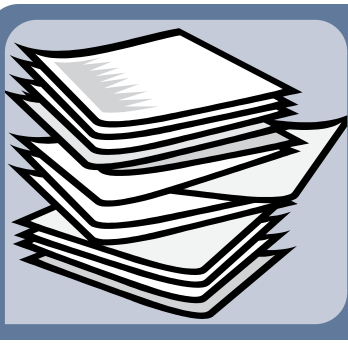


Reading Utility Bills

Students recognize and interpret electricity and natural gas use patterns for one year by reading a set of utility bills.

Grade Level: 5–8 (9–12)

Subject Areas: English Language Arts, Family and Consumer Science, Mathematics, Science

Setting: Classroom

Time:
Preparation: One hour
Activity: Two 50-minute periods

Vocabulary: Cubic foot, Customer charge, Energy charge, Kilowatt, Kilowatt-hour, Rate, Reading date, Therm

Major Concept Areas:

- Consumption of energy resources
- Quality of life

Getting Ready: As an option, use a set of utility bills from your local provider. Samples are provided on the KEEP website at keepprogram.org.

Objectives

Students will be able to

- read and interpret information from electric and natural gas bills; and
- analyze a year's worth of utility bills to determine an occupant's energy use patterns.

Rationale

Recognizing and interpreting electricity and natural gas use patterns by reading utility bills makes students aware of how people use energy at home and can lead students to develop sound strategies for managing energy use.

Materials

- Copies of the following pages:
  - ***Example Utility Bill***
  - ***Example Utility Bill Questions***
  - ***Reading a Set of Utility Bills***
  - ***Utility Bills for One Year***
  - ***Analyzing Energy Use Patterns Using Utility Bills***
- Graph paper
- Find additional resources related to this activity on keepprogram.org > Curriculum & Resources

Background

NOTE: See ***A Guide to Reading Utility Bills*** for definitions of electricity and natural gas energy units and for a detailed description of billing information. Also see ***Analyzing Energy Use Patterns Using Utility Bills***.

Once a month, local electric and natural gas utilities send out bills reminding consumers that the energy they use is not free. Customers respond by writing a check for the amount due or paying online. Beyond that, many customers do not give their utility bills much thought. However, the utility bill contains a great deal of valuable information for the customer.

One important piece of information found on a utility bill is the amount of electricity or natural gas used. Electric and natural gas use is determined by reading a meter located at the customer's home or business. Electric meters directly measure electric energy use in units of kilowatt-hours (kWh). Natural gas meters, however, do not directly measure the amount of energy in the gas that is used. Instead, they measure the volume of the gas in units of hundred cubic feet (abbreviated as ccf, where the first “c” stands for the Roman numeral one hundred) or thousand cubic feet (abbreviated as mcf, where the “m” stands for the Roman numeral one thousand). Natural gas meters measure volume because different sources of natural gas contain slightly different amounts of energy per unit of volume. After the volume of natural gas is measured, the amount of natural gas energy used is calculated by multiplying the volume by natural gas energy units called therms. This calculation is shown on the bill.

Other important pieces of information found on a utility bill are electric and natural gas rates. The rate is the cost of the electricity or natural gas per unit of energy. Electric rates are expressed in dollars (or cents) per kilowatt-hour, and natural gas rates are expressed in dollars (or cents) per therm. Electric and gas rates are often made up of at least two separate rates—one rate covers the utility’s cost of generating or purchasing and obtaining each unit of energy and the other rate covers the cost of handling these units of energy within the utility’s service territory. Utilities determine these rates based on the costs they must pay to provide electric or natural gas service plus their profit margin. Rates change over time, and utilities may change the way they report their rates as well.

The total cost for electric and natural gas service is calculated using energy use and rate information. In addition, the utility often includes a monthly customer charge to cover the cost of providing and reading meters, maintaining electric and natural gas lines, and processing bills. Other billing information includes meter reading dates, bill payment due dates, the customer’s account number, and heating or other weather-related information.

Billing information may be reported differently by different utilities; there is no standard format. Bills may also differ from customer to customer. Some customers may only use electricity, a few may only use natural gas, and others may have special rates or provisions associated with their service. Businesses and industries generally use much more energy than residential customers and as a result, usually purchase electricity and natural gas at lower rates.

Comparing a set of utility bills can reveal a great deal of information about how a consumer uses energy over the course of a year. For instance, billing information can show whether a natural gas customer uses this fuel to heat his or her home, or whether an electric customer uses air conditioning during the summer. Billing information can also show whether a customer has made improvements in energy efficiency. If a natural gas customer adds insulation to an attic or replaces an old natural gas furnace with an energy-efficient one, the results will show up on the bill as reduced natural gas use. Billing information can also show when a customer has increased his or her energy use, and may suggest actions that can be taken to avoid similar increases in the future.

Procedure

Orientation

Begin by asking students how much they think their families pay per month for electricity or natural gas. Do they think their families pay a lot of money for these energy sources? How much might students pay for electricity or natural gas if they had a home of their own? Ask students if they are familiar with electric and natural gas rates. If not, discuss the meaning of a rate by using examples of prices per unit of measure that students may be familiar with. These examples might include the price per pound for produce or the price per gallon of gasoline. Have students suggest other costs or prices that are expressed as rates. Discuss with students the reasons why understanding electric, natural gas, and various other rates is important and useful.

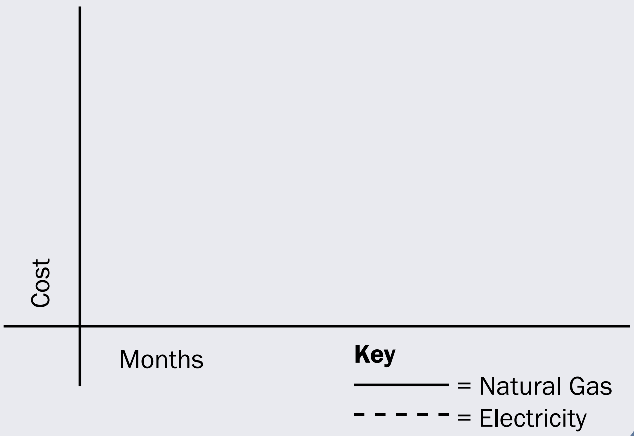
Steps

1. Use the information from “Electricity and Natural Gas Units” in ***A Guide to Reading Utility Bills*** to review the definitions of a kilowatt-hour, cubic foot, and therm with the class.

2. Hand out copies of the ***Example Utility Bill***. Ask students to work with a partner and challenge each team to list the most information found on the bill. Tell them there are more than 30 things they can tell from a bill. Refer to ***A Guide to Reading Utility Bills*** to identify items students should find. Alternatively, challenge students to answer the questions from ***Example Utility Bill Questions***.

3. Hand out copies of ***Reading a Set of Utility Bills*** and ***Utility Bills for One Year***. Have students complete the chart in Part I. Hand out graph paper and instruct students to graph the data. See suggestions on next page for setting up the graph.

Suggested Graph



4. Ask students to generate a list of observations about the graph and infer reasons for the shape of the lines. Refer to ***Analyzing Energy Use Patterns Using Utility Bills*** for suggestions.

5. Have students complete Part II and answer the questions on ***Reading a Set of Utility Bills***.

Closure

Ask students why it is a good idea to keep a set of utility bills from previous months or years instead of throwing them away. Discuss with students the ways they can use the information from a set of utility bills to manage future electricity and natural gas use.

Assessment

Formative

- Can students properly locate billing information on the utility bills?
- Are students able to accurately answer the questions on ***Example Utility Bill Questions*** and ***Reading a Set of Utility Bills***?

Summative

Have students analyze energy use patterns from a set of utility bills they brought from home, or those provided from elsewhere, using ***Analyzing Energy Use Patterns Using Utility Bills***.

Extensions

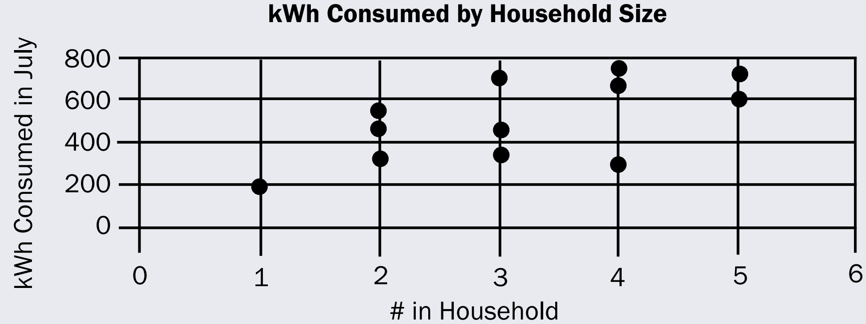
Have students apply their new skills in reading utility bills when studying bills from different energy providers. Sample bills from multiple providers are found on the KEEP website at keepprogram.org. Ideas for using the sample bills:

- Can you identify the same fees from one provider to another? Do any of the providers have different/ additional fees? What are the additional fees for?
- What information can be learned by studying the charts and statistics showing average temperature and gas and electric use comparisons to previous years?
- What is the difference in electric charges for a home with solar versus one without?

To incorporate both graphing and problem solving, ask all students to bring in utility bills from a specific month in their home. The students should also record the age and square footage of their home and the number of people living in the house. Divide students into teams and ask each team to graph some of the data collected. Each student team should create one XY scatter graph that shows how energy consumption varies based on one other variable. (See example graph below.) Student graphs should include:

- Total electric consumption for the month, by number of people in the household
- Total gas consumption for the month, by number of people in the household
- Total electric consumption for the month, by the home's square footage
- Total gas consumption for the month, by the home's square footage
- Total electric consumption for the month, by the age of the house

Suggested Graph



- Total gas consumption for the month, by age of the house

Ask each student group to look for patterns in the data they graphed. For example, does the size of the household seem to be related to the level of gas consumption? Ask all students to compare the various graphs to identify which information seems to be the best predictor of energy use. Talk to students about some of the possible reasons for their findings. Use the energy bills to calculate energy intensity for each household and then compare this number across the households.

Use the formula:

$$\frac{\textbf{Btu used during the month/heating degree days}}{\textbf{Square footage of the house}}$$

This formula usually yields numbers in the 2 to 20 range. A house scoring "2" has a low energy intensity—it uses little energy per square foot. Alternatively, a house that scores 20 has a high energy intensity; this house uses a lot of energy per square foot (which probably means the house is very "leaky"—a lot of heat escapes to the outside). Students should compare their energy intensity scores. Ask students to suggest reasons for the differences in their scores. Reasons might include the age of each house, the style of housing, number of occupants, whether residents are home during the day, whether residents set back the heat in their homes at night and while they are gone during the day (either manually or with a set-back thermostat).

Utility bills provide a good starting point to explore the energy used by various household appliances. Challenge students to develop a list of the items that use the most gas and electricity in their homes. Remind students to think about items that operate seasonally (like air conditioning). Ask students to find out whether these appliances are powered by gas or electricity or some other source at their house. Explore with students how the energy consumption of these appliances helps shape the overall energy use of their home. (See ***Analyzing Energy Use Patterns Using the Utility Bills*** for more details.)

Related KEEP Activities

This activity complements "Reading Utility Meters" and "The Cost of Using Energy." Energy Cost Analysis Sheets found in "The Cost of Using Energy" may be used to provide additional cost exercises that use information found on utility bills. Prior to this activity, you may want to have students complete one of the surveys from "At Watt Rate?" Information from this activity supplements "Energy Prices: Laws of Supply and Demand." Show students Action Ideas: "Energy Efficiency Measures" in the Energy Sparks section to learn ways they can reduce their utility bills.

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Wisconsin K-12 Energy Education Program (KEEP)
College of Natural Resources
University of Wisconsin-Stevens Point

Alliant Energy. WPPI energy The way energy should be. We. WPS. Xcel Energy RESPONSIBLE BY NATURE. MGE Madison Gas and Electric

A Guide to Reading Utility Bills

Introduction

Utility bills may show information and use terms and abbreviations that may be unfamiliar. The purpose of this guide is to make this information more clear.

The first part of this guide includes definitions of electricity and natural gas units commonly found on utility bills. The second part describes information found on typical bills from a Wisconsin utility, like the ***Example Utility Bill*** and the set of ***Utility Bills for One Year***. This section can also be used to read bills from other Wisconsin utilities and customers. Be aware that bills from other utilities may look different, may report some of the information differently, or may include extra information that applies to a particular customer. If you have questions about information found on a particular bill contact the utility that generated the bill.

Electricity and Natural Gas Units

Kilowatt-Hour (kWh)

Electrical energy is measured in kilowatt-hours. One kilowatt-hour is equal to the amount of energy produced by ten 100-watt incandescent light bulbs turned on for one hour. It is also equal to 3,413 British thermal units (Btu) of energy. One Btu of energy will raise the temperature of a pound of water one degree F. A Btu is also approximately equal to the energy produced by one lit match.

Kilowatts (kW)

A kilowatt is a unit of power. Power is the rate at which energy is produced or used per unit of time (or more accurately, the rate at which energy is converted from one form to another per unit of time). For example, ten 100-watt incandescent light bulbs (one kilowatt) produce light and heat at a rate ten times faster than one 100-watt incandescent light bulb. One kilowatt also equals about one and one-third horsepower.

Cubic Feet (cf)

The volume of natural gas is measured in cubic feet. A cubic foot is the volume enclosed by a cube with edges that are one foot long. Since cubic feet are small units, natural gas is usually measured in units of hundred cubic feet (abbreviated as ccf, where the first “c” stands for the Roman numeral one hundred) or thousand cubic feet (abbreviated as mcf, where the “m” stands for the Roman numeral one thousand).

Therm

The energy contained in natural gas is often measured in therms. One therm of natural gas contains 100,000 Btu of energy.

Reading a Utility Bill

The numbers next to each description below correspond to the numbers shown on the ***Example Utility Bill Key***. Numbers 1 through 15 describe information about natural gas service, numbers 16 through 28 describe information for electric service, and numbers 28 to 33 describe information for the whole bill. This guide can also be used to interpret the information found on the set of ***Utility Bills for One Year***.

Abbreviations that appear either on the ***Example Utility Bill*** or the ***Utility Bills for One Year*** are

- kW = kilowatt
- kWh = kilowatt-hour
- CCF = one hundred cubic feet
- CR = credit

A Guide to Reading Utility Bills

Natural Gas Service (Numbers 1–15)

1. The number of days between meter readings is 29 days.
2. The day the natural gas meter was last read was November 16, 2016 (11/16).
3. The previous date the natural gas meter was read was October 18, 2016 (10/18).
4. The latest reading of the natural gas meter was 6216.
5. The previous reading of the natural gas meter was 6095.
6. The meter multiplier (1.000) is the number that meter readings are multiplied by to convert the readings to hundreds of cubic feet (ccfs). In this case the meter measures ccfs so the meter multiplier is 1.000. Some meters measure thousands of cubic feet, and in those cases meter readings are multiplied by a multiplier of 10.
7. The usage in ccfs—the amount of natural gas used from 10/18 to 11/16—is equal to 121 hundred cubic feet (ccf). This amount is found by taking the latest meter reading and subtracting the previous meter reading and then multiplying the difference by the meter multiplier (6216 −6095 = 121 × 1.000 = 121).
8. The therm factor is a multiplier that adjusts for the amount of energy (or the heat content) of the fuel. One hundred cubic feet (1 ccf) of natural gas equals approximately 100,000 Btu or 1 therm. The therm factor adjusts for cases when the energy in the fuel is more or less than this. The therm factor varies from month to month between a value slightly below 1.000 to a value slightly above 1.000.
9. The total natural gas energy used in therms is 122 therms. This total is equal to 121 ccf multiplied by the therm factor of 1.007 (121 x 1.007 = 122). The utility bills the customer on the basis of therms used, which means customers pay for the amount of energy they use, rather than the volume of natural gas used.
10. The customer charge for natural gas service is $0.71950 per day. Since there are 29 days in this billing period, the total charge is $22.95. This charge covers the cost of making natural gas service available to the customer. It includes the cost of meters, meter reading, connecting natural gas pipelines to customers, and billing and record keeping expenses. This is a fixed cost, regardless of how much (or little) natural gas a customer uses during the month.
11. The natural gas distribution charge ($0.11670 per therm) covers the costs that the local utility incurs in handling the natural gas inside its service territory. Handling efforts include depressurizing the gas, adding odor, and getting the gas to the customer. This charge is based on the volume of natural gas used.
12. The administrative charge ($0.01316 per therm) covers the utility's costs that are associated with purchasing natural gas for its customers. Utilities purchase natural gas on a competitive basis from sources around the country. This charge is based on the volume of natural gas used.
13. The service charge ($0.35158 per therm) is the cost that the local utility pays for the natural gas, including the costs associated with bringing the gas to the utility's service territory from the wellhead. This charge is based on the volume of natural gas used.
14. State and county sales tax is applied to energy bills. The utility calculates a subtotal (in this case $81.69) and multiplies the subtotal by the local sales tax rate (here 5.50%) to calculate the sales tax—$4.49.
15. The total cost of the natural gas service for the billing period is $86.18 ($22.95 + $14.24 + $1.61 + $42.89 + $4.49 = $86.18).

Electric Service (Numbers 16-28)

16. The number of days between meter readings is 29 days.

A Guide to Reading Utility Bills

17. The day the electric meter was last read was November 16, 2016 (11/16).

18. The previous date the electric meter was read was October 18, 2016 (10/18).

19. The latest reading of the electric meter was 7282 kilowatt-hours.

20. The previous reading of the electric meter was 7040 kilowatt-hours.

21. The meter multiplier (1.000) is the number that meter readings are multiplied by to convert the readings to kilowatt-hours (kWh). In this case the meter measures KWH so the meter multiplier is 1.000. Some meters measure tens or hundreds of kWH, and in those cases meter readings are multiplied by a multiplier of 10 or 100, respectively.

22. The amount of electricity used from 10/18 to 11/16 is equal to 242 kilowatt-hours. This amount is found by taking the latest meter reading and subtracting the previous meter reading (7282 − 7040 = 242).

23. The customer charge for electric service is $0.62466 per day. Since there are 29 days in this billing period, the total charge is $18.12. This charge covers the cost of making electric service available to the customer. It includes the cost of meters, meter reading, connecting electric lines to customers, and billing and record keeping expenses. This is a fixed cost, regardless of how much (or little) electricity a customer uses during the month.

24. The energy charge ($0.10807 per kWh) is the number of kilowatt hours used per billing period. This includes the rate (price) for energy generation and distribution.

25. The fuel adjustment ($0.03356 per kWh) is the local utility's charge that may be required to accommodate for changes in fuel prices. This charge is based on the volume of electricity used. In Wisconsin, electricity service charges tend to vary between winter and summer. The charges are higher in the summer (when electric consumption is at a peak due to air conditioning loads) and lower in the winter.

26. State and county sales tax is applied to energy bills. The utility calculates a subtotal (in this case $53.96) and multiplies the subtotal by the local sales tax rate (here 5.50%) to calculate the sales tax—$2.97.

27. This is a fee that all utilities in Wisconsin collect and pass to the State of Wisconsin. It is used to provide energy efficiency and utility bill payment assistance to low-income customers. Residential customers pay the lower of these options:

1. An amount equal to 3% of their total pre-tax electric bill, or
2. $3.15 per month, which is the maximum monthly charge a residential electric customer would pay, as determined by the Department of Administration.

28. The total cost of electric service for the billing period is $56.93 ($18.12 + 26.15 + 8.12 + 1.57 + 2.88 = $56.84).

Other Parts of the Bill (Numbers 29–33)

29. The next scheduled reading date is December 17, 2016 (12/17). This is the next date when both the natural gas and the electric meter will be read by a meter reader.

30. The customer's account number is 008756. This is the number the utility uses to keep track of this customer. If the customer has a question about her bill, it is likely she will need to use this number when talking with the utility.

31. The utility charged the customer $98.18 for energy in the previous month and the customer paid this bill so there is no outstanding balance.

32. The total cost of both natural gas and electric service is equal to $143.02 ($86.18 + $56.84 = $143.02).

33. December 14, 2016 (12/14/16) is the date when the bill is due and must be paid.

Example Utility Bill Key

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	12/17 (29)	008756 (30)

Previous Account Balance.. $98.18
Payment Received, 11/04/16.. $98.18 31
Balance Forward.. $0.00

Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
29	11/16	10/18	6216	6095	1.000	121 CCF	1.007	122 Therms
1	2	3	4	5	6	7	8	9

Customer Charge	29 days at $0.71950 ...	$22.95 10
Distribution Service	122 Therms at $0.11670 11	$14.24
Gas Supply Service Administrative Charge	122 Therms at $0.01316 12	$1.61
Natural Gas Service Charge	122 Therms at $0.35158 13	$42.89
State & County Tax	$81.69 at 5.50% 14	$4.49
	Gas Subtotal	**$86.18** 15

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
29	11/16	10/18	7282	7040	1.000	242 KWH
16	17	18	19	20	21	22

Customer Charge	29 days at $0.62466	$18.12 23
Energy Charge	242 KWH at $0.10807 24	$26.15
Fuel Adjustment	242 KWH at $0.03356 25	$8.12
Low Income Assistance Fee	....	$1.57 27
State & County Tax	$52.39 at 5.50% 26	$2.88
Electric Subtotal	....	**$56.84** 28
Total Charges for Service this Month:	....	**$143.02**
	Account Balance	**$143.02** 32

DATE DUE	33 12/14/16	AMOUNT DUE PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES	$143.02 32

Example Utility Bill Questions

1. On what date was the natural gas meter most recently read?

2. What was the present reading of the natural gas meter for the date in Question 1?

3. On what date was the natural gas meter previously read?

4. What was the previous reading of the natural gas meter for the date in Question 3?

5. How many days went by between natural gas meter reading dates?

6. How many hundred cubic feet (ccf) of natural gas were used?

7. What is the difference between the present and previous natural gas meter readings?
Does your answer equal your answer to Question 6?

8. How many therms of natural gas were used?

9. What is the monthly customer charge for natural gas equal to?
Does it depend on the amount of natural gas the customer used?

10. Three natural gas rates are shown on this bill: the distribution charge, the administrative charge, and the natural gas service charge. What are the three rates?

11. What is the total natural gas rate for this bill?
(Hint: add the three rates you listed in your answer to Question 10.)

12. What is the total amount the customer paid for natural gas?

13. On what date was the electric meter most recently read?

14. What was the present reading of the electric meter for the date in Question 13?

Example Utility Bill Questions

15. On what date was the electric meter previously read?

16. What was the previous reading of the electric meter for the date in Question 15?

17. How many days went by between electric meter reading dates?

18. How many kilowatt-hours (kWh) of electricity were used?

19. What is the difference between the present and previous electric meter readings? Does your answer equal your answer to Question 18?

20. What is the monthly customer charge for electricity equal to? Does it depend on the amount of electricity the customer used?

21. Two electric rates are shown on this bill: the energy charge and the fuel adjustment. What are the two rates? What is the total electric rate?

22. What is the total amount the customer paid for electricity?

23. Why is a low income assistance fee charged?

24. How much is the total for both electric and natural gas service?

25. By what date must the bill be paid?

Reading a Set of Utility Bills Answers

Part I

Bill #	Monthly Period and Year (dates from–to)	Total Natural Gas Use (therms)	Total Cost of Natural Gas ($)	Total Electricity Use (kilowatt hours)	Total Cost of Electricity ($)
1	1/18/16–2/16/16	243 therms	$145.44	220 kWh	$53.47
2	2/16/16–3/17/16	159 therms	$102.78	232 kWh	$55.31
3	3/17/16 - 4/18/16	98 therms	$74.06	173 kWh	$48.29
4	4/18/16–5/16/16	42 therms	$42.59	177 kWh	$46.18
5	5/16/16–6/16/16	14 therms	$30.63	455 kWh	$90.92
6	6/16/16 –7/19/16	15 therms	$32.66	618 kWh	$117.33
7	7/19/16–8/17/16	14 therms	$29.12	663 kWh	$121.54
8	8/17/16–9/19/16	11 therms	$30.63	549 kWh	$106.72
9	9/19/16–10/18/16	21 therms	$32.68	191 kWh	$49.01
10	10/18/16–11/15/16	60 therms	$51.73	198 kWh	$49.40
11	11/15/16–12/15/16	147 therms	$97.43	220 kWh	$54.14
12	12/15/16–1/18/17	208 therms	$131.45	251 kWh	$61.61
TOTAL		**1,032 therms**	**$801.20**	**3,947 kWh**	**$853.92**

Part II

Rates

1. Total electricity rate in dollars per kWh: $0.10807 + $0.03356 = **$0.14163**

2. Total natural gas rate in dollars per therm: $0.11670 + $0.01316 + $0.35158 = **$0.48144**

Part III

1. The highest natural gas use was 243 therms from 1/18/94 to 2/16/94 (Bill 1). The lowest natural gas use was 11 therms from 8/17/94 to 9/19/94 (Bill 8). The highest natural gas use was 22 times greater than the lowest natural gas use.

2. The highest electricity use was 663 kWh from 7/19/94 to 8/17/94 (Bill 7). The lowest electricity use was 173 kWh from 3/17/94 to 4/18/94 (Bill 3). The highest electricity use was about 3.8 times greater than the lowest electricity use.

3. The occupants used natural gas to heat the house because gas usage was well over four times greater during the winter months than during the summer months. Electricity use was lower during the winter than during the summer.

Reading a Set of Utility Bills Answers

4. There is a good chance that the occupants used air conditioning to cool the house during the summer, because overall monthly electricity usage increased significantly during the summer.

5. In addition to a natural gas furnace, the occupants most likely have appliances that use natural gas, because small amounts of natural gas were used during the summer when space heating was not used. The appliances they might have include a natural gas water heater, stove, or clothes dryer, or a combination of these appliances.

Challenge Questions

1. Total natural gas rate from Bill 1 is $0.48144 per therm.
   6 therms x $0.48144 / therm = $2.89

2. Electric rate is $0.14163 per kWh.
   13 kWh x $0.14163 / kWh = $1.84

3. **First Model:**
   70 kWh / month × $0.14163 / kWh × 12 months = $118.97

   Second Model:
   60 kWh / month × $0.14163 / kWh × 12 months = $101.97

   Money saved by the second model refrigerator over an entire year:
   Cost to operate first model − Cost to operate second model = $118.97 − $101.97 = **$17.00**

   Calculate the total cost of each refrigerator, over a 17-year life.

   60 kWh model will cost: **$652** to purchase and **$101.97/year** for 17 years

   70 kWh model will cost: **$589** to purchase and **$118.97/year** for 17 years

   60 kWh model: $652 + $101.97 x 17 = **$2385.49**

   70 kWh model: $589 + $118.97 x 17 = **$2611.49**

   The model using 60 kWh is a better bargain in the long run.

Example Utility Bill

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	12/17	008756

Previous Account Balance.................................... $98.18
Payment Received, 11/04/16.................................. $98.18
Balance Forward.. $0.00

Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
29	11/16	10/18	6216	6095	1.000	121 CCF	1.007	122 Therms

Customer Charge	29 days at $0.71950	$22.95
Distribution Service	122 Therms at $0.11670	$14.24
Gas Supply Service Administrative Charge	122 Therms at $0.01316	$1.61
Natural Gas Service Charge	122 Therms at $0.35158	$42.89
State & County Tax	$81.69 at 5.50%	$4.49
	Gas Subtotal	**$86.18**

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
29	11/16	10/18	7282	7040	1.000	242 KWH

Customer Charge	29 days at $0.62466	$18.12
Energy Charge	242 KWH at $0.10807	$26.15
Fuel Adjustment	242 KWH at $0.03356	$8.12
Low Income Assistance Fee	....	$1.57
State & County Tax	$52.39 at 5.50%	$2.88
Electric Subtotal	**..........................**	**$56.84**
Total Charges for Service this Month:	**.........................**	**$143.02**
	Account Balance	**$143.02**

DATE DUE	12/14/16	AMOUNT DUE PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES	$143.02

Reading a Set of Utility Bills

Introduction

You have been given a set of ***Utility Bills for One Year*** that show how two adults living in a single family house used electricity and natural gas. The bills cover a one-year period from January 18, 2016, through January 18, 2017. You need to find out:

- how much electricity and natural gas were used by the occupants each month;
- how much they paid for electricity and natural gas each month;
- what their electricity and natural gas use patterns were like throughout the year; and
- the electricity and natural gas rates they paid.

Part I

Fill in the table below using information from the ***Utility Bills for One Year*** (Bill 1 to Bill 12). To help you get started, information from the first bill (Bill 1) has already been filled in.

Bill #	Monthly Period and Year (dates from–to)	Total Natural Gas Use (therms)	Total Cost of Natural Gas ($)	Total Electricity Use (kilowatt hours)	Total Cost of Electricity ($)
1	1/18/16–2/16/16	243 therms	$145.44	220 kWh	$53.47
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
TOTAL					

Reading a Set of Utility Bills

Part II

Find the electricity and natural gas rates the occupants paid from the ***Utility Bills for One Year*** by filling in the rate information requested below.

Rates

1. Total rate for electricity, in dollars per kilowatt-hour from Bill 1. (Add the energy charge and the fuel adjustment rates)

2. Total natural gas rate in dollars per therm from Bill 1. (Add the distribution service rate to the administrative charge and the natural gas service charge to get the combined rate.)

Questions

Use the ***Utility Bills for One Year*** and the information you filled into the table in Part 1 to answer the following questions.

1. During which period was natural gas use the highest? During which period was natural gas use the lowest? How many times greater was the highest natural gas use compared to the lowest natural gas use?

2. During which period was electricity use the highest? During which period was electricity use the lowest? How many times greater was the highest electricity use compared to the lowest electricity use?

3. Did the occupants use natural gas or electricity to heat the house? Explain.

4. Did the occupants use air conditioning to cool the house? Explain.

5. Do you think the occupants have any appliances that use natural gas? Explain. What kind of appliances might they have?

Reading a Set of Utility Bills

Challenge Questions

1. Suppose a dryer used six therms of natural gas energy during the period shown on Bill 1. How much did it cost to run the dryer?

2. The total amount of electricity used by a 200-watt color television while watching all the regular season Green Bay Packer games is equal to about 13 kilowatt-hours. How much did the electricity cost to watch all the games?

3. Suppose you wish to buy a new refrigerator and you've narrowed your choice to two models. The first model uses 70 kilowatt-hours of electricity per month and the second model uses 60 kilowatt-hours of electricity per month.
   - How much money would you save in electricity costs over an entire year if you bought the second model refrigerator instead of the first?
   - If the 60 kWh refrigerator costs $652 and the 70 kWh model costs $589 and if we assume that the refrigerators will both last 17 years, which model is the best bargain?

Utility Bills for One Year

Bill 1

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	03/17	008756

Previous Account Balance	$196.18
Payment Received, 02/02/16	$196.18
Balance Forward	**$0.00**

Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
29	02/16	01/18	6914	6672	1.000	242 CCF	1.004	243 Therms

Customer Charge	29 days at $0.71950	$20.87
Distribution Service	243 Therms at $0.11670	$28.36
Gas Supply Service Administrative Charge	243 Therms at $0.01316	$3.20
Natural Gas Service Charge	243 Therms at $0.35158	$85.43
State & County Tax	$137.86 at 5.50%	$7.58
	Gas Subtotal	**$145.44**

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
29	02/16	01/18	8679	8459	1.000	220 KWH

Customer Charge	29 days at $0.62466	$18.12
Energy Charge	220 KWH at $0.10807	$23.78
Fuel Adjustment	220 KWH at $0.03356	$7.38
Low Income Assistance Fee		$1.48
State & County Tax	$49.28 at 5.50%	$2.71
Electric Subtotal		**$53.47**
Total Charges for Service this Month:	**$198.91**	
	Account Balance	**$198.91**

DATE DUE **03/16/16** — **AMOUNT DUE** PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES **$198.91**

Bill 2

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	04/18	008756

Previous Account Balance	$198.91
Payment Received, 03/02/16	$198.91
Balance Forward	**$0.00**

Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
29	03/17	02/16	7072	6914	1.000	158 CCF	1.004	159 Therms

Customer Charge	29 days at $0.71950	$20.87
Distribution Service	159 Therms at $0.11670	$18.56
Gas Supply Service Administrative Charge	159 Therms at $0.01316	$2.09
Natural Gas Service Charge	159 Therms at $0.35158	$55.90
State & County Tax	$97.42 at 5.50%	$5.36
	Gas Subtotal	**$102.78**

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
29	03/17	02/16	8911	8679	1.000	232 KWH

Customer Charge	29 days at $0.62466	$18.12
Energy Charge	232 KWH at $0.10807	$25.07
Fuel Adjustment	232 KWH at $0.03356	$7.79
Low Income Assistance Fee		$1.53
State & County Tax	$50.98 at 5.50%	$2.80
Electric Subtotal		**$55.31**
Total Charges for Service this Month:		**$158.09**
	Account Balance	**$158.09**

DATE DUE **04/14/16** — **AMOUNT DUE** PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES **$158.09**

Utility Bills for One Year

Bill 3

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	05/16	008756

Previous Account Balance	$158.09
Payment Received, 04/06/16	$158.09
Balance Forward	**$0.00**

Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
32	04/18	03/17	7170	7072	1.000	98 CCF	1.003	98 Therms

Customer Charge	32 days at $0.71950	$23.02
Distribution Service	98 Therms at $0.11670	$11.44
Gas Supply Service Administrative Charge	98 Therms at $0.01316	$1.29
Natural Gas Service Charge	98 Therms at $0.35158	$34.45
State & County Tax	$70.20 at 5.50%	$3.86
	Gas Subtotal	**$74.06**

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
32	04/18	03/17	9084	8911	1.000	173 KWH

Customer Charge	32 days at $0.62466	$19.99
Energy Charge	173 KWH at $0.10807	$18.70
Fuel Adjustment	173 KWH at $0.03356	$5.81
Low Income Assistance Fee		$1.34
State & County Tax	$44.50 at 5.50%	$2.45
Electric Subtotal		**$48.29**
Total Charges for Service this Month:		**$122.35**
	Account Balance	**$122.35**

DATE DUE	05/16/16	AMOUNT DUE PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES	$122.35

Bill 4

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	06/16	008756

Previous Account Balance	$122.35
Payment Received, 05/04/16	$122.35
Balance Forward	**$0.00**

Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
28	05/16	04/18	7212	7170	1.000	42 CCF	1.006	42 Therms

Customer Charge	28 days at $0.71950	$20.15
Distribution Service	42 Therms at $0.11670	$4.90
Gas Supply Service Administrative Charge	42 Therms at $0.01316	$.55
Natural Gas Service Charge	42 Therms at $0.35158	$14.77
State & County Tax	$40.37 at 5.50%	$2.22
	Gas Subtotal	**$42.59**

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
28	05/16	04/18	8679	9261	1.000	177 KWH

Customer Charge	28 days at $0.62466	$17.49
Energy Charge	177 KWH at $0.10807	$19.13
Fuel Adjustment	177 KWH at $0.03356	$5.94
Low Income Assistance Fee		$1.28
State & County Tax	$42.56 at 5.50%	$2.34
Electric Subtotal		**$46.18**
Total Charges for Service this Month:		**$88.77**
	Account Balance	**$88.77**

DATE DUE	06/14/16	AMOUNT DUE PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES	$88.77

Utility Bills for One Year

Bill 5

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	07/19	008756

Previous Account Balance........ $88.77
Payment Received, 06/06/16........ $88.77
Balance Forward........ $0.00

Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
31	06/16	05/16	7226	7212	1.000	14 CCF	1.007	14 Therms

Customer Charge	31 days at $0.71950	$22.30
Distribution Service	14 Therms at $0.11670	$1.63
Gas Supply Service Administrative Charge	14 Therms at $0.01316	$.18
Natural Gas Service Charge	14 Therms at $0.35158	$4.92
State & County Tax	$29.03 at 5.50%	$1.60
	Gas Subtotal	**$30.63**

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
31	06/16	05/16	9716	9261	1.000	455 KWH

Customer Charge	31 days at $0.62466	$19.36
Energy Charge	455 KWH at $0.10807	$49.17
Fuel Adjustment	455 KWH at $0.03356	$15.27
Low Income Assistance Fee		$2.51
State & County Tax	$83.80 at 5.50%	$4.61
Electric Subtotal		**$90.92**
Total Charges for Service this Month:		**$121.55**
	Account Balance	**$121.55**

DATE DUE	07/14/16	AMOUNT DUE PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES	$121.55

Bill 6

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	8/17	008756

Previous Account Balance........ $121.59
Payment Received, 05/04/16........ $121.59
Balance Forward........ $0.00

Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
33	07/19	06/16	7241	7226	1.000	14 CCF	1.007	15 Therms

Customer Charge	33 days at $0.71950	$23.74
Distribution Service	15 Therms at $0.11670	$1.75
Gas Supply Service Administrative Charge	15 Therms at $0.01316	$.20
Natural Gas Service Charge	15 Therms at $0.35158	$5.27
State & County Tax	$30.96 at 5.50%	$1.70
	Gas Subtotal	**$32.66**

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
33	07/19	06/16	10334	9716	1.000	618 KWH

Customer Charge	33 days at $0.62466	$20.61
Energy Charge	618 KWH at $0.10807	$66.79
Fuel Adjustment	618 KWH at $0.03356	$20.74
Low Income Assistance Fee		$3.24
State & County Tax	$108.14 at 5.50%	$5.95
Electric Subtotal		**$117.33**
Total Charges for Service this Month:		**$149.99**
	Account Balance	**$149.99**

DATE DUE	08/16/16	AMOUNT DUE PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES	$149.99

Utility Bills for One Year

Bill 7

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	09/19	008756

Previous Account Balance........ $149.99
Payment Received, 08/16/16........ $149.99
Balance Forward........ $0.00

Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
29	08/17	07/19	7255	7241	1.000	14 CCF	1.021	14 Therms

Customer Charge	29 days at $0.71950	$20.87
Distribution Service	14 Therms at $0.11670	$1.63
Gas Supply Service Administrative Charge	14 Therms at $0.01316	$.18
Natural Gas Service Charge	14 Therms at $0.35158	$4.92
State & County Tax	$27.60 at 5.50%	$1.52
	Gas Subtotal	**$29.12**

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
29	08/17	07/19	10997	10334	1.000	663 KWH

Customer Charge	29 days at $0.62466	$18.12
Energy Charge	663 KWH at $0.10807	$71.65
Fuel Adjustment	663 KWH at $0.03356	$22.25
Low Income Assistance Fee		$3.36
State & County Tax	$112.02 at 5.50%	$6.16
Electric Subtotal		**$121.54**
Total Charges for Service this Month:		**$150.66**
	Account Balance	**$150.66**

DATE DUE	09/14/16	AMOUNT DUE PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES	$150.66

Bill 8

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	10/18	008756

Previous Account Balance........ $150.66
Payment Received, 09/06/16........ $150.66
Balance Forward........ $0.00

Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
33	09/19	08/17	7266	7255	1.000	11 CCF	1.016	11 Therms

Customer Charge	33 days at $0.71950	$23.74
Distribution Service	11 Therms at $0.11670	$1.28
Gas Supply Service Administrative Charge	11 Therms at $0.01316	$.14
Natural Gas Service Charge	11 Therms at $0.35158	$3.87
State & County Tax	$29.03 at 5.50%	$1.60
	Gas Subtotal	**$30.63**

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
33	09/19	08/17	11546	10997	1.000	549 KWH

Customer Charge	33 days at $0.62466	$20.61
Energy Charge	549 KWH at $0.10807	$59.33
Fuel Adjustment	549 KWH at $0.03356	$18.42
Low Income Assistance Fee		$2.95
State & County Tax	$98.36 at 5.50%	$5.41
Electric Subtotal		**$106.72**
Total Charges for Service this Month:		**$137.35**
	Account Balance	**$137.35**

DATE DUE	10/17/16	AMOUNT DUE PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES	$137.35

Utility Bills for One Year

Bill 9

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	11/15	008756

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Previous Account Balance.................................... $137.35
Payment Received, 10/11/16.................................. $137.35
Balance Forward.............................................. $0.00
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Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
29	10/18	09/19	7287	7266	1.000	21 CCF	1.000	21 Therms

```
Customer Charge                        29 days at $0.71950 ....... $20.87
Distribution Service                   21 Therms at $0.11670 ...... $2.45
Gas Supply Service Administrative Charge 21 Therms at $0.01316 ....... $.28
Natural Gas Service Charge             21 Therms at $0.35158 ...... $7.38
State & County Tax                     $30.98 at 5.50% ............ $1.70
                                       Gas Subtotal .............. $32.68
```

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
29	10/18	09/19	11737	11546	1.000	191 KWH

```
Customer Charge                        29 days at $0.62466 ....... $18.12
Energy Charge                          191 KWH at $0.10807 ....... $20.64
Fuel Adjustment                        191 KWH at $0.03356 ........ $6.41
Low Income Assistance Fee              ............................ $1.36
State & County Tax                     $45.17 at 5.50% ............ $2.48
Electric Subtotal                      .......................... $49.01
Total Charges for Service this Month:  .......................... $81.69
                                       Account Balance ........... $81.69
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DATE DUE	11/15/16	AMOUNT DUE PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES	$81.69

Bill 10

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	12/15	008756

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Previous Account Balance..................................... $81.69
Payment Received, 11/09/16................................... $81.69
Balance Forward.............................................. $0.00
```

Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
28	11/15	10/18	7347	7287	1.000	60 CCF	0.992	60 Therms

```
Customer Charge                        28 days at $0.71950 ....... $20.15
Distribution Service                   60 Therms at $0.11670 ...... $7.00
Gas Supply Service Administrative Charge 60 Therms at $0.01316 ....... $.79
Natural Gas Service Charge             60 Therms at $0.35158 ..... $21.09
State & County Tax                     $49.03 at 5.50% ............ $2.70
                                       Gas Subtotal .............. $51.73
```

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
28	11/15	10/18	11935	11737	1.000	198 KWH

```
Customer Charge                        28 days at $0.62466 ....... $17.49
Energy Charge                          198 KWH at $0.10807 ....... $21.40
Fuel Adjustment                        198 KWH at $0.03356 ........ $6.64
Low Income Assistance Fee              ............................ $1.37
State & County Tax                     $45.53 at 5.50% ............ $2.50
Electric Subtotal                      .......................... $49.40
Total Charges for Service this Month:  ......................... $101.13
                                       Account Balance .......... $101.13
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DATE DUE	12/13/16	AMOUNT DUE PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES	$101.13

Utility Bills for One Year

Bill 11

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	01/18	008756

Previous Account Balance	$101.13
Payment Received, 12/02/16	$101.13
Balance Forward	**$0.00**

Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
30	12/15	11/15	7496	7347	1.000	149 CCF	0.989	147 Therms

Customer Charge	30 days at $0.71950	$21.59
Distribution Service	147 Therms at $0.11670	$17.15
Gas Supply Service Administrative Charge	147 Therms at $0.01316	$1.93
Natural Gas Service Charge	147 Therms at $0.35158	$51.68
State & County Tax	$92.35 at 5.50%	$5.08
	Gas Subtotal	**$97.43**

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
30	12/15	11/15	12155	11935	1.000	220 KWH

Customer Charge	30 days at $0.62466	$18.74
Energy Charge	220 KWH at $0.10807	$23.78
Fuel Adjustment	220 KWH at $0.03356	$7.38
Low Income Assistance Fee		$1.50
State & County Tax	$49.90 at 5.50%	$2.74
Electric Subtotal		**$54.14**
Total Charges for Service this Month:		**$151.57**
	Account Balance	**$151.57**

DATE DUE	01/14/16	AMOUNT DUE PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES	$151.57

Bill 12

Service Address	Customer	Next Scheduled Meter Reading	Account Number
1515 Residential Lane	Nancy Smith	02/17	008756

Previous Account Balance	$151.57
Payment Received, 01/04/16	$151.57
Balance Forward	**$0.00**

Residential Gas Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage	× Therm Factor	Therms
34	01/18	12/15	7705	7496	1.000	209 ccf	0.997	208 Therms

Customer Charge	34 days at $0.71950	$24.46
Distribution Service	208 Therms at $0.11670	$24.27
Gas Supply Service Administrative Charge	208 Therms at $0.01316	$2.74
Natural Gas Service Charge	208 Therms at $0.35158	$73.13
State & County Tax	$124.60 at 5.50%	$6.85
	Gas Subtotal	**$131.45**

Residential Electric Service

Number of days	Present	Previous	Present	− Previous	× Constant	= Usage
34	01/18	12/15	12406	12155	1.000	251 KWH

Customer Charge	34 days at $0.62466	$21.24
Energy Charge	251 KWH at $0.10807	$27.13
Fuel Adjustment	251 KWH at $0.03356	$8.42
Low Income Assistance Fee		$1.70
State & County Tax	$56.79 at 5.50%	$3.12
Electric Subtotal		**$61.61**
Total Charges for Service this Month:		**$193.06**
	Account Balance	**$193.06**

DATE DUE	02/15/16	AMOUNT DUE PLEASE PAY BY DUE DATE TO AVOID LATE PAYMENT CHARGES	$193.06

Analyzing Energy Use Patterns Using Utility Bills

Introduction

A family's home energy use patterns can be found by reading a set of utility bills that cover a full year. Some residential energy use patterns that match changes in electricity or natural gas use are given below. Be sure to review the complete list of patterns before drawing any conclusions, since a change in electricity or natural gas use may have more than one cause. In addition, small changes may not be fully explained by the patterns below.

Patterns Related to Changes in Electricity Use

There is a large increase in use from September to January or February, then a large decrease from February to April or May. The total usage is at least three to four times greater in the winter than it is in the summer.

Possible Causes:

- The customer most likely heats the home with electricity.
- The customer uses a number of portable electric space heaters.

There is a small increase in use from September to January or February, then a small decrease from February to April or May.

Possible Causes:

- The customer increased the use of lighting because there is less daylight in winter than there is in summer.
- The customer limited the use of portable electric space heaters.

There is a large increase in use from May to July, then a large decrease from August to October.

Possible Causes:

- The customer most likely has air conditioning. The larger the increase, the more likely the customer has central air conditioning or a number of room air conditioners.
- The customer may use a dehumidifier.

Patterns Related to Changes in Natural Gas Use

There is a large increase in use from September to January or February, then a large decrease from February to April or May. The total usage is at least three to four times greater in the winter than it is in the summer.

Possible Cause:

- The customer most likely heats with natural gas.

There is nearly constant use from month to month for a number of months, especially from May through September even though the customer heats the home with natural gas.

Possible Cause:

- Customer may have a natural gas water heater, stove, dryer, or other gas appliance, or a combination of these appliances.

Analyzing Energy Use Patterns Using Utility Bills

Patterns Related to Changes in Both Electricity and Natural Gas Use

There is a noticeable decrease in use during any month.

Possible Causes:

- The weather was warmer than usual during a winter, spring, or fall month.
- The weather was cooler than usual during a summer month.
- Occupants were not at home very much.
- One or more occupants may have been away for an extended period of time. Possibilities include family vacations, business trips, or hospital stays.

There is a noticeable increase in use during any month.

Possible Causes:

- The weather was colder than usual during a winter, spring, or fall month.
- The weather was warmer than usual during a summer month.
- Occupants often stayed home.
- The household had a temporary increase in number of occupants. For instance, a relative may have been visiting for a few weeks.
- The occupants had a number of guests. This situation may occur during weddings, graduations, holidays, or family functions.
- The occupants increased their electricity use for things like Christmas lights during the winter holiday season.

There is a noticeable increase or decrease in use that lasts for several months.

Possible Causes:

- A new large appliance, such as a refrigerator or dishwasher, was added (increase in use).
- A smaller appliance, such as a waterbed heater or a coffee maker, was left on for most of the day every day, or a number of smaller appliances were added (increase in use).
- A new large appliance that uses one kind of energy source replaced an appliance that used another. For instance, a new gas stove may have replaced an old electric stove (gas use increased and electricity use decreased).
- Occupants took significant measures to conserve energy (decrease in use).