Intro: TITLE SLIDE

Today, we are going to talk about energy!

Who can tell me a little bit about energy?

SLIDE 2

Do you need energy to:

- Turn on the lights?
- Cool or heat your home?
- Cook your favorite food?
- Play video games or watch tv?

We need energy every day. Without it, you couldn't use your computer, take a warm bath, heat or cool your home and school, or even turn on the lights.

Do you all use a lot of energy? What kind of things do you use energy for?
(Have students talk about how they use energy)

How much energy do you think you use?

SLIDE 3

Each of us uses energy, and together we use a lot of it. The amount of energy we use has grown over the past decades. ***Do you have any ideas as to why?***

Optional Videos:
Energy and its surprising role in your life

Optional Activity:
The Energy Around Us Scavenger Hunt

SLIDE 4

My name is XXXX XXXXX, and I work with XX XXXX XXXXXX. Our job is to make sure everyone in the community has the energy they need. Energy can come from many different sources. The source of energy I work with comes from natural gas. And today, we are going to learn more about:

- Types of energy
- What natural gas is and why it is important to all of us
- How to be safe around natural gas
- Jobs like mine that help to make sure our communities have the energy they need
- And, our energy future

SLIDE 5

Types of Energy:

To start out…

When we think about using energy in our homes, let's think about where the energy comes from. We have two different types of energy resources — renewable and nonrenewable.

Optional Videos:

What Is Energy

The Evolution of Energy and its Impact on the World (Start to 1:19)

What is Energy: Foundation of Modern Life

The Evolution of Energy and its Impact on the World (5:14 to 8:27)

SLIDE 6

Renewable energy resources are virtually unlimited, such as solar or wind energy. These sources of energy are useful for many different energy needs but can be dependent on other factors, such as weather conditions — if the sun is shining or wind is blowing.

- Solar energy comes from the sun. Solar panels can be installed on rooftops or land, capturing the light from the sun and converting it to electricity!
- Wind energy comes from wind spinning giant turbines that generate electricity.
- Hydro energy comes from water. The power of water flowing can move turbines or water wheels to generate electricity.
- Biomass energy is made from living things — such as plants and animals — most commonly using plants, wood and waste. Biomass can be burned to create heat, converted into electricity, or processed into biofuel.
- Geothermal energy comes from heat beneath the earth's surface — water or steam is used for heating and generating electricity.

SLIDE 7

- Nonrenewable energy sources are those which cannot be replenished. Most sources were formed from fossilized plants and animal remnants from millions of years ago.
- Coal is a fossil fuel in the form of a black rock. Coal is mined by coal miners and then burned to generate electricity.
- Oil, also known as petroleum, is a fossil fuel and is the primary source of energy for the world today. It is used to fuel cars and planes, generate electricity, and in the production of materials used for many everyday products, like electronics, clothing and cosmetics.
- Natural gas is the most eco-friendly fossil fuel option. It provides communities with electricity, heating and cooking, and is used to make fertilizers, steel and plastics.
- Nuclear energy is a carbon-free energy source produced through a process called fission, where heat, produced by splitting uranium atoms, boils water to make steam which turns turbines to generate electricity.

By working together, both renewable and nonrenewable energy resources make up the backbone of our energy ecosystem. Currently we need them both to ensure we have the energy we all need.

Optional Activity:
Now that we've talked about renewable and nonrenewable sources of energy, let's see what you remember…
Renewable vs non-renewable energy source question game
Show images of each and ask students to say whether it's a renewable or non-renewable source.
Quiz: https://www.proprofs.com/quiz-school/story.php?title=nzk4nti0h8nz

SLIDE 8

We encounter energy in our homes primarily through electricity. Electricity is a form of energy and gives many devices and appliances in our home the ability to operate. It comes to our homes through power lines that carry the electricity from power stations. Of the total energy consumed in the United States, about 40% is used to generate electricity.
https://www.mcecleanenergy.org/mce-news/energy-vs-electricity-whats-the-difference/

SLIDE 9

Most electricity generated in the United States is created by heating up energy resources to create steam. This steam is then used to spin internal turbines, powering electrical generators.

SLIDE 10

Natural gas is a crucial resource when it comes to electricity production. Over 39% of all electricity produced in the United States comes from natural gas, that's more than any other natural resource.

Optional Videos:

How We Make and Use Energy

Question after video: In what ways do we use energy?

- To make electricity
- To transport people and products
- To make heat
- All of the above

Electricity Powers Our Lives

Optional Handouts/Activities:

Energy Fact Sheet: Introduction to Energy
Introduction to Energy
How to Fuel a 5th Grader (Slides 28–38)

SLIDE 11

What Natural Gas is and why it is Important:

Natural gas is a specific form of energy that comes from the ground beneath your feet — deep, deep underground. But you can't just plug a phone into the ground and expect it to charge, right?

Let's talk about where natural gas comes from and how we can use it…

Optional Videos for Natural Gas:
What is Natural Gas?
Uses of Natural Gas

Optional Handouts:
Natural Gas Fact Sheet

SLIDE 12

How is natural gas formed?
Natural gas is a non-renewable energy source. It is also what we call a fossil fuel because it is formed when organic matter such as fish, plants and even dinosaurs decompose over millions of years.

Over time, sand and silt in the ground changes to rock, covering this organic material — *the fish, plants and dinosaurs* — trapping it beneath the rock. Pressure and heat changes some of this organic material into natural gas — *tiny bubbles of odorless gas*.

We then must be able to access natural gas and bring it to the surface so we can use it. Here's how we do that…

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How do we get natural gas?

https://need-media.smugmug.com/Graphics/Natural-Gas/i-stsDVmP

Finding natural gas begins with geologists, these are scientists who study the structure and processes of the Earth. They locate the types of rock that are likely to contain gas and oil deposits.

Geologists' tools include seismic surveys used to find the right places to drill wells to access the gas. Some of these areas are on land but many are offshore, deep in the ocean.

Once natural gas is found and a well is drilled, the natural gas flows up through the well to the surface of the ground and into large pipelines. The pipelines deliver the gas to a processing plant where any impurities are removed. Once that happens, natural gas can be distributed through smaller pipelines to our communities where we can utilize it.

An interesting fact, most of the natural gas used in the United States is produced here in the United States! That is a huge benefit for us…

https://safeandsmart.org/middle-school-students/#form-natural-gas

SLIDE 14

There are 2.6 million miles of natural gas pipelines in the U.S. (This would stretch to the moon and back almost nine times!)

These pipelines are largely unseen and exist almost everywhere to transport natural gas.

You could think of a natural gas pipeline as an energy highway.

Optional: Pipelines are the safest method of transporting natural gas when compared to other methods, such as by ship, train or by vehicle.

Optional Activity:
Let's Build A Pipeline

SLIDE 14

How do we use natural gas?

Does anyone know if you are using natural gas at your home?

Optional: Stats on natural gas usage…

- *Approximately 32% of the energy consumed/used in the U.S. comes from natural gas. The only energy source that has greater consumption is petroleum.*
- *And more than 60% of the homes in the U.S. use natural gas*

Once natural gas is sent to our homes, we can start to use it for things we do and need every day…For example, here are some of the ways we use natural gas for our homes, businesses and communities:

- Gas ovens: Many ovens use natural gas. For example, you can bake an amazing apple pie in a natural gas oven.
- Gas top ranges: These ranges are usually on top of an oven. If the burners on that range have a blue flame, it is likely using natural gas. And as an example, you could cook a tasty grilled cheese and tomato soup on a gas range.
- Home heat: A natural gas furnace will keep your home comfortably warm when it is cold outside. Some fireplaces also use natural gas to operate. This makes it so you don't have to buy or find wood to burn.
- Water heat: Natural gas water heaters are an efficient way to warm our water, so we don't have to take cold baths or showers.
- Clothes dryer: Natural gas dryers dry your clothes after you wash them. No one wants to wear wet clothes, right?
- Fueling cars: There are cars and buses that run on natural gas instead of gasoline. Some of the reasons are that natural gas is available here in the United States (as we talked about) and vehicles that run on natural gas have lower emissions which means they can be better for our environment.
- Electricity: Power plants can use natural gas to make electricity to power your lights, appliances and more, every day. Nearly 40% of the electricity generated in the United States comes from natural gas!

Optional Graphic:
Natural Gas Graphic/House

SLIDE 15

Products that come from natural gas:

And…not only is natural gas a great source of energy, but it can also be made into a huge variety of products we use every day. ***Now we are going to play a game…***

I am going to show you a picture of something and you tell me with a thumbs up or thumbs down whether it came from natural gas…

Choose from options below, all but the last come from natural gas.

- Tires
- Toothpaste
- Crayons
- Paintbrush
- Mobile phone
- Eggs *(Well, eggs don't come from natural gas, but you can cook some delicious eggs using a natural gas range that we talked about earlier!)*

Optional Video:
Energy Powers Life

SLIDE 16

The role of the U.S.:

Today, the United States is the world's largest producer of natural gas. Natural gas supplies about 1/3 of the United States' primary energy consumption, with its primary uses being heating and generating electricity.

The United States has an abundance of natural gas reserves, the largest of which are in Texas, Pennsylvania, West Virginia, Louisiana and Oklahoma. It is estimated that the United States has enough natural gas to last at least another 60 years or more!

SLIDE 17

Additionally, natural gas is versatile...has anyone heard of liquefied natural gas? Liquefied natural gas or LNG is natural gas that has been cooled to a liquid state. This process makes it possible to transport natural gas to places pipelines do not reach but where it is needed around the world.

The U.S. is one of the top exporters of LNG in the world. For example, as of August 2021, U.S. LNG has been delivered to 40 countries on five continents.

SLIDE 18

So natural gas is pretty amazing!

We produce it here and we use it here, providing energy to so many people who need it!
Natural gas provides many benefits:

1. Natural gas is affordable! For example, households that use natural gas for heating, cooking and clothes drying save an average of **$1,000 per year** compared to homes using electricity for those applications.
2. Natural gas is reliable and resilient! Only **1 in 112 customers** are expected to experience a planned or unplanned natural gas outage in any given year. In fact, during a storm, underground pipelines are rarely impacted, which means that the natural gas continues to flow where it is needed, and households and businesses can continue to use certain appliances that are powered by natural gas.
3. Natural gas is safe! America's natural gas utilities invest billions of dollars each year in enhancing the safety of natural gas distribution and transmission systems.

SLIDE 19

4. Natural gas is essential for improving our environment! America's natural gas industry will be **essential** to achieve a net-zero emissions future. When we burn natural gas, it releases less carbon dioxide into the atmosphere compared to other fossil fuels. And homes that use natural gas can have lower emissions that harm the environment overall. (We'll talk more about that in a bit!) Fun fact: The United States reduced its emissions by 1047.4 million metric tons between 2005 and 2022 — more than any other country in the world!

SLIDE 20

And even though natural gas is safe, part of my job is also ensuring that people like you are safe around natural gas… so now we want to talk about how you can be safe around natural gas.

SLIDE 21

How to be Safe around Natural Gas:

First, you should talk to a parent or guardian to see if you have any appliances in your home that use natural gas. We just talked about some of those…

- Ovens
- Water Heaters
- Fireplaces

What do these items have in common?

That's right; they all are either heating or are producing a flame! That is why talking to an adult about these appliances is so important. You should never use any of these appliances unsupervised.

Optional Video:
Kids and Natural Gas Safety

SLIDE 22

As we talked about, natural gas is an odorless and colorless gas. However, it has been given a particular smell to help identify if there has been a leak. The smell is a nasty one, purposefully given to catch your attention — it is the smell of rotten eggs! **Has anyone ever smelled a rotten egg?!?**

Natural gas leaks can be harmful to your health, and if you smell rotten eggs in your home (and I'm not talking about your little brother), notify a parent or guardian immediately!

SLIDE 23

So, if you smell gas, act fast! Here are some tips if you think there has been a natural gas leak in your home:

- Don't use any electricity — Don't turn off the television or flip any light switches.
- Do not look for the leak — leave that for the professionals.
- Be sure to notify an adult and go outside.

Optional Activities:

Let's Make Methane

Scratch and Sniff Cards

- https://projectenergysavers.com/product/natural-gas-scratch-sniff-card/
- https://culverco.com/product/scratch-and-sniff-natural-gas-safety-card-large/
- https://www.promoprintinggroup.com/natural-gas-scratch-sniff/

SLIDE 24

811 – Safe Digging Around Your Home

We talked about this a little bit, but underneath your home is a vast web of utility pipes and wires, providing your home with energy sources such as natural gas, electricity and water. So, before you or your family dig in your yard (maybe to plant a tree or garden or place a fence), talk to an adult about 811.

811 is the national call-before-you-dig phone number. Anyone who plans to dig on their property should call 811 or go to their state 811 center's website to request that the approximate location of buried utilities be marked with paint or flags. This is so you don't unintentionally dig into an underground utility line.

811 protects you and your community! Hitting a buried line while digging can disrupt your and your neighborhood's access to natural gas, electricity or water service, cost money to repair, and/or cause serious injury.

Optional Safety Activities:

- Natural Gas Word Search
- Natural Gas Word Search 2
- Natural Gas Coloring Picture
- Natural Gas Interactive Maze
- Natural Gas Safety Quiz
- Natural Gas Safety Facts

Now that we have talked about what natural gas is, why it is so important and how to be safe around it, let's talk about some jobs you may want to consider in the future…

SLIDE 25

Jobs:

What do you want to be when you grow up?
(Have students answer and explain how some of the jobs use energy)

Did you know energy is important to each one of those jobs? Firefighters need fuel to power their trucks just like chefs need energy to power their kitchens to make delicious meals!

SLIDE 26

Why careers in energy are important:

Just like all the things you all want to be when you grow up, jobs in the energy industry are important and can be fun too! And companies in the natural gas industry continue to expand their business to other energy sources, so the opportunities are abundant! The natural gas industry employs 4 million Americans.

Almost everything we use in our daily lives is powered by or was created by natural gas. It takes a lot of smart, hard-working people to keep our energy flowing.

Has your power ever gone out?... Who do you think fixes it so that it gets turned back on?
(Talk about the careers that fix it: line workers, etc.)

SLIDE 27

Let's talk about some of the other careers in the energy industry.

There are so many jobs in the energy industry and specifically dealing with natural gas, we need chemists, geologists and other scientists, engineers, builders and construction crews, and environmental specialists to name just a few! Each job plays a key role in making sure we have the energy and materials we need.

SLIDES 28-32

Now, raise your hand if:

- **You like science and math: 28**
  - If you like these subjects, you might make a great engineer one day!
- **You like going on adventures*:* 29**
  - If you're an adventurous person, a lot of energy jobs involve working outside like line workers who repair power lines after a storm, pipeline construction workers who build the pipelines that allow natural gas to flow all throughout the country, or even an operator out at sea on a gas rig.
- **You like investigating and researching: 30**
  - If this sounds interesting to you, you might enjoy being a leak survey technician to help make sure everyone's homes are safe and gas isn't released into the air.
- **You like talking to people: 31**
  - If you're a people-person, you might like being a team leader or being a call center operator talking to and helping people who use and need energy.
- **Who collects cool rocks or likes digging?: 32**
  - If you like these activities, a career as a geologist might be perfect for you!

Optional Video:
Energy Careers

Optional Hand-outs/Activities:
Career quiz for middle to high schoolers
Create word search with various jobs in the industry

SLIDE 33

Energy career benefits:

Now that we've talked about some of the jobs you can have, let's talk about some of the benefits.

- *Good pay*
- *Long, stable career*
- *Jobs all around the world*
- *Opportunities to travel*
- *Different types of school & training options*
- *Help build our clean energy future*

SLIDE 34

There are also jobs that require different levels of education. With some you'll need to go to college and get a degree, but with others you can go through a training program after high school and get a specialized certificate for what you want to do.

SLIDE 35

We also need innovators like you to continue working toward a clean energy future, to keep our planet healthy and our power on!

SLIDE 36

Our Energy Future:

The natural gas industry is focused on continually reducing emissions to ensure we're keeping our planet as clean as possible. Since natural gas is the cleanest and most efficient fossil fuel, it'll be a key player in our energy future.

SLIDE 37

Researching and developing new, cutting-edge technologies as well as partnering with renewable resources — such as energy that comes from the sun or wind — is a top priority in the industry right now. And, as the sun does not always shine and the wind does not always blow, we need the support of a stable energy source — natural gas — to ensure our energy keeps flowing.

Since natural gas is a reliable, easy-to-store, low-carbon energy source, using it alongside renewable sources of energy will help us to preserve the supply, making it last longer and giving our engineers and scientists time to scale up renewable energy storage and explore innovative new energy pathways.

Optional Videos:
Why Renewable Energy Sources Can't Replace Oil and Natural Gas
The Evolution of Energy and its Impact on the World 8:28-10:17
Match Made in Heaven

SLIDE 38 – VIDEO

Together, we are working toward keeping our planet clean and our energy sources sustainable!

SLIDE 39

Thank you all for your time and attention today! Did we learn anything? Tell me one thing you learned…

Optional Videos/Materials (these are also placed throughout):

- What Is Energy?
- The Evolution of Energy and its Impact on the World
- Energy Fact Sheet: Introduction to Energy
- Introduction to Energy
- What is Energy: Foundation of Modern Life
- How We Make and Use Energy
- Electricity Powers Our Lives
- What is Natural Gas?
- Uses of Natural Gas
- Natural Gas Fact Sheet
- Let's Build A Pipeline Activity
- Kids and Natural Gas Safety
- Let's Make Methane activity
- Energy Careers

Potential Safety Activities:

- Natural Gas Word Search
- Natural Gas Word Search 2
- Natural Gas Coloring Picture
- Natural Gas Interactive Maze
- Natural Gas Safety Quiz
- Natural Gas Safety Facts

Notes and other options for content:

- Grade K-2
    - Videos
    - Online Games
    - Print Handout Activities
- Grade 3-5
    - Videos
    - Online Games
    - Print Handout Activities
- Grade 6-8
    - Print Handout Activities
- Energy Ecosystem Lesson Materials