



SoCalGas™

Introduction to Cooking with Gas

Lesson 8: Stewing

ADVANCED



Introduction

Welcome to Introduction to Cooking with Gas. Today's topic is stewing using a range or stovetop and learning how to turn gas appliances on and off properly. Once you learn about stewing using a range or stovetop, you will learn how to cook with gas to make your own chunky bean chili.

This lesson can be completed in a classroom or at home. Your teacher will provide instructions for completing the assignment from home.

Opening Assessment

1. Which statement applies to stewing?
 - a. The food is totally submerged in water.
 - b. It only works with softer pieces of meat.
 - c. It takes very little time to complete a meal.
 - d. Minimal oil is needed to tenderize the food.
2. Out of what material is a Dutch oven usually made?
 - a. steel
 - b. plastic
 - c. cast iron
 - d. aluminum alloy
3. What is an advantage of using natural gas for cooking?
 - a. It reduces cooking time.
 - b. It produces cleaner byproducts.
 - c. It prevents food from drying out.
 - d. It takes longer to use up than other fuels.
4. Why is it important to brown the meat before adding it to the chili?
 - a. It helps to remove the fat.
 - b. It makes it easier to mix with the beans.
 - c. It prevents it from breaking down as quickly.
 - d. It keeps the vegetables from releasing their vitamins.
5. Why is combination cooking a desirable method of preparing food?
 - a. It allows more appliances to be used in the kitchen.
 - b. It prevents significant loss of flavor from the vegetables.
 - c. It produces large quantities of food in short periods of time.
 - d. It employs techniques that make cheaper cuts of meat more delicious.

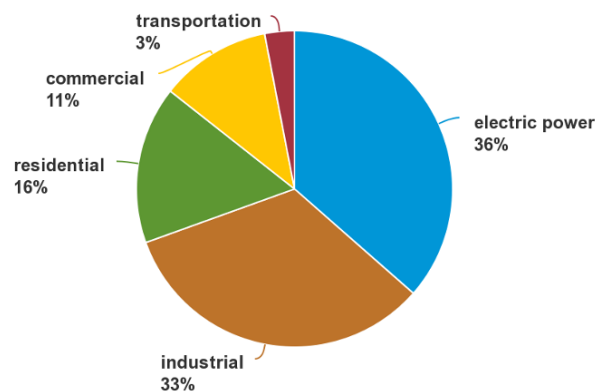
Comparison of Natural Gas to Other Fossil Fuels

Natural gas is a **fossil fuel** that comes from deep underground. It has several important uses, including heating and cooking. It is also used to generate electricity. Natural gas that is used to generate electricity is sent to gas power plants that burn the fuel to generate electricity for the power grid. Virtually all of the natural gas consumed in the United States comes from operations within the country.

The graph below shows the main areas where natural gas is used.

U.S. natural gas consumption by sector, 2019

Total = 31 trillion cubic feet



Note: Transportation includes pipeline and distribution use and vehicle fuel.

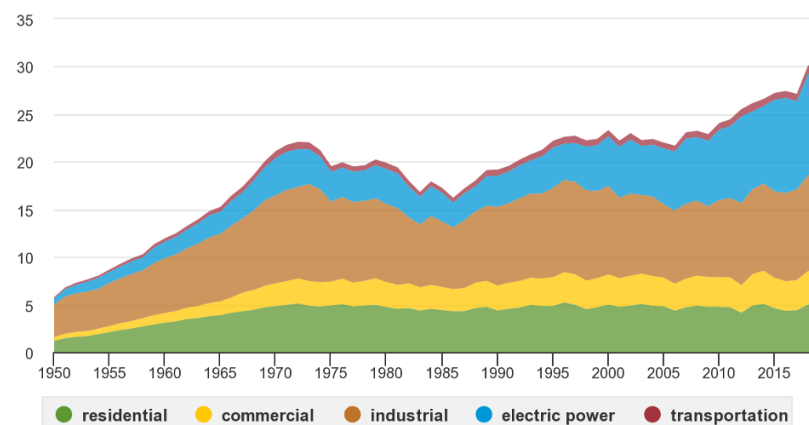
Source: U.S. Energy Information Administration, *Monthly Energy Review*, June 2020, preliminary data for 2019

Image Credit: [EIA](#)

The graph below shows how natural gas usage compares to other fuel sources over time.

U.S. natural gas consumption by sector, 1950-2019

trillion cubic feet



Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 4.3, June 2020, preliminary data for 2019

Image Credit: [EIA](#)

Even though natural gas is a fossil fuel, it burns much cleaner than other fossil fuels. This means that it does not emit as much carbon dioxide when burned compared to other fossil fuels. This is a good thing for the environment since human-produced carbon dioxide is the main contributor to global climate change. Improvements to natural gas power plants have helped to decrease the output of carbon dioxide further.

The table below compares the carbon dioxide emissions of various fossil fuels per British thermal unit (Btu).

Pounds of CO₂ emitted per million British thermal units of energy¹

Fuel Source	CO2 Emitted (lb/million Btu)
Coal (anthracite)	228.6
Coal (bituminous)	205.7
Coal (lignite)	215.4
Coal (subbituminous)	214.3
Diesel fuel and heating	161.3
Gasoline (without ethanol)	157.2
Propane	139.0
Natural gas	117

¹United States Energy Information Administration

Coal is the main contributor to carbon dioxide emissions. When it burns, it releases the gas into the air, causing all kinds of pollution. Diesel fuel and gasoline are better than coal but still release emissions. Natural gas is by far the cleanest fuel source. In fact, natural gas plants emit carbon dioxide at about half the rate of coal plants per kilowatt-hour of electricity generated.

Cooking with Natural Gas

Cooking with natural gas is a great way to have controlled heat and make sure the food is cooked throughout. In California, cooking with natural gas is very popular, and many commercial and industrial kitchens have gas-powered appliances installed. A recent report estimated that about 70 percent of all appliances in commercial and industrial kitchens use natural gas as their energy source. The graph here shows an estimated number of the different types of gas appliances in kitchens around the state.

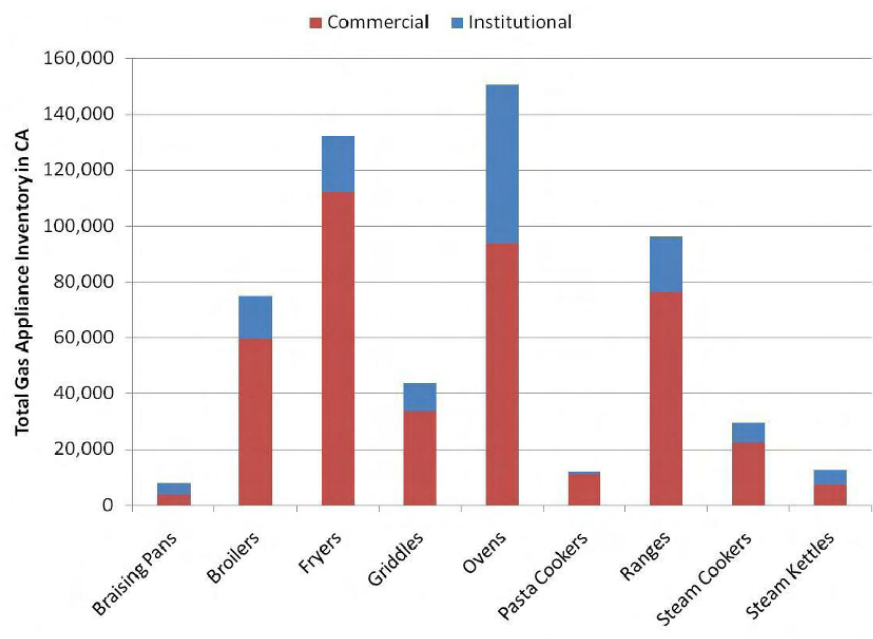


Image Credit: Beyond the Blue Flame

With the popularity of natural gas as an energy source for cooking, it is also important to be mindful of safety and pollution when using this energy source. Cooking with natural gas is much cleaner than other energy sources, but using natural gas can be dangerous.

Turning on the natural gas range or oven only when needed helps cut down on injuries, as leaving a gas range on while unattended can cause fires. Making this a priority can also save gas in the long run by ensuring it does not get wasted. When not in use, check that the gas knobs (used to control the flame's intensity) are turned off. This easy step reduces the chances of gas free-flowing into the gas lines and building up.

Cooking Methods

There are three types of cooking methods that utilize natural gas:

1. **Moist cooking** involves cooking with moisture in either liquid or steam form.
2. **Dry cooking** involves cooking without any moisture.
3. **Combination cooking** combines moist and dry heat cooking.

Today, you will be learning about and preparing food using a combination cooking method.

Combination Cooking: Stewing

Combination cooking methods include braising and stewing. Each method utilizes browning and fully submerging in liquid in order to cook the food. This lesson will utilize a range, a large pot or Dutch oven, and the stewing cooking method. A **Dutch oven** is a metal, thick-walled cooking pot that has a tight-fitting lid. They are usually made of cast iron. Sometimes the metal is covered with enamel. If a Dutch oven is not available, a normal metal pot will work just as well. This is a container made out of metal (usually stainless steel) that has tall sides and a lid. Just make sure the pot is large enough to hold all of the ingredients.



Dutch oven

Another kitchen appliance that works well for combination cooking is called a combination oven (or “combi” oven). Combination ovens offer dry and moist cooking options, all in the same place. They have fans built-in to allow for the circulation of the dry heat. At the same time, they also have steamer functions that add moisture to the food. By using both these methods at the same time, food tends to come out more flavorful and moist and usually does not shrink as much.

Natural gas combination ovens are usually more efficient and they also can have more precise temperature and moisture controls, as well as many programmable menus that allow for better food customization.

To make chunky chili on a range or in a combination oven, it is necessary to put the ingredients into a container that is large enough to hold everything, as well as withstand the intense heat of the gas burner. This is where the Dutch oven is useful.

Foods like meat, beans and vegetables cook well in combination cooking. For stewing, meats that are high in collagen are best. Examples of these include brisket, oxtail or chuck roast. Chicken also works well. These meats should be browned before starting the moist cooking, as the browning helps to remove the fat from the meat and bring out the flavor. Vegetables that are ideal for chili include onions and celery. These work well because their fibrous tissues break apart, leaving them chewable yet firm when done. Stewing also involves submerging the ingredients in liquid to complete the process. This effort helps to finish cooking the food all the way through. It creates a hot water bath that completely surrounds the food, providing moist heat to complete the cooking. You will learn how to utilize forms of moist and dry heat to cook various proteins and vegetables throughout your lessons on combination cooking.

Instructor Demonstration

Watch the instructor's demonstration on proper natural gas range safety and how to use the range and the pot or Dutch oven to make the chunky bean chili. Answer the following questions as you watch the demonstration:

- What safety tips did the instructor give during the demonstration?
- Why was the meat browned before adding the other ingredients?
- How does making chili relate to combination cooking?
- How did the instructor determine how long to cook the protein, beans and vegetables?
- What cooking tips did the instructor give during the demonstration?

Selecting and Preparing a Recipe

The following section can be completed at home if the preparing and cooking can be performed safely. Residential and commercial cooking equipment vary; while the information focuses on natural gas equipment, electric ranges and stoves may also be used to complete the cooking assignment.

Now you are going to make your own chunky chili recipe using protein, beans and other ingredients. Once cooked, the chili will be placed into a bowl and topped with grated cheese and other flavors. You can optionally top the chunky chili with sour cream, chopped onions or avocado.

Your teacher will review your recipe and dish based on the criteria listed below. If you are learning remotely, your teacher will provide you with instructions on how to submit your recipe and images or video(s) of your completed dish.

Criteria	Excellent 3	Proficient 2	Emerging 1
Procedure	clearly followed given instructions and the example provided in the demonstration	somewhat followed given instructions and/or the example provided in the demonstration	did not follow given instructions and/or the example provided in the demonstration
Content (submitted photos, procedure, videos, etc.)	content and explanations were thorough and well detailed	included content and explanation but included few specific details	included little to no additional content or explanations and/or no specific details
Organization	organized when preparing and making their recipe	somewhat organized when preparing and/or making their recipe	not organized when preparing and/or making their recipe

Create Your Recipe

For this recipe you will need to choose one item from the protein and one item from the fats categories. You can choose to add any additional ingredients, toppings or flavors based on your preference, dietary restrictions, allergies and available ingredients. Before starting to cook, it is important to have all of your ingredients, tools and equipment prepared ahead of time, what chefs call “mise en place” or “everything in its place.”

Select a protein:

cut chicken breast
ground beef (90% lean)
tofu (or meat substitute)
shredded pork loin
ground turkey/chicken

Select a fat (1 Tbsp):

butter
olive oil

Select the vegetables/add-ins:

diced yellow onions
cumin
granulated sugar
chili powder
tomato paste
garlic powder
salt
ground black pepper
beef (or other) broth
diced tomatoes
tomato sauce
choice of cheese
lime wedges
jalapeño slices
red pepper flakes
sour cream
saltine crackers
or oyster crackers
diced avocado
ground cayenne pepper
red kidney beans

Safety first:

- Always keep a Class ABC fire extinguisher nearby.
- Make sure the pot is not filled to the top so it doesn't spill when it simmers or when you add the beans and vegetables.
- Make sure there are no pot holders, towels or other flammable materials next to the burner.
- Make sure there are no plastic or meltable objects next to the burner.
- Always use potholders to protect your hands from burning on the hot pot.
- Always pour hot liquids away from you.
- Do not put your face directly over the pot as splashing may occur.
- Be extra careful when chopping the vegetables.
- Never use wet or moist potholders, oven mitts or towels as they will conduct heat, burning your hands.
- Make sure to keep your face away from the pot when browning the meat, as splashing may occur.
- Practice knife safety when cutting the vegetables and use knives that are properly sharpened.

Equipment:

- Gas stovetop or range
- Dutch oven or large pot
- Wooden stirring spoon
- Paper towels for draining the meat
- Potholders
- Serving spoon/ladle

Ingredients:

- 1 tbsp butter or olive oil
- 1 medium yellow onion – diced
- 1 lb. choice of protein
- 2½ tbsp chili powder
- 2 tbsp ground cumin
- 2 tbsp granulated sugar
- 2 tbsp tomato paste
- 1 tbsp garlic powder
- 1½ tsp salt
- ½ tsp ground black pepper
- ¼ tsp ground cayenne pepper* – optional
- 1½ cups choice of broth
- 1 (15 oz.) can petite diced tomatoes
- 1 (16 oz.) can red kidney beans, drained and rinsed* – optional
- 1 (8 oz.) can tomato sauce

Procedure:

1. Add the butter or olive oil to the Dutch oven or large soup pot and place it over medium-high heat for two minutes. Add the onion and protein. Cook for 5-7 minutes, stirring occasionally. Make sure your protein is fully cooked.
2. Add the chili powder, cumin, sugar, tomato paste, garlic powder, salt, pepper and optional cayenne. Stir until well combined.
3. Add the broth, diced tomatoes (with their juice), drained beans (*optional) and tomato sauce. Stir well.
4. Add any of the additional ingredients you would like to include in your chili.
5. Bring the liquid to a low boil. Then, reduce the heat (low to medium-low) to gently simmer the chili, uncovered, for 20 minutes, stirring occasionally.
6. Remove the pot from the heat. Let the chili rest for 5-10 minutes before serving.

Tips:

- You can skip the cayenne pepper if you do not want to make the chili too spicy. Hot sauce can also be added to taste after chili is served.
- Make sure to check the temperature of the protein. Make sure no pink coloration is showing.
- Stir occasionally while simmering to prevent the chili from sticking to the bottom of the pot.

Activity

After you complete cooking your chunky chili recipe, select one prompt to write about.

1. There is an age-old argument about whether or not beans should be added to chili. Some people say yes, while others say no. The recipe you just cooked had the beans as optional for just this reason. What would be an advantage to adding beans to the chili? What would cause some regions to add beans and others to veto them outright? Explain your reasoning. Be sure to discuss the flavors and textures that might be involved with one's decision to add or omit the beans.
2. Most likely, you cooked your chili on the range. How did using the gas range enhance or detract from the recipe? What benefits did you have by using the gas range? How do you think this impacted the flavors/textures of the chili? Do you think the chili would have come out as well if you used an electric stovetop? Defend your answer.

Final Assessment

1. Which statement applies to stewing?
 - a. The food is totally submerged in water.
 - b. It only works with softer pieces of meat.
 - c. It takes very little time to complete a meal.
 - d. Minimal oil is needed to tenderize the food.
2. Out of what material is a Dutch oven usually made?
 - a. steel
 - b. plastic
 - c. cast iron
 - d. aluminum alloy
3. What is an advantage of using natural gas for cooking?
 - a. It reduces cooking time.
 - b. It produces cleaner byproducts.
 - c. It prevents food from drying out.
 - d. It takes longer to use up than other fuels.
4. Why is it important to brown the meat before adding it to the chili?
 - a. It helps to remove the fat.
 - b. It makes it easier to mix with the beans.
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5. Why is combination cooking a desirable method of preparing food?
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Introduction to Cooking with Gas—Advanced

Lesson 8: Stewing

Teacher Guide

(1-2 class sessions depending on the setting)

Introduction

This lesson explores the benefits of using natural gas as a fuel. Then, students will learn how natural gas is used in combination cooking to use a range to cook chunky chili. Keep in mind that students may have dietary preferences, restrictions or allergies that may need to be accommodated in order for them to complete the recipe. Note that students may have different types of appliances at home, such as an electric or induction range, which will not prevent them from completing the assignment. If the student is preparing food at home, ensure that appropriate adult supervision will be available.

This lesson could be completed in a classroom or at home. Suggestions and instructions will be given for both scenarios.

Opening Assessment: Answer Key (3 minutes)

Use these questions to obtain a baseline for what your students know before beginning the lesson. The correct answers are highlighted.

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Comparison of Natural Gas to Other Fossil Fuels (5 minutes)

Students will read about how natural gas compares with other fossil fuels in terms of cleanliness of burning and emissions produced. The following questions could be used for a class discussion or given to students to complete individually.

- Which sectors use the most natural gas?
- Why is natural gas a better source of energy for cooking?
- Why is natural gas called a fossil fuel?

Cooking with Natural Gas (5 minutes)

Students will read about safety protocols used when cooking with natural gas appliances. The following questions could be used for a class discussion or given to students to complete individually.

- How does turning on a gas stove contribute to air pollution?
- Why should gas appliances only be turned on when in use?

Cooking Methods (2 minutes)

Students will understand that there are three cooking methods that utilize natural gas: moist cooking, dry cooking and combination cooking.

Combination Cooking: Stewing (5 minutes)

Students will read about cooking with combination heat and the stewing technique. The following questions could be used for a class discussion or given to students to complete individually.

- What are the benefits to cooking with combination heat?
- How would a combination oven make the preparation of this recipe easier?
- Why do you think stewing takes longer than boiling?

Instructor Demonstration (8 minutes)

The demonstration can either be performed in class or recorded for remote use. If the demonstration is done in person, consider preheating the pot while the students complete their readings so that the pot is hot enough to begin stewing in time for your demonstration.

You may also consider chopping all the vegetables for the students during this time so that the students will be able to cook along with the demonstration, or having the students start preheating their pots and browning the meat during the demonstration so that they may begin cooking directly following the demonstration rather than waiting for the pot to heat up and chop the vegetables.

The demonstration should include:

- how a gas range works
- safety tips when using a gas range and Dutch oven/pot
- knife techniques and safety when cutting the meat and vegetables
- how to brown the meat
- benefits of using stewing as a cooking technique
- how to cook chunky chili, noting how to check the beef (or whatever protein) for doneness
- finishing the chili by adding everything together and incorporating other optional ingredients

Students will use the following questions as a guide to either a class discussion after or note-taking during the demonstration:

- What safety tips did the instructor give during the demonstration?
- How much broth did the instructor put into the Dutch oven/pot?
- How high did the instructor have the flame?
- How did the instructor determine how long to cook the protein?
- What cooking tips did the instructor give during the demonstration?

Selecting and Preparing a Recipe (25 minutes)

If the students will be cooking in the classroom, ensure that the ingredients are available to the students ahead of time. Make sure that student allergies, dietary restrictions, and preferences are taken into account. Also be sure to plan a few minutes at the end of class for cleanup.

If the students will be cooking at home, be sure to provide the list of ingredients or the “mis en place” ahead of time to give the students time to assemble the ingredients. Take into consideration the time the recipe typically takes to cook and the ability for students to purchase their ingredients from the grocery store.

Students will use the instructor demonstration as a guide to cook their own chunky chili. Students will select a protein, a fat, vegetables and optional flavorings and toppings from a list in order to complete their recipe.

Students cooking at home can submit a description of the ingredients and procedure they would use along with pictures of their completed dishes or a video of themselves cooking the recipe. Be sure to share instructions with your students on what to submit and how to share it with you.

Scoring Rubric:

Criteria	Excellent 3	Proficient 2	Emerging 1
Procedure	clearly followed given instructions and the example provided in the demonstration	somewhat followed given instructions and/or the example provided in the demonstration	did not follow given instructions and/or the example provided in the demonstration
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Activity (10 minutes or as homework)

Students will select one of the prompts and write about their experiences in cooking their stew recipe. Share the short answer scoring rubric with students before they complete their writing activity.

1. There is an age-old argument about whether or not beans should be added to chili. Some people say yes, while others say no. The recipe you just cooked had the beans as optional for just this reason. Why do you think beans are such a topic of controversy? What would cause some places around the country to add beans and others to veto them outright? Explain your reasoning. Be sure to discuss the flavors and textures that might be involved with one's decision to add or omit the beans.
2. Most likely, you cooked your chili on the range. How did using the gas range enhance or detract from the recipe? What benefits did you have by using the gas range? How do you think this impacted the flavors/textures of the chili? Do you think the chili would have come out as well if you used an electric stovetop? Defend your answer.

Scoring Rubric:

4	3	2	1
<p>The student response ...</p> <ul style="list-style-type: none">• fully responds to each part of the writing prompt with relevant, strong details• has logical organization• uses effective language and word choice for purpose and audience• contains no errors in usage or grammar	<p>The student response ...</p> <ul style="list-style-type: none">• addresses each part of the writing prompt with sufficient details• has sufficient organization• uses mostly effective language and word choice for purpose and audience• contains minor errors in usage or grammar that do not affect meaning	<p>The student response ...</p> <ul style="list-style-type: none">• addresses some of the writing prompt with weak details• attempts organization• uses some language and word choice for purpose and audience• contains minor errors in usage or grammar that slightly affect meaning	<p>The student response ...</p> <ul style="list-style-type: none">• does not address a large portion of the writing prompt• lacks organization• rarely uses appropriate language and word choice for purpose and audience• contains major errors in usage or grammar that greatly affect meaning

Final Assessment: Answer Key (3 minutes or as homework)

Use these questions in conjunction with the discussion questions in each section to formatively assess student growth over the course of the lesson. Address any student misconceptions that remain at the end of the lesson. Consider having students compare their opening assessment with their final assessment to see how their understanding of cooking with gas improved over the course of the lesson.

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