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The Passive House Case for Building Performance Standards

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Agenda

- Introduction to BPS
  - Policy Comparison
- Passive House and BPS
  - Principals
  - Targets
- BPS Policy Development
- National BPS Coalition
- Key Takeaways

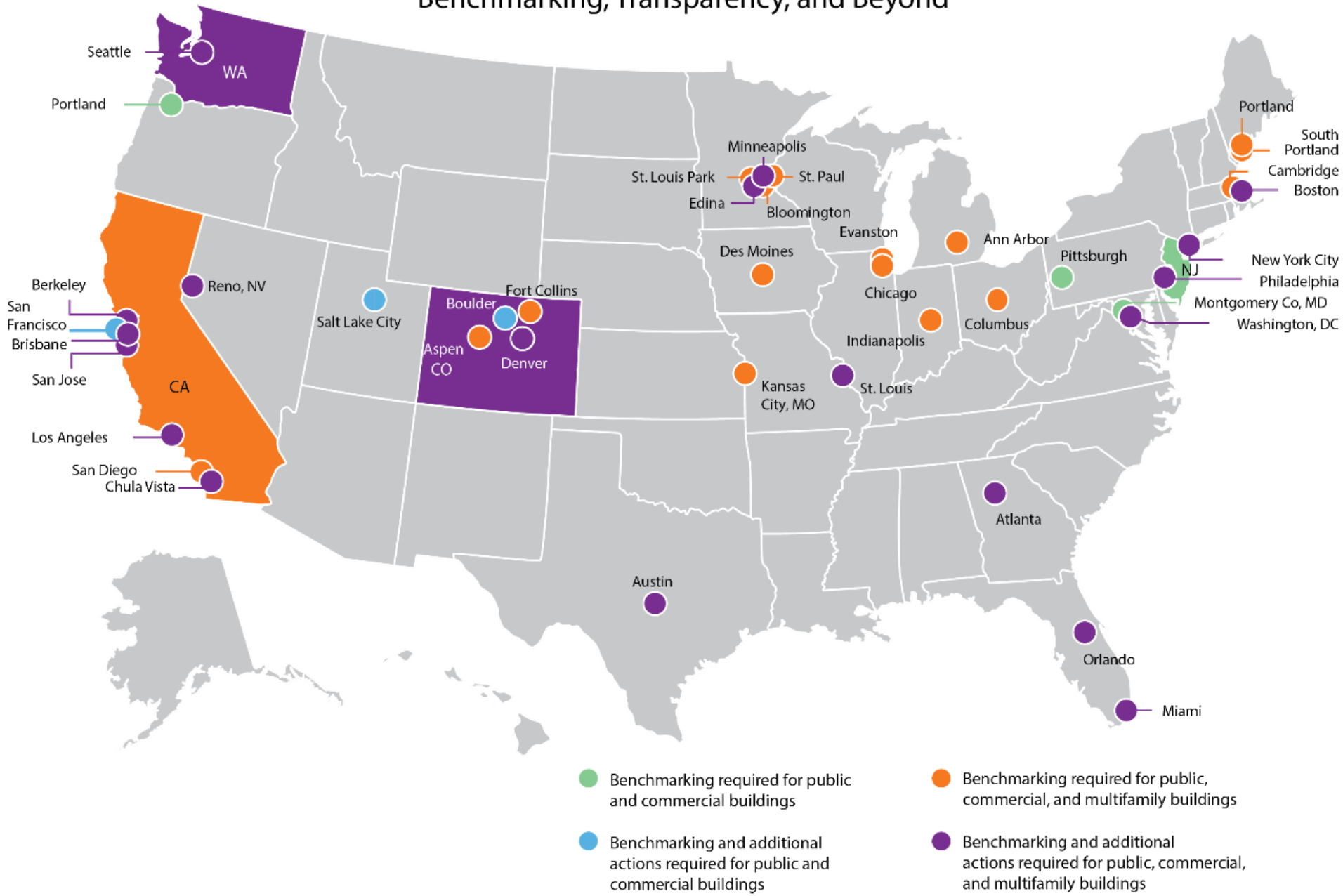
Building Performance Standard Overview

Building Performance Policy Landscape

Types of Building Performance Policy

Type	Description
Building Codes	• Sets standards for building design and construction for primarily new buildings and major renovations
Benchmarking and Transparency	• Requires owners to report their annual energy performance to the government which publishes a subset of that info for the public
Audit Requirement	• Requires owners to conduct an energy audit identifying opportunities to improve building performance
Tune-up Requirement	• Requires owners to identify and correct operational inefficiencies through low- and no-cost repairs and adjustments
Building Performance Standard	• Requires buildings to meet a minimum threshold of performance

U.S. City, County, and State Policies for Existing Buildings: Benchmarking, Transparency, and Beyond



BPS A Companion Tool for Climate Action

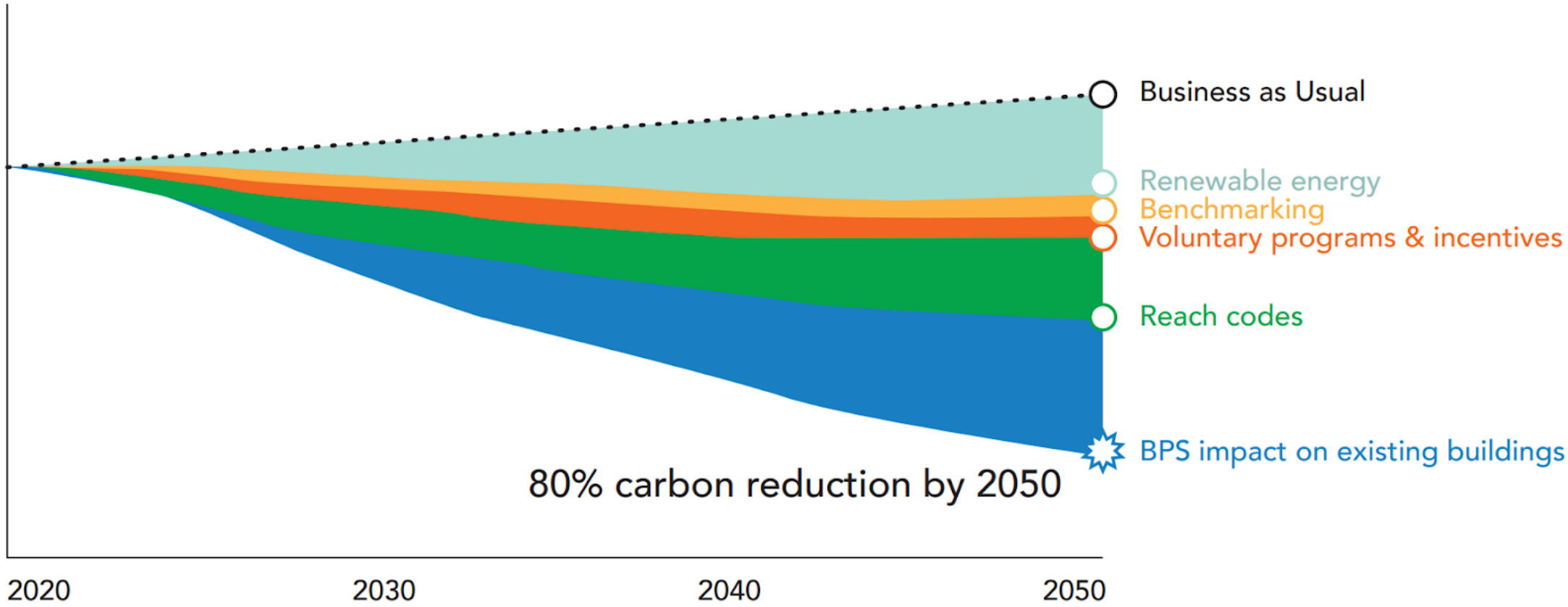
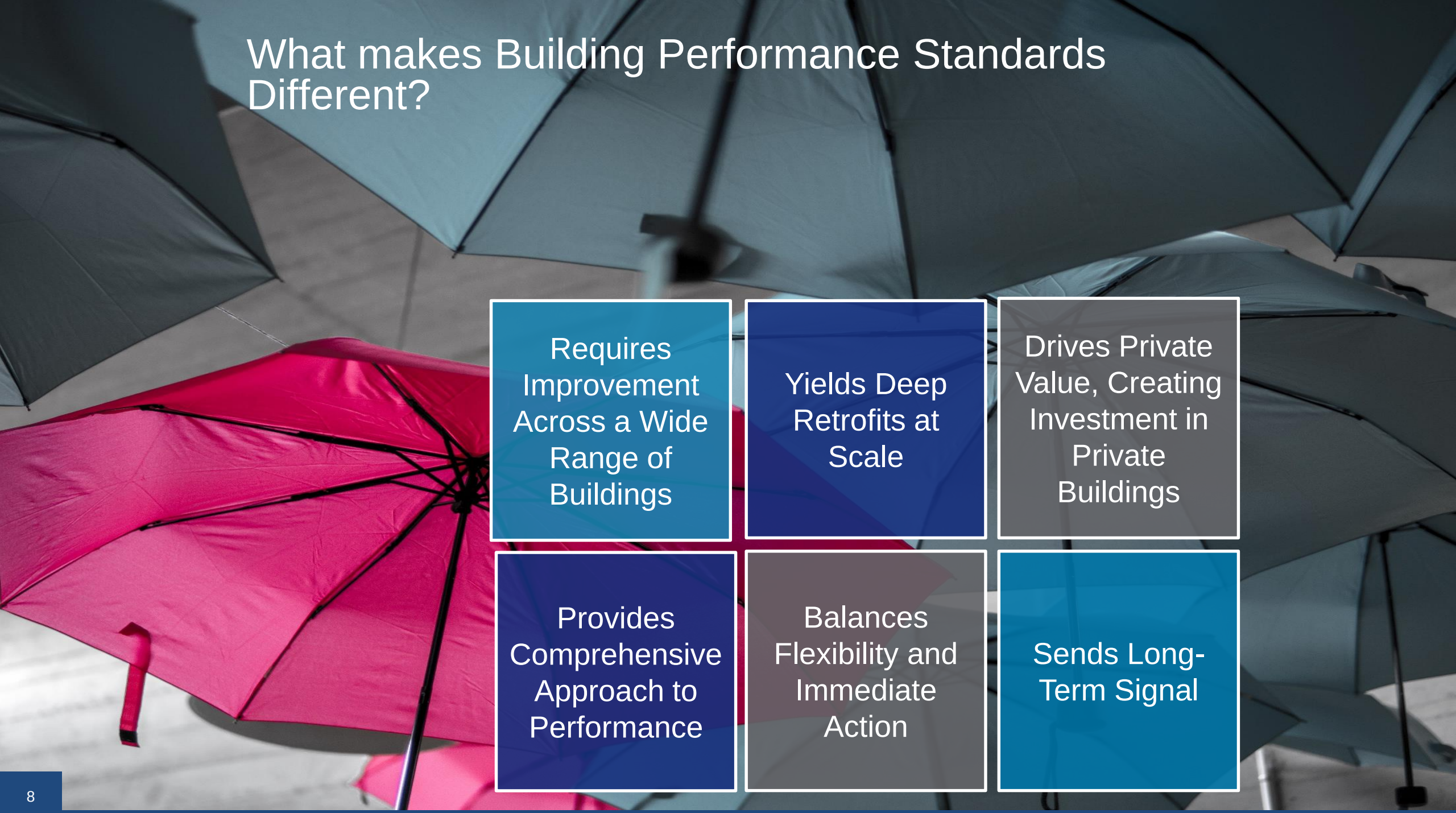


Image from IMT/USDN analysis on impact of BPS

What is a Building Performance Standard (BPS)?

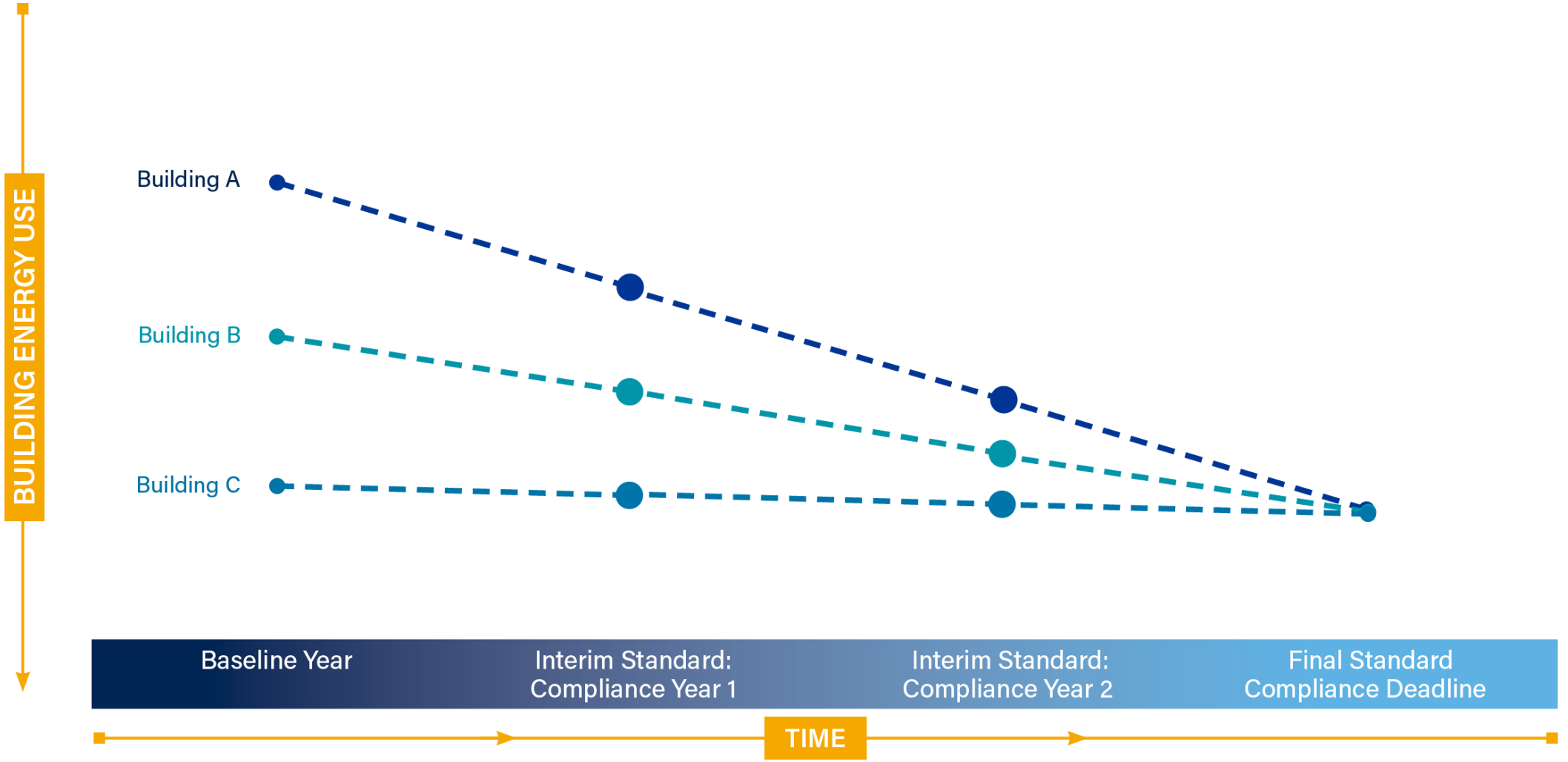
- The most powerful tool to improve the performance of existing buildings
- Sets minimum performance requirements for buildings expressed in objective numeric metrics
  (e.g. x kBTU/year/sq. ft.)
- Applies to some or all buildings over a certain size
- Date certain deadlines for meeting requirements
- Different from and a complement to building codes

What makes Building Performance Standards Different?

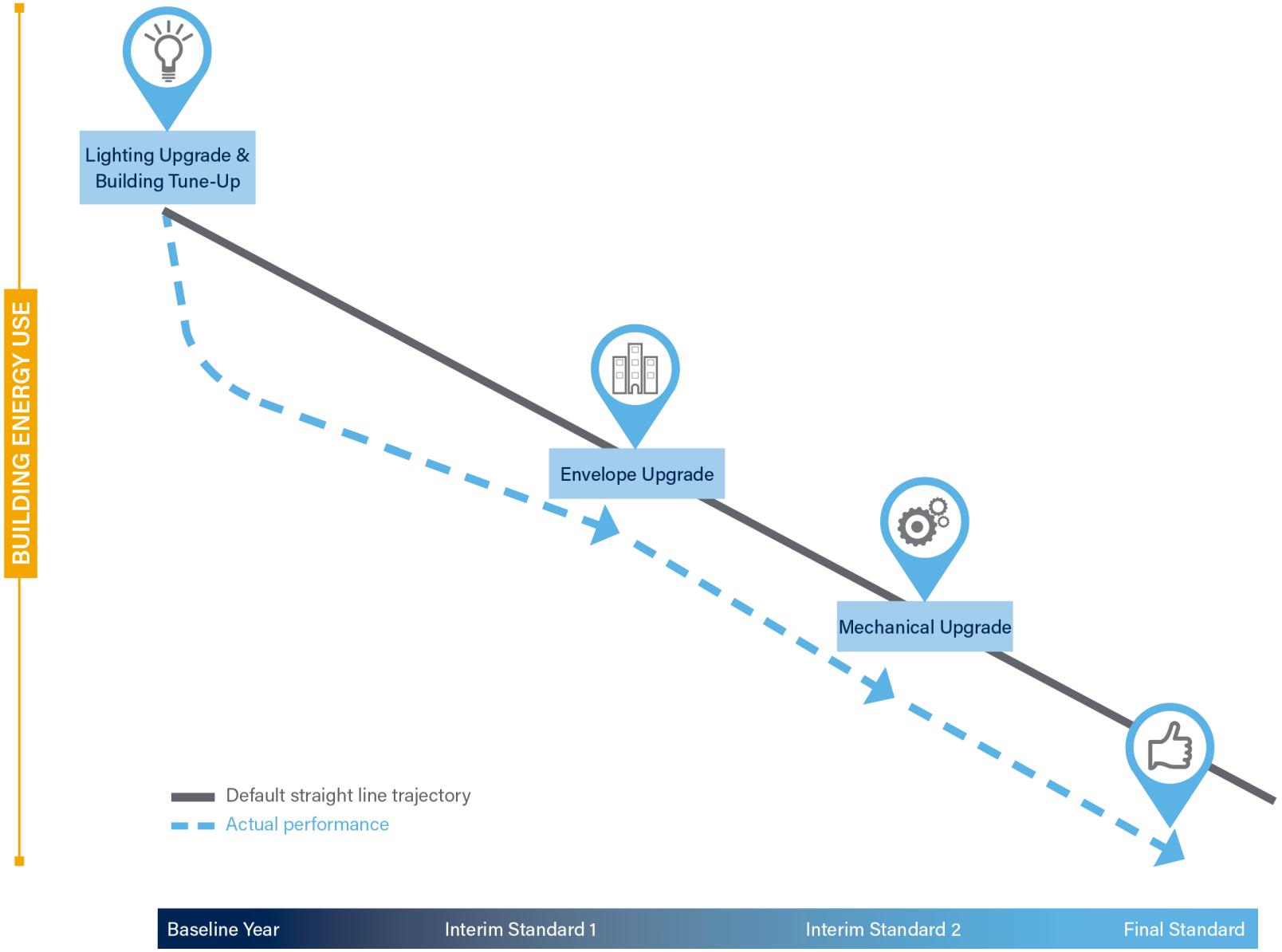


- Requires Improvement Across a Wide Range of Buildings
- Yields Deep Retrofits at Scale
- Drives Private Value, Creating Investment in Private Buildings
- Provides Comprehensive Approach to Performance
- Balances Flexibility and Immediate Action
- Sends Long-Term Signal

IMT's BPS Trajectory Approach: Final and Interim Standards for 3 Office Buildings

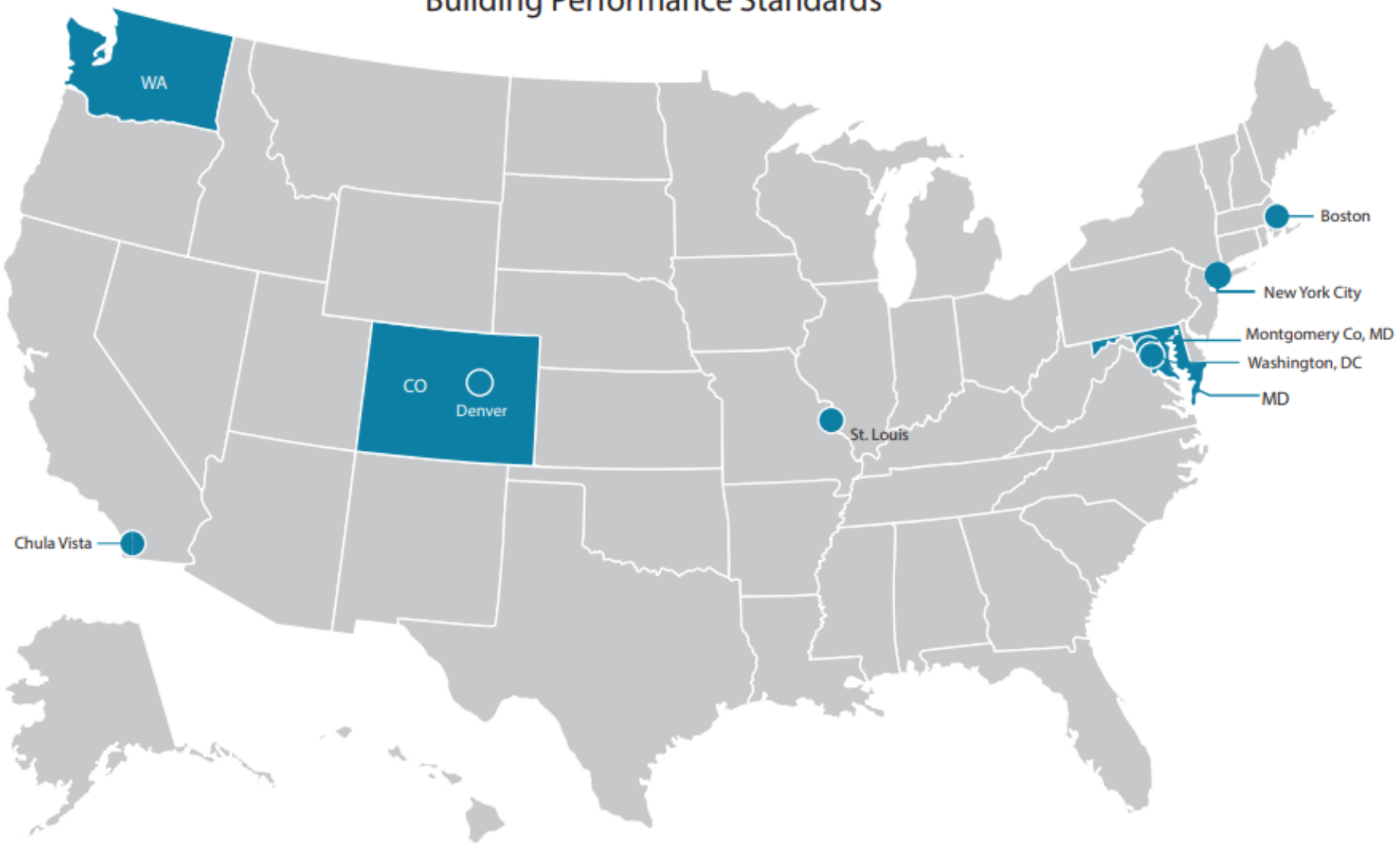


Encourages Continuous Upgrades



Building performance standards set performance targets that buildings must meet and it is on owners to explore energy conservation measures to meet those targets.

U.S. City and State Policies for Existing Buildings: Building Performance Standards



Canadian Policies for Existing Buildings: Benchmarking, Transparency, and Beyond

BPS Type 1: Standards recalculated every 4-5 years

DC BEPS

Covers Comm, MF ≥ 10,000 sf

Metric: ENERGY STAR Score; source and site EUIs for certain buildings

Performance, prescriptive, and alternative compliance paths

St. Louis BEPS

Covers Comm, MF ≥ 50,000 sf

Metric: Site EUI

Performance and custom compliance paths

Washington Clean Buildings Standard

Covers Comm, MF ≥ 20,000 sf

Metric: Site EUI

Performance path and custom compliance path based on life-cycle cost analysis

BPS Type 2: Long-term, GHG-based standards

New York City

Covers: Comm, MF ≥ 25,000 sf
Metric: Annual GHG emissions
Deadlines begin in 2024 & get stricter every 5 years until 2050

Boston

Covers: Comm, MF ≥ 20,000 sf
Metric: Annual GHG emissions
Standards deadlines: Begin in 2025 and get stricter every 5 years until 2050

BPS Type 3: Trajectory Approach

IMT Model Ordinance

Compatible with any metric except ENERGY STAR Score

Sets final, long-term standards for each building type

Buildings have individual trajectory with interim standards

Denver BPS

Covers Comm, MF ≥ 25,000 sf

Metric: Site EUI

Performance, prescriptive, and custom compliance paths

Montgomery County, MD

Covers Comm, MF ≥ 25,000 sf

Metric: Site EUI

Performance and custom compliance paths

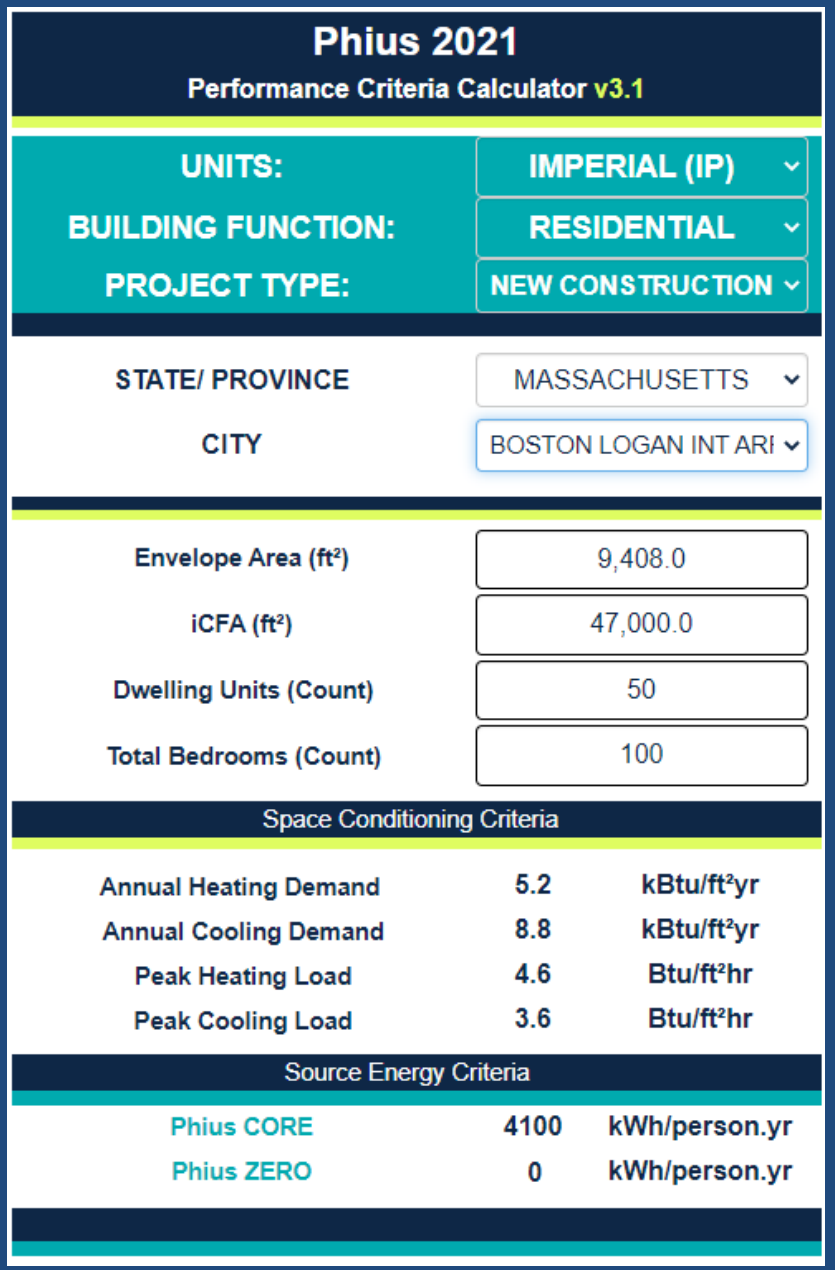
Passive House and BPS

BPS and Passive House Alignment

- Both PHIUS Certification and Building Performance Standards sets high performance targets
- Both PHIUS and Building Performance Standards encourage building owners, managers, and designers to explore and innovate different strategies to achieve targets
- Both cover the same buildings, existing and new construction
- Both PHIUS and Building Performance Standards have the same goals;
  - Climate Action
  - Building Decarbonization
  - Energy Efficiency
  - Occupant Health and Comfort
  - Energy Cost Savings

Comparison Case Example

- 11 jurisdictions have adopted BPS to date. Some use energy use intensity, greenhouse gas intensity, or have yet to establish their performance metric.
- Compared the same large multifamily or commercial building's PHIUS performance criteria to the BPS standards in Boston and Vancouver .



Phius 2021
Performance Criteria Calculator v3.1

UNITS:	IMPERIAL (IP)
BUILDING FUNCTION:	RESIDENTIAL
PROJECT TYPE:	NEW CONSTRUCTION
STATE/ PROVINCE	MASSACHUSETTS
CITY	BOSTON LOGAN INT ARI
Envelope Area (ft²)	9,408.0
iCFA (ft²)	47,000.0
Dwelling Units (Count)	50
Total Bedrooms (Count)	100

Space Conditioning Criteria

Annual Heating Demand	5.2	kBtu/ft²yr
Annual Cooling Demand	8.8	kBtu/ft²yr
Peak Heating Load	4.6	Btu/ft²hr
Peak Cooling Load	3.6	Btu/ft²hr

Source Energy Criteria

Phius CORE	4100	kWh/person.yr
Phius ZERO	0	kWh/person.yr

Boston BPS Comparison

Boston's BPS established greenhouse gas intensity targets by building typology that ratchet down to zero carbon over time.

PHIUS Heating Demand Limit (kBtu/ft²yr)	PHIUS Annual Heating Demand Limit (kg/ft²yr) NG Conversion	Boston BPS Total Emissions Target in 2030 (kg/ft²yr)	Boston BPS Total Emissions Target in 2040 (kg/ft²yr)
5.2	0.28	2.4	1.1

A PHIUS certified building would use approximately 1/9 in 2030 and 1/4 in 2040 of its BPS emissions limit on heating. Boston buildings normally use 65% of its energy on heating.

BUILDING USE	2025-2029	2030 - 2034	2035 - 2039	2040-2044	2045-2049	2050 -
Assembly	7.8	4.6	3.3	2.1	1.1	0
College / University	10.2	5.3	3.8	2.5	1.2	0
Education	3.9	2.4	1.8	1.2	0.6	0
Food Sales and Service	17.4	10.9	8.0	5.4	2.7	0
Healthcare	15.4	10.0	7.4	4.9	2.4	0
Lodging	5.8	3.7	2.7	1.8	0.9	0
Manufacturing / Industrial	23.9	15.3	10.9	6.7	3.2	0
Multifamily Housing	4.1	2.4	1.8	1.1	0.6	0
Office	5.3	3.2	2.4	1.6	0.8	0
Retail	7.1	3.4	2.4	1.5	0.7	0
Services	7.5	4.5	3.3	2.2	1.1	0
Storage	5.4	2.8	1.8	1.0	0.4	0
Technology / Science	19.2	11.1	7.8	5.1	2.5	0

Vancouver BPS Comparison

PHIUS Annual Heating Demand Limit (kBtu/ft²yr)	Vancouver's BPS Heat Energy Limit – 2040 (kBtu/ft²yr)
5.6	7.9

Vancouver's BPS has two metrics of performance, a carbon pollution limit and a heat energy limit.

In 2026 office buildings must meet a GHG limit from onsite combustion of 25 (kg/ft²yr).

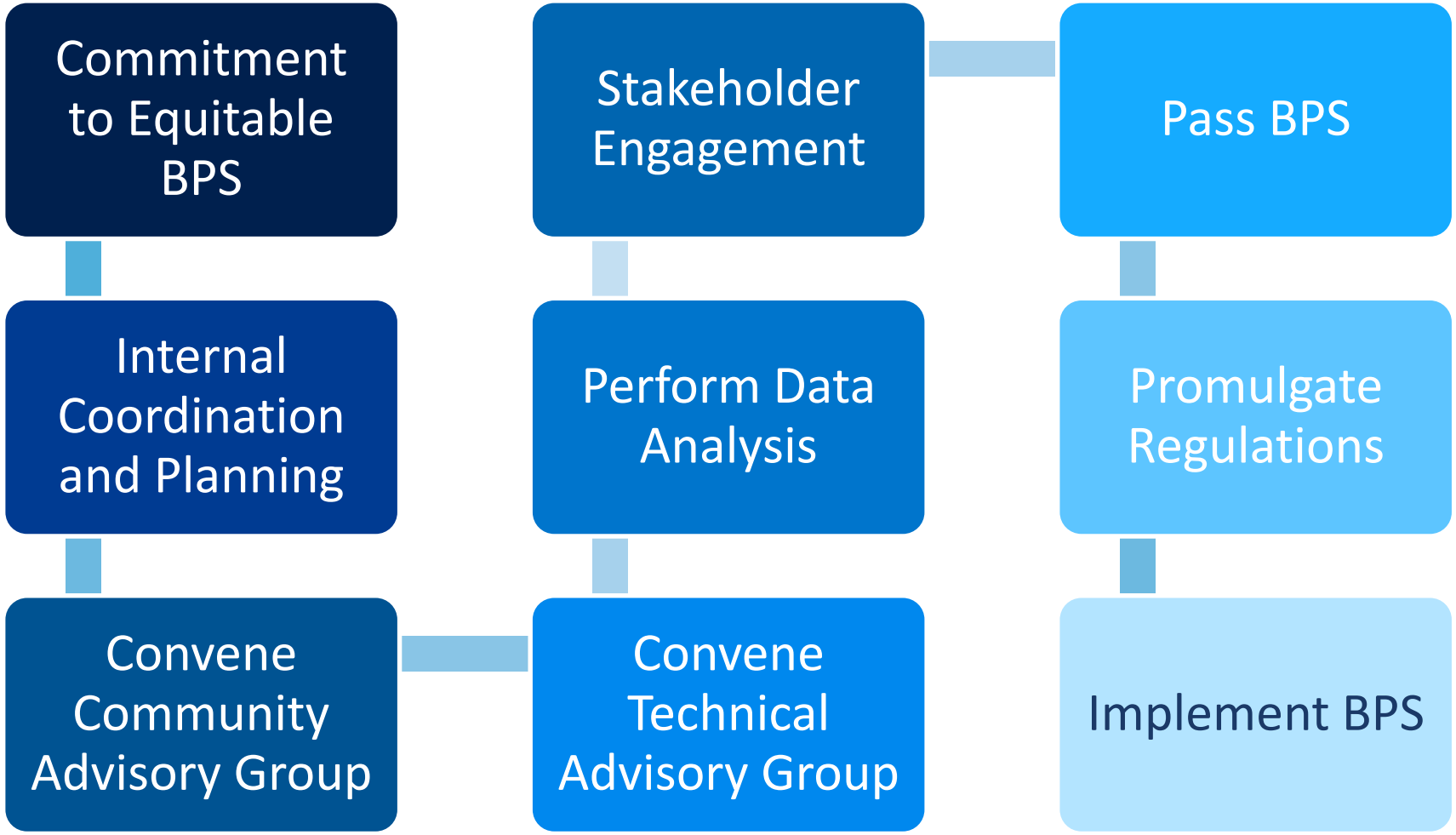
In 2040 office and retail buildings must meet a GHG limit from onsite combustion of 0 (kg/ft²yr). Furthermore they must meet a heat energy limit from all heating sources of 7.9 (kBtu/ft²yr).

A PHIUS office or retail building would have an annual heating demand limit 40% less than the BPS heat energy limit

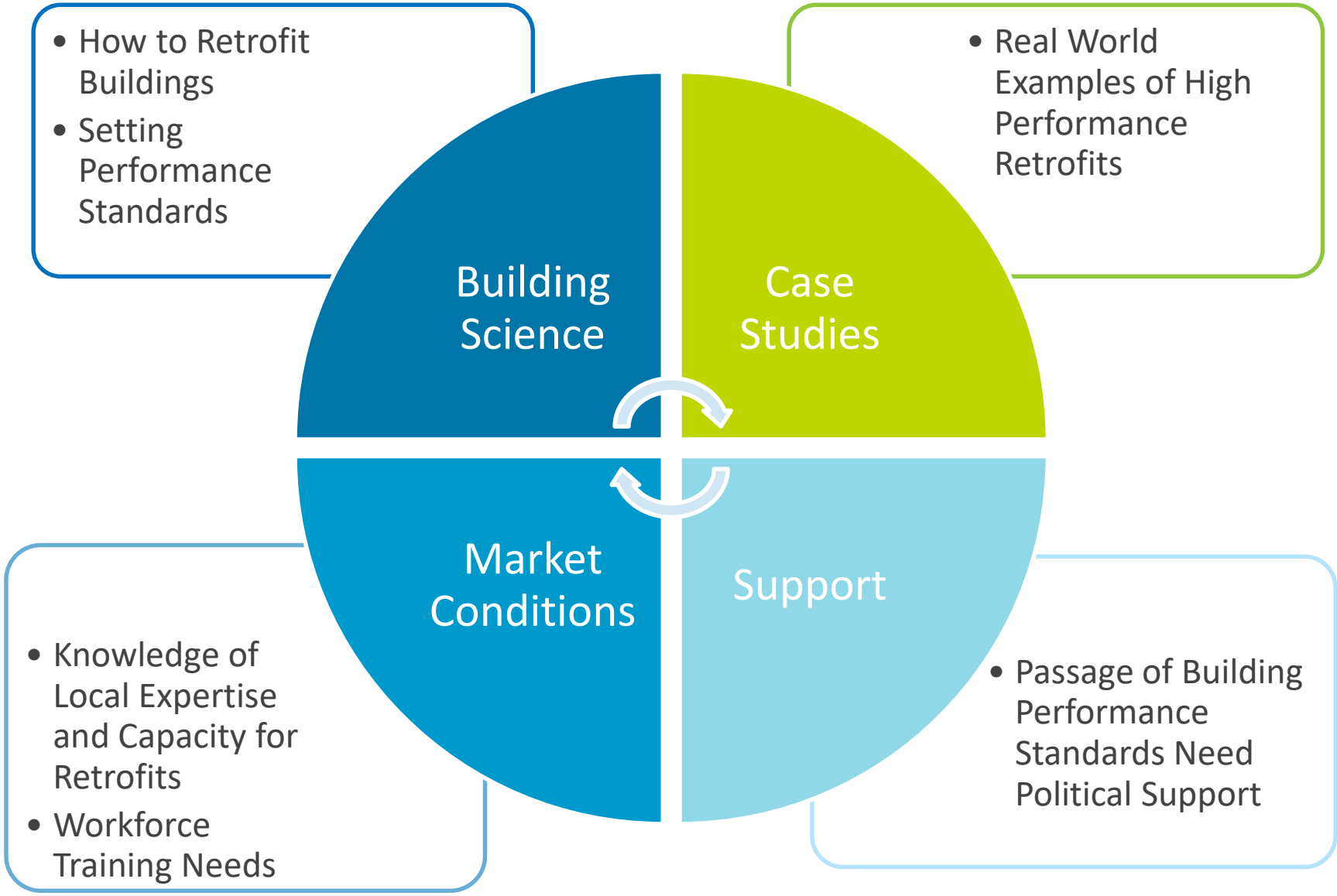
Passive House design principles are in many cases the best strategies for buildings to meet the requirements of their local building performance standards.

BPS Policy Development

BPS Roadmap


Commitment to Equitable BPS
Internal Coordination and Planning
Convene Community Advisory Group
Convene Technical Advisory Group
Perform Data Analysis
Stakeholder Engagement
Pass BPS
Promulgate Regulations
Implement BPS

Contributions of Passive House Professionals

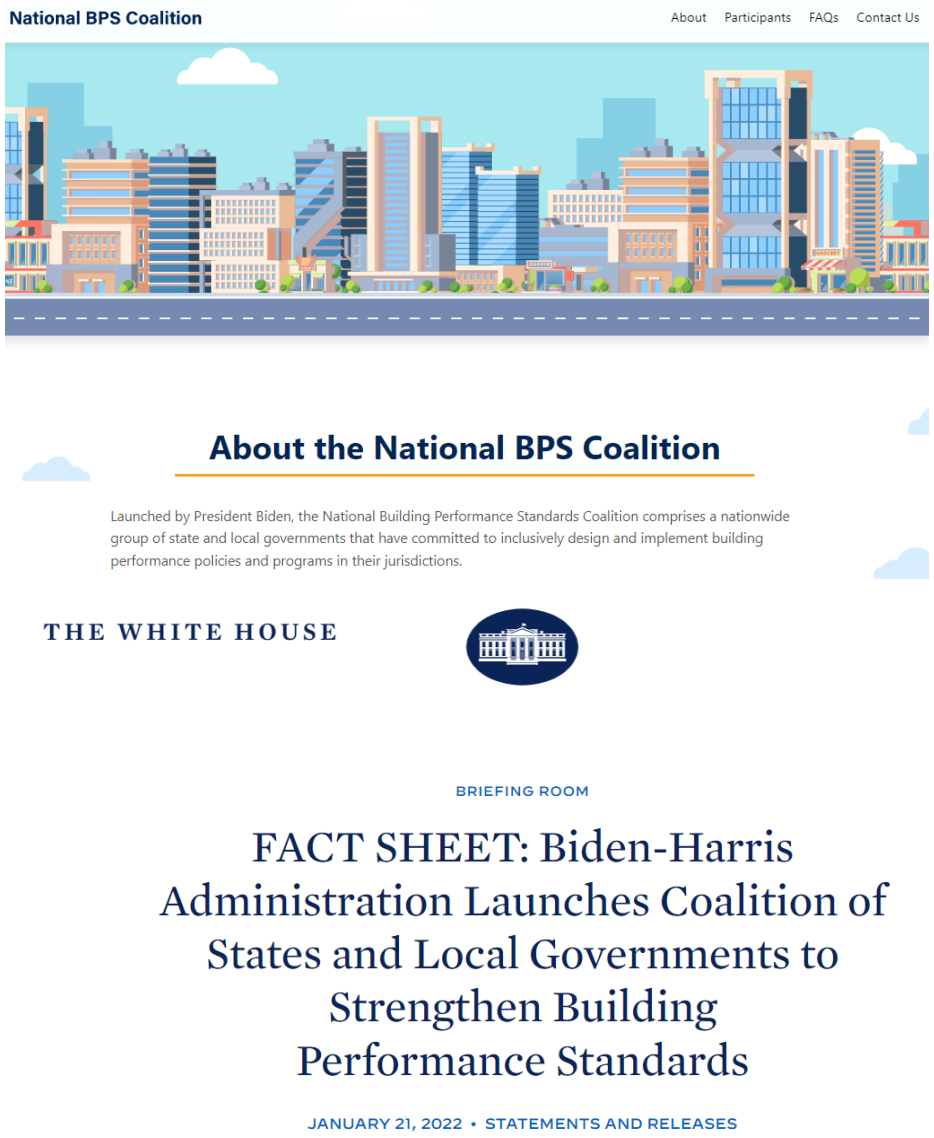


Passive House professionals can be leading stakeholders in developing building performance standards, setting their targets, and supporting their passage.

National BPS Coalition

National Building Performance Standards Coalition

- President Biden and the White House Center on Environmental Quality launched the coalition in January 2022
- Nationwide group of 33 state and local governments that have committed to inclusively design and implement equitable building performance standards and complementary programs by Earth Day 2024
- Federal agencies, including U.S. Department of Energy and Environmental Protection Agency providing technical assistance



National Building Performance Standards Coalition

Key Takeaways

- Building Performance Standards are the future of existing building decarbonization policy
- Building Performance Standards are likely to be adopted in dozens of major jurisdictions in the coming years
- Passive House buildings offer some of the best strategies for achieving compliance with BPS
- Passive House professionals have the know how to contribute to the development of these policies and setting the standards that jurisdictions needs

This is a **huge** opportunity for the Passive House movement and Passive House professionals that you can have a role in.

Thank You

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