

Fueling energy demands

Focus questions	How has human population growth and affluence altered vehicle use over time? What impact can this increasing number of vehicles have on fuel consumption? How can we meet this demand in a sustainable way?
Learning target	Students observe the growth of vehicle use and fuel consumption and begin to brainstorm ways to address the growing demand for fuel.

HS-LS1: From Molecules to Organisms: Structures and Processes

Performance expectation HS-LS1.6	Classroom connection: Students will observe the growth of vehicle use and fuel consumption in order to brainstorm ways to address the growing demand for fuel.
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Science and engineering practices

Constructing Explanations and Designing Solutions	Classroom connection: Students generate questions about numbers of vehicles and amount of fuel those vehicles demand.
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Disciplinary core ideas

LS1.C: Organization for Matter and Energy Flow in Organisms	Classroom connection: Students generate questions around fuel sources for cars and how they are being used.
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Cross-cutting concepts

Energy & Matter	Classroom connection: Students begin to investigate how ethanol is being used to supplement fuel supplies.
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Procedure

1. Show an image of a busy, multilane highway to the students, such as the one found here: commons.wikimedia.org/wiki/File:Miami_traffic_jam,_I-95_North_rush_hour.jpg
2. After showing the image, ask students to brainstorm questions individually for 30 seconds to one minute, then share their questions within small groups (3–4 students) for two or three minutes.
3. Have groups share their questions one-by-one to the large group until all questions are shared.
4. Create a Driving Question Board to keep note of the questions, as they will guide the rest of this unit. (for more information on driving question boards, see The Science Teacher (November 2008), Vol 75, No 8.

Possible questions:

- How many vehicles does the average family in the United States own?
- How many vehicles are in use worldwide?
- Why do we need so many vehicles?
- How many vehicles are in use on average per day?
- How much fuel is consumed on average per day?
- What forms of fuel are available?
- What impact can these fuel types have on the environment?
- Can we extract enough petroleum to meet this growing demand?
- Can we create enough ethanol to create gasohol blends?
- How will human growth impact fuel consumption?

If no one brings up fuel consumption or fuel production, add your own questions: Do we have enough fuel to power these vehicles? What types of fuel are available for these vehicles to use? What methods are used to produce these fuel types? How will human growth impact vehicle use and fuel consumption in the future?

To begin investigating these questions, organize the ones that relate to the sheer number of vehicles and the rate at which the vehicle use has grown.

See these resources for additional information:

- bts.gov/topics/national-transportation-statistics
- epa.gov/automotive-trends/highlights-automotive-trends-report
- eia.gov/opendata/qb.php?category=711246
- afdc.energy.gov/data/

Use the lessons in the energy & ethanol unit to address some of these questions.