

we plug in

How we grow things

How we get around

19%

16%

51 billion tons/year

Grand Challenge 3: How We Grow Things | Climate Project

What does cow burps have to do with climate change? Probably more than you think. The way society grows food and raises animals causes a lot of damage for the environment. We can't stop eating, but we can figure out cleaner ways to feed the population. And it's going to take all of us to get there.

0:09

Narrator speaking; photo of a hamburger; photos of grapes, nuts, and meals

Photo of corn

Photo of cattle with wildfire smoke in the background; photo of a sign during a drought

Photo of tractor on right and cattle on left and hamburger meat below

Grand Challenges infographic (zooms in on GC 3)

1:07

Narrator speaking on screen

Photos of the four categories shown in order with respective text boxes

Photo of food in the trash; text box: Food waste; text: We can do this; transition music

2:05

Narrator speaking

Your hamburgers are in danger.

For that matter, so are your grapes and almonds and... pretty much every other food you eat for sustenance and enjoyment.

I'm sorry. I don't mean to be grumpy, I just...haven't had lunch yet.

You see, if you're like me, you need food to survive.

That's one of the many reasons climate change is so awful—it's putting the food security of all of our communities at risk.

It's causing more and more intense wildfires, droughts, flooding, and extreme temperatures.

All of these things are bad if you grow crops or raise cattle. All of these things are bad if, like me, you need to eat food to live.

But, here's the catch: the way we grow crops, raise cattle and make hamburgers is also one of the primary drivers of climate change.

This problem is at the heart of Grand Challenge Number 3: How We Grow Things. And it's responsible for 19 percent of all emissions every year. And, as global populations continue to rise, we'll need to grow even more food—about 70 percent more.

That, in turn, means more greenhouse gas emissions and more climate-related disasters like droughts and fires that threaten our food supply.

That is, unless we can change the methods we use to grow our food.

Total emissions from how we grow things are split into four categories: livestock, crop production, land use, and food waste.

About a third (31 percent) comes from livestock and fisheries, mostly waste produced by the animals we raise. Almost another third (27 percent) comes from the way we grow all the plants we eat. About a quarter (24 percent) is from land use, mostly from when we cut down forests to make fields to grow our food.

The rest is mainly from processing, transporting, and packaging food, including food waste. All of these activities contribute to greenhouse gas emissions, making climate change worse and making our food systems less secure.

We can't stop eating, however, if we can change our methods of producing our food we can get to zero net emissions in this Grand Challenge. So let's talk about how we grow our food.

Ancient drawings of irrigation and the plow; photo of a person using advanced technology; photo of Borlaug with text description

Photo of the Haber-Bosch process

From irrigation and the plow to the advanced digital systems we rely on today, humans have always relied on technological innovations to feed our expanding populations. In the 1960s, the agricultural scientist, Norman Borlaug, saved billions from starvation by developing new varieties of wheat, which produced more food from less land.

Earlier in the 20th century, the Haber-Bosch process made it possible to produce synthetic fertilizer, allowing us to grow more food in more places.

Thanks to these and other innovations, today we can grow the same amount of crops as we did in 1961 while only using 30 percent of the farmland.

Clearly, we have the capacity to make monumental agricultural innovations. But, we're going to need a lot more.

3:00

Text: To what extent...?; transition music

Four photos of the four pathways

Text: How We Grow Things Solutions; photos of livestock

So let's plow into some of the innovations we'll need to cultivate to get from 19 percent to zero.

For this Grand Challenge, we've identified four pathways you might choose to research. These pathways are areas we think innovation has the best chance of helping us to get to zero in how we grow things.

Most of this video is going to focus on the largest contributor to our agricultural emissions: livestock. But cattle, pigs, and chickens are just one part of the puzzle. There are three other pathways you can explore as you seek solutions to the Grand Challenge of How We Grow Things.

For example, our fertilization methods are really crap for the environment. Fertilizers are the chemicals we put into the ground to make crops grow better. Synthetic fertilizers allow us to grow more of the food we need. But, to make these fertilizers we burn natural gas which, in turn, releases greenhouse gases.

It's not just the way we create food that needs innovation, though.

3:59

Narrator speaking

We also need innovations to minimize food waste. Almost one third of all the food we make and grow gets wasted, and that means we've created a lot of unnecessary greenhouse gasses.

Finally, humans have cut down a lot of trees to make room for our farms. Trees are great carbon sinks. That is, they can pull greenhouse gasses out of the atmosphere and store them. But, replacing forests isn't as simple as just planting a bunch of new trees.

Text: How do livestock...?; transition music

We need smart reforestation that considers what kinds of trees to plant and where.

So, we have plenty of options to get this Grand Challenge to zero, but for now, let's focus on just one of them.

Photo of cows eating

Hmm. . . well, I could really pick any of these, but I think I'll talk about the one that's gonna let me say cow burps, farts, and poop live on camera.

So, let's talk turkey and chicken and pigs and goats and fish, but especially cattle.

In other words, let's talk about livestock.

4:58

Photo of a man feeding chickens; text box: livestock

Livestock are animals we raise to eat, or, in some cases, consume their milk or eggs.

Photos of the impact of climate change

Like other farmers, livestock farmers are also under pressure from climate change. The same fires and droughts that have burned crops in the west, have made it increasingly hard to raise, graze, and water livestock there. Many ranchers have been forced to sell entire herds.

So livestock farms are suffering from climate change, but they're also a big contributor to it. That means they're also a big part of any potential solution.

Raising animals creates a lot of greenhouse gases.

Photo of land used for farming

First, there's all that land that used to be forests or other biomes which absorbed carbon and are now being used for pasturing animals instead.

Photo of a woman shopping in a grocery store

Processing and transporting meat, eggs, and dairy, also contribute to livestock emissions.

Photo of a cow

And, livestock themselves create a lot of greenhouse gasses, especially methane, which comes from the way some animals, like cattle, digest their food.

5:57

Bar graph of largest producers of emissions

Cow burps and farts (but mostly the burps) are a huge source of greenhouse gas. If cows were a country, they would be the third largest emitter, behind only China and the United States.

So what kind of livestock solutions could help us get to zero?

Text: Can we do anything about the cow burps?; cartoon cow passing gas; photo of a man with cow feed

First, we have to see if we can do anything about the cow burps. Actually, researchers are looking for ways to deal with bovine flatulence. They're finding that these emissions can be minimized by strategies like vaccines that change cows' digestive tracts, and special seaweed additives to their diet.

We might also make changes to how we take care of cattle and their waste.

Photos of cattle, a vet and a cow, and a farm; text: Can we...?; transition music

Wealthy countries already have access to innovations in food quality, veterinary care, and manure disposal that allow their cows to produce far less methane than cows in poorer countries.

At this point, you might be wondering, "Why can't we just stop raising so many animals for meat?"

Photo of meat alternatives

You've probably seen meat alternatives in the grocery store or even eaten them yourself.

6:57

*Photo of lab grown meat;
text: Obstacles; transition
music*

Text box: Green Premium

*Photo of plant-based
meats; photo of a sign for
plant-based meats*

*Photo of a plant-based
food truck*

These are plant-based products prepared in a way that makes them taste and feel very similar to real meat.

Then, there's lab grown meat, which is molecularly identical to meat from a cow but grown in a laboratory.

We're making progress in all of these areas, but the fight to reduce livestock emissions still faces many obstacles.

For example, both lab grown and plant-based meats carry a green premium, the difference in cost between the way we do things now and the zero emissions option.

Happily, plant-based meats are coming down in price. Why? Because more people are buying them.

That's one way we lower the green premium. By convincing more people to adopt the cleaner option early at a higher price, we can gradually decrease the price for everyone else.

7:47

*Text: Cultural Choice;
photo of a cookout*

But these innovations are facing cultural resistance as well. Not everyone wants to eat vegetable-based replacement foods, or even know they exist. And many people around the world depend on livestock ranches and jobs both financially and culturally.

If you live in one of those communities, like in Oklahoma or Wyoming, you're going to have a tough time convincing many people to make the switch from animal meat.

Anyway, all of these solutions have significant green premiums.

Additional costs, like for seaweed additives and livestock feed, can hurt farmers who are already struggling through the effects of climate change.

But, don't think that means you shouldn't do anything. In fact, there's lots for you to do.

For example, you might raise awareness about meat substitutes, maybe even getting them served in your school; or, if you live in a rural area, you might try to get the government to provide funding for farmers to reduce the cost of feed additives that can reduce livestock methane emissions; or you might choose to start a course of study that will let you contribute in the long term.

The science behind cow burps is more exciting than it sounds.

If we're going to get to zero, we need more food scientists for livestock studying additives and diets that will reduce methane emissions.

Norman Borlaug is credited with saving a billion lives. Might you be the next big agricultural innovator? What will you do to help us get to zero?

8:31

*Text: Action Opportunities;
photos of different
action opportunities
with respective text box
descriptions*

*Outro music; OER Project
logo appears*



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