

Renewable Energy and Electric Utilities



RENEWABLE ENERGY
THE INFINITE POWER
OF TEXAS

For High School

OVERVIEW

Students will discover the great potential for using renewable energy resources and compare utility residential rates in Texas. The growing use of renewable energy in Texas will encourage student interest. Students will conduct research on the Internet and make presentations regarding their findings, using technology to prepare their audiovisual materials.

OBJECTIVES

See High School Teacher Resource Guide for TEKS objectives and additional information regarding this and other high 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 Description	Content Area
<i>30 minutes</i>	1 – Introduction and Reading Passage	Science Vocabulary Reading
<i>120 minutes spread over four or five periods</i>	2 – Internet Activity – Researching Renewable Energy 3 – Group Presentations and Discussion	Science Vocabulary Reading
<i>30 minutes</i>	4 – Assessment	Science Reading
<i>60 minutes</i>	5 – Follow Up Activity – Geothermal Energy	Science Mathematics Vocabulary

REQUIRED MATERIALS

- copy of Reading Passage and Student Data Sheets for each student
- an equipment kit for each Lab Activity group consisting of:
 - computer with Internet access and presentation software
 - list of relevant web sites
 - research materials, journals, data (such as found in World Watch, newspapers, energy companies, and organizations)
- an equipment kit for each Follow Up Lab Activity group consisting of:
 - access to Texas geothermal map on the Internet
 - Texas highway map
 - marker

BACKGROUND INFORMATION

All sources of energy have advantages and disadvantages, which can make for interesting comparisons. Advantages to using renewable energy sources include convenience, low or no cost for fuel, little or no environmental impact, sustainability, independence from reliance on other nations or regions for fuel, no dangerous end products to clean up as a major expense, safety factors, and reduced pollutant emissions. Disadvantages of some non-renewable energy sources include unstable cost, transportation of raw materials and fuel, inconvenience, utilization of public water for production, pollution, limited supplies of fuel, non-sustainability, high cost of disposal of residues, dependence on foreign nations or other regions for fuel, climate change resulting in extreme

weather patterns, decrease in agricultural productivity, possible sea level rise, and species loss. Electric generators and electricity providers consider all these impacts and more when developing new power plants or buying energy for their customers.

Largely due to the deregulation of the electric industry in Texas, many Texans have the option to buy electricity that has been generated by renewable energy sources. For example, electric customers in one Texas town can purchase energy that comes from renewable energy sources. While the fuel charge of this “green” electricity is a bit more expensive (3.30 cents per kilowatt-hour instead of the standard charge of 2.796 cents per kilowatt-hour) the rate is guaranteed through 2013. The green power comes from 61 wind turbines located in west Texas and from a landfill biogas project located near San Antonio.

Texas has vast stores of potential alternative energy resources, but currently only a fraction of Texas electricity comes from renewable sources.

SUMMARY OF ACTIVITIES

Teachers should read through the entire sequence of student activities first. Students should review the Reading Passage, “Renewable Energy and Electric Utilities,” before starting their research project.

Activity 1 – Introduction and Reading Passage

Explain to the class the topic that will be covered in this unit of study. Teachers can include material from the teacher background information section. Have students consider the following quote:

“Everything that can be invented has been invented.” – Charles H. Duell, Commissioner, U.S. Patent Office, 1899

This obviously is not true. Have students consider what drives the need to invent, what makes a good invention, and how this relates to our current energy needs in replacing fossil fuels with renewable, cleaner energy.

Each student will need a copy of the Reading Passage and the Student Data Sheets (includes reading

comprehension questions and vocabulary words). Instruct students to study the Reading Passage and complete the Student Data Sheet to help them understand the marketing and availability of sources of renewable energy. Key vocabulary words in the Reading Passage will assist students in understanding the Lab Activity instructions.

Activity 2 – Internet Activity – Researching Renewable Energy

Review the Internet Activity section of the Student Data Sheets with the class. So that students will have a clear understanding of what is expected of them during this internet activity, a rubric is included in the Student Data Sheets that should be distributed to and reviewed with the class before they begin the activity. Research tells us that students perform better, learn more when they know what is expected from them, and find the tasks more manageable. Students will research from a variety of sources, including the Internet, to review the current status of electricity production in Texas. They will review the current fuels being used to generate electricity and the potential in their futures for using renewable energy sources. Students can research the forms of energy most feasible for Texas in the future. The web site addresses suggested in the activity are just a few possibilities for students to begin their searches. There are many links from these sites and additional places to research. Instructions on the use of search engines should also be shared.

Divide the class into small groups and assign each group a different renewable energy resource to research, such as solar energy (passive and/or active), wind energy, biomass, geothermal energy, hydroelectric power and building (construction) climatology. Each group can plan a division of labor.

Activity 3 – Group Presentations and Discussion

1. Ask students to consider the following points while creating their presentations:
 - oral presentations will be a product of student research with tables and graphs to be used during the presentation

- the class audience should be kept in mind, so the most important concepts are presented without lengthy details;
 - the materials used and produced by each group for their presentation (i.e. their notes, outlines, summaries, transparencies, etc) should be turned in after the presentation. Students could use a presentation software application, such as Microsoft Power Point, to make transparencies or to use directly in the presentation if an LCD projector is available.
2. Instruct the groups to give their presentations allowing each student an opportunity to present a topic.
 3. Group Discussion
After all groups have completed their presentations, a discussion of what was learned could involve questions such as what are:
 - a) the safest energy sources? (*Discussion can include a definition of “safest,” including worker safety and chances of a catastrophic failure of the energy source.*)
 - b) the most efficient energy sources? (*Discussion should include a definition of “efficiency,” including relative cost.*)
 - c) the most environmentally benign sources? (*Make sure students support their assertions with scientific and engineering information, not just opinion.*)
 - d) the most economical sources? (*This will depend on the geographic area. The cost of renewable energy is expected to decrease over the next 10 years and may soon become competitive. However, if the environmental cost of non-renewable energy consumption is included in the calculation, renewable energy may already be cheaper.*)
 - e) the most abundant sources in the surrounding geographical area? (*Answers will vary. In Texas, wind energy is abundant in the high plains and the far west. Solar energy is widely available, but more available toward the western part of the State.*)

“Jigsaw” Method for Research and Group Presentations

An alternative way to organize the student research and presentation groups is known as “jigsaw.” First students are assigned to a Peer Group for the unit consisting of 4 or 5 students. Each student from each Peer Group is assigned a different renewable energy resource to research. After doing some individual, initial research, all students regroup according their research topics (solar, wind, biomass, etc.) and form a Research Topic Group. Each Research Topic Group develops a presentation of that topic, complete with assessment instruments and questions that follow the presentation. Students then go back to their Peer Groups, and each student, who is now an “expert” in his or her subject area, presents the research to the group. Students should develop assessment criteria by which they will complete a peer evaluation for each student’s presentation. By teaching each other, research tells us that students learn much more than just passively listening. Also, having a peer evaluation instills a sense of accountability in each student for the quality of his or her research and presentation.

Activity 4 – Assessment

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 5 – Follow Up Activity

The Follow Up Activity involves researching Texas’ potential for geothermal energy, creating a map of the location of these resources and proposing a geothermal power plant for your community. Review the Follow Up Activity section of the Student Data Sheets with the class. Students should work with their original Lab Activity group.

ADDITIONAL ACTIVITY Resource List

Students can compile library resources for future use to include the following: videotapes, journals, magazines, newspapers, and books. This list can assist the librarian in ordering new materials.

Renewable Energy and Electric Utilities



RENEWABLE ENERGY
THE INFINITE POWER
OF TEXAS

HIGHLIGHTS

- **The Texas electric industry is changing**
- **Texas is becoming a leader in renewable energy development**
- **Customers now have electric provider choices**

INTRODUCTION

Due to a set of laws and rules changing how power is bought and sold in Texas, we now have a system of competitive and choice-driven electric companies, much like telephone service, in which you can choose and change your supplier. Texas law required big, publicly owned electric utilities, such as those in Dallas and Houston, to open their markets in 2002. Rural electric cooperatives and municipal utilities, such as those owned by Austin and San Antonio, were not required to open their market base to competition, but may choose to do so in the future. The outcome is more choices for more customers, including the ability to choose energy generated from the state's clean,

renewable energy resources like wind, solar and biomass power.

NEW RULES CATAPULT RENEWABLES

Renewable Portfolio Standard (RPS)

The law that defined the new electric structure for Texas requires that all electric service providers sell a minimum amount of renewable energy. The law requires that



SOURCE: LLOYD HERZIGER

CLEAN, LOW COST ELECTRICITY FOR TEXAS *Wind farms similar to this one in the west Texas mountains near Van Horn could become a major source of home-grown power in the future.*

Baseline Capacity when law passed, 1999	880 MW	
New Capacity Targets:		
Deadline	Increment	Cum. Total
By 2003	400 MW	1,280 MW
By 2005	450 MW	1,730 MW
By 2007	550 MW	2,280 MW
By 2009	600 MW	2,880 MW

PROJECTED INCREASES IN NEW RENEWABLE ENERGY POWER PLANTS THROUGH 2009

The Texas Renewable Portfolio Standard provides targets for installing new renewable power plants that will increase the state's total renewable generating capacity from 800 MW in 1999 to 2,880 MW by 2009.

2,000 megawatts (MW) of new renewable generating capacity be installed by 2009 and added to the 880 MW already in Texas at the time the law was passed in 1999. This concept is called a “Renewable Portfolio Standard,” and while Texas was only the 6th state to adopt such a rule, its RPS is shaping up to be the most effective one to date.

Renewable Energy Credits (RECs)

The cornerstone of the new Texas rules is the ingenious yet simple creation of a tradable certificate called a Renewable Energy Credit. Renewable energy generation projects certified in the state create one (1) REC per megawatt hour (MWh) of electricity produced.

On an annual basis, every Retail Electric Provider (REP) selling electricity in the

competitive areas of the state must show that it has purchased its share of the required renewable energy generation. That share will be determined by prorating the required benchmarks for renewable energy generating capacity based on the company's share of the electricity market. The REP will prove it is meeting its MW capacity benchmarks by the number of RECs it possesses.

The demand for RECs will result in the building of new renewable energy projects, thereby displacing electricity that would otherwise be generated from traditional resources. The kilowatt hour (kWh) of renewable electricity is not tied to the REC. Each may be sold separately. Claims of renewable energy use in Texas will depend

solely on ownership of RECs and not where the commodity energy flows.

This market-based system has been extraordinary in stimulating the Texas renewable energy market. During 2001 as much renewable energy generating capacity came on-line in the state as during the previous 100 years. That is quite a success story! And because of the large volume of new construction, renewable energy has become more affordable, leading to more opportunities for customers wanting cleaner electricity.

RENEWABLES FOR ELECTRIC CONSUMERS

It is important to understand just what energy resources are included in any “Green Power” product offered by an electricity marketer. In Texas, only a reference to the term “renewable energy” in such marketing is a reference to those resources clearly defined as renewable in the electric utility restructuring law. This would include electricity generated from solar, wind, biomass, geothermal and hydro resources, and clearly excludes any fossil-based resources. Other power products using Texas natural gas resources can still be marketed as “green” due to the low emissions associated with natural gas power plants.

Some companies specialize in selling 100% renewable power with reliability that is identical to what customers are

used to. Others offer power with various percentages of renewable energy. In some cases they offer renewable power contracts at fixed rates, while rates for conventional electricity rise and fall with fossil fuel prices.

It is exciting that Texas has become the nation’s best wholesale market for renewable energy, and it will be interesting to see how Texas customers continue to respond at the retail level for cleaner electricity.

What to look for in the electricity you buy:

All retail electric providers are required to disclose certain information enabling customers to make educated decisions about choosing among competing offers. Here are some important characteristics to consider:

1. Types of renewables
2. Content of new renewable energy
3. Emissions impact
4. Other factors important to you, such as fixed price, company contributions to environmental causes, use of union labor, etc.

Understanding the Reading Passage

Based on the information from the Reading Passage, answer the following questions:

1. What change made it possible for consumers to purchase renewable energy directly?

2. Which electric utilities were required to open their markets to competition?

3. By what amount is renewable energy capacity expected to increase between 1999 and 2009? _____
What is the percentage increase? _____

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 _____

green pricing _____

prorate _____

public utility _____

renewable energy _____

solar energy _____

wind energy _____

Rubrics for Research Presentation

Name: _____

Teacher: _____

Date of Presentation: _____

Title of Work: _____

	Criteria				Points
	1	2	3	4	
Organization	Audience cannot understand presentation because there is no sequence of information.	Audience has difficulty following presentation because student jumps around.	Student presents information in logical sequence which audience can follow.	Student presents information in logical, interesting sequence which audience can follow.	_____
Content Knowledge	Student does not have grasp of information; student cannot answer questions about subject.	Student is uncomfortable with information and is able to answer only rudimentary questions.	Student is at ease with content, but fails to elaborate.	Student demonstrates full knowledge (more than required) with explanations and elaboration.	_____
Visuals	Student uses no visuals.	Student occasional uses visuals that rarely support text and presentation.	Visuals relate to text and presentation.	Student uses visuals to reinforce screen text and presentation.	_____
Delivery	Student mumbles, incorrectly pronounces terms, and speaks too quietly for students in the back of class to hear.	Student incorrectly pronounces terms. Audience members have difficulty hearing presentation.	Student's voice is clear. Student pronounces most words correctly.	Student used a clear voice and correct, precise pronunciation of terms.	_____
Total →					_____

INSTRUMENT ADAPTED FROM WWW.TEACH-NOLOGY.COM

Internet Activity – Researching Renewables

Introduction

The purpose of this activity is to gain an understanding about renewable energy in Texas and its feasibility.

Before You Start

Review the vocabulary words from the Reading Passage. Ask your teacher if you are unsure of any of the meanings.

Materials

- computer with Internet access and presentation software
- list of relevant web sites
- research materials, journals, data (such as found in World Watch, newspapers, energy companies, and organizations)

Preparation

The teacher will direct your groups as to how the topic for research will be chosen and the work distributed among individuals.

Performing the Activity

Your group should collect data on the current status of your renewable energy source, the benefits and disadvantages for its use, global impact and other topics of your choice. Determine who will be responsible for each research topic.

Your group should consider at least these points while researching your topic:

- How much energy does the assigned energy source currently produce in Texas, compared to its future potential production?
- How important is this source likely to become?
- What are the assigned energy source's advantages and disadvantages?
- What position would the local electric company take regarding this source in your opinion?
- Is the source constant and reliable?
- Will the technology be improved over the next 15 years?
- Is the resource affordable?
- How does this energy affect the environment (greenhouse gases, land, water)?

Points that your group should consider while creating your presentations are:

- Your presentation will be a product of your research. Include tables and graphs to illustrate information you have gathered.
- Consider your class, which is the audience. The most important concepts should be presented without lengthy details.
- The materials your group uses and produces for the presentation (i.e. notes, outlines, summaries, transparencies, etc) should be turned in after the presentation.

There are many printed information sources, as well as Internet sites to utilize.

WEB SITES

Alliance to Save Energy
www.ase.org

American Council for an Energy Efficient
Economy
www.aceee.org

American Electric Power
www.aep.com

American Solar Energy Society
www.ases.org

American Wind Energy Association
www.awea.org

Arizona Solar Center
www.azsolarcenter.com

Center for the Analysis and Dissemination of
Demonstrated Energy Technologies
www.caddet-re.org

Center for Renewable Energy and Sustainable
Technology and the Renewable Energy Policy
Project
<http://solstice.crest.org>

El Paso Solar Energy Association
www.epsea.org

Florida Solar Energy Center
www.fsec.ucf.edu

Integrated Waste Services Associates
www.wte.org

Midwest Renewable Energy Association
www.the-mrea.org

National Renewable Energy Laboratory
www.nrel.gov

The National Hydropower Association
www.hydro.org

North Carolina Solar Center
www.ncsc.ncsu.edu

Northeast Sustainable Energy Association
www.nesea.org

Renewable Energy: The Infinite Power of Texas
www.infinitepower.org

Renewable Energy Policy Project
www.repp.org

Solar Energy Industries Association
www.seia.org

Texas Solar Energy Society
www.txses.org

Union of Concerned Scientists
www.ucsusa.org

US Department of Energy, Energy Efficiency and
Renewable Energy
www.eere.energy.gov

U.S. Department of Energy, Bioenergy
bioenergy.ornl.gov

U.S. Environmental Protection Agency
www.epa.gov

Worldwatch
www.worldwatch.org

ADDRESSES & PHONE NUMBERS

American Solar Energy Society
2400 Central Ave G-1
Boulder, Colorado 80301
(303) 443-3130

American Wind Energy
122 C. Street NW
Washington, DC 20001
(202) 383-2505

Austin Energy
721 Barton Springs Road
Austin, Texas 78704
(512) 322-6300

El Paso Solar Energy Association
P.O. Box 25384
El Paso, Texas 79926
(915) 772-7657 (SOLR)

Public Utility Commission of Texas
1701 N. Congress Ave.
Austin, Texas 78701
(512) 936-7120

National Renewable Energy Laboratory
1617 Cole Blvd.
Golden, Colorado 80401-3393
(303) 275-3000

Texas Renewable Energy Industries Association
P.O. Box 16469
Austin, Texas 78761
(512) 345-5446

Texas Solar Energy Society
P.O. Box 1447
Austin, Texas 78767-1447
(512) 326-3391

Assessment Questions

1. What have the new rules described in the Reading Passage done for renewable energy in Texas?

2. Describe a Renewable Energy Credit (REC) in your own words.

3. What is “Green Power” and what are eligible resources in Texas?

Multiple Choice Questions

1. Consumers want their energy sources to be:
 - a) clean
 - b) renewable
 - c) affordable
 - d) all answers a, b, and c
2. The rules governing electricity suppliers in Texas mean that:
 - a) consumers in rural cooperatives and municipal utility territories can now choose their electric supplier.
 - b) consumers in publicly owned utility territories can now choose their electric supplier.
 - c) consumers in publicly owned utility territories can not choose renewable energy sources of electric power.
 - d) consumers in rural cooperatives and municipal utility territories will never be able to choose their electric supplier.
3. Green pricing means:
 - a) paying extra money to use renewables
 - b) cost of trees
 - c) prices in east Texas
 - d) none of the answers
4. Renewable energy resources include:
 - a) wind energy
 - b) solar energy
 - c) biomass
 - d) all answers a, b, and c
5. Regarding renewable energies:
 - a) you would strongly support their use
 - b) they are of little importance
 - c) they are important to the future
 - d) a and c

FOLLOW UP ACTIVITY – GEOTHERMAL ENERGY**Introduction**

Solar is not the only source of renewable energy on Earth. The hot rocks beneath the surface of Earth can also supply energy. The word “geothermal” comes from Greek words for Earth and heat. Geothermal energy is used in Italy and New Zealand. Because of its unique location right on the Midatlantic Ridge, Iceland has been able to develop geothermal energy production to provide nearly 50% its energy needs.

There is some evidence that Native Americans used hot springs in the Big Bend area of west Texas to bathe and to cook food. However, geothermal energy in Texas has much broader potential.

Earth’s core is very hot, around 6000 K. Heat from the deep core slowly moves toward Earth’s surface. In some places, this thermal energy appears as volcanoes, hot springs or geysers. The only places where hot springs could provide sufficient steam to generate electricity are in Yellowstone National Park and in parts of California. Yellowstone National Park is protected, but some geothermal development has taken place in California.

Almost all power plants use steam to generate electricity. The high-pressure steam rotates a turbine that is connected to an electrical generator. The steam can come from water heated by burning fossil fuels, from water heated by nuclear energy, or from steam from geothermal sources. There are three types of

geothermal power plants: dry steam, flash steam, and binary cycle.

Dry steam power plants draw steam directly from underground resources. The steam is piped directly to the power plant, where it turns a turbine. The only dry steam reservoirs are in northern California and under Yellowstone National Park in Wyoming. Thus California has the only dry steam plants in the United States.

Flash steam power plants are more common. They pipe water from deep wells with temperatures greater than 360°F (182°C). The water flows under its own pressure. At this temperature, water flashes instantly to steam at atmospheric pressure. The steam is then separated from the water and used to power a turbine connected to a generator. After running the turbine, the condensed steam is mixed back with the water and both are pumped back into the ground to replenish the reservoir.

Binary cycle power plants use even lower temperature water of about 225°–360°F (107°–182°C). The thermal energy from this water is used to boil another fluid with a lower boiling point in a heat exchanger. (Thus there are two separate fluid cycles, hence binary cycle.) The hot vapor from the working fluid turns a turbine. The water is then injected back into the ground to be reheated and the working fluid condenses and is recycled.

Small-scale geothermal power plants (under 5 megawatts) have the potential for widespread application in rural areas, possibly even as distributed energy resources. Distributed energy

resources refer to a variety of small, modular power-generating technologies that can be combined to improve the operation of the electricity delivery system.

Materials

- Texas geothermal map on the Internet
- Texas highway map
- marker

Step I. Evaluating Geothermal Potential

1. Examine the Texas geothermal map found at www.infinitepower.org/resgeothermal.htm
2. Locate your community on the Texas highway map.

3. Locate your community on the Texas geothermal map.
4. Determine the temperature of water available in the geothermal reservoir under your community.

Step II. Choosing a Geothermal Power Plant

1. Based on the information in the introduction, decide which kind of geothermal power plant, if any, might be suitable for your community.
2. In some areas of Texas, insufficient hot water is available to harvest energy from hot water. Investigate other geothermal applications, such as radiant heat for buildings.

Data Analysis

1. What is the temperature of the geothermal reservoir in your community? _____
2. If any, which of the three types of geothermal power plants is suitable for your community?

3. Are there any other ways in which your community could exploit geothermal energy besides electric power generation?

Understanding the Reading Passage

1. Deregulation of the electric utility industry and passage of the Renewable Portfolio Standard
2. Publicly owned utilities were required to open their markets. Rural co-ops and municipally owned utilities may choose to participate or not.
3. Capacity is expected to increase by 2000 MW, which is a percentage increase of 227%.

Assessment Questions

1. The new rules have stimulated the Texas renewable energy market. During 2001 as much renewable energy generating capacity came on-line in the state as during the previous 100 years. Renewable energy has become more affordable, leading to more opportunities for customers wanting cleaner electricity.
2. Students answers should contain the following information: a REC is a tradable certificate where one (1) REC is the equivalent megawatt hour (MWh) of electricity produced by a source of renewable energy. Retail electric providers in Texas are required to have a certain number of RECs in their portfolio, so the establishment of RECs is a

way to encourage more renewable energy power plants to be developed in Texas.

3. Green power describes electricity produced by sources that are less harmful to the environment than fossil fuels. Eligible sources in Texas include: solar, wind, biomass, geothermal, and hydro resources. Natural gas resources can still be marketed as “green” due to the low emissions associated with natural gas power plants, but are not considered renewable energy.

Multiple Choice Questions

- 1 d; 2 b; 3 a; 4 d; 5 d (best answer)

Follow Up Lab Data Analysis

1. Answers will vary but should be between 90 and 160 °C.
2. In most areas of Texas, the temperature of the water is too low to generate electricity. Binary cycle power plants might be marginally feasible in a few communities. Along Texas’s Gulf Coast, deep reservoirs are available, but drilling into these reservoirs is impractical.
3. Using heat exchangers for space heating remains a useful application.

Vocabulary Definitions

biomass – plant and animal materials (wood, hay, vegetable residues, etc.) which have chemical energy stored in their organic molecules

green pricing – a program offered by some utilities to charge money above the standard fee, to customers who agree, in order to promote using renewable energies

prorate – divide or assess in proportionate parts of the whole

public utility – a service, as electricity or water, essential to the community; a company providing such a service, controlled by a nationalized or private monopoly and subject to public regulation

renewable energy – forms of energy that derive and quickly replenish from the natural movements and mechanisms of the environment, such as sunshine, wind, movement of the seas and the heat of the earth

solar energy – energy radiated from the sun used directly (solar thermal, passive solar and photovoltaic) or indirectly

wind energy – air in motion; kinetic energy related to the motion of the atmosphere; air heated by the sun when rising replaced by cold air

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 #96-824B (03/05)