind, biomass, hydroelectric, geothermal or tidal?
3. Does Texas have any renewable energy resources?

Since many of the renewable energy terms are unfamiliar to students, make the words contextually relevant to them. This can be done by discussing each word in terms of something they are familiar with. For example, the term hydroelectric has the prefix “hydro” that means water, similar to fire hydrant that is a source of water. Or photovoltaic: “photo” means light (as in photosynthesis) and volt means electricity (as in a 9 volt battery). Later when the discussion includes passive solar energy, the word passive can be clarified by a similar discussion such as the following: “When you are sitting in front of the television set, you are passively listening and learning as there is no movement or reaction that needs energy between you and the television. Similarly, a passive solar water heating system requires no moving parts and no external energy source except the presence of the sun itself.”

See Teacher Resource Guide for alternative or additional assessment activity.

Activity 3 – Vocabulary and Reading Passage (45 minutes)

Each student will need a copy of the Reading Passage and the Student Data Sheets, which include reading comprehension questions, vocabulary words and the Internet Research Activity. (As an alternative to making copies, the Study Data Sheets can be displayed so the entire class can view them and copy the information

into their science notebook.) Instruct students to study the Reading Passage, “Renewable Energy Resources for Texas,” and complete the questions and vocabulary. This activity will introduce students to renewable energy and provide them with a basic background for expanding their knowledge of specific resources during the Internet Research Activity. Key vocabulary words in the Reading Passage will assist them during their research. At the end of this activity, collect and grade the student’s work. Return their graded work the following day.

Homework Assignment – Key Vocabulary List

1. Instruct students to create in their science notebooks meaningful sentences that reflect an understanding of the definition of each vocabulary word. Students should have written the definition of the words in their science notebooks during class. See Teacher Resource Guide for alternative vocabulary homework.
2. Collect and grade this assignment the next day.

Activity 4 – Pre-Lab (30 minutes)

1. Explain to the class that the purpose of the Lab Activity is to expand their knowledge of renewable energy by researching a particular technology in depth.
2. Divide the class into groups of 2 – 3 students and assign each group one of the following types of renewable energy. The number of groups and the group size will depend upon access to computers. The teacher can decide to increase or decrease the number of groups and topics:
 - solar electricity (photovoltaics)
 - solar thermal (can include water heating, space heating, or solar cooking)
 - passive solar energy
 - wind energy
 - biomass energy
 - geothermal energy (can include heat pumps and large-scale power plants)
 - hydroelectric energy
 - tidal or wave energy
3. Review the Internet Research Activity Guidelines with the students so they understand the components of their research. Teacher should add additional topics as appropriate.

4. There are several good search engines on the Internet, such as google.com, yahoo.com, lycos.com, askjeeves.com and hotbot.com (as of 2005). The teacher can recommend a particular engine or provide a list. Refer to the Teacher Resource Guide for further instructions on how to conduct Internet research using these engines.

Activity 5 – Internet Research Activity

(60 minutes)

1. **Research:** Instruct each group to research their assigned topic using the Internet Research Activity Guidelines. Teacher can determine whether students should save their information to a disk (floppy or CD) or if the information can be saved directly onto the computer hard drive. Teachers can either distribute disks to students or request that they bring one from home. If saving research information to the hard drive, students can create their own folder named appropriately on the computer hard drive and save their research information in their folder.
2. **Compilation:** Groups should compile their information and organize it into a presentation based on the Internet Research Activity Guidelines. Inform each group that they will be allowed 10 to 15 minutes to present their topic and to organize their information accordingly. Encourage groups to divide the presentation among all group members so each student has an opportunity to present a piece of their topic.
3. **Topic quiz:** Groups should develop 5 questions based on the information they present that will serve as a class quiz. This will hold the class responsible for paying attention to the presentations. Students should administer the quiz at the conclusion of their presentation. The quiz can be the last slide of their computer presentation, done orally or written on the board. Each group can decide if they want the whole class to answer the questions together or if they want each student to answer the questions individually. They should

present the questions and call upon students to give the answers orally, or they should instruct the class to individually write the answers. Students can then check and grade each other's work.

Activity 6 – Group Presentations (60 minutes)

1. Allow each group 10 to 15 minutes (including setup) to present their topic.
2. Allow time for questions after each group. Once all the groups have presented, wrap up the discussions and summarize the findings. The new information can be added to the graphic organizer generated during the initial class discussion.

Activity 7 – Assessment (30 minutes)

Distribute a copy of the Assessment Questions to each student. Instruct each student to work alone and answer the short answer and multiple-choice questions. Collect the handouts, grade and return them to the students.

Activity 8 – Follow Up Activity (90 – 120 minutes)

Inform students that during this activity they will create web pages based on the research they gathered on their assigned renewable energy resource. The electronic information they collected (text, graphics, links, etc.) will be used as the content of their web page. Students should work in the same groups from the Internet Research Activity. Review with the class the basic steps to creating a web page based on instruction included in the Follow Up Activity Student Data Sheet. Students will turn in a hard copy print out of their web pages with the file name and computer identified. Teacher should view the web page on the computer as the final step.

ADDITIONAL ACTIVITY

Renewable Energy Resources in Texas

Using a blank template of the state of Texas and colored pencils, instruct students to shade in the areas where the solar, wind and biomass potential are the greatest. Each color should represent a different form of energy.

Renewable Energy Resources for Texas



RENEWABLE ENERGY
THE INFINITE POWER
OF TEXAS

HIGHLIGHTS

- Texas has more renewable energy potential than any other state
- Every Texas community can use clean, renewable energy affordably
- Developing Texas' renewable resources will help the State's economy

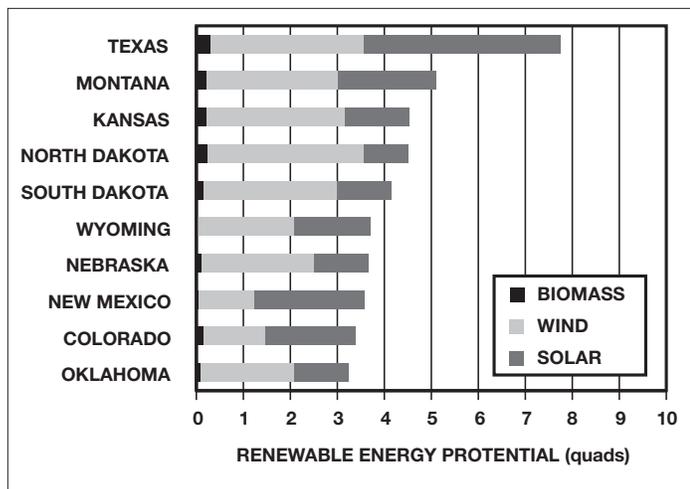
SUMMARY

Due to its size and diverse climate, Texas has tremendous potential to use clean, renewable energy resources such as wind, solar and biomass. These resources are plentiful, large enough in fact to meet all of our State's energy needs. These technologies do not create pollution and are available as large systems (power plants) and as smaller systems (for home use). Thanks to rules established by the Texas government, our State must have 2,000 Megawatts of electricity that comes from renewable resources by the year 2009. Not only does renewable energy help our environment, but it also means good business and creates jobs for our local communities.

WHAT IS RENEWABLE ENERGY?

Renewable energy is energy that comes from sources that are always available in the natural world and cannot be used up. Following are examples of renewable energy and their resources:

- Solar energy – energy that is produced from the sun whether it is in the form of sunlight particles that can create electricity (solar electricity or photovoltaics) or in the form of heat to warm water or air space
- Wind energy – energy that is produced from the natural movement of the wind; also considered a form of solar energy because wind is created by differences in the amount of heat that the sun sends to different parts of the earth
- Biomass energy – energy that comes from materials that were once living like plants or some types of garbage
- Geothermal energy – energy that comes from heat generated deep inside the Earth from items like hot rocks, hot water and steam
- Hydroelectric energy – energy that is produced from moving or falling water
- Tidal/wave energy – energy that is produced when ocean tides or waves change or move across the ocean or sea



TEXAS IS #1 IN RENEWABLE POTENTIAL *This figure, based on a study done for the United Nations, shows that Texas can develop more clean, renewable energy than any other state.*

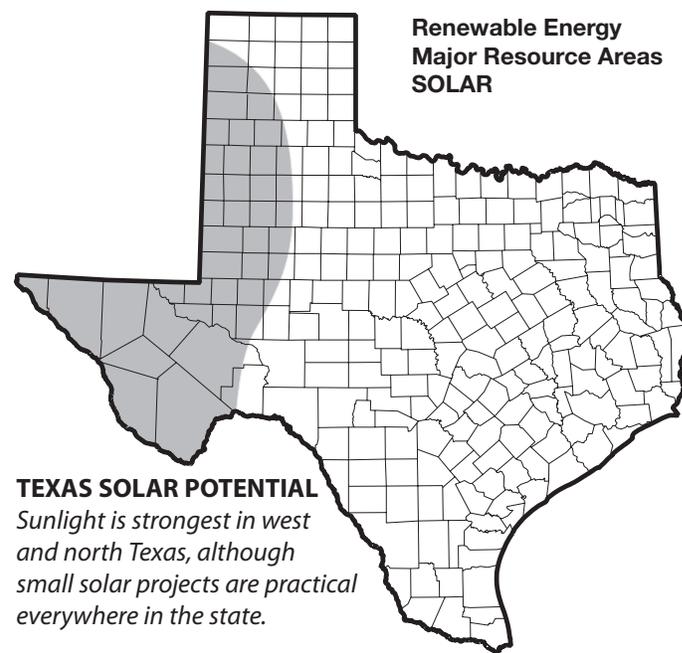
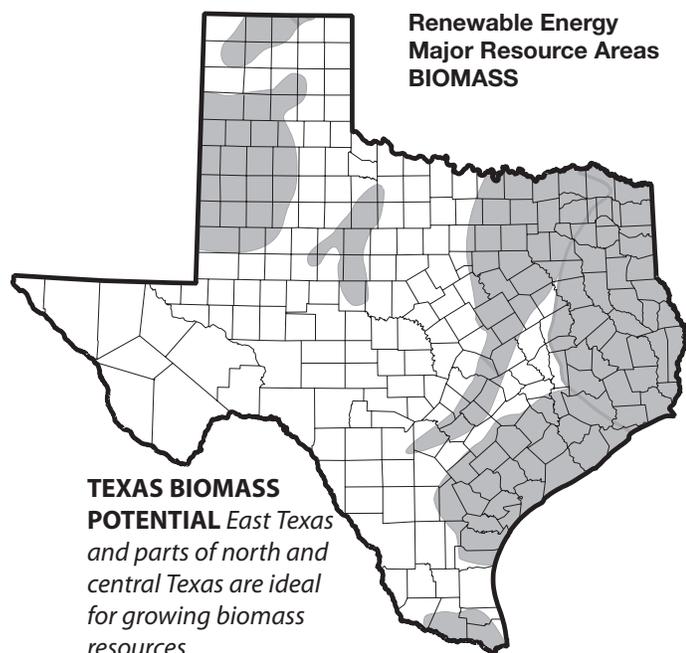
All of these forms of energy are made directly from the sun (solar), indirectly from the sun (wind, hydropower and biomass) or from other movements of our natural world (geothermal and tidal/wave energy). The most common types of renewable energy in Texas are solar, wind, and biomass.

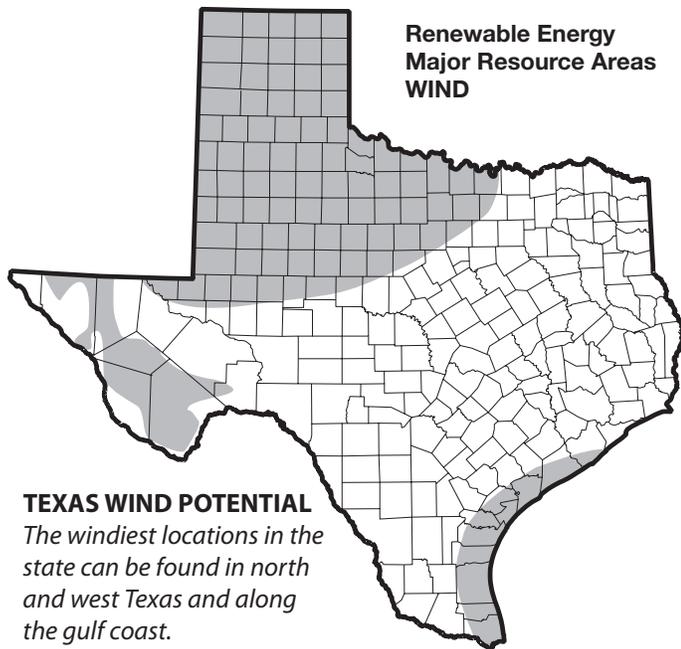
RENEWABLES HAVE “TEXAS SIZE” POTENTIAL

Texas has large amounts of fossil fuel resources such as oil, gas, coal and uranium. But the State has even more renewable resources that make those fossil fuel resources look small. The wind, solar and biomass potential in Texas is equal to 4,330 quadrillion British Thermal Units (BTUs) per year, or about 400 times the amount of energy our State uses per year. Wind energy alone could provide eight times as much power as all of the State’s electric power plants combined. And our potential for solar energy is even greater than wind! In order to meet our energy needs in Texas, we only need to use a small fraction of the renewable energy resources that are available.

WHERE ARE THE RESOURCES LOCATED?

No matter where you are in Texas, renewable energy resources are, more than likely, all around you. Some forms of renewable





energy such as solar heating, photovoltaics, solar water heaters and geothermal (in the form of heat pumps) can be used just about everywhere in Texas. Other technologies, such as biomass energy plants and water pumping windmills, can be used in many communities across the State.

However, for large power projects that use wind and solar energy, the best locations in the State should be found. For wind and solar, the best areas are in south Texas, west Texas and the Panhandle. The best biomass resources are in east Texas and the Panhandle. When you add it all up, Texas can benefit from clean, renewable energy sources in every community in the State.

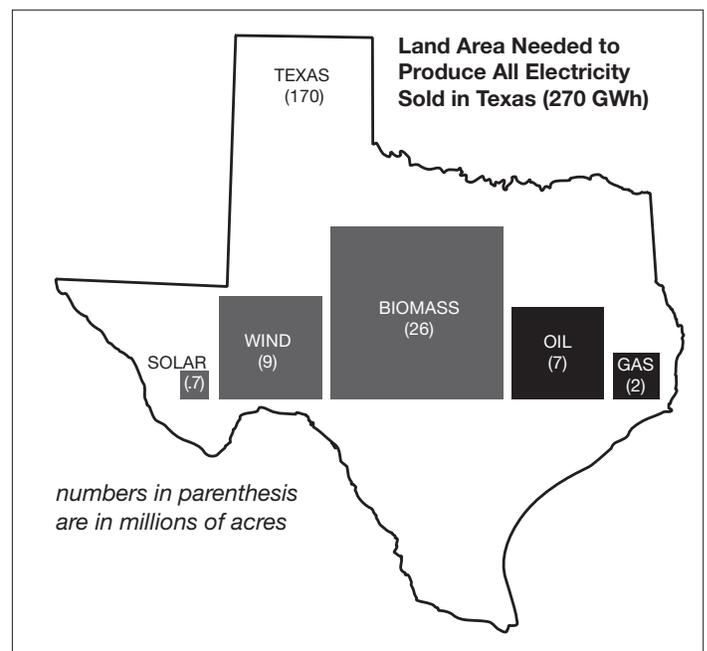
RENEWABLE ENERGY USES

Renewable energy resources can fulfill our energy needs that we often get from fossil fuels. These needs include generating electricity, providing heat, powering mechanical equipment and powering vehicles.

Renewable energy comes from nature in many forms, each of which is best suited for certain uses. Biomass in particular has many uses. The solar energy stored in biomass can make liquid fuels for cars (like ethanol), fuels in the form of gas (like methane) that can be burned in place of natural gas, or solid fuels like wood chips that can be burned like coal.

LAND USE

Some people think that renewable energy uses too much land to be practical. This is not true. Renewable energy uses as much land as that used by fossil fuels such as oil and gas. Harnessing renewable energy can be done along side other traditional land uses. For instance, cattle can graze around windmills, and solar equipment can be placed on the roofs of factories, shopping centers and individual houses, over parking lots and along roadways.



LAND AREA NEEDED FOR VARIOUS TEXAS ENERGY SOURCES Each square shows the land area needed by different energy resources to produce enough electricity for the entire state of Texas. Oil wells and wind turbines produce about the same amount of energy per unit of land area.

Understanding the Reading Passage

1. What is renewable energy? _____

2. Briefly describe the following types of renewable energy in your own words:

• solar energy _____

• wind energy _____

• biomass energy _____

• geothermal energy _____

• hydroelectric energy _____

• tidal/wave energy _____

3. Can renewable energy be used for our current energy needs? Why or why not? _____

4. Does renewable energy use too much land to be considered? Why or why not? _____

Vocabulary

Based on the Reading Passage, write down your understanding of these words or word pairs and verify your definitions in a dictionary, on the Internet if available or with your teacher:

biomass energy _____

British Thermal Unit (BTU) _____

fossil fuels _____

geothermal energy _____

heat pump _____

hydroelectric energy _____

quadrillion _____

potential _____

renewable energy _____

resources _____

solar energy _____

tidal/wave energy _____

wind energy _____

Internet Research Guidelines

Researching Renewable Energy Resources

Introduction

The purpose of this activity is to expand your understanding of renewable energy resources by researching a specific technology as directed by your teacher.

Before You Start

Review the vocabulary words from the Reading Passage. Ask your teacher if you are unsure of any of the meanings. Divide up all the steps in the Lab Activity first, so that everyone has a clear job to do.

Research Guidelines

1. Receive your renewable energy technology assignment from your teacher.
2. Your teacher will provide guidelines for using search engines on the Internet. Based on your assigned topic, use the Internet to research the following aspects of your technology:
 - description of the technology and the renewable resource that powers it—include how the resource and technology work and typical equipment components if applicable;
 - end uses or applications of the technology—include users;
 - where, if at all, the resource can be found in the state of Texas;
 - at least 1 sample project in Texas; and
 - conclusion stating whether the assigned resource is practical, worthwhile and can be successfully used in Texas.
3. The research you compile should consist of the following components at a minimum:
 - written electronic text in your own words that addresses each aspect listed in #2 above;
 - electronic graphics, such as photos, tables or diagrams, supporting the information gathered; and
 - a list of resources with website links for more information.
4. Save any information you gather from the Internet on disk or the computer's hard drive, according to your teacher's directions (text, photos, diagrams, resource links, etc.).

Presentation Guidelines

1. Your presentation will be made using computer software that is available to your class (such as Microsoft PowerPoint).
2. Organize your information so that when it is presented, it follows a clear and logical flow such as: introduction, main information, conclusion and where to get more information.
3. Your presentation should include all the components listed in #3 above.
4. Choose text colors, style, font size and background colors that can be easily viewed by the class.
5. The last part of your presentation will be a quiz for your classmates to answer. This will make sure they pay attention to your presentation! Prepare 5 questions about your assigned topic. You can present the questions as the last slide of your presentation, read them aloud or write them on the board. You can make the quiz for the whole class to answer aloud or have students write the answers in their notebooks and check each other's work.

Assessment Questions

1. What is the difference between renewable energy and fossil fuels? _____

2. How much of our energy needs in Texas could we get from renewable energy? _____
3. What types of renewable energy are the most common in Texas? _____

Multiple Choice Questions

1. The State with the greatest potential for using wind energy is:
 a) Oklahoma c) Kansas
 b) Texas d) Wyoming
2. The State with the most sunlight is:
 a) New Mexico c) Colorado
 b) Montana d) Texas
3. Biomass is derived from:
 a) water power c) plants and animals
 b) solar energy d) wind power
4. Renewable energies regenerated indirectly from the sun include:
 a) wind c) energy stored in biomass
 b) hydropower d) all answers a, b, and c
5. Biomass is most prevalent in:
 a) the Texas Panhandle c) south Texas
 b) west Texas d) east Texas
6. Energy that comes from materials that were once living, like plants or some types of garbage, is called:
 a) wave/tidal c) biomass
 b) hydropower d) solar
7. Energy that comes from heat generated deep inside the earth from items like hot rocks, hot water and steam is called:
 a) wind c) biomass
 b) geothermal d) solar
8. Energy that is produced from moving or falling water is called:
 a) biomass c) geothermal
 b) hydroelectric d) solar
9. A form of solar energy that creates electricity from particles of sunlight is called:
 a) plate-tectonics c) tidal energy
 b) geothermal d) photovoltaics
10. The renewable energy source you would most like to use is:
 a) solar c) biomass
 b) wind d) hydroelectric

Follow Up Activity

Create a Web Page

In this activity, you will use the information you gathered during the Internet Research Activity and create a web page about your assigned renewable energy resource. If you saved images, text and information links on a disk, you can easily retrieve them to include in your web page.

PART I – Organization of Information

Develop a general outline of how information will be presented on your web page. Points to consider include:

- flow of information (you can refer to the presentation you made during the main unit)
- titles and subtitles
- use of graphics (photos, diagrams, other images, tables, graphs, etc.)
- layout and positioning of graphics on your web page
- font size, color, spacing, etc.

PART II - Web Page Composition Instructions

Once you have decided your general approach to the layout of your web page and keeping in

mind that the layout may change as you begin composing, use the web composition software to create your web page. Instructions are included for Netscape Composer.

1. Access Netscape Composer. On the menu bar go to > **Communicator menu** > **Composer**. This will open a new document that will be used to paste and generate text for your web page.
2. Save this document by selecting > **File menu** > **Save As** and give the document a new name. As you create your web page, you should save your file often so you do not lose any data.
3. If the information you created for your Internet Research is on disk, get approval from your teacher to copy it onto the hard drive of your computer for easier access. Copy the files into the same folder as the Netscape Composer document you just created.
4. Begin creating your web page by typing text (either new text or copied from the information you gathered from your Internet Research), inserting images, and creating links. The following table describes common tasks used in creating web pages:

| | |
|-----------------------------------|--|
| <p>Format the web page</p> | <p>To format the color, texture or image for the background of your web page:</p> <ul style="list-style-type: none"> • Right Click any place on the blank page. • Choose Page Properties. • Choose a Background color or select a background image • Set default colors |
|-----------------------------------|--|

| | |
|---|--|
| <p>Creating Text</p> | <p>Simply begin typing text in the new document you created in Netscape Composer. If you are using documents you created for your Internet Research, you can save time by cutting and pasting text segments between your existing information and your new web page document. Use the formatting buttons to center or align text as desired.</p> |
| <p>Changing Text Color, Style and Font</p> | <p>Open the Format menu and choose Character Properties; then click the Character tab. Following are the available options:</p> <ul style="list-style-type: none"> • Font Face: click to select the font type you want. • Font Size: click to select the size of the specified font. In the list of font sizes, you will see a menu of point sizes (8, 9, 10, 12, 14 and so forth), the relative HTML (Hyper Text Markup Language) font scale (-2 to +4), or both. You can specify which type of menu you want in the General panel of the Composer. • Color: select Preference dialog box (Windows only). Click Use Color and then click the color button to choose the color of the selected characters. The color button is the rectangle to the right of the “Use Color” button. If the current text color is black, then the color button is black. |
| <p>Inserting an Image</p> <p><i>(NOTE: In a Mac operating system, you must have Quick Time installed to copy a PICT file from the system clipboard. Composer prompts you to name the image file before you paste it and converts the file to JPEG format.)</i></p> | <p>Insert GIF (Graphic Interchange Format) and JPEG (Joint Photographic Experts Groups) images into your web page as follows:</p> <ul style="list-style-type: none"> • Click where you want the image to appear in your document • Open the Internet file menu and choose the image • Specify the image file and adjust settings in the Images Properties dialog box <p>(TIP: To quickly insert an image, cut and paste it from the clipboard, or drag and drop it onto your page. When you insert an image by pasting from the clipboard or by dragging and dropping, either put a copy of the image file in the same directory (folder) as the web page, or leave the image file where it is on your hard disk or network. The settings you specify in Composer Preference determine which method you use. To quickly resize an image, select it and drag the handles that appear at each corner.)</p> |

| | |
|--|---|
| <p>Linking within the same page</p> | <p>To link within the same page, create a target and then create a link that points to the target as follows:</p> <ul style="list-style-type: none"> • Put the cursor at the beginning of a line where you want to create a target, or select some text at the beginning of a line. • Open the Insert menu and choose the target. • Type a name for the target in the edit box (up to 30 characters). If you selected some text in step 1, this box already contains a name. • Click OK. A Target icon (visible only in the Composer window) appears in your document to mark the target's location. Note: Targets are also called anchors. • Put the cursor on the text or image that you want to link to the target. • Open the Insert menu and choose the Link. • Open the File menu and choose Browse Page; then click the link you just created. |
| <p>Linking to Other Pages</p> | <p>Link to local pages on your own computer or on your school's network, or to remote pages somewhere on the Internet. You can quickly create a link by dragging and dropping from other windows. For example, you can highlight a link from a web page, bookmark, or mail and news window and drag and drop it on your page. You can also create a link using the Link Properties dialog box.</p> <ul style="list-style-type: none"> • Select the text or image you want to link to another page. • Open the Insert menu and choose Link. • Use the Link Properties dialog box to set up the link. The dialog box is explained below. |
| <p>Link Properties Dialog Box</p> | <p>Use the Link Properties Dialog Box to insert a new link or modify an existing link.</p> <ul style="list-style-type: none"> • Enter the text you want to link to another page or target. If you've already highlighted an image or text, you see it here. • Link to page location or local file. • If you want to link your page to someone else's page, type the local path and file name or remote URL of the other person's page. If you're not sure of the path and filename or a local file, click Browse to find it on your hard disk or network. |

| | |
|---------------------------------|---|
| <p>Targets</p> | <ol style="list-style-type: none"> Targets are used to label sections of a page (such as top, bottom, section headings) to navigate around the page. Once a target has been placed on a page, a link may be made to navigate to the target. <ul style="list-style-type: none"> Position the cursor at the point where a target should be marked. Click the Target icon and give the target a name. In Composer a target icon appears, but in Navigator the target is invisible. Show targets as follows: <ul style="list-style-type: none"> Click Current File to see the named targets in the page you're currently editing. Click Selected File to see named targets in the file you specified under "Link to page location or file," above. |
| <p>Removing a Link</p> | <p>Click to unlink the selected linked text. If the current selection contains more than one link, an alert box appears asking you whether to remove all links.</p> |
| <p>Linking to Images</p> | <p>You can make images behave as links in your pages. When the user clicks a linked image, the browser window displays the page to which the image is linked.</p> <ul style="list-style-type: none"> Click to highlight an image on your page. Open the Insert menu and choose Link. Use the Link Properties dialog box to set up the link. <p>(TIP: Dragging a linked image from the Navigator window into a Composer window copies both the image and the link.)</p> |

- After you have created your web page, be sure to save the final version. Print a hard copy of the page and turn it in to your teacher with the name of your file and the computer you were using. Your teacher will decide if the web pages your class created will become published on your school website.

Understanding the Reading Passage

- Renewable energy is energy that comes from sources that are always available in the natural world and cannot be used up. They are made directly from the sun (solar), indirectly from the sun (wind, hydropower and biomass) or from other movements of our natural world (geothermal and tidal/wave energy).
- solar energy – energy that is produced from the sun whether it's in the form of sunlight particles that can create electricity (solar electricity or photovoltaics) or in the form of heat to warm water or air space.
 - wind energy – energy that is produced from the natural movement of the wind; also considered a form of solar energy because wind is created by differences in the amount of heat that the sun sends to different parts of the earth
 - biomass energy – energy that comes from materials that were once living like plants or some types of garbage
 - geothermal energy – energy that comes from heat generated deep inside the earth from items like hot rocks, hot water and steam
 - hydroelectric energy – energy that is produced from moving or falling water
 - tidal/wave energy – energy that is produced when ocean tides or waves change or move across the ocean or sea
- Yes. Solar and biomass alone could provide about 400 times the amount of energy Texas uses per year.
- Renewable energy uses as much land as that used by fossil fuels such as oil and gas. However, harnessing renewable energy can be done along side other traditional land uses. For instance, cattle can graze around windmills, and solar equipment can be placed on the roofs of factories, shopping centers and individual houses, over parking lots and along roadways.

Assessment Questions

- Renewable Energy is energy that comes from sources that are always available in the natural world and cannot be used up. Fossil fuels were formed in the ground after millions of years by chemical and physical changes in plant and animal residues under high temperature and pressure and can be used up. Renewable energy is typically clean, non-polluting energy whereas fossil fuels emit pollutants into the air.
- All of it.
- Solar, wind, biomass and hydroelectric.

Multiple Choice Questions

- 1 b; 2 d; 3 c; 4 d; 5 d; 6 c; 7 b; 8 b; 9 d; 10 any

Vocabulary Definitions

biomass energy – energy that comes from materials that were once living like plants or some types of garbage

British Thermal Unit (BTU) – the amount of energy generated by burning a material; the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit

fossil fuels – fuels formed in the ground after millions of years by chemical and physical changes in plant and animal residues under high temperature and pressure, such as oil, natural gas and coal; fossil fuels emit pollutants into the air when burned

geothermal energy – energy that comes from heat generated deep inside the earth from items like hot rocks, hot water and steam

heat pump – a heating and air conditioning unit that heats or cools by moving heat

hydroelectric energy – energy that is produced from moving or falling water

quadrillion – the number that is represented as a one followed by 24 zeros (1,000,000,000,000,000,000,000,000)

potential – anything that may be possible

renewable energy – energy that comes from sources that are always available in the natural world and cannot be used up; typically non-polluting energy

resource – a source of supply

solar energy – energy that is produced from the sun whether it is in the form of sunlight particles that can create electricity (solar electricity or photovoltaics) or in the form of heat to warm water or air space.

tidal/wave energy – energy that is produced when ocean tides or waves change or move across the ocean or sea

wind energy – energy that is produced from the natural movement of the wind; also considered a form of solar energy because wind is created by differences in the amount of heat that the sun sends to different parts of the earth

InfinitePower.org

Financial Acknowledgement This publication was developed as part of the Renewable Energy Demonstration Program and was funded 100% with oil overcharge funds from the Exxon settlement as provided by the Texas State Energy Conservation Office and the U.S. Department of Energy. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.



RENEWABLE ENERGY
THE INFINITE POWER
OF TEXAS

State Energy Conservation Office

111 East 17th Street, Room 1114

Austin, Texas 78774

Ph. 800.531.5441 ext 31796

www.InfinitePower.org

Texas Comptroller of Public Accounts

Publication #96-812B (03/05)