



Grade Level K-4

Today we'll talk about natural gas and natural gas safety. Natural gas is a valuable resource, and it can be very useful. Like all fuels, we must learn how to use natural gas safely.

There are three important facts about natural gas:

1. Natural gas burns cleanly.
2. Natural gas releases energy in the form of heat.
3. Natural gas is transported easily through pipes under the ground.

Because of these things, natural gas is used as a fuel throughout the United States and in many other parts of the world.

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Where does natural gas come from? Some natural gas fields were formed millions of years ago when plants and animals died and were buried in the mud and sand, forming fossils.

- Natural gas was formed long ago.
- Natural gas is non-renewable – once it is used, it cannot be replaced.
- Scientists are not sure how natural gas was formed.
- Some scientists believe natural gas formed from the remains of prehistoric plants and animals (not necessarily dinosaurs, but perhaps in that time period).

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That's why we call natural gas a FOSSIL fuel. There are three kinds of fossil fuels: coal, oil and natural gas. Which one of these is a solid? A liquid? A gas? Because these fuels come from natural products, they are our biggest sources of energy today. They are made up of atoms of hydrogen and carbon which combine into molecules called hydrocarbons. CH_4 = methane = natural gas. (Last sentence for older students only.)

- Coal, oil and natural gas are known as fossil fuels.
- Fossil fuels were formed millions of years ago.
- Fuels contain energy; when burned, they give off energy in the form of heat.
- These three fossil fuels represent different states of matter: coal (solid), oil (liquid), and natural gas (gas).
- Of the three fossil fuels, natural gas burns the cleanest, producing the least amount of pollution.
- The byproducts of burning natural gas are carbon dioxide (CO_2) and water vapor.

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As more mud, sand and sediment built up, they formed layers of rock. The rocks were buried deeper and deeper. Scientists think that pressure from the layers above, together with the earth's heat, slowly changed the organic material into crude oil and natural gas. Now, natural gas is a vapor, not solid (like coal), not liquid (like oil), and collects in "pockets" of underground rock, just like water in a sponge. Sometimes it becomes trapped and cannot escape. This is called deposit.

- Natural gas is found underground, usually at depths of 1,000 feet or more.
- Natural gas is trapped underground between layers of rock.
- Natural gas is found in small open spaces in rock (pores). It is not found in large open caverns under the earth's surface.
- Scientists use seismic instruments and other information to predict where natural gas is located.

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We drill into the ground to find deposits of natural gas. Sometimes we hit a deposit. However, many times we drill, but do not locate any natural gas deposits.

- We can tap natural gas deposits by drilling into the rock containing natural gas.
- Natural gas comes out of the ground under its own pressure. It does not need to be pumped.
- Once a natural gas "field" has been located, and tapped, the drilling rig is removed, and pipes and valves are installed to transport the gas to market.
- Many wells may be drilled into a natural gas field to extract greater amounts of natural gas.
- Scientists believe the United States has sufficient natural gas deposits (reserves) to last many, many years.

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To meet future needs for natural gas, scientists are always looking for new deposits. After finding a deposit of natural gas, we transport the gas through large pipes to our neighborhoods. Then smaller pipes carry gas to our homes, schools and businesses. Pumps are used along the way to keep pressure in the lines.

- Natural gas is pumped through large pipes to our cities and towns (transmission lines).
- Once it arrives in our community, it travels through smaller pipes (distribution lines) under streets and lawns, and into our homes, schools, factories and businesses.

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Since natural gas is like air – not solid, not liquid – it's hard to weigh or measure it, like milk (quarts) or butter (pounds). So how do we know how much we use? Before natural gas enters our homes it passes through a meter which measures how much we use. Each month we receive a bill from RG&E (or other local natural gas company) based on the amount of gas we used.

- Once natural gas reaches our home, it flows through a meter to measure how much we use.
- Once it passes through your meter, pipes carry natural gas to appliances in your home to produce heat.
- Your natural gas company reads this meter and sends each customer a bill for the gas that was used.

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Because natural gas is such a clean energy source, it has many uses in the home. The biggest uses include space heating and water heating. We also use natural gas to cook food and dry clothes.

Typical appliances in your home which may operate on natural gas include:

- Furnaces (space heating)
- Water heaters
- Clothes dryers
- Kitchen ranges (cooking)

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These signs tell us that the design of the appliance we are using meets strict safety rules. Almost six out of 10 homes in the United States are warmed with natural gas. Most of these homes also use natural gas for cooking meals and drying clothes.

- Before they are sold, appliances must be carefully designed to make sure they are safe to use in your home.
- When you see these symbols on an appliance, it means the appliance has been “design certified” by a testing agency.

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When used properly, natural gas is a safe and reliable energy source. But as with anything that burns, it can be dangerous if used carelessly. So you must be careful with it. Never put things near natural gas appliances, like in this picture of a furnace that heats your home. They could catch on fire.

- Furnaces need a lot of fresh air to operate properly.
- Keep objects away from furnaces. This helps allow air to enter the furnace, and reduces the risk of things catching on fire.
- Never keep gasoline inside the house.
- Never place paint or combustible materials near a furnace.

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What's wrong with this picture? The boy shouldn't be standing on the chair because he could fall, but what is he holding onto? The pipe could break. How about the clothes hanging on the pipe? Is that a good idea? NO – the pipe could break and natural gas could escape. Don't play near pipes that carry natural gas.

- Don't swing on pipes.
- Don't hang things on pipes.

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What's happening in this picture? The boy could tip the pan and get burned. How do you know it's hot? The lines show heat being given off. The boy could also start the toy airplane on fire. Never play near the stove. It's not safe. Keep toys away from appliances.

- Be careful around natural gas ranges. They can be very hot and cause burns.
- Do not play with burners or controls.
- Keep yourself, other children, and all objects away from natural gas ranges.
- Ranges are safe when used properly.

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What's wrong with this picture? Is it safe to sit in front of the open range door? NO – the girl could get burned or breathe in fumes that could make her very sick. Ranges are made for cooking food, not for heating the house.

- Ranges are designed to cook foods, not heat rooms.
- Never use your range for space heating.

(Explain the dangers of carbon monoxide, if age-appropriate. Explain the symptoms of carbon monoxide poisoning, if appropriate.)

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Natural gas, as it comes from the ground, has no odor. You can't smell it. We add an odorant that makes it smell like rotten eggs. The smell of natural gas helps us to know whenever there is a leak.

- When it comes from the ground, natural gas has no odor.
- We add a strong odor to natural gas so you can smell it and know if there is even a slight leak.
- If you should smell natural gas in your home, there are some things you should do, and should NOT do.

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Don't turn a light switch or any electric appliance on or off. The spark could cause an explosion. Don't strike a match, and don't try to look for the leak yourself. Don't even stop to use the telephone.

- If the odor of natural gas is strong, DO NOT light any matches, turn any light switches on or off, or use the telephone.
- These actions can create sparks or heat which can be dangerous if there is a natural gas leak in your home.

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Tell mom, dad or some other adult that you smell natural gas. Have them go to a telephone nearby and call your natural gas company. They will send people to your house to make sure you are safe.

- Go to a neighbor or other adult you know and tell them that you smell natural gas in your home.
- Have your neighbor or other adult call your natural gas company. They'll come to your house right away and make it safe.

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Have everyone leave the house and leave the doors and windows open so fresh air can enter. Stay outside, away from the house until the gas company tells you it is safe to go back inside.

- If you smell natural gas, tell your parents right away.
- If the odor is strong, it is best that you and your family leave your house.

PAGE 17 CONCLUSION

Play it safe around natural gas. REMEMBER – when used properly, natural gas is a safe and reliable energy source.

- Natural gas is a clean, efficient and useful form of energy which we use every day.
- There are many ways we can use natural gas in our homes to provide comfort and convenience.
- Like all other fuels, natural gas must be used carefully.
- By following these simple safety rules, natural gas can be used safely in our homes and our community.
- REMEMBER – Play it safe around natural gas.

