

NET ZERO

NBI & NASEO

DENIS HAYES

Denver

Sept 17, 2013

Pepper . . . and Salt

THE WALL STREET JOURNAL



“You’re free to go, sir. But seriously, I’d get that prostate looked at.”





Kim Jong-Un Named *The Onion's* Sexiest Man Alive For 2012 [UPDATE]

NEWS • North Korea • Lifestyle • ISSUE 48•46 • Nov 14, 2012



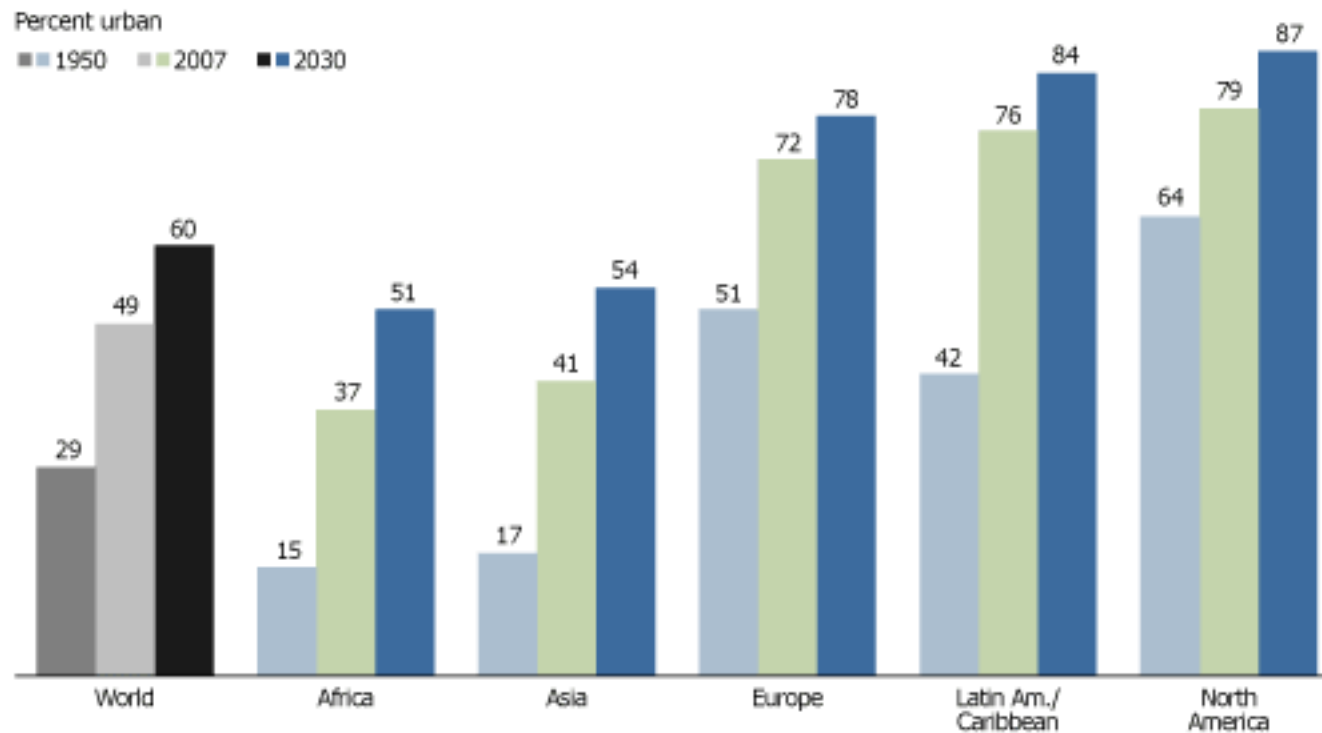
China plans to move 250 million people
from the countryside into cities in the next
25 years.

That is roughly equal to the total urban
population of the United States.

Hong Kong



By 2030, Nearly Two-Thirds of the World's Population Will Live in Urban Areas.



Source: United Nations, *World Urbanization Prospects: The 2005 Revision* (2006) and Carl Haub, 2007 *World Population Data Sheet*.

The Great Urban Migration

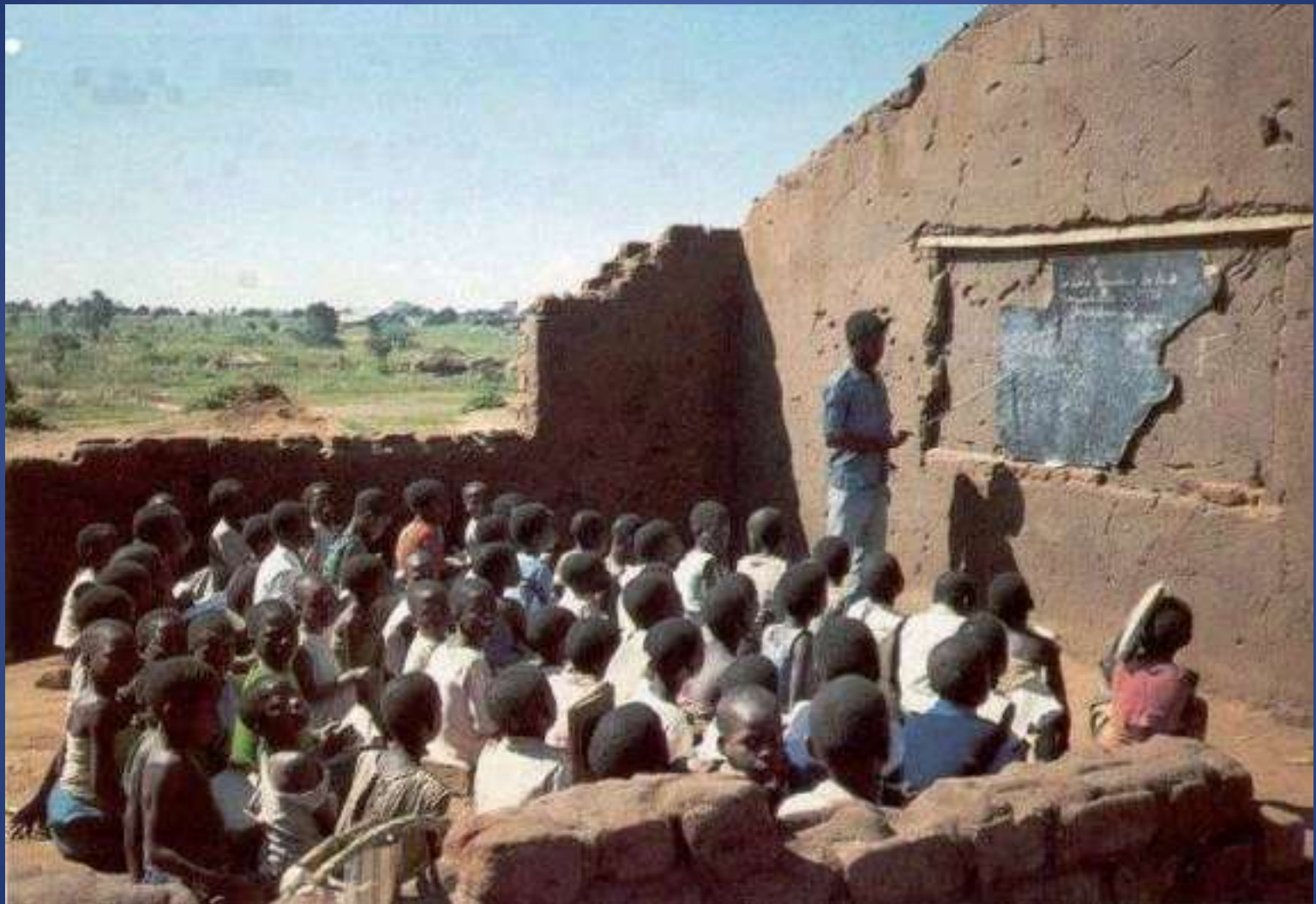
Driven by Policy, Climate
Disruption, Economic
Opportunity, and the
Ecological Undermining
of World Agriculture.

CLIMATE DISRUPTION

2012 – WORST YEAR FOR FOREST FIRES IN THE STATE'S HISTORY

2013 – WORST SINGLE FOREST FIRE IN THE STATE'S HISTORY

2013 – 1,000 YEAR FLOOD



Somalia



The Great Urban Migration

Requiring massive
investments in energy
efficiency, energy
sources, water
infrastructure,
sustainable materials,
and healthy food.

Sao Paulo, from one Direction



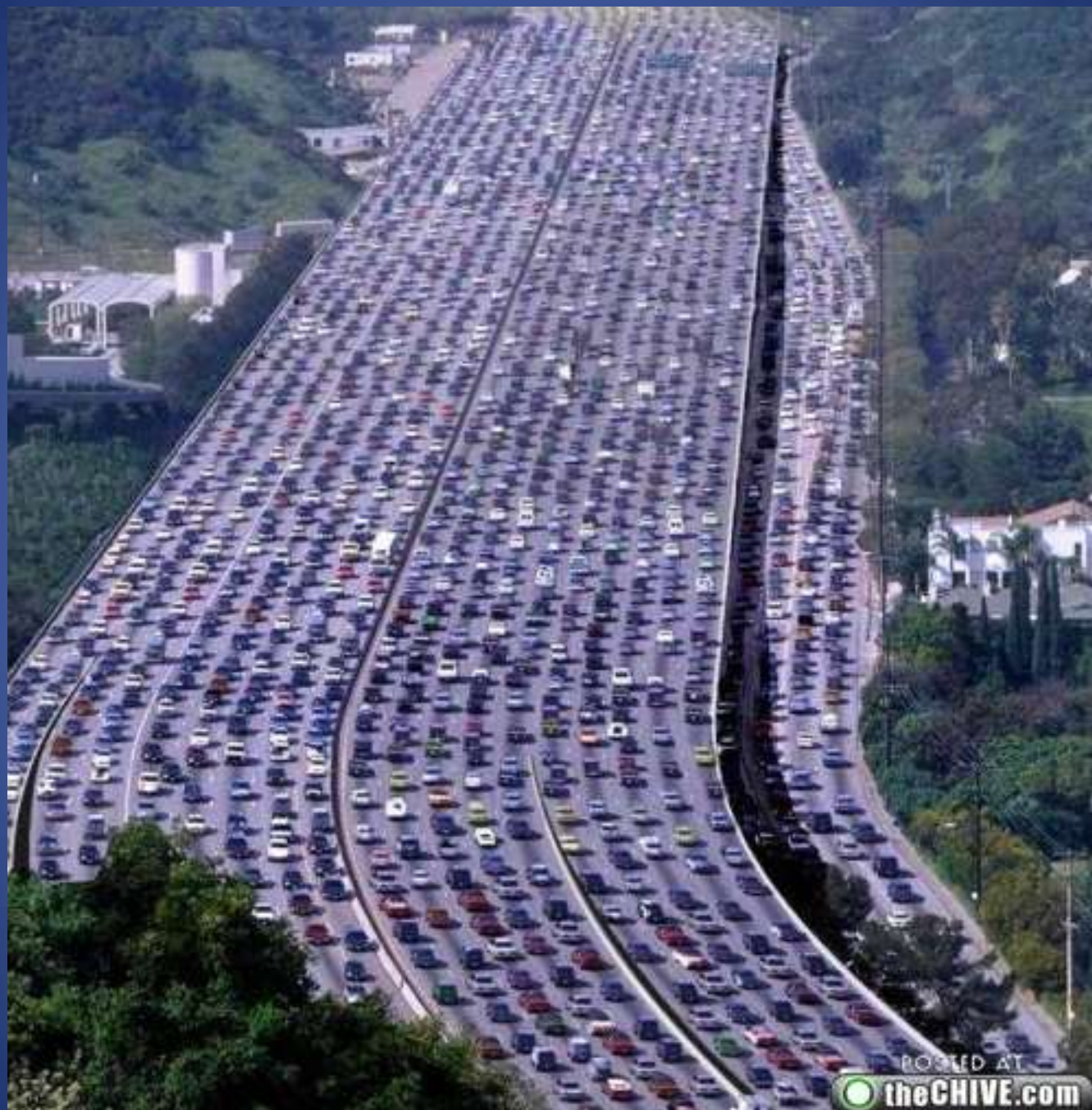
Sao Paulo: from Another Direction











Cities should be healthy ecosystems, designed on the basis of 200,000 years of Darwinian beta testing, using the fruits of modern science and technology to promote the well-being of people.

Cities should consist of “living buildings” inside vibrant neighborhoods

CODE

LEED CERTIFIED

LEED SILVER

LEED GOLD

LEED PLATINUM

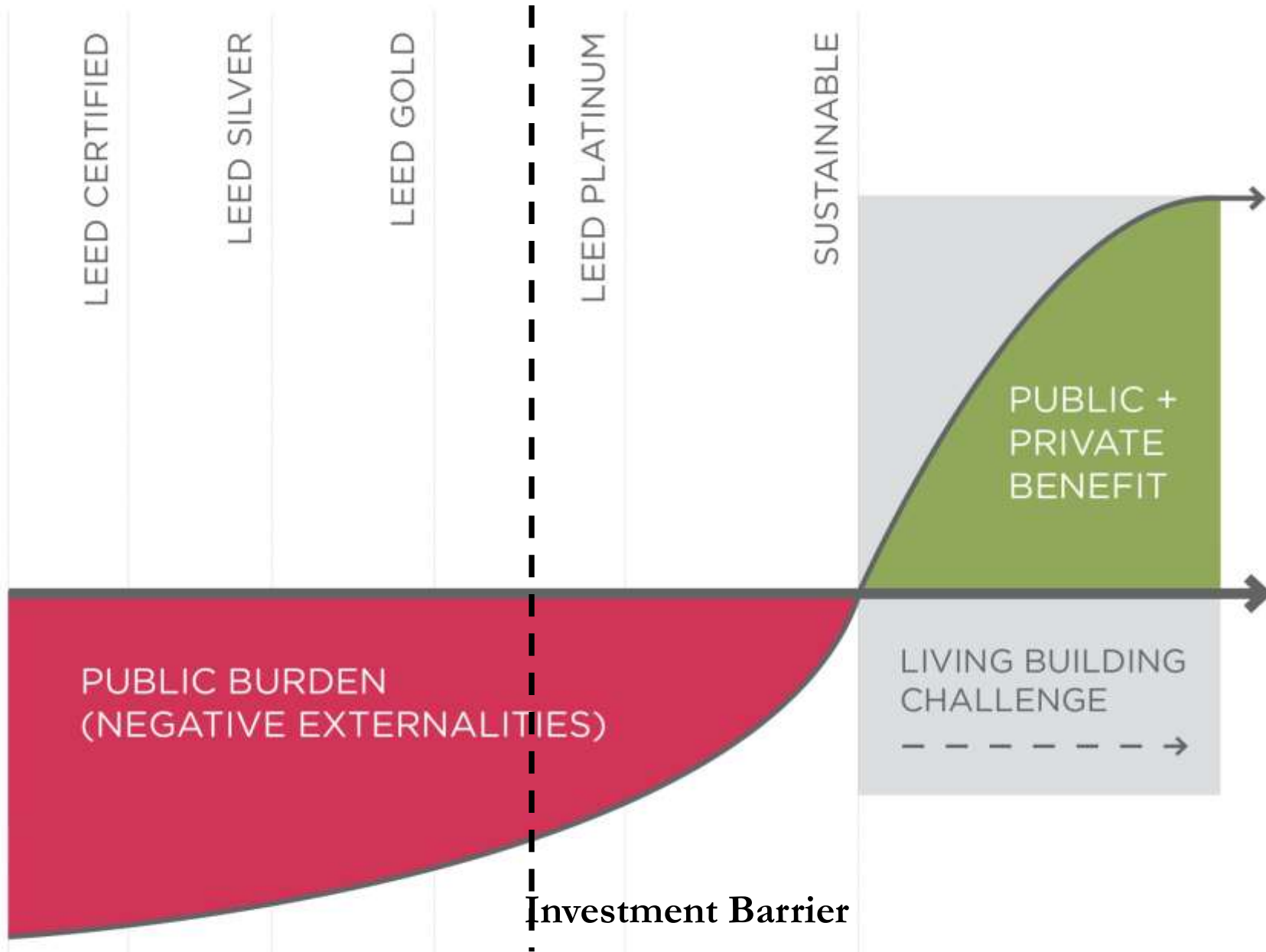
SUSTAINABLE

PUBLIC BURDEN
(NEGATIVE EXTERNALITIES)

PUBLIC +
PRIVATE
BENEFIT

LIVING BUILDING
CHALLENGE

Investment Barrier



Cost

CODE

LEED CERTIFIED

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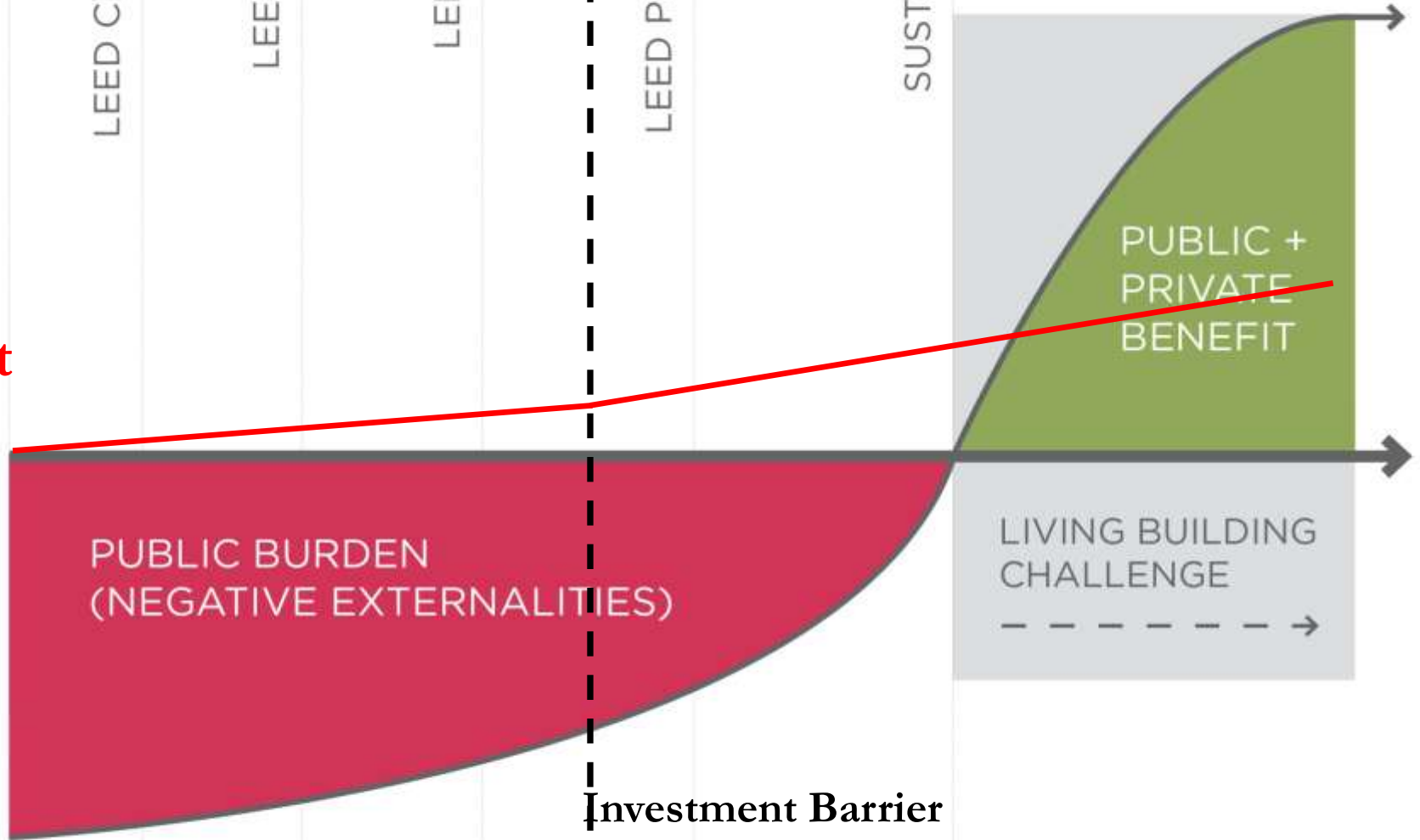
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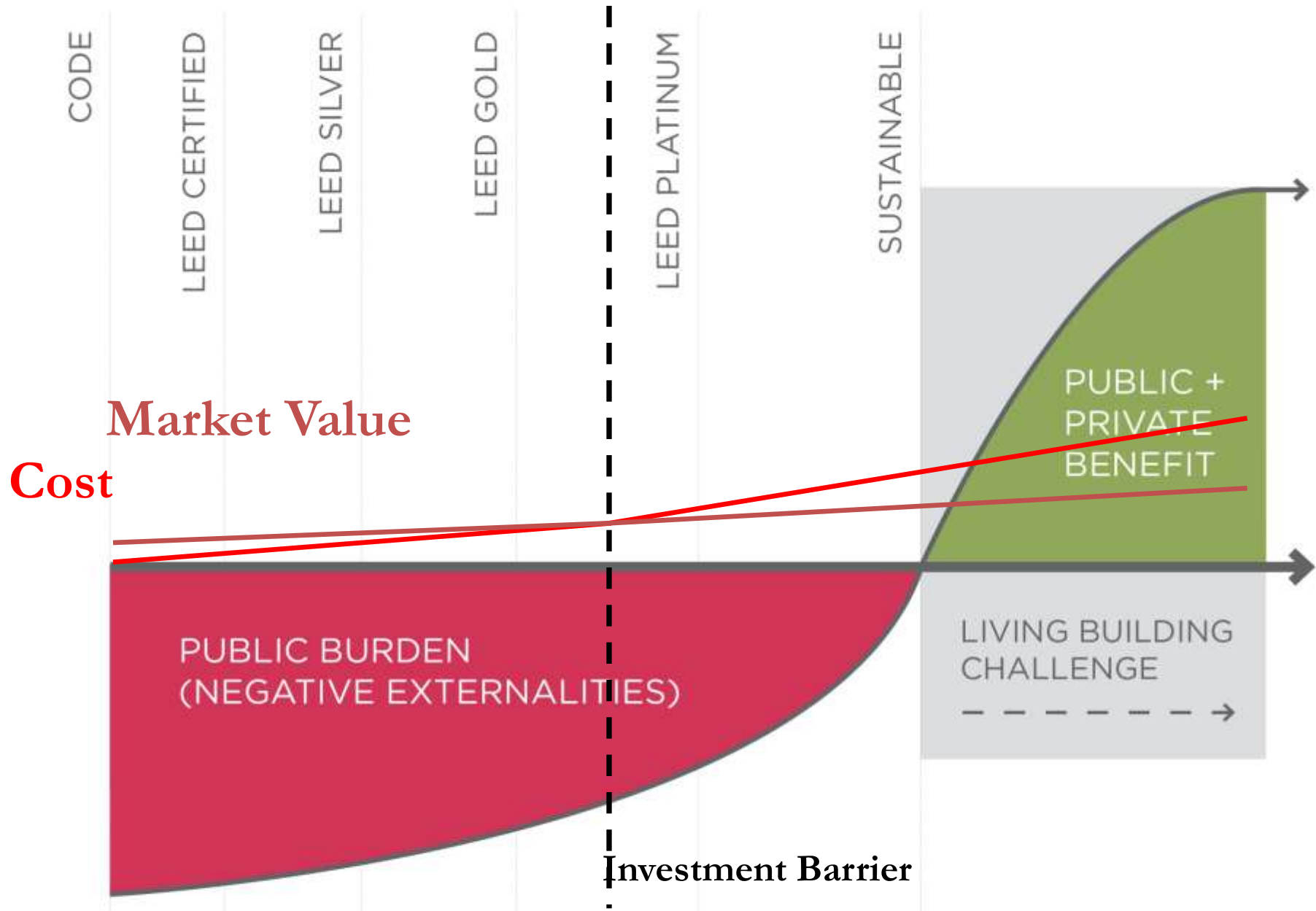
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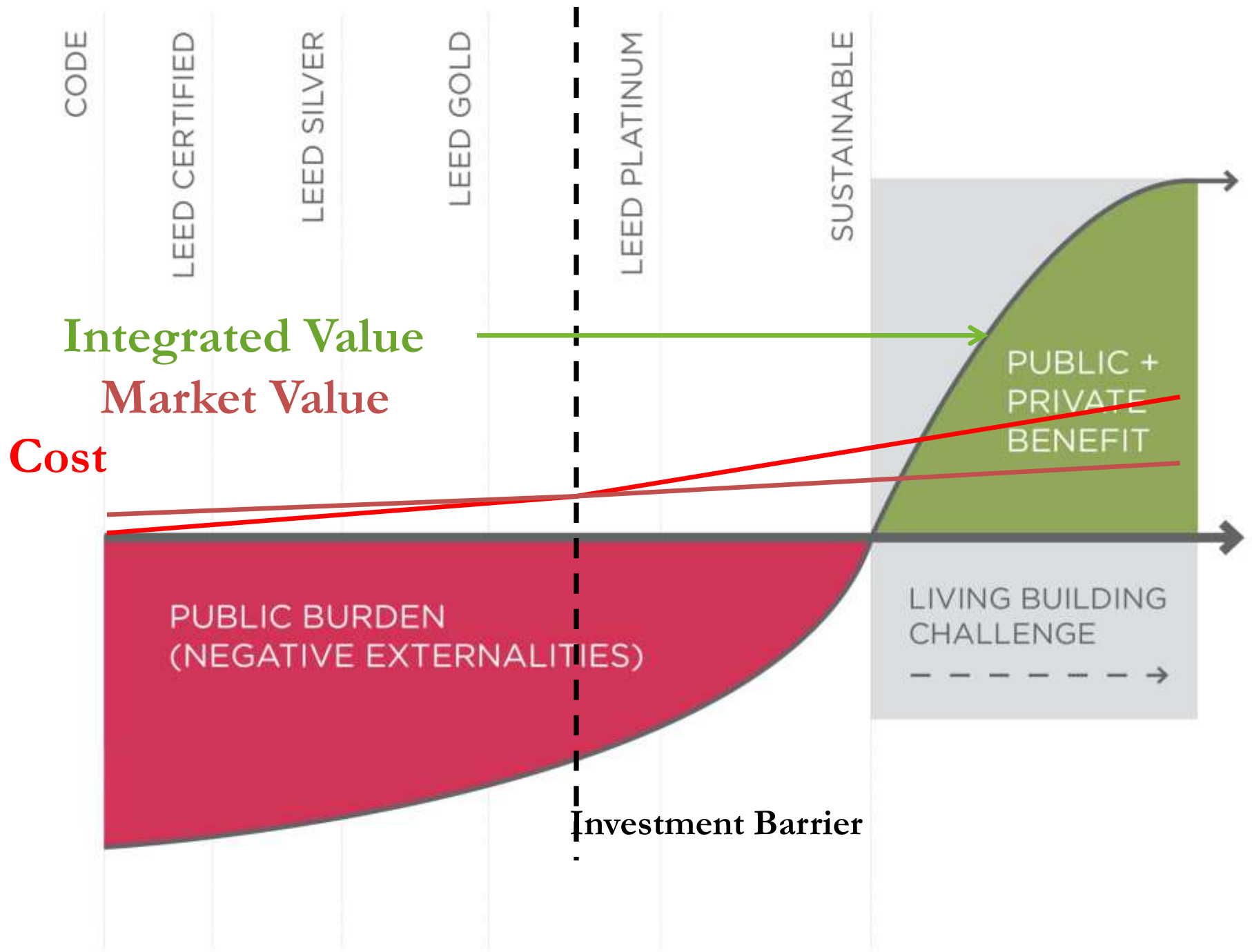
PUBLIC +
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LIVING BUILDING
CHALLENGE
----->

Investment Barrier







PERFORMANCE





LIVING BUILDING CHALLENGE™ 2.0

A VISIONARY PATH TO A RESTORATIVE FUTURE

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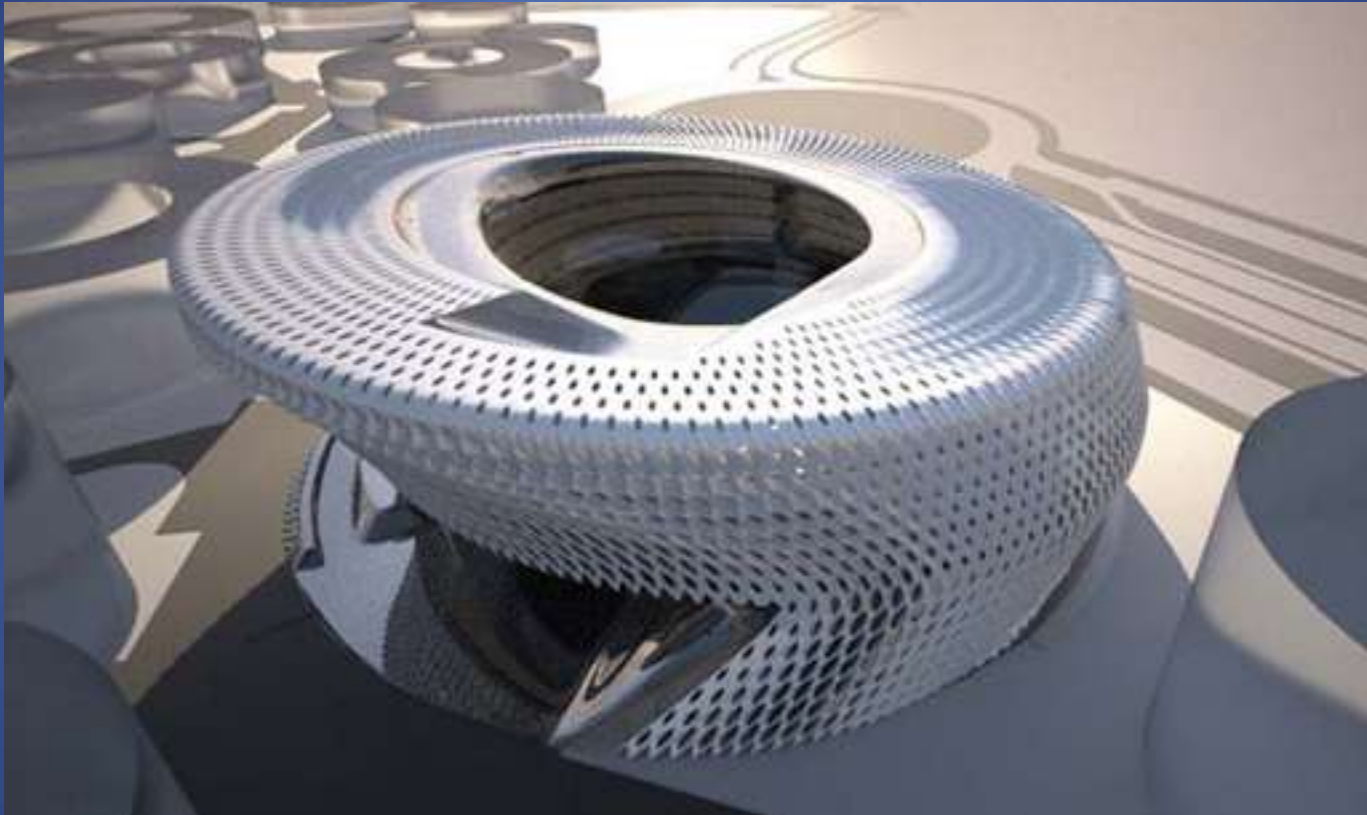


FIRSTS

- First six-story building in the United States to be truly energy-neutral from sunbeams hitting its own roof.
- Most energy efficient office building in America.
- First public office building in the United States to use rain water for potable drinking water, showers, etc.
- First office building in an American city to infiltrate all its treated gray water into the soil on site.
- First commercial structure in the United States to achieve “project certification” from the Forest Stewardship Council.
- First six-story building in the world to use composting toilets.
- First large commercial structure in the world to attempt to meet the Living Building Challenge.









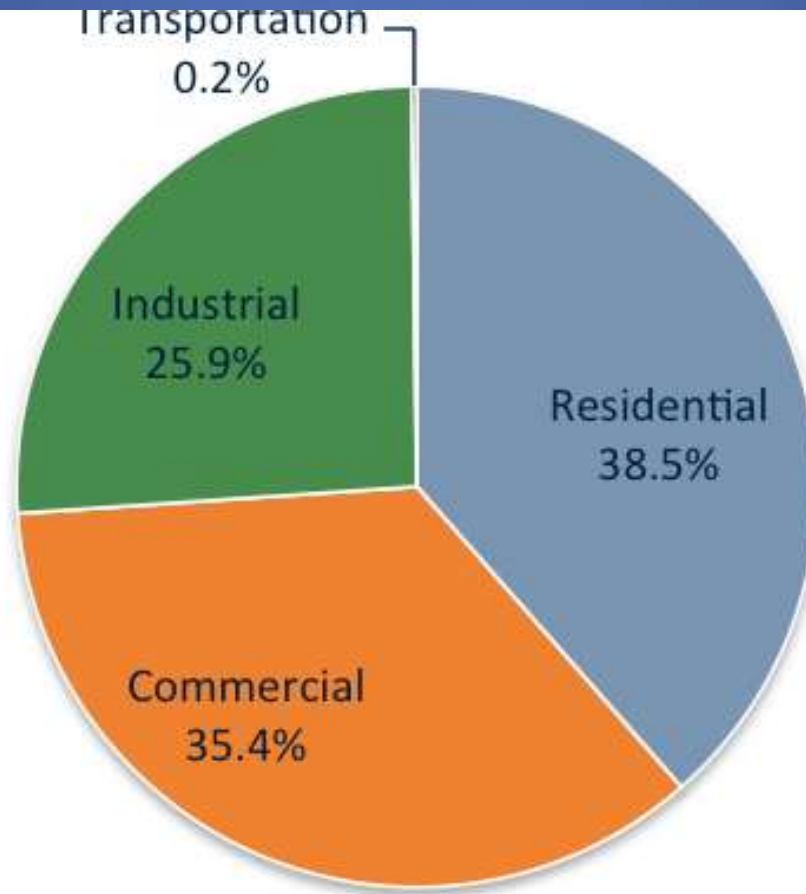


Ultra-Efficiency: Job # 1

U.S. Electricity Consumption by Sector

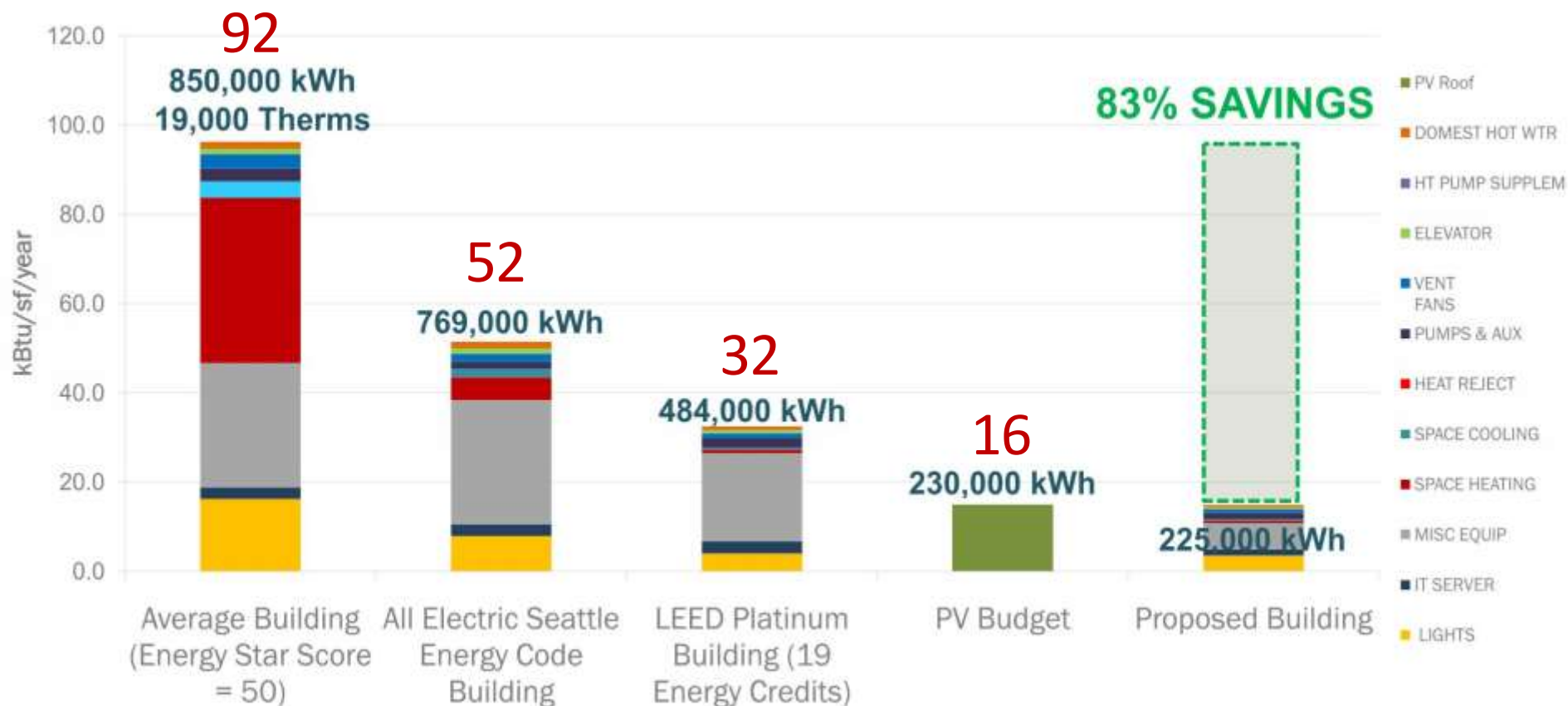
Buildings = 74 Percent

U.S. Energy Information Administration, September, 2012



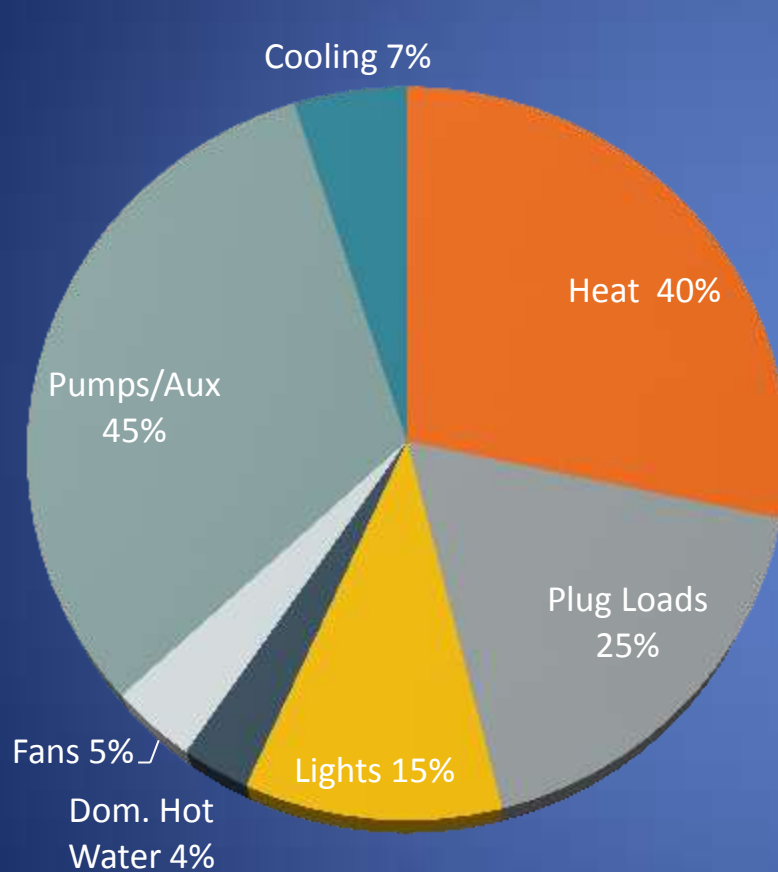
NET ZERO ENERGY

Energy Use + Solar Budget

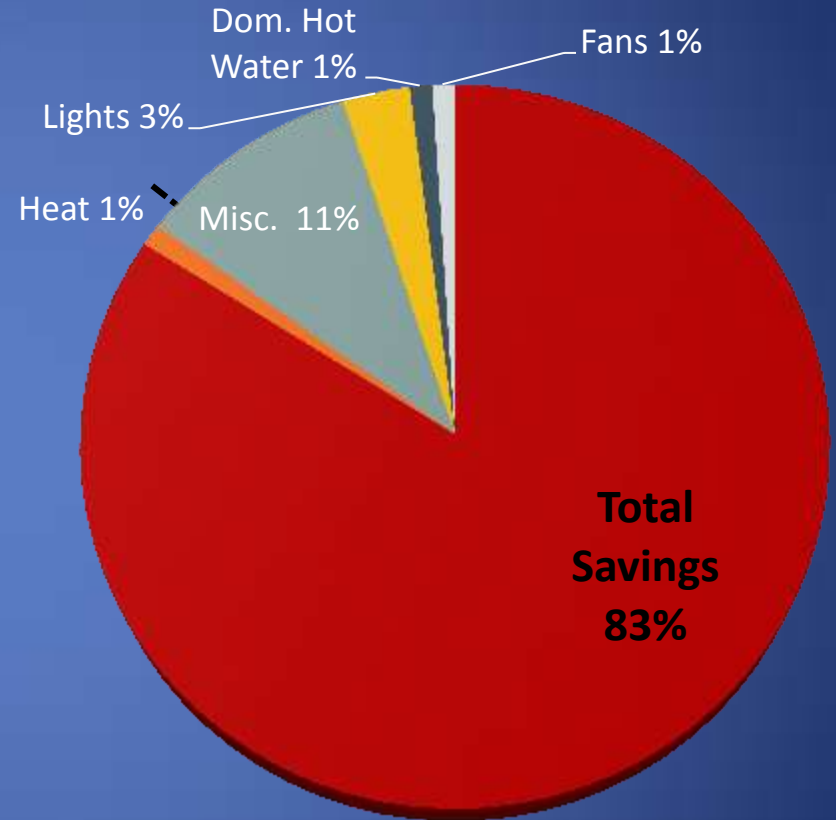


NET ZERO ENERGY

Energy Consumption



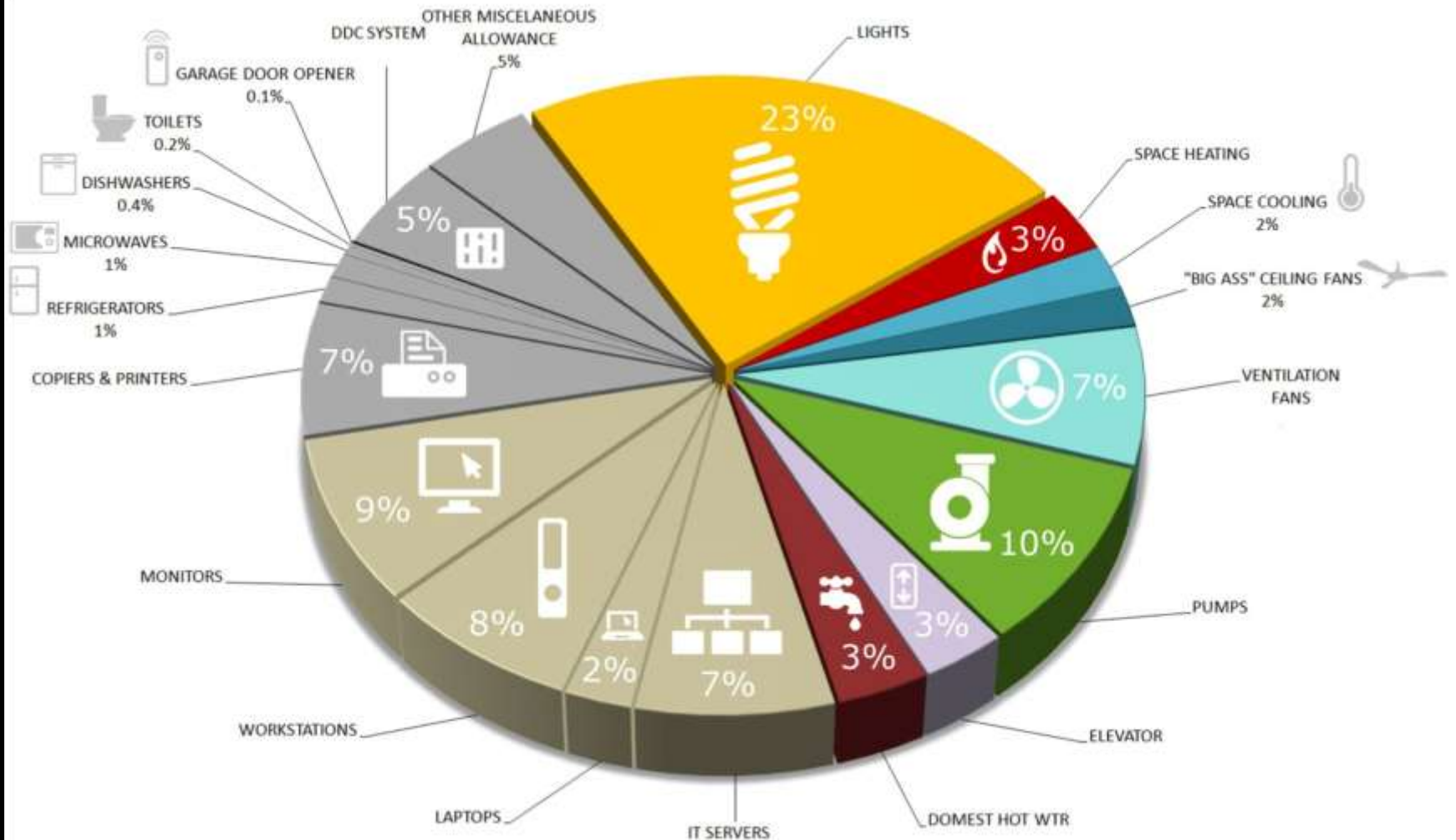
Typical Building



Proposed Building

NET ZERO ENERGY

Proposed Building Energy Use

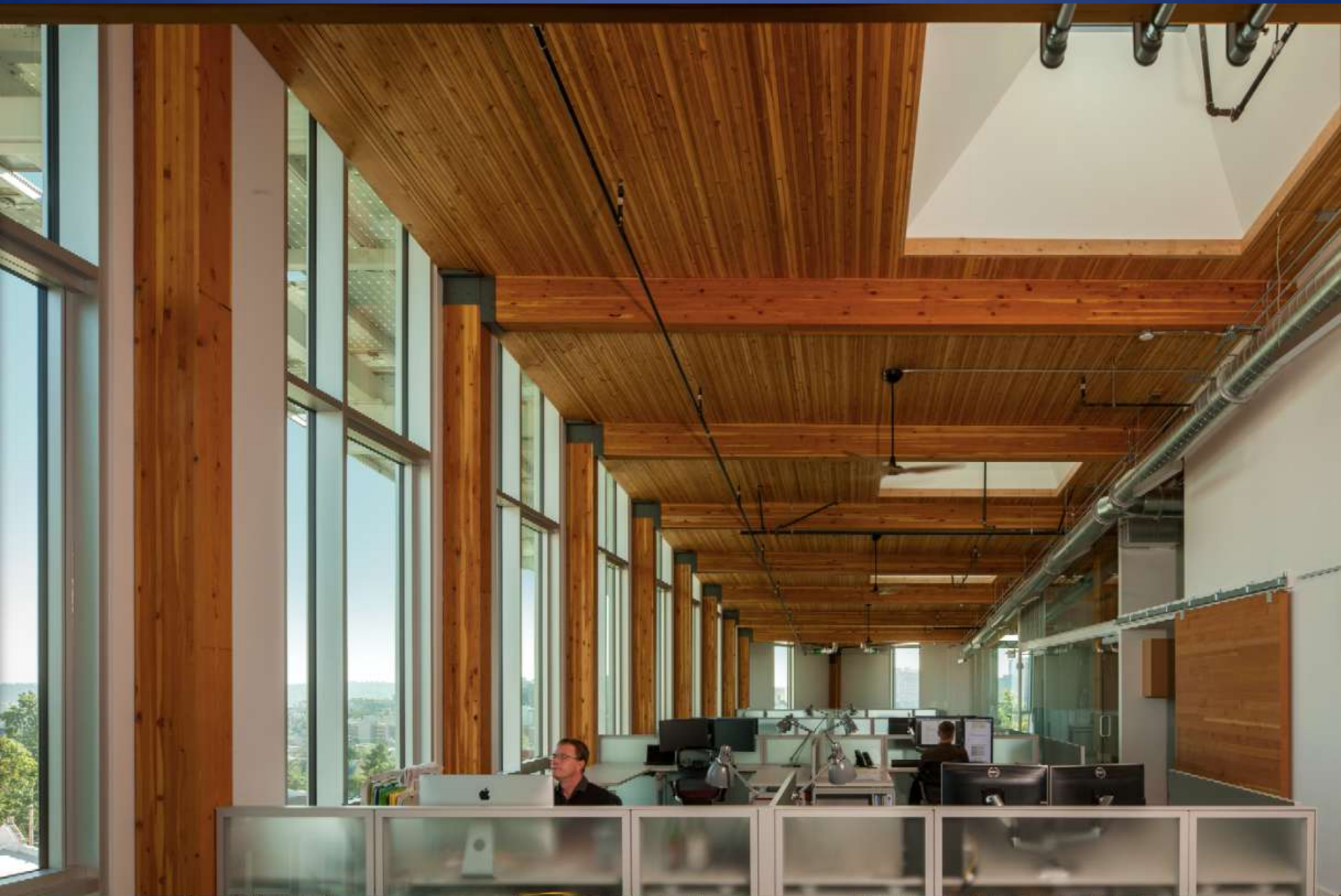




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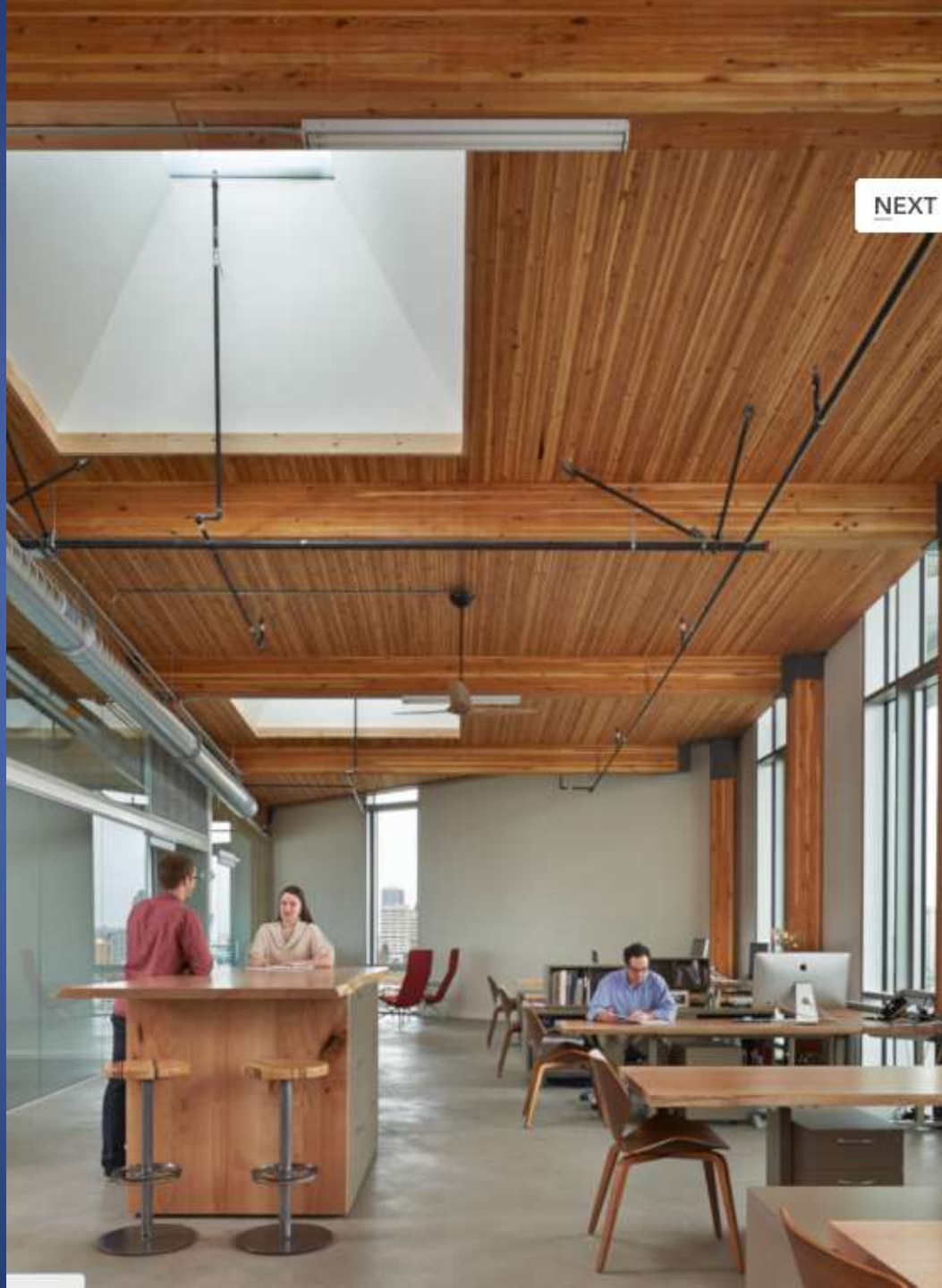
Weather station at SW corner of Pearl Apts

photo: John Stamets









NEXT



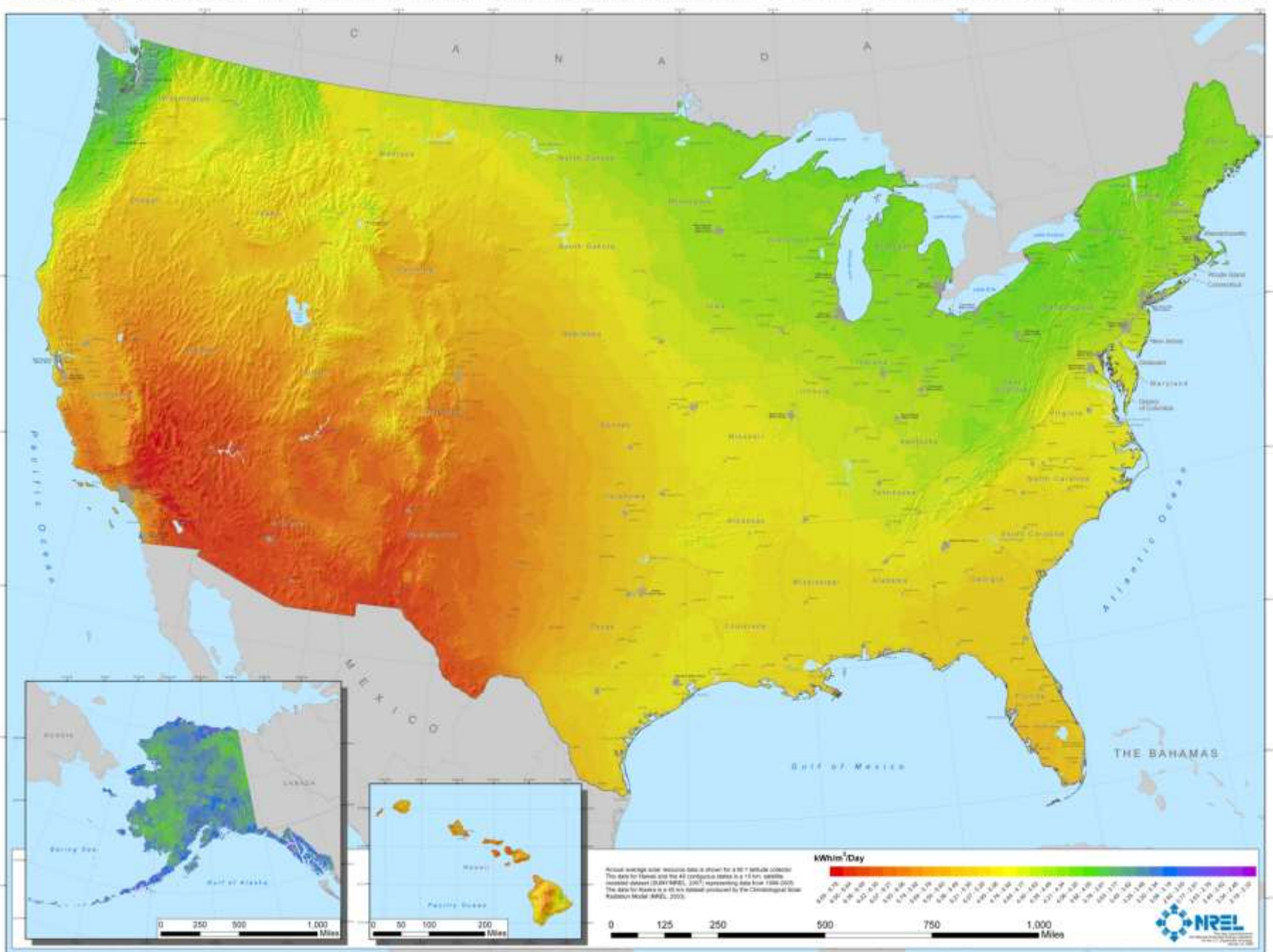


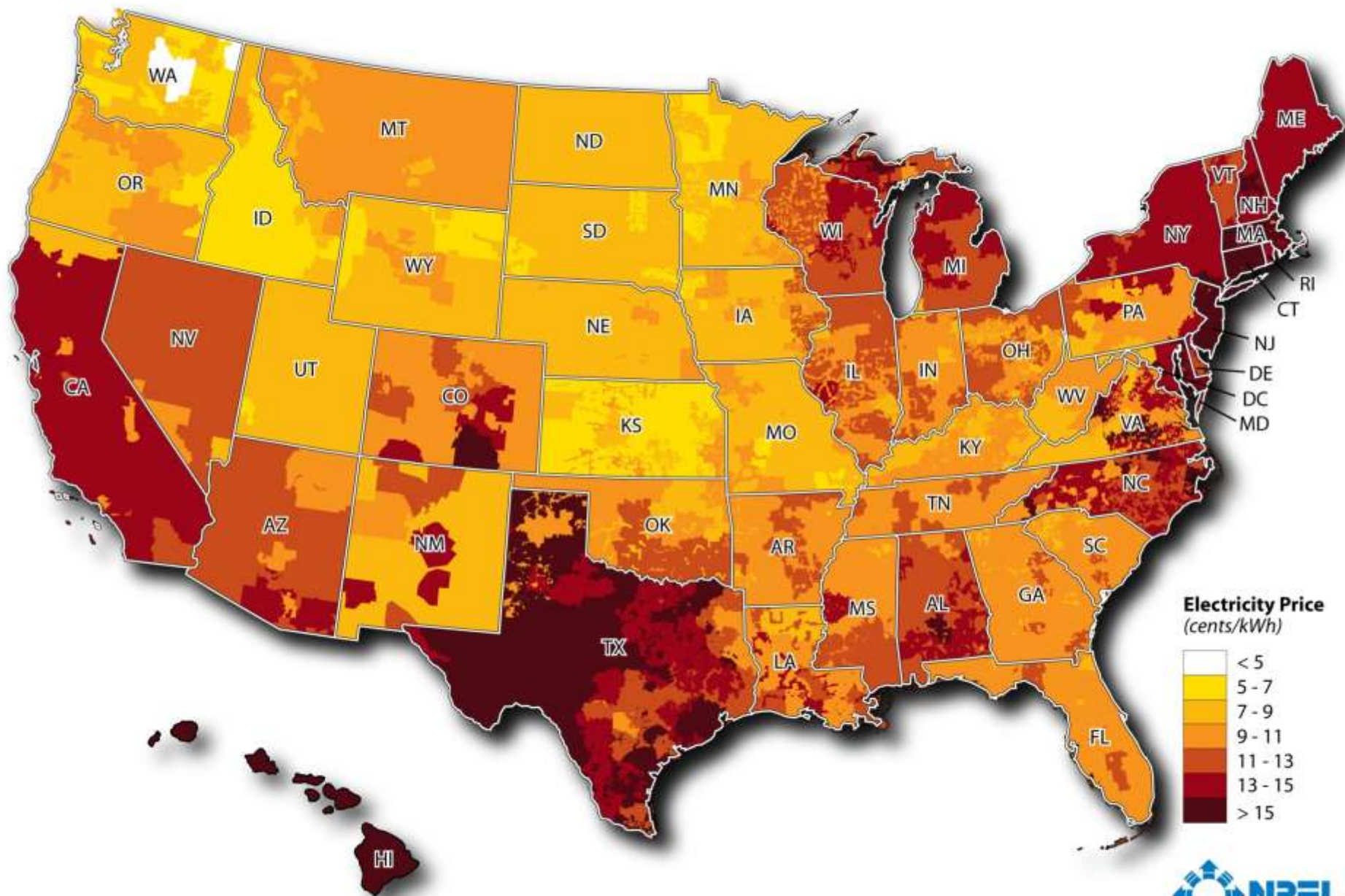
Retrofit Existing Buildings

- Energy RM
- Equilibrium Portfolio Company
- Pilot Project with Bullitt Center in Seattle
- Selling Metered Saved Negawatt-Hours to the Utility on a 20-year contract.
- **Power Purchase Agreement for saved energy**
- Serves the interests of (1) the utility; (2) all of its ratepayers; (3) the building owner; (4) Energy Efficiency Investors. NO LOSERS.

Sunbeams in Seattle?

United States Photovoltaic Solar Resource : Flat Plate Tilted at Latitude





NET ZERO ENERGY

Sunpower 425W - SPR-425E-WHT-D

Number of modules	570
Unit Nom. Power	425 W
Peak System Output	242 kW
Produced Energy	230,000 KWH/yr
Panel Efficiency (STC)	19.7%



230,000 KWH/Year

For a 50,000 sq ft building, this equals an EUI of 16









2012-7.28_0274

Connector walks back to building after bolting together the far tip.

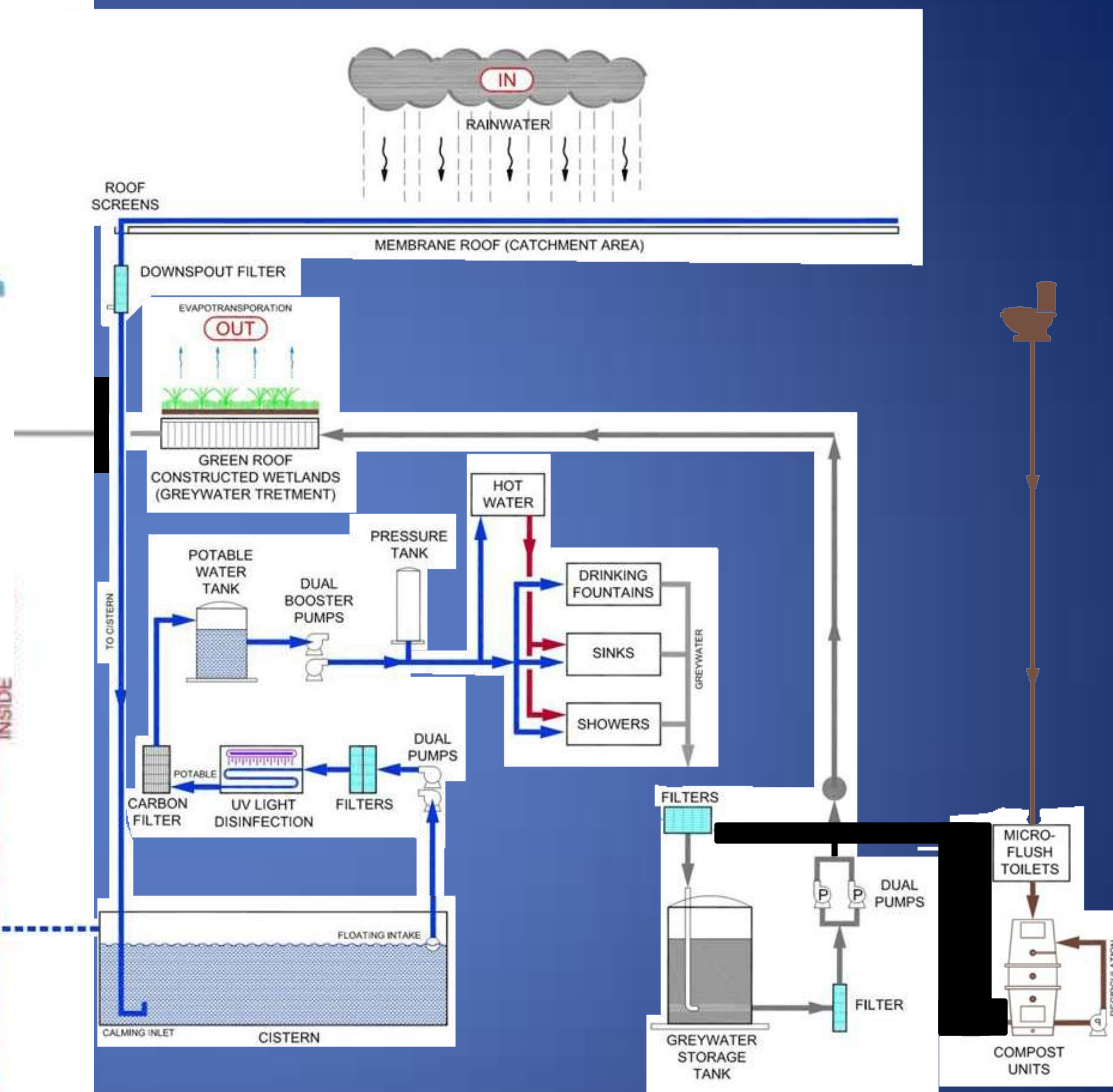
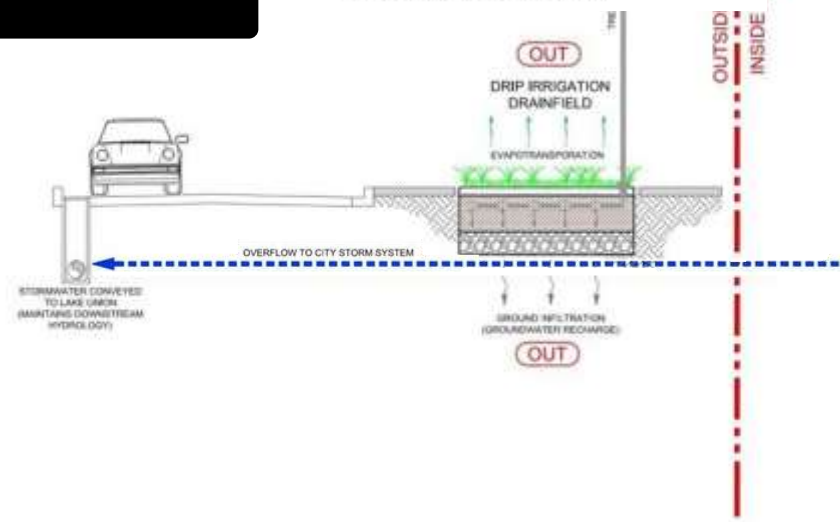
photo: John Stamets

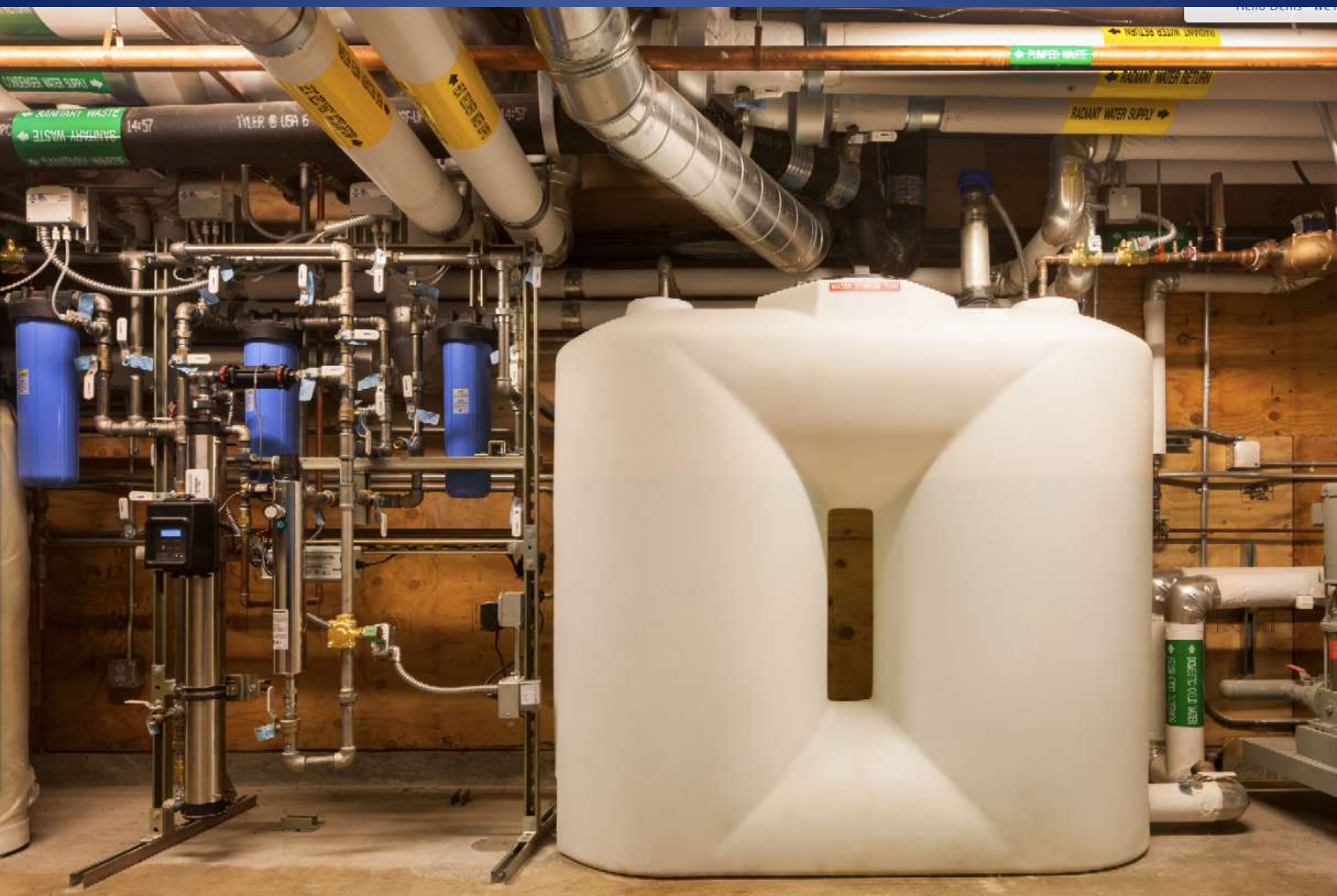






Phoenix R-200





GRAY WATER TREATMENT

An architectural rendering of a modern, multi-story building with a prominent green roof and a large solar panel array. The building features large glass windows and a white facade. The green roof is visible on the left side of the building. The solar panel array is mounted on a white metal frame that extends over the building's roof. The building is situated on a street with trees and a sidewalk. The sky is blue with some clouds.

**GREEN ROOF
FILTRATION**

**POST-TREATMENT
INFILTRATION**

IMAGE: MILLER HULL

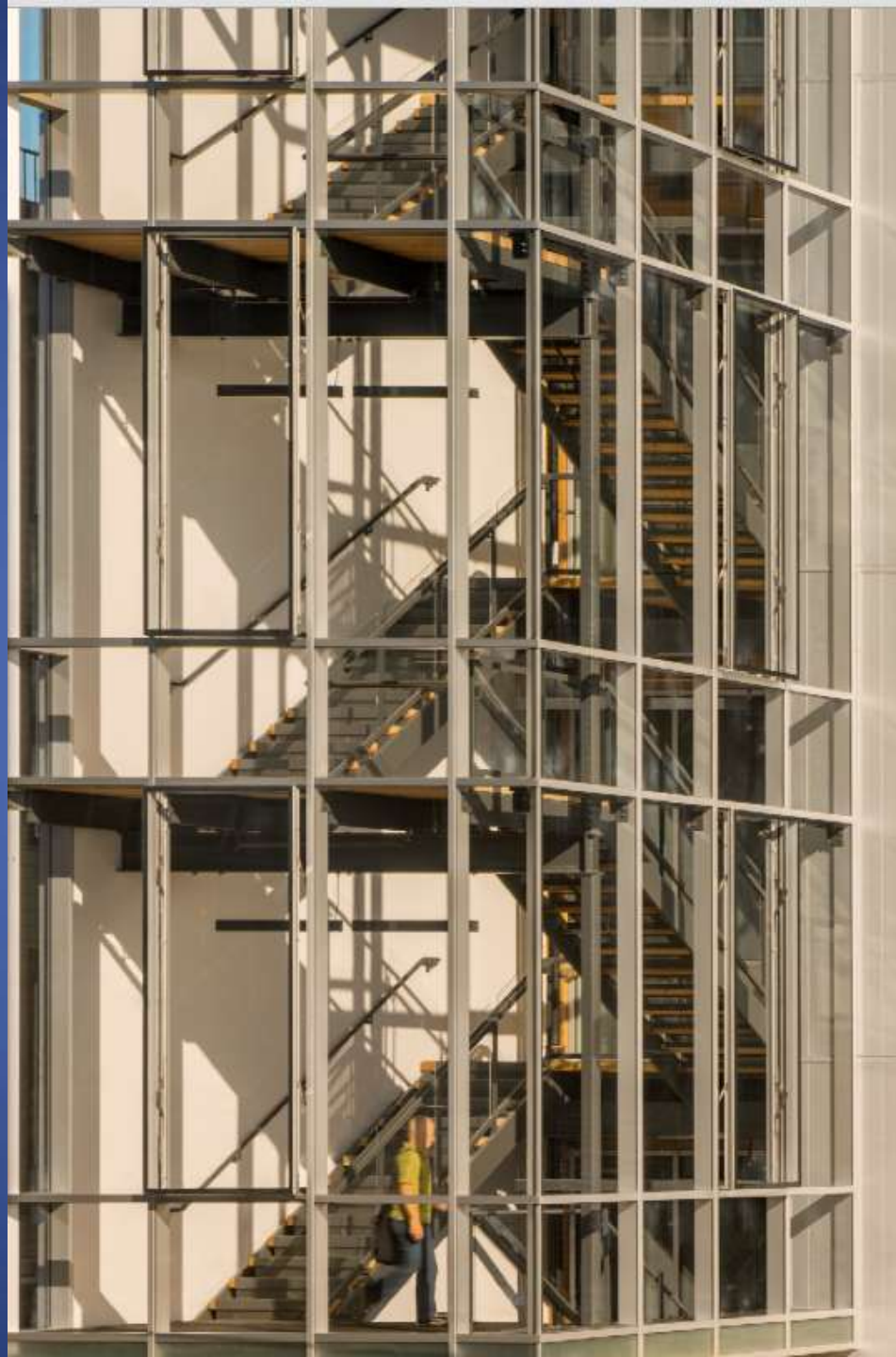




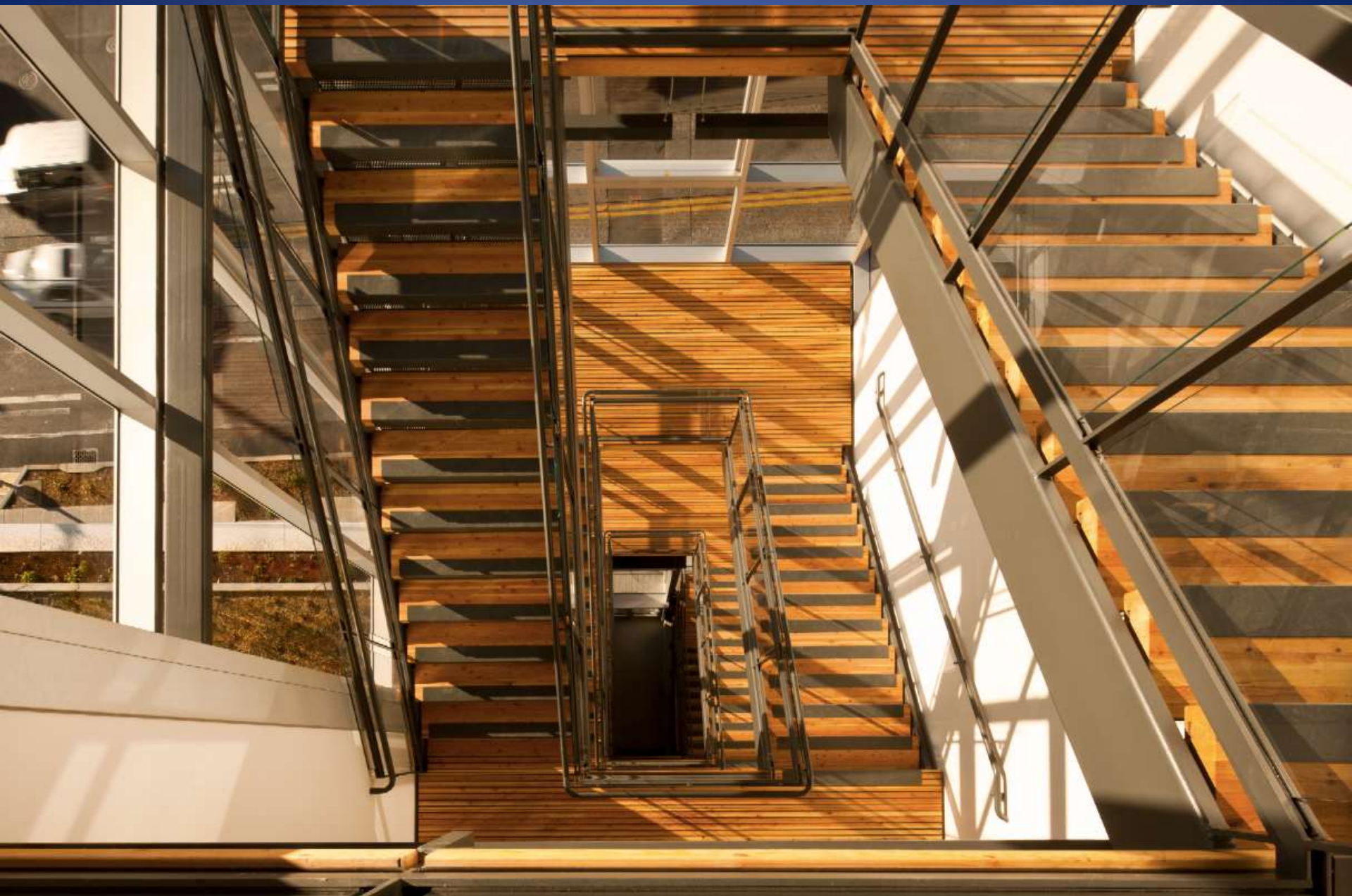




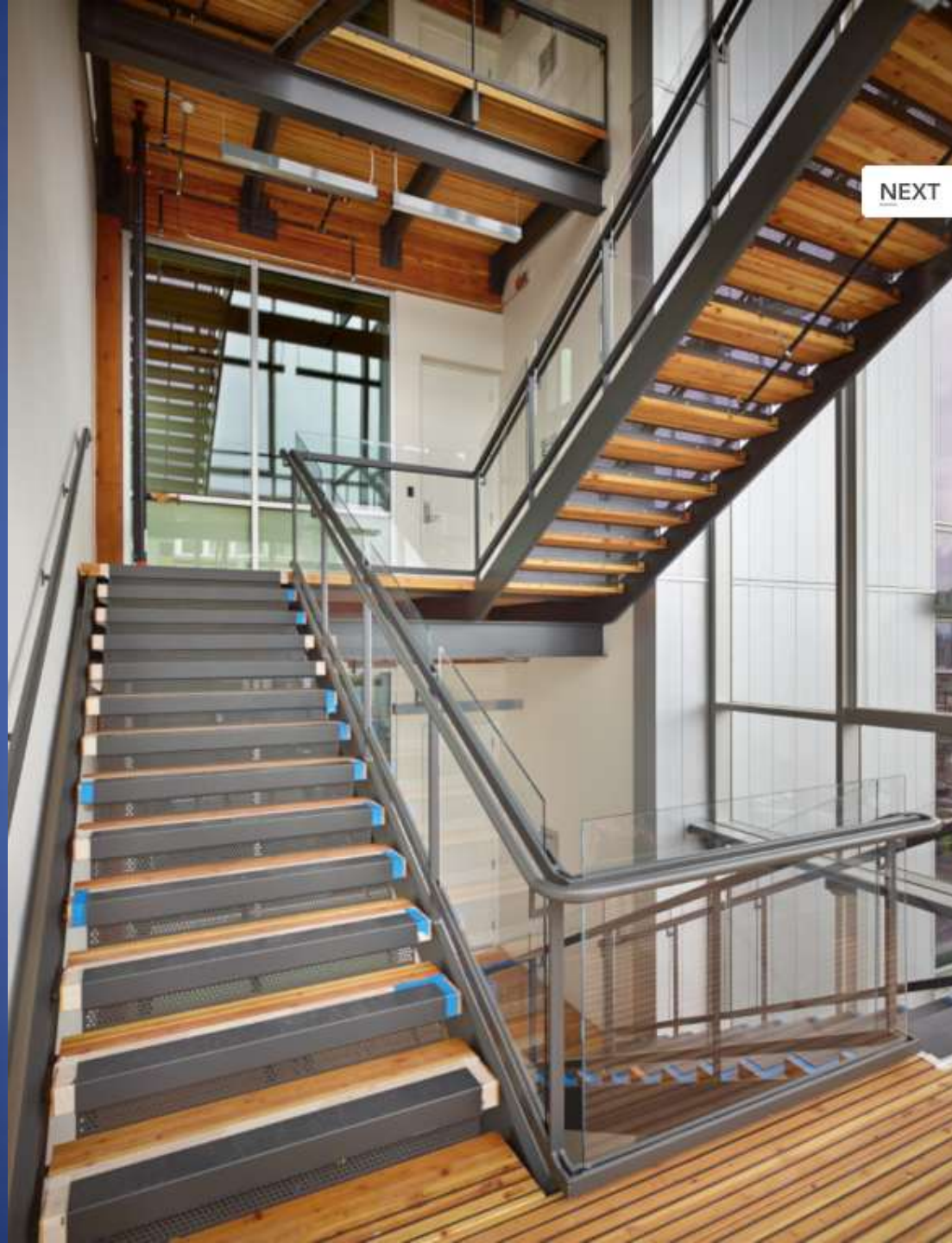




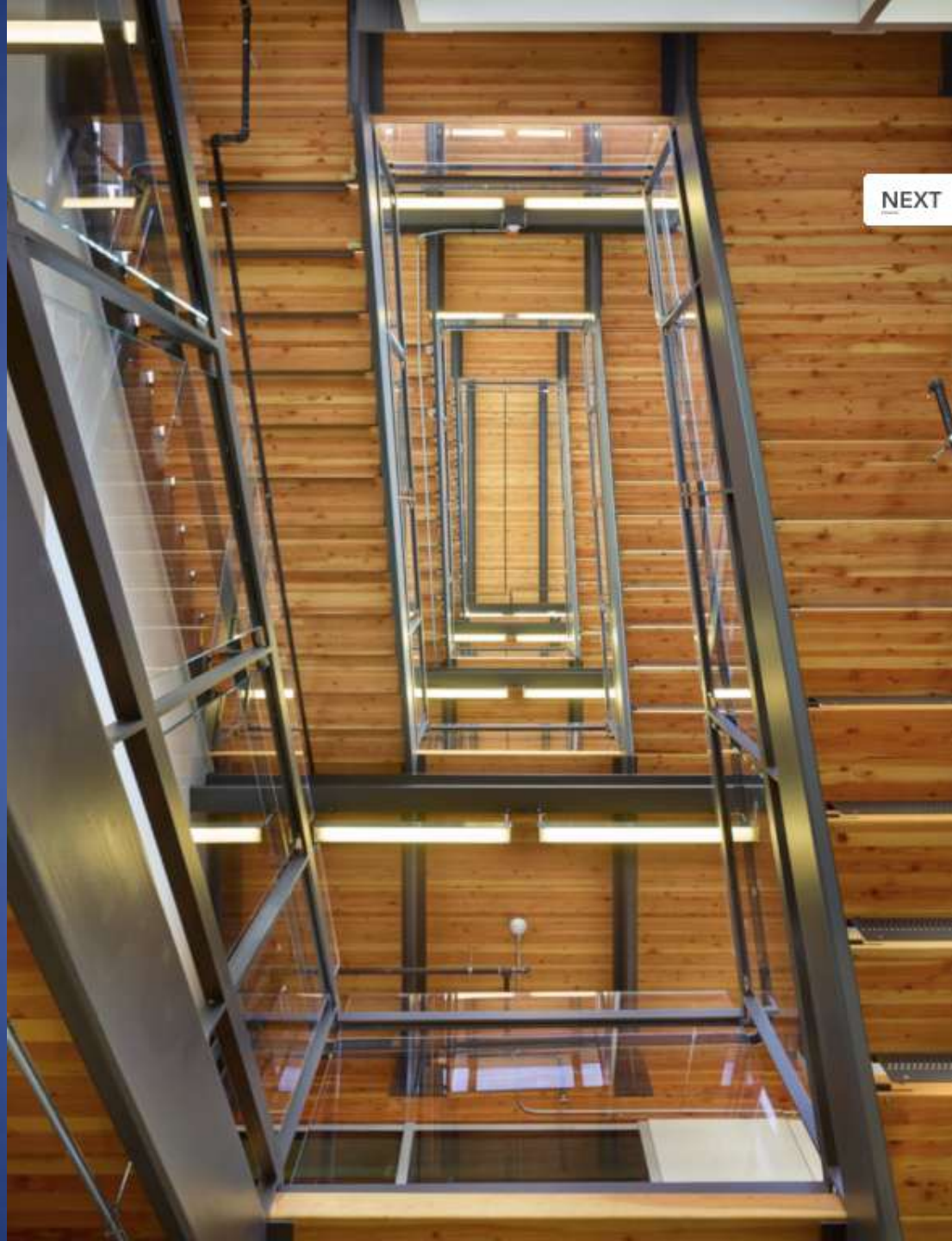






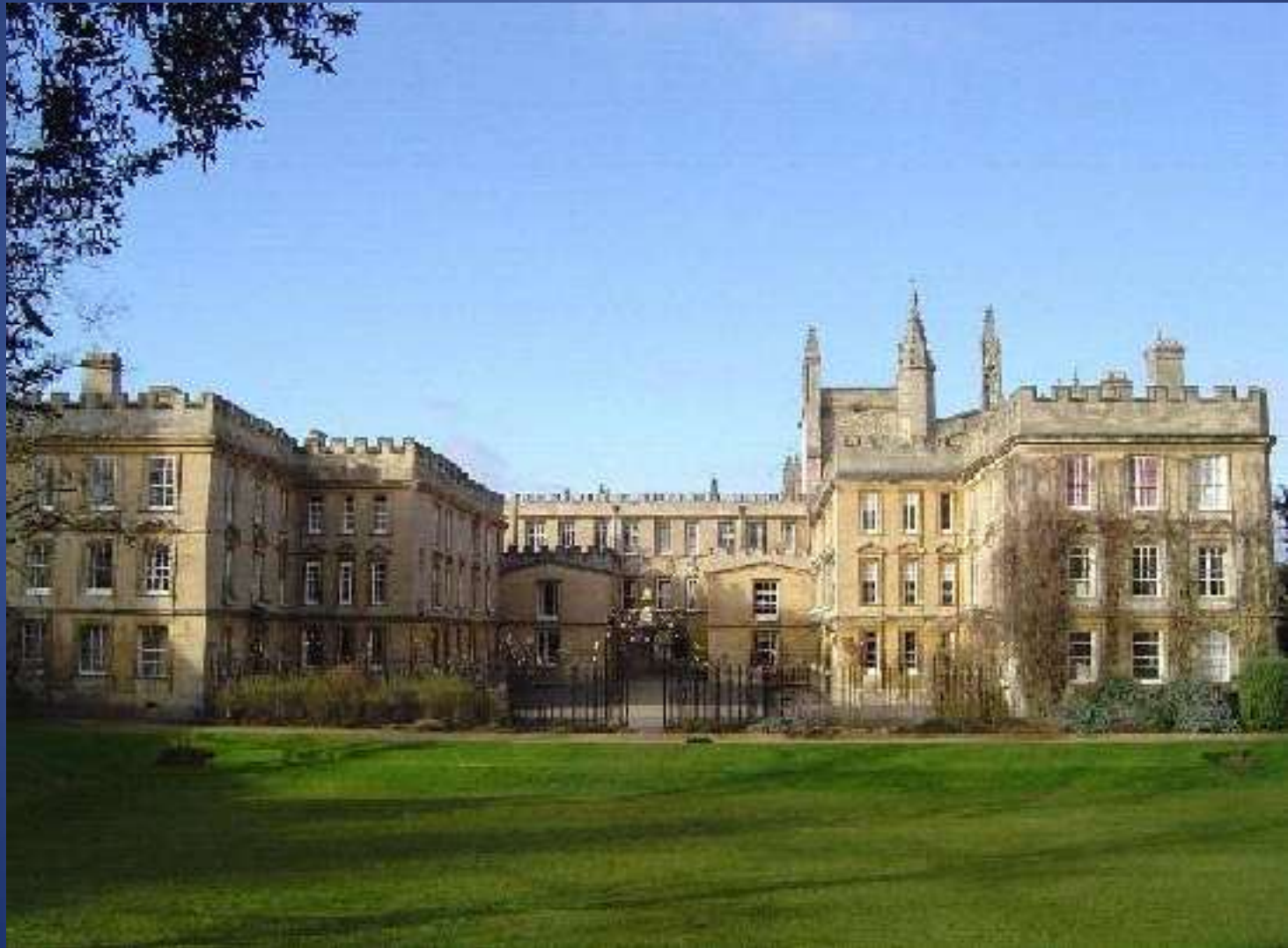


NEXT





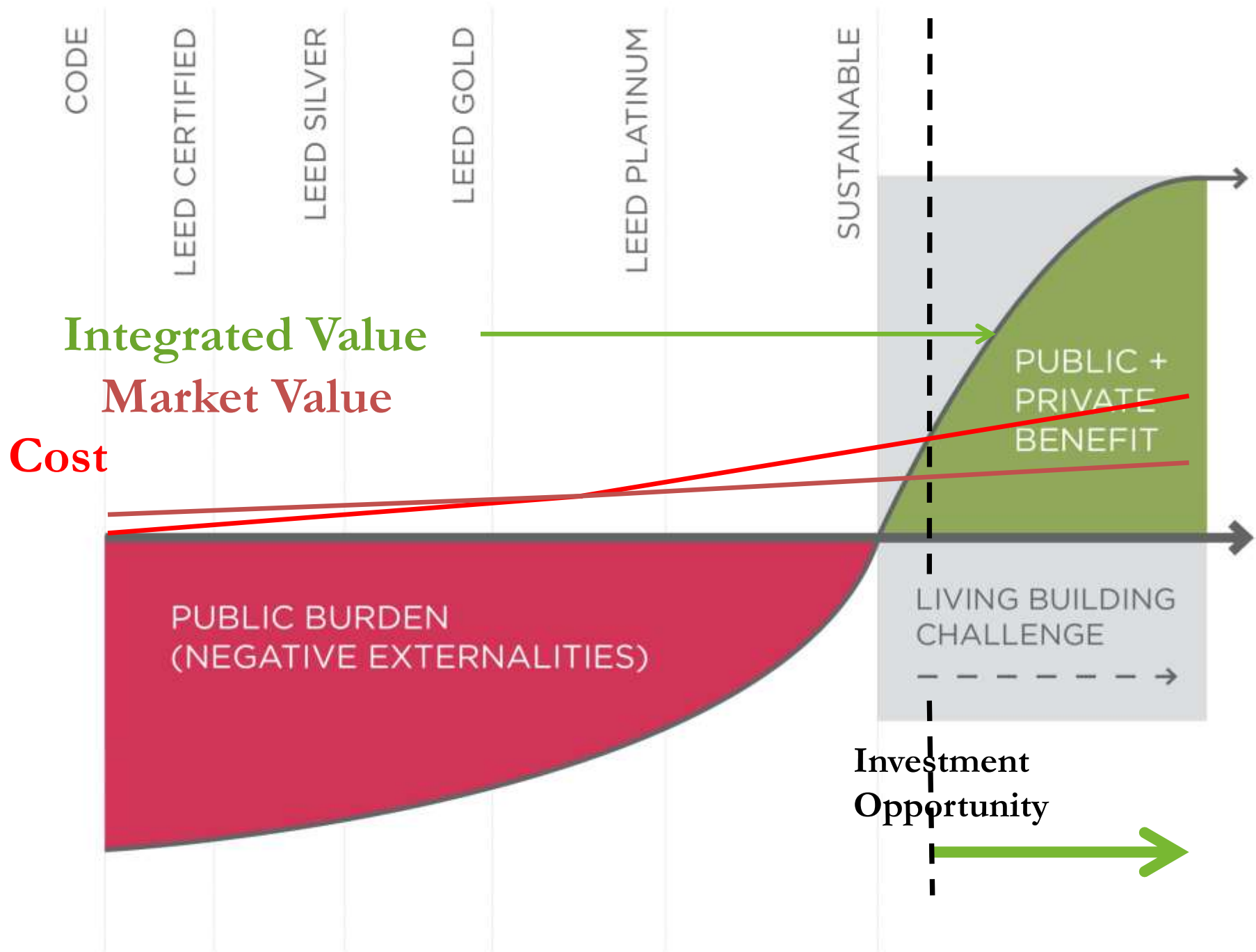
New College, Oxford











LIVING BUILDING

Regulatory Summary

Seattle Living Building Pilot Ordinance:

- 10 foot building height bonus
- Additional height for PV and “rooftop features” (skylights)
- Elimination of on site commercial loading berth

Term Permit

- PV over ROW
- Greywater infiltration in ROW

King County Dept. of Health

State Dept. of Health

- On Site Sewer for greywater discharge

Environmental Protection Agency

- Collected roof rainwater for potable use

BIG CHANGES

Building Energy Performance Standards

Accelerated Regulatory Review for Ultra Green Buildings

Preferential Access to Municipal New Market Tax Credits

Solar Access Law

PV over Right of Way



Earth Day
2014 & 2015:
Green Cities





EarthDay.org

2014-2015: The Built Environment

Denis Hayes

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