



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.




Resiliency & Energy Code


Breaking Down Code

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


**BUILDING CODES: DRIVING GROWTH THROUGH INNOVATION, RESILIENCE AND SAFETY**
RESILIENCE IN THE BUILDING CODES

Creating a resilient nation requires diligent planning and innovative thinking. Incorporating new technologies in current building practices to achieve higher resiliency is exciting but can be expensive. Thankfully, effectively utilizing current codes and standards throughout all phases of the building's lifecycle increases the efficacy of new building technologies and offers a cost effective path toward community stability during times of disaster. Resilience starts with strong, regularly updated, and properly implemented building codes.



**PLANNING**
Creating a Sustainable Community


- Provisions in the I-Codes include sustainability measures for the entire construction project and its site making buildings more efficient and less economically and environmentally wasteful.
- Building sustainably has effects that go beyond the walls and into the community — for example, car charging stations make it easier to own eco-friendly vehicles and smart grid demand response systems lower energy prices for the consumer and increase grid stability for the surrounding area.

**RESPONSE**
Ensuring Mental & Physical Health and Wellbeing

- Provisions in the I-Codes address mental and physical health and well-being from dealing with sanitation and pest control to designing buildings that respond to the latest science on mood and mental health.

**RECOVERY**
Efficient Disaster Mitigation & Recovery

- Provisions in the I-Codes address disaster preparedness and recovery — from how and where to build in flood plains to constructing buildings that can better withstand natural and manmade disasters.
- Codes are cost-effective, too. A study for FEMA done by the National Institute of Building Sciences' Multihazard Mitigation Council showed that for every dollar spent on mitigation efforts like adopting current codes, four dollars were saved in post-disaster relief costs.

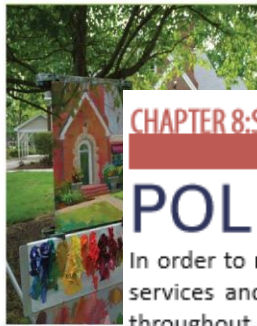
**RESILIENCE**
Improving Building Life Cycles

- Provisions in the I-Codes enable changes to the systems inside the building or even the structure itself at some point after its initial construction and occupation including repair, alteration, change of occupancy, addition to and relocation of existing buildings.
- As communities change, so do the buildings they use. Updated codes allow buildings to adapt, keeping a sense of continuity while also reducing blight from outdated, unused buildings.

www.iccsafe.org

16-12603

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:

THE CARY 2040 COMMUNITY PLAN

THE COMPREHENSIVE PLAN FOR THE TOWN OF CARY

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.

Policy Intent

Generations That Balance High Quality

The intent of this policy is to maintain a balance of high quality services and infrastructure will support development; however, development patterns should help to ensure high quality provision of services. Development patterns should support infill, redevelopment, 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.



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 and report.
- Work with neighborhoods to explore d interests and concerns to Town official
- Amend the LDO to include context-ser
- Expand the framework of what is now examines whether the Project Phoenix development, code enforcement, and
- Expand the funding and scope of the M

SHOP: Create Vibrant Destinations by Managing Future Land Use and Encouraging Redevelopment and Infill Efforts

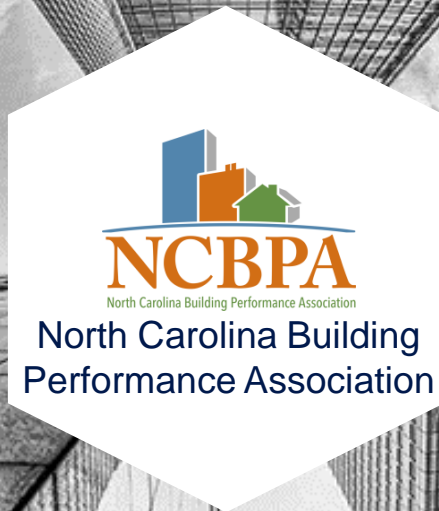
Policy Initiative: Promote and Enable Revitalization of Existing Commercial Centers

- 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.

Case Study Town of Cary, NC

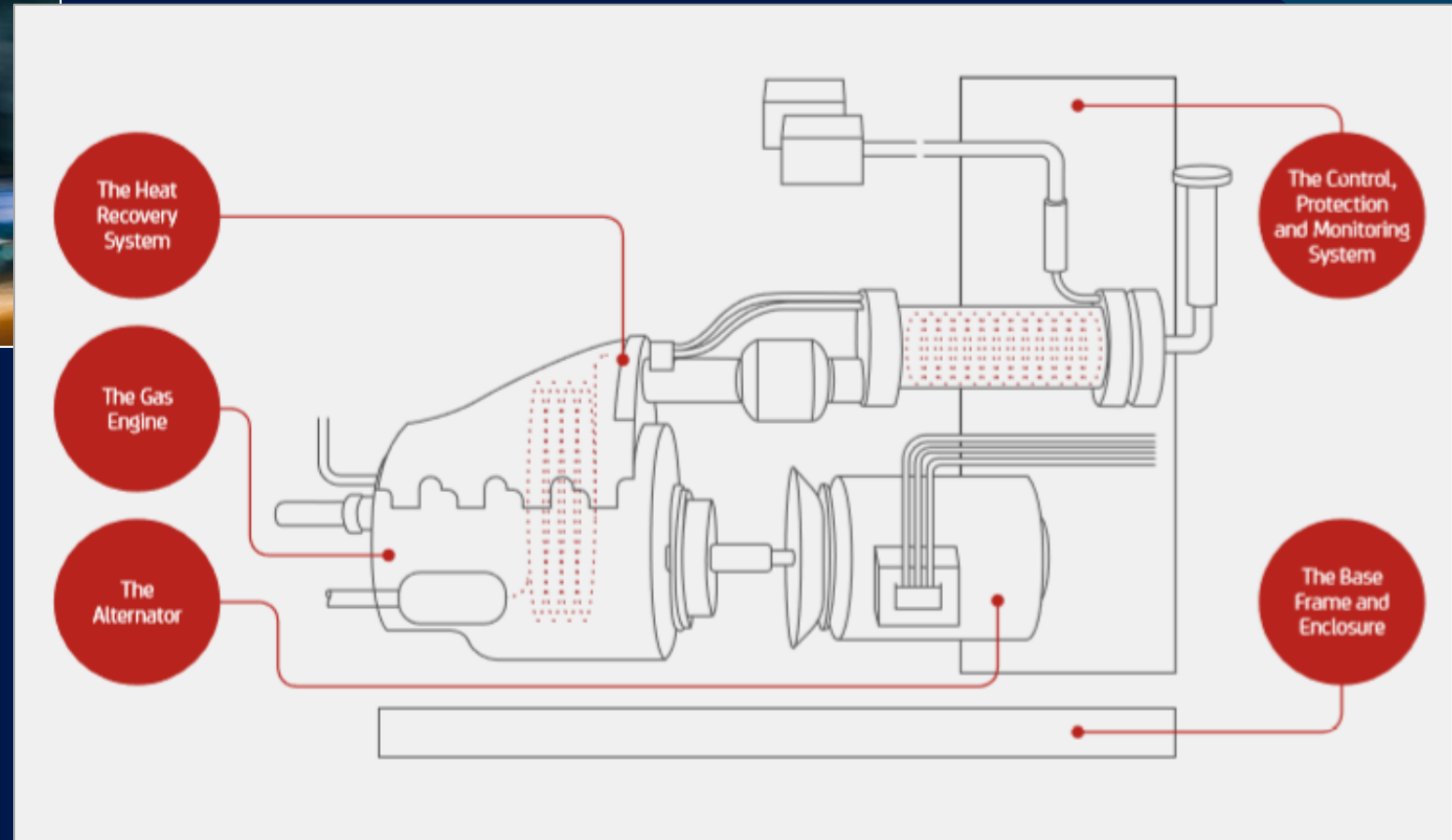
- Planning
- Response
- Recovery
- Resilience

CHAPTER 8:SERVE	
Policy	Policy Intent
<i>Policy 8: Integrate Concepts of Resiliency and Adaptation into Planning Practices</i>	
Support resiliency of all municipal services by identifying potential risks and planning ahead for solutions.	<p>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.</p> <p>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.</p>

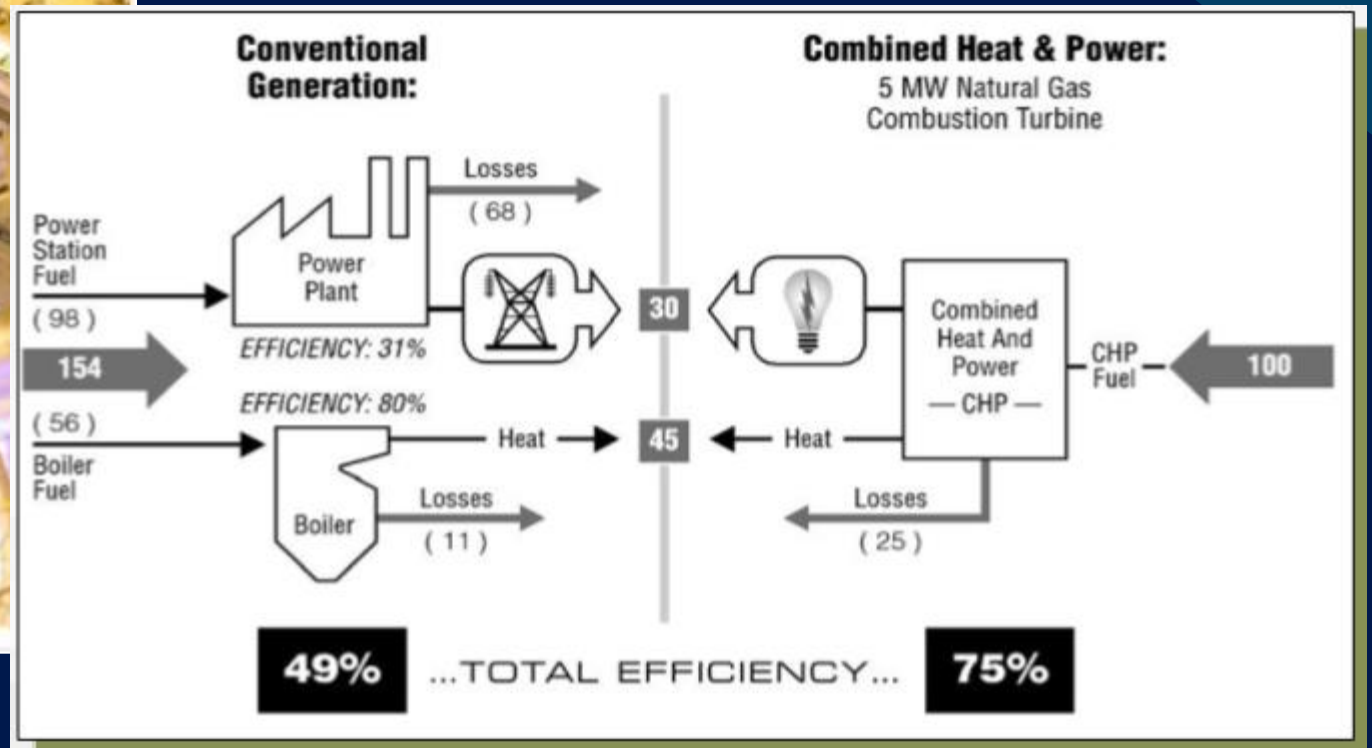
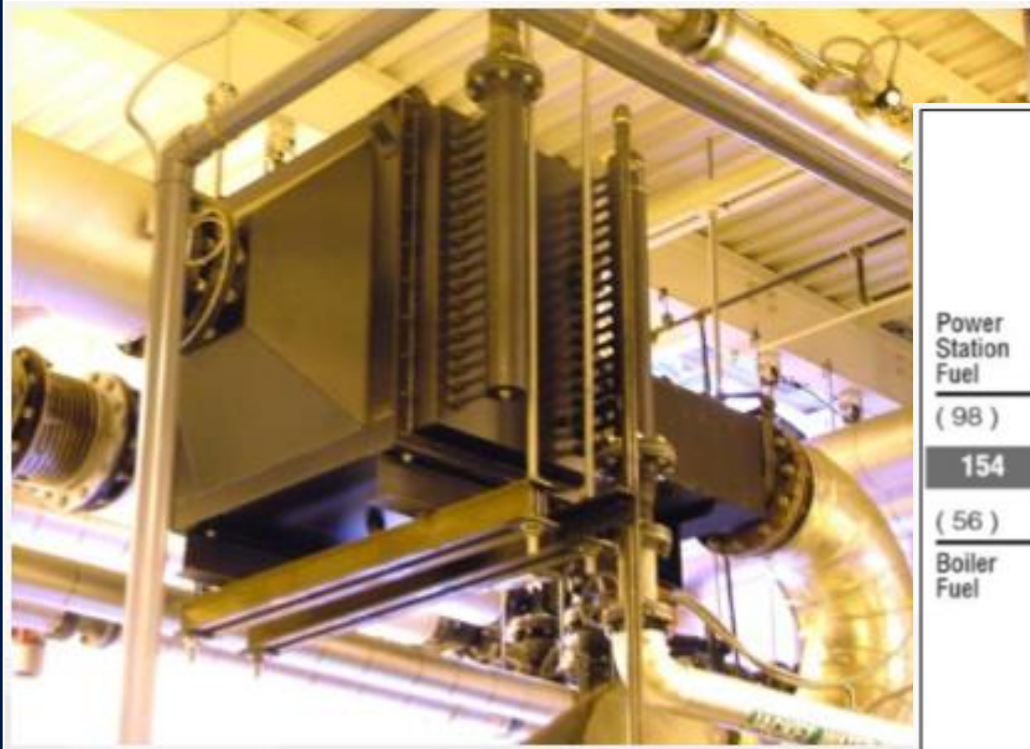


Resilient Design Practices

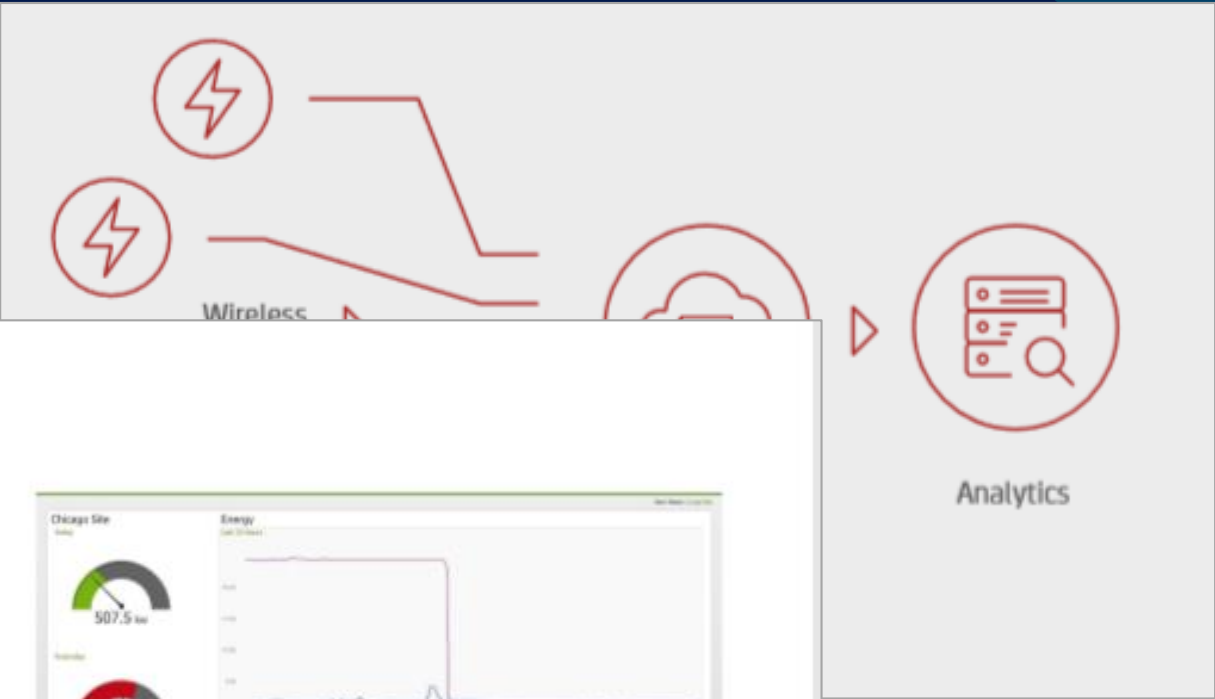
CHP Combined Heat & Power



CHP Combined Heat & Power



Wireless Automation Energy Insights



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



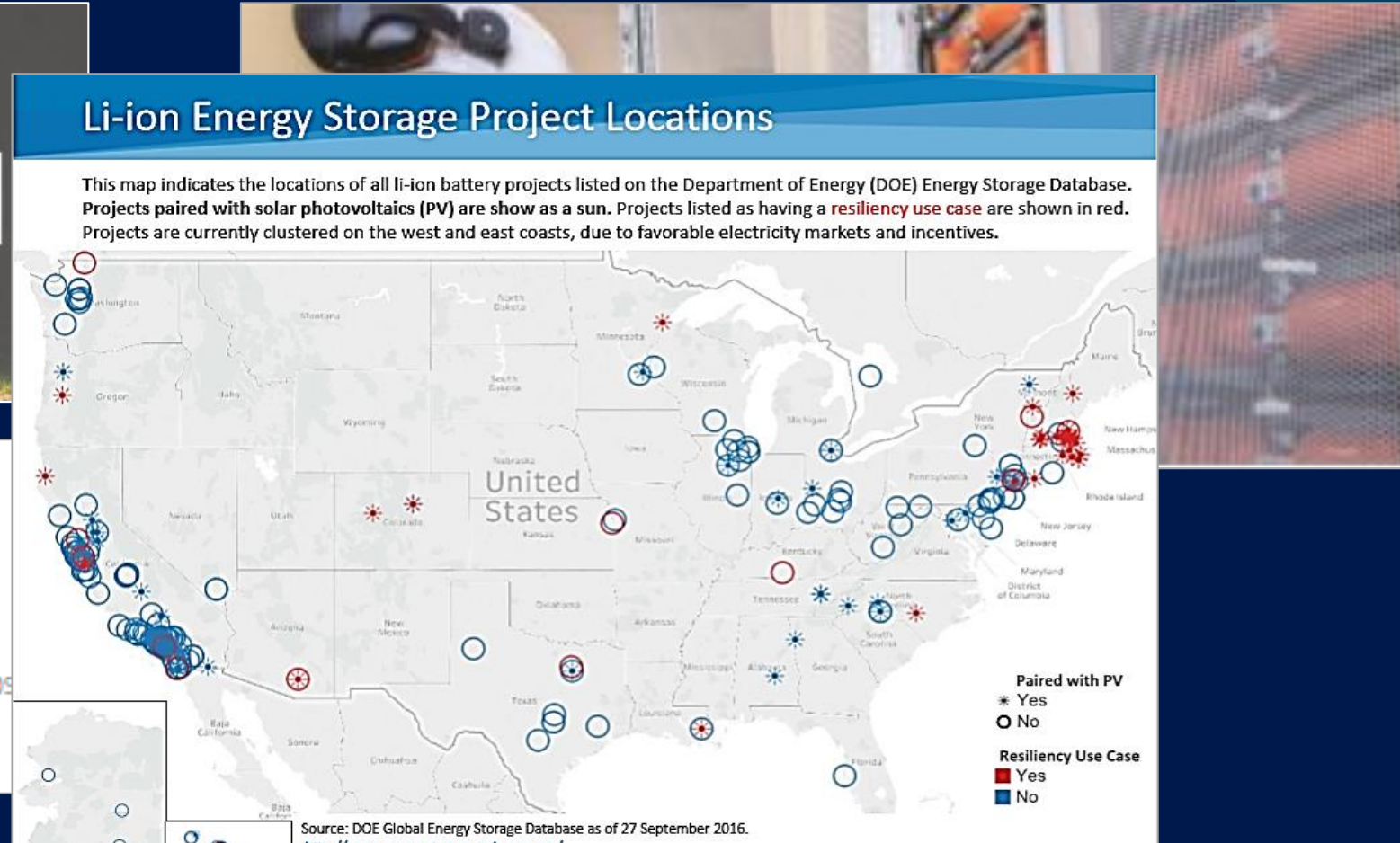
Single point of supply with end-to-end service – just add fuel

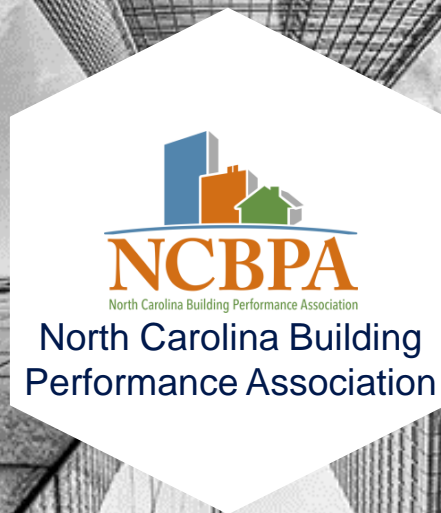
Energy Storage Accessibility Meets Planning



17%

average percentage revenue lost
to power interruptions





Resilient Planning

Planning For Zero



STEP 1
Set Goals

STEP 2
Baseline

STEP 3
Plan Efficiency
Projects

STEP 4
Analyze

LOCATION	MATERIAL AND LABOR FACTOR ^{xiii}	UTILITY ENERGY CHARGE ^{xiv}	UTILITY DEMAND CHARGE	IECC CLIMATE ZONE	SOLAR RESOURCE (KWH/KW ^{yr})	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%



Better
daylight
& views



Improved
indoor
air quality



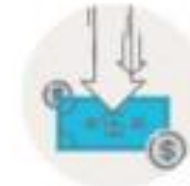
Better
thermal
comfort



Bolstered
employee
recruitment
& retention



Improved
employee
satisfaction &
productivity

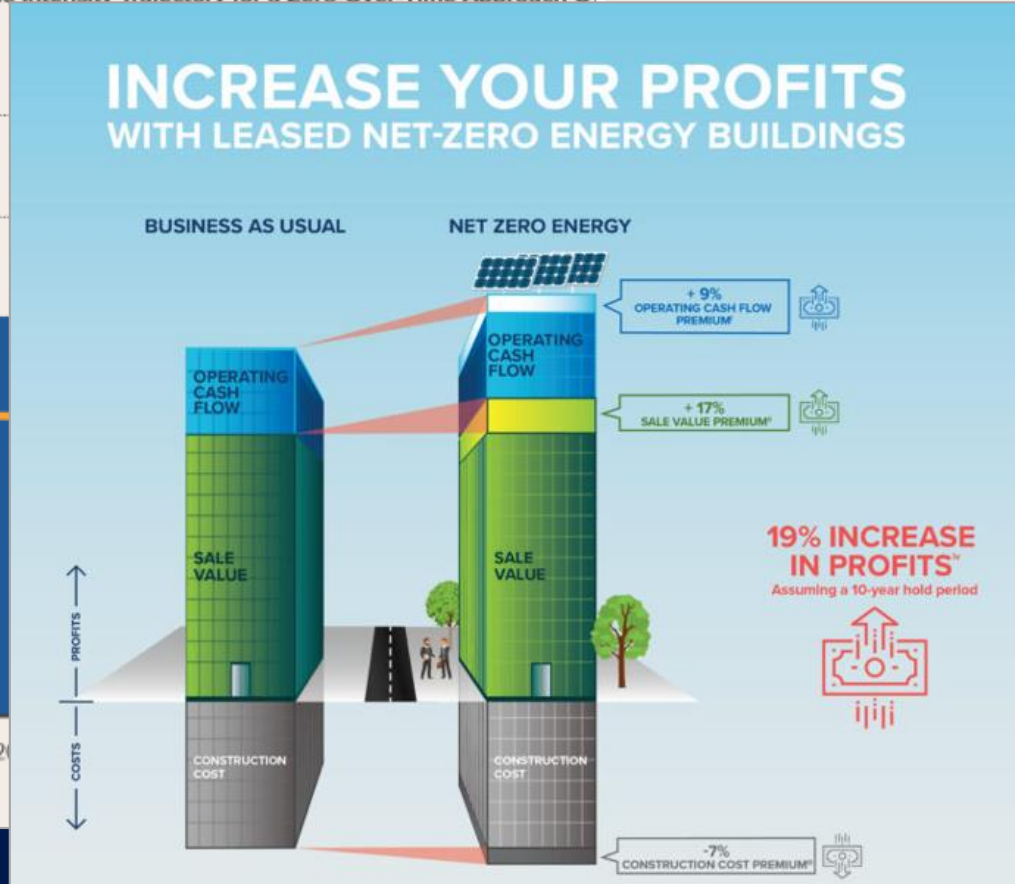
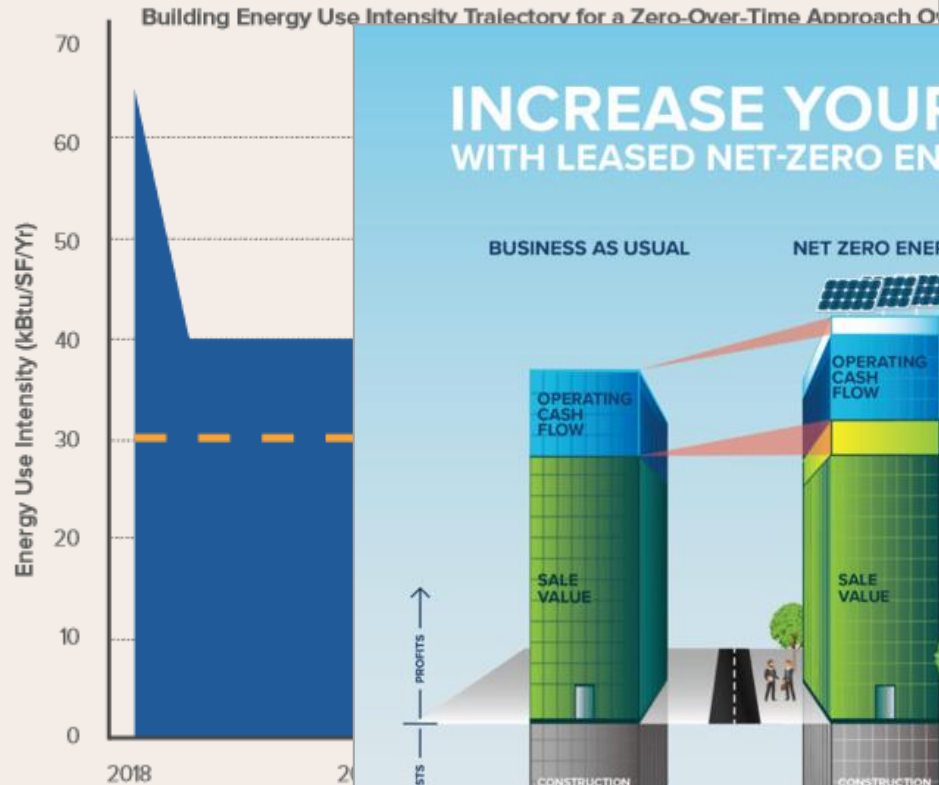


Lower
operating
costs

Planning For Zero

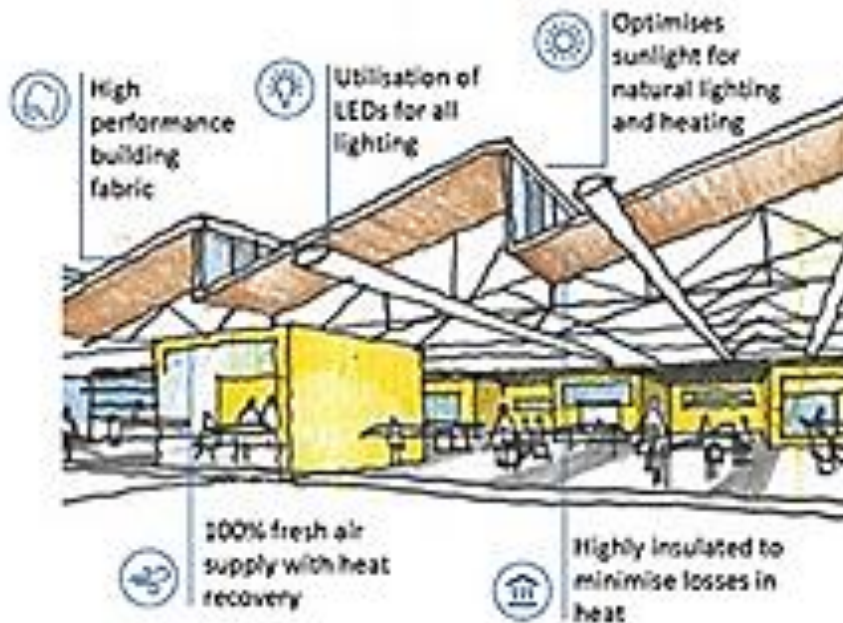
FIGURE 1

ENERGY USE INTENSITY VS. SOLAR CAPACITY OVER TIME

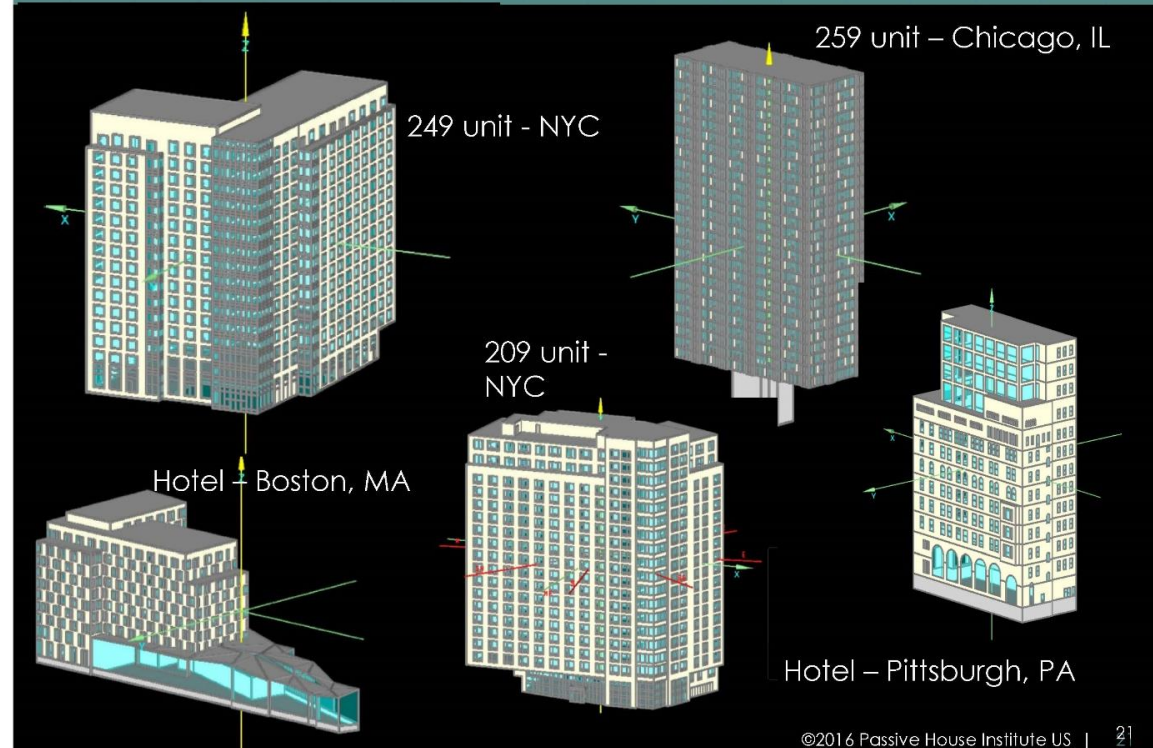


TIMING	ACTIONS TO CONSIDER
HVAC replacement	<p>Replace HVAC equipment with higher-efficiency equipment or new HVAC technology at end of life. Always right-size mechanical equipment to the actual loads (not just like-for-like sizing), and wherever possible downsize equipment if load-reducing ECMs were performed. Consider fuel switching equipment from gas to electric.</p> <p>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.</p> <p>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.</p> <p>Install continuous insulation on exterior walls.</p> <p>Consider swapping out diesel generator for batteries and/or a microgrid as technology improves and becomes more affordable.</p> <p>Consider opportunity for fuel switching to electric. For more information, review RMI's report on The Economics of Electrifying Buildings.</p>

Planning for Passive Resilience



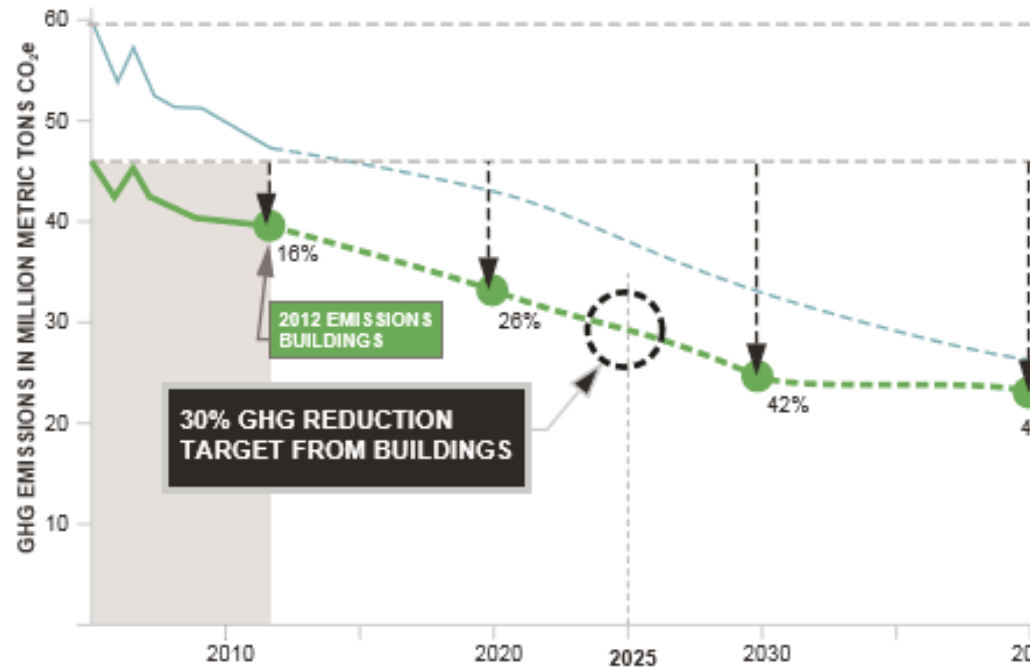
HI RISE BUILDINGS ON THE HORIZON



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Planning for Passive Resilience


Pathways for Reductions in Greenhouse Gas Emissions from Buildings



Source: New York City Mayor's Office of Long-Term Planning and Sustainability



One City Built to **LAST**

An aerial night view of a city skyline. A prominent skyscraper with a grid-like facade and a red-tipped antenna stands on the left. The rest of the city is a dense network of lights, with a few other notable buildings like a pointed skyscraper in the center. The sky is a pale, hazy blue.

Design | Plan | Save Reaching Resiliency In Our Built Environment



North Carolina Building
Performance Association

Thank You!



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