

Topic 3.4

How do human activities affect the natural greenhouse effect?

Specific Expectations

- **D1.2** analyze ways in which human actions have increased or decreased the production of greenhouse gases
- **D2.3** use a research process to investigate a source of greenhouse gases and its effect on a region of Canada
- **D3.5** describe methods by which different greenhouse gases are produced by humans
- **D3.6** identify the natural and human causes of climate change in the world and, in particular, how Canada contributes to climate change

Skills

- gather relevant information on research topics from various sources
- formulate scientific questions and hypotheses
- draw conclusions from data
- communicate using appropriate language, in a variety of formats

Materials

Please see the teaching notes for each activity for a list of the materials required. Please see pages TR-47 to TR-49 for a summary of the materials required in this topic.

Overview

In this topic, students will consider how human activities, and in particular those of Canadians, increase the amount of greenhouse gases in Earth's atmosphere, which increases Earth's natural greenhouse effect and causes global warming.

Common Misconceptions

- **Students may think that other countries, such as the United States, are responsible for producing most of the world's greenhouse gases.** Explain to students that, although the United States is the largest producer of greenhouse gases, Canada is also a significant contributor. Refer students to pages 234 and 235.
- **Students may think that all greenhouse gases come from using fossil fuels.** Explain to students that while the use of fossil fuels such as oil, gas and coal do produce greenhouse gases, they are not the only sources. For example, the Canadian cattle industry is responsible for 72% of emissions of methane, another greenhouse gas.

Background Knowledge

In 2009, Canada had 13.18 million head of cattle, which includes beef and dairy cattle. The United States had 94.5 million head of cattle, almost double the number in Argentina.

Before 1950, cattle in the United States were almost never fed corn. Now, most beef cattle in the United States and Canada are raised in feedlots and fed corn (and animal by-products). Cattle are ruminants and have a digestive system that functions best when they eat grass. Feeding them corn can damage the health of the cattle and reduce the nutritional quality of the beef. However, it does significantly reduce the amount of time it takes to fatten a calf for market so farmers earn more money producing corn-fed cattle. Corn-fed beef cattle also produce less methane than grass-fed cattle. Methane gas is over 20 times more effective in absorbing heat than carbon dioxide.

Since 1997, after the 1993 discovery of a case of *bovine spongiform encephalopathy* (BSE), or Mad Cow Disease, in Canada, it has been illegal in Canada to feed cattle (and other ruminants) meat meal or bone meal made from other ruminants. Meals made from non-ruminants, such as pigs, horses, fish or chickens, are still allowed. Chickens and pigs can still be fed meal from their own species. In January 2003, another Canadian cow was diagnosed with BSE, raising more questions about health and safety in our cattle industry.

Biofuels are a source of fuel created from plant material such as corn, sugar cane, and canola. Biofuels can come from a fermentation process that produces alcohol from decomposing plants, such as ethanol from sugar cane. Or, plant material can be pressed to release the plant's oils, which are then burned, such as with corn, canola, and hemp. Biofuels can also be created from post-consumer oils, such as the used cooking oil from deep fryers. One type of biofuel is biodiesel. Many Hollywood celebrities, such as Daryl Hannah, have been championing the biofuel cause.

Literacy Strategies

Before Reading

- **ELL** Encourage students to make a cause-and-effect map or a concept web to help them organize their understanding of this topic. Provide students and especially English language learners with **BLM G-39 Cause-and-Effect Map** or **BLM G-40 Concept Map** for this purpose. Have them scan the headings and subheadings to start their cause-and-effect or concept maps, and fill in more details as they progress through the topic.

During Reading

- Remind students to update their cause-and-effect or concept maps as they read.
- Have students record a question they may have for each section, as they begin reading each subsection.

After Reading

- Have students work with a partner to compare and answer the questions they have formulated during reading. These questions and answers can be shared in a class discussion at the end of the topic.
- Have students review their cause-and-effect or concept maps. Ask them to consider if they have understood the relationships between the concepts correctly. Is there anything they would have done differently now that they have a better understanding of the concepts?

Assessment FOR Learning		
Tool	Evidence of Learning	Supporting Learners
Learning Check, page 232	Students explain how human activities contribute to the greenhouse effect.	<ul style="list-style-type: none"> • Provide students who are struggling with BLM G-39 Cause-and-Effect Map to scaffold question 3. • ELL English language learners may prefer to use diagrams or sketches in their cause-and-effect map. Remind them to label their diagrams.
Learning Check, page 235	Students explain how Canadians add to the increase of greenhouse gases in the atmosphere.	<ul style="list-style-type: none"> • Provide students with BLM 3-23 Canadian Greenhouse Gas Production to help scaffold question 1. Students could also use this blackline master to answer the Inquire Further question in Investigation 3C.
Review, question 2, page 241	Students describe three human activities that enhance the natural greenhouse effect.	<ul style="list-style-type: none"> • Have students create review cards using BLM 3-24 Human-Created Greenhouse Gases. Encourage them to review their jot notes on human-created greenhouse gases as part of their review process.

Topic 3.4 (Student textbook pages 230–241)

Using the Topic Opener

- Students may find the idea of farting cattle quite funny, so expect any class discussion to take a bit of extra time before students can settle down.
- Explain to students that ruminants, such as cattle, sheep, and goats, have bacteria in their intestinal tracks and stomachs that help break down the cellulose in the tough plants they eat. Methane is a product of this process. The amount of methane cattle produce depends greatly on what they eat.
- Have students consider Canadian scientist David Suzuki’s recommendation that all Canadians eat one meatless meal per week. Conduct a class discussion on the impact this would have on the number of cattle raised in Canada and on the amount of methane produced by the cattle industry.

Starting Point Activity (Student textbook page 231)

Pedagogical Purpose

This activity helps to consolidate students’ understanding of the causes of greenhouse gases and encourages them to think about how reduce the amount of greenhouse gases produced through human activities.

Planning

Materials	BLM G-44 K-W-L Chart (optional) BLM G-49 Venn Diagram (optional)
Time	20–30 min in class

Activity Notes and Troubleshooting

- Have students review their jot notes from the topic opener before beginning this activity.
- You may wish to conduct a class brainstorming session for question 1. Ensure students are respectful of the brainstorming process. Remind them that all suggestions are welcome and that everyone should contribute their ideas and listen in a respectful way. Record students’ contributions on the chalkboard or on chart paper. Continue the class discussion to summarize the list. Have students transfer these points to a K-W-L Chart and have them add more details as they read through the topic.
- Have students work in pairs or small groups for question 2. You may wish to have students focus on a smaller, more personal example, such as, how to reduce greenhouse gases from a specific industry or how to reduce greenhouse gases from their home or school activities. Student groups should share their ideas with the class.

Additional Support

- **ELL** Have English language learners use **BLM G-44 K-W-L Chart** for question 1, and fill in the chart as they progress through the topic.
- **DI** Enrichment—Students with logical-mathematical intelligence may wish to research how much beef per year the average Canadian consumes. Then, have them calculate how much methane would be reduced by a vegetarian diet. Have them prepare their results in a graph of their choice to share with the class.
- Enrichment—Both topic 3.3 and topic 3.4 open with an environmental study that uses animals, elephant seals in topic 3.3 and cows in topic 3.4. Conduct a class discussion or pose questions to interested students about whether they think it is right to use animals for testing in this way. Ask students to consider whether the Argentinean cow study was harmful to the cows. (How did researchers run the tubes into the cows’

stomachs?) Students should write a paragraph or two on their thoughts on this issue. Interested students could conduct additional research and learn more about this research. Have them share their findings with the class.

- **ELL** English language learners may benefit from using **BLM G-49 Venn Diagram** if you plan to have them compare the elephant seals with the Argentinean cows.

Starting Point Activity Answers

Answers may vary.

1. Examples could include driving vehicles (carbon dioxide), burning fuel in wood stoves and furnaces (carbon dioxide), growing food in greenhouses (water vapour, if greenhouse is not properly sealed), and eating meat (methane).
2. Examples could include taking public transit, eating less meat, or using solar or wind power instead of fossil fuels.

Instructional Strategies for Topic 3.4

- If you tell students about the diet of Canadian cattle from the Background Knowledge above, you may wish to introduce the Case Study following the topic opener. Otherwise, use the Case Study as a culminating activity.

Student textbook pages 232-233

- As a class, read the information on page 232.
- **ELL** English language learners will benefit from **BLM G-38 English Word Study** to help them tackle the Key Terms in this section.
- Draw students' attention to Figure 3.17. Ask students to analyze the image. What do they see? (Smokestacks, person on horseback.) Why do they think this image was selected for this section? (It shows the changes to the landscape cause by the industrial revolution.)
- Have students use a graph of their choice to rank the four greenhouse gases listed on page 233 in terms of their heat absorption abilities. Students may wish to use a pie chart or circle graph, a bar graph or another graph of their choice.
- **ELL** **DI** English language learners and those students who struggle with logical-mathematical intelligence may benefit from reading Numeracy Skills Toolkit 2, Organizing and Communicating Scientific Results with Graphs on pages 392 to 397 before attempting to graph the information on page 233. Supply **BLM G-33 Organizing and Communicating Scientific Results with Graphs**, if necessary.
- Assign Activity 3.10 and the Learning Check questions.
- **ELL** **DI** English language learners and spatial learners may benefit from using **BLM G-49 Venn Diagram** for Learning Check question 1.
- You may wish to have students use **BLM G-39 Cause-and-Effect Map** for Learning Check question 3.

Student textbook pages 234-235

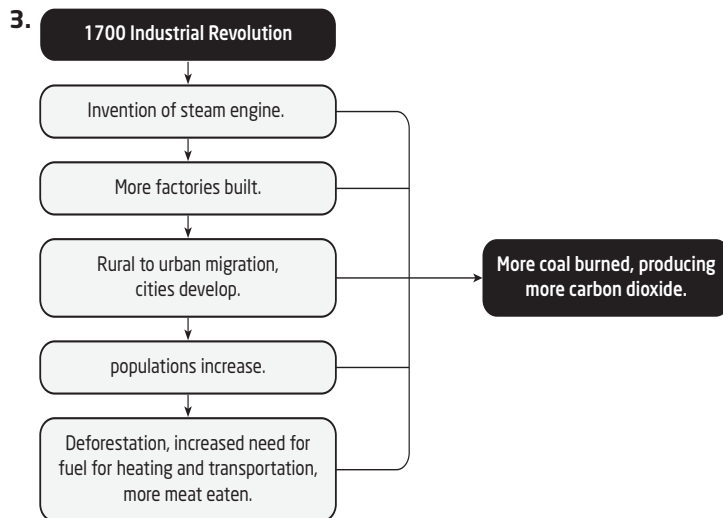
- Read through the text as a class. Have students make jot notes to refer to later.
- **ELL** You may wish to have English language learners and other students use **BLM G-40 Concept Map** to help them organize their learning for this section.
- Assign the Learning Check questions. Questions 1 and 4 are researched in more depth in Investigation 3C. As a prelude to this investigation, have students record their answers to questions 1 and 4. Then, after the investigation, have them return to their notes and check if they still agree with their answers. For question 1, provide **BLM 3-23 Canadian Greenhouse Gas Production**, if necessary.
- Assign Investigation 3C.

Student textbook page 241

- For question 4, provide **BLM 3-24 Human-Created Greenhouse Gases**.
- Note: Question 7 is misnumbered as question 6 in the student textbook.

Learning Check Answers (Student textbook page 232)

1. The anthropogenic greenhouse effect is the production of greenhouse gases through human activity, which augment, or increase, the natural greenhouse effect. The anthropogenic greenhouse effect is heating up our planet at a much faster rate than the natural greenhouse effect.
2. Trees absorb carbon dioxide from the air and use it to carry out photosynthesis, which produces sugars and water. Cutting trees reduces the number of trees absorbing carbon dioxide so there is more carbon dioxide in the atmosphere.



4. The media reports more on the effects of carbon dioxide than on nitrous oxide because more carbon dioxide is produced through human activities than nitrous oxide.

Learning Check Answers (Student textbook page 235)

1. Answers may vary. Most students should recognise that Canadians produce more greenhouses gases than people in smaller and/or warmer countries who do not need to use as much fuel for heat or for travelling around their country.
2. Hydroelectric dams are not sustainable ways to produce electrical energy because water is not a sustainable resource. Also, to produce dams, lands must be cleared by flooding. The standing water and drowned vegetation produce methane gas.
3. Answers may vary. For example:
Agriculture: Reduce the amount of methane gas produced by livestock by changing their diets. Use unsold crops as biofuel or compost.
Landfills, Reduce, reuse, and recycle as much as possible to reduce the amount of waste. Trap the methane gas produced by composting and use the gas as fuel.
4. Answers may vary. For example:
Agriculture: Alberta has the largest agricultural industry, so it contributes the most toward greenhouse gases through this activity.
Landfill: Ontario is the most heavily populated province in Canada. It has the most landfill waste and produces the most greenhouse gases through this activity.

Investigation 3C Cross-Country Climate Change

(Student textbook pages 236-237)

Pedagogical Purpose

In this investigation, students research activities that produce greenhouse gases on a provincial level and analyze the links between greenhouse gas emissions and climate change. Students use their research to create a reduction plan and a presentation.

Planning	
Materials	Internet access (optional) BLM 3-25 Investigation 3C (optional) BLM A-9 Computer Slide Show Presentation Checklist (optional) BLM A-34 Presentation Rubric (optional) BLM G-13 How to Do a Research-Based Project (optional)
Time	60-120 min in class

Background

Before starting the investigation, display an interactive map that shows information about greenhouse gas emissions and production by Canadian province and territory. Go to www.scienceontario.ca and follow the links. For example, Ontario's emissions are expected to reach 213.87 megatonnes (Mt) by 2010 compared to Manitoba's predicted emissions of 25.81 Mt.

The Kyoto Protocol is an international agreement of 37 countries and the European Union to set binding limits and reductions of greenhouse gases to 5% below where they were in 1990. Participating countries have agreed to meet these targets between 2008 and 2012. Canada ratified the Kyoto Protocol in 2002 and entered the agreement in force in 2005. Question 2, in What Did You Find Out?, is similar to the Kyoto Protocol on a provincial level. The Kyoto Protocol has mechanisms that allow nations with higher carbon dioxide production to "trade" carbon emissions over their limits with other nations who have not exceeded their limits. Audit information shows that Canada is not meeting its Kyoto Protocol targets and that carbon emissions are actually increasing.

Skills Focus

- formulate scientific questions and hypotheses
- draw conclusions from data
- communicate using appropriate language, in a variety of formats

Activity Notes and Troubleshooting

- Have students work in groups for this activity. Hand out **BLM 3-25 Investigation 3C** if necessary.
- **ELL** **DI** To ensure an even distribution of abilities, you may wish to assign the groups, rather than letting students select them.
- Assign each group a province or territory. This could be done randomly or you could allow students to choose their favourite province.
- You may wish to have students consult with you before proceeding with their presentation in the What Did You Find Out? section.
- To assist you in assessing your students' work, you may wish to use **BLM A-9 Computer Slide Show Presentation Checklist** or **BLM A-34 Presentation Rubric**. If you plan to assess your students' work in this investigation, ensure that they are aware of how they will be evaluated before they begin.

Additional Support

- **ELL** English language learners may benefit from reading Science Skills Toolkit 7, How to Do a Research-Based Project on page 386 to 389 for this activity. Supply **BLM G-13 How to Do a Research-Based Project** if necessary.
- **ELL** **DI** Encourage English language learners and spatial learners to work on a graphic presentation, such as a collage, a mural, a website, and so on.
- **ELL** **DI** English language learners and students with bodily-kinesthetic and/or musical intelligences may wish to provide a poem, a song, a play, or another artistic presentation. As long as students are still meeting the criteria of the investigation, encourage these creative alternatives.
- **Enrichment**—Have interested students research the actual amount of greenhouse gases produced by their province or territory. This information could be added to their presentation, or shared separately with the class. Ideally, this enrichment activity would be taken up by one student per province or territory.

Investigation 3C Answers

What To Do

Presentations may vary. For example:

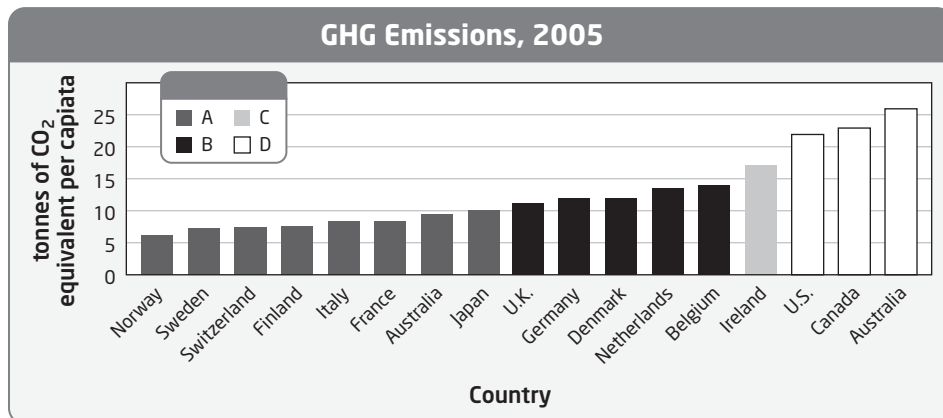
- a)** The 2008 population of Ontario is 12 292 000. The greater the population, the greater the greenhouse gas emissions. There were be more homes and vehicles burning fuel, creating carbon dioxide.
 - b)** Alberta produces more greenhouse gas than Ontario with its oilsands projects and high number of methane producing cattle. There is also more agriculture in Alberta. Prince Edward Island produces less greenhouse gas than Ontario. Its population is less than 4% of Ontario's, meaning fewer homes, vehicles, and industries. There is much less agriculture than in Ontario since P.E.I. is so small.
 - c)** Urbanization probably produces the most greenhouse gases. The construction of homes, roads, and so on means more vehicles, more fuel burning, more logging and land clearing, all of which contribute to gas production.
 - d)** To reduce greenhouse gases, Ontario could limit the spread of urbanization, promote public transit, and create more green spaces, and ecofriendly homes and buildings. The province could encourage conservation of electrical energy and water so power plants do not always work at a maximum. This would reduce heat and carbon dioxide emissions.
- a)** Manufacturing and industry produces a lot of carbon dioxide.
 - b)** Excess amounts of carbon dioxide in Earth's atmosphere will absorb and radiate solar energy from the Sun, making Earth's temperatures warmer. The increase in temperatures affects climate by changing precipitation patterns, severity of storms and winds, and increased sea level.
 - c)** There are more frequent storms in Ontario, and they are more severe. For example, there was a small tornado in southern Ontario in the summer of 2009, a region not known for tornadoes.

What Did You Find Out?

1. Presentations will vary.
2. Answers may vary. For example: Larger provinces should be allowed to produce more greenhouse gases because they have larger populations. It is inevitable that with greater populations, there will be more greenhouse gas emissions due to greater urbanization, construction, vehicles, and possibly manufacturing and industry in these regions. However, all provinces should be making efforts to decrease greenhouse gas emissions. Provinces with many industries should be asking the companies to look at ways to reduce their emissions. Financial incentives would be a good starting point.

Inquire Further

Answers may vary. For example: The 2005 data from the Conference Board of Canada show that Canada was the second largest polluter per capita out of the 17 developed countries surveyed. We are bigger polluters than the USA! Interestingly, China and India were not included since they are considered to be developing nations.



Source: The Conference Board of Canada

Using the Case Study Investigation (Student textbook pages 238-239)

Literacy Support

Before Reading

- **ELL** The Case Study is textually dense and may be intimidating to English language learners and those students struggling with literacy. Have students read the headings only before they read the text.
- Have students rewrite each heading as a question that they will answer as they read the text. Students may wish to use **BLM G-44 K-W-L Chart** to organize their thinking.

During Reading

- Have students use their K-W-L Chart and their questions from the headings as a starting point to make jot notes as they read through the text.
- You may wish to assign each subsection to a group of students. Have each group read their section and write jot notes about the contents. Then, have students share their notes as a class.
- **ELL** Encourage English language learners to add unfamiliar words to their personal glossaries and ask or look up the meanings as they read.

After Reading

- Have students complete a main idea web. Supply **BLM G-45 Main Idea Web** as needed.
- Ask students to write a brief, two-sentence summary of the main points of the section. Then, as a class, use these summaries to create a class summary for all students to use. Use the chalkboard or chart paper. You could ask a student to act as a class scribe.

Activity Notes

- Have students return to the topic opener information on methane and cattle. Ask them to consider how the case study might be connected to the topic opener. (Corn is used to feed cattle and to make biofuel.) Ask students to consider how more corn could be made available for biofuel without compromising the corn available for people. (If people changed their eating habits, we could reduce the number of cows and then there would be more corn available for biofuel.)

- **ELL** **DI** English language learners and students who are struggling with literacy may benefit from using **BLM G-3 Analyzing Issues—Science, Technology, Society, and the Environment** for this activity. Have them complete the blackline master to prepare them for the reading.
- You might consider using question 4 as a starting point for a class discussion on bias. Ask students to consider whether the author of the case study is in favour of biofuel or against it. What evidence can they offer from the text to support their opinion? To help get them started ask leading questions, such as the following.
 - Is corn the best source of biofuel?
 - Can biofuel be used as a complete replacement for fossil fuels?
 - How does the author feel about the reduction of energy consumption?
 - What about biofuel made from post-consumer sources? Is this a viable alternative to plant based biofuels?
- If you have time, you may wish to stage a class debate on the pros and cons of biofuels. Have students research the pros and cons of biofuel as an alternative fuel and present their arguments in class.

Case Study Investigation Answers

1. Per molecule, nitrous oxide has a greater warming effect than carbon dioxide. But there are more sources of carbon dioxide emissions than nitrous oxide emissions, so carbon dioxide causes more warming overall.
2. Fertilizers used in farming leach into run-off water and contaminate aquatic and terrestrial ecosystems. Growing biofuel crops sometimes requires land clearing. The destruction of trees and plants affects terrestrial ecosystems. Farming disturbs terrestrial ecosystems by polluting the water and disrupting wildlife.
3. Smog is air pollution. It can irritate your eyes, nose, and throat. It can also cause or worsen heart and lung problems and increase the risk of heart or lung cancer with long-term exposure. But the problem of smog is not serious enough to ban the production of biofuel. The production of biofuel needs to be regulated so that harmful emissions are reduced during production. Smog is mostly produced by vehicle and factory emissions, which also need to be regulated and reduced.
4. Answers may vary. For example: No, biofuel is not the only solution to reducing our dependence on fossil fuel. We could use alternative energy sources such as solar energy and wind power to produce electricity. The sun and wind are sustainable energy sources. We need to build the technology to harvest this energy efficiently and effectively to produce the levels of power needed. Or we could use algae to make biofuel. Algae needs water not land, so growing it would not lead to deforestation, and is not a food source.

Activity 3.10 Which Greenhouse Gas? (Student textbook page 240)

Pedagogical Purpose

This activity hones students' observational and analytical skills and provides them with the opportunity to apply their knowledge of greenhouse gases to the real situations depicted in the photographs.

Planning	
Materials	BLM G-9 Data Tables (optional) BLM A-1 Making Observations and Inferences Checklist (optional) BLM A-10 Computer Slide Show Presentation Checklist (optional) BLM A-11 Poster Checklist (optional)
Time	30-40 min in class

Skills Focus

- communicate using appropriate language, in a variety of formats

Activity Notes and Troubleshooting

- Allow students to provide their answers in a creative presentation format. Students may wish to use computer presentation software, a poster or a collage to identify the greenhouse gases in the images. In this case, you may wish to use **BLM A-10 Computer Slide Show Presentation Checklist** or **BLM A-11 Poster Checklist** to assist you in assessing your students.
- This activity could be conducted as a class discussion. Enlarge and post each photograph on the chalkboard. With the class, design a table on a large sheet of chart paper or an overhead. Have students discuss each image in turn and then record the activities that produce greenhouse gases and identify the gases produced.
- To save time, you may wish to have students work in small groups for this activity. Assign each group one of the photos to analyse. Have them create a brief presentation to share their results with the rest of the class.
- You may wish to use **BLM A-1 Making Observations and Inferences Checklist** to assist you in assessing your students' work in this activity. Distribute the blackline master beforehand so students are aware of how they will be evaluated.

Additional Support

- **ELL** **DI** This activity provides an opportunity for students to express their answers in a creative way. English language learners or spatial learners may prefer to use diagrams or drawings for their answers. The answers may be provided in a table or in another format.
- **ELL** **DI** If students work in groups for this activity, ensure that the group members share the work equally and that all students' opinions and thoughts are being represented. Have English language learners work with a mentoring student. Interpersonal learners will appreciate the group work.
- Provide **BLM G-9 Data Tables** for students to record their answers, if necessary.
- Enrichment—Have interested students bring in copies of photographs from magazines or from the Internet and identify the activities that produce greenhouse gases and the gases produced. This could be done as an individual class activity.

Activity 3.10 Answers

Answers may vary. For example:

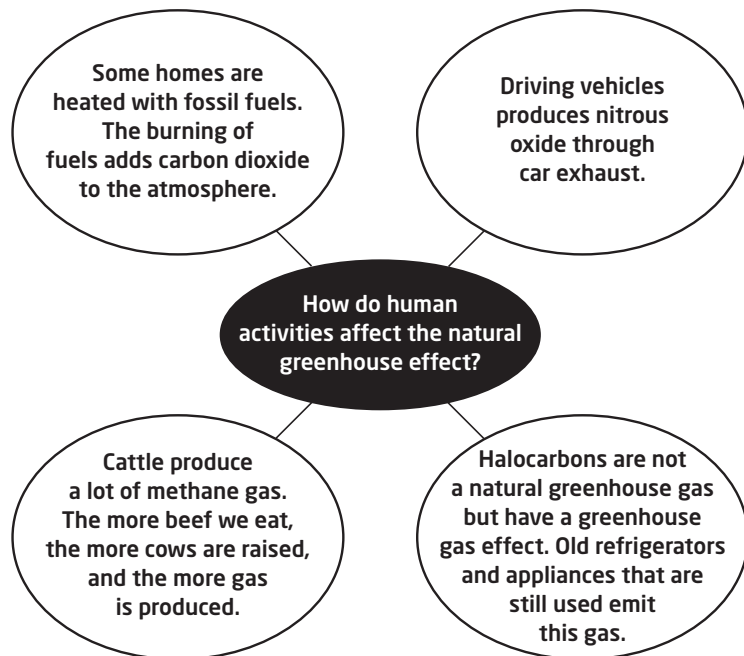
Photograph	Description	Greenhouse Gases Produced
A	urbanization	<ul style="list-style-type: none">• carbon dioxide from vehicles, home heating• water vapour from greater heat retention of concrete buildings• methane from city landfills• nitrous oxide from vehicles• halocarbons from refrigeration, household products
B	deforestation	<ul style="list-style-type: none">• carbon dioxide increase from loss of trees, vehicles for transport and clearing, burning wood• nitrous oxide from vehicles
C	hydro-electricity production	<ul style="list-style-type: none">• carbon dioxide from land clearing, loss of trees• methane gas from flooded land, stagnant water• nitrous oxides from vehicles around plant• water vapour from flowing water
D	air travel	<ul style="list-style-type: none">• carbon dioxide from burning fuel
E	agriculture	<ul style="list-style-type: none">• carbon dioxide from farm equipment• nitrous oxide from vehicle, fertilizers• methane gas from rotting crops

Topic 3.4 Review (Student textbook page 241)

Please see also **BLM 3-26 Topic 3.4 Review (Alternative Format)**.

Answers

1. Answers may vary. For example:



2. Answers could include driving vehicles (produces nitrous oxide), burning fossil fuels for heat, (produces carbon dioxide), and eating meat, especially beef (contributes to methane production).
3. Answers could include driving to school, eating red meat, or using old appliances.
4. Halocarbons are produced solely by humans.
5. **a)** Dairy cows produce methane when they digest food.
b) Answers could include driving to the store and using a plastic bag (plastics manufacturing produces carbon dioxide and nitrous oxide).
6. Answers may vary. Changes could include asking students and teachers to car pool or take public transit, encouraging bus drivers not to idle their engines, or reducing electricity use in parts of the school that are not used regularly.
7. **a)** The Industrial Revolution started in the 1700s. Many of the new machines were fuelled by coal, which produces carbon dioxide when it burns.
b) The increased industrialization that started in the 1700s produced a lot of carbon dioxide. The pace of this industrialization has increased steadily over time.
8. Answers may vary. For example: The topic has also shown that our world is fragile. Events in different parts of the world can cause changes globally. For example, the Mount Pinatubo eruption in the Philippines caused global temperatures to decrease. Everything we do affects our environment and climate. For example, deforestation increases the greenhouse effect by destroying vegetation that would normally capture carbon dioxide. We need counteract or reduce our negative impact on our planet.