

Science & Environmental Education:
Community Connections, Impacts & Actions

9th - 12th Grade Curriculum




Environmental education is lifelong learning process that leads to an informed and involved citizenry having the creative problem-solving skills, scientific and social literacy, ethical awareness and sensitivity for the relationship between humans and the environment, and commitment to engage in responsible individual and cooperative actions.

Purpose of

ENVIRONMENTAL EDUCATION



By these actions, environmentally literate citizens will help ensure an ecologically and economically sustainable environment.



ESSENTIAL QUESTION:
Why is biodiversity important for a healthy ecosystem?

Population Dynamics

NGSS Performance Expectations: [HS-LS2-1](#), [HS-LS2-6](#)

Wisconsin Environmental Education Standard ELS.EX2:

Students in Wisconsin will assess how diversity influences health and resilience of natural and cultural systems.

Location: Prairie Springs Environmental Education Center

Number of Students: 75

Description:

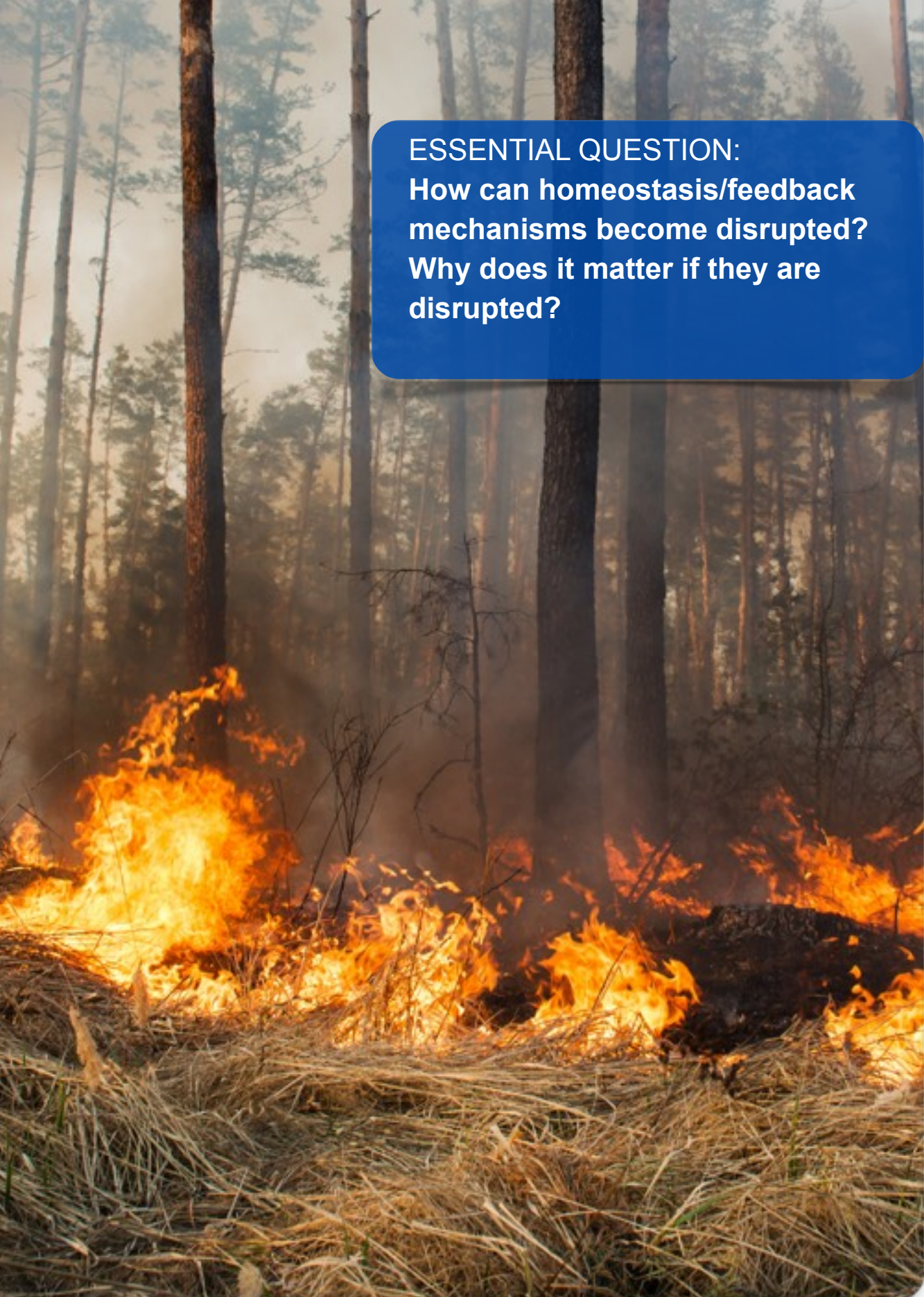
Students will build evidence for the claim that “Biodiversity is Important for Maintaining Healthy Ecosystems.” They will explore how invasive species affect biodiversity in an ecosystem and how differences in biodiversity affect the food webs in an ecosystem.

[Lesson Plan](#)

[Program Request](#)

CALL TO ACTION:

Aquatic and land invasive species and local groups are always looking for volunteer groups to participate in removal.



ESSENTIAL QUESTION:
How can homeostasis/feedback mechanisms become disrupted?
Why does it matter if they are disrupted?

Homeostasis & Feedback Mechanisms

NGSS Performance Expectations: [HS-LS1-3](#)

Wisconsin Environmental Education standard ELS.EX2:

Students in Wisconsin will evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

Location: Retzer Nature Center

Number of Students: 100

Description:


Students will explore the interconnection of species and environmental regulators, how homeostasis is maintained in an environment, and what happens when feedback mechanisms are disrupted. Students will visit a prairie habitat and make connections on how fire effects this ecosystem's biodiversity. They will explore how water run-off and how different types of road salt impacts water systems. Students will also explore how plants maintain homeostasis.

[*Lesson Plan*](#)

[*Program Request*](#)

CALL TO ACTION:

Students will investigate the salting practices of their school and calculate how much salt is used on school grounds during an average winter.





ESSENTIAL QUESTION:
How do greenhouse gases in the environment affect climate change?

The Chemistry of Climate Change

NGSS Performance Expectations: [HS-PS1-4](#), [HS-PS3-4](#)

Wisconsin Environmental Education standard ELS.EN7:

Students in Wisconsin will analyze the dynamic balance between natural and cultural systems.

Location: Prairie Springs Environmental Education Center

Number of Students: 75

Description:


Students will investigate how greenhouse gases cause the greenhouse effect and can lead to climate change. Students will explore how changing water temperatures affect aquatic organisms and participate in an ongoing experiment measuring the acidification of ground and surface water.

[Lesson Plan](#)

[Program Request](#)

CALL TO ACTION:

Students will work collaboratively to [make plans](#) for how the school can reduce emissions, compare their data to national averages, and work to implement the plans with building leaders.



ESSENTIAL QUESTION:
How do chemicals in water
affect organisms?

Water Quality Testing

NGSS Performance Expectations: [HS-PS1-5](#)

Wisconsin Environmental Education standard ELS.EX2:

Students in Wisconsin will evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

Location: Prairie Springs Environmental Education Center

Number of Students: 75

Description:

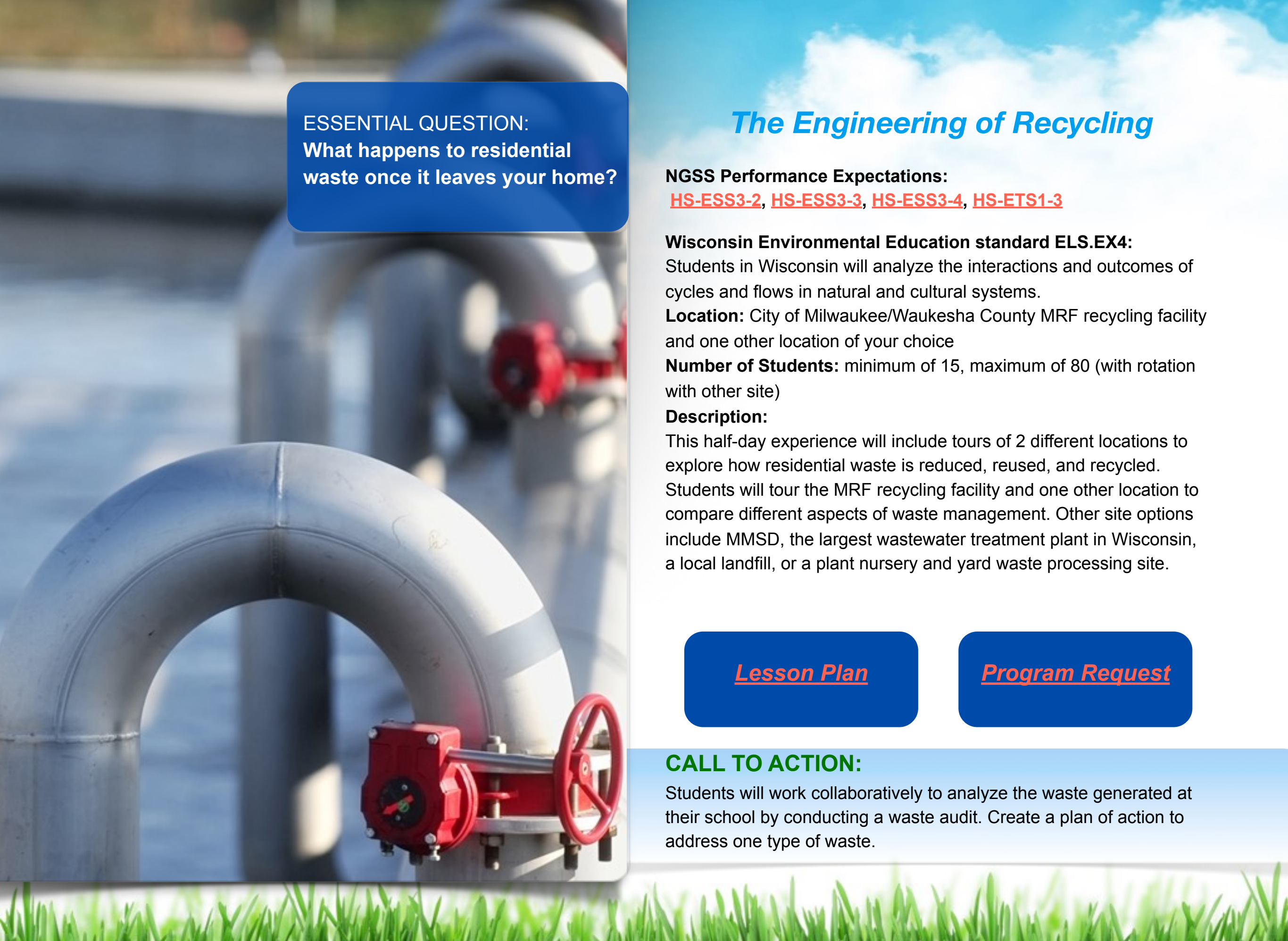
Students will assess the biological, physical, and chemical aspects of water samples to determine water quality and simulate addition of pollutants to water ecosystems to learn how these chemicals affect water quality.

[*Lesson Plan*](#)

[*Program Request*](#)

CALL TO ACTION:

Students will mark storm drains with the message, "Dump no Waste, Drains to River". Supplies are available for this activity.



ESSENTIAL QUESTION:
What happens to residential waste once it leaves your home?

The Engineering of Recycling

NGSS Performance Expectations:

[HS-ESS3-2](#), [HS-ESS3-3](#), [HS-ESS3-4](#), [HS-ETS1-3](#)

Wisconsin Environmental Education standard ELS.EX4:

Students in Wisconsin will analyze the interactions and outcomes of cycles and flows in natural and cultural systems.

Location: City of Milwaukee/Waukesha County MRF recycling facility and one other location of your choice

Number of Students: minimum of 15, maximum of 80 (with rotation with other site)

Description:

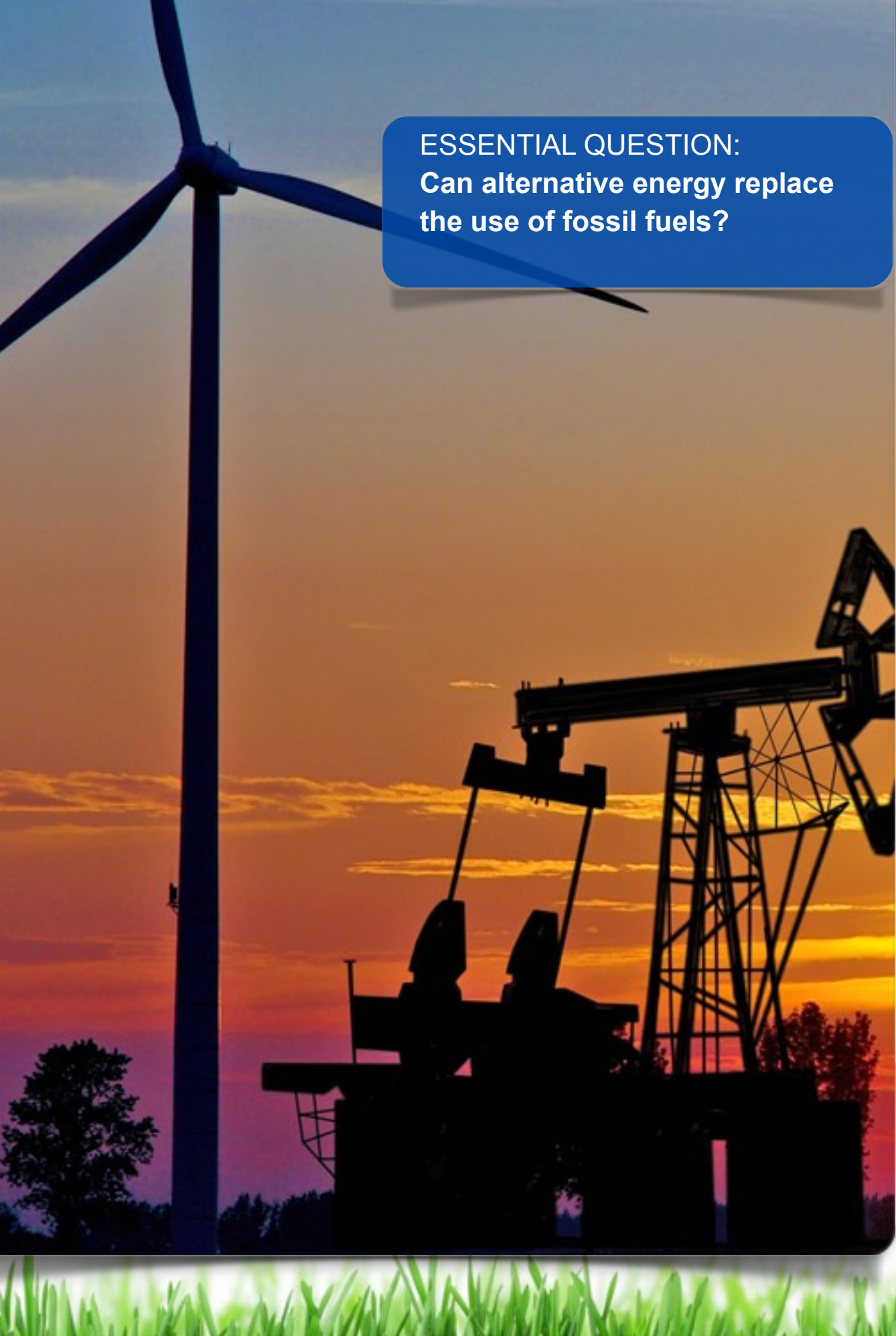
This half-day experience will include tours of 2 different locations to explore how residential waste is reduced, reused, and recycled. Students will tour the MRF recycling facility and one other location to compare different aspects of waste management. Other site options include MMSD, the largest wastewater treatment plant in Wisconsin, a local landfill, or a plant nursery and yard waste processing site.

[Lesson Plan](#)

[Program Request](#)

CALL TO ACTION:

Students will work collaboratively to analyze the waste generated at their school by conducting a waste audit. Create a plan of action to address one type of waste.



ESSENTIAL QUESTION:
Can alternative energy replace
the use of fossil fuels?

Engineering Alternative Energy for a Changing Climate

NGSS Performance Expectations:

[HS-ESS2-4](#), [HS-ESS3-1](#), [HS-ESS3-4](#), [HS-ESS3-5](#)

Wisconsin Environmental Education standard ELS.EX4:

Students in Wisconsin will be able to analyze the interactions and outcomes of cycles and flows in natural and cultural systems.

Location: Retzer Nature Center

Number of Students: 25-100

Description:


Students will explore how energy from the earth can passively heat and cool buildings through geothermal systems, discover how solar energy is captured to create energy, and experience how the earth's interconnected systems shape our climate.

[Lesson Plan](#)

[Program Request](#)

CALL TO ACTION:

Students will build a plan to lower the environmental impact of energy use at their school by reducing energy usage, using energy more efficiently, and educating the members of their community.



ESSENTIAL QUESTION:
What are some of the hidden threats to the environment and what is their impact? How can these threats be mitigated?

Hidden Threats

NGSS Performance Expectations: [HS-ESS3-5](#), [HS-ESS3-1](#)

Wisconsin Environmental Education standard ELS.C1:

Students in Wisconsin will be able to evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

Location: Retzer Nature Center

Number of Students: 25-100

Description:

Students will explore local threats to the land and water, their impacts and how these threats may be mitigated. Students will investigate invasive species threatening the ecosystems of Southern Wisconsin. Students will also explore the threats to water quality and their sources.

[Lesson Plan](#)

[Program Request](#)

CALL TO ACTION:

Students will build a plan to lower the environmental impact of these “hidden threats” at their school by reducing usage, using resources more efficiently, and educating the members of the school community.

Retzer Nature Center is over 450 acres of prairie, forest, wildlife habitat, nature trails and environmental learning facilities in Waukesha County. The state-of-the-art, 90-seat, Digistar-6 planetarium is owned and operated by the School District of Waukesha.





Carroll University's Prairie Springs Environmental Education Center and Greene Field Station are located in the Town of Genesee, about 10 miles from the University's main campus in Waukesha. The site includes a stunning new facility for teaching and research—as well as 75 acres of natural springs, wetlands, woodlands and grasslands along Genesee Creek.



Waukesha County, Waukesha School District, and Carroll University have collaborated to create a comprehensive, interdisciplinary K-12 science and environmental education curriculum fully integrated with NGSS Science and Literacy standards.

The goal of this curriculum is to create more scientifically and environmentally literate citizens with the ability to understand and critically assess current scientific and environmental issues, along with a desire and ability to engage in these issues. This project focuses on improving efficiencies through program coordination among partners as well as building comprehensive approaches.

