



PROJECT 1 : Designing a City of the Future

# Lesson 2

## Curb Climate Change and Adapt to Its Impacts

### Learning Objectives:

1. Understand the science of climate change
2. Appreciate the impacts/consequences of climate change
3. Categorize and analyze strategies in reference to mitigation versus adaptation



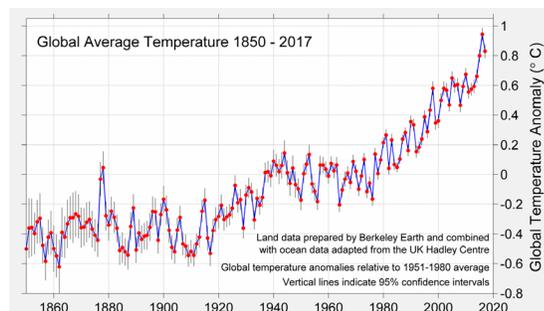
▶ With temperatures rising around the globe, extreme weather patterns, forest fires and floods, climate change is affecting our lives. How will cities change to adapt to climate change? What can be done now to mitigate the changes? How will these changes affect the design of cities in the future? In the Environmental Engineering for the 21st Century study, Grand Challenge 2 explores ways to “Curb Climate Change and Adapt to Its Impacts”.

1

Start class by displaying the following:

**Global Average Temperature 1850-2017 graph [Fig. 2-1]**

**Free Write: Instruct students to observe the graph and then write for 5 - 7 minutes.**



\* Middle school students may need more guidance. They should be instructed to make a T-chart on their note page with the headings “I notice” and “I wonder” to help facilitate their response. The free write activity is designed to let students explore their knowledge, thoughts and ideas about climate change. Students will most likely have some knowledge of the sources and impacts of climate change.

2

**Discussion: Have students share their writing.**

**As they do, organize their ideas on the board into two lists:**

- 1) Physical changes expected from climate change and
- 2) Impacts/Consequences

Then have students read pages 26 - 27, and pages 35-36 of the report. Students should add ideas/concepts from the reading to the list developed by the class in terms of sources and impacts of climate change.

Discuss whether these impacts are evenly distributed across the world’s populations or whether some groups and locations may be more impacted than others.





PROJECT 1 : Designing a City of the Future

# Lesson 2

## Curbing Climate Change and Adapt to Its Impacts

Introduce the terms: Mitigation and Adaptation – develop definitions and discuss how environmental engineers need to tackle the issue of climate change through these two processes.



3

Offer students the following examples of mitigation and adaptation strategies to climate change:

**MITIGATION:**

Use of solar power vs. renewables

**ADAPTATION:**

Building up the shoreline vs. managed retreat

In a Think-Pair-Share instruct students to compare and contrast the above mitigation strategies. Can they be accomplished with technology or behavioral changes? Instruct the students to do the same with the adaptation strategies.

# GALLERY WALK

### Categorize and Analyze Strategies to Climate Change

Divide the class into 4 or 5 groups. Give each group a specific color marker, which will help to identify their work during the activity.

Each group of students will receive 4 statements from the Mitigation and Adaptation Examples Handout. Include statements from both categories (mitigation and adaptation).

Instruct students to analyze each strategies to decide where it fits among the categories listed in the box on the right hand side of this page.

Then have the students walk through the ‘Gallery Walk’ and add each statement to the appropriate poster board using the same categories in the blue box.

After students complete the walk, discuss the choices students made. Does the class agree with the group’s classification? Are there examples that fit into more than one category?

[For example: “hybrid vehicles” can be considered for all three mitigation categories]

In summary have students write a short paper (3 – 4 paragraphs) to reflect on the following question: Are there any strategies that seem easier to achieve? If so, why?

**MITIGATION**

- Efficient Energy Use
- Alternative Energy Source
- Reduction of Greenhouse Gases

**ADAPTATION**

- Disaster Resilience
- Reducing Impacts on Ecosystems
- Agricultural Practices
- Infrastructure





PROJECT 1 : Designing a City of the Future

Organizer Worksheet: Lesson 2  
List of Mitigation and Adaptation Examples



Directions: Cut these examples along the dotted line.  
Give each group at least 2 mitigation examples and 2 adaptation examples.

MITIGATION EXAMPLES

✂️ Advent of LED lighting	Chemical process to capture carbon dioxide
Energy-efficient appliances	Tools to track and detect methane leakage
Electricity generated from non-carbon-emitting sources	Precision agricultural techniques
Carbon cap and trade system (tax on carbon production)	Use of heat that is by-product of the generation of electricity
Nuclear power	Feeding livestock easier to digest foods
Electrically powered transportation	Education on voluntary emission reductions
Hybrid vehicles	Laws such as the Clean Air Act
Planting fields year-round or using cover crops	

ADAPTATION EXAMPLES

✂️ Develop building standards based on flood risk	Building seawalls
Using natural systems such as wetlands to manage flood risks	Constructing pumps to reduce flooding
Improved landscape design and management to prevent ignitions of wildfires	Strengthening infectious disease surveillance systems
Habitat restoration	Using vegetation and other features to reduce temperature of cities
Active management of invasive species	Develop national wildfire smoke forecast system
Developing drought resistant crops	