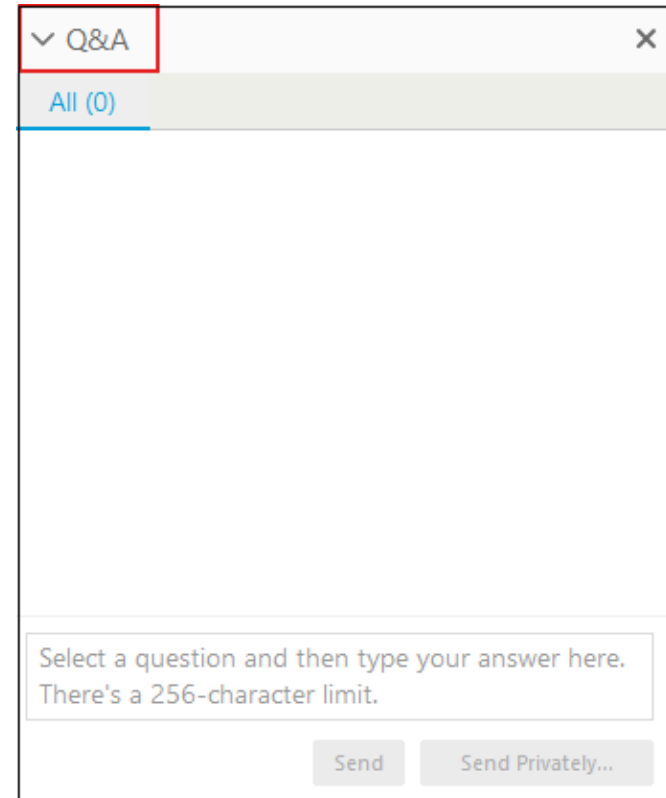


Welcome

- PowerPoint and webinar recording will be available on the HUD Exchange
- Participants in 'listen only' mode

Questions?

- Please submit your content related questions via the Q&A box
- Please submit your technical questions via the Q&A box
- Please include the slide number when applicable to the question
- Send to Host, Presenter and Panelists



The screenshot shows a Q&A interface. At the top, there is a dropdown menu with a red box around it, showing a downward arrow and the text 'Q&A'. To the right of the dropdown is a close button (X). Below the dropdown is a tab labeled 'All (0)'. The main area is a large white box for questions. At the bottom, there is a text input field with the placeholder text 'Select a question and then type your answer here. There's a 256-character limit.' Below the input field are two buttons: 'Send' and 'Send Privately...'.

Building Energy Efficiency: bolster affordability and resilience in Action Plans

June 18, 2020



Introductions

- **Dale Hoffmeyer | Building Technologies Office | U.S. Department of Energy**
- **Elizabeth Arnold (Fellow)| Building Technologies Office | U.S. Department of Energy**
- **Sean Flynn| Sr. Associate, Curtis + Ginsberg Architects**
- **Isaac Panzarella | Director of the Southeast CHP TAP**
- **Mikayla Catani | U.S. Department of Housing and Urban Development | CPD Specialist**
- **Roosevelt Grant | U.S. Department of Homeland Security | Federal Emergency Management Agency**

Agenda

1

BACKGROUND: CDBG-MIT

2

**IMPORTANCE OF ENERGY EFFICIENCY AND RESILIENT DESIGN
FOR MITIGATION AND RECOVERY**

3

ENERGY EFFICIENCY & RESILIENCE STRATEGIES
[Overarching and building specific strategies]

4

EXAMPLES

5

FINANCING

6

RESOURCES - Q & A

U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY

Background: CDBG-MIT

Mikayla Catani, HUD



CDBG-MIT Purpose:

The CDBG Program provides Grantees funds to develop viable communities by providing **decent housing** and a **suitable living environment**, and by **expanding economic opportunities**, principally for low- and moderate-income persons.

HUD's Federal Register Notice:

1. Meet the definition of a mitigation activity;
2. Address current and future risks as identified in the grantee's mitigation needs assessment of most impacted and distressed (MID) areas;
3. Be CDBG-eligible activities or otherwise eligible pursuant to a waiver or alternative requirement; and
4. Meet a national objective, including additional criteria for mitigation activities and covered projects.

- CDBG-MIT funds may be used to:
- Support infrastructure projects, housing activities, public services, economic development, disaster preparedness, and planning efforts.
- Increase resilience and reduce or eliminate risk, per HUD's definition of mitigation.
- 50% of CDBG-MIT funds must also be used to benefit low-to-moderate income (LMI) persons.

Maximizing CDBG-MIT

To maximize the impact of all available funds, grantees should coordinate and align these CDBG–MIT funds with other mitigation projects funded by FEMA, the U.S. Army Corps of Engineers (USACE), the U.S. Forest Service, and other agencies as appropriate.

According to the CDBG-MIT Notice, grantees must:

1. Advance long-term resilience to current and future hazards;
2. Align its CDBG–MIT programs or projects with other planned federal, state, regional, or local capital improvements; and
3. Promote community-level and regional planning for current and future disaster recovery efforts and additional mitigation investments.

Maximizing CDBG-MIT, Energy Lifeline

- The Mitigation Needs Assessment must quantitatively assess the significant potential impacts and risks of hazards affecting the following seven critical service areas, or community lifelines: such as *Energy (Power & Fuel)*
- Energy Efficiency Infrastructure: Typical infrastructure mitigation programs may include regional investments in risk reduction for all-hazards (e.g. flood, fire, wind) to develop disaster-resistant infrastructure including *Energy* infrastructure to address specific, identified risks.
- Covered Projects only: For purposes of this section of the notice, an infrastructure project is defined as an activity or group of related activities that develop the physical assets that are designed to provide or support services to the general public in the following sectors, including Energy production and generation, including from fossil, renewable, nuclear, and hydro sources; electricity transmission.

Building Energy Efficiency: bolster affordability and resilience in Action Plans

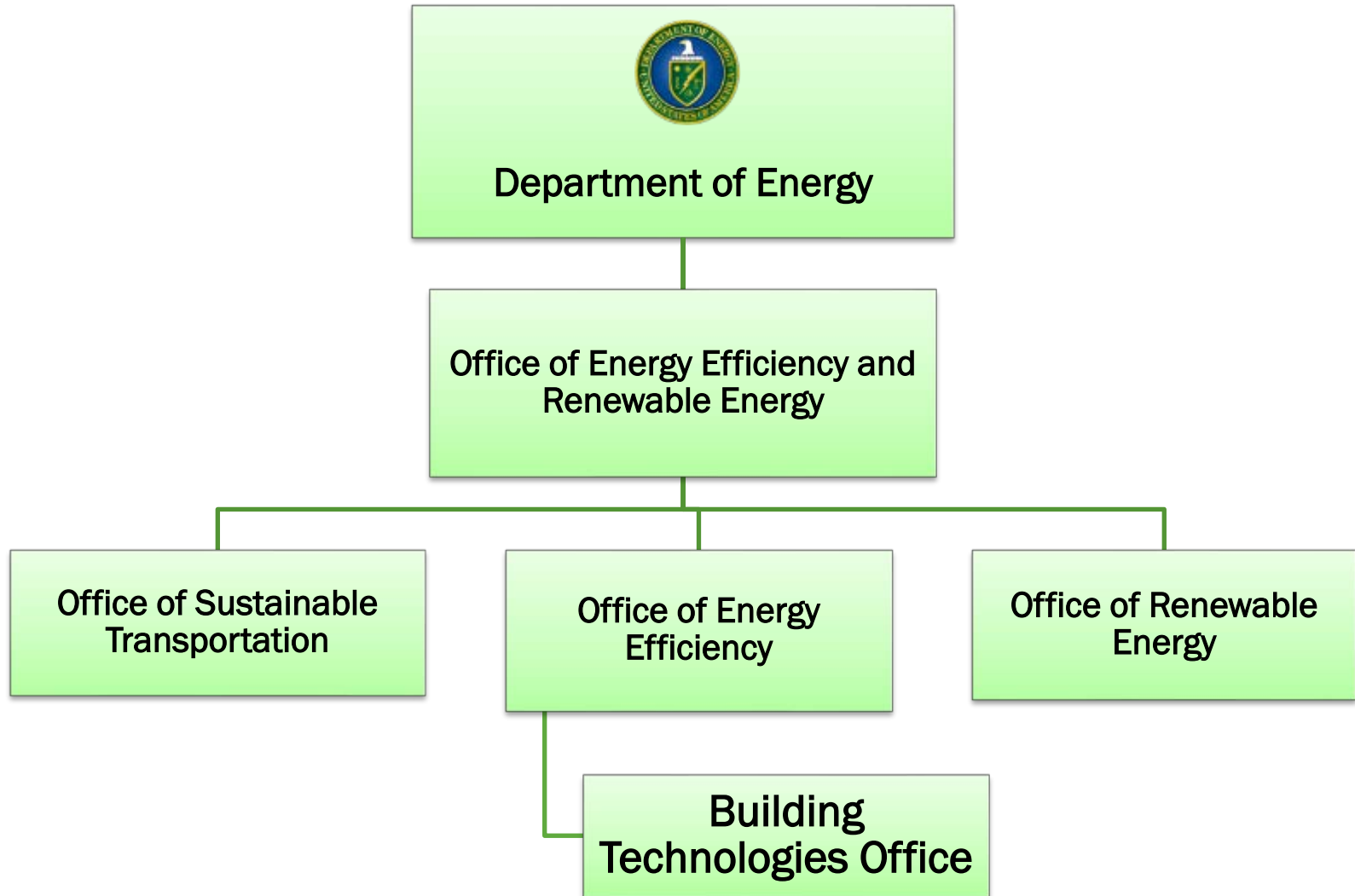
June 18, 2020

Dale Hoffmeyer, Department of Energy

Elizabeth Arnold (Fellow), Department of Energy



U.S. Department of Energy Organizational Chart



Building Technologies Office

BTO invests in energy efficiency & related technologies that make homes and buildings more affordable and comfortable, and make the US more sustainable, secure and prosperous. Budget ~US\$285M/year; activities include:



R&D

Pre-competitive, early-stage investment in next-generation technologies



Integration

Technology validation, field & lab testing, metrics, market integration



Codes & Standards

Whole building & equipment standards technical analysis, test procedures, regulations

Highlighting Some Relevant Laboratory Expertise



- Electricity Grid, Energy Planning
- Windows
- Indoor Air Quality



- Renewable Energy
- Energy Modeling of Buildings and Communities



- Materials, Envelope & HVAC
- Manufacturing, 3D Printing



- Building Energy Codes & Modeling
- Lighting
- Tools for Architects, Builders

Importance of energy efficiency and resilient design in mitigation

Energy Efficiency and Disaster Mitigation

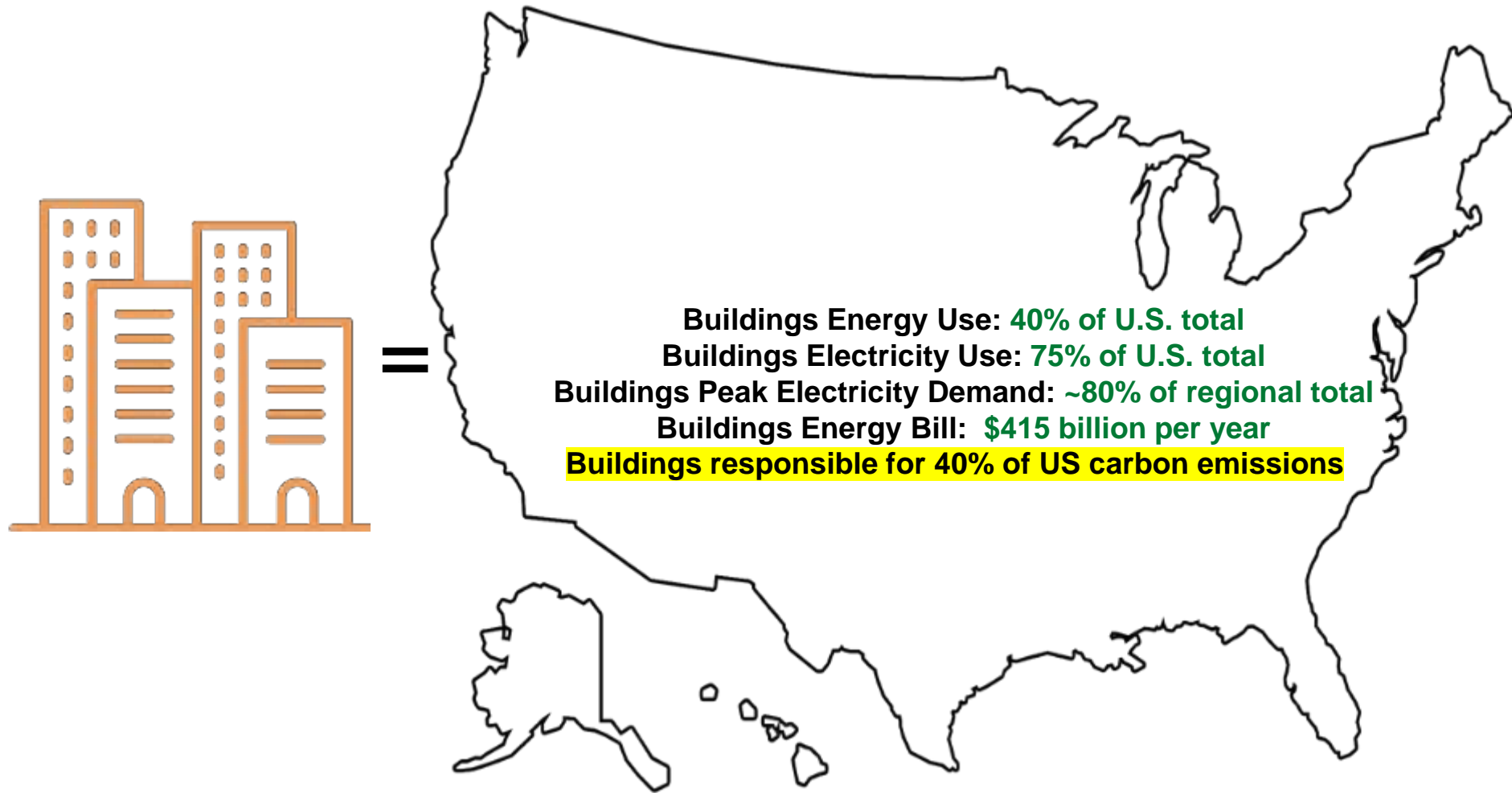


Lower operating costs and reduced stress on energy infrastructure





Energy Efficient Buildings Are More Resilient

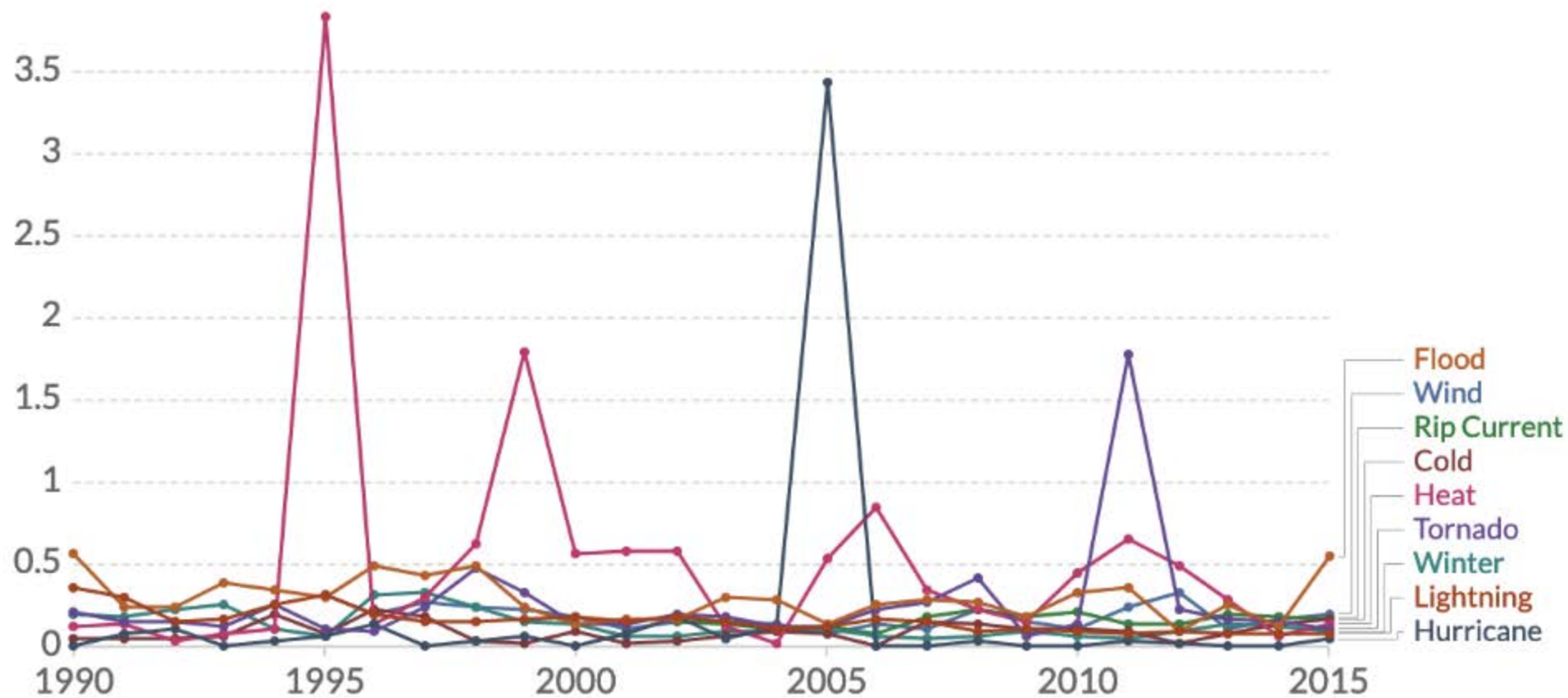


Source: U.S. Energy Information Administration, Monthly Energy Review, Table 2.1, April 2019, preliminary data

Fatality rate by weather event

Fatality rates in the US due to weather events

Annual death rate from weather events, measured per million individuals.



Source: Our World In Data based on NOAA, Lopez Holle and population data
OurWorldInData.org/natural-disasters/ • CC BY

Extreme Temperatures

10,033 heat-related deaths between 1999-2016 (~20 states reporting). [CDC]

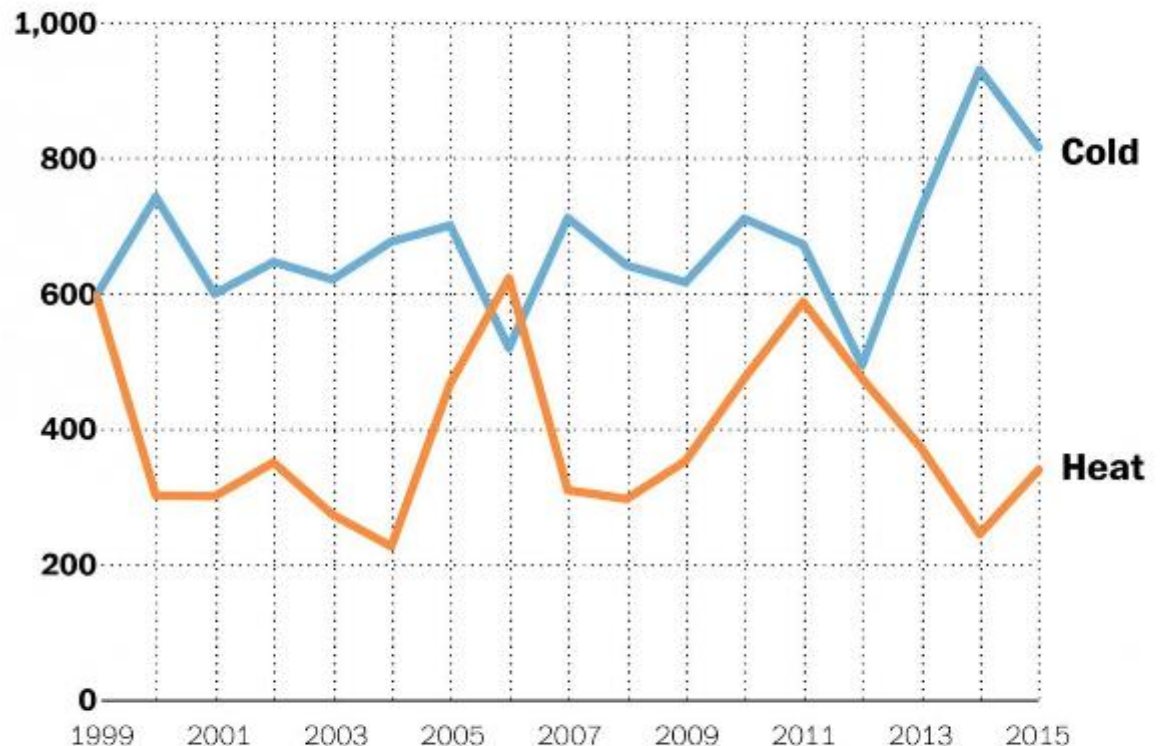
When most deadly?

- multi-day “events”
- combo with other weather factors (humidity, wind)

Who is most affected?

- 65+
- children under 4
- lower income households

Deaths from hypothermia (excessive cold) and hyperthermia (excessive heat) in the U.S.



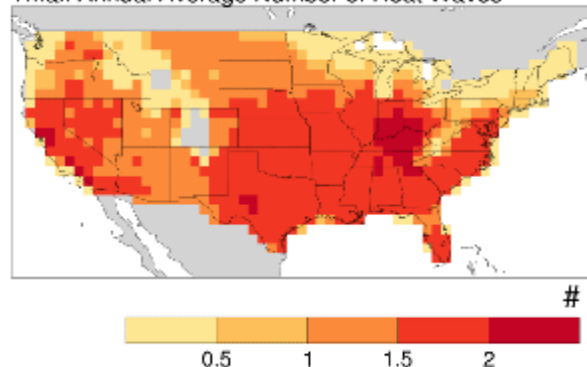
WAPQ.ST/WONKBLOG

Source: CDC WONDER

Temperature Severity Indicators

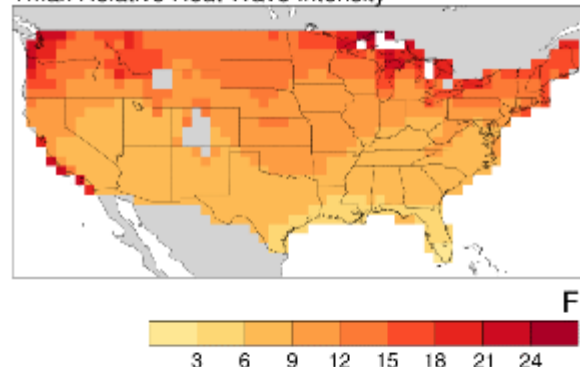
Frequency

Tmax Annual Average Number of Heat Waves



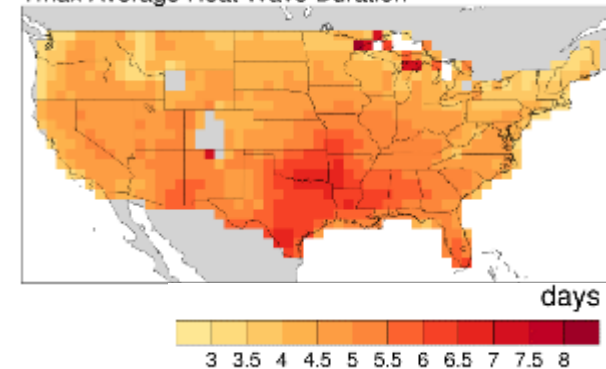
Intensity

Tmax Relative Heat Wave Intensity

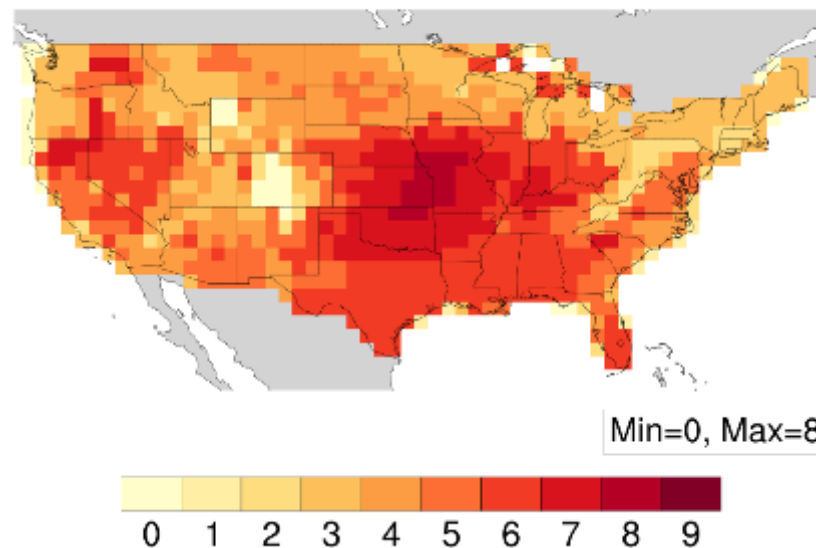


Duration

Tmax Average Heat Wave Duration



daytime high T heatwaves index



%ile	F (#/yr)	I _r (°F)	D (days)
25 th	0.84	8.02	4.26
50 th	1.43	10.08	4.72
75 th	1.72	13.29	5.24

<http://hudgis-hud.opendata.arcgis.com/datasets/temperature-severity-indicators>

Everyone Deserves a Safe and Healthy Home

www.hud.gov/healthyhomes



A stakeholder guide for protecting the health of children and families

Lead	Radon	Unsafe Drinking Water	Home Safety
Mold and Moisture	Carbon Monoxide	Household Chemicals	Home Comfort
Asthma and Allergies	Indoor Environmental Quality	Pests	Asbestos



Guiding Goals

For Safe and Healthy Homes

Keep it **DRY**

Damp homes provide an environment for dust mites, roaches, rodents and molds. All of these can cause or worsen asthma, and pests can transmit disease. In addition, moisture can damage the building materials in homes, including lead-based paints.

Keep it **CLEAN**

Clean homes reduce pest infestation and exposures to contaminants.

Keep it **PEST FREE**

Exposure to pests such as roaches and rodents can trigger an asthma attack or cause other illnesses.



Keep it **SAFE**

Injuries such as falls, burns and poisonings occur most often in the home, especially with children and seniors.

Keep it **CONTAMINANT FREE**

Levels of contaminants such as lead, radon, carbon monoxide, asbestos, secondhand smoke and other chemicals are often much higher indoors.

Keep it **WELL VENTILATED**

Having a good fresh air supply in homes is important to reduce exposure to indoor air pollutants and to increase respiratory health.



Keep it **WELL MAINTAINED**

Poorly maintained homes are at risk for moisture, pest problems, and injury hazards. Deteriorated lead-based paint is the primary cause of children being harmed by lead.

Keep it **TEMPERATURE CONTROLLED**

Homes that do not have balanced and consistent temperatures may place families at increased risk from exposure to extreme cold, heat, and humidity. Young children, older people, and those with chronic medical conditions are at most risk.

Adapted from the National Center for Healthy Housing at www.nchh.org

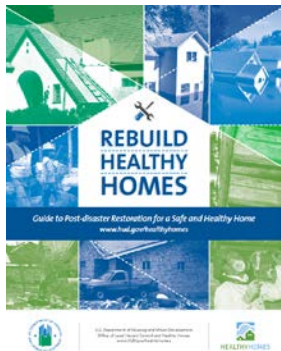


Keep it Comfortable

Make it easier and more affordable to stay warm in winter and cool in summer with energy-efficiency improvements. See www.energystar.gov, basc.pnnl.gov and www.extension.org to learn how to weatherize without causing moisture or health problems.



- ▶ Restore gutted walls, ceilings and floors with higher-R value insulation installed with no gaps, voids or compression.
- ▶ Air seal the entire enclosure of your living space, especially at the ceiling, to stop air leaks. Uncontrolled air leaks can cause discomfort, higher energy costs, moisture problems, and sometimes draw in pollutants from attics or crawl space.
- ▶ If you have central air conditioning and/or heat, get your ductwork leak tested and sealed as airtight as possible.
- ▶ Replace any damaged or worn out HVAC, windows, doors, appliances, electronics and lighting with models having Energy Star labels. Compare the yellow Energy Guide labels on appliances before buying.
- ▶ Include sun control strategies to cut summer heat gain, such as landscaping, solar film or screens, awnings, and light exterior colors. In warm climate zones, install a radiant barrier under the roof of a vented attic with the shiny side down, or replace roof decking with foil-lined decking.



Housing affordability (HUD's priority) and energy affordability (DOE's priority) are linked because energy use supports our lifestyle.



Comfort



Illumination



Hot Water



Cold Food



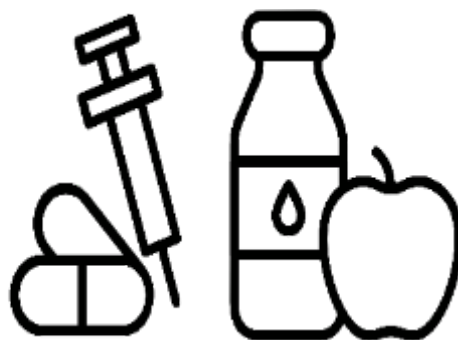
Entertainment

We spend most of our time and money at home

Energy Burdens in the U.S. are High



Nearly **one-third** of U.S. households reported facing a challenge in paying energy bills or sustaining adequate heating and cooling in their homes in 2015.



About **one in five** households reported reducing or foregoing necessities such as food and medicine to pay an energy bill.



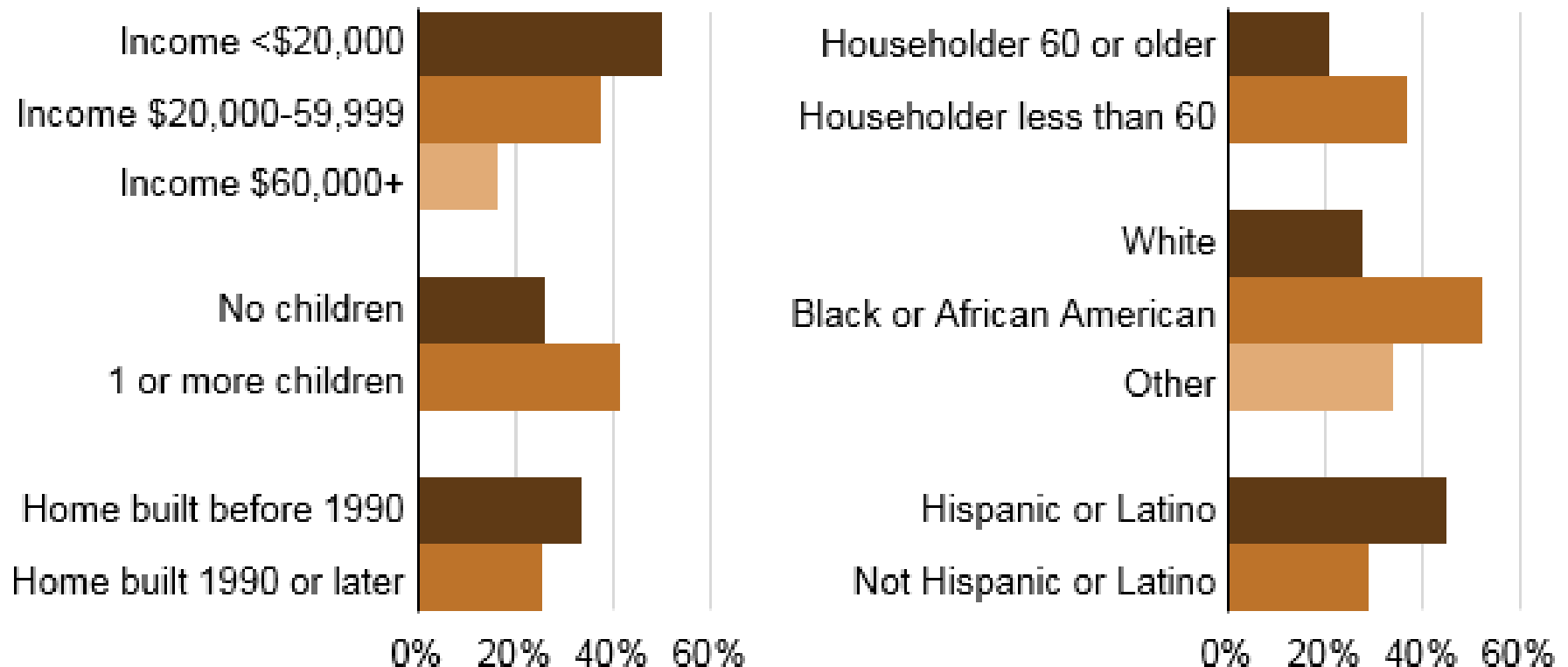
The **most common reason** reported for individuals seeking payday loan products is to pay their utility bills.

Inefficient buildings cost people and communities too much money.

Sources: EIA 2015; FDIC 2012

Who is most burdened?

Household energy insecurity by household characteristics, 2015
percent of households



Low-income, elderly, and people of color experience most energy burden.

Energy Efficient Homes are More Affordable

AVERAGE HOME



ENERGY EFFICIENT/ HIGH PERFORMANCE HOME

Energy bills are **\$2,000/year**

High maintenance costs
(1%–4% of home value for a \$400,000
home = **\$4,000–\$16,000 per year**)

Problems with building durability

Uncomfortable rooms

Indoor air quality issues, negatively
impacting health and quality of life



Energy bills cut in half–**\$1,000/year**



Reduced maintenance costs



Improved durability



Improved comfort



Improved indoor air quality, positively
impacting health and quality of life

How to incorporate EE and resilient design into your Action Plan

NASEO Report Recommendations

Pre-Disaster Planning and Mitigation Strategies	
Pre-Planning Programs	<ul style="list-style-type: none"> (1) Conduct internal assessment of resources and capability. (2) Establish disaster rebuilding and recovery plan (3) Identify goals and priorities for disaster response. (4) Practice disaster response scenarios to refine plans and identify potential gaps.
Awareness Building	<ul style="list-style-type: none"> (1) Build public awareness around value of energy efficiency and resilience in homes. (2) Build public awareness of available state, utility, and federal programs. (3) Building public and industry awareness of energy efficient and resilient design and building technologies.
Partnership Building	<ul style="list-style-type: none"> (1) State and federal emergency management agencies (2) Utilities (3) Contractors and homebuilders (4) Financial institutions (5) Housing authorities and home associations (6) Big box and hardware stores
Financial Incentives	<ul style="list-style-type: none"> (1) Create energy efficiency and renewable energy loan funds or credit enhancements that can be easily accessed in an emergency situation (2) Establish consumer technical assistance and marketing initiatives that could be ramped up during times of emergency.
Building Codes	<ul style="list-style-type: none"> (1) Work with state agencies and local jurisdictions to adopt and implement energy-efficient code provisions (2) Provide technical assistance and training on improving and complying with code (3) Consider building performance programs (e.g. FORTIFIED Home™) that can encourage similar outcomes.

Building Codes Prove Effective in Limiting Damage from CA Wildfires

Example: the deadly California Camp Fire in Nov. 2018

- ~51% of the 350 single-family homes built after 2008 in the path of the Camp Fire were undamaged (McClatchy)

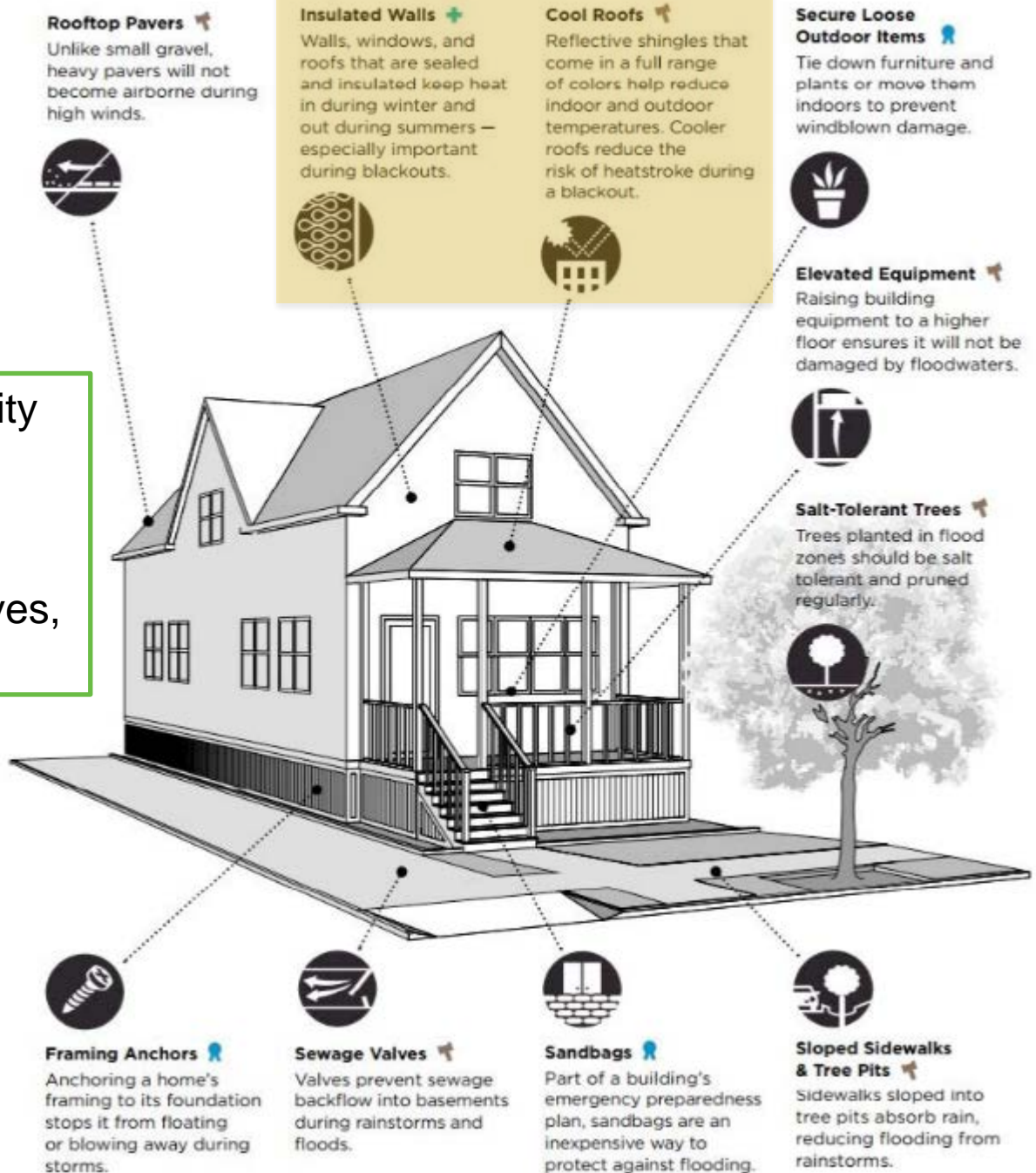


Only 18% of the 12,100 homes built prior to 2008 escaped damage. [Those figures don't include mobile homes, which burned in nearly equal measure regardless of age.]

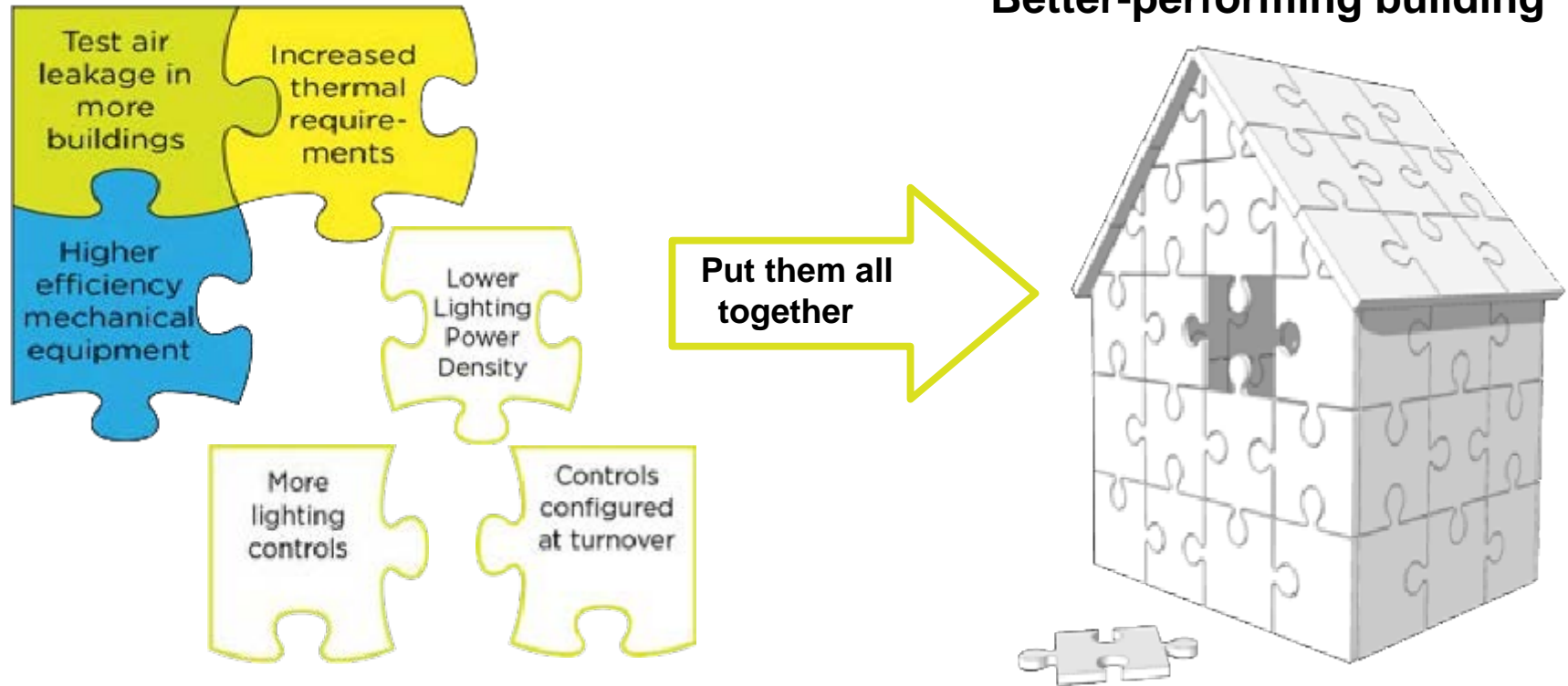
Source: [KQED](#)

Designing For Better Performance

Example from New York City Illustrates recommended technologies for homes vulnerable to floods, high winds, blackouts, heat waves, and extreme weather.

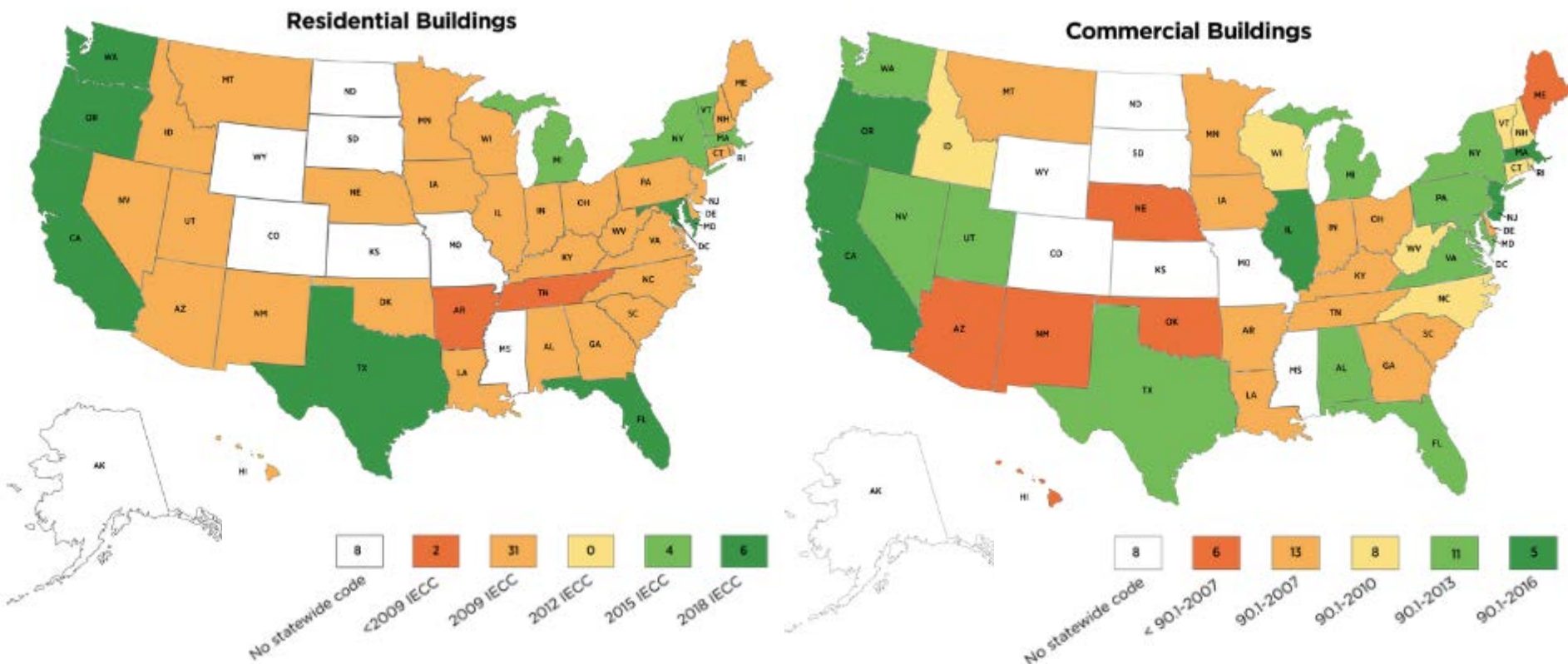


Newer Code Leads to Better Building Performance



Model codes protect the public by establishing rules and minimum acceptable levels of safety or energy efficiency. They carry the force of **law** when adopted by jurisdictions. **Standards** establish guidelines and requirements to achieve those acceptable levels.

State adoption of building energy codes



Building energy codes will save U.S. home and business owners an estimated \$126 billion and 841 million metric tons of avoided carbon dioxide emissions through 2040.

www.energycodes.gov

Updated as of December 2019

ICC Building Codes and Scope

The International Code Council (ICC) publishes several model codes, including the International Building Code (IBC) and International Residential Code (IRC). The intent of all model codes is to provide a reasonable level of public safety, health, and general welfare, as well as comfort, durability, and accessibility.

IBC: Covers for all types of buildings other than those covered in the IRC.

IRC: Covers detached one- and two-family dwellings, and townhouses not more than 3 stories in height, and their accessory structures.

Both the IBC and the IRC cover all requirements (structural, mechanical, plumbing, etc.)

ICC Codes:

Building

Residential

Fire

Plumbing

Mechanical

Fuel Gas

Energy Conservation

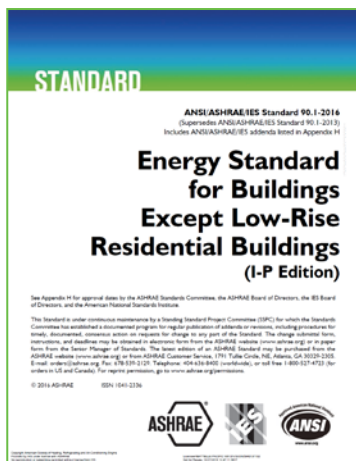
Performance

Existing Building

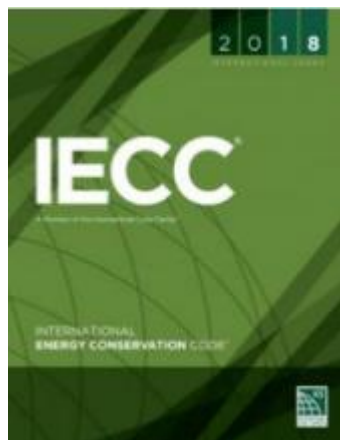
Property Maintenance

...and more

Building Energy Codes



ASHRAE Standard 90.1 (commercial and high-rise residential)



International Energy Conservation Code (all residential and commercial, references 90.1 as alternative)

- Different development processes
- Both written in enforceable language
- Both cover building envelope, mechanical, service water heating, and lighting
- Individual requirements can vary

Nursing home lost main air conditioning system



12 residents lost their lives

Could energy efficiency or design have improved resilience?

Common Resilience Projects

COMMON RESILIENCE PROJECTS

Energy Supply

- ▶ Renewable energy
- ▶ Combined heat and power (CHP)
- ▶ Battery storage
- ▶ Backup generation
- ▶ Microgrid
- ▶ Electric vehicle charging

Resource Conservation

- ▶ Efficient lighting and HVAC
- ▶ Water efficiency measures
- ▶ Building envelope improvements

Structure Hardening

- ▶ Seismic retrofits
- ▶ Wind-resistant roofs and windows
- ▶ Flood mitigation

Ensure building systems
continue operating

Reduce energy and water
demand; increase operating
time on backups

Mitigate property damage, injury,
and system outages

Source: [DOE Resilience Roadmap](#)

Residential Buildings

Building America Solution Center

U.S. DEPARTMENT OF
ENERGY | Energy Efficiency &
Renewable Energy

Log in or register to create Field Kits and Sales
Worksheets. [Why register?](#)

Log In | Register

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[ENERGY STAR Certified Homes](#)

[EPA Indoor airPLUS](#)

[EPA WaterSense®](#)

[FIND RESOURCES](#)

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[Code Briefs](#)

[Case Studies](#)

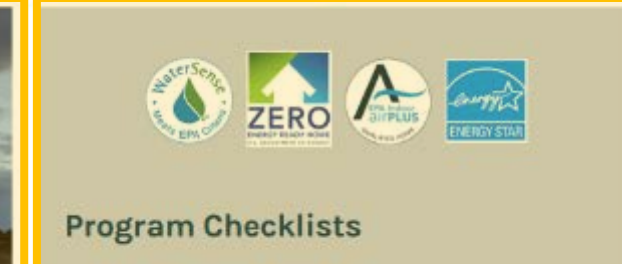
[Image Gallery](#)

[Videos](#)

[CAD Files](#)

[Optimized Climate Solutions](#)

The Building America Solution Center provides access to expert information on hundreds of high-performance construction topics, including air sealing and insulation, HVAC components, windows, indoor air quality, and much more. Click on the links below to explore the Solution Center.



Home Improvement Expert Checklists

Checklists for 21 Common Upgrades



Enclosure Upgrades

Attic Air Sealing & Insulation	Home Air Sealing
Basement Wall Insulation	Vented to Unvented Attic
Framed Wall Insulation	Vented to Unvented Crawl Space
Masonry Wall Insulation	Window Replacement

Heating & Cooling

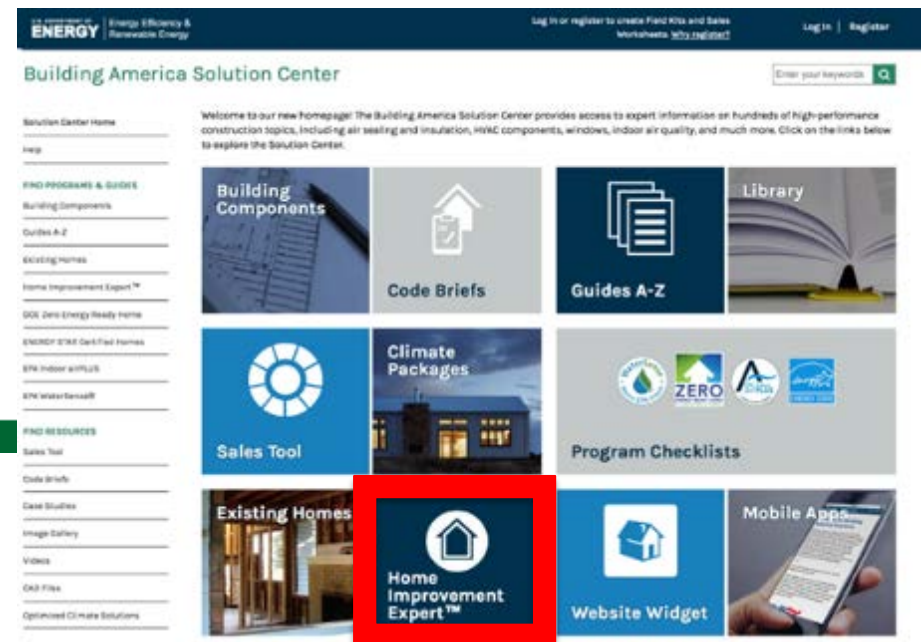
Air Conditioner Replacement	Duct Sealing & Insulation
Gas Furnace Replacement	Oil or Gas Boiler Replacement
Heat Pump Replacement	

Hot Water Heating

Gas Tank Water Heater
Gas Tankless Water Heater
Heat Pump Water Heater

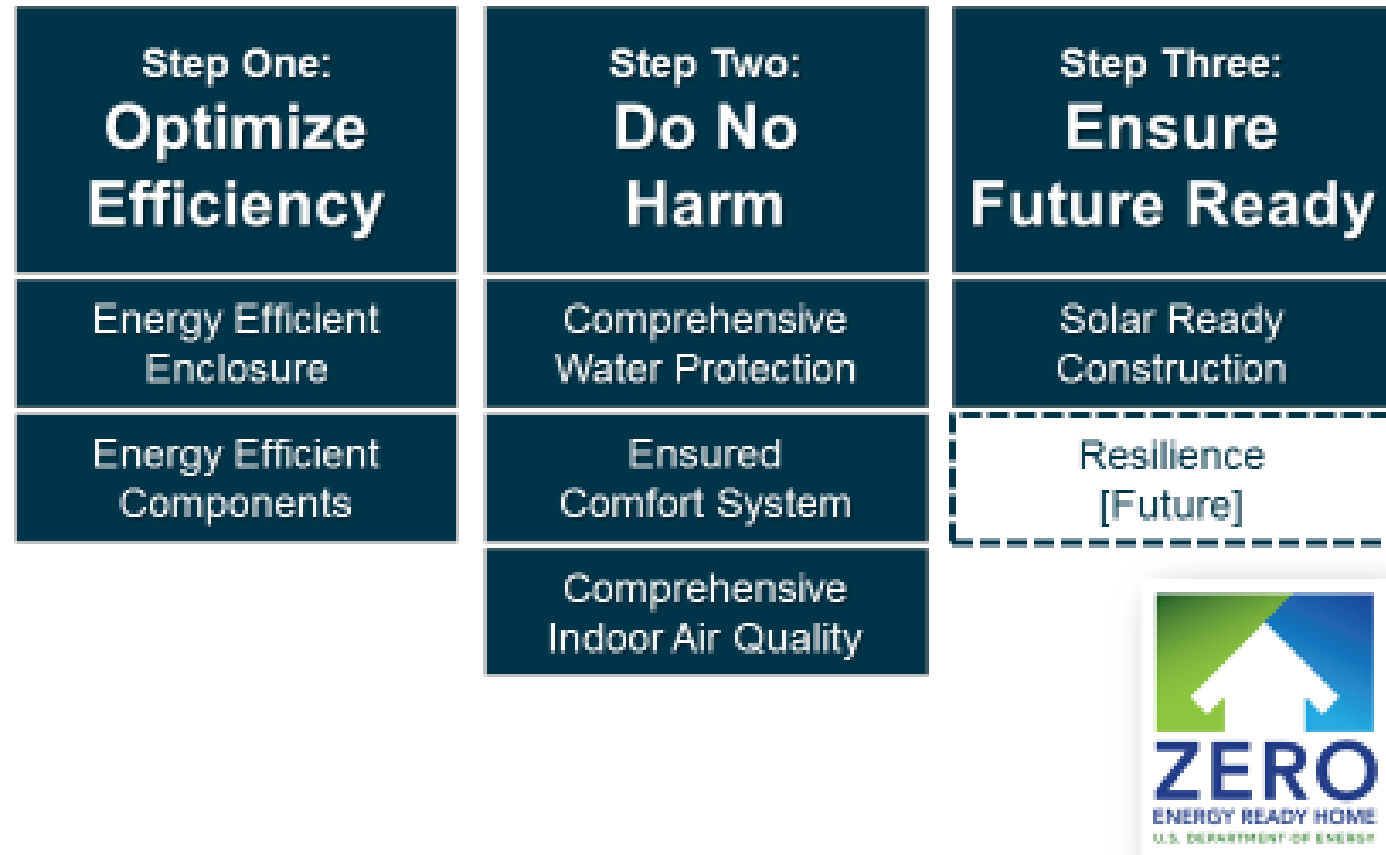
Fresh Air Systems

Bathroom Exhaust Fan	Balanced Supplyplus Exhaust
Kitchen Exhaust Fan	Supply Integrated with HVAC
Balanced HRV/ERV	



<https://basc.pnnl.gov/home-improvement-expert>

What is Zero Energy Ready Home?



<https://www.energy.gov/eere/buildings/zero-energy-ready-homes>

Multi-Family Buildings

Strategies for Multifamily Building Resilience

Curtis +
Ginsberg
Architects

55 Broad Street FL8
New York NY 10004

Sean Flynn RA
Senior Associate
Curtis + Ginsberg Architects

212 634 1429
Office 212 929 4417
sean@cplusga.com
www.cplusga.com

Multifamily Resiliency

READY TO RESPOND

Strategies for Multifamily Building Resilience



Disaster Preparedness
for Affordable
Housing Organizations



Community 106

Strategies that encourage behavior which enhances resilience.

16	Building Community Ties	107
17	Creating Community Resilience Spaces	112
18	Developing an Emergency Management Manual	118
19	Organizing for Community Resilience	123

Protection 14

Strategies to reduce a building's vulnerability to extreme weather.

1	Wet Floodproofing	15
2	Dry Floodproofing	21
3	Site Perimeter Floodproofing	28
4	Resilient Elevators	34
5	Backwater Valves	40
6	Sump Pumps	46

Adaptation 51

Strategies that improve a facility's ability to adapt to changing climate conditions.

7	Envelope Efficiency	52
8	Elevated Equipment	59
9	Elevated Living Space	65
10	Surface Stormwater Management	70
11	Window Shading	76
12	Distributed Heating and Cooling	82

Backup 87

Strategies that provide critical needs for when a facility loses power or other services.

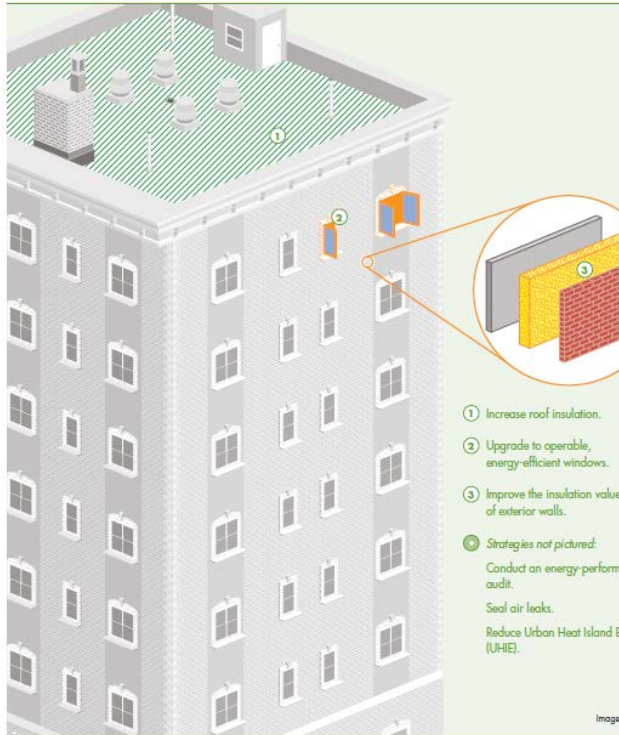
13	Maintaining Backup Power to Critical Systems	88
14	Emergency Lighting	96
15	Access to Potable Water	101

Multifamily Resiliency

7 Envelope Efficiency



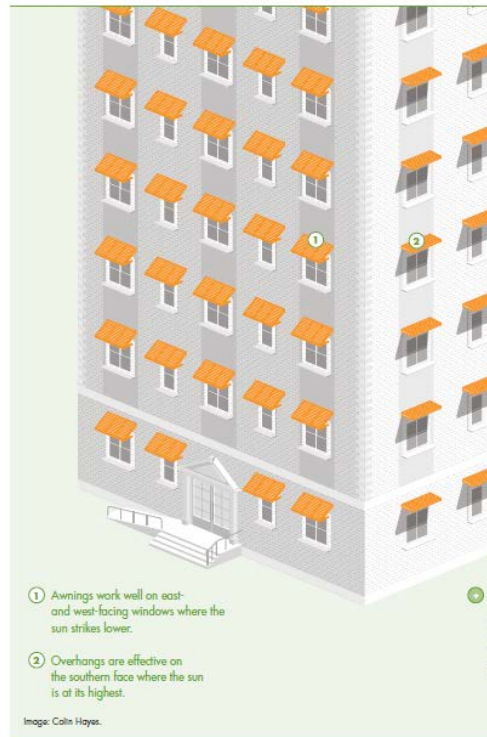
Aligns with
Enterprise Green Communities Criteria:
**3.6 Surface Stormwater
Management.**
**5.2b Advanced Certification:
Nearing Net Zero.**
**5.2a Additional Reductions in
Energy Use.**



11 Window Shading



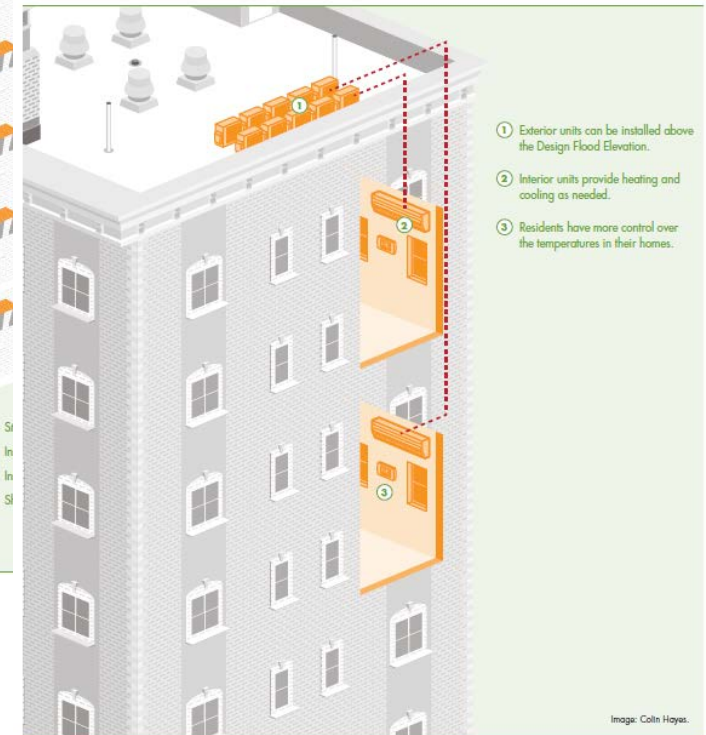
Aligns with
Enterprise Green Communities Criteria:
**2.10 Passive Solar Heating/
Cooling.**



12 Distributed Heating and Cooling



Aligns with
Enterprise Green Communities Criteria:
**5.8a Resilient Energy Systems:
Floodproofing.**



Multifamily Resiliency



Beech Green Dunes I

109,000 SF

101 units

Certified Passive House

Developer: The Bluestone Organization



Envelope Efficiency

Floodproofing—Dry and Wet

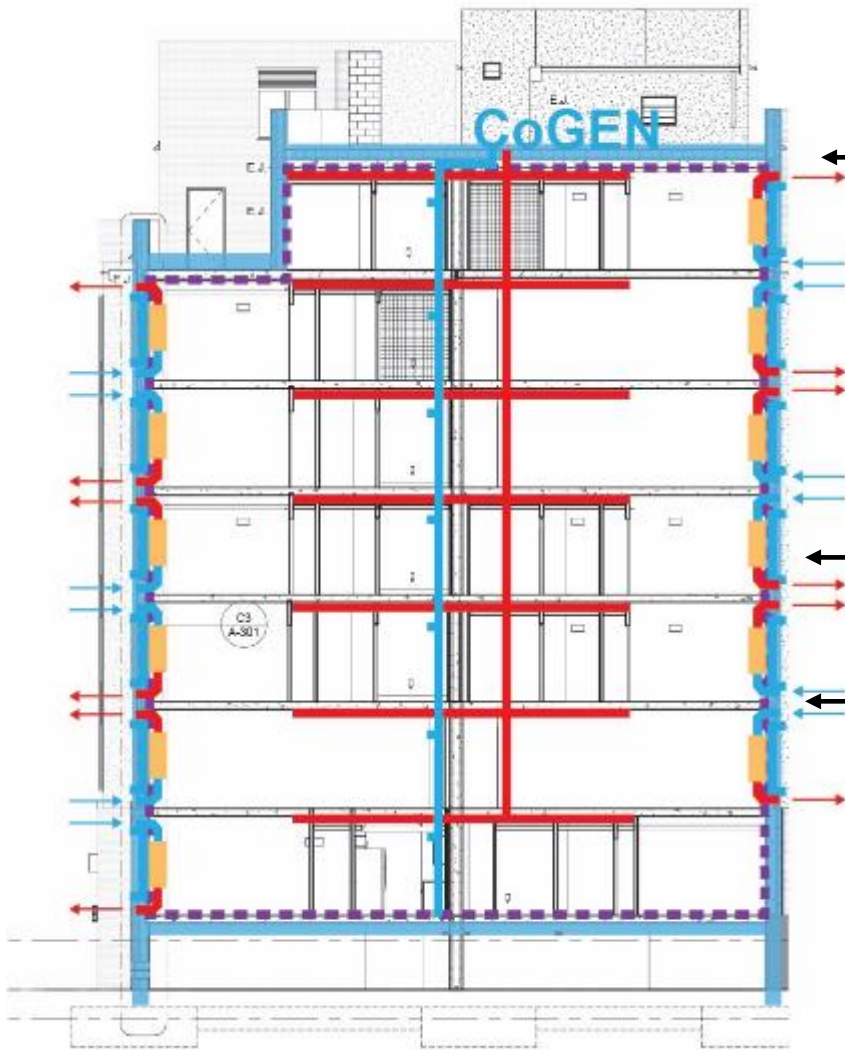
Distributed heating

Back-up

Elevated equipment



Multifamily Resiliency



Optimizing Building Envelope

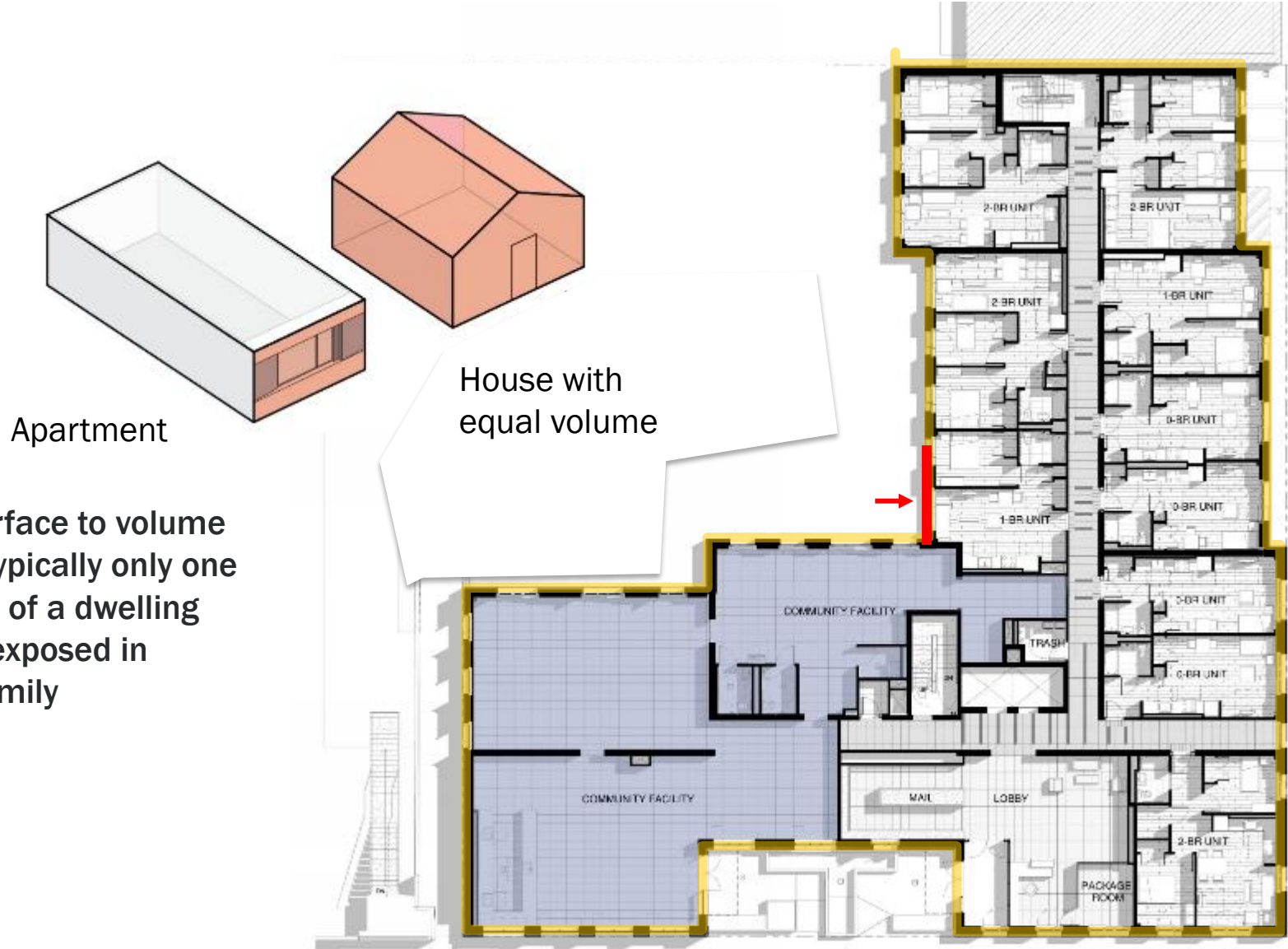
- Continuous Insulation
- Controlling Solar Gain
- Reducing Thermal Bridging

Creating Air / Wind Tightness

Provide Ventilation with Heat / Moisture Recovery

= Minimal Mechanical /
Minimal Energy Consumption

Multifamily Resiliency



Multifamily Resiliency

Envelope Efficiency
Floodproofing—Wet
Elevated equipment

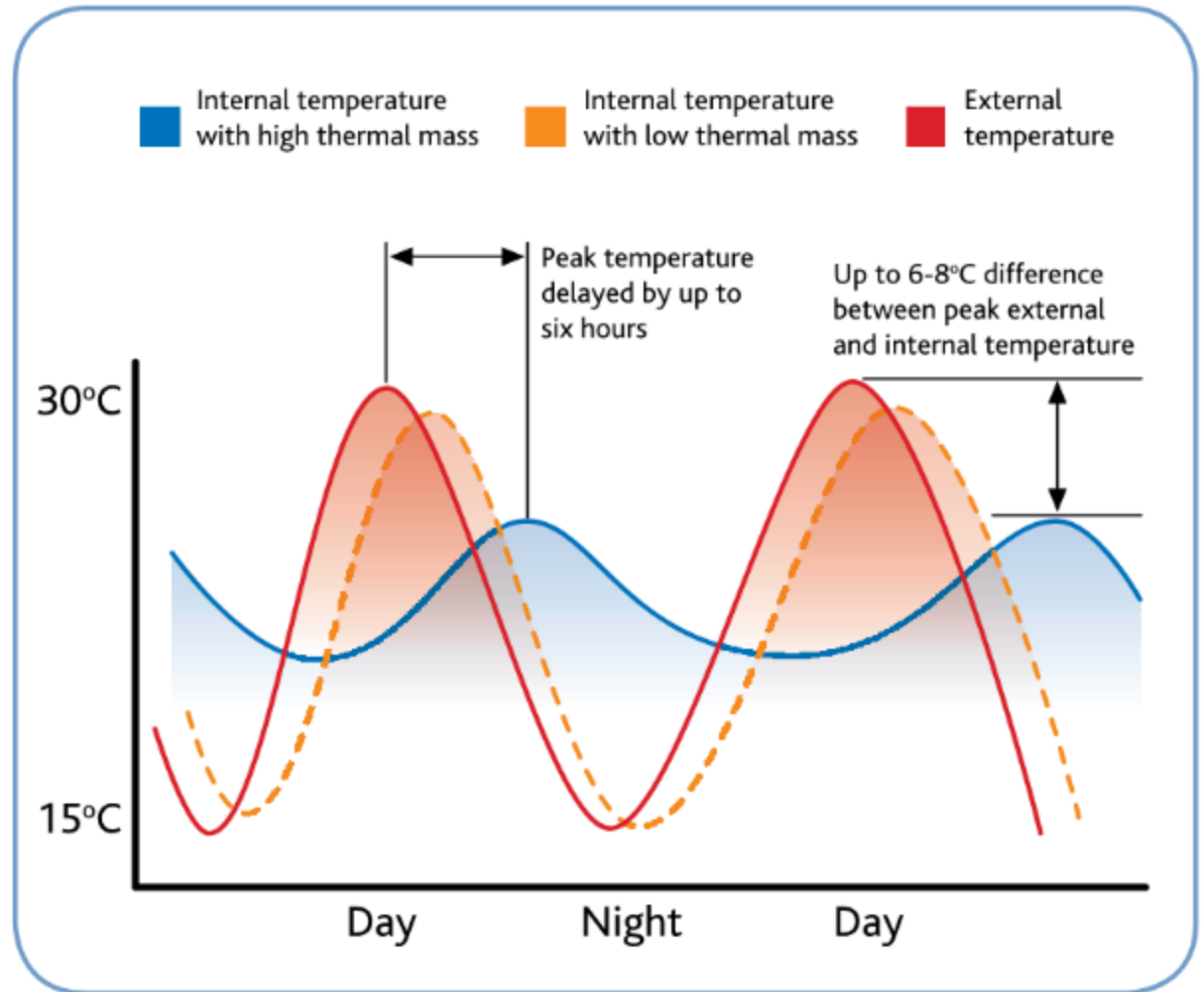


Rebuild Resilient Staten Island (RRSI)

Four single family homes
Range of 670 SF to 1,700 SF
Certified Passive House
Developer: The Bluestone Organization



Multifamily Resiliency

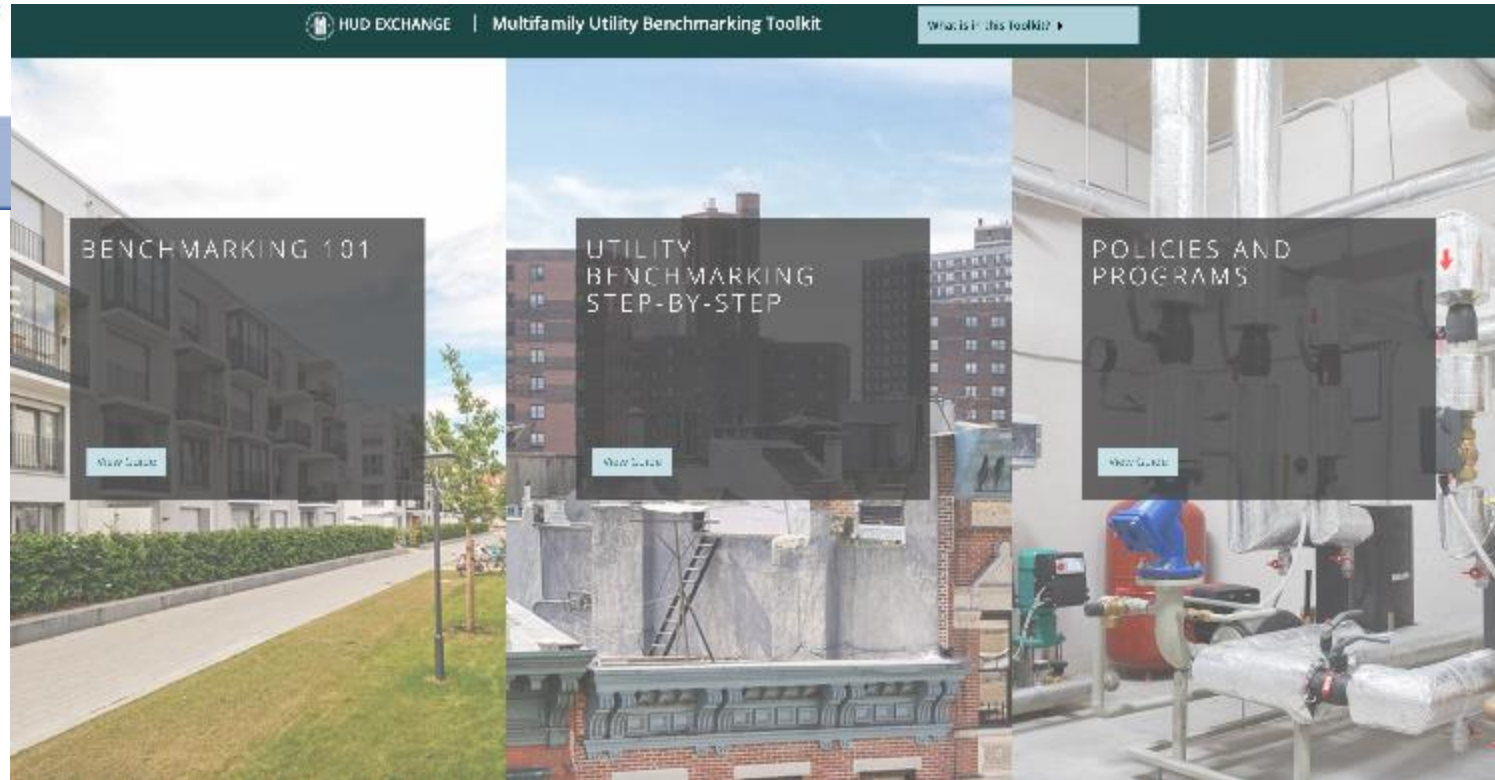


Benchmarking Building Energy Efficiency



SOLUTIONS

Utility benchmarking is a fundamental asset management practice, consisting of tracking, analyzing, and reporting the consumption and costs associated with a property or portfolio of properties.



<https://www.hudexchange.info/programs/utility-benchmarking/toolkit/>

Resilient CHP for Multifamily Housing

HUD Exchange CDBG-MIT Training

Building Energy Efficiency:

Bolster Affordability and Resilience in Action Plans

18 June 2020

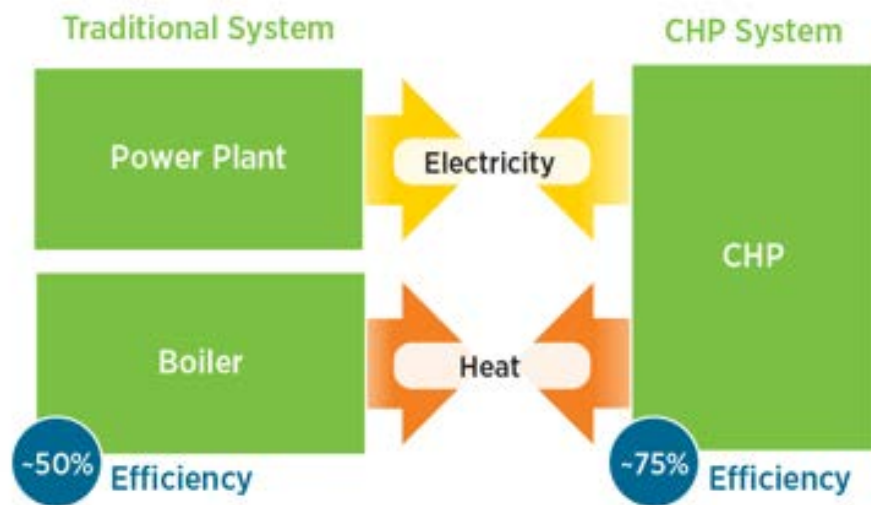
Isaac Panzarella, Director,
DOE Southeast CHP TAP;
NC Clean Energy Technology Center
NC State University



CHP Technical Assistance Partnerships

CHP: A Key Part of Our Energy Future

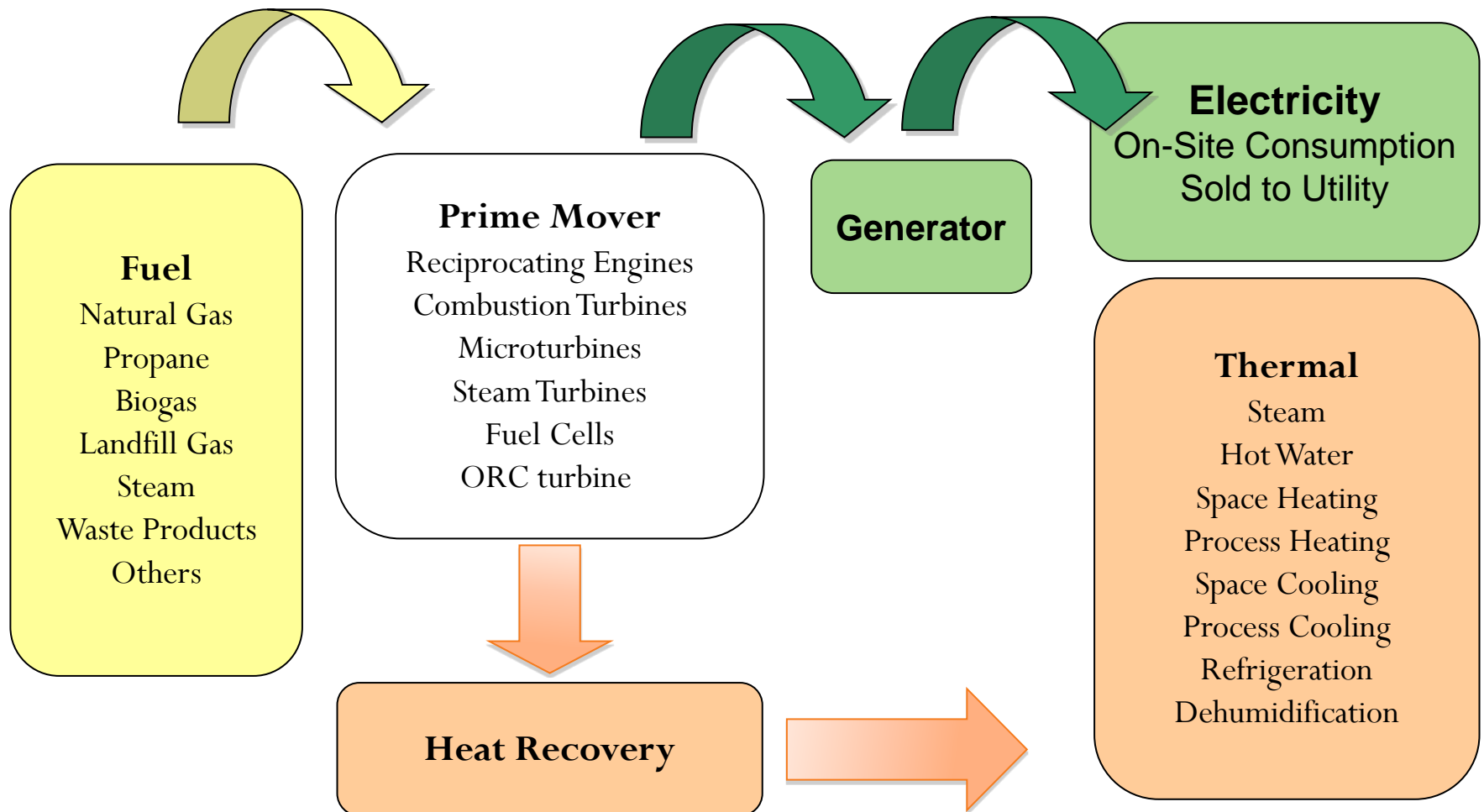
- Form of Distributed Generation (DG)
- An integrated system
- Located at or near a building / facility
- Provides at least a portion of the electrical load and
- Uses thermal energy for:
 - Space Heating / Cooling
 - Process Heating / Cooling
 - Dehumidification



CHP provides efficient, clean, reliable, affordable energy – today and for the future.

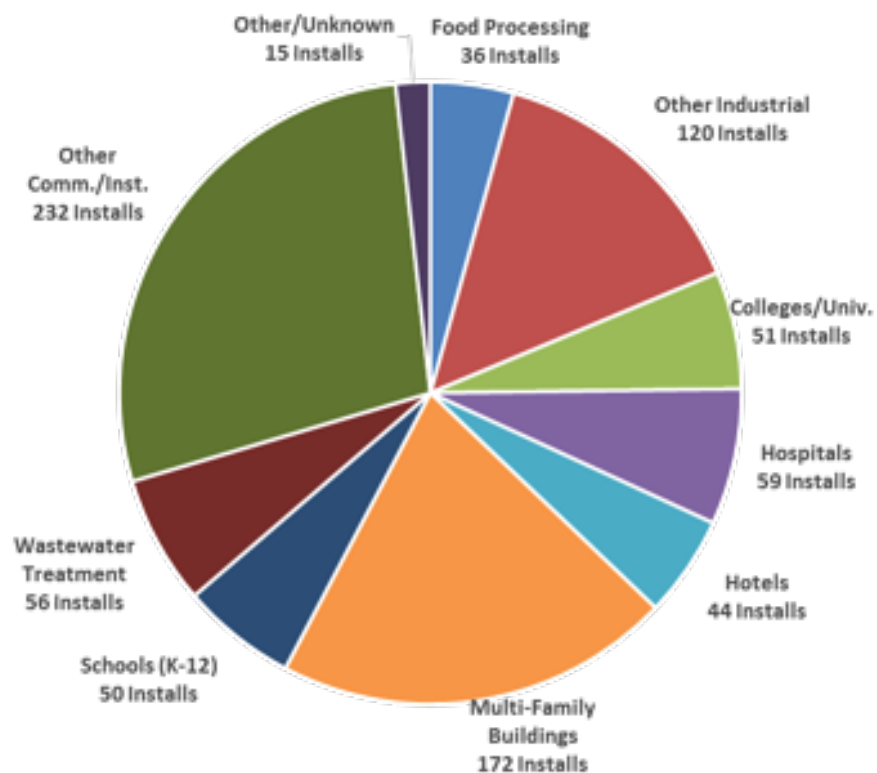
Source: www.energy.gov/chp

CHP System Schematic

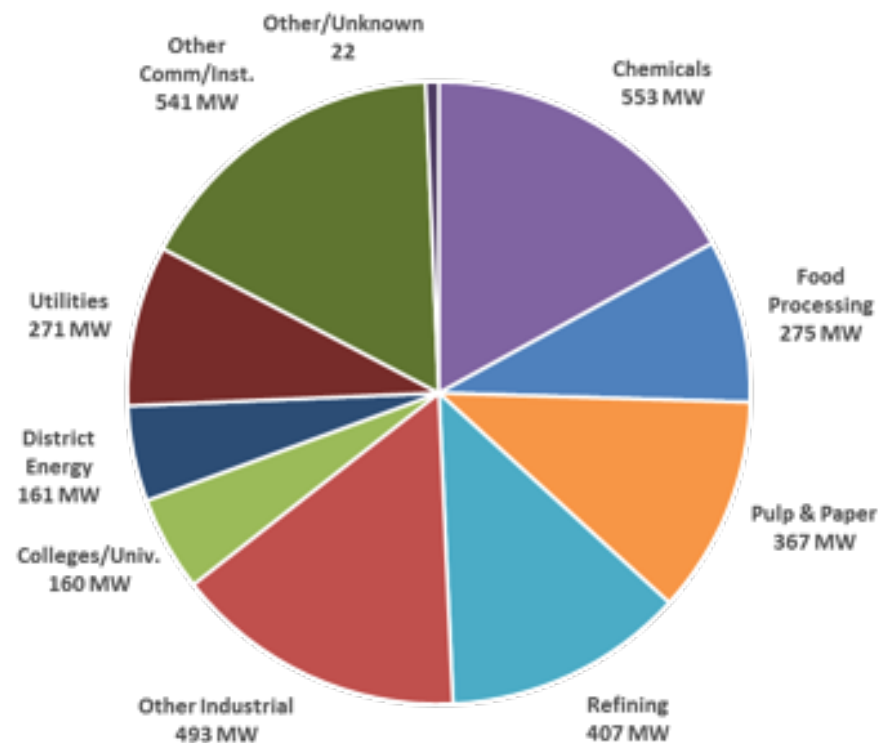


CHP Additions by Application (2014-2018)

By Installations – 835 Installs



By Capacity – 3.3 GW



Source: DOE CHP Installation Database
(U.S. installations as of Dec. 31, 2018)

Slide prepared on 8-9-19

Critical Infrastructure and Resiliency Benefits of CHP

“Critical infrastructure” refers to those assets, systems, and networks that, if incapacitated, would have a substantial negative impact on national security, national economic security, or national public health and safety.”

Patriot Act of 2001 Section 1016 (e)

Applications:

- Hospitals and healthcare centers
- Water / wastewater treatment plants
- Police, fire, and public safety
- Centers of refuge (often schools or universities)
- Military/National Security
- Food distribution facilities
- Telecom and data centers

CHP (if properly configured):

- Offers the opportunity to improve Critical Infrastructure (CI) resiliency
- Can continue to operate, providing uninterrupted supply of electricity and heating/cooling to the host facility

Project Snapshot:

CHP Application in Cooperative Housing

- Cooperative “Co-op” City
- The Bronx, NY
- Application/Industry: Multi-family, cooperative housing
- Capacity: 40 MW
- Prime Mover: Gas turbine
- Fuel Type: Natural gas
- Thermal Use: Heating
- Installation Year: 2007
- Energy Savings from CHP: Approx. \$15 million per year
- “We decided to invest in an onsite cogeneration plant because we wanted to save money by producing our own electricity and capturing the waste heat to provide our residents with hot water and space cooling,” said Herb Freedman, a principal of Marion Real Estate, Inc., which manages Co-op City for the Riverbay Corporation. “We have certainly saved money, but we are also really happy to provide our residents with the added benefit of independence from the power grid.”



*Riverbay Cogeneration Plant at Co-op City
(image courtesy of Stantec)*

Source: https://www.energy.gov/sites/prod/files/2013/11/f4/chp_critical_facilities.pdf
<https://www.stantec.com/en/projects/united-states-projects/r/riverbay-cogeneration-plant>

*Slide prepared
6/2020*

Project Snapshot:

CHP Application in Affordable Housing

- Stevenson Commons
- Bronx, NY
- Application/Industry: Multi-family, affordable housing
- Capacity: 525 kW
- Prime Mover: (7) 75 kw reciprocating engines
- Fuel Type: Natural gas
- Thermal Use: Heating
- Installation Year: 2012
- Energy Savings from CHP: Unknown
- Highlights: The project was installed with no upfront cost to the building management firm. The CHP developer recoups costs by selling electricity and hot water to the complex; at rates well below normal utility rates.



*Top: Stevenson Commons
Left: 75 kW
Aegen-LE CHP
module
(images
courtesy of
Aegis Energy
Services)*

Source: https://chptap.lbl.gov/profile/220/StevensonCommons-Project_Profile1.pdf

*Slide prepared
6/2020*

Project Snapshot:

Microturbine Application in Apartments

- Schmidt Artists Lofts. (revamped Schmidt Brewery)
St. Paul, MN
- Application/Industry: Multifamily
- Capacity: 65 kW
- Prime Mover: Microturbine
- Fuel Type: Natural gas
- Thermal Use: Heating
- Installation Year: 2014
- Energy Savings from CHP: Unknown
- Highlights: The 65 kW “jet engine” produces electricity and thermal energy around the clock. Vergent Power’s “Factory Protection Plan” is providing full maintenance coverage through 2024.



58

Source: www.vergentpower.com/; <http://www.dominiumapartments.com/>

Slide prepared
6/2017

Project Snapshot:

Microturbine Application in Senior Housing

- Court Tower Apartments
- Newark, NJ
- Application/Industry: Multi-family, Senior living community
- Capacity: 35 kW
- Prime Mover: Microturbine
- Fuel Type: Natural gas
- Thermal Use: Heating
- Installation Year: 2017
- Energy Savings from CHP: Unknown, \$56,415 total from all energy conservation measures



*Court Tower Apartments
(<https://betterbuildingssolutioncenter.energy.gov/showcase-projects/court-tower-apartments>)*

Source: <https://betterbuildingssolutioncenter.energy.gov/node/7183/pdf>

*Slide prepared
6/2020*

DOE CHP Technical Assistance Partnerships (CHP TAPs)

- **End User Engagement**

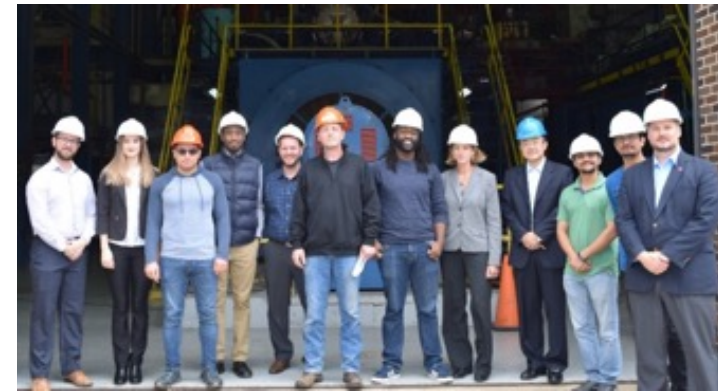
Partner with strategic End Users to advance technical solutions using CHP as a cost effective and resilient way to ensure American competitiveness, utilize local fuels, and enhance energy security. CHP TAPs offer fact-based, non-biased engineering support to manufacturing, commercial, institutional and federal facilities and campuses.

- **Stakeholder Engagement**

Engage with strategic Stakeholders, including regulators, utilities, and policy makers, to identify and reduce the barriers to using CHP to advance regional efficiency, promote energy independence, and enhance the nation's resilient grid. CHP TAPs provide fact-based, non-biased education to advance sound CHP programs and policies.

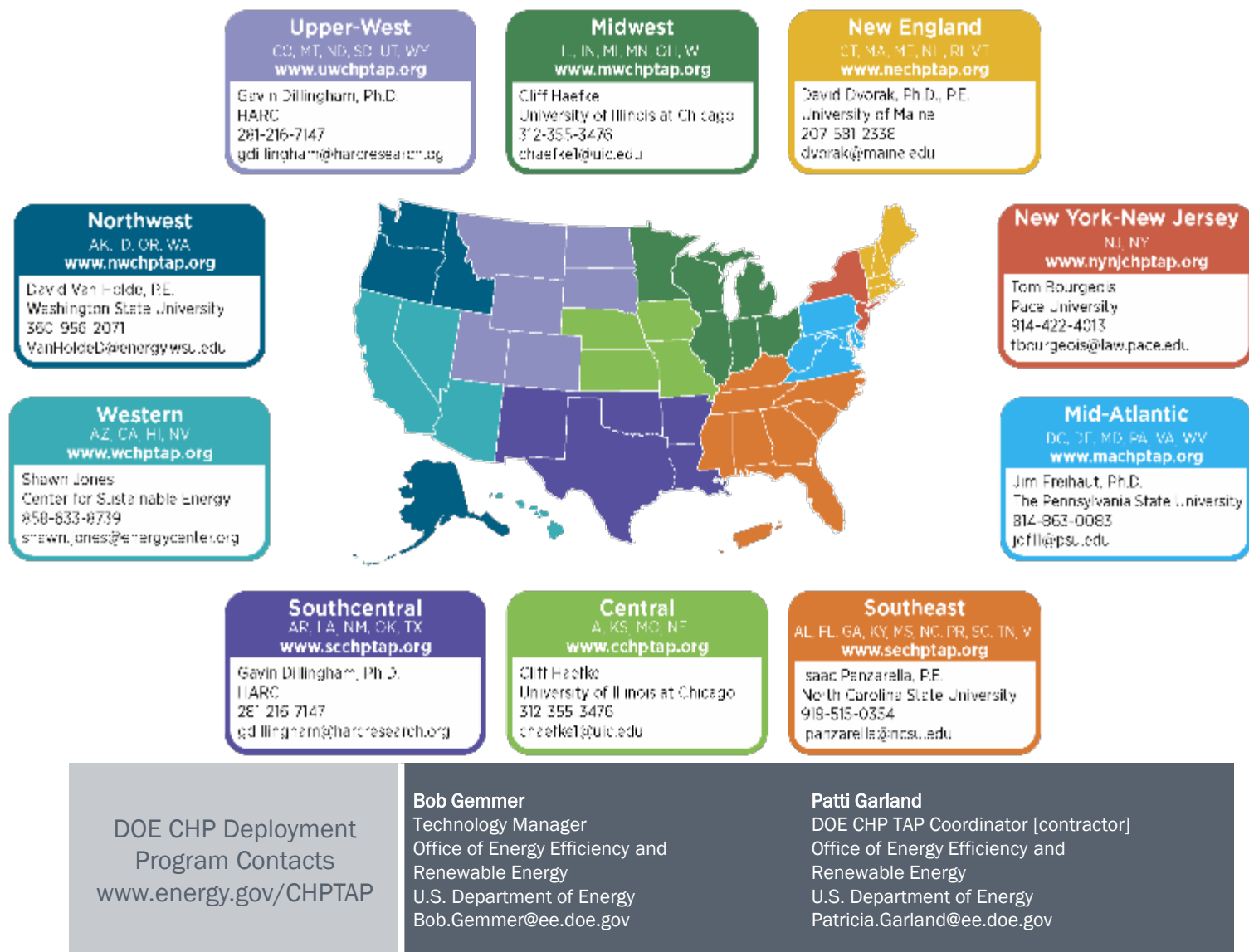
- **Technical Services**

As leading experts in CHP (as well as microgrids, waste heat to power, and district energy) the CHP TAPs work with sites to screen for CHP opportunities as well as provide advanced services to maximize the economic impact and reduce the risk of CHP from initial CHP screening to installation.

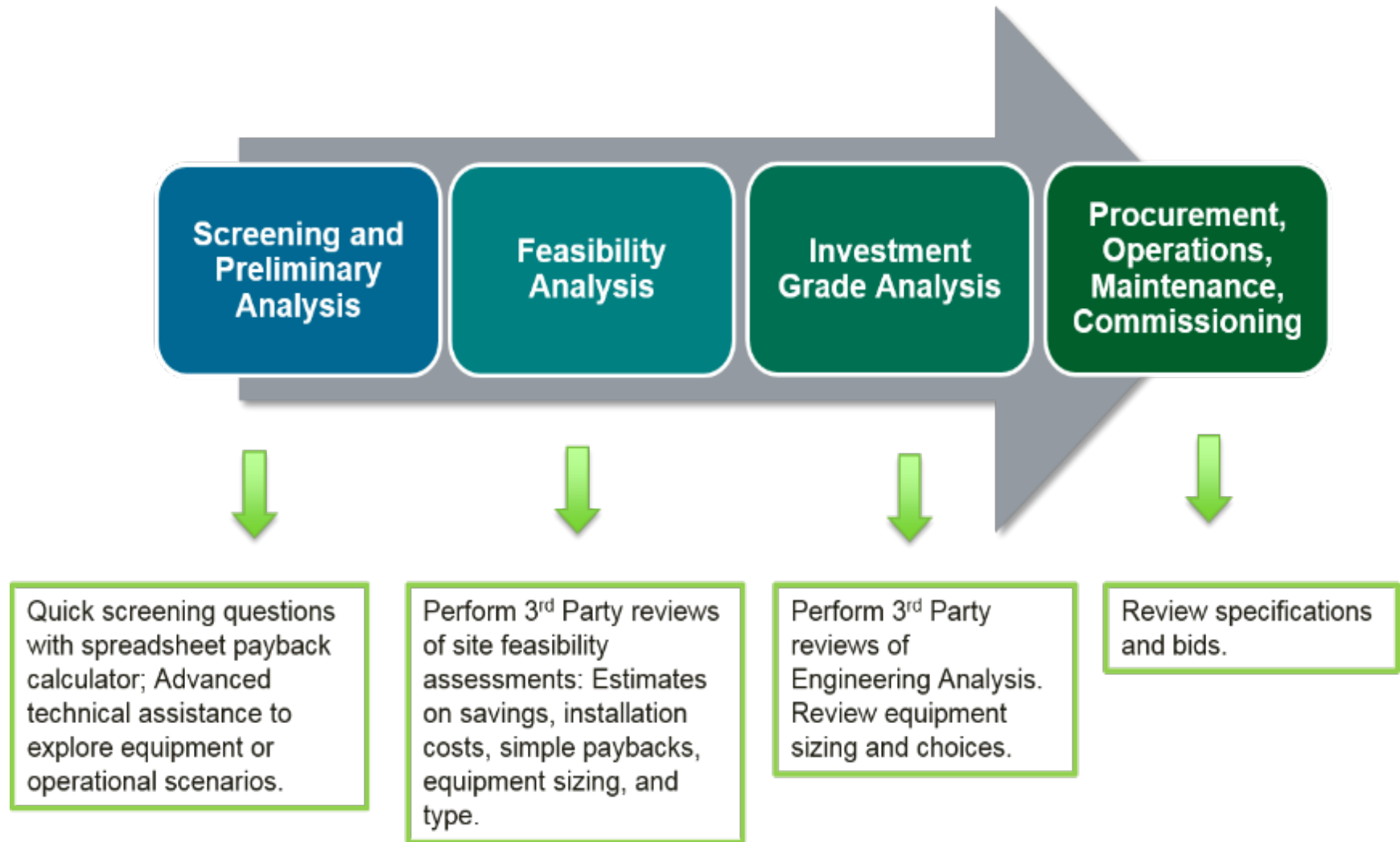


National Manufacturing Day 2019 at the
University of Illinois at Chicago

DOE CHP Technical Assistance Partnerships (CHP TAPs)



CHP TAP Role: Technical Assistance



CHP in Resilience Resources

DG for Resilience Planning Guide



<https://dg.resilienceguide.lbl.gov/>

CHP: Enabling Resilient Infrastructure for Critical Facilities



https://www.energy.gov/sites/prod/files/2013/11/f4/chp_critical_facilities.pdf

CHP Project Resources

DOE Project Profile Database



energy.gov/chp-projects

DOE Policy/Program Profiles



energy.gov/chptap

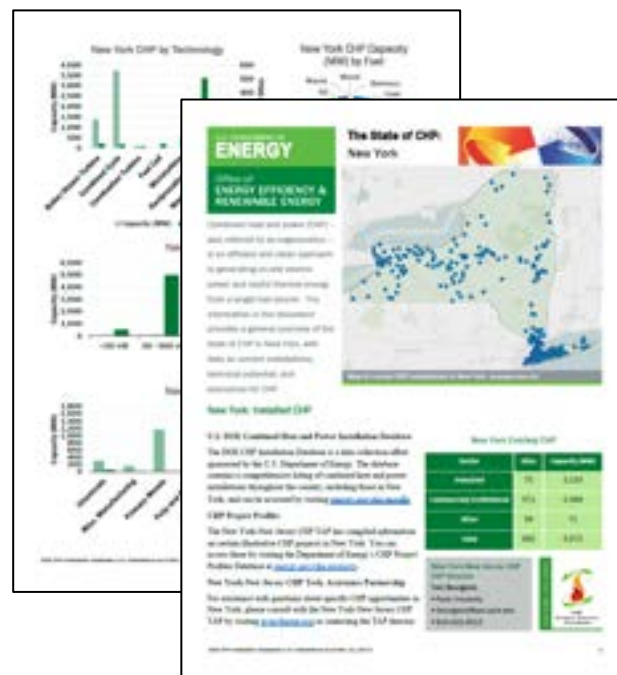
CHP Resources

DOE CHP Technologies Fact Sheet Series



www.energy.gov/chp-technologies

State of CHP Pages



<https://www.energy.gov/eere/amo/state-chp-all-50-states-fact-sheet-series>

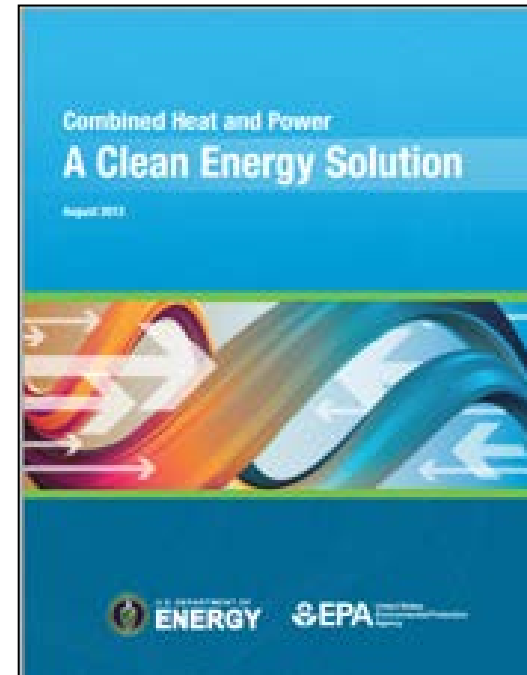
CHP Resources

CHP Issue Brief Series



<https://betterbuildingssolutioncenter.energy.gov/chp/resources-publications>

Good Primer Report



<https://www.energy.gov/eere/amo/downloads/chp-clean-energy-solution-august-2012>



A program sponsored by



Thank You!...

Questions?

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NC Clean Energy Technology Center

NC State University

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CHP Technical Assistance Partnerships

Non-Residential Building Sectors



SOLUTIONS

Through Better Buildings, DOE partners with leaders in the public and private sectors to make the nation's homes, commercial buildings and industrial plants more energy efficient by accelerating investment and sharing of successful best practices.



<https://betterbuildingssolutioncenter.energy.gov/>

The Better Buildings Webinar Series takes on the most pressing topics facing energy professionals, with new experts leading the conversation on proven best practices, cost-effective strategies, and innovative new ways to approach sustainability and energy performance.

SCHEDULED 2020 SUMMER WEBINARS:



BEHIND-THE-METER DISTRIBUTED ENERGY RESOURCES: BEST PRACTICES FOR INTEGRATING DERS INTO COMMERCIAL BUILDINGS

Wednesday, July 8, 2020 | 1:00 - 2:00 PM ET

Speakers from Lawrence Berkeley National Lab (LBNL) and Kaiser Permanente will discuss best practices for integrating and optimizing the performance of renewables, thermal energy storage, and battery energy for load flexibility. [Register Now](#)



PROGRAM DESIGN WITH EVERYONE IN MIND: LOW INCOME SOLAR PROGRAM STRATEGIES

Thursday, July 9, 2020 | 1:00 - 2:00 PM ET

This webinar will highlight examples of low-income renewable energy programs, including the Solar in Your Community Challenge and the Clean Energy for Low-Income Communities Accelerator, best practices, and discuss DOE's new National Community Solar Partnership. [Register Now](#)



THE DYNAMIC DUO: UNLEASH PUBLIC SECTOR ENERGY SAVINGS WITH FINANCING AND TECHNICAL ASSISTANCE

Tuesday, July 14, 2020 | 3:00 - 4:00 PM ET

Description coming soon. [Register Now](#)



NEXT GENERATION BUILDING PERFORMANCE POLICIES: MAXIMIZING ENERGY SAVINGS AND ENVIRONMENTAL IMPACTS

Thursday, July 16, 2020 | 1:00 - 2:00 PM ET

Hear from leading cities deploying the next generation of building performance policies about their strategies for policy design, implementation challenges and successes, and early policy impacts. [Register Now](#)



STRATEGIES TO COMBINE ENERGY + HEALTH UPGRADES IN MULTIFAMILY HOUSING

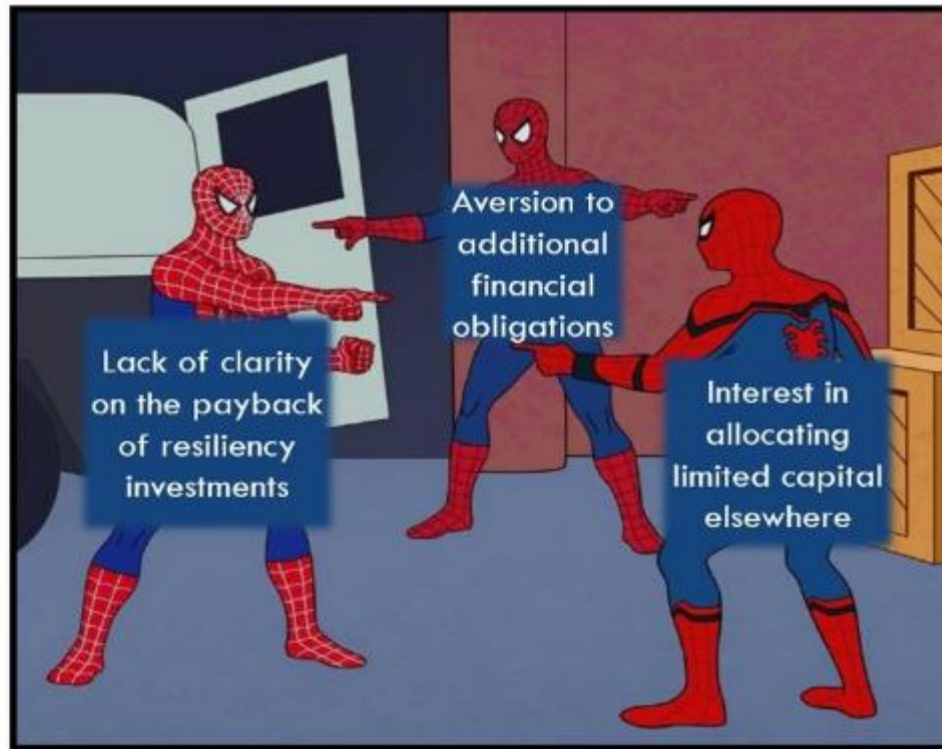
Tuesday, July 21, 2020 | 1:00 - 2:00 PM ET

In this webinar, panelists will present case studies of innovative partnerships between affordable housing providers, public health, and building science stakeholders to advance energy + health initiatives and will share experiences pursuing the FitWell® certification for healthy buildings. [Register Now](#)

Financing

Financing: chicken and the egg problem

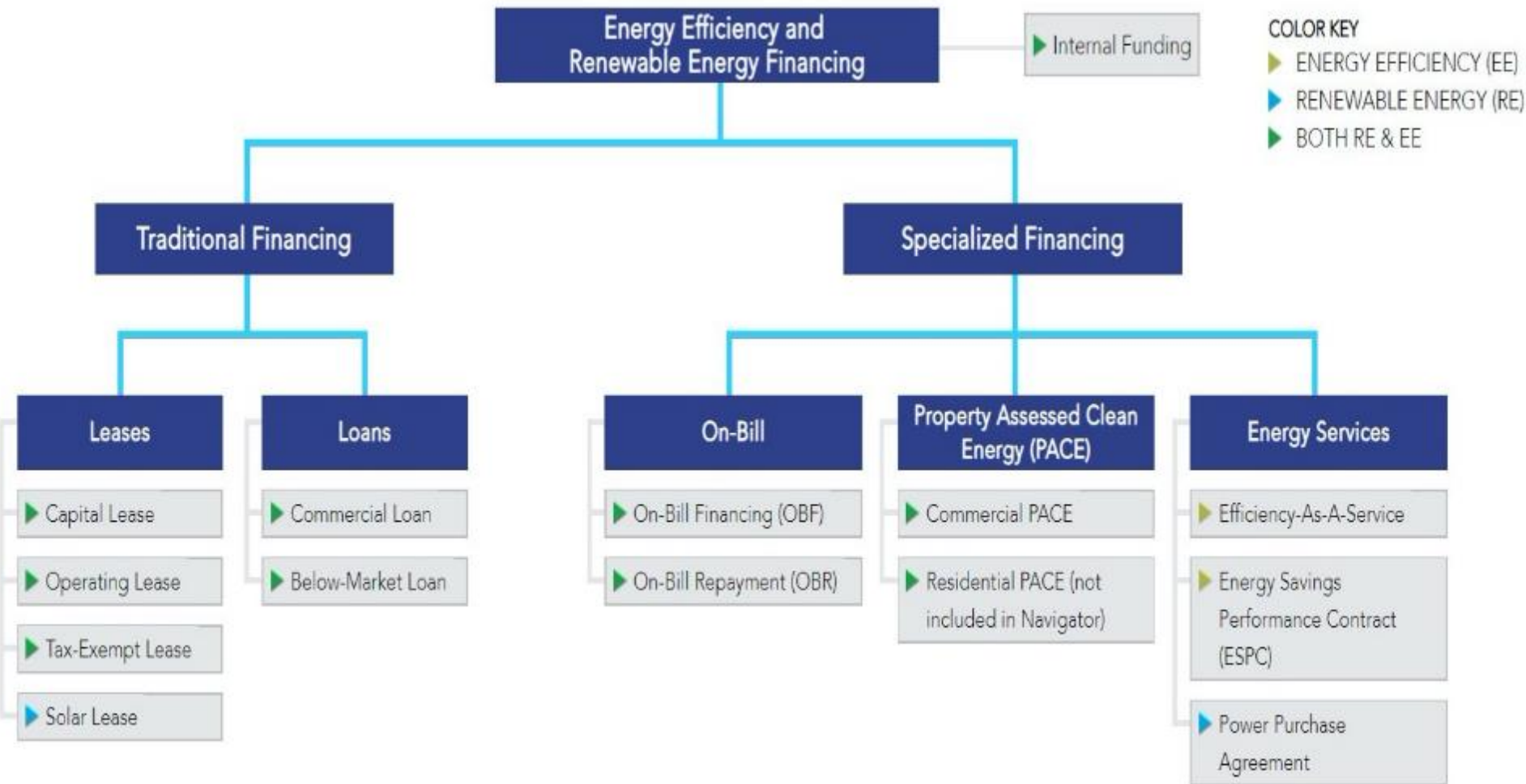
A “FINANCING PROBLEM” IS OFTEN REALLY A..



Better Buildings Financial Allies are market-leading financing companies that have committed to funding energy efficiency and renewable energy projects:

<https://betterbuildingssolutioncenter.energy.gov/financing-navigator>

Energy and Resilience Financing Options



<https://betterbuildingsolutioncenter.energy.gov/webinars-on-demand>

Commercial Property Assessed Clean Energy (C-PACE)

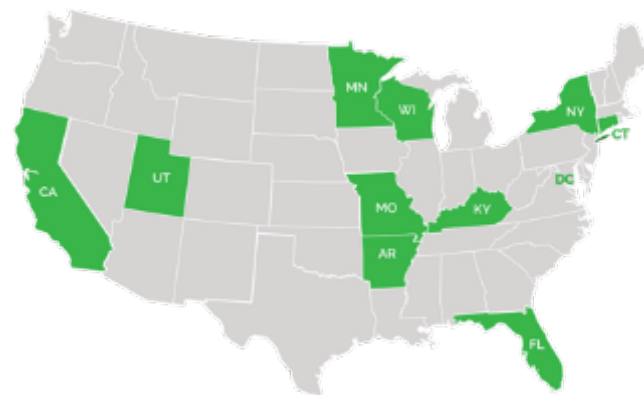
C-PACE 101

Commercial Property Assessed Clean Energy (C-PACE):

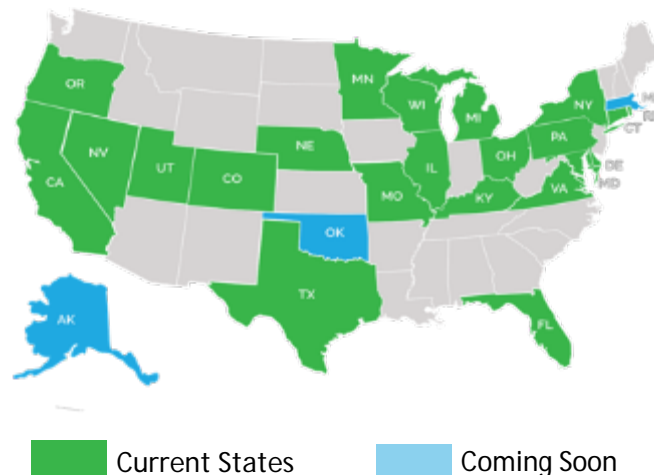
- Public-private financing through which private lenders finance qualified public benefit improvements in commercial properties
- Eligible measures include energy efficiency, renewable energy, water conservation projects, and seismic & hurricane resiliency
- Fixed-rate financing that self-amortizes over the life of the improvements, typically 20-30 year terms
- Enabled by State law and modeled after long-established public benefit assessments (i.e. utility, downtown renewal)
- Documented by a tri-party financing agreement between borrower, C-PACE lender, and government-appointed administrator
- Administrator places a non-accelerating assessment on the property's tax parcel, and remits payments to C-PACE lender
- Requires consent from secured lenders; obtained from 250+ lenders

C-PACE is Spreading Across the U.S.

11 Available Markets in 2015



22 Available Markets in 2020



Most Buildings Qualify

Building Requirements

- ✓ Commercial, Industrial, Non-Profit, Multi-Family >5 Units
- ✓ Does NOT work for residential, government
- ✓ Located within operational PACE municipality
- ✓ Current on property taxes

Financial Requirements

- ✓ Financed amount cannot exceed 35% of property value
 - and 20% for new construction
- ✓ Total property debt (mortgage + PACE) cannot exceed 95% of property value
- ✓ Not in bankruptcy
- ✓ Meets other state statutory requirements



Hotels & Offices

Increase tenant and guest comfort as well as net operating income



Retail

Invest in windows, lighting and more with long-term, low-cost capital



Manufacturing

Offset high energy use with renewables and ensure operations with resiliency measures



Multi-family

Properties with greater efficiency are not only more profitable, but marketable to tenants as well

Commercial Property Assessed Clean Energy (C-PACE)

Project Types



Energy Efficient Upgrades and Deferred Maintenance

Replace HVAC, lighting, windows, roof, etc. or improve seismic or hurricane resiliency to improve property and portfolio value.



New Construction & Gut Rehabs

Improve cash on cash returns; decrease cost of capital; fill equity gaps.



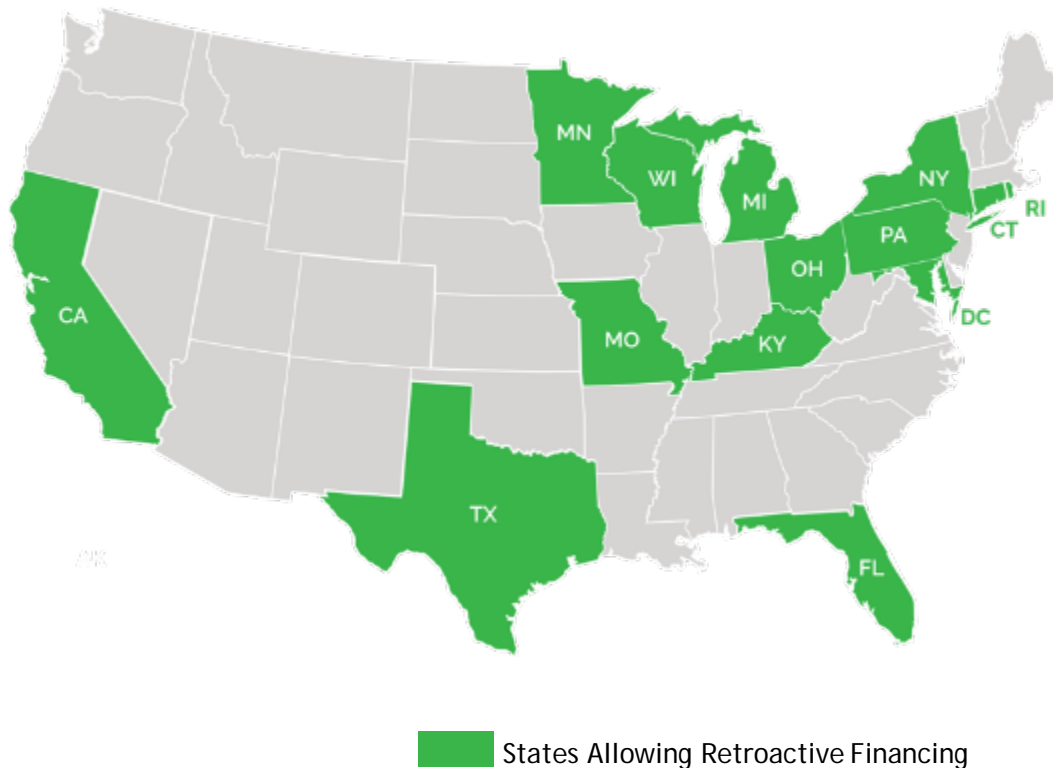
Solar & Renewables

100% financing and 20+ year repayment drives day-one cashflow and maximizes tax equity for owners.



Commercial Property Assessed Clean Energy (C-PACE)

Retroactive Financing



- ✓ CA (3 years)
- ✓ CT (1 year)
- ✓ DC (Case by case)
- ✓ FL (3 years)
- ✓ KY (No limit)
- ✓ MD - PG Co. (18 months)
- ✓ MI (3 years)
- ✓ MO (Case by case)
- ✓ MN (1 year)
- ✓ NY (Case by case)
- ✓ OH (No limit)
- ✓ PA (Back to Aug of 2018)
- ✓ RI (2 years)
- ✓ TX (Case by case)
- ✓ WI (30 months)

U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY

Summary and Resources

Roosevelt Grant, HUD



World-Class Best Practices...



...At Your

Fingertips



Building America
Solution Center
BASC.pnnl.gov

- Residential High Performance and the Three “R”s: Resistance, Resilience, and Recovery (Gilbride, Reichel, Mantell-Hecathorn, Baechler)
Presentation describing construction techniques to make homes both energy efficient and disaster resistant. (Oct 2019)
- DOE report: building a durable and energy efficient home in post-Katrina New Orleans (July 2007)
- Building Science Corporation Digest BSD-111, Flood and Hurricane Resistant Buildings (Oct 2006)

Value of EERE in Action Plans: Meeting CDBG-MIT's Goals

- ❖ **HUD Goal 1:** Support data-informed investments, focusing on repetitive loss of property and critical infrastructure
- ✓ **Example:** EE and resilient design are critical

- ❖ **HUD Goal 2:** Build capacity to comprehensively analyze disaster risks and update hazard mitigation plans
- ✓ **Example:** Mitigation planning, Research and Development, Codes and Standards are necessary

- ❖ **HUD Goal 3:** Support the adoption of policies that reflect local and regional priorities that will have long-lasting effects on community risk reduction, including risk reduction to community lifelines and decreasing future disaster costs
- ✓ **Example:** Model building codes and standards promote EE and resilient design

- ❖ **HUD Goal 4:** Maximize the impact of funds by encouraging leverage, private/ public partnerships, and coordination w/other federal dollars
- ✓ **Example:** Leveraging federal DOE and FEMA funds to achieve your goals



DOE Resources

- [Efficiency-Resilience Nexus](#)
- [DISASTER! Resilience and Adaptation Pre- and Post-Disaster](#) (Better Buildings Residential Network Peer Exchange Call Series, Sept. 26, 2019)
- [Efficiency and Resilience Improvements with PACE Financing](#) (BBRN Peer Exchange, March 14, 2019)
- ZERH webinar: [Going Green and Building FORTIFIED Homes](#)
- DOE / EERE resource page: [energy resources for hurricane season](#), and [case study](#) energy efficiency and sustainability practices post-Katrina/Rita in New Orleans



FEMA Resources

- FEMA Hazard Mitigation Plan Resources website:
<https://www.fema.gov/hazard-mitigation-planning-resources>
- FEMA State Mitigation Planning Resources website:
<https://www.fema.gov/state-mitigation-planning-resources>
- FEMA State Mitigation Planning Key Topics Bulletins:
<https://www.fema.gov/media-library/assets/documents/115780>
- FEMA Local Mitigation Planning Resources website:
<https://www.fema.gov/local-mitigation-planning-resources>
- FEMA National Response Framework:
<https://www.fema.gov/media-library/assets/documents/117791>

HUD CDBG-MIT Resources

- **Community Development Block Grant Mitigation Program:**
<https://www.hudexchange.info/programs/cdbg-mit/>
- **HUD CDBG-Mitigation Notice:**
<https://files.hudexchange.info/resources/documents/FR-6109-N-02-CDBG-Mitigation-Notice.pdf>
- **HUD CDBG-Mitigation 2019 Webinar series:**
<https://www.hudexchange.info/news/cdbg-mit-webinar-series/>

Other Resources

- [Resilience Contributions of the International Building Code](#) (ICC, 2019)
- [The Important Role of Energy Codes in Achieving Resilience](#) (ICC, 2019)
- [Keep Safe Guide](#) (Enterprise Community Partners, 2019)
- [Enterprise Green Communities](#) (Enterprise Community Partners, 2020)
- [Puerto Rico Energy Tool Kit](#) (Rocky Mountain Institute, 2019)



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Energy Efficiency &
Renewable Energy

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HUD CDBG-MIT Guidance Questions

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