

Greenprint Denver

Mayor John Hickenlooper's Sustainable Development Program



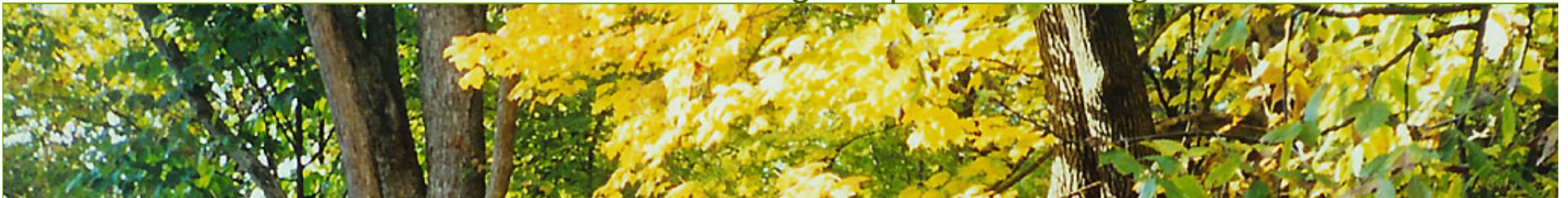
Laying the Foundation:
Denver's Attempt to Formulate
a Green Concrete Policy

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EPA Industrial Materials Summit

April 2, 2008

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Greenprint Denver

Denver's Action Plan for Sustainability



Mission Statement:

Greenprint Denver develops and implements sustainable solutions and services to make Denver a better place to live, work and play. We also strive to showcase Denver's national leadership in resolving resource challenges that meet the needs of current Denver residents while securing the economic, social and environmental health of future generations.

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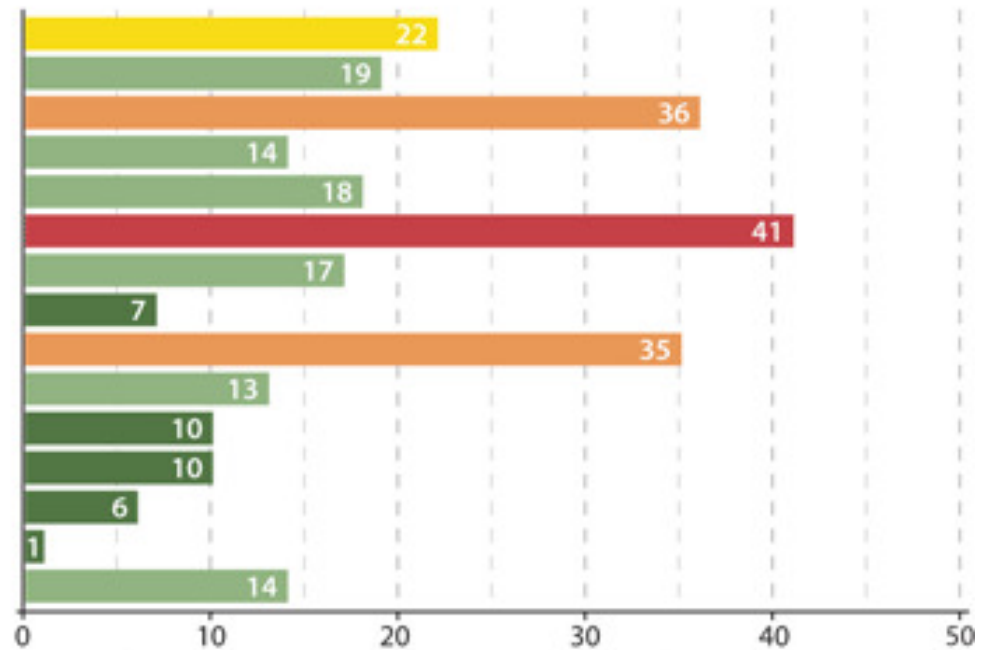




Where Denver Ranks

#9 Denver, Colorado

- City Commuting
- Metro Public Transit
- Metro Congestion
- Air Quality
- Tap Water Quality
- Solid Waste Diversion
- Planning/Land Use
- City Innovation
- Housing Affordability
- Natural Disaster Risk
- Energy/Climate Change Policy
- Local Food and Agriculture
- Green Economy
- Knowledge Base
- LEED (Green) Buildings



■ Sustainability Leader ■ Sustainability Advances ■ Mixed Results ■ Sustainability Challenged ■ Sustainability in Danger

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City-Scale Climate Actions are Crucial

- US Mayor's Climate Protection Agreement
 - Over 500+ Mayoral signatories in 2007
- Cities becoming increasingly important for sustainability policy and climate reduction strategies
 - 80% of population in urban areas
 - Local actions greatly influence land use and transportation policies
 - State and federal support needed

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Greenprint Denver Climate Action Plan

GOAL: Reduce greenhouse gas emissions
10% by 2012 (25% by 2020)



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A Need to Build Partnerships

- Urgent need to understand baseline emissions
- For greenhouse gas emissions:
 - Partnered with Univ. of Colorado at Denver and Dr. Anu Ramaswami and team
 - Opportunity for a sustainable partnership was a driving factor

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Comprehensive GHG Inventory

- City is viewed as a demand center for energy AND key urban materials
- End-use of energy in all buildings & industries located within Denver is inventoried
- Embodied energy of critical urban materials is included
 - Water, fuel, cement in urban concrete, food/packaging

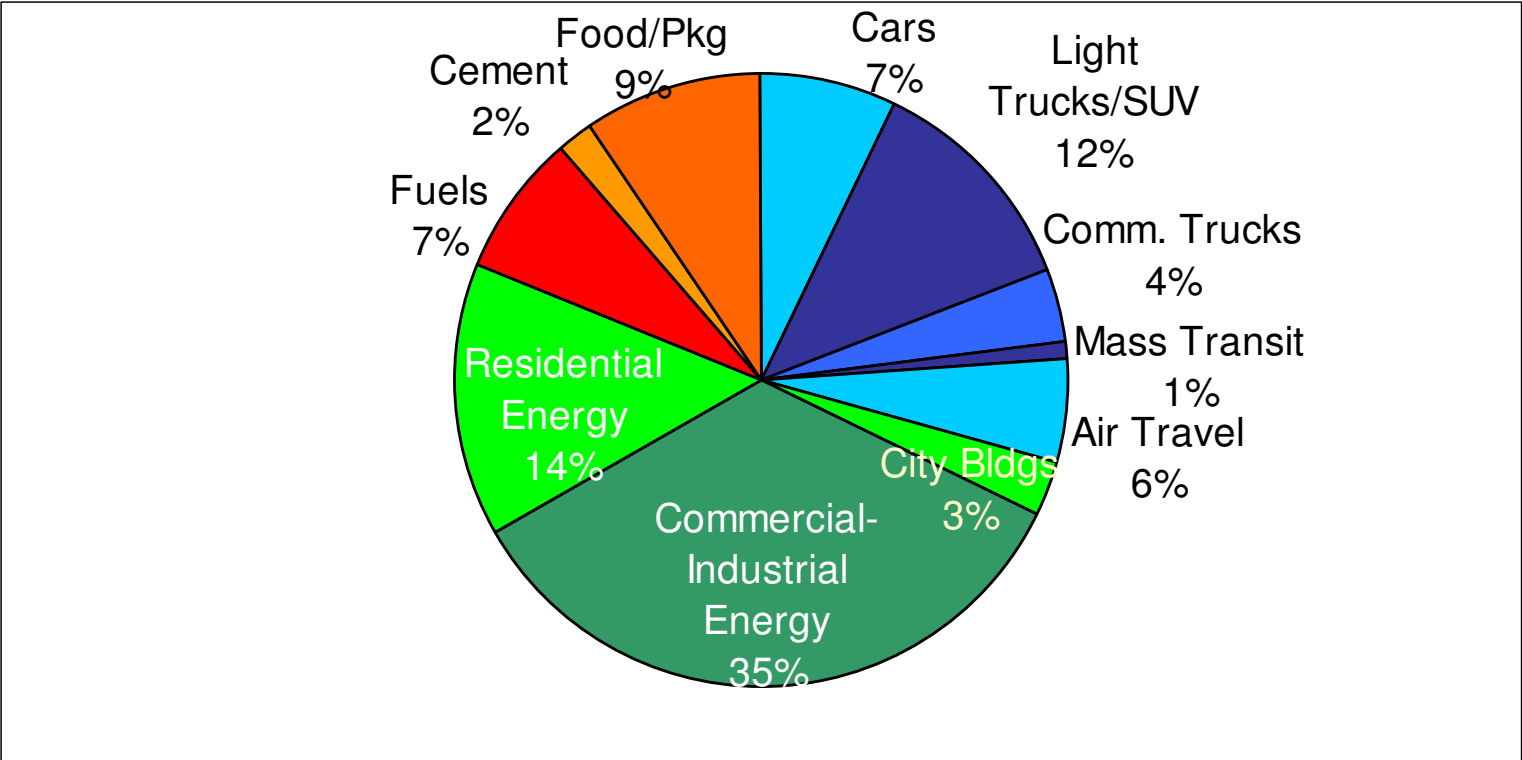
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2005 Greenhouse Gas Levels in Denver

Per Capita emissions = 25.5 mtCO₂e / person

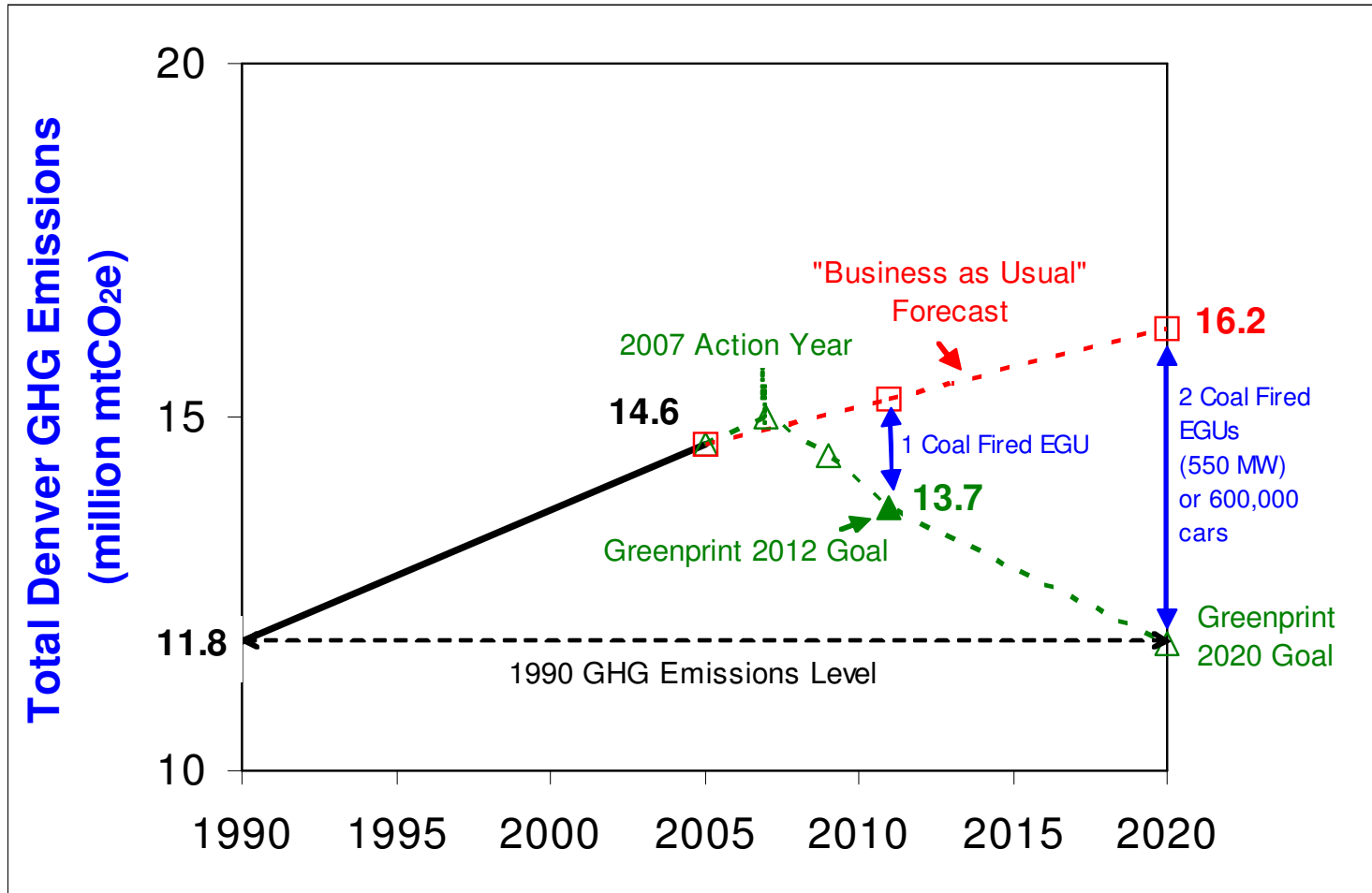


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Charting the Future



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Greenprint Advisory Council

- 33 Civic, Business, and Community Leaders
- Climate Action Plan proposed to the Mayor in May 2007
- Adopted by Mayor in October 2007
 - Includes Green Concrete Policy as a goal for public and private sector projects

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Laying the Foundation

- Mayor adopts Executive Order 123
 - Creates City's Sustainability Policy
 - Includes City's first Green Building policy
 - Building and infrastructure projects will use concrete consisting of at least 20 percent fly ash
 - Tied to cost differential of cement vs fly ash
 - Construction and demolition waste will be recycled (city funded projects)

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Better Denver Program

- Voters approve 9 ballot issues totaling \$550M
 - Repair existing infrastructure and build new
 - 68 projects
 - Private contractors introduced to city policies
 - Influence market forces without mandates

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Green Concrete Policy

- City needs to be comfortable with own policy before thinking bigger (citywide)
- Within City government, there is still healthy debate between when/where green concrete should be used
- For 2008, green concrete is targeted for flatwork projects
 - Pavement, alleys, gutter, bridge (800,000 ft³)
- Track baseline fly ash use and C&D in 2008

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Green Concrete History

- UCD and Denver Public Works field test 20% Fly Ash concrete in the lab and in the field
 - lab tests perform as well as Portland cement, more durable, 15-30% life cycle GHG reductions
 - field tests also performed well
 - High fly ash panels (60%) did not hold up well
- Moving from flatwork to structural will require further discussions and experience
 - More experience with fly ash than recycled aggregate

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Green Concrete Challenges

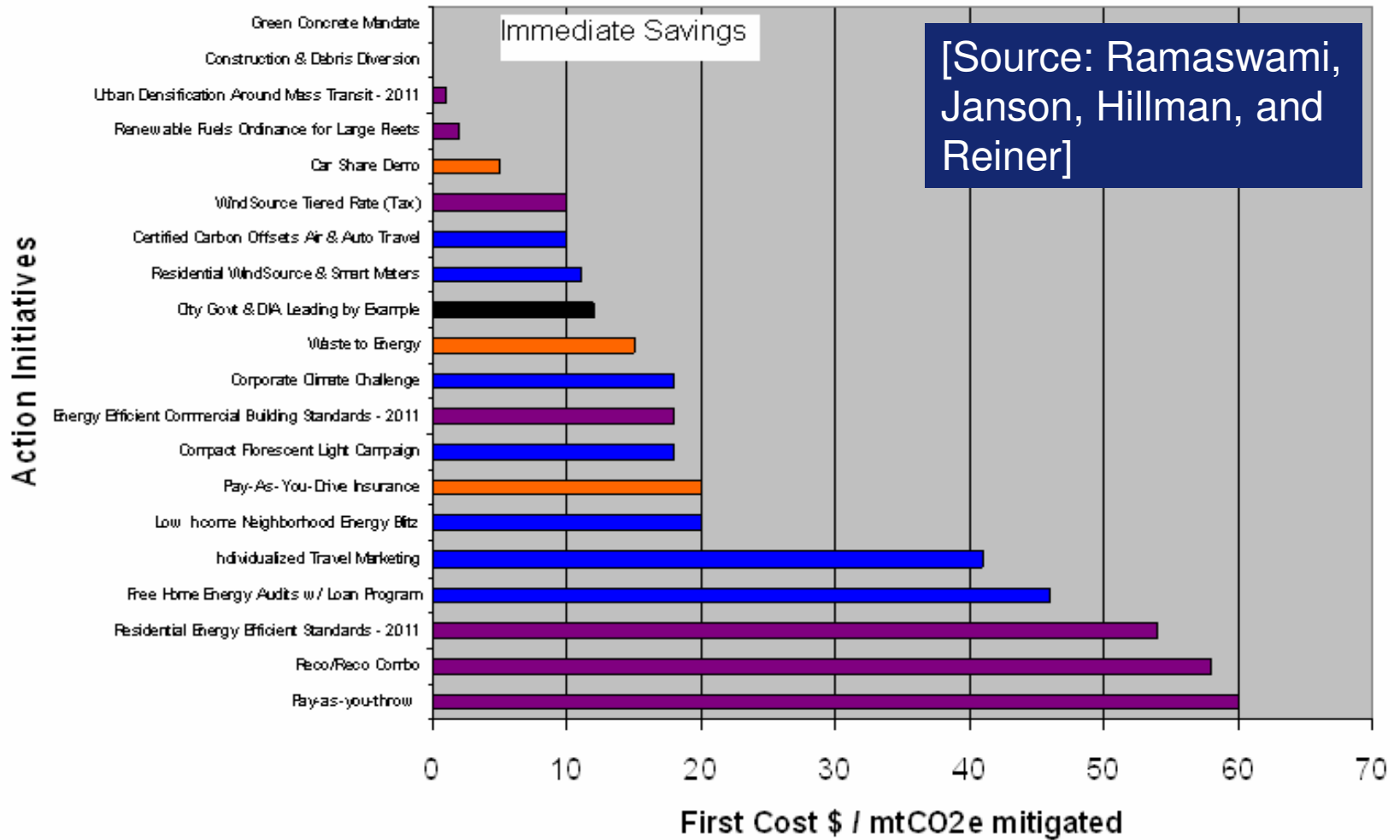
- Impact of Mercury Controls on Fly Ash
 - Federal CAMR vacated
 - Potential MACT standards may change outlook in certain areas
- Local supply of Portland Cement to increase
- XO 123 tied to cost differential
- Gaining experience with structural fly ash
- Recycled aggregate in all types of concrete

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Cost-Benefit of GHG Strategies





Ongoing Discussions (re: carbon credits)

- American Coal Ash Association
- Colorado Ready Mix Concrete Association
- Cement Industry
- Concrete Recycler(s)
- Regulatory Agencies
 - Greenprint, Public Works, Planning, Env Health
 - Colorado Dept of Transportation (CDOT)
 - EPA Region VIII

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Summary

- Climate Action Plan has put City on purposeful path to sustainability and GHG reductions
- Have developed partnerships along the way that will be sustainable
- Have broken down silos common in local governments
- Fly Ash-Recycled Aggregate Policy in Denver could save more than 55,000 mtCO₂e per year
- Significant cost savings and added durability

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More Information

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