Federal Priorities for the Built Environment

Future of Building Energy Codes Workshop

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Overarching Agency Goals

*A national effort aimed at **creating the jobs** we need **to build a modern, sustainable infrastructure** now and deliver an **equitable clean energy future.***

Equity

- Prioritize addressing long-standing and persistent racial injustice.[1]
- Ensure **40% of the benefits** of these investments go towards disadvantaged communities.[1]

Jobs

- Generate at least **1 million** good-paying jobs with choice to join union.[2]
- Prioritize American workers and domestic supply chains.[3]

Modernize Infrastructure

- Create more resilient grid.[1]
- Build and retrofit more than **2 million homes and commercial buildings.**[1]
- Build clean energy economy of tomorrow.[1]

Climate leadership

- Invest in R&D to position US as global leader in clean energy technologies.[4]
- Boost climate resilience efforts through regional plans in partnership with national labs and universities.[4]

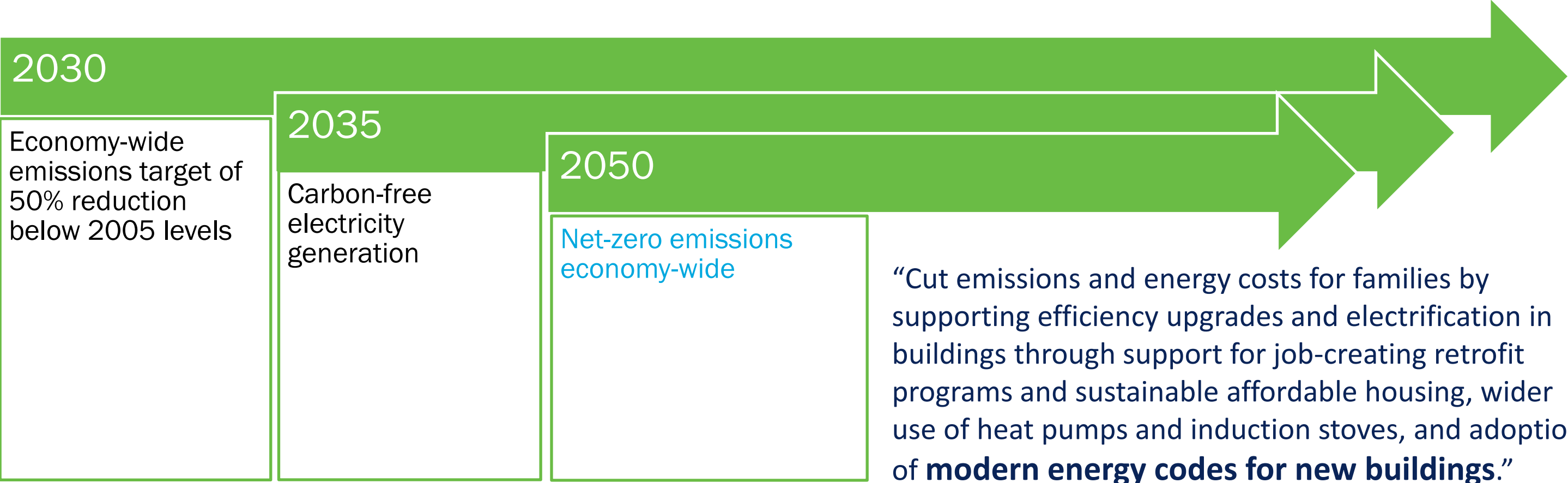1. White House American Jobs Plan Announcement, March 31st, 2021, link
2. Joe Biden Campaign Clean Energy Plan, link
3. White House Greenhouse Gas Pollution Reduction Target Fact Sheet, April 21, 2021, link
4. White House Announcement on Tackling Climate Crisis, January 27, 2021, link

Emissions Targets and Goals

Administration's Focus: "Building back better in a way that will create millions of good-paying, union jobs, ensure economic competitiveness, advance environmental justice, and improve the health and security of communities across America."

2030
Economy-wide emissions target of 50% reduction below 2005 levels

2035
Carbon-free electricity generation

2050
Net-zero emissions economy-wide

"Cut emissions and energy costs for families by supporting efficiency upgrades and electrification in buildings through support for job-creating retrofit programs and sustainable affordable housing, wider use of heat pumps and induction stoves, and adoption of **modern energy codes for new buildings**."

White House Fact Sheet, April 22, 2021, link

Building-Specific Goals and Priorities

*"Goal of Modernizing and upgrading the nation's residential and commercial buildings to be **affordable, resilient, accessible, energy efficient, and electrified.**"*[1]

New Construction and Building Upgrades

- *Build, preserve, and retrofit more **than two million homes and commercial buildings.**[2]*
- *Modernize nation's schools and early learning facilities and upgrade VA hospitals and federal buildings.[2]*
- *Invest in new technologies to reduce emissions associated with construction, including high-performance electrified buildings. [3]*

Workforce Development

- *Announced $30M DOE investment through technical assistance and funding awards.[1]*
- *Expand support for organizations including unions, trade associations, and educational institutions. [1]*
- *Prepare people to join the workforces of the future, and support career pathways for a diverse, qualified, and well-paid workforce that can support the development/construction of high-performance building.[1]*

Housing Affordability

- *Produce, preserve, and retrofit more than **one million affordable housing units.**[2]*
- *Build and rehabilitate more than **500,000 homes** for low- and middle-income homebuyers.[2]*

1. White House May 17th, 2021 Announcement, link
2. White House American Jobs Plan Announcement, March 31st, 2021, link
3. White House Greenhouse Gas Pollution Reduction Target Fact Sheet, April 22, 2021, link

New and Updated Programs, Certifications and Standards

- **Federal Building Performance Standards:** White House interagency sustainability effort with GSA, DOE, and EPA to develop the first-ever building performance standards (BPS) for federal buildings.[1]
  - Establish metrics, targets, and tracking methods to achieve federal carbon emissions goals.

- **DOE's efficiency standards program:** DOE directed to review all existing regulations, orders, guidance documents, policies, and any other similar agency actions actions.[2]
  - Executive order: Immediate review of Energy Convservation Program for Appliance standards.[3]

- **Updated ENERGY STAR program and announced new certification programs:** series of advancements in the ENERGY STAR program.[4]
  - Residential: Develop ENERGY STAR Home Upgrade program, advance Indoor airPLUS home labelling program, and advance ENERGY STAR Recognition Program for Residential New Construction.
  - Updated ENERGY STAR standards for residential water heaters and heating/ cooling equipment that advance heat pump technologies

1. White House May 17th, 2021 Announcement, link   3. White House Executive Order, January 20th, 2021, link
2. DOE Announcement on February 19, 2021, link   4. EPA May 17th, 2021 Announcement, link
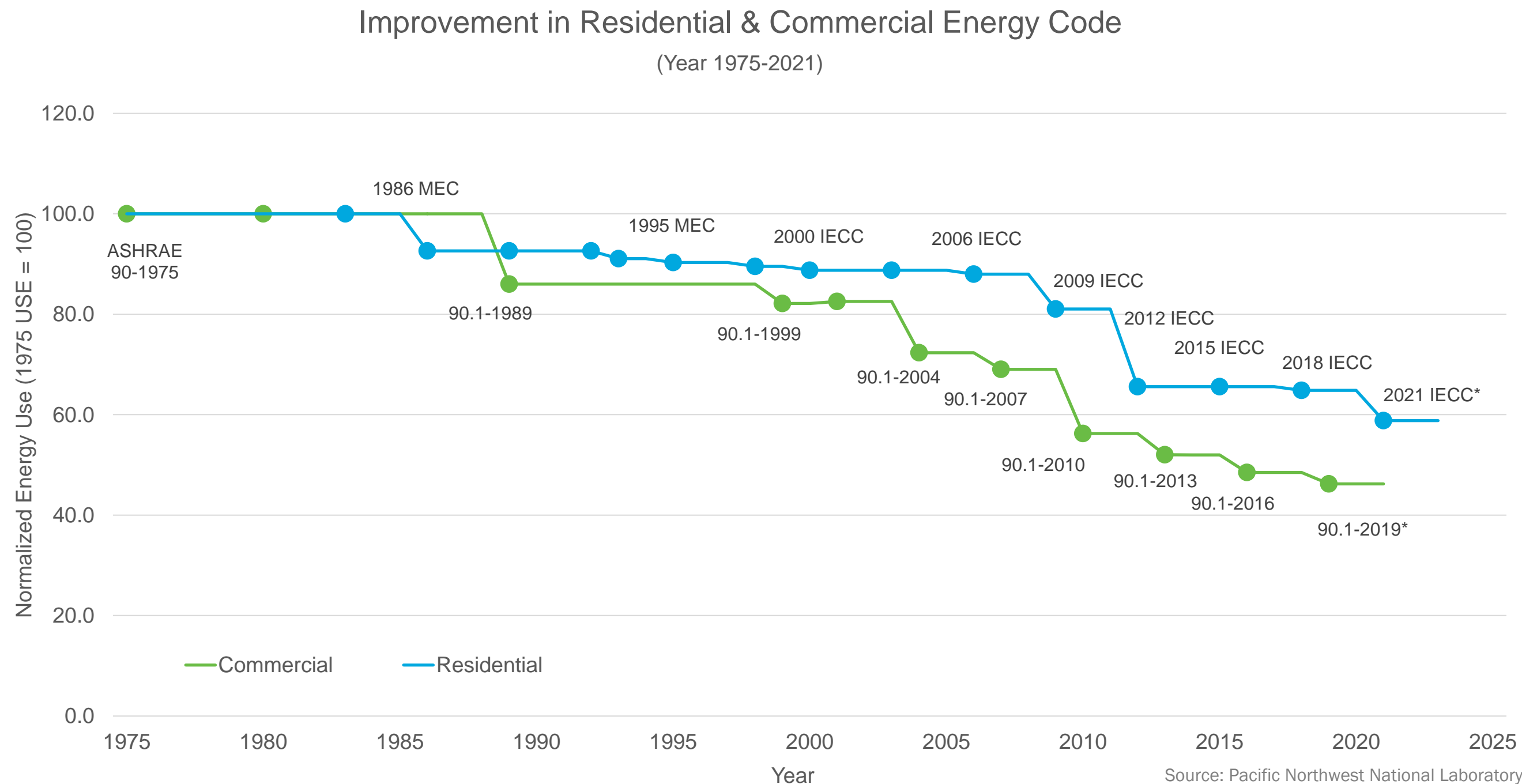
DOE Advancing New Technology Research and Deployment

- **Initiative for Better Energy, Emissions, and Equity** (E3): new national research initiative on innovating clean and efficient heating and cooling systems.[1]

  - $10M towards accelerated research and adoption of heat pump technologies.

  - Includes new Cold Climate Heat Pump Technology Challenge.

- **Grid-Interactive Efficient Buildings Roadmap released**: BTO roadmap to support research, development, demonstration, and deployment of GEBs.[2]

  - Goal to triple the energy efficiency and demand flexibility of the buildings sector by 2030.[2]

  - New GSA blueprint to integrate GEB technologies into energy savings contracts.[3]

- **Low-carbon buildings pilot**: New DOE Better Buildings Initiative.[3]

  - Support information sharing between commercial, industrial, and multifamily organizations.

1. E3 Initiative Factsheet, link
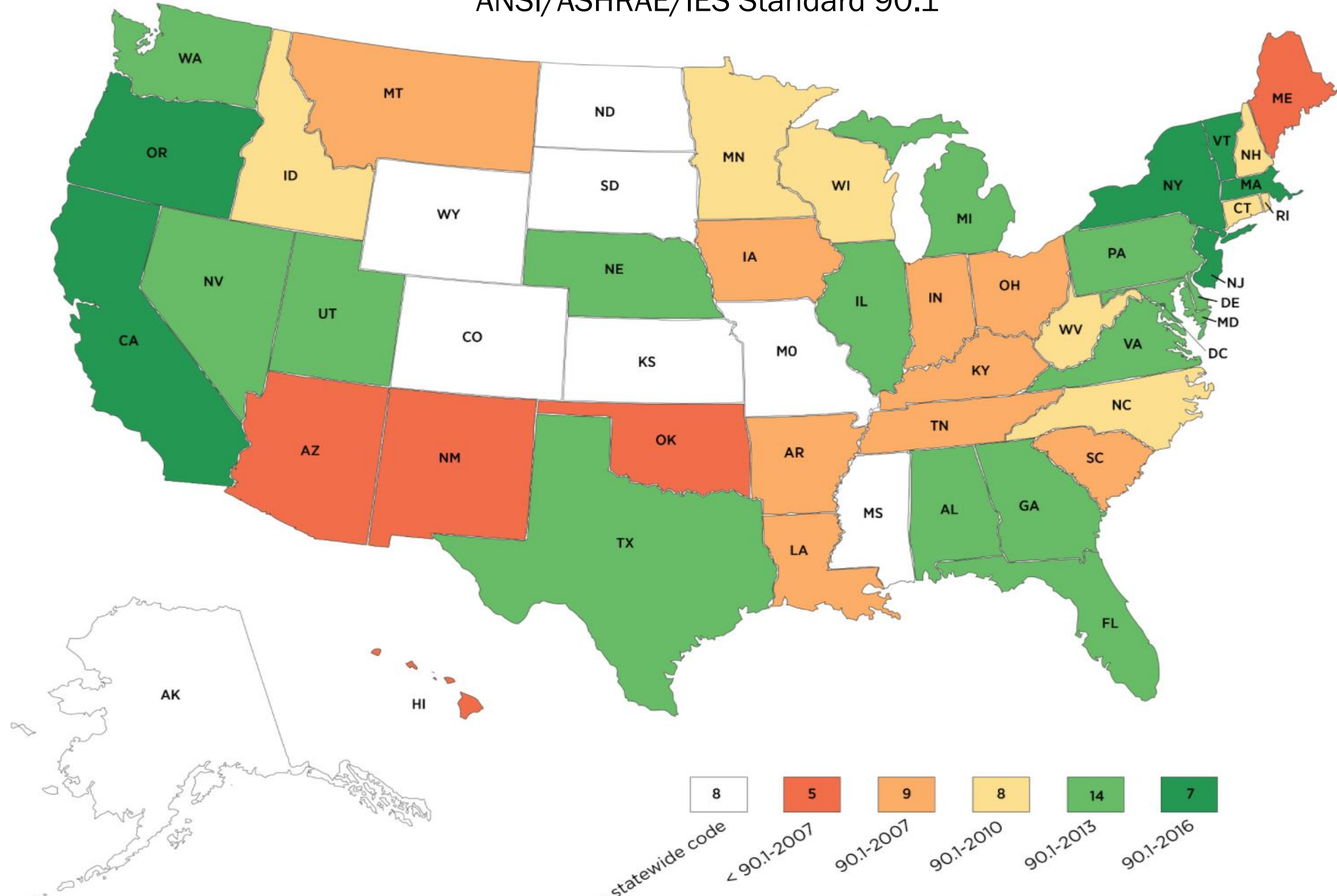2. DOE Announcement, May 18th, 2021, link
3. White House May 17th, 2021 Announcement, link

Historical Improvement: IECC and Standard 90.1

Improvement in Residential & Commercial Energy Code
(Year 1975-2021)

Source: Pacific Northwest National Laboratory

Commercial Buildings
ANSI/ASHRAE/IES Standard 90.1

8	5	9	8	14	7
No statewide code	< 90.1-2007	90.1-2007	90.1-2010	90.1-2013	90.1-2016

https://www.energycodes.gov/adoption/states

Stretch Codes: State and Local Perspective

Primary City Energy Code Equivalency
- 🔴 2009 to 2012 IECC
- 🟡 2012 to 2015 IECC
- 🟢 2018 IECC and above

State Preemption
- Home Rule
- Min
- Min/Max

CBSA Metro Avg. Annual Residential Permits (14-18)
- 5000
- 20000
- 40000
- 60000
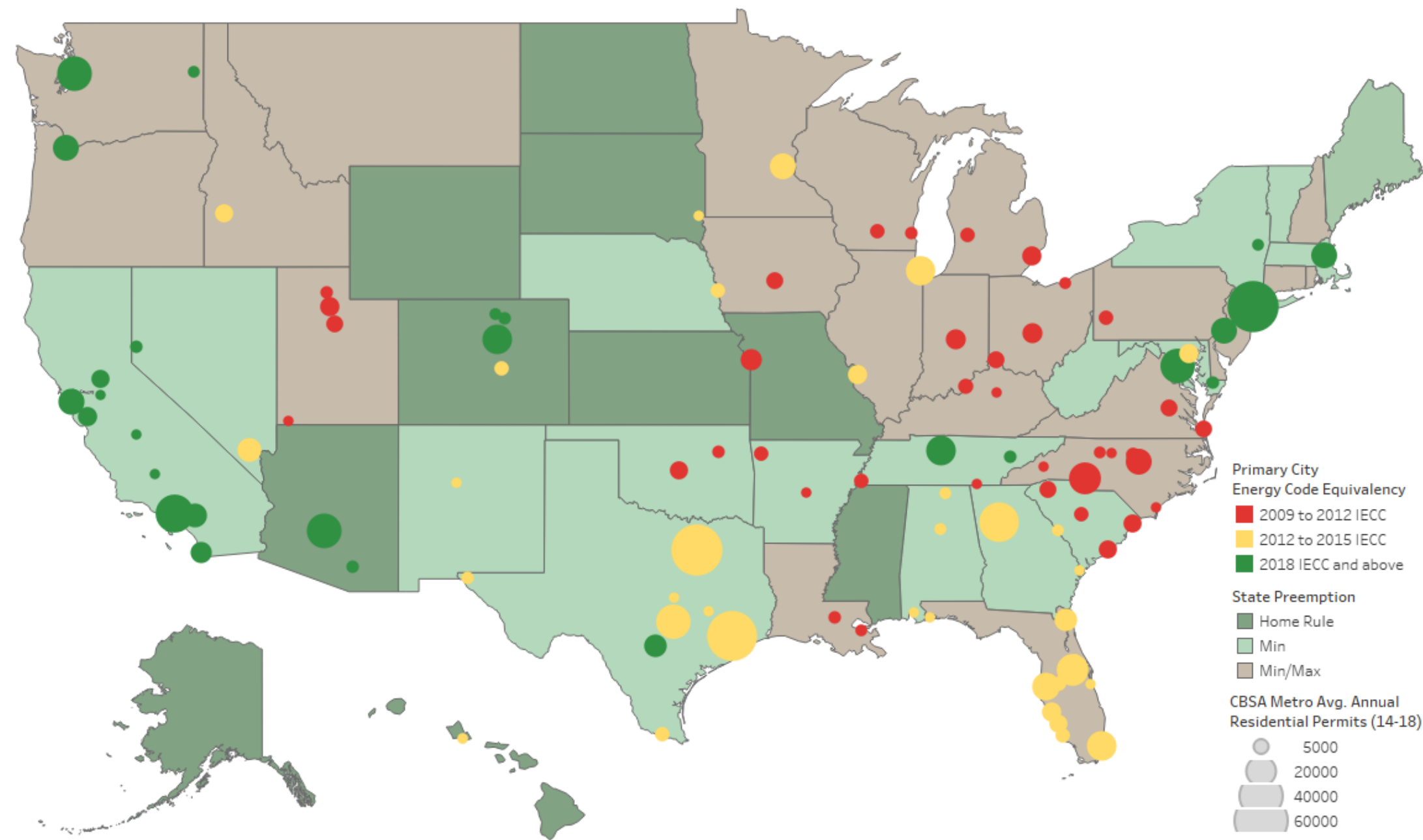
Data Source: ACEEE 2020 City Clean Energy Scorecard

Stretch Codes: Solar and Electric Vehicles

Solar or EV Ready
- ■ EV Ready
- ■ Solar Ready
- ■ Both
- ■ No

State Preemption
- ■ Home Rule
- ■ Min
- ■ Min/Max

CBSA Metro 14-18 Avg. Annual Commercial Sq. Ft.
- 10,000,000
- 100,000,000
- 200,000,000
- 300,000,000
- ≥ 400,000,000
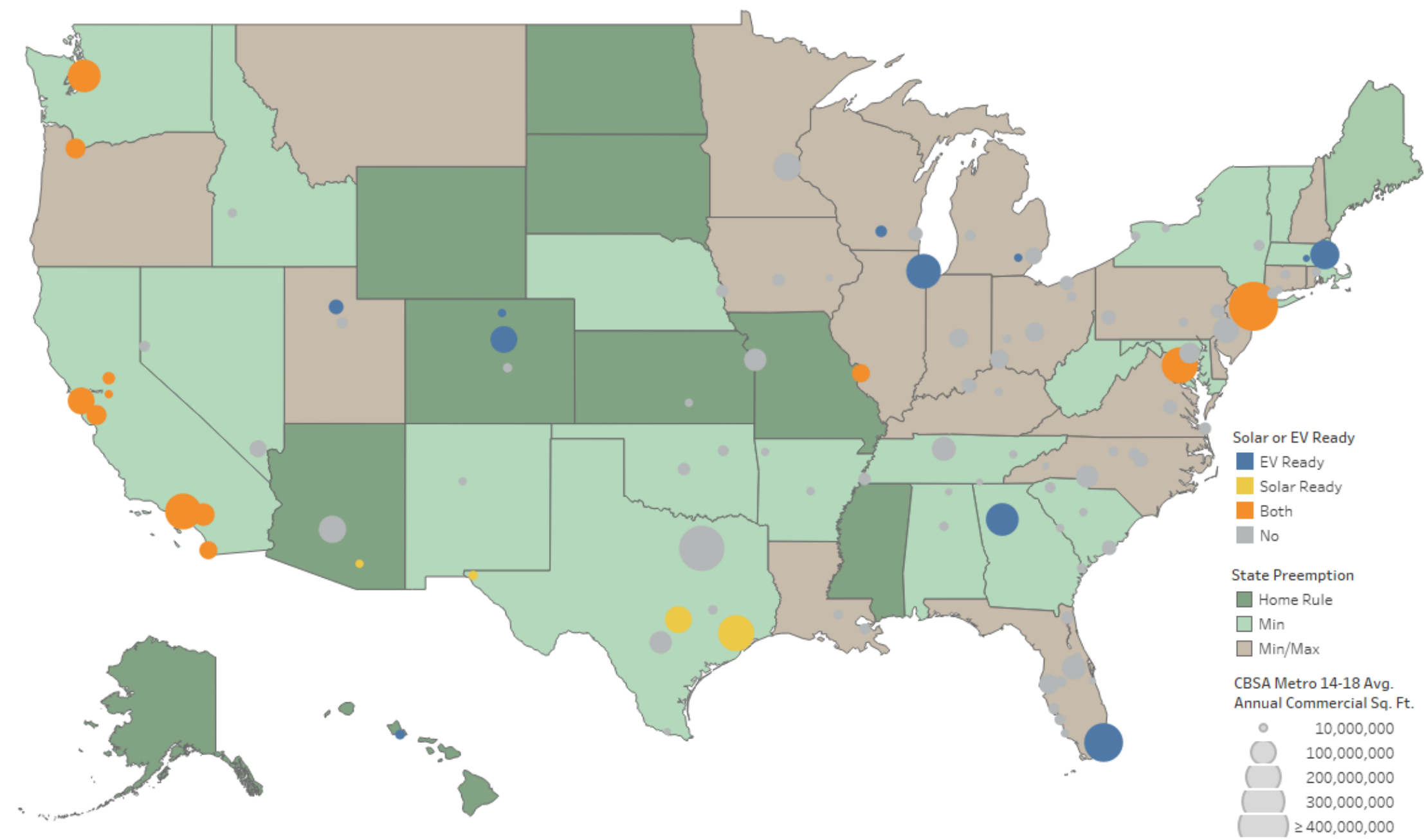
Data Source: ACEEE 2020 City Clean Energy Scorecard & SWEEP

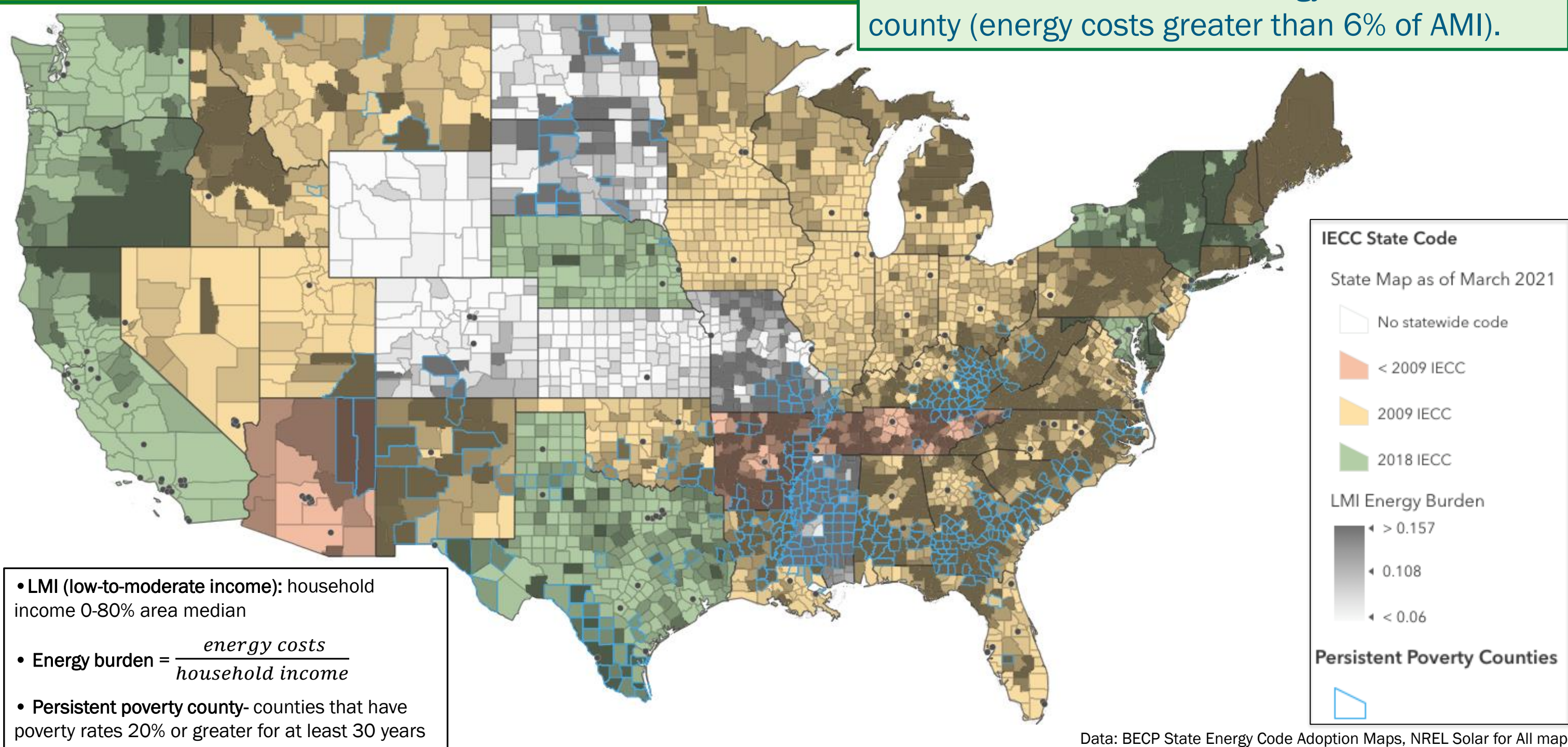# Building Performance Standards (BPS)
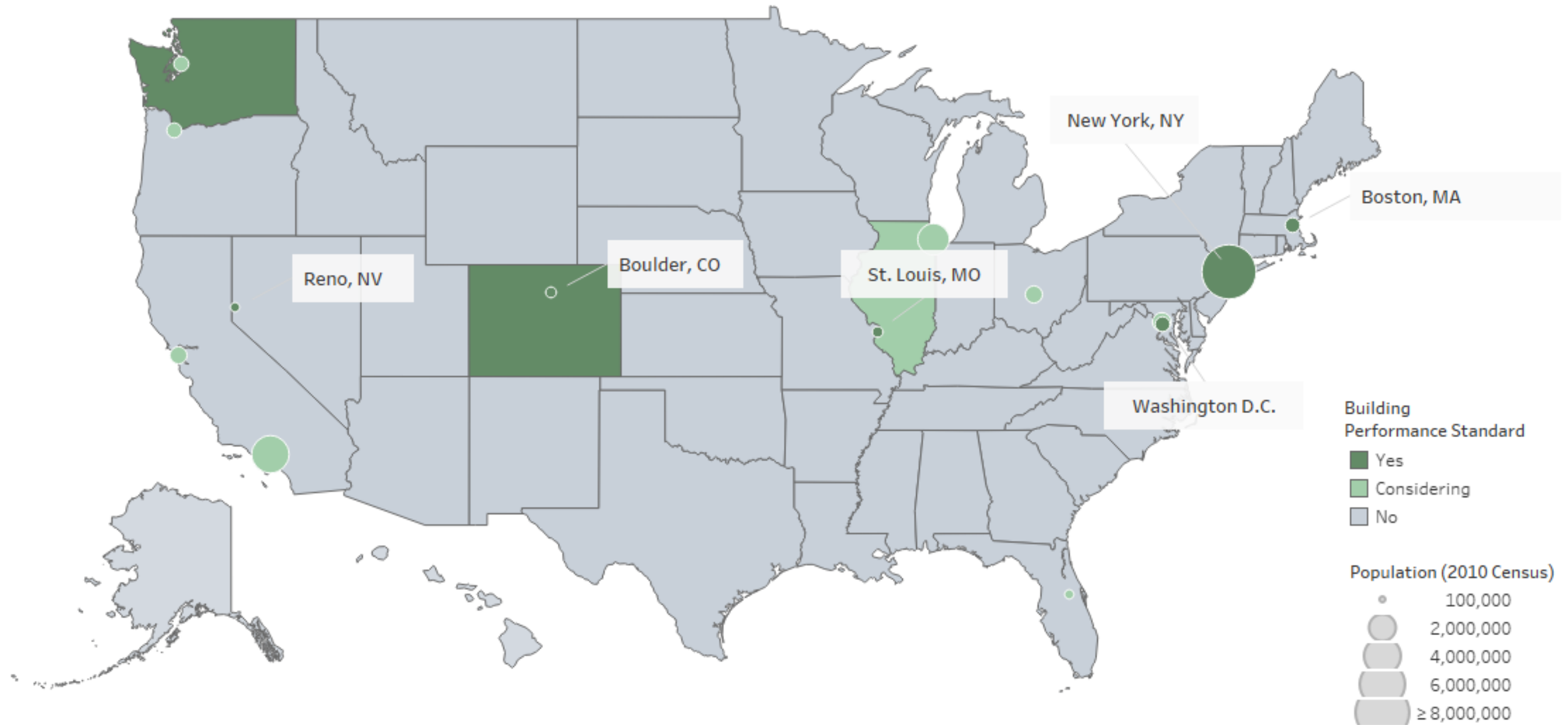
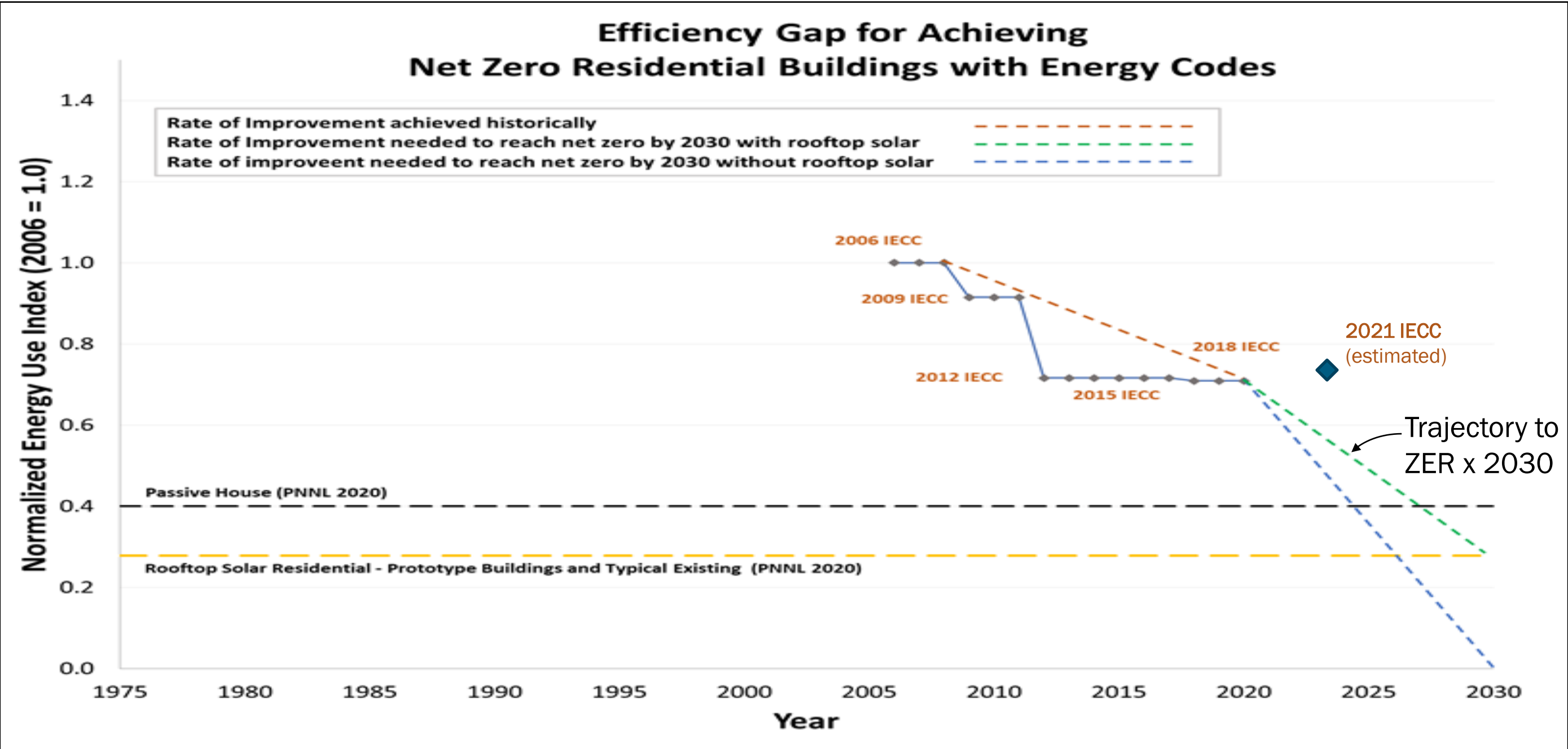Data Source: ACEEE 2020 City Clean Energy Scorecard & IMT

Energy Burdens across the US

In states with 2009 IECC or worse, **over 65% of LMI households** live in an energy-burdened county (energy costs greater than 6% of AMI).

IECC State Code

State Map as of March 2021

- No statewide code
- < 2009 IECC
- 2009 IECC
- 2018 IECC

LMI Energy Burden

- ◄ > 0.157
- ◄ 0.108
- ◄ < 0.06

Persistent Poverty Counties

- LMI (low-to-moderate income): household income 0-80% area median

- Energy burden = $\dfrac{energy\ costs}{household\ income}$

- Persistent poverty county- counties that have poverty rates 20% or greater for at least 30 years

Data: BECP State Energy Code Adoption Maps, NREL Solar for All map

Model Energy Codes: Looking to the Future

Efficiency Gap for Achieving Net Zero Residential Buildings with Energy Codes

SOURCE: PNNL Feasibility Study (publication pending)

DOE Priorities for Building Energy Codes

Model Energy Code Determinations (pending):

- **Commercial:** 4.7% site energy savings based on Standard 90.1-2019 [April 21, 2021]
- **Residential:** 9.4% site energy savings based on the 2021 IECC [May 21, 2021]

Technical assistance supporting **state and local governments:**

- Updated analysis underpinning the latest codes—national and custom state analysis (e.g., energy savings, cost effectiveness, GHG impacts)
- New analysis exploring the next generation of building energy codes—for both the model codes as well as adopting states and local governments
- Workforce education & training programs that can help the industry adapt to evolving codes, technologies and construction practices
- > National Energy Codes Conference (July 20-22)

Emerging Themes in Building Energy Codes (Development)

- Net zero energy / Net zero carbon (+Readiness)
  - ICC specified an optional stretch goal of zero energy by 2030; optional zero-ready appendices in the 2021 IECC
- Electrification (+Readiness):
  - Pre-wiring for future electric appliances, reserved space for heat pump water heaters
- Renewable integration (PV):
  - CA T24, ASHRAE Standard 90.1
- Grid integration:
  - Grid-interactive water heaters, smart thermostats, methods for evaluating grid-interactive measures
- Electric Vehicles: Pre-wiring or actual charging
- Performance-based codes
- Existing Buildings: Building Performance Standards (BPS)

> Opportunity: DOE can bolster support for these efforts through increased technical analysis—both for the model codes and by working with states/locals