

Sustainability Metrics and Design Response



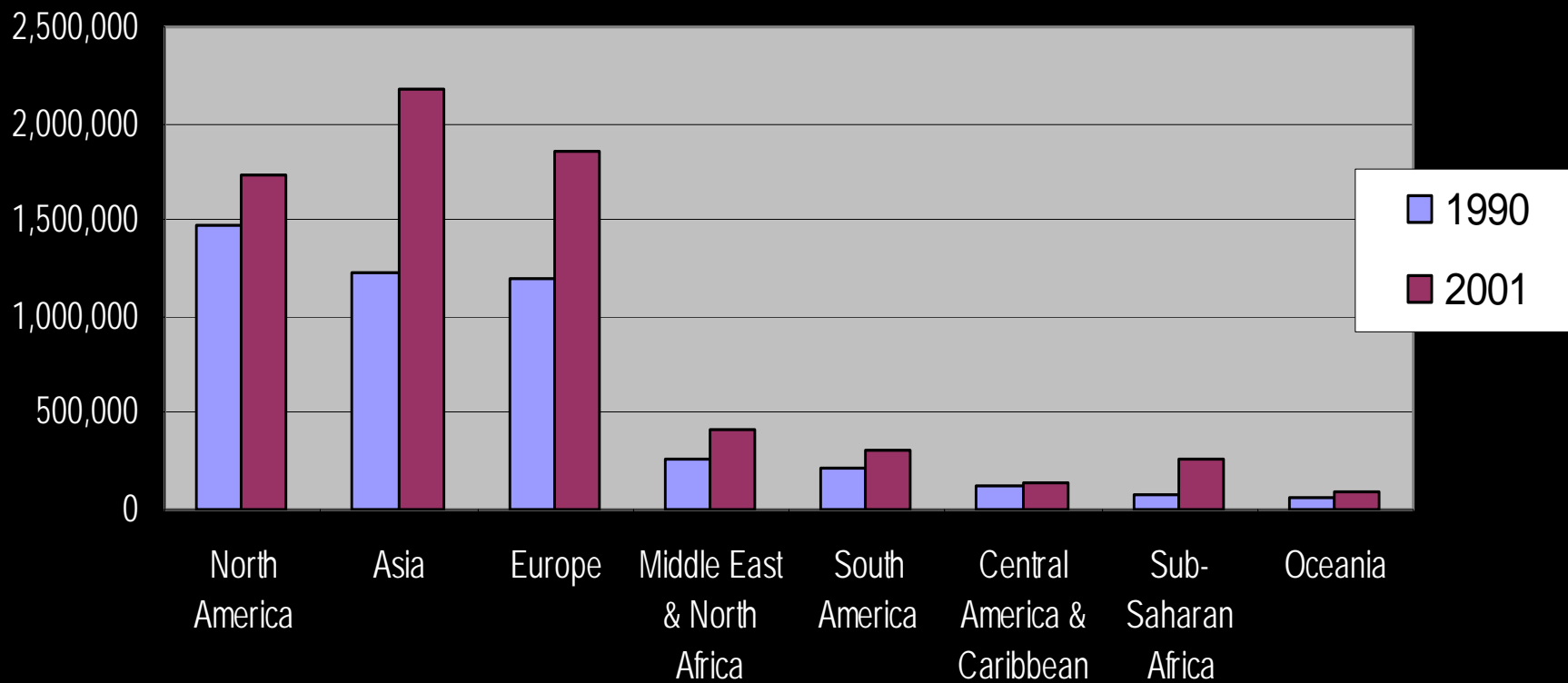
Buildings use approximately 40% of the Energy in the US

	Residential	Commercial	Total Buildings	Industry	Transportation	TOTAL	Total Consumption (Quadrillion BTU's)
1980	20%	14%	34%	41%	25%	100%	78.3
1990	20%	16%	36%	38%	26%	100%	84.7
2000	21%	17%	38%	35%	27%	100%	98.9
2004	21%	17%	39%	33%	28%	100%	99.7
2010	21%	18%	39%	32%	29%	100%	107.9
2020	21%	19%	40%	31%	29%	100%	120.7
2030	20%	20%	40%	30%	30%	100%	134.0



Global Energy Use is increasing at varying rates

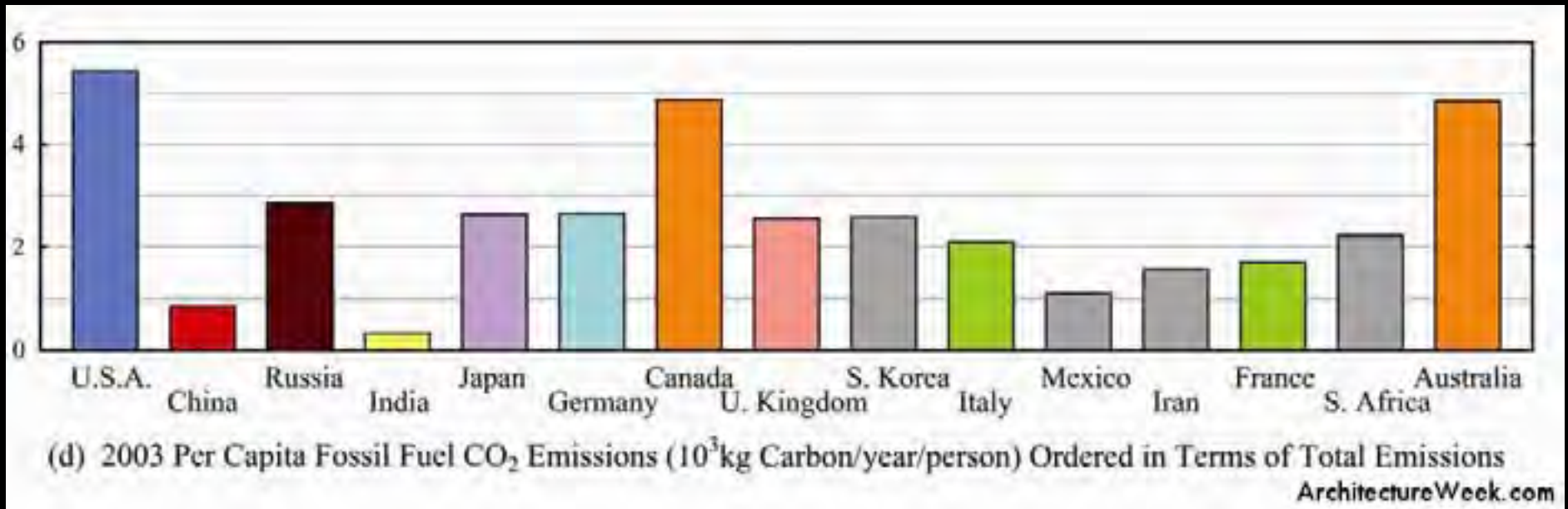
... Asia and Europe gains reflect economic growth



However per capita emissions point to opportunities to improvement

... US is 2X of Germany, Japan, UK

... and over 5X of China



Impacts on Global Climate Change

CO₂ accounts for 85% of all US GHG (greenhouse gas) emissions

... buildings account for 43% of CO₂ emissions (658 MMTC)

Methane and Nitrous Oxide accounts for 14% of US GHG

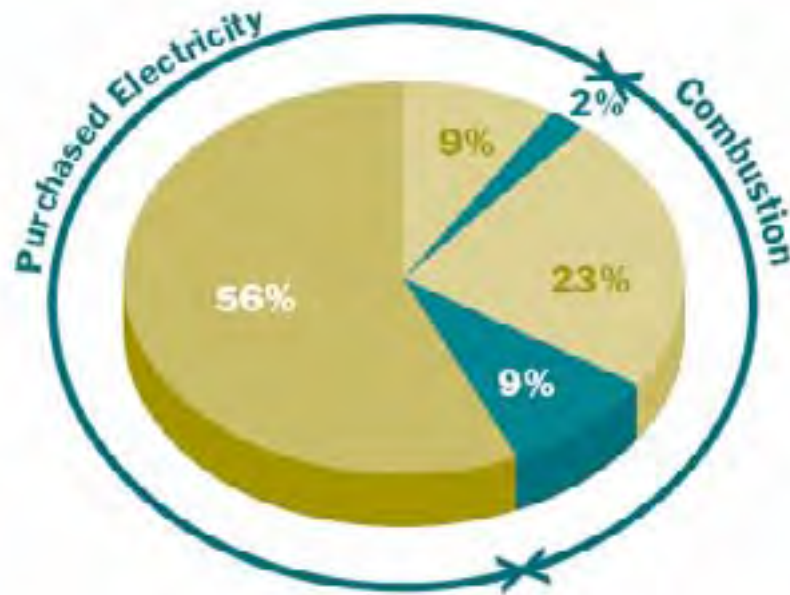
... methane from building related landfill and incomplete fireplace and cooking combustion (12 MMTC equivalent)

“Other” gases account for 2% of US GHG

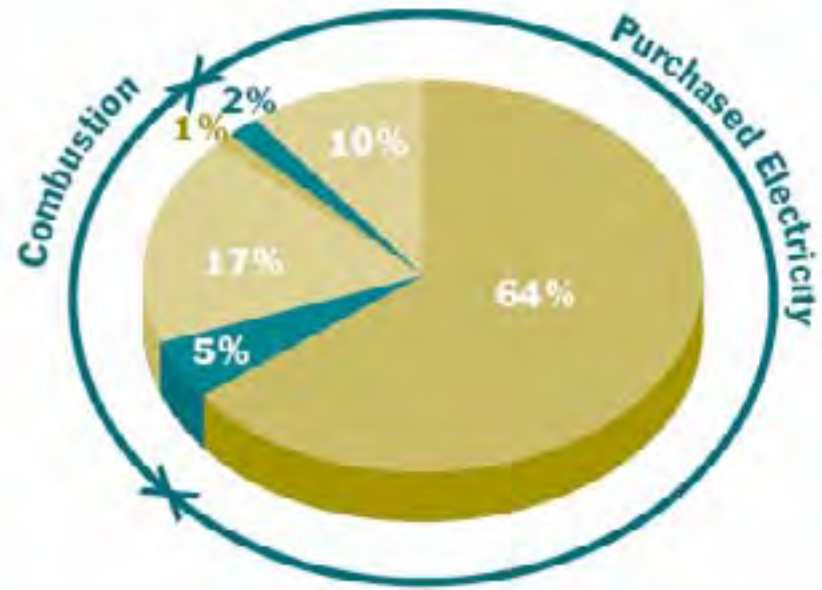
... HFC's released from building equipment and insulation blowing agents (12 MMTC equivalent)



76% of CO2 emissions from Commercial Buildings in the US relate to electricity usage



313 MMTC
Residential Buildings



264 MMTC
Commercial Buildings

Carbon in coal Carbon in petroleum Carbon in natural gas

Source: Based on U.S. Environmental Protection Agency. 2004. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2002. p. 3-4, 3-7, 3-17, tables 3-3, 3-6, and 3-10. Note: units are in million metric tons of carbon (MMTC).

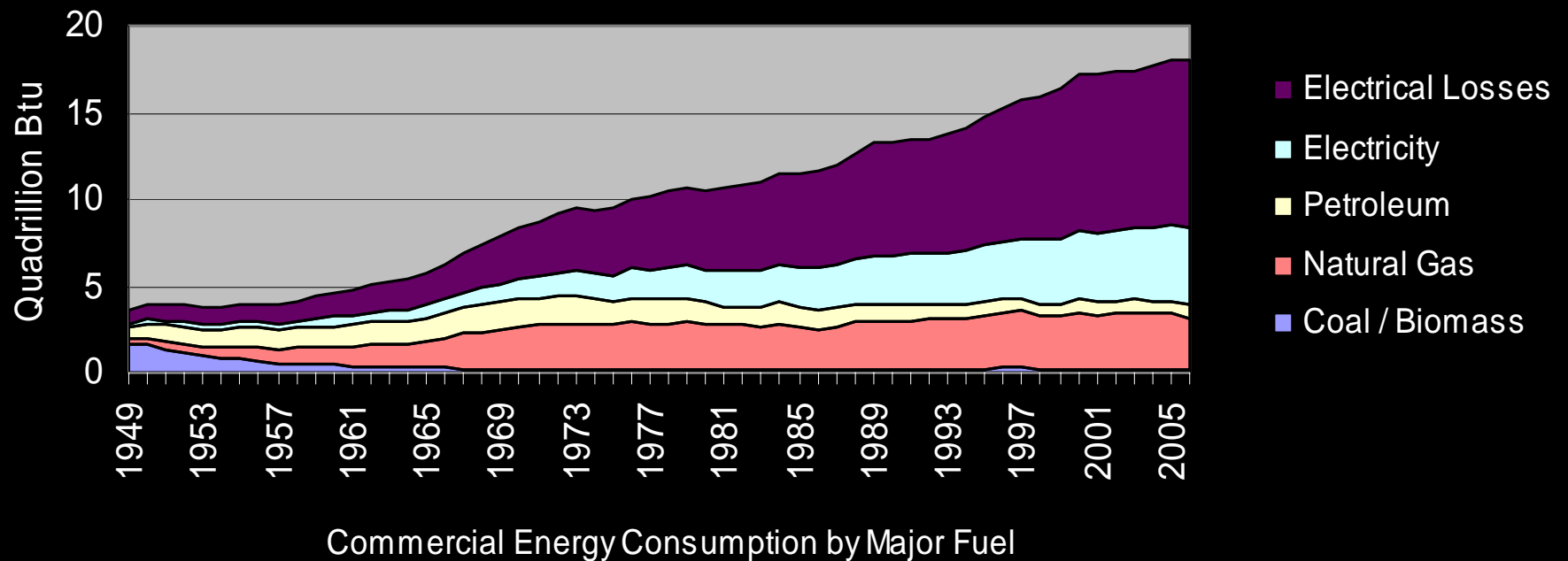


Buildings use over 70% of the Electricity in the US

	Residential	Commerical	Total Buildings	Industry	Transportation	TOTAL	Delivered Total (Quadrillion BTU's)
1980	34%	27%	61%	39%	0%	100%	7.1
1990	34%	31%	65%	35%	0%	100%	9.3
2000	35%	34%	69%	31%	0%	100%	11.7
2004	36%	34%	71%	29%	1%	100%	12.2
2010	37%	36%	73%	27%	1%	100%	13.6
2020	37%	38%	75%	25%	1%	100%	15.8
2030	36%	40%	76%	24%	1%	100%	18.2



More than half of energy use by buildings is attributed to “electrical losses”



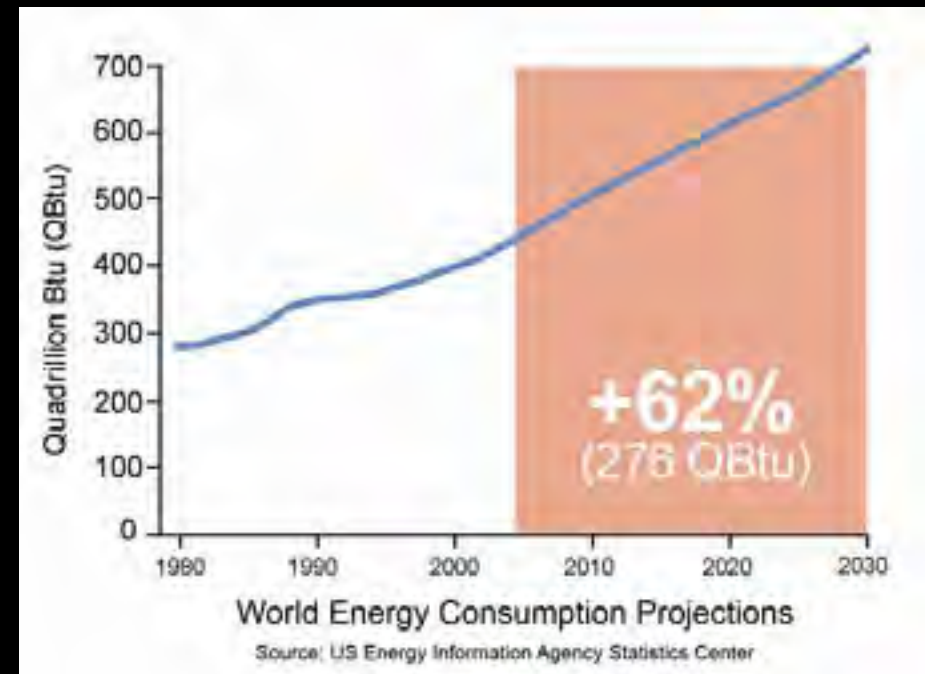
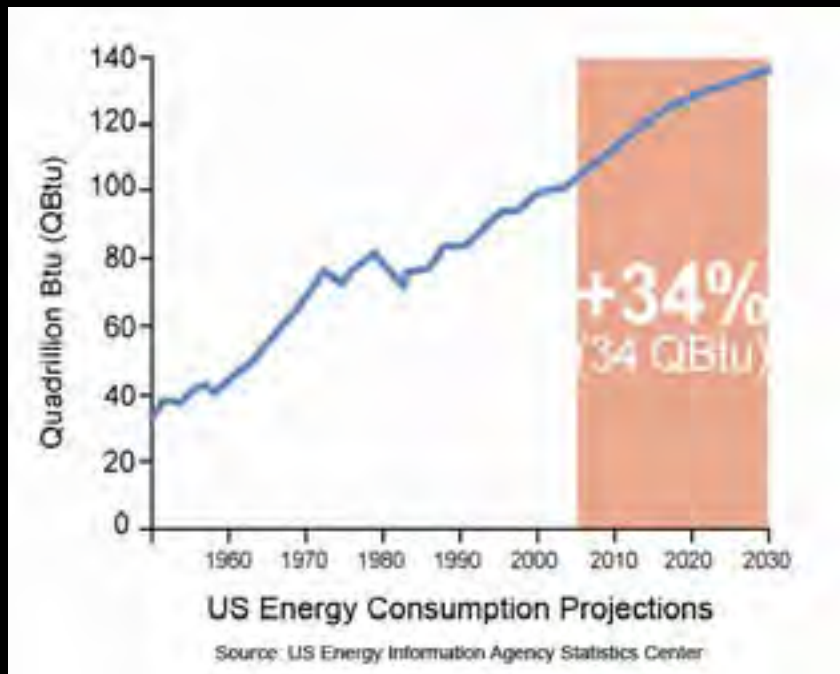
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... Electricity generation is less efficient today than it was in 1900!

... Average efficiency is only about 30% - however 85% is possible with new CHP plants and distributed generation

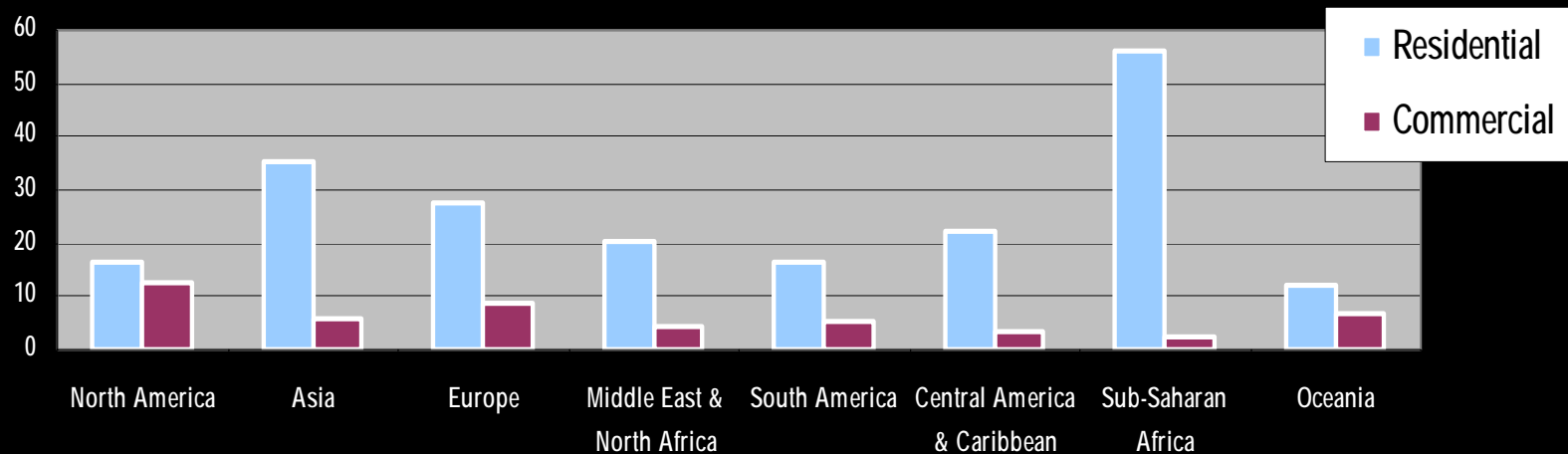


Increases in energy demand reflect population growth and rising prosperity in developing nations



As GDP rises in developing nations (such as China and India) more commercial buildings will be needed

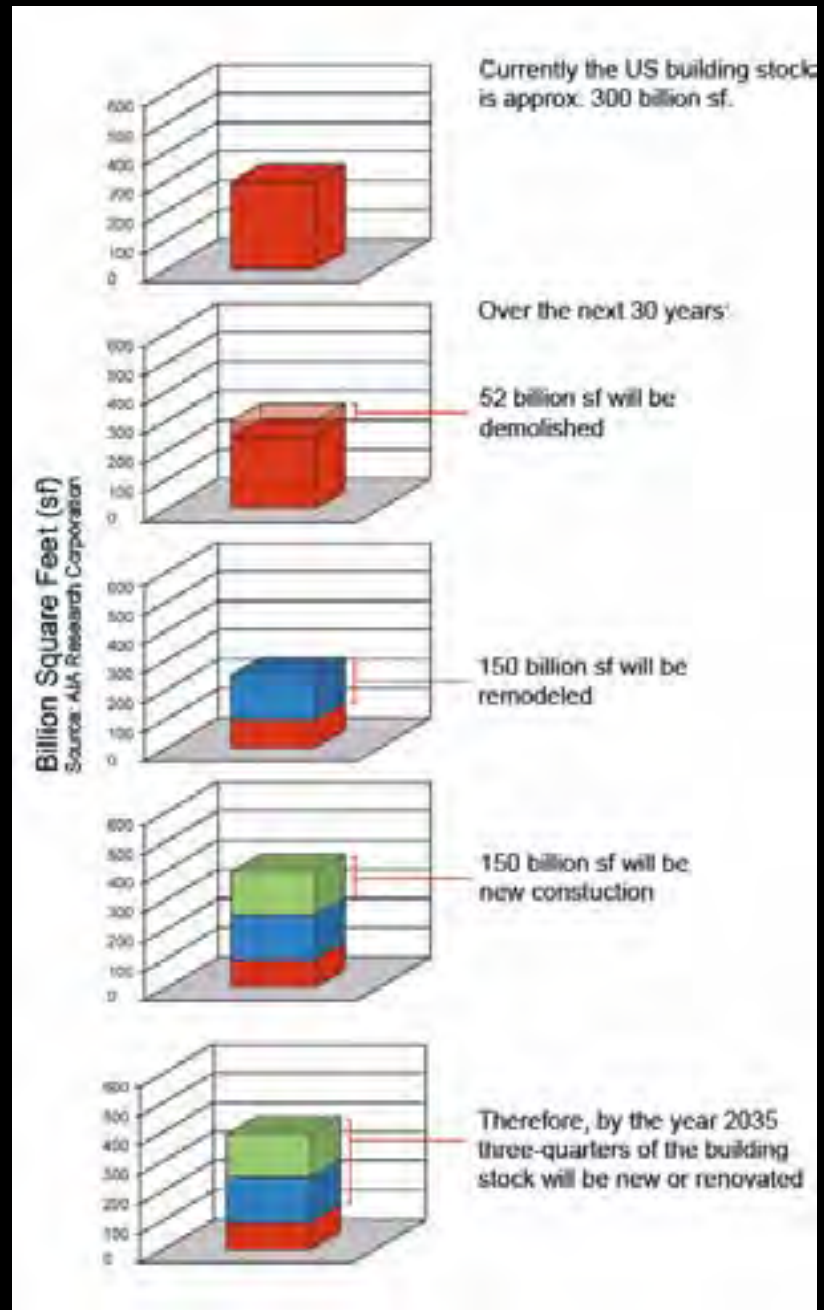
Buildings Share of Site Energy Consumption



**Building stock in the US
will increase by about
35% by 2035**

- 300 Billion SF in 2005
- 400 Billion SF in 2035

**75% of all buildings will
be new or renovated by
2035**



Adobe Systems Headquarters

- 990,000 SF Office Space
940,000 SF Parking
- *First Platinum LEED® EB*



Adobe with Cushman & Wakefield

- \$1.4 Million Spent on 64 Separate Projects
- \$389k in Rebates
- \$1.2 Million in Annual Savings
- 10 Month Payback



Adobe Systems Headquarters

- Reduced Electricity 35%
- Reduced Natural Gas 41%
- Reduced Domestic Water 22%
- Reduced Landscape Irrigation 76%
- Diverted 87% of Solid Waste
- Reduced CO₂ Emissions Approx. 20%



**Sidwell Friends School
Kieran Timberlake Associates**

AIA Top Ten 2007



HOK Sustainable Design

Sidwell Friends School Kieran Timberlake Associates

AIA Top Ten 2007

- Location: Washington DC
- Building type: School
- 54% new; 46% renovation
- 72,000 sq. feet
- Completed Sept 2006

- LEED Platinum
- 60% Reduction in energy use



NOAA Pacific Regional Center, Hawaii



NOAA Pacific Regional Center, Hawaii



Wind Scoop





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Home Documents and Lists Create Site Settings Help

Documents

Shared Documents

Pictures

Lists

Announcements

Northeast Region
Green Innovations

Green
Recommended
Reading

Discussions

General Discussion

Surveys

Sustainability Summit



Citi Realty Services held a Sustainability Summit on Thursday, June 14. The working session, presented by the architecture firm HOK, provided an opportunity for members from across regions to share insight and ideas for sustainable programs related to Citi's real estate portfolio.

Participants were asked to list current and potential sustainable behaviors in four categories: Building Site Selection, Building Energy, Building Materials/Indoor environment, and Cultural/Community Action. The result was a list of current practices as well as short- and long-term priorities for CRS's Workplace and Sustainability Program.

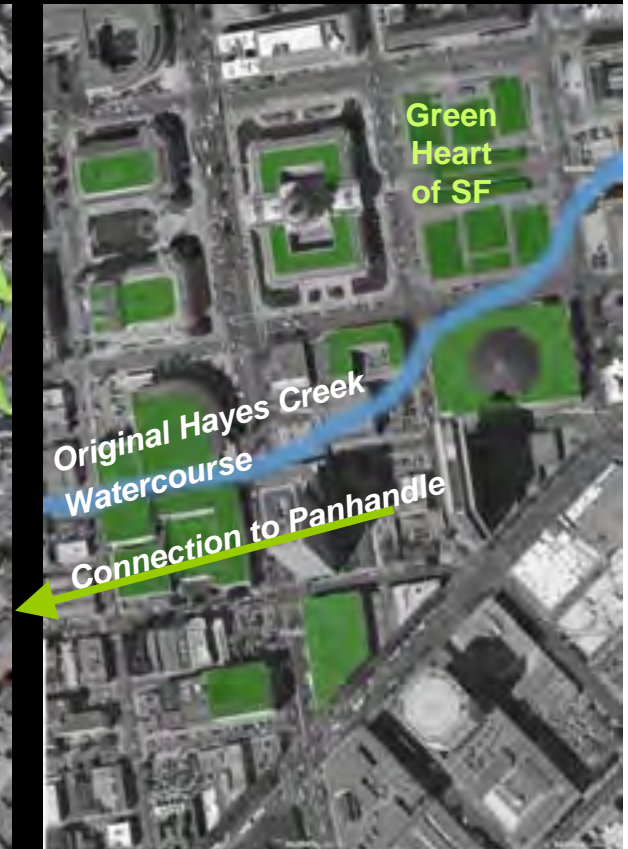
San Francisco Charrette

Living Infrastructure Charrette

- Reduced stormwater infrastructure costs
- Improved urban ecology
 - Increased wildlife habitat opportunities
 - Increase carbon sink for air pollution
 - Increased generation of oxygen
- Improved quality of urban life
 - Beautify SF
 - Increase open space with roof-top parks and garden roofs
- Enhanced property values
- Reduced contribution to climate change
- Positions city as a leader



San Francisco Charrette



- Use of public buildings and community centers as pilot projects
- Connected corridors of green roofs (such as the Panhandle to Market St.)
- Greening of poorer areas to balance social inequity
- Density incentives as an offset with green infrastructure
- New requirements for trees and permeable surfaces as liners for surface parking lots
- Exhibits and publications to provide an educational component



Conclusion

Incremental efficiency gains are not good enough

Industry challenge for zero energy buildings has begun

Integrated planning processes are needed

