The Disruptive Transition to Intelligent, Secure, Low Carbon, and Climate Adaptive Infrastructure

Smart Infrastructure Panel Talk
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The Disruptive Transition to Intelligent, Secure, Low Carbon, and Climate Adaptive Infrastructure

- **The First Wave:**
  - Infrastructure Will Gradually Become "Intelligent"
  - Increasing Potential Risk of Cyber-attacks
- **The Second Wave:**
  - From High to Low Carbon Emissions
- **The Third Wave:**
  - Climate Change is Now Occurring on a Time Scale Commensurate With the Lifetime of Infrastructure

Enable Structures & Systems to Self-Monitor, Self-Diagnose, & Self-Correct Throughout Their Life Cycle



An Intelligent Infrastructure Initiative for Australian Society and Homeland Security

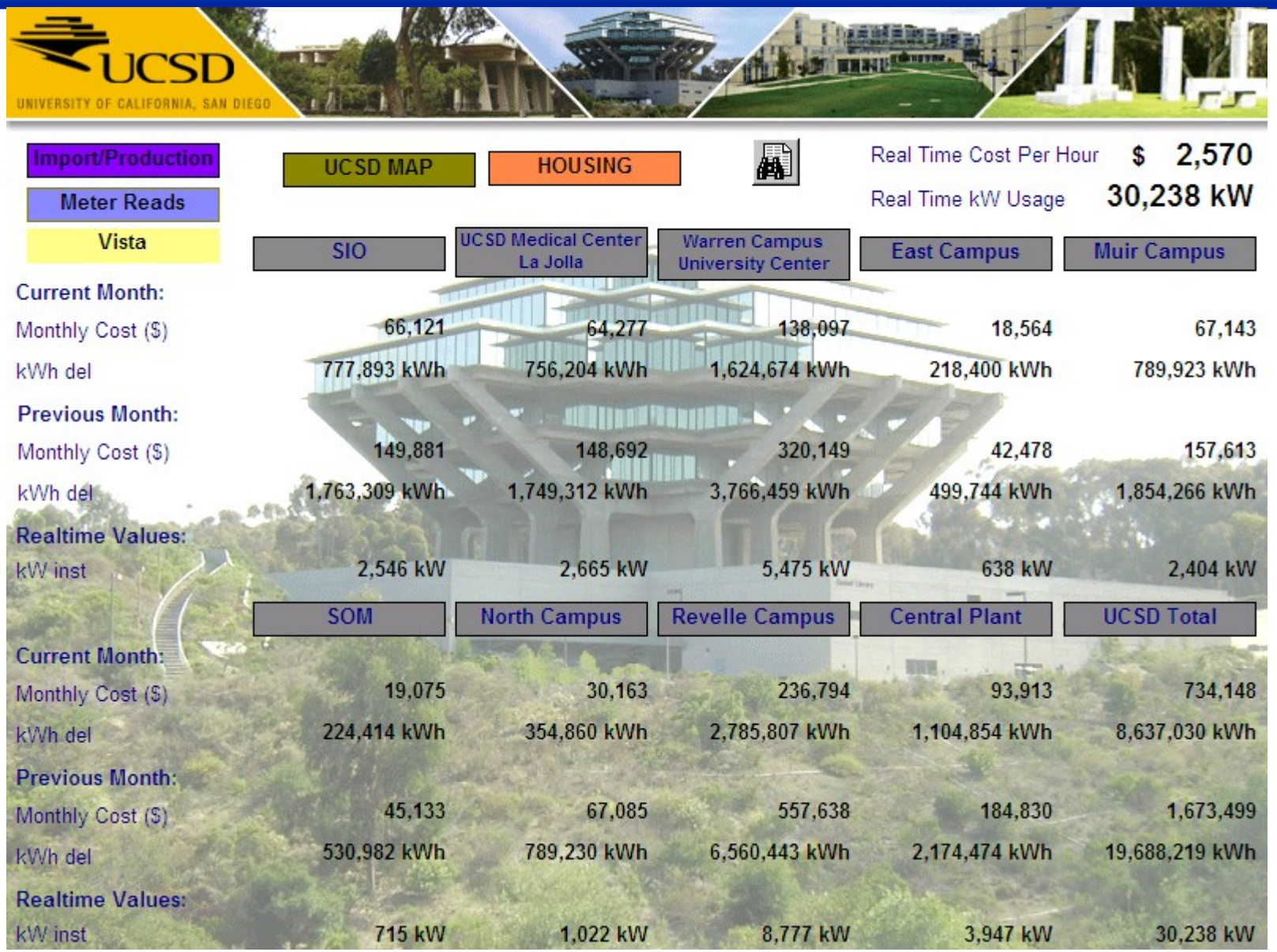
October 20, 2008



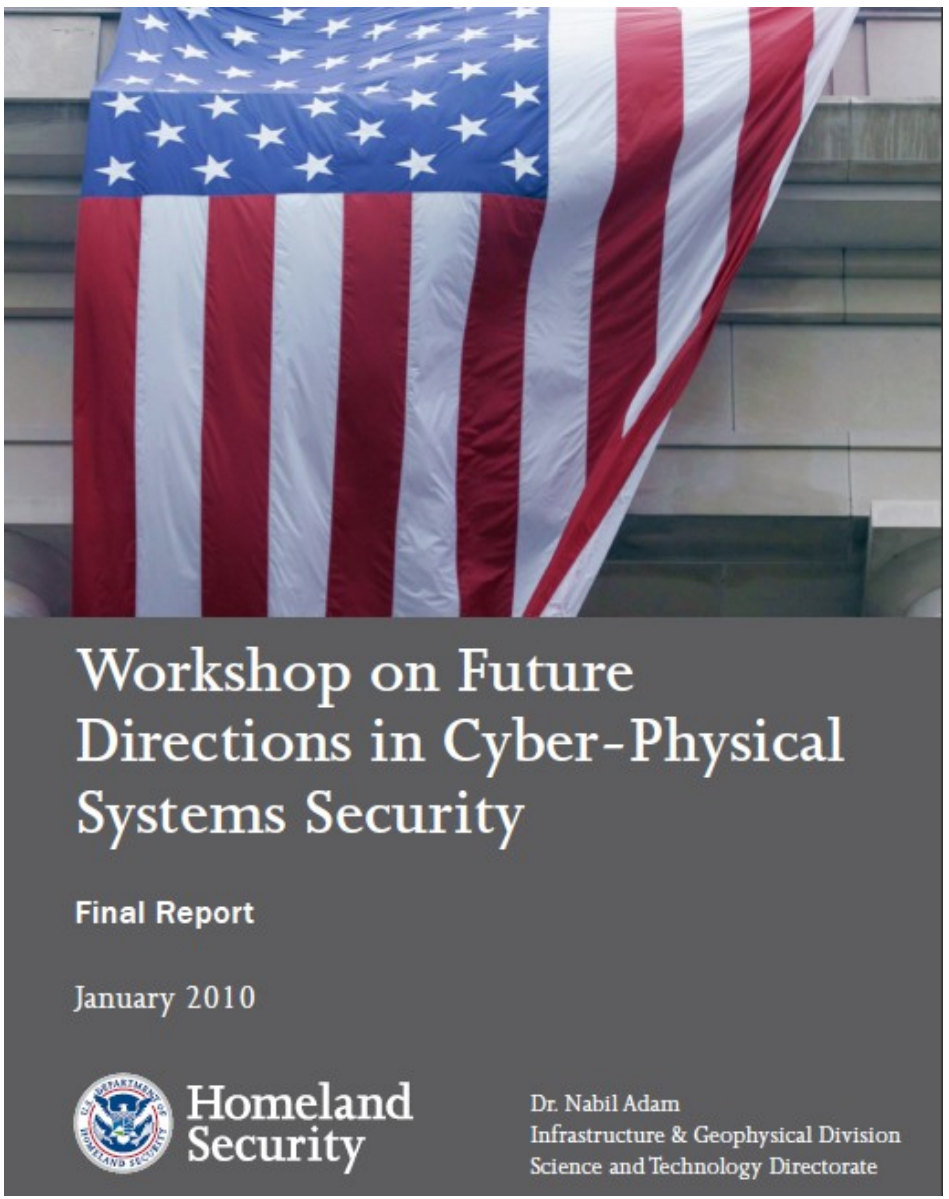
http://lsmarr.calit2.net/repository/Intelligent_Infrastructure_Initiative_2008.pdf



Real-Time Monitoring of Building Energy Usage: Toward a Smart Energy Campus



The Downside of Adding Intelligence to Infrastructure is Keeping it Secure



Transition to Low Carbon Infrastructure: Race for Low-Carbon Industries is New Driver

Europe must up CO_2 cuts to 30%: EU

July 15, 2010 - 7:04PM

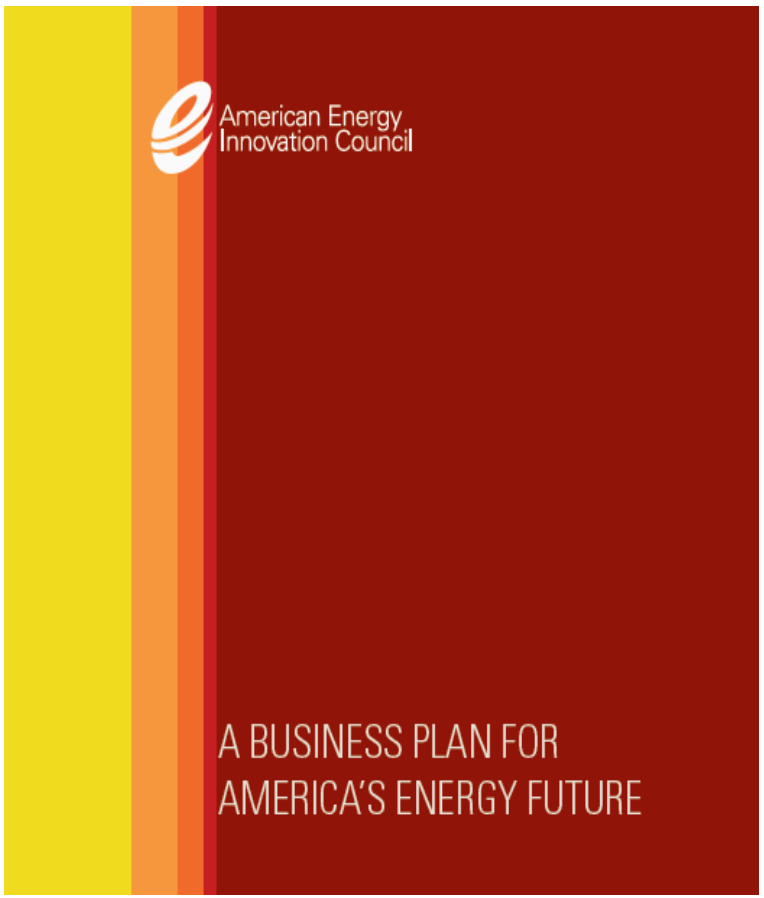
Previous Goal—By 2020, 20% Cut Below 1990 Levels

"If we stick to a 20 per cent cut, Europe is likely to lose the race to compete in the low-carbon world to countries such as China, Japan or the US - all of which are looking to create a more attractive environment for low-carbon investment," --British, French, and German Climate and Environmental Ministers

Source: Sydney Morning News

A Business Plan for America's Energy Future







OUR RECOMMENDATIONS

Create an independent national energy strategy board.
Invest $16 billion per year in clean energy innovation.
Create Centers of Excellence with strong domain expertise.
Fund ARPA-E at $1 billion per year.
Establish and fund a New Energy Challenge Program to build large-scale pilot projects.

www.americanenergyinnovation.org

Countries, States, and Cities are Beginning to Conceive of a New Low Carbon Future

Australian Sustainable Energy
Zero Carbon Australia
Stationary Energy Plan

ZEROCARBONBRITAIN
A NEW ENERGY STRATEGY

CARBON NEUTRAL BRITISH COLUMBIA

Masdar City: Zero Carbon, Zero Waste

Seattle as North America's First Carbon-Neutral City
ALEX STEFFEN, 3 DEC 09

A Visionary Low Carbon Infrastructure Plan: Zero Carbon Australia

FIGURE 6
ZCA2020 Proposed 100% Renewable Grid

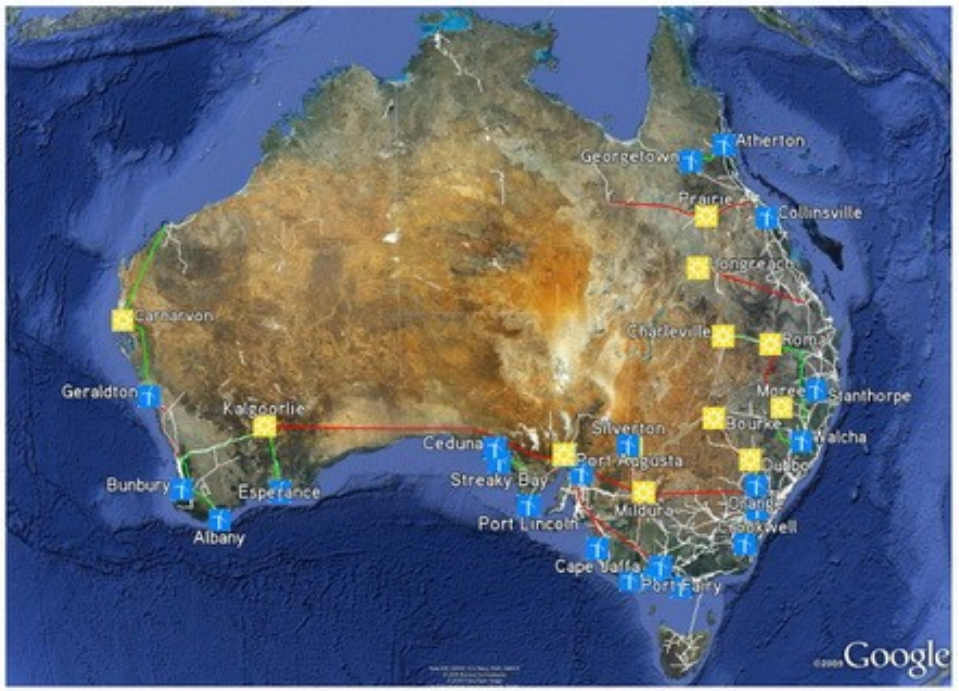


FIGURE 9
ZCA2020 Model Results (daily average data). 'Excess' is combined solar and wind energy in excess of demand.

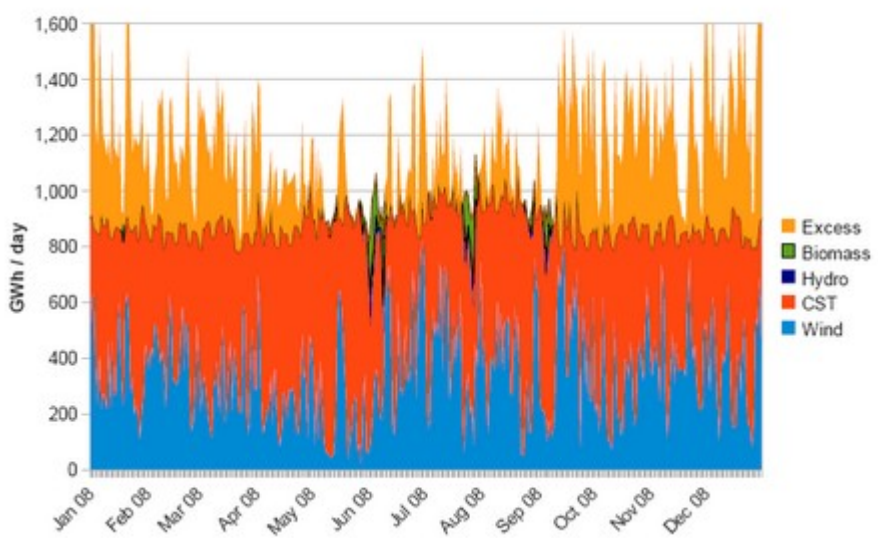
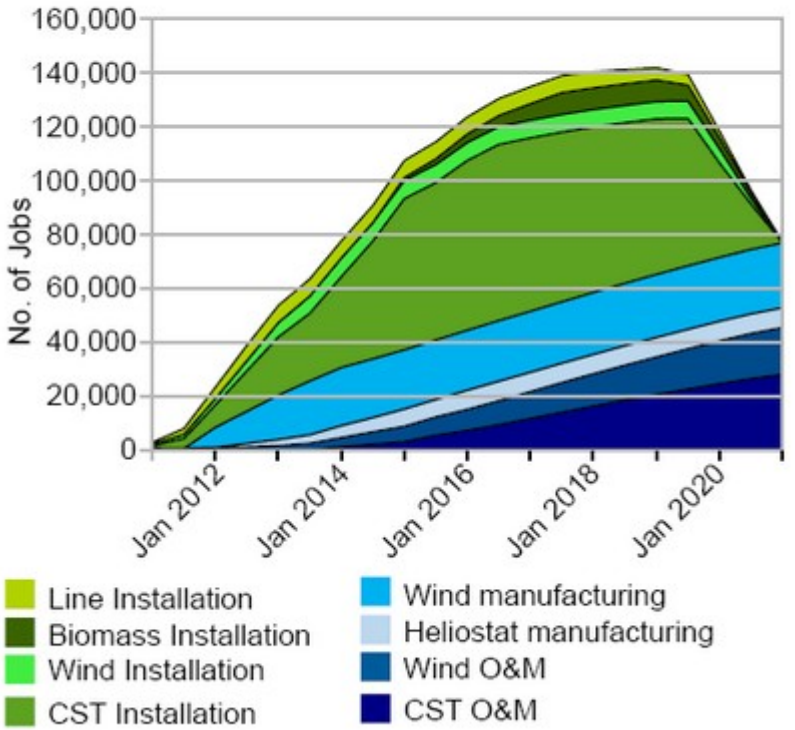


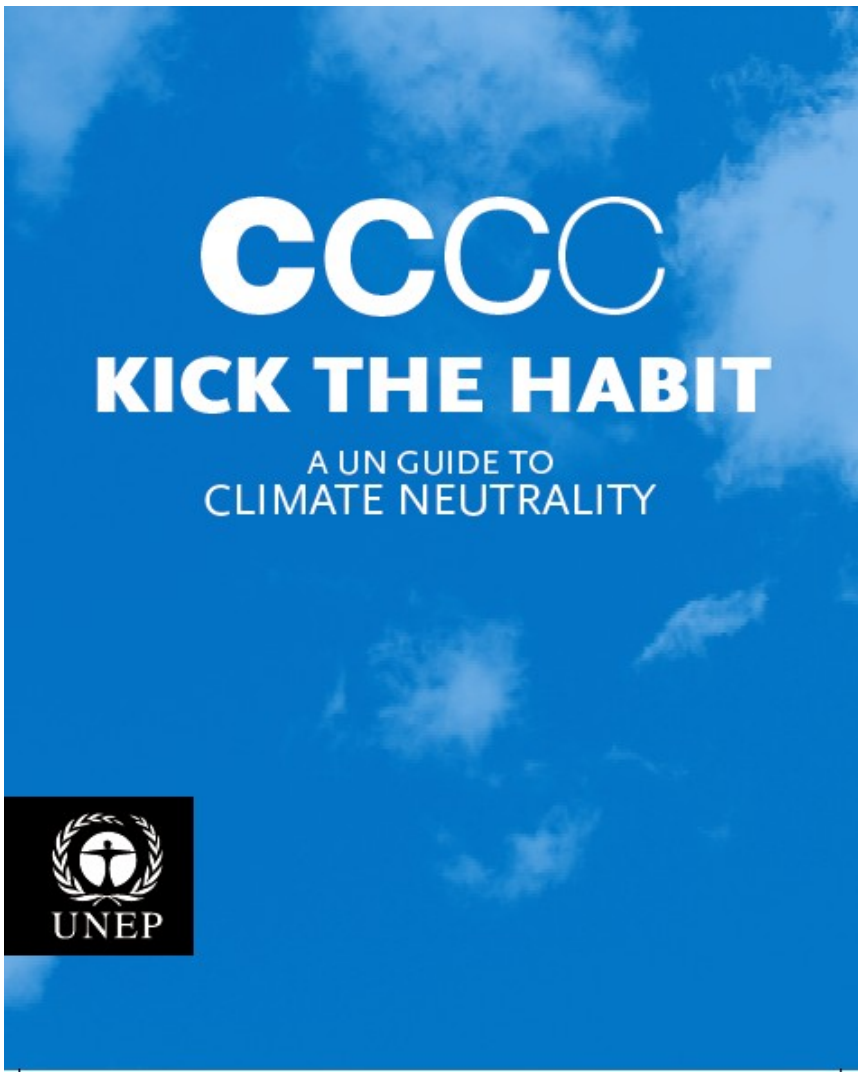
FIGURE 15
Total Jobs created by the ZCA2020 Plan

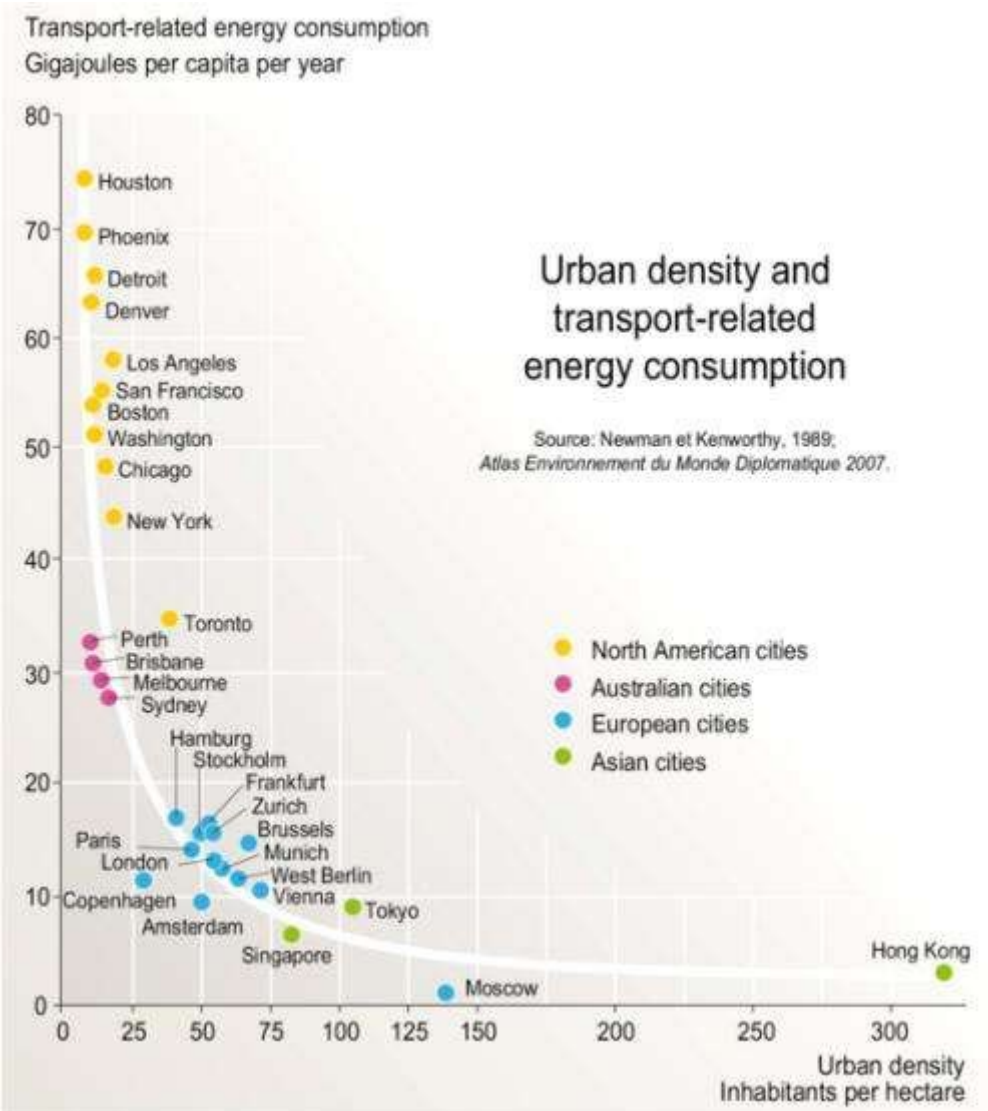


http://beyondzeroemissions.org/

Wind & Concentrating Solar Thermal (CST) Are Major Renewable Energy Sources

The Transition to a Low Carbon Society Requires Rethinking Our Cities Infrastructure

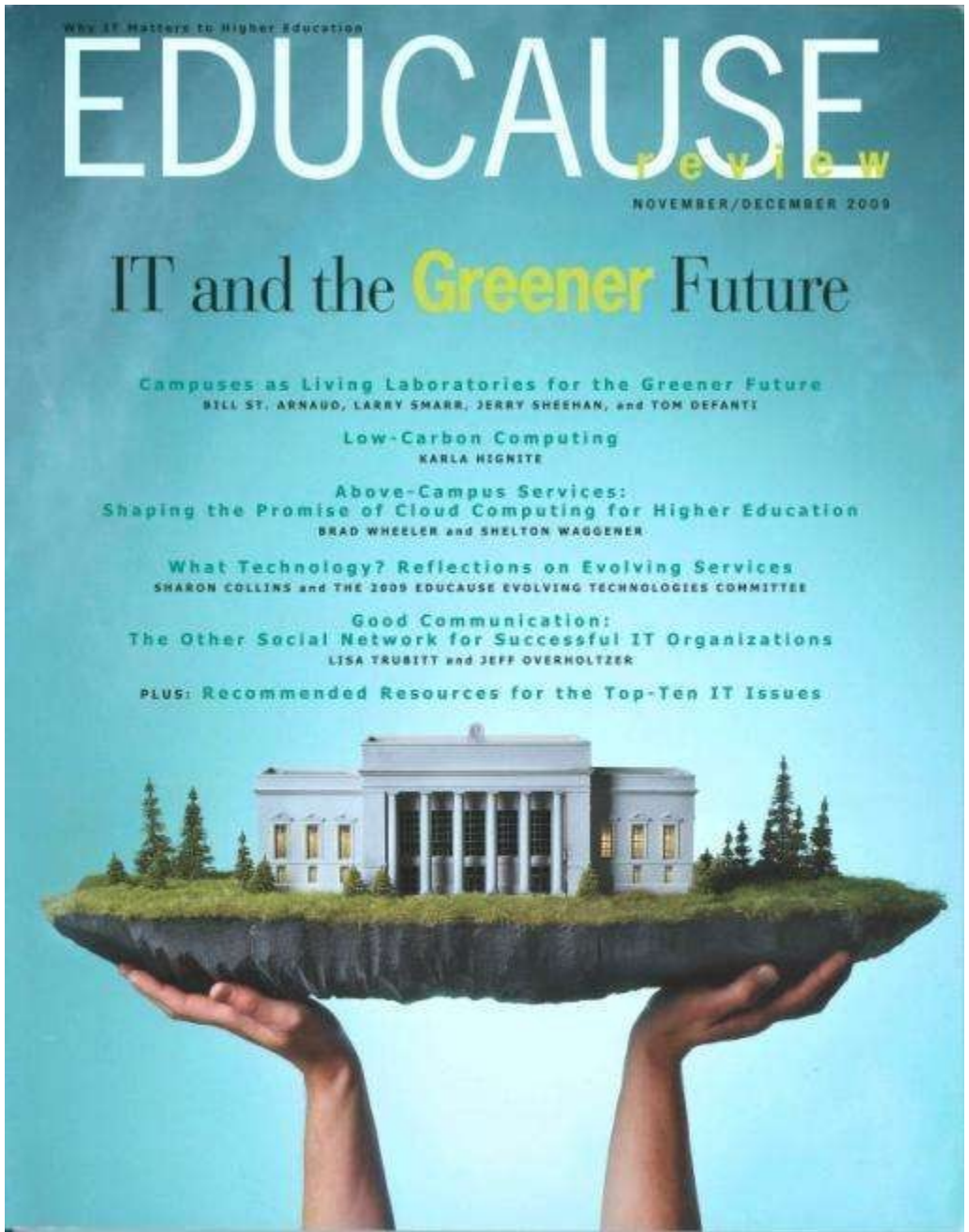




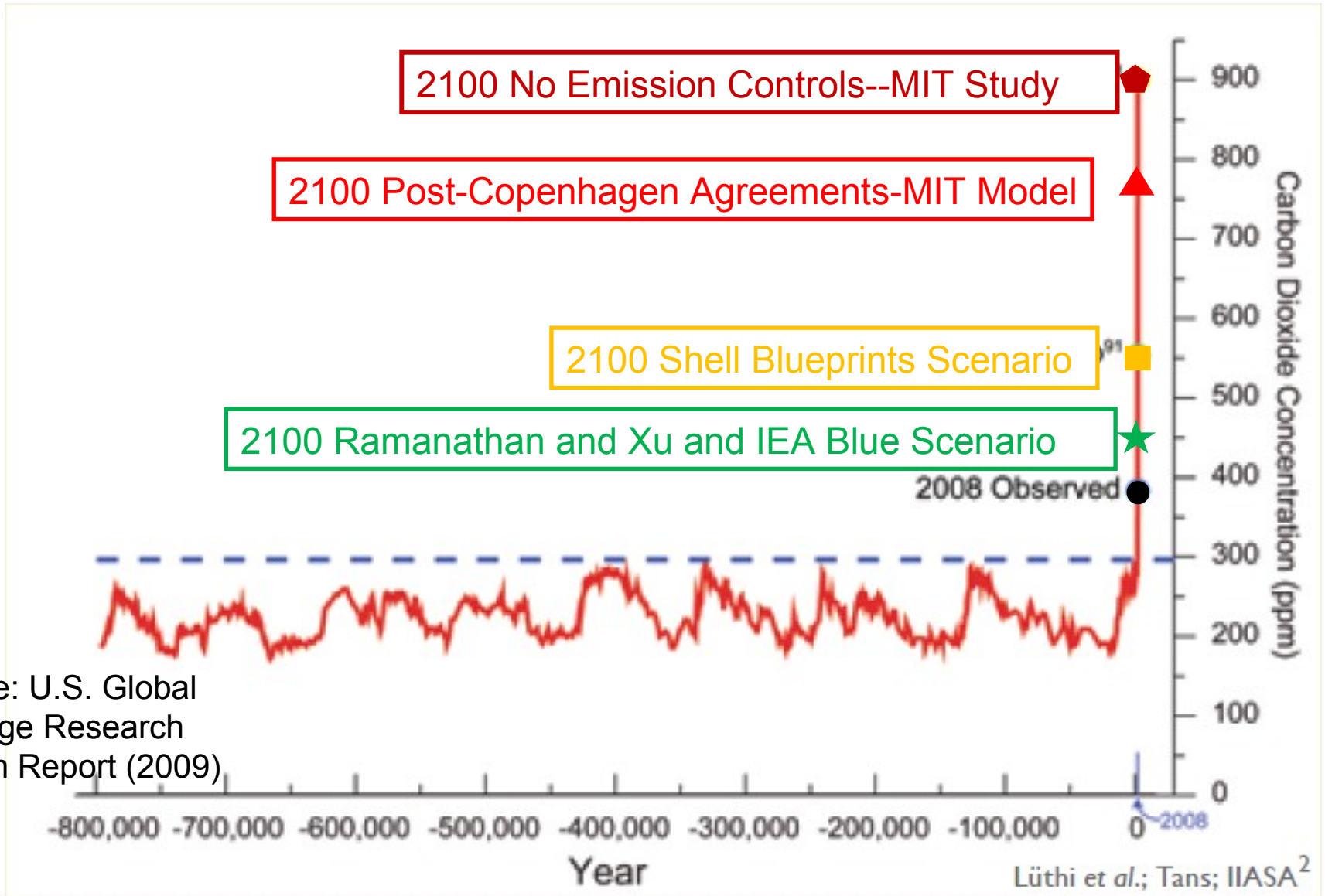
www.unep.org/publications/ebooks/kick-the-habit/pdfs/KickTheHabit_en_lr.pdf

Making University Campuses Living Laboratories for the Greener Future

www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume44/CampusesasLivingLaboratoriesfo/185217



Atmospheric CO_2 Levels for Last 800,000 Years and Several Projections for the 21st Century

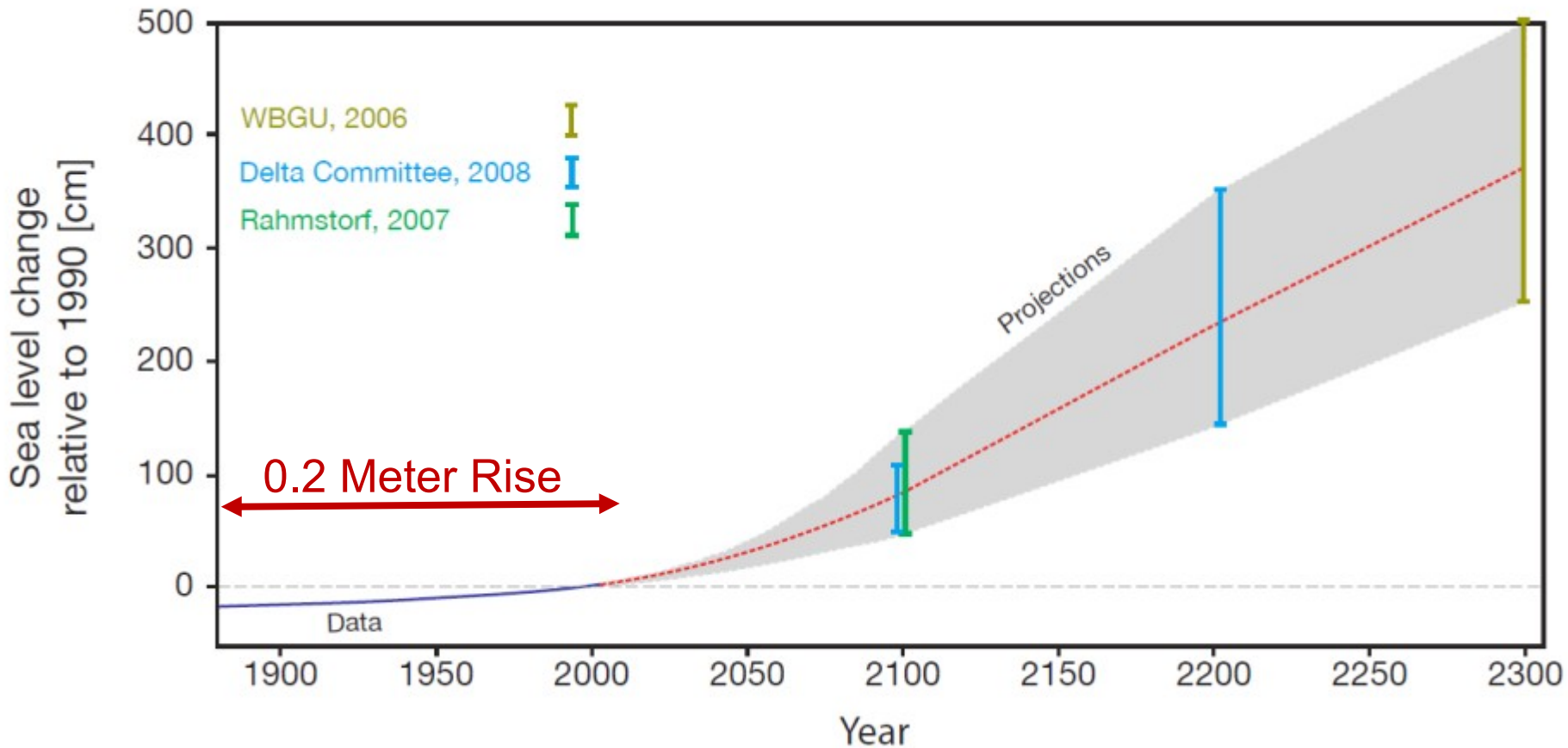


Source: U.S. Global Change Research Program Report (2009)

Graph from:
www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/download-the-report

Human Induced Sea Level Rise Will Continue for Centuries

1 Meter will Submerge Over 2 Million sq. km of Land Where ~150 Million People Live, Mostly in Asia



Meters of Sea Level Rise

5

3

1

Source: The Copenhagen Diagnosis, Allison, et al. (2009)

The Transition to Climate Adaptive Infrastructure: "Rising Currents" Exhibit at Museum of Modern Art



New York City's Harbor & Coastline -- How it Could be Restructured to Deal with the Rising Sea Level



New Ways to Occupy the Harbor With Adaptive "Soft" Infrastructures

www.moma.org/explore/inside_out/category/rising-currents#description