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Building Science

Don't Do Stupid Things - A Green Rant

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R2




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R2




R4




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R2



R4




R6




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R2




R4



R6




R8




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R2




R4




R6



R8

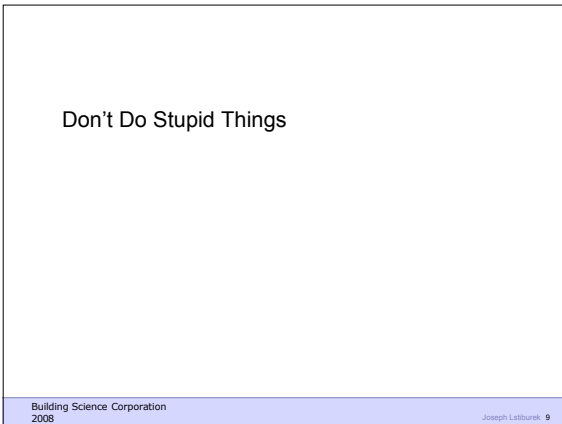
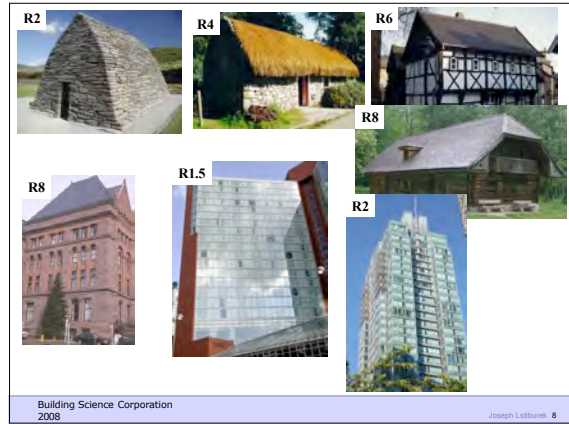
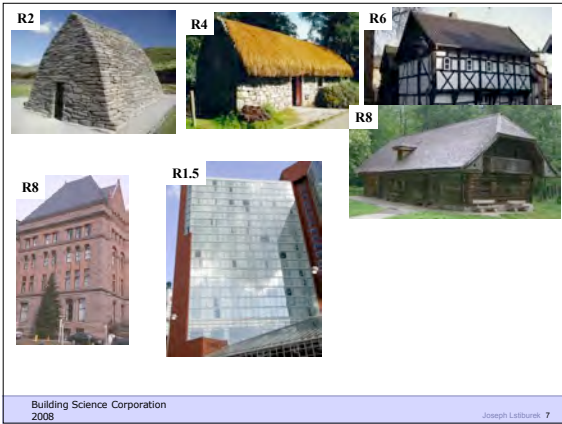


R8



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Chronicle / Kurt Rogers

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Chronicle / Kurt Rogers

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Double Facade

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aka "Facadists"

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Note the difference - "viva la difference"

Single façade with exterior shade - good

Double façade - bad

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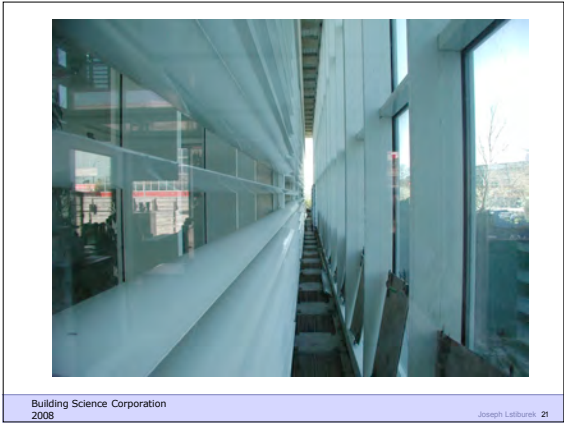
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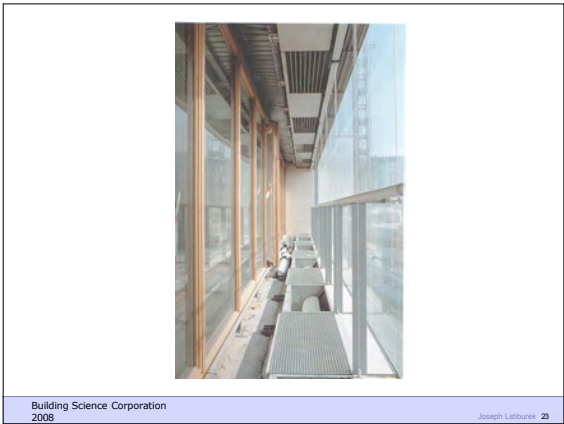
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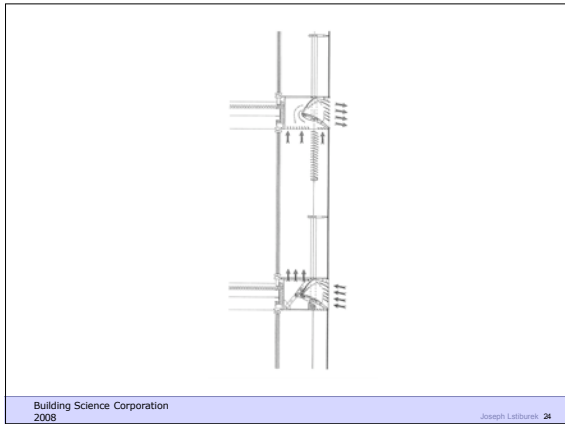
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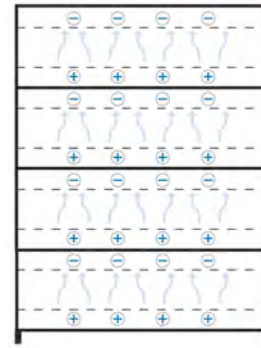
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UFA...aka "Underfloor Air Plenums" - or other dumb things I did before I became an adult....

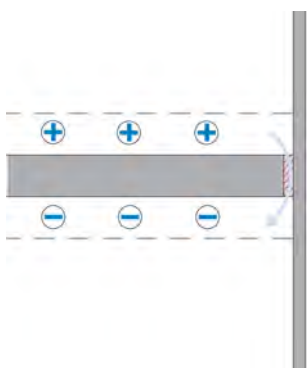
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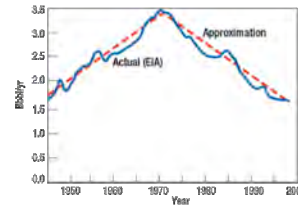
Energy Security Climate Change

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Hubbert's Peak

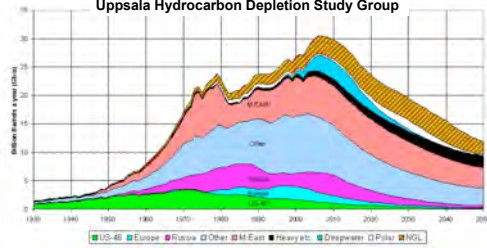
- Shape of oil production in the US lower 48
- Predicting the peak made Hubbert famous



Ref: Hirsch 2005

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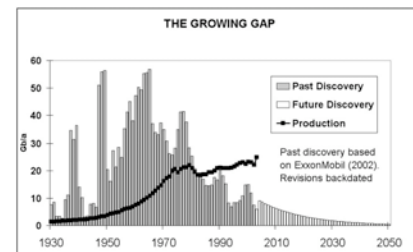
OIL AND GAS LIQUIDS 2004 Scenario Uppsala Hydrocarbon Depletion Study Group



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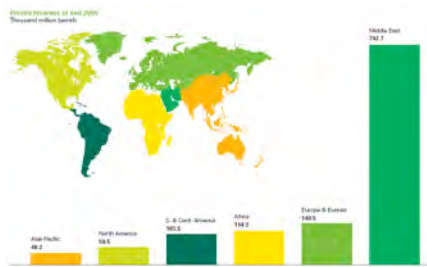
Production vs Discovery



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Where is the Oil?



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Enhanced oil recovery

- Technology helps get oil out faster, and to get more (increases to 50%+ recovery)
- Increasing cost makes hard oil worth it
- The impact of enhanced oil recovery
 - Water and gas injection, heating, etc
- Delay peak followed by fast decay

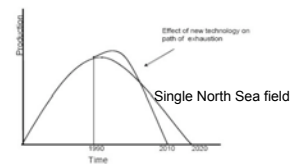


Fig. 2. Technological advance masks impending production declines

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So will we "run out"?

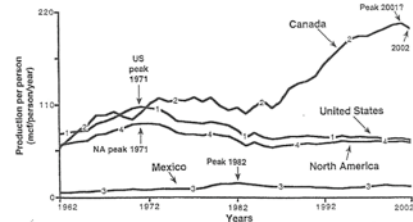
- We will always have expensive oil
- "The Stone Age did not end for lack of stone, and the Oil Age will end long before the world runs out of oil."
 - Zaki Yamani, Saudi Oil Minister 1962-1985
- As oil gets more expensive, we will develop substitutes
 - Natural Gas gets expensive too
 - coal, biofuel, wind, solar

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Natural Gas

- Tight supply – likely past peak

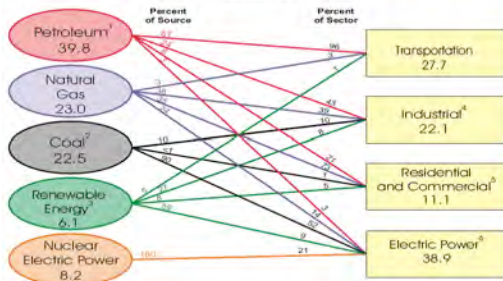


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U.S. Primary Energy Consumption by Source and Sector, 2004

(Quadrillion Btu)



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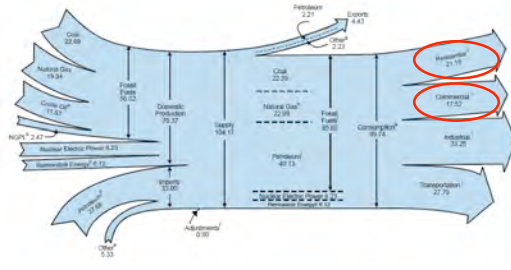
Source: US EIA

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Total Energy

Domestic Sources Supply 70% of Total Energy
40% of Total Supply is Petroleum
23% of Total Supply is Natural Gas
Buildings are #1 Use of Energy in the US (40%)

Quadrillion Btu



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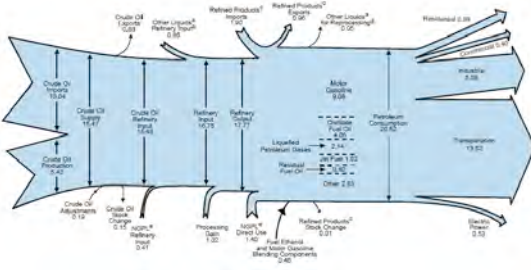
Source: US EIA

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Petroleum Energy

2/3 of Oil is Imported
2/3 is Used in Transportation
Building Use is Very Small

Millions barrels per day



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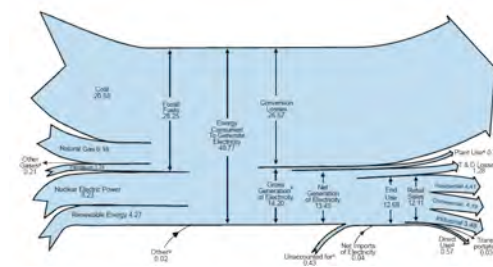
Source: US EIA

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Electrical Energy

2/3 From Fossil Fuels
Oil Very Small
2/3 is Lost at Generating Plant
2/3 Used in Buildings

Quadrillion Btu



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Source: US EIA

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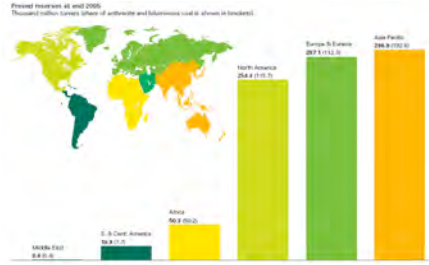
Transportation Sector Will Compete With The Building Sector For The Same Energy

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Coal

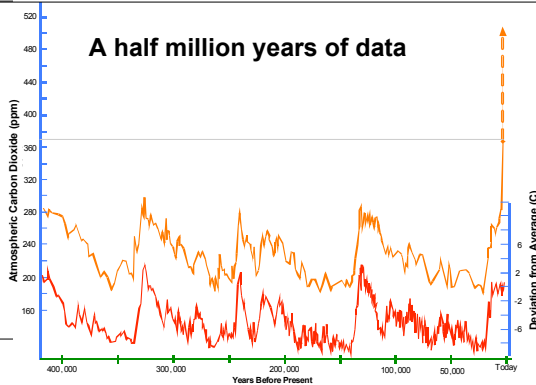
- Fastest Growing Source of Energy
- America is the "Saudi Arabia of Coal"
- Carbon Dioxide Production Twice that of Natural gas (fundamental chemistry)



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A half million years of data



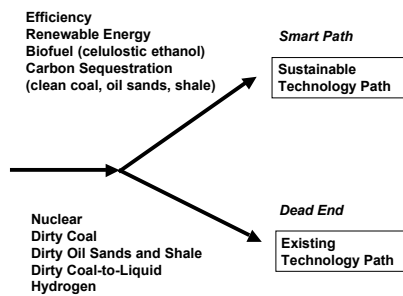
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- There is No Question that Climate Change is Happening
 - The Questions are When, How Bad, Did We do it and Can We Do Anything About it?
 - Looks Like Sooner Than Expected
 - Could be Pretty Bad, But then Again Maybe Not
 - Looks Like We Did Do it, But Not Completely Sure
 - We Can Fix it - But is it Worth it?
 - One Solution – Reduce CO2 Through Efficiency & Renewables
- Energy Security is a Decoupled Issue
 - Solution - Efficiency and New Energy Sources (coal?)
- Solving Energy Security the Wrong Way Will Worsen Climate Change
- Solving Climate Change also Solves Energy Security

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It's The Energy Stupid

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Buildings Are The Key To Energy Security
And Climate Change

Typical Family Carbon Footprint
50 % House
50% Transportation

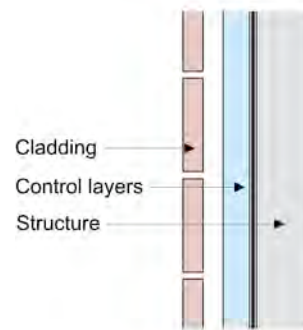
50 % Total Energy Reduction
(2,500 ft2 house over basement)

Advanced Framing	- less \$1500
Insulating Sheathing	- add \$1000
95 % Furnace	- add \$ 500
Simplified Ductwork	- less \$ 500
Windows	- add \$1000
Cavity and Roof Insulation	- add \$ 300
Heat Exchanger	- add \$1500
Air Sealing	- add \$ 300
16 SEER a/c	- add \$ 750
Tankless DHW	- add \$ 500
Compact Fluorescent Lighting	- add \$ 250
Energy Star Appliances	- add \$1000
	Approximately \$5,100 more

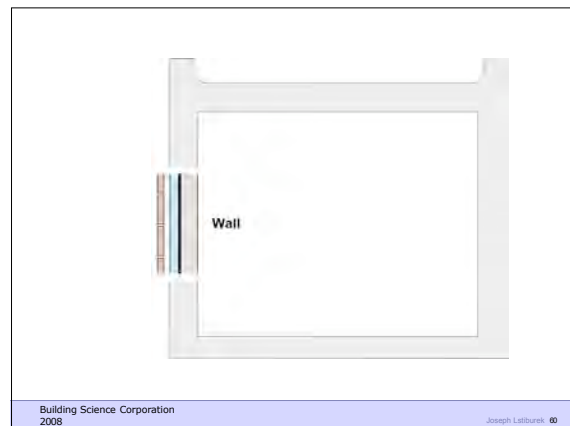
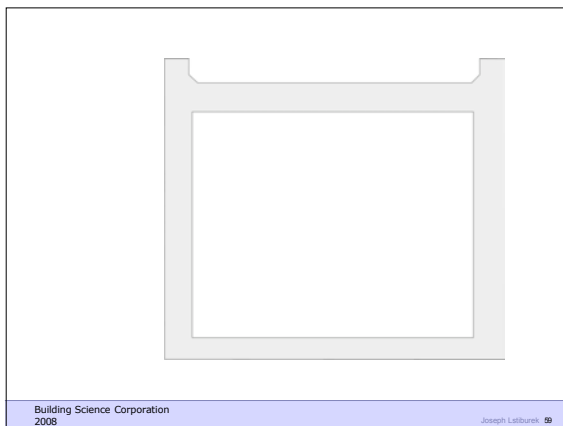
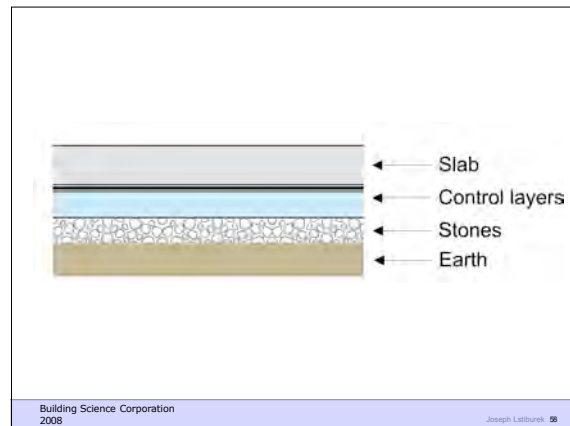
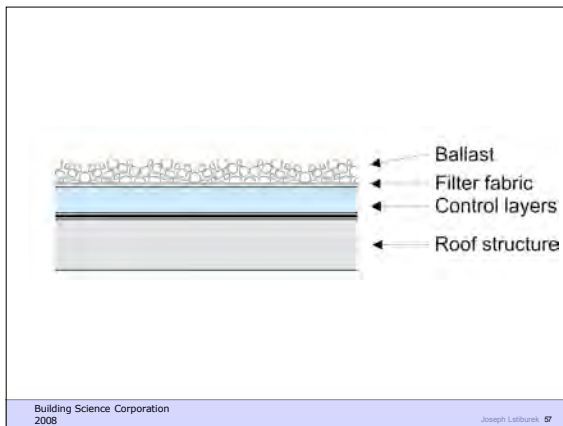
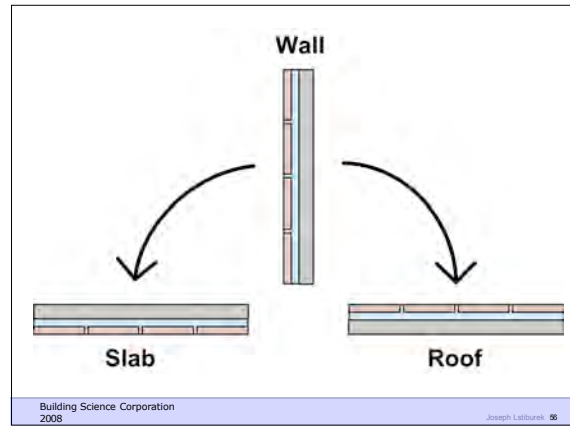
50 % Total Energy Reduction
Costs Approximately \$5,000 More
Financed For Approximately \$50/month
Saves \$100/month in Utilities
Cash Flow is \$50/month Positive

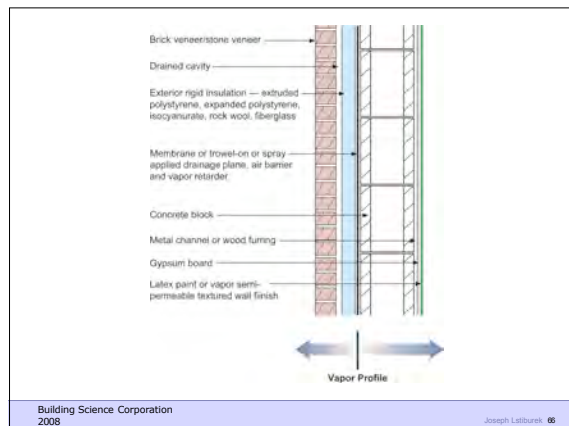
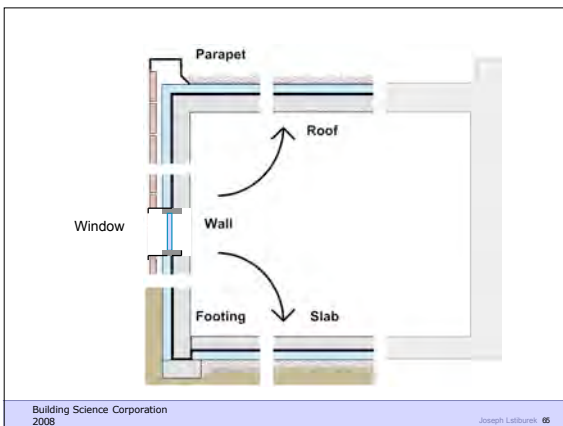
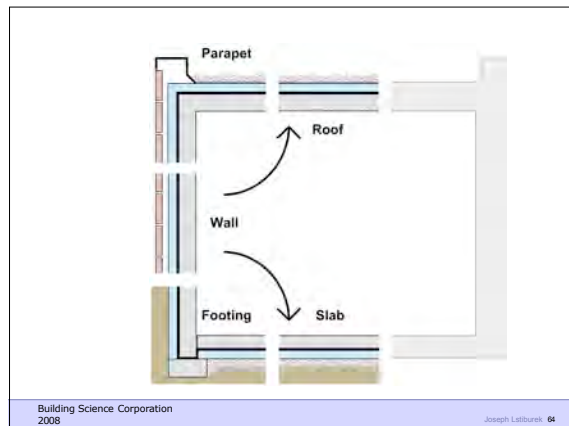
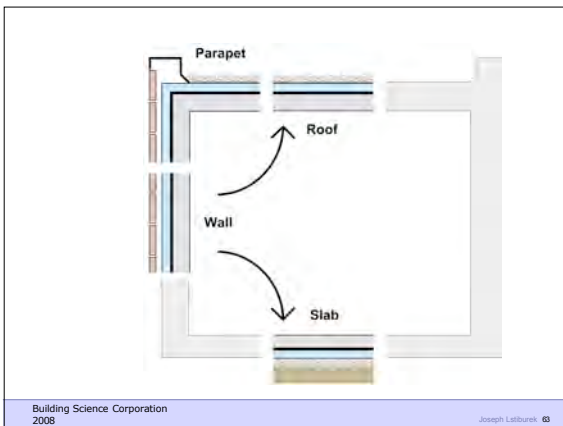
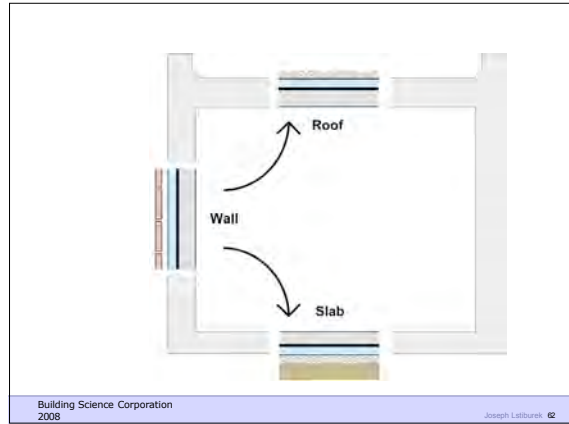
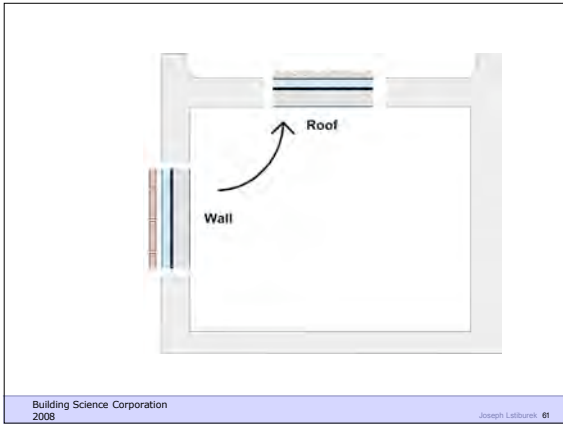
We Don't Have An Energy Problem
We Have A Stupid Problem

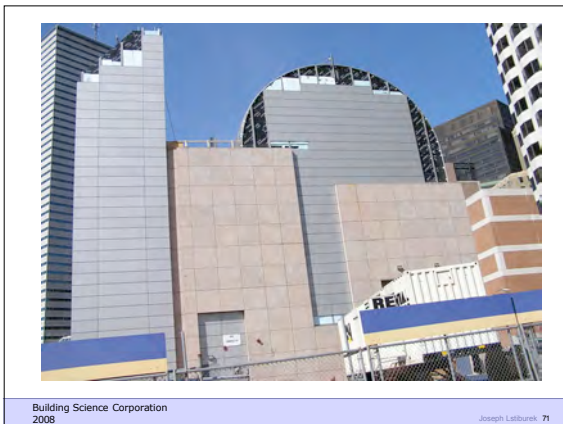
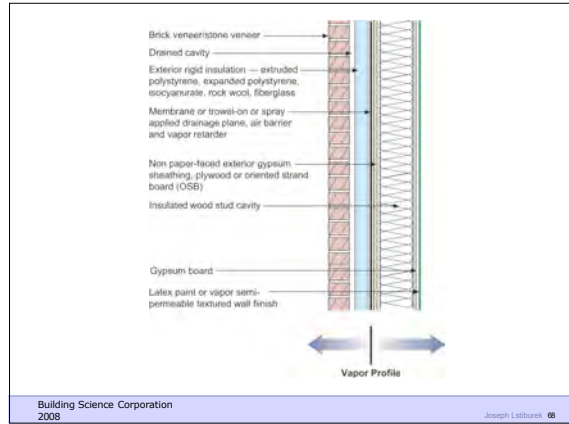
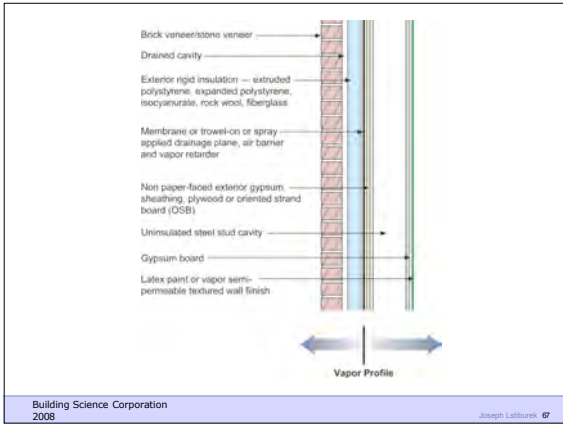
We're Stupid



Rain Control Layer
 Air Control Layer
 Vapor Control Layer
 Thermal Control Layer









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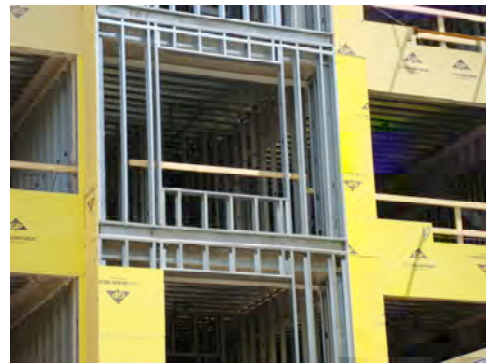
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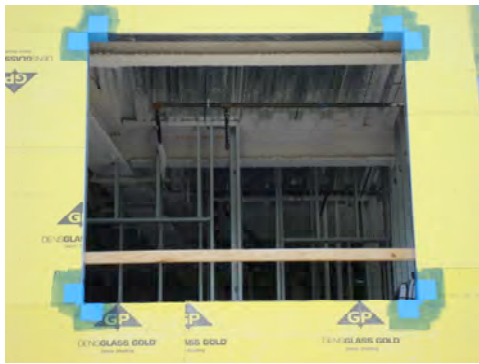
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