



Lovejoy Office Building | Portland, OR Credit: Opsis Architecture

nbi new buildings
institute

Building Codes and Climate Goals

Climate Camp | April 2021



California Lottery Santa Fe Springs | Santa Fe Springs, CA Credit: LPAS Architecture + Design

nbi new buildings
institute

Mission

To achieve better buildings that are zero energy, zero carbon, and beyond – through research, policy, guidance and market transformation – to protect people and the planet.

Building Codes 101

What's a Building Code?

- Laws that regulate how we design and build
- Covers everything from structural design to energy use
- Impact on new construction and existing buildings

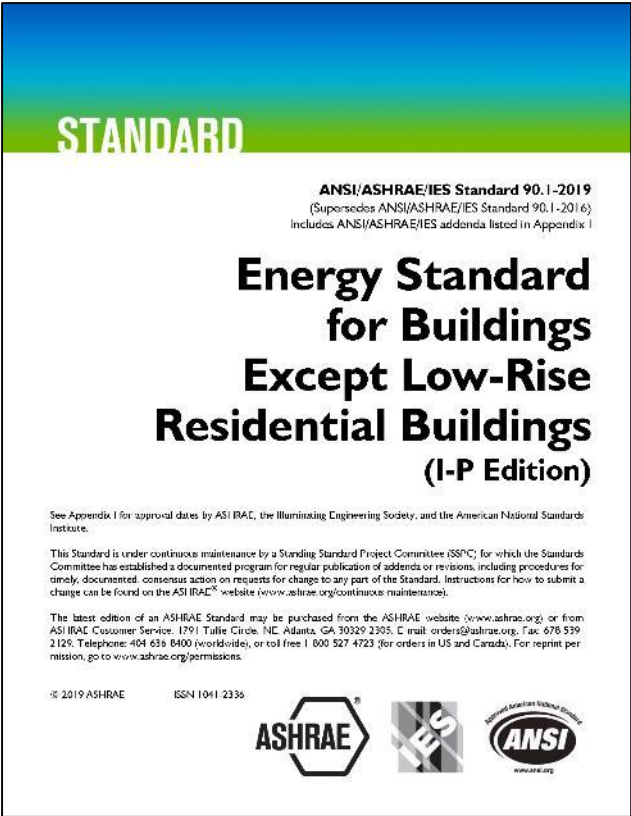


Code and Standards Bodies

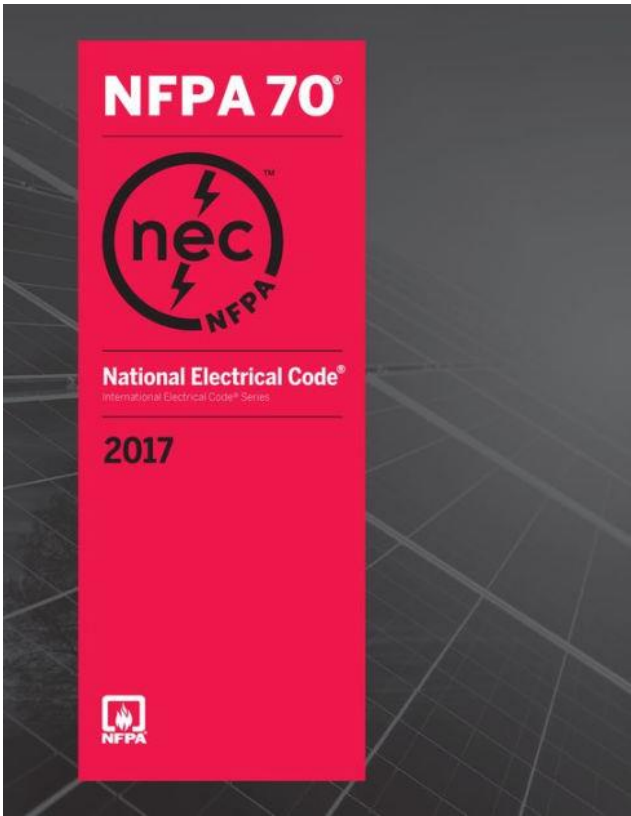
International Code Council



ASHRAE



NFPA



Code/Standard Development

- Committees are convened
- Proposals are developed, submitted and vetted
- Proposals are sent out for public comment
- Proposals finalized and voted on
- New editions are published (~3 years)



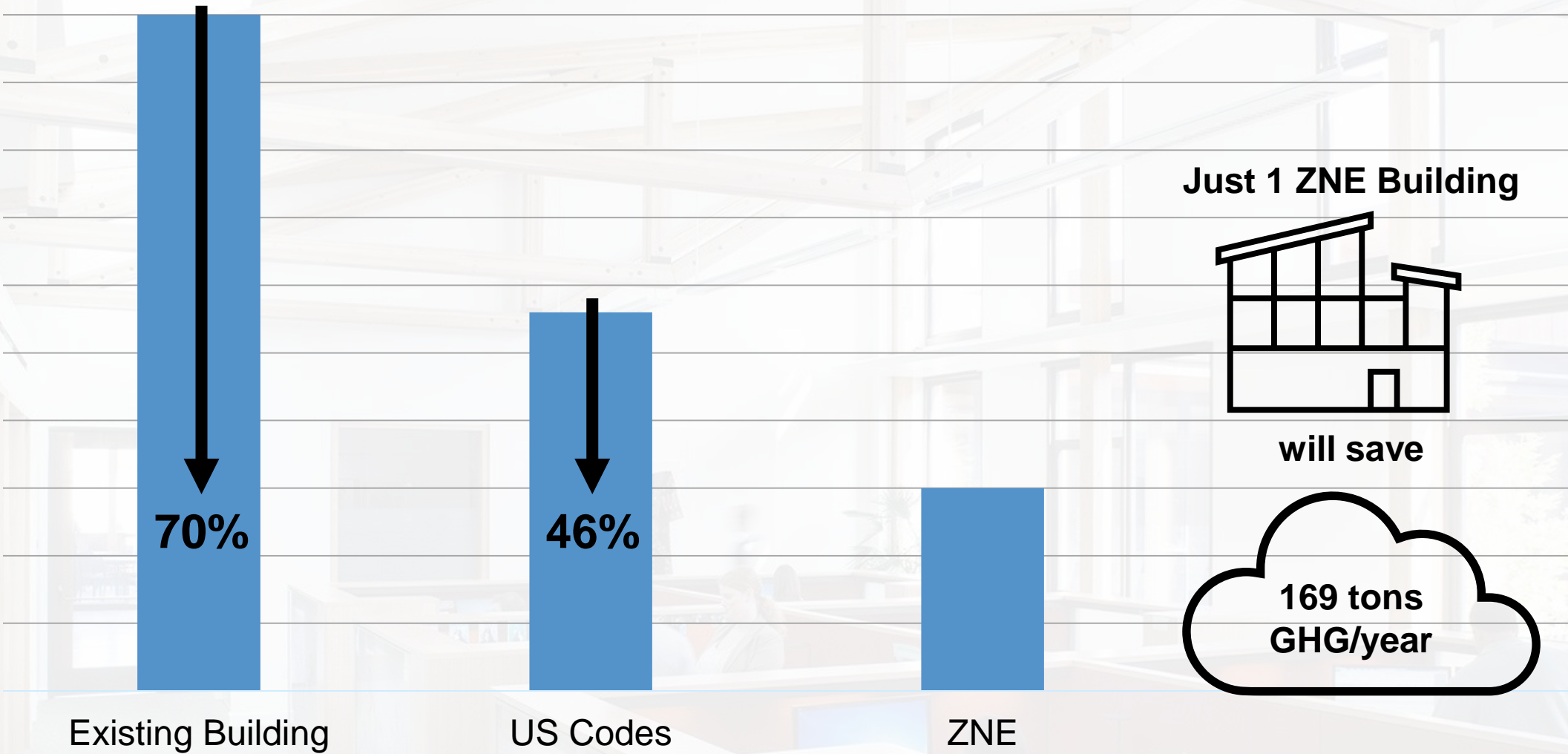
75%
electricity
consumption

The infographic features three overlapping blue circles. The largest central circle contains the text '38% US Emissions'. To its left is a circle with '75% electricity consumption', and to its right is a circle with '50% fossil gas consumption'. The background is a photograph of a modern building with a balcony, surrounded by trees and a blue sky with clouds.

**38% US
Emissions**

50% fossil gas
consumption

Office Building Energy Use





**Cut GHG
50% by 2030;
Zero by 2050**



**Re-enter Paris
Agreement**



**Limit global
warming to 1.5
degrees Celsius**

1.5° Code Framework

Understanding Carbon



Embodied Carbon

Manufacture, transport and installation of construction materials

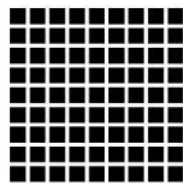
Operational Carbon

Building energy consumption

The Five Foundations of Zero Carbon Building Policies



Energy
Efficiency



Renewable
Energy



Grid Integration
+ Storage



Building
Electrification



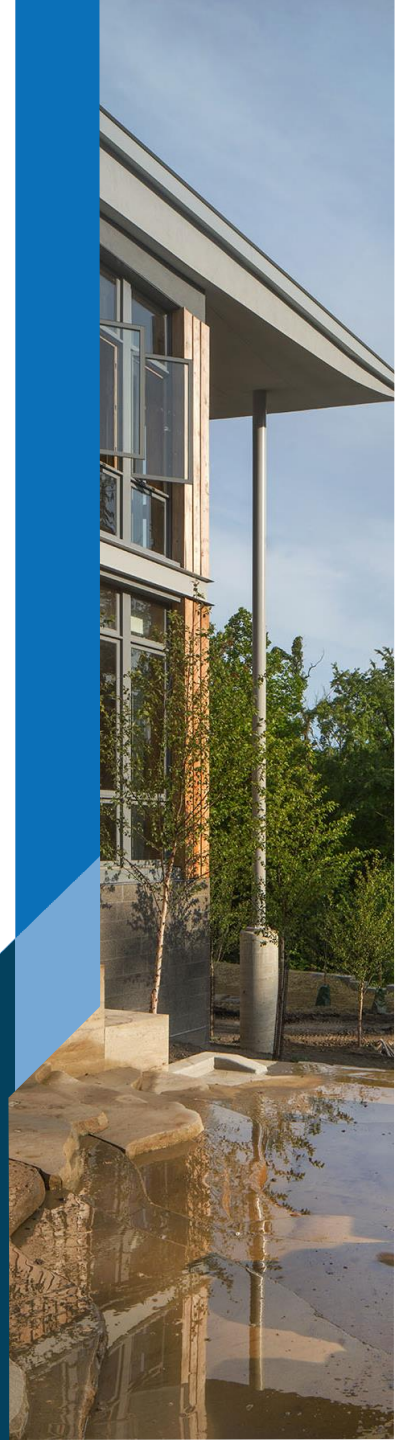
Life-Cycle
Impacts



Zero
Carbon
Building
Policy

Scope and Goal

	Scope	Goal
Efficiency	Base Codes / Building Systems	Highly Efficient / Passive Resilience
Electrification	Building Systems + Vehicles	Prohibit all on-site combustion
Renewables	Onsite, Offsite + Procurement	Onsite resilience, Support RPS and additive procurement
Grid Integration	Controls, Storage	TOU Carbon reduction and Grid-sensitive
Lifecycle Impact	Embodied Carbon, Refrigerants + Deconstruction	Lifecycle GHG reductions
Equity	[TBD]	Ensure just transition, Improve health, Workforce Opportunities



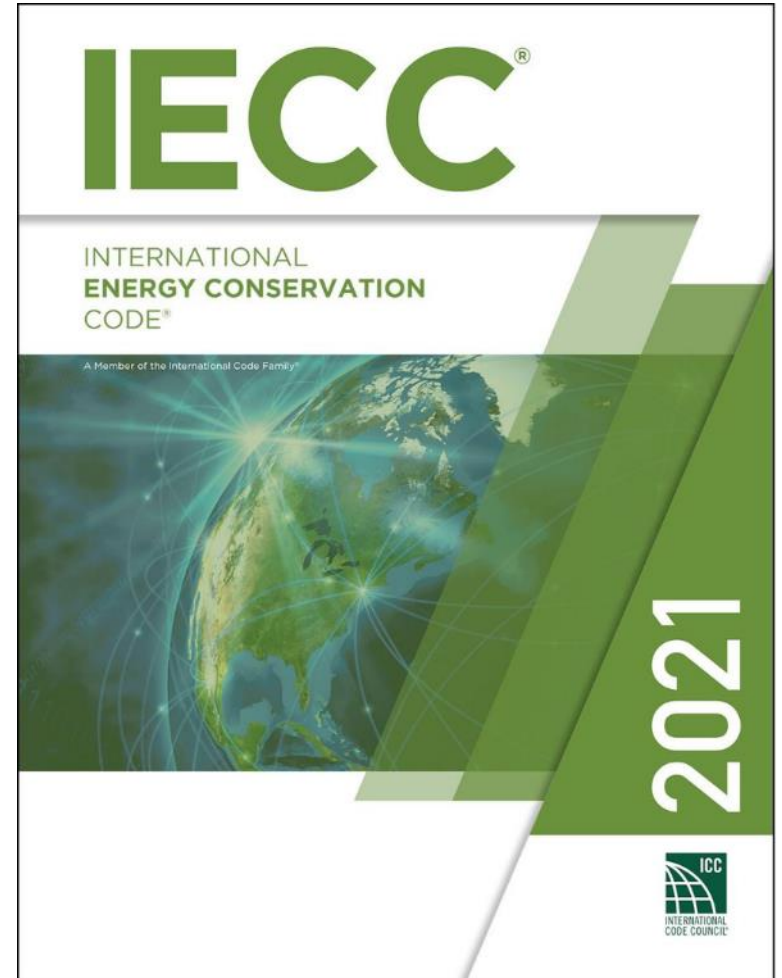


Energy Efficiency

Impacting base codes and building systems to
achieve highly-efficient, passively resilient buildings

ICC Energy Code Status

- 2021 produced :
 - ~10% efficiency gain
 - The most challenges to the code development process
- Change IECC from code to standard
- Removed voting process for governmental members
- Call for development committees closed April 23.

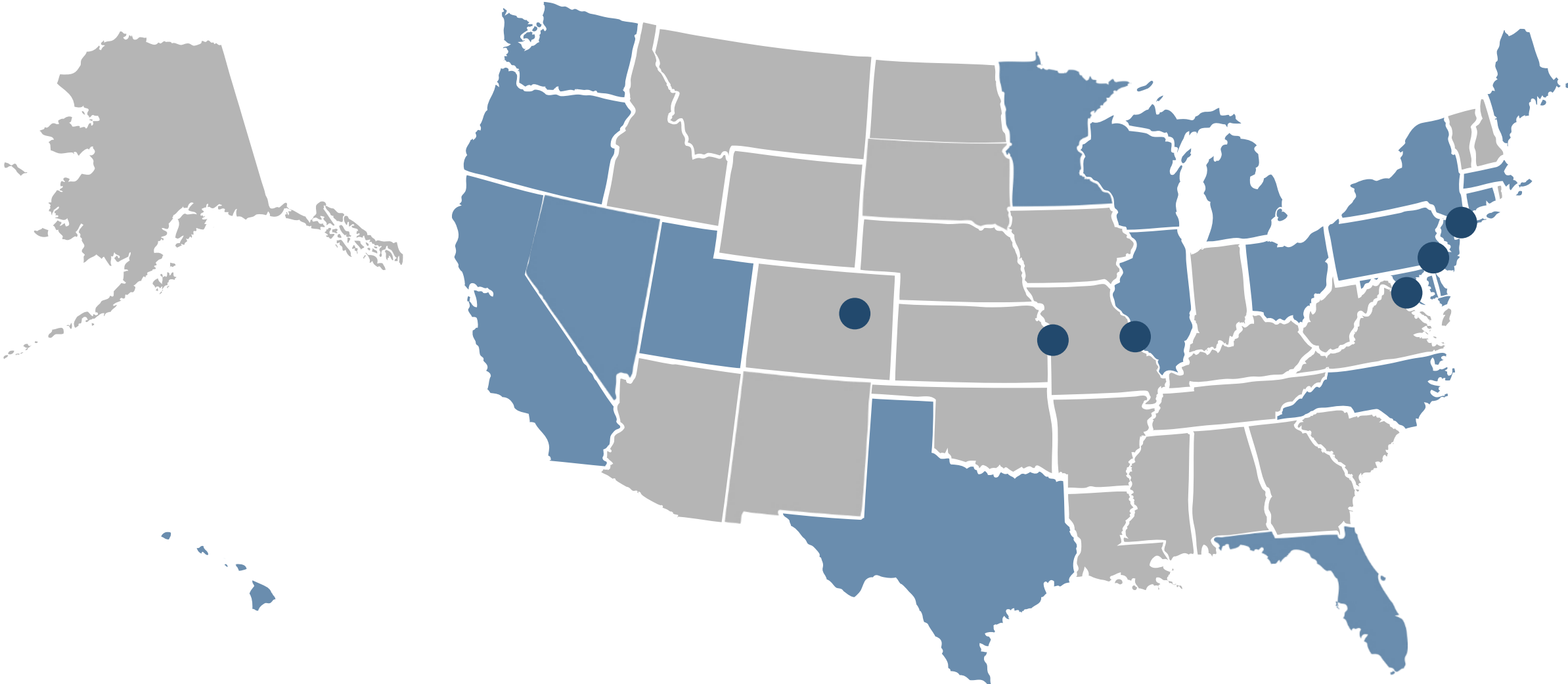


ASHRAE Energy Standard

- 90.1 Determination Released
 - 4.7% site energy
 - 4.3% source energy
 - 4.3% energy cost
 - 4.2% carbon emissions
- Building Decarbonization Task Force
- Standard 228p released for public comment April 2, 2021
- 90.1 and 189.1 technical work supported by National Labs



Codes Developing through 2023

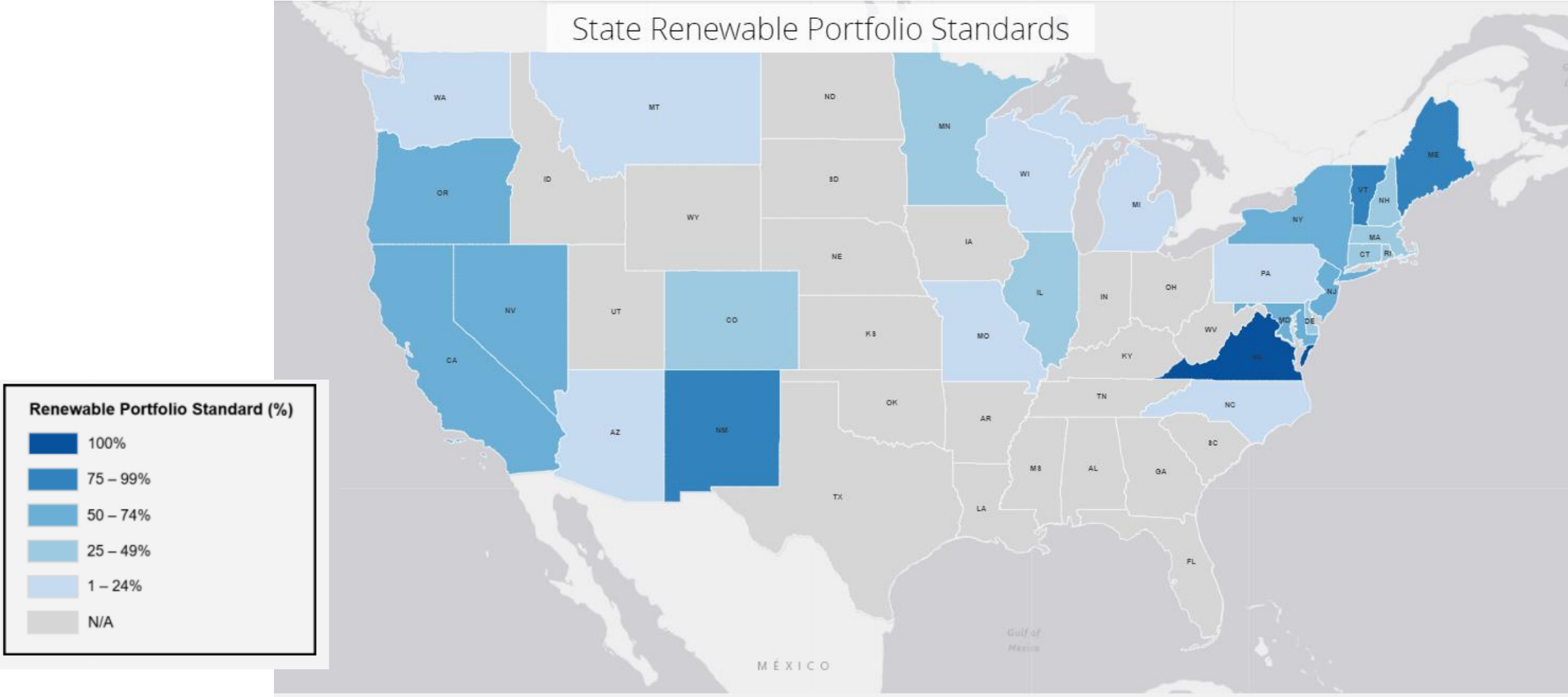




Renewable Energy


Providing onsite, offsite and procurement regulation to achieve resilience, support RPS and additive generation

State Renewable Portfolio Standards



Reference: <https://www.nrdc.org/resources/race-100-clean>

Renewable Energy in Code



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 2030, 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 this type of code language.

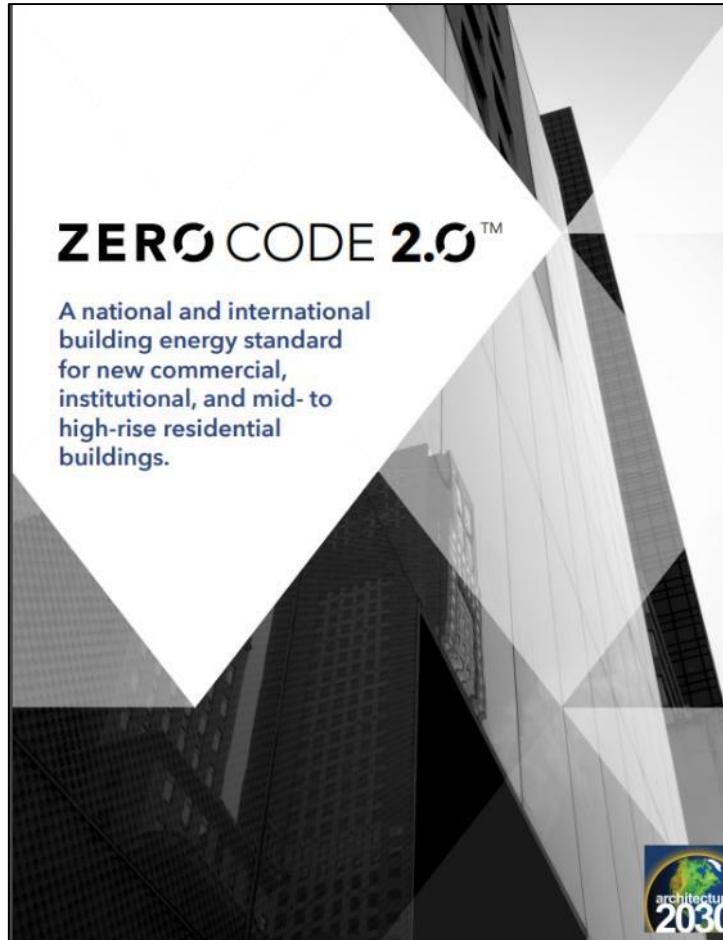
Integrating a zero energy building appendix into the 2021 IECC as a jurisdictional requirement or option will make the model energy code a more robust policy tool.

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.




The Cottle Zero Energy Home | San Jose, CA
Credit: One Sky Homes



ZERO CODE 2.0™

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



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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.

his 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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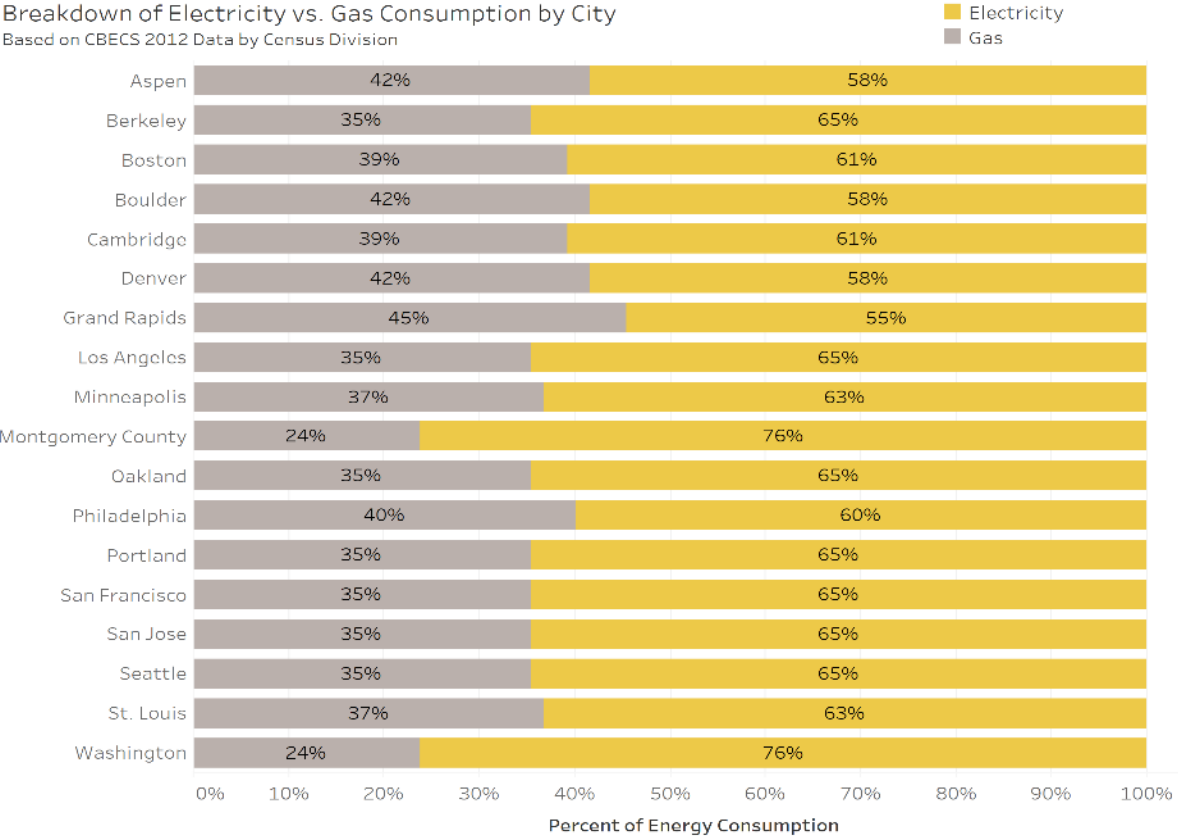
Electrification

All building systems and vehicles
powered by clean electricity

Gas v. Electric Commercial Bldgs (Site BTUs)

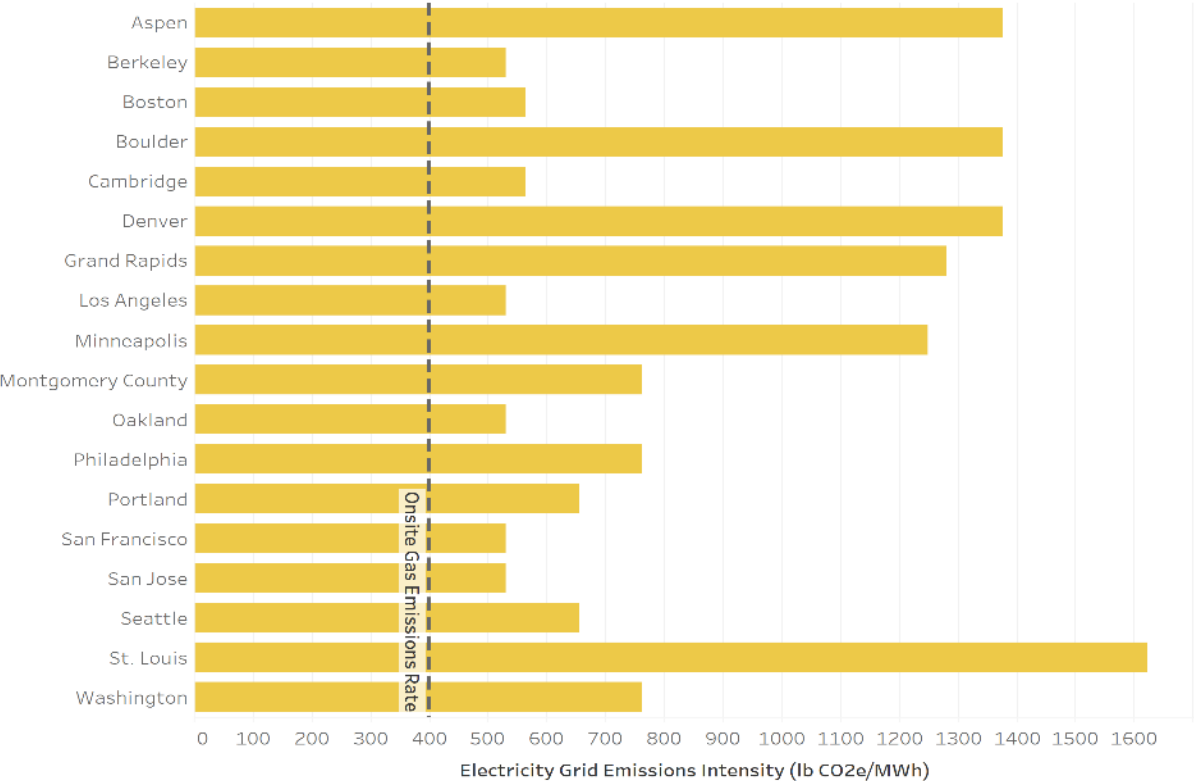
Breakdown of Electricity vs. Gas Consumption by City

Based on CBECS 2012 Data by Census Division



Emissions intensity of electricity generation by city

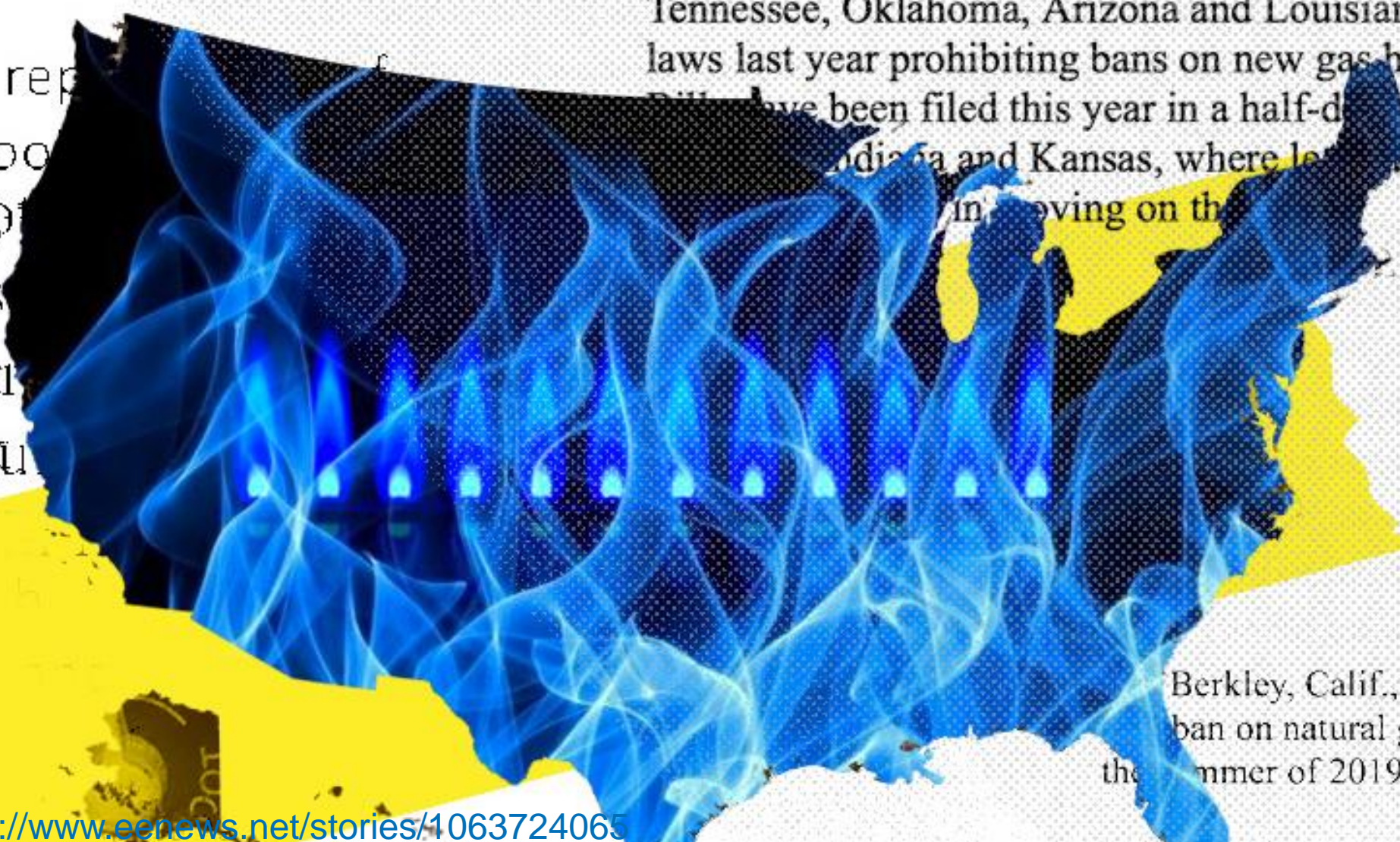
Data from eGrid 2016 and Portfolio Manager



Gas ban backlash spreads across the U.S.

Jeffrey Tomich, E&E News reporter • Published: Tuesday, February 2, 2021

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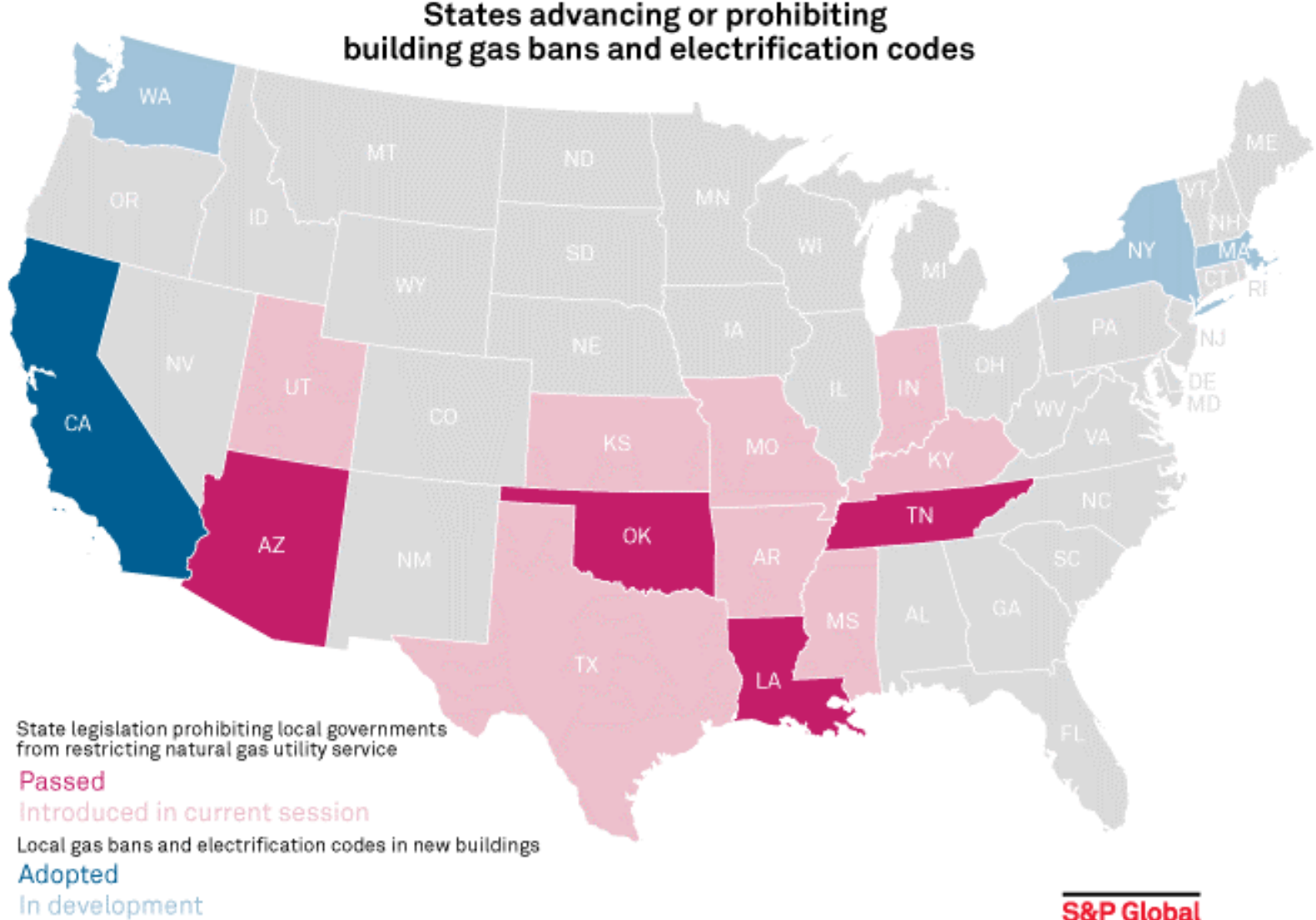


Tennessee, Oklahoma, Arizona and Louisiana enacted laws last year prohibiting bans on new gas hookups. Bills have been filed this year in a half-dozen others, including Indiana and Kansas, where legislators have been moving on the

Berkley, Calif., City Council ban on natural gas hookups the summer of 2019.

A year and a half later, the decis

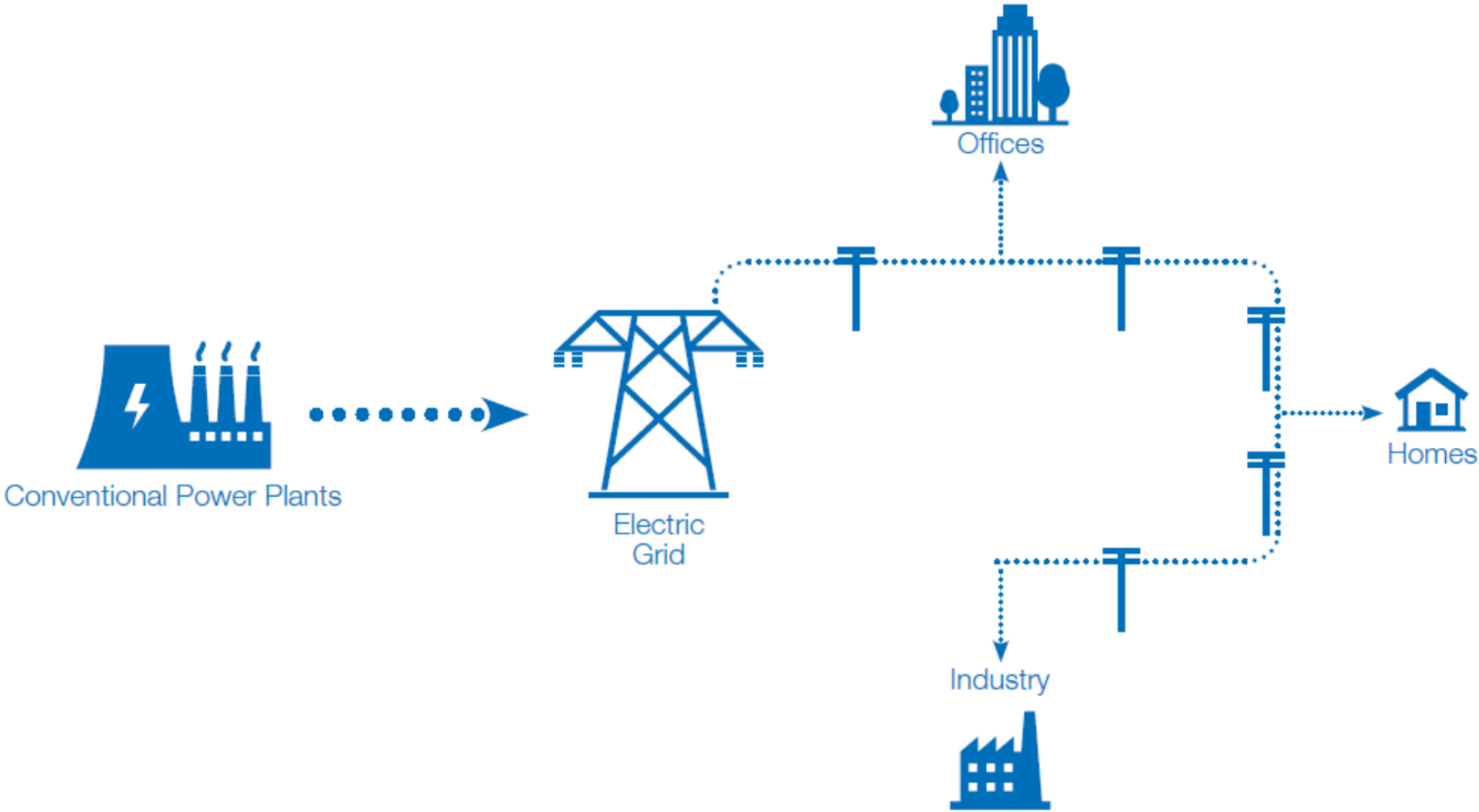
Opportunities and Distractions



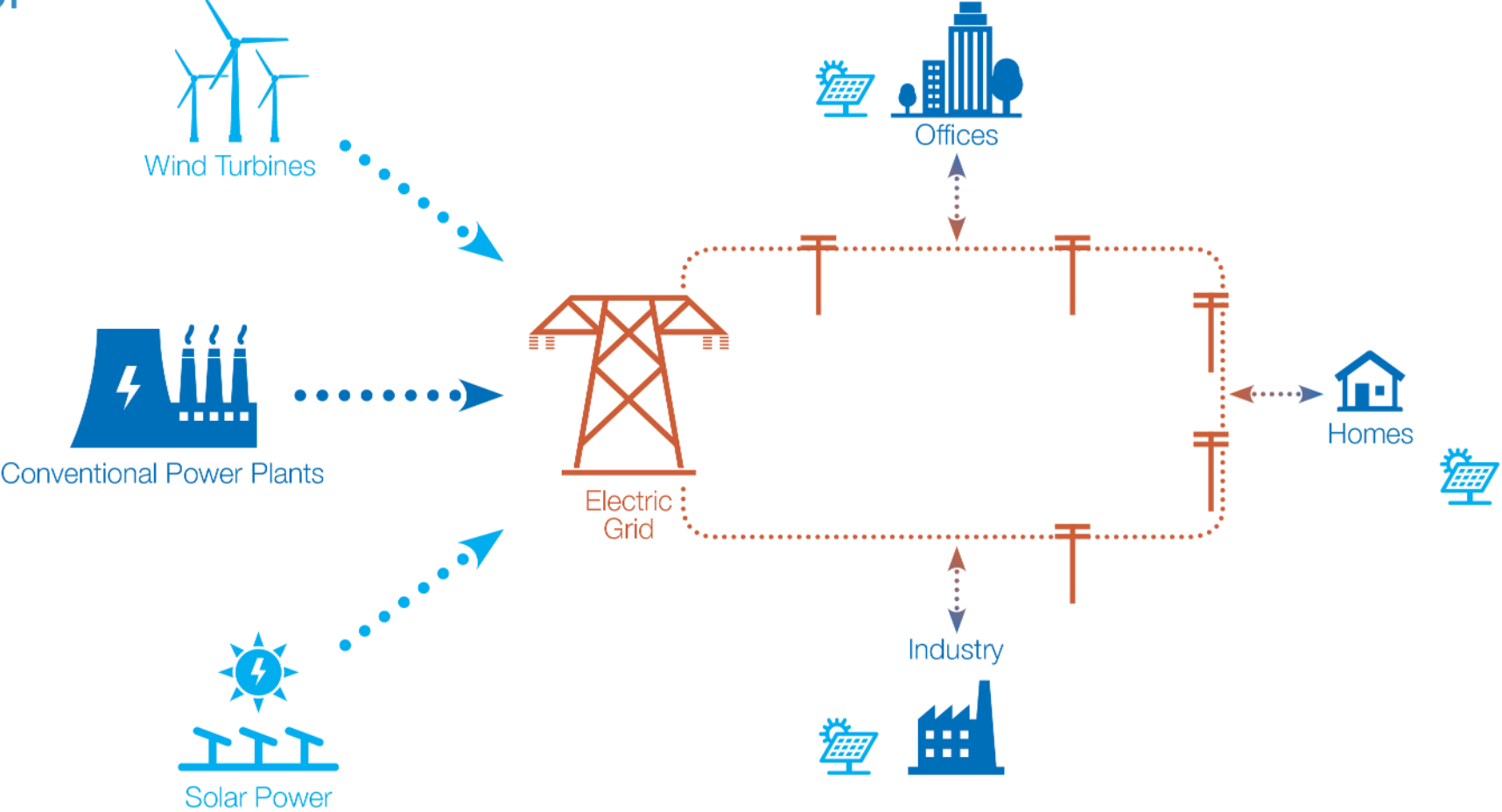
Grid Integration

Buildings include controls and storage to respond to time-of-use carbon and resilience signals

One-Way Grid



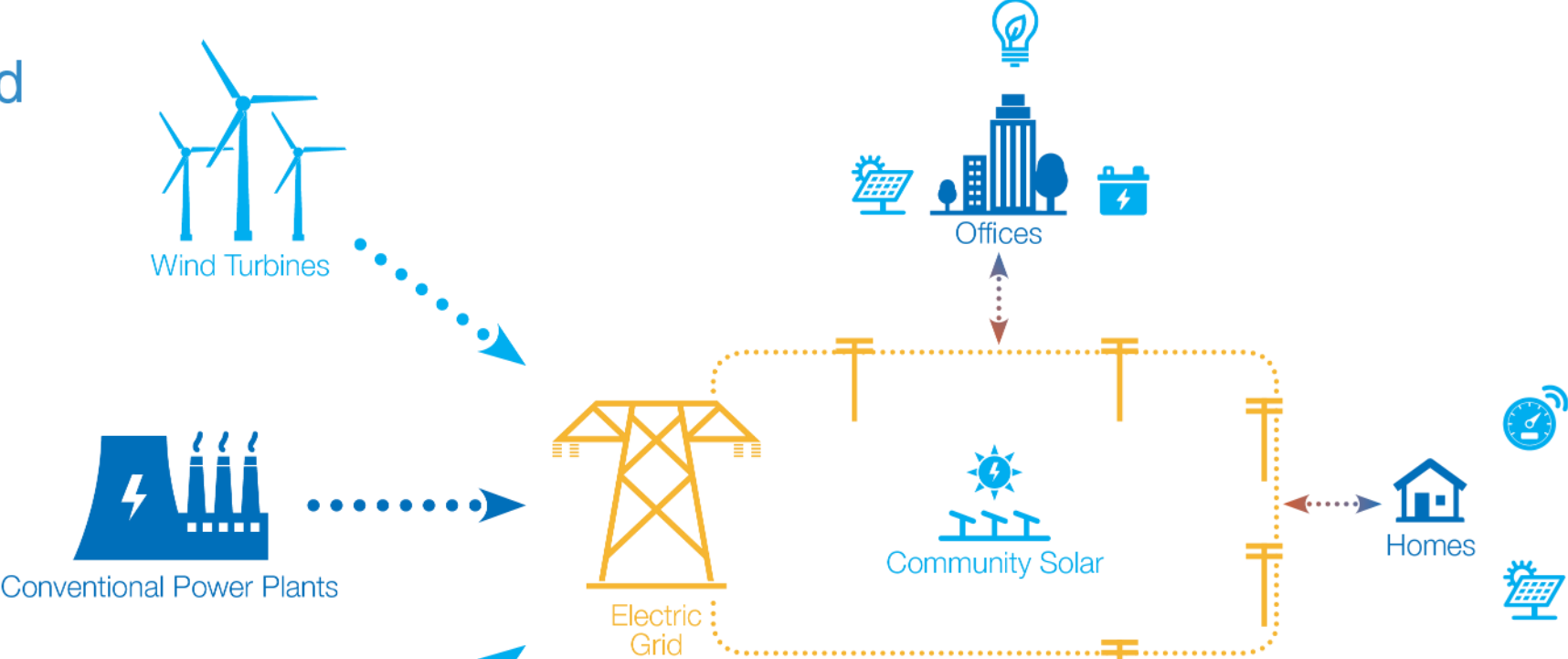
The proliferation of distributed generation creates a need for more active grid management



GridOptimal Technologies and Strategies:



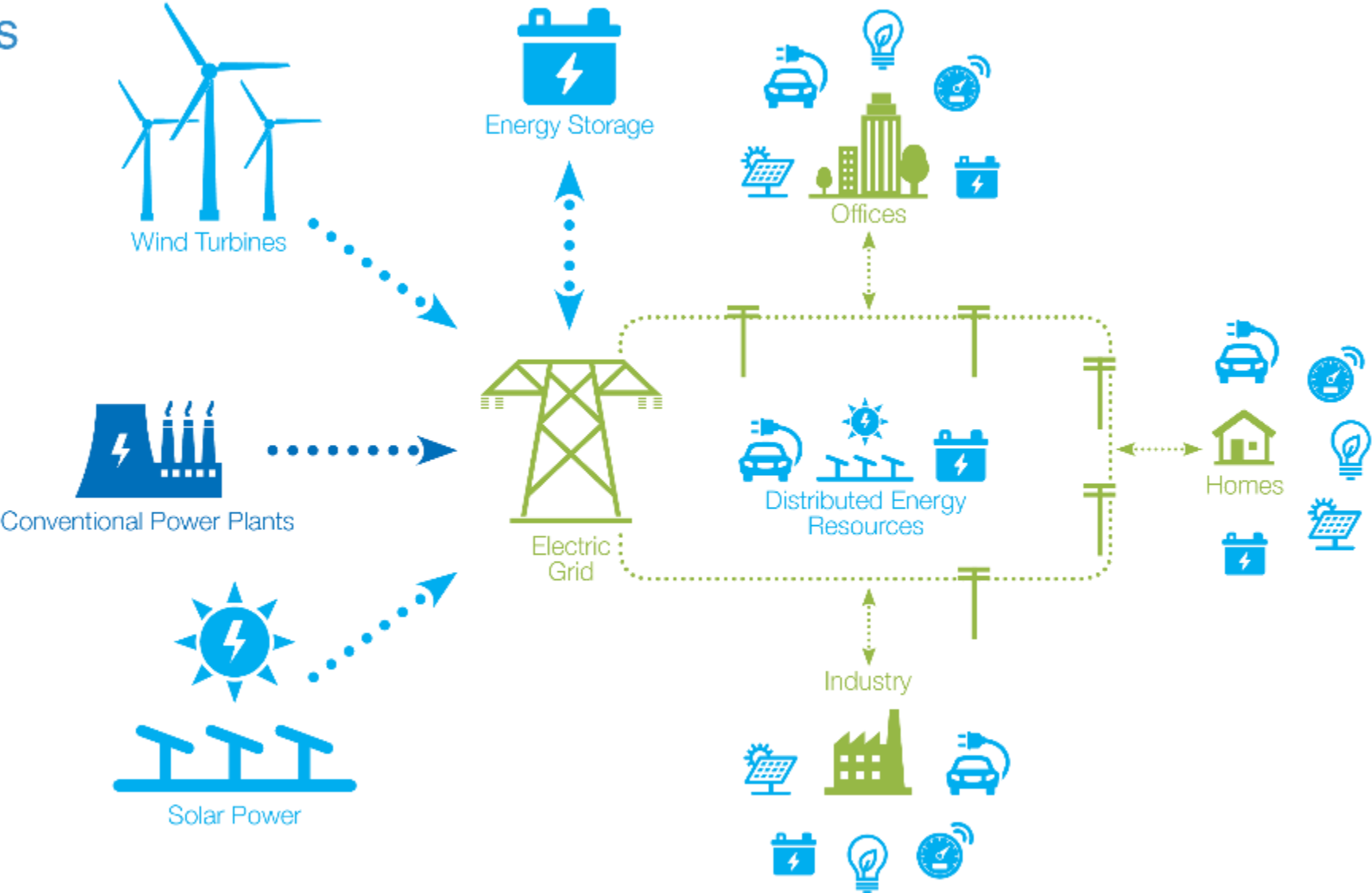
Storage and smart devices can help support clean grid operations



GridOptimal Technologies and Strategies:

- renewable energy
- energy efficiency
- electric vehicle
- energy storage
- smart connected controls

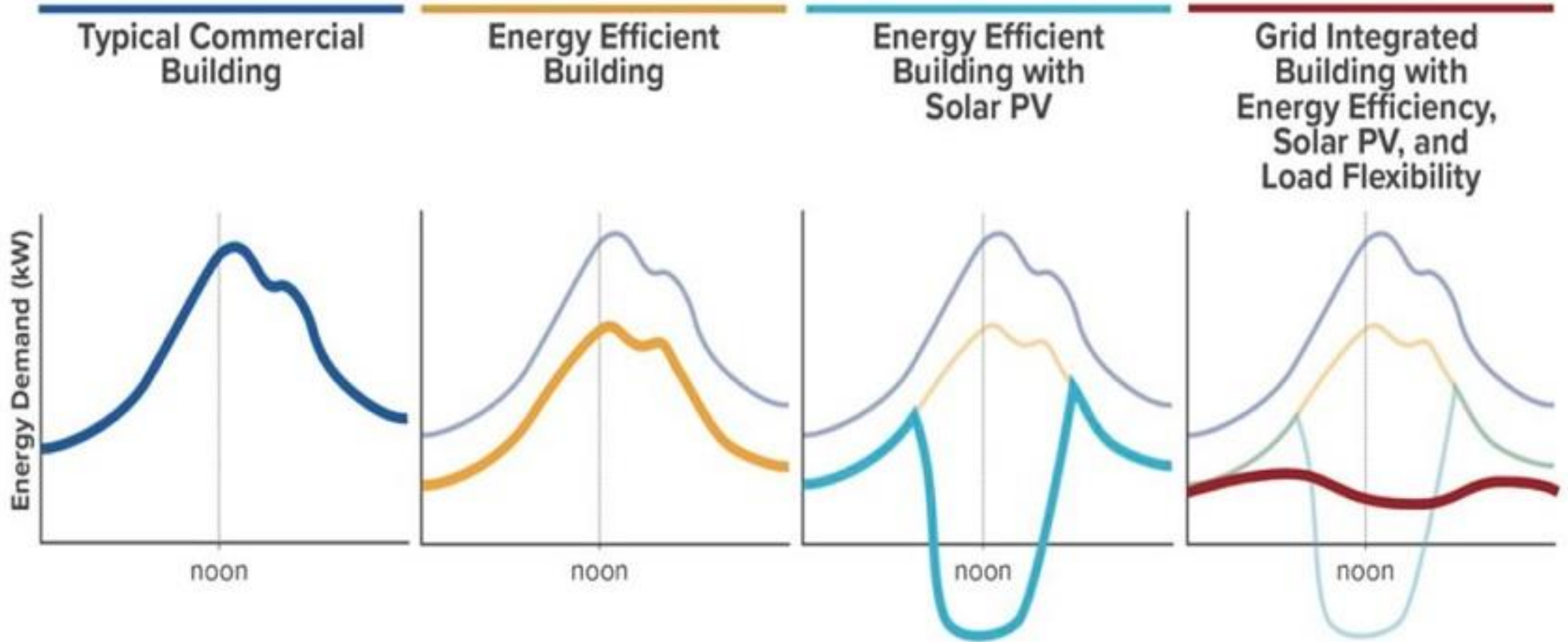
GridOptimal empowers players on both sides of the meter to actively support the transition to a carbon free grid



GridOptimal Technologies and Strategies:

-  renewable energy
-  energy efficiency
-  electric vehicle
-  energy storage
-  smart connected controls

Impact of Grid-Integrated Buildings

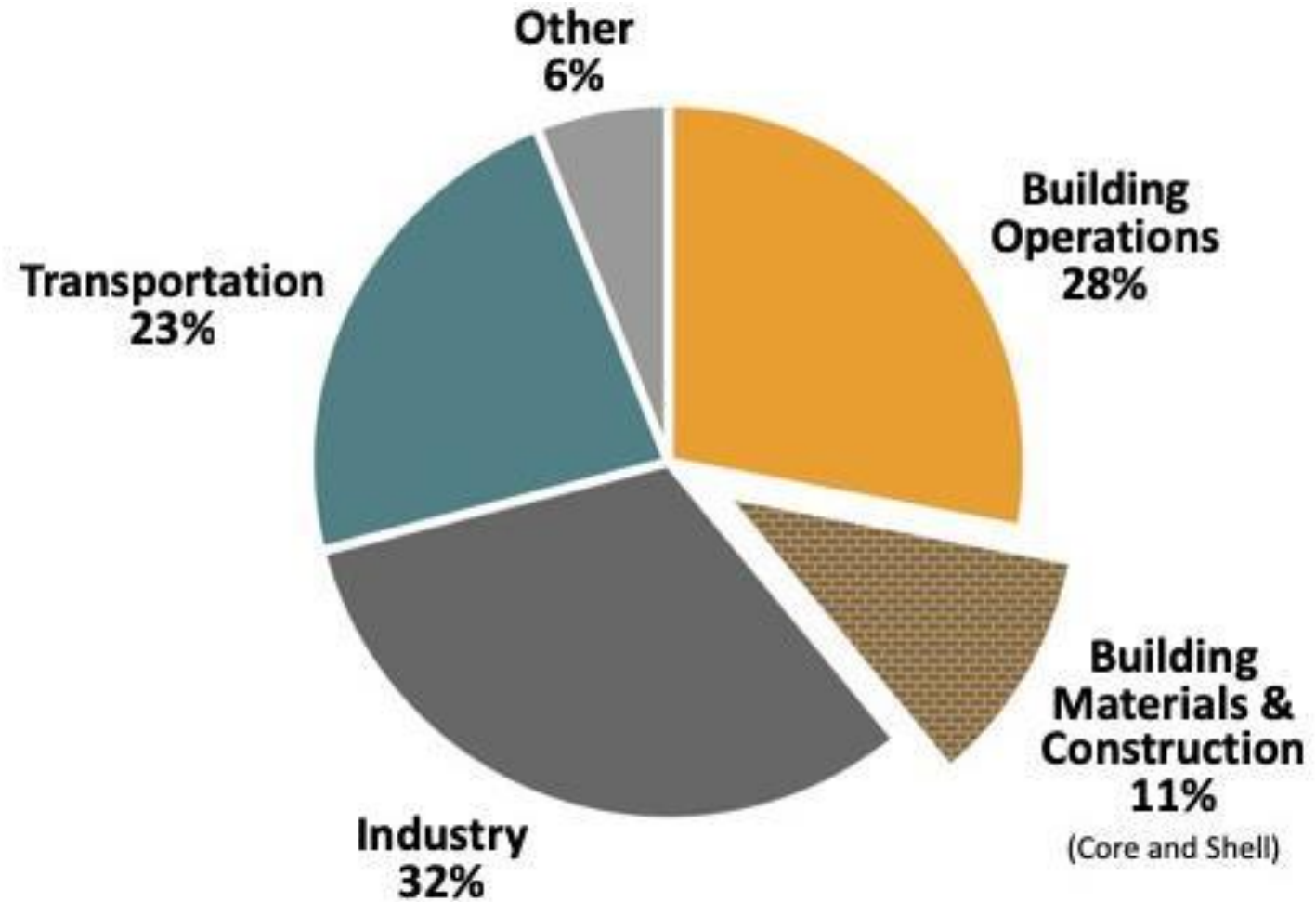




Lifecycle Impact

Design for embodied carbon, refrigerants, and deconstruction to reduce the lifecycle GHG impact of buildings

Global CO₂ Emissions



Policy Solutions

APPLIANCE STANDARDS

THERE IS STILL ENORMOUS ROOM FOR IMPROVEMENT TO EXISTING STANDARDS

HERE'S WHAT THAT WOULD MEAN PER YEAR BY 2050:

ELECTRICITY SAVINGS

335
BILLION KILOWATT HOURS (KWH)

EQUAL TO ELECTRICITY PRODUCED IN A YEAR BY

60,000 NEW WIND TURBINES



LOWER UTILITY BILLS

\$65 BILLION

ABOUT WHAT AMERICANS SPEND ON LOTTERIES EVERY YEAR



WATER SAVED

850 BILLION GALLONS

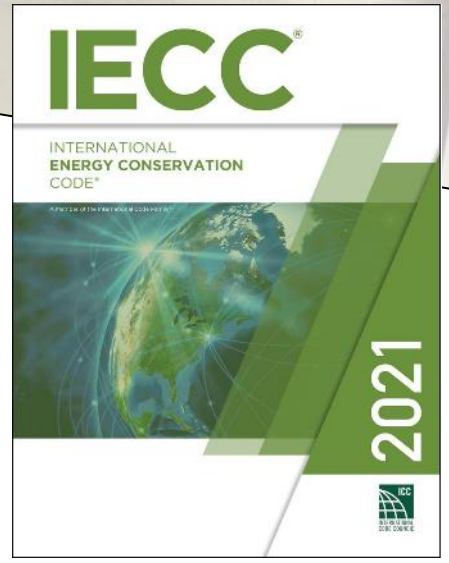
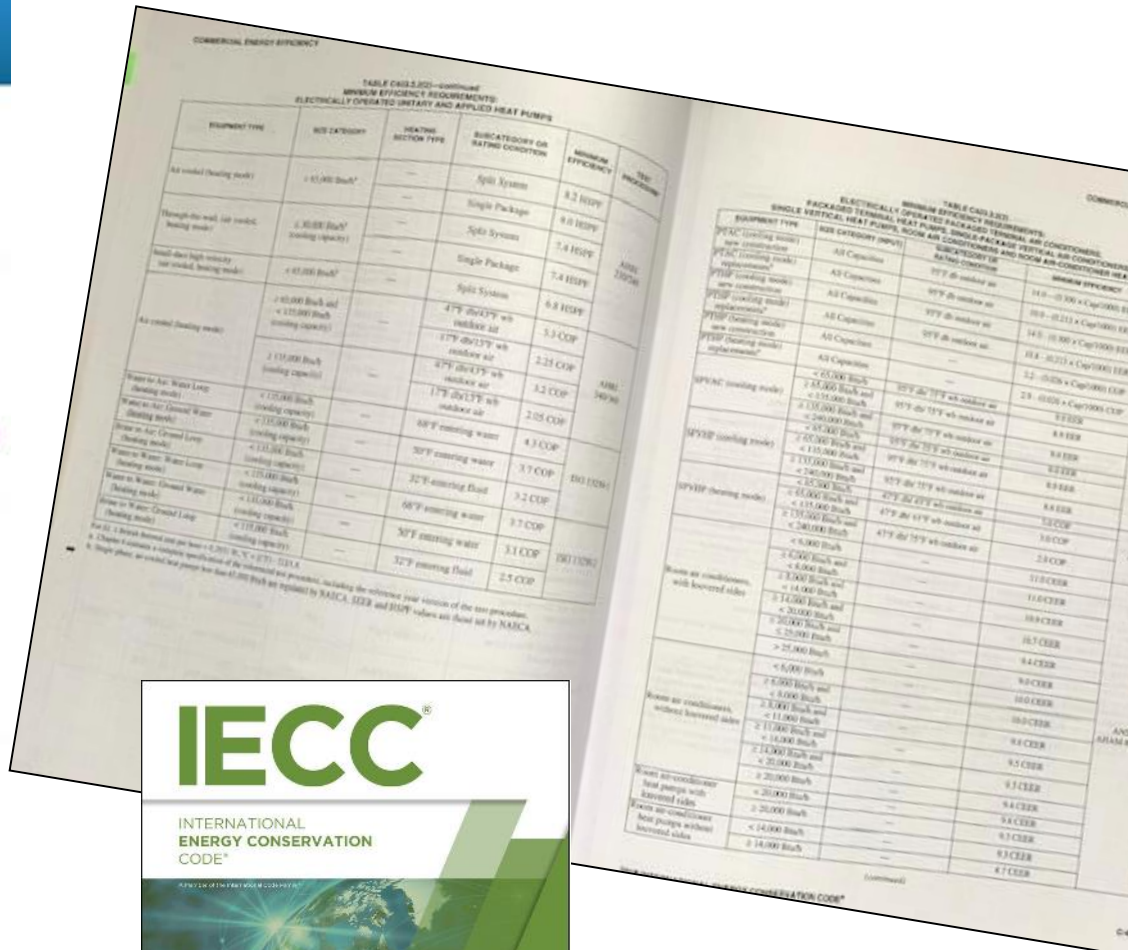


EQUAL TO WHAT **TEXAS** HOUSEHOLDS USE IN A YEAR

CLIMATE EMISSION CUTS

200 MILLION METRIC TONS OF CARBON DIOXIDE

EQUAL TO ANNUAL POLLUTION FROM **60** COAL-FIRED POWER PLANTS

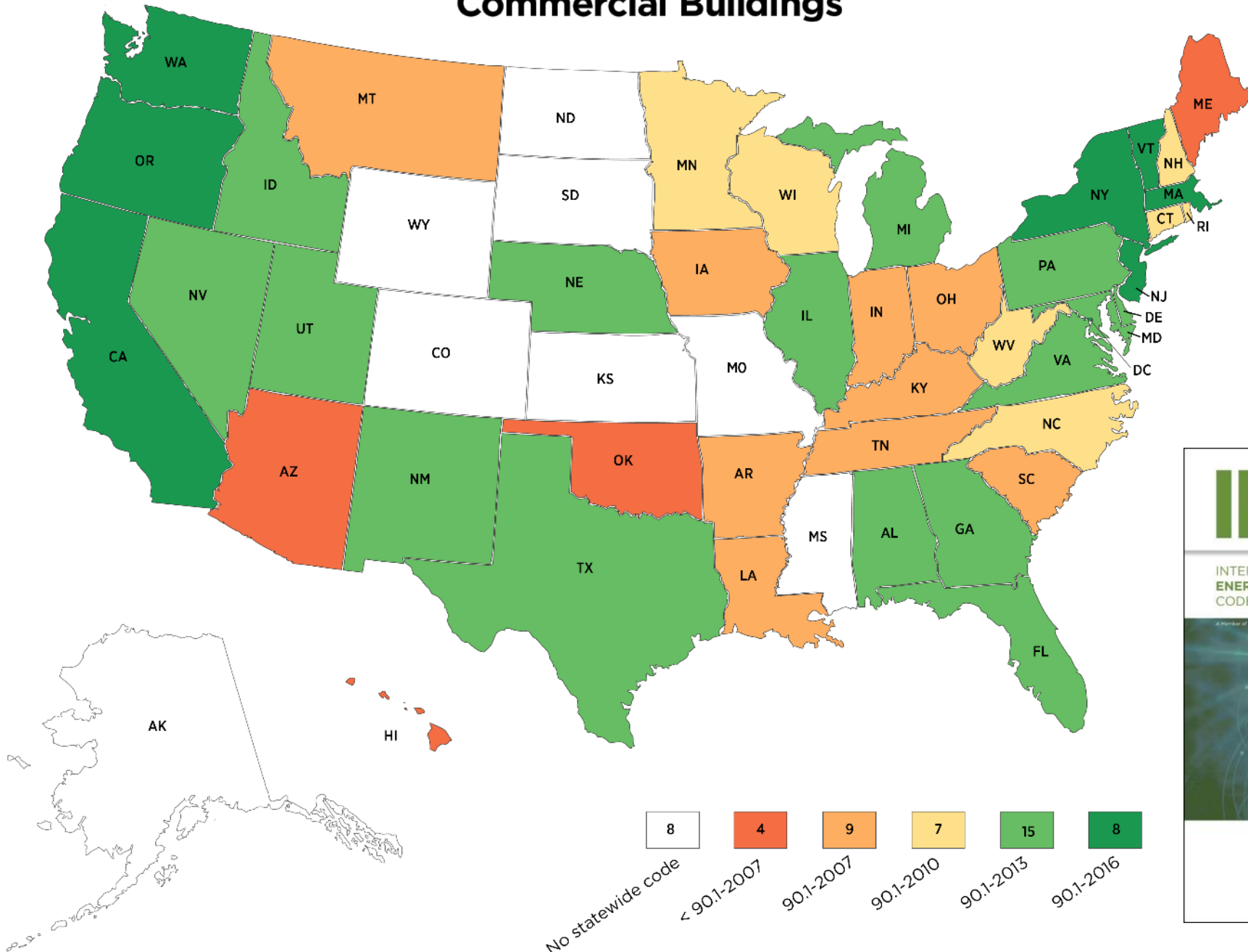


LEARN MORE AT APPLIANCE-STANDARDS.ORG

ASAP | APPLIANCE STANDARDS AWARENESS PROJECT

ACEEE
American Council for an Energy-Efficient Economy

Commercial Buildings



STANDARD

ANSI/ASHRAE/IES Standard 90.1-2019
(Supersedes ANSI/ASHRAE/IES Standard 90.1-2005)
Includes ANSI/ASHRAE/IES addenda listed in Appendix I

Energy Standard

IECC®

INTERNATIONAL
**ENERGY CONSERVATION
 CODE®**

2021

Low-Rise Buildings
Buildings
(I-P Edition)

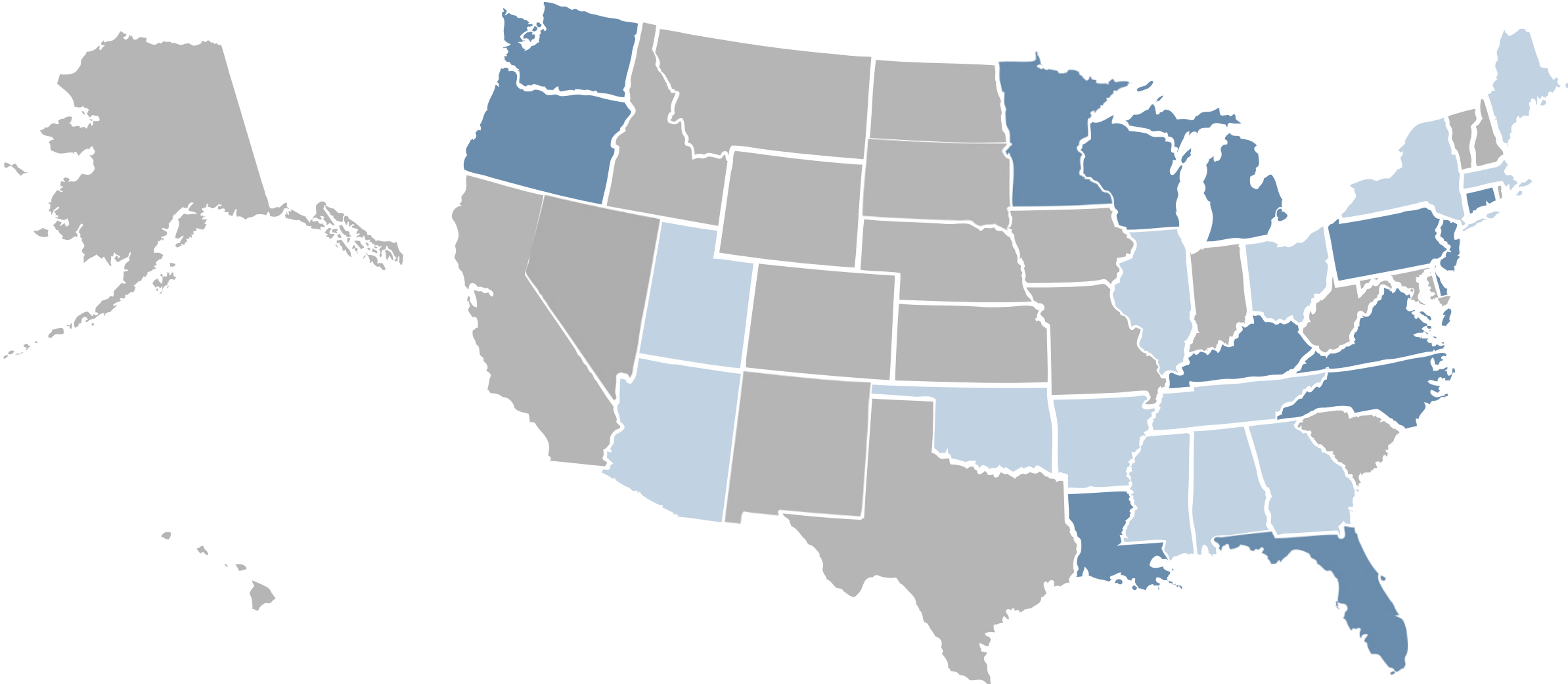
ICC
 INTERNATIONAL CODE COUNCIL



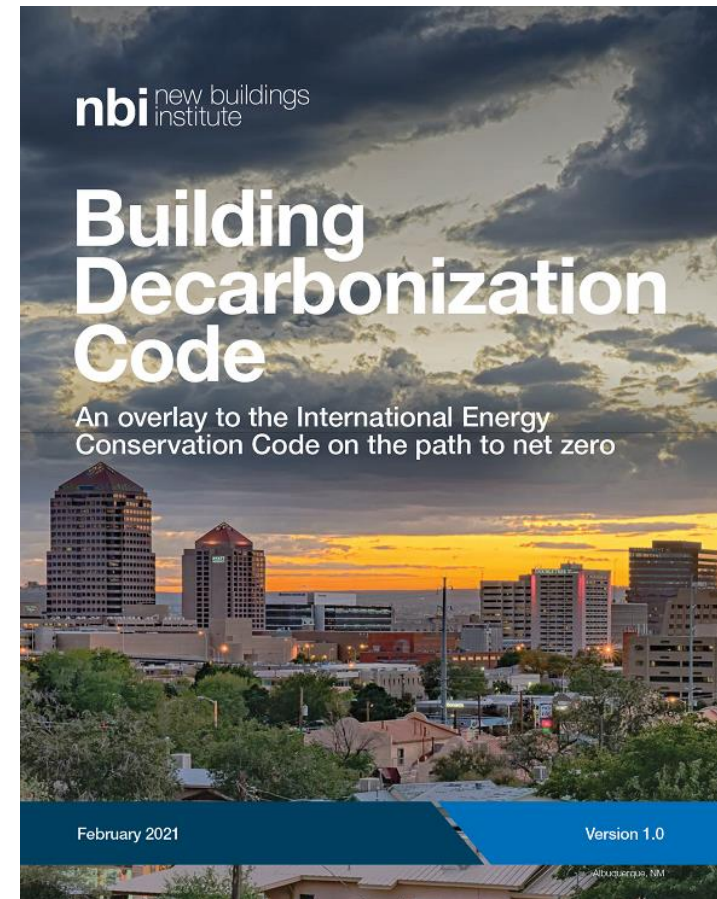
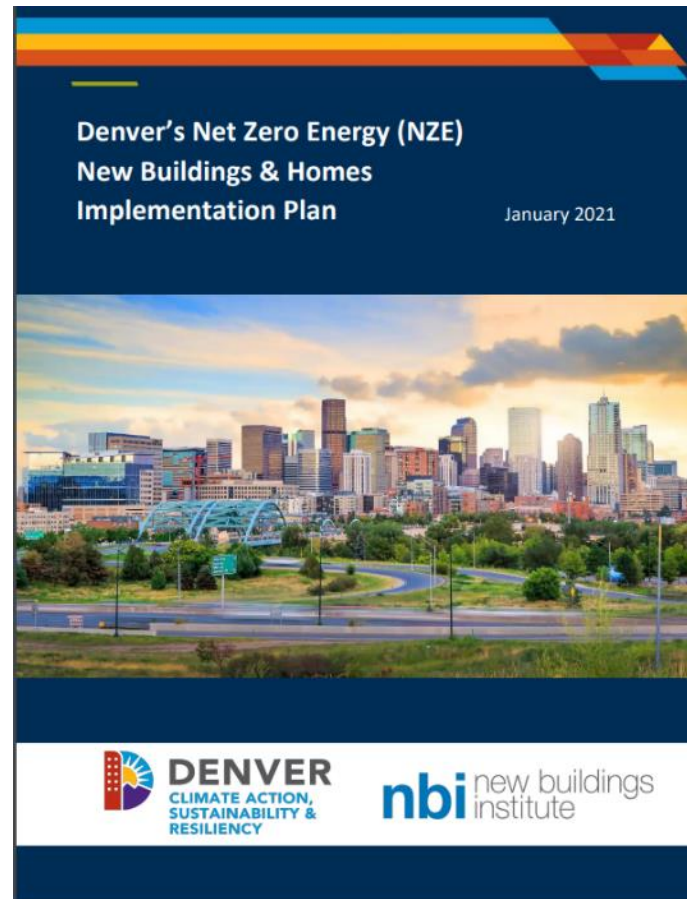
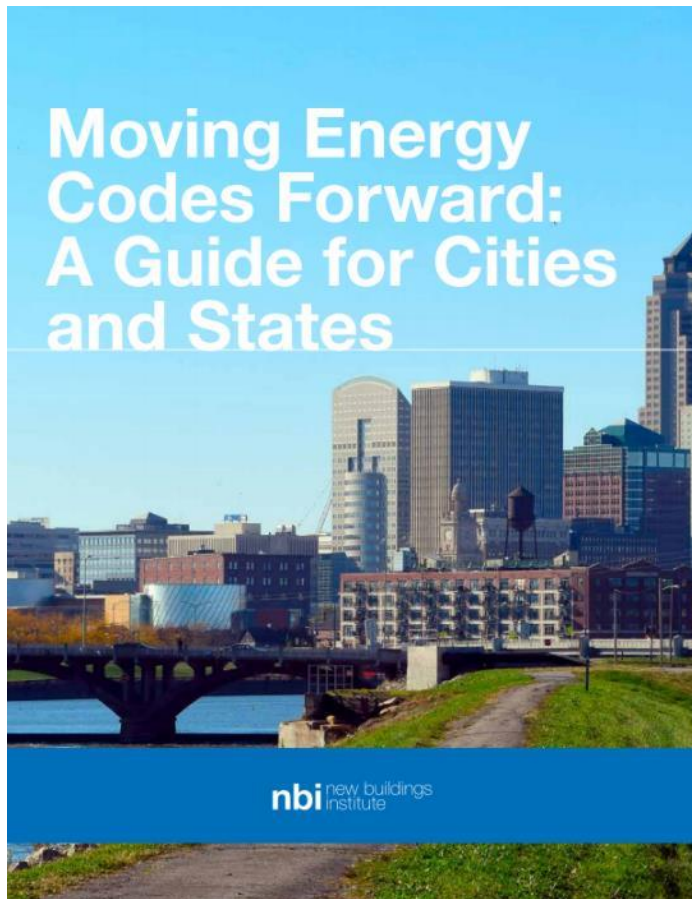
ASK ABOUT
ENERGY STAR
CERTIFIED HOMES



State Level Preemption



“Beyond” Code





Save the Date!

GETTING TO
zero
FORUM 2021

October 27-29, 2021

New York City

Join building and energy industry leaders at the premier global event dedicated to defining a low-energy, low-carbon future for the built environment.

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Questions?

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