

# General Energy Introduction

## WORKBOOK



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When people use electricity in their homes, the electrical power is probably generated by burning coal or natural gas, by nuclear reaction or by a hydroelectric plant on a river to name just a few sources. When people fill up a car's gasoline tank, the energy source is petroleum (gasoline) refined from crude oil and may include fuel ethanol made by growing and processing corn. Coal, natural gas, hydropower, petroleum, and ethanol are called **energy sources**.

Look at the chart to see what energy sources the United States uses.

*Energy sources are divided into two groups:*

**Renewable** - an energy source that can be easily replenished. For example, water, solar, wind and geothermal energy can be used to generate electricity.

**Nonrenewable** - an energy source that cannot be easily replenished. For example nuclear energy and fossil fuels: petroleum, coal, natural gas and uranium.

Renewable and nonrenewable energy sources can be used as primary energy sources that produce useful energy such as heat, or to produce secondary energy sources such as electricity.

**U.S. Top Three Energy Sources**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

**What is the Total Percentage of Nonrenewable Sources?**

**What is the Total Percentage of Renewable Sources?**

**U.S. Energy Consumption by Source, 2009**



**BIOMASS | 4.1%**  
Renewable

- Heating, Electricity, Transportation



**HYDROPOWER | 2.8%**  
Renewable

- Electricity



**GEOTHERMAL | 0.4%**  
Renewable

- Heating, Electricity



**WIND | 0.7%**  
Renewable

- Electricity



**PETROLEUM | 37.3%**  
Nonrenewable

- Transportation, Manufacturing



**NATURAL GAS | 24.7%**  
Nonrenewable

- Heating, Manufacturing, Electricity



**COAL | 20.9%**  
Nonrenewable

- Electricity, Manufacturing



**URANIUM | 8.8%**  
Renewable

- Electricity



**SOLAR & OTHER | 0.1%**  
• Light, Heating, Electricity

Source: U.S. Energy Information Administration, Annual Energy Review 2009

ACTIVITY



## LOUISIANA'S ENERGY PROFILE

An **energy profile** is an in-depth look at the many details of a country's or state's energy use and production. Louisiana ranks in the top 5 natural gas-producing U.S. states and is responsible for refining roughly  $\frac{1}{5}$  of the United States' oil. It is plain to see why natural gas is also Louisiana's primary energy source.

According to the United States' Energy Information Administration, Louisiana has the lowest prices for energy in the nation.



### Make a Prediction

Since Louisianans pay the lowest prices for their energy, do you think Louisianans' energy bills are:

**Circle one:** Very low   Very high

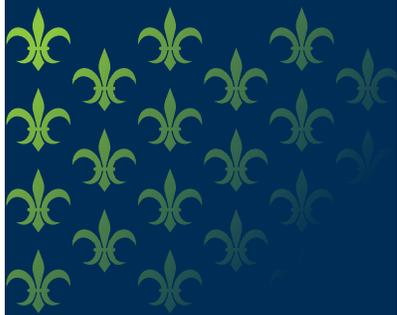
As a state, Louisiana consumes or uses the most energy of all the states in the U.S. across all sectors: residential (home), commercial (business), industrial (manufacturing), and transportation. Louisianans consume the most energy per person as well. That means that we're using far more than we need. The way you and your family use appliances in your house daily not only affects your energy bill every month but has much larger impacts as well.



Was your prediction correct? **Circle one:** Yes   No

### Finish the sentence below.

Louisianans' energy bills are very high because...



Humans will always require energy to fuel their lives, but the big question is, what resources will we use to satisfy our needs? The answer to that question is very important because the resources that we use are causing grave damage to our Earth in many ways. **One example is the GREENHOUSE EFFECT.**



**Greenhouse Effect**

## ACTIVITY • Read the Article



Read the following article from NASA Climate Kids.

### What is the Greenhouse Effect?

#### The Short Answer:

The **greenhouse effect** is a process that occurs when gases in Earth's atmosphere trap the Sun's heat. This process makes Earth much warmer than it would be without an atmosphere. The greenhouse effect is one of the things that makes Earth a comfortable place to live.

During the day, the Sun shines through the atmosphere. Earth's surface warms up in the sunlight. At night, Earth's surface cools, releasing heat back into the air. But some of the heat is trapped by greenhouse gases in the atmosphere. That's what keeps our Earth a warm and cozy 58° Fahrenheit, on average. Without the greenhouse effect, Earth's average temperature would be -64° Fahrenheit.

### How does the greenhouse effect work?

As you might expect from the name, the greenhouse effect works ... like a greenhouse! A greenhouse is a building with glass, walls and a glass roof. Greenhouses are used to grow plants, such as tomatoes and tropical flowers.

A greenhouse stays warm inside, even during the winter. In the daytime, sunlight shines into the greenhouse and warms the plants and air inside. At nighttime, it's colder outside, but the greenhouse stays pretty warm inside. That's because the glass walls of the greenhouse trap the sun's heat.

The greenhouse effect works much the same way on Earth. Gases in the atmosphere, such as carbon dioxide, trap heat just like the glass roof of a greenhouse. These heat-trapping gases are called **greenhouse gases**.

## How are humans impacting the greenhouse effect?

Human activities are changing Earth's natural greenhouse effect. NASA has observed increases in the amount of carbon dioxide and some other greenhouse gases in our atmosphere. Too much of these greenhouse gases can cause Earth's atmosphere to trap more and more heat. This causes Earth to warm up. Burning fossil fuels like coal and oil put more carbon dioxide into our atmosphere. The greenhouse effect is gradually increasing the temperature of the Earth's surface, leading to global warming which leads to sea-level rise and climate change.

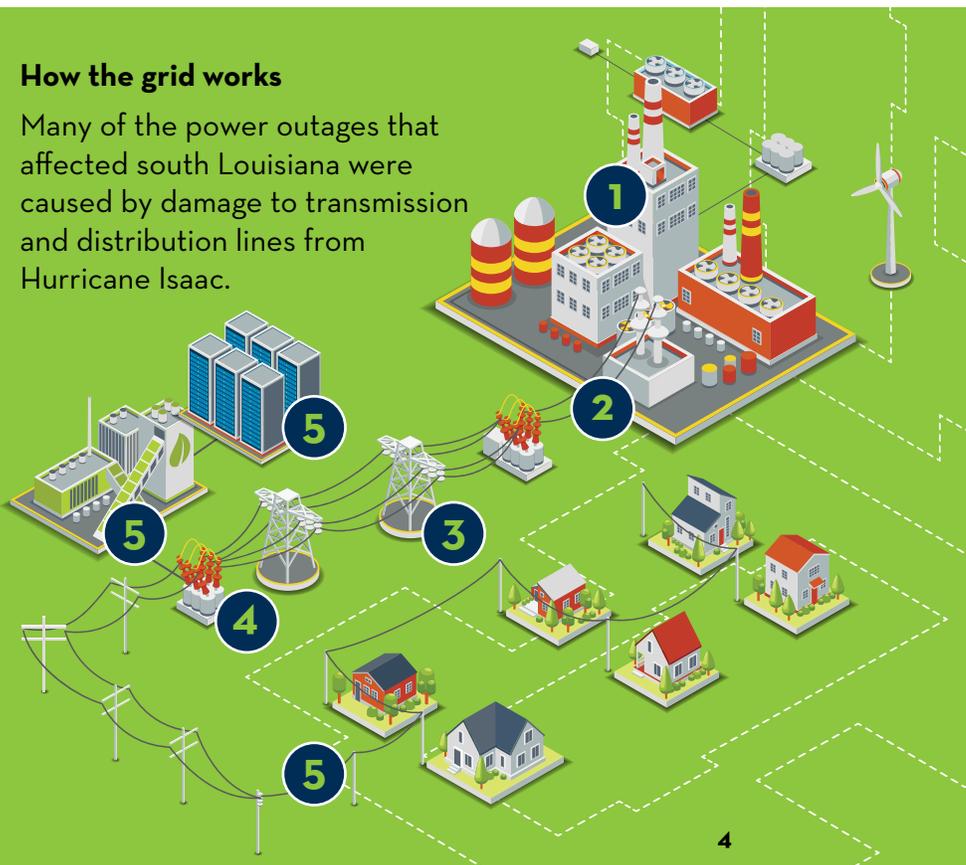
Additionally, extraction practices such as fracking, drilling, mining and deforestation all cause extensive damage to our natural environments and geography. Endangering plants and animals and increasing the risk of complete extinction.

Our everyday choices significantly impact the health of our environment. The illustration below explains how energy sources are transmitted and distributed to homes in Louisiana. Every light, appliance or system in your home uses electricity that has been extracted, transported, processed, generated and transmitted. Every drop of heated water needs that same electricity to power your home's water heater. Every drop of heated water increases your energy bill and water bill.

That is why practicing energy efficiency is so important. **Energy efficiency** simply means using less energy to perform the same task - that is, eliminating energy waste. **Energy efficiency** brings a variety of benefits: reducing greenhouse gas emissions, reducing demand for energy imports, and lowering our costs on a household and economy-wide level (Environmental and Energy Study Institute).

### How the grid works

Many of the power outages that affected south Louisiana were caused by damage to transmission and distribution lines from Hurricane Isaac.



- 1 Electricity is generated.
- 2 Electricity is sent over high-voltage transmission lines.
- 3 Transmission towers carry the lines.
- 4 Substations lower voltage and send it to...
  - ...residential customers. Transformers on distribution poles lower voltage for use in homes.
  - ...industrial customers.
  - ...commercial customers.

## REVIEW



**Directions:** Answer the following questions.

### Define:

Energy Efficiency \_\_\_\_\_

Greenhouse Gas \_\_\_\_\_

### Fill in the blank - fossil fuels, natural gas, top 5:

This fossil fuel is used the most by all sectors in Louisiana \_\_\_\_\_.

Louisiana ranks \_\_\_\_\_ in the United States for natural gas production.

The United States relies heavily on coal, petroleum and natural gas as energy sources. All are \_\_\_\_\_.

### True or False:

The greenhouse effect is a natural process. **Circle one:** True False

### Short Response:

Explain the greenhouse effect in your own words.

How are human activities impacting the greenhouse effect?



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