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


Decision and Information Sciences Division
Energy Engineering and Systems Analysis Directorate
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.
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).

Environment and Climate: The Pearl River Delta in 1980 and today, illustrating the impact of urbanization on the planet.
Computation-Enabled Urban Design
Today’s urban growth is driving city-scale development projects.
Existing Computational Simulations

Design

Infrastructure Geometry

Analyse

Energy demand

Water Demand / Waste

Storm water

Transportation

Plan

Energy Supply

Water/Sewage

Storm water treatment / mg mt

Streets, Public Transport

Decide

Financial, Economic Model

Independent consultant studies
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...)

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

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.
DISCUSSION?

Thank you
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