The "Power" of Energy Efficiency

Presentation to the
NC Legislative Commission on Global Climate Change
Tuesday, December 9, 2008

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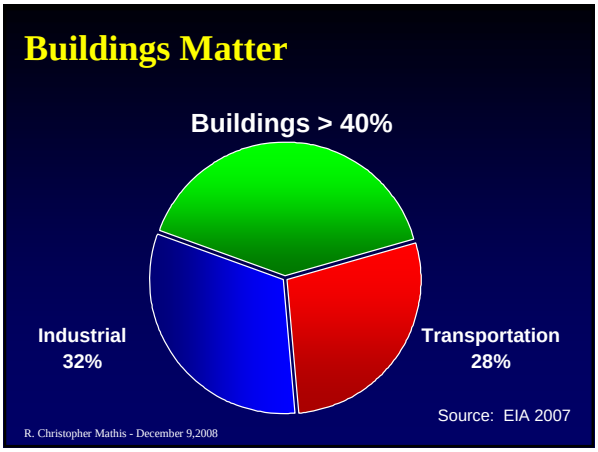
The End in Mind

- Want Cleaner Air? Then Focus on **Buildings**!
  - Proven, Permanent Solutions
  - Economic Stimulus and Job Creation
- Possible Legislative Actions to Consider
  - Improved Building Energy Codes
  - Reward Utilities Differently
  - Incentivize Improving Existing Building Stock

Who Am I?

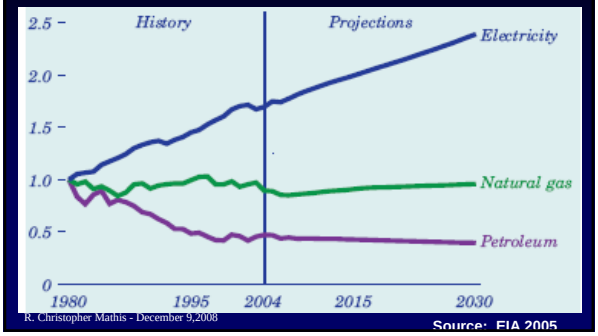
- Building Scientist and Educator
- Standards Writer
- Code Professional
- Efficiency Advocate
- A Beekeeper…
  - Learning from our most experienced building scientists…

Buildings Matter



The Rate of Change…

Commercial Energy Consumption by Fuel – 1980 - 2030



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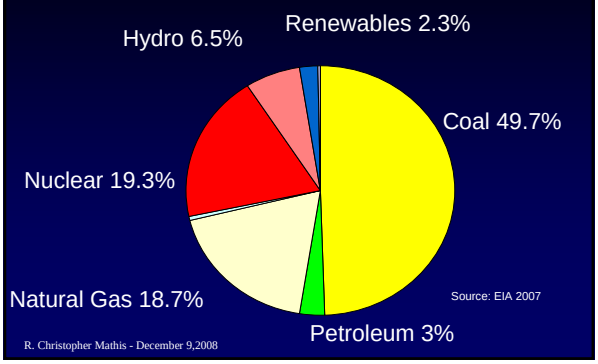
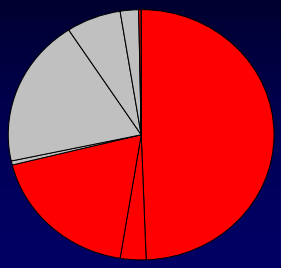
Source: EIA 2005

Electricity Sources



Electricity Generation



Fossil Fuels 71.4%

Coal, natural gas, petroleum

Source: EIA 2007

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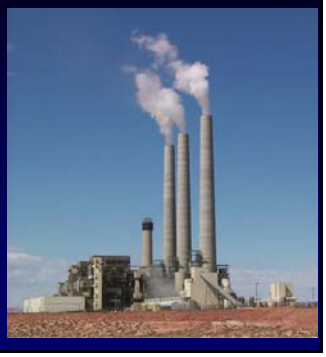
The Energy MEGATREND

- Increasing demand
- Supply challenges
- Peak power concerns
- National security
- Economic security



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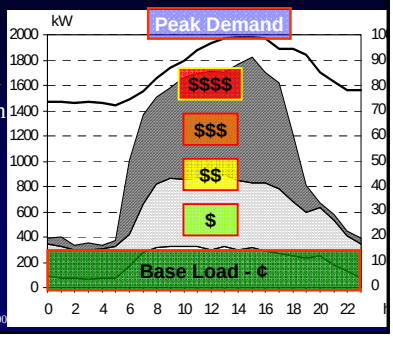
Utility Concerns

- Meeting Our Demand
  - Base Load
  - Peak Demand
  - Cooling Driven
  - Lighting Driven



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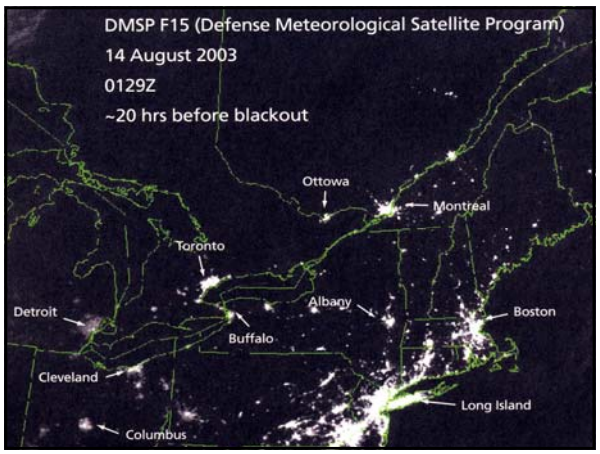
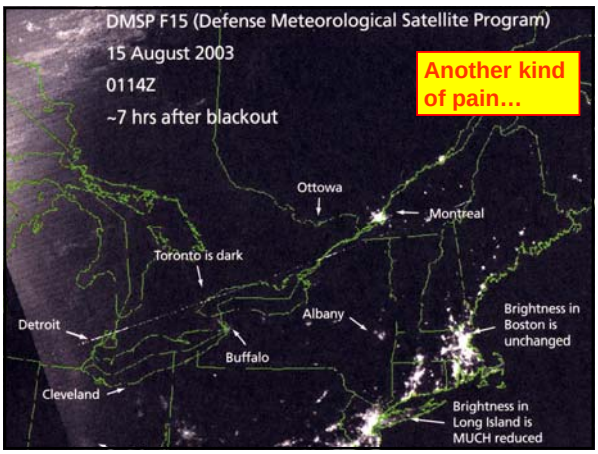
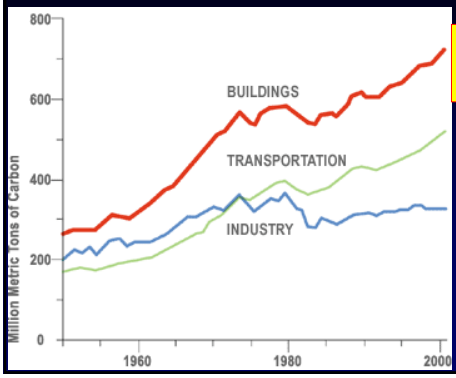




Climate Change? Building Matter!



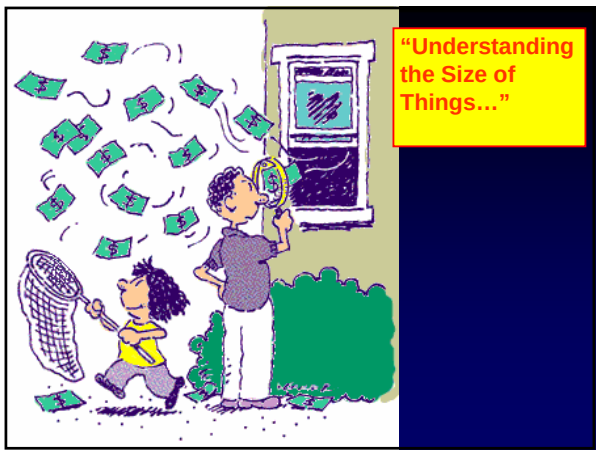
Over HALF of the carbon emissions…

Source: EIA 2007

Buildings Matter!

- Use over 40% of our nation's energy…
- Are responsible for dramatically more atmospheric pollution than cars…
  - Yes, your home pollutes more than your car…
  - Over twice as much!

Source: EPA Energy Star Program - 2007



"Understanding the Size of Things…"

Buildings Matter!

A 30% improvement in US building efficiency would reduce energy bills by $75 billion in 15 years and eliminate the need for 80 new nuclear power plants over the next 20 years.

Source:
DOE Office of Energy Efficiency and Renewable Energy 1997

… and 30% is easy!

What is the Code?

- Least safe…
- Least strong…
- Least energy efficient…

…building allowed by law.

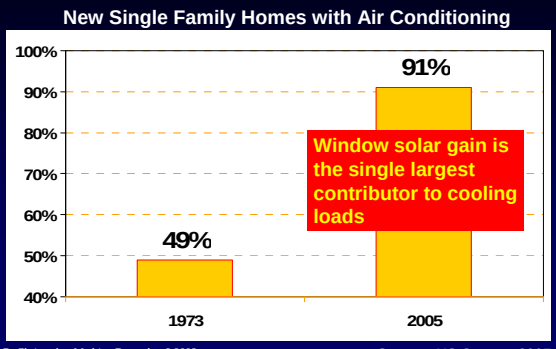
We're not allowed to build it any crappier…

The Size of Things…

- Example #1: US Homes
  - There are over 120 million existing residential buildings
- Over half still have old Single or Double Pane glass!
  - Wouldn't meet today's minimum energy code
- Using "Chris Math" this means that we have about 1 Billion windows in the US that need to be replaced!

Sources:
US Census Data - 2005
US DOE Core Energy Book - 2007

Homes Have Changed



Source: US Census 2005

What's a Ton of AC Worth?

- Saving 1 ton of AC per house
  - 1 ton = 12,000 Btu/hr
  - 13 SEER = 13,000 Btu/kWh
  - Using "Chris Math" – ~1 kW per house
  - ~120 million existing homes
  - About half have lousy windows
  - ~60 million X 1 kW = 60 million kW

What is 60 million kW?

- **Roughly the equivalent of about 300 old coal-fired power plants (200 MW)**

  Or

- **100 new "super" coal plants (at 600 MW each)**

…just by changing the windows…

What if we employed the other proven efficiency lessons we know?

- Insulate
- Air Seal
- Solar Control
- Duct Sealing and Insulation
- Water Heater blankets
- HVAC sizing and efficiency improvements

- Sound familiar?

Essential Message

- We MUST fix our existing buildings
  - 99% of the problem
  - The "Big Gorilla in the Corner"
  - Thousands of little power plants we have already built but we haven't turned on!
  - Known solutions. Proven Solutions.

"The Rest of the Story"

- Where do we get these building materials?
  - Answer: Local companies.
- Who buys them?
  - Answer: Local building product suppliers.
- Who installs them?
  - Answer: Local contractors.

Neighbors. Using US made goods, supporting local businesses, local contractors, fixing the homes of neighbors. Paying taxes each step along the way.

Jobs, Jobs, Jobs!

- THIS is job creation on a huge scale
- THIS is sustainable business, putting people to work!
- THIS is durable energy savings.
- THIS is energy security.

THIS also helps the most people…

NC-Specific Example

- Utility proposed a new nuclear power plant
  - Estimated at $17 billion and 2200 Megawatts
- What if we fixed our NC buildings instead?

Let's work this example together…

Power Plant Example

- $20 billion for 2200 MegaWatts
- $5000 per home in efficiency improvements
- Answer: 4 million homes (essentially every home in NC)
- Peak power savings of 1 to 2 tons of AC per home
- 1 ton of AC is roughly 1 kW of peak power
- 4,000,000 x 1 x 1 = 4,000,000 kW
- 4000 MegaWatts
  - TWICE the power!

The Rest of the Story Again

- The power plant will employ about 500 people
- How many jobs will we create fixing 4 million homes?
  - Installing insulation, air sealing, replacing windows, sealing leaky ducts, etc.
- How much tax revenue will we generate at each step along the path?
- What will people do with the energy savings?

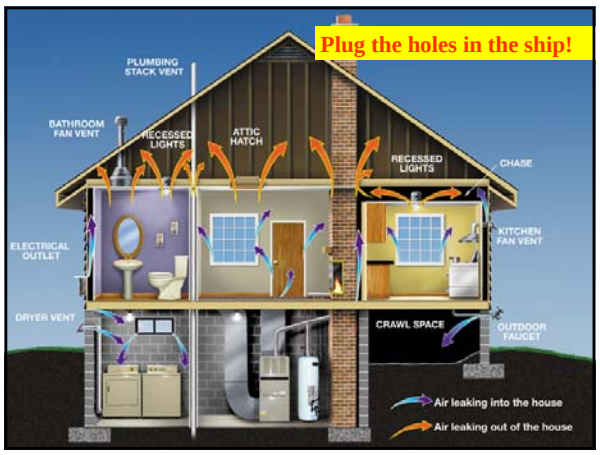
Energy and Water Connection

- It takes about 30 gallons of water to produce 1 kW of electricity
- About 3 gallons (10%) are lost in evaporation
- Do the math on the water requirements of the new power plant

During the most recent water shortages and drought conditions, how many people were told to conserve water by **turning off a light?**

Insulation Fundamentals

- More is better
- Code is the minimum
- Installation is everything!
- We know this stuff!



Important Action Steps - 1

- **Dramatically improve our minimum building codes**
  - For new buildings & existing buildings
  - Get the code better enforced
- **Create programs to encourage improvement of ALL existing NC residential and commercial buildings**
  - Tax policy, utility policy, budget priorities, etc.

Get Our Own "House" In Order

- **Immediately move to significantly improve the energy efficiency in all State-owned buildings**
  - **Offices, schools, housing, etc.**

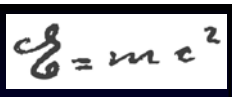
Important Action Steps - 2

- **Reward our utilities differently!**
  - Require a dramatically greater investment in Energy Efficiency
  - Create an equal (or greater) ROI for investments in energy conservation versus power generation
  - Require proof of delivered energy and power savings with all proposed programs
  - Require all utility programs to prioritize building efficiency improvements FIRST!

Selling these ideas?

- **Improved building energy efficiency:**
  - "Creates jobs"
  - "Helps the poor"
  - "Protects local businesses"
  - "Stimulates growth"
  - "Cleans the air"
  - "Conserves water"
  - "Provides a hedge against energy inflation"
  - "Promote our own energy security"
  - "Helps mitigate climate change"

Contact Information



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