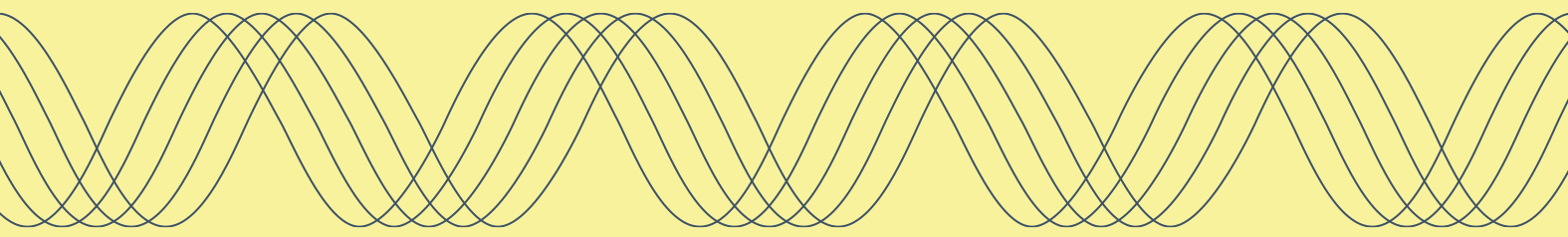




# Northwest



# Multifamily Water Heater Program



# Earn cash with your water heaters



- **Connect and Earn**
  - Every connected water heater earns an annual incentive of \$20
    - That's \$6,000 a year for a 300-unit property
- **Upgrade and Earn**
  - PGE will pay to make your replacement "smart" so you can start earning your annual incentives
- **Start Smart**
  - Let PGE help you start your project with smart water heaters
  - Let your new water heaters start making you money



# Sign Up & Start Saving

**Find out more: [portlandgeneral.com/waterheaters](http://portlandgeneral.com/waterheaters)**

Contact us:

Program Contact

888.987.0976

[waterheaters@pgn.com](mailto:waterheaters@pgn.com)

**Contact me directly:**

Molly Thompson

503.467.2138

[Molly.Thompson@clearresult.com](mailto:Molly.Thompson@clearresult.com)



**Let's  
meet the  
future  
together.**



# PANELISTS



**Monika Henn**  
ULI Greenprint Center



**Renee Loveland**  
The Green Cities Company



**Karina Hershberg**  
PAE



**Isaac Barrow**  
Portland General Electric



**Ralph DiNola**  
New Buildings Institute

The background of the slide is a high-angle, aerial photograph of a city skyline at night. The buildings are densely packed and illuminated with various lights, creating a vibrant, glowing effect. The sky is dark, and the overall scene conveys a sense of urban energy and modern infrastructure.

# Electrify: The Movement to All-Electric Real Estate

MARCH 2022

# Electrify: The Movement to All-Electric Real Estate

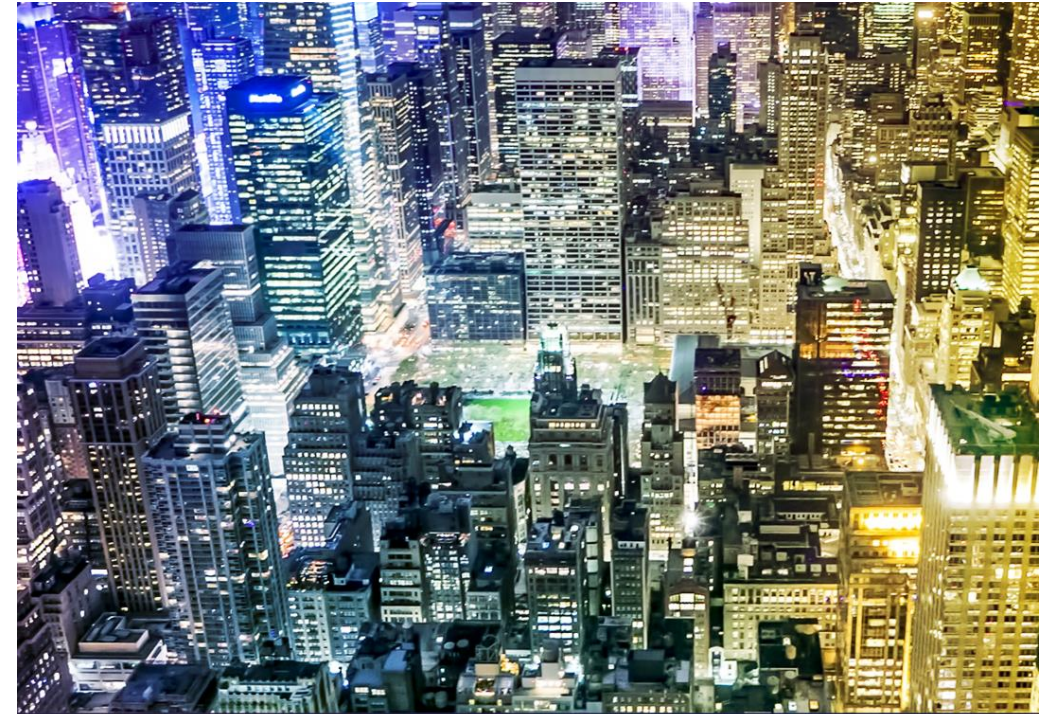
## What is electrification?

- Buildings without any fossil fuel combustion onsite. Applies to retrofits, new construction, and all asset types

## Technologies to electrify

- Space Heating: Gas Boiler to Electric Heat Pump
- Hot Water: Gas Boiler to Electric Heat Pump
- Cooking: Gas Stove to Electric Induction Cooktop

[www.uli.org/electrify](http://www.uli.org/electrify)





# BUSINESS CASE FOR ELECTRIFYING

## FINANCIAL BENEFITS

- Saving construction costs
- Optimizing retrofit timing
- Lowering operational energy costs

## IMPENDING REGULATIONS

- Complying with “gas ban” policies
- Preparing for future sustainability requirements

## TECHNICAL BENEFITS

- Driving energy efficiency
- Optimizing smart building grid-interconnectivity

## ENVIRONMENTAL BENEFITS

- Achieving corporate decarbonization and net-zero goals
- Supporting tenant sustainability goals
- Improving health and safety



# Challenges: Commercial Building Electrification Retrofits

- Timing the Retrofit
- Ensuring Enough Space
- Weather Considerations
- Upfront Costs
- Social Equity Concerns
- Occupant Preference
- Utility Infrastructure



# Solutions: Commercial Building Electrification Retrofits

- Schedule/Plan for Equipment Turnover
- Optimize Vacancies/Occupant Turnover
- Communicate/coordinate with Occupants, Property Teams, and Utility
- Scale Across Portfolio



# Zero Carbon, From Grid to Building

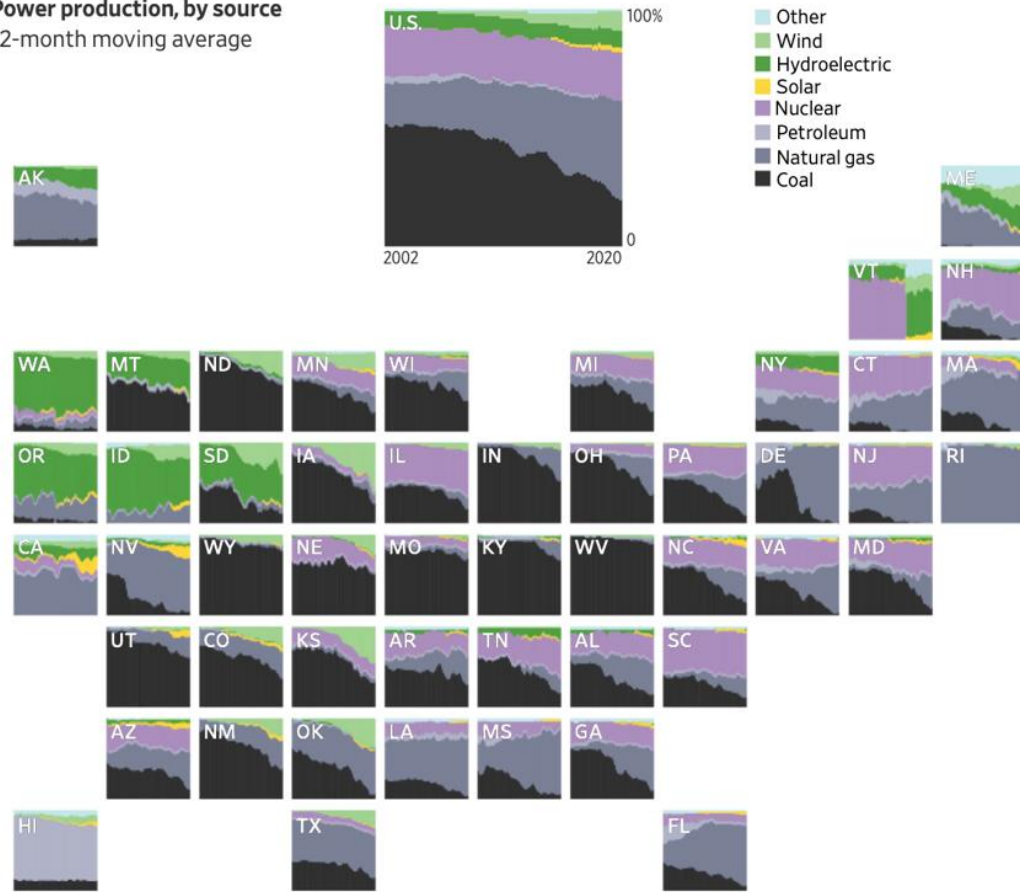
Isaac Barrow

March 2022





### Power production, by source 12-month moving average




Source: Environmental Protection Agency  
James Benedict/THE WALL STREET JOURNAL

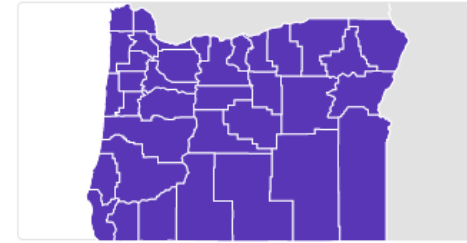




SAVINGS


**99% of households in Oregon** — 1.6 million — could **save \$442 million a year** on energy bills if they were using modern, electrified furnaces and water heaters instead of their current machines.

Share 



JOBS

Electrification would create **3,100 installation jobs** in Oregon. In addition, nationwide, it would further generate **80,000 manufacturing jobs** and **800,000 indirect and induced jobs**.

Share 



**Installation**  
Electricians, plumbers, contractors



**Manufacturing**  
Factory, assembly line, and supply chain workers



**Indirect**  
Truck drivers, welders, mine engineers, accountants



**Induced**  
Service, retail, food & beverage workers, teachers

PURPOSE

## We exist to power the advancement of society

We energize lives, strengthen communities, and drive advancements in energy that promote social, economic and environmental progress.

VISION

## To lead the clean energy future

Together, with our customers, stakeholders and communities, we will lead the energy transformation by decarbonizing, electrifying and performing.



## 3,300+ MW of Generation

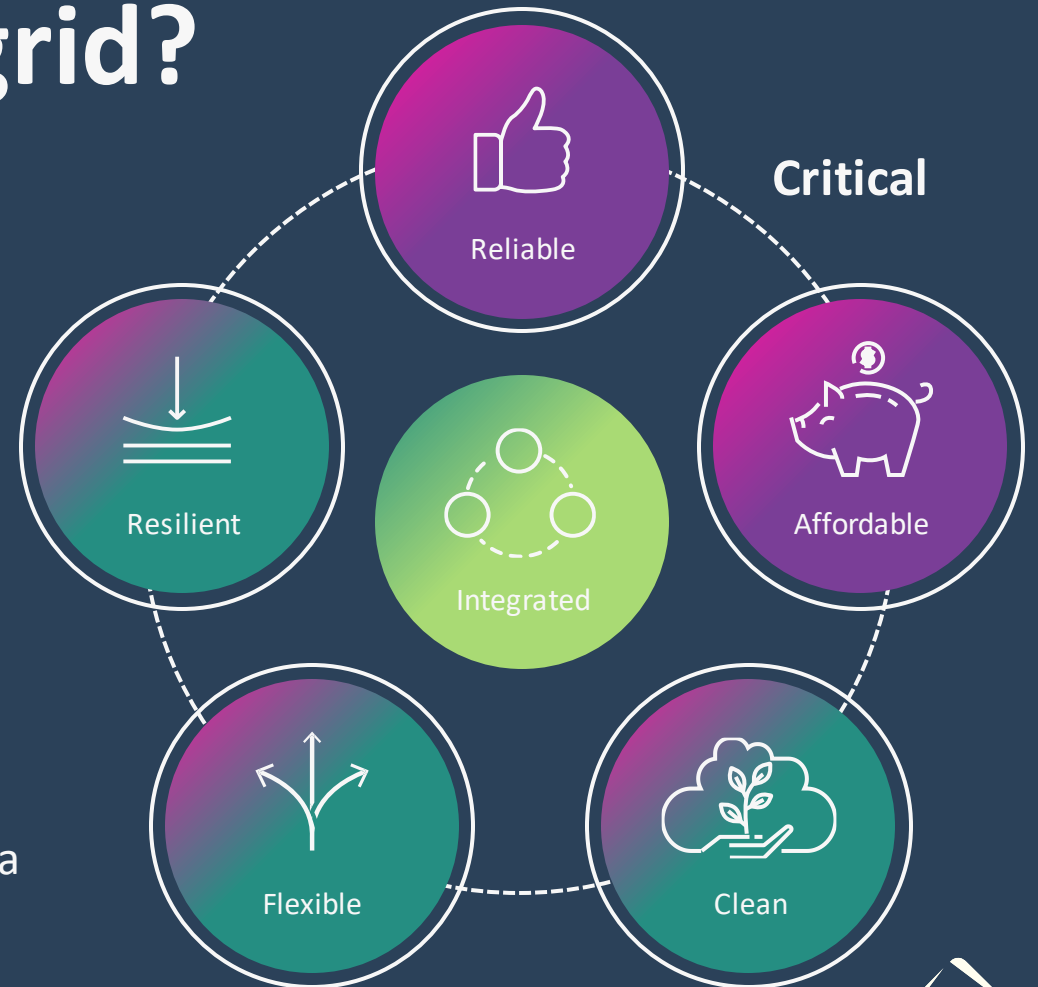
- ~ 10% Wind
- ~ 20% Hydro
- ~ 40% Conventional
- ~ 30% Purchased



# What is a modern, integrated grid?

## More Critical Components:

- Two-way flow
- Automated
- Flexible
- Customer participation
- Communication and data



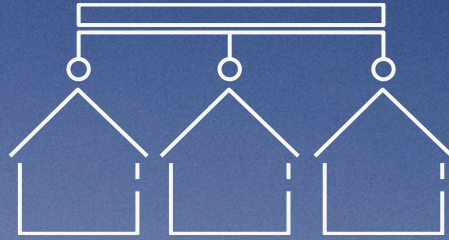




### Direct Load Control

---

One-way communication  
High cost  
Load shed only  
Zero touch with customer



### Basic DR

---

Two-way communication  
Manage events in aggregate  
Limited device flexibility  
Low-touch with customer

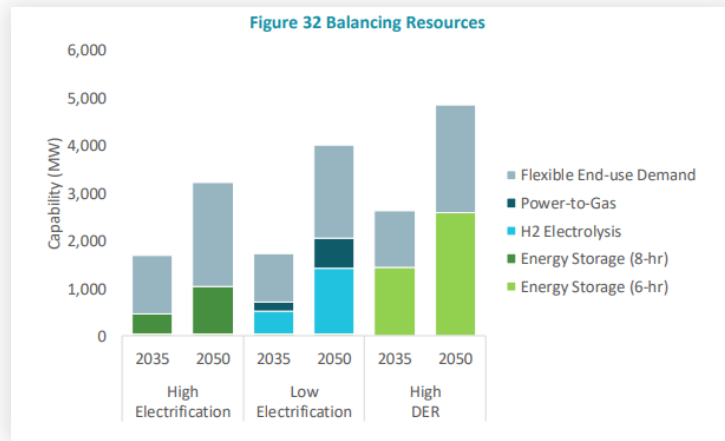


### Real-Time Control

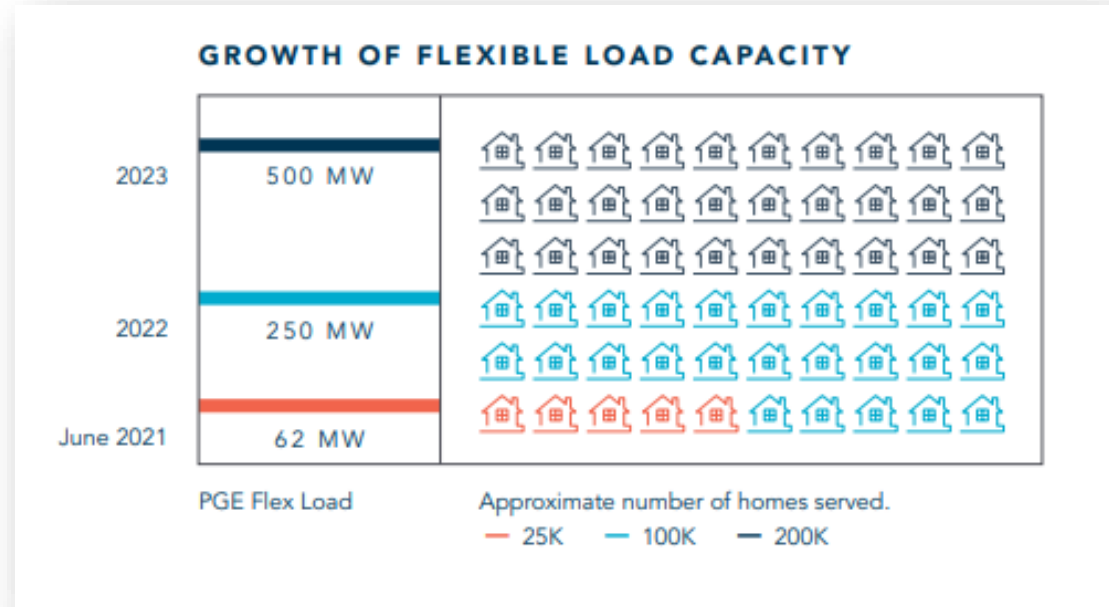
---

Device optimized  
Manage events at household level  
Infinite device types  
High-touch with customer  
AI and Machine Learning

## 2019 Deep Decarbonization Study



## 2021 ESG Report



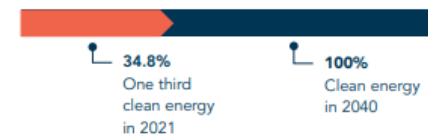
### 2021 HIGHLIGHTS

#### Clean energy

**34.8%**

Of PGE's energy served to retail customers in 2021 came from clean energy sources.

#### ENERGY SERVED



# Flexible Load Portfolio

## Active Programs

### COMMERCIAL + INDUSTRIAL

Energy Partner

Multi-family  
Water Heater

Fleet Partner

### RESIDENTIAL

Smart Thermostat

Peak Time Rebate

Charger Rebates

## Under Development

### COMMERCIAL + INDUSTRIAL

Battery Storage

EVSE

Heat Pump  
Water Heater

Design Assistance

### RESIDENTIAL

Battery Storage

EVSE

New Construction  
Bundle



Brewery Blocks, Portland, OR  
Photo: Gerding Edlen Development

**nbi** new buildings  
institute


# New Buildings Institute

Driving better buildings that achieve zero energy, carbon neutrality, and beyond

---

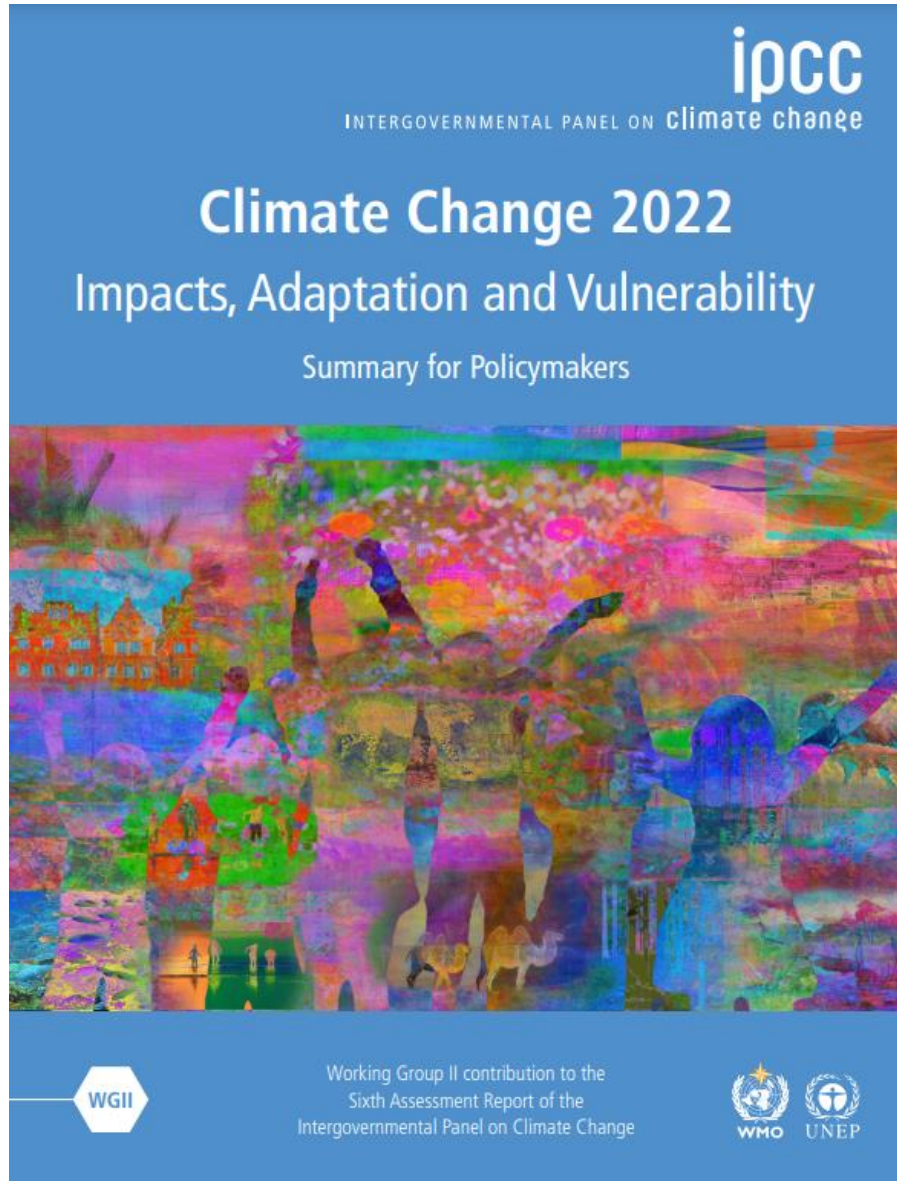
# New Buildings Institute

[www.newbuildings.org](http://www.newbuildings.org)



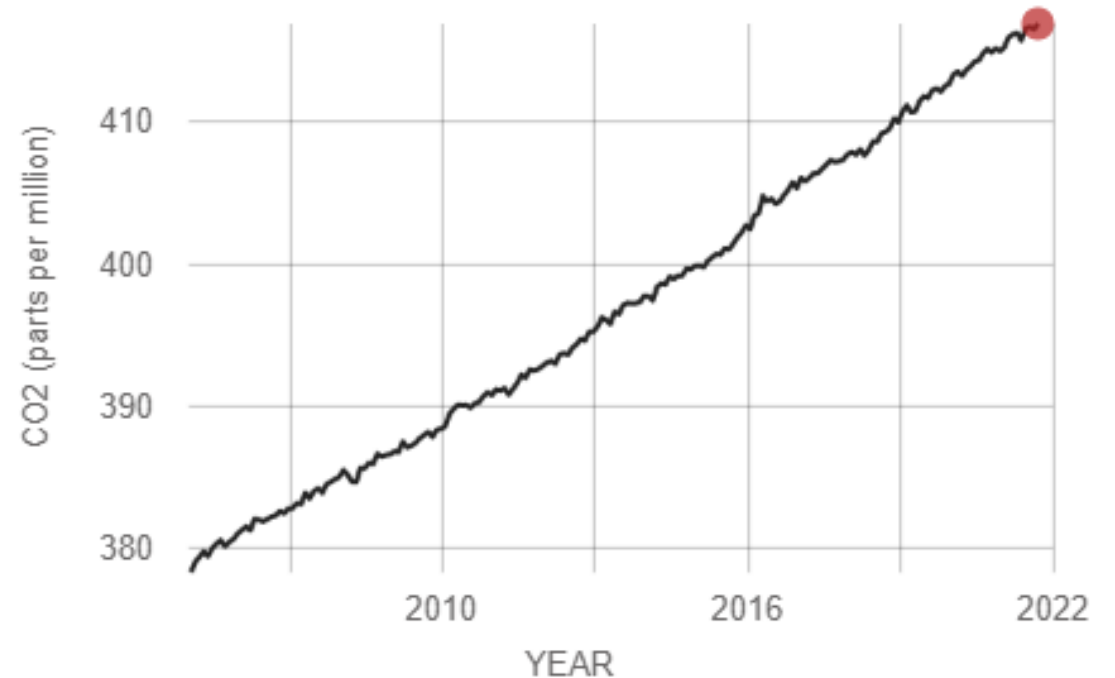
**Vision:** We envision a transformed built environment that is carbon-free, sustainable, and energy-efficient and supports thriving economies that benefit all people and the planet.

**Mission:** We push for better buildings that achieve zero energy, zero carbon, and beyond – through research, policy, guidance, and market transformation – to protect people and the planet.



### DIRECT MEASUREMENTS: 2005-PRESENT

Data source: Monthly measurements (average seasonal cycle removed). Credit: [NOAA](#)

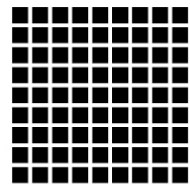


# The Five Foundations of Zero Carbon Building Policy

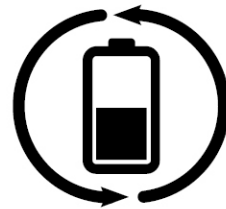
Objectives: Equity, Affordability, and Health



Energy Efficiency



Renewable Energy



Grid Integration + Storage + EV



Building Electrification



Life-Cycle Impacts



Zero Carbon Building Policy

© New Buildings Institute, 2021

<https://newbuildings.org/making-the-transition-from-zero-energy-to-zero-carbon-building-policies/>

# Codes for Climate™

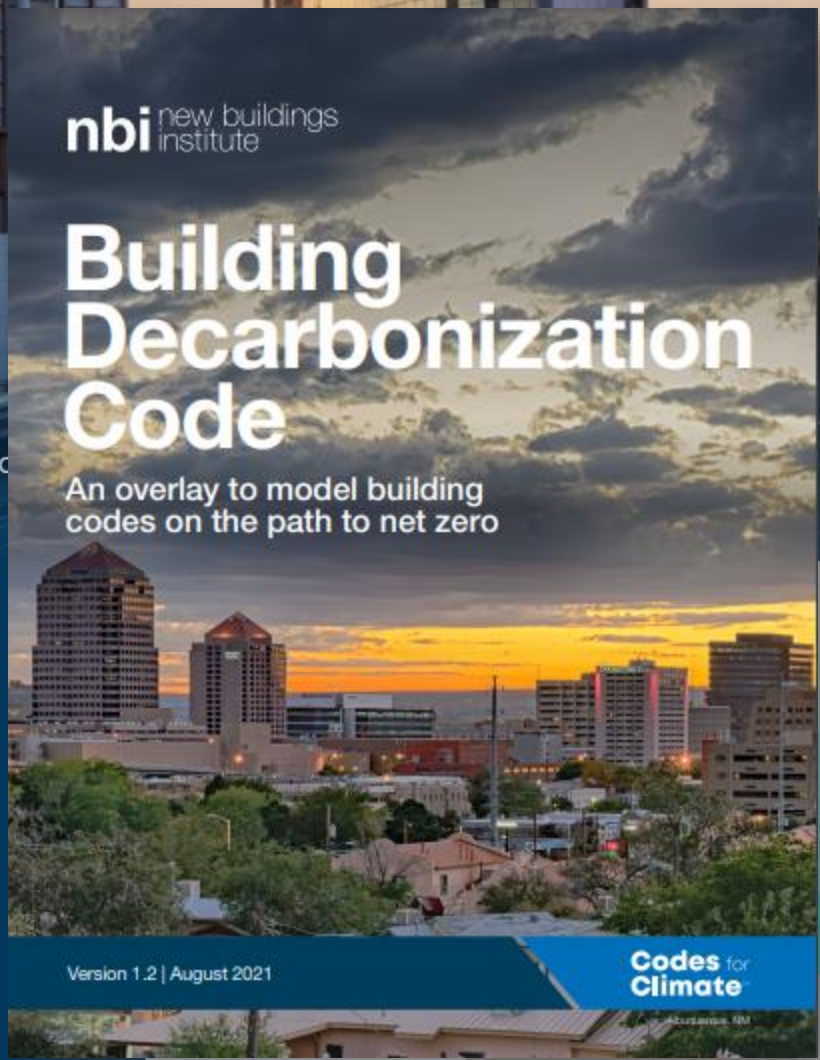
Building Today for a Zero-Carbon Future

HOME THE OPPORTUNITY

Building use accounts for  
**39% of CO<sub>2</sub>**  
**Emissions in U.S. \***

Today, many U.S. cities and states are poised to take bold action on climate change and address the large share of emissions from the built environment. These leading jurisdictions have moved ahead of the slow and deliberate process of the national energy code making bodies and are calling for codes that can meet the needs of their advanced goals and policies.

Codes for Climate is working to provide achievable pathways for cities and states to adopt climate-aligned codes that help them accelerate significant carbon and energy savings for both new construction and existing buildings, for all building types within the next decade.



nbi new buildings institute

# Building Decarbonization Code

An overlay to model building codes on the path to net zero

Version 1.2 | August 2021

Codes for Climate

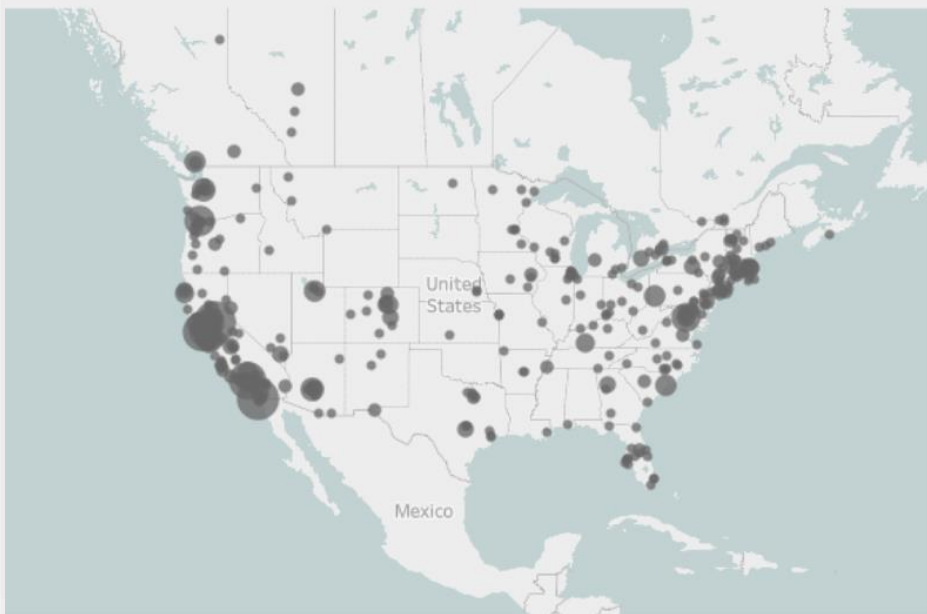


Other Industry



GETTING TO  
**zero**

# Buildings Database



Map and List Analysis

## NBI Getting to Zero Buildings Database

Use the filters on the left to filter projects in the map, and/or select a bubble on the map to filter the table below. Use the tabs above or buttons in the top right to navigate to the analysis and graphics page

Reset Filters

Analysis Graphics

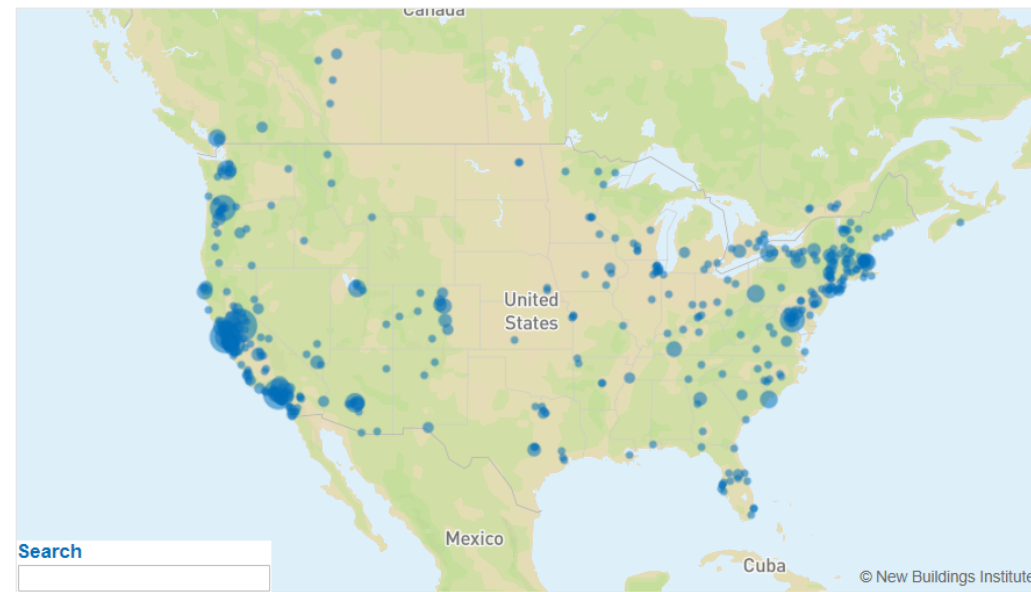
**ZE Status**    **Count**  
 Emerging    585  
 Verified    150

**State or Province**

- (All)
- Alabama
- Alberta
- Arizona
- Arkansas
- British Columbia
- California
- Colorado
- Connecticut
- District of Columbia
- Florida
- Georgia
- Hawaii
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Missouri
- Montana
- Nebraska
- Nevada
- New Brunswick
- New Hampshire
- New Jersey
- New Mexico
- New York
- North Carolina
- North Dakota
- Ontario
- Oregon
- Pennsylvania
- Prince Edward Island
- Quebec
- Rhode Island
- South Carolina
- South Dakota
- Tennessee
- Texas
- Utah
- Vermont
- Virginia
- Washington
- West Virginia
- Wisconsin
- Wyoming

**Building Type**

- (All)
- Education
- Food Sales
- Food Service
- Health Care (Inpatient)
- Health Care (Outpatient)
- Lodging
- Mercantile (Enclosed ...)
- Mercantile (Retail Oth...)
- Multi-Family
- Office
- Other
- Public Assembly
- Residential
- Retail
- Transportation
- Warehouse and St...

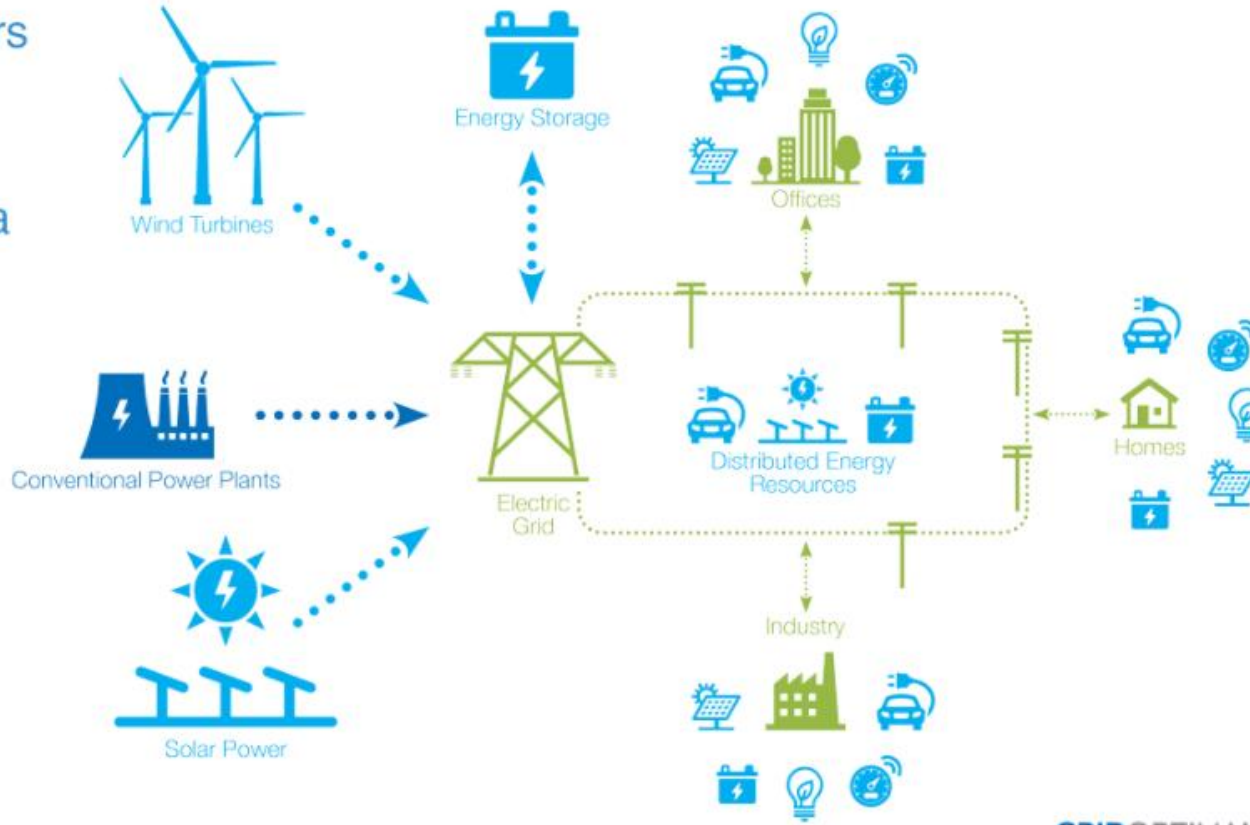


ZE Status	State or Province	Name	Certifications	City	Building Type	Size (sf)	Total Site EUI	Net Site EUI
Verified	AR	Entegrity Headquarters	LEED, ILFI	Little Rock	Office	13,342	13	0
Verified	AZ	DPR Construction - Phoenix	LEED, ILFI	Phoenix	Office	16,533	26	-2
Verified	BC	VanDusen Botanical Garden Visitor Centre	LEED, ILFI	Vancouver	Public Assembly	19,000	37	-1
Verified	CA	008 Energy Commission Building		Sacramento	Office	142,378	39	0
Verified	CA	010 Dept. of Rehabilitation		Sacramento	Office	163,350	49	0
Verified	CA	013 EDD Solar Building (incl. subterr.)		Sacramento	Office	272,546	38	0
Verified	CA	021 State Personnel Building		Sacramento	Office	84,400	47	0
Verified	CA	039 and 045 Office Building 8 and 9		Sacramento	Office	628,592	44	0
Verified	CA	049 Education Building		Sacramento	Office	562,582	41	0
Verified	CA	106 State Record Ctr. & Whse		Sacramento	Warehouse and St..	82,682	24	0
Verified	CA	153 Cal Trans District Office 3		Marysville	Office	225,378	38	0

GridOptimal empowers players on both sides of the meter to actively support the transition to a carbon free grid

GridOptimal Technologies and Strategies:

- renewable energy
- energy efficiency
- electric vehicle
- energy storage
- smart connected controls



GRIDOPTIMAL BUILDINGS INITIATIVE

© 2019 New Buildings Institute

# The future of water heating is here.

Heat pump water heating technology is a game changer in the climate change fight.

[Will you join us?](#)

News:

**U.S. DOE announces support for national level AWHI**

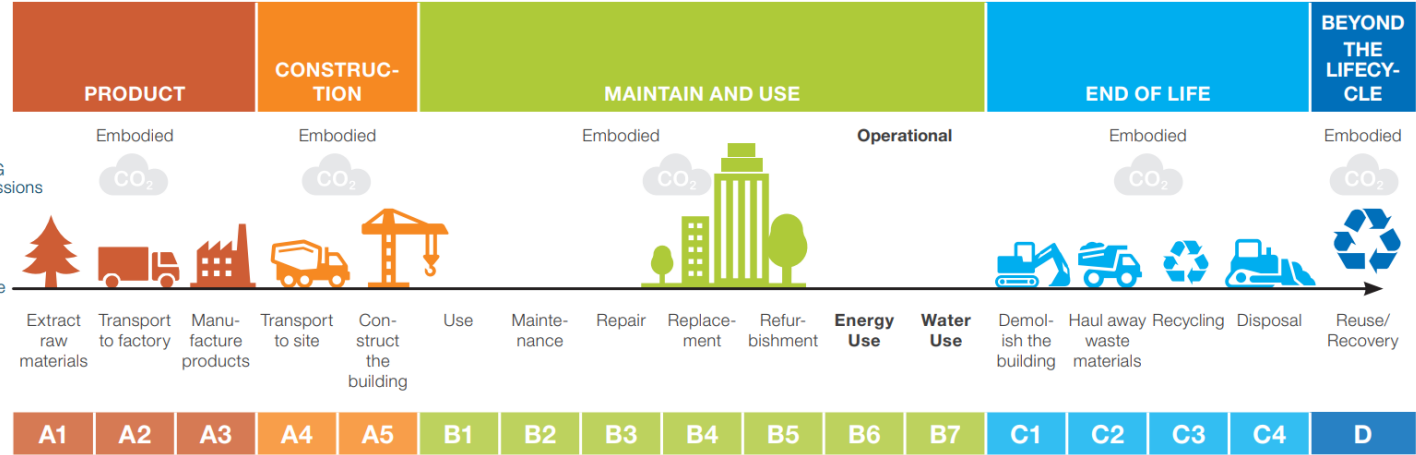
[Read more](#)

# Embodied Carbon

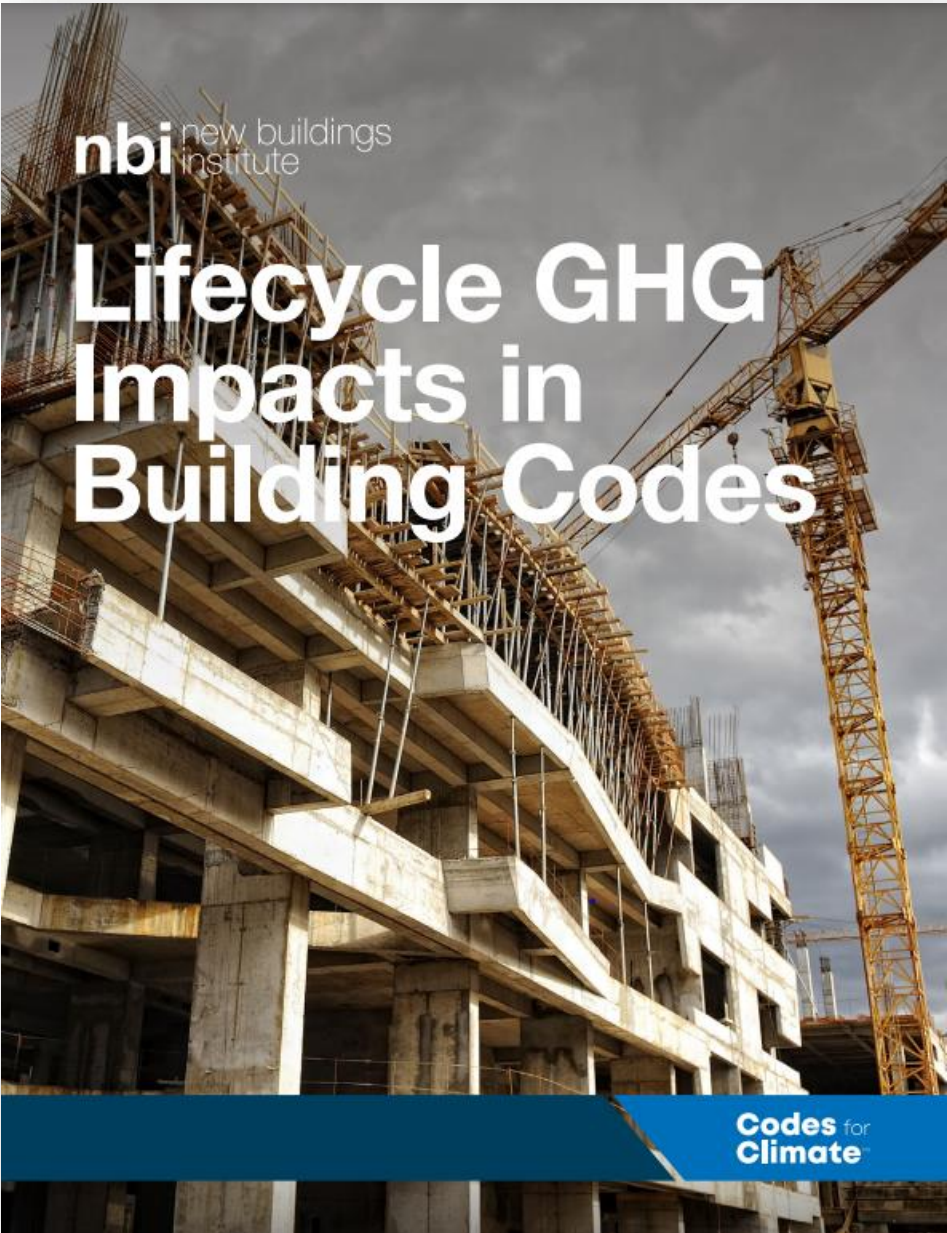
FIGURE 1: LIFECYCLE STAGES

Data source: BS EN 15978:2011

STAGE



© New Buildings Institute



# Low Carbon Financing Specification

CIRRUS™ Low Carbon is the nation's only private financial product that offers a differentiated cost of capital for low carbon buildings. The savings negate the cost of pursuing high efficiency, lower carbon building performance.



“The specification was clear and achievable and the lower rate made CIRRUS absolutely the right thing to do.”

Shawn Neece, Principal  
Renew Partners



## Introduction

PACE Equity believes in the power of PACE financing to help our customers achieve financial success. We strive to improve our planet by helping customers develop sustainable projects that maximize energy savings while improving financial outcomes. Our objective in this low carbon building program is to influence real estate developers to make incrementally more sustainable buildings that lead to improved return on equity for the developer AND a better carbon footprint for the benefit of the planet. Return on equity is positively correlated to return to the environment.

Complementing this specification, PACE Equity will provide a) design assistance to achieve the objectives in this specification at the lowest incremental cost and b) lower cost capital based on alignment of environmental and sustainability objectives with ESG investors.

We are pleased to have partnered with New Buildings Institute to create this specification that creates a win, win, win for the triple bottom line.

## Carbon Neutral Buildings

Improving the performance and reducing carbon emissions associated with the operation of commercial buildings is critical to meeting climate goals. According to the International Energy Agency (IEA), the construction and operation of buildings accounts for approximately 35% of global energy consumption and 39% of emissions. To be on track to achieve a carbon neutral building stock by 2050, the IEA estimates that carbon emissions associated with buildings would need to decrease by 60% by 2030, or about 6% per year.<sup>1</sup>

NBI considers a net zero energy building is a highly energy efficient building that maximizes on-site renewables and procures off-site renewables. For the most part, so too are the components of a carbon neutral building operations. However, to achieve carbon neutral operations, any carbon produced from grid or on-site supplied energy must be offset through additional renewable energy procurement.

This specification should be considered as a technical resource that provides insights on the energy efficiency and renewable energy aspects associated with zero carbon buildings. It is recommended that additional specifications addressing grid integration and energy storage, decarbonization of fuels, and life-cycle of building materials be developed and implemented as part of PACE Equity's approach to carbon neutral buildings.

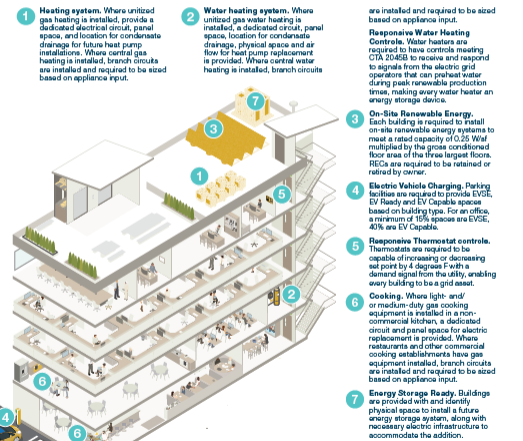
<sup>1</sup> 2020 Global Status Report for Buildings and Construction, United Nations Environment Programme (UNEP)

The following strategies represent core components of net zero energy buildings, and served as a technical framework for measure development for this building specification:

- 1 Maximize energy efficiency by setting mandatory efficiency requirements for all projects
- 2 Provide an efficiency-based pathway to higher tiers of performance by selection of additional efficiency options or by using an energy model to achieve comparable levels of efficiency
- 3 Select a renewable energy strategy by performance tier that includes solar readiness, on-site solar or off-site renewable energy procurement

Additional components associated with carbon neutral buildings are described in the image below and include the following:

- Electrification readiness for any on-site combustion of fossil fuels and/or the elimination of on-site fossil fuels
- Optimized building-grid integration and the inclusion of on-site energy storage capabilities
- Specification of equipment that uses low global warming potential (GWP) refrigerants
- Consider low embodied carbon material



---

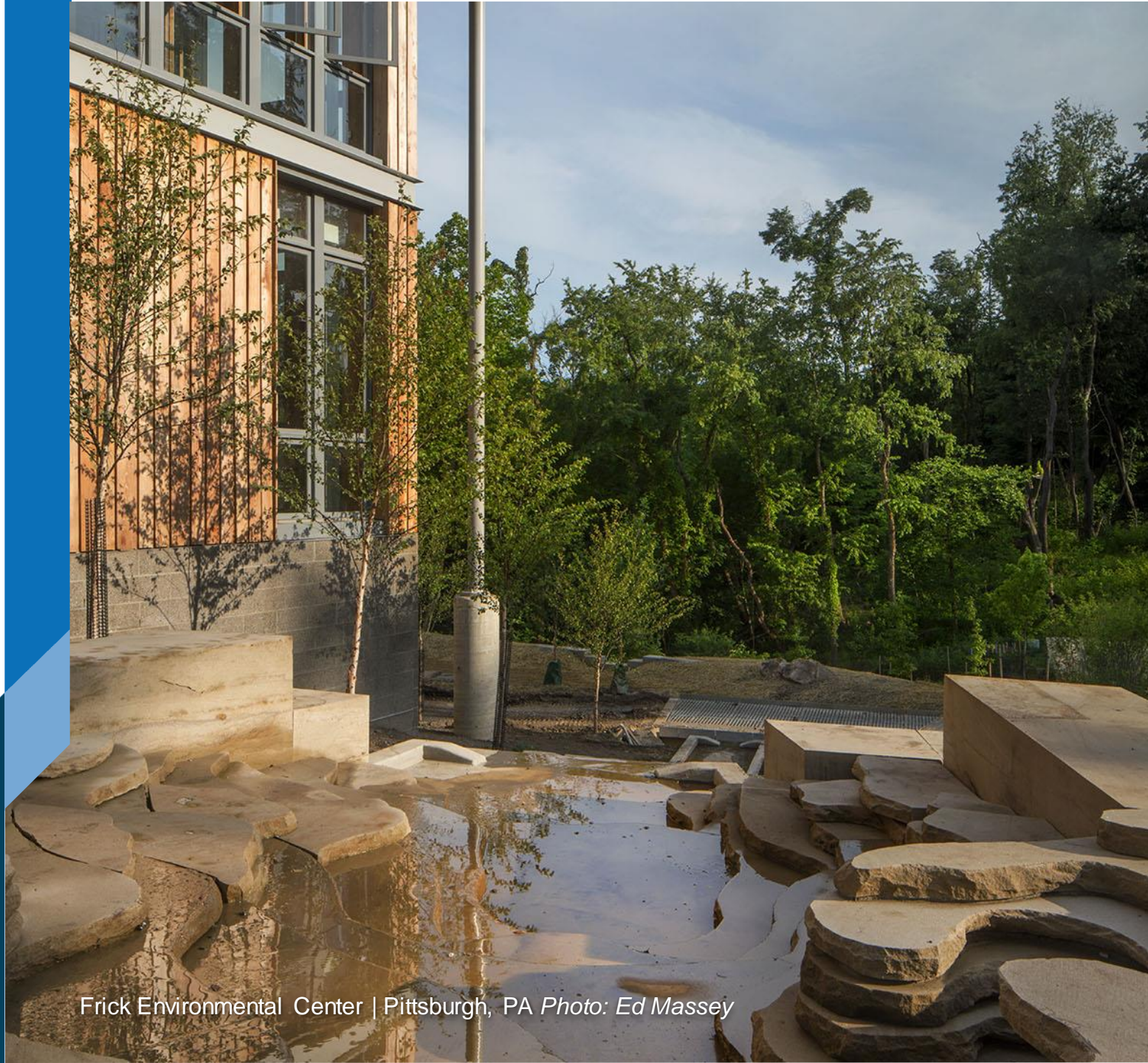
# Thank you!

Ralph DiNola, CEO

[ralph@newbuildings.org](mailto:ralph@newbuildings.org)

**nbi** new buildings  
institute

[www.newbuildings.org](http://www.newbuildings.org)



Frick Environmental Center | Pittsburgh, PA *Photo: Ed Massey*



THE  
GREEN  
CITIES  
COMPANY

## Urban Land Institute Northwest

---

## Electrification Panel

MARCH 17, 2022

# Redefining Green

We embrace a broader ESG platform to drive value into our assets and positively impact communities.

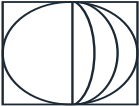
Our proprietary Green Cities Index includes five key pillars:

## THE GREEN CITIES INDEX



**ENVIRONMENTAL  
IMPACT**

Focus on optimizing the energy, emissions, water, waste, and materials and furnishings used by our properties.



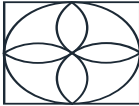
**CLIMATE CHANGE  
MITIGATION**

Action-oriented look to the future, taking bold steps to reduce fossil fuel usage and reduce emissions of greenhouse gases.



**RESILIENCE**

Enhancing the preparedness of our properties and tenants to withstand and recover from challenges like climate risks, social unrest, and large-scale health threats.



**HEALTH AND  
WELLBEING**

Commitment to safety, comfort, and physical and emotional wellness to improve the quality of life for our tenants.

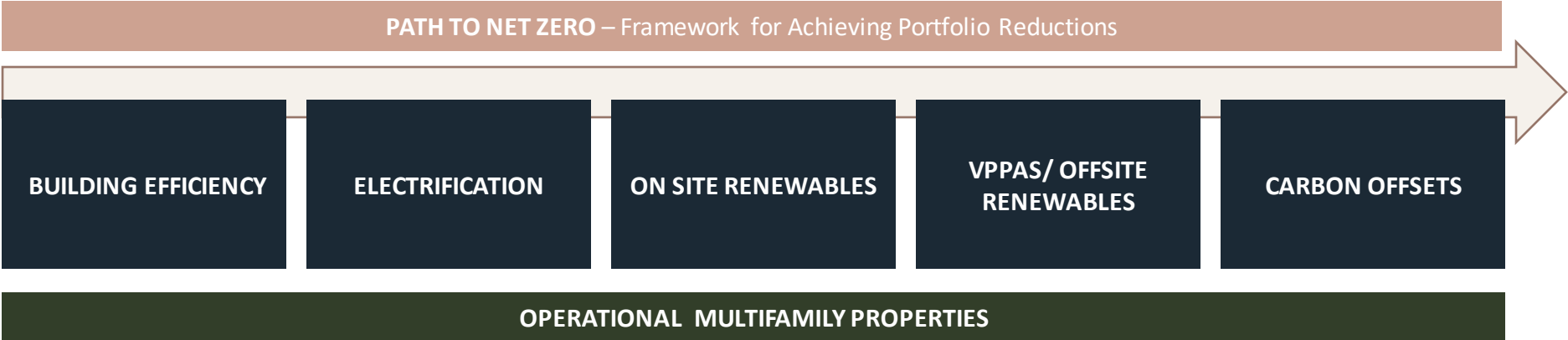


**EQUITABLE  
COMMUNITIES**

Engagement to create a positive, inclusive impact within our properties and on the neighborhoods where they reside, driving opportunity, justice, and anti-discrimination.



# Path to Net Zero



### CHALLENGES AND OPPORTUNITIES

- Measuring progress across a dynamic, value-add portfolio
- High capital costs and increased operating costs for electrification measures makes value creation difficult
- Leverage savings achieved through onsite renewable energy to pay for electrification upgrades
- Virtual PPAs can be cash positive



THE  
GREEN  
CITIES  
COMPANY

# Portland's First Living Building

DESIGNED TO MEET THE WORLD'S MOST STRINGENT SUSTAINABILITY STANDARD



**WATER**  
100% of the building's water demand is collected and treated onsite.



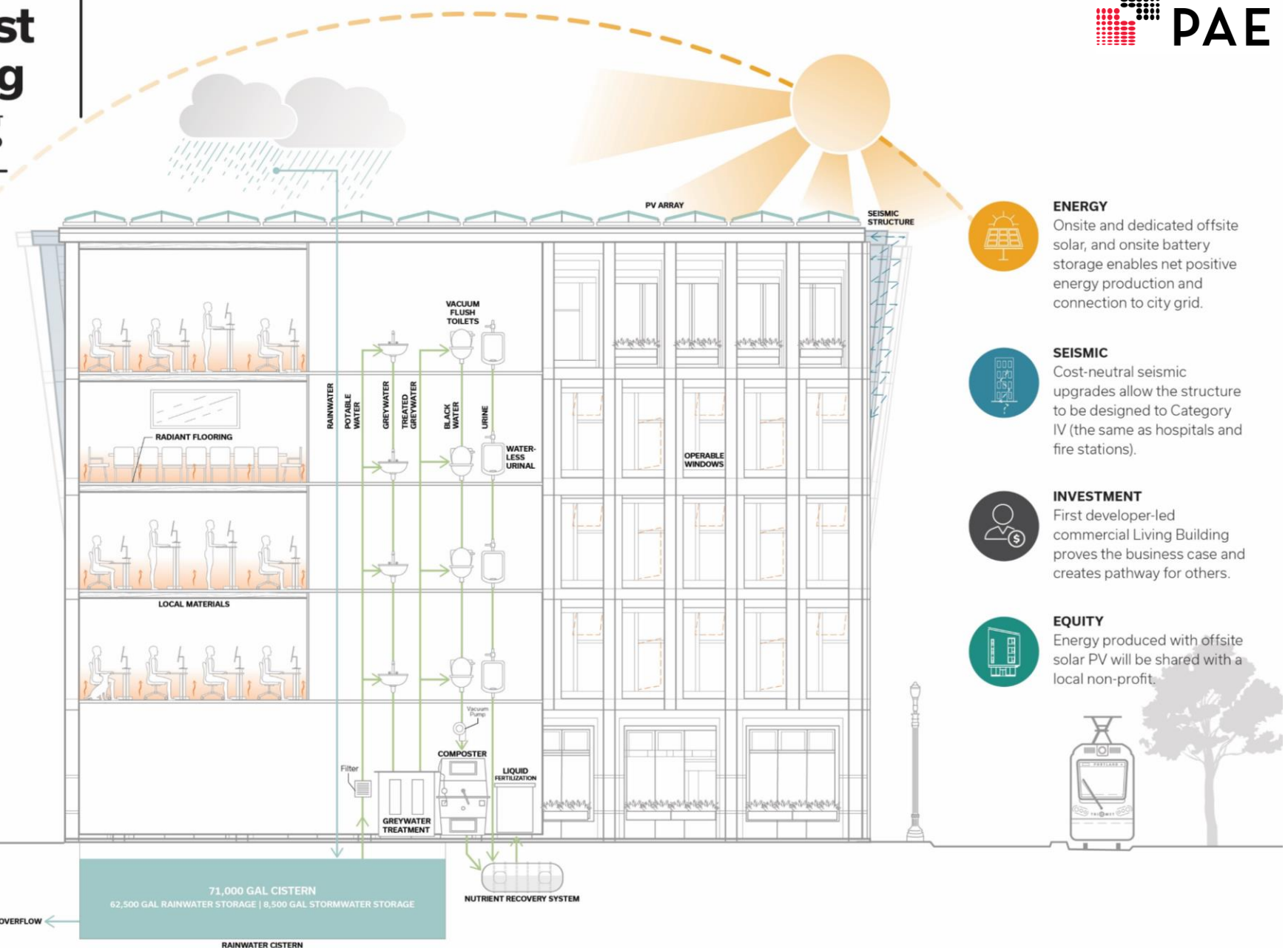
**WORKPLACE**  
Daylight, views, operable windows, filtered heat recovery ventilation and other biophilic strategies support occupant health, comfort, and productivity.



**MATERIALS**  
Sustainable and healthy building materials include Pacific Northwest cross-laminated timber certified by the Forest Stewardship Council.



**NUTRIENTS**  
First-of-its-kind multi-story vacuum-flush compostable toilets reduce water use and transform waste into a rich nutrient source.



**ENERGY**  
Onsite and dedicated offsite solar, and onsite battery storage enables net positive energy production and connection to city grid.



**SEISMIC**  
Cost-neutral seismic upgrades allow the structure to be designed to Category IV (the same as hospitals and fire stations).



**INVESTMENT**  
First developer-led commercial Living Building proves the business case and creates pathway for others.



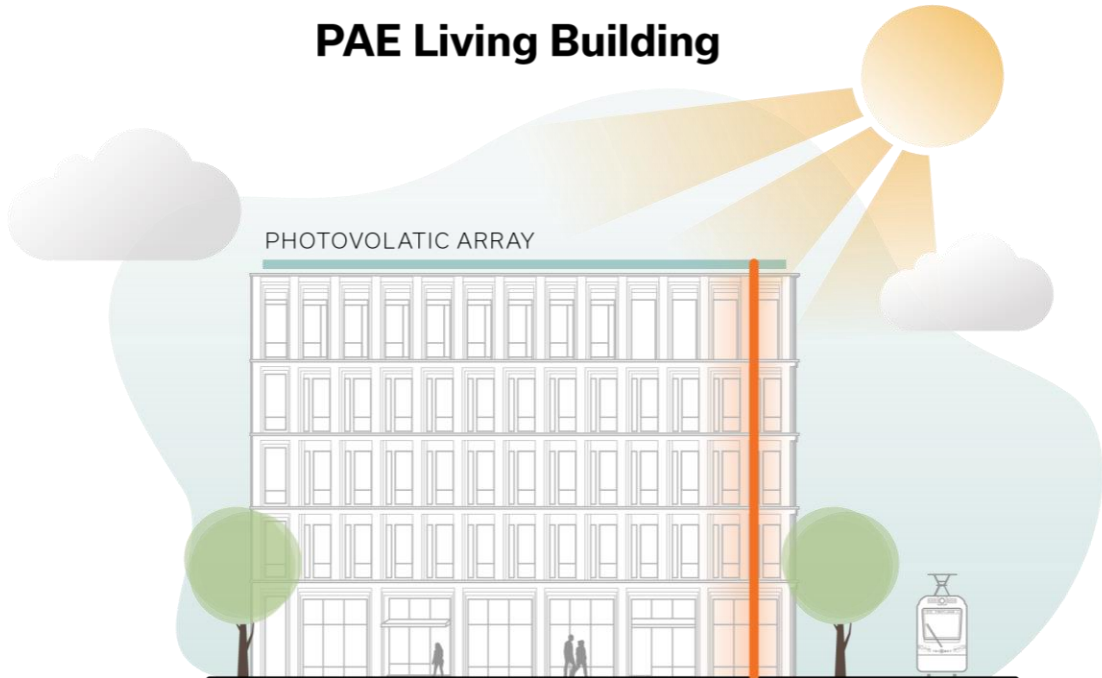
**EQUITY**  
Energy produced with offsite solar PV will be shared with a local non-profit.



# Sustainable Communities

PAE LIVING BUILDING

## PAE Living Building



SUPPORTS



GRID

## Affordable Housing

RENAISSANCE COMMONS



SUPPORTS





# Northwest