



Taking Charge of Climate Change through Stretch Codes

NECC Seminar Series
August 18, 2022

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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



Policies for Energy and Emissions Reduction

Commitments

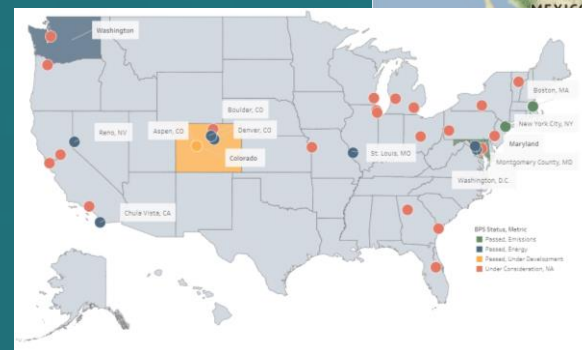
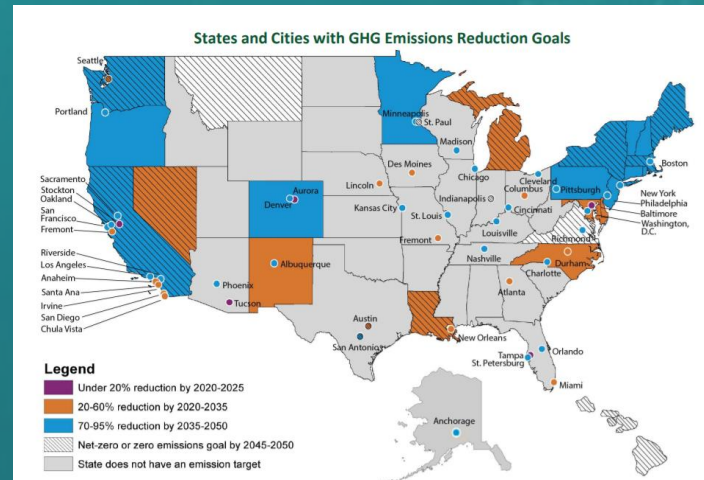
- Local, State and Regional Emissions Reduction
- Renewables

New Buildings / Major Renovation

- Building Energy Codes: Base Codes, Stretch Codes, Renewables Codes, Zero Codes, and more
- Carbon Neutral Zoning and Ordinances
- Zero Emissions/Electric Ordinances
- Clean Heating Standard
- Appliance Standards

Existing Buildings

- Benchmarking
- Building Performance Standards (BPS)
- Clean Heating Standard
- Appliance Standards



Building Energy Code 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



NEEP Region Building Energy Codes

2015

ME → 2021*

CT → 2021

DC → 2021*

WV

2018

MA → 2021*

NY → 2024*

MD → 2021

NJ → 2021

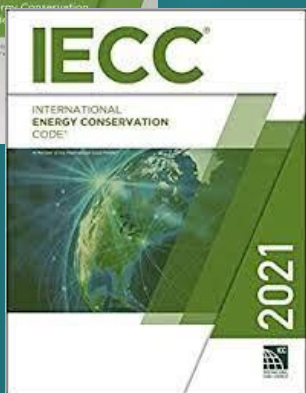
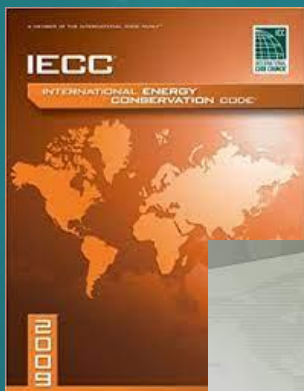
VT → 2021*

DE → 2021*

RI → 2021*

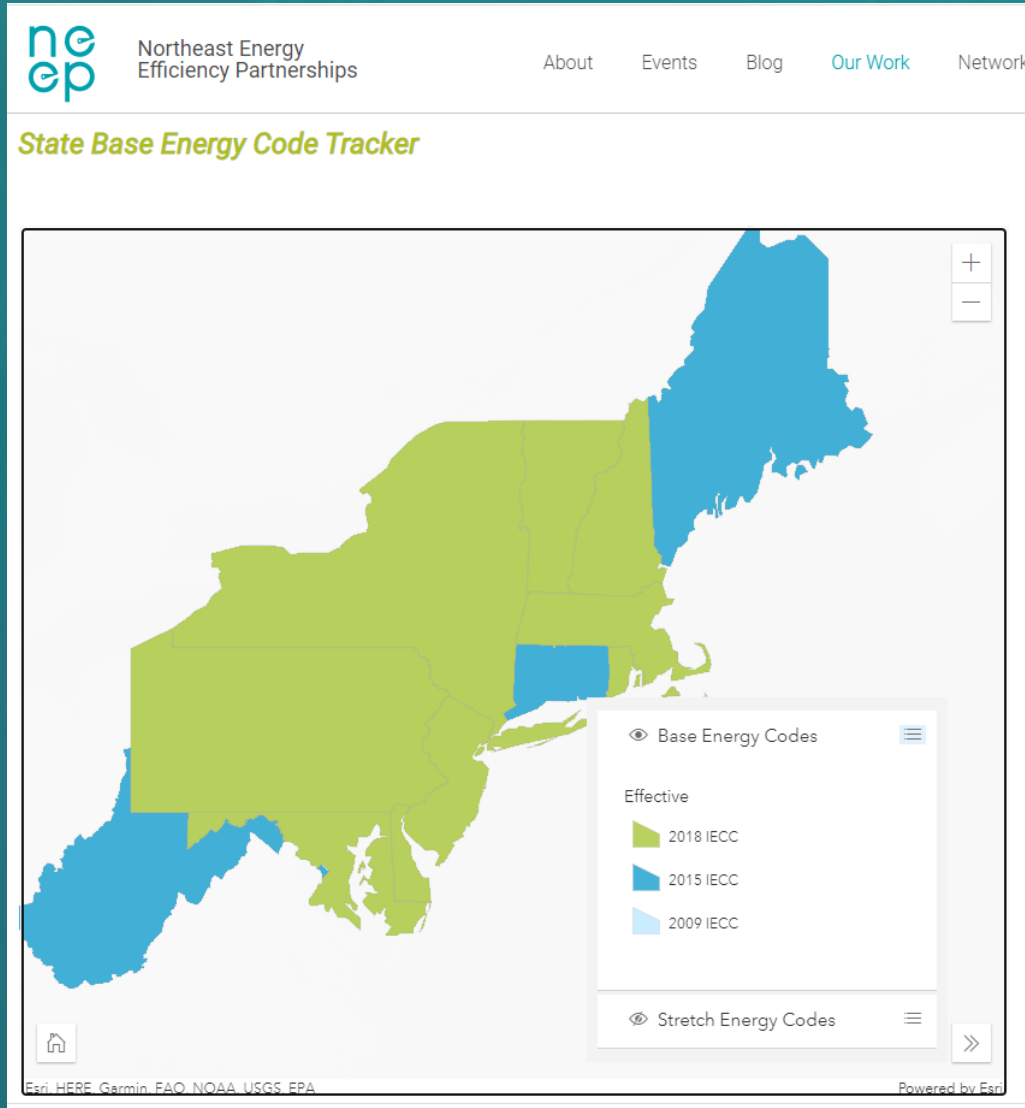
PA → 2021

NH



*Updating/creating stretch codes

Stretch Codes States



MA

NY (Ithaca, NYC)

DC

VT

RI

ME (Port, S.Port)

MD (Mont, Balt)

CA, IL, OR, WA

BC

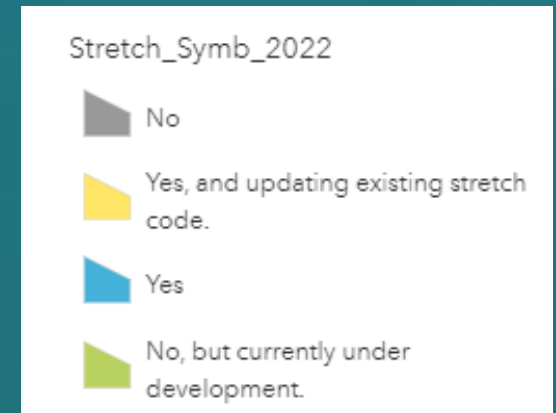
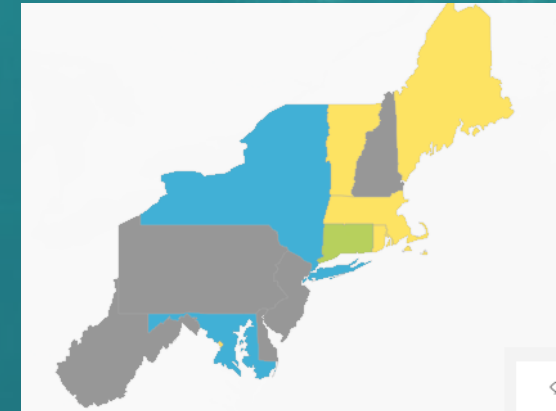
Boulder, Co

Scottsdale, AZ

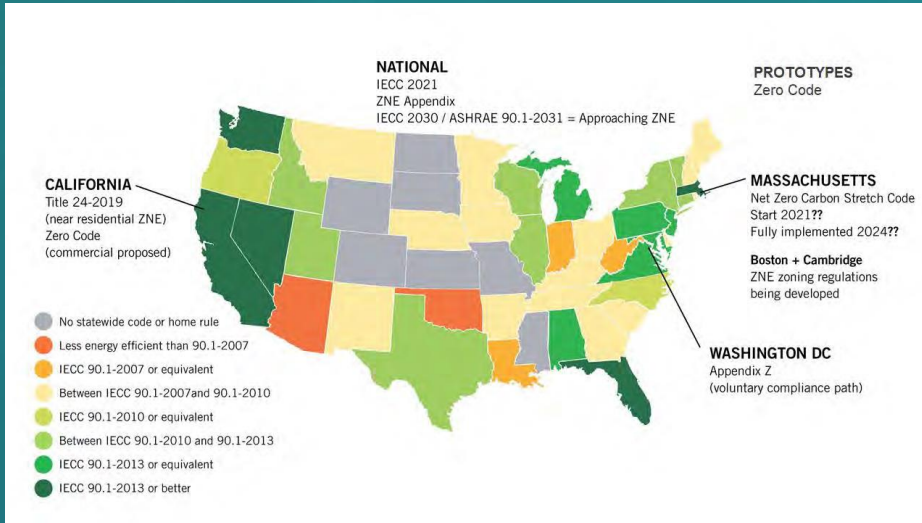
Stretch Codes: NEEP Region



| State | Residential | Commercial | Details |
|-------|------------------|--------------------------|---|
| MA | HERS/ERI | Percent Better | Stretch, Muni Opt In |
| NY | IECC | IECC/ASHRAE | Updating; Zero Energy base 2026 |
| DC | | Appendix Z (zero energy) | Electrification measures in base code 2021, Zero Energy base 2026 |
| VT | Point Based | | EV Charging, Solar Ready, Air Sealing, Points, HERS; ZE base 2030 |
| RI | DOE ZERH | IGCC | Updating - Zero Code Option |
| ME | IECC ZE Appendix | IECC ZE Appendix | |
| MD | | IGCC | Statewide Stretch Zero/Electric Code |



Stretch Codes Take Many Paths



BC ENERGY STEP CODE

ABOUT THE STEP CODE:
The BC Energy Step Code provides a clear path to net zero carbon buildings. It is a performance-based code that allows for innovation in building design and construction. The code is designed to be flexible and adaptable to different building types and climates.

LAST COUNTRY'S PROPOSED TABLE:

| Energy Step | 2018 | 2021 | 2024 | 2027 |
|-------------|------|------|------|------|
| Step 1 | 1 | 2 | 3 | 3 |
| Step 2 | 1 | 2 | 3 | 3 |
| Step 3 | 1 | 2 | 3 | 3 |

INDUSTRY FEEDBACK TOURS:
The BC Energy Step Code is a performance-based code that allows for innovation in building design and construction. It is designed to be flexible and adaptable to different building types and climates.

IMPLEMENTATION:
The BC Energy Step Code is a performance-based code that allows for innovation in building design and construction. It is designed to be flexible and adaptable to different building types and climates.

Timeline:

- April 2017: BC Energy Step Code adopted by BC Building Code Council
- December 2017: BC Energy Step Code adopted by BC Building Code Council
- January - May 2018: BC Energy Step Code adopted by BC Building Code Council
- June 2018: BC Energy Step Code adopted by BC Building Code Council
- August 2018: BC Energy Step Code adopted by BC Building Code Council

LAKS COUNTRY
1000 Lakeshore Blvd. West, Suite 1000, Oakville, ON L6M 3B1
Phone: 905.846.1111



ZERO ENERGY READY HOME
U.S. DEPARTMENT OF ENERGY

A Symbol of Excellence

HEALTHFUL ENVIRONMENT

COMFORT PLUS

ADVANCED TECHNOLOGY

ULTRA EFFICIENT

QUALITY BUILT

DURABILITY

KEY:

- Green: DOE Zero Energy Ready Home
- Blue: ENERGY STAR Certified Home
- Grey: Existing Home

The label indicates relative performance of this Zero Energy Ready Home to existing homes built between 1990 and 2010 and in similar climate zones.

U.S. DEPARTMENT OF ENERGY

nbi new buildings institute

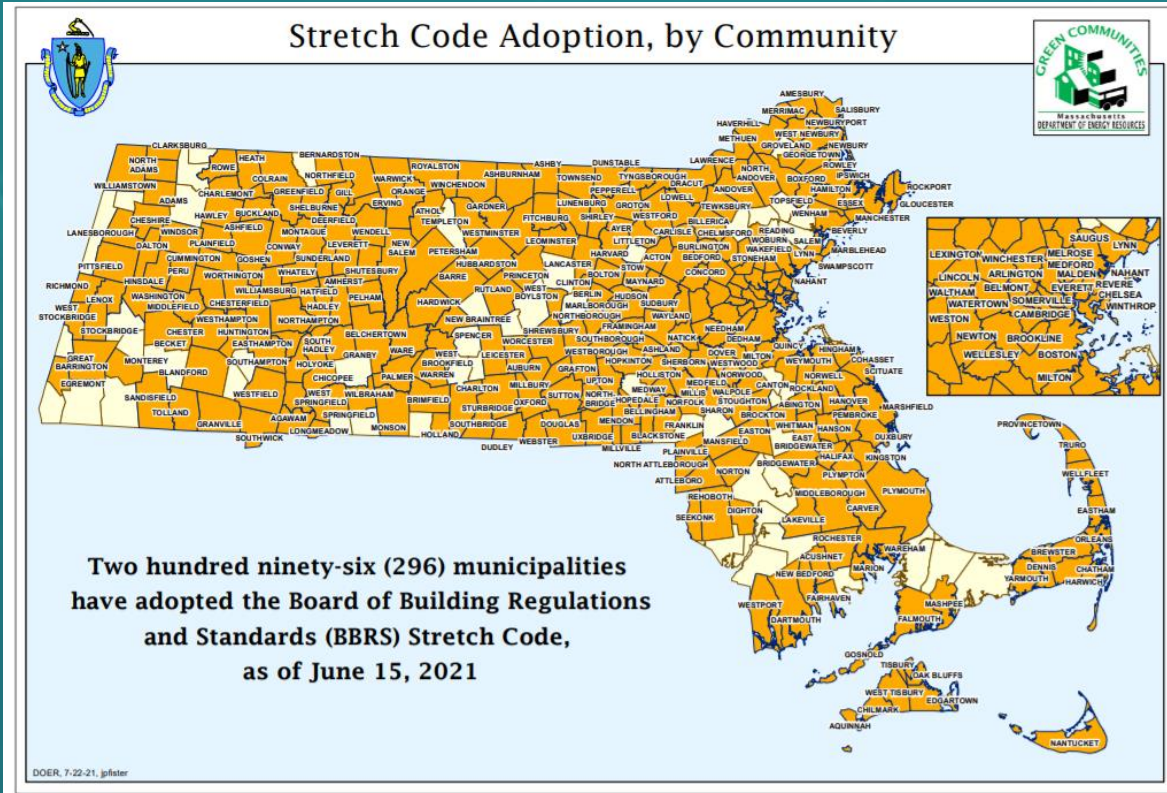
Building Decarbonization Code

An overlay to model building codes on the path to net zero

Version 1.2 | August 2021

Codes for Climate

Massachusetts Stretch Code



Base code 2021 IECC in January 2023

Stretch code, Specialized Muni Opt-In Stretch Code to be issued December 2022

Taking Charge of Climate Change through Stretch Codes



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Stretch Codes in Illinois

US DOE 2022 NECC Seminar Series

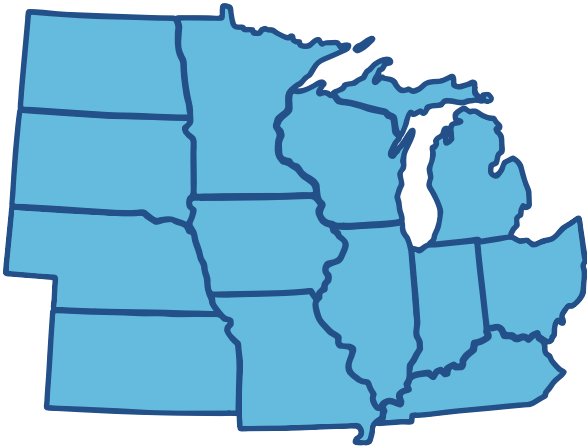


August 18, 2022

Midwest Energy Efficiency Alliance

The Midwest Energy Efficiency Alliance (MEEA) is a collaborative network, promoting energy efficiency to optimize energy generation, reduce consumption, create jobs and decrease carbon emissions in all Midwest communities.

MEEA is a non-profit membership organization with 160+ members, including:



Electric & gas utilities



State & local governments



Academic & Research institutions



Energy service companies & contractors



Illinois Energy Code

As of 8/18/2022

- Residential – 2018 IECC w/amendments
 - 15.4% less efficient than the 2021 IECC
 - Envelope weakened
 - 4ACH(50) instead of 3ACH(50)
- Commercial – 2018 IECC
 - 4.8% less efficient than ASHRAE 90.1-2019
 - Removed requirements for roof replacements
- Illinois is updating to the 2021 IECC
 - Proposed residential code has same envelope as before, moved to 3ACH(50)
 - Commercial will remove roof replacement requirements
 - Has been approved by CDB, currently in public comment period



Climate and Equitable Jobs Act

- **Efficiency:** Statewide Stretch Code
- **Renewables:** 100% Zero-emissions power sector by 2045
 - 40% Renewable Energy by 2030
 - 33-42% rooftop/community solar (\$11B private investment over 10 years)
- **Grid Integration:** 1.4MW of Energy Storage over 10 years (\$4.6B private investment)
- **Electrification:**
 - Rebates for Electric Vehicles, and Electric Vehicle Charging Infrastructure (1M cars/\$1.5B private investment)
 - Expanded Utility Efficiency Programs which Allow Rebates for Building Electrification

CEJA influence on State Code Process

- Expand Advisory Committee
 - representative from a group that represents environmental justice
 - a representative of a nonprofit or professional association advocating for the environment
 - an energy-efficiency advocate with technical expertise in single-family residential buildings
 - an energy-efficiency advocate with technical expertise in commercial buildings
 - an energy-efficiency advocate with technical expertise in multifamily buildings, such as an affordable housing developer.

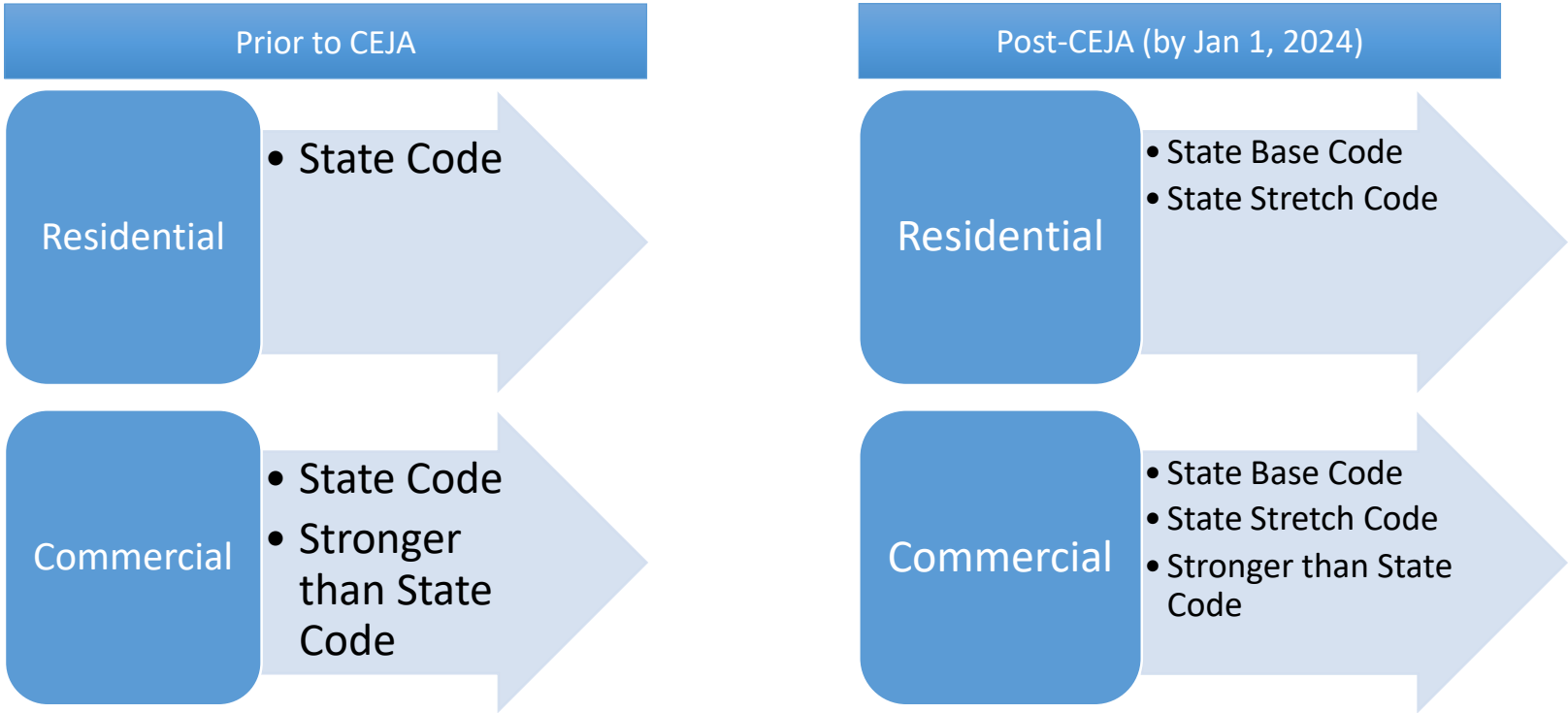
Stretch Code in CEJA

Bill Elements

- Directs the Illinois Capital Development Board (CDB) to create a residential and commercial stretch energy code that can be adopted by individual municipalities.
- Stretch code must meet a set of specific “site energy index” performance targets that include “only conservation measures and excludes net energy credit for any on-site or off-site energy production.”
- Stretch code targets increase in energy efficiency every three years; first target is 9.1% more efficient than current Illinois commercial code and 34.2% more efficient than the current Illinois residential code.
- Once formally adopted by a municipality, the stretch code takes the place of the state energy code and establishes the minimum energy efficiency requirements for new construction, additions, and major renovations.

Energy Codes in Illinois

Energy Conservation vs. Renewables, etc.



Residential Targets

Single-family and low-rise multifamily buildings

| Stretch Code Version | Implementation Date | Site Energy Index | Performance Targets | Code Created By |
|-------------------------------|---------------------|-------------------|--|-----------------------------|
| 2024 Residential Stretch Code | December 31, 2023 | 0.50 | At least 50% more efficient than 2006 IECC | Set by CDB by July 31, 2023 |
| 2026 Residential Stretch Code | December 31, 2025 | 0.40-0.42 | At least 60% more efficient than 2006 IECC* | Set by CDB in 2025 |
| 2029 Residential Stretch Code | December 31, 2028 | 0.33 - 0.35 | At least 67% more efficient than 2006 IECC** | Set by CDB in 2028 |
| 2032 Residential Stretch Code | December 31, 2031 | 0.25 | At least 75% more efficient than 2006 IECC | Set by CDB in 2031 |

*If "unanticipated burdens" are associated with previous stretch code, new code must be at least 58% more efficient than 2006 IECC and at least 5% better than 2024 IECC

** If "unanticipated burdens" are associated with previous stretch code, new code must be at least 65% more efficient than 2006 IECC; and at least 5% better than 2027 IECC

Commercial Targets

Commercial buildings and multifamily buildings higher than 3 stories

| Stretch Code Version | Implementation Date | Site Energy Index | Performance Targets | Code Created By |
|------------------------------|---------------------|-------------------|--|-----------------------------|
| 2024 Commercial Stretch Code | December 31, 2023 | 0.60 | At least 40% more efficient than 2006 IECC | Set by CDB by July 31, 2023 |
| 2026 Commercial Stretch Code | December 31, 2025 | 0.50 | At least 50% more efficient than 2006 IECC | Set by CDB in 2025 |
| 2029 Commercial Stretch Code | December 31, 2028 | 0.44 | At least 56% more efficient than 2006 IECC | Set by CDB in 2028 |
| 2032 Commercial Stretch Code | December 31, 2031 | 0.39 | At least 61% more efficient than 2006 IECC | Set by CDB in 2031 |

Energy Codes in Illinois

Energy Conservation vs. Renewables, etc.

State Base Energy Code

- No Conservation Targets
- Energy Efficiency must happen here or stretch code
- Often Weakened

CEJA Stretch Energy Code

- Conservation Targets Required
- Energy Efficiency must happen here or base code
- Could Include Other Elements (Solar, EV, etc.)

Other Codes

- Could Include Other Elements (Solar, EV, etc.)

Utility Programs

Illinois

- Utilities have a statutory requirement to spend a certain amount of money on energy efficiency investments for their customers
- Programs span new construction to existing building, residential to commercial and industrial
- No programs currently exist in Illinois for advancing or supporting code, but program elements are under consideration

Building policies and utility support

Benefits to a municipality

- Technical resources, tools, and program implementation for residents
- Incentives for investments

Benefits to the utility

- Help meet their energy savings and spending goals
- Potential for positive customer interaction

Stretch Code Advancement and Support

Utility-funded Initiative

- ComEd, Nicor, Peoples Gas and North Shore Gas
- MEEA and Slipstream, with support from the Metropolitan Mayors Caucus
- Initiative focuses on Advancement of stretch codes adoption and Compliance of stretch code implementation
- Developing Market Transformation savings framework
- Initiative also has an existing buildings element with BPS

Potential Utility Program Elements

Stretch Code Support

Building code officials

- Compliance guidance
- Targeted training and education
- Circuit rider to review plans
- Energy code compliance collaborative

Design / construction community

- Design / construction technical guidance
- Targeted training and education
- Incentives for meeting design requirements
- Energy code compliance collaborative

Jurisdiction / Policy Making

- Assistance with stretch code adoption or advancement
- Energy code compliance collaborative

Chicago Energy Code

Municipality over 1 million population

- Proposing 2021 IECC
 - Residential unamended
 - Commercial contains same reroofing amendments
- Electrification-ready requirements for heating in residences
- Solar-ready requirements for commercial
- City already has EV-ready provisions

Stretch Code in Illinois

Next Steps

- The Illinois Energy Code Advisory Council will meet in September to determine next steps in CEJA Stretch Code Development.
- Recommendations for elements and requirements of the stretch code must be completed by July 31, 2023, with final language available for adoption by December 31, 2023.
- There may be opportunities for the utilities to assist in developing elements of the stretch code that could be supported by a program.
- The availability of a stretch code will now make it easier for municipalities to adopt. Slipstream and MEEA are continuing outreach.

Thank you!



Alison Lindburg

Senior Building Policy Manager

Midwest Energy Efficiency Alliance

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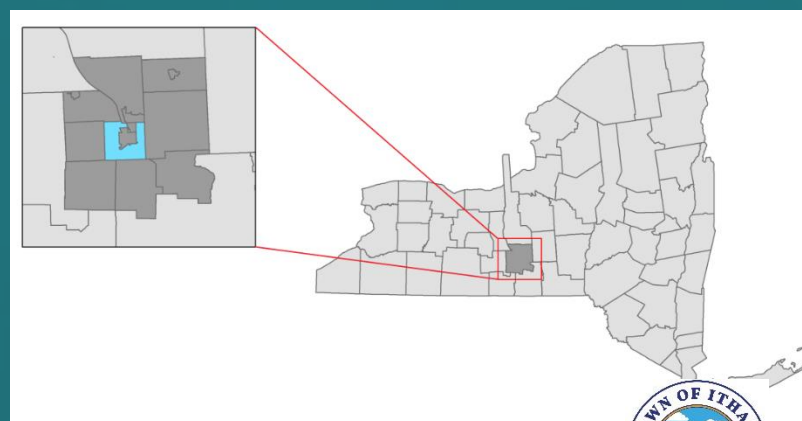


THE ITHACA ENERGY CODE SUPPLEMENT

Nick Goldsmith
Town of Ithaca, NY

Background – About Ithaca

- Small college town in upstate NY
- Population ~ 20,000
- About 50% renters
- Median household income \$46,360
- Very liberal
- Relatively small buildings



Background – Ithaca Green New Deal

- Achieve equitable transition to carbon-neutrality, town-wide, by 2030
- Renewable energy and clean fleet goals for Town operations



Overview of Ithaca Energy Code Supplement (IECS)



- Local code requirements for new buildings and major renovations
- Overlays NYS energy code
 - Must also comply with all NYS codes
- Focuses on GHG emissions reduction, affordability, electrification, and renewable energy
- Adopted in City of Ithaca and Town of Ithaca
- Went into effect in 2021
- Not to be confused with City of Ithaca electrification program for existing buildings



IECS - Current and Future Code Cycles



- 2021: 40% reduction in GHG emissions compared to state code and local practices
- 2023: Requirements increase; 80% GHG reduction
- 2026: Requires net-zero carbon building and no fossil fuel usage in building
 - Cooking and process energy may use FF



Whole Building Path Performance-Based



- Allows more flexibility in building design
- Must comply with requirements based on third-party green building standards.
- Certification is not necessary.
 - LEED (minimum 17 energy points)
 - Energy Rating Index (HERS Rating max. 40)
 - National Green Building Standard (min. 80 EE points)
 - Passive House
 - GHG Emission Calculation Method (minimum 40% GHG reduction, shown through energy modeling)



Easy Path Prescriptive



- Six points are needed to comply (2021-2022)
 - Calibration: 6-10% GHG emission reduction per pt.
 - Compared to 2015 NYS Energy Code and local construction
- Meant to be easy to understand and use
- Point Categories:
 - Efficient Electrification
 - Affordability Improvements
 - Renewable Energy
 - Other Points



Easy Path Prescriptive



Six points are needed to comply in 2021.

Efficient Electrification

| | | |
|-----|--|-----------------------------------|
| EE1 | Heat pumps for space heating | 2 - 5 points |
| EE2 | Heat pumps for service water heating | 1 point (Residential, hotel only) |
| EE3 | Commercial Cooking electrification | 3 points (Food svc only) |
| EE4 | Residential cooking and clothes drying electrification | 1 point (Residential only) |

Affordability Improvements

| | | |
|-----|---------------------------------|--|
| AI1 | Smaller building/room size | 1 - 2 points (Residential, hotel only) |
| AI2 | Heating systems in heated space | 1 point |
| AI3 | Efficient building shape | 1 point |
| AI4 | Right-lighting | 1 point (Commercial only) |
| AI5 | Modest window-to-wall ratio | 1 point |

Renewable Energy

| | | |
|-----|----------------------------------|--------------|
| RE1 | Renewable energy system | 1 - 3 points |
| RE2 | Biomass system for space heating | 3 - 5 points |

Other Points

| | | |
|-----|---------------------------------|--------------|
| OP1 | Development Density | 1 point |
| OP2 | Walkability | 1 point |
| OP3 | Electric Vehicle Parking Spaces | 1 - 2 points |
| OP4 | Adaptive reuse | 1 point |
| OP5 | Meet NY Stretch Energy Code | 1 - 2 points |
| OP6 | Custom energy Improvement | 1 - 2 points |



IECS Development Process



ZERO IS HUGE

LET'S CELEBRATE!

Northstar House (outside), 202 E Falls St.

Thursday, June 17, 5:30 pm - 7:00 pm+

Food and drink available for purchase

First drink free if you walk, bike, bus, or roll



The **City of Ithaca** just passed a law requiring all **new construction** to be **net-zero by 2026**. The **Town of Ithaca** is considering adoption June 14. Ithaca now has the **strongest energy code** in New York.

Learn more at www.ithacagreenbuilding.com.

Free drinks made possible by generous donations from:



Challenges Faced - Process

- Time-intensive
 - Customized point system
 - Two municipalities, one code
- Community buy-in
 - Large institutions vs. climate advocates
 - Solutions: extensive outreach, state goals early and often
- Knee-jerk reactions and misinformation
 - Low-window to wall ratio = living in a cave??
 - Lower GHG = higher construction cost??
 - It's not time for electrification yet??
- Implementation
 - Education
 - Resources



Challenges Faced - Technical

- Renewable Energy
 - How to ensure lasting benefit?
 - Off-site
 - RECs
 - Reporting
- What is a process load?
 - Process loads are exempt from regulation (sometimes)
 - Commercial cooking and refrigeration
 - NOT Plug loads
 - NOT Make-up air for ventilation (e.g. labs and kitchens)
- Fossil fuels
 - How to discourage, when to disallow?



Learn More About the IECS

- Town of Ithaca documents posted at:
 - <http://www.town.ithaca.ny.us/code-enforcement>
- City of Ithaca documents posted at:
 - <http://www.cityofithaca.org/135/Codes-Standards>
- Additional information at project website:
 - www.IthacaGreenBuilding.com
- Ithaca Energy Code Supplement
- Compliance checklists
- Enabling legislation
- Reference document
 - Non-essential information to help understand and use the IECS
 - Background information, commentary, best practices



Thank You!



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Appendix Z

DC's Net-Zero Energy

Code

Casey Studhalter
Urban Sustainability Administration
DOEE



GOALS: 2032



ADAPT TO CLIMATE CHANGE

CLIMATE READY BUILDINGS

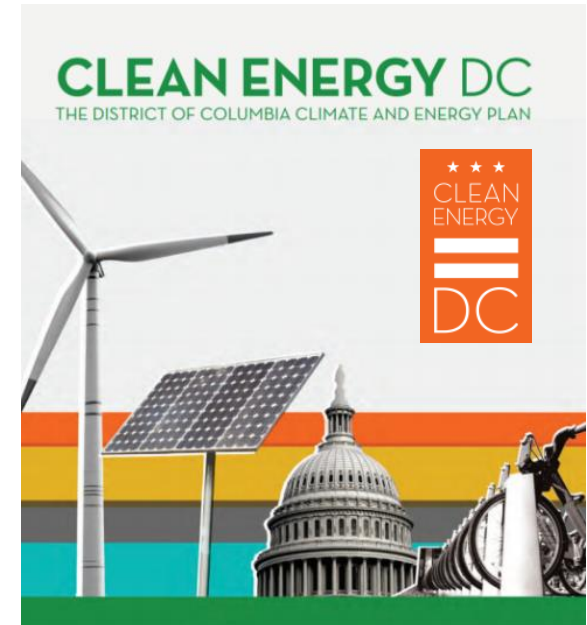
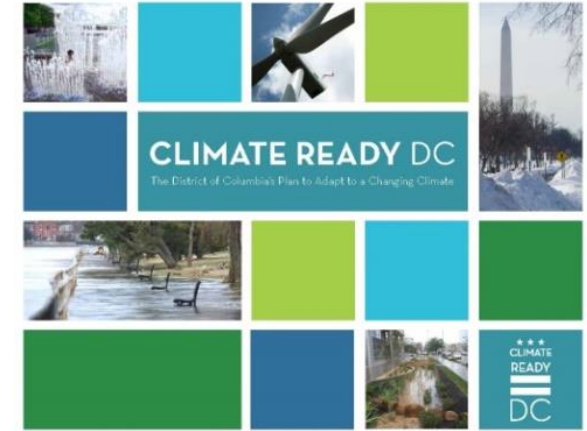
CUT ENERGY USE 50%

50% RENEWABLE ENERGY

NET ZERO NEW BUILDINGS

NET ZERO RETROFITS

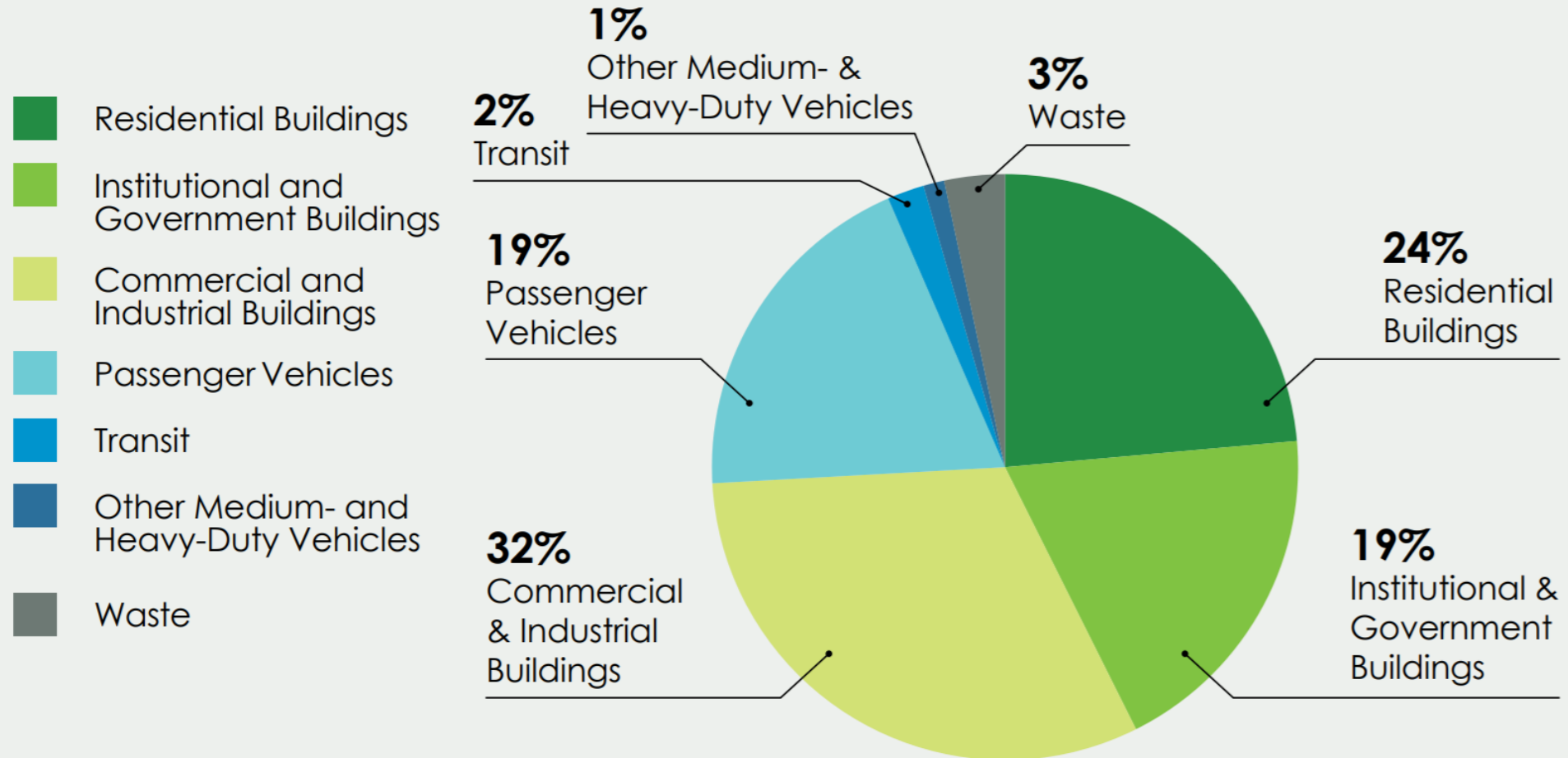
CUT GHG EMISSIONS 50%

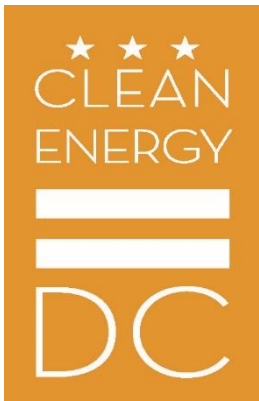


2050: Mayor Bowser Commitment to ZERO Carbon

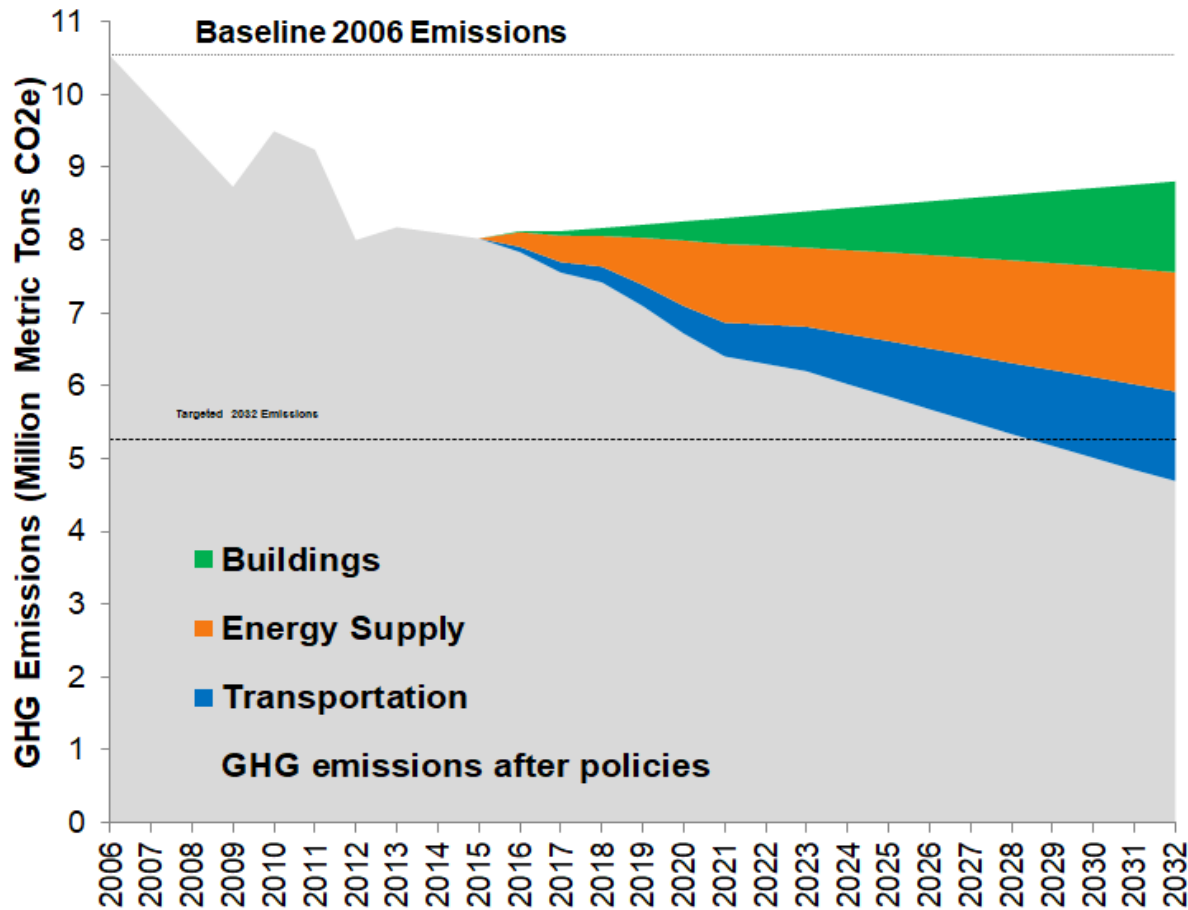
ENERGY USE AND EMISSIONS IN DC

MODELED PROPORTION OF GHG EMISSIONS BY SECTOR

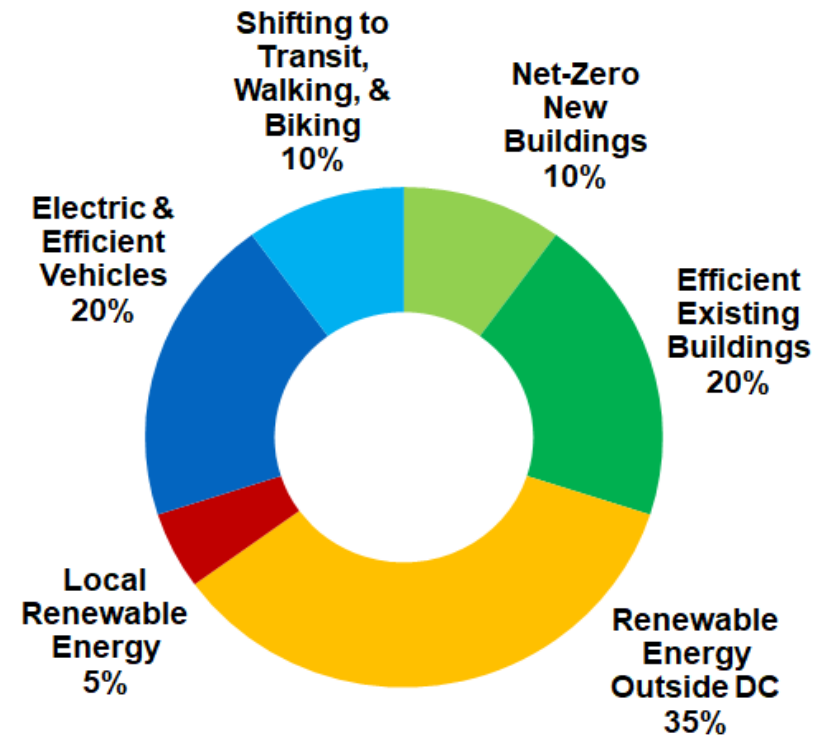


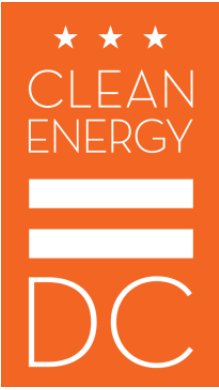


ESTIMATED GHG SAVINGS: 56%



RELATIVE IMPACT OF ACTION AREAS





NET-ZERO ENERGY CONSTRUCTION CODES

- NZE codes are called for in Clean Energy DC Plan (Recommendation NC.1), but not (yet?) codified in law
- Next planned code update 2023
 - Targeting zero energy ready
- Stepping down to reach NZE by 2026
 - All new construction and major renovation





[LIMS Home](#) > [Legislation Detail](#)

Under Council Review

B24-0420 - Clean Energy DC Building Code Amendment Act of 2021



Introduced



First Reading



Final Reading



Mayoral
Review



Congressional
Review



Official Law

Additional Information:

BILL SUMMARY - As introduced Bill 24-420 would require that all new construction be subject to the District's voluntary net zero energy standard known as Appendix Z by a date certain.



NZE INCENTIVES

<https://doee.dc.gov/node/1509771>

District of Columbia
Department of Energy and Environment



NOTICE OF FUNDING AVAILABILITY AND REQUEST FOR APPLICATIONS (RFA)

Building Innovation Design Assistance
(Short name: Building Innovation Design Assistance)
RFA #2021-2101-USA

Publication Date: December 4, 2020

Application Deadline: January 11, 2021 at 4:30 p.m.

<https://dcra.dc.gov/page/zero-energy-zero-carbon>

Zero Energy / Zero Carbon

DCRA in conjunction with the DC Sustainable Energy Utility (DCSEU) is proud to announce the launch of Washington DC's first volunteer Net-Zero Energy (NZE) Program! We are excited to bring you this industry leading program designed to help projects of all types and sizes meet the achievable and fulfilling goal of going Net-Zero. Below you will find helpful documents and guides, created to introduce you to the concept of DC NZE. Our program is hands on, so please reach out to us when you are ready to learn more. For NZE program questions, please [contact us](#). We look forward to hearing about your project.

How to Participate



Supporting Documents



Resources



TAG THIS PRESENTATION: @DOEE_DC



NET-ZERO ENERGY MEANS
ENERGY CONSUMED =
ENERGY GENERATED

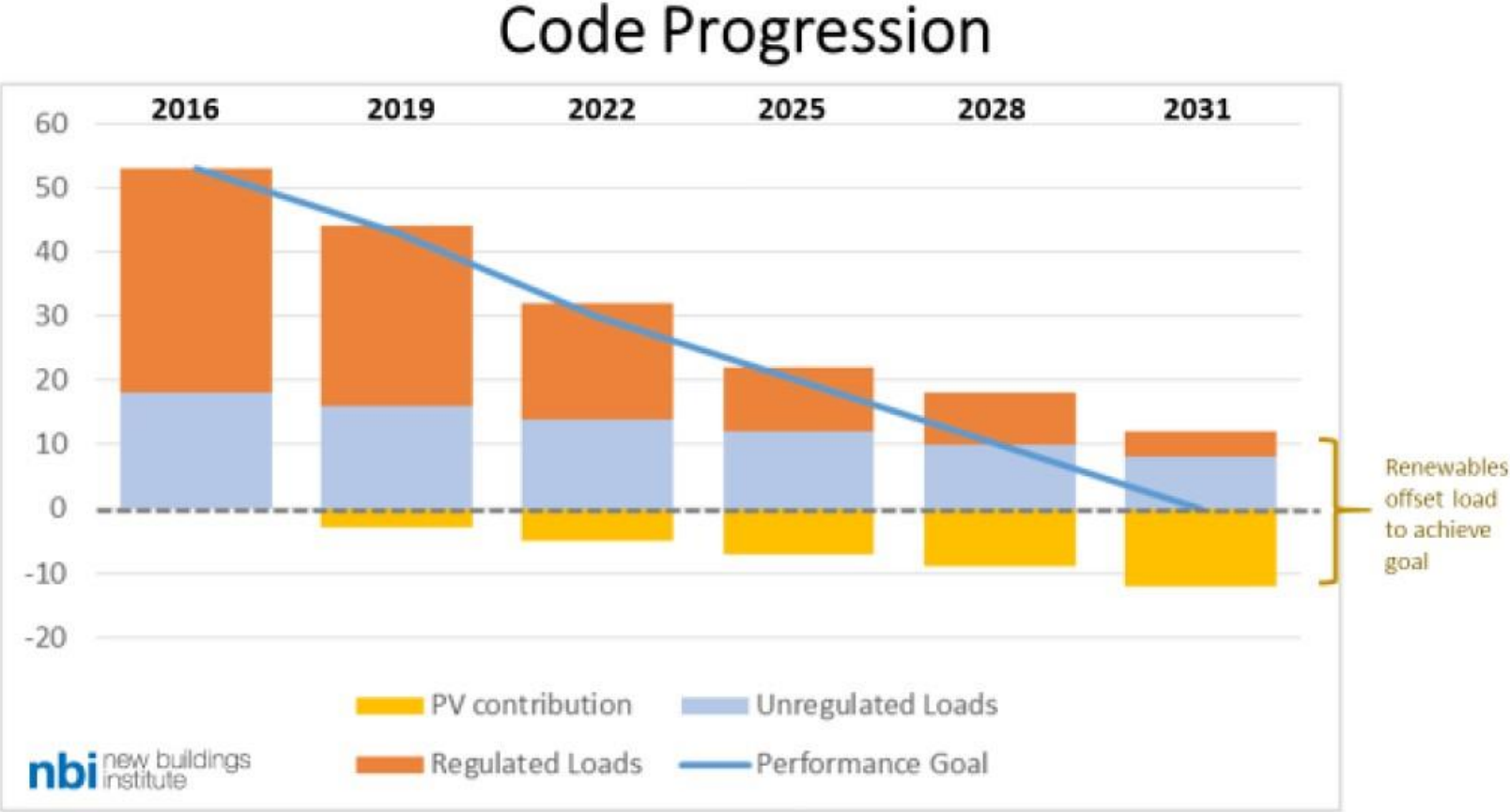
BUT, WHAT ABOUT...



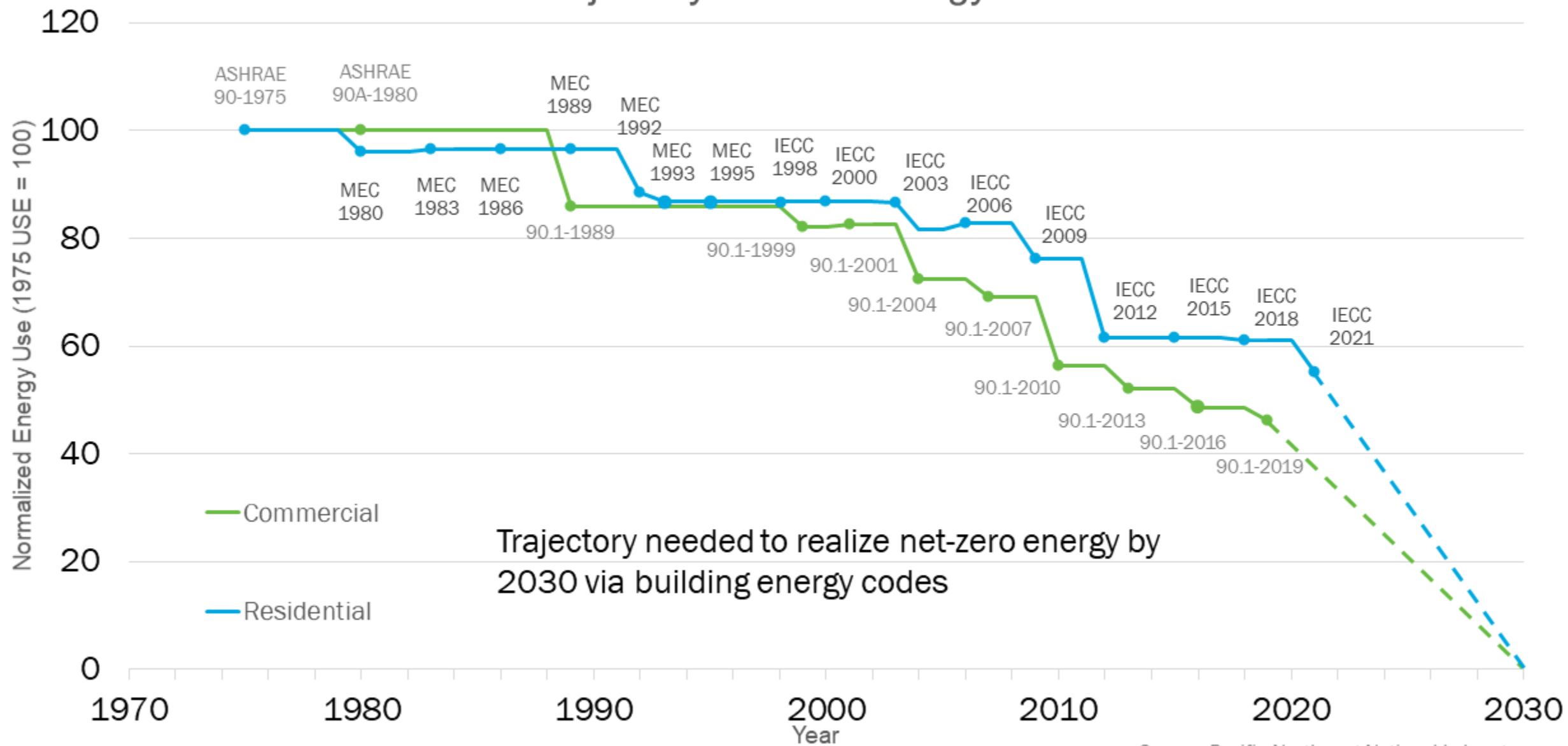
- Onsite versus offsite energy?
- Renewable energy qualifications?
- Onsite combustion?
- Modeled or performance based?
- Efficiency minimums or allow any building to offset consumption?



Code Progression to Zero Energy

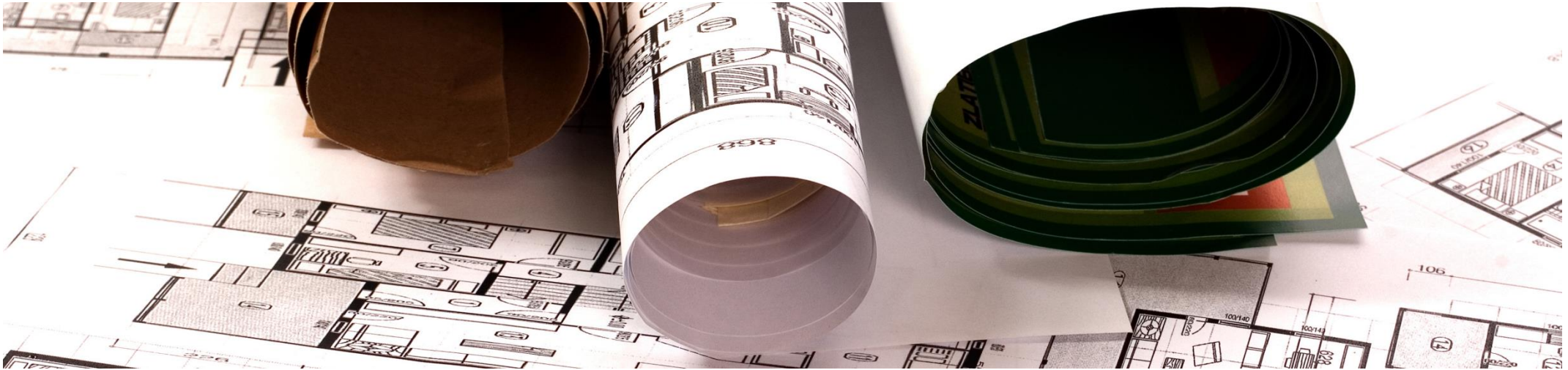


Improvement in Residential & Commercial Energy Code Trajectory to Zero Energy



Source: Pacific Northwest National Laboratory

MODEL CODE REFERENCES IN 2017 DC CONSTRUCTION CODES

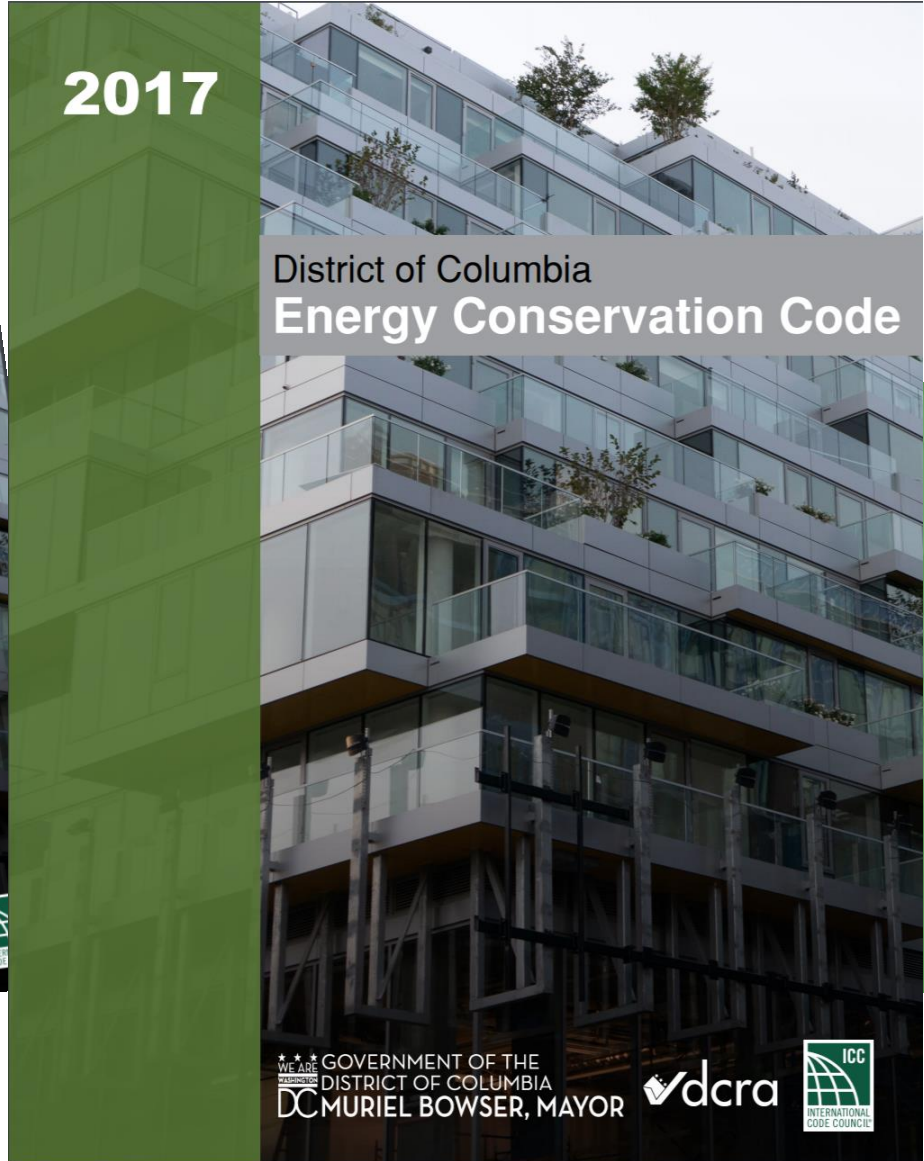


DC Construction Code

- 2017 DC Building, Residential, Fuel Gas Mechanical, Plumbing, Property Maintenance, Fire, and Existing Building Codes
- 2017 DC Green Construction Code
- 2017 DC Energy Conservation Code
- 2017 DC Electrical Code

National Model Code Reference

- 2015 International Codes Council (ICC) codes
- 2012 IgCC
- 90.1- 2013 (C) and 2015 IECC (R)
- 2014 National Electrical Code



<https://dcra.dc.gov/page/dc-construction-codes>

2017 DC COMMERCIAL ENERGY CONSERVATION CODE

Appendix Z – Net-Zero Energy Compliance Path

- Nation's first net zero energy code
- Voluntary
- Simplified pathway for commercial NZE projects to comply with energy code
- Provides working definition of net-zero energy in DC

“The design of a *net-zero energy building* shall be achieved through the use of three complementary approaches, to be employed to the maximum extent feasible, in the following order:

Reducing building energy demand for heating, cooling, lighting and ventilation through the use of passive design and improved envelope performance techniques.

Reducing total building energy demand through the installation of high-efficiency mechanical systems, hot water systems, power systems, lighting, and process equipment.

Supplying remaining building energy needs from renewable sources of energy. “

2017 DC COMMERCIAL ENERGY CONSERVATION CODE

Appendix Z – Net-Zero Energy Compliance Path, continued

Minimum efficiency requirements

- Max heating demand (4.2 kBtu/ft²/yr) & max cooling demand (6.4 kBtu/ft²/yr)
- Zero Energy Performance Index (zEPI) of 30 or lower, source energy
- Commissioning requirements from DC ECC
- Airtightness testing (0.25 cfm/ft² at 75 Pa)

Renewable energy

- On-site combustion prohibited (exception for commercial kitchens)
- On-site generation preferred
 - Min 5% generated on-site, or 25% site area allocated to PVs
- Off-site procurement requirements
 - 5 year PPA for solar or wind energy generated in DC/MD/VA

Energy reporting

- Annual energy benchmarking with DOEE
- Performance verification within 24 months of occupancy
 - 12 continuous months demonstrated NZE



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Q & A

Thank you

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