

## **WHAT GREEN MEANS: Sustainability Initiatives in New York State**

### **Overview:**

In this lesson, students will be introduced to some of the many ways in which New Yorkers at both the individual and institutional level are adopting new “green” technologies, behaviors, and policies to lessen environmental impact, increase energy efficiency, and promote a more sustainable economy.

In the Introductory Activity, students will test their own prior knowledge of some of the environmental challenges faced by a major modern city by playing an interactive about New York City’s waste management system. The Learning Activities focus on promoting discussion about a series of video clips state from the PBS special *Going Green New York* depicting green initiatives throughout New York City. In the Culminating Activity, students are challenged to develop a concept for a green business of their own based upon what they have learned.

**Grade Level:** 9-12

**Time Allotment:** Two 45-minute class periods

**Subject Matter:** Social Studies, Environmental Studies

### **Learning Objectives:**

Students will be able to:

- Describe the complex waste management challenges of a major metropolitan area and suggest improvements.
- Explain the nature and benefits of wind power
- Contrast the environmental efficiency of mass transit systems against that of automobiles
- Articulate the environmental benefits of organic, locally grown food.
- Synthesize “green” technologies, behaviors, and policies into an environmentally sustainable business model.

### **Standards:**

From the Excellence in Environmental Education Guidelines for Learning available at: <http://www.naaee.org/programs-and-initiatives/guidelines-for-excellence/materials-guidelines/learner-guidelines>

Strand 2.3—Humans and Their Societies

Guidelines:

A) Individuals and groups—Learners understand the influence of individual and group actions on the environment, and how groups can work to promote and balance interests.

- Predict how the environmental effects of their personal actions might change over time. Consider variables such as technological advances, lifestyle changes, or taking on such roles as business owners, employees in various careers, or parents.

- Analyze how the actions of societal organizations such as businesses or community groups may have environmental consequences and other impacts that go beyond the intended aims of the group.
- Describe how particular groups meet or balance individual needs, group goals, and the common societal good. Use examples such as conservation organizations, organizations of professionals in environmental or resource management fields, community associations, or business groups.

#### Strand 2.4—Environment and Society

##### Guidelines:

A) Human/environment interactions—Learners understand that humans are able to alter the physical environment to meet their needs and that there are limits to the ability of the environment to absorb impacts or meet human needs.

- Evaluate ways in which technology has changed humans' ability to alter the environment and its capacity to support humans and other living organisms. Consider technologies that have had impacts learners see as positive, as well as negative.
- Use the concepts of carrying capacity and ecological footprint to analyze the sustainability of current trends in world population growth and natural resource consumption.

C) Resources—Learners understand that the importance and use of resources change over time and vary under different economic and technological systems.

- Identify ways in which various resources can be recycled and reused.
- Evaluate the viability of recycling based on economic and technological factors, spatial variables such as distance from recycling facility to markets, and possible future developments. For example, discuss factors that influenced the development of the steel or plastics recycling industry in the United States.

#### **MEDIA COMPONENTS:**

*Going Green New York*, selected segments. To view the clips below, go to:  
<http://www.thirteen.org/going-green-new-york/educational-video-segments>

#### **Clip 1: “The Future at Stake”**

An introductory overview of *Going Green New York*.

#### **Clip 2: “Winds of Change”**

A description of how new wind turbines are generating power—and jobs—in upstate New York.

#### **Clip 3: “Solar Subways?”**

A tour of New York City’s new green subway station at Coney Island in Brooklyn.

#### **Clip 4: “Eating Green”**

The green philosophy and business model of an organic baker in Manhattan.

## Websites:

### “The Garbage Game”

<http://www.gothamgazette.com/games/garbage.php>

An interactive game developed by The Gotham Gazette in which students are challenged to make decisions about how to dispose of New York City’s waste both as an individual consumer and as the city’s sanitation commissioner.

## Materials:

For each 5 person group:

Computer with internet access

For each student:

“The Garbage Game” student organizer

## Prep for Teachers:

Prior to teaching this lesson, you will need to:

- Preview the video segments and website used in the lesson.
- Download the video clips used in the lesson to your classroom computer, or prepare to watch them using your classroom’s internet connection.
- Bookmark the website used in the lesson on each computer in your classroom. Using a social bookmarking tool such as [del.icio.us](http://del.icio.us) or [diigo](http://diigo) (or an online bookmarking utility such as [portaportal](http://portaportal)) will allow you to organize all the links in a central location.
- Print out and make enough copies of the “Garbage Game Student Organizer” for your entire class.

## INTRODUCTORY ACTIVITY

1. Divide the class into groups of five students and assign each group to a computer logged onto “The Garbage Game.” Explain that this interactive specifically simulates the environmental challenges that New York City residents face in disposing of their garbage, but that most of the concepts are universally applicable. Explain that for this activity, each group will be using their own collective judgment to try and determine the most environmental friendly—or “green”—manner in which to dispose of their garbage—EXCEPT FOR ONE GROUP, which will be assigned to make what they think are the WORST environmental choices throughout the interactive. Tell students that the interactive is essentially a series of multiple choice questions, and that for each choice their group makes, each individual should write down his or her own rationale for it on “The Garbage Game Student Organizer,” starting with the page of the interactive asking what should be done with empty plastic water bottles. Explain to students that as they

will learn in the course of the interactive, New York City has not yet adopted many of the most environmentally friendly options, and that they should keep track of ways in which the city could become more green by writing them down in the space provided at the bottom of the student organizer.

2. After allowing a half hour for the groups to complete this activity, invite each group to share their results. Which group's waste management plan performed best in each ranking? Did the most environmentally friendly results (i.e. those with the lowest garbage volume and CO<sub>2</sub> emissions) cost more? How did the group assigned to make the least environmentally friendly decisions compare? Was their waste management plan more or less expensive than the others? (*Probably less.*) Ask students why they think adopting environmentally friendly policies might be economically difficult or politically controversial. (*Accept all answers.*)

3. Tell students that they will now be looking at a series of segments excerpted from the PBS program ***Going Green New York***. FRAME Clip 1—“The Future At Stake”—by explaining that this opening segment is a quick montage depicting some of the many different ways in which New Yorkers are meeting today's challenges of environmental sustainability. FOCUS students' attention during the clip by asking them to identify as many of these new green behaviors and technologies as they can. PLAY Clip 1.

4. FOLLOW UP the clip by asking students to identify as many of these new green behaviors and technologies as they can. (*Answers will vary but should include wind turbines, mass transit, green construction, recycling, bicycling, hybrid and fuel cell vehicle technology, CFL light bulbs, and solar panels.*) Tell students that the rest of the lesson will be spent taking a closer look at some of these ways in which New York state—from the Canadian border to Coney Island—is “going green.”

## LEARNING ACTIVITIES

1. Explain to students that increased scientific understanding of the planet's fragile ecology and finite resources is helping us to recognize that the very survival of humanity depends on finding a balance and harmony between our own civilization and the natural world. Ask students what they think some examples of that science might be. (*Accept all answers, but encourage an understanding that global climate change caused by human consumption of finite resources like fossil fuels is now widely regarded in the scientific community as a fact.*) Ask students what they think some consequences of global climate change might be. (*Answers will vary but should include temperature changes, melting polar ice caps and rising sea levels.*)

2. Explain that a highly-charged political controversy about the causes, solutions, and even the very existence of global climate change exists in the United States, but that this lesson will not delve into that debate. Tell students that something almost everyone can agree upon is that we live on a planet of finite fossil fuels, and that it is in everybody's interest to both conserve those resources and harness newer, more renewable resources

wherever possible. Ask students if they understand what the term “renewable” means in this context. (*Renewable energy is naturally, continually replenished by the environment rather than being depleted, like fossil fuels.*) What would be some examples of renewable energy? (*Answers should include solar, hydroelectric, and wind.*) Tell students that another common term for renewability is “sustainability”—a term which has come to define an increasingly popular brand of environmentalism that emphasizes a healthy long-term balance between the natural world and human society.

3. FRAME Clip 2—“Winds of Change”—by explaining that it portrays a new effort in Plattsburgh, New York to harness a renewable energy resource that is plentiful in the state’s rural north: wind. FOCUS students’ attention as they watch the clip by asking them what the benefits of new wind-harnessing turbines are for Plattsburgh and New York State more generally. PLAY Clip 2.

4. FOLLOW UP the clip by asking students what the benefits of new wind-harnessing turbines are for Plattsburgh and the New York State more generally. (*Answers should include the following main points: A) Each turbine generates enough “clean” electricity to power 400 homes annually—equivalent to the energy generated by burning 1300 tons of coal—which contributes to lower power costs for the entire state; B) Noble Environmental Power—the company which owns and operates the wind turbines—rents the land on which they’re built from local landowners like store owner Dick Dykos for \$6,000 per turbine per year; and C) wind turbines contribute to the otherwise depressed local economy by providing turbine construction and maintenance jobs.*)

5. Ask students where most of the energy produced by rural wind turbines like those near Plattsburgh will ultimately be consumed? (*Cities like New York City.*) Ask students if they think cities are good for the environment. (*Accept all answers.*) Explain that for most cities (and indeed most of the populated world), it’s already too late to preserve the environment as it existed before humans; great cities have long since transformed every inch of the land on which they’re built, paving over much of it; even “natural” urban environments like parks are generally artificial, constructed landscapes. Remind students however, that preservation of natural environments is only one dimension of environmentalism, however, and that much of today’s “green” initiatives focus more on the efficient use of energy resources—something that cities actually do better than suburban and even rural communities. Ask students why they think this might be. (*Accept all answers.*)

6. FRAME Clip 3—“Solar Subways?”—by telling students that the next clip they will be looking at explores how New York City’s Metro Transit Authority helps make living in the nation’s largest city so energy efficient. FOCUS students’ attention while watching the first part of the clip by asking them approximately how many automobiles the MTA’s subways keep off the road every day by providing mass transportation for commuters. PLAY Clip 3.

7. PAUSE the clip after Rafael Pi Roman says “How can a transit system with roughly 6500 trains using enough electricity to travel the equivalent of 350 millions miles of track

a year even begin to call itself energy efficient?” FOLLOW UP the clip by asking how many cars the MTA’s subways keep off the road annually by providing mass transportation for commuters. (*800,000 to one million cars annually.*) Ask students how they would answer Pi Roman’s question: How can a transit system with roughly 6500 trains using enough electricity to travel the equivalent of 350 millions miles of track a year even begin to call itself energy efficient?” (*While the MTA’s subway consumes vast amounts of energy as Con Edison’s #1 client, so many people use it that the average consumption per person is much lower than if all those people drove to work.*) Ask students if they think the same principle of efficiency applies to the MTA’s bus fleet? (*It does.*) Point out that the MTA’s buses also use hybrid gas/electric engines to further improve energy efficiency. FOCUS students’ attention for the remainder of the clip by asking them how the new Stilwell Avenue station in Coney Island is further improving the MTA’s energy efficiency? PLAY Clip 3 through to the end.

8. FOLLOW UP the clip by asking students how the new Stillwell Avenue station in Coney Island is further improving the MTA’s energy efficiency? (*2730 solar panels generate 15% of the station’s energy needs.*) How much did this cost? (*\$200 million.*) How does the MTA’s Chief Environmental Engineer Thomas Abdallah justify such an expense in the midst of an economic downturn? (*The new station has stimulated new development and investment in the neighborhood.*) Ask students if this rationale reminds them of the effect that wind turbines have had upstate in Plattsburgh? (*Yes. In both cases the expense of new green technologies is in part being justified by the indirect economic stimulation they bring to otherwise depressed areas.*) Explain that on the current recession, green initiatives are increasingly having to justify their existence not only in environmental but economic terms, and that the race—within and between nations—to develop and implement more environmentally sustainable technological infrastructure is increasingly being seen as a major economic driving force in its own right.

9. Explain that while large-scale state and corporate funded investments like wind turbines and mass transit are essential components of today’s greening economy, private individuals are also playing an increasingly prominent role by prioritizing environmentally sustainability in their own lives and businesses, giving new meaning to the classic environmental slogan: “think globally, act locally.” Ask students for some examples of everyday environmentalism they’ve already encountered in this lesson. (*Answers will probably include recycling and composting.*) FRAME Clip 4—“Eating Green”—by explaining to students that they are about to be introduced to an increasingly popular way to incorporate sustainability into everyday life: local food. FOCUS students’ attention as they watch the clip by asking them why local food is environmentally sustainable. PLAY Clip 4.

10. PAUSE clip after Raphael Pi Roman says “Even New York City restaurants are getting on the bandwagon, and doing good business at the same time.” FOLLOW UP the clip by asking students why locally grown food is environmentally sustainable. (*Because the closer food production is to its eventual consumption, the fewer energy resources it requires for transportation by truck, train, boat, or plane.*) FRAME the next part of the clip by telling students that they are about to meet Maury Rubin, whose City Bakery was

one of the first restaurants in New York City to make locally produced, organic food a priority. FOCUS the students' attention by asking them why the ingredients used by City Bakery are environmentally sustainable. PLAY the next part of Clip 4.

11. PAUSE the clip after Rubin checks out at the Union Square Green Market, and immediately ask what small green gesture Rubin just made in the video. (*He emptied the plastic bag he's been using, presumably to reuse it.*) FOLLOW UP the clip by asking students why the ingredients Rubin uses at City Bakery are more environmentally sustainable. (*Local, seasonal ingredients require less transportation from farm to consumers, and organic ingredients are less energy intensive than industrially grown.*) FRAME the remainder of the clip by explaining that in 2005, Rubin started a new bakery chain called Birdbath. FOCUS students' attention on how Rubin has made Birdbath a "99% green" business. PLAY Clip 4 through to the end.

12. FOLLOW UP the clip by asking students how Rubin has made Birdbath a "99% green" business.

(*Answers should include the following: wheatboard and recycled plastic/banana fiber furnishings, milk-based paint, a recycled counter made of paper and a wooden shipping crate counter, a bicycle rickshaw for delivery, self-composting in a community garden.*) Ask students if it is more expensive to run a business following all these green principles? (*Yes. 20-25% more in overall operating costs.*) Why does Rubin think it's worth it? (*A new, more valuable, more long-lived business with a bright future as more people "go green" themselves.*) Ask students if they think a small, independent baker like Rubin can have much of an environmental impact? (*Accept all answers, but point out, as Rubin did, that there are 20,000 food businesses in NYC—each generating 30 tons of food waste a year; if they all adopted the same practices of composting and recycling, the impact on New York City could theoretically generate 600,000 tons of new crop-growing soil rather than sending it to landfills.*) Ask students what percentage 600,000 tons would represent of their overall garbage generation in their results for "The Garbage Game" that they played in the Introductory Activity." (*Accept all answers.*) Do they think that percentage is significant?

## **CULMINATING ACTIVITY**

Divide the class into groups of 4 or 5. Explain that just as Maury Rubin did back in 1991, each group will now be developing an idea for some kind of small local business with a positive environmental impact. Explain that these can be any type of business, but that they should all incorporate the "green" behaviors and/or technologies they've seen demonstrated in the video clips and already noted on their "Garbage Game" student organizers, as well as any other ideas that the group can think of. Allow each group a half hour of class time to brainstorm and develop their ideas (this activity may also be assigned as homework) before presenting their business to the class for evaluation and discussion.

**THE GARBAGE GAME**  
**Student Organizer**

1. What should individuals do with empty plastic water bottles?  
Why?
2. What should individuals do with fraying bathroom towels?  
Why?
3. What should individuals do with apple cores and other organic waste?  
Why?
4. What should individuals do with dirty diapers?  
Why?
5. What should individuals do with junk mail?  
Why?
6. Where should the city send collected recyclables?  
Why?
7. Where should the city send the raw materials made from processed recyclables?  
Why?
8. Where should the city send collected, unrecyclable garbage?  
Why?
9. What was the total cost of your group's waste management plan?
10. What was the total volume of garbage in your group's waste management plan?
11. What were the total CO<sub>2</sub> emissions generated by your group's waste management plan?
12. List some ways in which New York City's recycling and waste management system could be improved: