

U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY

Addressing Existing Buildings - Building Performance Standards Building Energy Codes Program Webinar Series

Billierae Engelman, US Department of Energy

Wednesday, February 15th, 2024



BECP WEBINAR SERIES LINEUP

Catch the entire lineup of sessions the third Thursday of each month @ 1p ET.

- 9/21/23: How Building Codes Facilitate Resilient Communities
 - 10/19/23: Strategies to Equitably Expand the Energy Codes Workforce
 - 11/16/23: What You Need to Know About the New Energy Standard for Commercial Buildings: ASHRAE 90.1-2022
 - 1/18/24: Best Practices for Understanding and Improving Compliance: Field Studies, Circuit Riders, and More
 - 2/15/24: Addressing Existing Buildings: Building Performance Standards and Implementation Support Tools
 - 3/21/24: Energy Code Enforcement Challenges and Opportunities in Rural Communities
- And more to be announced soon!

> Learn more: www.energycodes.gov/becp-energy-code-webinar-series

2024 NATIONAL ENERGY CODES CONFERENCE

ENERGY
CODES | 2024



2024 NATIONAL ENERGY CODES CONFERENCE

HOSTED BY THE U.S. DEPARTMENT OF ENERGY

May 6-8, 2024 | Sacramento, CA

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Office of ENERGY EFFICIENCY
& RENEWABLE ENERGY



Building Energy Codes

> Learn more: <https://www.energycodes.gov/2024-national-energy-codes-conference>



Building Energy Codes

U.S. DEPARTMENT OF ENERGY

Agenda

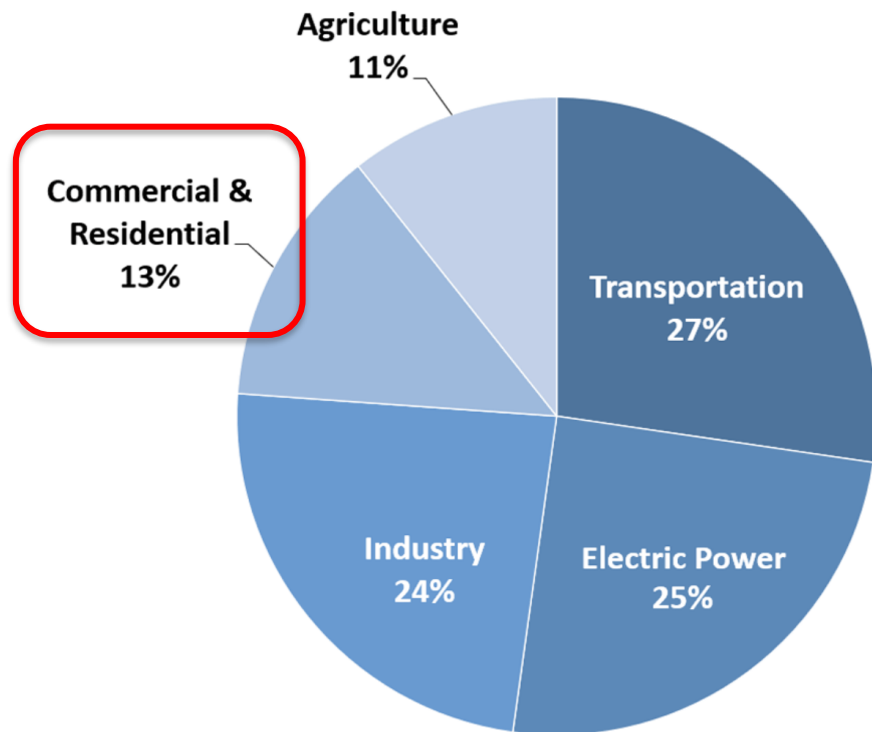
- **Speaker Intro**
- **Building Performance Standards (BPS) Introduction**
- **Data tools for BPS**
- **BPS Administration and Implementation**
- **BPS and equity**
- **BPS and energy codes**
- **Q&A**

Speakers

- ❖ Billierae Engelman, US Department of Energy
- ❖ Harry Bergmann, US Department of Energy
- ❖ Sydney Applegate, US Department of Energy/ORISE
- ❖ Joshua Kace, Lawrence Berkeley National Laboratory
- ❖ Isabel Langlois-Romero, National Renewable Energy Laboratory
- ❖ Molly Curtz, Pacific Northwest National Laboratory

Buildings critical to US Climate Goals

Total U.S. Greenhouse Gas Emissions
by Economic Sector in 2020



>70% of electricity used in buildings

Here today

76%

Of homes



52%

Of businesses



Here in 2050

Building Energy Codes - Crucial, but not enough

Commercial and residential building energy codes have raised floor of energy performance over time, but do not affect majority of existing buildings



Average annual building retrofit rates of 2% alone **will not meet US energy and climate goals**

Building Performance Standards connect gap between energy codes and rate of voluntary retrofits **over lifecycle of existing building**

Policy Momentum: National BPS Coalition

January 21, 2022 – President Biden launched the National BPS Coalition with 33 state and local governments publicly committed to passing BPS by Earth Day, 2024.

THE WHITE HOUSE



[Administration](#)

[Priorities](#)

[COVID Plan](#)

[Briefing Room](#)

[Español](#)

[MENU](#)



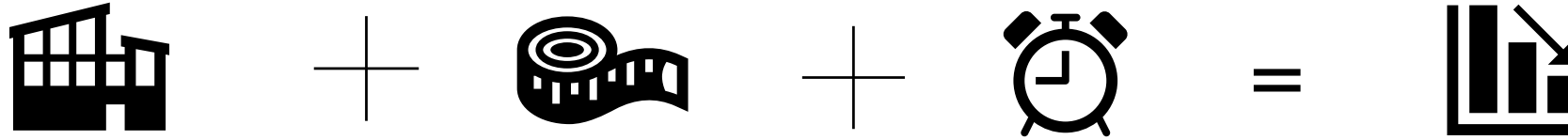
BRIEFING ROOM

FACT SHEET: Biden-Harris Administration Launches Coalition of States and Local Governments to Strengthen Building Performance Standards

JANUARY 21, 2022 • STATEMENTS AND RELEASES

Source: [FACT SHEET: Biden-Harris Administration Launches Coalition of States and Local Governments to Strengthen Building Performance Standards | The White House](#)

Building Performance Standards 101



- ❖ **Mandated energy and/or emissions reduction through set performance target(s)**
 - ❖ Mainly commercial & large multifamily >10,000-25,000 sqft
 - ❖ Common Metric(s) – EUI, GHGI
- ❖ **Alternative compliance pathways to provide flexibility & equitable implementation**
 - ❖ Audit requirements, prescriptive measure pathways, timeline extensions, etc.
- ❖ **Policies adopted at state and/or local level**
 - ❖ 14 adopted, 40+ under consideration

DOE & EPA Building Performance Standards Technical Assistance Network

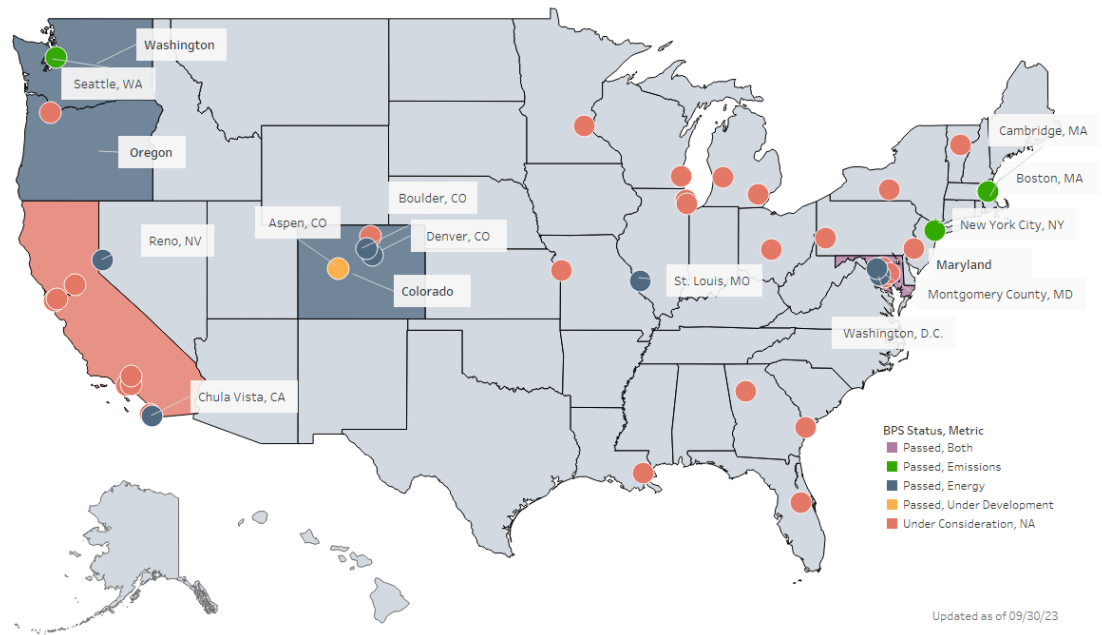


The **BPS TA Network** is open to all members of the National BPS Coalition *and* any other cities, states, and jurisdictions working on or interested in a BPS or similar policy prompting improvements in a building.

❖ Technical Assistance Network support includes:

- ❖ Technical analysis – Building stock, energy & emissions impacts, economic impacts
- ❖ Compliance pathways tools & support
- ❖ Performance target-setting and savings trajectories
- ❖ Program design & administrative structure support, including data tools implementation
- ❖ Stakeholder engagement best practices & equitable policy design support
- ❖ And more!

State and Local Building Performance Standards



Source: [DOE Building Performance Standards Technical Assistance Program](#)

To request Technical Assistance or to learn more about BPS, please reach out: BPS@ee.doe.gov

Highlighted Resources

<https://www.energycodes.gov/segmentation>



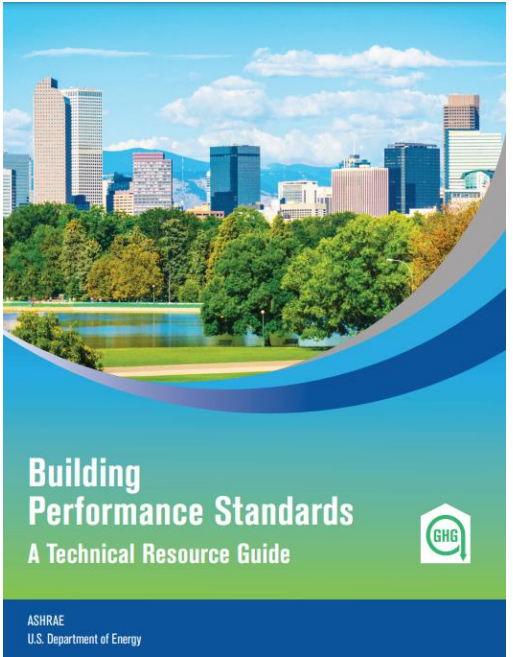
Figure 2. Building stock segmentation by building size. The black line indicates buildings above 50,000 square feet

❖ Phase I Commercial Building Stock Segmentation Analysis

- ❖ National building data across 88 geographic clusters including building type, size, energy consumption, and emissions
- ❖ Phase II forthcoming!

❖ DOE & ASHRAE Building Performance Standards Technical Guidance

- ❖ Overarching BPS Analysis Methodology
- ❖ BPS Metrics
- ❖ Performance Target Setting
- ❖ Policy Decision Support
- ❖ And more!



[BPS Technical Guidance Report](#)

Additional Resources

ENERGY.GOV
Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Building Energy Codes Program

About | Subscribe | Events

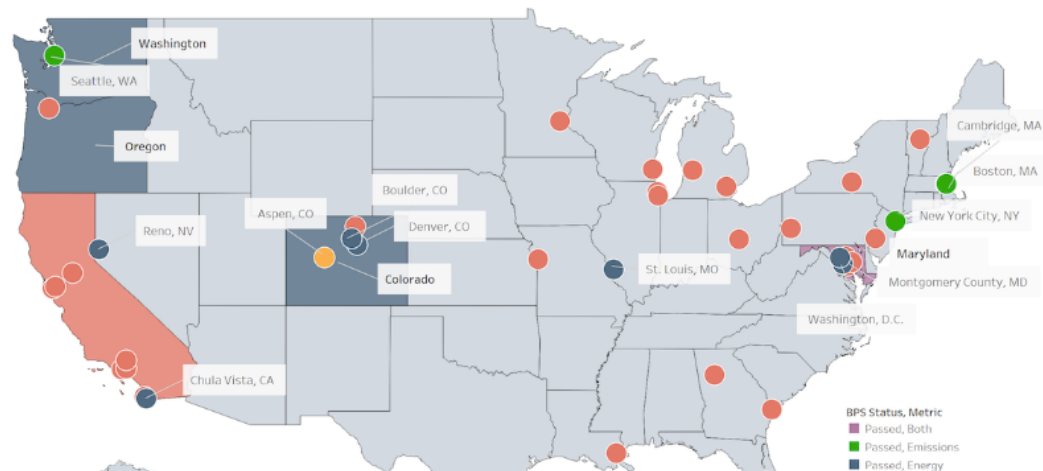
STATUS ▾ | IMPACTS ▾ | TECHNICAL ASSISTANCE ▾

EERE » Home

Building Performance Standards

Building Performance Standards (BPS) are outcome-based policies and laws aimed at reducing the carbon impact of the built environment by requiring existing buildings to meet energy and/or greenhouse gas emissions-based performance targets. When combined with building codes that regulate performance in specific instances like new construction or major renovations, BPS are powerful policy tools that provide a lifecycle approach to building performance and can empower state and local governments to deliver on their energy and carbon goals for the building sector.

State and Local Building Performance Standards



LEARN MORE...

[BPS TECHNICAL ASSISTANCE \(FORM\)](#)

[BPS RESOURCE LIBRARY](#)

[BPS FINANCING](#)

[BPS IMPLEMENTATION](#)

[BUILDING SEGMENTATION ANALYSIS](#)

Visit energycodes.gov/BPS for resources and information!

Bipartisan Infrastructure Law Funding – Section 40511 (RECI)

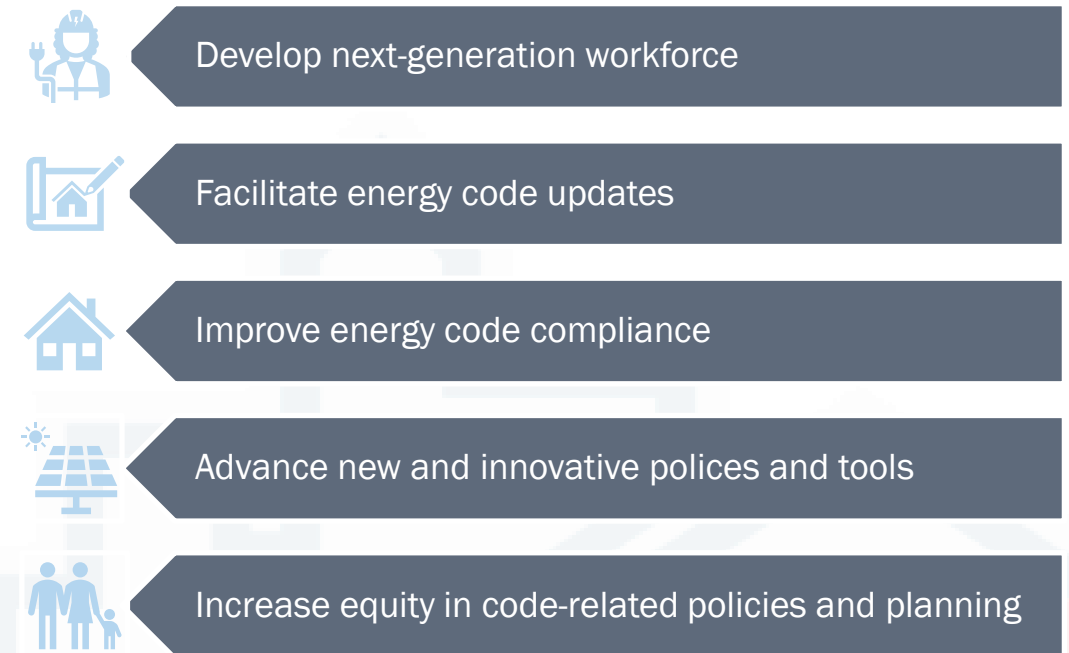
Title: Cost-effective Codes Implementation for Efficiency and Resilience

Funding: \$225M through FY26

Key Areas of Interest



Targeted Outcomes



➤ **To date, 27 projects awarded across 26 states and District of Columbia**

[Biden-Harris Administration Announces \\$90 Million To Support Resilient and Efficient Building Energy Codes and Save American Families Money | Department of Energy](#)

2023 BIL RECI Awards

State and Local Code Adoption

2813-1520 - Slipstream Group Inc: Building a Strong Foundation for Wisconsin Code Adoption, Compliance, and Local Support

2813-1560 - Colorado Energy Office: Colorado Advanced Energy Code Adoption and Enforcement Program

Workforce Development

2813-1565 - Alaska Housing Finance Corporation: Framework for Responsive Code Development in Alaska

2813-1582 - Pennsylvania Department of Environmental Protection: Maximizing Workforce for Energy Efficient Buildings and Building Construction in Pennsylvania

2813-1549 - American Society of Heating, Refrigerating and Air-Conditioning Engineers: Energy Code Official – Training & Education Collaborative (ECO-TEC)

2813-1568 - Southeast Energy Efficiency Alliance: Securing Energy Code Advancements in Louisiana

Implementation and Compliance

2813-1522 - Southeast Energy Efficiency Alliance: Georgia Residential Energy Code Field Studies: Single-family and Multifamily

2813-1542 - Northeast Energy Efficiency Partnerships: Pennsylvania and Delaware Energy Code Field Studies

2813-1523 – International Code Council: CODES: Code Official Digitization and Efficiency Support

2813-1524 - Karpman Consulting, LLC: Automation of Performance-based Compliance Quality Control and Reporting

2813-1544 - California Energy Commission: Digital Infrastructure to Support Energy Code Compliance and Implementation

2813-1519 - Energy Futures Group: Vermont Building Energy Code Administration Project

Innovative Approaches

Stretch Codes

2813-1577 - Massachusetts Department of Energy Resources: Massachusetts Integrated Deployment of a Decarbonized Long-term Energy Code (MIDDLE-C)

2813-1510 - Center for Energy and Environment: Minnesota Advanced Energy Codes Partnership: A Path to Net Zero

2813-1595 – City of Fort Collins: Zero Carbon Performance Code Implementation

2813-1502 - New Buildings Institute: District of Columbia Net Zero Code Implementation

BPS

2813-1588 - Earth Advantage: Advancing Building Performance Standards in Oregon

2813-1554 - University of Cincinnati: Developing a cost-optimal, equitable approach to building performance standards in Ohio's large cities

2813-1580 - ClearlyEnergy, Inc.: Designing & Implementing Building Performance Standards in Small, Rural, and Justice40 Communities

2813-1537 - Institute for Market Transformation (IMT): Supporting Equitable Building Performance

2813-1528 - Elevate Energy: Building Performance Resource Hub

2813-1556 - Colorado Energy Office: Advancing Building Performance Standards (BPS) in Colorado

EEEJ

2813-1570 - Southeast Energy Efficiency Alliance: Closing Equity Gaps to Advance Codes and Standards

2813-1514 - Clean Energy Group, Inc.: Climate Resilient Energy Codes for Multifamily Affordable Housing

Partnerships

2813-1597 - Metropolitan Energy Center: Mid-America Collaborative for Codes Workforce Development and Implementation

2813-1553 - American Council for an Energy-Efficient Economy (ACEEE): National Energy Codes Collaborative

2813-1505 - New Buildings Institute: Resilient Southwest Building Code Collaborative



SCEP

STATE & COMMUNITY ENERGY PROGRAMS

Inflation Reduction Act of 2022 (IRA) Assistance For The Adoption Of The Latest And Zero Building Energy Codes

February 15, 2024

IRA Section 50131

Adoption of the Latest and Zero Building Energy Codes

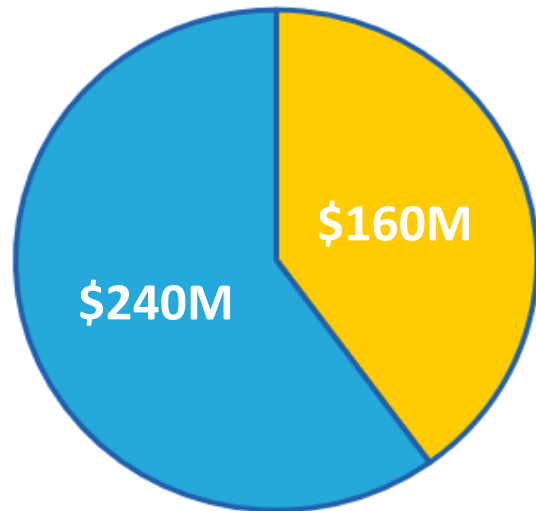


Overview of Funding Breakdown by Mechanism / Timing

Reminder: Applicant must have code/standard adoption authority

Formula – \$400M Total

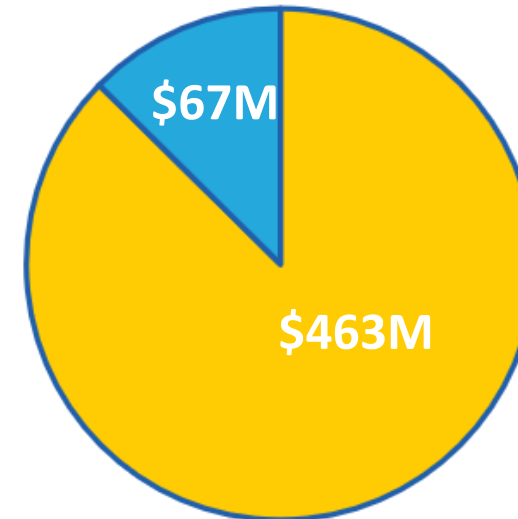
Eligible Entities: States
(and partnerships with States)
Released: September 19, 2023



Streamlined process for motivated States

Competitive FOA – \$530M Total

Eligible Entities: States, and localities with
code adoption authority
Released: December 18, 2023



- Latest Model Energy Codes or Equivalent
- Zero Energy Codes or Equivalent

FOA Topic Areas & Equivalence-based Subtopic Areas

Topic Area 1: Adoption and Implementation of Qualifying Building Energy Codes by Certain Units of Local Government (*No calculation required*)

– *Subtopic A: LMC; Subtopic B: ZEC*

Topic Area 2: Adoption of the Latest Model Energy Codes or Zero Energy Codes with Combinations of Strengthening and Weakening Amendments by States and Certain Units of Local Government

– *Subtopics A & B: LMC Equivalence; Subtopics C & D: ZEC Equivalence*

Topic Area 3: Adoption of Innovative Building Energy Code Approaches by States and Certain Units of Local Government

– *Subtopic A: LMC Equivalence; Subtopic B: ZEC Equivalence*



SCEP

STATE & COMMUNITY ENERGY PROGRAMS

Submit additional questions to IRACodes@hq.doe.gov

Answers are posted to Infrastructure Exchange through the FAQ process described in the FOA.

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Benchmarking and Building Performance Standard Implementation

EPA & DOE BTO Building Energy Data Software

Sydney Applegate, US DOE/ORISE



Benchmarking & BPS Implementation Support Software

ENERGY STAR®
**Portfolio
Manager**®

ENERGY STAR Portfolio Manager – enables the reporting of a building’s energy and water use, square footage, and operational details in a consistent format.

 **SEED**
STANDARD ENERGY EFFICIENCY DATA
PLATFORM™

SEED – central database for tracking building related information

U.S. DEPARTMENT OF ENERGY

 BUILDING ENERGY
**AUDIT
TEMPLATE**

Audit Template – standard format for asset-based building data collection & persistency

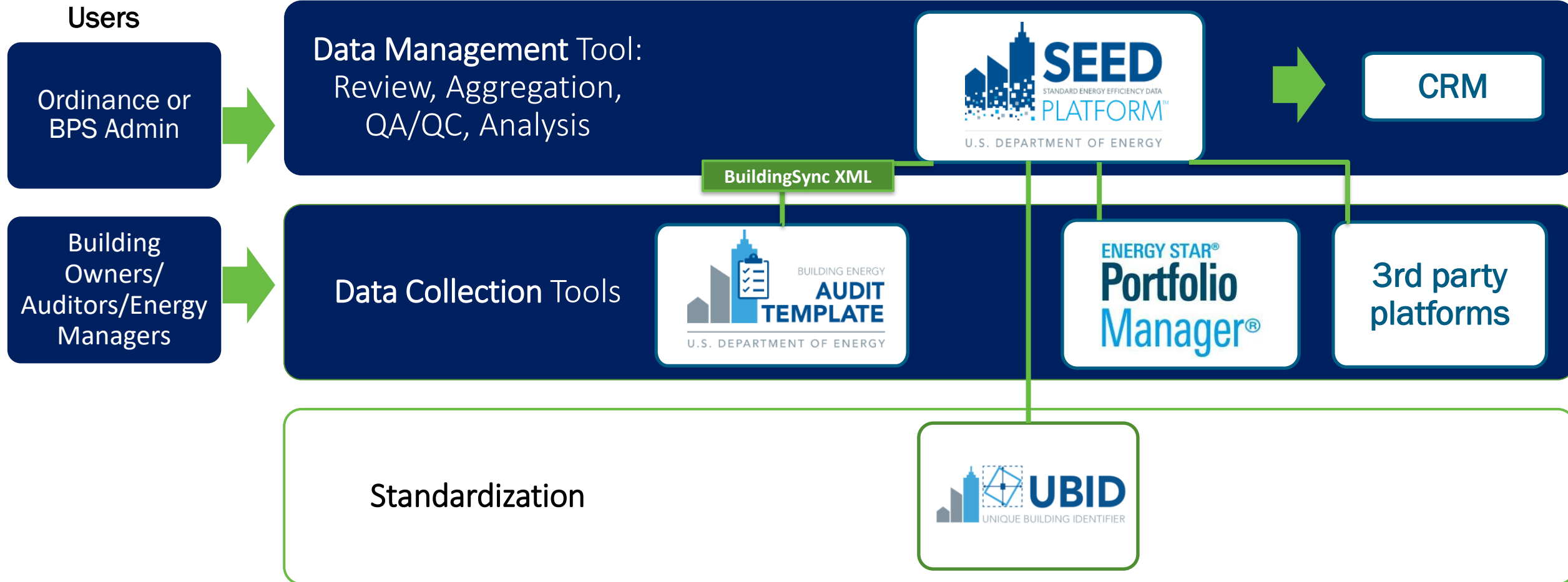
U.S. DEPARTMENT OF ENERGY

 **UBID**
UNIQUE BUILDING IDENTIFIER

UBID – unique building identifier based on geospatial location supporting data use

Benchmarking Ordinances or Building Performance Standards

Data Collection, Management, and Standardization



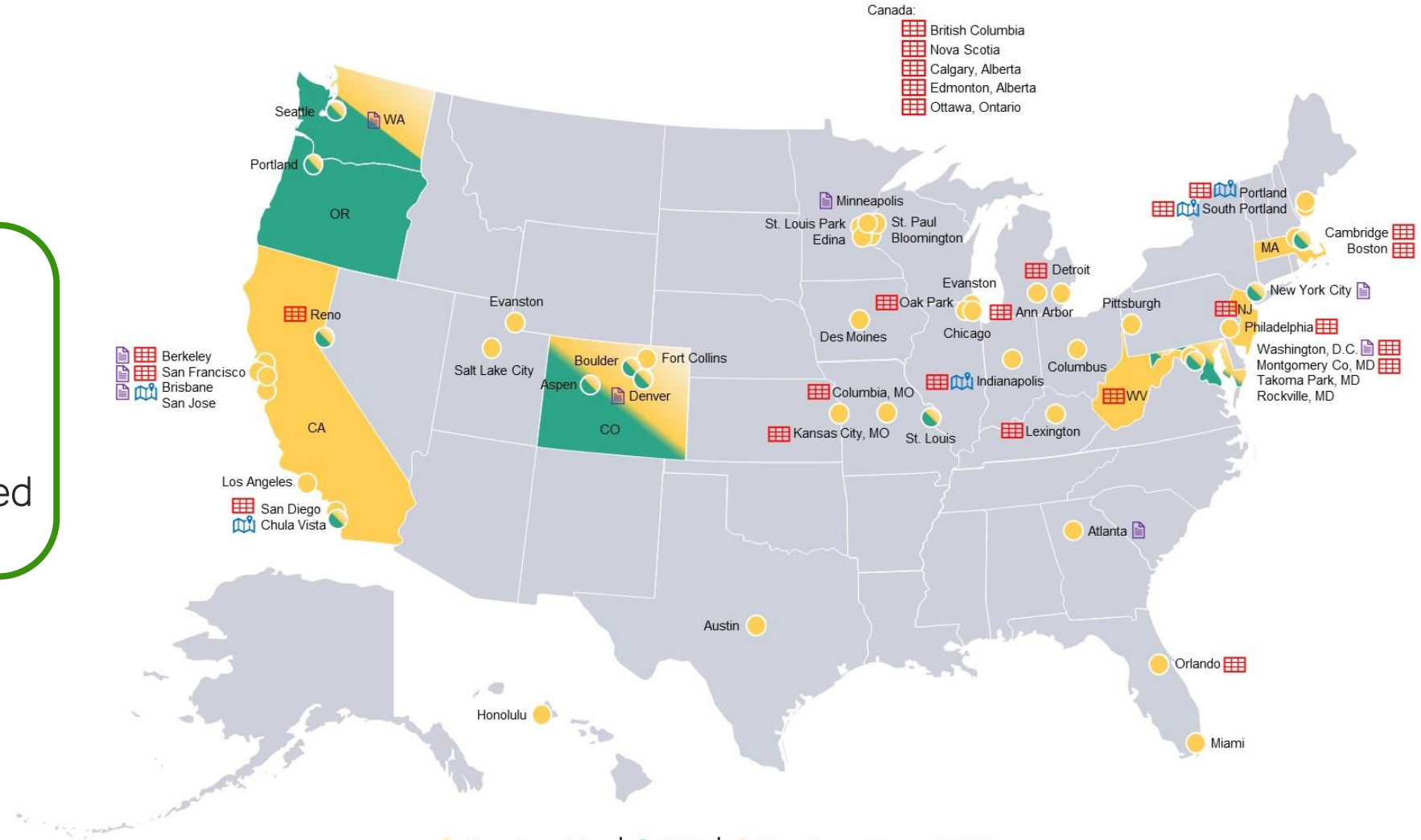
Suite Adoption (as of September 2023)

Current (Known) Adoption

8 Audit Template

5 UBID

24 SEED or SEED- Based

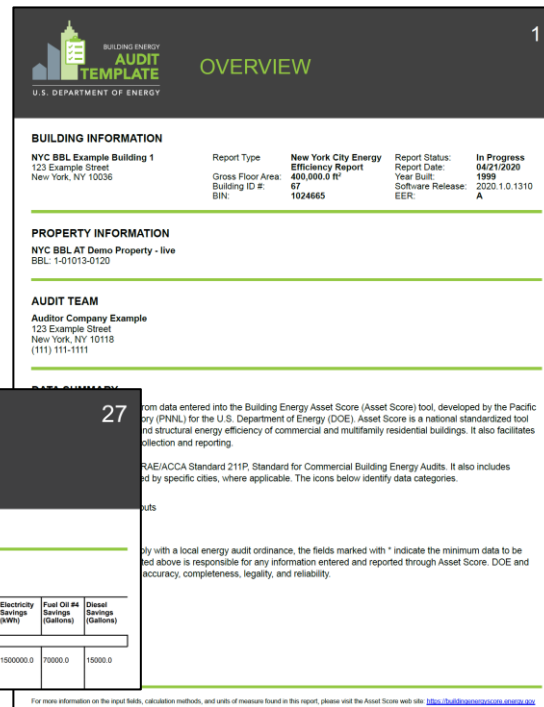


● Benchmarking | ● BPS | ● Benchmarking and BPS

📄 Using Audit Template | 🏠 Using SEED or SEED-based Platform | 📖 Using UBID

Audit Template

- Free, web-based tool to collect, store, and report building energy and water asset data
- The generated asset data report may be submitted to jurisdictions or agencies to demonstrate audit completion or any asset-based alternative compliance pathway



Package Name	Measure	Status (*)	Modeling / Calculation Approach (**)	Total Cost Savings	Peak Demand Savings (kW)	Natural Gas Savings (therms)	Electricity Savings (kWh)	Fuel Oil #6 Savings (Gallons)	Diesel Savings (Gallons)
Lighting pkg	Retrofit with CFLs	**1	**2	3000.0	250.0	60000.0	1500000.0	70000.0	15000.0

Facility Description

Building Characteristics

Use Types

Construction

Lighting

HVAC

Service Hot Water System

Operations

Process Loads / Generation

DC BEPS Energy Audit Report Categories

SEED (Standard Energy Efficiency Data)

A central database for tracking jurisdictional building energy policy/program data. It merges information from Portfolio Manager, Audit Template, and other city datasets in one place, behind one intuitive interface.



- Automate spreadsheet-based workflows to simplify data management
- **Improve data quality while reducing staff time**
- Share data to CRM & dashboards
- Track BPS compliance & progress
- Keep data secure and private
- Send automated emails to building owners

Converting data into actionable insights

+25%

Reduction in time
spent managing
programs

Get started by requesting a one-on-one demonstration or free test account.

BPS Implementation | Building Energy Codes Program

ESPM Contact Support (site.com)

Building Data Tools (energy.gov)



BPS IMPLEMENTATION + ADMINISTRATION

JOSHUA KACE, LAWRENCE BERKELEY NATIONAL LAB



Introduction to BPS Implementation + Administration

Start-Up Responsibilities



Ongoing Responsibilities



Staffing



Best Practices + Tips

START-UP RESPONSIBILITIES



Confirming the lead public agency & establishing a stakeholder group



Creating a “Covered Buildings List” (CBL)



Developing a compliance web portal



Establishing a help desk



Creating reference/guidance materials



Delivering initial notifications to covered buildings & distributing initial outreach/trainings



Disclosing public data, as appropriate



Coordinating with various building data entities

Help Desk & Creating Reference/Guidance Materials

Defining your help desk scope

Complex

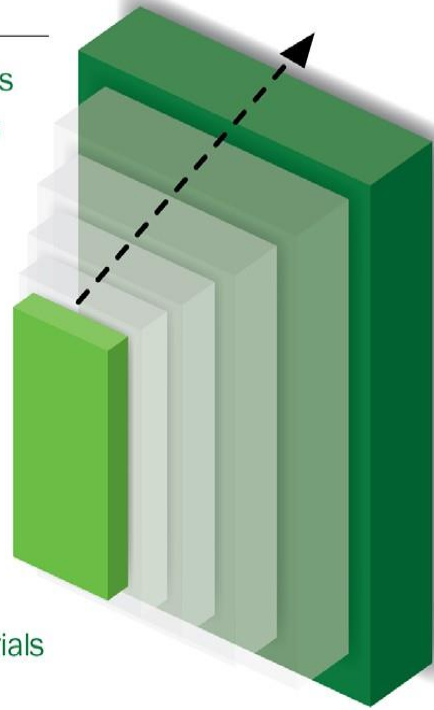
- Analyze specific retrofit recommendations
- Review draft scopes of work/vendor bids
- Ability to conduct on-site and/or virtual energy audits

Moderate

- Assistance connecting building owners to financial resources
- Benchmarking/target analysis
- Assistance with alternative compliance pathways

Basic

- Referral program
- IT troubleshooting
- Library of resources and reference materials



Key Responsibilities:

1. Handle inbound questions
2. Troubleshoot IT issues with compliance portal
3. Referral programming (escalate issues to proper office)
4. Share reference materials

Coordinating With Various Building Data Entities

Benchmarking Depts & Audit Programs



- Leverage information collected from existing benchmarking or audit programs.
- Existing programs can inform the BPS covered building list, provide building energy consumption, and provide equipment information.

Utility Companies



- Building energy consumption data
- Utility Energy Efficiency Upgrade programs

Tax Assessment Departments



- Typically, can provide a list of buildings that fit the BPS criteria, share records of building floor area and building type, and may have an electronic copy of the parcels.
- Tax assessor departments differ – Some may have information like land use category and property sub-type while others may not have that level of detail.

Permitting Departments



- Permitting departments may have information about a building's energy efficiency upgrades.
- This information can help characterize building types and help establish reasonable BPS targets for those buildings.

ONGOING RESPONSIBILITIES

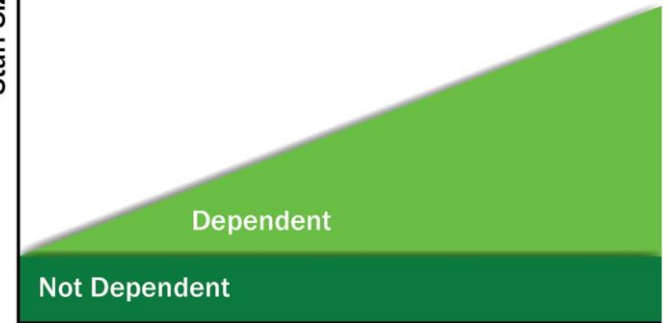
Not Dependent on Size of CBL

- Overseeing BPS implementation
- Annually assessing building performance
- Internal technical resourcing
- Maintaining & updating compliance web portal
- Ongoing program & policy outreach
- Supporting equity & responsibilities

Dependent on Size of CBL

- Handling inbound inquiries & supporting building owners
- Auditing & validating building performance reports
- Reviewing exemptions, alternative compliance pathways, & special cases
- Enforcement

Staff Size



Number of Buildings



Supporting Equity & Responsibilities

- Resourcing for equitable and just delivery of a BPS is **often underestimated**
- Presents an important opportunity to ensure **all buildings** reap the benefits of energy efficiency improvements.

EXAMPLES OF POLICY MECHANISMS USED TO DRIVE EQUITABLE BPS IMPLEMENTATION:

Enhanced help desk support for disadvantaged communities

Equity-targeted financial incentives

Revolving green funds

Full-Time Employees & Resourcing

Assigning Tasks & Roles

- To assign an appropriate level of effort, quantify tasks in either **work hours per year** or **full-time employees (FTE's)**.
- Once you understand the tasks required & the associated level of effort, assign roles to each task to define (3) responsibilities:
 - Who is **primarily** responsible for the task
 - Who **supports** the task
 - Who is **tangentially involved** with the task
- This effort will give you a bottom-up idea of the **time commitments** and **roles** within your BPS implementation team.

	Leadership	Energy analysis and/or energy benchmarking	Building performance	Compliance Administration	Help Desk Support
Oversee BPS implementation	Primary				
Annually assessing building performance	Support		Primary	Support	Support
Internal technical resourcing	Support			Primary	Primary
Maintain/update we portal for building BPS submission + review	Support			Primary	Primary
Ongoing outreach about program/policy	Support	Primary	Support		
Equity support and responsibilities	Primary	Support	Involved		
Handling inbound inquiries/building owner support	Involved	Support	Support	Primary	Primary
Auditing/validation of building emission reports	Involved	Support	Support	Primary	Primary
Review exemptions, alternative compliance submissions, special cases	Involved		Primary	Support	Support
Enforcement	Involved			Primary	Primary

Primary

Support

Involved

Dependent on number of covered buildings

Other Resourcing Considerations

Example of external organizations that may support your BPS needs

1. Resource hubs, financing hubs
2. NGO Partner Organizations
3. Regional Academic Institutions
4. Fellowship Programs (e.g. - FUSE)
5. Equity support groups, affordable housing departments
6. Other building owner support hubs

Policy components to consider when resourcing

1. Alternative compliance pathways (Number of pathways and how many buildings could potentially apply them)
2. Provisions for timeline adjustments
3. Prescriptive pathways (Energy Audits, Re-Tuning/Retro-Commission, implementation of certain ECMs)
4. Renewable Energy Credit (REC)/ Greenhouse Gas (GHG) Offset accounting / management
5. Custom normalization methods
6. Custom emissions factors for district systems, electricity
7. Building stock exemptions

Best Practices + Tips



**Prepare for surges
around compliance
deadlines**



**Early compliance can be
a powerful tool**



**Build a referral network
for inbound inquiries
from building owners**



**Craft your job titles and
requirements carefully**

Best Practices + Tips



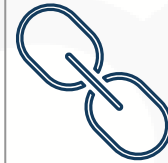
Engage with legal support early in the process



Consider geographically nested policies



Workforce development & training programming



Connection to energy codes program offices

Guide Available Here!

- https://www.energycodes.gov/sites/default/files/bps/2023-11/BPS_Program_Administration_Guide.pdf



2. Key Ongoing Responsibilities

- 2.1. Overseeing BPS implementation
- 2.2. Annually assessing building performance
- 2.3. Internal technical resourcing
- 2.4. Maintaining & updating compliance web portal
- 2.5. Ongoing program & policy outreach
- 2.6. Supporting equity & responsibilities
- 2.7. Handling inbound inquiries & supporting building owners
- 2.8. Auditing & validating building performance reports
- 2.9. Reviewing exemptions, alternative compliance pathways, & special cases
- 2.10. Enforcement

The following topics go into detail on the core ongoing responsibilities associated with implementing a BPS and should be carefully considered when developing a long-term staffing plan for your BPS implementation.

The following responsibilities have been divided into two buckets:

- 1) those that are **not dependent** on the number of covered buildings and
- 2) those that are **dependent** on the number of covered buildings

For example, if your BPS policy has a covered building list that changes over time, resourcing for tasks in bucket 2 may need to increase accordingly.

2.1. Not Dependent on Number of Covered Buildings

2.1.1. Overseeing BPS implementation

Oversight of the implementation process requires leadership, strong organization skills, strong time management skills, and continuous engagement with key stakeholders.

2.1.2. Annually assessing building performance

Establishing and administering protocols for annual energy assessment is always done in coordination with existing benchmarking protocols. Jurisdictions without a benchmarking ordinance must budget significant additional effort for benchmarking implementation.

2.1.3. Internal technical resourcing

Methods for calculating building performance and calculating targets can vary significantly between jurisdictions and needs to be considered as part of internal technical resourcing. This could include the development and distribution of tools, integration of calculations into web portals, and QA/QC/Auditing processes to ensure accuracy.

2.1.4. Maintaining & updating compliance web portal

Once a compliance web portal has been established, ongoing maintenance and updates requires support by a contractor or internal IT team. The web portal team should also have the bandwidth to update the compliance web portal with new guidance, deadlines, and any changes to the ordinance.

2.1.5. Ongoing program & policy outreach

Ongoing program outreach is important and should utilize any existing communication channels like contact lists from benchmarking ordinances, press releases, and leave behinds at building departments. Time and resources should be devoted to deadline reminders, dispersing updated guidance materials, outreach to newly eligible buildings, etc.

2.1.6. Supporting equity & responsibilities

Resourcing for equitable and just delivery of a BPS is often underestimated but presents an important opportunity for jurisdictions to ensure that all buildings covered by the BPS policy reap the benefits of energy efficiency improvements. Three of the most important policy mechanisms that have been used to drive equitable BPS implementation are enhanced help desk support for disadvantaged communities, equity-targeted financial incentives, and revolving green funds.

Defining your help desk scope

A well-designed web portal provides benefits such as automation, reduced staffing needs, data quality, data standardization, and data centralization. Further, the web portal design process forces an agency to consider standardization early in the implementation timeline. Special circumstances, alternative compliance paths, and custom calculations are all elements that can make a BPS more add administrative burden and are not native aspects of a web portal.

Complex

- Analyze specific retrofit recommendations
- Review draft requests of work/vendor bids
- Ability to conduct on-site and/or virtual energy audits

Moderate

- Assistance connecting building owners to financial resources
- Benchmarking/target analysis
- Assistance with alternative compliance pathways

Basic

- Historical program
- IT troubleshooting
- Library of resources and reference materials

1.5.2. Referral programming

One of a help desk's most important tools is the ability to refer building owners to other entities that can best support their needs. The following represent entities that can support building owners at various phases of the compliance process.

Case Study: Denver, CO

Denver compiled a directory of Benchmarking and Energy Service Providers. The directory lists individuals that have completed the city's benchmarking training and/or Energy Denver training. The city notes that the service providers' qualifications have not been verified by the city and the list is not an endorsement of their services.

Exploring Equity in Building Performance Standards (BPS)

Presenter and Research Group: Isabel Langlois-Romero,
Communities & Urban Science Research Group (NREL)

Email: Isabel.Langlois@nrel.gov



Equity in BPS Overview

What we will cover?

- (1) Explore some opportunities for equitable implementation in BPS.
- (1) Snapshots of equitable implementation in BPS in practice.
- (1) NREL research to support jurisdictions.



Opportunities for Equity Considerations in BPS

Opportunities:

- Coalition building and stakeholder engagement (I.e., broad engagement, targeted outreach, community advisory boards).*
- Equity portfolio prioritizations and research.*
- Tailored outreach strategies, resources, programming.*
- Dedicated staff (I.e., Equity Administrator).
- Program evaluation for equity considerations.
- Funding resources for upgrades in prioritized properties.

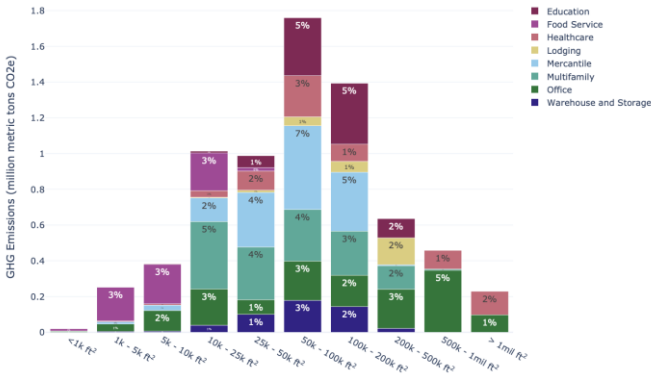


Figure 4. Greenhouse gas (GHG) emissions by building type and size

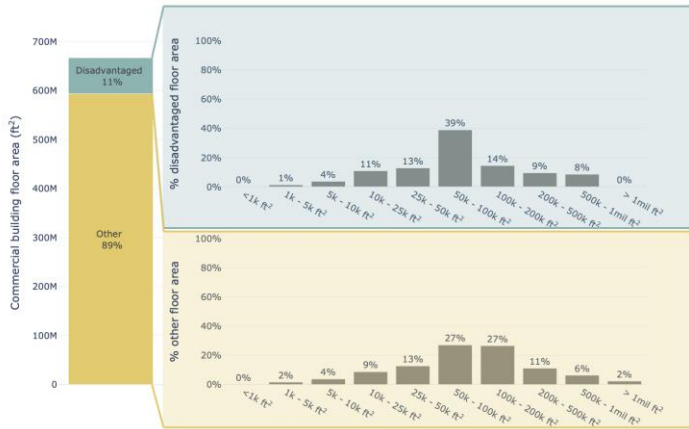


Figure 6. Segmentation of the commercial building stock by size, segmented into "disadvantaged" and "other" (as defined by CEJST)

Stakeholder Engagement in BPS

Engagement to ownership spectrum

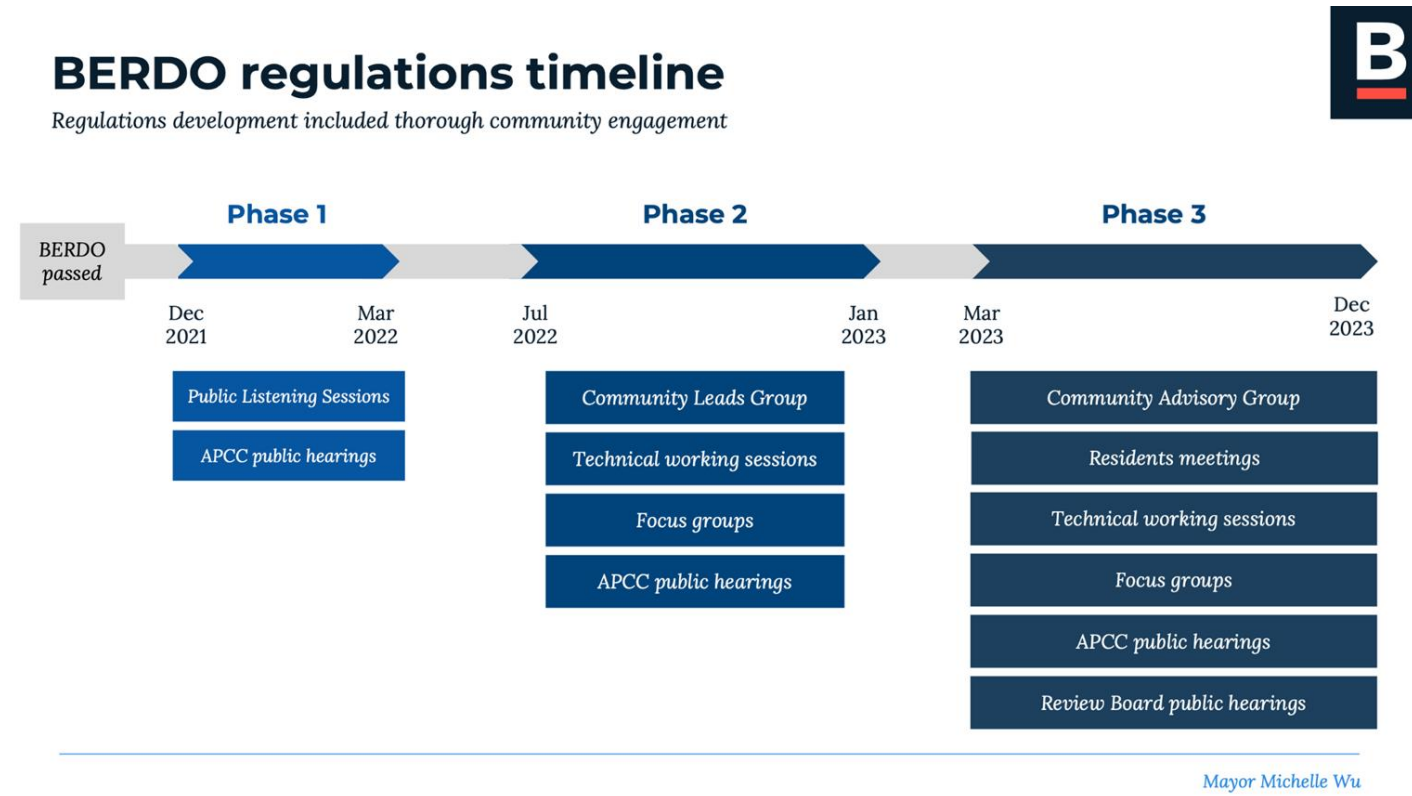


Image Credit: American Cities Climate Challenge

- Timeline of BPS and stakeholder engagement:
 - Preparation - Coalition building, initial outreach, co-creation of plan for stakeholder engagement
 - Policy Making - Public meetings, policy comment periods, targeted outreach for hard-to-reach communities
 - Implementation - Stakeholder board oversight, ongoing compliance support

Boston, Massachusetts

- Boston, MA strategy: **Outreach for each stage of BPS** (Boston ordinance: BERDO).
 - Phased approach for stakeholder engagement.
 - Diversity in types of outreach and degree of details for meetings.



Boston, Massachusetts

- Boston, MA strategy: **Review Boards**

- Review Board has authority to convene working groups on key topics and sectors (two already created in District energy healthcare facilities; commercial real estate).
- Review boards provide oversight on policy and permanent voice for the community.

BERDO has a Review Board that provides community oversight over the implementation of the Ordinance



1 SEAT FOR CITY COUNCILOR OR THEIR DESIGNEE.

**The City Councilor must be the Chair of the Environmental Justice, Resiliency And Parks Committee*



6 SEATS FOR INDIVIDUALS NOMINATED BY COMMUNITY BASED ORGANIZATIONS (CBOs).



2 ADDITIONAL SEATS FOR INDIVIDUALS THAT ARE SELF-NOMINATED AND/OR NOMINATED BY ANY OTHER INDIVIDUAL OR ENTITY.

The current board includes members with backgrounds in:

- Affordable housing
- Building engineering & construction
- Data analytics
- Energy performance & energy efficiency
- Environmental justice
- Racial equity
- University sustainability
- Workforce development
- Workers' rights and labor unions

Mayor Michelle Wu

Equity Portfolio Prioritizations

- Types of equity portfolio prioritizations:
 - Equity prioritization of covered buildings list (including geospatial analysis).
 - Analyzing stock energy use and BPS targets in disadvantaged and non-disadvantaged building stock.
 - Creating local equity indexes, metrics, or definitions
 - To measure program success related to equity,
 - To prioritize building upgrades in disadvantaged communities,
 - To tailor financing mechanisms to specific building type/industry/other.

View by Property	View by Tax Lot	Address Line 1	City	Created	Geocoding Confidence	Gross Floor Area (ft²)	Latitude	Longitude	Property Name	
✓	📍	Above 50k_CO Disadvantaged Community	111 Havana st, aurora, ...	aurora	2023-09-26 9:41 AM	Manually geocoded (N/...	139,626.00	39.72	-104.87	111 Havana
✓	📍	Above 50k_CO Disadvantaged Community	11265 east mississippi ...	aurora	2023-09-26 9:41 AM	Manually geocoded (N/...	163,186.00	39.70	-104.86	frontier valley
✓	📍	Above 50k_CO Disadvantaged Community	1420 ursula st, aurora, ...	aurora	2023-09-26 9:41 AM	Manually geocoded (N/...	225,288.00	39.74	-104.84	
✓	📍	Above 50k_CO Disadvantaged Community	1050 newark st, aurora, ...	aurora	2023-09-26 9:41 AM	Manually geocoded (N/...	227,560.00	39.73	-104.85	
✓	📍	Above 50k_CO Disadvantaged Community	13200 east 14th pt uni...	aurora	2023-09-26 9:41 AM	Manually geocoded (N/...	167,861.00	39.74	-104.84	
✓	📍	Above 50k_CO Disadvantaged Community	3700 salida st, aurora, ...	aurora	2023-09-26 9:41 AM	Manually geocoded (N/...	128,180.00	39.77	-104.78	
✓	📍	Above 50k_CO Disadvantaged Community	14705 e 53rd pl, auror...	aurora	2023-09-26 9:41 AM	Manually geocoded (N/...	155,999.00	39.77	-104.82	
✓	📍	Disadvantaged Community		2023-07-10 11:29 AM	Manually geocoded (N/...		39.75	-104.88		
✓	📍	Disadvantaged Community		2023-07-10 11:29 AM	Manually geocoded (N/...		39.75	-104.87		
✓	📍	Disadvantaged Community		2023-07-10 11:29 AM	Manually geocoded (N/...		39.75	-104.88		

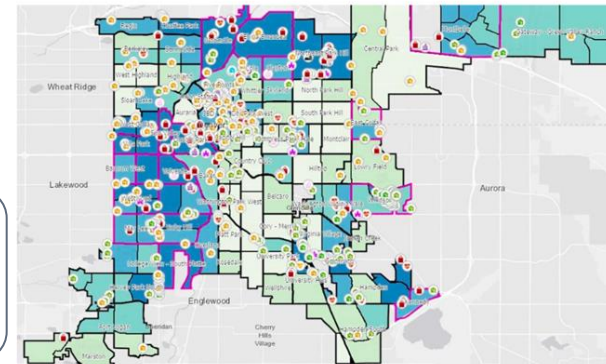
Denver, Colorado

- Denver, CO strategy: **Use equity index** for **portfolio prioritization**.
 - Equity Priority Buildings were pre-identified on buildings list and Denver provides targeted resources and financing mechanisms to these building owners.
 - Equity index also localized national equity metrics with local considerations.

Equity Priority Buildings (EPB)

Developing a method to identify EPB buildings:

- Buildings with over 30% regulated **affordable housing** units.
- Market-rate structures in **stressed** neighborhoods with a high equity index prioritization.
- Buildings **significant to the neighborhood**, catering to frontline community members (e.g., low-income, BIPOC, etc.).
- Buildings with **human service providers** as tenants/owners responsible for HVAC systems and/or utility bills.
- Building location requirements: In a census tract **below Denver's Median Income** and either 1) in a high-prioritization equity index tract or 2) serving frontline communities.
- Buildings offering affordability (rent), e.g., **NOAH**.
- Building with **corporate social** responsibility operations.



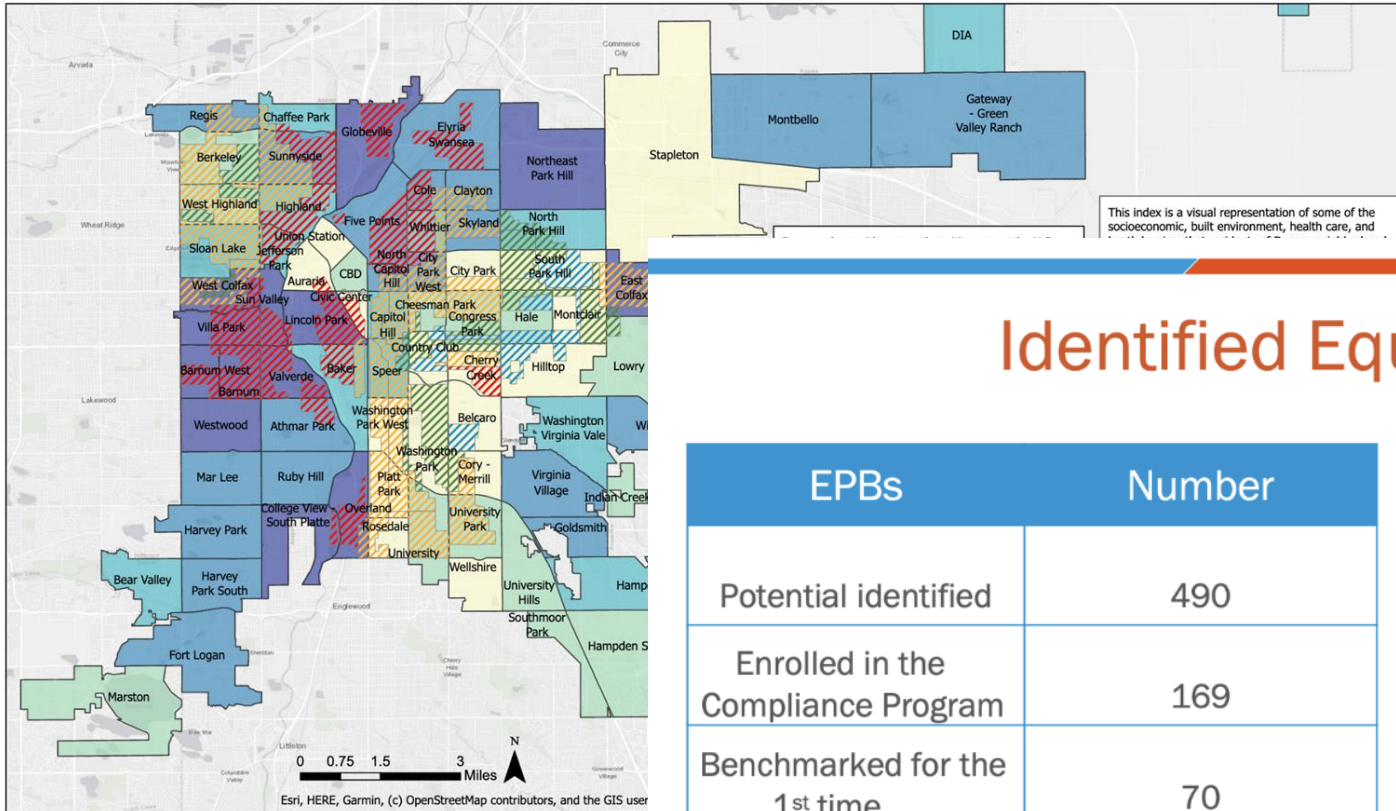
Equity Index: social equity indicators (utility burden, income stress, heat island, asthma rates, racial composition, etc.)



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FOLLOW US @DENVERCASR

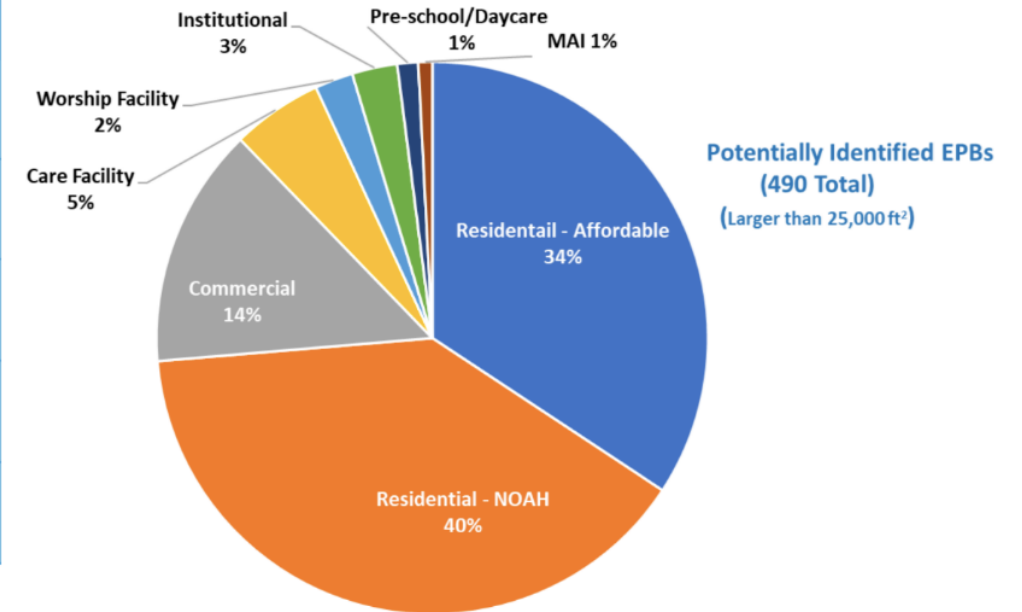
Denver, Colorado

Denver Neighborhood Equity Index Scores (updated March, 2020) and Historic Redlining Grades



Identified Equity Priority Buildings

EPBs	Number
Potential identified	490
Enrolled in the Compliance Program	169
Benchmarked for the 1 st time	70
Onsite visits	183
ASHRAE level 2 audits	16



NREL's Equity Research for TA Network

- Highlight: NREL **commercial building equity research** to support various equity opportunities in BPS.
 - I.e., **Equity portfolio prioritization, stakeholder engagement** strategies, **community outreach tools** (surveys, processes - multilingual resources).

2023 Commercial Equity Pilot in Aurora, Colorado

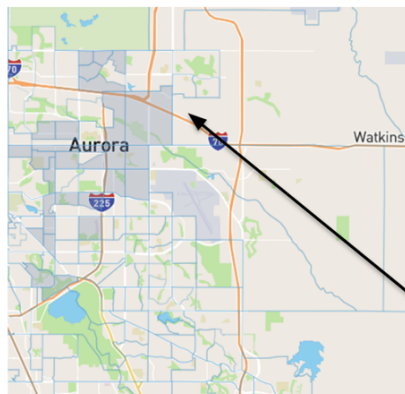
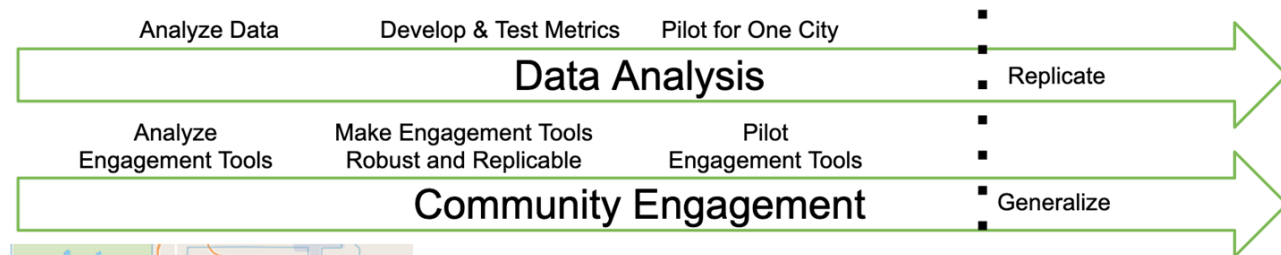


Photo Credit: Ymbar Polanco Pino, Tufts

1. Pressing use case with equity impacts - **State of CO BPS**
2. City of Aurora, CO as the pilot (380,000 ~50% of Denver pop.)
3. Non-anchor city, commonly underserved
4. Majority-minoritized population, significant DAC
5. NREL has local knowledge and community connections

DAC per <https://screeningtool.geoplatform.gov/en/#9.69/39.7492/-104.7638>

NREL: Commercial Buildings Equity Pilot in Aurora, CO

- NREL strategy: **Equity prioritization of commercial properties** for **targeted outreach**
 - How can we help cities identify under-resourced commercial buildings (characteristics beyond census tract)?
 - Replicable outreach strategies and resources for jurisdictions to identify buildings which are significant to the community (“community-prioritized”).
 - Created Equity BPS Board for DOE Building Performance Standards Technical Assistance Network to support local jurisdictions.

- Buildings **significant to the neighborhood**, catering to frontline community members (e.g., low-income, BIPOC, etc.).
- Buildings with **human service providers** as tenants/owners responsible for HVAC systems and/or utility bills.



Thank You

PI Name and Organization: Isabel Langlois-Romero, Communities and Urban Science Research Group

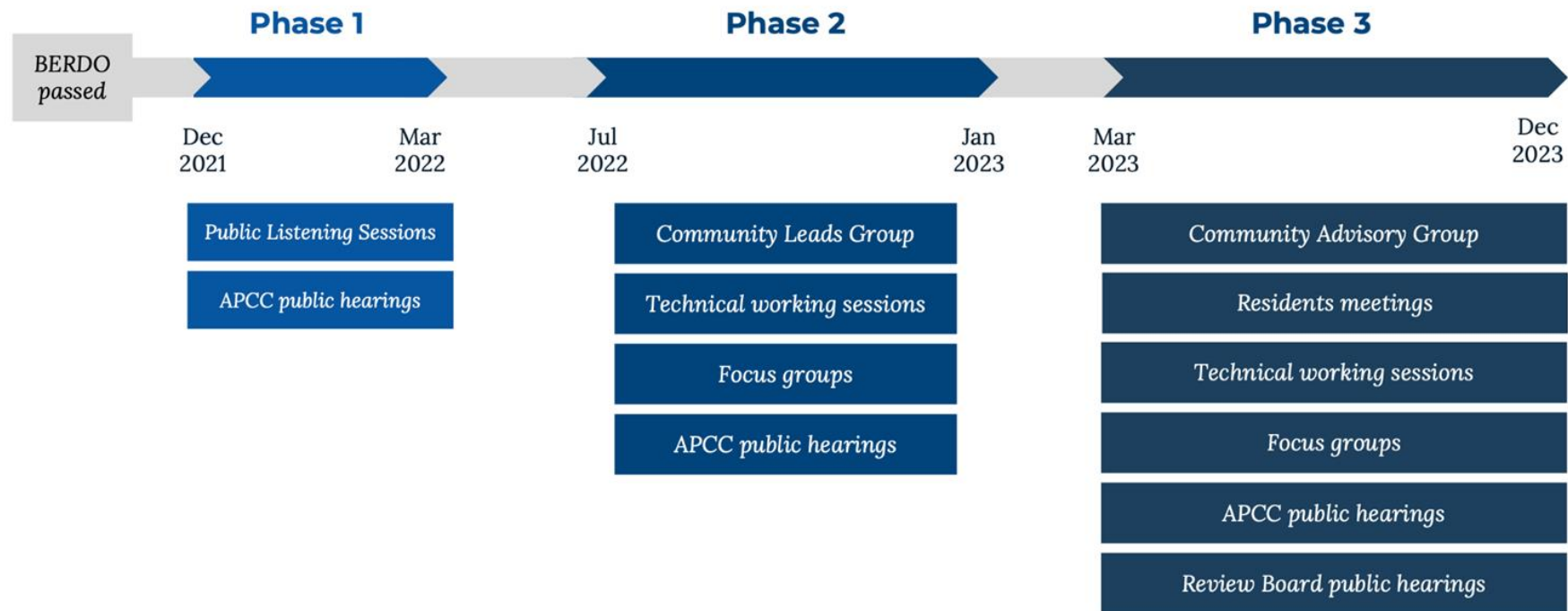
PI Email: Isabel.Langlois@nrel.gov

REFERENCE SLIDES



BERDO regulations timeline

Regulations development included thorough community engagement



Mayor Michelle Wu



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



Continuing engagement after regulations

- Review Board provides a **permanent voice for the community** over the implementation of BERDO.
- Review Board may convene **working groups** on key topics and sectors. Two have already been created:
 - Commercial Real Estate
 - Healthcare institutions connected to district energy systems
- Review Board must hold at least one public meeting per year dedicated to hear concerns and provide information to **residential tenants of BERDO** buildings.
- BERDO team conducts regular outreach and engagement to building owners and the public (e.g., newsletter, webinars, office hours, workshops, etc.)

Mayor Michelle Wu



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

Denver, CO

Energize Denver: Equity Priority Buildings Application for Compliance Assistance

This application is for equity priority buildings that would like to apply for free compliance assistance to meet Energize Denver benchmarking and Performance Requirements. City staff will review your application to determine if the building is eligible for compliance assistance.

You will be contacted if we need additional information and notified by email of your application status following its review. If you have questions regarding your application status, reach out to the Building Performance Help Desk by phone (844)-536-4528 or by email energizedenver@denvergov.org.

I. Contact Information

First Name *

Last Name *

Phone Number *

Email Address *

Relationship to Building *

Company Name *

II. Building Information

Phase 1 – Benchmarking and Data Verification

- Targeted outreach to all buildings we have identified as potential Equity Priority Buildings
- Assistance with filling out the Equity Priority Building eligibility application
- Assistance with completing your annual benchmarking report and data verification
- Advanced benchmarking assistance
- Assistance with completing the Target Adjustment applications (if needed)

These services are available to you after we review your Equity Priority Building eligibility application. If you have already applied and we have approved it, you can request these services today. [Submit your application!](#)

Phase 2 - Advanced Services

We will be piloting these services throughout 2023:

- Access to an online building portal to track energy performance and savings
- Virtual ASHRAE Level 1 Energy Assessment for your building
- Onsite ASHRAE Level 2 Energy Audit for your building
- Assistance with completing Alternate Compliance applications (if needed)
- Specific energy retrofit recommendation analysis for your building
- Assistance with draft scopes of work for retrofit plans and bids
- Assistance in reviewing vendor bids and choosing a contractor
- Assistance in finding financial resources to make energy efficiency upgrades to your building

If you have any questions, email us at EnergizeDenver@denvergov.org or call us at (844)-536-4528.

Final Framework – Benefits to Businesses to People

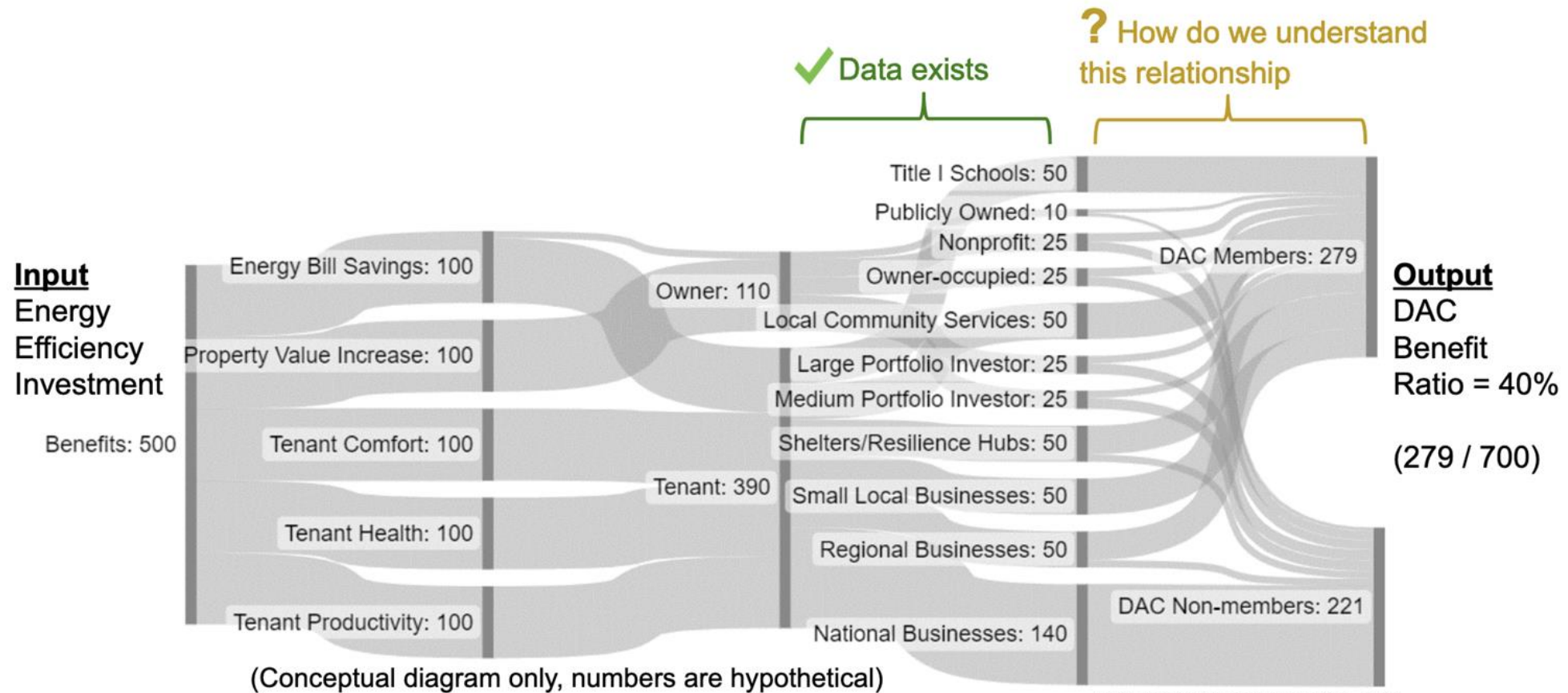


Photo Credit: Ymbar Polanco Pino, Tufts



**Pacific
Northwest**
NATIONAL LABORATORY

Building Performance Standards and Energy Codes

February 15, 2024

Molly Curtz, P.E.

Senior Research Engineer

U.S. DEPARTMENT OF
ENERGY **BATTELLE**

PNNL is operated by Battelle for the U.S. Department of Energy

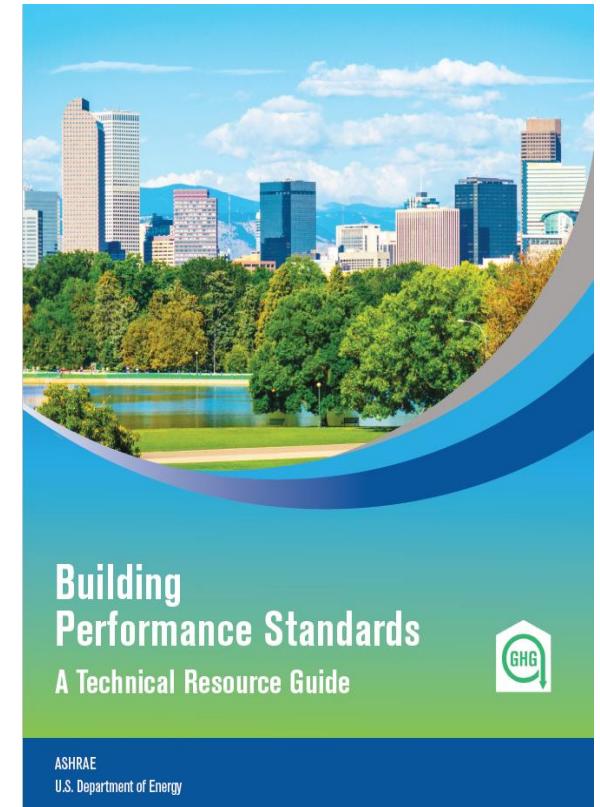


Policy Drivers in Building Performance

- **Building Energy Codes**, including Zero Energy Codes
- **Building Performance Standards**
- **Technical Assistance**



PNNL partnered with New York City and completed the pilot on **performance-based codes**.

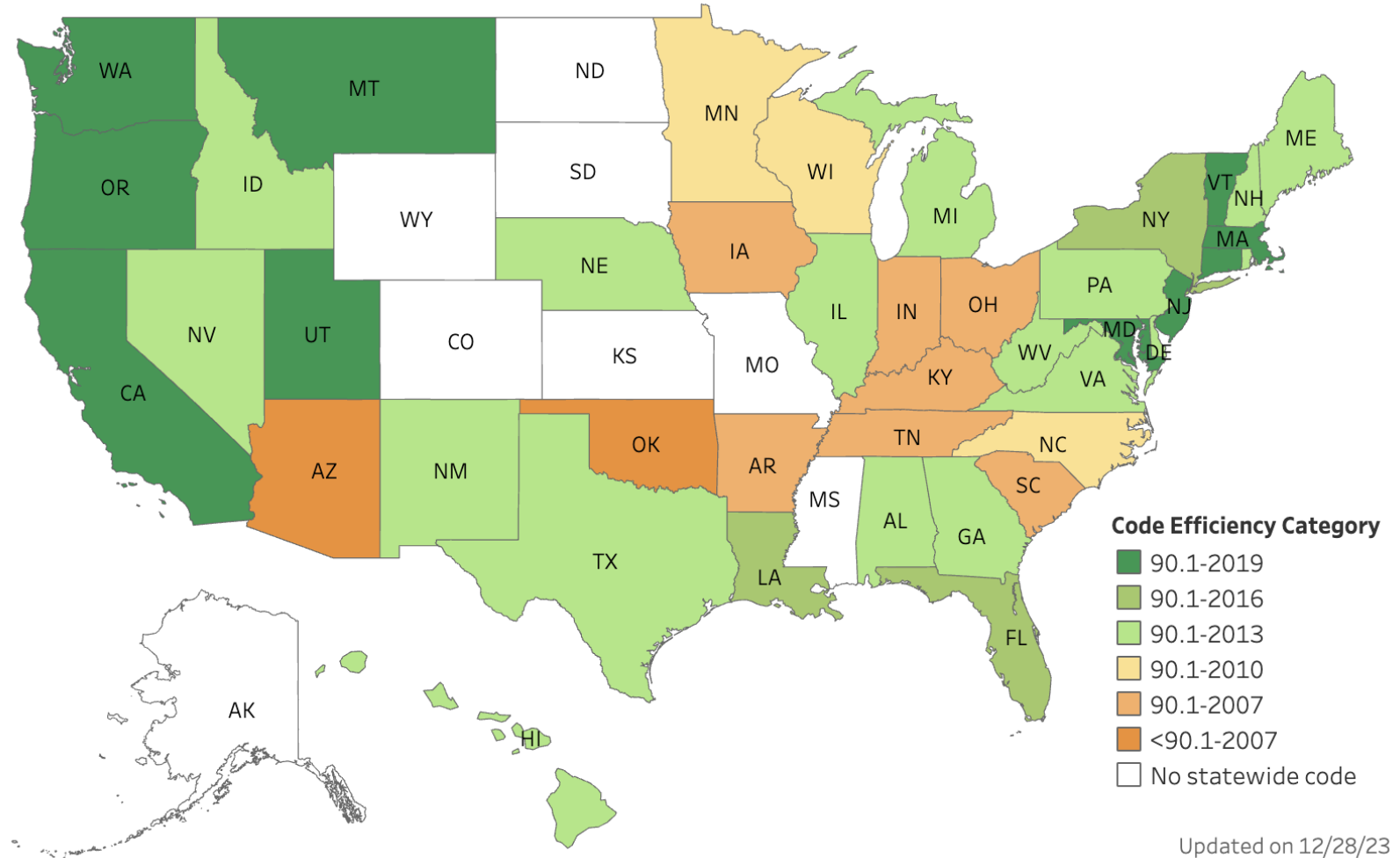
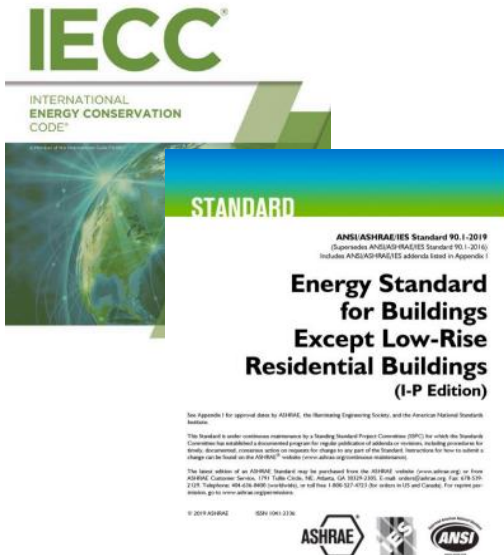


PNNL helped lead the ASHRAE/DOE **BPS Technical Resource Guide** development

Publication date: Feb 2023. Free Download.

Energy Codes

Energy code covers the design and construction of a building, giving an indication of its ability to perform efficiently.

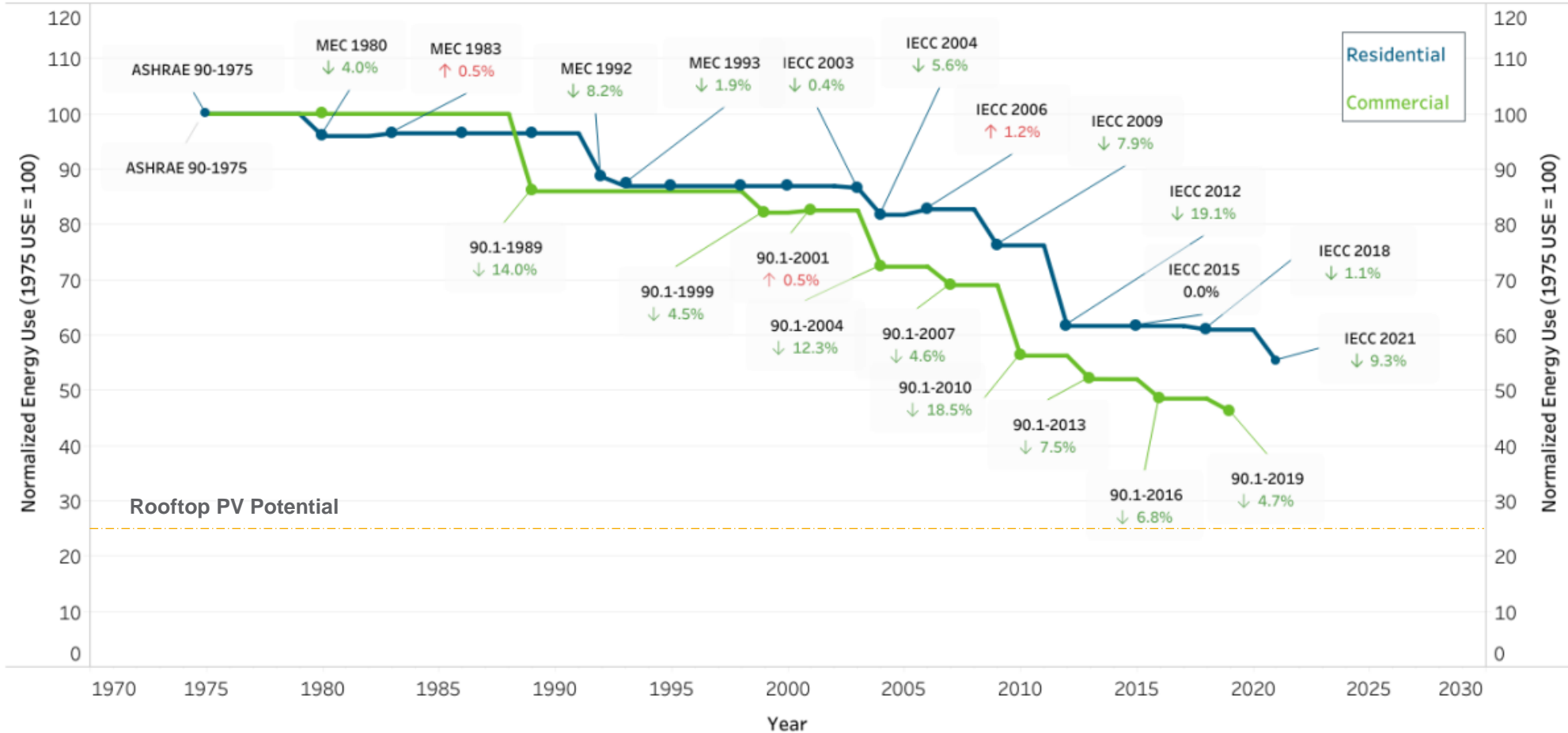


Updated on 12/28/23

Historical Context of Codes



Estimated Improvement in Residential & Commercial Energy Codes
(1975 - 2021)



Code Compliance Pathways

PRESCRIPTIVE

Code prescribes the performance of specific building elements: envelope, mechanical systems, etc.

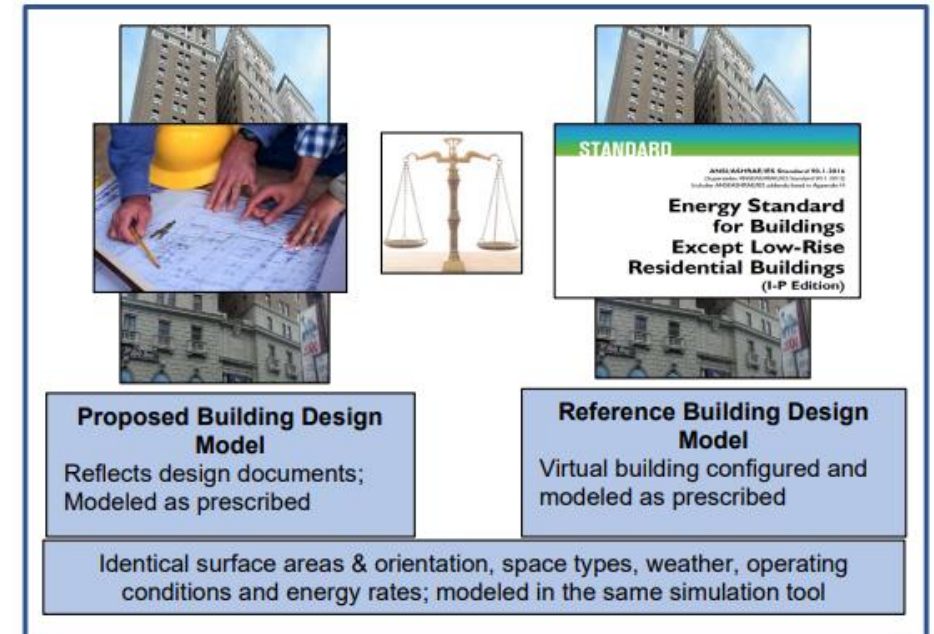
PERFORMANCE

Proposed building design demonstrates better performance than a reference design through simulation and other tools

TABLE C402.4
BUILDING ENVELOPE FENESTRATION MAXIMUM U-FACTOR AND SHGC REQUIREMENTS

CLIMATE ZONE	0 AND 1	2	3	4 EXCEPT MARINE	5 AND MARINE 4	6	7	8								
Vertical fenestration																
U-factor																
Fixed fenestration	0.50	0.45	0.42	0.36	0.36	0.34	0.29	0.26								
Operable fenestration	0.62	0.60	0.54	0.45	0.45	0.42	0.36	0.32								
Entrance doors	0.83	0.77	0.68	0.63	0.63	0.63	0.63	0.63								
SHGC																
	Fixed	Operable	Fixed	Operable	Fixed	Operable	Fixed	Operable	Fixed	Operable	Fixed	Operable	Fixed	Operable	Fixed	Operable
PF < 0.2	0.23	0.21	0.25	0.23	0.25	0.23	0.36	0.33	0.38	0.33	0.38	0.34	0.40	0.36	0.40	0.36
0.2 ≤ PF < 0.5	0.28	0.25	0.30	0.28	0.30	0.28	0.43	0.40	0.46	0.40	0.46	0.41	0.48	0.43	0.48	0.43
PF ≥ 0.5	0.37	0.34	0.40	0.37	0.40	0.37	0.58	0.53	0.61	0.53	0.61	0.54	0.64	0.58	0.64	0.58
Skylights																
U-factor	0.70	0.65	0.55	0.50	0.50	0.50	0.50	0.50	0.44	0.41						
SHGC	0.30	0.30	0.30	0.40	0.40	0.40	0.40	0.40	NR	NR						

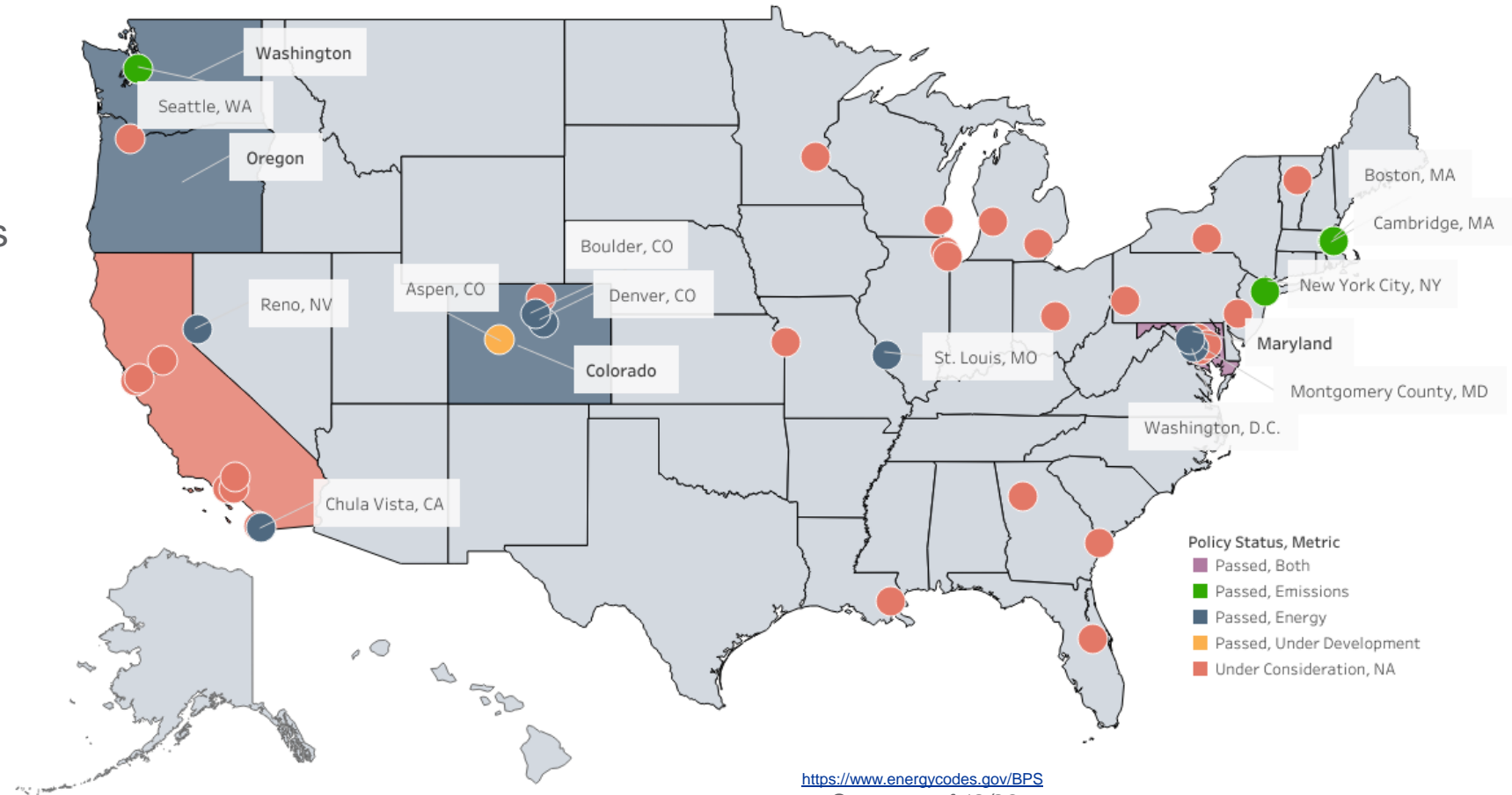
NR = No Requirement, PF = Projection Factor.



Building Performance Standards (BPS)

BPS covers actual ongoing performance of the building, considering variables like occupancy, operation, and maintenance.

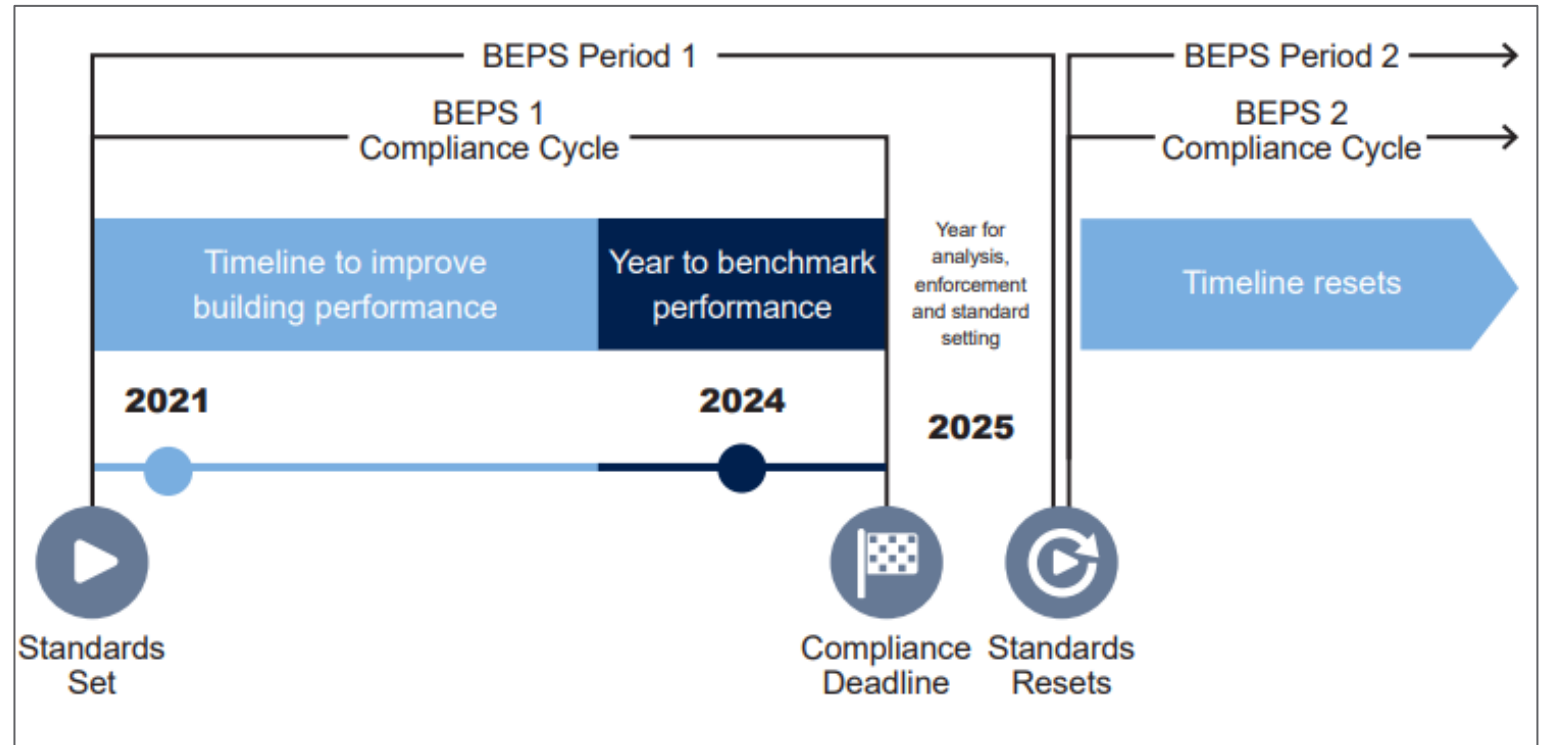
- **16** state and local policies passed to date
- **Federal BPS** started in December 2022



<https://www.energycodes.gov/BPS>
Status as of 12/23

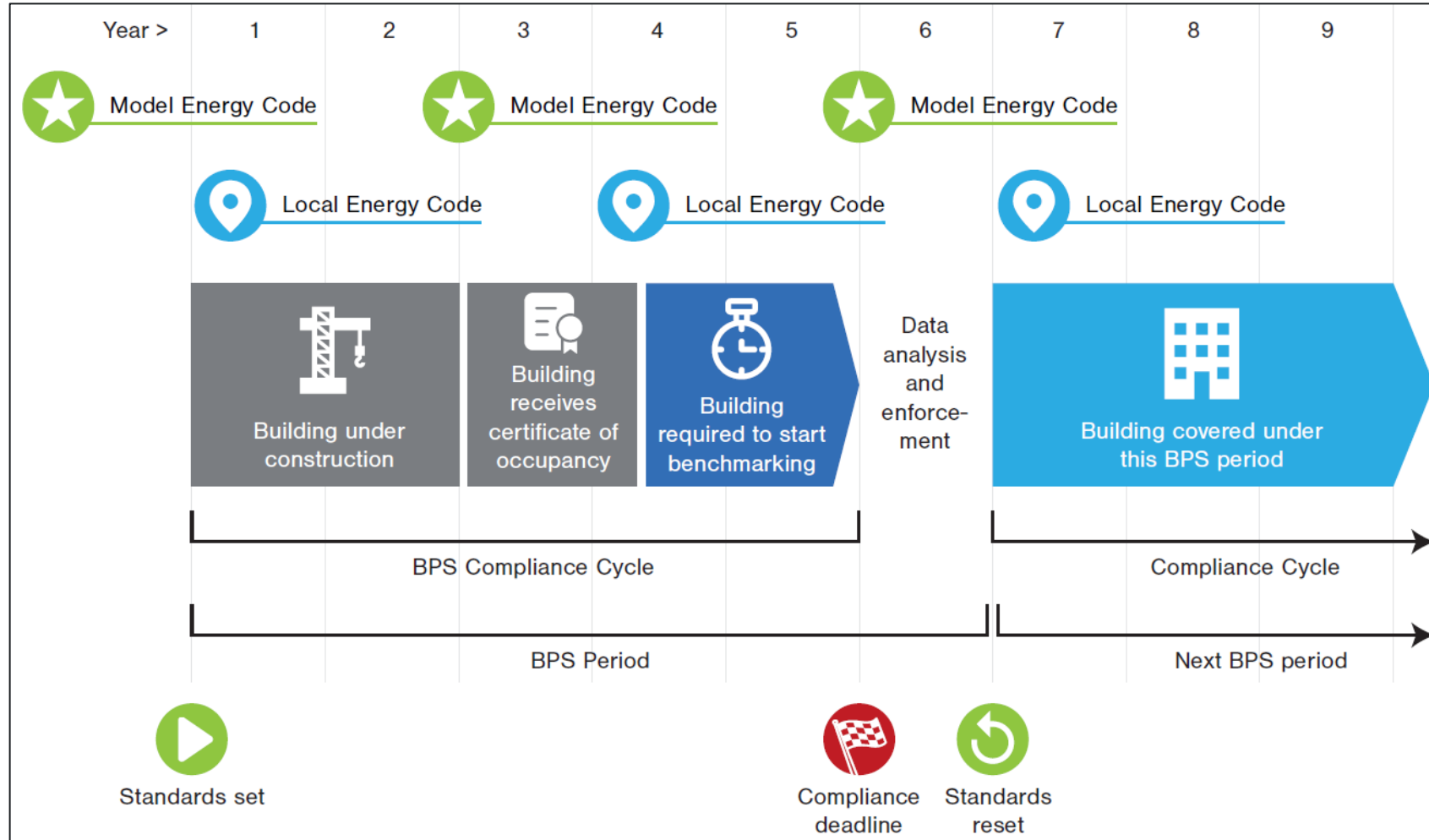
Building Performance Standards

- Comply by meeting a performance target, with some options for alternative compliance by jurisdiction.
- ACPs may include:
 1. Timeline adjustment
 2. Target adjustment
 3. Hardship flexibility
 4. Prescriptive pathway



Source: St. Louis Building Energy Performance Standard (BEPS): BEPS Compliance Pathways Fact Sheet

Interface of Energy Code and BPS



Source: ASHRAE BPS Technical Resource Guide, 2023

Differences in Policy Focus and Scope

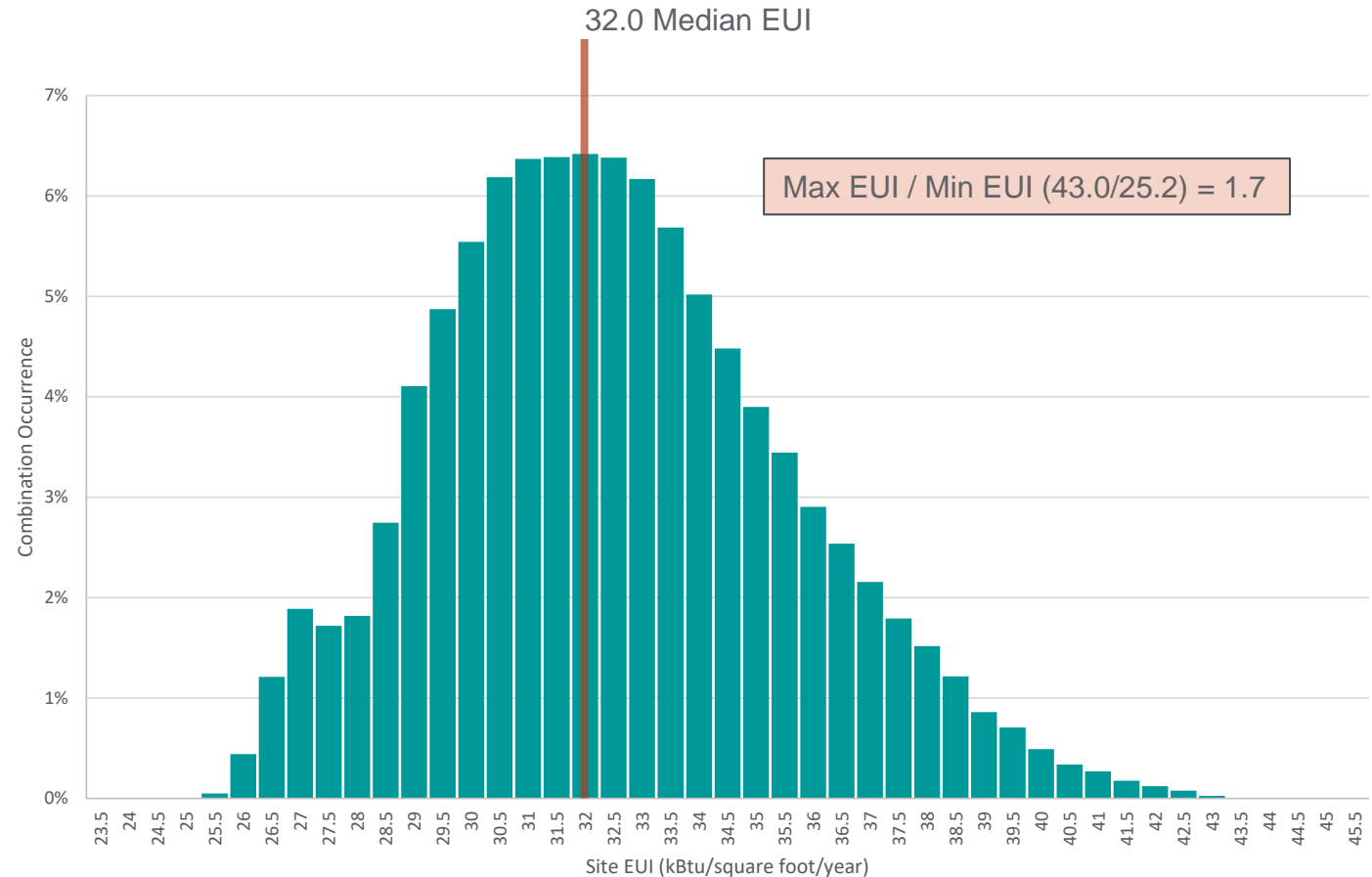
Energy Codes	BPS
New construction and major renovations	Existing buildings
Efficient building systems: HVAC, SWH, lighting, envelope, controls	Efficient building systems: HVAC, SWH, lighting, envelope, controls Efficient operation of building systems
One-point of compliance: comply prior to permit/Certificate of Occupancy	Multiple points of compliance: may increase stringency over time, may require ongoing improvement of performance

Differences in Policy Impact

Factors Affecting Building Performance	Addressed by BPS?	Addressed by Energy Code?
Inherent efficiency of building design (envelope insulation; heating, cooling and SWH system efficiencies; lighting and HVAC controls, etc.)	Yes	Yes
Building operation and maintenance (whether systems and controls work as specified)	Yes	Limited
Building use by occupants (operating hours, occupant density, plug-in equipment, school cafeteria, office IT)	Yes	No

Consider Both Policies

- Energy codes allow a wide range of performance outcomes
- Code compliance protocols are not intended to predict outcomes
- Differences between “ideal” and actual operation of building systems
- Impact of occupant behavior, demographics, weather and occupant-installed equipment
- Plan ahead for BPS



Prescriptive Energy Code Outcomes, Modeled EUI Performance:
Medium Office, 2018 IECC, Climate Zone 5B

Energy Codes and BPS – Brochure

Guidance for jurisdictions:

- Understand typical new building performance
- Align policy metrics
- Bridge new construction to BPS, identifying compliance options
- Collaborate and coordinate between code and BPS departments
- Support and educate designers and developers

https://www.energycodes.gov/sites/default/files/bps/2023-11/BPS_and_Energy_Codes_Guide.pdf

U.S. DEPARTMENT OF ENERGY
Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

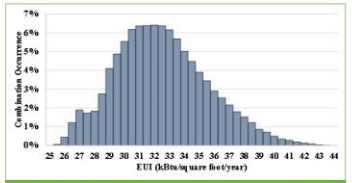
Energy Codes and Building Performance Standards

Why Align Energy Codes and Building Performance Standards?

Unlike building energy codes, which set minimum requirements for energy-efficient construction at the time of construction and major renovations, a Building Performance Standard (BPS) is designed to ensure existing buildings meet specific levels of performance over their lifetime. Given the different goals of codes and BPS it is possible that buildings constructed and occupied within the years preceding, during, or immediately following the adoption of a BPS may be compliant with the applicable energy code but unable to meet the BPS targets, potentially requiring further interventions to bring the building into compliance with the BPS. To reduce confusion in the marketplace and enable new buildings to be capable of meeting a performance standard, it's imperative to align the requirements of the applicable energy code and the BPS where possible during the BPS development process.

How Does the Code Compliance Path Affect Future BPS Compliance?

The prescriptive pathway is a frequently used compliance path for commercial buildings, but it can result in a wide range of performance outcomes, making it a poor predictor of actual operational energy use.¹ Figure 1 highlights this variation by showing the range of performance outcomes that result from simulating over 100,000 combinations of prescriptive building parameters (none exceeding minimum requirements) for a medium office building in Reno, Nevada.



Options for Jurisdictions: Aligning a Building Performance Standard with Energy Codes

There are a few key actions jurisdictions can take to align their proposed BPS with

Options for Building Developers and Designers

Building developers and designers have an important responsibility to ensure their building is compliant with future BPS cycles during the building's design and construction. Building owners can consider engaging energy modeling professionals early on during the design phase of a project with the task of predicting post-occupancy energy use (or other metrics as required by the BPS). Providing modeling professionals with as much accurate information as possible regarding the anticipated operation of the new building will help improve the modeling outcomes.

What Strategies Can Be Used to Align Energy Codes with BPS?

The first step in aligning the energy code with BPS is to understand the typical code outcomes for the jurisdiction. This can be achieved by 1) reviewing recent code compliance applications to understand the most common types of compliance pathways, building designs, and modeled outcomes and 2) reviewing building energy benchmarking data where available to understand the performance of recently constructed buildings and assess how they compare them with proposed BPS targets. With a better understanding of any potential performance discrepancies between code and BPS, jurisdictions can look to strategies such as code updates or changes to the BPS targets and compliance pathways that could improve outcomes for newer buildings compliance.

Options for Jurisdictions: Aligning a Building Performance Standard with Energy Codes

There are a few key actions jurisdictions can take to align their proposed BPS with

Streamlining Code and BPS Compliance

With the addition of a BPS policy, an entirely new process and potentially a different agency may be designed to ensure compliance with a BPS compared to the energy code. Encouraging collaboration between inspectors enforcing both policies or, where feasible, placing them in the same agency, may create greater opportunities for collaboration and resource-sharing (e.g., help desk, tracking and reporting, etc.), increasing the efficiency of the compliance process for both jurisdiction staff and building owners/operators.

Available Resources

U.S. DOE offers existing resources and funding to provide technical assistance to support jurisdictions with the adoption and implementation of BPS and advanced energy codes.

- [BPS Help Desk](#)
- [BPS Resources](#)
- [Energy Codes Help Desk](#)

References

¹ Rosenberg, M., Zhang, J., Hart, R., & Adhikari, R. 2015. *Roadmap for the Future of Commercial Energy Codes*. Richland, WA: Pacific Northwest National Laboratory.

How Can the Gap Between New Buildings and BPS Be Bridged?

A gap in code vs. BPS compliance for newer buildings may exist depending on factors like code stringency, how well the BPS targets align with code, or how the new building is operated. An initial step a jurisdiction can take to help address any potential discrepancies between their energy code and a BPS is to evaluate recently constructed buildings (potentially through benchmarking data, if available) to assess how their performance compares with proposed BPS targets. This can help inform additional actions such as code updates that provide feedback loops between projected and actual building performance. For example, jurisdictions could consider including a parallel requirement in the code demonstrating that new construction will be capable of meeting the BPS target using either simulation or a code compliance approach tied to actual energy use.

Jurisdictions could also evaluate providing alternative compliance options for buildings constructed during transitional periods between construction and BPS compliance, such as allowing non-compliant buildings to apply for an extension, or to retro-commission the building to try to bring it into compliance.

For more information, visit: [energycodes.gov/BPS](https://www.energycodes.gov/BPS)

June 2023

Conclusions

- BPS are continuing to be adopted across the country and are expected to increase in number.
- Focus of BPS policy development remains energy and carbon impact of older existing buildings, but they will impact new construction.
- To support energy code and BPS alignment, consider:
 - At a minimum, align metric used in both policies
 - Narrowing the band of expected performance outcomes in the energy code can help "equip" buildings for success under BPS
 - Strengthen metering, commissioning, and operations and maintenance requirements in code to align with BPS outcome and reporting needs
 - Require a prediction of BPS compliance at permitting, based on a building energy model



Resources

ASHRAE Building Performance Standards: A Technical Resource Guide

https://forms.ashrae.org/forms/PDFdownload_BuildingPerformanceStandards

ASHRAE BPS Resources and Publications

<https://www.ashrae.org/file%20library/about/bps-resources-and-publications-for-web-posting---final.pdf>

ACEEE Building Performance Standards Whitepaper

https://www.aceee.org/sites/default/files/pdfs/buildings_standards_6.22.2020_0.pdf

DOE Building Energy Codes

<https://www.energycodes.gov/status>

DOE Building Performance Standards

<https://www.energycodes.gov/BPS>

EPA Benchmarking and Building Performance Standards Policy Toolkit

<https://www.epa.gov/statelocalenergy/benchmarking-and-building-performance-standards-policy-toolkit>

USDN Building Performance Standards Framework

https://www.usdn.org/uploads/cms/documents/bps-framework_july-2021_final.pdf



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Thank you

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SENIOR RESEARCH ENGINEER

molly.curtz@pnnl.gov

www.pnnl.gov

Thank you!

Questions?

THANKS

Building Energy Codes Program

www.energycodes.gov/training

BCEP help desk

<https://www.energycodes.gov/technical-assistance/help-desk>