

FUEL OUR FUTURE NOW

G9–12

MODULE OVERVIEW – Transport to the Future: Making a Plan for Positive Change

MODULE OVERVIEW

Module Description: For high school students, the future is now. In this module, students use data from scientific investigations and engineering design to explore factors that affect vehicle efficiency and safety. They research real-world mass transit options, alternative fuels, and government tax incentives that encourage alternatives to the gasoline-powered vehicle. Students collect information about the types of vehicles that teachers, friends, and neighbors drive and their transportation habits. Finally, they use this information to create an action plan to reduce transportation-related energy use and greenhouse gas emissions in their community.

Module Project: Students analyze local private and mass transportation use and develop a plan to decrease the amount of greenhouse gases put into the atmosphere by individuals in the community.

Module Objectives:

- Identify efficiency for vehicles that use different sources of power, including gasoline, electricity, and biofuels.
- Identify personal driving habits that use fuel more efficiently and reduce automobile emissions.
- Explain ways to conserve energy and reduce emissions from transportation, including the use of mass transit and alternative fuel sources for vehicles.
- Develop an action plan to reduce greenhouse gas and other emissions from vehicles used in the local community.

Relevant STEM Topics:

- Energy and Efficiency
- Planning a Project
- Engineering Design
- Conducting Experiments
- Collecting, Recording, and Analyzing Data
- Making Calculations
- Using Digital Technology

Please see *Standards Addressed in G9-12* for a list of the applicable science, technology, engineering, and math standards, as well as the 21st Century Skills.

Total Time: 2 weeks

LESSON PLANS

Lesson 1 – Introduction to Fuel Efficiency

Students begin their research by considering different types of energy sources that are currently used to power vehicles. The students use data to help develop an operational definition of efficiency for these different fuels.

Lesson 2 – How Does Driving Behavior Affect Fuel Efficiency?

Students explore different aspects of driving behavior that lead to increased fuel consumption. They explore gear ratios and efficiency of the power needed to propel a vehicle.

Lesson 3 – Driving in Luxury

Students design and build a structure meant to withstand a large impact in order to examine the costs of building safe vehicles. They use real data to determine how much extra energy is used to run car electronics such as GPS devices and DVD players.

Lesson 4 – Mass Transit

Students use data on individual vehicles and mass transit to compare the efficiency of both types of transportation. They consider factors that cause people to choose one type of transportation over another.

Lesson 5 – Government Incentives

Students examine incentives that encourage the use of alternative energy source vehicles. They use data to examine the opportunities and challenges of using alternative energy vehicles and consider the requirements needed to expand this use in the future.

Lesson 6 – Community Survey

Students go out into the community to collect information about the vehicles that are driven by their neighbors, friends, and teachers. They also determine what alternative forms of transportation are being used in the community.

Lesson 7 – Can You Design a Better Community?

After reviewing the main concepts developed in the first six lessons of this module, students design an action plan intended to reduce greenhouse gas emissions in their community. Students create multimedia presentations to share their plans with their classmates.

Acknowledgment: This material is based upon work supported by the Department of Energy, National Energy Technology Laboratory under Award Number DE-FG26-08NT03077.

Disclaimer: This Curriculum was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express, or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

