



Procuring Outcomes

TO ADVANCE DISTRICT ENERGY & SUSTAINABILITY GOALS



CampusEnergy2020

THE POWER TO CHANGE

FEBRUARY 10-14 • SHERATON DENVER DOWNTOWN • DENVER, CO

Framing Goals

MISSION RELEVANCE

- ▶ Higher-quality learning environment
- ▶ Implement Talloires Declaration principles
- ▶ Drive greater enrollment
- ▶ Build “reputational endowment”

SUSTAINABILITY & ENERGY

- ▶ Reduce GHG
- ▶ Increase renewable energy
- ▶ Reduce EUI
- ▶ Robust green building standards

FINANCIAL

- ▶ Set discount/escalation rates
- ▶ Go / no go criteria
- ▶ Equity or debt finance
- ▶ Maximize incentives, grants, rebates

ASSET RENEWAL

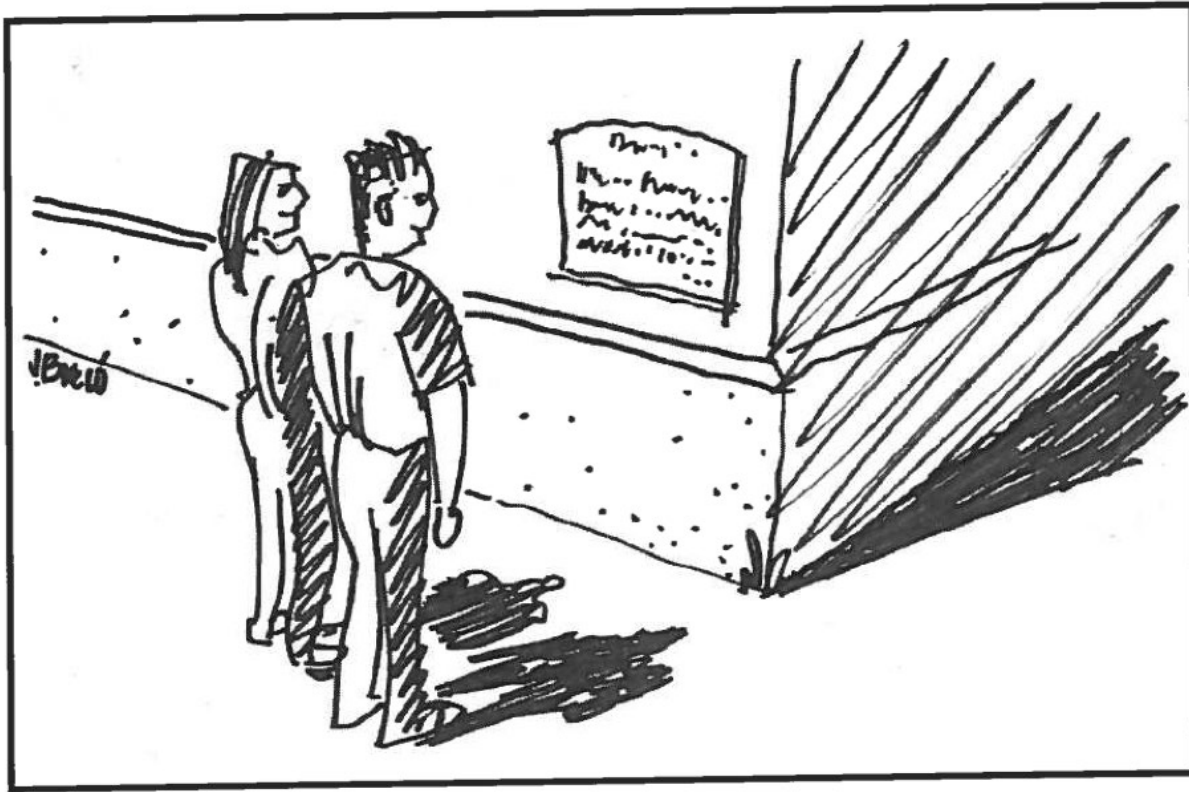
- ▶ Reduce deferred maintenance / FCI
- ▶ Increase resiliency / flexibility
- ▶ Ease of operations
- ▶ Strategic asset renewal to drive value

TRIPLE
BOTTOM LINE
MISSION RELEVANT
BEST LCCA
NPV



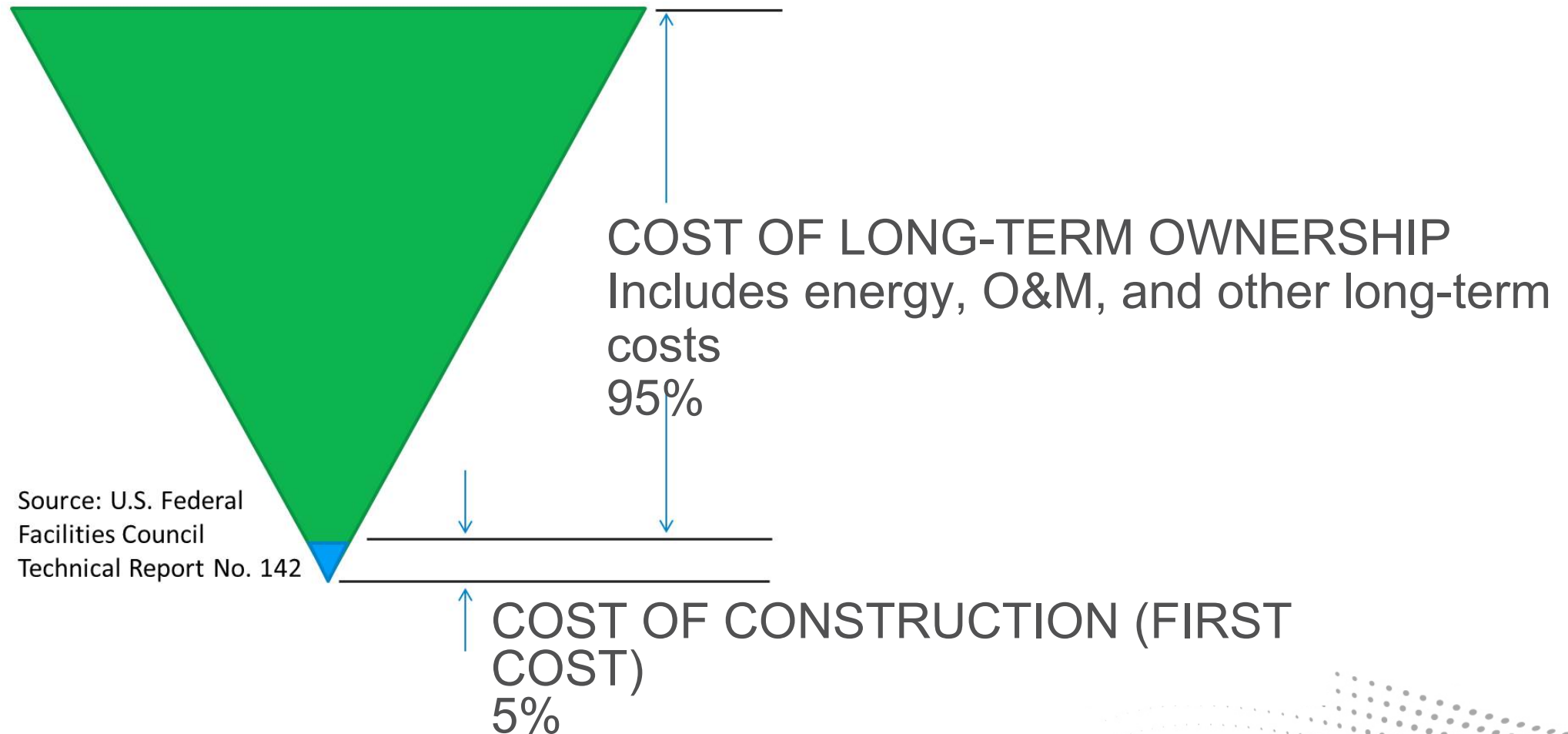
**RMI TRANSFORMS GLOBAL
ENERGY USE TO CREATE A
CLEAN, PROSPEROUS, AND
SECURE
LOW-CARBON FUTURE.**

Why do we need to focus on energy from the start?



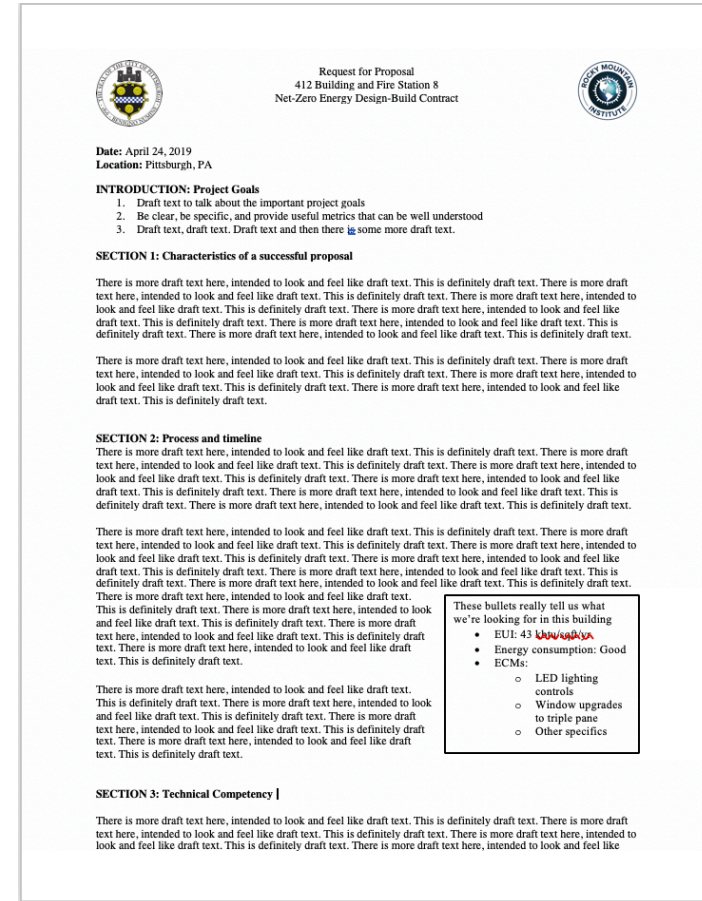
“ THIS WOULD HAVE BEEN A GREAT GREEN BUILDING IF IT WASN'T FOR THE BAD DECISIONS MADE AT THE DESIGN TEAM MEETING HELD ON JULY 11, 2011.

Lifecycle costs far outweigh first costs, so we can't let good design escape early on



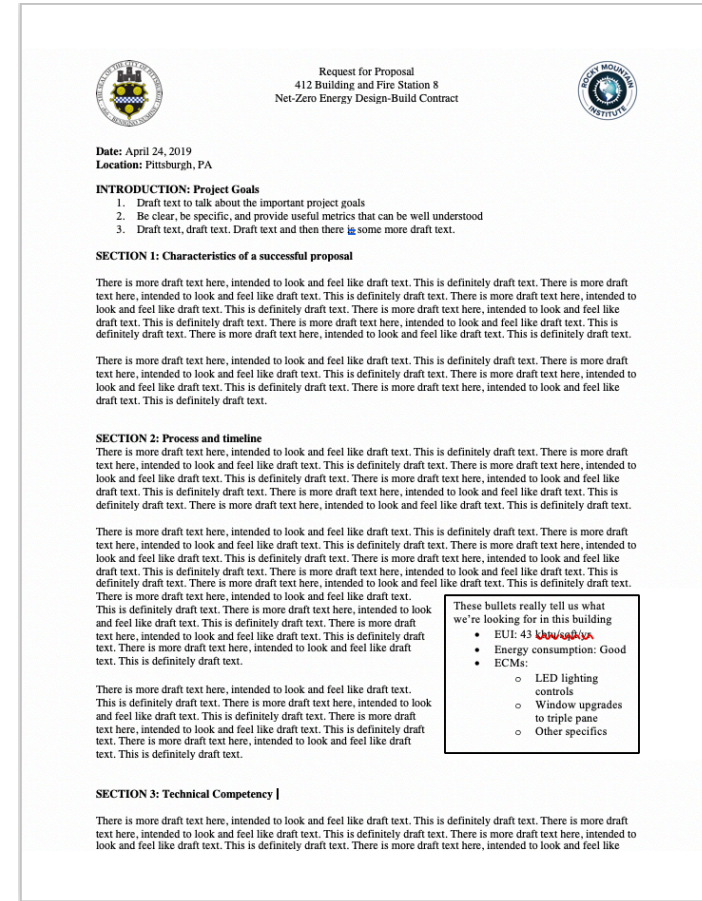
Putting Concepts into Practice: THE NET-ZERO ENERGY RFP

- ▶ Understand how your building uses energy
- ▶ Clearly state goals
- ▶ Iterative, integrated design process
- ▶ Require energy modeling
- ▶ Evaluate projects using LCCA
- ▶ Commission building systems
- ▶ Measure and Verify
- ▶ Continually improve RFP




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Understand How your Building Uses Energy: DEFINE A CLEAR BASELINE

- ▶ It's important to understand a building's baseline (existing) energy consumption before designing to net-zero energy.
 - ▶ The building's baseline energy consumption can help characterize the size of the opportunity AND help to benchmark against common metrics for similar buildings.
 - ▶ It's more challenging to retrofit existing buildings to net-zero energy than it is to design new buildings to achieve net-zero energy, so net-zero energy ready targets for existing buildings may be higher than those for new buildings.
- 



Clearly State Goals:

PERFORMANCE TARGETS

- ▶ Define building performance based on commonly understood targets, and make them clear to respondents
 - ▶ Understand what these targets mean
 - ▶ Define a minimum set of requirements for the team to achieve
 - ▶ Provide tiered goals that match the team's ambitions
 - ▶ If possible, incentivize achievement of the second- and third-tier goals
- 




Clearly State Goals:

HOW DO WE DEFINE PERFORMANCE?

Codes and Standards

- ▶ American Society of Heating and Air-Conditioning Engineers (ASHRAE) 90.1, 62.1, 55
- ▶ International Energy Conservation Code (IECC)


Certification Organizations

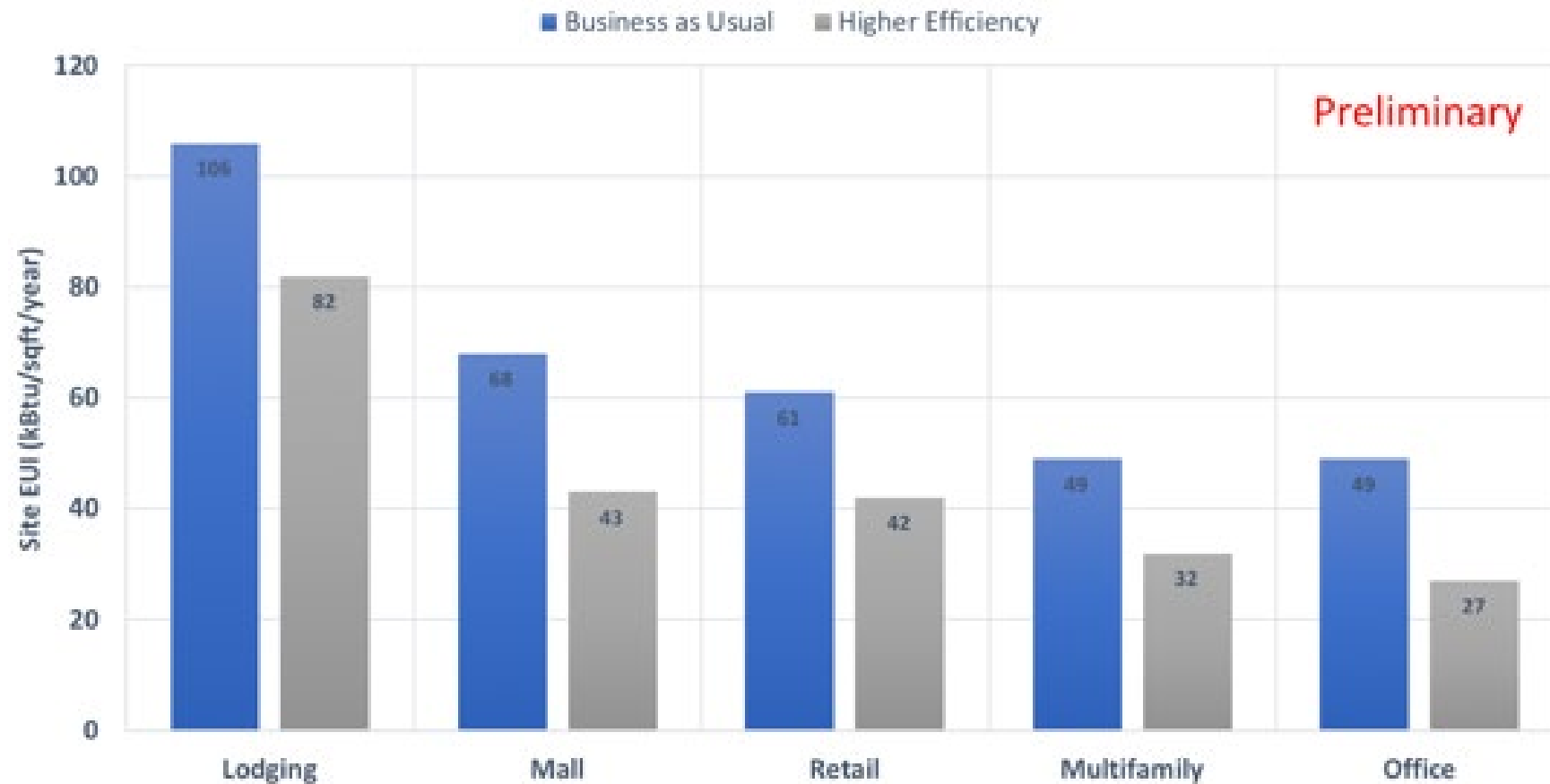
- ▶ LEED (Leadership in Energy and Environmental Design)
 - ▶ Architecture 2030
 - ▶ International Living Futures Institute
 - ▶ EnergyStar Portfolio Manager
- 



Clearly State Goals:

ENERGY USE INTENSITY

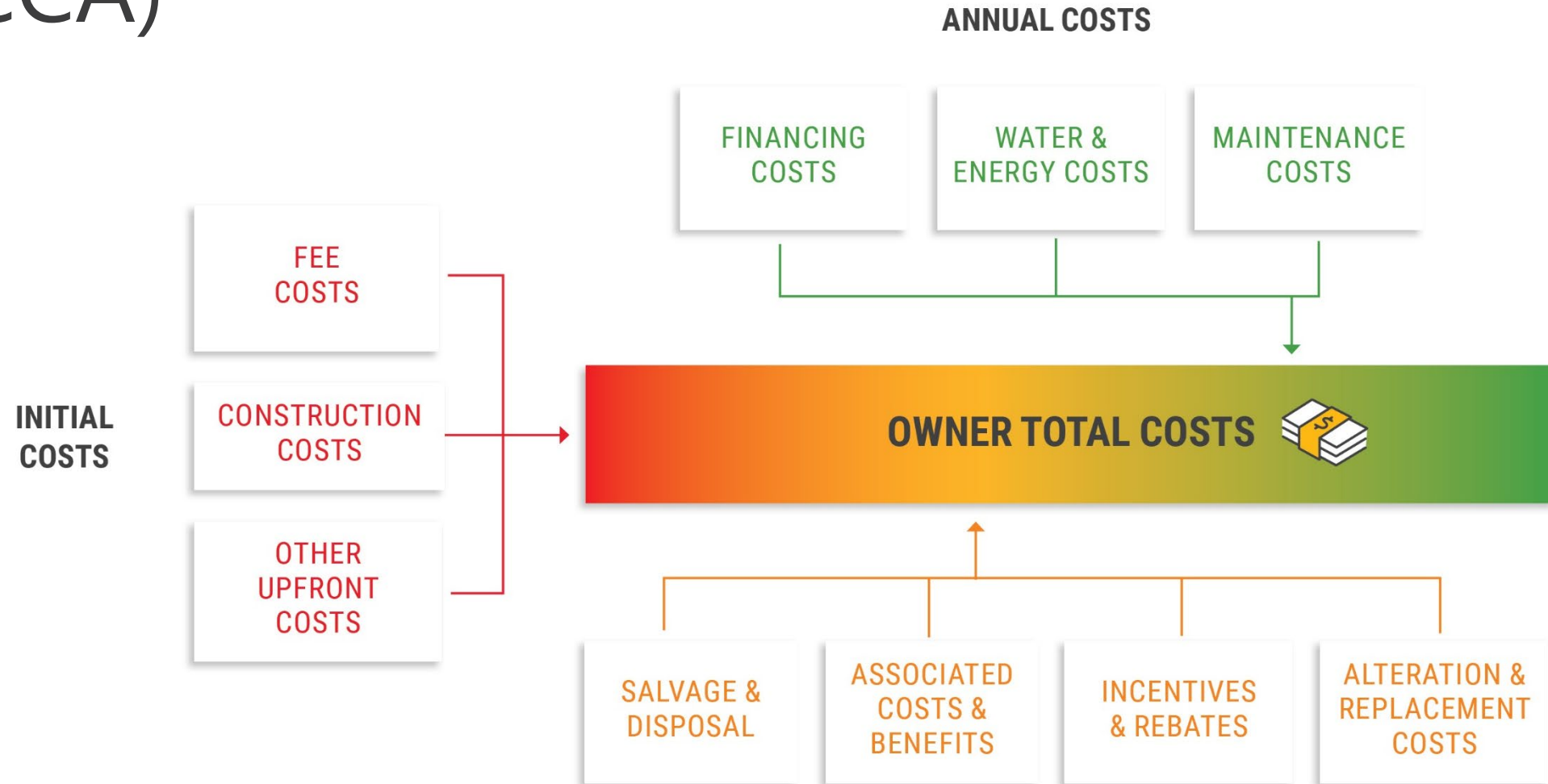
- ▶ Energy Use Intensity (EUI), or energy consumption per square foot per year, is a normalized metric that allows comparison between buildings.
 - ▶ Often, EUIs are compared only to EUIs of similar building use types.
 - Comparing the EUI for offices to restaurants can be like comparing apples to oranges
- 



Example building energy simulation analysis to identify achievable energy use intensity values in different building types relative to business as usual; simulations were performed for DOE prototype buildings in the IECC 3a climate zone (Atlanta, Georgia) using OpenStudio/EnergyPlus workflows

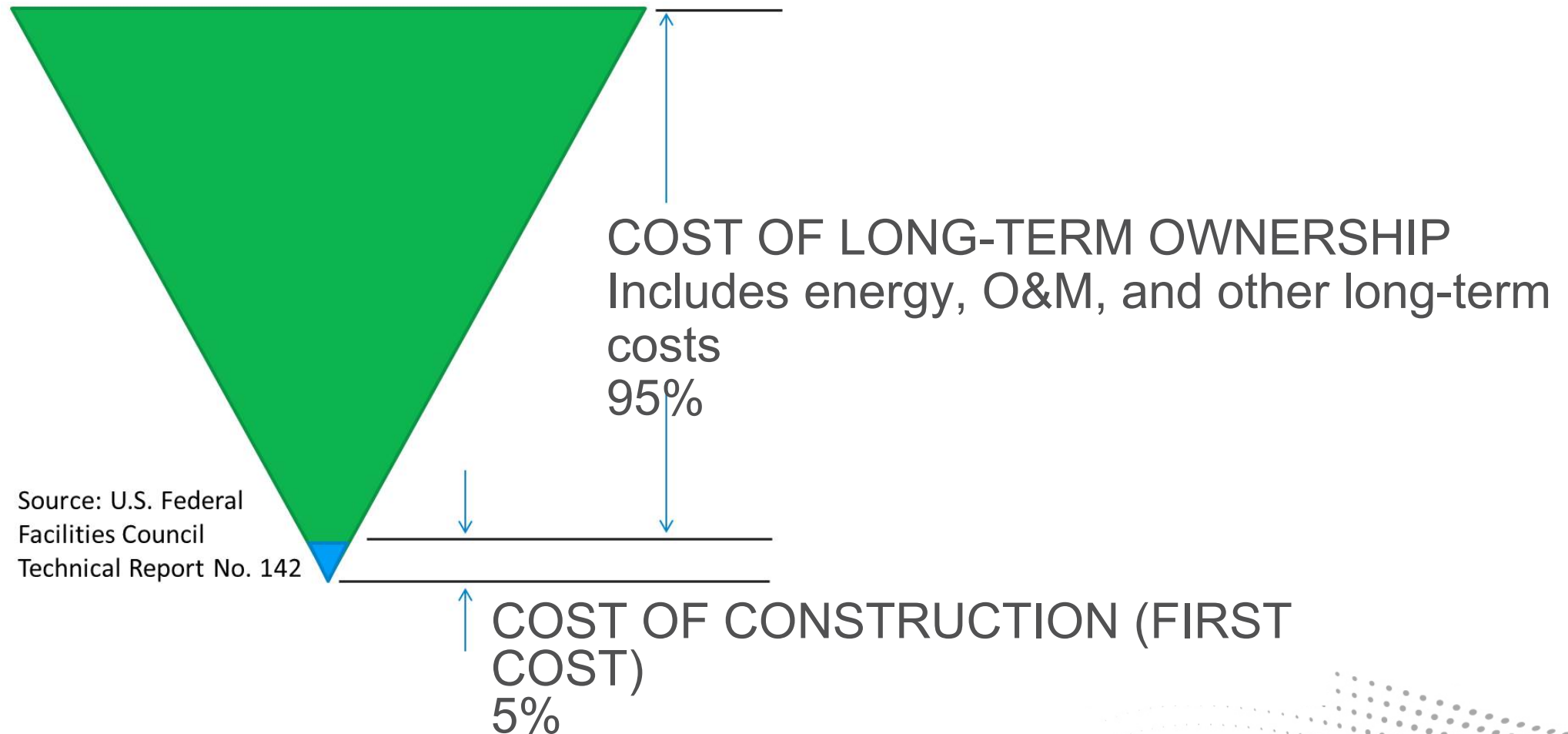
Credit: National Renewable Energy Laboratory (NREL)

Components of Lifecycle Cost Analysis (LCCA)



Adapted from Kirk and Dell'isola *Life Cycle Costing for Design Professionals* (1995)

Lifecycle costs far outweigh first costs, so take the long view



The Results – NREL Campus



NREL Campus Growth with Design-Build

PROCUREMENT PROCESS ATTRIBUTES *POST*-2008:

- ▶ Design-build project delivery with firm fixed price for >\$400 Million of new facilities
- ▶ Specific energy performance requirements in the Request for Proposal (RFP, also referred to as the contract)
 - RSF I, office example: 25 kBtu/ft²/yr
 - SEB, guard house example: net zero energy
 - PUE for datacenter of 1.06
- ▶ Energy modeling required to substantiate goals
- ▶ Energy end-use metering requirement
- ▶ Voluntary incentive (\$) program to ensure measurement and verification outcome has a chance to meet predicted performance

Owner Defines Desires

TIER 1

Mission Critical Goals

Project cannot succeed without this element

- ▶ Attain safe work/design
- ▶ LEED Platinum
- ▶ ENERGY STAR® "Plus"

TIER 2

Highly Desirable Goals

What the owner wants

- ▶ 800 staff capacity
- ▶ 35 kBtu/ft² yr
- ▶ Architectural integrity
- ▶ Honor future staff needs
- ▶ Measurable ASHRAE 90.1
- ▶ Support culture and amenities
- ▶ Expandable building
- ▶ Ergonomics
- ▶ Flexible workspace
- ▶ Support future technologies
- ▶ Documentation to produce "how to" manual
- ▶ Allow secure collaboration with visitors
- ▶ Completion by 2010

TIER 3

If Possible Goals

The wish list

- ▶ Net-zero energy
 - ▶ Most energy-efficient building in the world
 - ▶ LEED Platinum Plus
 - ▶ 50% better than ASHRAE 90.1
 - ▶ Visual displays of current energy efficiency
 - ▶ Support public tours
 - ▶ Achieve national and global recognition and awards
-
- ▶ Utilize design competition for firm fixed price

Acquisition Strategy Results (From DOE)

CREATED VALUE BEYOND THE BUDGET AT
LOWER COST AND RISK TO ALL PARTIES

- ▶ No Claims or Controversy
- ▶ No Contractor Change Orders
- ▶ Virtually No Contingency Use for Unknowns or Omissions
- ▶ Sixteen Months from Shovel to Move-In
 - *Over a year of delivery time saved!*
- ▶ Large Scale Net Zero Energy without increase in first cost

DEFINED A NEW NATIONAL BUILDING ENERGY STANDARD

- ▶ Replicable Acquisition Strategy for Use by Others
to Create Their Own Successes!



Institutionalize Best Practices

COLORADO COLLEGE FACILITIES DESIGN GUIDE MANUAL



The College has achieved Net-Zero Energy/Net-Zero Carbon buildings and strives to maintain that level of building design performance whenever appropriate. The following table highlights the minimum construction performance targets for Colorado College:

Performance Goal	Goal Quantification
Total Energy Use	20 KBTU/SF/YR or less
Water Use – Building	2.4 Gal/Building SF/YR or less
Water Use – Irrigation	14 Gal/Turf SF/YR or less
Total Building Power Factor	Not less than 0.95 lagging at the utility meter
Indoor Air Quality	700 PPM CO ₂ or less during occupied hours
Artificial Lighting	0.30 W/SF or less
Lighting Levels	35 FC in classrooms

Note that the energy usage goal represents total building load including plug loads, not just HVAC and lighting. Predicted energy use shall be tracked during design using modeling and will be confirmed using utility billing data. Likewise the water usage goal represents both building use and irrigation.

Energy-Performance-Based Acquisition for Commercial Buildings

Energy-performance-based acquisition is the process of considering well-defined energy performance goals and incentives for the entire building lifecycle, including planning, design, construction, and operation. Learn more about a typical energy-performance-based project using the steps and resources below.

Explore the Steps for an Energy-Performance-Based Project

Keeping a focus on energy efficiency, these steps outline five time-phased efforts central to setting and attaining energy goals for new commercial buildings.

1 2 3 4 5

Download the Detailed How-To Guide

The how-to guide describes in detail the actions that owners, designers, contractors, and other project team members can take to help ensure aggressive energy savings are achieved in design and construction and maintained over time.

Download

See Energy-Performance-Based Case Studies

Aggressive energy savings of 50% over code are possible using the energy-focused acquisition approach shown in these examples.

Skip to case studies

See Annotated RFP Examples

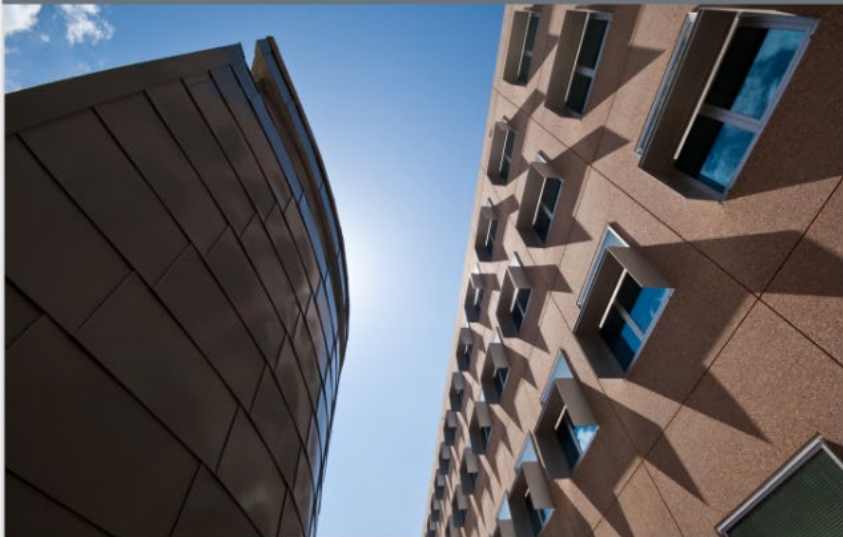
The National Renewable Energy Laboratory (NREL) has annotated example request for proposals (RFPs) to highlight the energy-performance-based acquisition process.

Skip to annotated RFPs

https://buildingdata.energy.gov/cbrd/energy_based_acquisition/

How-To Guide for Energy-Performance-Based Procurement

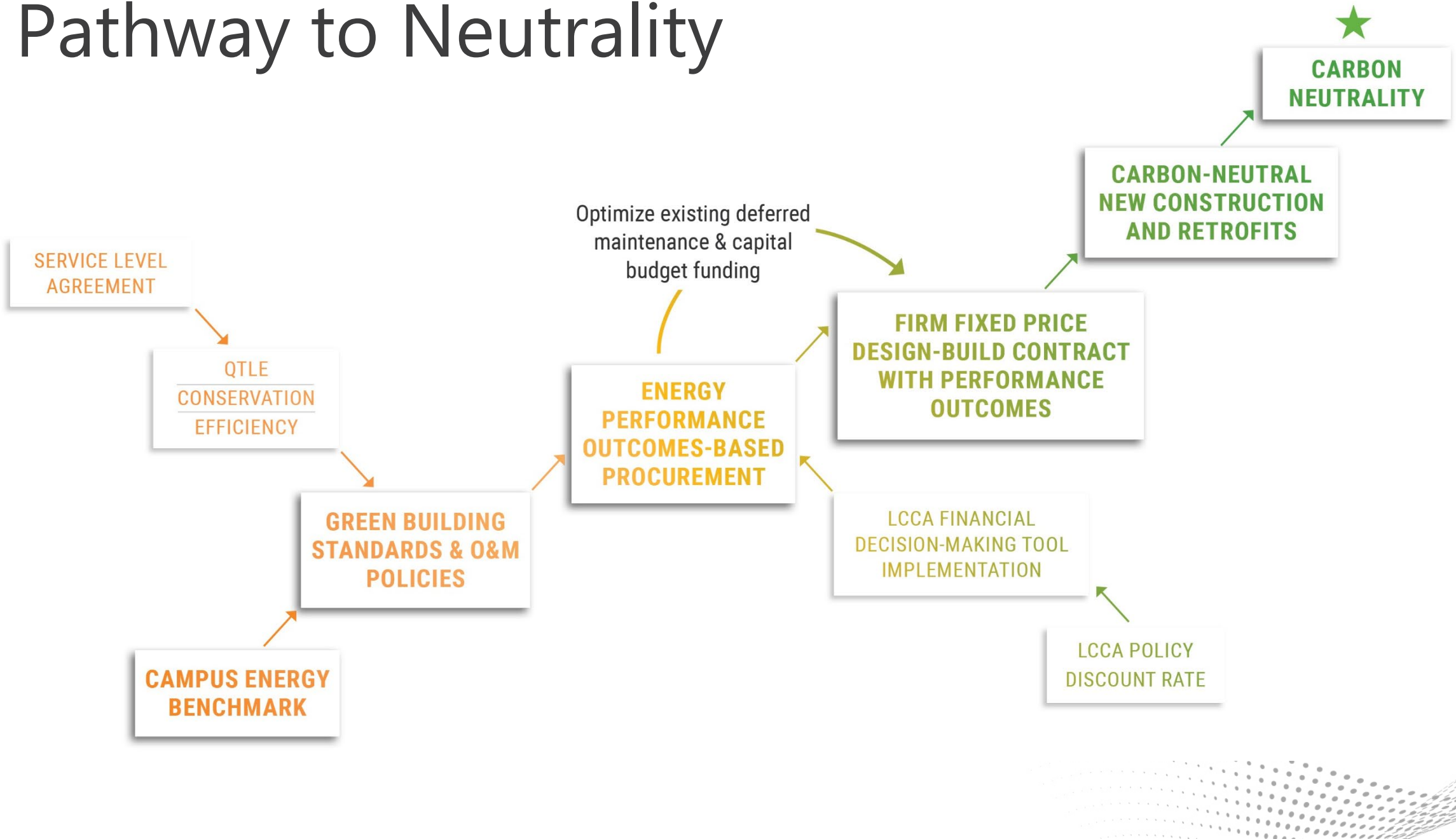
An Integrated Approach for Whole Building High
Performance Specifications in
Commercial Buildings



COST CONTROL STRATEGIES FOR ZERO ENERGY BUILDINGS

High-Performance Design and
Construction on a Budget

Pathway to Neutrality



The background is a solid yellow color. Overlaid on this are several wavy, horizontal lines that create a sense of motion. These lines are composed of small white dots, with the density of the dots increasing towards the center of each wave. The waves are positioned in the lower half of the image, with one wave starting from the left and another starting from the right, both curving upwards towards the center.

Questions?

Thank you!

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