



Lesson Plan: Energy from Waste, Grade 11 Biology (SBI3C and SBI3U)

Introduction

The Durham York Energy Centre (DYEC) has proven air pollution control technologies that reduce emissions to safe levels following strict regulatory requirements. In addition to continuous air emission monitoring at the site, the Regions must monitor the ambient air, soil, groundwater, and surface water quality in the facility's area.

In this lesson, students will take a closer look at the DYEC soil monitoring program. The aim of this program is to quantify background contaminant concentrations in the area, measure possible emission dispersion of energy from waste (EFW) related soil contaminants in nearby residential areas, ensure ongoing environmental management of the site, and quantify any measurable concentrations resulting from the DYEC.

Learning Objectives

1. Demonstrate an understanding of the process in which our household garbage becomes energy in the EFW facility
2. Assess how toxins in the environment may affect the growth and reproduction of plants in the environment
3. Demonstrate an understanding of how changes to plant life caused by environmental stress may affect the surrounding ecosystem
4. Identify structures in plants used to combat the presence of toxins in the environment

Resources Provided

- [Durham York Energy Centre Website](#)
- [Energy from Waste Process Overview](#)
- [Durham York Energy Centre Virtual Tour](#)
- [Durham York Energy Centre: 2020 Soil Testing Report](#)

Activity

1. Students will work through the DYEC Virtual Tour.
2. Students will brainstorm in general, what effects pollution and toxins in the environment may have on plant life in the area.
3. Students will look at the Durham York Energy Centre: 2020 Soil Testing Report and investigate through the TABLES on page FIGURES starting on page 20. While exploring, students will note:
 - a. Which parameters are being investigated?
 - b. Which combinations have you heard about in previous studies?

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- c. How do the levels compare to the standards?
 - d. What do you notice about the location of testing spots in the figures chart?
4. Students will then note their thoughts on what potential impacts these parameters may have on plant life in the area if concentrations were elevated.
 5. Students will independently research how heavy metals may affect reproduction in plants and how plants adapt to survive within heavy metal toxicity levels.
 6. The class will discuss the following questions: why is this environmental monitoring so crucial to the Region? What might be the potential impacts to our local environment if DYEC did not take on such stringent environmental monitoring measures?
 7. Students will create an infographic in small groups on the different parts of plants and identify the features plants may use to adapt to toxicity levels within the environment.

Summary

The Durham York Energy Centre (DYEC) has proven air pollution control technologies that reduce emissions to safe levels following strict regulatory requirements. Within one month of completion of each soil testing event, including sampling and laboratory analysis, a soil testing report is submitted to the Ministry of the Environment, Conservation and Parks (MECP) District Manager. This program is in place to ensure the protection of the environment and the community.

Curriculum Connections Expanded

The Ontario Curriculum, Grades 11 and 12: Science, 2008 (revised)

Biology, Grade 11, University Preparation (SBI3U)

A. Scientific Investigation Skills and Career Development

- A1. Scientific Investigation Skills: demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating)

F. Plants: Anatomy, Growth, And Function

- F2. Developing Skills of Investigation and Communication: investigate the structures and functions of plant tissues, and factors affecting plant growth
- F3. Understanding Basic Concepts: demonstrate an understanding of the diversity of vascular plants, including their structures, internal transport systems, and their role in maintaining biodiversity

Biology, Grade 11 (SBI3C)

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F. Plants in The Natural Environment

- F1. Relating Science to Technology, Society, and the Environment: analyse the roles of plants in ecosystems, and assess the impact of human activities on the balance of plants within those ecosystems
- F2. Developing Skills of Investigation and Communication: investigate some of the factors that affect plant growth
- F3. Understanding Basic Concepts: demonstrate an understanding of the structure and physiology of plants and their role in the natural environment