



Nexus of Building Energy Codes and Emissions

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About NEEP

A Regional Energy Efficiency Organization



One of six REEOs funded in-part by U.S. DOE
to support state and local efficiency policies and programs.

Northeast Energy Efficiency Partnerships



“Assist the Northeast and Mid-Atlantic region to reduce building sector energy consumption by at least 3% per year and carbon emissions by at least 40% by 2030 (relative to 2001)”

Mission

We seek to accelerate regional collaboration to promote advanced energy efficiency and related solutions in homes, buildings, industry, and communities.

Vision

We envision the region's homes, buildings, and communities transformed into efficient, affordable, low-carbon, resilient places to live, work, and play.

Approach

Drive market transformation regionally by fostering collaboration and innovation, developing tools, and disseminating knowledge

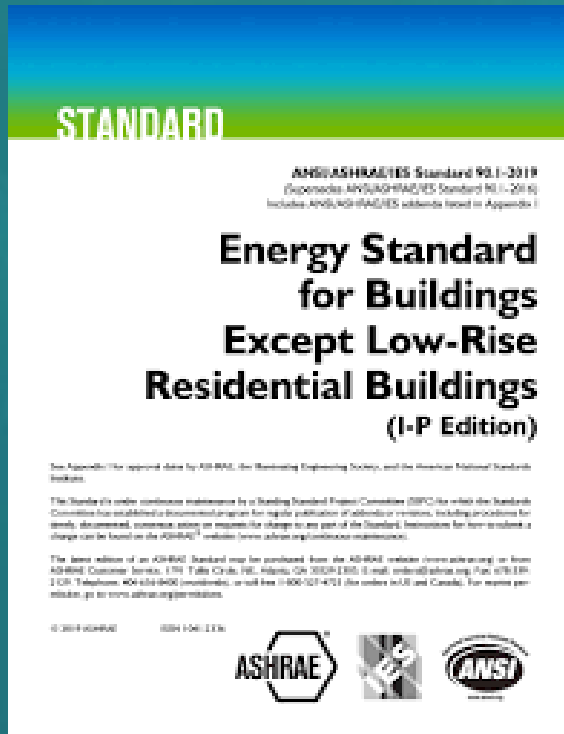


Presentation Overview

- Background on Energy Codes and Appliance Standards
- Existing regulations on building electrification
- How regulations can complement codes and standards

Building Codes combined with appliance standards are powerful tools to fight climate change, improve health, and save households money.

Building Energy Codes in the U.S.



Primarily covers new residential and commercial construction and new sections or renovated sections of existing buildings. No provisions for existing buildings.

Building Energy Codes in the U.S.

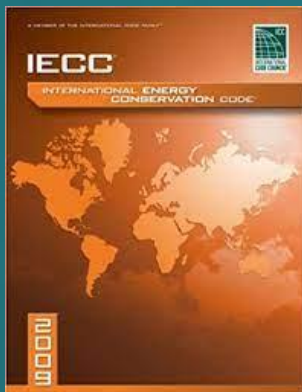
- U.S. doesn't have standardized approach to building codes
- No federal issued standards for energy efficiency
- Codes developed by trade organizations
 - International Code Council (ICC)
 - ASHRAE
- State/Local government determines which code to adopt and enforce
 - They can amend to weaken or strengthen
 - Patchwork of efficiency
 - Inconsistent enforcement
 - Many muni seek to go beyond base code
 - Stretch codes, Zero Codes.
 - Zoning Regs –or- Ordinances to increase EE, require all electric buildings



Building Energy Codes (Model)

2009

WV → 2015



2015

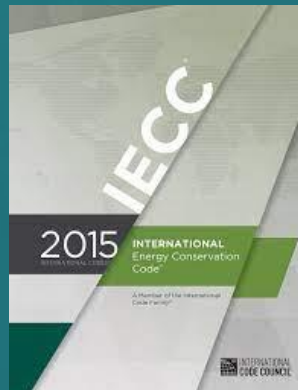
ME → 2021*

CT → 2021

NH → 2018

DC → 2021

*Updating stretch codes



2018

MA → 2021*_{PV}

MD → 2021*

NJ → 2021_{PV}

VT → 2021*_{EV}

DE → 2021

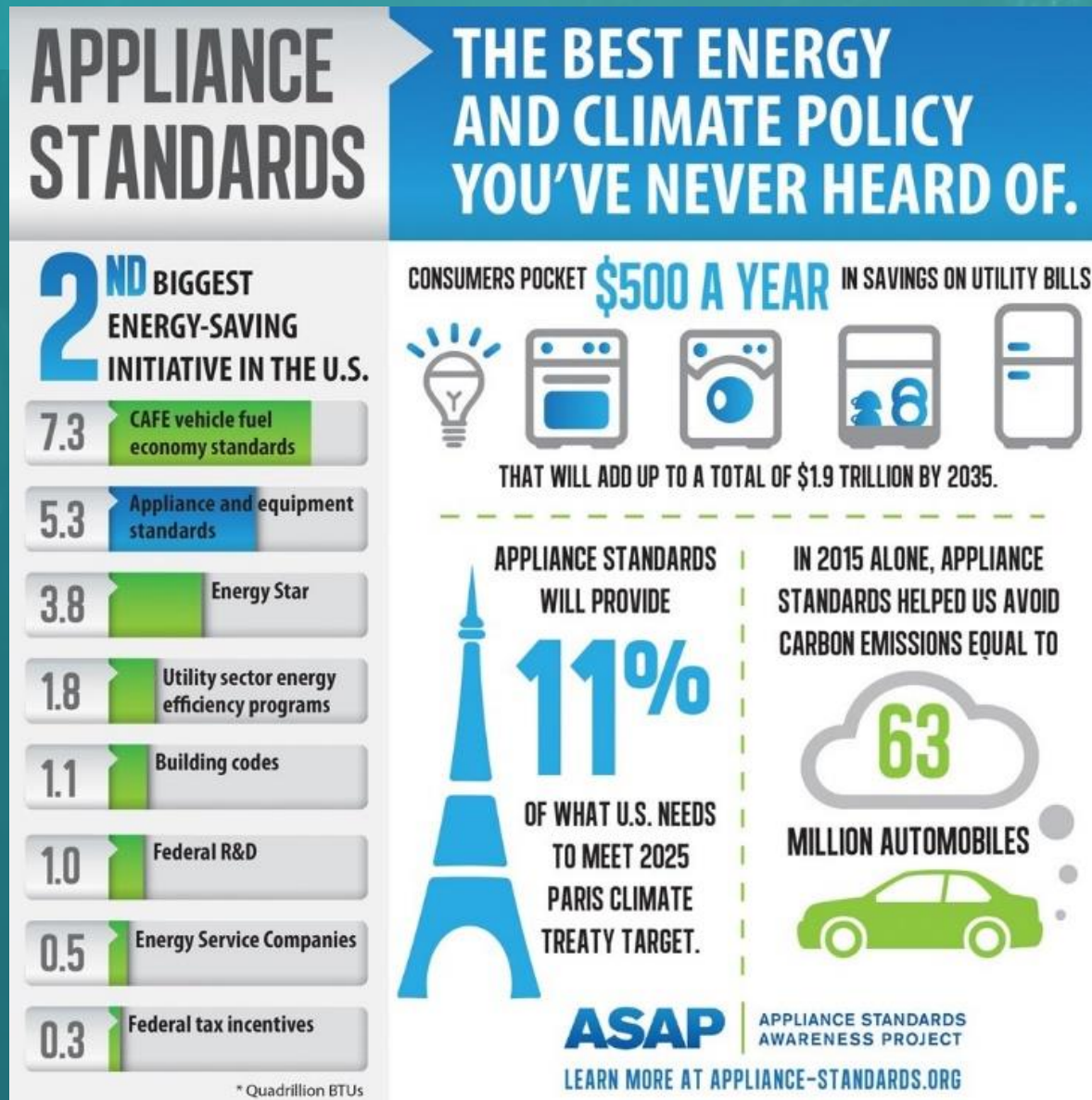
RI → 2021*

PA → 2021

NY → 2024*



Appliance Standards



State and Regional Emissions Commitments



NEEP Region State Climate Goals				
State	Baseline Year	Near-term Goal	Interim Goal	Long-term Goal
Connecticut	2001	10% by 2020	45% by 2030	80% by 2050
Delaware	2005*	45% by 2020*	30% by 2030*	
Maine	1990	10% by 2020	45% by 2030	80% by 2050
Maryland	2006	25% by 2020	40% by 2030	recommends 80% - 95% by 2050
Massachusetts	1990	50% by 2030	75% by 2040	85% by 2050
New Hampshire	1990	10% by 2020	20% by 2035	80% by 2050
New Jersey	2006	1990 emissions level by 2020		80% by 2050
New York	1990	40% by 2030		85% by 2050
Pennsylvania	2005	26% by 2025		80% by 2050
Rhode Island	1990	10% by 2020	45% by 2035	80% by 2050
Vermont	1990	40% by 2030		75% by 2050
Washington D.C.	2006	50% by 2032		100% by 2050
West Virginia				

2045

Trajectory of Building Codes Toward Zero

- Increased Energy Efficiency
 - Envelope
 - Appliances
- Electrification
 - Heat pumps, storage, PV (ready), EV (ready), Appliances
- Renewables
- LCA/Embodied Carbon/GWP/Red List

**Air regulations
compliment/push code**



Residential Buildings:

- **Water Heating**
NAECA minimum electric storage tank water heaters are required to be installed with renewables. Gas water heating is required to meet the minimum UEF [RE126]. Requires water heating systems using gas to not contain continuously burning pilot lights [RE107].
- **Lighting and Power**
Electrical outlets required by all fossil fuel appliances [RE147].
- **Electric Vehicle Ready**
Requires EV Capable or Ready charging stations for residential buildings [CE217].

Commercial Buildings:

- **Lighting and Power**
Requires EV Capable or Ready charging stations for high rise residential and commercial buildings [CE217].

Upcoming Committee Meetings – ICC ([iccsafe.org](https://www.iccsafe.org))

<https://www.iccsafe.org/news-and-events-calendar/category/codes-standards-calendar/>

2024 Code Change Proposals

[2021-Public-Input-Complete-Monograph -Revised-12-14-2021 reduced-file-size.pdf \(iccsafe.org\)](#)

2024 IECC – EECC Recommendations on Key Proposals

[EECC-Reccommendations-on-Key-2024-IECC-Proposals.pdf \(energyefficientcodes.org\)](#)

Opportunities coming to engage in public comments.

Local and Statewide Regulations toward Building Electrification / Zero Emissions



- Benchmarking
- Building Performance Standards
- Stretch Codes
- Carbon Neutral Ordinances
- Zero Emissions/Electric Ordinances
- Zero Energy Codes

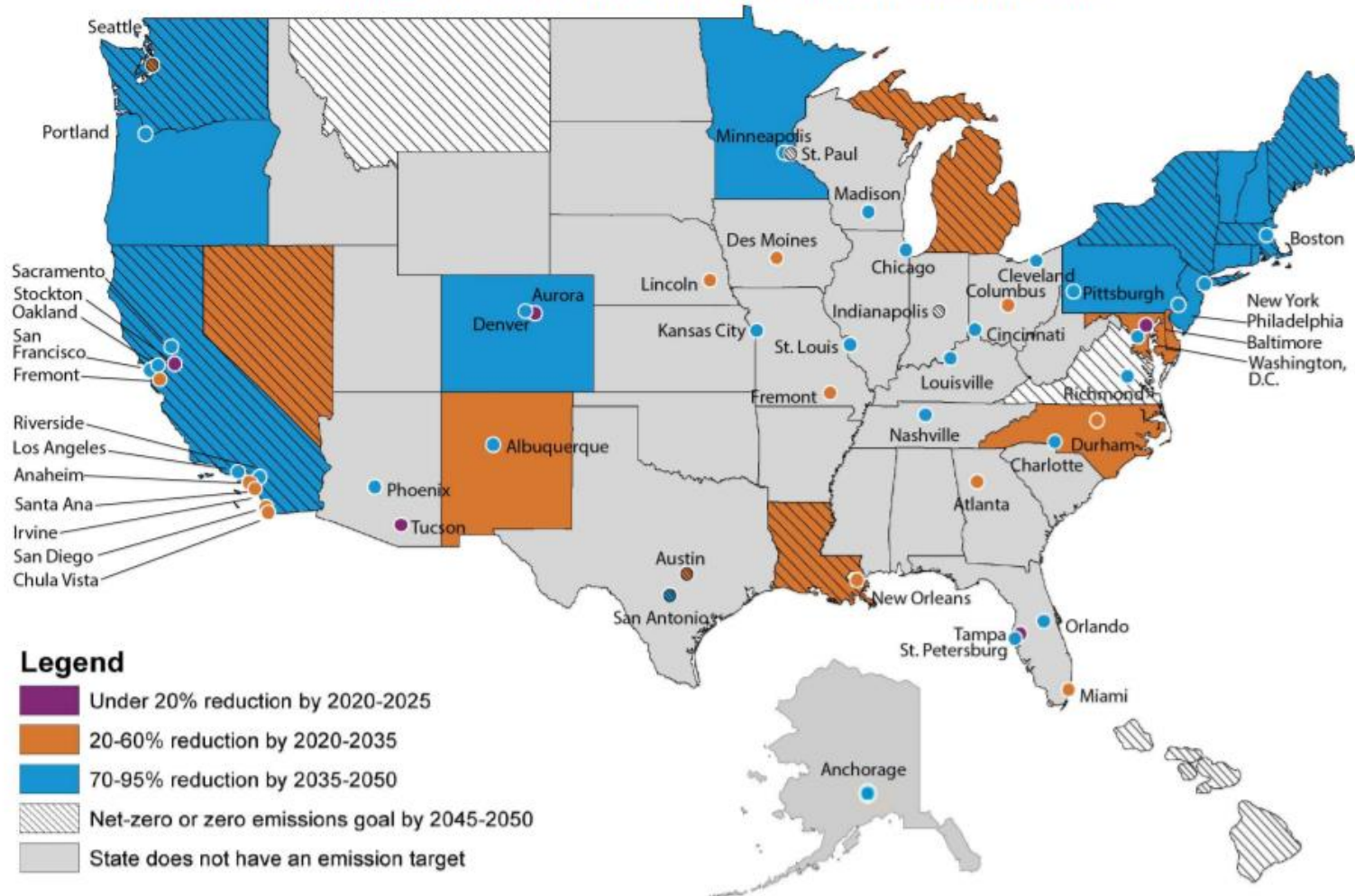


Benchmarking Existing Buildings



Building Performance Standards (BPS)

States and Cities with GHG Emissions Reduction Goals



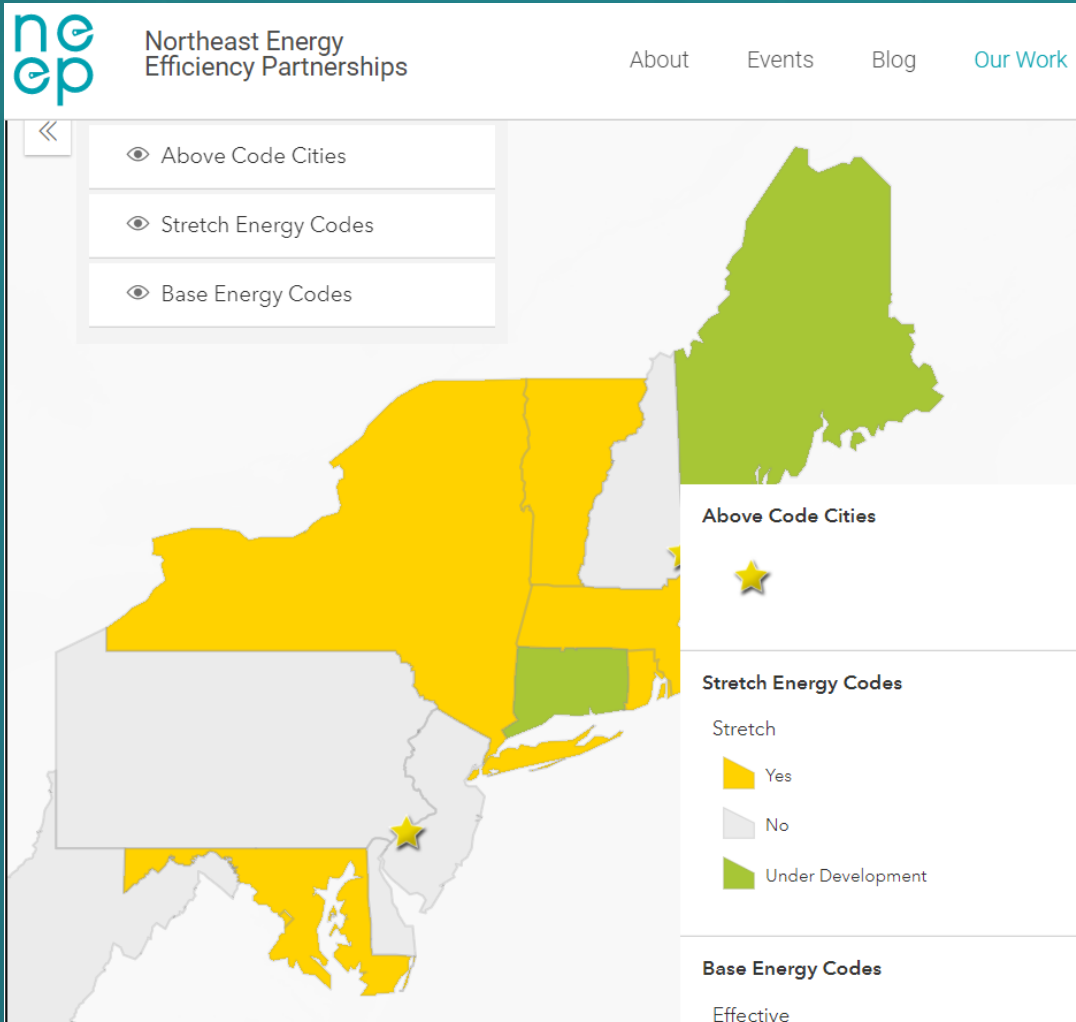
Building Performance Standards Northeast



- Boston – BERDO 2.0
 - 50% by 2030 100 % by 2050
- NYC Act 97
 - 40% by 2030 2005 baseline
- DC Omnibus Act of 2018
 - GHG and EE 50% by 2032
- Baltimore, Philadelphia, Pittsburgh



Stretch Codes NEEP Region

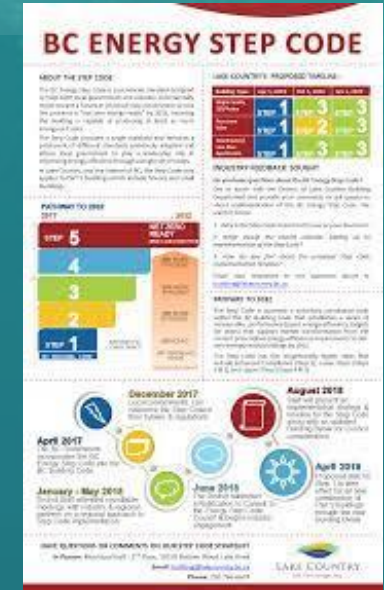


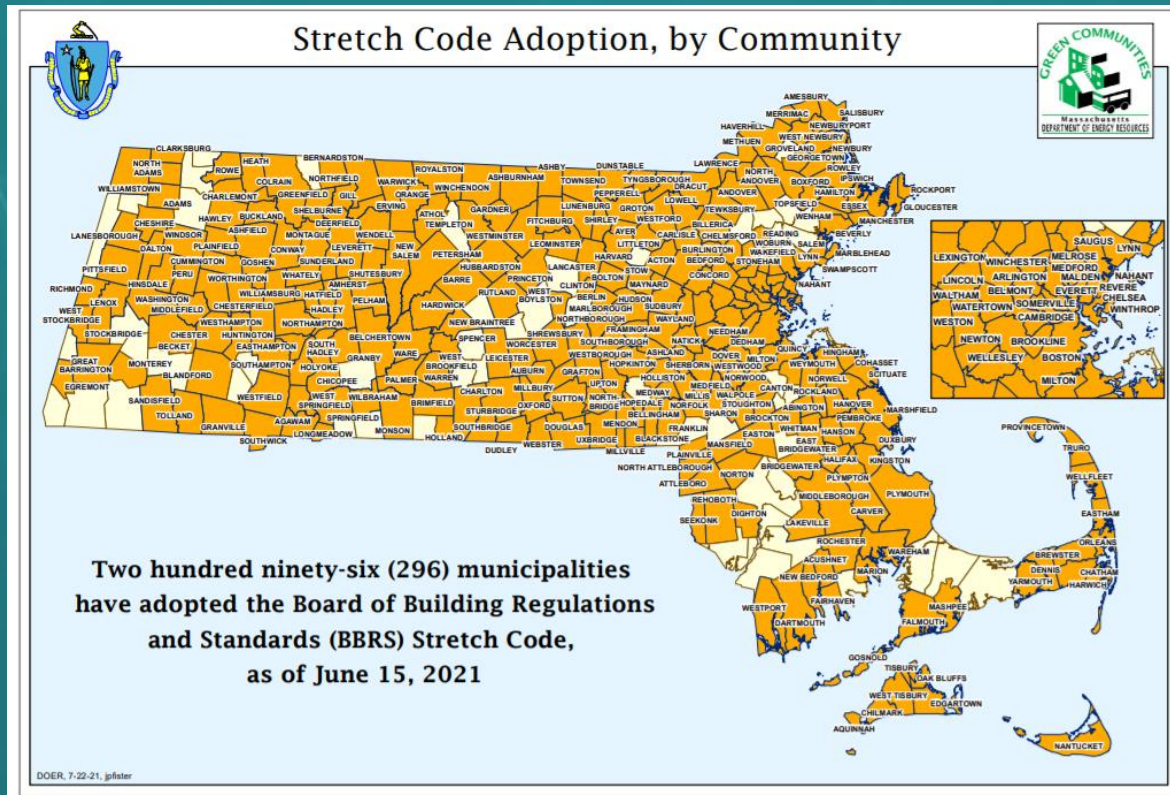
MA
NY
DC
VT
RI
ME
MD

CA, IL, OR, WA

BC

Boulder, Co
Scottsdale, AZ





Base 2021 IECC w/ electrification, Stretch code, 2022 Muni Opt-In Zero Code

Mass Energy Zero Code (EZ-Code)



Energy Efficiency

Prescriptive Path

-OR-

Performance Path w/ Prescriptive Backstop

Electrification

No Combustion (w/exceptions)

EV requirements

Demand Response requirements

Renewable Energy

Achieve Net Zero

Renewables demonstrating Additionality

No Weighting Factors

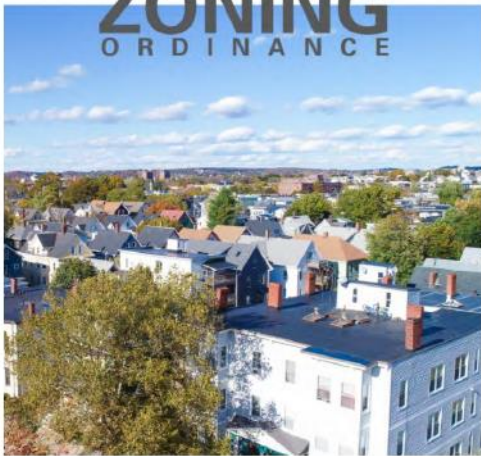
On-site Solar requirements

Carbon Neutral Zoning & Ordinances



SOMERVILLE

ZONING ORDINANCE



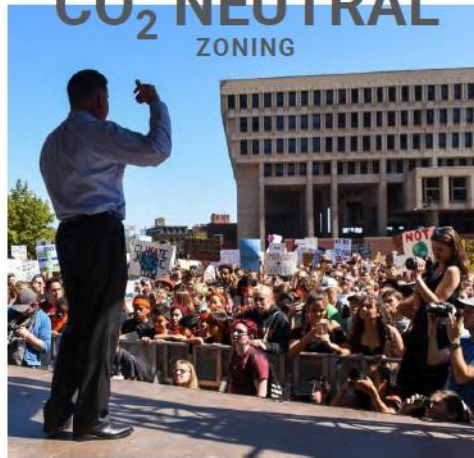
2020

WATERTOWN

SOLAR PV ORDINANCE

BOSTON

CO₂ NEUTRAL ZONING

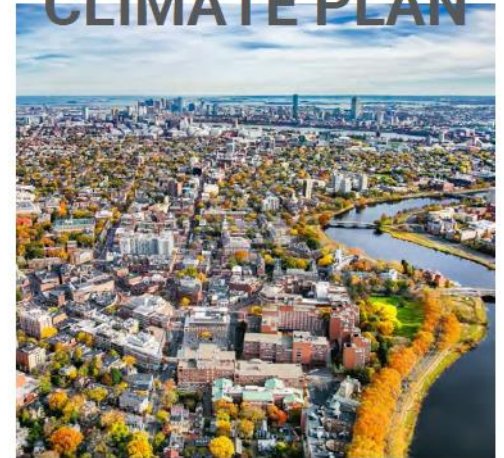


2021 / 2022

BROOKLINE

CAMBRIDGE

CLIMATE PLAN

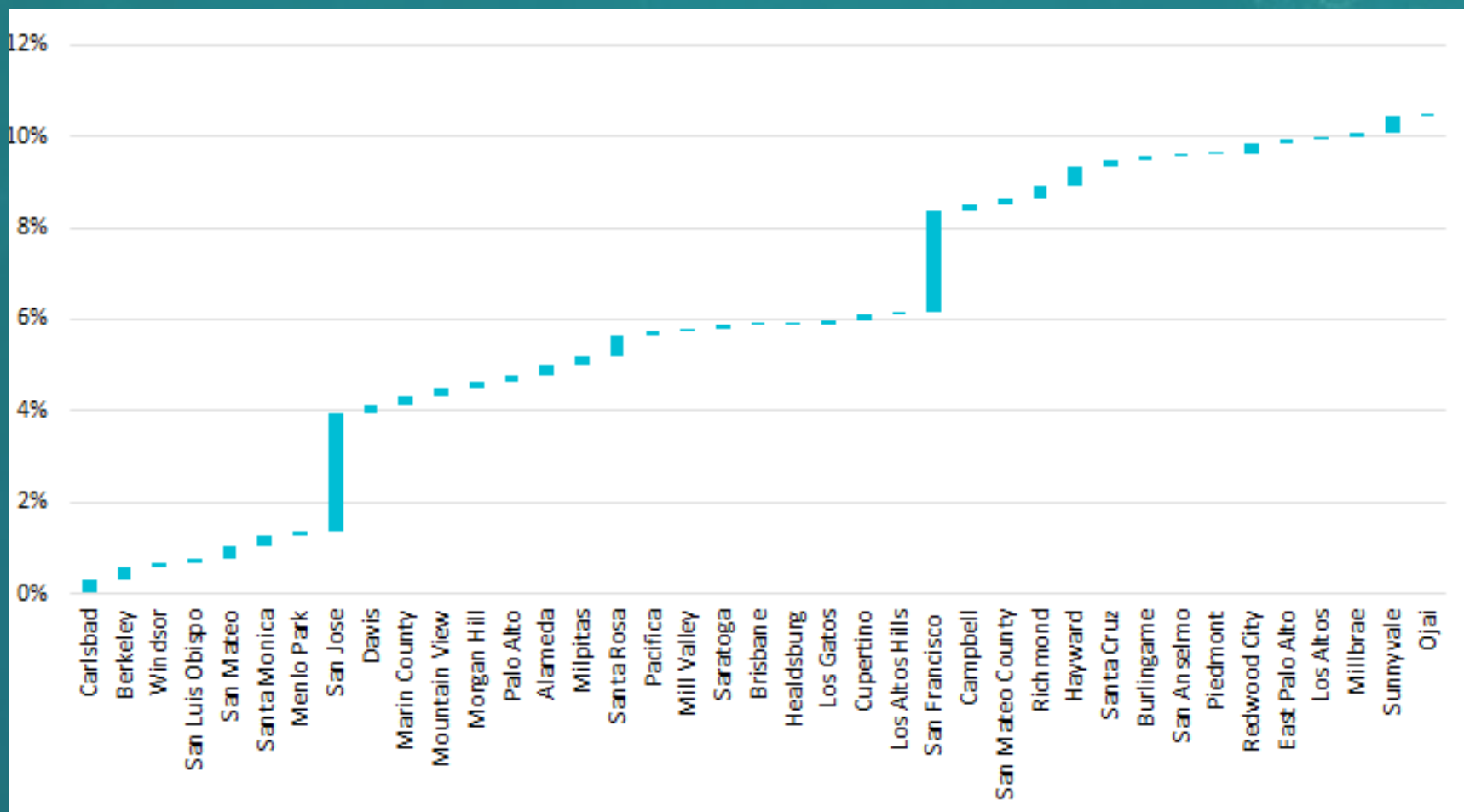


2020 - 2030

MANY OTHERS

SEEKING HOME RULE TO BAN GAS

Zero Emissions / Electric Ordinances



11+ Percent of California Population Living in Zero Emission Muni's

Decarbonization - No Combustion or Limit Nitrous Oxide (Nox)

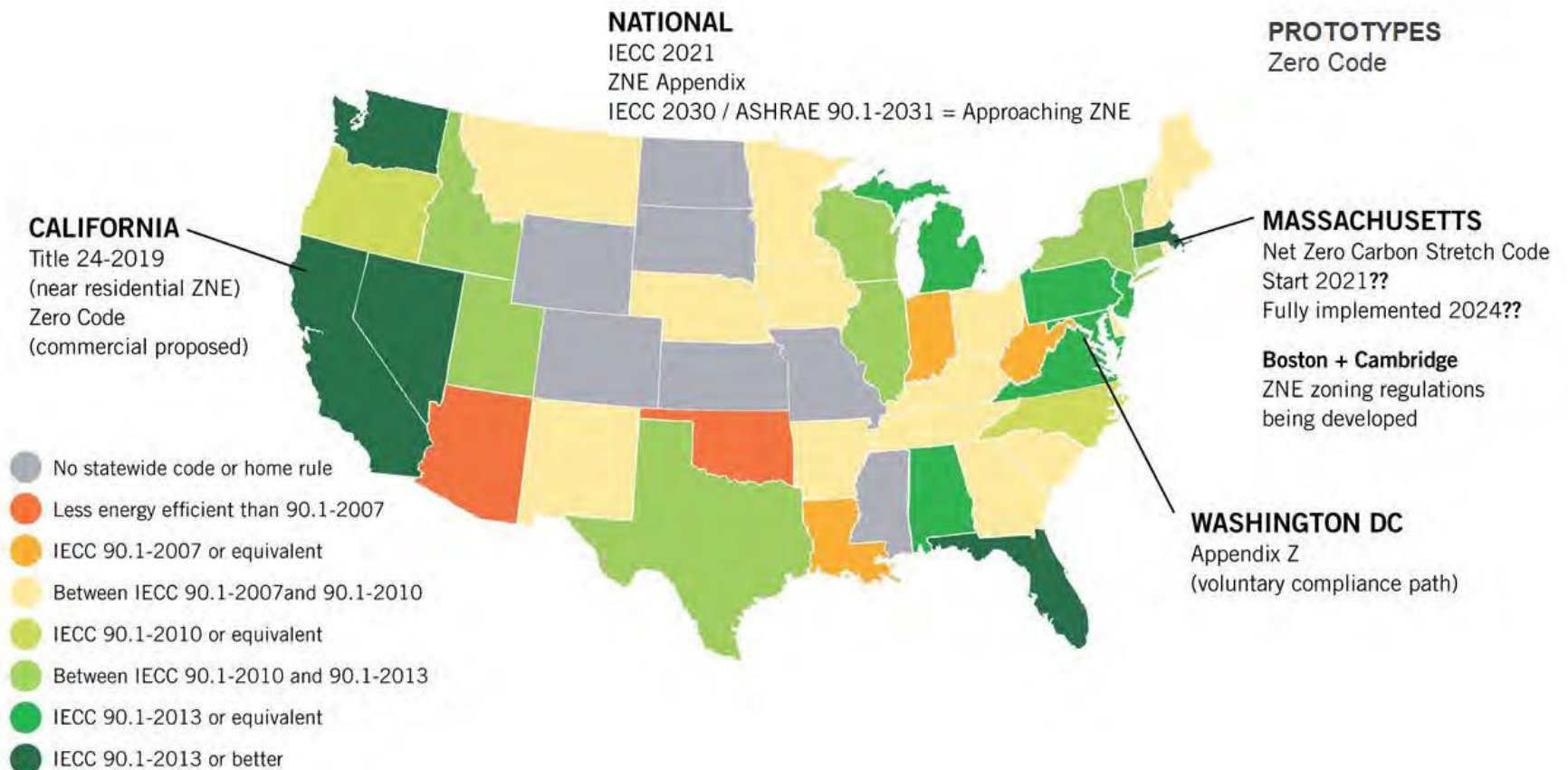


- California
 - Bay Area Air Quality Management District (BAAQMD) - first proposed zero-emissions rule
 - Southern California Air Quality Management District (SCAQMD)
 - Cal Air Resources Board Scoping Plan (June 24 comments)
- New York Scoping (comments July 1)
- U.S. Department of Energy (DOE) Gas furnace efficiency 95% AFUE
- Ozone Transport Rules (comments June 21)
- Montgomery County, MD (no incentives for combustion appliances)
- Washington State Building Codes Council – space and water heating electric requirements 2023

Existing NOx Emissions Limits from Water Heaters

Texas, Utah, Bay Area, San Joaquin Valley, South Coast, Ventura

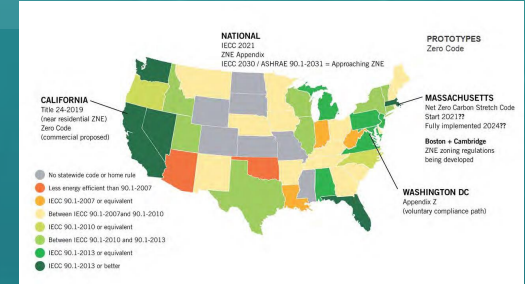
Zero Energy Codes



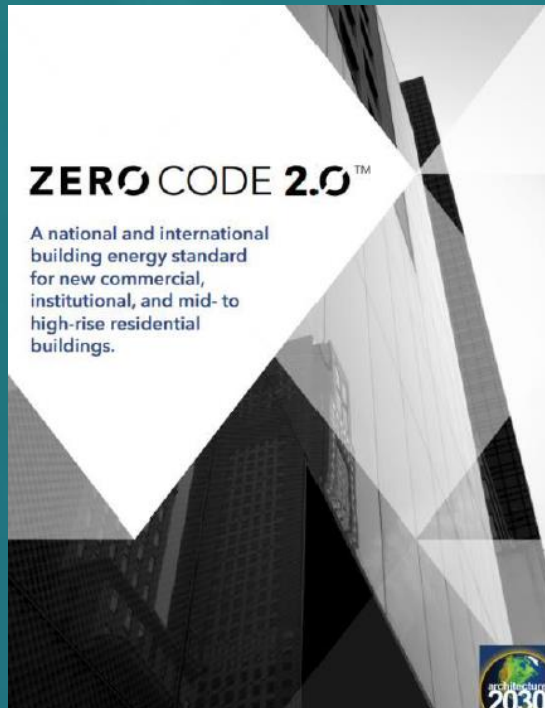
Zero Energy / Emissions Codes



- **NEEP Region**
 - Washington DC – Appendix Z (2027)
 - MA Muni Opt-in ZE Stretch 2022?
 - On the path to zero-base code **VT (2027), NY (2026)**
 - MD all-electric code 2024
- **California**
 - Residential Solar requirement 2020
 - 2022 Code Heat pumps, Electric Ready, Battery Storage, Increased PV, Ventilation Requirements
 - Commercial and Multifamily Solar requirements 2023
 - All buildings net-zero
- **Washington State** - **Water/Space heat Pumps req July 23**



Renewables in Code



ZERO CODE 2.0™

A national and international building energy standard for new commercial, institutional, and mid- to high-rise residential buildings.



ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2020
(Supersedes ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2017)
Includes ANSI/ASHRAE/ICC/USGBC/IES addenda listed in Appendix M

Standard for the Design of High-Performance Green Buildings

Except Low-Rise
Residential Buildings

The Complete Technical Content of the International Green Construction Code®

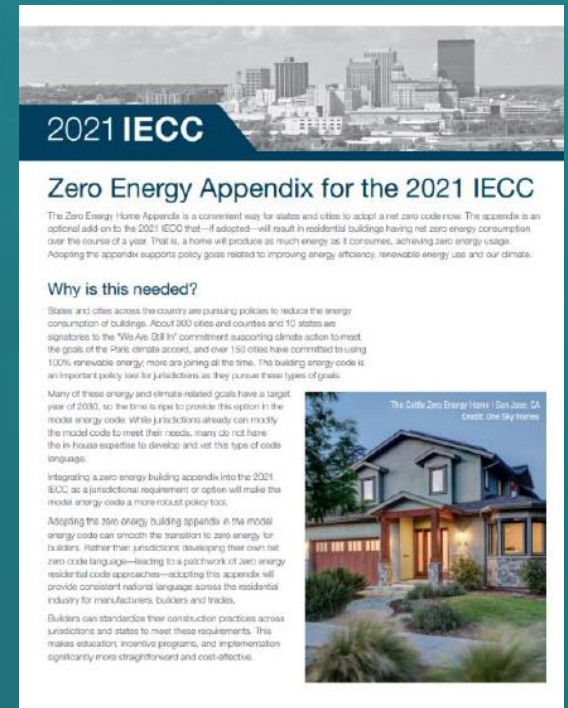
See Appendix M for approval dates by the ASHRAE Standards Committee, the ASHRAE Board of Directors, the International Code Council, U.S. Green Building Council, the Illuminating Engineering Society, and the American National Standards Institute.

This Standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely documented, consensus action on requests for change to any part of the Standard. Instructions for how to submit a change can be found on the ASHRAE® website (<https://www.ashrae.org/continuous-maintenance>).

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2021 IECC

Zero Energy Appendix for the 2021 IECC

The Zero Energy Home Appendix is a convenient way for states and cities to adopt a net zero code now. The appendix is an optional add-on to the 2021 IECC that—if adopted—will result in residential buildings having net zero energy consumption over the course of a year. That is, a home will produce as much energy as it consumes, achieving zero energy usage. Adopting the appendix supports policy goals related to improving energy efficiency, renewable energy use and our climate.

Why is this needed?

States and cities across the country are pursuing policies to reduce the energy consumption of buildings. About 300 cities and counties and 10 states are signatories to the "We Are Still In" commitment supporting climate action to meet the goals of the Paris climate accord, and over 150 cities have committed to using 100% renewable energy, more are joining all the time. The building energy code is an important policy tool for jurisdictions as they pursue these types of goals.

Many of these energy and climate-related goals have a target year of 2050, so the time is ripe to provide this option in the model energy code. While jurisdictions already can modify the model code to meet their needs, many do not have the in-house expertise to develop and vet the type of code language.

Integrating a zero energy building appendix into the 2021 IECC as a jurisdictional requirement or option will make this model energy code a more robust policy tool.

Adopting the zero energy building appendix in the model energy code can smooth the transition to zero energy for builders. Rather than jurisdictions developing their own net zero code language—leading to a patchwork of zero energy residential code approaches—adopting this appendix will provide consistent national language across the residential industry for manufacturers, builders and trades.

Builders can standardize their construction practices across jurisdictions and states to meet these requirements. This makes education, incentive programs, and implementation significantly more straightforward and cost-effective.



Carbon - Codes - Policies

- For codes to be effective the latest model codes must be adopted and enforced.
- Codes to support ZE buildings must include latest efficient technology.
- Codes must not be fossil fuel agnostic and move toward maximum electrification (w/exceptions).
- Codes should connect buildings to the grid and scale buildings to communities.
- Codes must address equity, to ensure zero energy buildings for all populations.
- Incorporate a formalized anticipatory and precautionary focus into regulatory process.
- Zero Energy Buildings are possible and affordable, today!

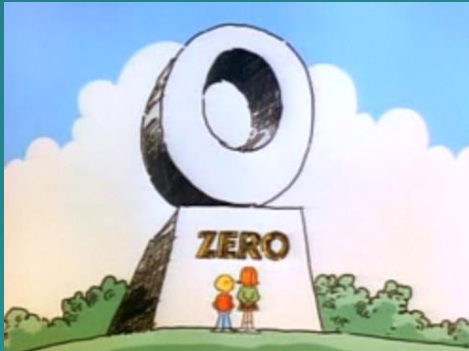
Codes / Standards Trackers, Toolkits, Papers

- Building Energy Codes & Standards
 - <https://neep.org/efficient-resilient-buildings-and-communities/energy-codes>
- Efficient, Resilient Communities
 - <https://neep.org/efficient-resilient-buildings-and-communities/high-performance-communities>

Glossary Page



- AFUE
 - Annual fuel utilization efficiency ratio which measures furnace efficiency
- ASHRAE
 - American society of heating refrigeration and air conditioning engineers
- IECC
 - International Energy Conservation Code
- PV Ready
 - Photovoltaic Ready
- EV Ready
 - Electric Vehicle Ready
- LCA/GWP/Red List
 - Life cycle analysis of energy technology
 - Global Warming Potential
 - The Red List is the “worst in class” materials and chemicals known to pose serious health risks to humans and the environment as determined by the International Living Future Institute



Thank you.

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