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ANSI Workshop: *Smart and Sustainable Cities*

Thursday, November 21, 2013 | 9 a.m. – 5:30 p.m.

Ronald Reagan Building and International Trade Center

Pavilion Room, 2nd Floor

1300 Pennsylvania Avenue NW
Washington, DC 20004

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U.S. DEPARTMENT OF ENERGY

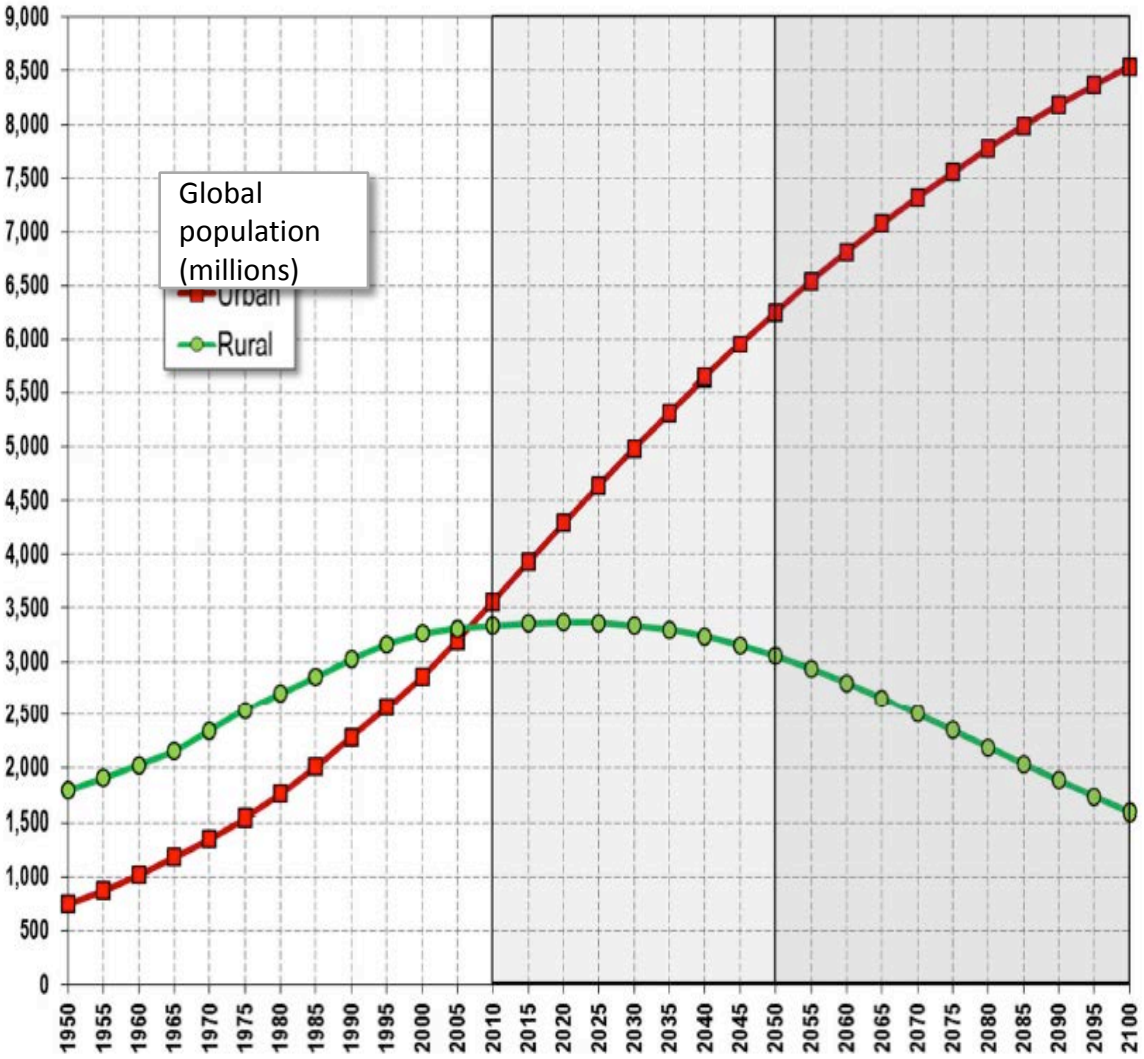
Why?

THE CHALLENGE

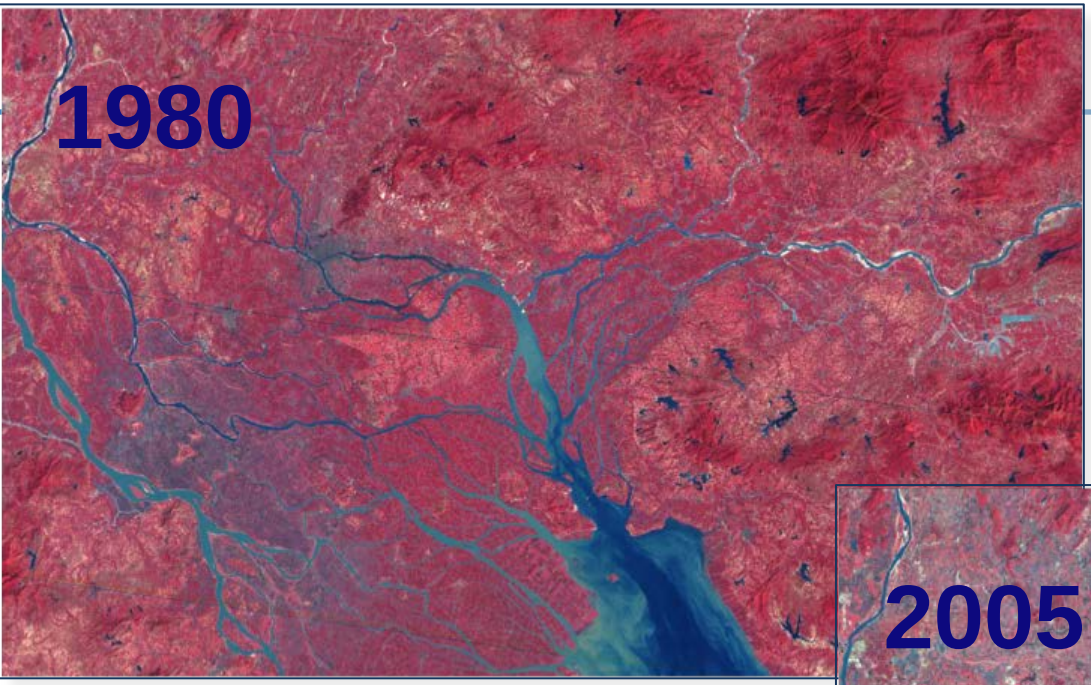
- By 2030, 87% of U.S. energy will be consumed in cities
- Urban growth is skyrocketing in developing economies, changing the global energy landscape

THE VISION

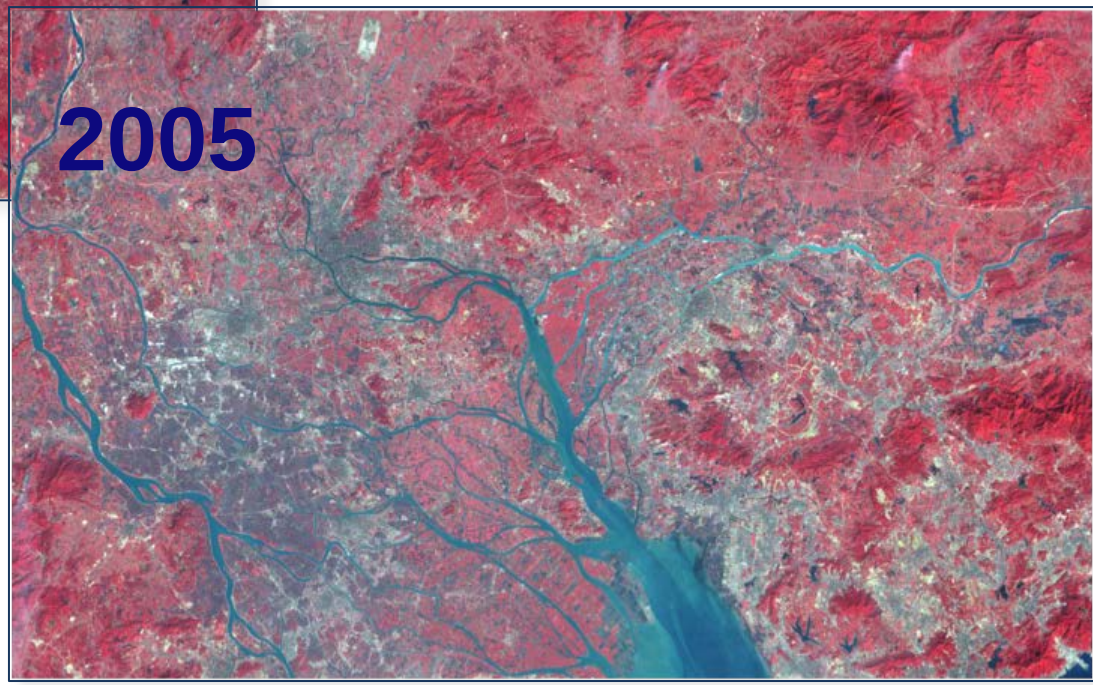
- Cities made livable through 'intelligent,' energy-efficient, renewable technologies: sensors & controls, predictive analytics & optimization, multi-scale computational models



United Nations, Department of Economic and Social Affairs, Population Division (2012); World Urbanization Prospects, the 2011 Revision, New York;



Environment and Climate: The Pearl River Delta in 1980 and today, illustrating the impact of urbanization on the planet.



Energy Security: By 2020, China will invest $300B in new infrastructure to transform the delta into a single 40M person city.

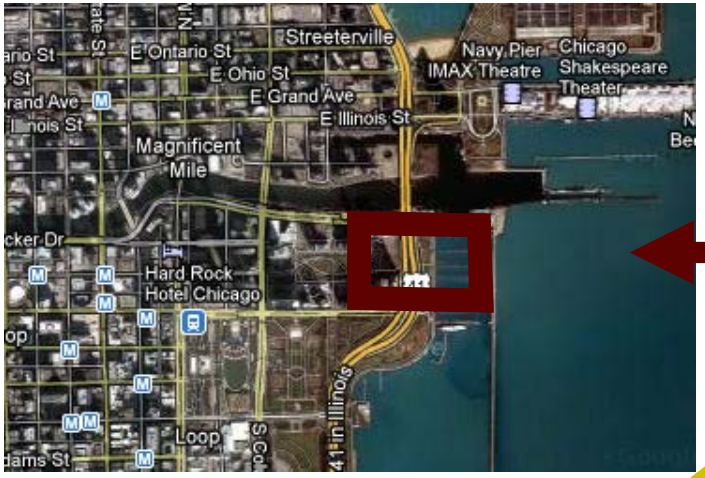
From buildings to transportation, this new infrastructure (representative of similar expansion elsewhere in China, in India, and elsewhere) will shape China's energy demand (and emissions).

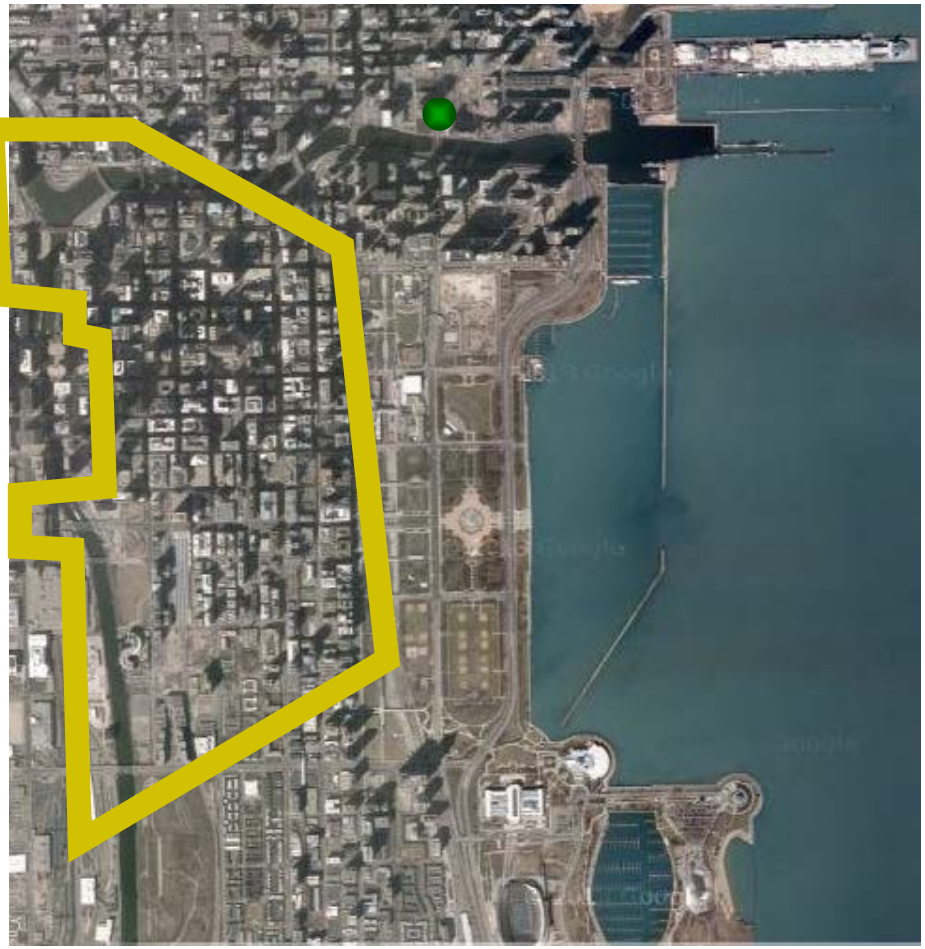
Computation-Enabled Urban Design

US Steel Plant
Chicago, Illinois
1930

Today's urban growth is driving *city-scale* development projects.

Experience Demand





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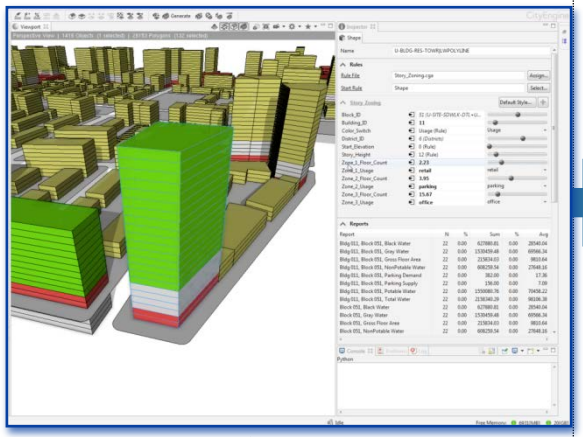
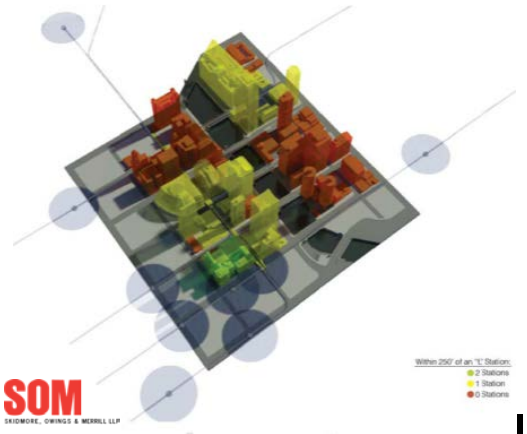
Existing Computational Simulations

Design



Infrastructure Geometry



Analyze

- Energy demand
- Water Demand / Waste
- Storm water
- Transportation

Plan

- Energy Supply
- Water/Sewage
- Storm water treatment/mgmt
- Streets, Public Transport

Decide

Financial, Economic Model

Independent consultant studies

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McCAFFERY Interests

USS Real Estate
Division of United States Steel

SOM

RAMBOLL

+ CLEAN ENERGY TRUST

SPACECO INC.

CISCO

WSP

General Electric

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What else?

Computation: Models and Analytics

- New city-scale computational models calibrated/validated by sensor and operational data
- Frameworks and analytical tools to build/run composite models of urban component models (e.g., buildings, vehicles, energy, water networks...)

Integrated and Optimized Design, Planning, Operation

- City design/re-design and planning tools to integrate and optimize zoning, building design, transportation design/operation with water/energy delivery, city operations.

Data: Sensors and Measurement

- Energy harvesting, self-identifying, self-commissioning, and self-calibrating sensors
- Sensor networks for:
  - Real-time optimization of traffic and individual vehicles
  - Building energy delivery and use based on current/predicted internal and external conditions, demands
  - Water, waste, and renewable energy sources
- Operational data acquisition to integrate economic, social, safety, and other factors to predict non-deterministic city-scale phenomena and trends

DISCUSSION?

Thank you

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