

Sustainable Infrastructures, Sustainable Communities

A Nation-Leading Program at the
University of Colorado Denver (UCD)

Dr. Anu Ramaswami, Professor and Director
Alison Culpin, Sustainability Outreach Project Coordinator
Luann Rudolph, IGERT Program Coordinator

IGERT Program on Sustainable Urban Infrastructure
Center for Sustainable Infrastructure Systems
University of Colorado Denver





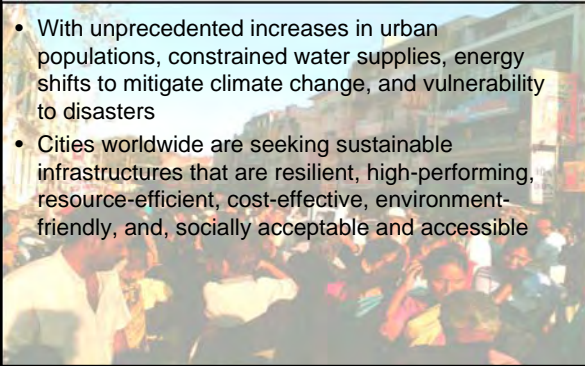
Where We Are

- Our research focus is on environment and infrastructures in cities in the US and world wide
- We are located in an urban campus
 - And, we have an excellent cadre of full time students doing research



Why Urban Emphasis?

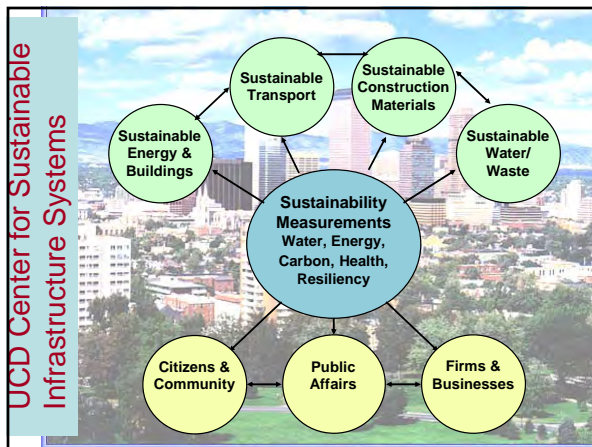
- With unprecedented increases in urban populations, constrained water supplies, energy shifts to mitigate climate change, and vulnerability to disasters
- Cities worldwide are seeking sustainable infrastructures that are resilient, high-performing, resource-efficient, cost-effective, environment-friendly, and, socially acceptable and accessible



Why Urban Infrastructure Systems?


- **Infrastructure systems** are:
- “The framework of interdependent networks and systems comprising identifiable industries, institutions (including people and procedures), and distribution capabilities that provide a reliable flow of products and services essential to the defense and economic security of the United States, the smooth functioning of government at all levels, and society as a whole”

President Clinton's Executive Order 13010 (1996)



How Does UCD Work with Cities and Communities?

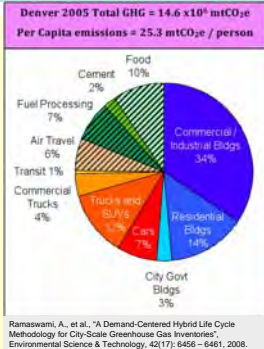
1. **Track sustainability baselines:** State-of-the-art carbon accounting for cities
2. **Scenario Modeling** w/ Task Force/Citizen Groups
3. **Customized Action Plan:**
 - Cost and savings
 - Expected participation rates
 - Technology effectiveness
 - Overall CO₂e reductions
4. **Pilot-test innovative actions** (e.g. home energy meters)
5. **Outcomes Assessment**



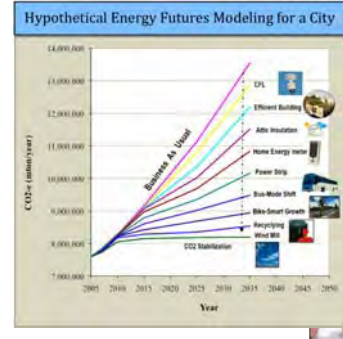
Community Meeting in Broomfield, CO

Measuring Sustainability: A Holistic Carbon Footprint For Cities

- It's not about carbon, but about understanding
- All infrastructure sectors linked together
 - Promotes innovative cross-sector, trans-boundary sustainability strategies
- Efficiency Benchmarks in each sector
 - Help in scenario modeling, quantitative goal-setting



Scenario Modeling in Cities : Public Engagement & Policymaking



Broomfield, CO:
Combining
Analysis with
Deliberation



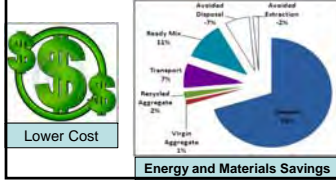
Innovative Technologies and Policies: Green Concrete Policies



High Strength and More Durable



Field-Tested



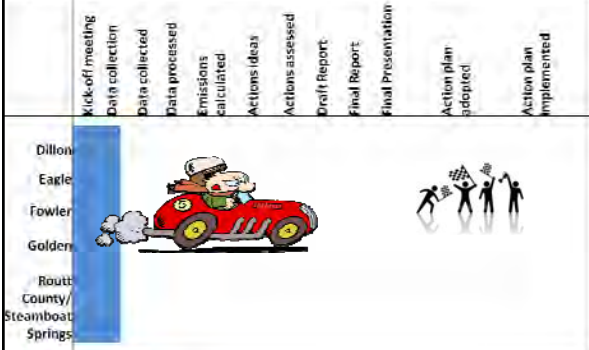
Lower Cost

Energy and Materials Savings

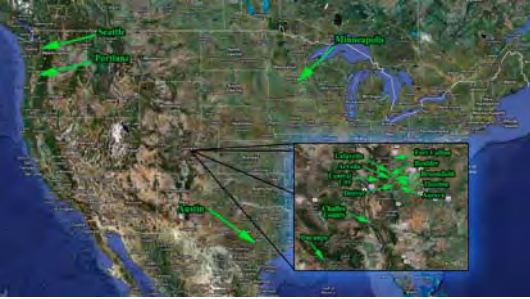
Outcomes Assessment of City-Scale Sustainability Programs



Small Communities Progress Evaluation



Our Work in US Cities



*Hillman, T; Ramaswami, A. "Greenhouse Gas Emissions and Energy Use Metrics for Eight US Cities." Reviewed positively, accepted to Environmental Science & Technology, accepted December 3, 2009.

Our Work in Global Cities

Our Global City Network*:

- Bangkok (city)
- Barcelona (city)
- Cape Town (city)
- Denver (city and county)
- Geneva (Canton)
- London (GLA)
- Los Angeles (county)
- New York City
- Prague (GPR)
- Toronto (GTA)

Cities in India:

Hyderabad, Rajkot and Coimbatore



*Kennedy, C et al. "Greenhouse Gas Emissions from Global Cities." Accepted to Environmental Science & Technology 2009, 43, 7297-7302, August 20, 2009.

Sponsored Program: National Science Foundation

- Integrative Graduate Education & Research Traineeship
 - \$3.2 Million grant
 - 26 total PhD students
 - Engineering, Public Affairs, Planning, Health & Behavioral Sciences
 - ~ 20 Masters students from many disciplines (MS Associates)
 - Certificate in Sustainable Infrastructure

Other Program Sponsors and Partners: Public Sector

- Colorado Cities:
 - Denver, Arvada, Central City, Broomfield, Aurora, Durango, Lafayette, Thornton
- Governor's Energy Office
- Colorado Municipal League (CML)
- National Civic League
- Urban Drainage and Flood Control District
- Colorado Department of Public Health & Environment
- Office of Naval Research
- US EPA – P3 Program

Other Program Sponsors and Partners: Private Sector

- **AT&T Foundation:** Faculty Fellowship in Industrial Ecology
- **Wal-Mart Foundation:** Outreach to Colorado Cities in partnership with CML
- **MWH:** Sponsored project with funded student
- **Clinton Global Initiative University Outstanding Commitment Award:** funding student outreach

Thank You!