



PROJECT 1 : Designing a City of the Future

Lesson 1

Sustainably Supply Food, Water, & Energy

Learning Objectives:

1. Understand the concept of sustainability
2. Examine the impact of population growth, change in living standards and climate change on the life essentials: food, water, and energy



▶ How will cities 10, 20, 30 or more years from now meet the increasing and changing needs of the population? As the climate changes, technology grows and people’s lives evolve, how will the environmental engineers, city planners and other stakeholders manage the food, water and energy demands? In the Environmental Engineering for the 21st Century study, [Grand Challenge 1](#) explores ways to “Sustainably Supply Food, Water and Energy.”

REMOTE LEARNING SUGGESTIONS

We suggest this lesson be done collaboratively with students, discussing either in classroom or virtually. We have supplied [this student planning worksheet](#) for more independent work as needed in your implementation.

1

Start class by displaying the following questions:

What is sustainability? What does it mean to sustain?



Have students discuss and come up with a definition. Then have students list the items that are essential to life and need to be sustained. Write the responses on board and try to organize into components tied to the categories of: Food | Water | Energy

2

Tell the class they are going to explore the issues, challenges and potential solutions of these three life essentials.

Divide class into 3 groups:

1. FOOD
2. WATER
3. ENERGY



Distribute [Grand Challenge 1](#) and instruct students as follows:

Each group will read through the introduction to Grand Challenge 1 and their assigned parameter (either food, water, or energy) and as they do they will focus on two aspects:

1. The issues/challenges of the parameter
2. Potential solutions for sustainably supplying this parameter



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ISSUES & CHALLENGES



Students will read through the material and make a list challenges and issues for their parameter (food, water, or energy). Then they should display their lists on a large poster board to share with the class.

Each group will present their boards to the class. Students should take notes on the presentations. Once the presentations are completed lead a class discussion allowing students to reflect on the connections between the issues. For example: food and energy production both impact water supply through discharge of pollutants.



Students should appreciate the connected nature of these issues and understand that the solutions must include a holistic, systems-oriented approach.

POTENTIAL SOLUTIONS

With the list of challenges, students will now develop a list of possible solutions for their parameter. They should categorize their solution as to whether it is based on technological developments or behavioral changes. This list of solutions will be used for work on the Design a City Project.* An optional worksheet is included for students to organize their potential solutions.

After students complete the solutions for their group, they can break out into mixed groups and share their work. Each group will have one person from each parameter.



***Middle school students can use the graphic organizer on the following page for their note-taking.**

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Organizer Worksheet: Lesson 1

Notes for Solutions to Food, Water, and Energy Issues



Parameter: FOOD

CATEGORY

EXAMPLES

Use of Technology:

Alternative Farm Practices:

Reducing Food Waste:

Changing Dietary Patterns:

Parameter: WATER

CATEGORY

EXAMPLES

Recovery and Reuse:

Reducing Water Use:

Reimagining Aging Systems:

Parameter: ENERGY

CATEGORY

EXAMPLES

Alternatives to Fossil Fuel:

Use of Microgrids:

Redesigning Energy Storage:
