



# Sustainable Building

Supporting sustainable development for the future of Chatham County



A Chatham County Climate Change Advisory Committee Presentation



Why is sustainable building important to Chatham County?

Why are resilient and healthy communities by design important?

How does it relate to climate change and disaster recovery?



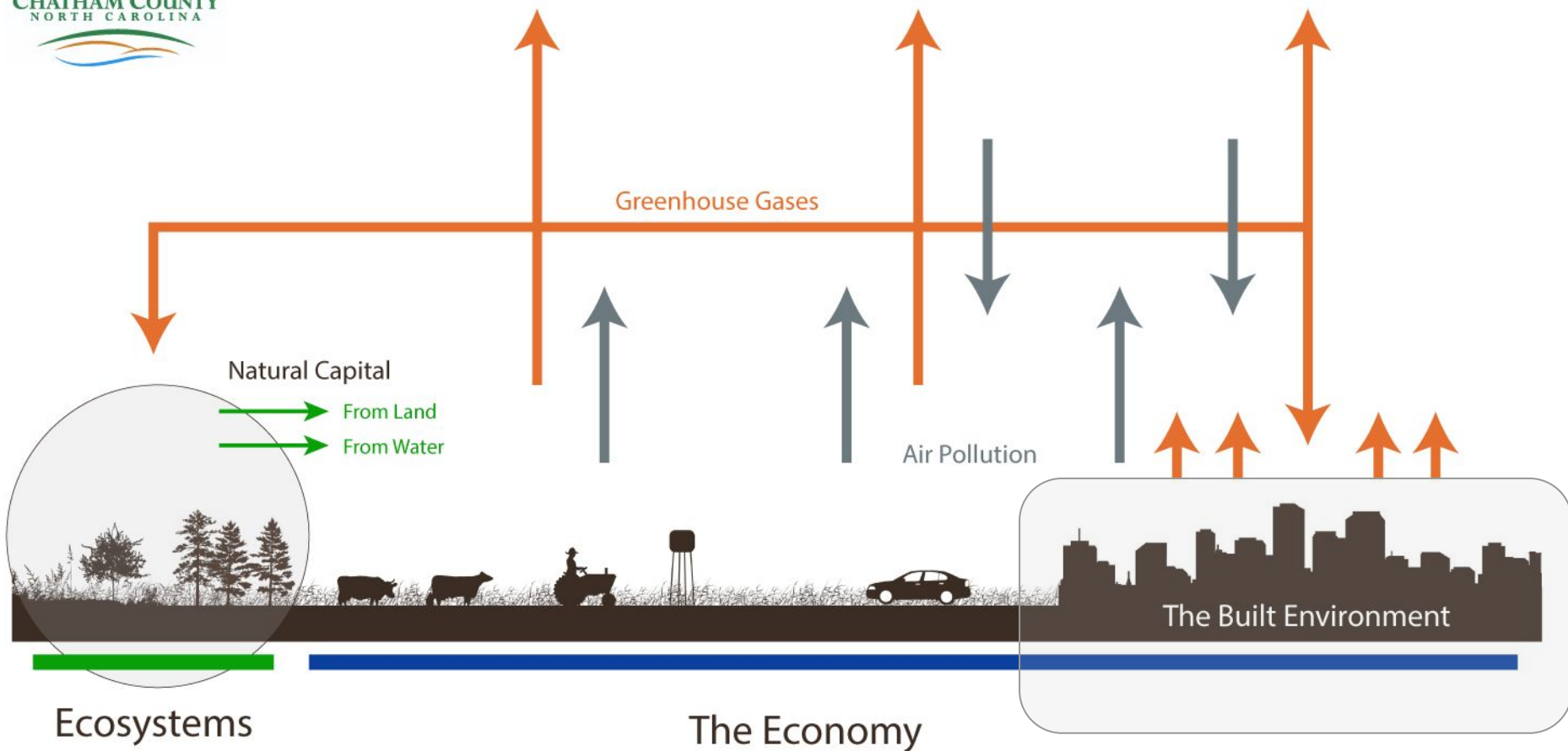
buildings consume **48%** of U.S. energy

EIA 2012



A cyclist wearing a blue helmet with 'SPECIALIZED' written on it, a teal zip-up jacket, and a black face mask with a 'GIP' logo. The cyclist is looking down and to the left. The background is a blurred stone wall.

and contribute **45%** of U.S. GHG emissions





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# What We'll Share

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- I Definitions and a Short History
- II Examples - The Good, the Bad and the Ugly
- III Sustainable Building Certifications
- IV LEED: How much does it cost, really?
- IV Recommendations



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## Definitions

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**Sustainable Building** refers to both a structure and the using of processes that are environmentally responsible and resource-efficient throughout a building's life-cycle, to include:

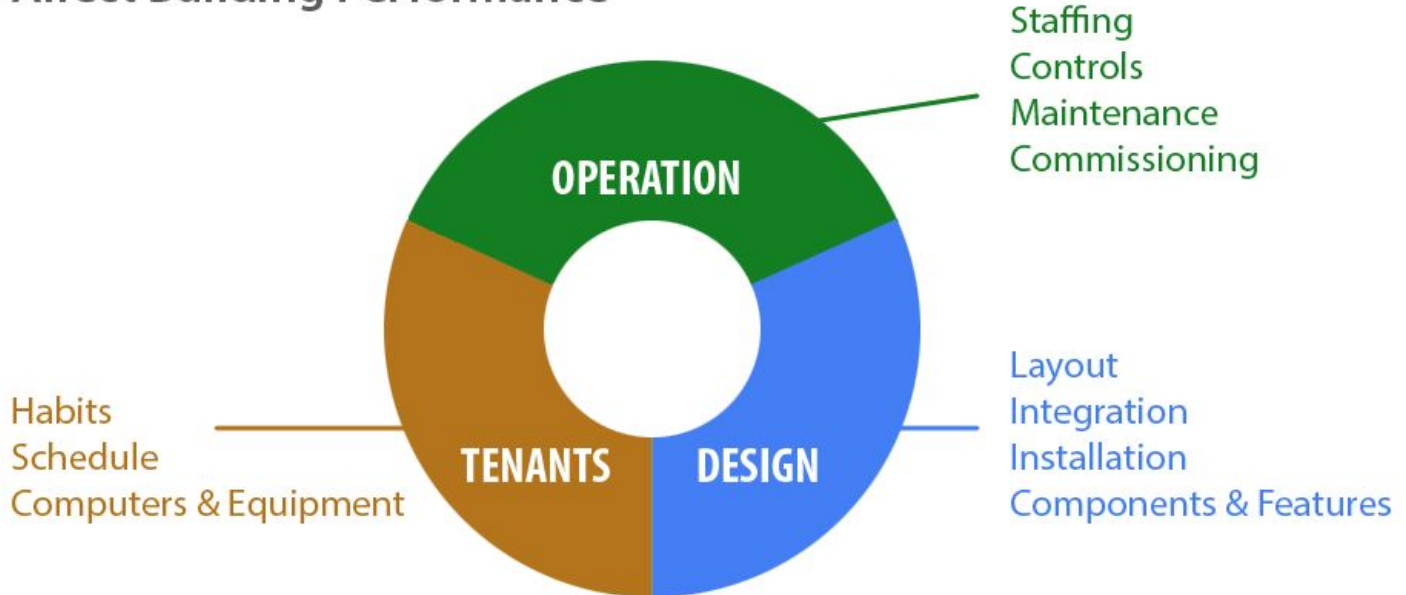
- Siting
- Design
- Construction
- Operation
- Maintenance
- Renovation
- Reuse (vs demolition)

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# Definitions

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## Different Players Affect Building Performance







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# Definitions

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**Community Resilience** is a measure of the sustained ability of a **community** to utilize available resources to

- respond to,
- withstand, and
- recover from adverse situations



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# History

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2012 North Carolina Energy Conservation Code

ASHRAE 90.1 - 2007

LEED (Leadership in Energy Environmental Design)

Energy Star

Incentives & rebates



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## History

# Federal Requirements

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- GSA (General Services Administration) requires all new federal buildings to:
  - Designed to LEED Gold standards
  - Meet Energy Star standards
- GSA will design net-zero buildings - zero grid dependence



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## History

# NC Green Building Incentives

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Local governments can:

- Provide reductions/rebates for building permit fees
- Meet LEED, the Green Globes program, or another recognized certification program
- Provide density bonuses, or other incentives to developers or builders (SB 1597 of 2008)



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## History

# NC Energy Standards for Public Buildings

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Public building projects:

- Required to be **designed, constructed and certified** to exceed the energy efficiency requirements of ASHRAE 90.1-2004 of 30% for new buildings, and 20% for major renovations.
- Consume 20% less potable water.
- Consume 50% less outdoor water.



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## History

# LEED Adoption in NC

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Some participating NC jurisdictions:

- City of Asheville
- City of Charlotte
- Durham County
- Town of Chapel Hill - Includes Commissioning
- Catawba County
- Chatham County... voted LEED out in 2011



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## History

# Rebates - Incentives in NC

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- City of New Bern (heat pump, water heaters)
- City of Asheville (rebates building permits)
- Four county EMC (appliances, water heaters)
- Duke Energy Progress (commercial rebates)
- Duke Energy Progress (residential new rebates)
- TVA (commercial rebates)
- Carteret Craven Electric Cooperative (HP, WH)



## Examples: The Good, the Bad and the Ugly

### The Good

#### RAFI-USA

Rural Advancement Foundation International

- Headquartered in Pittsboro
- Integrative Design Process
- Operations and Maintenance
- Healthy Environment
- Early stakeholders Charrette to set goals
- 2002 - 1st **Energy Star** office building in NC







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## Examples: The Good, the Bad and the Ugly

### A bit of each...

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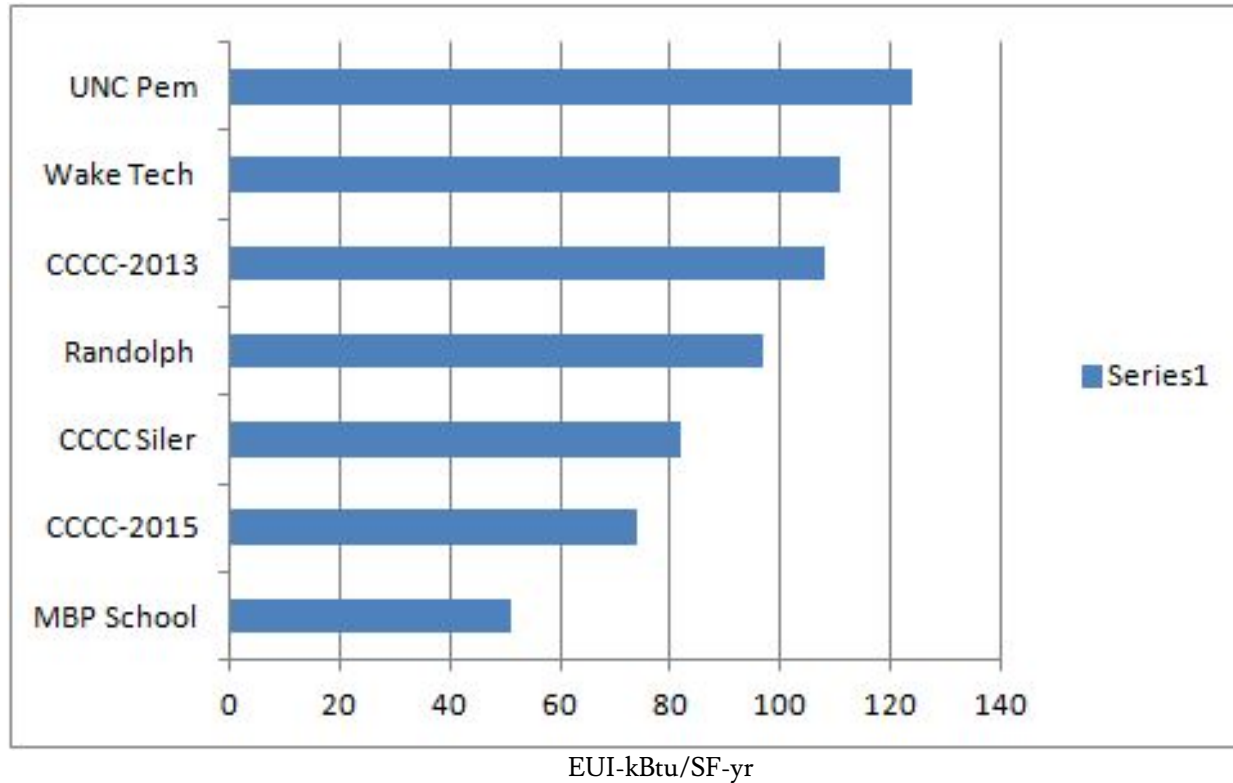
South view, County Library, Pittsboro

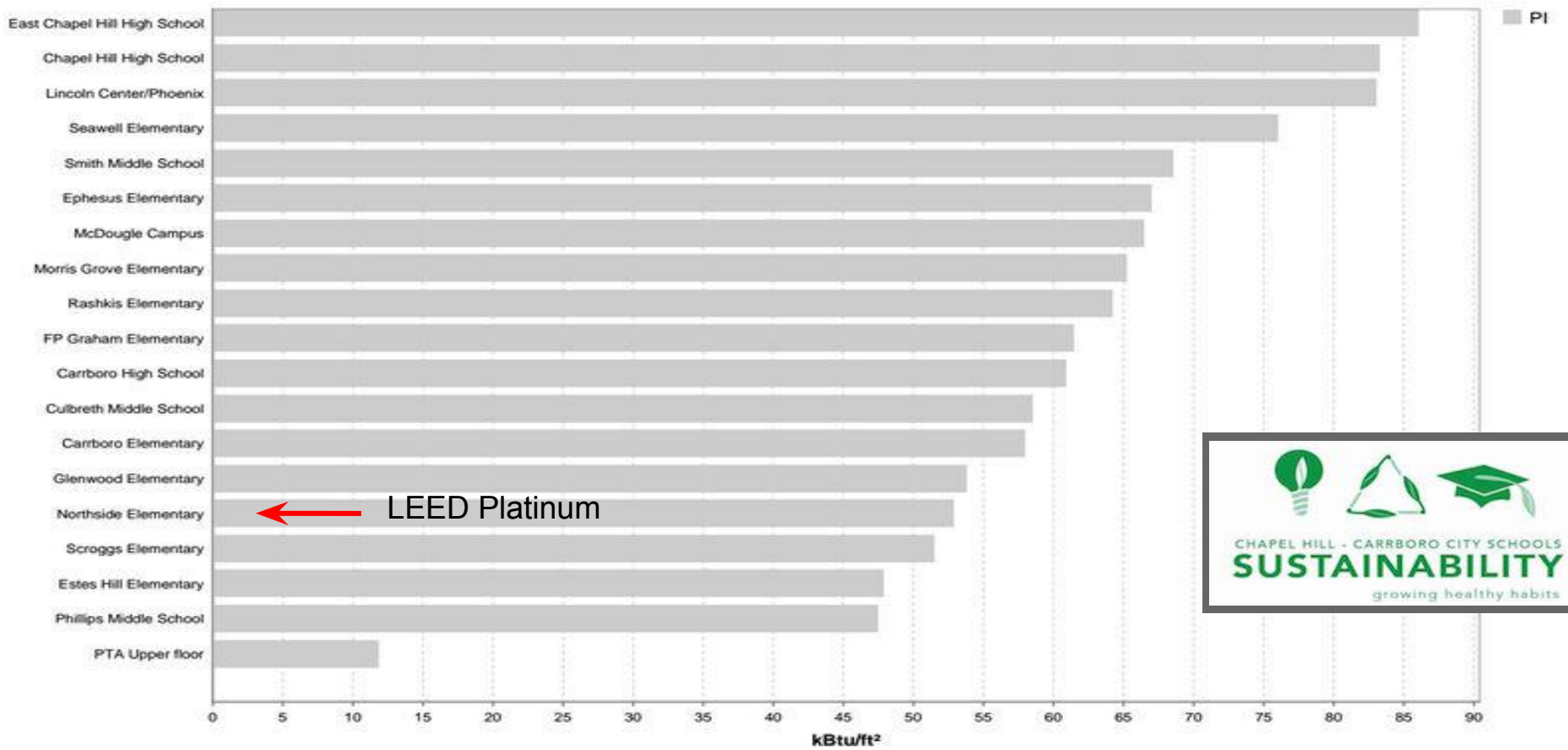


- Good: use of site with CCCC
- Bad: Performance
- Ugly: Indoor air quality (smell)
- Good: orientation E-W axis
- Bad: North facing clerestories (too much glass = heat loss)
- Ugly: lack of ongoing operations & maintenance



## Actual energy use comparison

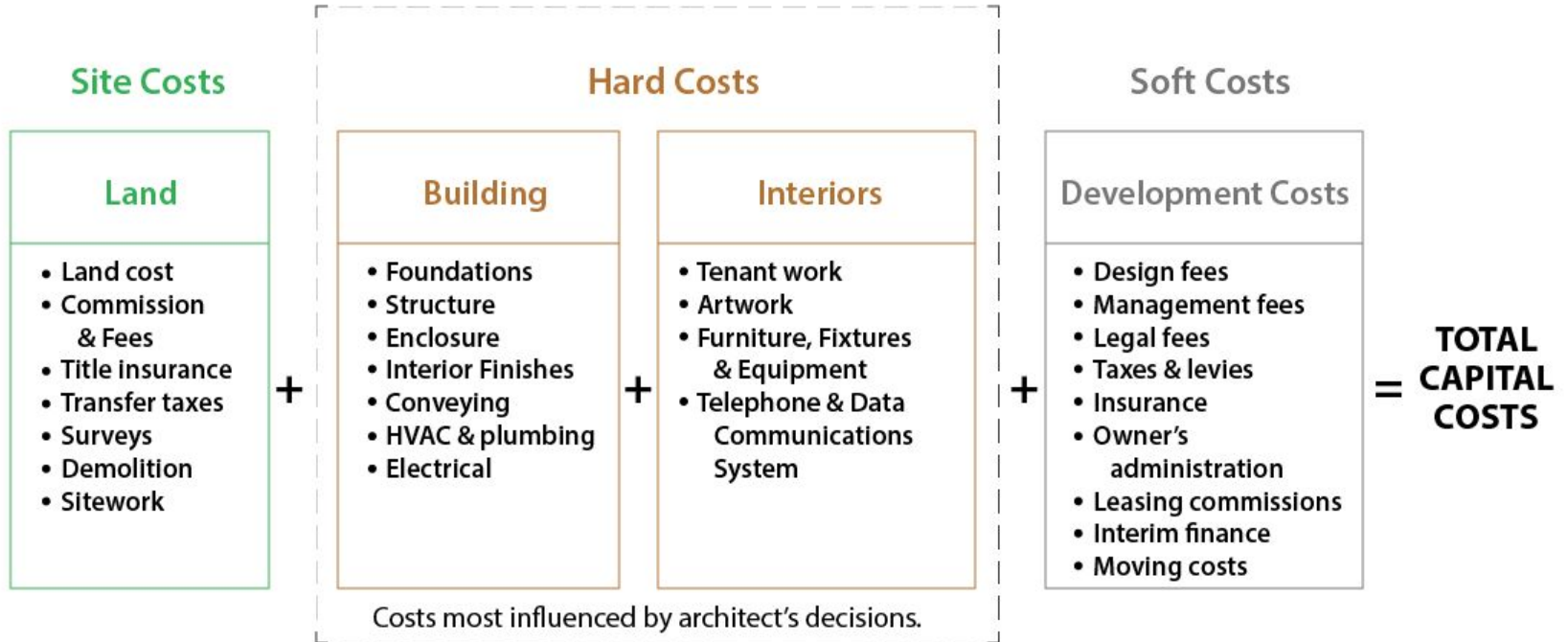






## Examples: The Good, the Bad and the Ugly

# Bottom Line: How We Invest Impacts Sustainability



# Sustainable Building Certifications

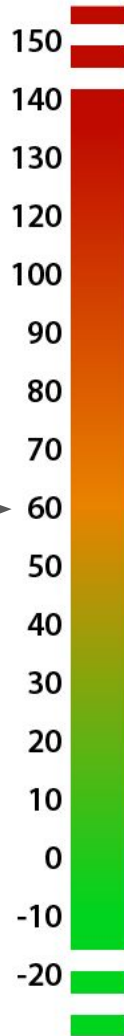




Chatham Park is proposing 30% better homes --- not good enough!



Lower  
Is  
Better



Scale extends indefinitely for really inefficient and poorly managed buildings

← Average consumption adjusted for neutral variables

← Minimum code compliance

← CEC adopted "reach" standard

← Ultimate goal of zero net energy

Scale may extend below zero for net-energy producers

## Certifications Encourage Sustainable Building Practices



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## Sustainable Building Certifications

# Energy Star

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Based on 12 months of actual use of energy, water and waste:

- Free
- Recognized
- Plaque of excellence!



ENERGY STAR®  
PortfolioManager®





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## Building Certifications

# Living Building Challenge

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- Net zero buildings - most rigorous certification
- Based on actual energy use
- Difficult to achieve
- Material selection challenging



**LIVING  
BUILDING  
CHALLENGE**<sup>SM</sup>





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## Building Certifications

# LEED (Leadership in Energy & Environmental Design)

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- Multiple levels -
  - Certified Silver, Gold, Platinum
- Integrative design approach
- Third party certification
- Rigorous documentation through design and construction
- Recognized benchmarks and sharing of actual energy and water use





## Building Certifications

# LEED (Leadership in Energy & Environmental Design)

Green Schools within a generation





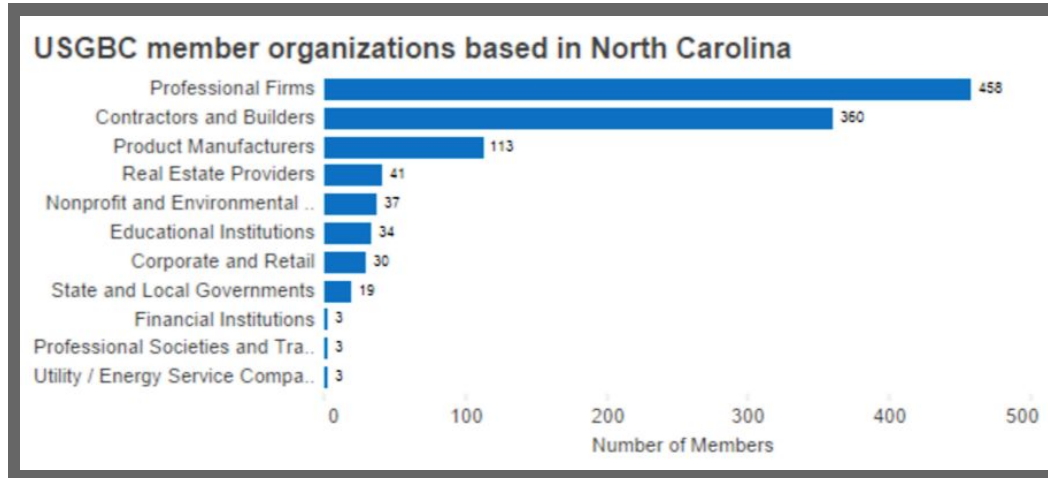
## Building Certifications

# LEED (Leadership in Energy & Environmental Design)

In North Carolina:

458 Professional Firms

360 Contractors and Builders

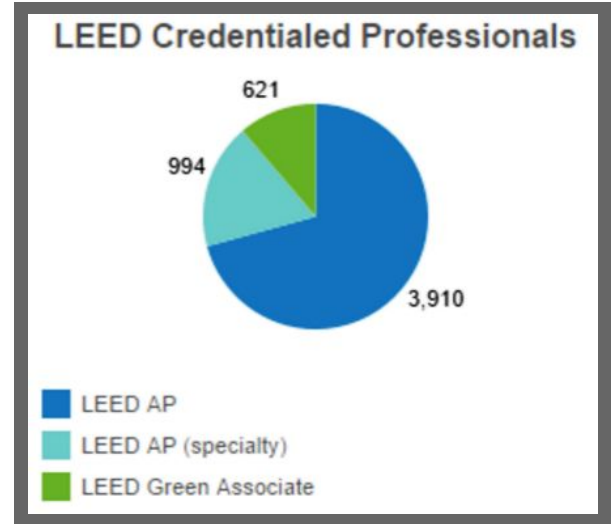




## Building Certifications

# LEED (Leadership in Energy & Environmental Design)

In North Carolina:  
Almost 4,000 Credentialed  
Professionals!



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## LEED: How much does it cost, really?

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- One pot of money
- One building project
- Two approaches to deployment:
  - LEED & Pseudo LEED



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## LEED: How much does it cost, really?

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### Description:

20,000 SF building with offices and conference rooms to include full service kitchen, bathrooms.  
Budget: \$4,000,000

### The Challenge:

Design and construct a sustainable facility that will be LEED certified within the constraints of the site selected, budget and programmatic requirements.



# LEED: How much does it cost, really?



## LEED Approach

1. The fees  
3-5¢ / SF

\$4,000  
\$3,996,000



## Pseudo LEED Approach

1. The fees  
None - no certification

\$0  
\$4,000,000



# LEED: How much does it cost, really?



## LEED Approach

2. Documentation Time & Effort  
Compiling the LEED documentation and managing compliance process.

\$20,000  
\$3,976,000



## Pseudo LEED Approach

2. Documentation Time & Effort  
No documentation or measures for compliance with any sustainable design standards.

\$0  
\$4,000,000





# LEED: How much does it cost, really?



## LEED Approach

3. Extra Research & Design  
Investigate alternative products.  
Costs could be zero if the professionals have experience.

\$0

\$3,976,000



## Pseudo LEED Approach

3. Extra Research & Design  
Sustainable alternatives not likely used,  
consultants likely lack knowledge.

\$0

\$4,000,000



# LEED: How much does it cost, really?



## LEED Approach

4. Commissioning & Modeling  
Modeling affords an owner projected measures on building sustainability. Simulations on various scenarios.

\$20,000  
\$3,956,000



## Pseudo LEED Approach

4. Commissioning & Modeling  
This is not required. Consultants do not likely have knowledge to prepare scenarios. A “wing-it” approach provides no assurances.

\$0  
\$4,000,000



# LEED: How much does it cost, really?



## LEED Approach

- 5. Construction  
May not be additional cost when integrative design approach is used.

        \$0  
\$3,956,000



## Pseudo LEED Approach

- 5. Construction  
No third-party certification costs.

        \$0  
\$4,000,000



## LEED: How much does it cost, really?



### LEED Approach

6. Completed Facility!  
We're out of money.

3,956,000  

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\$0.00



### Pseudo LEED Approach

6. Completed Facility!  
We're out of money.  
But...

4,000,000  

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\$0.00



# LEED: How much does it cost, really?



## LEED Approach

Collaboration among stakeholders

Energy Modeling

Proactive



## Pseudo LEED Approach

Silos

No energy modeling

Reactive

Added Costs Later





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## LEED: The Bottom Line

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- Challenges in existing “LEED” buildings
- Ongoing Assessment: energy, water, waste, resources
- Facilities Management → Knowledge → Sustainability
- Healthier environments
- Happier tenants/users/community



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# Recommendations

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1.

Implement specific reduction targets regarding:

- **energy use**
- **water use**
- **transportation**
- **waste**

for the county buildings included in the proposed 2016-2017 budget as well as in the future.

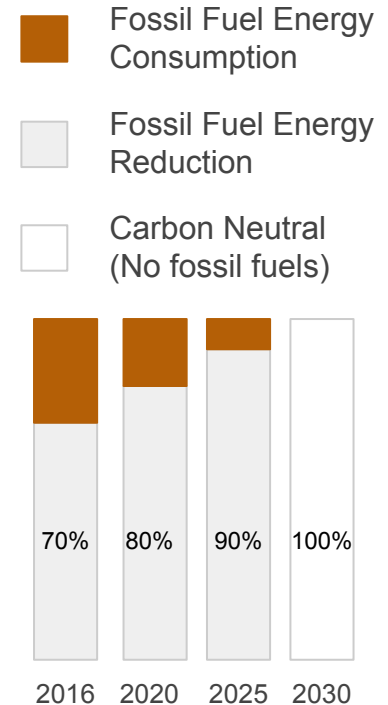


# Recommendations

2.

Adopt and implement a 70% reduction of energy use that is below the regional 2003-2004 fiscal year average, as follows:

- 80% by 2020
- 90% by 2025
- Carbon-neutral or better by 2030 (using no fossil fuel GHG emitting energy to operate or construct)







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## Recommendations

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3.

Adopt for all County buildings and schools the **life-cycle cost analysis standards** that were adopted by the NC General Assembly for state, university and community college buildings.

Note: Application of the state law shall commence at the schematic design phase of all existing and future construction or renovation projects, updated or amended as needed at the design development phase, updated or amended again as needed at the construction document phase.



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## Recommendations

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4.

Adopt the use of third party certification Leadership in Energy and Environmental Design (LEED) for all county facilities and schools (proposed language submitted separately)

5.

Benchmark all existing and new facilities and schools with Energy Star Portfolio Manager

6.

Create a position to oversee future projects from RFQ and RFP through building operations and maintenance



Thank You!

Questions?