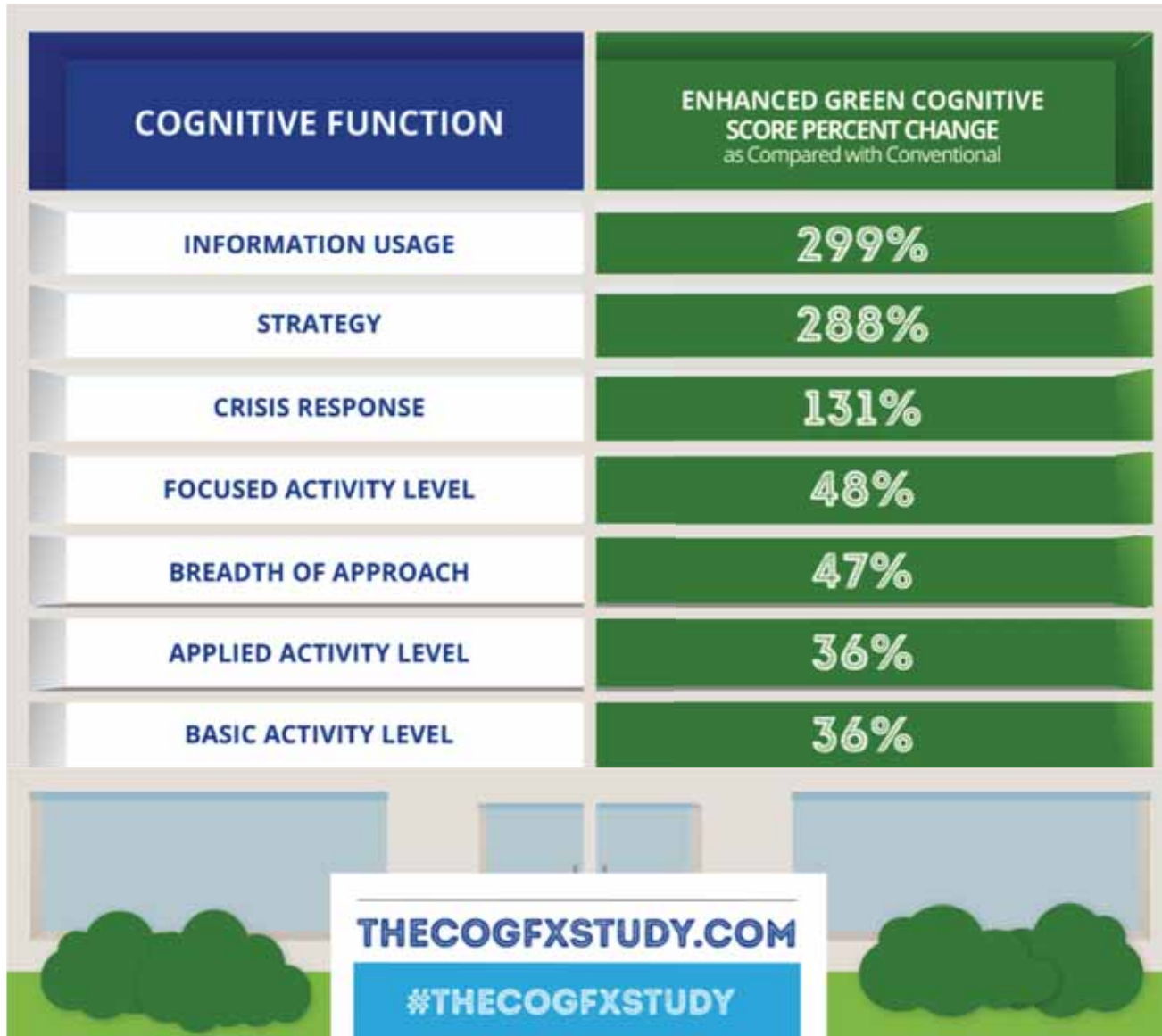


CHAPTER 11: HEALTHY INDOOR ENVIRONMENTS

Good Indoor Air Makes A Huge Difference in Human Productivity



Building Products Can Contain Harmful Toxins

- **Volatile Organic Compounds (VOCs):** In solvents, glues, and cleaning products
- **Formaldehyde:** Found in adhesives in plywood and other pressed wood, wallpaper, and furnishings
- **Polyvinyl chloride (PVC):** Is a VOC and uses harmful chemicals in its manufacturing process



Sealants

DISCUSSION:

Can you think of anything on the jobsite that may have VOCs in it?

How could you find out if a product has VOCs?

Safety Data Sheets (SDS)



Safety Data Sheets (SDS) for all chemicals you work with should be available so that you can protect yourself and respond to emergency situations.

Purchase Products Certified Green



Green Seal: Paints, Construction and cleaning products



CRI Plus: Carpets, rugs, floor cleaning products, adhesives



UL Environment: Construction products, Floor coverings, furnishings



Greenguard: Building materials, finishes, cleaning products

In the U.S. Chemicals Can be Brought to Market Unless they are Proven to be Unsafe

The European Union uses the **precautionary principle** which means that chemicals are tested for toxicity **before** they come into widespread use.

Poor Indoor Environmental Quality is Easier to Prevent than Fix



Use low- or no-VOC adhesives, caulks and sealants

Construction Indoor Air Quality (CIAQ) Plan

A Construction Indoor Air Quality (CIAQ) Plan reduces indoor air quality problems from construction activities.

You will likely see these measures on green job sites.

Its goal is to protect the health and well-being of both workers and occupants.

CIAQ Plan

As part of a CIAQ Plan, contractors:

1. **Vent** at specified rates for supply of fresh air
2. **Protect** HVAC systems and moisture-sensitive items from contamination
3. **Control** sources of pollutants by airing out carpet and woodwork in unoccupied spaces prior to installation
4. **Interrupt** path of pollutants with partitions or plastic sheeting
5. **Clean** continually
6. **Flush** pollutants out of the building



Protect moisture-sensitive items

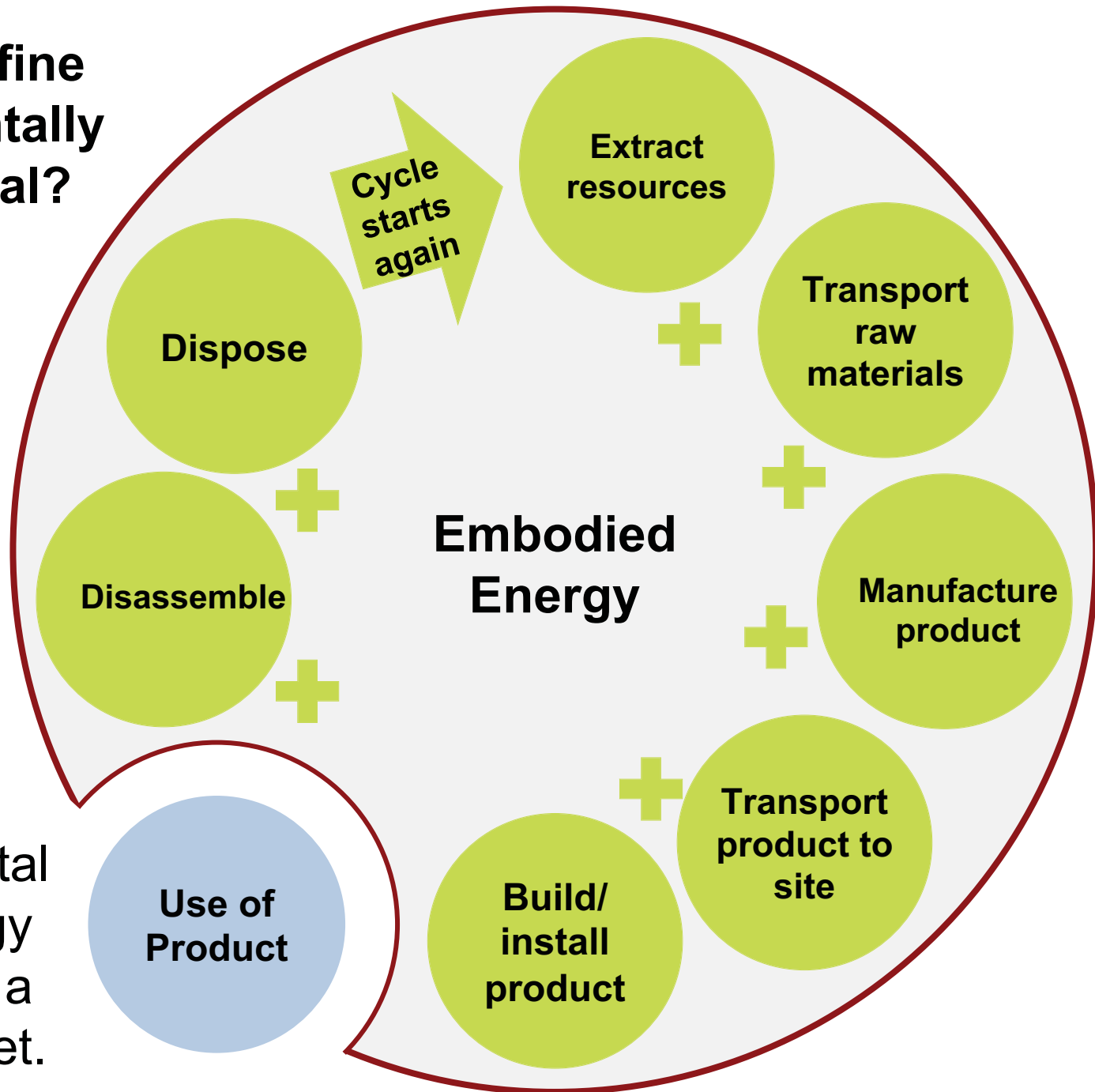


Partition off dusty areas

CHAPTER 12

ENVIRONMENTALLY- FRIENDLY MATERIALS

How Do We Define an Environmentally Friendly Material?



Embodied energy is the total amount of energy needed to bring a product to market.

Which object has more embodied energy?

Name some ways to conserve this embodied energy

2.1

Megajoules



REUSE

3.3

Megajoules



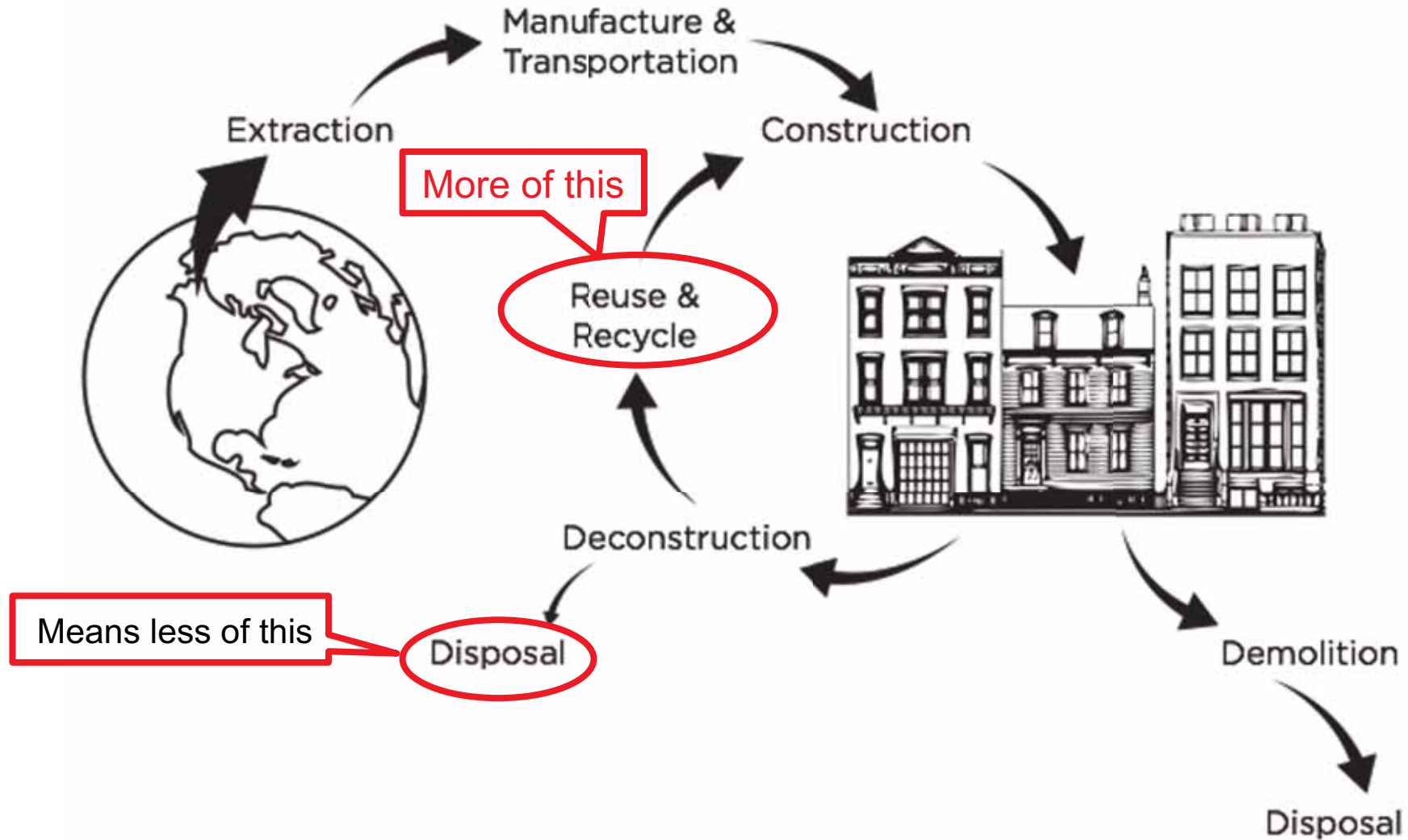
RECYCLE

0.1

Megajoules



Life Cycle Assessment (LCA) is Good Measure of Environmental Impact



LCA can be measured for building products and whole buildings

CASE STUDY:

United Nations - Retrofit or Rebuild?

UN Design Team studied the lifetime carbon cost of:

- Demolishing and rebuilding the campus versus
- Retrofitting the existing buildings

They calculated it would take **35-70 years** before the operational efficiencies gained by the new, more efficient, construction would offset the carbon cost of demolishing the building.

The U.N. opted to retrofit rather than rebuild.

See Case Study on
page 10 of the workbook.



The Order of the 3 R's is Important:



Reduce

Reuse



Recycle



Dump

1. Reduce

2. Reuse

3. Recycle

Each process uses more energy and creates additional pollution.

Construction Waste Management (CWM)

Proper CWM requires waste to be sorted into reusable, recyclable, and hazardous materials. Sorting can occur on-site or off-site



Use separate dumpsters on-site to sort waste



Heartland Recycling Facility, Forest View, IL

Purchase Regionally Sourced Products



CASE STUDY: Alberici Headquarters

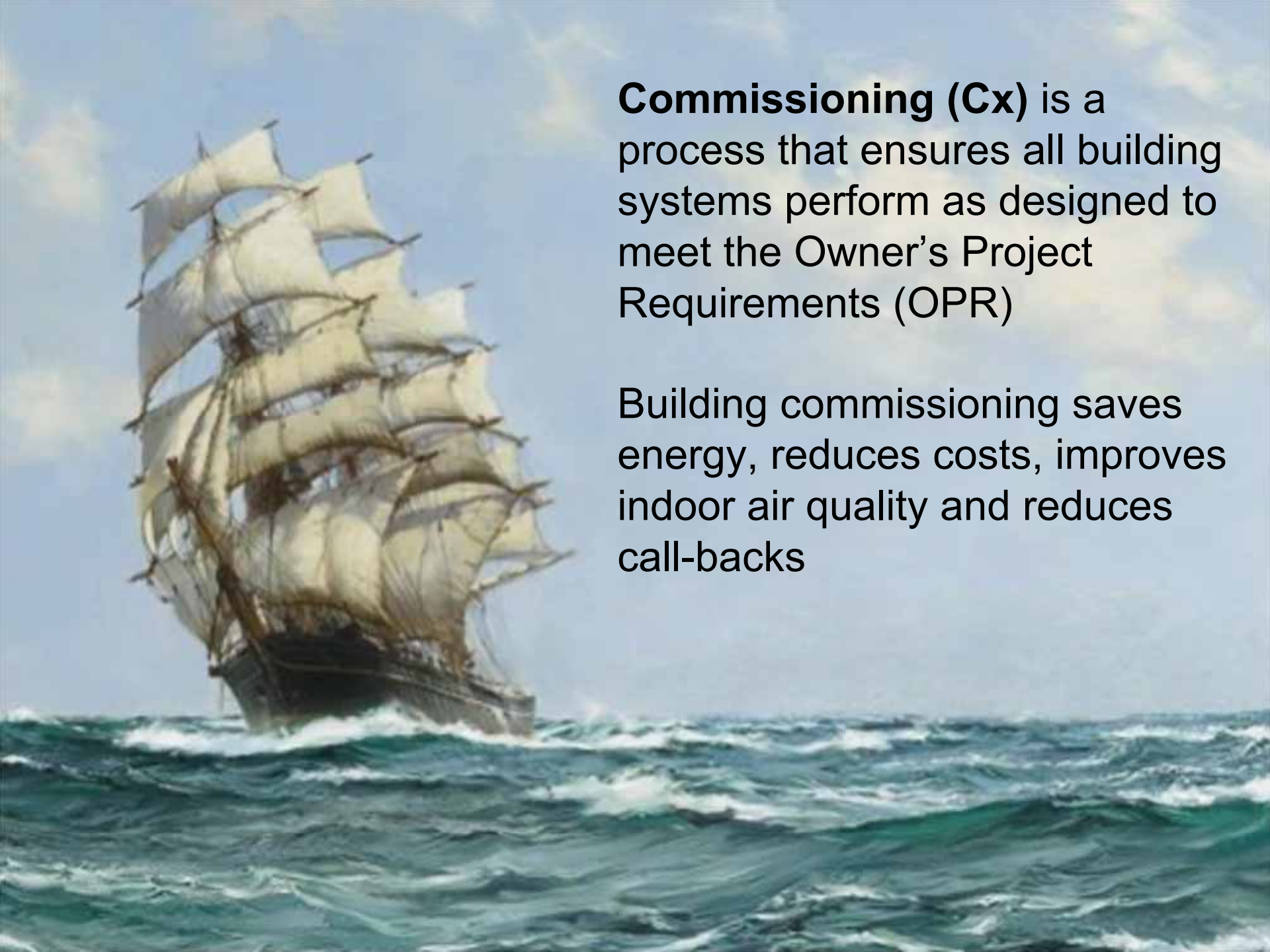
- Salvaged over 10% of materials from the project
- 20% of new materials were manufactured within 500 miles of the site
- 6,000 tons of waste was diverted from landfills



Alberici Headquarters, St. Louis, MO

CHAPTER 13

CODES AND COMMISSIONING

A large, multi-masted sailing ship with white sails is shown on a blue sea under a cloudy sky. The ship is positioned on the left side of the frame, moving towards the right. The water is choppy with whitecaps. The sky is a pale blue with scattered white clouds.

Commissioning (Cx) is a process that ensures all building systems perform as designed to meet the Owner's Project Requirements (OPR)

Building commissioning saves energy, reduces costs, improves indoor air quality and reduces call-backs

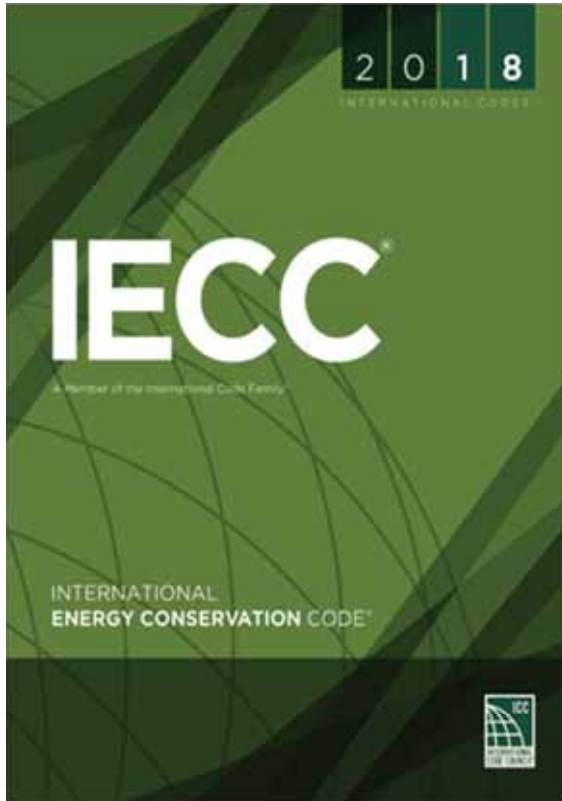
Commissioning Buildings Ensure Performance in New Buildings

Systems Commissioning (Cx):

- Cx focuses on the building's energy-using systems
- Cx starts early in the design process and continues until all systems are operational.
- Everyone participates



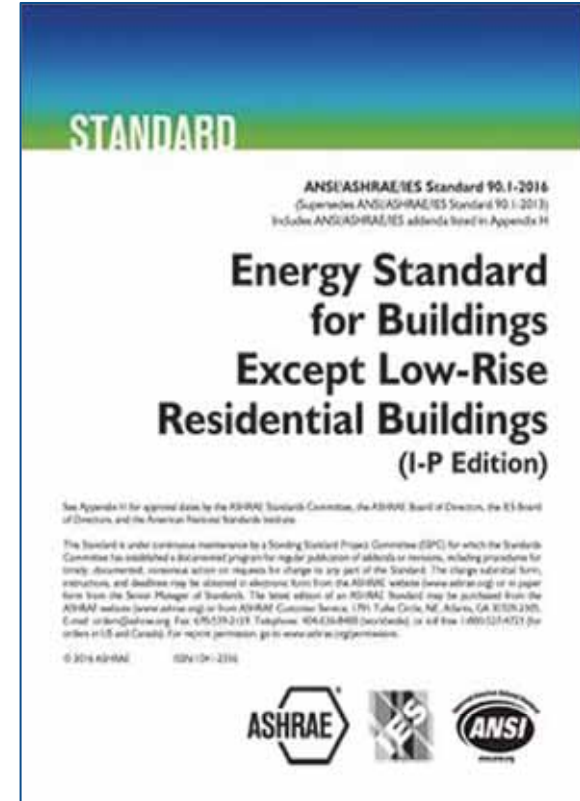
Energy Codes Are Getting Stricter and Requiring More Testing



IECC: International Energy Conservation Code

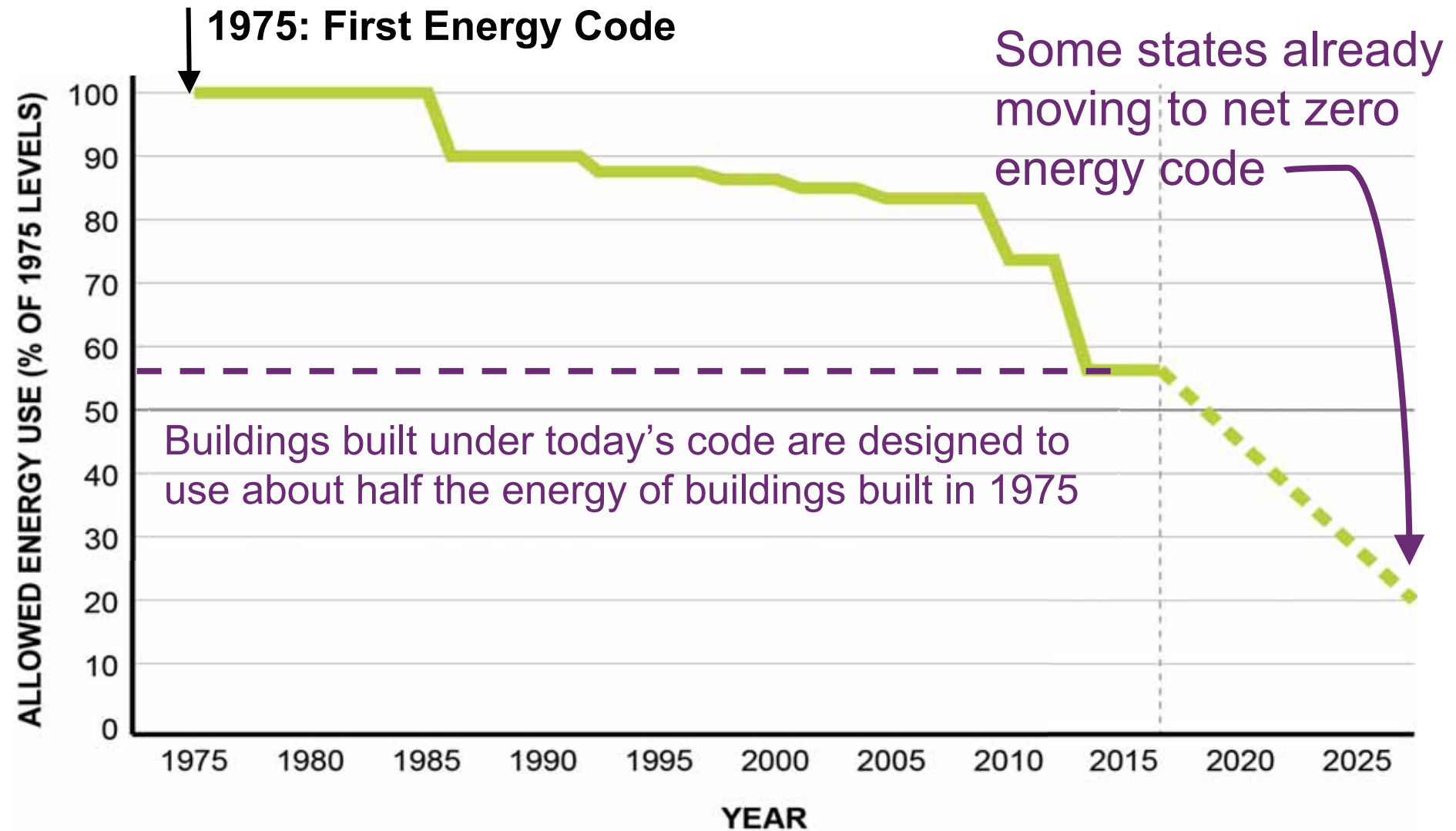


IGCC: International Green Construction Code



ASHRAE 90.1: Energy Standard for Buildings

Energy Codes are Already Getting Stricter



Buildings built under today's code are designed to use about half the energy of buildings built in 1975

Some states already moving to net zero energy code

1975: First Energy Code

Building energy use allowed under International Energy Conservation Code (IECC) over the life of the building

Green Buildings Require Proof of Performance



Nutrition Facts

Serving Size 1/2 cup (115g)
Servings Per Container About 4

Amount Per Serving	
	% Daily Value*
Calories 250	Calories from Fat 130
Total Fat 14g	22%
Saturated Fat 9g	45%
Cholesterol 55mg	18%
Sodium 75mg	3%
Total Carbohydrate 26g	9%
Dietary Fiber 0g	0%
Sugars 26g	
Protein 4g	
Vitamin A 10%	Vitamin C 0%
Calcium 10%	Iron 0%

* Percent Daily Values are based on a 2,000 calorie diet.

...and are becoming mandatory in some cities and counties

Understanding LEED: Credit Categories

LEED is a point based system which certifies building meets sustainability standards in all categories

Out of 110 points:

- Platinum (80+ points)
- Gold (60–79 points)
- Silver (50–59 points)
- Certified (40–49 points)

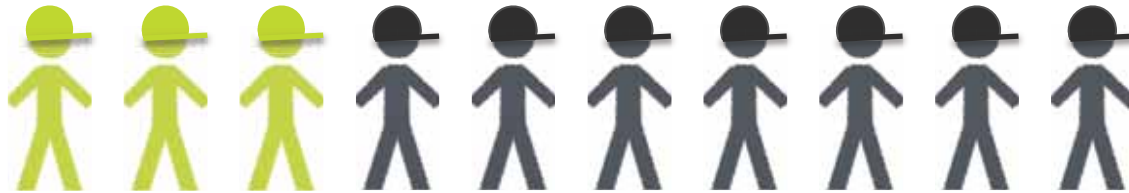


Categories:

- Location and Transportation
- Sustainable Sites
- Water Efficiency
- Energy & Atmosphere
- Materials & Resources
- Indoor Environmental Quality
- Regional Priority
- Innovation

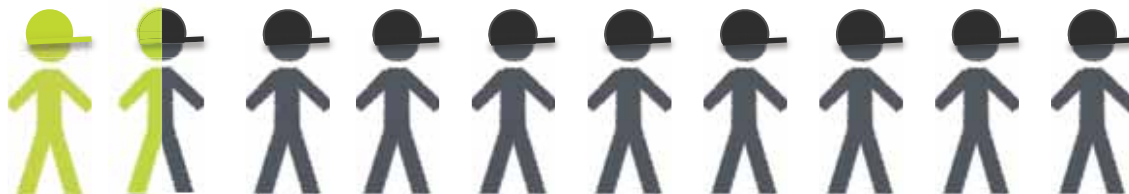
LEED Pilot Credit 81: Green Training for Contractors, Trades, Operators and Service Workers

Under LEED Building Design & Construction (BD&C), Pilot Credit 81 offers one innovation point for either:

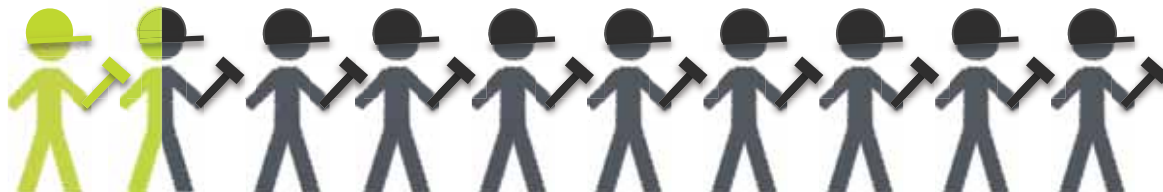


30% Construction Management Staff

OR



15% Construction Management Staff AND 15% Trades

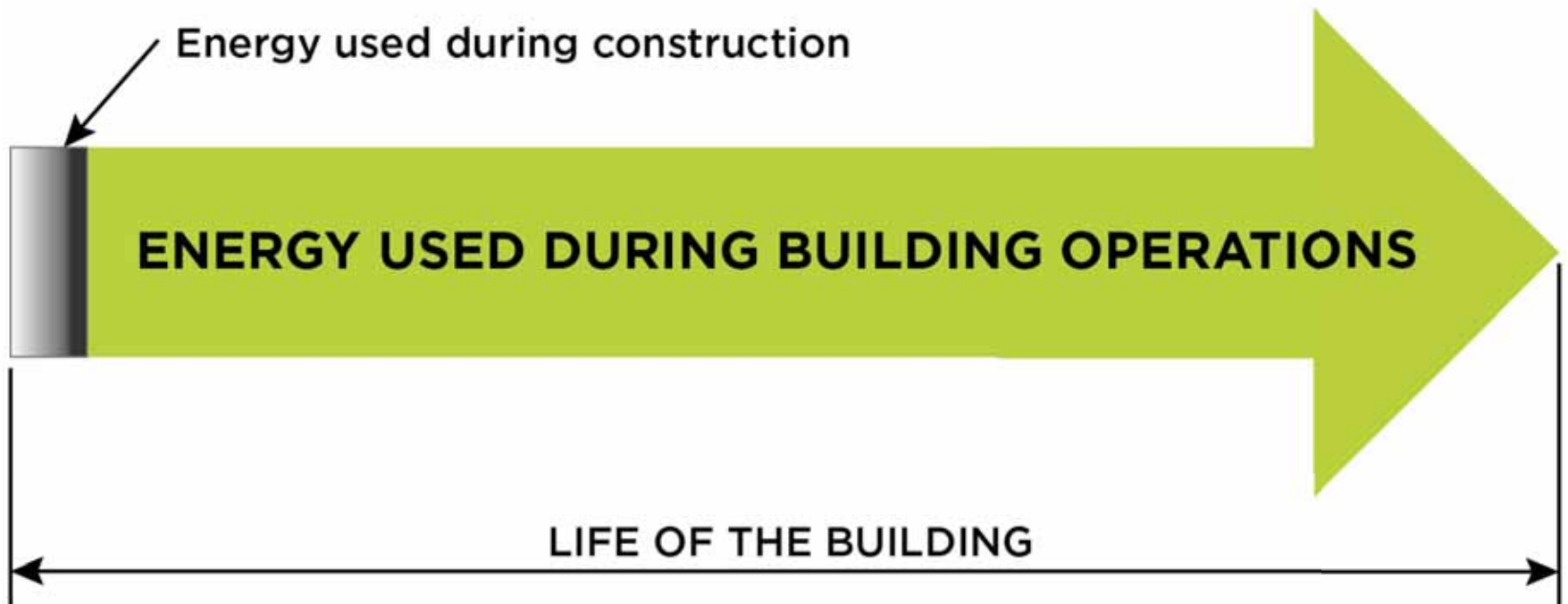


CHAPTER 14

**OPTIMIZING EXISTING
BUILDINGS**

The Role of Building Operations and Maintenance Professionals

Building operations team is responsible for over 90% of a building's environmental impact.



Operate Systems to Maximize Efficiency and Lifespan

Building operators are critical to a building's long-term sustainability

- Ensure systems run smoothly and efficiently every day
- Measure and monitor system performance
- Collect occupant feedback and diagnose common problems
- Implement corrective, preventive & predictive maintenance



Performing combustion efficiency test

Commissioning Existing Buildings Restores Performance

Operations teams at even the greenest buildings can regularly uncover energy-saving opportunities with an ongoing *Existing Building Commissioning* process.

Cx Agents collect and analyze energy data

- **Existing Building Commissioning**
 - Optimize existing systems based on test results to meet current needs for the facility
- **Energy Audit**
 - Propose longer term capital improvement measures



Green Cleaning Reduces Workers' Exposure to Unhealthy Chemicals



Green cleaning strategies reduce cleaners' exposure to unhealthy chemicals

LEED Pilot Credit 81: Green Training for Contractors, Trades, Operators and Service Workers

Under LEED Existing Buildings: Operations & Maintenance (EB:OM) Pilot Credit 81 offers one innovation point for either:



75% Building
Operations &
Maintenance staff

OR



50% Building
Operations &
Maintenance staff



AND

30% Building
Service Workers

THANK YOU!

GPPRO

Green Professional Building Skills Training