

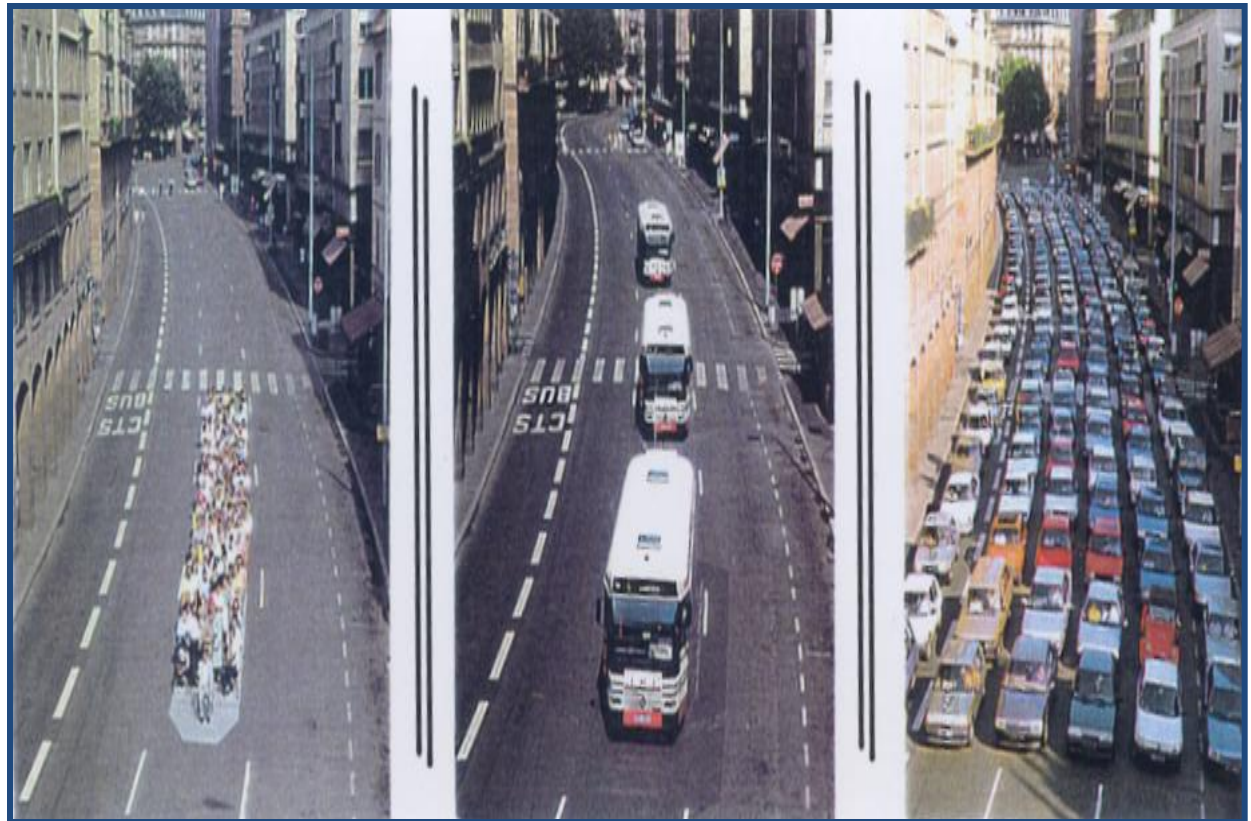
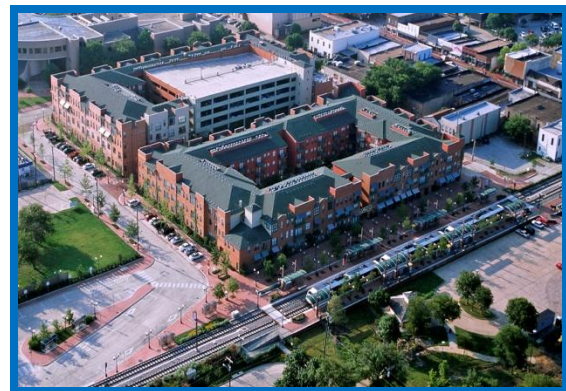
Please note that this presentation
was given during the United
Nations Climate Change
Conference (COP-15) in
Copenhagen, December 7-18, 2009
for more information please visit
<http://www.cop15.state.gov/> .



Public Transit & Low-Carbon Cities

Session on: *Buses, Trains, and Commuter Vans:*
Reducing Carbon through US Public Transit

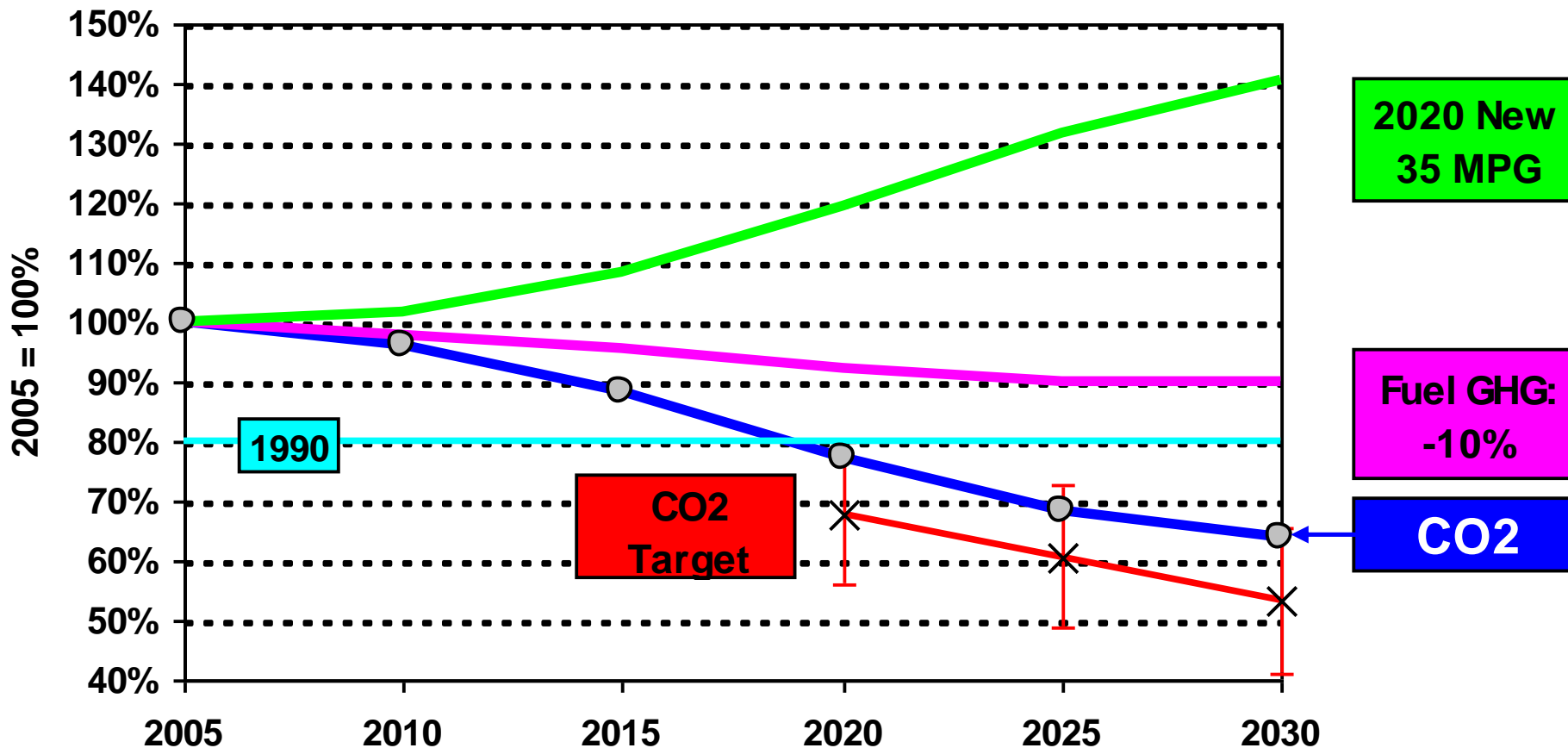
Robert Cervero, University of California, Berkeley
COP15 Copenhagen





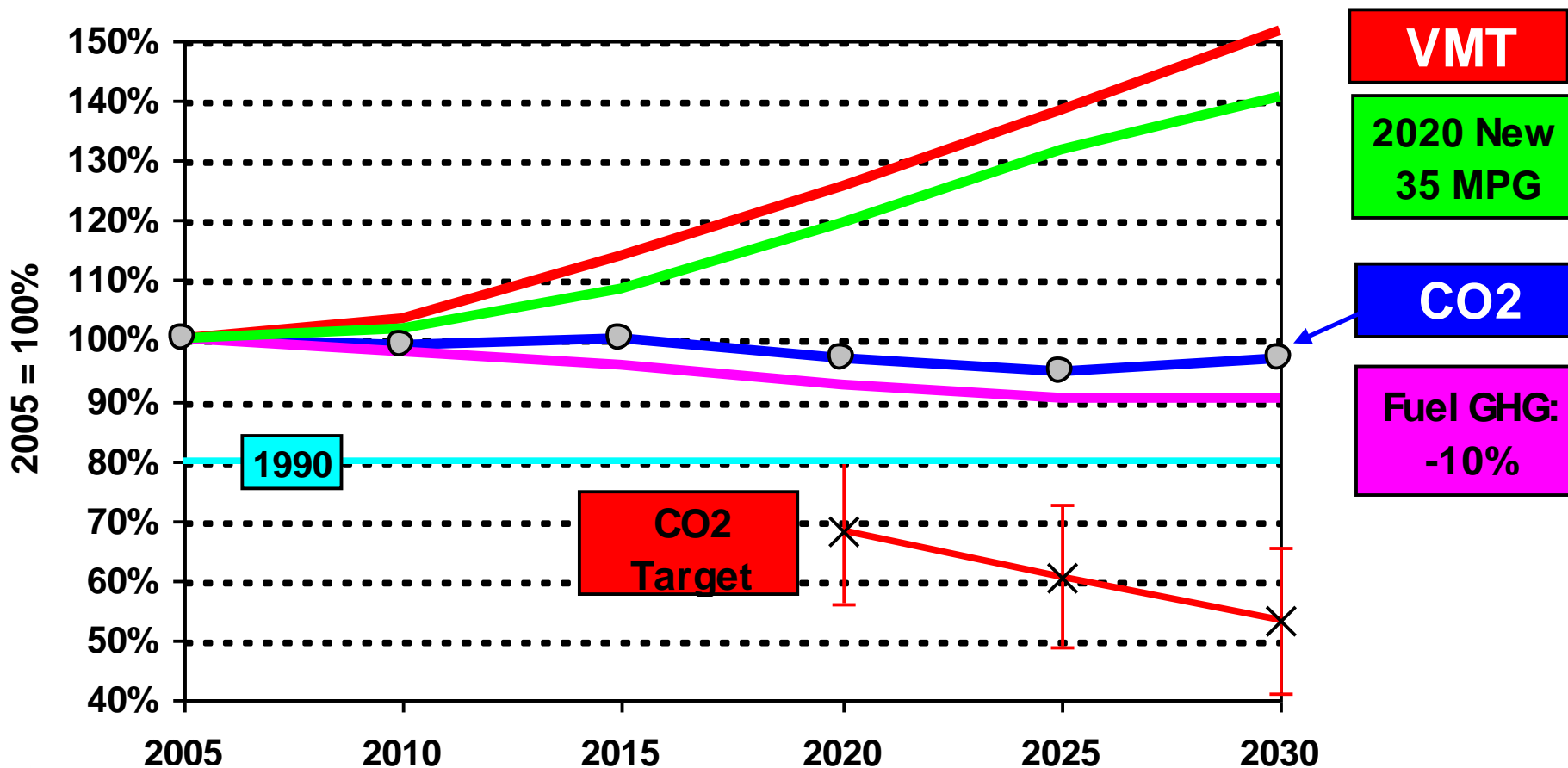
Technology Alone Won't Reverse Global Warming

U.S. Projections: 2005-2030





Technology Alone Won't Reverse Global Warming U.S. Projections: 2005-2030



Transportation CO₂

Vehicles

SUSTAINABLE TECHNOLOGIES

Fuels

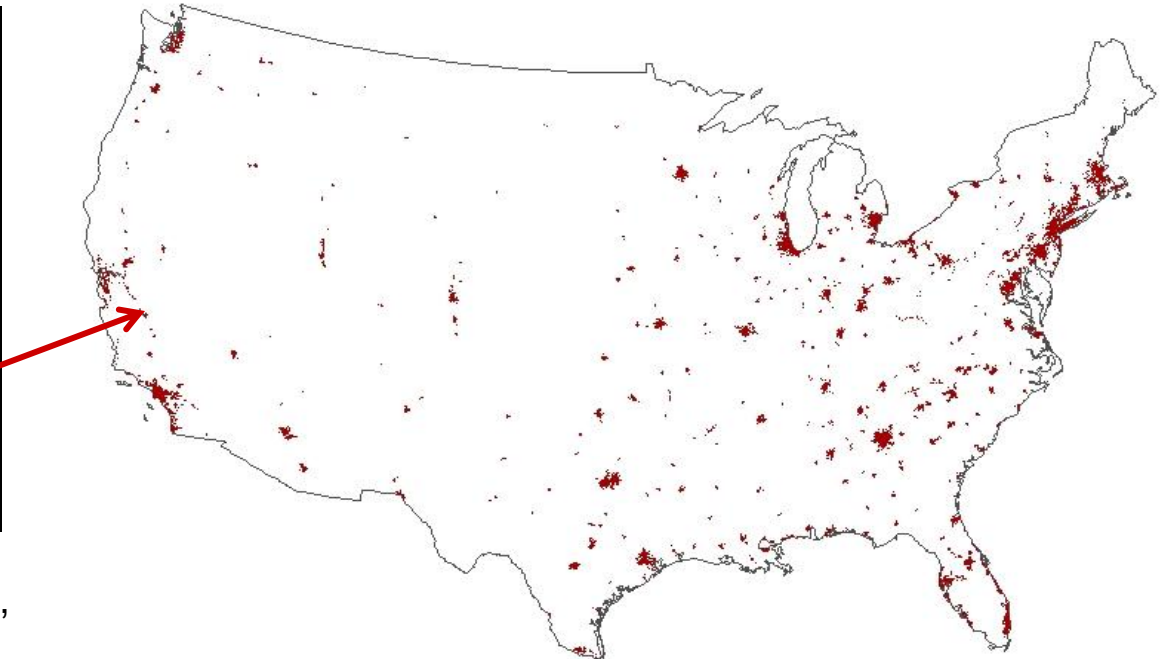
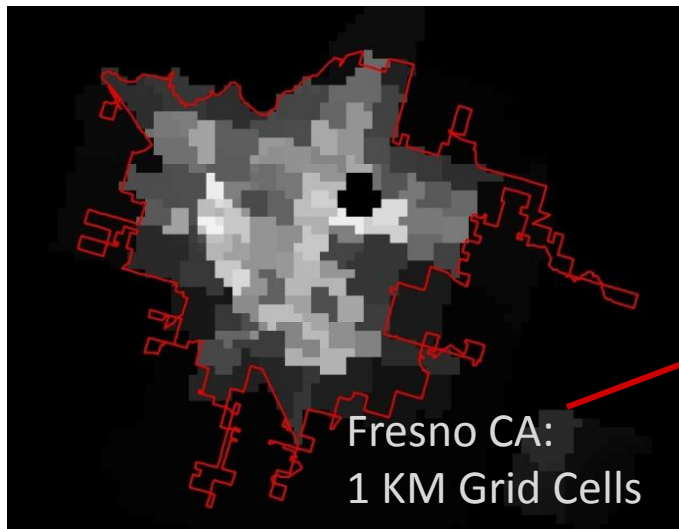
VMT

**SUSTAINABLE
URBANISM**

Study of VMT & Carbon Footprint across 370 U.S. Metropolitan Areas, 1990-2004

$$\text{GHG Emissions} = \underbrace{\left[\frac{\text{Gallons}}{\text{Mile}} \right]}_{\text{Fuel Consumption}} \times \underbrace{\left[\frac{\text{Carbon}}{\text{Gallon}} \right]}_{\text{Carbon Content}} \times \underbrace{\left[\text{Vehicle Miles Traveled} \right]}_{\text{Activity}}$$

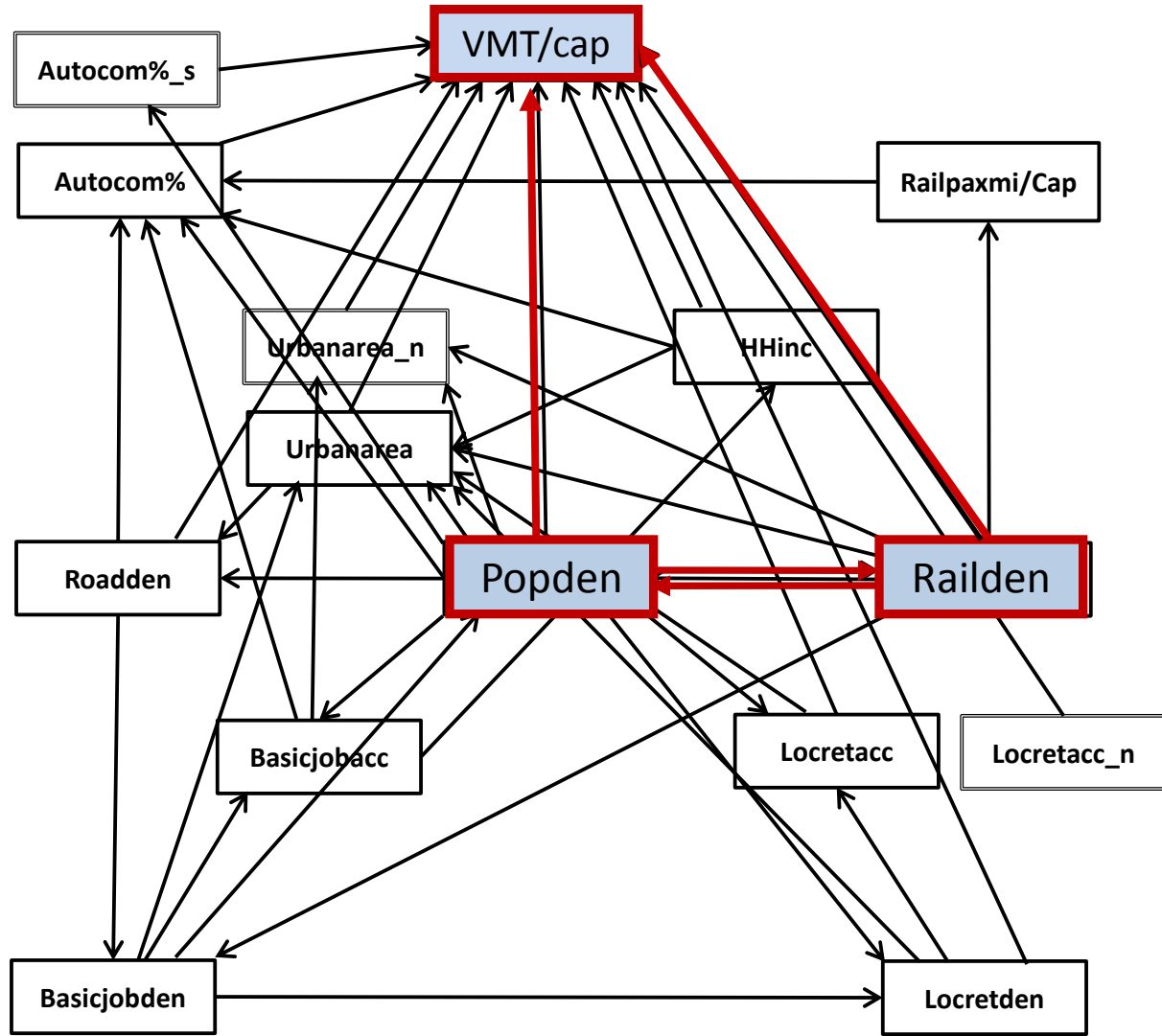
Sustainable Mobility Sustainable Urbanism



Source: Cervero and Murakami (2010),
Environment and Planning A.

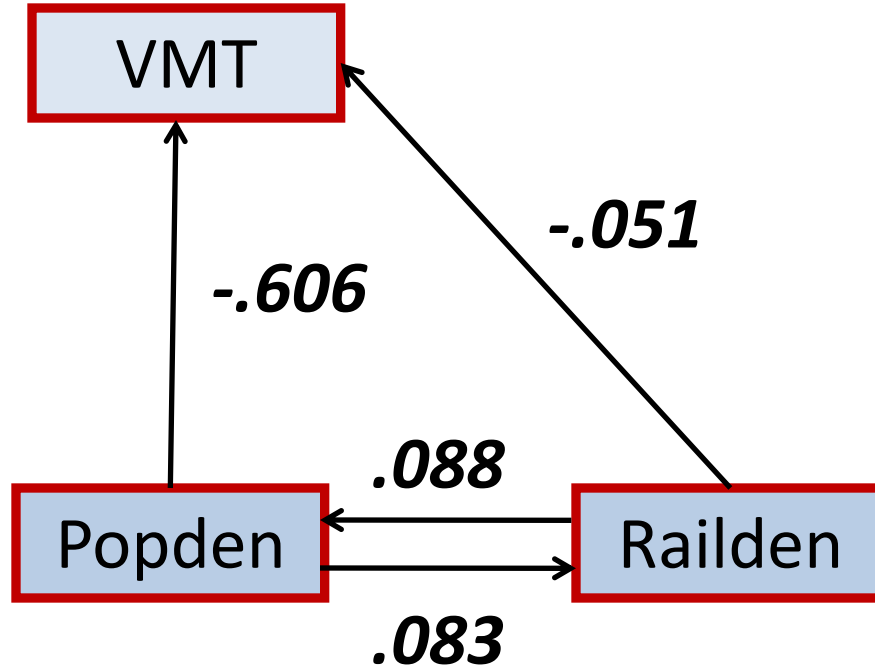
Infrastructure, Built Environments & VMT/Capita

Structural Equation Model



Daniel Moynihan:
“The curse of planning is everything’s related to everything”

Historically, Fairly Modest Rail-Land Use Links



Elasticities:

Direct: $(\% \Delta \text{VMT}) / (\% \Delta \text{ in Rail Track KMs}) \approx -0.051$

Indirect: $(\% \Delta \text{VMT}) / (\% \Delta \text{ in Rail Track KMs \& Density}) \approx -0.50$

Transit Oriented Development (TOD)

- Compact
- Mixed Land Uses
- Pedestrian-friendly design
- Physically “oriented” to transit; not just “adjacent”

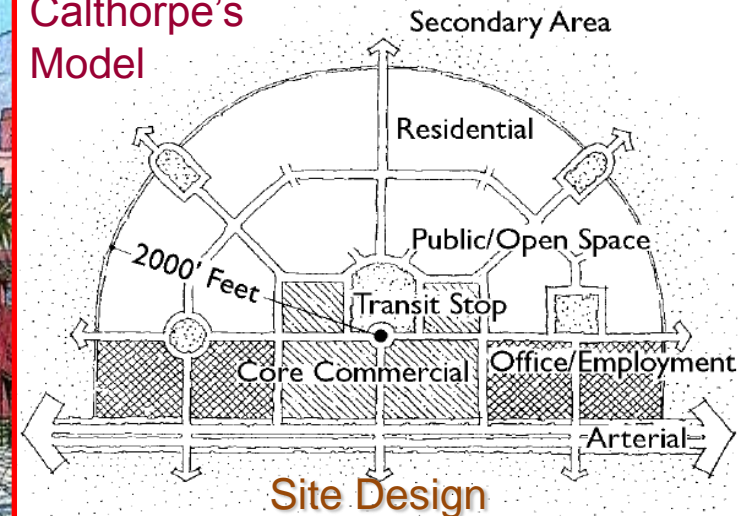
Transit Station Milieu – “A Place to Be...
Not Just to Pass Through”

Scope

In US, ~ 100 TODs (out of 2800 passenger rail stations) ...~3.5% of stations

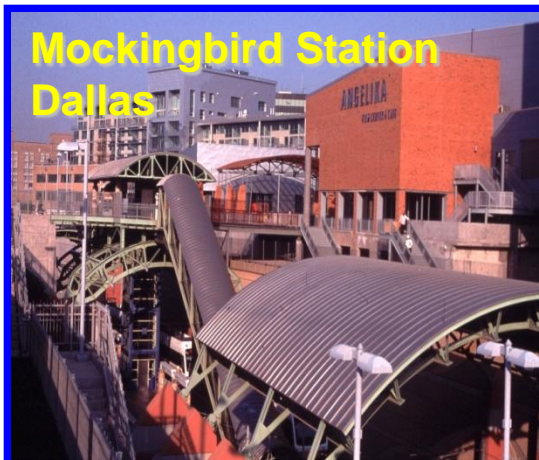


Calthorpe's Model

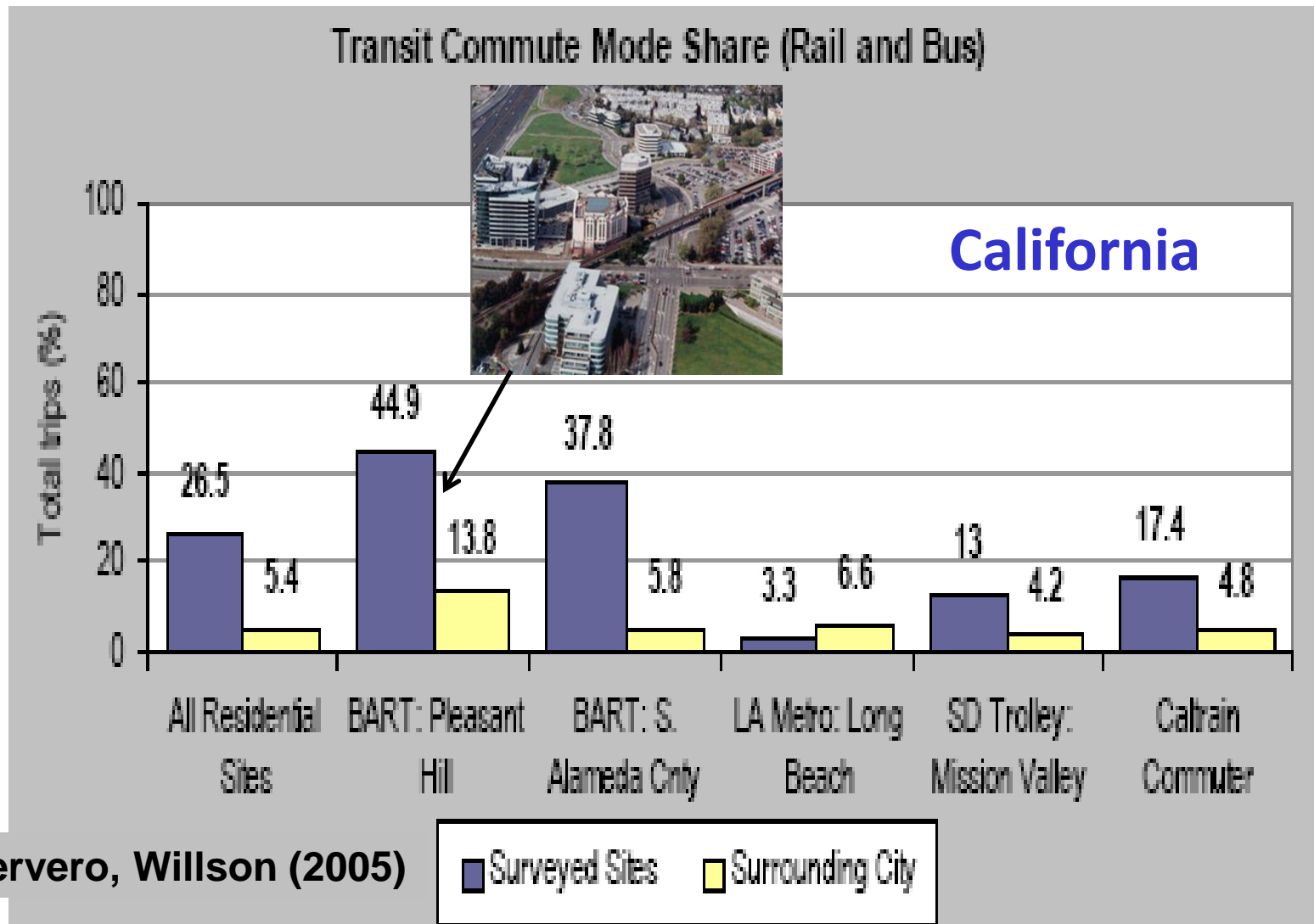


Market responsive

- In U.S., TOD has the potential to accommodate **25% of all new metro households** (Center for TOD 2004; Urban Land Institute, 2004)
- TOD ranked as the top real estate investment prospect (*Emerging Trends in Real Estate*® by ULI and PricewaterhouseCoopers every year since 2005)
- CTOD estimates doubling of US HHs living within walking distance of rail station: **2000 – 6.2 million HHs**
2030 – 15.2 “ “



- **Ridership Bonus:** Transit commute shares exceed surrounding city by a factor of 5

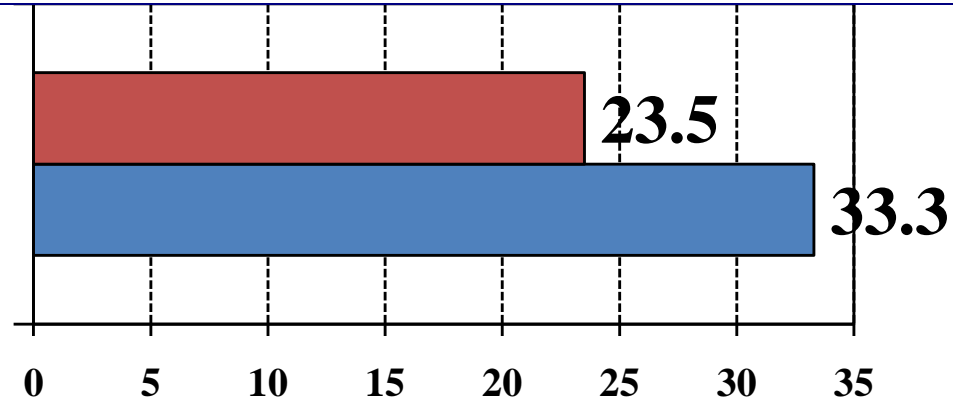


TOD, VMT, and Carbon

California Research

Mean Daily Commute VMT

■ TOD ■ Prior Residence



Lund, Cervero, Willson (2005)

- **Portland, San Francisco, Washington DC, New Jersey:** Vehicle Trip Generation Rates of TOD residents were 44% below typical suburban rates. Cervero and Arrington (2008)



Less by:

- 44% all day
- 49% AM Peak
- 48% PM Peak

- If 20% of new metro HHs from 2010-2030 live near rail stops, could reduce VMT & GHG emissions in metro areas by ~ **9%-10%** or ~ **15 million metric tons of CO₂e annually** relative to “Business as Usual”

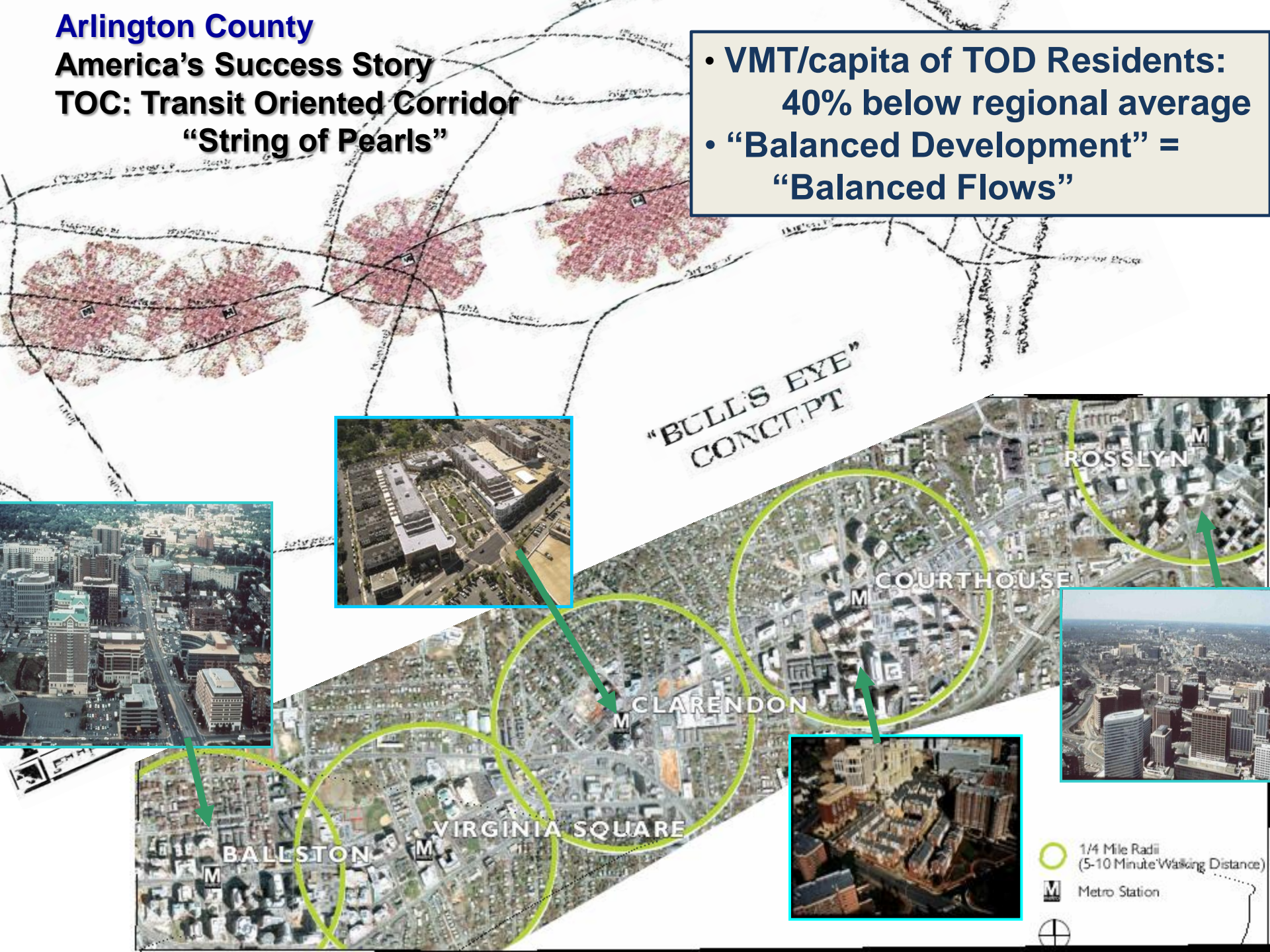
Arlington County

America's Success Story

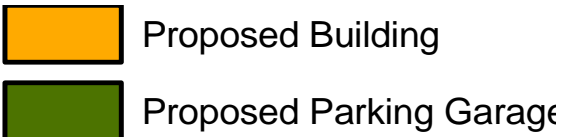
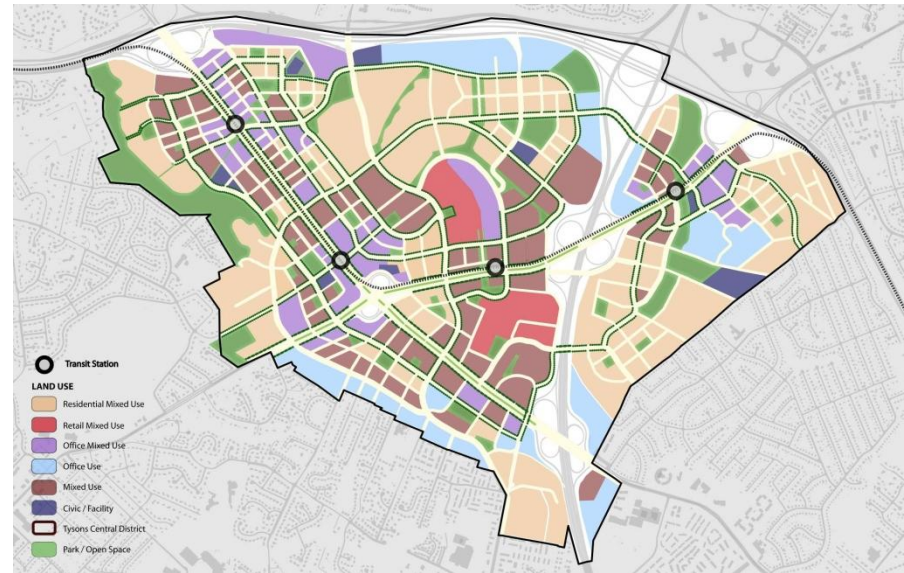
TOC: Transit Oriented Corridor

"String of Pearls"

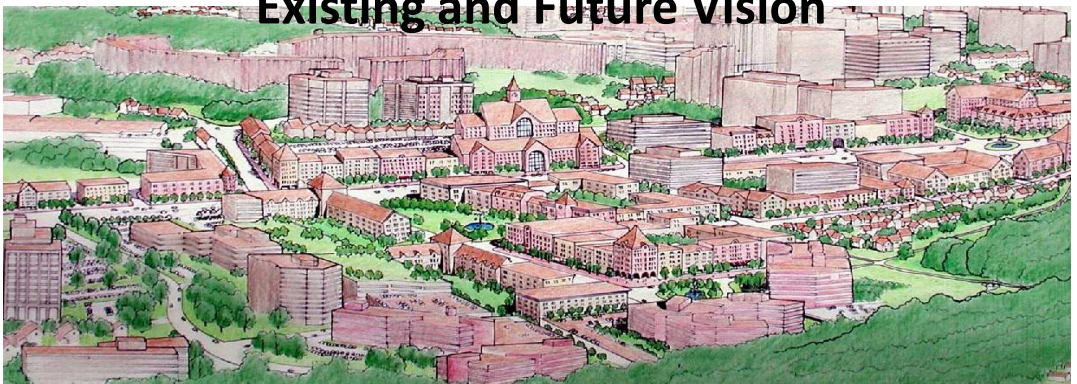
- VMT/capita of TOD Residents: 40% below regional average
- "Balanced Development" = "Balanced Flows"



Extending Metrorail to Tysons Corner: From Car-Oriented Edge City to TOD



Tysons West Station Area
Existing and Future Vision



8 Unique Districts



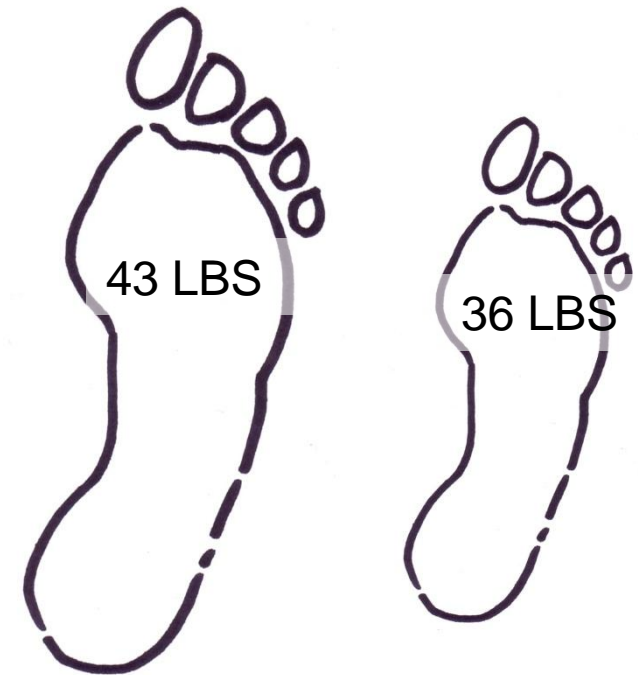
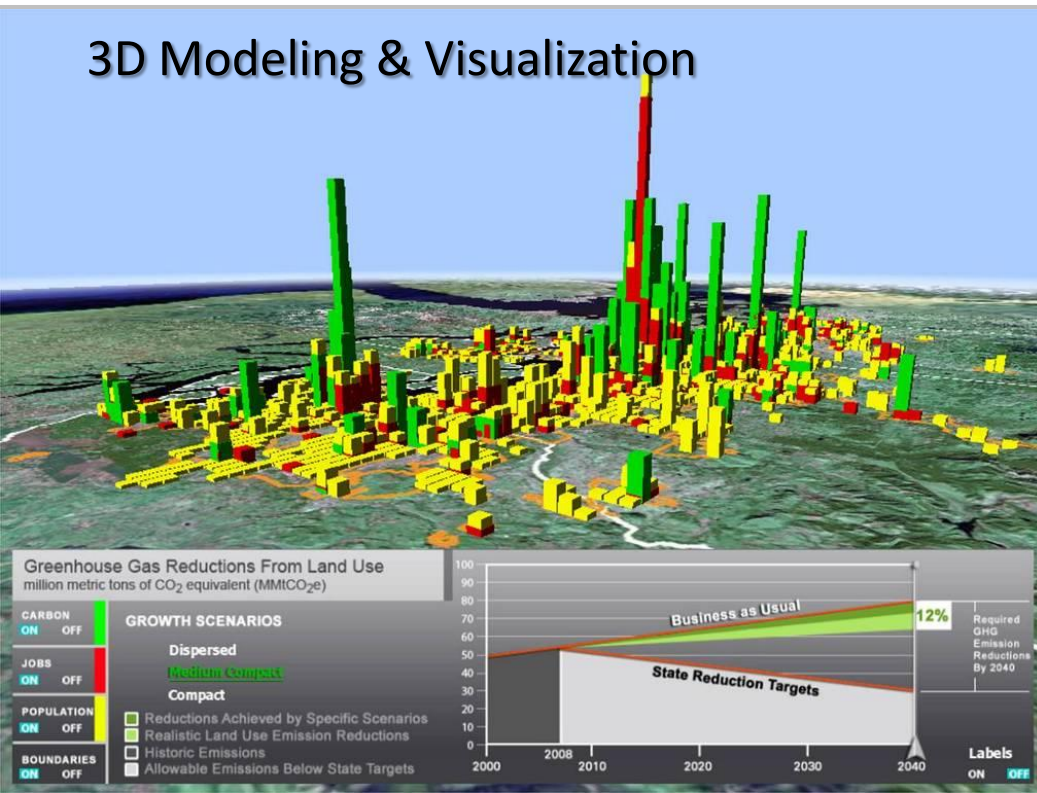
Tyson's Central 7

Lower Carbon Footprint

- Greenhouse Gas emissions
16% less per capita
- 2.5 billion lb reduction
annually

Daily CO₂E Per Capita

3D Modeling & Visualization



Base Case

TOD

Green TOD

A Marriage of TOD & Green Urbanism

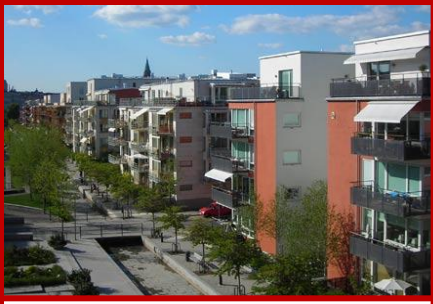


TOD *Mobile Sources*

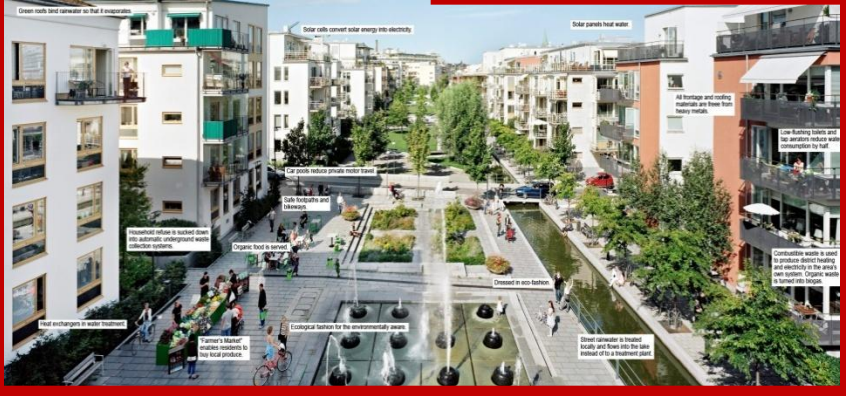
- **Transit Design**
World-class transit (trunk & distribution)
Station as hub
- **Reduced VKT** (30%-50% ridership bonus)
- **Non-motorized access** (bikepaths, ped-ways)
- **Bikesharing/Carsharing**
- **Minimal Parking** (reduced land consumption, building massing & impervious surfaces)

Green Urbanism *Stationary Sources*

- **Energy self-sufficient** (renewably powered – solar, wind turbines)
- **Zero-waste** (recycle; re-use; methane digesters; rainwater collection for irrigation & gray-water use)
- **Community gardens** (compost, canopies, food security)
- **Buildings: Green Roofs, Orientation** (optimal temperatures), **Materials** (recycled; low impact)



Hammarby Sjöstad



Malmö

Balance, Variety, Choice

Sustainable Mobility



*It's easier to get pollution,
than people, out of cars*



Sustainable Urbanism



*Also need sustainable Cities &
Regions...broadly defined*

....

Conservation must be part of the equation

