

FACILITATOR GUIDE

BREATHTAKING VIEWS FROM THE EDGE

OBJECTIVES

Students will:

- **Understand** the unique elements that went into designing Edge
- **Analyze** how the sustainable practices in place at Hudson Yards minimize environmental impact
- **Create** an illustration of what they think their Edge experience will look like

PICTURE THIS...

It's a clear, sunny day. You emerge from an elevator and are greeted by a sky of light. You walk through the tall glass doors and keep walking until you're at the apex of two glass walls. You think that this must be what it feels like to be at the bow of a massive ship. You can see for miles in every direction, floating 100 stories above the island of Manhattan. It is like you are on the edge of the world. This dream is about to become a reality. Prepare yourself for the experience of a lifetime: visiting Edge.

This facilitator's guide will help you and your students make the most out of this encounter. Before the visit, you will provide students with historical information about the Hudson Yards neighborhood of New York. Then, you will guide them through a visualization exercise where they draw what they imagine some of the most remarkable elements of Edge to look like. During the visit, students will participate in a scavenger hunt where they will identify the elements they visualized in the prior exercise. Finally, students will reflect on their visit and design a structure that has some of the same innovative features of Edge that could benefit their own community.

VISUALIZE

Before your visit to Edge

GUIDING QUESTION

What do you think it will be like to stand on the Edge of the world?

OVERVIEW

In Visualize, students engage with the history of Hudson Yards and learn about the revolutionary construction of Edge, the tallest outdoor observation deck in the world. Students will examine the sustainable practices that engineers used to make Hudson Yards a neighborhood of the future. Then, they will participate in a visualization exercise where they illustrate what they think the most remarkable elements of Edge will look like.

REACH FOR THE SKY

MATERIALS

- Computer with access to the internet
- Index cards (one per student)
- Pencils
- Sketch paper (five pieces per student)
- Coloring utensils (colored pencils, markers, crayons)
 - Optional extension: Students can create their visualizations using the computer app [TinkerCAD](#).

INSTRUCTIONS

Inform students that they will soon be visiting Edge, a remarkable attraction located at 30 Hudson Yards. Explain that today's activity will provide students with important background information that will prepare them for their visit. This pre-visit activity will be divided into two parts:

- Part I: Sustainable Solutions
- Part II: Imagining Innovations

Part I: Sustainable Solutions

1. Give each student an index card and writing utensil. Explain that you are about to read a passage from the webpage [Hudson Yards, a Sustainable Neighborhood](#). After you read the passage, you will ask students to answer a series of five questions on their index cards.

2. Read the following excerpt:

Hudson Yards was designated Manhattan's first LEED Gold neighborhood development on Earth Day 2019. The designation, by the U.S. Green Building Council, is a global recognition of achievement and leadership in the area of sustainability. The group also recognized the individual buildings—10, 15, 20, 30 and 55—for their sustainable design and construction. And no wonder: innovative sustainability was a driving force behind the planning of Hudson Yards—from its infrastructure to the buildings themselves. The resulting development, with a first-of-a-kind microgrid, stormwater reuse, five acres of public green spaces, pedestrian-friendly design and easy access to public transportation, has set the standard for forward-thinking, low-impact urban planning.

Toward that end, Hudson Yards is continuing its commitment by supporting eco-friendly waste and energy efforts, identifying recycling opportunities and encouraging compost throughout the campus.

3. Instruct students to label their index cards with the numbers one through five. Then, ask the following five questions. Pause after each question so that students can write down their responses.
 - **Question 1:** What designation did the neighborhood of Hudson Yards achieve in 2019?
 - **Question 2:** Who awarded Hudson Yards with this designation?
 - **Question 3:** What two words describe the driving force behind the design of Hudson Yards?

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- **Question 4:** Name at least three of the sustainable initiatives present at Hudson Yards.
 - **Question 5:** Name at least one way Hudson Yards is looking to continue its commitment to sustainability.
4. When students have finished writing, review each question out loud. Ask student volunteers to provide their responses. As you collect responses, share the answers to the questions:
- **Question 1:** What designation did the neighborhood of Hudson Yards achieve in 2019?
LEED Gold
 - **Question 2:** Who awarded Hudson Yards with this designation? **U.S. Green Building Council**
 - **Question 3:** What two words describe the driving force behind the design of Hudson Yards?
Innovative sustainability
 - **Question 4:** Name at least three of the sustainable initiatives present at Hudson Yards.
First-of-a-kind microgrid, stormwater reuse, five acres of public green spaces, pedestrian-friendly design and easy access to public transportation.
 - **Question 5:** Name at least one way Hudson Yards is looking to continue its commitment to sustainability. **Supporting eco-friendly waste and energy efforts, identifying recycling opportunities and encouraging compost throughout the campus.**
5. Now, tell students that one important aspect of their visit will be identifying and learning more about the sustainable initiatives at Hudson Yards. In the next section of this activity, students will sketch what they think these sustainable initiatives will look like.

Part II: Imagining Innovations

1. Ask students to take out five pieces of sketch paper. Distribute coloring utensils. Explain that students will now participate in an exercise where they will visualize what the cutting-edge sustainable innovations at Hudson Yards will look like.
2. Instruct students that you will read out the five sustainable initiatives listed in Question 4 of the quiz. After you read each initiative out loud, you will provide students with three minutes to sketch it on their paper.
3. Read out each of the following initiatives, providing 3 minutes after reading each one for students to sketch their visualizations.
 - The Hudson Yards microgrid (Hint: This is an energy system that supports a local area and can disconnect from a traditional power grid and operate independently; microgrids can often be more environmentally-friendly than traditional power grids)
 - Stormwater reuse
 - Five acres of public green space
 - Pedestrian-friendly design
 - Easy access to public transportation
4. When you have read out each initiative and students have sketched their visualizations, invite a few volunteers to share.

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5. Conclude the activity by asking students to pair up with a classmate. In their pairs, allow students to reflect on the following three questions:
 - What are you most looking forward to about your visit to Edge at Hudson Yards?
 - What is one question you have about Edge that you hope to answer during your visit?
 - What sensory experiences do you think you will have at Edge: sight, smell, sound, touch and taste?

OBJECTIVES

Students will:

- **Apply** what they learned in the Visualize activity to their visit experience.
- **Analyze** the different elements of Edge and how they come together to create a one-of-a-kind building.
- **Evaluate** their experience using the A-E-I-O-U Discovery SOS strategy.

IDENTIFY

During your visit to Edge

GUIDING QUESTION

How does your visit to Edge surpass your expectations?

OVERVIEW

Identify takes place during students' visit to Edge. This section of the guide is full of interesting facts about the building that you can share as you conduct your visit. Students will be able to engage with the architectural wonder on a deeper level as they complete a scavenger hunt. Finally, the activity includes a reflection that will help students synthesize their experience and prepare for the final section: *Reflect*.

MATERIALS

- "Identify" Capture Sheet (one per student)
- Writing utensil (one per student)
- Optional extension: Students can use their smartphones to take pictures during their visit.

INSTRUCTIONS

Before you begin your visit to Edge, inform students that you will share interesting facts with them as they progress through the experience. Tell students that you will also be distributing capture sheets and pencils right before you enter the building. They will use these to conduct a scavenger hunt. At the end of the visit, you'll be collecting these capture sheets. Before you journey home, you'll invite students to reflect on their experience using the A-E-I-O-U strategy.

1. When you are outside of Edge getting ready to go in, share the following facts with students (Note: You can make the facts more engaging by asking students to guess the answers before sharing):
 - Edge is 1,130 feet high (over 100 stories tall)!
 - Edge is the highest outdoor observation deck in the western hemisphere.
 - Edge is open every day of the year.

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- Edge has a snow melt system underneath the sky deck floor so when it snows it melts so there's no need to shovel!
2. Before you enter, distribute one capture sheet and one writing utensil to each student. Provide students with 5–10 minutes to review the scavenger hunt instructions on the capture sheet and see if they can identify any of the elements on the sheet in the area surrounding Edge.
3. Once students have had 5–10 minutes to explore, reconvene, and prepare students to go inside. Proceed to the fourth floor to The Shops at Hudson Yards to the entrance of Edge.
4. Before taking the ride up to Edge in the elevator, students will walk through immersive rooms that explain how Edge was constructed. Be sure to highlight the following facts:
 - The entire Hudson Yards development rests on a bed of concrete and steel that floats above the ground. The platform is held up by 289 concrete columns called caissons.
 - As Hudson Yards was being built, the trains that flowed through the tunnels underneath the buildings never stopped running.
 - Hudson Yards is home to 30,000 species of plants that are native to New York, including a forest of 300 mature trees.
 - The soil at Hudson Yards is "smart," meaning that it is carefully formulated with special chemistry and biology. It has layers for aeration, irrigation and drainage.
 - Tubes below the soil circulate cooling liquid through a sealed concrete slab in order to insulate the plants from the incredibly hot train yard below them.
 - All of the trash at Hudson Yards gets collected underground and compacted, which keeps trash and garbage trucks off the road.
 - Filtration systems pull fresh air into the buildings and filters catch dust and bacteria before they have a chance to enter.
 - 15 jet engine fans move the heat generated by trains and circulate fresh air into the area underneath the ground. This makes it possible for rail workers to do their jobs without getting overheated.
 - Hudson Yards collects and stores 10 million gallons of rainwater every year in a tank underneath the development. They use this to water the plants and trees on the property.
 - The rainwater harvesting helps to conserve water, reduces stress on the New York City sewer system and keeps the Hudson River clean. It also saves 6.5 megawatt hours of energy and offsets 5 tons of greenhouse gas emissions every year.
5. Make your way to the elevators. Before you enter, inform students that their elevator ride will be less than 1 minute long. This journey will include a video that shows the history of New York City come to life. Here are some facts you can share:
 - The fourth and fifth floors of Edge are exact copies of one another. This allows for better crowd control.

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6. When the elevator ride is over, the doors will open and you will be immediately greeted by the view from the sky. Provide students with 3–5 minutes to walk around the interior space before heading outside to the observation deck.
7. When everyone is ready, gather students and inform them that you are about to proceed outside. Once outside, you'll provide students with 30 minutes to walk around and explore. Remind students that they'll need to complete their scavenger hunt capture sheets as they observe Edge. When they are ready to reflect and discuss, students should head to the stairs and wait for next steps.
8. Invite students to head outside. Here are some other facts and features that you can share with your students, as they discover Edge:
 - The deck consists of 15 sections that are bolted together and anchored to the east and south sides of the building. The observation deck extends 80 feet from the building at its furthest point.
 - Believe it or not, the strongest part of the platform is the glass floor! Look down to the bustling streets of New York City below you and see if you can spot a yellow cab.
 - The sky deck is surrounded by angled glass (with gaps for wind flow) that make you feel as though you can reach out and touch the city.
 - Edge contains 7,500 square feet of open air space, making it seem like an outdoor plaza in the sky.
 - On a clear day you can see up to 80 miles into the distance!
9. When students have finished exploring, have them gather around you. Instruct each student to find a partner. With their partner, have students walk through the A-E-I-O-U Discovery SOS strategy. This looks like:

A = Adjective: List something you saw or learned

E = Emotion: Describe how the visit made you feel

I = Interesting: What is something you found interesting during the visit

O = Oh!: Describe something that made you say "Oh!"

U = Um?: What is a question you have after your visit?
10. As students discuss their A-E-I-O-U with their partner, have them write it down on their *Identify* capture sheet.
11. Prepare students to head back to the elevator by providing them with a reflection question that they'll carry with them into the final activity: What did you learn at Edge that you can apply in your own community?

REACH FOR THE SKY

OBJECTIVES

Students will:

- **Remember** the different innovations they experienced during their visit to Edge
- **Evaluate** the innovations and select one that they think could improve their community
- **Create** a prototype sketch that demonstrates how the innovation could be implemented in their community

REFLECT

After your visit to Edge

GUIDING QUESTION

What did you learn at Edge that you can apply in your own community?

OVERVIEW

Reflect encourages students to dig into one of the urban innovations they learned about at Edge. This might be the "smart" soil, the incorporation of public green space, the excellent access to public transit, an engineering feat used at Hudson Yards to build a sky deck in the sky, or anything else that caught their interest. Students will research their urban innovation, develop a prototype of how that innovation could be implemented in their community, and share their work with their peers.

MATERIALS

- Students' drawings from the *Visualize* activity
- Photos from your visit to Edge (if available)
- Completed *Identify* capture sheet
- *Reflect* capture Sheet
- Graph paper
- Pencils

INSTRUCTIONS

When you have returned from your visit to Edge, reconvene your students for this reflection exercise. Students will begin by reviewing the drawings of sustainable solutions that they created in the *Visualize* activity. They will compare and contrast their visualizations with the solutions they saw in action at Edge. Next, students will review the *Identify* capture sheet they completed during their visit. They'll select one of the urban innovations they experienced and research it further. Finally, students will develop a prototype of how their selected urban innovation can be implemented in their own community and share their idea with their peers.

This activity is divided into three sections:

- Part I: Research
- Part II: Prototype
- Part III: Share

REACH FOR THE SKY

PART I: RESEARCH

1. Invite students to gather the following materials:
 - The drawings they created during the *Visualize* activity.
 - Any photos they might have taken during their visit to Edge.
 - Their completed scavenger hunt, as recorded on their *Identify* capture sheet.
2. Once students have gathered their materials, divide them into groups of four. Then, direct students to review their previous drawings of what they thought the sustainable solutions at Hudson Yards would look like. Instruct students to take turns in their groups, sharing what they thought the sustainable solutions would look like and then how that compared to what they actually saw. Invite students to share the photos they took during the trip as evidence to support their claims.
3. When all students have shared their drawings, instruct them to take out their completed scavenger hunts. As a group, students must choose one of the urban innovations they experienced at Edge to implement in their own community. Provide groups with five minutes to review their scavenger hunts and select which urban innovation they will prototype. Ask each group to share out which innovation they chose.
4. Give groups 10–15 minutes to research their innovation.

PART II: PROTOTYPE

1. Distribute graph paper and pencils to the student groups. Provide each student with a copy of the *Reflect* student capture sheet.
2. Explain that students will now engage in an engineering design challenge where they will attempt to reformat their selected urban innovation into a system that would work in their own community. To do this, students must complete the *Reflect* capture sheet together as a group. Then, they will work together to develop a prototype sketch of their innovation that adheres to the criteria and constraints listed on the *Reflect* capture sheet.
3. Give students with 30 minutes to complete the *Reflect* capture sheet and work in their groups to develop their prototype sketches.

PART III: SHARE

1. Invite each group to share their prototype. As they share, groups should be sure to highlight the following elements:
 - What the urban innovation is that they selected
 - How the urban innovation looked and functioned at Edge and Hudson Yards
 - Why they selected the innovation for their community
 - How they would implement the innovation
 - Criteria for how they would determine whether or not the innovation is successful

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2. While groups present their innovations, encourage students in the audience to ask questions by using the following question format:

I like how you _____. What if you _____?

3. Conclude the activity by guiding students through a discussion using the following questions:
 - Now that you've experienced Edge, what do you think the future of cities will look like?
 - What elements of Hudson Yards do you think could be used to help other cities and towns become more sustainable?
 - If you visited Edge again, what would you do differently?
 - What advice would you give to other students and visitors of Edge?

NATIONAL STANDARDS

Next Generation Science Standards

- **HS-LS2-7 Ecosystems: Interactions, Energy, and Dynamics**
Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*
- **HS-ESS3-4 Earth and Human Activity**
Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.*
- **HS-ETS1-2 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.
- **HS-ETS1-3 Engineering Design**
Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

Common Core: ELA

CCSS.ELA-LITERACY.SL.9-10.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

- **CCSS.ELA-LITERACY.SL.9-10.1.A**
Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
- **CCSS.ELA-LITERACY.SL.9-10.1.B**
Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.

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- **CCSS.ELA-LITERACY.SL.9-10.1.C**
Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.
- **CCSS.ELA-LITERACY.SL.9-10.1.D**
Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
- **CCSS.ELA-LITERACY.SL.9-10.2**
Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

INSTRUCTIONS

1. As you visit Edge, find as many elements listed in this scavenger hunt as you can. Make sure you look all around and listen closely to the facts that are being shared along the way—they will contain clues!
2. When you find an element on the scavenger hunt list, make an "X" in the "Found?" column of the table. Then, write the location where you found it in the "Location" column. Finally, write a brief description about it in the "Description" column.
3. Pay special attention to the sustainable innovations present at Edge. Think about how these compare to the sketches you visualized.
4. When you're finished with the scavenger hunt, find a partner for the "A-E-I-O-U" activity. This looks like:
 - A: Adjective—list something you saw or learned
 - E: Emotion—describe how the visit made you feel
 - I: Interesting—what is something you found interesting during the visit
 - O: Oh!—describe something that made you say "Oh!"
 - U: Um?—what is a question you have after your visit?
5. Record your AEIOU observations in the space allotted.

	Found?	Location	Description
Train			
Accessibility features (ramps, elevators, etc.)			
A subway entrance at Hudson Yards			
An example of stormwater reuse			
An example of public green space			
An example of pedestrian-friendly design			
A map of Manhattan			
A caisson			
A restaurant menu			

	Found?	Location	Description
A safety feature			
A gap between two glass panels			
An apex			
Drainage vents			
A bridge			
A Manhattan landmark			
The East river			
The Hudson River			
A construction site			
Someone taking a selfie			
The Statue of Liberty			

A: Adjective

What is an adjective that describes something you saw or learned?

E: Emotion

How did the visit make you feel?

I: Interesting

What is something you found interesting during the visit?

O: Oh!

What is something you experienced during your visit that made you say "Oh!"?

U: Um?

What is a question you have after your visit?

INSTRUCTIONS

1. Begin by answering the questions below:

Group members: _____

Innovation your group will prototype: _____

2. List the top five takeaways of your research here:

- 1.
- 2.
- 3.
- 4.
- 5.

3. Explain the proposed benefit that your innovation will have on your community:

4. Fill in the table with ways your innovation will be similar to what you saw at Hudson Yards, and ways that it will be different.

Similarities	Found?

5. Working with your group members, sketch a prototype of your innovation on the graph paper provided. Your prototype must adhere to the following criteria and constraints:

- It must improve your community in a specific and measurable way
- It must be designed for a specific area within your community
- Its function must be demonstrated in your sketch