NCBPA
North Carolina Building Performance Association

North Carolina Building Performance Association

Resiliency in the Built Environment

RETROFIT Conference

Resilient Buildings Panel

About NCBPA

- NCBPA is a not-for-profit 501(c)(6) trade association serving North Carolina's building performance companies and professionals with education, member services and industry advocacy.
  - Residents in need of lower utility bills and healthier, safer places to live in.
  - Businesses whose operating costs can be lowered through performance improvements.
  - Contractors who perform quality work in homes and buildings across the state.

1. Increasing the value and visibility of high performance homes and buildings.
2. Educating consumers on the benefits of high performance construction.
3. Improving our industry's legislative and regulatory business environment.
4. Creating workforce development and career opportunities for industry companies and professionals.

Learning Objectives

- Learn how building resiliency **transcends current building codes** to create a positive impact on the environment and people
- Learn about the various types of **resilient design practices**, products and systems available now and coming in the future
- Learn about the benefits of **resilient planning** versus a reactive approach
- Learn how up-front passive principles, **net zero energy** and various efficiency measures promote resiliency without detriment to building owners and occupants

Hurricane Florence, NC

- Hurricane Florence drastically altered the physical and built infrastructures of NC Eastern coast and inland communities
- Teaming up with local contractors, industry professionals & companies to bring restoration aid to impacted homeowners/businessowners
- “Stay Safe Long after the Storm” Retrotec, Advanced Energy
    - Steps to Make Sure your House is Healthy post Hurricane Florence
    - Choose your Contractor Wisely
    - Retrofit and restoration practices: dehumidifiers, crawlspaces, etc.
    - Helpful tools & articles, locating a reliable contractor, organizations that can provide assistance, etc.

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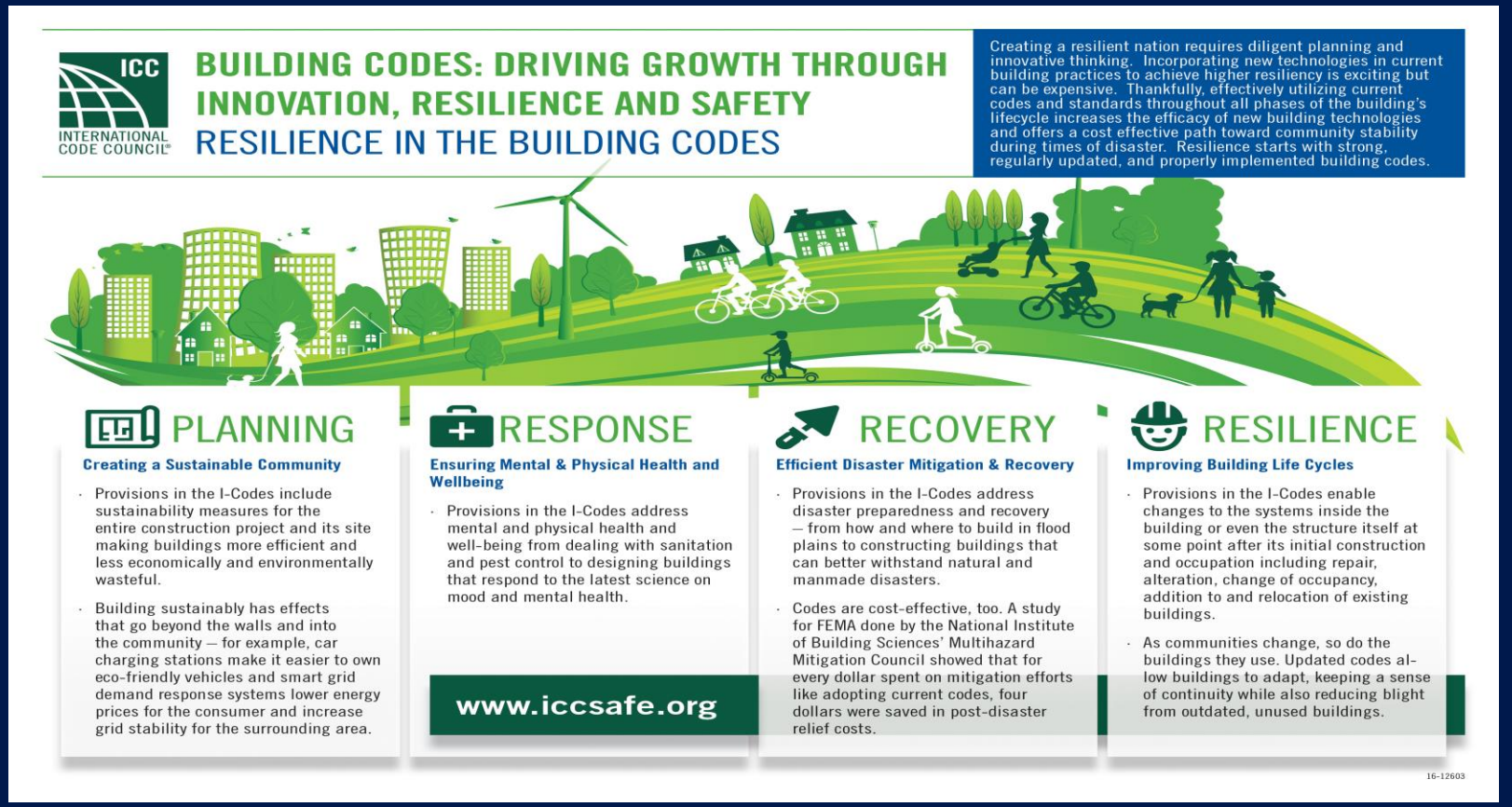
Resiliency & Energy Code

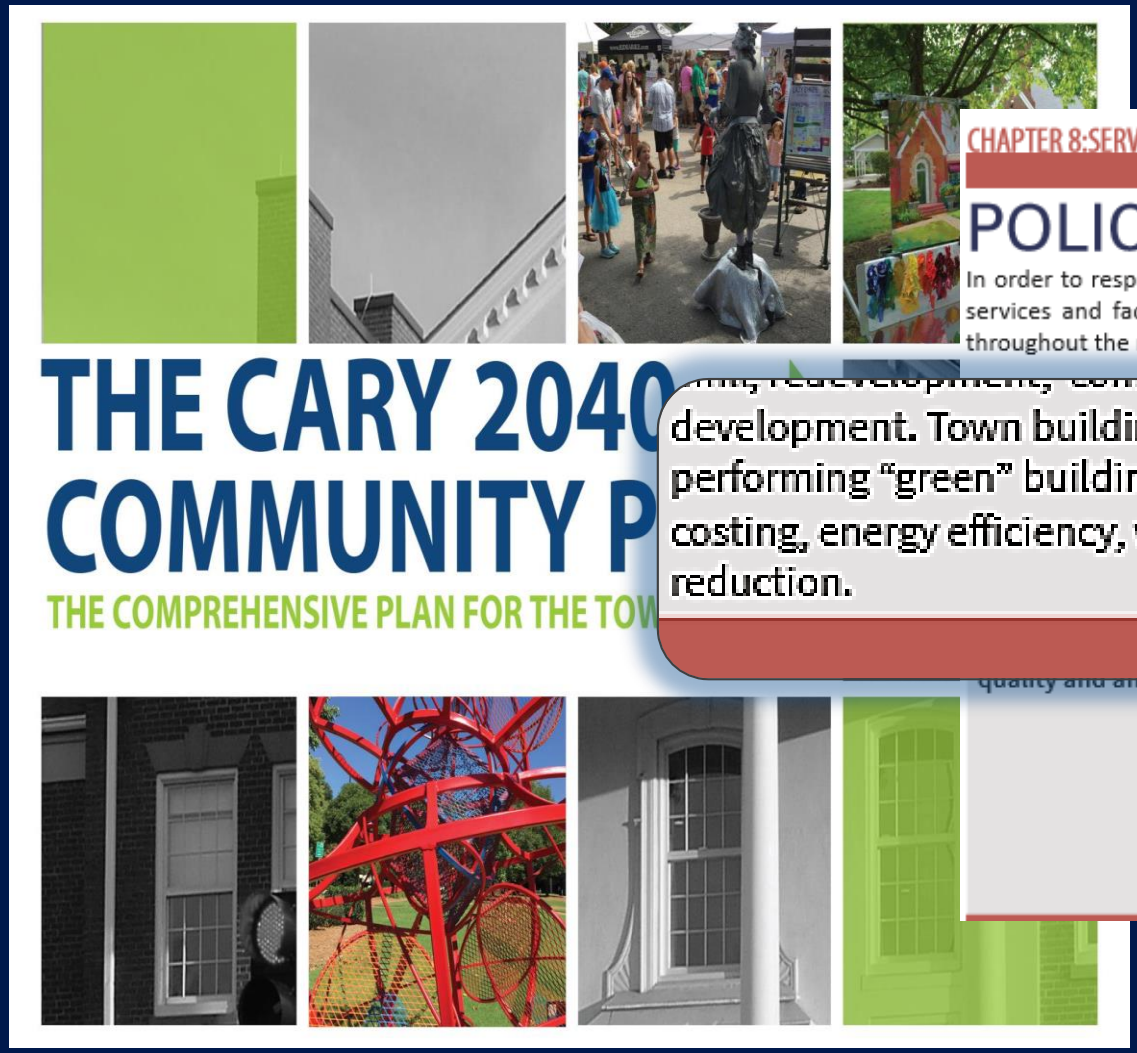
Breaking Down Code

"The ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events"



Graphic by ICC

Case Study Town of Cary, NC



CHAPTER 8:SERVE

POLICY DIRECTION

In order to respond to the challenges and opportunities for Cary's public services, and to provide reliable, affordable, and excellent services and facilities to the community in a way that protects the environment and anticipates growth and changes occurring throughout the region, the Town's public facilities and services policies are:

development. Town buildings will be constructed to be high-performing "green" buildings, with a commitment to lifecycle costing, energy efficiency, water conservation, and waste reduction.

olicy Intent

re Generations That Balance High Quality

tent of this policy is to maintain a balance of high quality ffordability in providing public facilities and services to bers of the community today, while ensuring that resources services will be available to a growing regional population. ervices and infrastructure will support development; however, development patterns should help to ensure high quality provisi n of services. Development patterns should support infill, rede opment, compact development and traditional development. Town buildings will be constructed to be high-performing "green" buildings, with a commitment to lifecycle costing, energy efficiency, water conservation, and waste reduction.

Graphics by Town of Cary

Case Study Town of Cary, NC

Cary Community Plan
Policy Initiatives and Recommended Major Actions

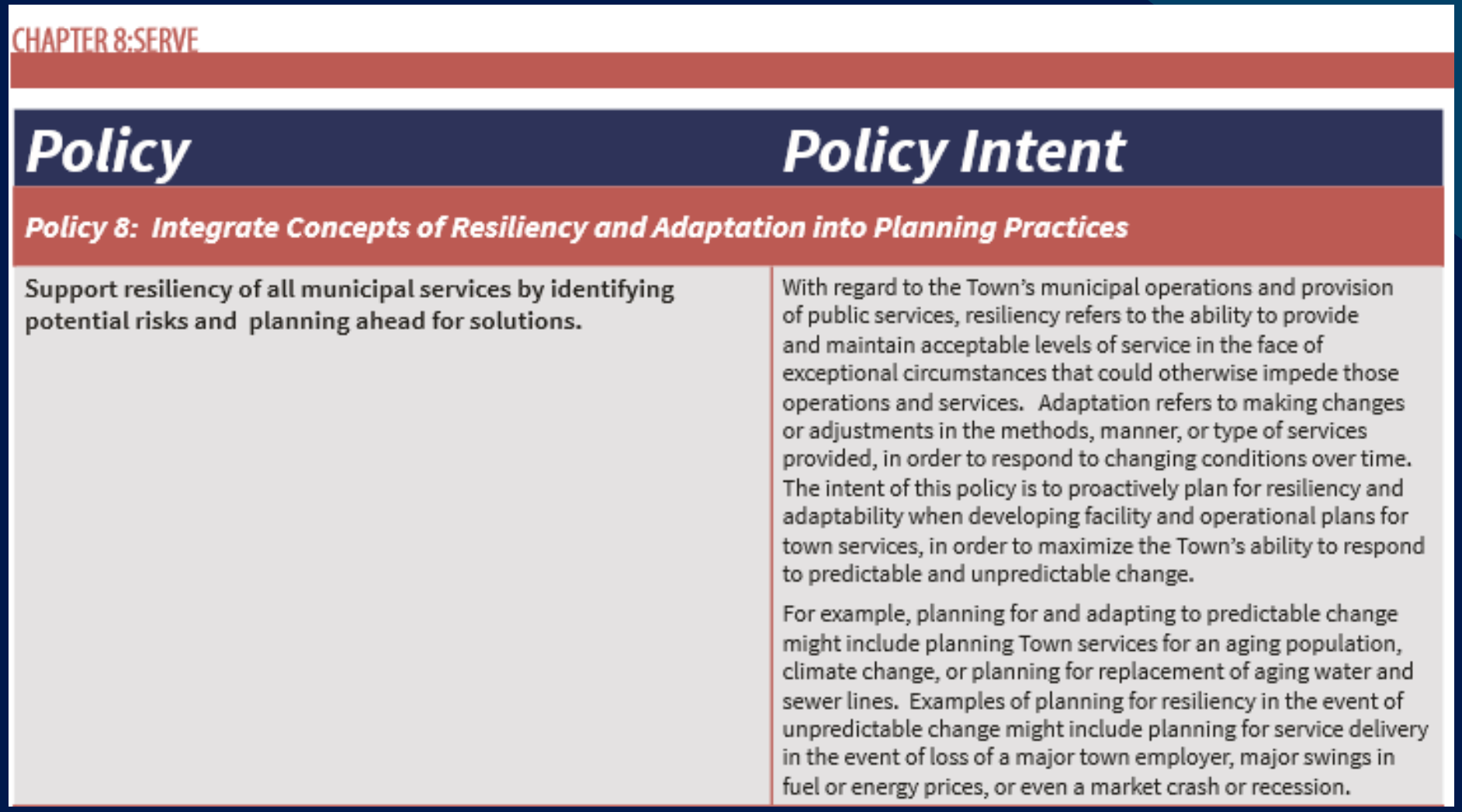
LIVE: Foster Strong and Sustainable Neighborhoods
Policy Initiative: Implement a Strong Neighborhoods Initiative
- Create a baseline housing inventory ar report.
- Work with neighborhoods to explore d interests and concerns to Town officia
- Amend the LDO to include context-sen
- Expand the framework of what is now examines whether the Project Phoenix development, code enforcement, and
- Expand the funding and scope of the N

SHOP: Create Vibrant Destinations by Managing Future Land Use and Encouraging Redevelopment and Infill Efforts
Policy Initiative: Promote and Enable Revitalization of Existing Commercial Centers
- Review all Town development regulations to identify and remove disincentives for redevelopment.
- Create baseline economic health indicators for aging commercial centers as a first step in evaluating the need for a Minimum Commercial Code.
- Develop evaluation criteria to guide public investment in redevelopment projects.
- Create new infill and redevelopment design guidelines that balance the goal of encouraging redevelopment with the goal of protecting the character of adjacent neighborhoods.

Graphics by Town of Cary

Case Study Town of Cary, NC

- Planning
- Response
- Recovery
- Resilience



CHAPTER 8:SERVE

Policy	Policy Intent
Policy 8: Integrate Concepts of Resiliency and Adaptation into Planning Practices	
Support resiliency of all municipal services by identifying potential risks and planning ahead for solutions.	With regard to the Town's municipal operations and provision of public services, resiliency refers to the ability to provide and maintain acceptable levels of service in the face of exceptional circumstances that could otherwise impede those operations and services. Adaptation refers to making changes or adjustments in the methods, manner, or type of services provided, in order to respond to changing conditions over time. The intent of this policy is to proactively plan for resiliency and adaptability when developing facility and operational plans for town services, in order to maximize the Town's ability to respond to predictable and unpredictable change. For example, planning for and adapting to predictable change might include planning Town services for an aging population, climate change, or planning for replacement of aging water and sewer lines. Examples of planning for resiliency in the event of unpredictable change might include planning for service delivery in the event of loss of a major town employer, major swings in fuel or energy prices, or even a market crash or recession.

Graphics by Town of Cary

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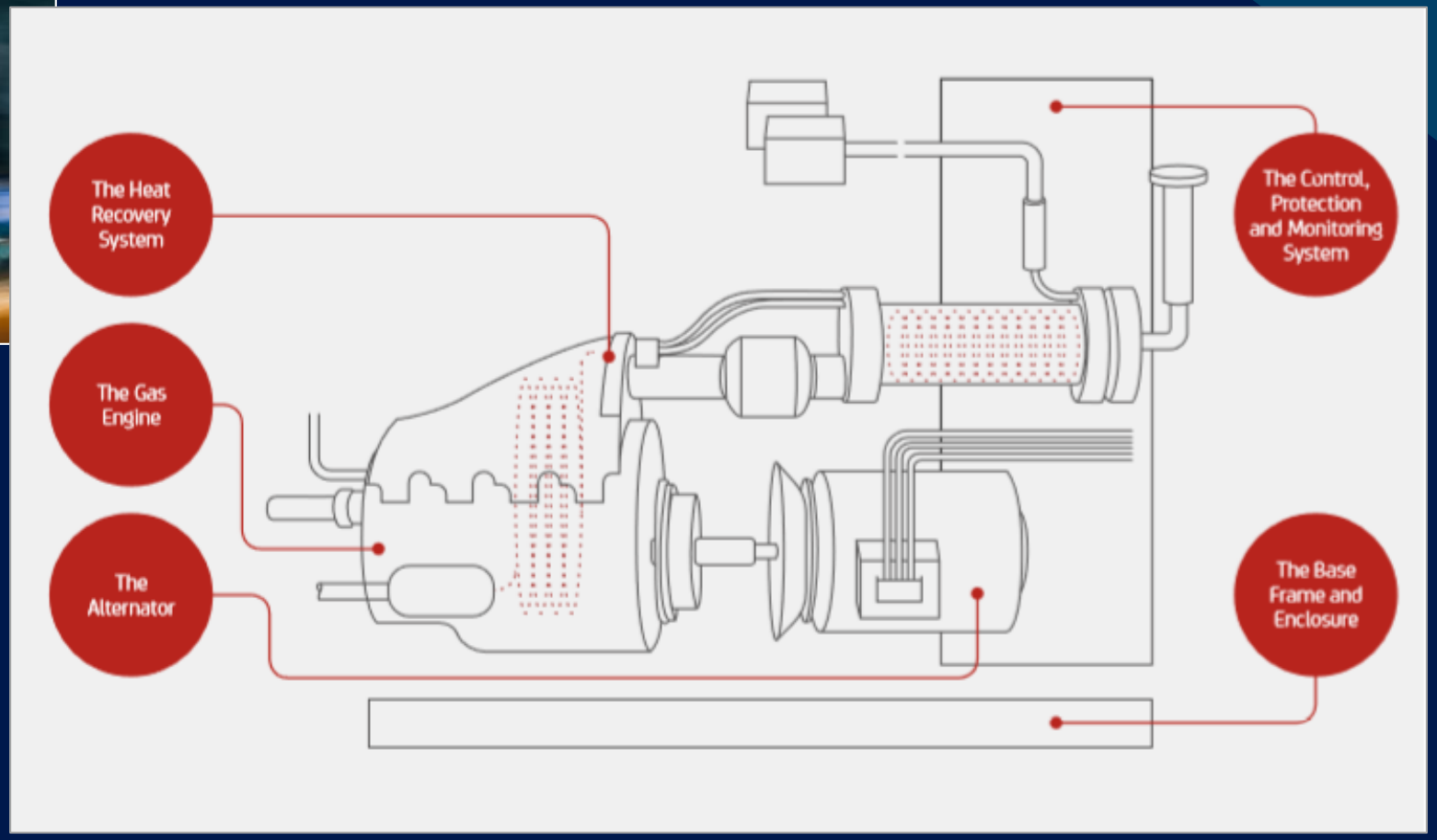
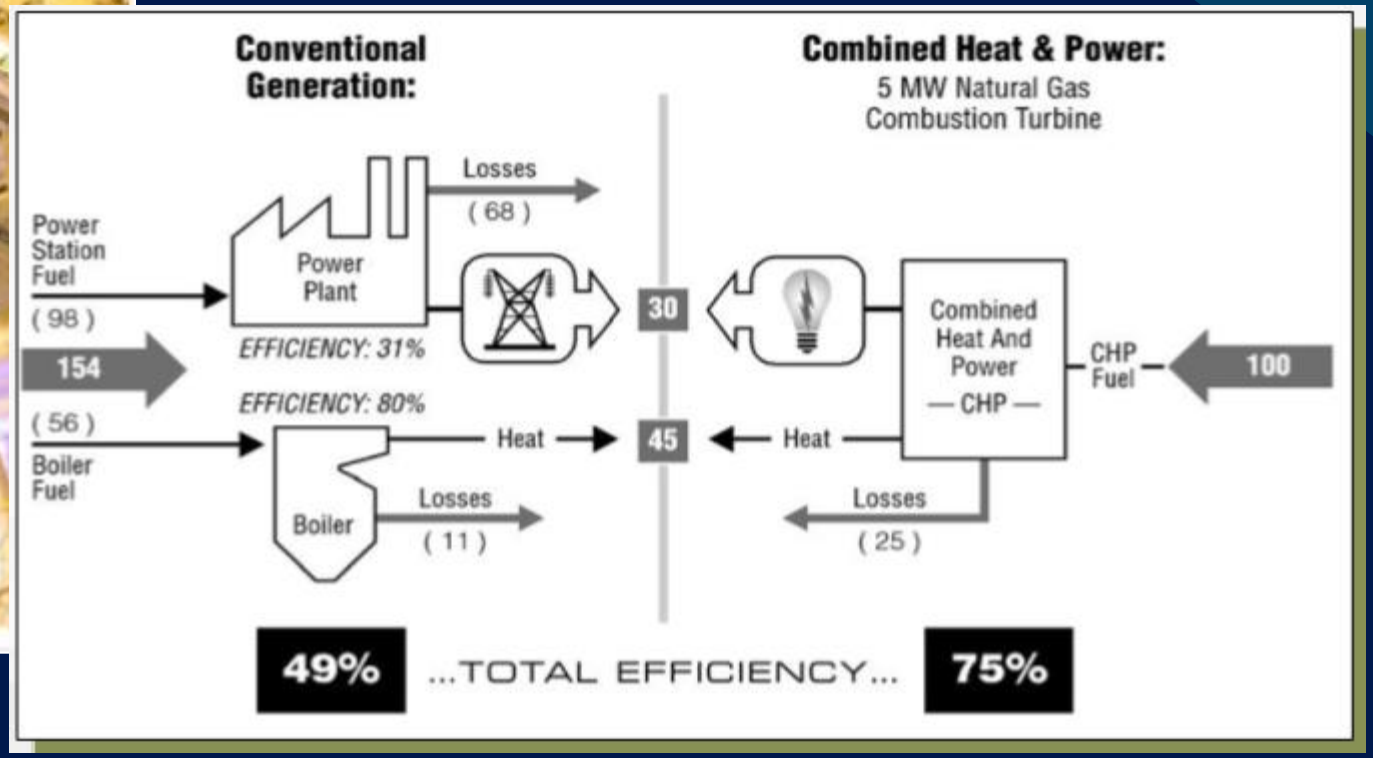
Resilient Design Practices

CHP Combined Heat & Power



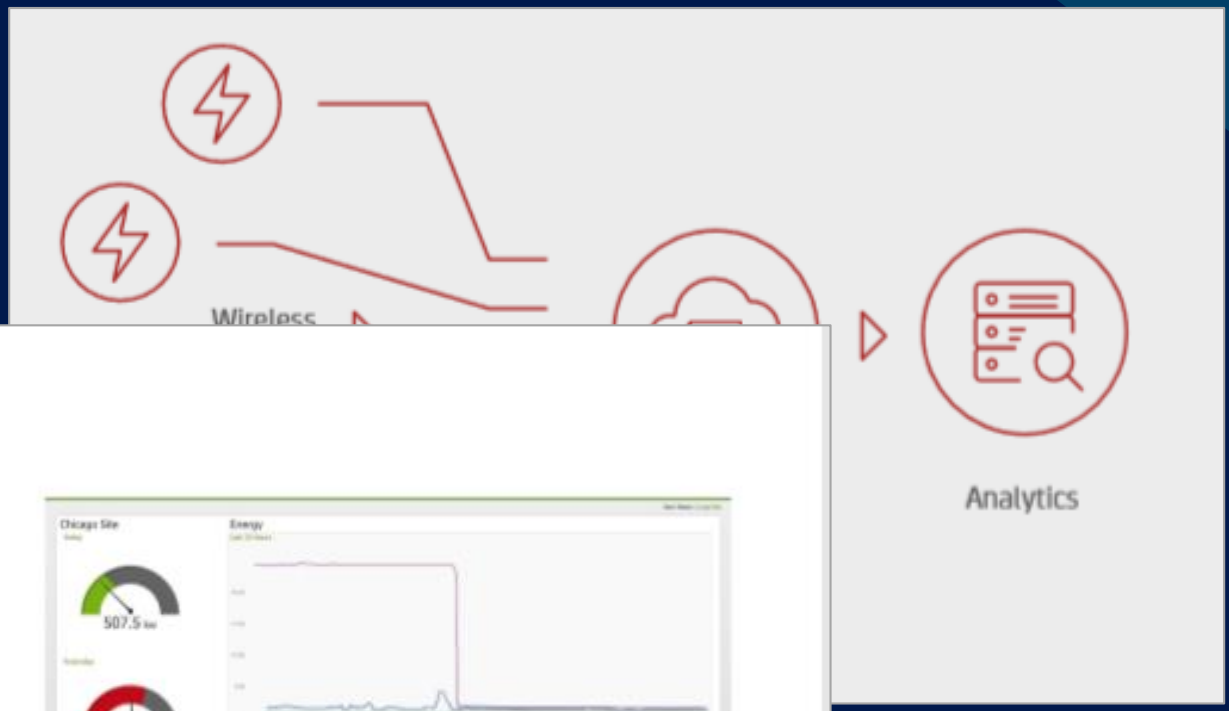
Graphic by Centrica

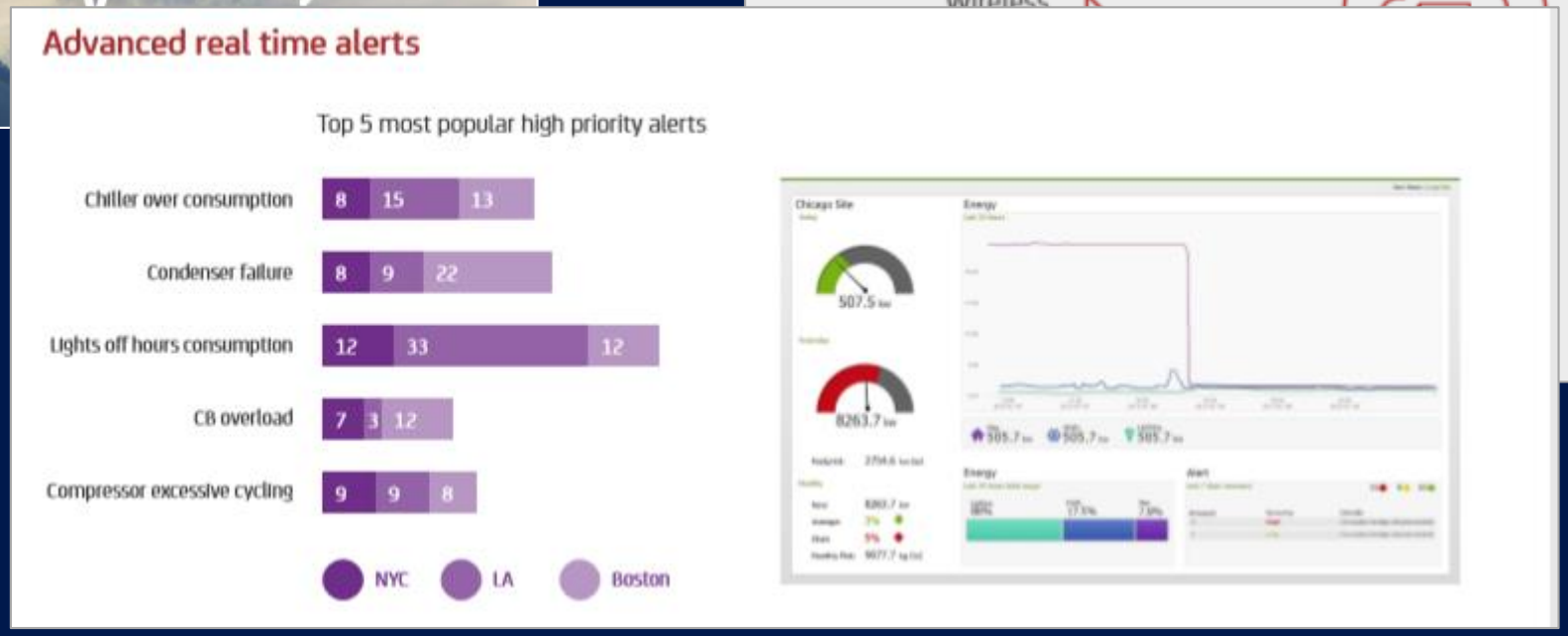
CHP Combined Heat & Power



Graphics by Midwest CHP App. Center

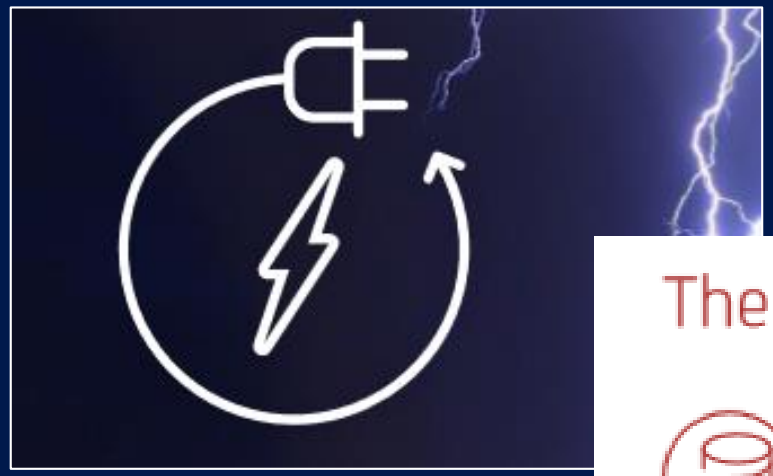
Wireless Automation Energy Insights





Graphic by Centrica

Power Generation On-Demand Energy

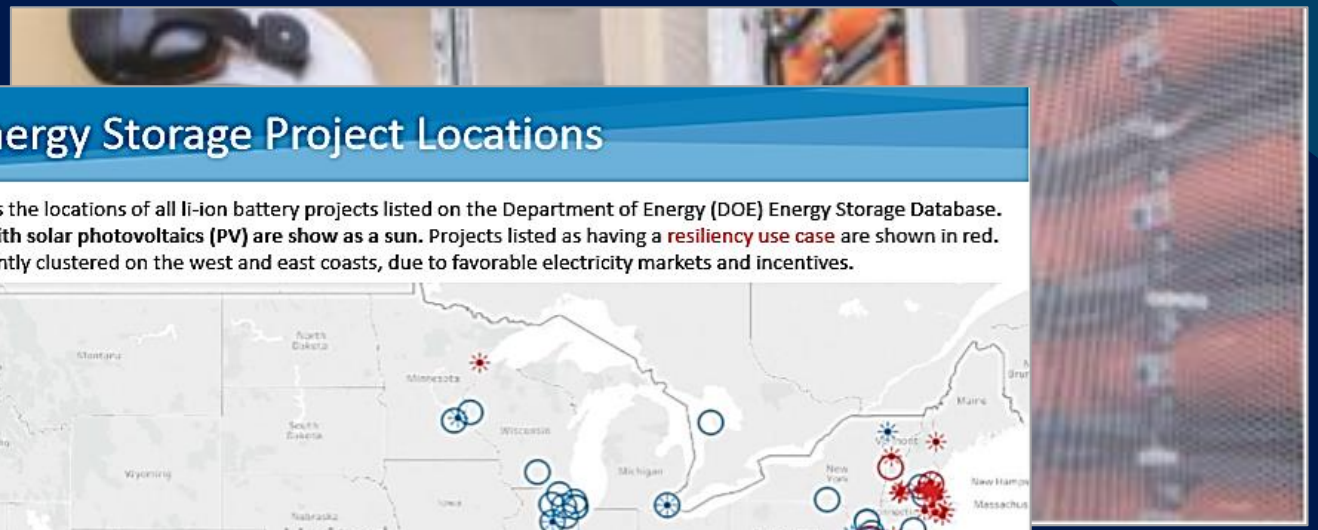


The benefits of Power Generation

- Create revenue by supporting the grid at peak times
- Fast start-up for entry into response time-based markets
- 1-50MW capacity through multiple engines offer flexibility and scalability
- Single point of supply with end-to-end service – just add fuel

Graphic by Centrica & Siemens

Energy Storage Accessibility Meets Planning

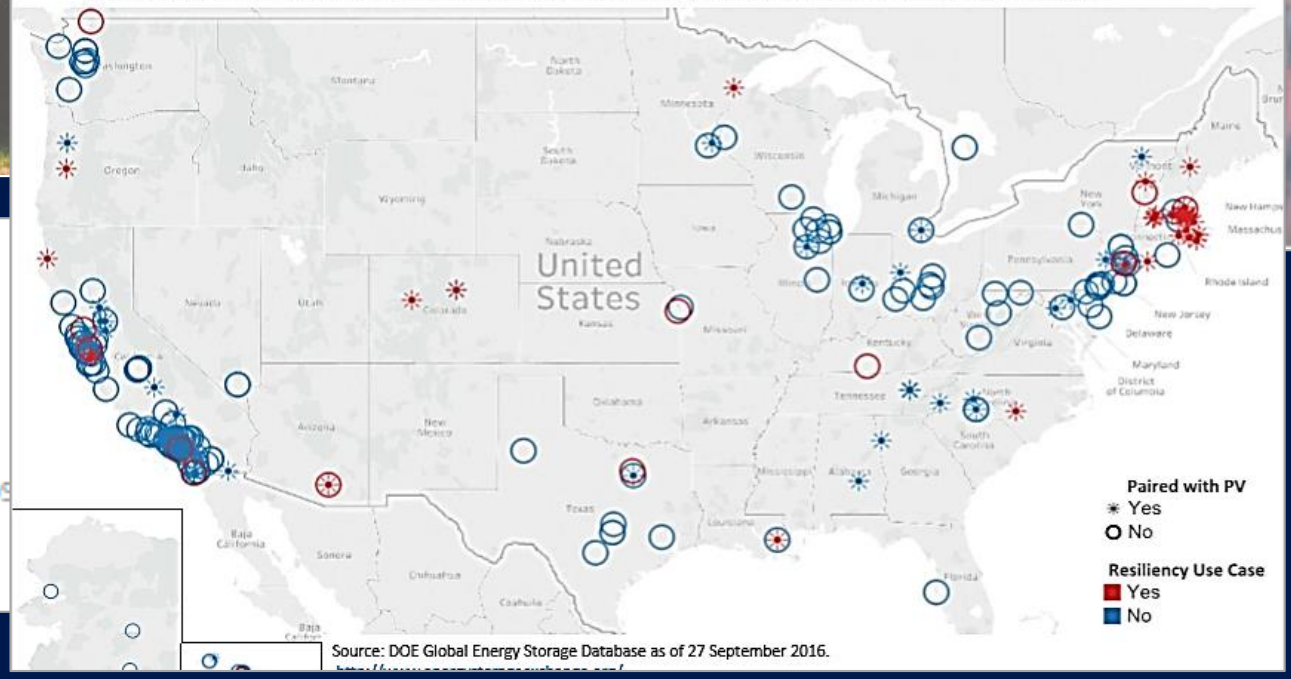


17%

average percentage revenue los
to power interruptions

Li-ion Energy Storage Project Locations

This map indicates the locations of all li-ion battery projects listed on the Department of Energy (DOE) Energy Storage Database. **Projects paired with solar photovoltaics (PV) are show as a sun.** Projects listed as having a resiliency use case are shown in red. Projects are currently clustered on the west and east coasts, due to favorable electricity markets and incentives.



Source: DOE Global Energy Storage Database as of 27 September 2016.

Graphic by Reliance Foundry, Centrica & Siemens

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Resilient Planning

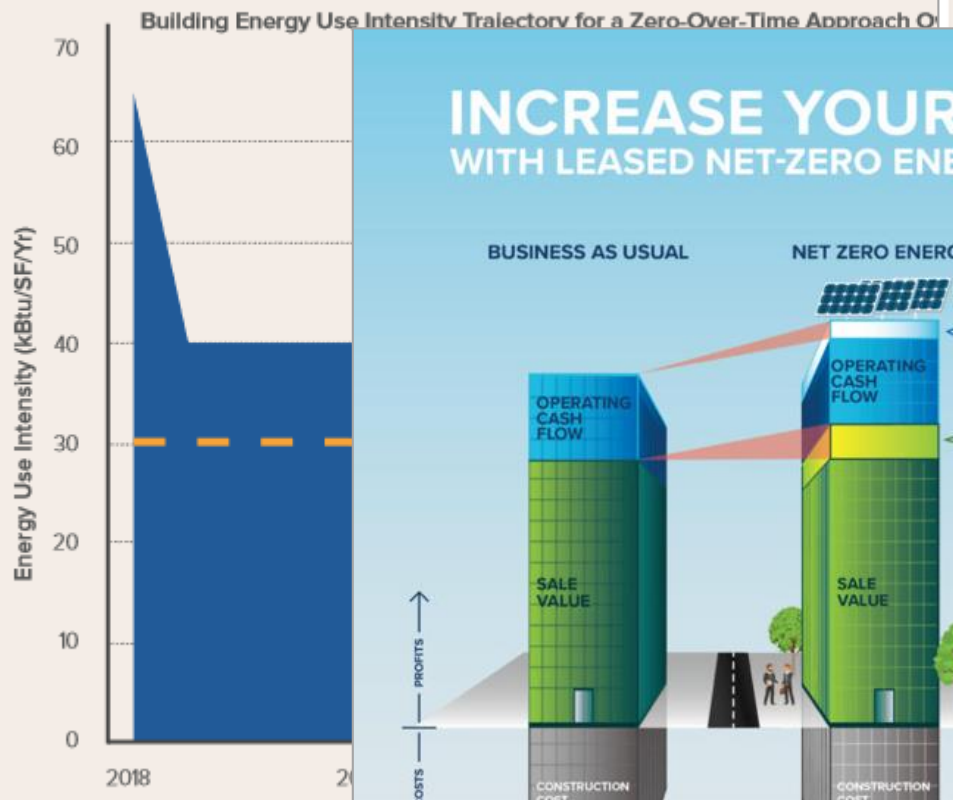
Planning For Zero

LOCATION	MATERIAL AND LABOR FACTOR[xiii]	UTILITY ENERGY CHARGE[xiv]	UTILITY DEMAND CHARGE	IECC CLIMATE ZONE	SOLAR RESOURCE (KWH/KW[xv])	20 YEAR IRR FOR ZOT
DENVER	0.898	$0.035/kWh	$21.09/kW	5	1,407	5.0%
					1,130	10.9%
					1,171	7.6%

Graphic by Rocky Mountain Institute

Planning For Zero

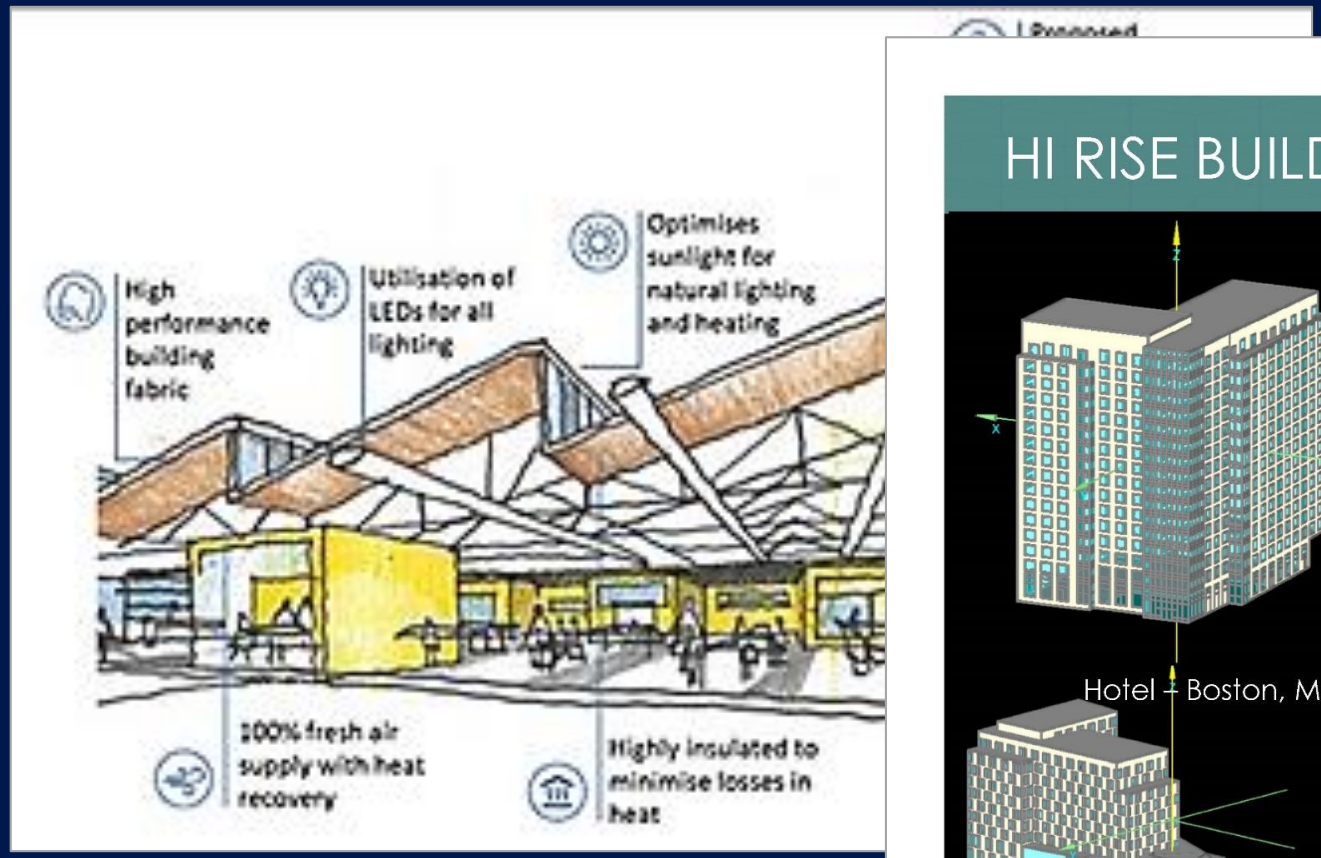
FIGURE 1
ENERGY USE INTENSITY VS. SOLAR CAPACITY OVER TIME

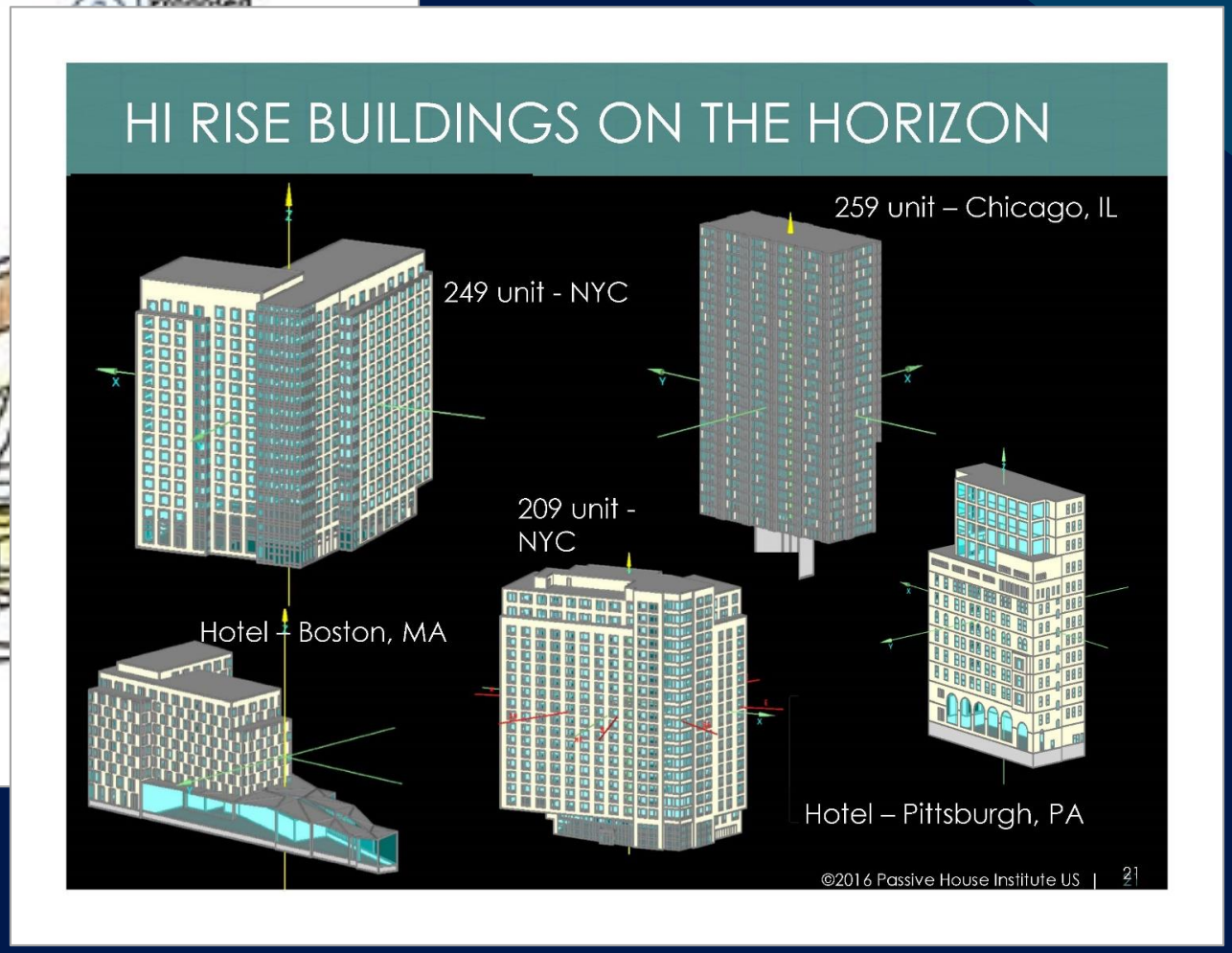


TIMING	ACTIONS TO CONSIDER
HVAC replacement	Replace HVAC equipment with higher-efficiency equipment or new HVAC technology at end of life. Always right-size mechanical equipment to the actual loads (not just like-for-like sizing), and wherever possible downsize equipment if load-reducing ECMs were performed. Consider fuel switching equipment from gas to electric.
	Consider adding insulation if recommended by the energy analysis, and ensure that the roof meets load requirements for future solar installation. Consider adding toplighting, which improves daylighting, though design carefully to avoid introducing too much heat. If viable, add solar. Consider painting the roof white in hot climates.
	Consider high-performance windows. Note that high-performance windows may reduce loads enough to downsize HVAC, so ensure HVAC sizing is analyzed before the next HVAC replacement.
	Install continuous insulation on exterior walls.
	Consider swapping out diesel generator for batteries and/or a microgrid as technology improves and becomes more affordable.
	Consider opportunity for fuel switching to electric. For more information, review RMI's report on *The Economics of Electrifying Buildings*.

Graphic by Rocky Mountain Institute

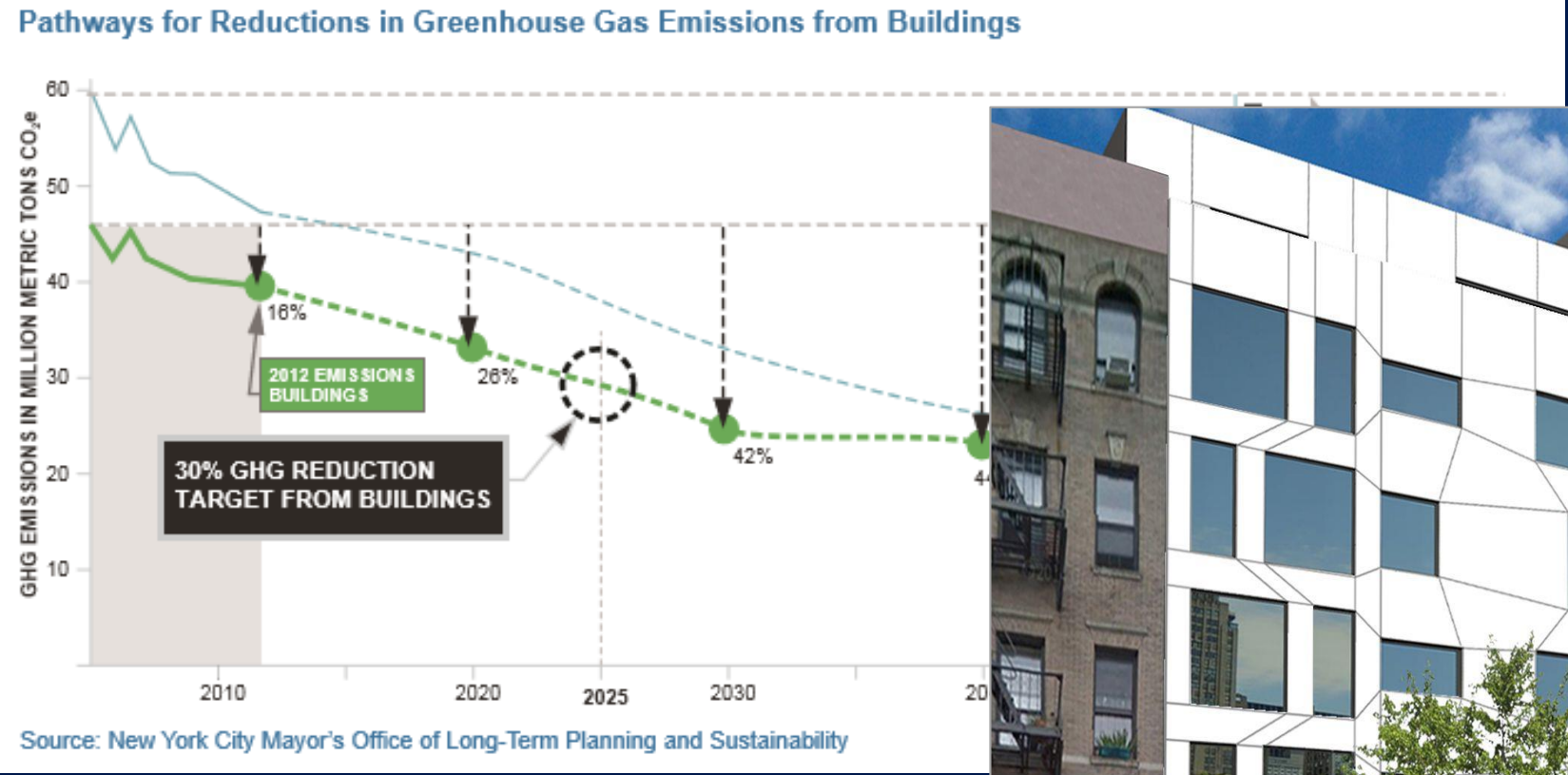
Planning for Passive Resilience

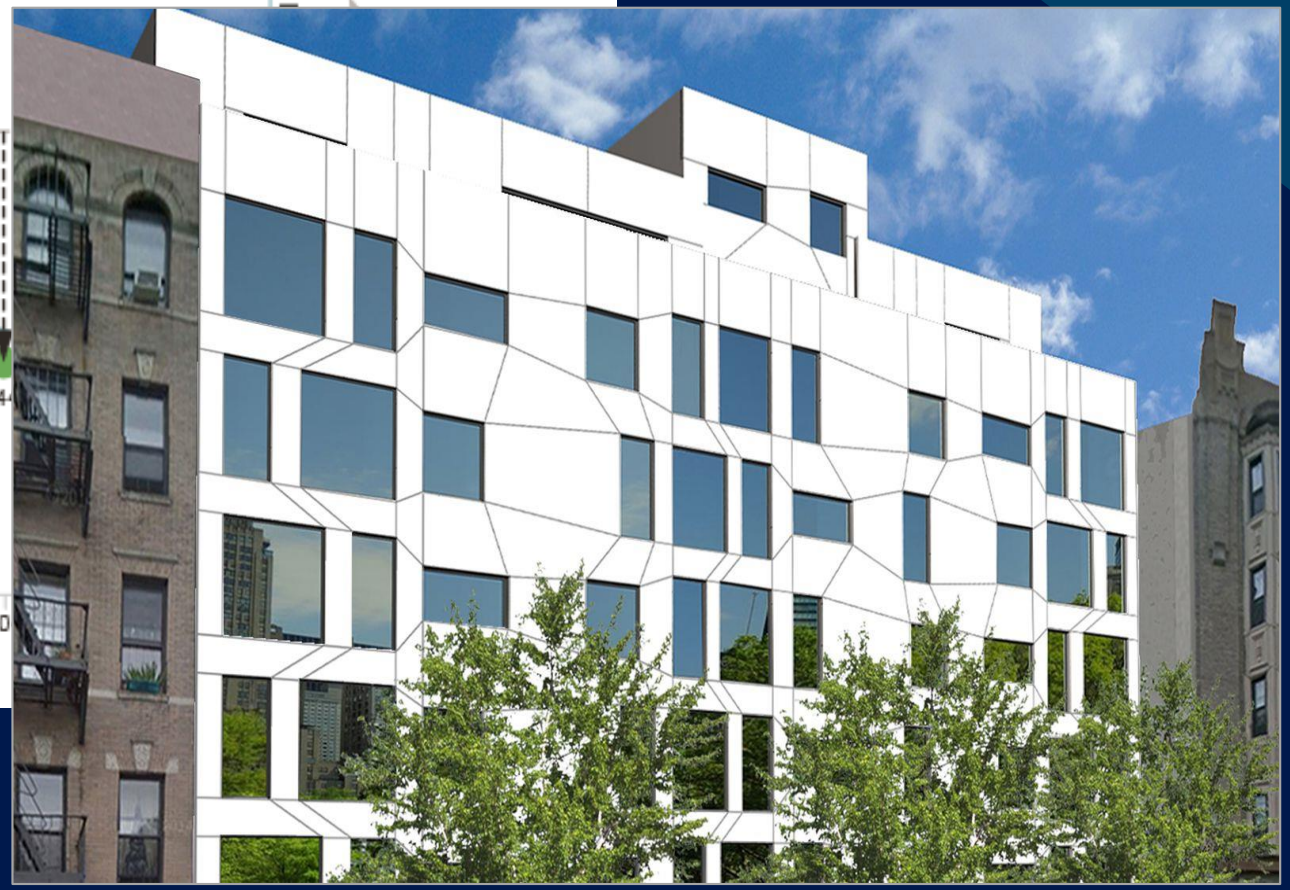




Graphic by Monash University, Mike Kapp

Planning for Passive Resilience





One City Built to LAST

Graphic by NYC Mayor's Office

Design | Plan | Save

Reaching Resiliency In Our Built Environment

Thank You!

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