



Fundamentals of Building Green

GPRO

Green Professional Building Skills Training

INTRODUCTIONS

About You:

- Name
- What do you hope to get from this class?
- What skills/knowledge you have to offer your classmates today?

Learning Objectives

After you complete this course you will be able to:

- Explain how reducing building energy will reduce the effects of climate change.
- Describe the basic elements of, green, high-performance construction and building operations.
- Describe the role of trades on high-performance job sites.
- Describe energy-consuming building systems and some strategies to reduce building energy use.

Agenda

Part A: SUSTAINABILITY

1. Connection Between Buildings and Climate Change
2. What are High-Performance Buildings?
3. Causes and Effects of Climate Change
4. Working Towards Solutions
5. Value of High-Performance Buildings

Part B: GREEN BUILDING PRACTICES

6. Small Changes, Huge Impact
7. Tight Building Envelope
8. Right-Sized HVAC
9. Water Conservation
10. Efficient Lighting and Electrical Systems
11. Healthy Indoor Environments
12. Environmentally-Friendly Materials
13. Codes and Commissioning
14. Operating Existing Buildings

CHAPTER 1:

CONNECTION

BETWEEN

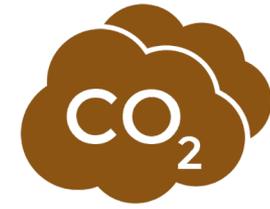
BUILDINGS AND

CLIMATE CHANGE

Success in the construction industry over the next half century will require an understanding of the relationship between building energy and carbon.

Buildings burn too much fossil fuel

- ➔ **Puts carbon in the atmosphere,**
- ➔ **Causes climate change**



High performance buildings:

- ➔ **Use less energy and emit less carbon,**
- ➔ **Reducing the effects of climate change.**

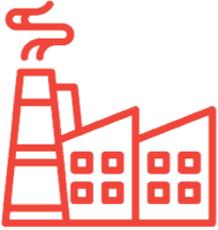


U.S. Buildings Use More Energy than Any Other Sector



TRANSPORTATION

28%



INDUSTRY

32%



BUILDINGS

40%

Nationally, the building sector, which is growing faster than the other two sectors, consumes the most energy, 2/3 of which is fossil fuel.

U.S. Buildings Use More Energy than Any Other Sector



TRANSPORTATION



INDUSTRY



BUILDINGS



In cities, building energy can be responsible for up to 70% of carbon emissions!

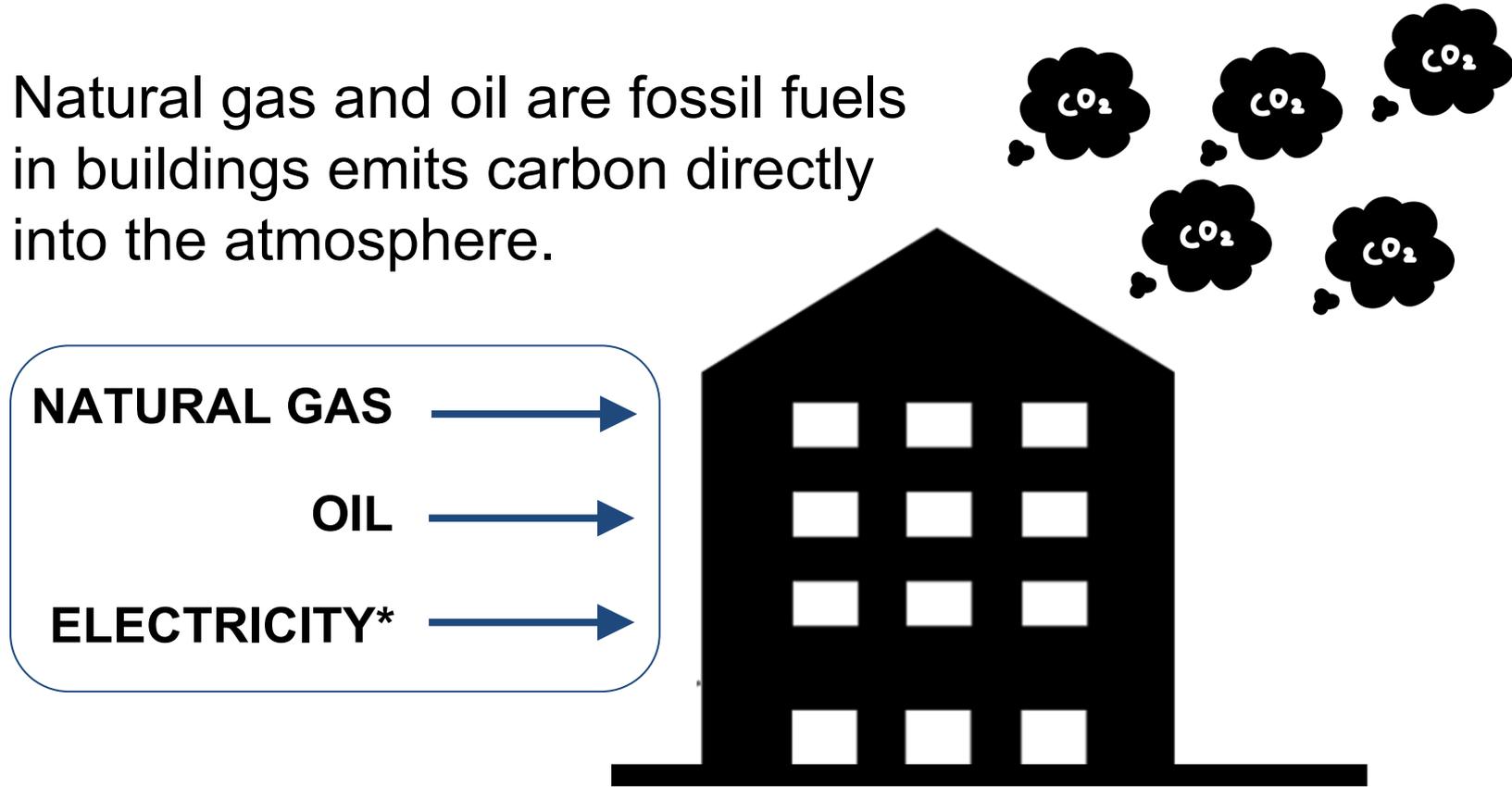


Where Does Energy Come From?

Site energy:

The amount of fuel and electricity a building consumes on site.

Natural gas and oil are fossil fuels in buildings emits carbon directly into the atmosphere.

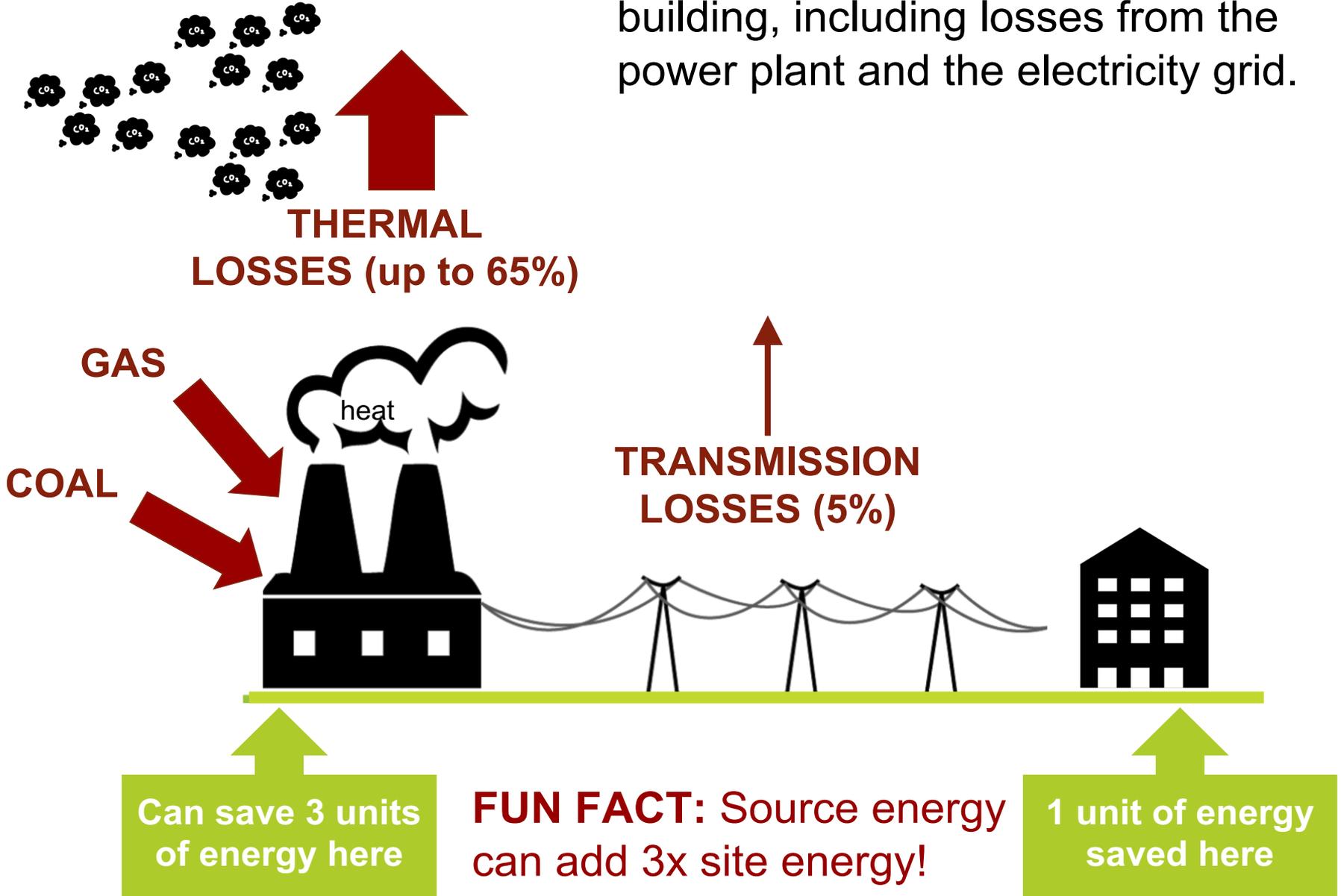


*Electricity has a hidden carbon footprint



Source Energy

Source energy is the total amount of raw fuel required to operate the building, including losses from the power plant and the electricity grid.



**Sustainability is about more
than just energy and carbon**

DISCUSSION:

Question: What does *sustainable* mean?

Sustainability is the capacity to thrive long-term without using up resources

The definition that the United Nations uses is:

A way of living (and working) that meets the needs of the present without compromising the ability of future generations to meet their own needs.

CHAPTER 2:

WHAT ARE HIGH-PERFORMANCE BUILDINGS?

DISCUSSION

1. What is a high-performance building?
2. How are high-performance buildings different from regular buildings?

High-Performance Building

This 6 minute video will explain more:

**The House at Cornell Tech
Roosevelt Island, New York City**
A low carbon, energy-efficient, healthy building. Passive House Certified, LEED Platinum





High-Performance Buildings

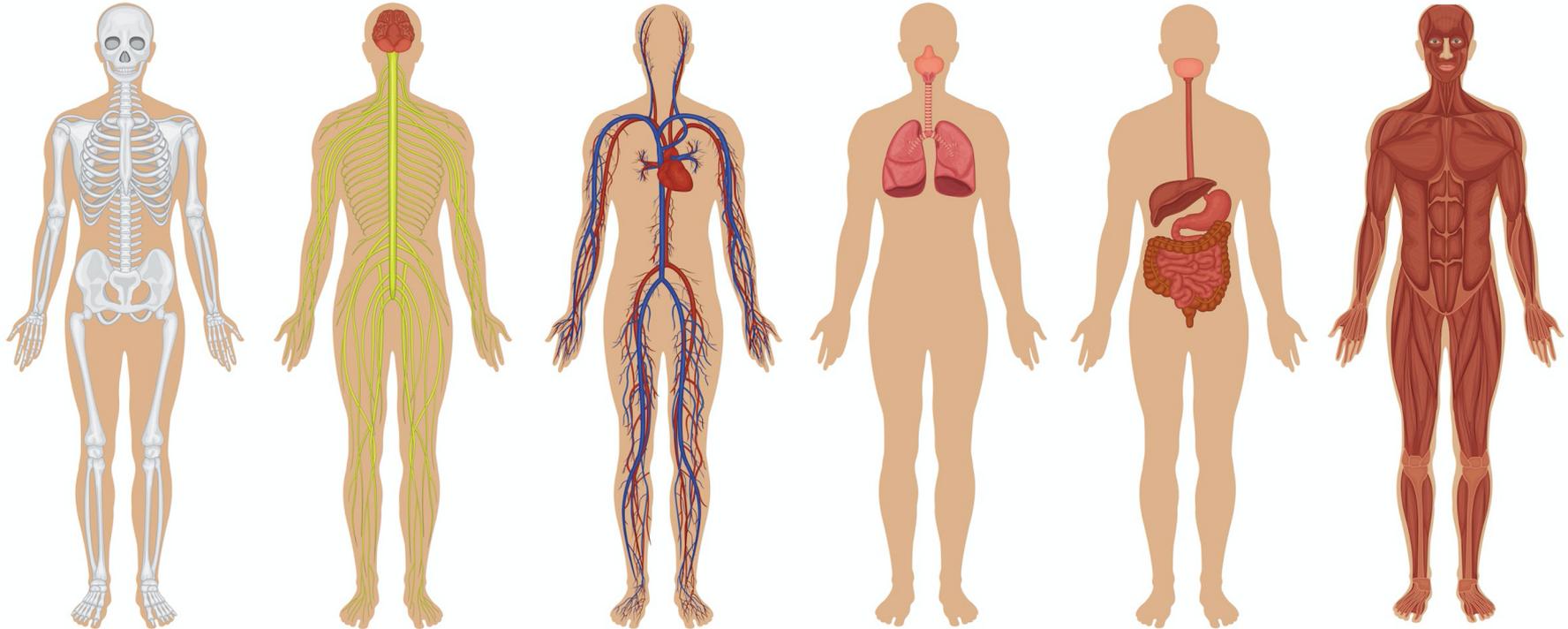
Three qualities in common:

1. **Efficient:** Uses less energy and water
2. **Healthy:** Improves the health and productivity of workers and occupants
3. **Environmentally responsible:** Durable, uses materials that don't damage the environment, low impact on community and surrounding areas

.... and they require systems thinking to design, build and operate them.

Systems Thinking

Systems thinking means understanding how systems work together.



Systems Thinking

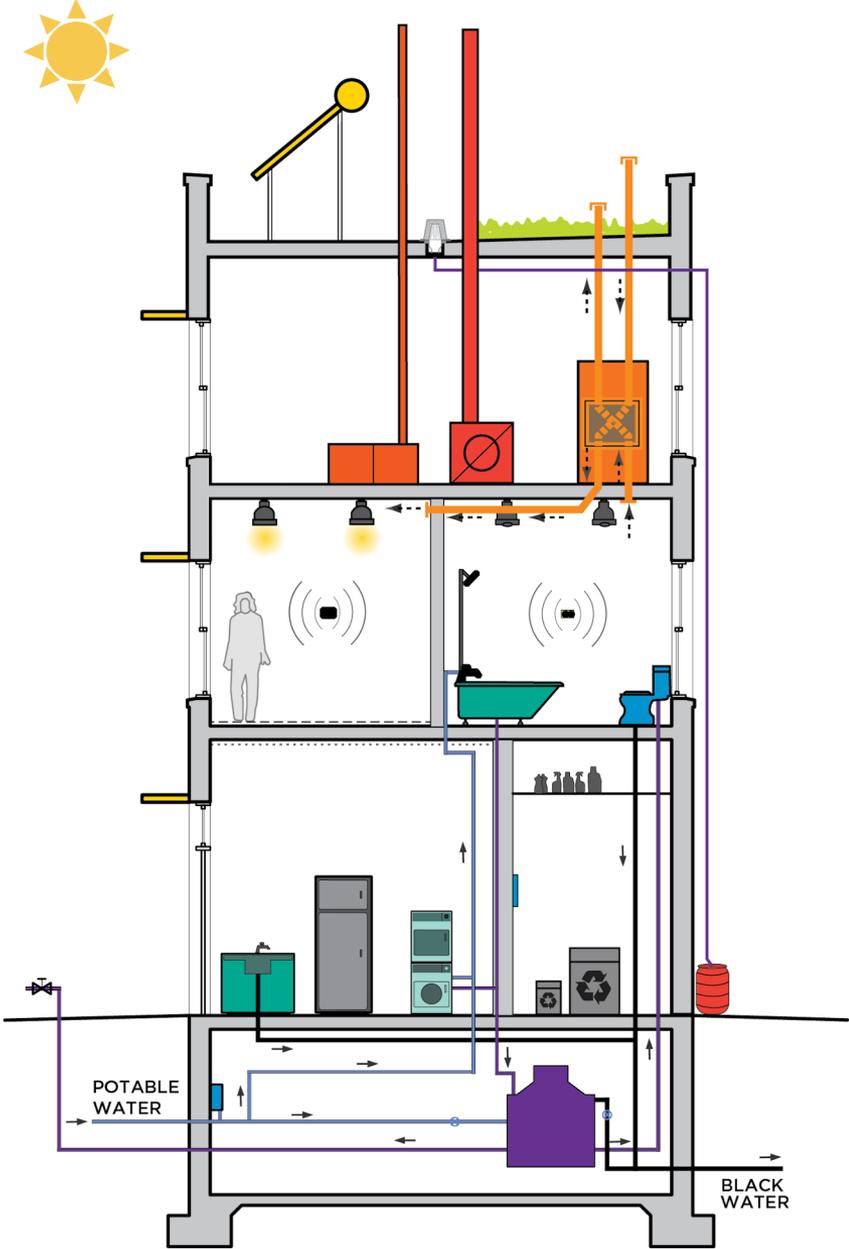
In buildings, *systems thinking*, is often called the *Whole-Building Approach*, which is:



A way of thinking of thinking about buildings as a system of systems-- changes in one system affect outcomes in another.

Whole-Building Approach

The *Whole-Building Approach* is a key principle of high performance building.



DISCUSSION:

How does the interaction between the systems affect the building's energy use?

1. What are some examples of building systems working well together?
2. What are some examples of building systems working against each other?

Systems Thinking for Teams: Integrated Project Delivery



Integrated Project Delivery

means coordination among the designers, builders, and operators throughout the entire project, sometimes before construction even begins.

Shared goals and intent means fewer misunderstandings and change orders.

