

Unit #3: Growing Solutions to Climate Change – Eat Sunshine, Not Fossil Fuels!

Presenter Guide

Teaching Point: The goal of this session is to review and link what we have learned about climate change and food to a farm that grows and markets local organic products. The local organic farm has systems that will demonstrate ways that food can be produced with a lower carbon footprint, compared to conventional food production.

Presentation Suggestions: The presenter notes and accompanying slides have been prepared as a “Virtual Field Trip” to a farm. The detailed presenter notes are designed so that a teacher or volunteer could review them in advance in order to be familiar with the material to be covered.

Here’s your chance to grab your hat and boots and become a classroom - farmer for a day!

There is also the option to have a *visit from a local, organic farmer*, who could speak first hand to the farming practices that are illustrated in the slides. If you would like to offer this to your students, please contact Canadian Organic Growers, (coordinator@cogwaterloo.ca) to arrange for a farmer to come to your school. This should be done at least 3 weeks prior to the date that you would like to have a visitor.

NOTE: *The presentation content that is printed in italics indicates that it is one of the answers from the Climate Change and Food Quiz.*

Information in brackets provides suggestions or clarification for the teacher and is not necessarily part of the presentation dialogue.

Slide#1 In the previous classes we have talked about the greenhouse gas emissions produced when food is processed and packaged.

Let's review what processed and packaged foods look like and how they differ from whole fresh foods. (Discussion of the photos).

(**Processing** means changing the original food, like grinding to make wheat into flour or by combining foods with other ingredients. These combinations of various foods are often baked, and sometimes frozen, then packaged, in order to get them ready for shelves and freezers at your grocery store.)

Slide #2 Packaging can include plastic wraps and containers, aluminum or steel cans, glass bottles and jars, Styrofoam trays (for meat and other foods), foil wraps and also paper containers made from wood pulp, such as cracker or cereal boxes. Sometimes these materials are used in combination, such as the paper, plastic and aluminum foil that makes up TetraPaks.

All of this packaging takes energy to make AND to recycle it.

Are there ways to package food that produces less greenhouse gases and less garbage? (re-usable containers, refillable drink bottles, fresh items like apples or pears that don't require any packaging, cooking instead of buying pre-cooked packaged food – homemade pizza!!!.....etc.)

Slide #3 We can see that processing and packaging makes food's carbon footprint a lot larger, but we have also found out that there is something that WE can do about it.

Now let's review the greenhouse gases produced from food transportation or "Food Miles".

Slide #4 Transportation of food also burns a lot of fossil fuels, producing greenhouse gases.

Trains, ships planes and cars are used to transport food. Some foods come all the way from China (such as garlic) or New Zealand (apples, lamb) which are thousands of kilometres away– even though many of these items can be grown right here.

This truck is carrying beef cattle to market.

The average item of food we eat in Canada travels nearly 2500 kilometres to reach our dinner plates or lunch bags. That's the distance from Toronto, Ontario to Regina, Saskatchewan.

Teacher note: This photo is from Australia - notice the truck seems to be on the wrong side of the road! Shorter trucks (one trailer) or trains are more commonly used to ship cattle in Canada.

Slide #5 What is this truck delivering?

What does it say on the back door? (local, organic, Organic Meadow, Foodland Ontario)

The milk we drink is usually local but as we can see, local food has to travel too, even if it is a much shorter distance.

Question: What is the only food that doesn't produce greenhouse gases to travel to your plate?

Answer: The food that you grow yourself in the backyard, on a balcony or in a community garden.

Slide# 6 Now that we have reviewed greenhouse gas production from the processing, packaging and transportation of food we are going to take a trip to a farm to find out how GROWING food produces greenhouse gases.

Did you know that it takes as much energy to GROW our food as it does to transport it from all over the world!

We will look at ways to reduce the greenhouse gases that come from growing our food, and most importantly, we will discover that one of the solutions is (in the soil) right under our feet!! Grab your hats and boots and let's dig for answers.

Slide # 7 Let's Start With the Basics. What is at the centre of our food system? The Sun.

(Eating Sunshine Drawing of energy cycle to show flow of energy originating at the sun and introducing soil life.)

We humans - like other animals - get all of our energy from the food we eat.

Until about 100 years ago, ALL of our food on Earth grew naturally through an amazing process called **photosynthesis**. This process allows plants to use carbon dioxide from the air to make food, using energy from the sun, plus water and nutrients generated by tiny organisms in healthy soil.

We humans either ate **plants** (ask for examples: corn, potatoes, bread made from wheat flour) or we ate **animals** that ate plants (ask for examples: chicken, fish, cow – milk, cheese, beef.)

100 years later we still rely on the sun and photosynthesis to make our food. Our food still comes from both plants and animals but some of the nutrients used to grow our food no longer come from healthy soils but are made artificially using lots of fossil fuels (in the form of fertilizers).

How did this happen?

(Can the students assign numbers to all of the arrows?)

Slide # 8 In 1909, a German scientist, named Fritz Haber, was experimenting in his laboratory where he mixed together natural gas (a fossil fuel) and nitrogen from the air. He heated this mixture to 1000 degrees Celsius – very hot! - using even more fossil fuels. Next, he applied great pressure - still more fossil fuels! What he created was something similar to an important plant food found naturally in healthy soil.

He had invented artificial plant food we now call '**fertilizer**'- not exactly what he set out to do in the first place.

(The original experiment was to produce explosives. The resulting compound turned out to be explosive as well as a plant nutrient.)

It takes 10 units of energy (fuel, fertilizers, packaging, processing, etc.) to produce 1 unit of food energy.

Slide #9 Now, over 100 years later, most farms around the world depend on Fritz Haber's invention - artificial fertilizers made from fossil fuels, instead of natural fertilizers found in healthy soil.

The use of artificial fertilizers creates a large carbon footprint - and the food grown by the farmer hasn't even travelled anywhere yet!

Slide# 10 Oil, another fossil fuel, is used to make chemicals – called pesticides and herbicides - that kill unwanted insects and weeds. The carbon footprint of this food gains another shoe size!!

Slide # 11 And of course, we all know that there are greenhouse gases produced when we burn gasoline and diesel fuel to run the many kinds of machinery used to produce food on the farm.

Slide # 12 (Photo of Dairy barn) (Consider a discussion of the chain of production – machines milk cows, milk is refrigerated, milk is transported, milk is pasteurized and packaged and trucked again.)

(This is not a system that we can or would want to change but it underlines the amount of energy that goes in to all of the food we eat.)

(What about wasted food? Wasted food means wasted energy and unnecessary greenhouse gas emissions. What is the solution?)

(Maybe this could be a class resolution?)

Slide# 13 If we look around we see forests and meadows that grow very well without using fertilizers made from fossil fuels. They rely on the energy cycle we looked at earlier – the sun, photosynthesis and healthy soil.

Slide # 14 One alternative to using fossil fuel-based fertilizers and pesticides to grow our food is to try to make our farms imitate nature, like the forest, using the natural energy cycle in the solar energy cycle diagram we saw before. This type of farming is called organic or ecological farming – what all farmers did before artificial fertilizers and pesticides were invented.

Slide # 15 On organic farms, soil is our hero. Super soils are home to billions of hard working creatures that eat up decaying plants and animal manure, leaving behind awesome food for crops. The most famous super hero of the soil is the earthworm.

(How about an Acrostic poem to celebrate SOIL?)

(The large photo is a row of freshly dug potatoes, beets and carrots.)

Slide # 16 Farmers know that worms and all of the other creatures of the soil need food for themselves in order to provide nutrients to the growing plants. Applying artificial fertilizer made from fossil fuels just gives the worms indigestion. Let's look at what organic farmers feed their soil to help the worms make healthy food for their crops.

Slide # 17 Composting is a way to make good fertilizer without fossil fuels. Compost starts out as manure or just waste plant material and gets mixed with straw, wood chips, old hay, leaves, even some weeds, to make food for the soil.

Compost can take up to 1 year to be ready to spread on the fields but the process can be sped up by turning the compost pile.

(The Jersey calf in the picture is just hours old. That's why she looks a little unsteady.)

Slide # 18 On organic and ecological farms some crops are grown just to feed to the soil. The farmers don't sell these crops, they plough them down to feed the billions of creatures in the soil. Organic farming does not allow the use of fertilizers made from fossil fuels so we team up with the natural life in the soil and make plant food right there in the dirt- less greenhouse gases from fertilizer use - happy worms and soil bugs.

(The farmer with the horses is ploughing down a winter cover crop. The slide in the right is a summer cover crop known as Buckwheat.)

Slide # 19 Clover plants form nutritious little bundles (nodules) on their roots. When the plants are ploughed down, they leave these nodules in the soil for the next crop. Organic farmers often grow clover just for the plant food they leave behind, as well as to make good hay for their animals to eat.

(The green strip in the slide is the clover just before it is ploughed down in the spring. The brown strip has recently been ploughed down and is ready for planting.)

Slide # 20 Healthy soils make healthy crops. Healthy crops fight off diseases and insects. But sometimes the insects are harder to get rid of, so organic vegetable and fruit farmers use thin fabric row covers instead of chemical pesticides, to keep insects off of their crops - less fossil fuel based chemicals for the earth, more juicy berries and tasty broccoli for us!!

(A good analogy to explain this concept is to compare what we do to protect ourselves from mosquito bites, when we go hiking. One option is to apply insect repellent; the other option is to wear a long sleeved shirt. The row cover is like the long sleeved shirt!)

Slide # 21 As farmers look for ways to reduce greenhouse gas emissions on the farm some farms harness energy wherever they can find it.

One idea is to use horses instead of tractors, if possible. This kind of horse power eats hay and puts out plant fertilizer (manure) at the other end. The tractors burn _____ and puts _____ out the other end.

(Here we are looking for fossil fuels or gas, diesel, oil - then carbon dioxide or greenhouse gases.)

Slide # 22 Fruits, vegetables, meats and grains can all be stored so we can serve local organic food during the winter season, when not that much is growing . The food in these jars was home grown and processed in to re-usable glass jars.

All of these things help shrink our personal carbon footprint and the food tastes really good too.

Slide # 23 We can see that by choosing organic food we can take action to reduce the greenhouse gases that contribute to climate change. If we learn to eat what is **local** and **in season** we can **REALLY** make a difference.

A good way to find out what is in season is to visit your local farms or farmers market.

Farmers love to talk about what they do so this could be a fun way to learn more.

Who knows, maybe you might be a farmer someday!

Slide # 24 Carrots are nutritious, delicious and can grow in almost every part of Canada. There are fresh, local carrots available year round!

(Organic carrots are an easy and popular snack to serve as part of this program. They represent a nutritious, local, organic, unprocessed, minimally packaged climate friendly food choice. During our pilot classroom sessions, “Crunch Time” was a euphemism for snack time.) (The picture of the kids diving in to the bowl of carrots was taken at “Crunch Time”)

Slide # 25 Here’s what we have learned so far.

What gives food it’s big carbon footprint?

- Packaging and processing
- Travelling long distances using gas or diesel power
- Pesticides and artificial fertilizers
- Farm equipment such as tractors and irrigation equipment

How can you keep your food carbon footprint low and “Take a Healthy Bite Out of Climate Change”?

- Growing something yourself
- Buying local and organic food

- Choosing food from a farm that uses compost and cover crops for fertilizer
- Eating things in season - check out a farmers' market to find out how
- Canning, preserving and storing local food to eat during the winter
- Above all, don't waste food. This is the number one thing all of us can do right now. Wasted food is wasted energy and unnecessary greenhouse gas emissions.