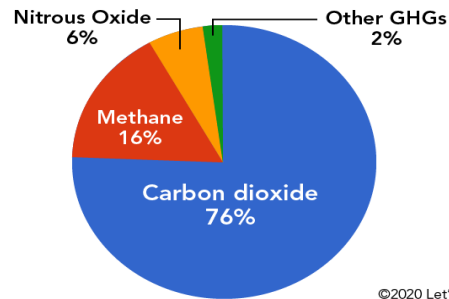


3c- How do beef and dairy cows contribute to climate change? Livestock agriculture is a source of methane, a powerful greenhouse gas.

Over the last couple of centuries, Earth has become warmer. That's because of **greenhouse gases** released into the atmosphere. One of the most commonly known greenhouse gases is **carbon dioxide (CO₂)**. Carbon dioxide is a colourless, odourless gas. It is released when **fossil fuels** are burned. Burning fossil fuels releases carbon dioxide into the atmosphere. And after carbon dioxide, the next most abundant greenhouse gas is **methane**. Although carbon dioxide is much more abundant in the atmosphere than methane, methane traps roughly 30 times more heat than carbon dioxide. This makes methane an important gas to keep an eye on.

Global Anthropogenic Greenhouse Gas Emissions by Gas, 2015



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Global anthropogenic greenhouse gas emissions by gas, 2015, given in CO₂ equivalents (Source: [Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2015](#) (EPA, 2017).

What are the sources of methane emissions?

Methane comes from both natural sources (30%) and **anthropogenic** (human-related) : whether agriculture (40 %) or other sources ('30 %- data source: [National Geographic](#))

How do livestock produce methane?

The [beef and dairy cattle industry](#) is one of the main contributors to global greenhouse gases. Methane makes up about half of the total greenhouse gases this sector emits. Cows generate methane in two main ways: through their digestion and through their waste.

Cows are part of a group of animals called **ruminants**. Ruminants have stomachs with four distinct chambers. Sheep, goats, and giraffes are also ruminants. The first chamber is called the **rumen**. The rumen is home to a complex ecosystem of **microorganisms which** include [bacteria, fungi, and protozoa](#). An important process called **enteric fermentation** takes place in the rumen. That's when bacteria break down complex carbohydrates into simple sugars. The end products of enteric fermentation by bacteria include **volatile fatty acids (VFAs)** as well as gases, such as carbon dioxide and methane. VFAs are absorbed through the walls of the rumen and transported to the liver where the animals use them for energy

Can we make cows produce less methane?

What cows eat has a big effect on how much methane they produce. Digesting certain types of food produces more methane than digesting other foods. For example, digesting hay and grass produces more methane than corn. Scientists are studying alternatives to cow feed that may produce less methane.

For example, scientists are trying adding seaweed to the cows' food. They hope that seaweed can inhibit a specific **enzyme**. That enzyme is involved in the production of methane while the cow digests its food. [A 2018 experiment](#) showed that adding seaweed to a cow's diet may reduce their methane production by as much as half! But researchers have found one problem with this solution: cows don't seem to like the salty taste of seaweed very much! Other scientists are taking a genetic approach. A [study published in 2019](#) found that the type and amount of methane-producing bacteria found in a cow's stomach is related to its genetic makeup. Knowing this, scientists can breed cows that have less of these bacteria in their stomachs. This will eventually create a type of genetically-modified cow that produces less methane! We share our planet with 1.4 billion cows. Each of these animals produces 250 to 500 litres of methane every day

What can you do to help fight climate change?

Many people like you and me are always looking for ways to keep greenhouse gas emissions down. For example, many of us choose to walk or bike instead of driving. But as you have just learned, methane gas emissions from livestock are a huge problem. So driving less may not be the most important thing we can do to help mitigate climate change. Many experts now believe that eating less meat would actually have a bigger impact.