

Decoding Carbon

#DECODINGCARBON

Activity: Negative Externality Game – Collective Action and Climate Change



Learning Outcomes

By the end of this activity learners will:

- Understand the concept of negative externalities.
- Understand the concept of climate change as a negative externality.
- Understand the need for government intervention to address climate change.
- Understand the effects of collective action to address a negative externality.

Curriculum Connections

Alberta

- Grade 10 Science
- Grade 10 Social Studies
- Grade 11 Social Studies

British Columbia

- Grade 10 Science
- Grade 10 Environmental Science
- Grade 11 Environmental Science
- Grade 12 Environmental Science

Ontario

- Grade 10 Science
- Grade 12 Canada & World Studies

Length of Activity

1 – 1.5 hours

Materials List

- Topic Backgrounder
- TEG Calculator
- Marking Rubric

- Computer (with Microsoft Excel)

Activity: Step 1

Introduce the Externalities Game - this game has been designed by [Arizona State University](https://www.asu.edu) but modified for Decoding Carbon. Before starting this game, revisit the concept of a negative externality covered in an earlier lesson. **(10 minutes)**

Activity: Step 2

Download the TEG_Calculator.xlsx file and walk the students through the workbook.

Activity: Step 3

- Divide the class into 3 producer profiles (economy, intermediate and luxury), where each producer group will review their roles as summarized in the TEG_Calculator file:
- Go over the “Rules” tab in the calculator with the students.
- The class will play 2 rounds of the externality game. In the first round, producers will produce units to earn maximum grades (where grades = points earned from the number of units produced), without any consideration for external costs (CO₂ emissions) associated with the production. Note: This is to demonstrate how individuals acting in self interest in a free market may result in externalities. In the second round, when producers are required to take into

account the social cost of their production decisions, players will be able to compare the two scenarios and reflect on learnings.

- After the first round of the game, residents of a city nearby that are external non-party to this market will provide important information regarding the effects of CO₂ emissions on their health, as there are 5 cases of individuals with pulmonary sickness caused by this CO₂ emission pollution. In response to this, the producers now have to maximize grades, however now producers will have to consider social costs (i.e., grades = points earned - social costs). Before entering round 2, producers will be given the opportunity to shut down their production plant for upgrades, which will reduce the CO₂ emissions per unit by 50%. However, this upgrade will lead to the overall production capacity of the group to decrease compared to the original capacity.
- Students will play rounds 2, where they will have to cooperate with each other to determine their production decisions.

Activity: Step 4

After the simulation, students will reflect on the experience in a class discussion and explore the importance of collective action in reaching overall goals of the class. **(10 minutes)**

Activity: Step 5

Students will make a journal entry reflecting on: "What is the importance of collective action and coordination of efforts between different countries in meeting global climate goals?" **(10 minutes)**