BPS and Codes: Making Sure the Left Hand Knows What the Right Hand is Doing

Learning Objectives

- 1. Understand the intersection between Building Performance Standards and Energy Codes.
- 2. Learn about the potential challenges when aligning BPS and codes.
- 3. Identify best practices from cities currently implementing a BPS and know what questions to ask when designing a BPS.
- 4. Discover which city agencies administer BPS and codes and learn how they can successfully collaborate.

Code Adoption and Stringency



Source: DOE

BPS Adoption and Development



Source: DOE

Design and Performance Collision Points



Metric and Target Misalignment



Energy Cost

Site or Source Energy

Emissions

Metric and Target Misalignment



Compliance Misalignment



Conflicting Governance



Conflicting Governance: Energy v. Carbon



Bldg Performance Stds vs. Codes DOE Energy Codes Conference May, 2023 Duane Jonlin, City of Seattle

10 C

Getting real about good intentions

- Can existing buildings stay funky forever?
 - Nightclubs, high-rise stairs
- BPS is radical
- Is your city serious enough about its climate commitments to mandate major upgrades?
- You won't be popular.



BPS: WA State

plus

BEPS: Seattle

Energy

- Most building types
- EUI targets set at state "average" for each building type
- Lower EUIs in future?
- 50,000 ft²: Starts 2026
- 20,000 ft²: Starts 2031

GHG Emissions

- In addition to State BPS
- Emissions targets shrink every 5 years...
- ...to zero carbon in the 2040s
- 50,000 ft²: Starts 2028



BPS + BEPS

- WA BPS: EUI
- Seattle **BEPS**: emissions
- BPS set at <u>average</u> EUI for each building type
 - Can demonstrate annual progress on a work plan
 - Must be cost-effective
 - Some hardship options
 - Report every 5 years
 - Potential future increase
- 2-fer Bonus Prize: Heat pumps reduce both energy and emissions



Seattle Energy Code: Replacement of existing gas equipment

- Most economical time to upgrade.
- Current (2018) Code. Replacement heating and water heating equipment must be heat pump system
 - <u>Exception</u> like-for-like replacement of "failing" equipment
- New (2021) Code. More options to postpone full conversion
 - But, no option to "do nothing and keep burning gas forever" anymore

Seattle Department of Construction & Inspections

BEPS + SEC

- Seattle BEPS: emissions
- Seattle Energy Code: heat pump upgrade

BEPS + SEC – Take Two

- Seattle BEPS: emissions
- Seattle Energy Code: heat pump upgrade
- <u>Quiz</u>: By what factor are mech systems oversized?
- 10%, 20%, 50%, 100%?

Alternate possibility, accounting for gross oversizing of existing systems

Costs

Project Cost per Square Foot Comparison

Potential Cost Reductions

Problems

- 1. Replacement heat pump system is big & expensive
- 2. Needs new electric service

<u>Solutions</u>

- Do you really need that much heating capacity? Are existing systems oversized?
- 2. Is metered building electric use as high as the default code assumption?
 - Electrical code allows metered peak + 25%

Image: Ecotope, Seattle 2023

Comparing Design Predictions to Actual Peak Flow Rates

Peak Hot Water Flow Rates in Multifamily Buildings

Many thanks to the Association for Energy Affordability, Ecotope, Frontier Energy, Peter Skinner, and the UC Davis Western Cooling Efficiency Center for providing data.

Future Decarbonization Plan Full engineered schematic design & cost estimate

- a. One-line system diagrams
- b. Equipment laid out to scale.
- c. Louvers, ducts, & air handling equipment
- d. Structural modifications
- e. Partitions & doors
- f. Electrical infrastructure
- g. Allowable roof coverage area & height
- **h.** Decarbonization planning form
- i. Schematic cost estimate
- j. Compliance dates for WA & Seattle Building Performance Standards

BPS collision with code? Not to worry.

Building Type	2018 SEC EUI (guess)	12% lower (2021 SEC target)	Best local examples	2030 Target EUI	WA BPS target
High-rise office	38	33	37	28	63-69
Mid-rise office	34	30	<mark>16, 21</mark> (22	63-69
Mid-rise multifamily	32	28	17, 19	20	
Elementary school	28	25	16, 18 - 20	19	49
Warehouse, conditioned	18	16		12	36

BEPS & Code: Two paths, same destination

- **BEPS** sets date certain for decarbonization
- <u>Energy code</u> requires heat pump as systems are replaced
 - with options to postpone
- <u>Postpone</u>, or not, based upon:
 - Construction cost: <u>Pay me now</u>
 - Years until BPS or BEPS would mandate upgrade anyway: <u>Pay me later</u>

What's the long game?

Eliminate fossil fuel heating

- Expensive up-front
- Then, clean air, clean water
- Keep that 6% circulating locally

Maintain fossil fuel heating

- No expense today
- Just deal with the health impacts
- ...and keep paying that 6% forever

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Leaders make it happen followers can catch up later

Building Performance Standards & Codes May 3, 2023

presented by Emily Hoffman, PE, CEM Director of Building Energy & Emissions Performance

Goal 2

Decarbonize our building stock

Our buildings are NYC's biggest source of CO₂ emissions

see: 2019 NYS CLCPA

To decarbonize our building stock, virtually every one of our city's 1,000,000+ buildings will need to be retrofit.

2015 Roadmap to 80x50

Windows and walls will need to be improved or replaced with new efficient ones.

> Large buildings (> 25,000 sf) that fail to cut their CO₂ emissions will face steep fines

2019 NYC Climate **Mobilization Act** (Local Law 97)

New buildings will be prohibited from installing fossil-fuel equipment Local Law 154

Boilers and furnaces will need to be replaced with all-electric heat pumps

Sustainability at NYC DOB

Legislation that drives our work

- Local Law 32 of 2018 sets Energy Code timeline and structure, Stretch Code in 2022 and Performance Code by 2025
- Local Law 97 of 2019 Building Performance law, effective 2024
- Local Law 154 of 2021 bans on-site emissions in new construction starting in 2024

NYC Energy Code of the Future

- Local Law 32 of 2018:
 - Mandates adoption of 2023 NYSERDA Stretch Energy Code
 - Mandates a performance-based code in 2025 Code
 - Determine predicted energy use with a to-be-determined metric
 - i.e. energy use intensity (EUI) or carbon
 - Alignment with other building policy (LL97 & LL154)
 - Establish targets for building prototypes
 - Cost effectiveness analysis
 - Examples of feasible designs for each prototype
 - Prescriptive compliance pathway

NYC's Building Performance Std.

- Local Law 97 of 2019:
 - Legislation established the goal to reduce emissions by
 - [•] 40% by 2030, and
 - 80% by 2050 (goal is carbon neutrality by 2050)
 - Caps GHG emissions of buildings over 25,000 Sq. Ft. beginning in 2024
 Penalties beginning in 2025
 - Emission limits (GHGI) reduce over time
 - 2024 2029 is a warm up period (roughly 80% of bldgs. comply)
 - 2030 is when limits become challenging for most buildings (roughly 75% of bldgs. <u>don't</u> comply)

NYC BUILDING ELECTRIFICATION LAW

- Local Law 154: Carbon Limits for Fuel-combustion Prohibits on-site combustion of fuels that emit more than 25kg CO₂/MMBTU
- EXCEPTIONS
 - Buildings used by a regulated utility for energy generation
 - Buildings operated by DEP for treatment of sewage or food waste
 - Buildings in which fossil fuels are necessary for a manufacturing use or purpose:
 - Laboratories
 - Laundromats
 - Hospitals and Crematoria
 - Commercial Kitchens
 - For emergency or standby power

LOCAL LAW 154: COMPLIANCE DATES

Summary of Proposed Zoning Changes

- 1. Rooftop solar: removing zoning impediments.
- 2. Solar parking canopies: remove zoning impediments to allow.
- 3. Solar: ensure standalone generation is allowed
- 4. On-shore wind: add a new tool for the CPC to consider future applications
- 5. Energy storage (ESS): add new rules to allow gridsupporting ESS in a wide range of zoning districts

- 6. Electrification retrofits: expand rooftop and yard allowances to accommodate increased need for outdoor electrified equipment like heat pumps
- 7. Building exterior retrofits: fix rules to ensure that the widest range of exterior retrofits are allowed.
- 8. Fix Zone Green: update and improve this floor area exemption to ensure it continues to promote betterthan-code performance.

- 9. Vehicle charging: expand allowance to all **Commercial Districts**
- 10. Charge-sharing: allow a % of residential spaces to be shared w/ the public
- 11. Parking flex: streamline car-sharing, car rental, and commercial parking rules
- 12. Automated parking: expand rules to encourage more automated facilities
- 13. Bike parking: add rules for storage and charging

- 14. Porous paving: clarify language to ensure permeable paving is allowed.
- 15. Street Trees: update rules to accommodate new raingarden prototypes
- 16. Organics: add new use regulations clarifying when composting and recycling are allowed.
- 17. Rooftop greenhouses: simplify the process to allow them as-of-right

THANK-YOU! GHGEMISSIONS@BUILDINGS.NYC.GOV ENERGYCODE@BUILDINGS.NYC.GOV

Colorado's Building Performance Standards

2023 National Energy Codes Conference

Crystal Egelkamp Building Performance Program Manager Colorado Energy Office

Achieving Colorado's Climate Goals

Colorado's GHG Pollution Reduction Roadmap

identified near-term actions the State could take to reduce GHG emissions economy wide 50% by 2030.

One of the near-term actions identified to meet emission reductions in the building sector were building performance standards.

The "Energy Performance for Buildings" Statute (or <u>House Bill 21-1286</u>) established **building benchmarking and performance standards** for the building sector.

The goal of this law is to help building owners increase energy efficiency, lower energy costs, and decrease greenhouse gas emissions in the building sector.

Colorado's Building Performance Standards: Legislative Background

- House Bill 21-1286 required the Colorado Energy Office (CEO) to develop a statewide benchmarking program, now referred to as <u>Building Performance Colorado (BPC)</u>. This program requires commercial, multifamily and public buildings 50,000 square feet or larger.
 - This program covers an estimated 8,400 buildings.
 - Building owners are required to submit their energy usage via Energy Star Portfolio Manager annually by June 1st.
- HB 21-1286 also established building sector-wide GHG emission reduction targets of 7%
 by 2026 and 20% by 2030 (from a 2021 baseline), which will be met with Building
 Performance Standards (BPS).
 - Building owners will need to meet BPS targets by 2026 and 2030.
 - The Task Force's final recommendations can be viewed <u>here</u>.
 - Rules will be finalized by <u>Air Quality Control Commission (AQCC)</u> by Sept 1, 2023.

Colorado's Building Performance Standards: Data Review

Top 5 building/property types:

- Multifamily housing
- K-12 school
- Office
- Hotel
- Distribution centers

Top 5 counties:

- Denver
- Arapahoe
- El Paso
- Boulder
- Jefferson

Colorado's Energy Codes: Previous Requirements

- Colorado legislature passed a law in 2019 (HB19-1260) requiring local governments that update any of their building codes to adopt one of the three most recent energy codes: the 2015, 2018, or 2021 International Energy Conservation Code (IECC).
 - Local governments are allowed to amend the code, but not in a way that would weaken the energy performance
- Current status of energy code adoption:
 - 15 jurisdictions are on 2021 IECC (~28% of CO population)
 - ~45 jurisdictions are actively updating to or considering updating to 2021 IECC
 - 142 jurisdictions are on 2015 or 2018 IECC (~61% of CO population)
 - 101 jurisdictions are on a code older than the 2015 IECC (~9% of CO population)
 - 79 jurisdictions have no energy code (~2% of CO population)

Colorado's Energy Codes: Current Requirements

HB22-1362: Energy-Efficient Building Codes - Passed May 2022

This landmark bill increased the statewide minimum performance requirements for building energy codes by establishing a new Energy Codes Board to review, approve, and recommend building energy codes. The bill includes the composition, objectives, and operating procedures of the new Board.

Requirements:

- ▶ July 1, 2023 and July 1, 2026
 - Cities and counties with building codes must adopt at least the 2021 International Energy Conservation Code (IECC) when they update other building codes. This adoption must include electric and solar ready provisions that an Energy Code Board will develop.
- ▷ After July 1, 2026
 - Cities and counties with building codes must adopt a low energy and carbon code based on a version of the IECC approved by an Energy Codes Board when they update one or more building codes. This code will include pathways for both all-electric and mixed fuel homes and buildings.

Building Performance Standards & Energy Codes

How do the State's energy codes intersect with BPS?

- In our BPS rulemaking, we have used <u>PNNL's Energy and Energy Cost Savings Analysis for the</u> <u>2021 IECC for Commercial buildings</u> to review whether our buildings will meet the BPS targets as they come online.
 - This analysis is still being performed; these property types do not perfectly align with ENERGY STAR's property types
- ▷ We anticipate that buildings built to the 2021 IECC should meet the EUI target, if not exceed it.

Are there any challenges with aligning BPS and energy codes?

- ▷ Colorado is a home-rule state
- > Early on in the implementation process of both the BPS and energy codes legislation
- > Lacking a complete building database and analysis of our building stock
- Need resources specifically supporting BPS and codes (e.g., cost analysis of zero carbon new construction strategies for multifamily, or technical support for unique building types like data centers)
- Lack of vendor/contractor capacity for this amount of buildings, in need of consensus-based procurement templates for vendors/software

COLORADO

Thank you!

Please visit the Colorado Energy Office's <u>website</u> for more information about the BPS.

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