

STEM SIT-DOWNS

MARINA DONOVAN

Marketing is the Second M in STEM

KEY LEARNING OBJECTIVES

Students will be able to:

- **Observe** the management of rainwater runoff, water, and electricity consumption on school property.
- **Create** a video or social media campaign to increase water quality and reduce the consumption of water and electricity in their school.

OVERVIEW

In this STEM activity, students will work together in small teams to define, understand, and solve a problem that will help their school conserve energy and water. Teams will work collaboratively to evaluate their school's existing energy and water infrastructure. Through marketing and advertising techniques, teams will create a video or social media campaign to educate students about possible STEM solutions to reduce the school's energy and water usage in the future.

CONNECTION TO THE ENERGY-WATER NEXUS

- The way we manage energy and water will define the century.
- Reducing water consumption saves energy, and reducing energy consumption saves water.

NATIONAL STANDARDS

Next Generation Science Standards

- HS-ESS3-4 Human Sustainability
Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
- HS-ESS3-3 Engineering Design
Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Common Core English Language Arts

- Speaking and Listening:
SL.1: Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
- SL.2: Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

BACKGROUND

Most schools use electricity to ensure that their students have a safe, secure, comfortable, and comfortable environment conducive to learning. Encouraging students to become involved in energy and water saving processes at a young age inspires responsibility and begins a lifetime of environmental consciousness. Most people think that energy conservation is the management of electricity, but many may not realize that water consumption has a direct relationship with energy consumption. Schools use water for drinking, food preparation, flushing toilets, maintenance of grounds, and for cleaning. Before water can be used, it must be pumped and treated, which requires energy. Stormwater comes from any form of precipitation. The importance of effectively managing stormwater is important to the safety and health of our community and environment. Older schools that have an increased amount of impervious surface area may be adding more pollution to streams, rivers, creeks, and ultimately larger bodies of water and approximately 1/3 of treated water is lost in the distribution via leaky infrastructure, so detection of leaks early is important.

KEY VOCABULARY

- Infrastructure
- Runoff
- Erosion
- Stormwater
- Smart technology

MATERIALS

- Video—[STEM Sit-Down with Marina Donovan](#)
- *School Report Card* student resource
- *Marketing Campaign* student resource
- Small stickers or sticky notes for consensogram

TEACHER PREPARATION

- Copies of *School Report Card* student resource for each student
- Copies of *Marketing Campaign* student resource for each student
- Consensogram scale of 1–10 on the board or large poster paper
- Organize students into small groups of 3–4

ACTIVITY OVERVIEW

Introduce

1. Open the lesson by conducting a consensogram to assess student beliefs. Pose the following question for students to consider: How well do you think our school conserves energy? Provide students with stickers or sticky notes and have them place their stickers on a scale of 1–10 posted in the front of the classroom. Once everyone has placed their sticker or mark on the consensogram, invite students to share their rationale for their selection.
2. Explain that students are about to watch a short video that features Marina Donovan, the vice president of global marketing and public affairs for Itron, and she is using her STEM skills and knowledge to create more awareness and help cities better manage these precious resources: energy & water.

View and Reflect

1. Before the class watches the *STEM Sit-Down* video, have the students fold a sheet of paper into fourths. In each box, have students write four STEM skills that will help them succeed across all STEM careers. Ask students to discuss with an elbow partner what they think each skill means, then compare their thoughts with the explanations below.
 - *Creativity*—The ability to develop original or innovative solutions to new problems.
 - *Communication*—The ability to effectively share your thoughts, ideas, and questions and listen to and understand the messages of others.
 - *Critical Thinking*—The ability to gather and analyze information to solve problems and form conclusions.
 - *Collaboration*—The ability to work effectively, respectfully, and flexibly with others.
2. Share the *STEM Sit-Down* video. Students may find it useful to view the video more than once.
3. After viewing the video, invite students to provide examples of how Marina Donovan uses each of the four skills listed on their paper in her work.

CHALLENGE

1. Explain that the class will now be challenged to work in small teams to collect data on how well their school manages water quality, energy, and water consumption. Students may be confused as to why they are evaluating water consumption and water quality. Take a moment and make the connection between the energy-water nexus.
2. Share the *School Report Card* handout and review the instructions. Depending upon time, teams can collect data together or divide into two smaller groups.
3. When students have finished collecting data on their school report card, share the *Marketing Campaign* handout and review the instructions. Remind students that they will be using their STEM skills to

educate as many students as they can with their marketing campaign.

CONCLUDE

1. Once the *Marketing Campaign* is complete, invite students to share their campaign with the class. Students can vote on their favorite campaigns.
2. Wrap up by asking the students if they would change the placement of their sticker or mark on the consensogram after completing this lesson. Invite students to share three things that they learned, two questions that they still have, and one thing they would like to learn more about.

EXTENSION

As an extension of this activity, teach students how to read electric, gas, and water meters. Assign student groups to keep records of meter readings and monitor the results. Have students create and implement a *Save Electricity Challenge* for one month. After the challenge, check how many kilowatt-hours were saved based on the meter readings.

SOURCES

1. [Energy Saver Guide](#)
2. [Energy Efficiency](#)
3. [Stormwater Maintenance](#)
4. [Water Sense for Kids](#)

Directions: Walk around your school property to evaluate how your school is managing and conserving the use of its water and energy.

Water Quality Conservation

1. Find a satellite image of your school using Google Maps. View your school using the terrain layer option to determine where you would evaluate its range below.

1 2 3 4 5 6 7 8 9 10

(1 = entirely made of concrete)

(10 = totally forested)

2. Where does rainwater drain after hitting the parking lot?
 - Highly vegetated areas
 - Mowed or lightly vegetated drainage ditch
 - Marked storm drain (drains to water source)
 - Unmarked storm drain
3. Speak to the building service manager and determine how the school grounds are maintained.
 - Grass clippings are left on the grounds as natural fertilizer
 - Lawn fertilizer is used according to a formula after doing soil tests
 - Lawn fertilizer is used according to instructions
 - Lawn fertilizer is applied randomly
4. Your school roof drains rainwater into mostly
 - Trees, shrubs, and unmown grass
 - Mown grass
 - Bare soil or impervious surface
 - Directly into a storm drain
 - A mixture of all
5. Identify any areas of bare soil or where rainwater has carved out ditches or washed-out vegetation. The school property has
 - Very little bare soil and erosion
 - Several patches of bare soil or areas of soil erosion
 - Mostly bare soil or impervious surfaces
6. Does your school have any of these run-off control systems?
 - Green roof
 - Rain barrels
 - Constructed wetlands
 - Bioretention areas

Energy Conservation

1. Describe the appliances used in the cafeteria of your school.
 - Most of the ovens, microwaves, and refrigerators are newer and energy-efficient
 - Less than half of the ovens, microwaves, and refrigerators are newer and energy-efficient
 - Mostly has older ovens, microwaves, and refrigerators
2. Describe the amount of natural light available within your school.
 - The school has many skylights and windows in the hallways, bathrooms, classrooms, and other common areas
 - The school has windows in almost half the hallways, bathrooms, classrooms, and other common areas
 - The school does not have windows in every hallway, bathroom, classroom, and other common areas
3. Find a satellite image of your school using Google Maps. View your school using the imagery option to determine if your school has solar panels.
 - The school has solar panels that cover almost 100% of the roof
 - The school has solar panels that cover less than 50% of the roof
 - The school has no solar panels on the roof
4. Describe the type of lighting in spaces of the school that only see occasional use like bathrooms and parking lots.
 - These spaces use motion sensors that will automatically turn on and off
 - The lights always remain on in these spaces of the school
5. Describe the types of lights that are used within the school.
 - Most of the hallways, classrooms, and common areas have LED lights
 - Most of the hallways, classrooms, and common areas have fluorescent lights
 - The school uses a combination of fluorescent, standard, and LED lights

Water Conservation

1. Does your school have water bottle filling stations?
 - Yes
 - No
2. Does your school have water saving technology?
 - Yes
 - No
3. Do your bathrooms have motion sensors on the sinks that automatically turn on/off the water?
 - Yes
 - No

How can we help our schools improve water quality and conserve water and energy?

Your job is to create an online marketing campaign to help schools identify areas where they can conserve energy and water and improve water quality.

Using your school report card, work with your team to include the following criteria in your campaign.

1. Identify one way your school could improve their report card.
2. Describe a solution that would help.
3. How much will your solution cost?
4. How much energy or water could your solution save?
5. How could your solution improve water quality?
6. How will your solution benefit the school and community?
7. Develop a company name and a unique logo.



Share your findings by creating a video to post on social media using [Powtoon](#) or [Animoto](#).

Share your findings by creating an infographic to post on social media using [Canva](#), [Venngage](#), or [Piktochart](#).

Share your findings by creating a video to post on social media using [Weebly](#) or [Wix](#).