

Engineering and Natural Gas

James Folta



Matt Nelsen is a Mechanical Engineer for PG&E, which stands for Pacific Gas & Electric. PG&E is a company in Northern California that provides electricity and natural gas. Matt, as an engineer, designs the pipes that carry natural gas.

Natural gas is found underground, trapped in rocks. It can be captured by drilling and pulling it out of the rocks. Once it is captured, it is refined so that people can use it. This gas can then be burned to do lots of different things.

This natural gas is provided by PG&E to people in Northern California. It is used in houses and individual buildings like schools. This gas is used for heating, water heating, and cooking. Also, PG&E provides gas to factories and other big companies. This gas is used for power generation, equipment sanitation, and product development. Everything from making electricity to recycling to making all the things in stores can use natural gas.

This gas is moved in pipes. Underground there are a lot of pipes that carry many different things in and out of buildings. There are pipes that carry water into a house and then there are pipes that carry the dirty water out. There are also pipes that move natural gas. Matt designs these pipes for PG&E, figuring out where the pipes need to be so that the gas gets where it needs to go.

This is called designing “high-pressure transmission pipeline systems.” This means that Matt figures out how many gas pipes are needed, how big they need to be, and how much gas needs to go through them. Matt needs to make sure that on any day, everyone who needs gas has it.

To figure this out, Matt first figures out when the most gas is being used. For Northern California, this is “in the winter, as customers use more gas when it's cold out,” says Matt. People need lots of gas in the winter to keep their houses warm and have hot water for showers and baths. People also use the most gas in the morning, when they want their homes to be warm when they wake up. Also, at this time of day many people are taking showers and they need hot water. So the morning in the winter is when the most gas is probably being used. Matt knows that this is when the most gas is needed. He designs pipes to be able to provide this amount of gas.

Matt likes being an engineer because of the problem solving he gets to do. He likes thinking about “how to approach complex issues and develop intelligent...solutions.” Matt has to be able to be flexible and solve problems. If something goes wrong, he is one of the people who PG&E asks to fix it.

Matt also likes getting to see the pipe systems that he designs built in the real world. He says it is a little scary because his pipe designs affect “so many people: construction workers, maintenance crews, customers.” There are a lot of people depending on Matt getting the pipes right! But Matt says it's worth it when his pipe systems are built. When Matt's designs are built and work like he expects them to, he says he feels like he's “really adding something to help people. It's a good feeling.”

Matt says the hardest thing is being worried that his solutions won't work. It's hard to know what will actually happen. Will there be enough gas? Will the pipes work correctly? Matt says that he can't “have every piece of information [he] need[s] to solve a problem.” This means that Matt and other engineers have to assume some things. Matt can guess how the pipes will work and how many people will need gas, but he can't know for sure. Not knowing for sure is the hard part of being an engineer.

There is a lot of work that goes into making gas pipes work. Matt works very hard to make sure that they work properly. So next time you wash your hands with warm water or you use a gas stove, think of Matt and all the engineers who made sure your house is getting the gas it needs!

Name: _____ Date: _____

1. Where is natural gas found?

- A in the atmosphere
- B trapped in underground rocks
- C in the ocean
- D trapped in certain trees

2. What does the author describe in the passage?

- A rock drilling methods
- B how to get a job at PG&E
- C the use and transportation of natural gas
- D the education needed to become an engineer

3. Read the following sentences: "Matt designs these pipes for PG&E, figuring out where the pipes need to be so that the gas gets where it needs to go... This means that Matt figures out how many gas pipes are needed, how big they need to be, and how much gas needs to go through them."

Based on this evidence, what conclusion can be made?

- A Matt has a challenging job.
- B Matt dislikes his job.
- C Matt has an easy job.
- D Matt will likely be promoted soon.

4. If the most gas is used in the morning during the winter, when can you infer that the least gas is used?

- A afternoon in winter
- B morning in summer
- C evening in winter
- D evening in summer

5. What is this passage mostly about?

- A the difficulties of being an engineer
- B average gas usage in an American city
- C designing the pipes that deliver natural gas
- D problems associated with drilling for natural gas

6. Read the following sentences: "Matt says that he can't 'have every piece of information [he] need[s] to solve a problem.' This means that Matt and other engineers have to **assume** some things."

What does "**assume**" mean?

- A calculate
- B guess
- C research
- D understand

7. Choose the answer that best completes the sentence below.

Natural gas is used for many domestic and commercial purposes, _____ heating, cooking, power generation, and product development.

- A including
- B above all
- C first
- D therefore

8. Why does Matt enjoy being an engineer?

9. What does Matt need to figure out before the “high-pressure transmission pipeline systems” can be built?

10. What makes being an engineer of natural gas pipe systems challenging? Support your argument with two examples from the text.

Teacher Guide & Answers

Passage Reading Level: Lexile 900

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8. Why does Matt enjoy being an engineer?

Suggested answer: Matt enjoys being an engineer because he gets to solve problems. He likes thinking about "how to approach complex issues and develop intelligent solutions." He also likes seeing his designs built in the real world.

9. What does Matt need to figure out before the "high-pressure transmission pipeline systems" can be built?

Suggested answer: Matt needs to figure out how many gas pipes are needed, how big the pipes need to be, and how much gas needs to travel through the pipes.

10. What makes being an engineer of natural gas pipe systems challenging? Support your argument with two examples from the text.

Suggested answer: Being an engineer of natural gas pipe systems is challenging because there is a lot of pressure to get it right; the pipe designs affect many people, from construction workers to customers. It is challenging because the engineers do not always have all the information they need to solve a problem, so they have to make educated guesses.