

# Natural Gas: An Invisible Fuel



Smell Gas. Act Fast.



# Natural Gas: An Invisible Fuel

## Natural gas is an invisible fuel

Natural gas is a colorless, odorless fuel. A chemical that smells like sulfur or rotten eggs is added to natural gas so we can smell it easily in case it leaks.

Natural gas is a source of energy.

### ACTIVITY

Add the missing vowels (a, e, i, o and u) to complete the words below.

NATURAL GAS CAN BE USED FOR:

C \_ \_ K \_ NG F \_ \_ D

H \_ \_ T \_ NG H \_ M \_ S and  
W \_ T \_ R

TR \_ NSP \_ RT \_ T \_ \_ N

M \_ N \_ F \_ CT \_ R \_ NG

*Hint: Read "Going Further" to help with this activity.*



### GOING FURTHER

Use your imagination! Make a collage of pictures from magazines that show food being cooked, goods being manufactured, hot water being used, and people or goods being transported.

# Energy in your life



## ACTIVITY

Unscramble the words in the following sentences:

Energy is the ability to do \_\_\_\_\_.  
rowk

Energy can make things \_\_\_\_\_.  
vmeo

When you move, your \_\_\_\_\_ uses energy.  
yodb

We get our \_\_\_\_\_ from the food we \_\_\_\_\_.  
gyeenr eta

## ACTIVITY

In a small group, or by yourself, list five activities you did today that required a lot of energy. Record the amount of time spent for each activity. Graph the results.

ACTIVITIES	TIME SPENT

## GOING FURTHER

Write a story about what your life would be like without energy. Would anything get accomplished? How would your daily life be changed? What difficulties would you encounter?



## Fossil fire



### ACTIVITY

To complete the story, write each orange letter in the box below that matches the orange number.

Millions of years <sup>7</sup>ago<sup>8</sup>, even before the dinosa<sup>4</sup>urs,  
plants and animals died and <sup>3</sup>settled to the bottom  
of lakes and oceans<sup>10</sup>. Eventua<sup>2</sup>lly they were covered<sup>5</sup>  
by sand and mud. Their bodies decomposed, and  
as <sup>9</sup>a result of the ea<sup>6</sup>rth's heat and pressure, they  
were turned<sup>1</sup> into

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>8</u>	<u>9</u>	<u>10</u>				

### VOCABULARY

**decompose:** to rot or decay

**fossil:** the remains of an animal or plant that lived long ago

### GOING FURTHER

#### COMPOSTING PROJECT

Bury objects like a banana skin, piece of plastic, lettuce leaf, and so forth. Check after five weeks to see which ones decomposed.



# Trapped in rock

## ACTIVITY

Write the number of each orange word next to its definition below.

Traditional natural gas formed when tiny, dead plants and animals became buried. After millions of years of (1) **pressure**, heat and (2) **shifting**, gas formed in (3) **porous** and (4) **sedimentary rock**. This rock was surrounded by other layers of rock that could not be (5) **penetrated**. The gas remains in these small pockets waiting to be discovered.



- \_\_\_\_\_ moving or changing
- \_\_\_\_\_ gone into or passed through
- \_\_\_\_\_ sand, mud and gravel that are deposited at the bottom of lakes and rivers form this material
- \_\_\_\_\_ full of pores or tiny holes through which water and air may pass
- \_\_\_\_\_ force caused by one thing pushing against another thing



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800-428-5837  
Product #38545 Run #5091 September 2021  
Printed by Quad/Graphics, West Allis, WI

## GOING FURTHER

Today, natural gas can be made from waste materials such as garden and lawn clippings, food scraps and cow manure. This is known as renewable natural gas, or RNG. Do some internet research to learn how RNG is made.



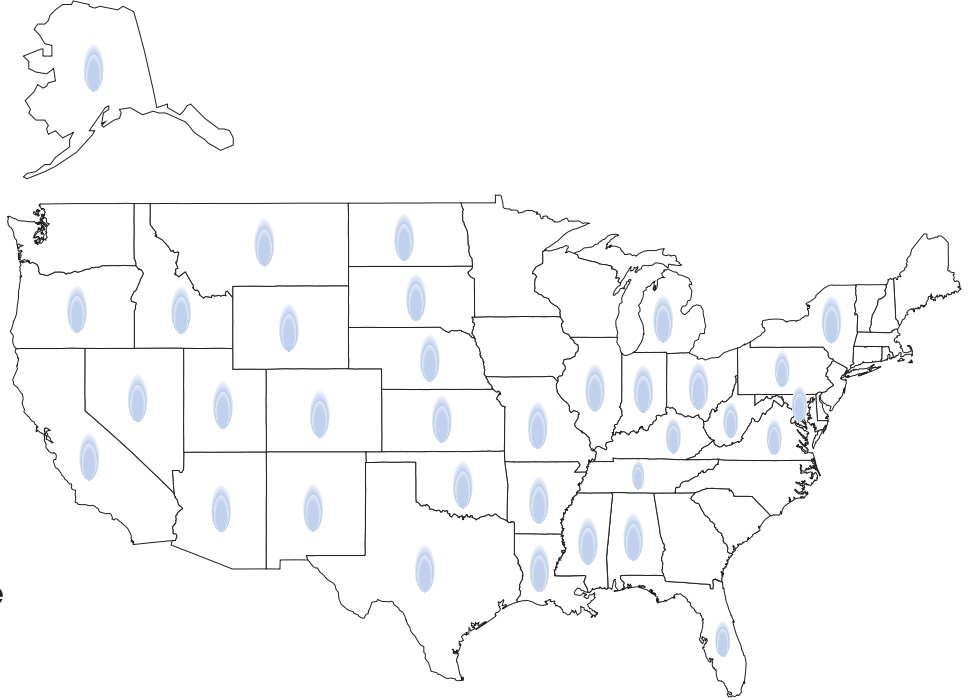
# Natural Gas: An Invisible Fuel

## Pump it up

Scientists find where natural gas is located underground. Wells are drilled to bring the gas to the surface. The United States is the biggest producer of natural gas in the world, and it supplies most of the natural gas we use.

Natural gas deposits are located in all of the states with gas flames on the map below.

- 1 Find your state and outline its borders.
- 2 Find five states near yours that have natural gas deposits, and outline their borders.
- 3 Label all the states you have outlined with their correct abbreviations.
- 4 How many states are shown on this map to have natural gas deposits? \_\_\_\_\_



**Bonus:** Label all the states on this map with their correct abbreviations.

Hint: Use an atlas or a globe to help with this activity.

## GAS MATH

In 1821, the first commercial well was drilled in Fredonia, New York. It was 27 feet deep.

How many years ago was the first commercial well in the United States drilled?

## HOW MANY DIGITS?

Underground pipelines bring natural gas to homes, schools and businesses. There are over three million miles of natural gas pipeline in the United States.

How can you write the number three million using digits?

# Natural gas can't be seen

When natural gas comes out of the ground it is colorless, odorless and tasteless. A chemical odor that smells like sulfur or rotten eggs is added to the gas so we can smell it easily in case it leaks.

Natural gas is \_\_\_\_\_.

A natural gas flame should be blue.

## ACTIVITY

Cross out the letters that appear twice. (Do not cross out any letters that appear three times.) The letters that remain spell the missing word above.

Z	I	J	N	G
V	I	G	A	S
Z	O	R	I	C
J	A	B	C	L
R	E	M	O	M

## SAFETY TIP

If your flame is large, yellow and flickering, ask an adult to have the range checked by a qualified repair person.

## GAS PIPELINE SAFETY

Pipeline markers can save lives by providing important information in emergency situations. They provide an emergency phone number, an operator and the product carried in the line.



### Warning signs of a natural gas leak

Leaks from natural gas pipelines, although rare, can be a fire hazard. Be alert for any of the warning signs below, and learn what to do in case a natural gas leak occurs in your community.

- A distinctive, sulfur-like odor
- A hissing, whistling or roaring sound
- Dirt spraying or blowing into the air from a hole in the ground
- Continuous bubbling in water
- Grass or plants dead or dying (in an otherwise moist area) over or near a pipeline

### What to do if you suspect a gas leak

- Do not use electricity or fire. Even the tiniest spark from a phone, flashlight, electrical appliance or match could ignite the gas.
- Go far away from the area immediately and do NOT go back until safety officials say it is safe.
- Ask a trusted adult to report the leak to 911 and your local natural gas utility.



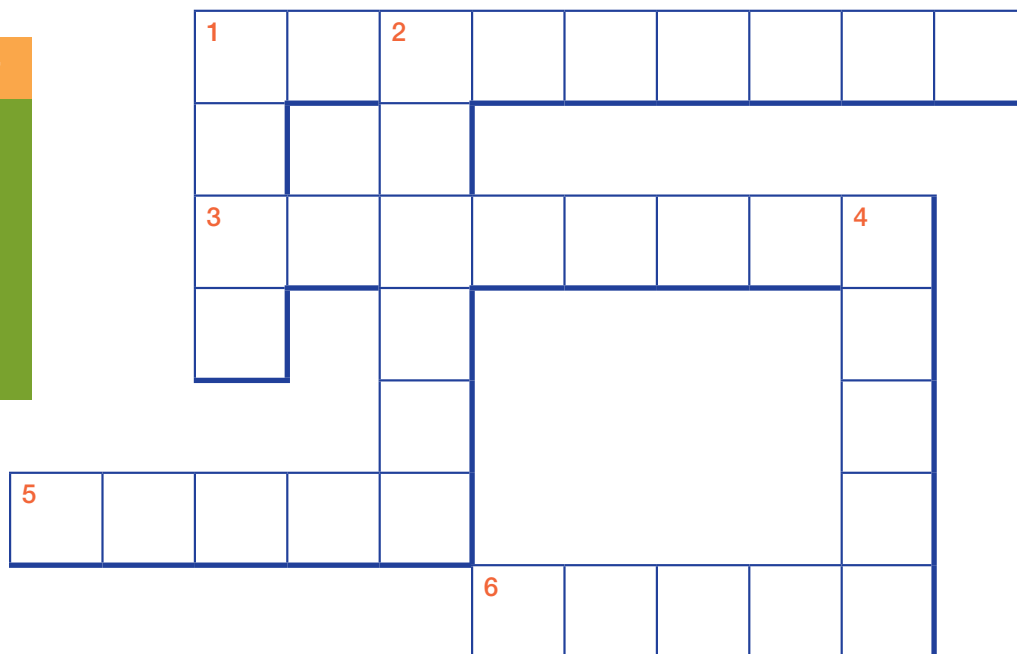
## Natural gas power

We use natural gas in our homes, businesses and schools, and for transportation.

### CROSSWORD PUZZLE ACTIVITY

#### WORD LIST

bakes  
cleans  
cools  
electric  
factories  
fuel  
heats



#### ACROSS

1. Natural gas manufactures goods in \_\_\_\_\_.
3. Natural gas generates \_\_\_\_\_ power.
5. Natural gas \_\_\_\_\_ cakes and cookies.
6. Natural gas \_\_\_\_\_ offices in the winter.

#### DOWN

1. Natural gas is used as a \_\_\_\_\_ for cars and buses.
2. Natural gas heats the water that \_\_\_\_\_ clothes in washing machines.
4. Natural gas \_\_\_\_\_ us in summer.

#### GOING FURTHER

Investigate how natural gas is used to generate electricity. Find out if any of the electricity provided by your local electric utility is generated from natural gas.



# NGVs\* get us there!

## ACTIVITY

- 1 Find the answer to each problem.
- 2 Write the letter from the box under the number it goes with.

The first one is done for you.



\*NGVs are natural gas vehicles.

How many days in a week?	7	= N
Divide 96 by 3		= B
Add 254 and 110		= D
Subtract 24 from 88		= K
Multiply 15 x 4		= U
Divide 48 by 4		= T
Add 114 and 52		= S
How many states in the U.S.?		= R
Subtract 101 from 207		= A
Multiply 24 x 3		= E
Add 925 and 1324		= C

Natural gas can be used to run...

2249	106	50	166		12	50	60	2249	64	166
				,						

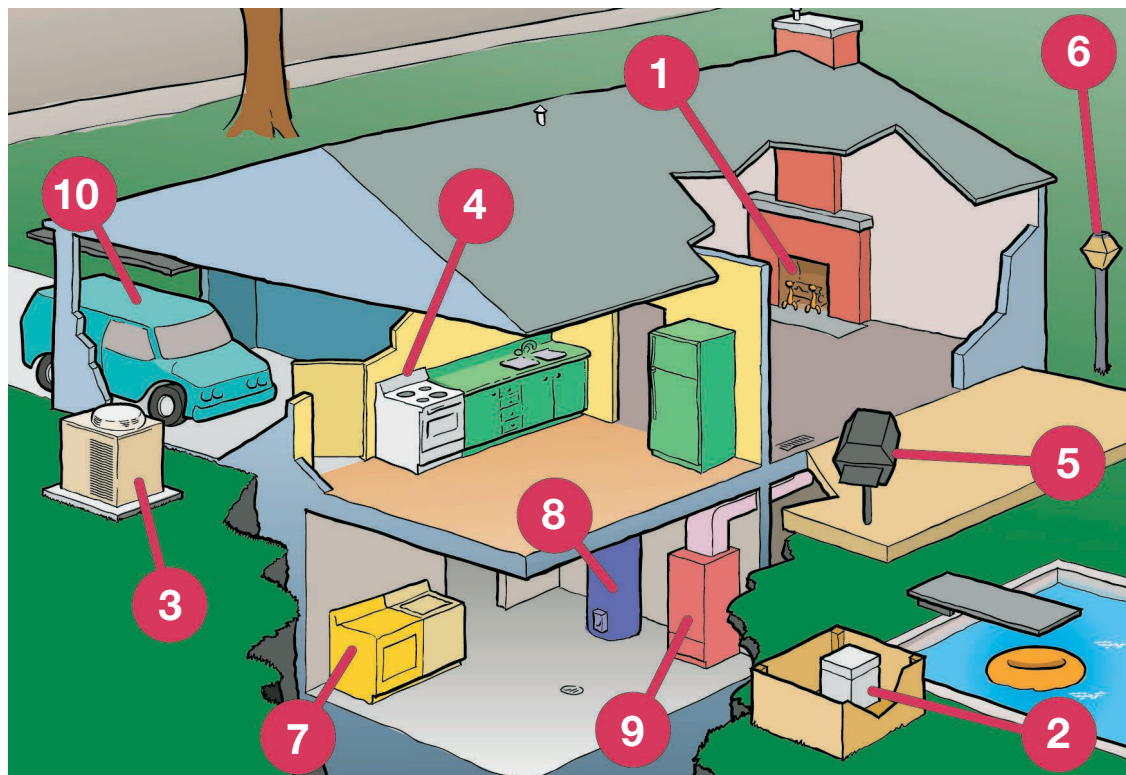
106	7	364		32	60	166	72	166
	N							



# Natural Gas: An Invisible Fuel

## Home Sweet home

Natural gas can be used in and around the home.



### SAFETY TIP

Make sure to keep items like paper towels and pot holders away from the gas range. Store all flammable liquids like aerosol in cans, paint thinner and gasoline far away from natural gas appliances, as the vapors could be ignited by a pilot light or appliance flame.

### ACTIVITY

Write the number from the picture next to each use of natural gas.

Air conditioner

Barbecue grill

Pool heater

Clothes dryer

Furnace

Lights

Fireplace

Range

Vehicle

Water heater

### GOING FURTHER

Interview family members and friends about what fuels they use in their homes and why they prefer them. Write your findings in your journal.

# Natural gas can heat and cool

## ACTIVITY

Who says what? Match the people's statements with their descriptions.

- A. Office building owner
- B. Pizza restaurant manager
- C. Hotel manager
- D. Bus rider
- E. Popcorn plant manager

\_\_\_\_\_ "We use natural gas here for cooking."

\_\_\_\_\_ "It is efficient for heating and cooling our offices and it saves us money."

\_\_\_\_\_ "Our guests like the temperature and humidity controls in their rooms."

\_\_\_\_\_ "It's a safe, efficient fuel to use in our plant."

\_\_\_\_\_ "I commute to work using a natural gas vehicle."



### GAS COOKING AND HEATING SAFETY

- When using a gas range, make the flame fit the pot. High flames are a fire hazard and waste energy.
- Natural gas space heaters must be properly vented or else have a switch to automatically shut them off if indoor oxygen levels get too low.
- Keep space heaters far away from flammable objects such as papers and curtains.



# Natural Gas: An Invisible Fuel

## Lighter than air

Everything in the world exists in one of three different states: solid, liquid or gas. These are the three states of matter. Matter in the gas state is lighter than air, so when natural gas is released, it dissipates into the air.

### ACTIVITY

Put each word from the globe on the right into its correct category below.



**Solids**

**Liquids**

**Gases**

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### ACTIVITIES

- 1 Fill a glass with cold water. Add one drop of food coloring. Observe the way the color spreads through the water. This is similar to the way natural gas dissipates into the air.
- 2 Blow up a balloon, tie it and toss it into the air. Did it float? Discuss what happened to the balloon and why.

#### GOING FURTHER

In an automobile accident, if the fuel line in a car breaks, why is it safer to have natural gas rather than gasoline as a fuel?



## ACTIVITY

1. Natural gas is used as a source of   21   n   11     4     6   y.

2. Natural gas began forming  $\frac{\quad}{12}$   $\frac{\quad}{26}$  li  $\frac{\quad}{27}$   $\frac{\quad}{15}$   $\frac{\quad}{8}$  of years ago.

3. NGVs are 28 3 25 9 r 14 l g 24 1 23 ehi 17 le 16.

4. Natural gas can be used as a fuel in h 18 2 13 20, schools and businesses.

5. Natural gas can also be used as fuel for 5 22 7 19 10 portation.

		1	2	3	4	5		6	7	8	
	9	10	11		12	13	14	15	16		
17	18	19	20	21	22	23	24	25	26	27	28

## GOING FURTHER

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# Natural Gas: An Invisible Fuel

## Safety first

It is important to know how to use natural gas safely and prevent hazards.

### ACTIVITY

Fill in the missing letter of each incomplete word.  
Then write the letters in the boxes below.

Keep the area around \_\_\_ **our** appliances  
**cl** \_\_\_ **an** and litter \_\_\_ **ree**.

Children should never **pl** \_\_\_ **y** around  
**na** \_\_\_ **ural** gas appliances and **pipe** \_\_\_.

Unscramble the letters you added to find the secret word.

--	--	--	--	--	--

### CALL BEFORE YOU DIG

If people dig into natural gas pipelines, the gas can leak out and cause a fire hazard. So if someone you know is planning a digging project, remind them to call the underground utility locator service at 811 several days before digging. This service makes sure underground gas pipelines and other utilities are clearly marked so people can dig a safe distance away.



Know what's **below**.  
**811** before you dig.

### GOING FURTHER

In a small group, or by yourself, come up with creative ways to get people to practice natural gas safety.

**Start with the letter “G” at the top of the circle and go clockwise, writing down every third letter in the spaces below.**

**G**                        

**1**       **2**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ !



Go to a safe location and ask a trusted adult to report the leak to 911 and National Grid. Do NOT go back to your home until safety officials say it is safe.

**Discuss why it would be hazardous to use candles, lights or electrical devices if you suspect a natural gas leak.**



# Natural Gas: An Invisible Fuel

## ACTIVITY

Find the words in the list. They have been hidden horizontally, vertically and diagonally.

C	O	L	O	R	L	E	S	S	T	B	Q	N
X	O	B	L	E	A	V	E	F	R	C	P	A
T	L	O	L	U	M	E	D	O	A	N	I	T
B	E	G	K	U	F	Z	I	S	N	H	P	U
M	U	L	B	I	E	U	M	S	S	E	E	R
A	R	S	L	T	N	E	E	I	P	A	L	A
C	L	E	A	N	N	G	N	L	O	T	I	L
M	A	N	U	F	A	C	T	U	R	I	N	G
G	A	I	L	B	E	R	A	N	T	N	E	A
S	M	E	L	L	W	T	R	E	A	G	V	S
O	D	E	N	E	R	G	Y	I	T	P	O	P
O	D	O	R	L	E	S	S	L	I	I	W	J
E	L	E	C	T	R	I	C	W	O	R	K	A
I	N	V	I	S	I	B	L	E	N	X	Z	B

### WORD LIST

BLUE	MANUFACTURING
BUS	NATURAL GAS
COLORLESS	PIPELINE
COOKING	ODORLESS
ELECTRIC	SAFETY
ENERGY	SEDIMENTARY
FOSSIL	SMELL
FUEL	TELL
HEATING	TRANSPORTATION
INVISIBLE	WORK
LEAVE	

## ANSWER KEY

I	N	V	I	S	I	B	L	E	N	X	Z	B
E	L	E	C	T	R	I	C	W	O	R	K	A
O	D	O	R	L	E	S	S	L	I	I	W	J
O	D	E	N	E	R	G	Y	I	T	P	O	P
S	M	E	L	L	W	T	R	E	A	G	V	S
G	A	I	L	B	E	R	A	N	T	N	E	A
M	A	N	U	F	A	C	T	U	R	I	N	G
C	L	E	A	N	N	G	N	L	O	T	I	L
A	R	S	L	T	N	E	E	I	P	A	L	A
M	U	L	B	I	E	U	M	S	S	E	E	R
B	E	G	K	U	F	Z	I	S	N	H	P	U
T	L	O	L	U	M	E	D	O	A	N	I	T
X	O	B	L	E	A	V	E	F	R	C	P	A
C	O	L	O	R	L	E	S	S	T	B	Q	N

BACK

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VEHICLES, 4. HOMES, 5. TRANSPORTATION,  
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**PAGE 14** Y, E, F, A, T, S, SAFETY  
**PAGE 15** GET RIGHT OUTSIDE QUICKLY

**PAGE 2** COOKING FOOD, HEATING HOMES & WATER,  
TRANSPORTATION, MANUFACTURING  
WORK, MOVE, BODY, ENERGY, EAT  
**PAGE 3** NATURAL GAS  
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**PAGE 7** INVISIBLE  
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CARS, TRUCKS AND BUSES  
**PAGE 10** 3, 5, 2, 7, 9, 6, 1, 4, 10, 8  
**PAGE 11** B, A, C, E, D  
**PAGE 12** SOLIDS: CHALK, ERASER, PENCILS; LIQUIDS:  
JUICE, MILK, WATER; GASES: HELIUM,  
NITROGEN, OXYGEN