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Environmental and
Energy Study Institute

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CONGRESSIONAL BRIEFING

**Congressional Climate Camp #4:
Federal Policies for Climate Mitigation and
Adaptation Win-Wins**

Briefing Series: Congressional Climate Camps

Friday, April 30, 2021

About EESI...



NON-PROFIT

Founded in 1984 by a bipartisan Congressional caucus as an independent (i.e., not federally-funded) non-profit organization



NON-PARTISAN

Source of non-partisan information on environmental, energy, and climate policies



DIRECT ASSISTANCE

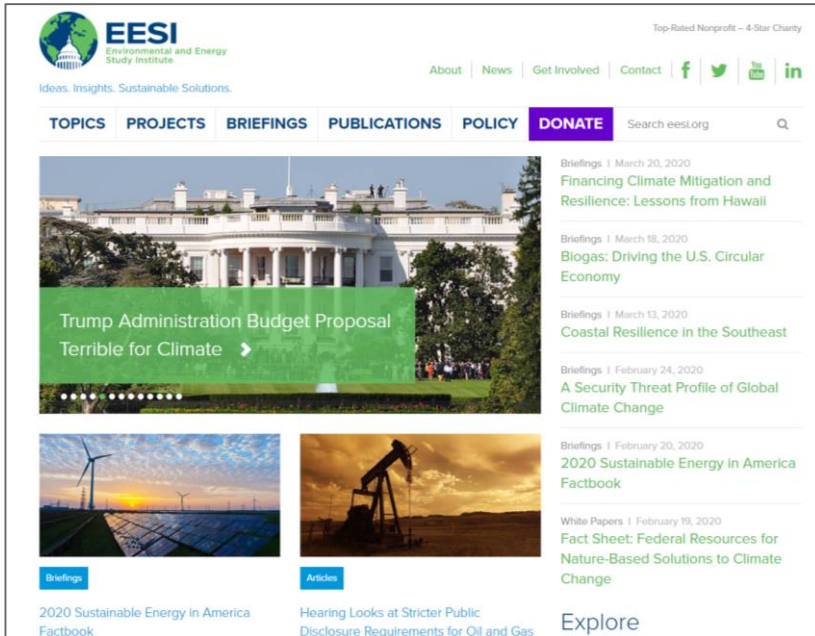
In addition to a full portfolio of federal policy work, EESI provides direct assistance to utilities to develop “on-bill financing” programs



SUSTAINABLE SOCIETIES

Focused on win-win solutions to make our energy, buildings, and transportation sectors sustainable, resilient, and more equitable

...About EESI



HILL BRIEFINGS

Video recordings and written summaries of Congressional briefings



CLIMATE CHANGE SOLUTIONS

Bi-weekly newsletter with all you need to know including a legislation tracker



SOCIAL MEDIA (@EESIONLINE)

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FACT SHEETS

Timely, science-based coverage of climate and clean energy topics



EESI PRESENTS

CONGRESSIONAL CLIMATE CAMP IV

FRIDAY, APRIL 30 | 2 PM EST
FEDERAL POLICIES FOR CLIMATE
MITIGATION AND ADAPTATION WIN-WINS

@EESIONLINE

Congressional Climate Camp Series



 **APRIL 30--Policy for Mitigation and Adaptation Win-wins**

 **MAY 21--BONUS SESSION – Understanding Budget Reconciliation**

Webcasts and written summaries available at www.eesi.org

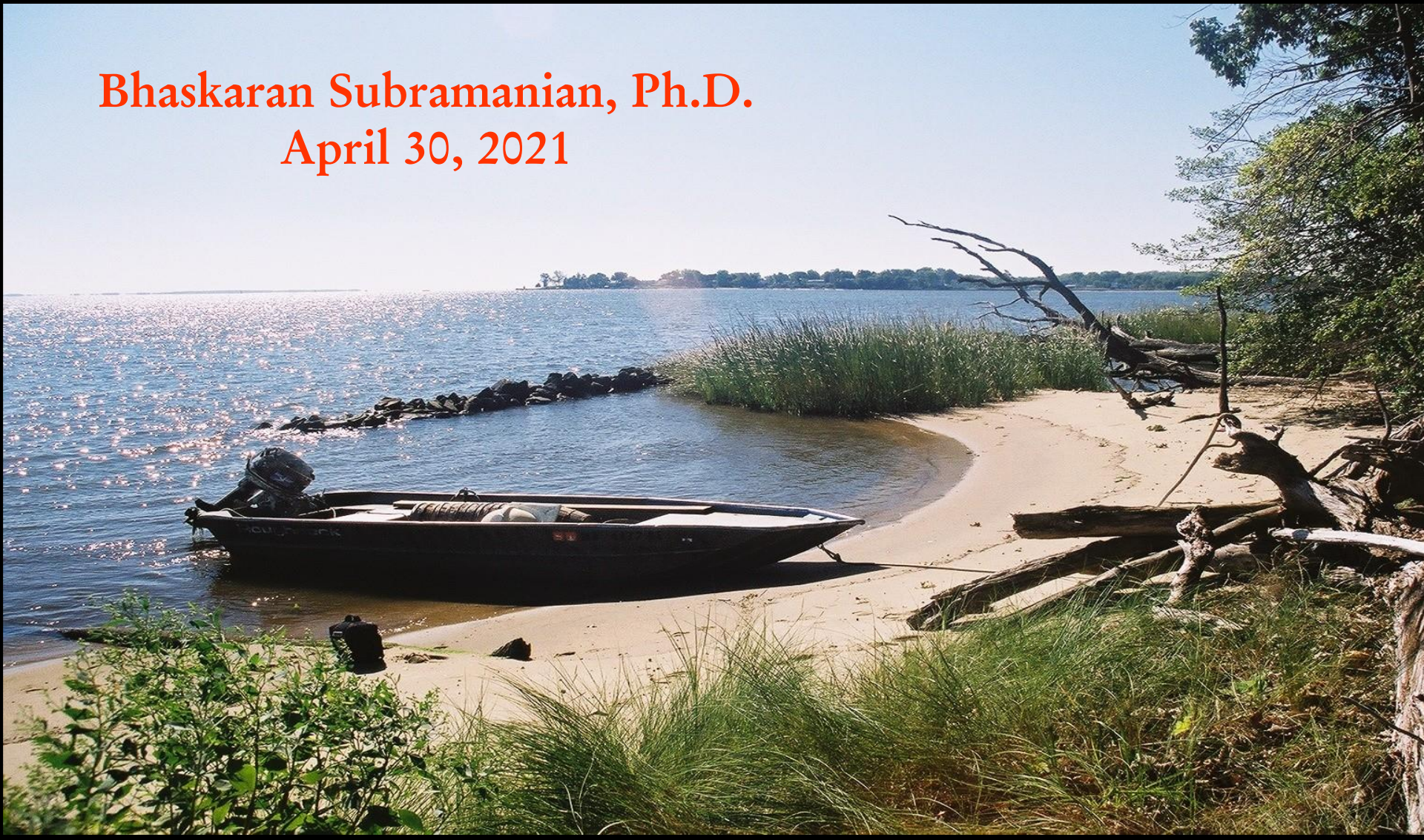
Audio-only excerpts released via The Climate Conversation podcast

Fact sheets, fact sheets, web articles, and web articles

Building Resiliency through Restoration: The Maryland Story



Bhaskaran Subramanian, Ph.D.
April 30, 2021



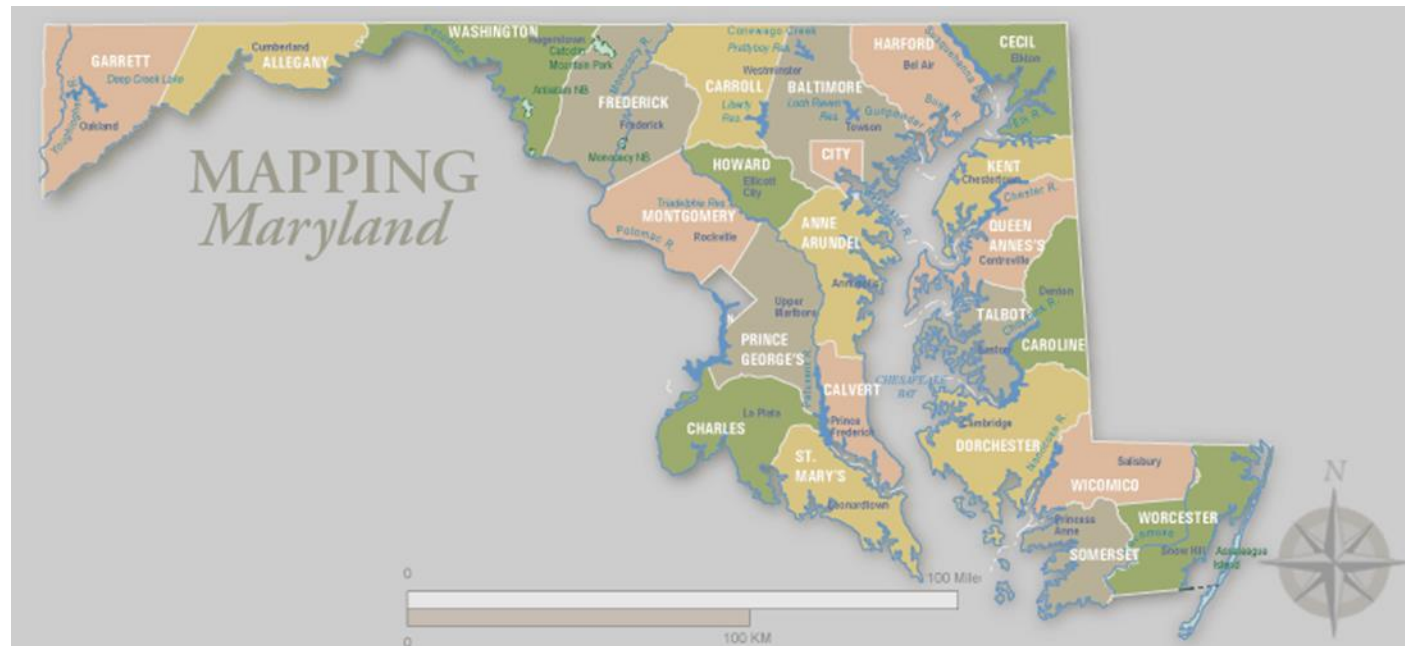
Outline



1. Brief history of living shorelines in Maryland
2. Examples of MD shorelines- response to extreme events
3. Legislation supporting living shorelines
4. Funding- loans; grants; and others!!
5. Role of federal programs and partnerships
6. Natural and Nature-Based Features (NNBF) and mitigation benefits (blue carbon)

1. History of Living Shorelines

- MD's tidal shorelines = 6,659 miles



- Erosion affects all 16 coastal counties along the Chesapeake Bay and Coastal Bays watersheds.

Primer on Erosion

Erosion- Not necessarily bad

Necessary process- helps to maintain beach, marsh and offshore habitats.

Ecological health of the estuary depends on it.



Traditional Methods of Erosion Control Methods

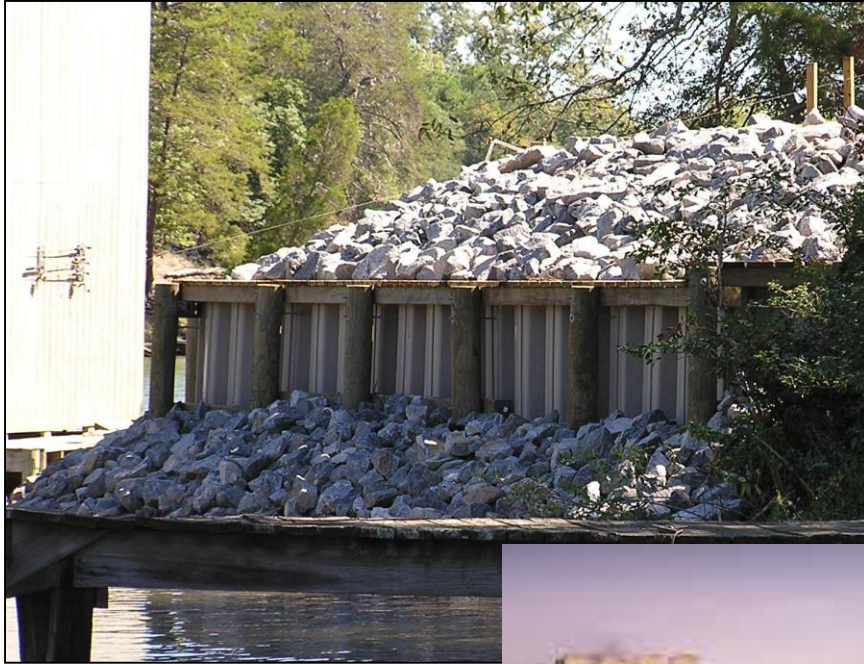


Rip-rap or Revetment



Wooden Bulkhead

Excessive ??



Misguided efforts to replicate the Great Wall of China!!!

Problems Associated with “Structural” Approach



Shoreline Erosion Rates in Maryland



| Rate of change | Shoreline Length | |
|---|------------------|-----|
| | Miles | % |
| Accretion | 2,006 | 30 |
| No Change | 75 | 1 |
| Slight erosion 0 to -2 feet/year | 3,740 | 56 |
| Low erosion -2 to -4 feet/year | 618 | 9 |
| Moderate erosion -4 to -8 feet/year | 173 | 3 |
| High erosion Over -8 feet/year | 48 | 1 |
| Total | 6,659 | 100 |

87% of Maryland's shoreline experience "slight" to no erosion

Why Living Shorelines?

- Shoreline Protection
- Habitat
- Aesthetics
- Coastal Resilience



What Kind of Living Shoreline Project is the Best?



• One size **DOES NOT** fit all!!



- Energy Regime
- Project Objective(s)
- Site Conditions

2. Maryland's Share of Severe Storms



| Name | Year | Surge above MLW (ft) |
|-------------------------------------|--------------------|-------------------------|
| Chesapeake- Potomac Hurricane | August 23, 1933 | 7.3 |
| Connie | August 13, 1955 | 6.0 |
| Ash Wednesday Storm | March 8, 1962 | 3.6 |
| TS Isabel | September 18, 2003 | 8.0 |

TS Isabel

- Isabel- major challenge to Maryland's capacity.
- Storm surge topped 8.0 feet above mean sea level.
- Some weak, insufficient or old shoreline protective devices did not survive.
- Nature-based projects survived unscathed.
- Most living shoreline projects survived without damage, blanketed by the surge of the storm.



Before Construction



CBEC LS Project



- Restored approx. 400 LF (linear feet) of shoreline to make it accessible to beach-nesting organisms.
- Created 600-foot oyster reef to provide fish and oyster habitat as well as serve as a break for wave energies.
- Created nearly 2 acres of tidal wetlands.
- Built “living breakwater” structures to protect the shoreline.
- Oyster reef located 600 ft from shore and is 600 ft long running parallel to the land.

After Construction



After Planting



After 3 years



Shoreline Conservation Service: 1968-2021



| Items | Structural Projects | Living Shoreline Projects |
|---------------------------|----------------------------|----------------------------------|
| # of Projects | 484 | 485 |
| LF of shoreline protected | 201,649 | 203,550 |
| Sq ft of marsh created | 12,412 | 3,934,855 |
| Amount of State loans | \$31,511,944 | \$3,990,381 |

Assessment of Living Shorelines in MD



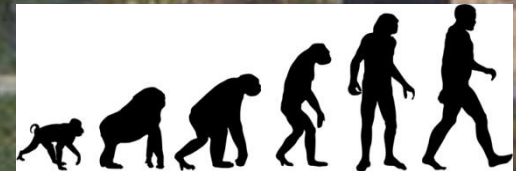
- Out of 177 projects, **131** of them were good or better.
- Investing in natural features like **wetlands, forest buffers, dunes, and living shorelines.**
- With natural buffers in place, communities will be better able to bounce back following climate-related events.



Evolution of Living Shorelines



High-profile sills with no gaps

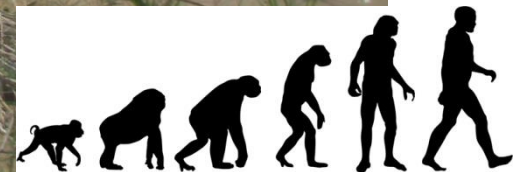


Fiber Glass Boat Analogy:

“Less is More”



Evolution of Living Shorelines



NextGen Project: Crucial Next Step in the Evolution of LS Projects



Conquest Preserve Living Shoreline Project



Before...

Completed: August 24, 2016

Cost: \$271,473

Cost/Linear feet: \$232

After



3. Legislation Supporting LS

- Shore Erosion Control Program- established in 1968 Maryland's General Assembly.
- The Program provides technical and financial assistance to waterfront property owners who experience erosion.
- Living Shoreline projects- **preferred**, but structural projects are used in areas with high rates of erosion.
- Technical assistance is provided through site evaluations, problem assessments and recommended solutions.



Shore Erosion Control Law: 1968

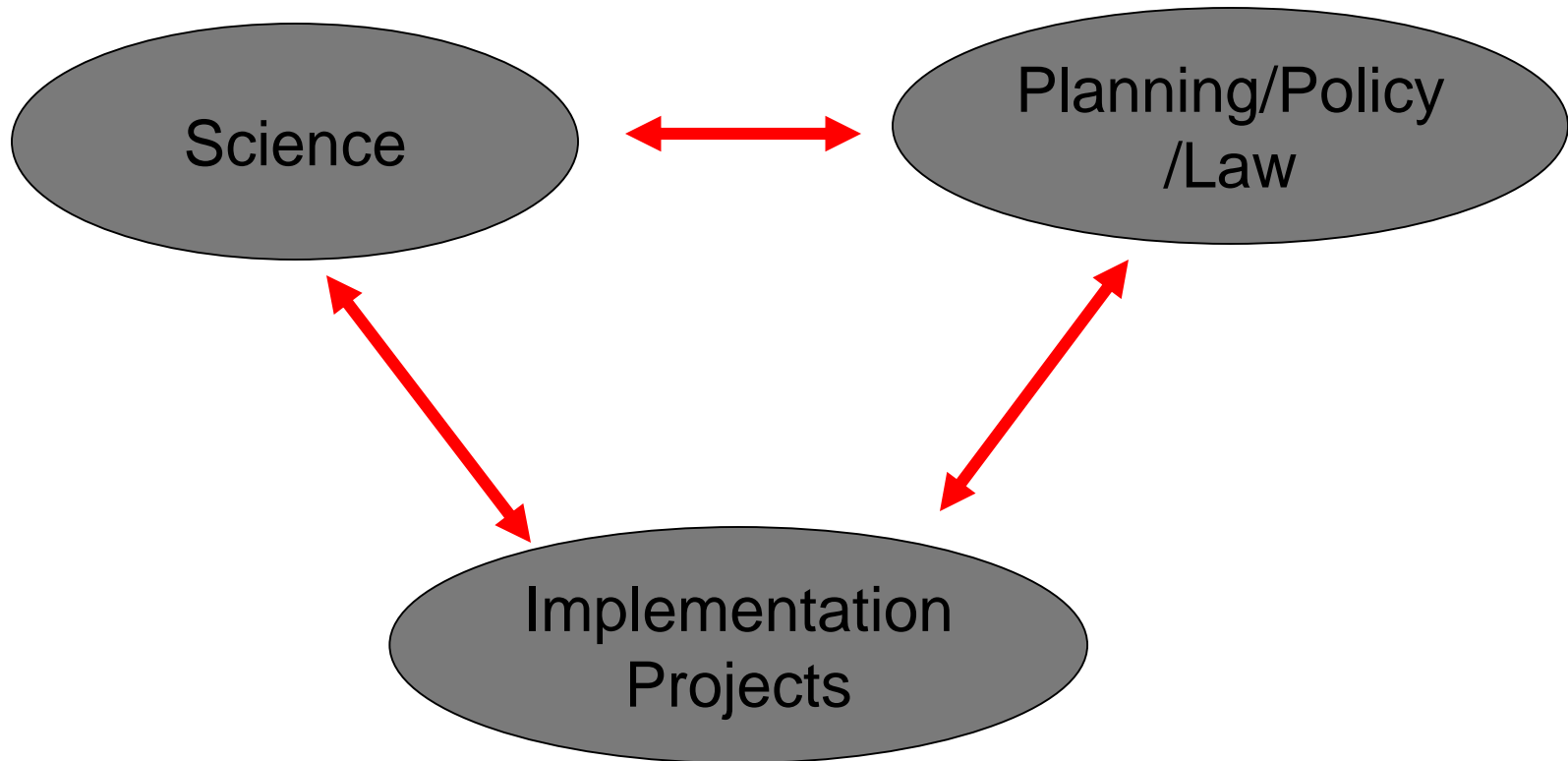
Living Shorelines Protection Act of 2008



- Bill passed into Law October 2008; regulations implemented in February 2013.
- Previously, Living Shorelines were “recommended” but not required.
- The law provides the regulatory agency with a strong foundation to promote alternate shoreline erosion control measures.
- The Law clearly states: “Improvements to protect a person’s property against erosion shall consist of non-structural shoreline stabilization measures (i.e. living shorelines) except where the person can demonstrate such measures are not feasible, or where mapping indicates areas that have been deemed appropriate for structural shoreline stabilization measures”.



MD-DNR's Coastal Adaptation Policy



Confluence of Science, Policy, Planning & Implementation!!



CHAPTER FIVE

Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change

Phase I: Sea-level rise and coastal storms



REPORT OF THE MARYLAND COMMISSION ON CLIMATE CHANGE
ADAPTATION AND RESPONSE WORKING GROUP

Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change

Phase II: Building societal, economic, and ecological resilience

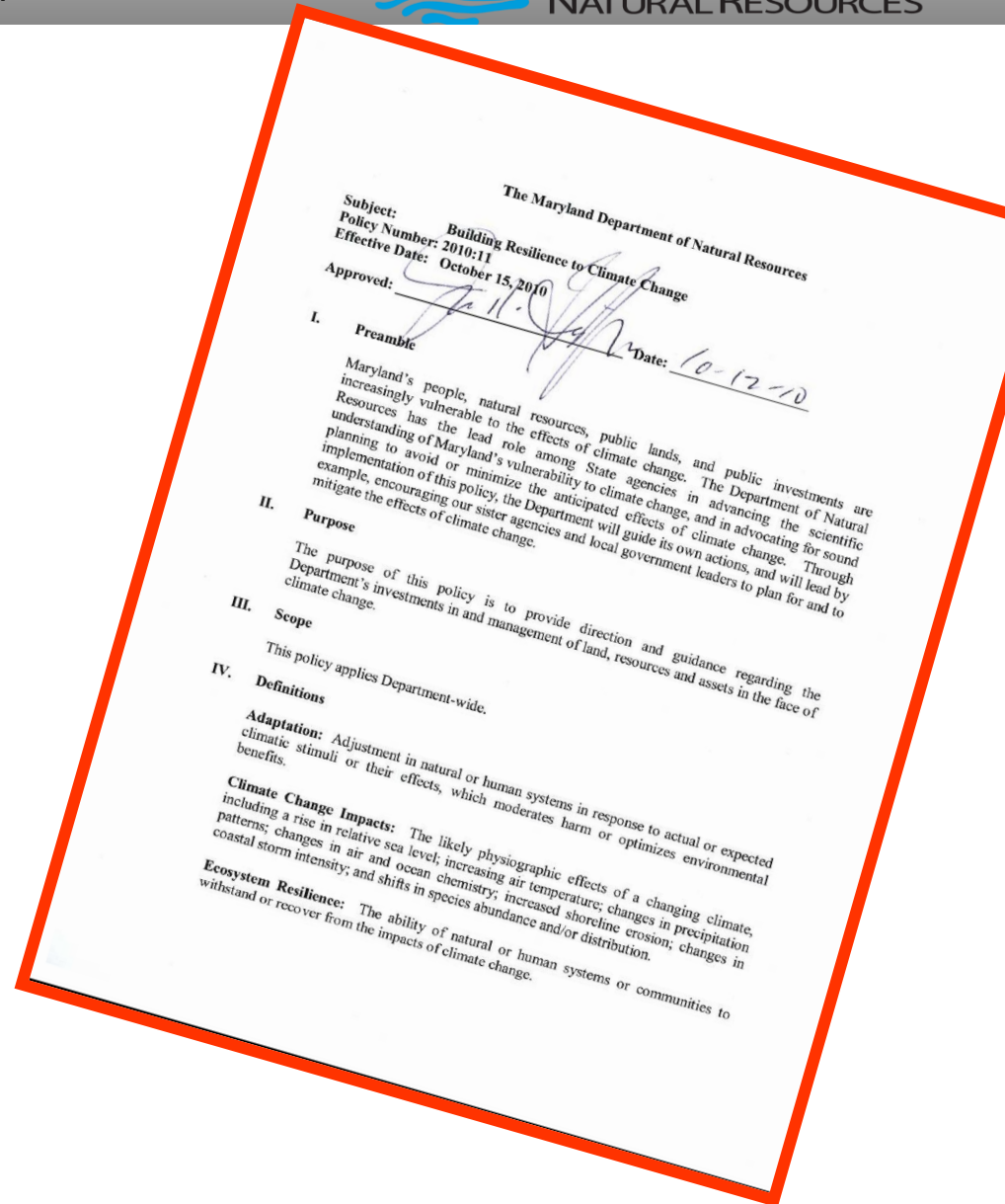


REPORT OF THE MARYLAND COMMISSION ON CLIMATE CHANGE
ADAPTATION AND RESPONSE AND SCIENTIFIC AND TECHNICAL WORKING GROUPS

Building Resilience to Climate Change: Investing in Nature



- Enhance the resilience of bay, aquatic and terrestrial ecosystems and/or increase on-site carbon sequestration.
- Incorporate factors associated with climate change in all phases of project.
- Compile a compendium (shortlist) of BMPs for habitat restoration project design.
- Conduct a GIS-based audit of DNR-owned lands to identify habitat restoration potential for enhancing ecosystem resilience and/or increasing carbon sequestration.



Confluence of Science, Policy, Planning & Implementation!!



SHORE PROTECTION

A Guide for Engineers and Marine Contractors
Working in the Chesapeake Bay Region



2013



U.S. Army Corps of Engineers
Maryland Department of Natural Resources

This information is presented as a public service. Inclusion of any shore protection device or method does not necessarily constitute a government recommendation or endorsement, nor is it guaranteed that any particular method will be successful for a specific application.

CCS HABITAT RESTORATION AND CONSERVATION DIVISION:
BUILDING RESILIENCE THROUGH HABITAT RESTORATION



Bay marsh meets Nor'easter. Photo courtesy of Chris Bason, Center for the Inland Bays.

Maryland Department of Natural Resources
Chesapeake and Coastal Service

October 2014

DISCLAIMER: This white paper is a guidance document for restoration planning, implementation, and project management within Maryland Department of Natural Resources' Chesapeake and Coastal Service. As such, it is a living document which will grow and change with advancing science and restoration techniques.

Building resiliency through restoration... was born!!

Components of RtR

Targeting using Coastal Resiliency Assessment

- Identify vulnerable coastal communities
- Identify locations where nature can help reduce risk

Community Resiliency Grant Program

- Technical and financial assistance
- Protect residents, economies, infrastructure and public resources.

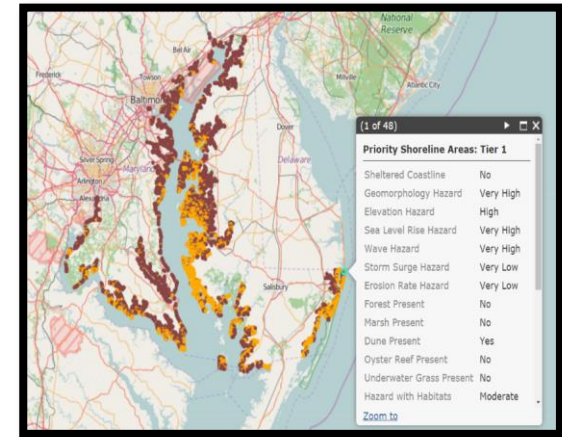
Innovative Climate-Resilient Designs

- Tidally influenced sites (SLR, marsh migration, storm surge, etc.)
- Non-tidal/inland sites (Precipitation, streamwater flow, etc.)

Monitoring for Maintenance & Adaptive Management

- Identify physical, chemical and biological metrics
- Improve design with changing conditions

Outreach, Communication & Education



4. Financing Options in MD



| Program | Organization | Contact Information |
|---|--|--|
| Shoreline Conservation Service | Maryland Department of Natural Resources (DNR) | Chesapeake and Coastal Service/ Shoreline Conservation Service Phone: (443) 454-1638 Website: https://dnr.maryland.gov/ccs/Pages/livingshorelines.aspx |
| Resiliency Through Restoration | | Chesapeake and Coastal Service Phone: (410) 260-8726 Website: https://dnr.maryland.gov/ccs/Pages/funding/grantsgateway.aspx |
| Maryland Linked Deposit | Maryland Department of the Environment | Maryland Water Quality Financing Administration Phone: (410) 537-3119 Website: https://mde.maryland.gov/programs/water/wqfa/pages/linked_deposit.aspx |
| Restoration and Science | Chesapeake Bay Trust | Chesapeake Bay Trust Phone: (410) 974-2941 Website: https://cbtrust.org/grants |
| National Coastal Resilience Fund | National Fish and Wildlife Foundation | National Fish and Wildlife Foundation Phone: (202) 857-0166 Website: https://www.nfwf.org/programs/national-coastal-resilience-fund |
| Resilient Communities Program | | Website: https://www.nfwf.org/programs/resilient-communities-program |

Shoreline Conservation Service Loan Program



MARYLAND DEPARTMENT OF NATURAL RESOURCES
ECOSYSTEM RESTORATION SERVICES
SHORELINE CONSERVATION AND MANAGEMENT SERVICE
(410) 260-8523

FINANCIAL ASSISTANCE FOR SHORE EROSION CONTROL PROJECTS*

| TYPE OF PROJECT | TYPE I | TYPE II | TYPE III |
|----------------------|---------|----------|----------|
| TYPE OF FUNDS USED | STATE | STATE | STATE |
| TYPE OF ASSISTANCE** | LOAN | LOAN | LOAN |
| LOAN INTEREST | 0% | 0% | 0% |
| LOAN TERM | 5 YEARS | 15 YEARS | 20 YEARS |

Type I Projects: Marsh creation/protection using natural/living materials

Type II Projects: Marsh creation/protection with stone edging, stone sills and/or stone groins, with sand fill and marsh plantings

Type III Projects: Marsh creation/protection with stone breakwaters, with sand fill & marsh plantings

| APPLICANT | EXTENT OF ASSISTANCE**** | | |
|--|--------------------------|------------------|------------------|
| COMMUNITY ASSOCIATIONS/NON-PROFIT ORGANIZATIONS/SERVICE ORGANIZATIONS | 75% NTE \$20,000 | 100% | 100% |
| MUNICIPALITY - PUBLIC LANDS | 75% NTE \$20,000 | 100% | 100% |
| MUNICIPALITY - SPONSORING PRIVATE OWNERS/BUSINESSES | 75% NTE \$20,000 | LOAN FORMULA *** | LOAN FORMULA *** |
| COUNTY - PUBLIC LANDS | 75% NTE \$20,000 | 100% | 100% |
| COUNTY - SPONSORING PRIVATE OWNERS/BUSINESSES | 75% NTE \$20,000 | LOAN FORMULA *** | LOAN FORMULA *** |
| COUNTY - SPONSORING COMMUNITIES/NON-PROFIT ORGANIZATIONS/SERVICE ORGANIZATIONS | 75% NTE \$20,000 | 100% | 100% |

* Financial Assistance provided based on project priority and availability of funds

** Matching grants are not available

*** Loan Formula as established in Natural Resources Article, Section 8-1005 of the Annotated Code of Maryland

Loan Formula:

| | | | | |
|--------------|-----------------|-----------|---------------|---------------------------|
| Project cost | \$0 to \$60,000 | 100% loan | \$60,000 loan | \$0 Property owner's cash |
| Next | \$20,000 | 50/50% | \$10,000 | \$10,000 |
| Next | \$20,000 | 25/75% | \$ 5,000 | \$15,000 |
| Above | \$100,000 | 10/90% | | |

No financial assistance provided for structural/barrier type projects

5. Federal Support



- State CZM Programs have effectively tackled the country's most pressing and emergent coastal issues for nearly 50 years.
- Support the congressionally recognized priority-effective management, beneficial use, protection, and development of the nation's coastal zone.
- Healthy coastal resources = support economic drivers and conservation
- In FY 2022, the CZM Programs will build on efforts to enhance the preparedness and resiliency of coastal communities and their capacity to mitigate the impacts of coastal hazards.



- Coastal communities are facing steadily increasing coastal hazards
- Coastal Management Grants enable states to:
 - increase their efforts to effectively prepare for,
 - mitigate impacts of, and
 - quickly recover from these hazards.

- States do this through priority investments in:
 - **Supporting technical assistance, planning, and implementation** necessary to strengthen coastal hazard preparedness, mitigation, and recovery capacity of communities, and
 - **Planning, assessment, design, and implementation of resilient coastal infrastructure**, including both natural (green) infrastructure and hard (grey) infrastructure"
 - In the wake of COVID-19 recovery, these types of resilient projects help to ensure **safe public access to coastal areas** and invest in coastal infrastructure habitat restoration projects which **drive local job creation**

6. Blue Carbon

- ❑ Carbon storage and sequestration in the estuarine or marine environment
 - Coastal wetlands
 - Submerged Aquatic Vegetation (sea grasses)

- ❑ Blue carbon is complicated
 - Highly variable rates of sequestration
 - Must account for changing rates of accretion and possible loss due to sea level rise/erosion
 - Must account for methane emissions



Blue Carbon



- ❑ Blue Carbon Initiative with UMCES, Restore America's Estuaries and COMPASS
 - Identify research needs
 - Highlight ongoing work
 - Identify co-benefits- flood prevention, nitrogen processing, wildlife habitat, etc.
 - Clarify how blue carbon fits into Maryland GHG reduction plan (currently a minor piece)

- ❑ US Climate Alliance Blue Carbon Modelling Project
 - Led by Duke University
 - Partnership of MD, NC, VA, DE, NJ, NY
 - Models impact of wetland change out to 2120 on blue carbon in coastal wetlands
 - Preliminary results show a wide range of outcomes dependent on emissions scenario but significant loss of blue carbon is likely by 2075

Blue Carbon in 2030 Maryland Greenhouse Gas Reduction Act

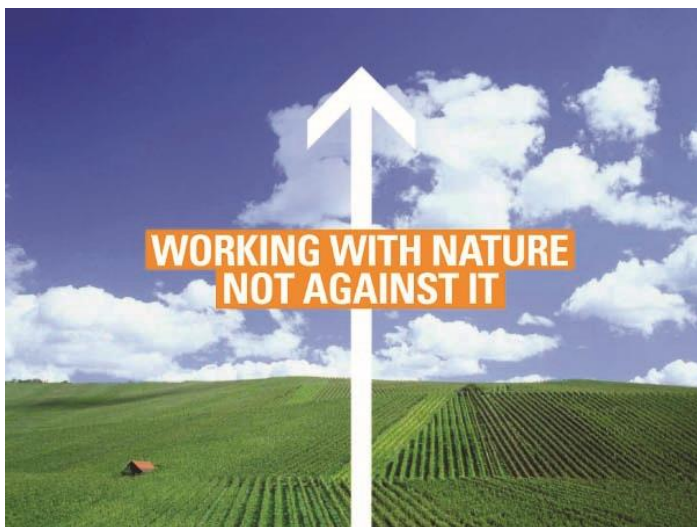


| Funding Source | Coastal Wetland Acres Restored 2006-2020 | Carbon Sequestration MT CO ₂ e per year | Estimate for additional acres by 2030 |
|--|--|--|--|
| Coastal Wetland Initiative | 505.6 | 1,095.3 | 500 |
| DNR Trust Fund | 3.8 | 8.2 | 0 |
| Federal Partners | 2096.9 | 4,542.8 | 2,500 |
| Total | 2,606.3 | 5,646.4 | 3,000 |
| Estimate of Annual Carbon Sequestration in 2030= | | 11,062.5 | We use RAE/Verra default carbon sequestration rate for created coastal wetlands- 2.16 MT CO ₂ e/ac/yr |

Blue Carbon a minor piece of the over 25 million MT of CO₂ reductions needed by 2030 to meet 50% GHG reduction goal...

...but comes with significant co-benefits

Take-Home Message



<http://dnr.maryland.gov/ccs/Pages/livingshorelines.aspx>



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Mobile: (443) 454-1638

Solutions from the Agriculture Sector

John Quinn, PhD

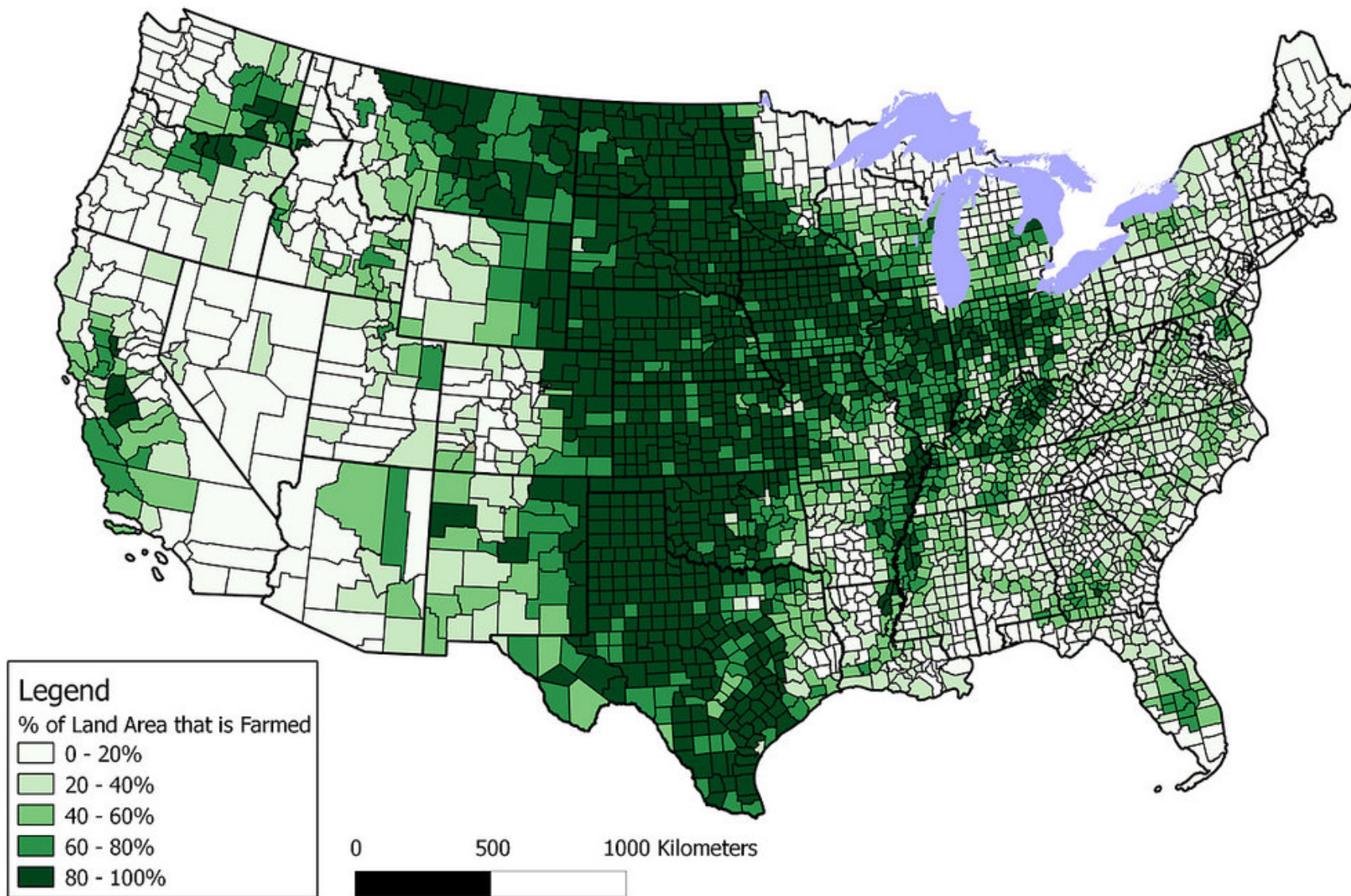
@ag_biodiversity

April 30, 2021

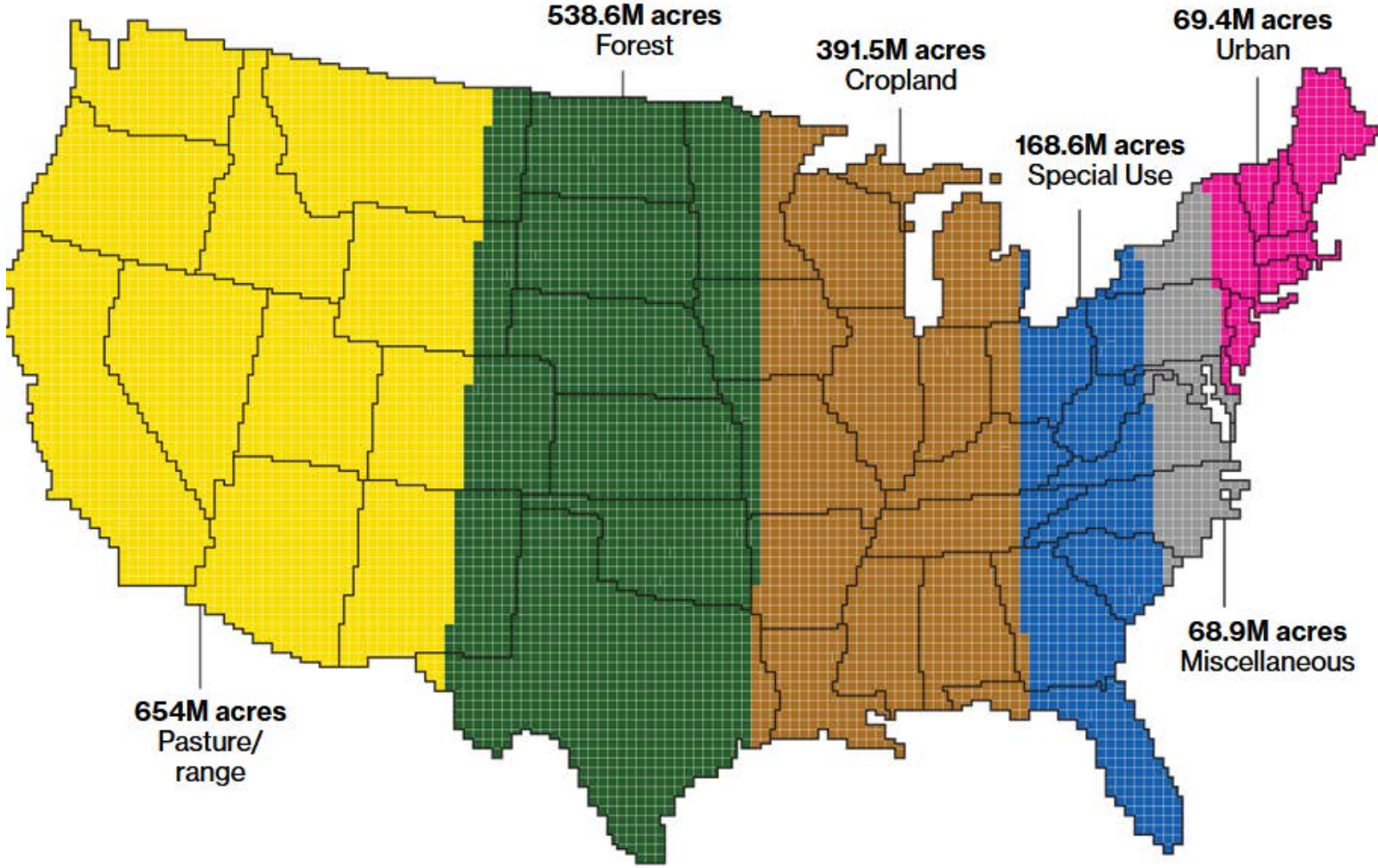


% of Land Area Devoted to Farming by U.S. County (2003)

Why Agriculture?



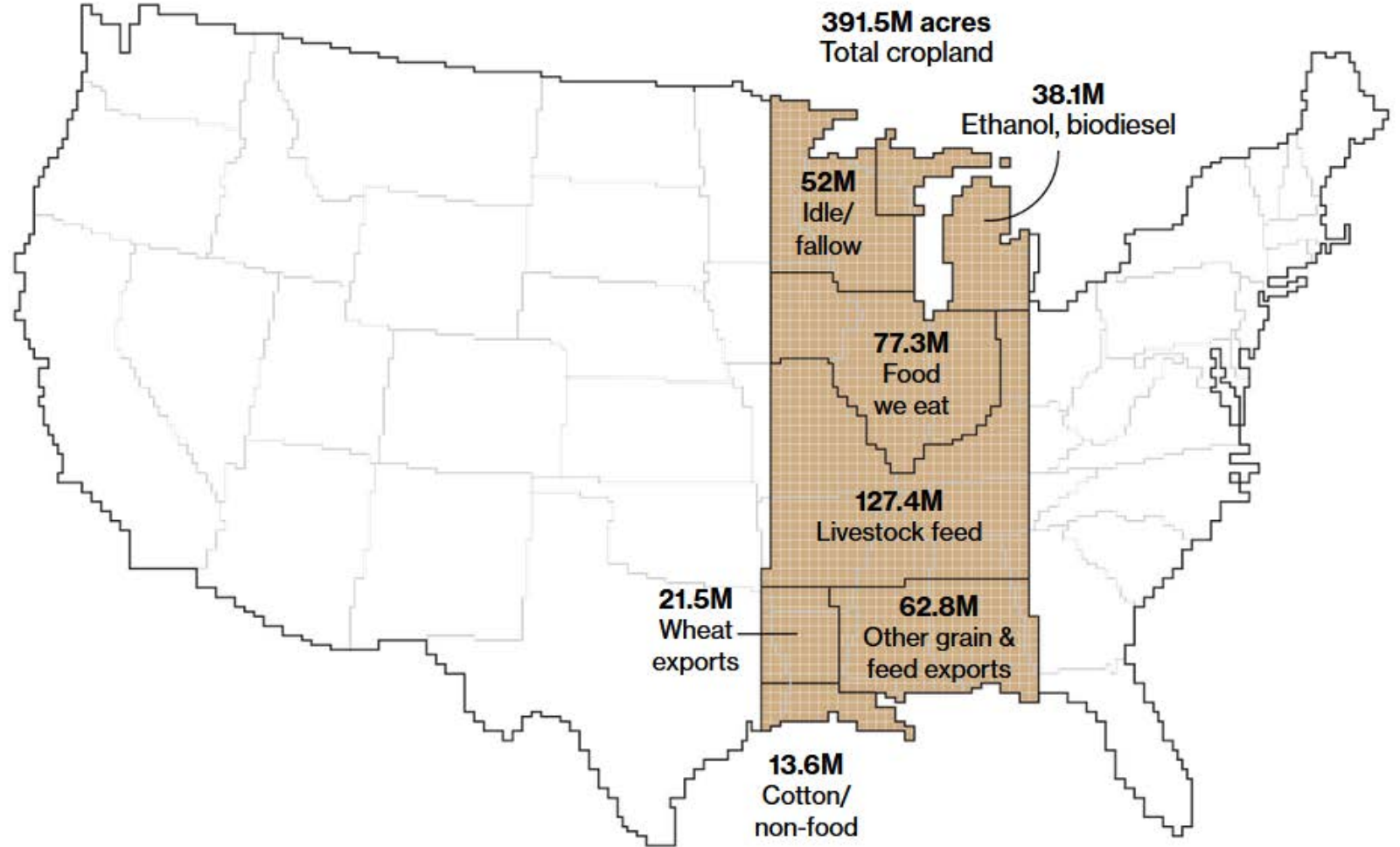
Why Agriculture?



<https://www.bloomberg.com/graphics/2018-us-land-use/>



Why Agriculture?

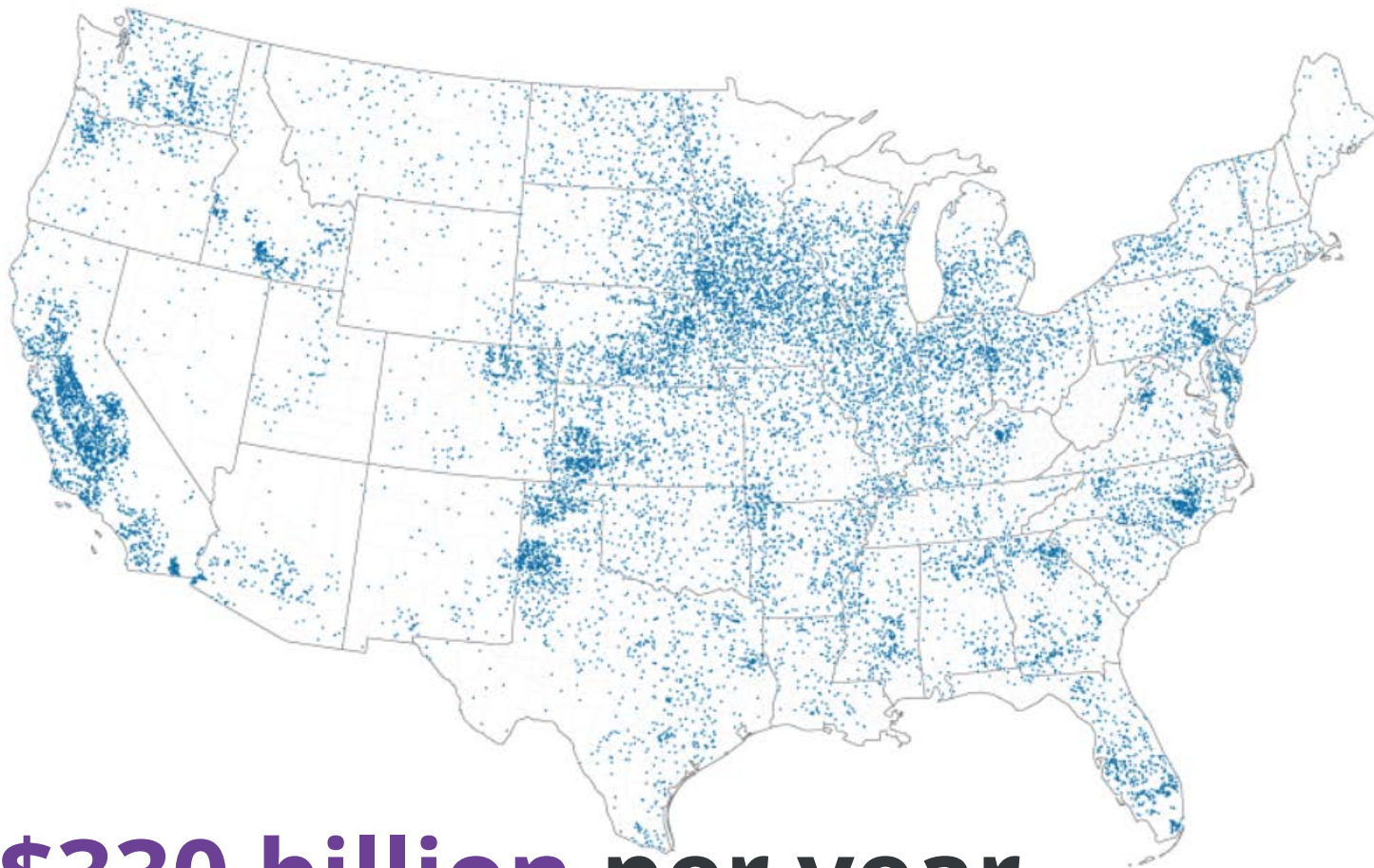


Market Value of Agricultural Products Sold: 2007



1 dot = \$20,000,000

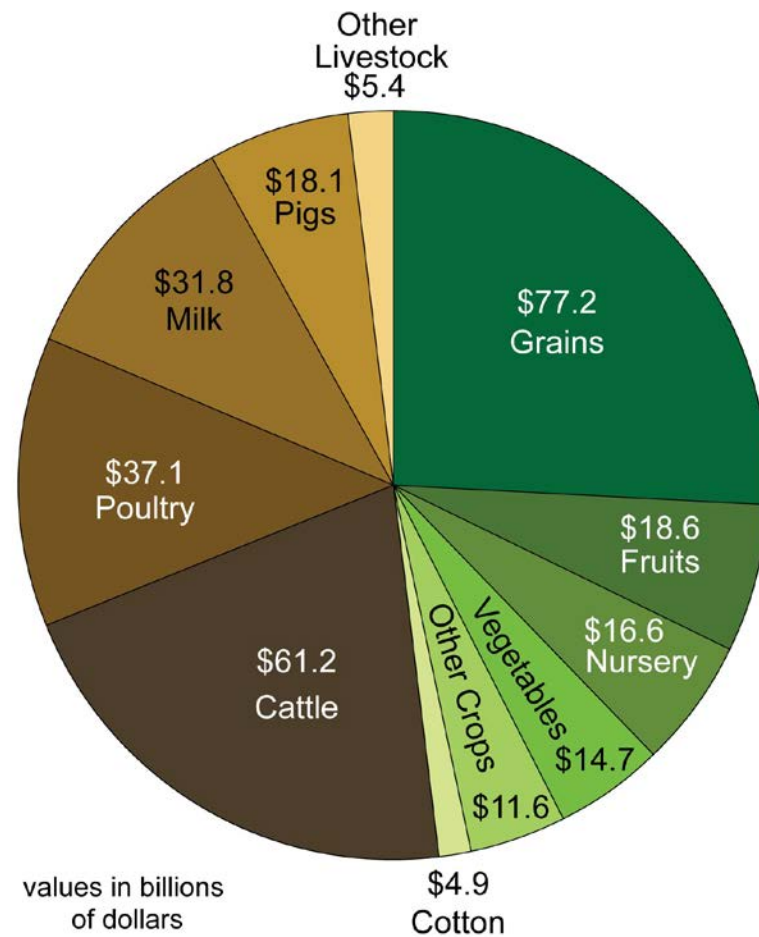
U.S. Total: \$297,220,491,000



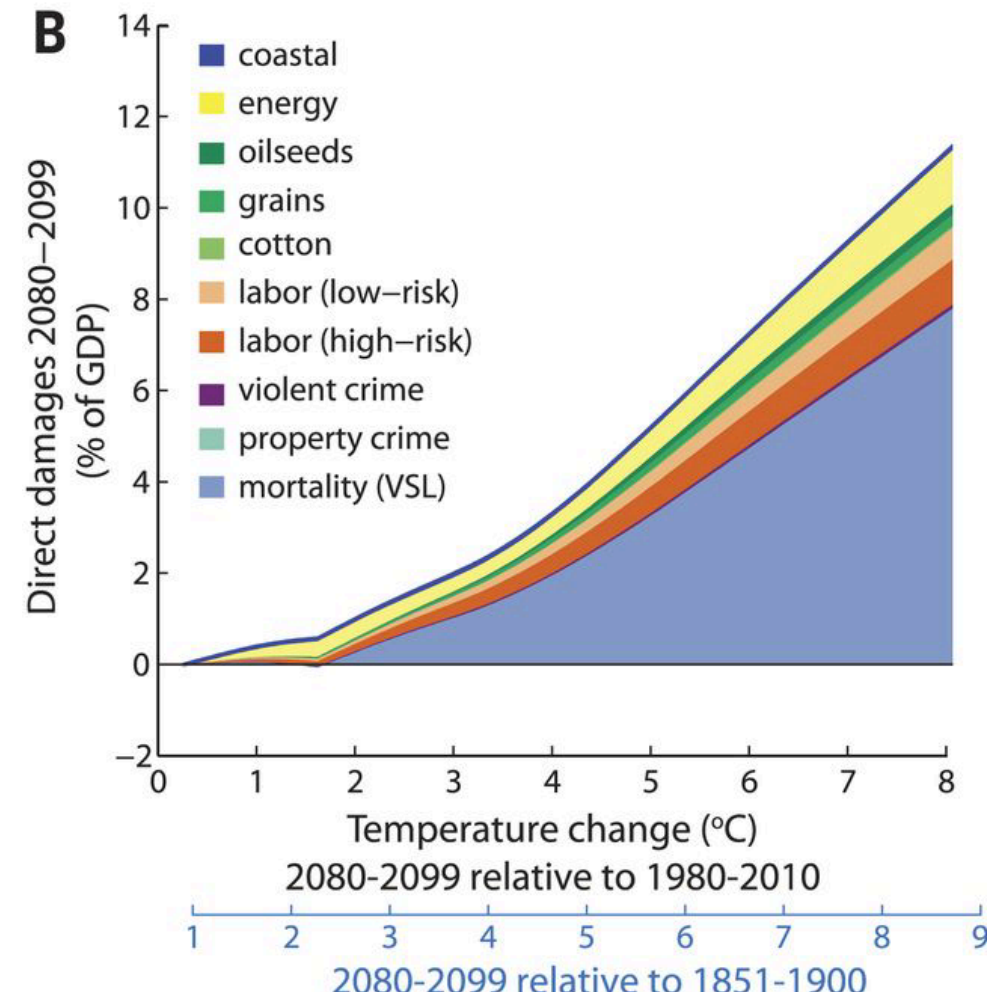
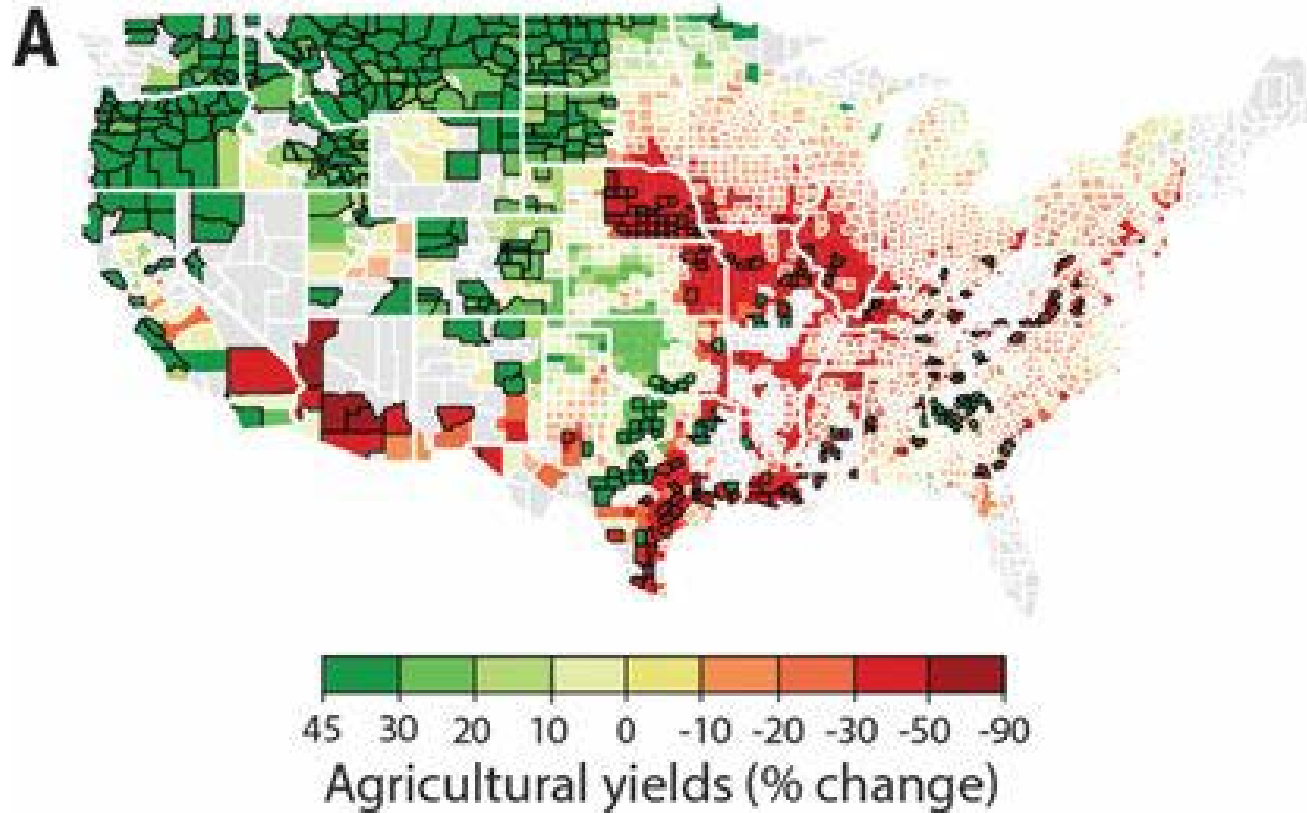
\$330 billion per year

in agricultural commodities

U.S. Agriculture



Impacts of climate change



Hsiang et al. 2017 Estimating economic damage from climate change in the United States



**Solutions
from the
agricultural
sector**

SOLUTIONS IN THIS SECTOR

■ ■
COASTAL WETLAND
PROTECTION



■ ■
CONSERVATION
AGRICULTURE



■
FARM IRRIGATION
EFFICIENCY



■ ■
FOREST PROTECTION



■ ■
GRASSLAND
PROTECTION



■ ■
IMPROVED RICE
PRODUCTION



■ ■
INDIGENOUS PEOPLES'
FOREST TENURE



■
NUTRIENT
MANAGEMENT



■ ■
PEATLAND
PROTECTION AND
REWETTING



■ ■
PLANT-RICH DIETS



■ ■
REDUCED FOOD
WASTE



■ ■
REGENERATIVE
ANNUAL CROPPING



■ ■
SUSTAINABLE
INTENSIFICATION FOR
SMALLHOLDERS



■ ■
SYSTEM OF RICE
INTENSIFICATION



**PROJECT
DRAWDOWN.**

Conservation Agriculture

- **9.43-13.4** gigatons of CO₂ equivalent reduced/sequestered
- **78-113** billion \$US net profit

No-till farming



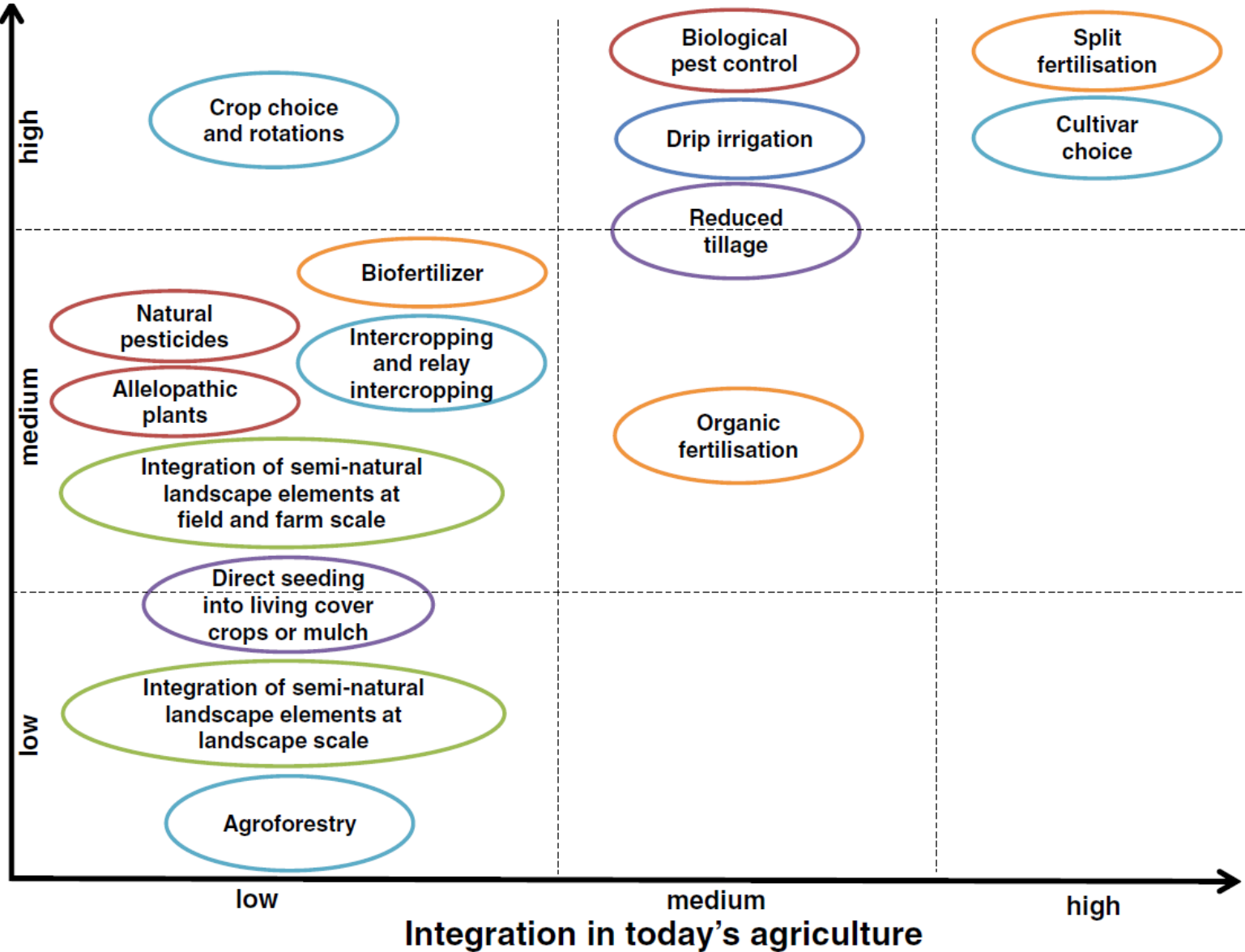
Cover Crops



Crop Rotations



Potential of adoption in 10 years



Regenerative Annual Cropping

PROJECT
DRAWDOWN.

- **14.5-22.3** gigatons of CO₂ equivalent reduced/sequestered
- **\$136-206** billion net profit



6 Core Principles of
REGENERATIVE AGRICULTURE



Farm Irrigation Efficiency

- **1.13-2.07** gigatons of CO₂ equivalent reduced/sequestered
- **\$540-930** billion savings

PROJECT
DRAWDOWN®



Environmental Quality Incentives Program



Agroforestry



Alley Cropping
(311)

Silvopasture Establishment
(381)

Multistory Cropping
(379)

Windbreak Establishment
(380)

Riparian Forest Buffers
(391)

Windbreak Renovation
(650)

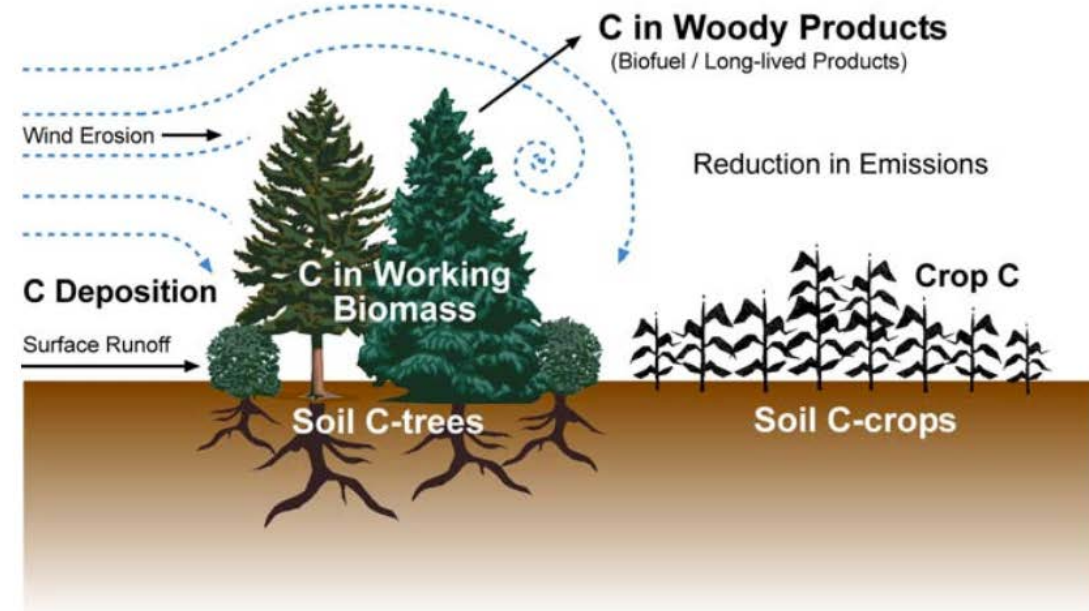


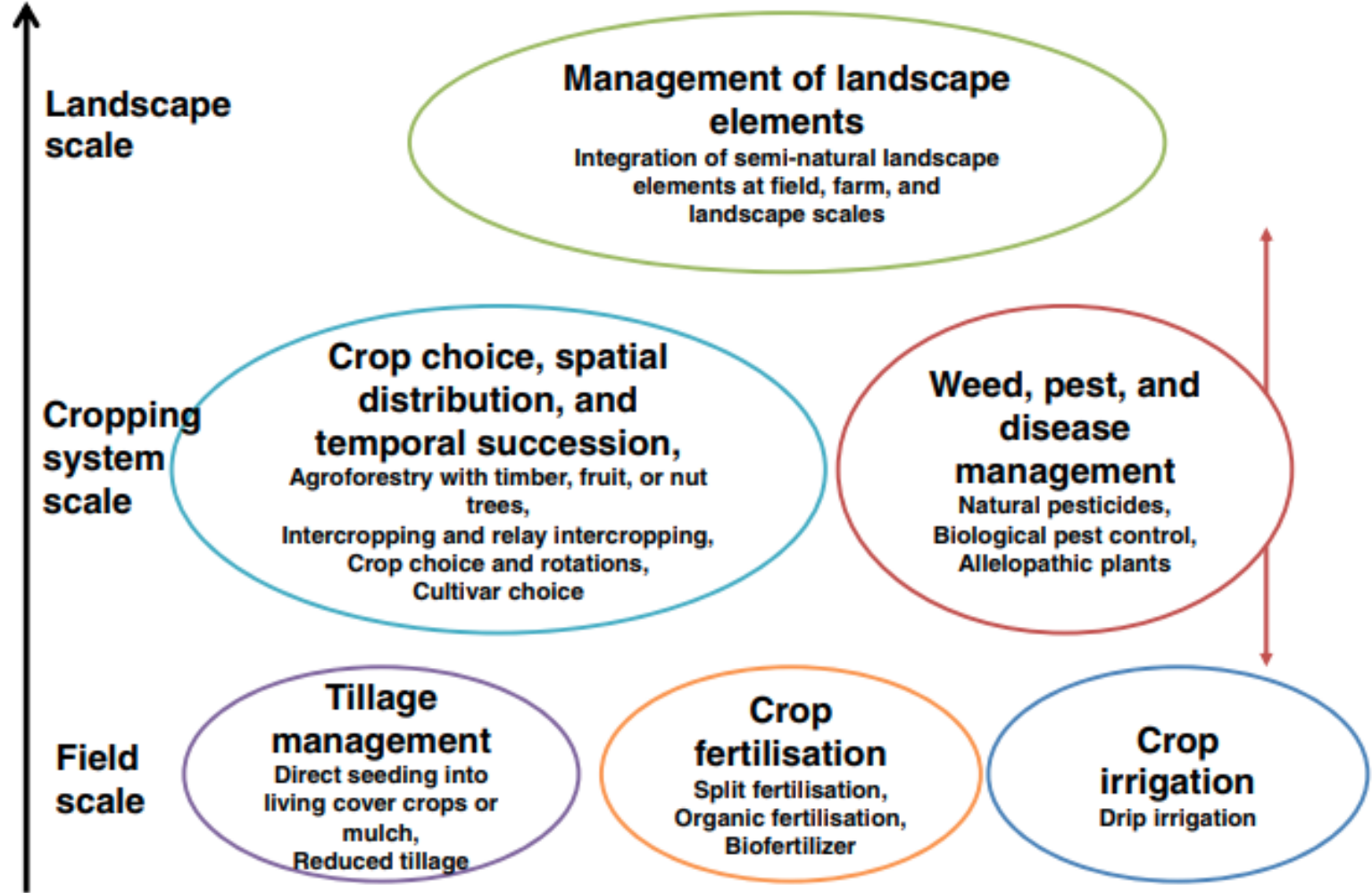
Figure 1: Major carbon sinks and sources that can be affected by a field windbreak. Image credit: Schoenberger 2008.

- Silvopasture at Greenbrier Farms
- <https://www.fs.usda.gov/nac/>

At the same time farmers mitigate climate change through agroforestry practices, they can also get other benefits.

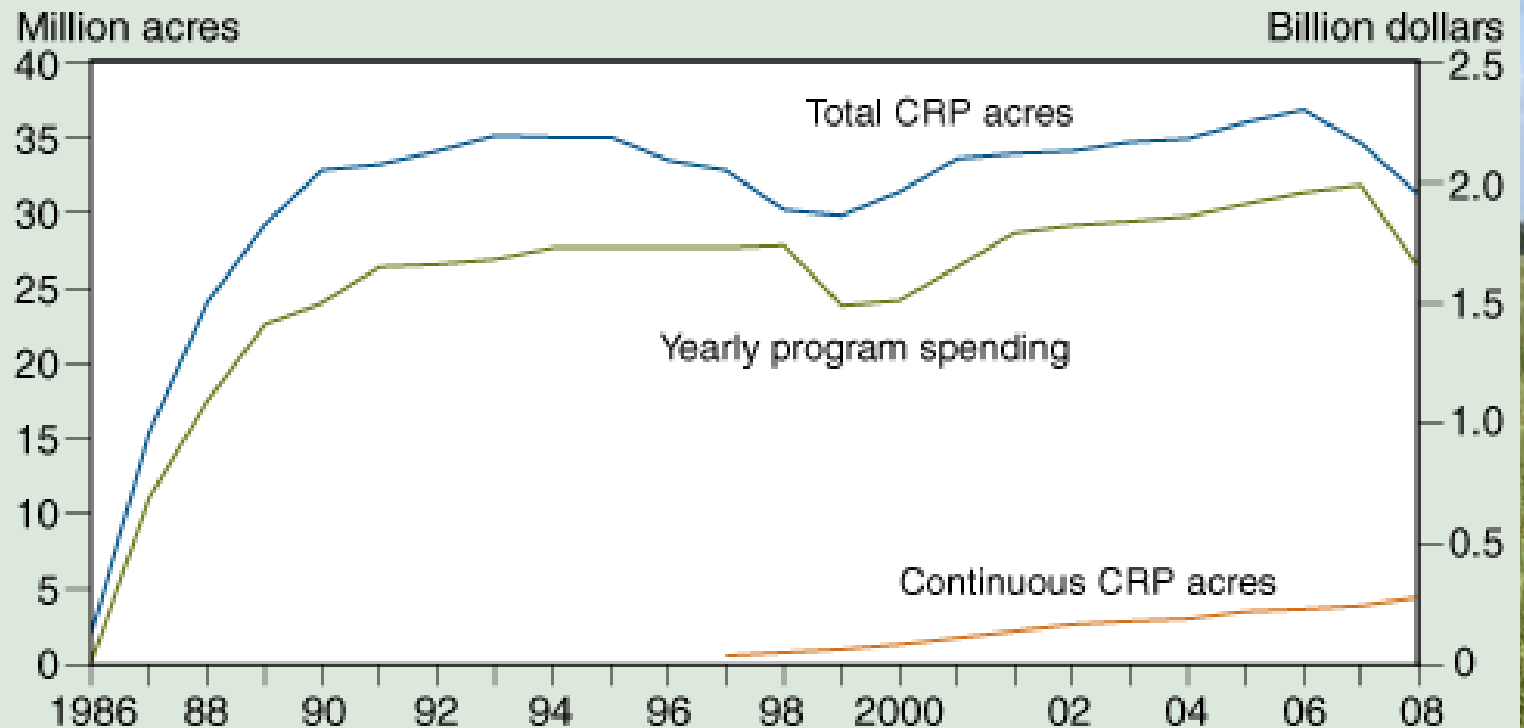
Scale of interventions

Scale of application of agroecological practice



Grassland Protection & Conservation Reserve Program

While overall enrollment in the CRP is declining, continuous program acreage is increasing



Source: USDA, Economic Research Service, based on CRP contract data maintained by USDA's Farm Service Agency.



USDA Expands and Renews Conservation Reserve Program in Effort to Boost Enrollment and Address Climate Change

Contact: FPAC.BC.Press@usda.gov

WASHINGTON, April 21, 2021 – Agriculture Secretary Tom Vilsack announced today that USDA will open enrollment in the Conservation Reserve Program (CRP) with higher payment rates, new incentives, and a more targeted focus on the program's role in climate change mitigation. Additionally, USDA is announcing investments in partnerships to increase climate-smart agriculture, including \$330 million in 85 Regional Conservation Partnership Program (RCPP) projects and \$25 million for On-Farm Conservation Innovation Trials. Secretary Vilsack made the announcement today at the White House National Climate Task Force meeting to demonstrate USDA's commitment to putting American agriculture and forestry at the center of climate-smart solutions to address climate change.

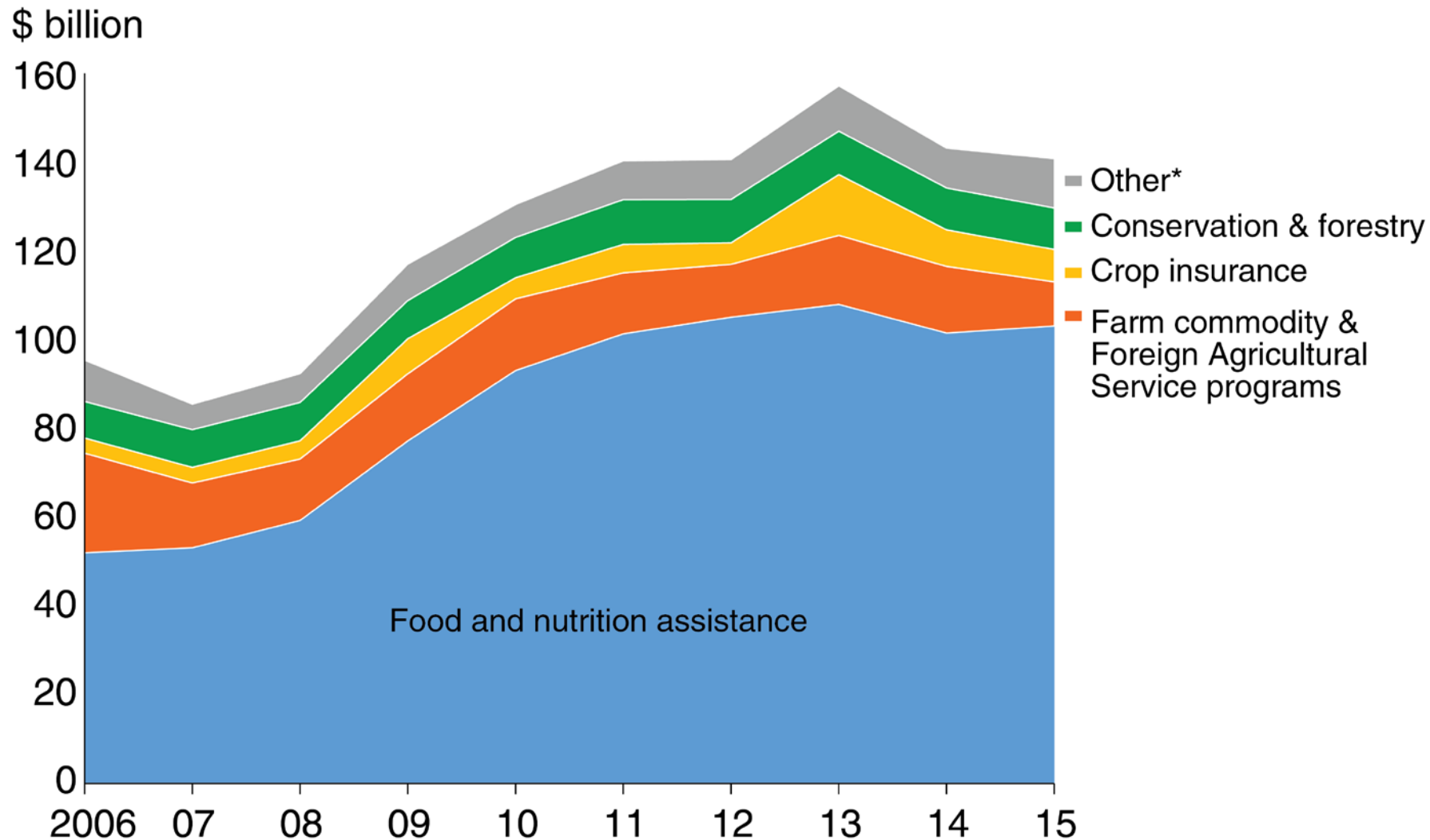
The Biden-Harris Administration is working to leverage USDA conservation programs for climate mitigation, including continuing to invest in innovation partnership programs like RCPP and On-Farm Trials as well as strengthening programs like CRP to enhance their impacts.

"Sometimes the best solutions are right in front of you. With CRP, the United States has one of the world's most successful voluntary conservation programs. We need to invest in CRP and let it do what it does best—preserve topsoil, sequester carbon, and reduce the impacts of climate change," said Vilsack. "We also recognize that we can't do it alone. At the White House Climate Leaders Summit this week, we will engage leaders from all around the world to partner with us on addressing climate change. Here at home, we're working in partnership with producers and local organizations through USDA programs to bring new voices and communities to the table to help combat climate change."

Conservation Reserve Program

USDA's goal is to enroll up to 4 million new acres in CRP by raising rental payment rates and expanding the number of incentivized environmental practices allowed under the program. CRP is one of the world's largest voluntary conservation programs with a long track record of preserving topsoil, sequestering carbon, and reducing nitrogen runoff, as well as providing healthy habitat for wildlife.

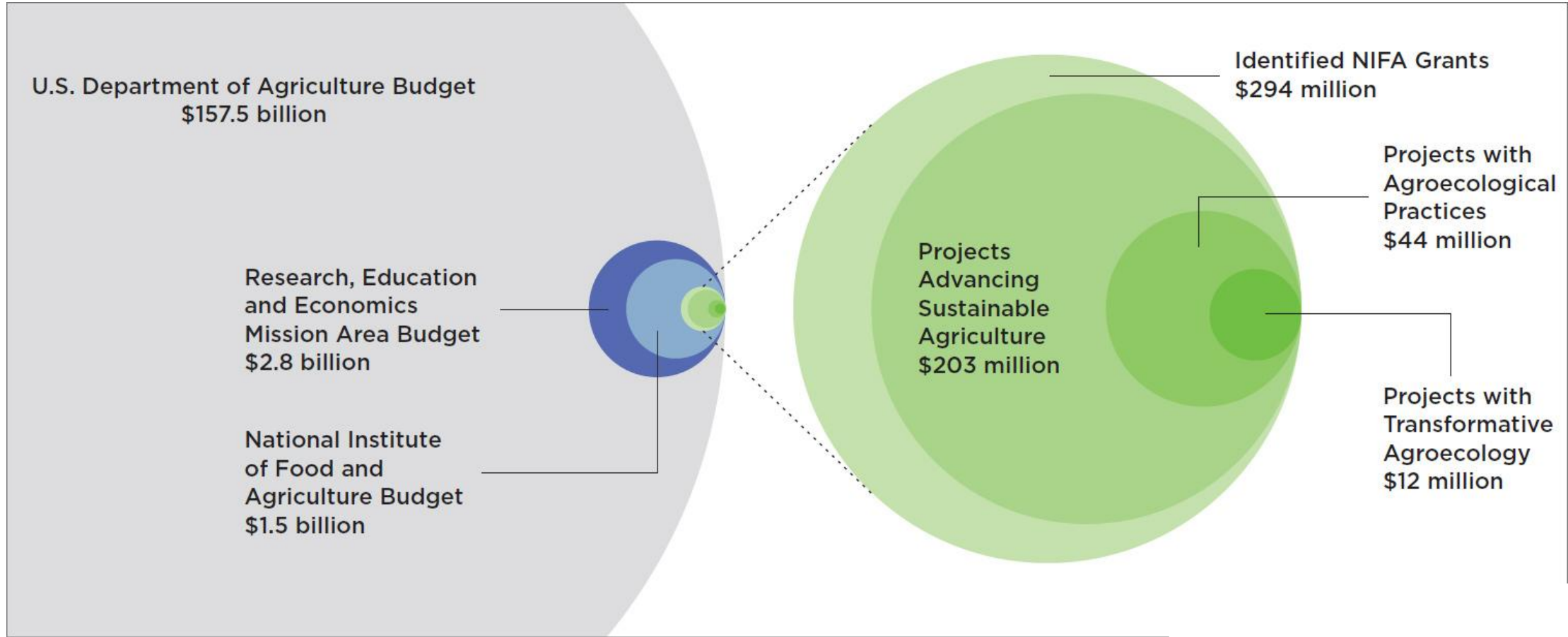
USDA budget outlays, fiscal years 2006-15



*Includes rural development, food safety, marketing and regulatory programs, research and departmental activities. Note: Nominal dollars.

Source: USDA, Economic Research Service using data from FY2008-FY2016 USDA Budget Summary and Annual Performance Plan.

Agroecology funding in the 2014 USDA budget



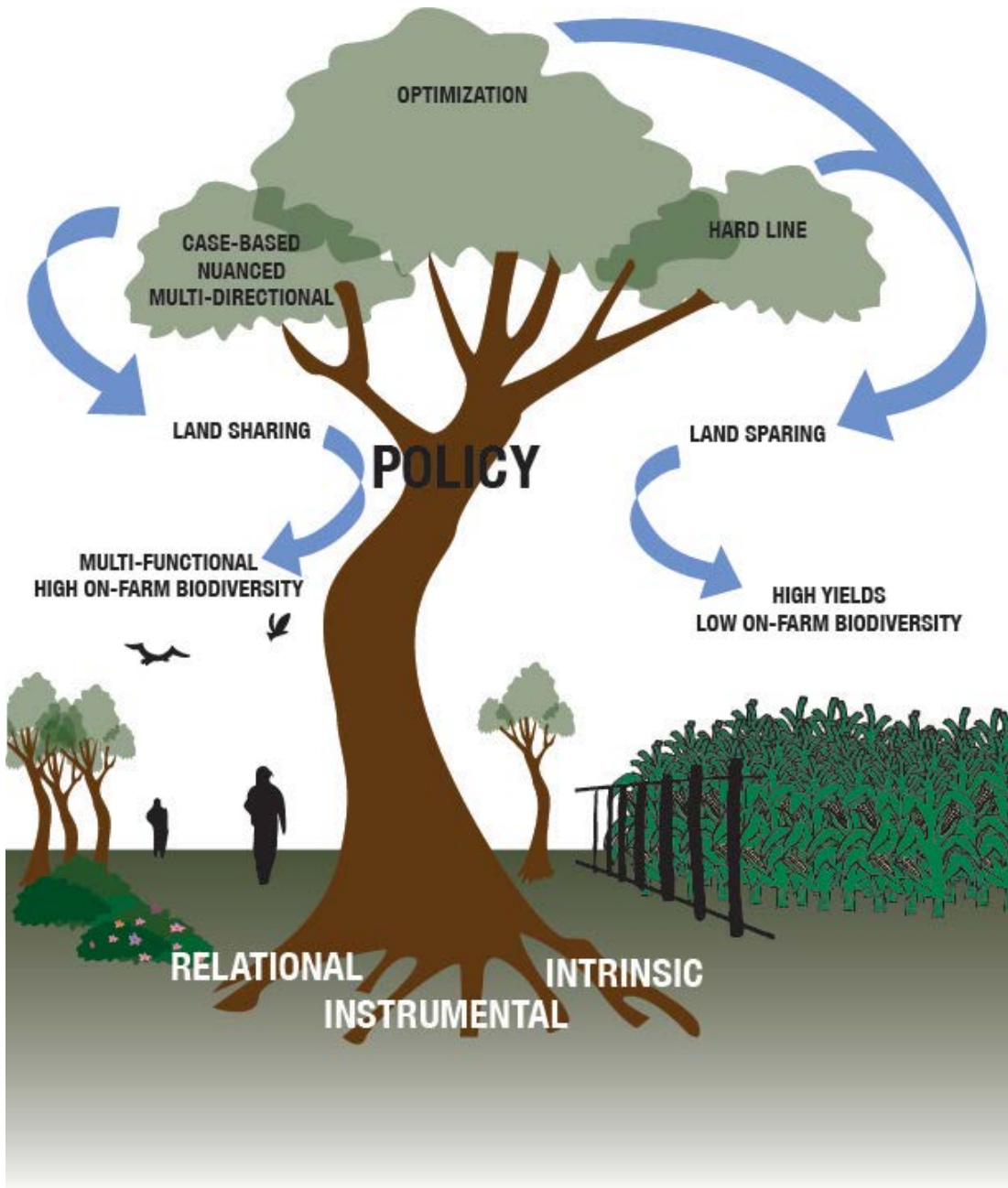
<https://www.ucsusa.org/resources/counting-agroecology>

A map of the United States divided into six regions: Northwest, Northern Plains, Midwest, Northeast, Southeast, and Southwest. Each region is outlined in yellow and contains a yellow location pin representing a Climate Hub. The hubs are: Northwest Hub (in the Northwest Region), Northern Plains Hub (in the Northern Plains Region), Midwest Hub (in the Midwest Region), Northeast Hub (in the Northeast Region), Southeast Hub (in the Southeast Region), and Southern Plains Hub (in the Southern Plains Region). A blue outline highlights the Eastern and Southern parts of the country, including the Northeast, Midwest, Southeast, and Southern Plains regions. A semi-transparent white circle is overlaid on the left side of the map, containing the title and a list of hub functions.

USDA Climate Hubs

- **Research and Science Information Synthesis**
- **Tool Development, Technology Exchange, and Implementation Assistance**
- **Stakeholder Education, Outreach, and Engagement**

The importance of relationships for change

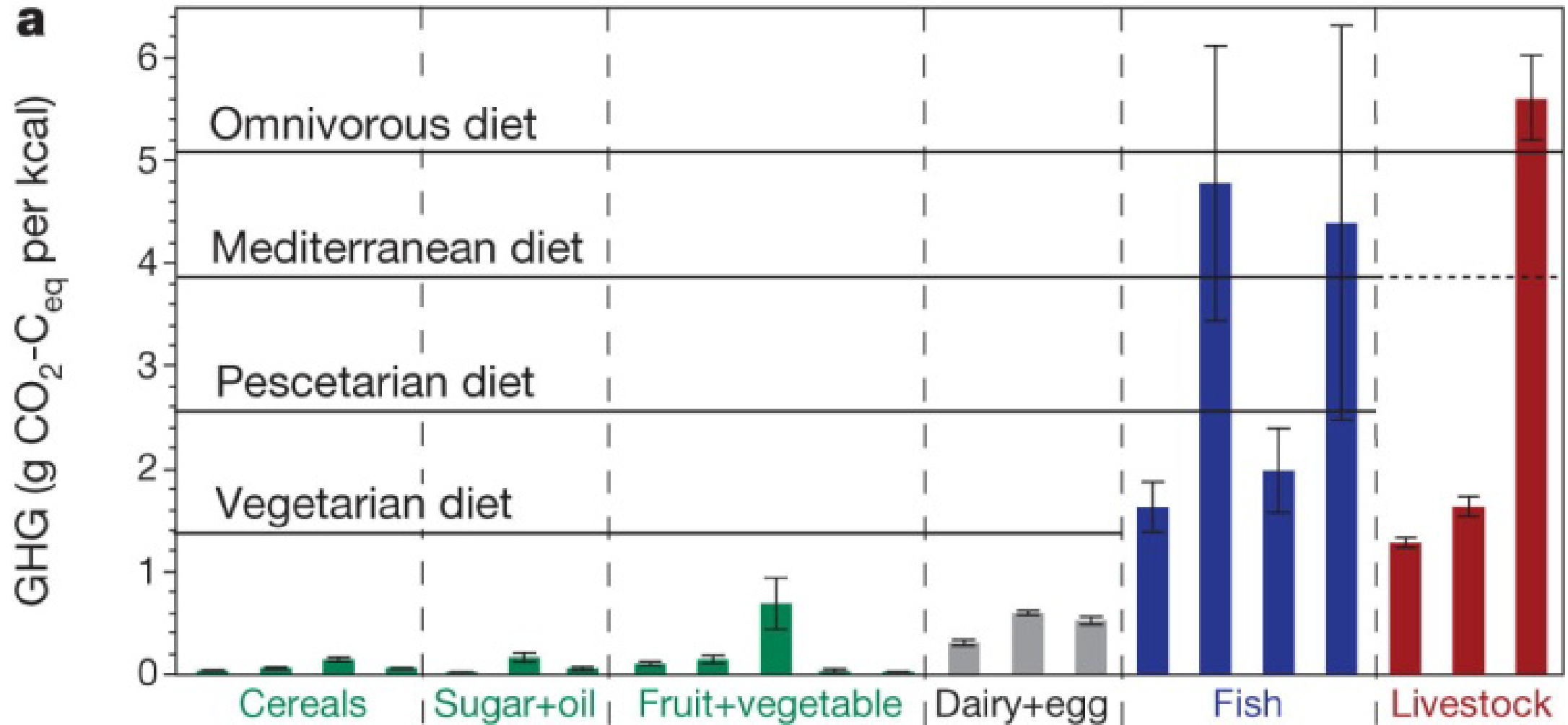


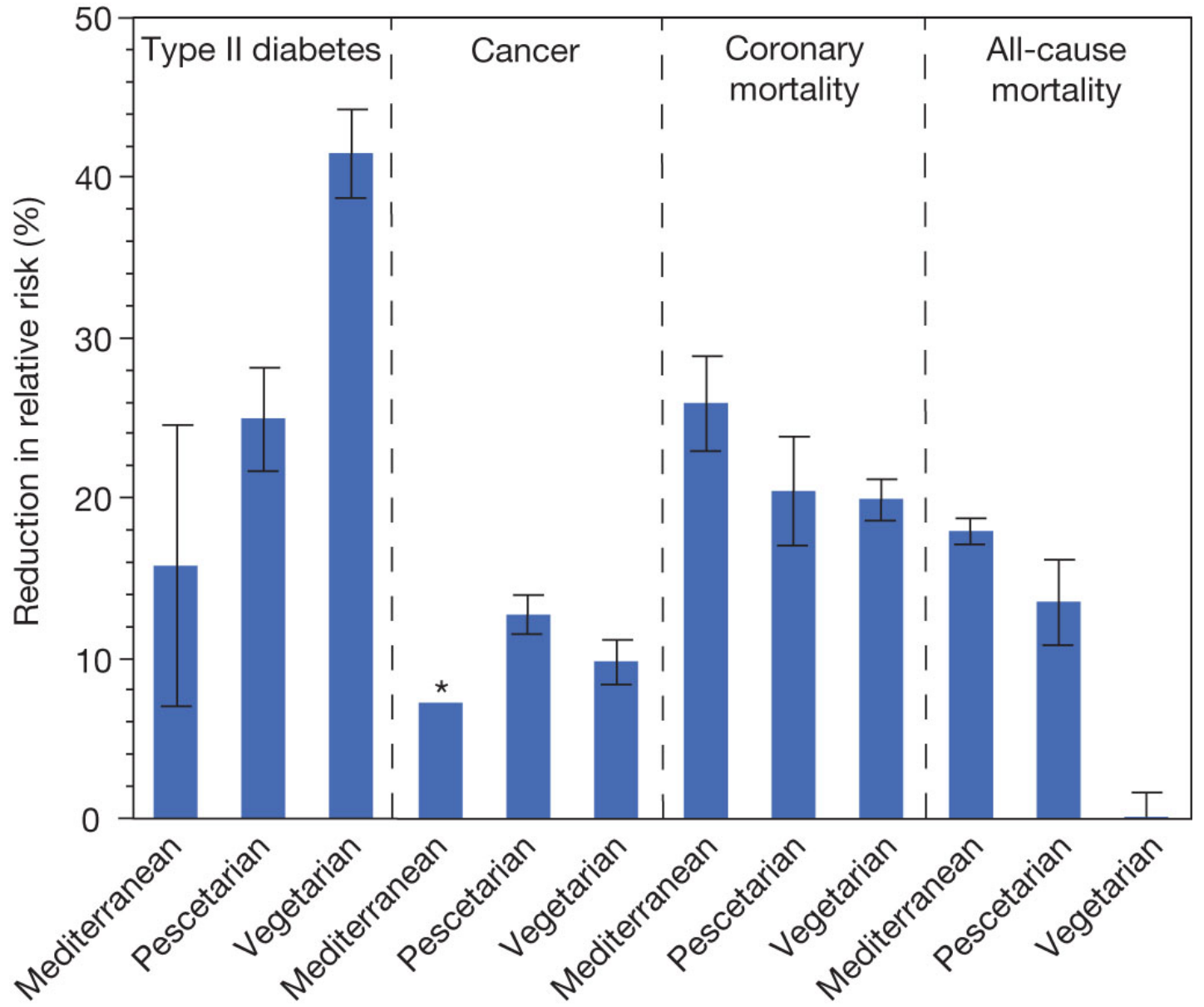
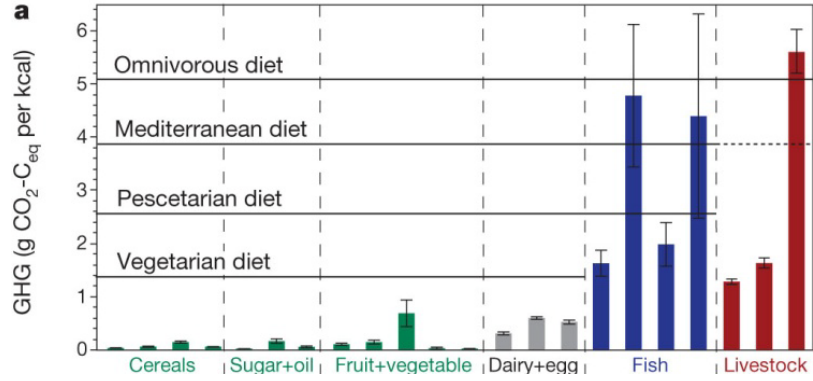
Allen et al. 2017
Riechers et al. 2020
Chapman et al. 2019

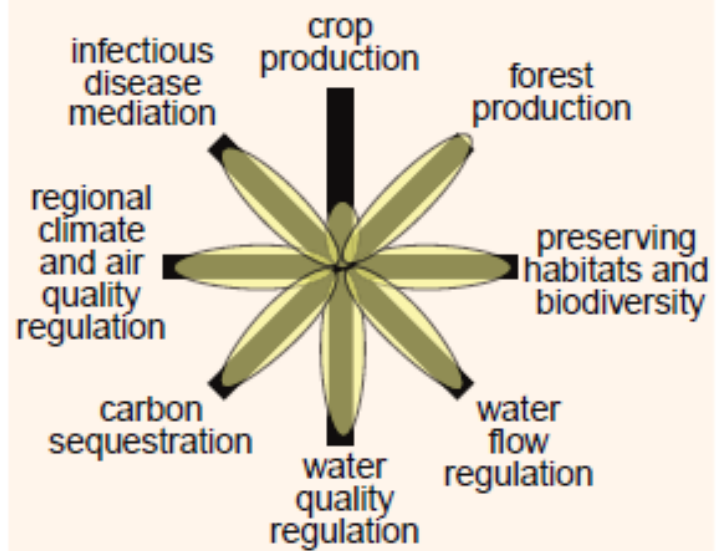
A top-down view of a white oval plate filled with food. The base is a thick layer of bright green, finely chopped or mashed vegetable. Scattered on top are several pieces of golden-brown, fried chicken. On the right side, there is a single, large, dark green leaf that has been fried, showing some charring. The plate is set on a light-colored, speckled granite countertop.

**What About
Consumers?**

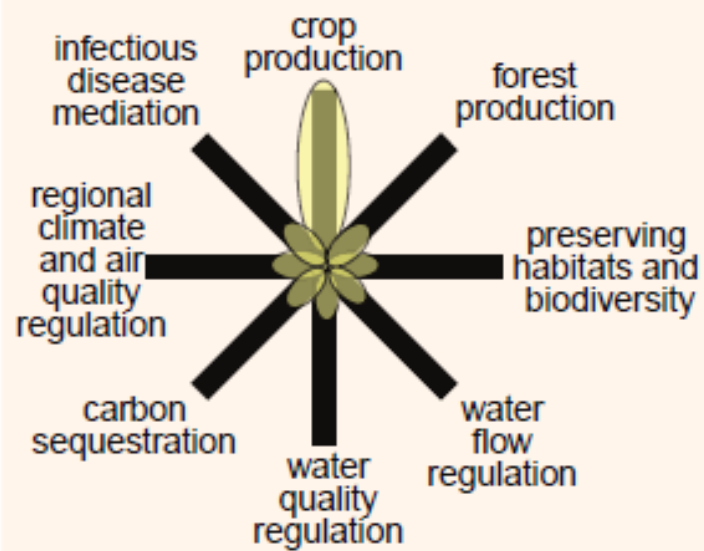
Lifecycle GHG emissions (CO₂-C_{eq}) for 22 different food types.



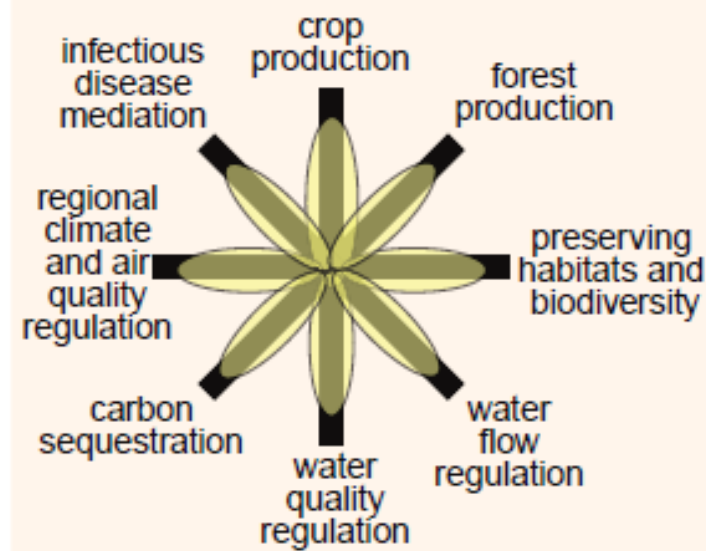




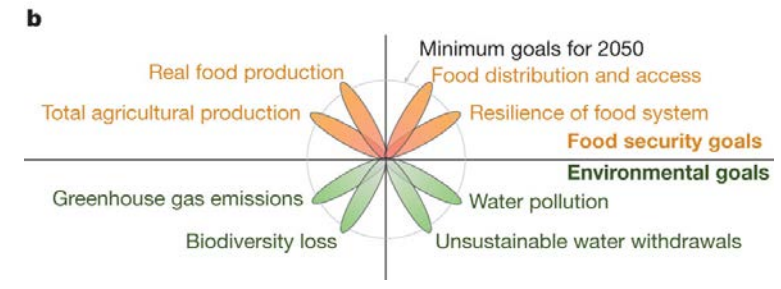
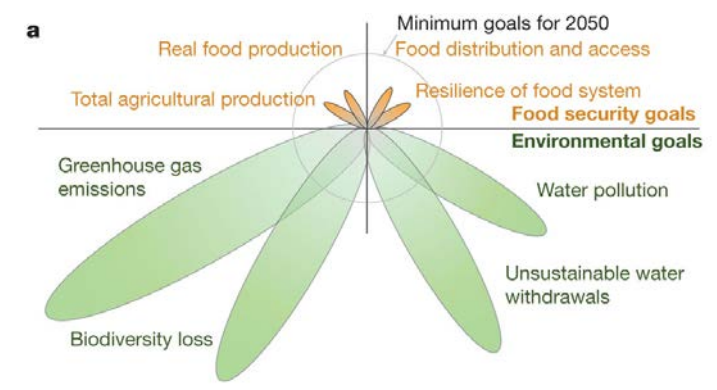
natural ecosystem



intensive cropland



cropland with restored ecosystem services



Solutions for a cultivated planet

Foley et al. 2011



Thank You &
Questions?

john.quinn@furman.edu



FURMAN



V A A G E N

T I M B E R S

Forest to Frame



ERA OF MEGAFIRES





















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

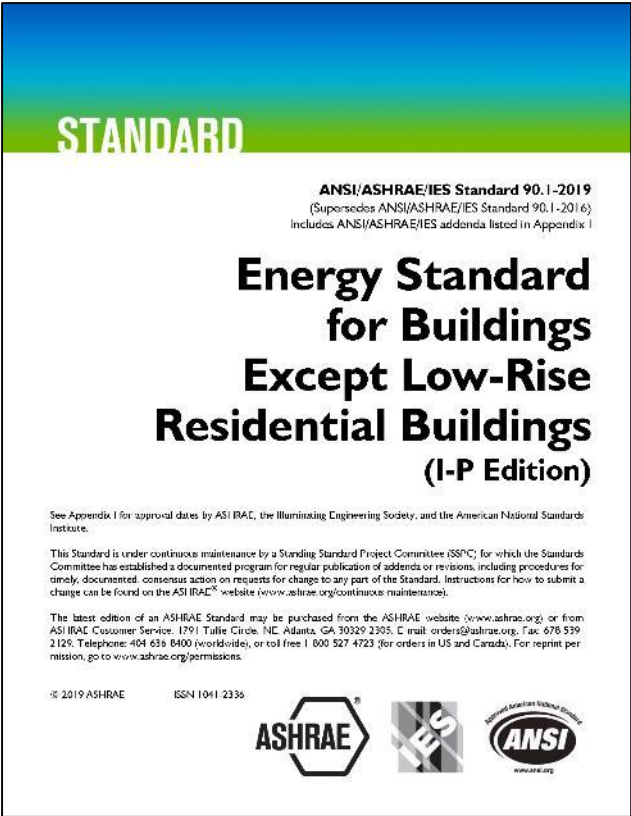


Code and Standards Bodies

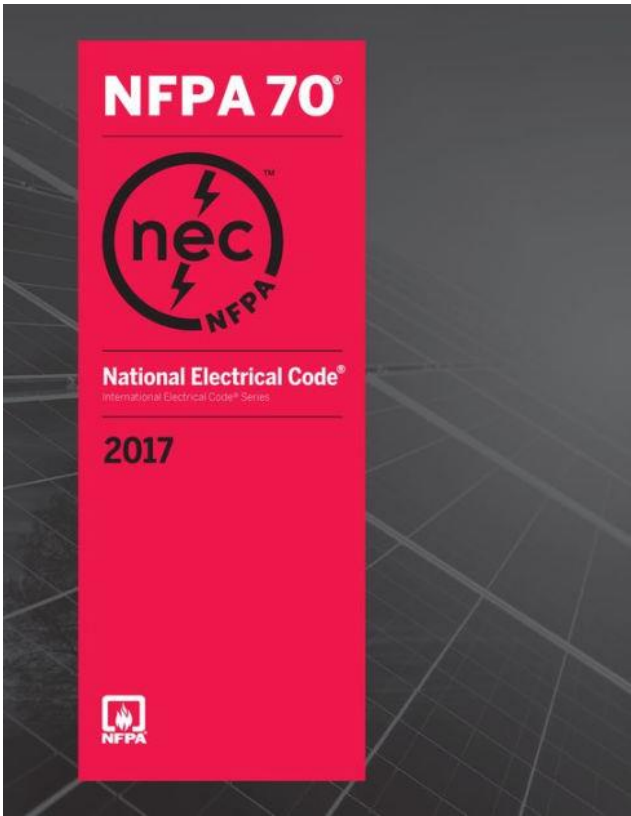
International Code Council



ASHRAE

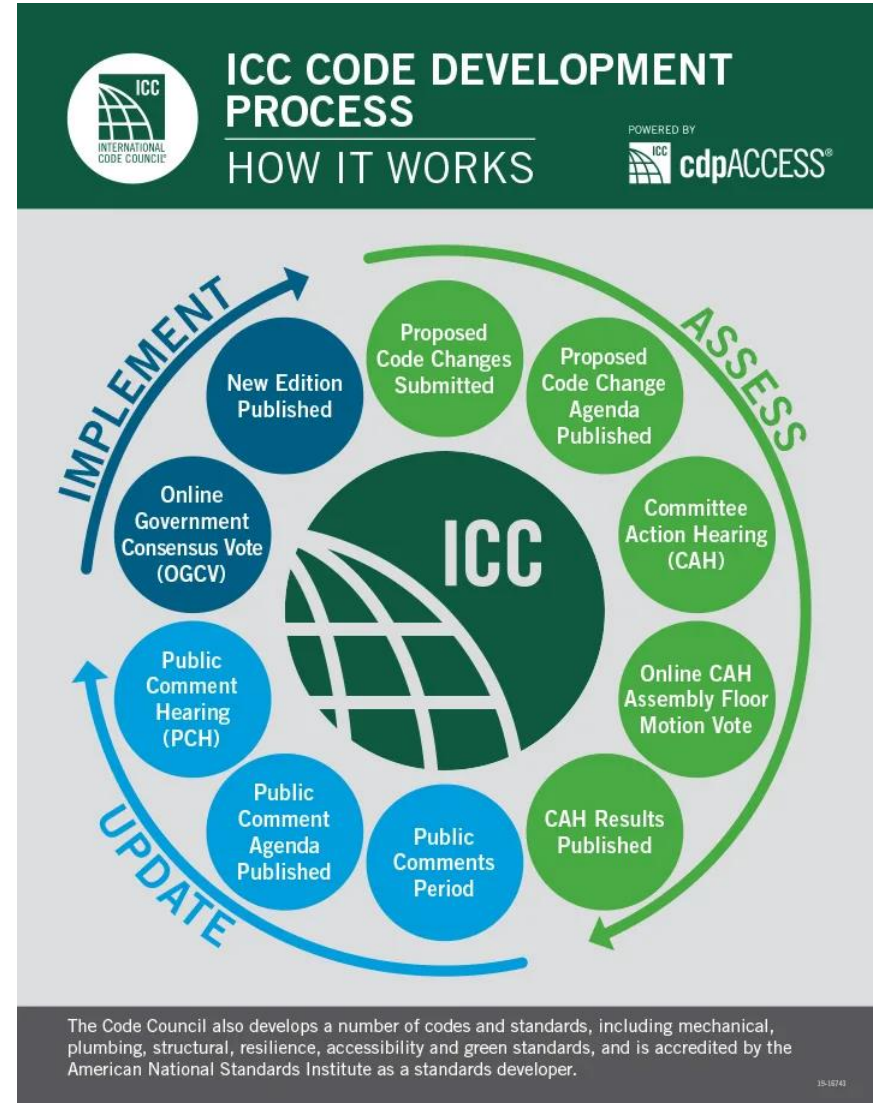


NFPA



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)

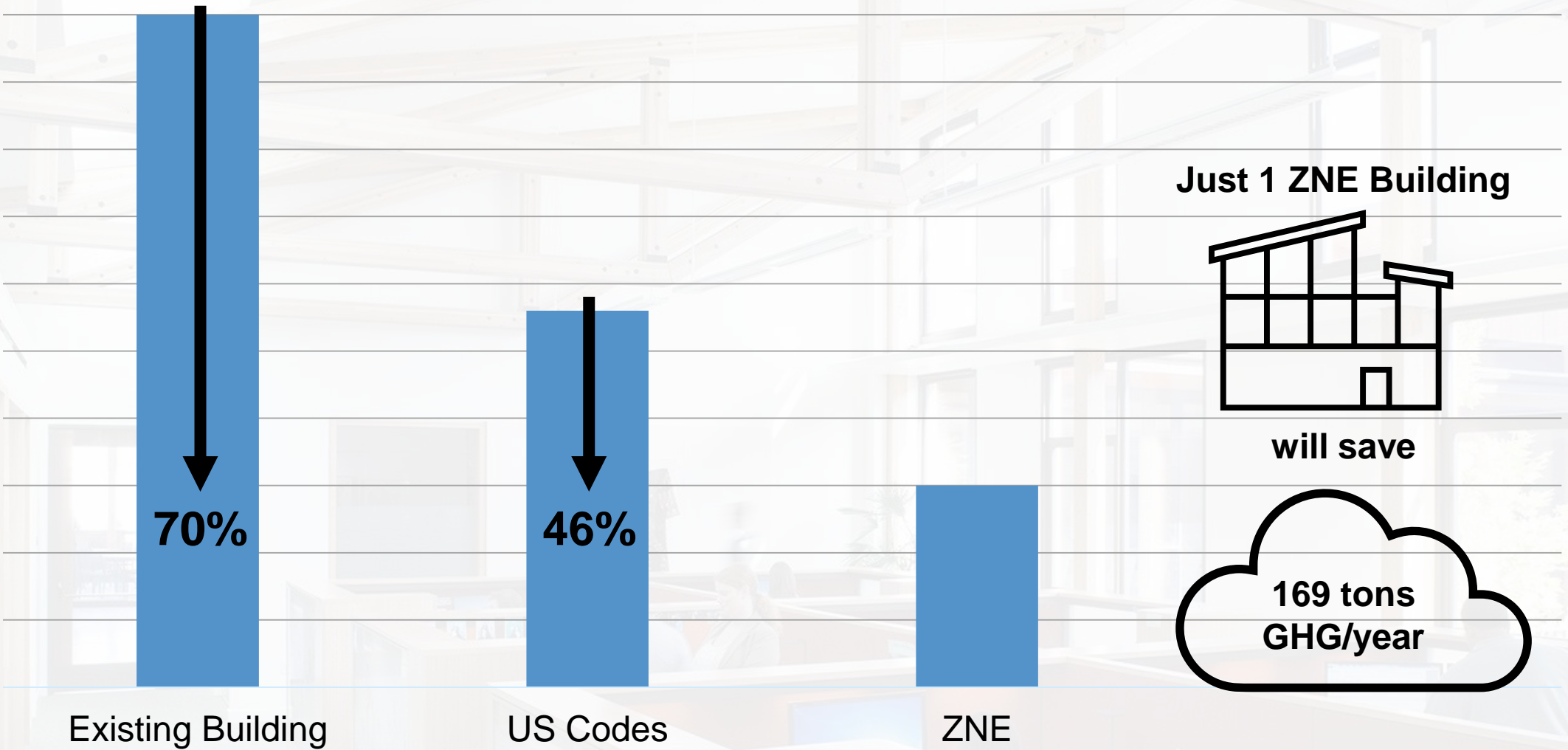


75%
electricity
consumption

50% fossil gas
consumption

**38% US
Emissions**

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



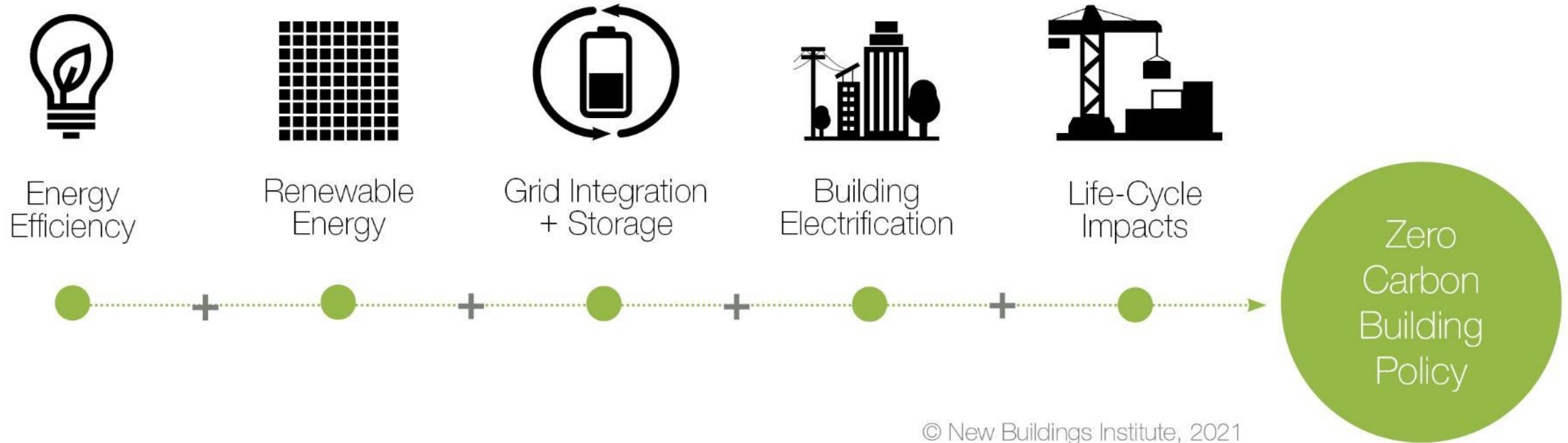
Embodied Carbon

Manufacture, transport and installation of construction materials

Operational Carbon

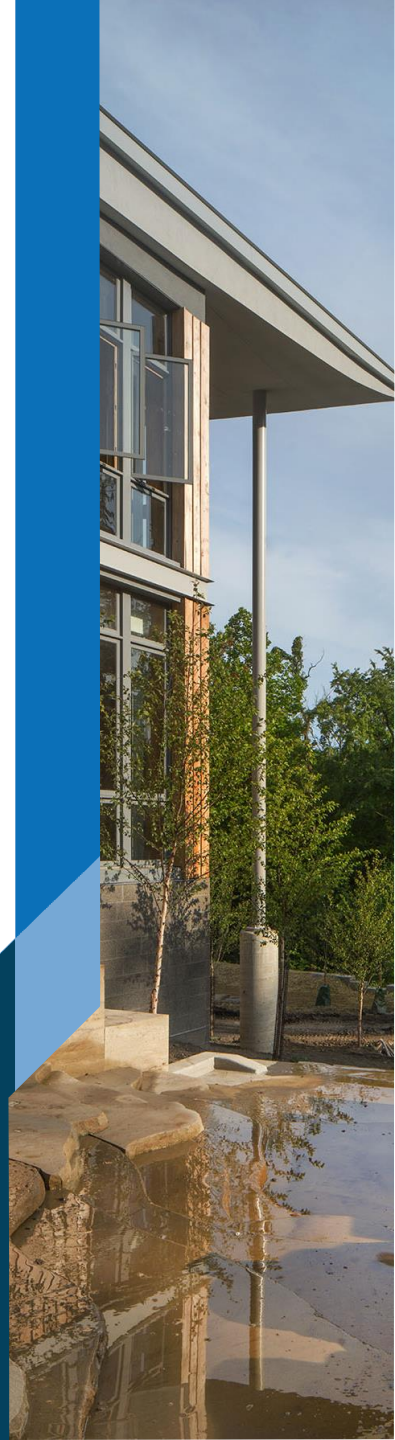
Building energy consumption

The Five Foundations of Zero Carbon Building Policies



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 |



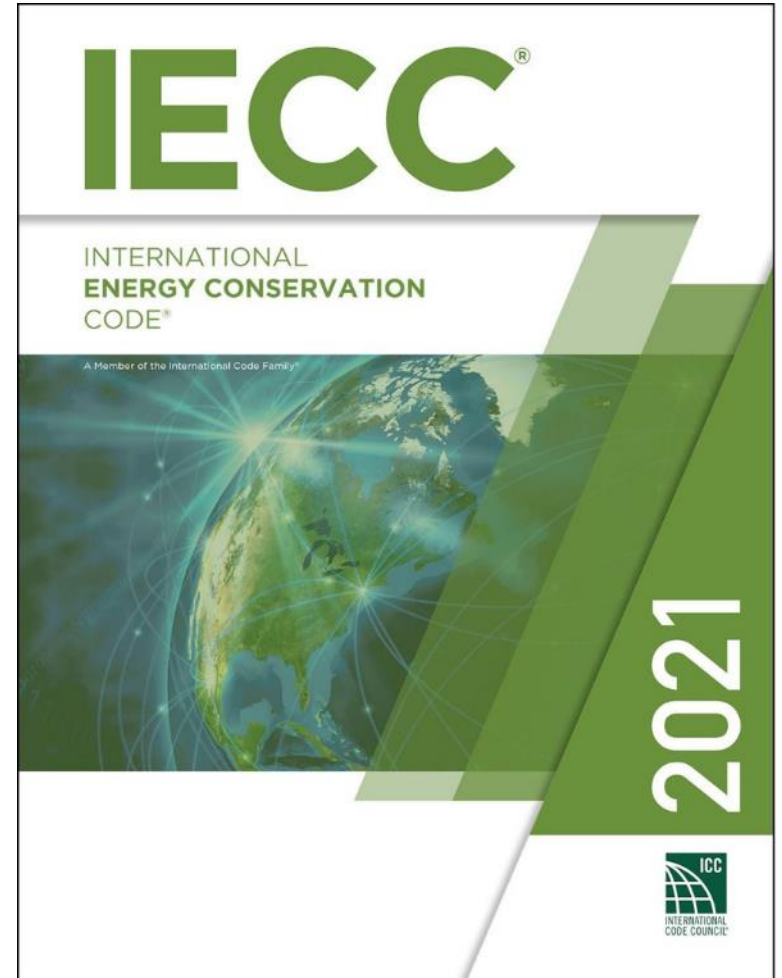


Energy Efficiency

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.

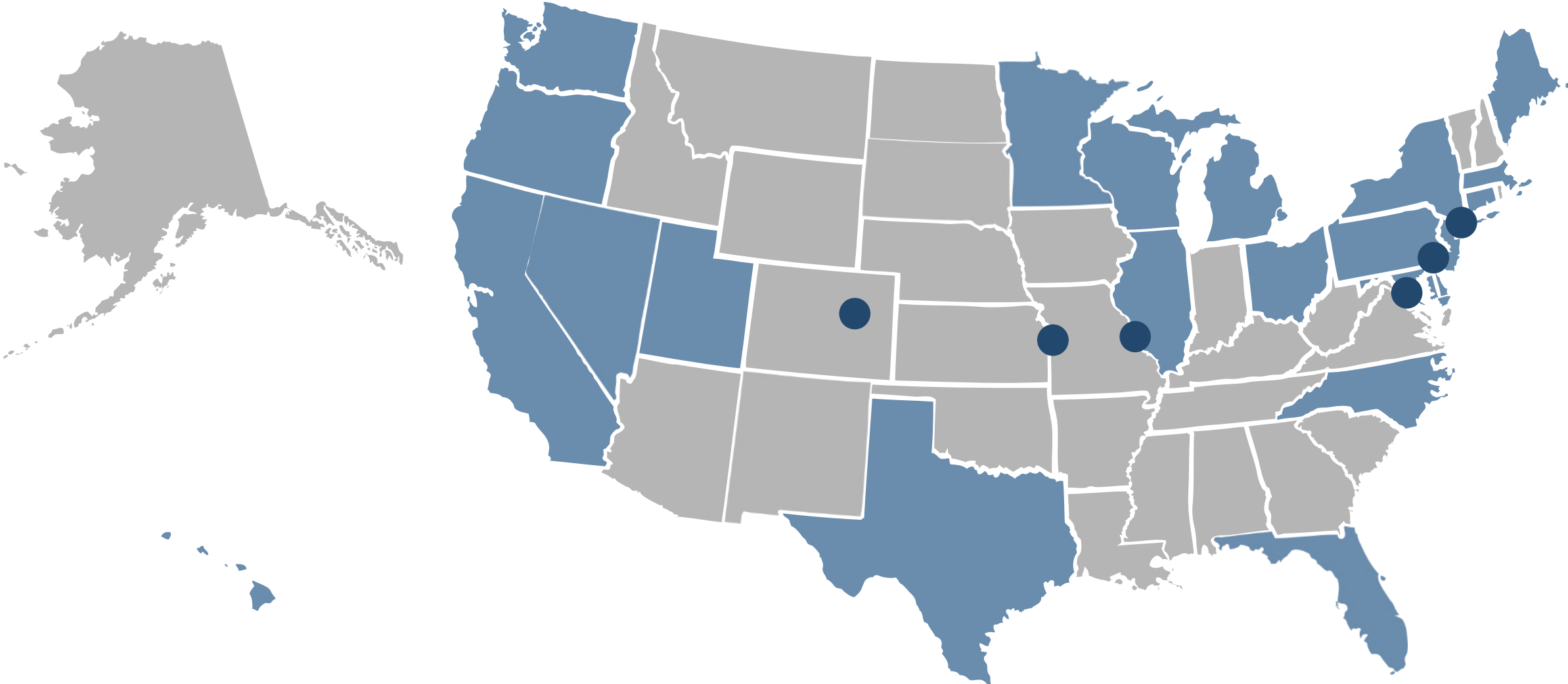


ASHRAE Energy Standard

- 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

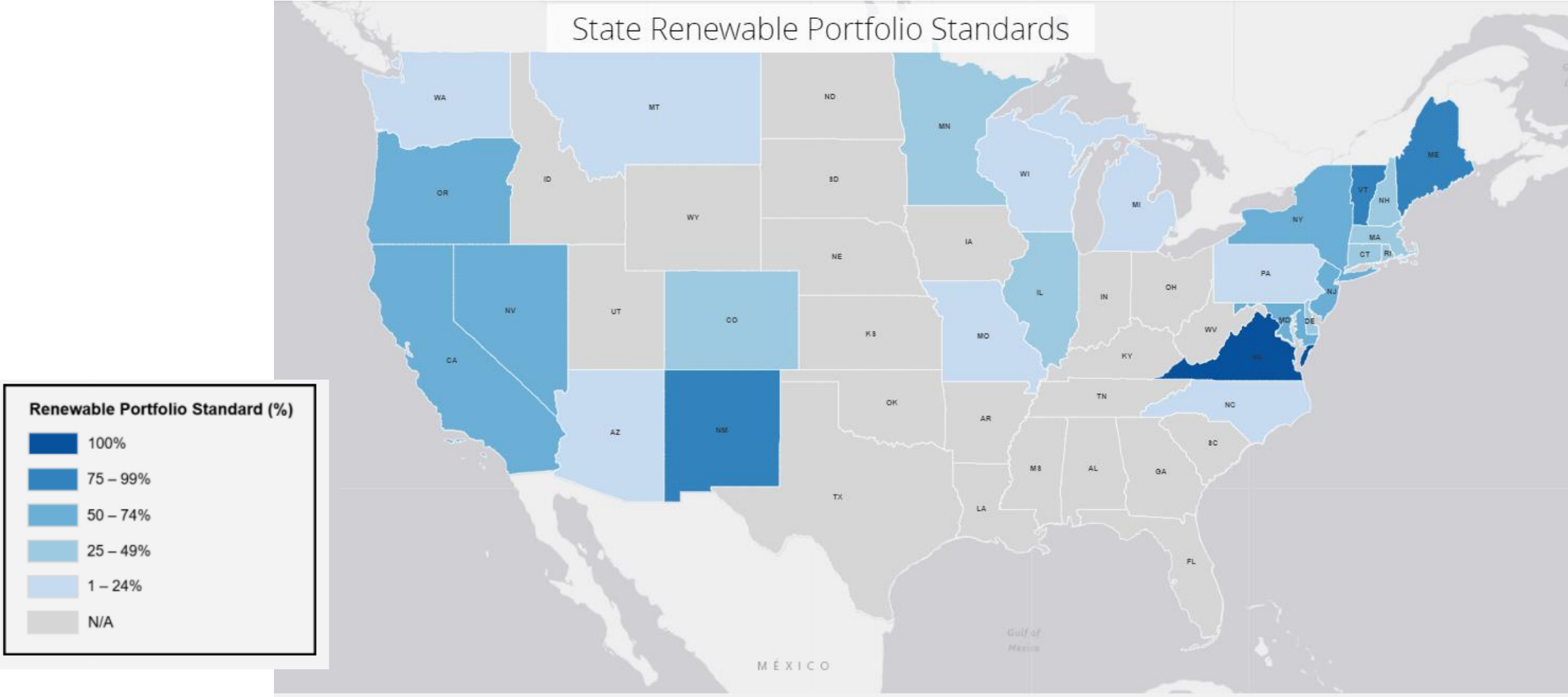




Renewable Energy


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.

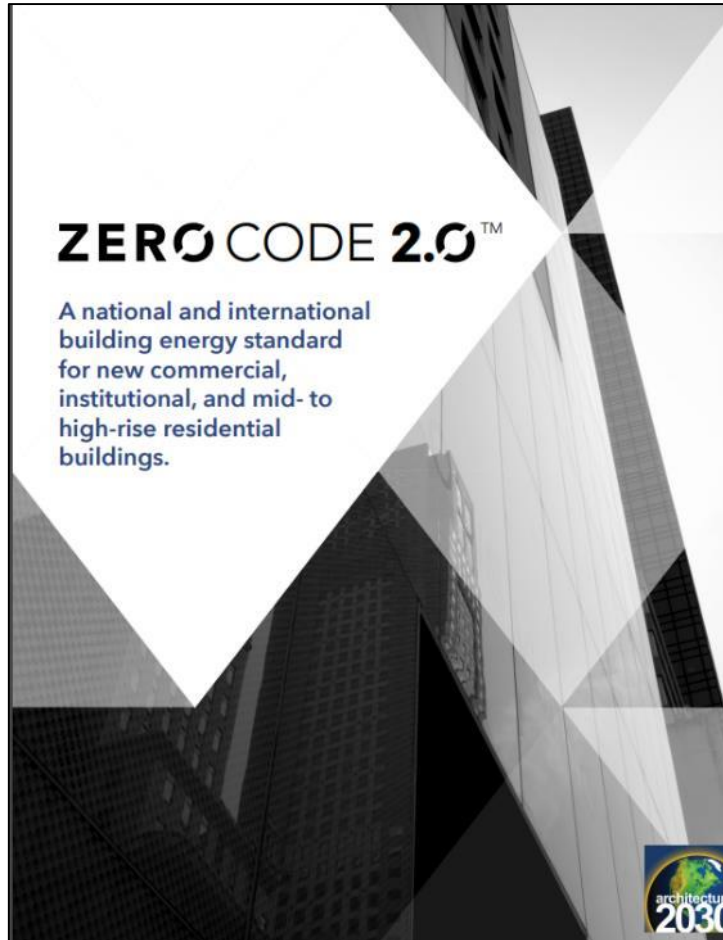
Integrating a zero energy building appendix into the 2021 IECC as a jurisdictional requirement or option will make the model energy code a more robust policy tool.

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>).

The latest edition of an ASHRAE Standard can be purchased from the ASHRAE website (www.ashrae.org) or from ASHRAE Customer Service, 180 Technology Parkway NW, Peachtree Corners, GA 30092. E-mail: orders@ashrae.org. Fax: 678-539-2129. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/permissions.

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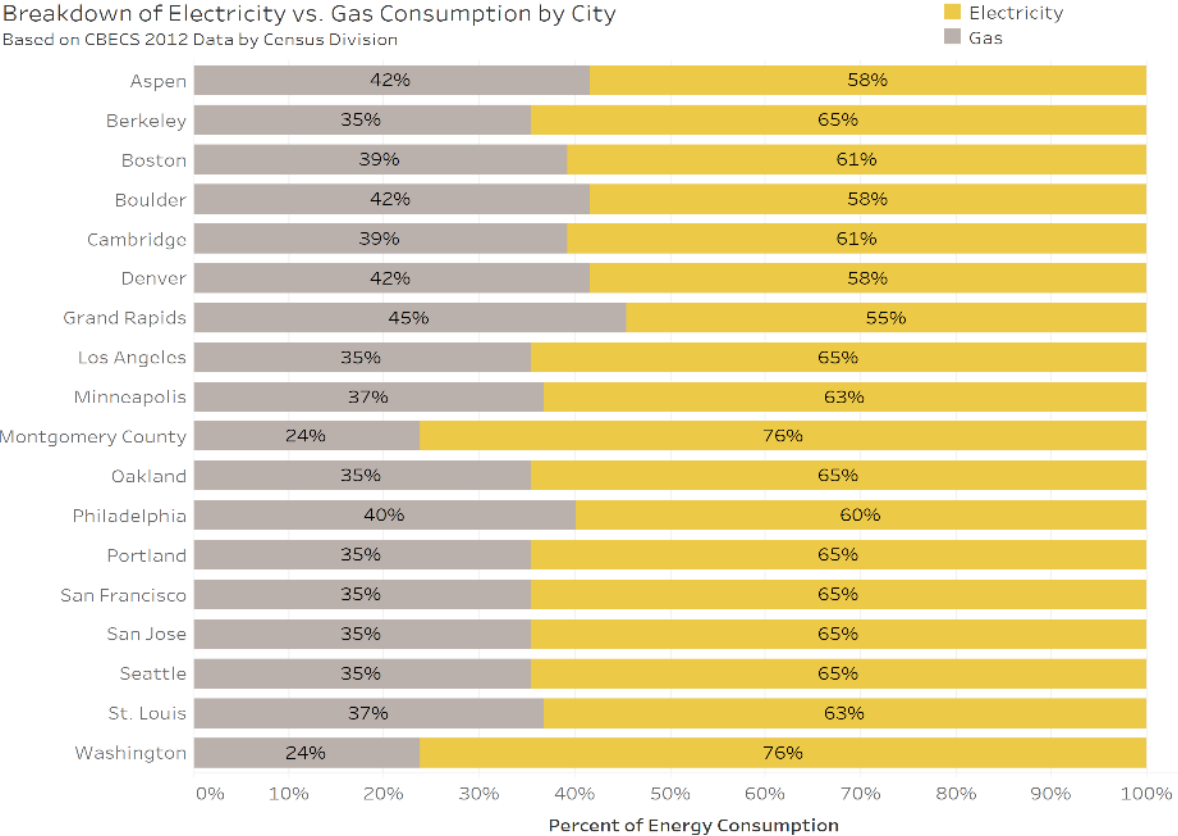
Electrification

All building systems and vehicles
powered by clean electricity

Gas v. Electric Commercial Bldgs (Site BTUs)

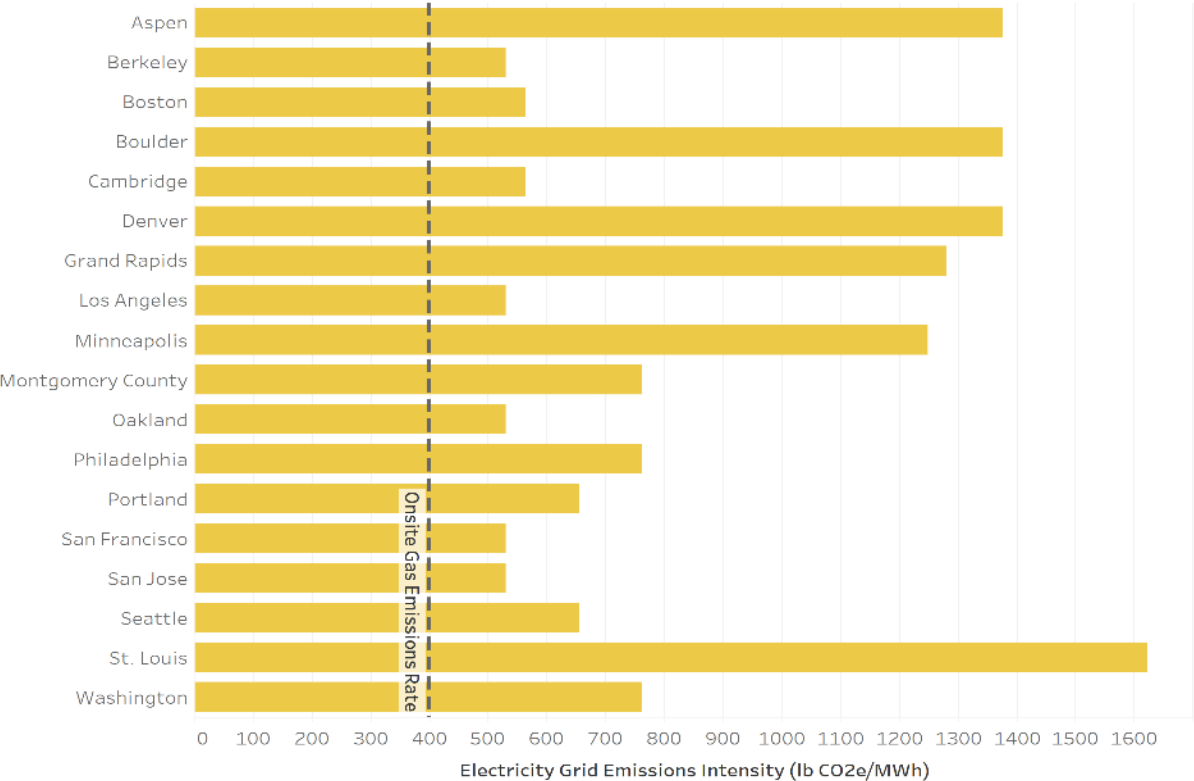
Breakdown of Electricity vs. Gas Consumption by City

Based on CBECS 2012 Data by Census Division



Emissions intensity of electricity generation by city

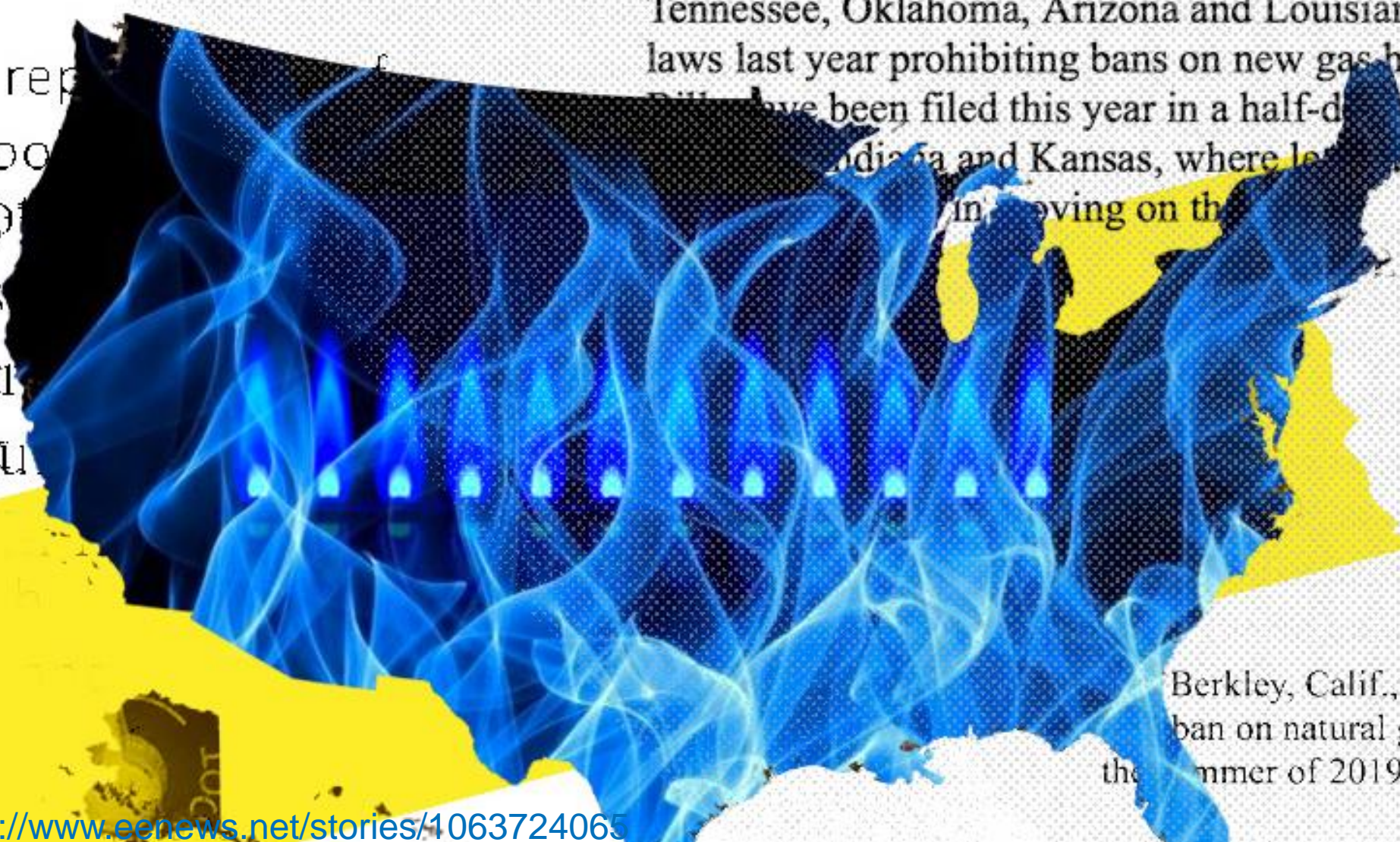
Data from eGrid 2016 and Portfolio Manager



Gas ban backlash spreads across the U.S.

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

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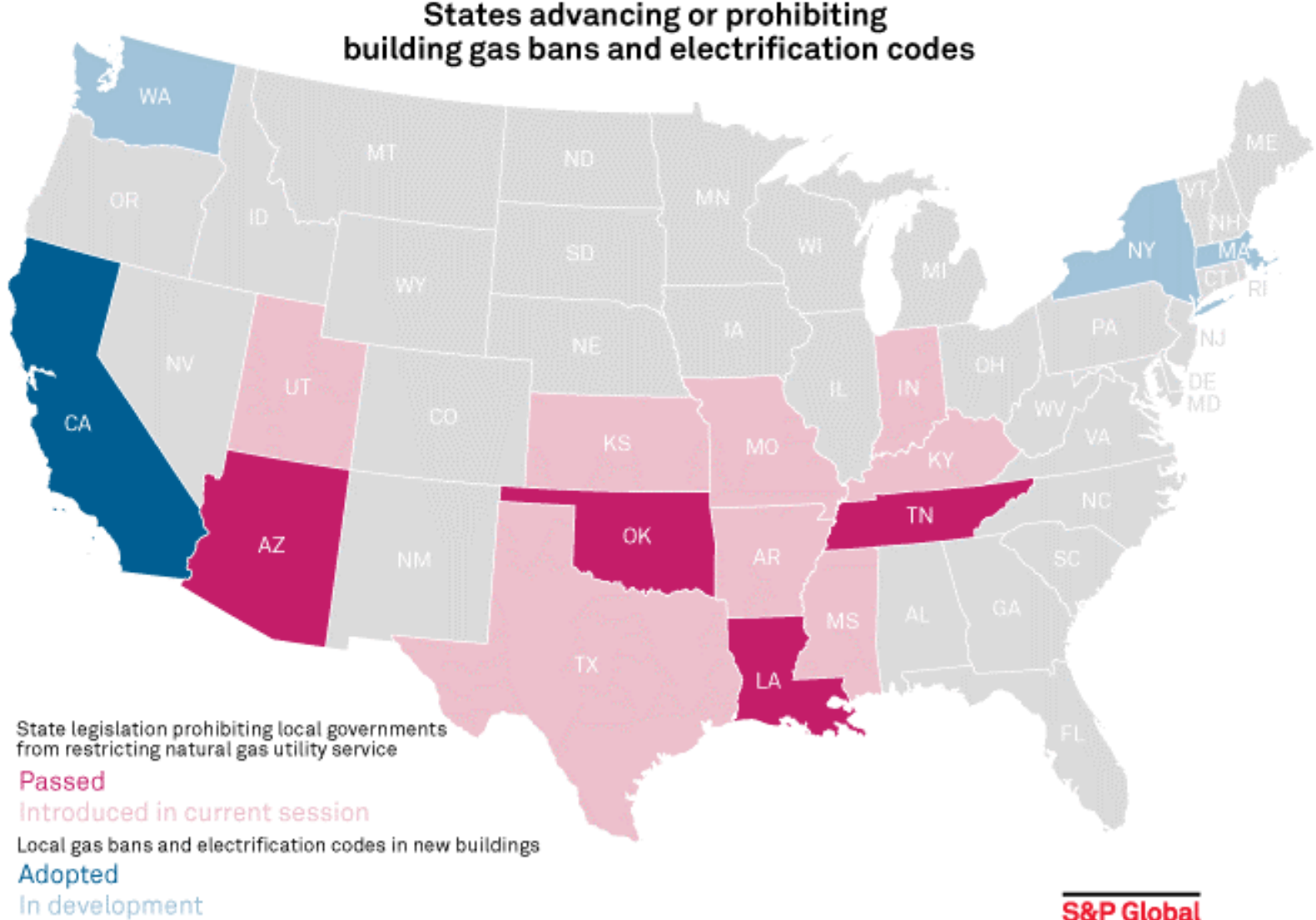


Tennessee, Oklahoma, Arizona and Louisiana enacted laws last year prohibiting bans on new gas hookups. Bills have been filed this year in a half-dozen others, including Indiana and Kansas, where legislators have been moving on the

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

A year and a half later, the decis

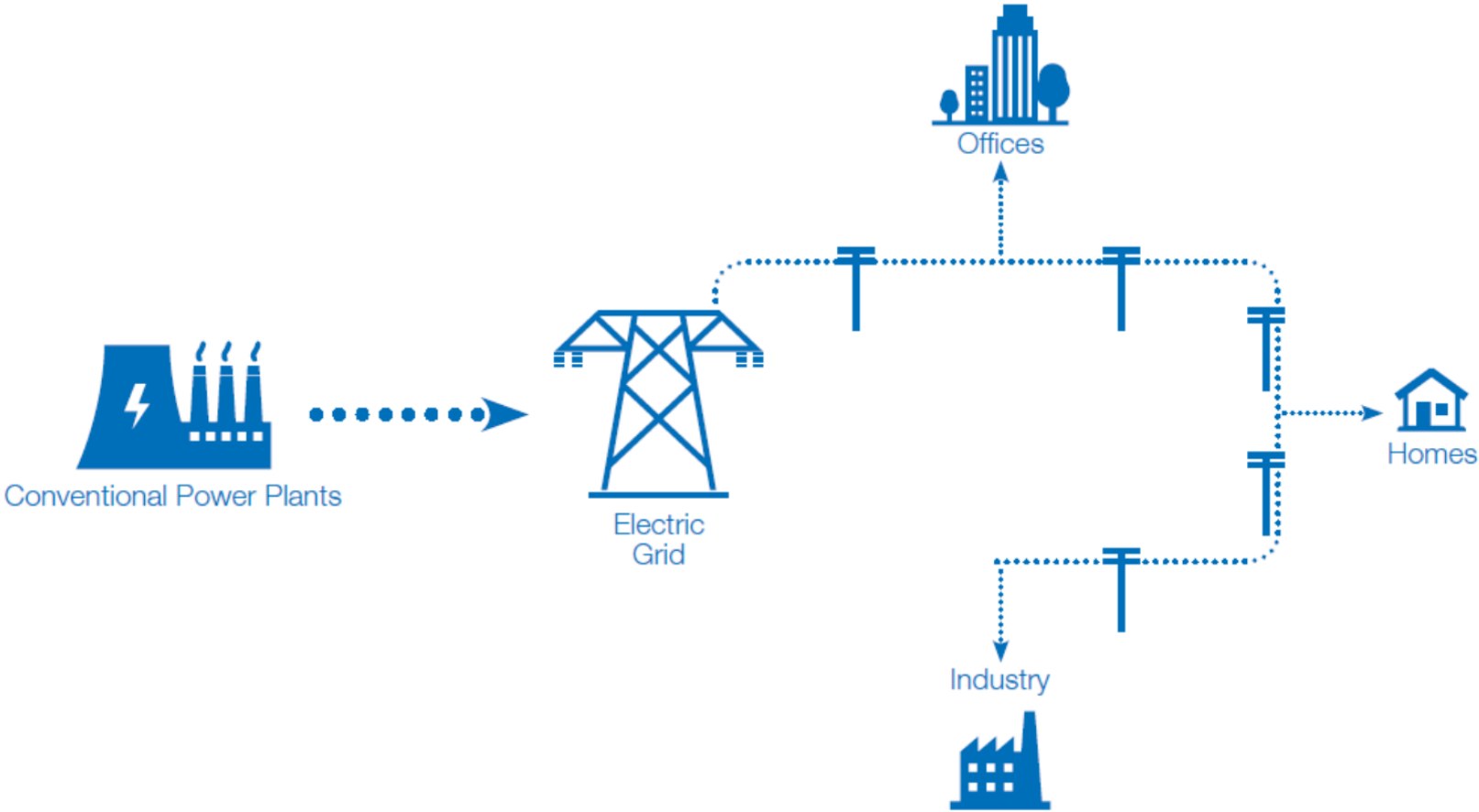
Opportunities and Distractions



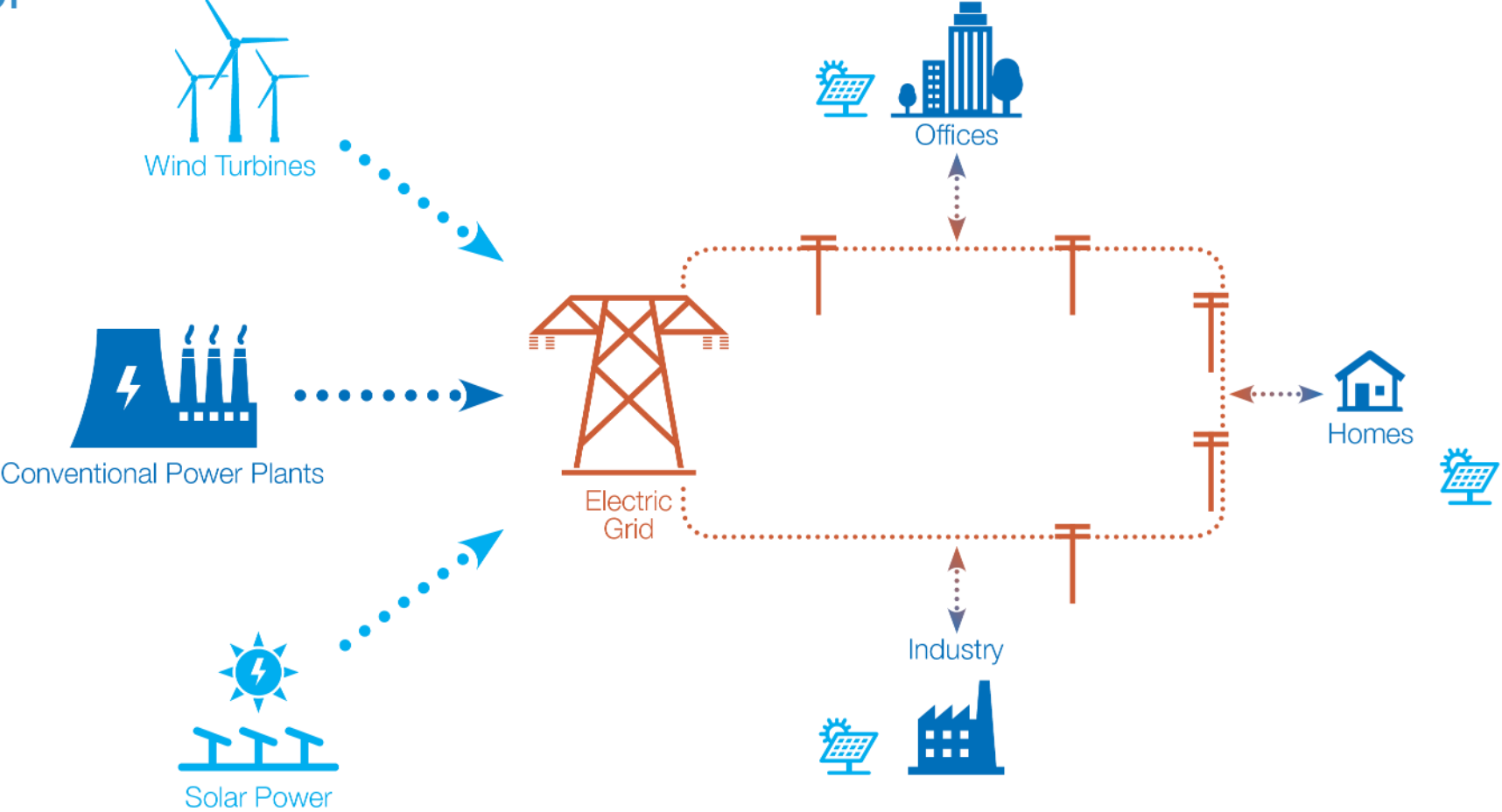
Grid Integration

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

One-Way Grid



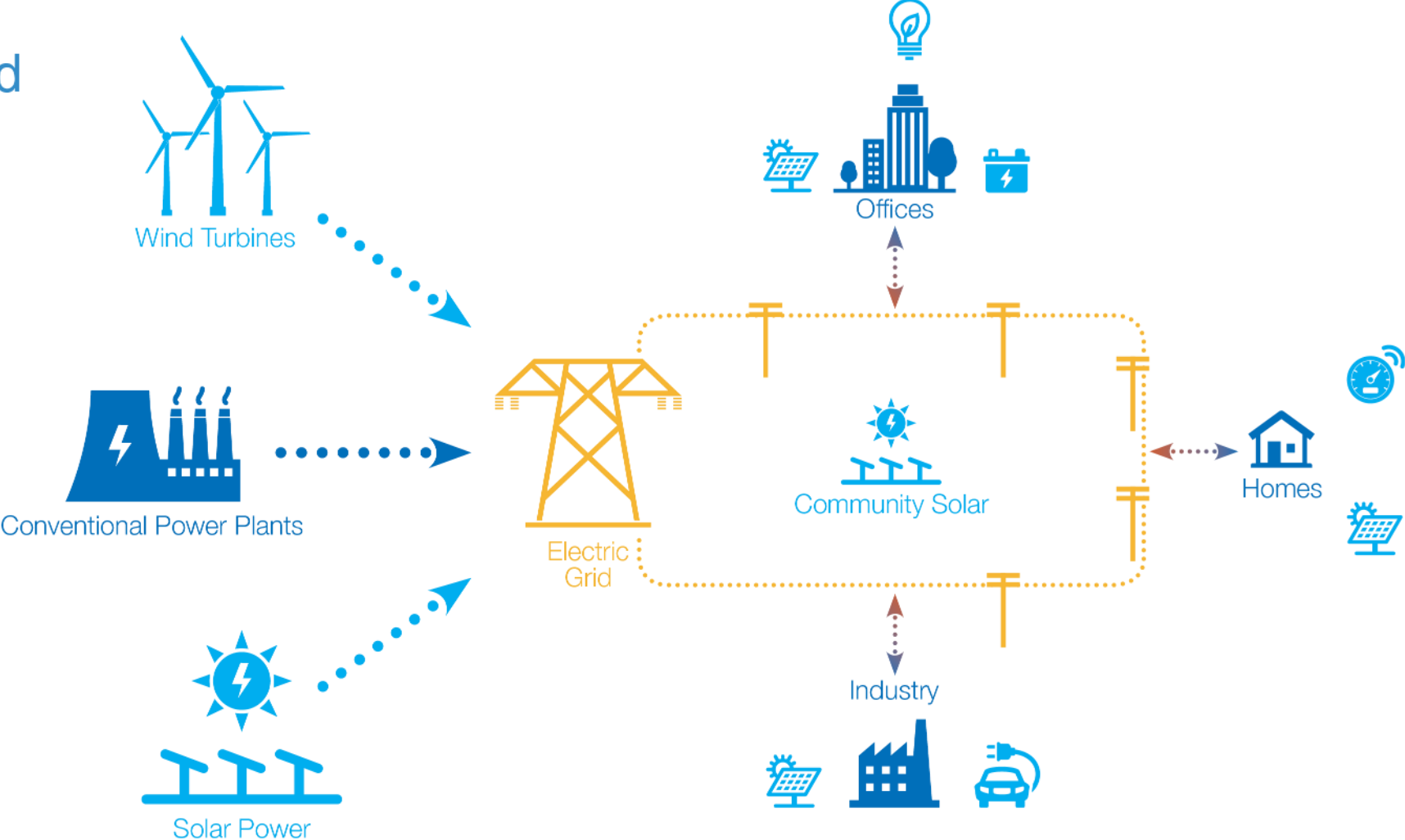
The proliferation of distributed generation creates a need for more active grid management



GridOptimal Technologies and Strategies:



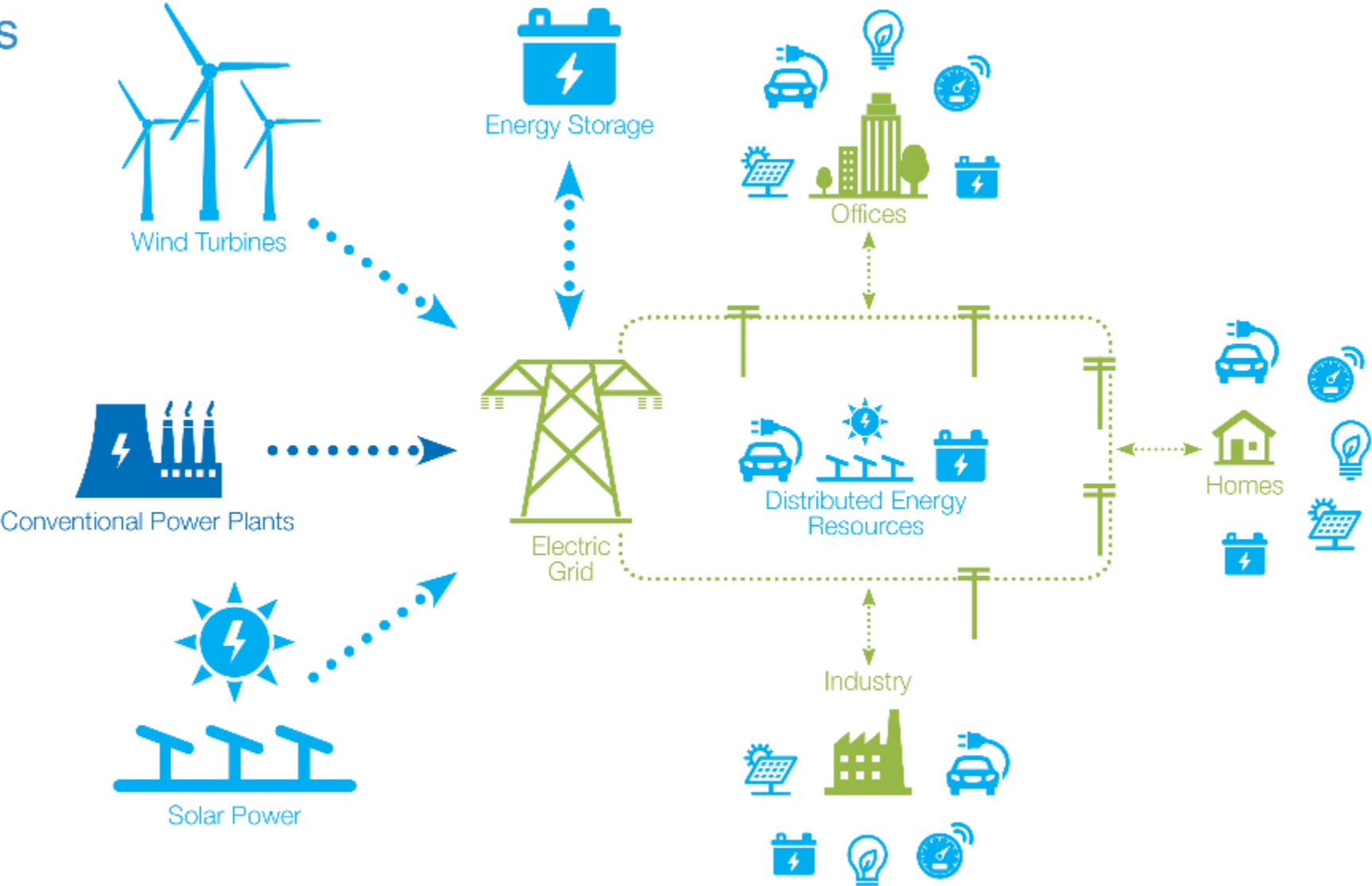
Storage and smart devices can help support clean grid operations



GridOptimal Technologies and Strategies:

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

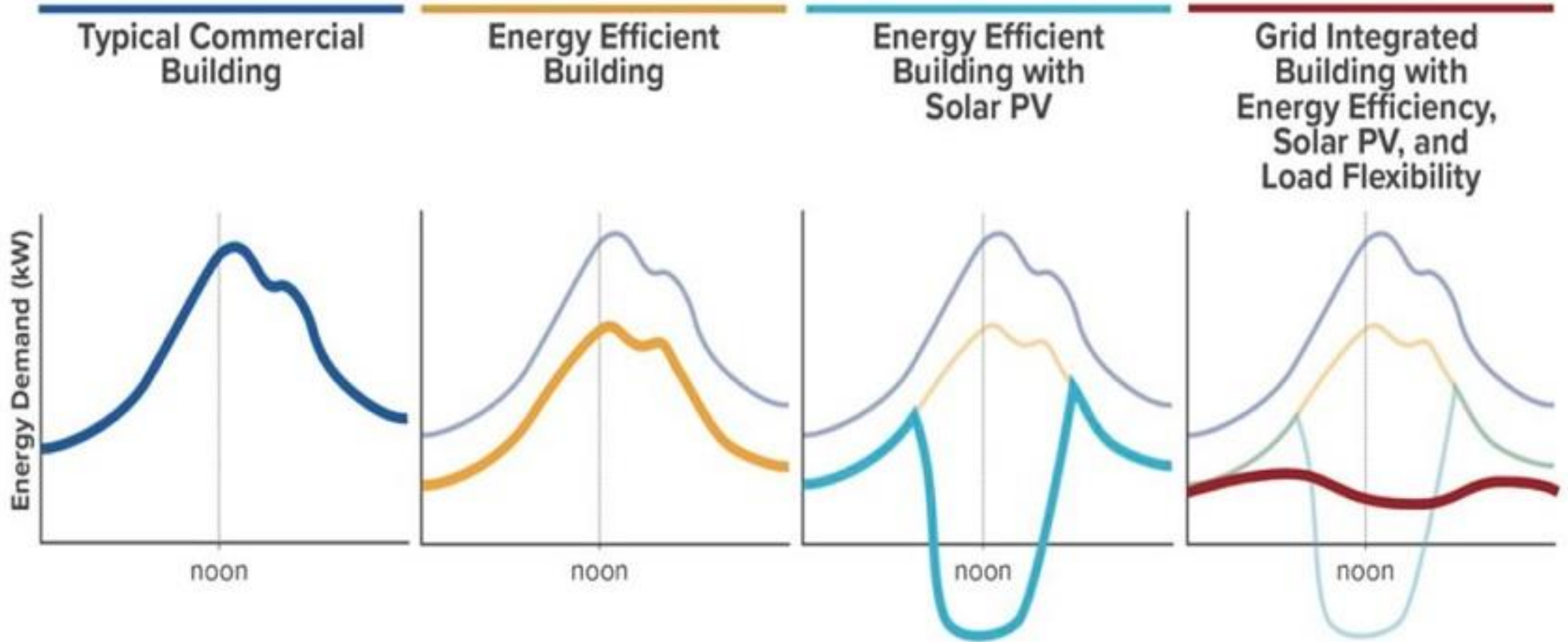
GridOptimal empowers players on both sides of the meter to actively support the transition to a carbon free grid



GridOptimal Technologies and Strategies:

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

Impact of Grid-Integrated Buildings

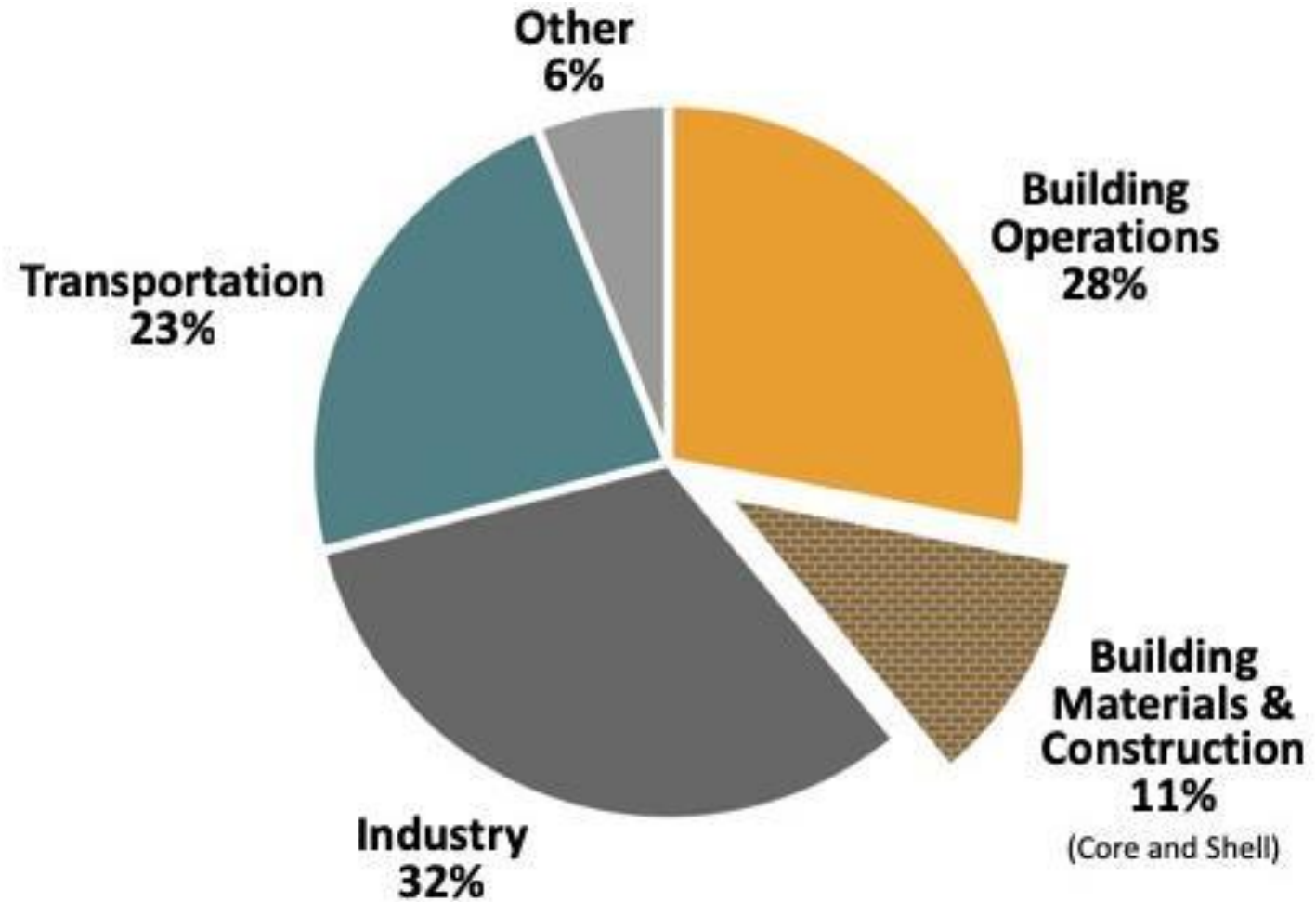




Lifecycle Impact

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

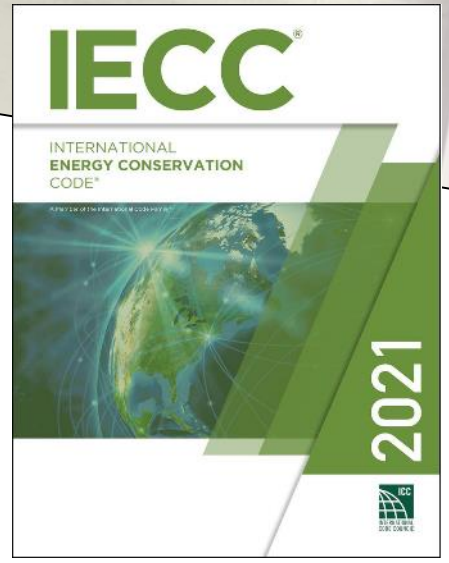
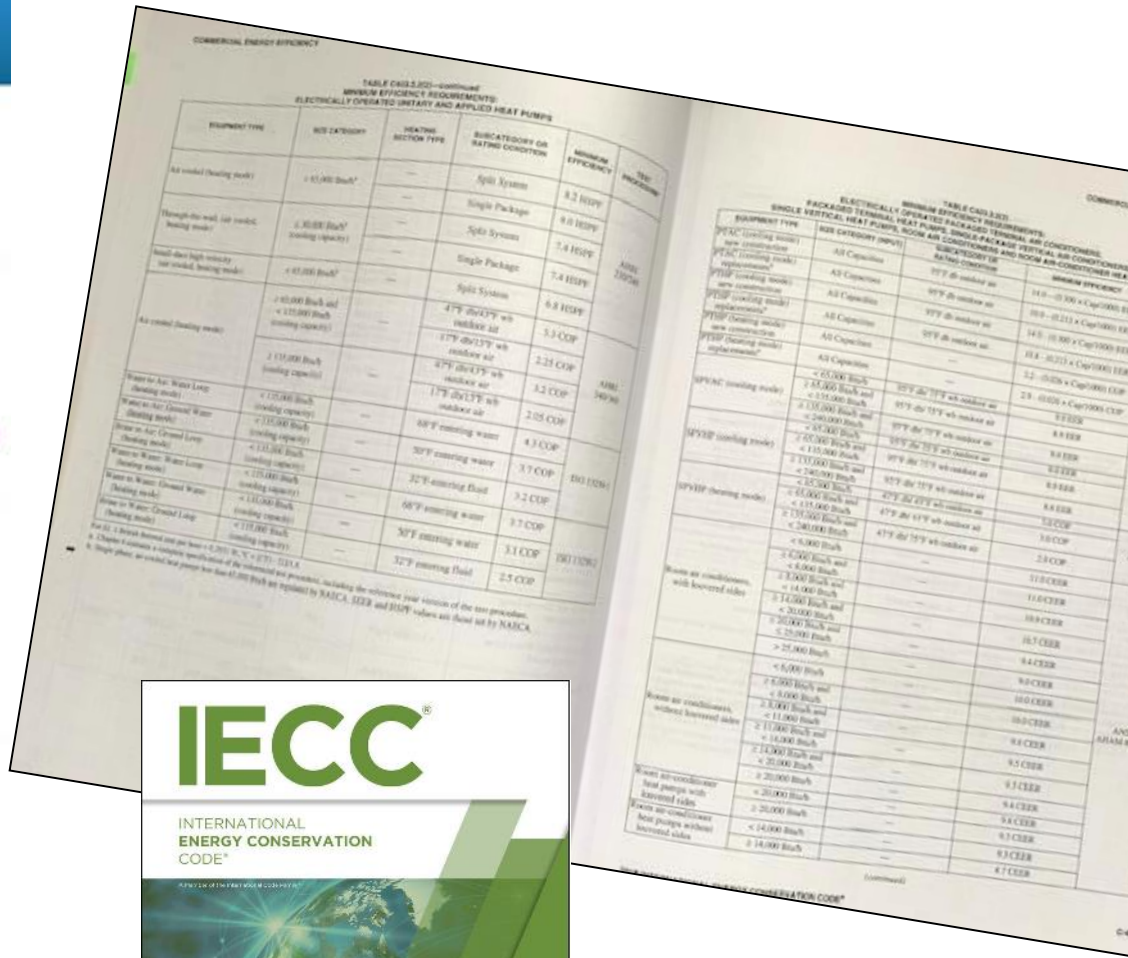


EQUAL TO WHAT **TEXAS** HOUSEHOLDS USE IN A YEAR

CLIMATE EMISSION CUTS

200 MILLION METRIC TONS OF CARBON DIOXIDE

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

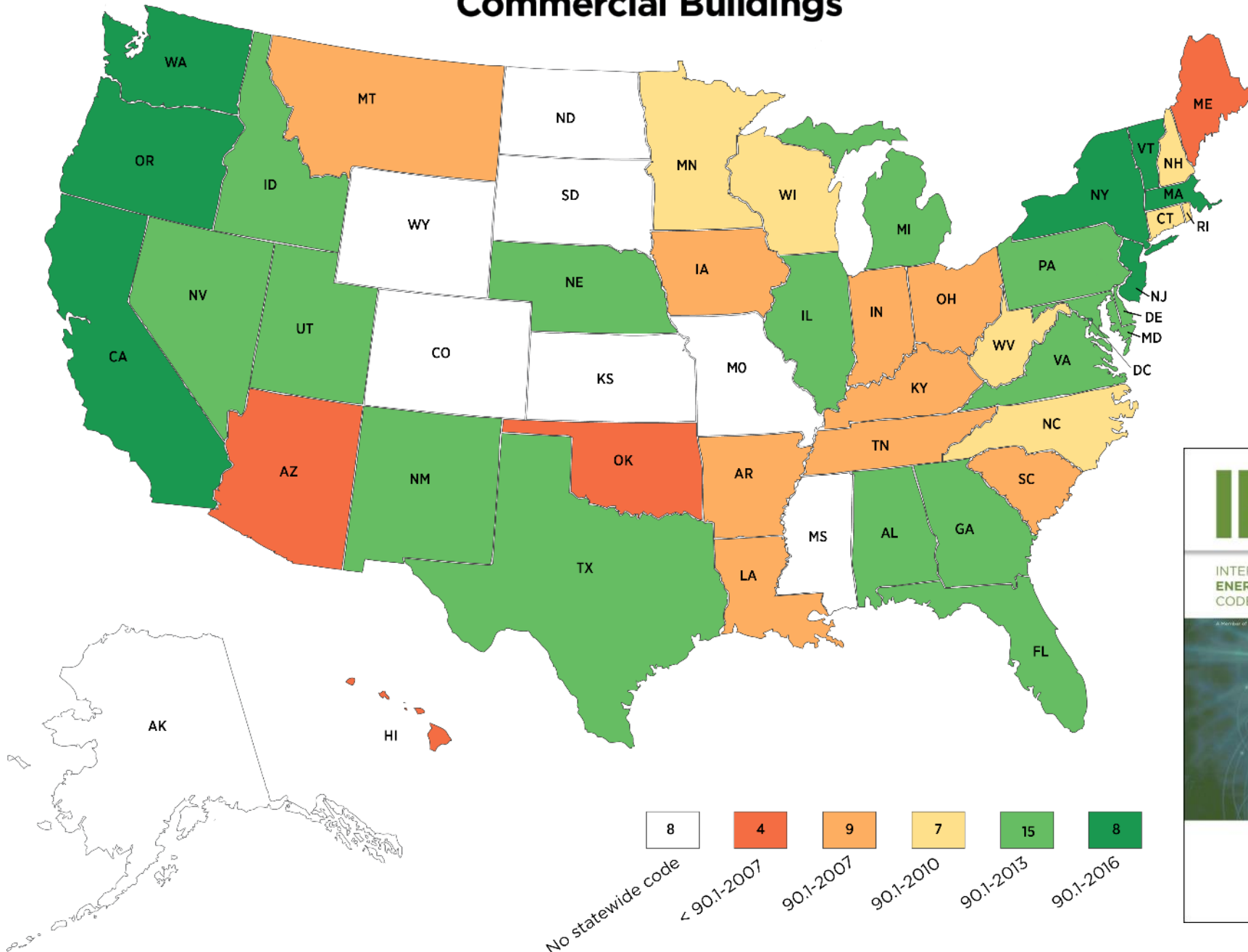


LEARN MORE AT APPLIANCE-STANDARDS.ORG

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

ANSI

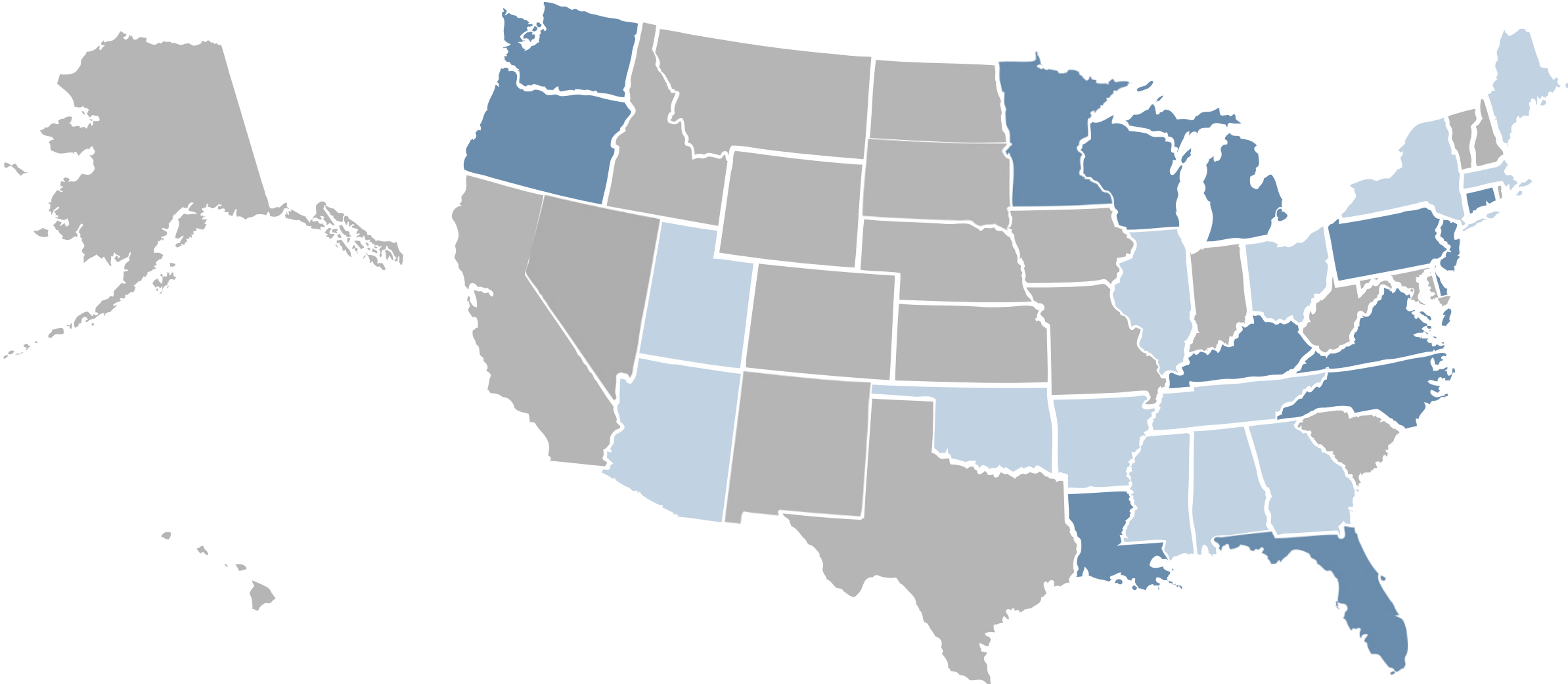
ICC



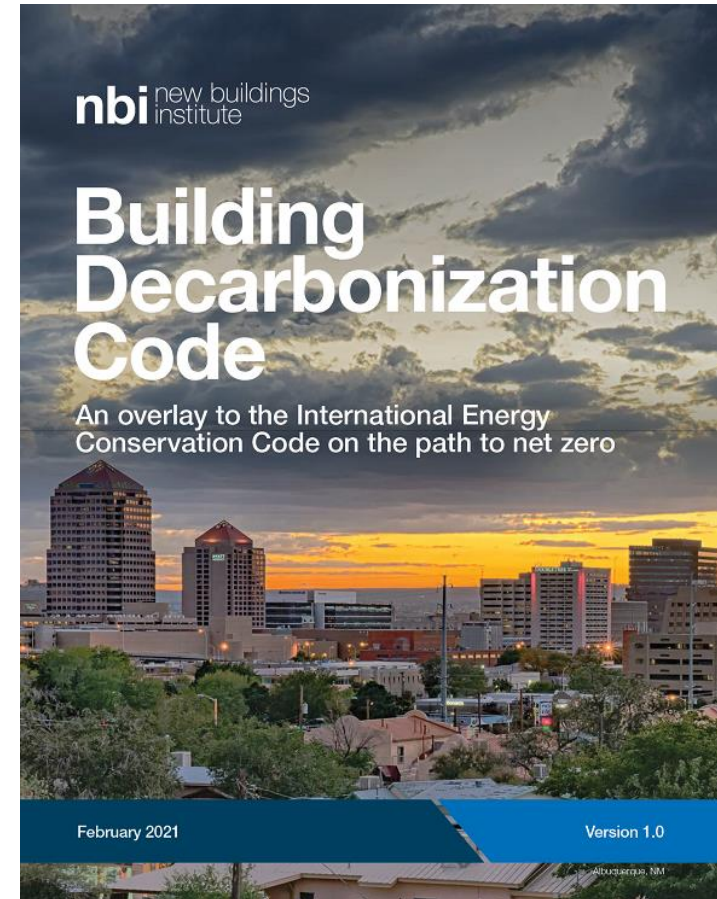
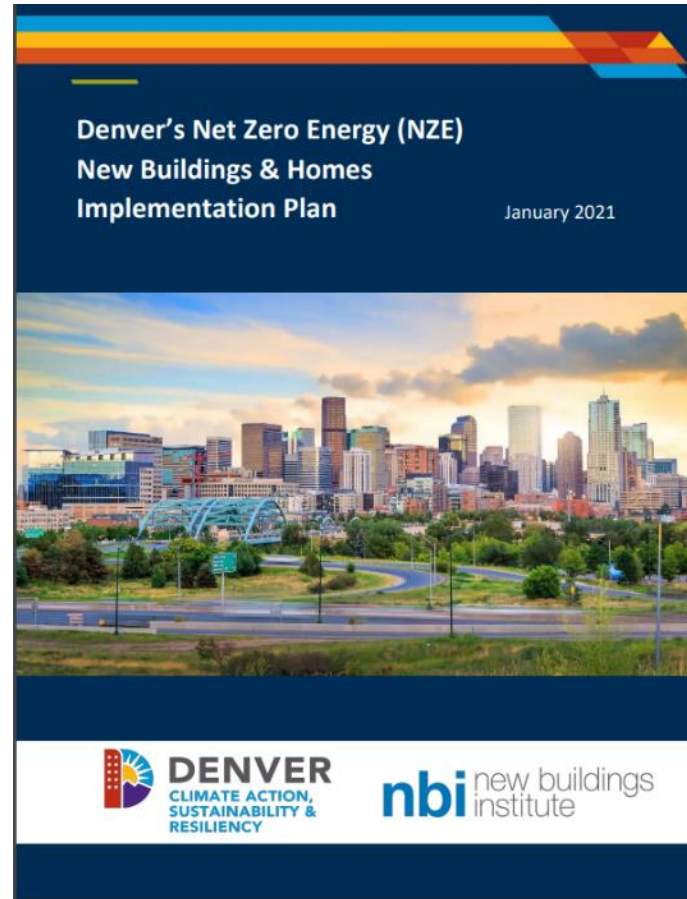
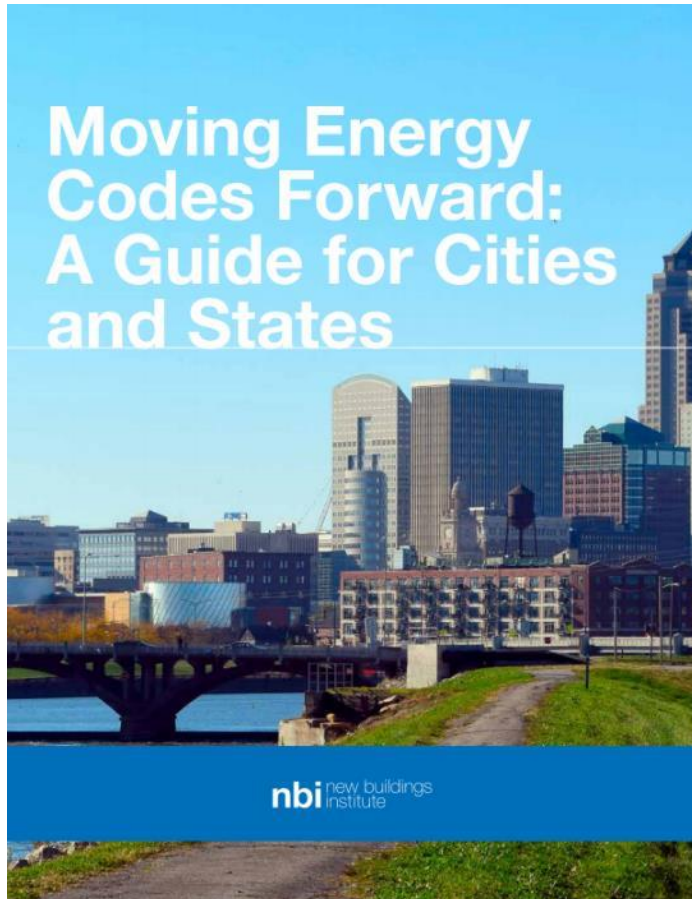
ASK ABOUT
ENERGY STAR
CERTIFIED HOMES



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.

nbi new buildings
institute



Questions?

Kim Cheslak
Director Codes
kim@newbuildings.org

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www.newbuildings.org



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Environmental and
Energy Study Institute

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Please take 2 minutes to let us know at:
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Materials will be available at:
www.eesi.org/043021camp

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Friday, April 30, 2021