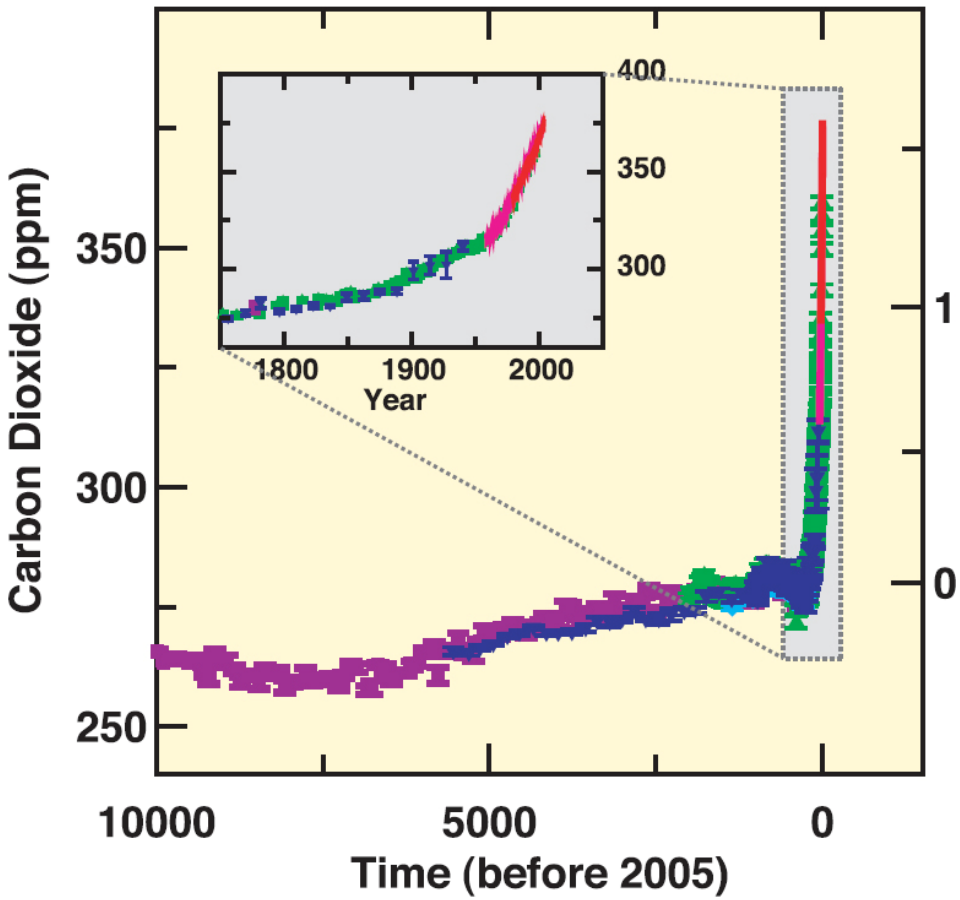
Growing Cooler: The Evidence on Urban Development and Climate Change

Reid Ewing
National Center for Smart Growth
University of Maryland

MWCOG, September 26, 2007

Unprecedented CO_2 Rise



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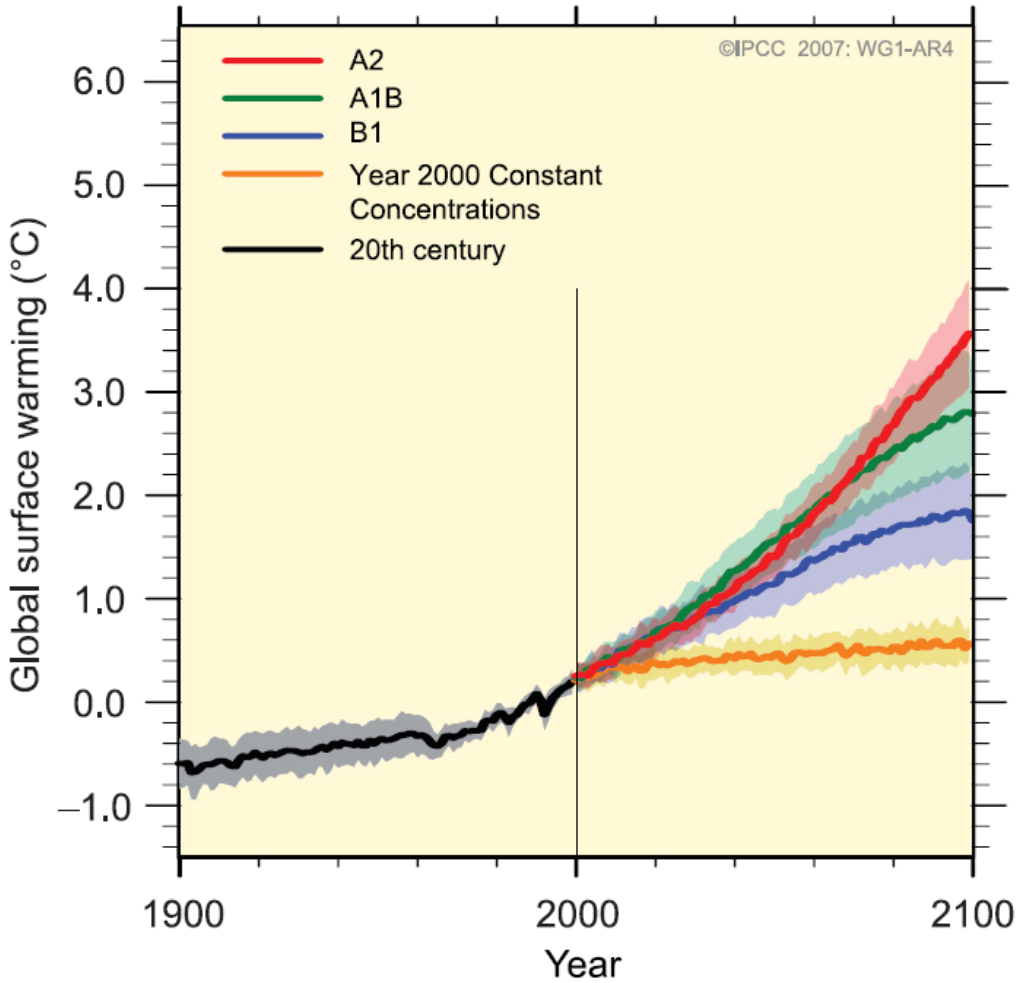
Inevitable Global Warming



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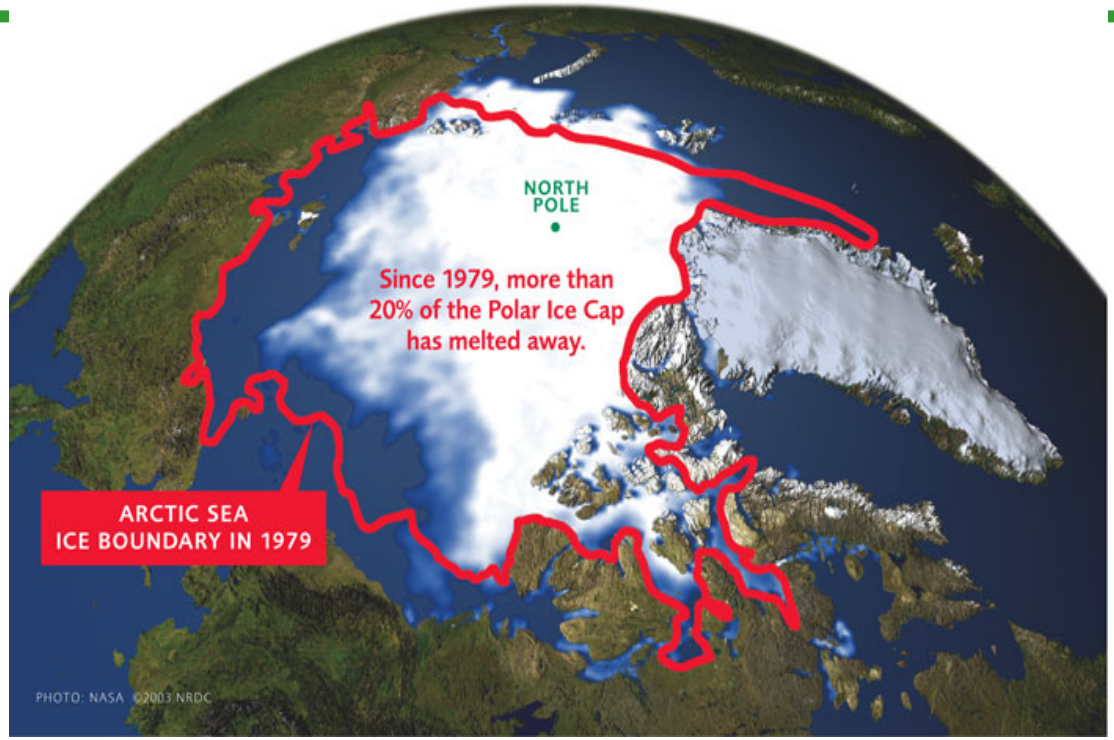
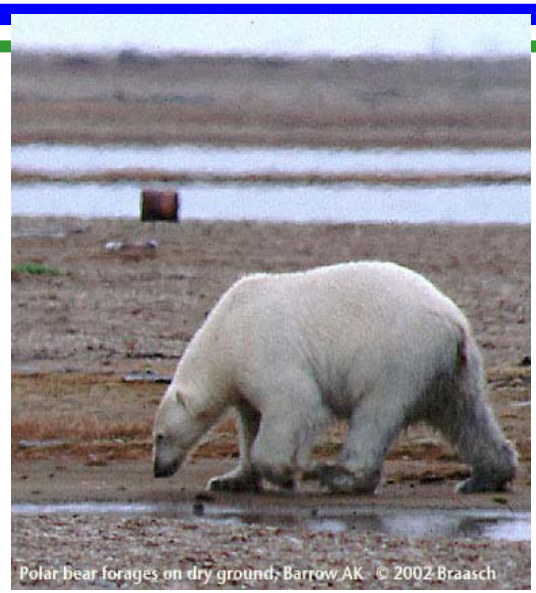
Global Warming Fingerprints





The listing of polar bears as threatened under the U.S. endangered species act will name global warming as the main threat, a first.

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Climate Change Science

- IPCC 2007
  - » Warming of the climate system is unequivocal
  - » Humans are responsible for most of the warming in the last half century
  - » Likely range of warming: from 1.1°C to 6.4°C by 2100
- Emerging international consensus: need to limit warming to at most 2°C to 3°C

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Climate Change Impacts at 2 to 3°C

- More than 1/3 of species at risk of extinction (corals, polar bears…)
- Amazon rainforest & Great Lakes ecosystem at risk of collapse
- Hundreds of millions displaced from coastal areas, at risk of hunger
- Partial deglaciation of Greenland Ice Sheet expected to begin: sea level to increase 4-6 meters over centuries to millennia

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US must cut Greenhouse Gases 60-80% below 1990 levels by 2050

- **15-30% below 1990 by 2020 to keep on track**
  - » US GHGs now 20% above 1990 levels
  - » Delayed action means higher risks and costs
- Transportation about 1/3 of US CO2 emissions, and growing fastest
- **Major reductions will be needed in all sectors**
  - » Other sectors (electricity, industry) unable to compensate for transportation

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Transportation Greenhouse Gases: 3 Legs of a Stool

1. Vehicle Efficiency (mpg)
2. Fuel Greenhouse Gas content (Fuel GHG)
3. Vehicle Miles Traveled (VMT)

- Need progress on all 3 legs, but climate policy discussions have ignored VMT

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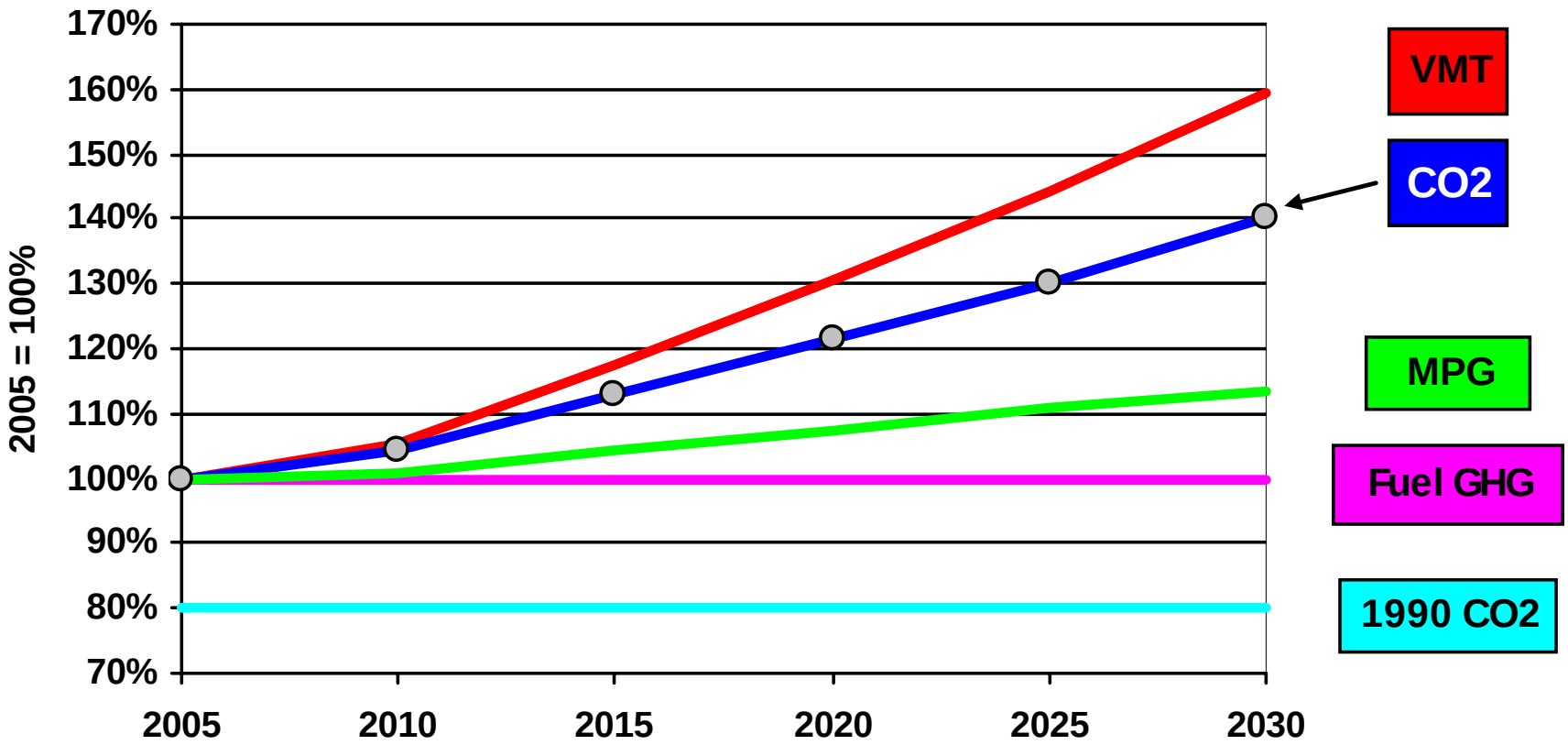
US VMT Growth Projected to Outpace Vehicle & Fuel Improvements (Fig 2-3)



Source: EIA AEO 2007

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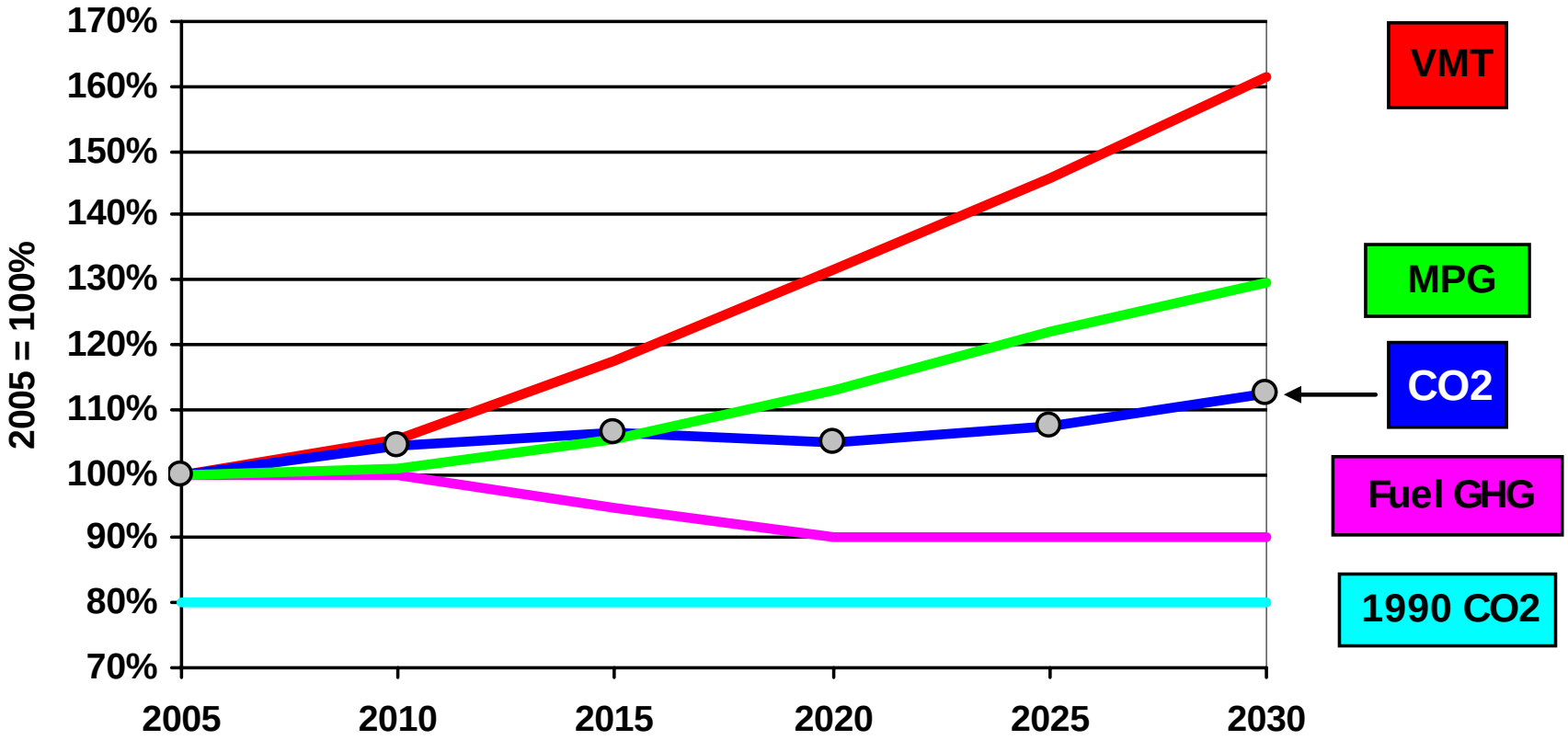
Senate CAFE (35 mpg) + CA Fuel stds (-10%): 40% above 1990 levels in 2030 (Fig 2-4)



Sources: VMT: EIA with 10% rebound MPG: US Senate, Fuels: CARB

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The 3 Questions Answered in *Growing Cooler*

1. What reduction in vehicle miles traveled (VMT) is possible in the United States with compact development rather than continuing urban sprawl? (Ewing)

2. What reduction in CO2 emissions will accompany such a reduction in VMT? (Ewing)

3. What policy changes will be required to shift the dominant land development pattern from sprawl to compact development? (Chen)
   - And what do consumers want?

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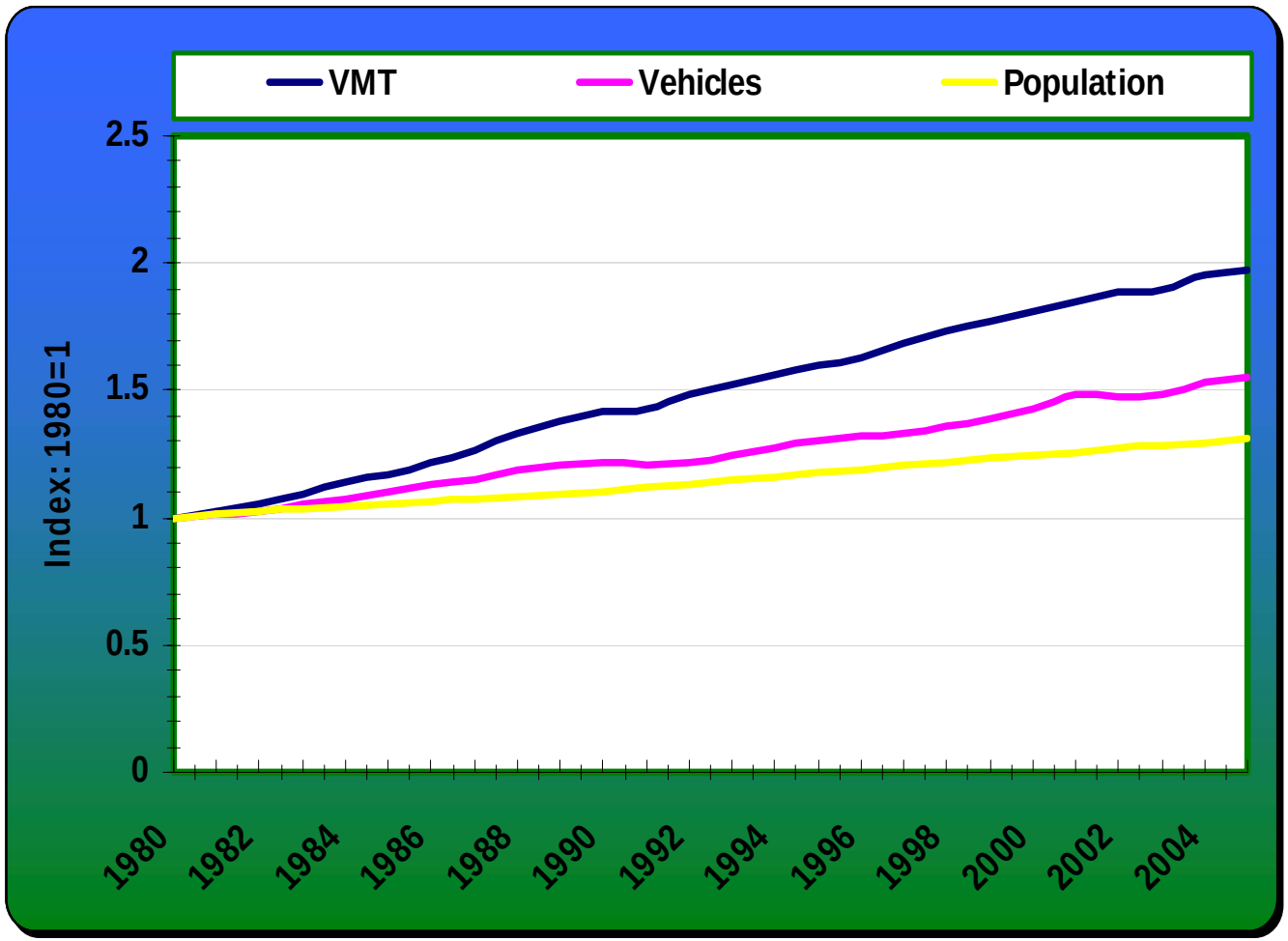
Reid Ewing
Research Professor
University of Maryland

We have been studying sprawl for a long time

So when EPA asked these questions, we could draw on a lot of research

U.S. Growth of Driving



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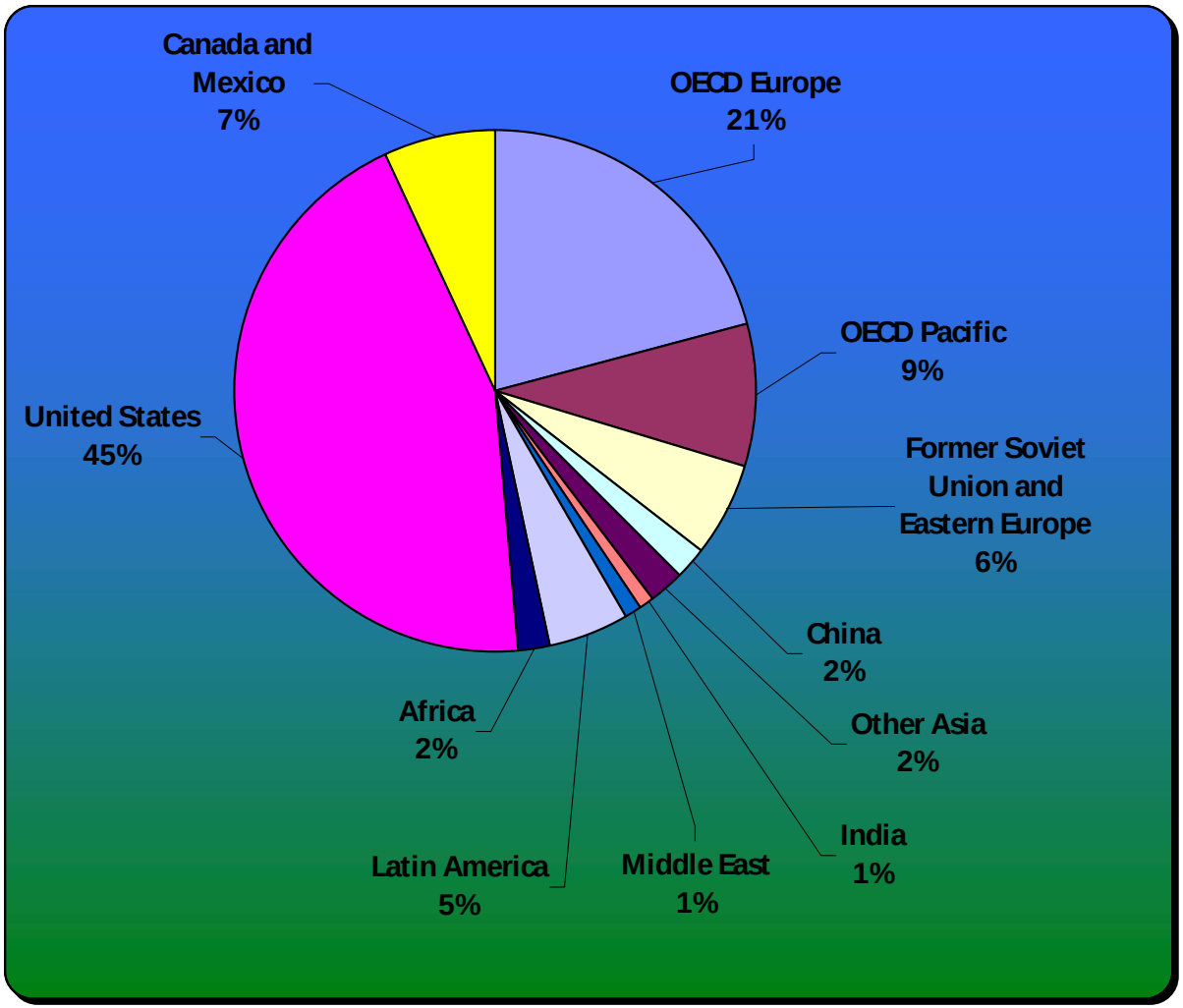
U.S. Share of Car Emissions



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Four Literatures – Core of ULI Book

- Aggregate travel studies
- Disaggregate travel studies
- Regional simulation studies
- Project simulation studies

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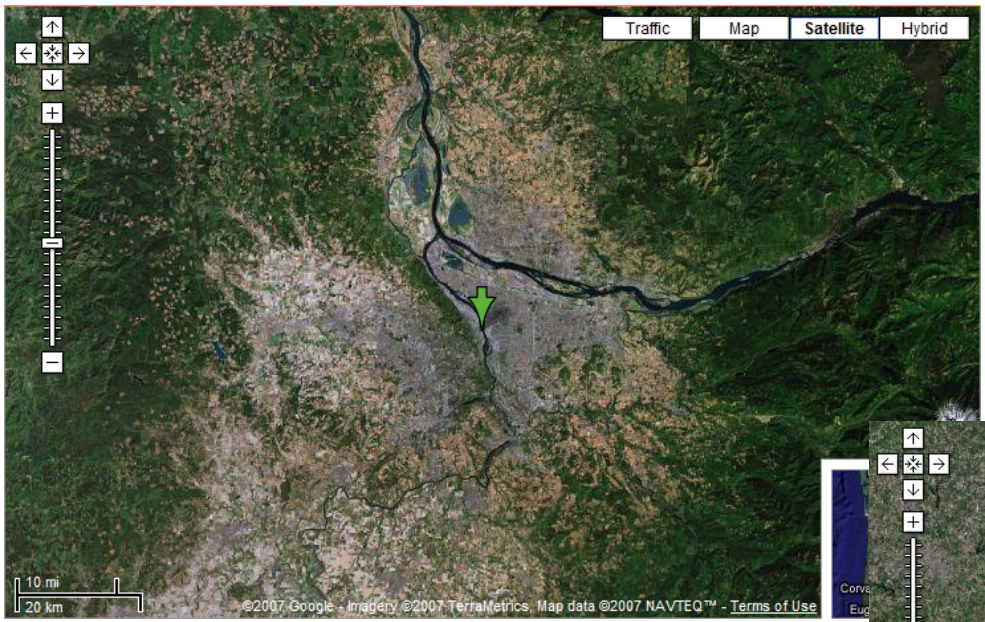
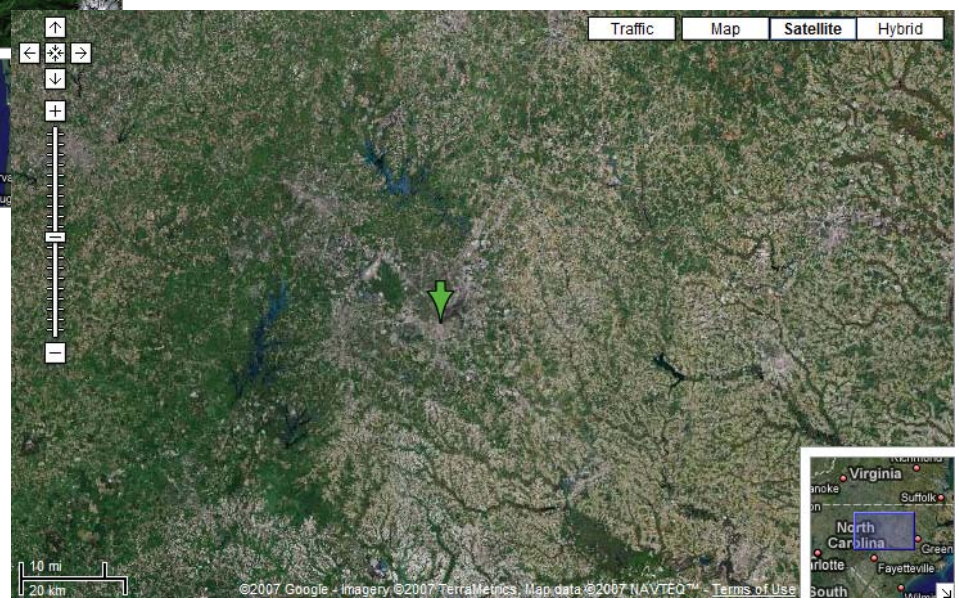
Portland vs. Raleigh





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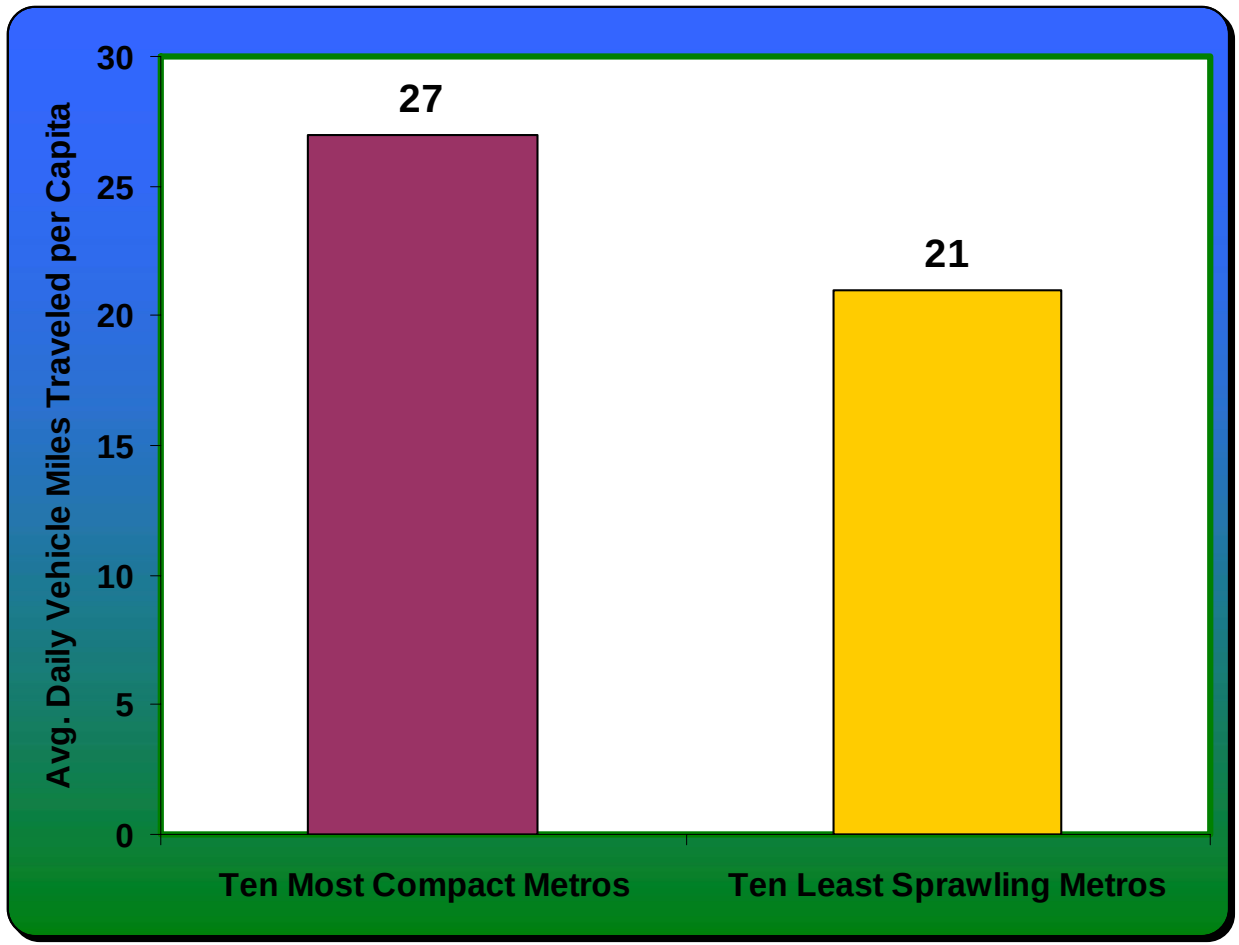
25% Less VMT with Compact Development



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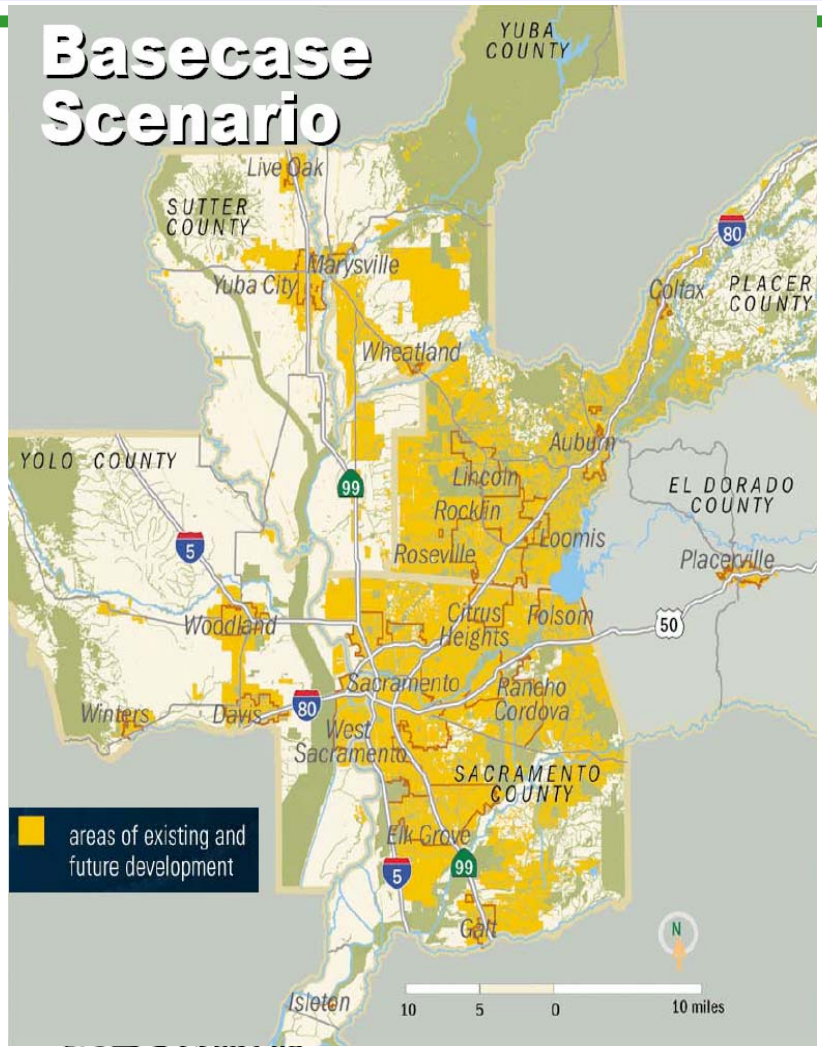
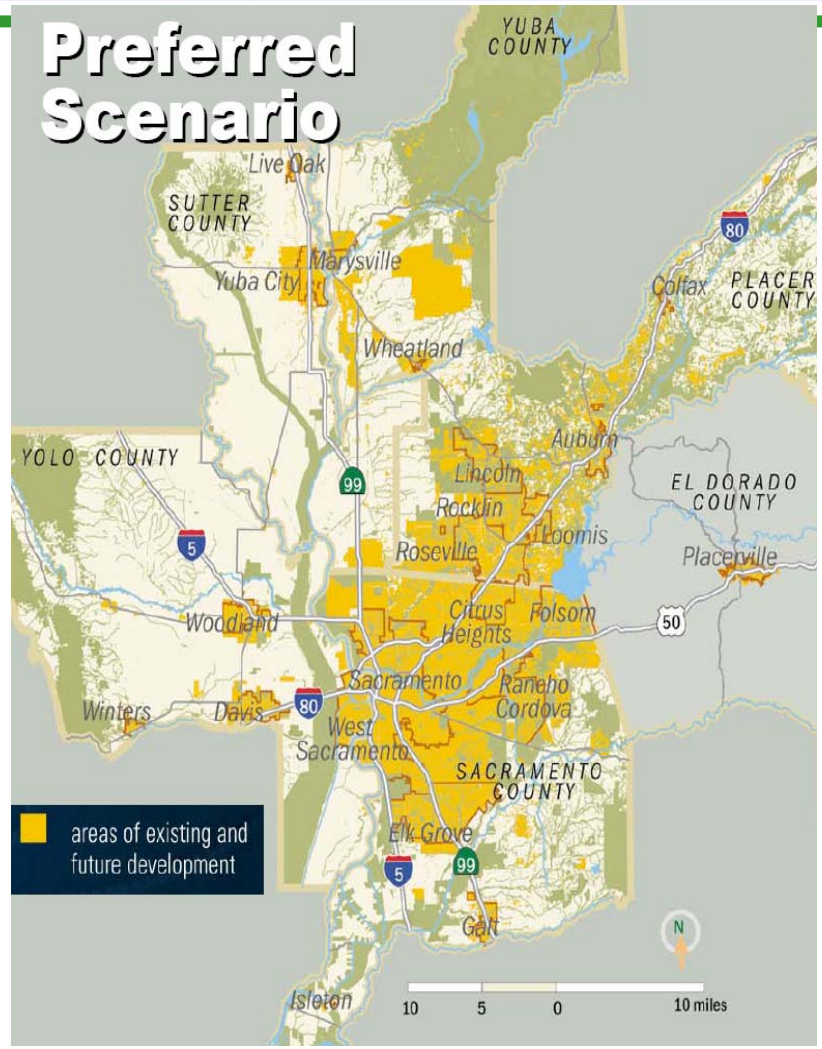
Many Different Scenarios





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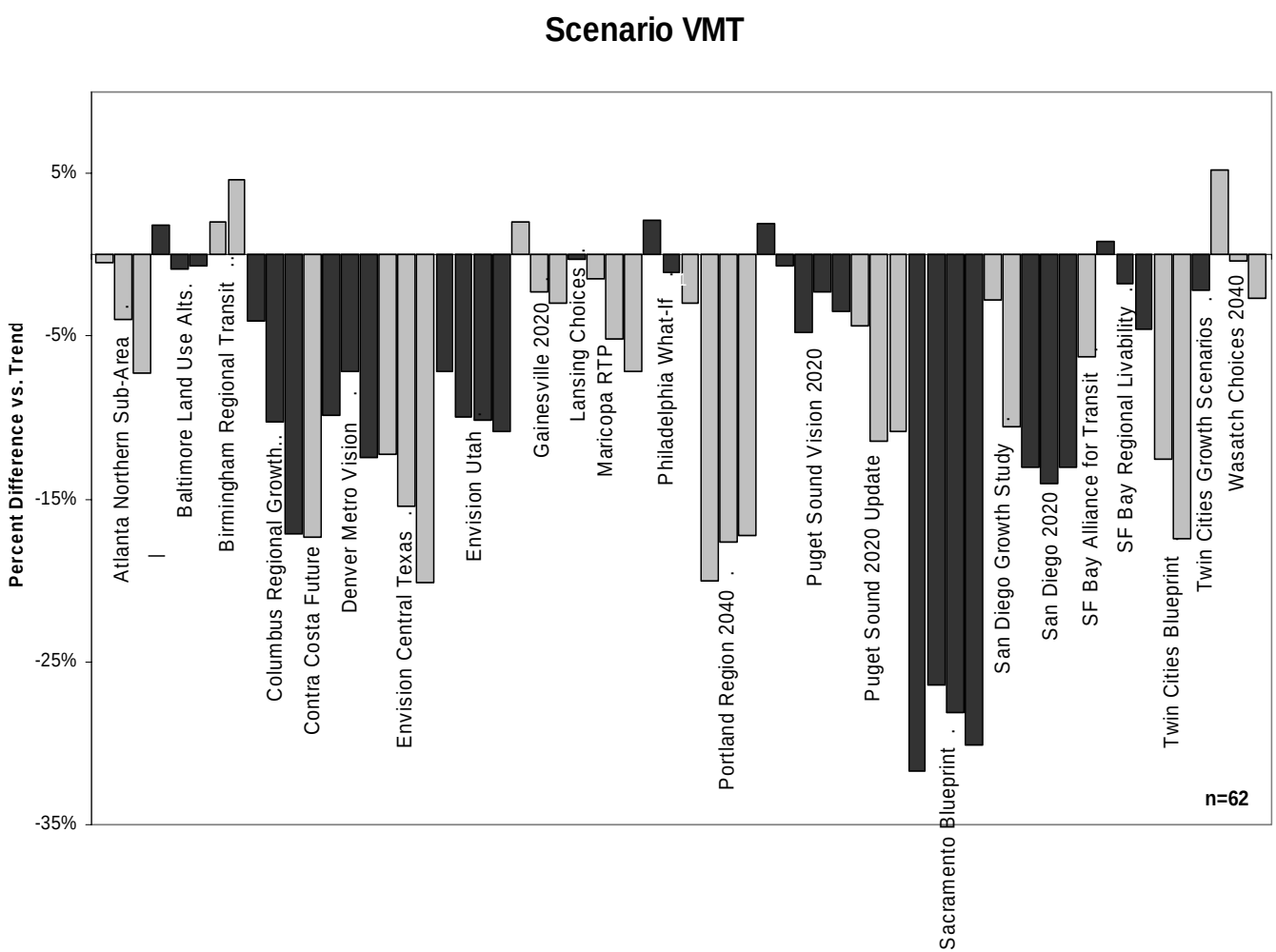
Results All Over the Map



Simulation Results

25% reduction in VMT by 2050

15% reduction in CO_2 by 2050

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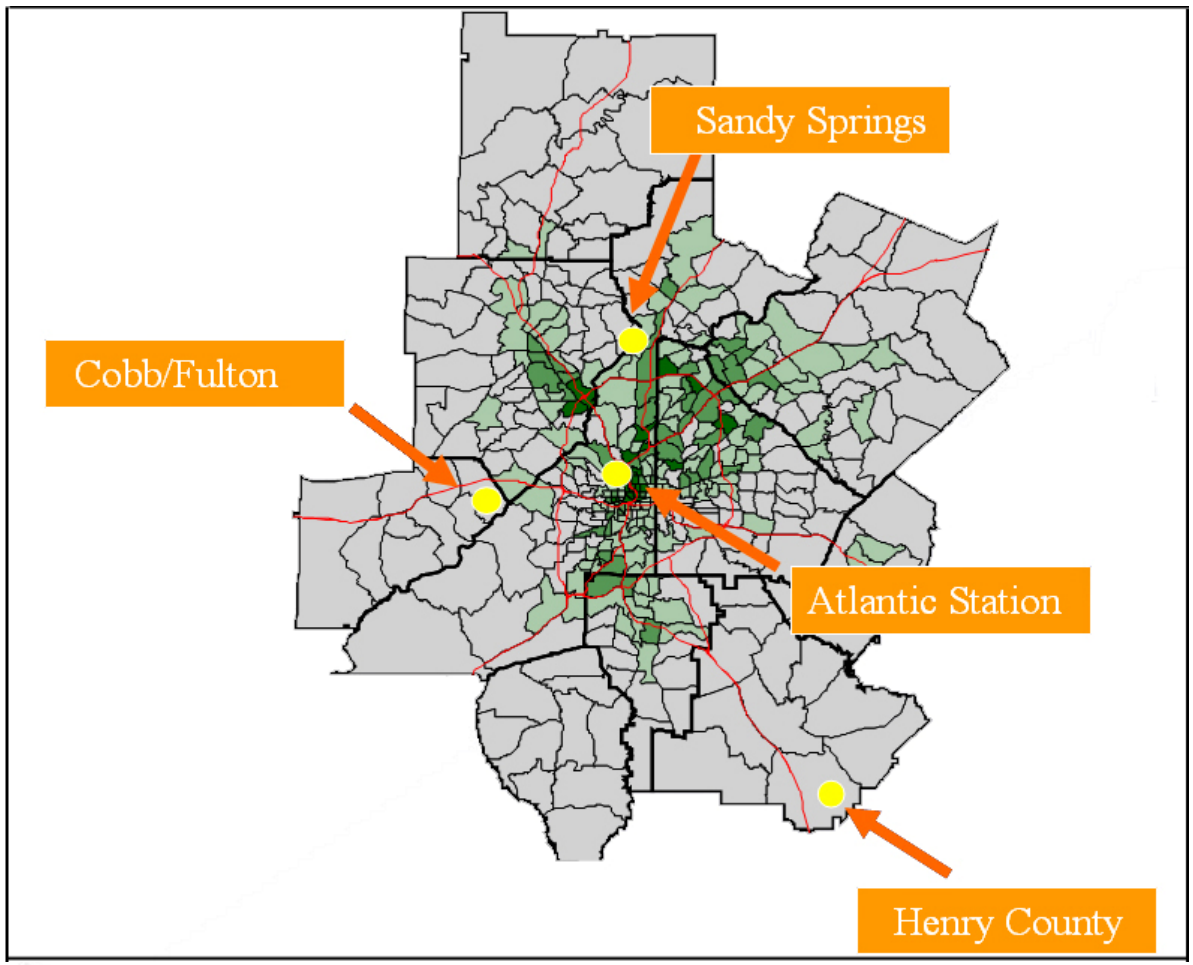
Atlantic Station vs. Henry County



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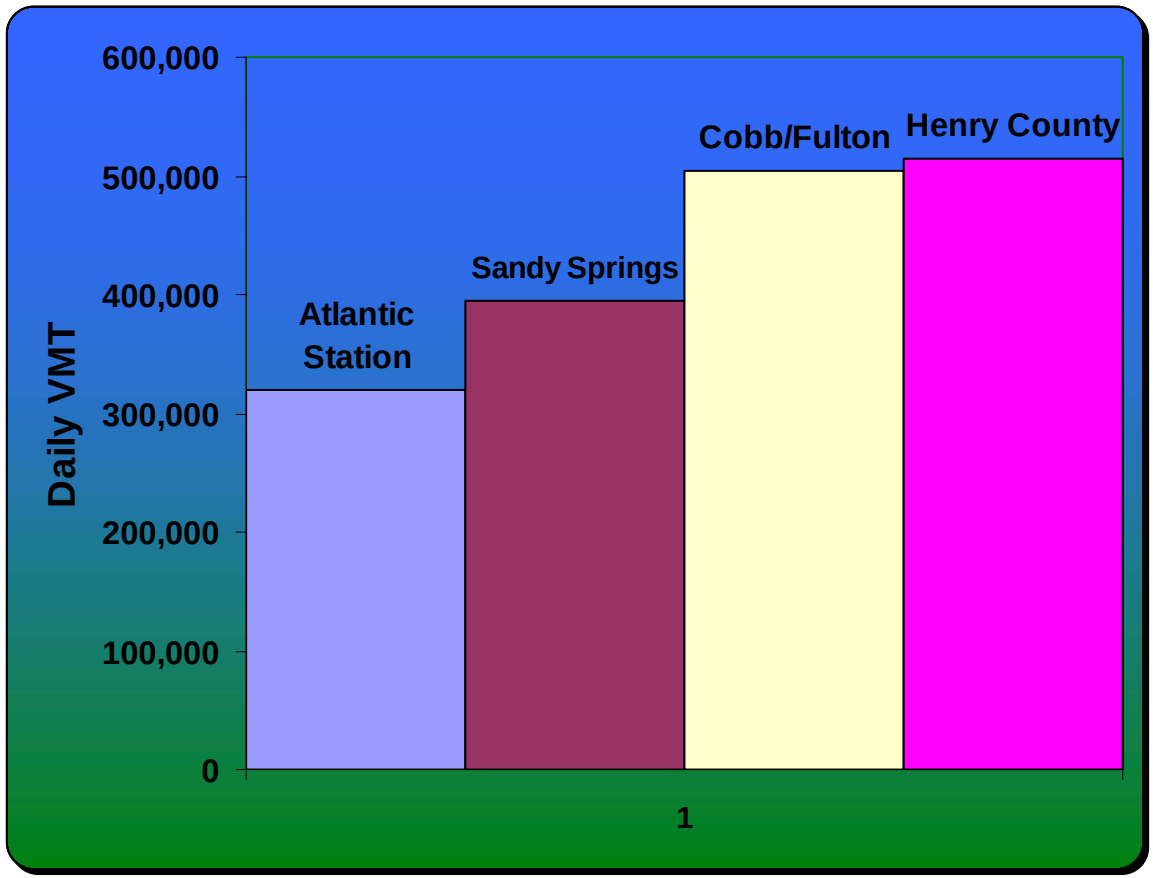
1/3 Savings Due to Regional Accessibility



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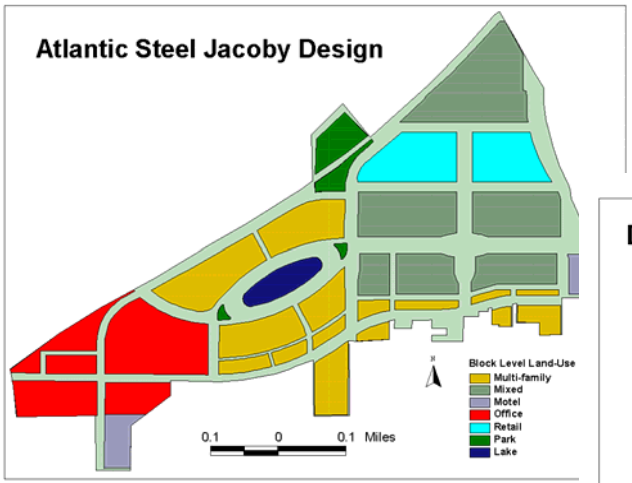
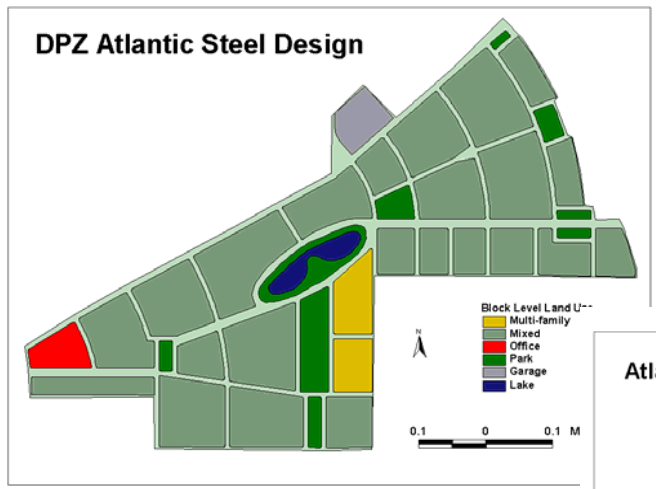
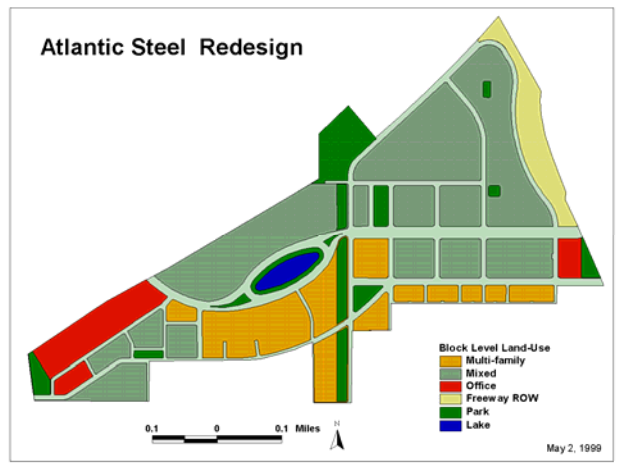
Alternative Site Plan Comparison







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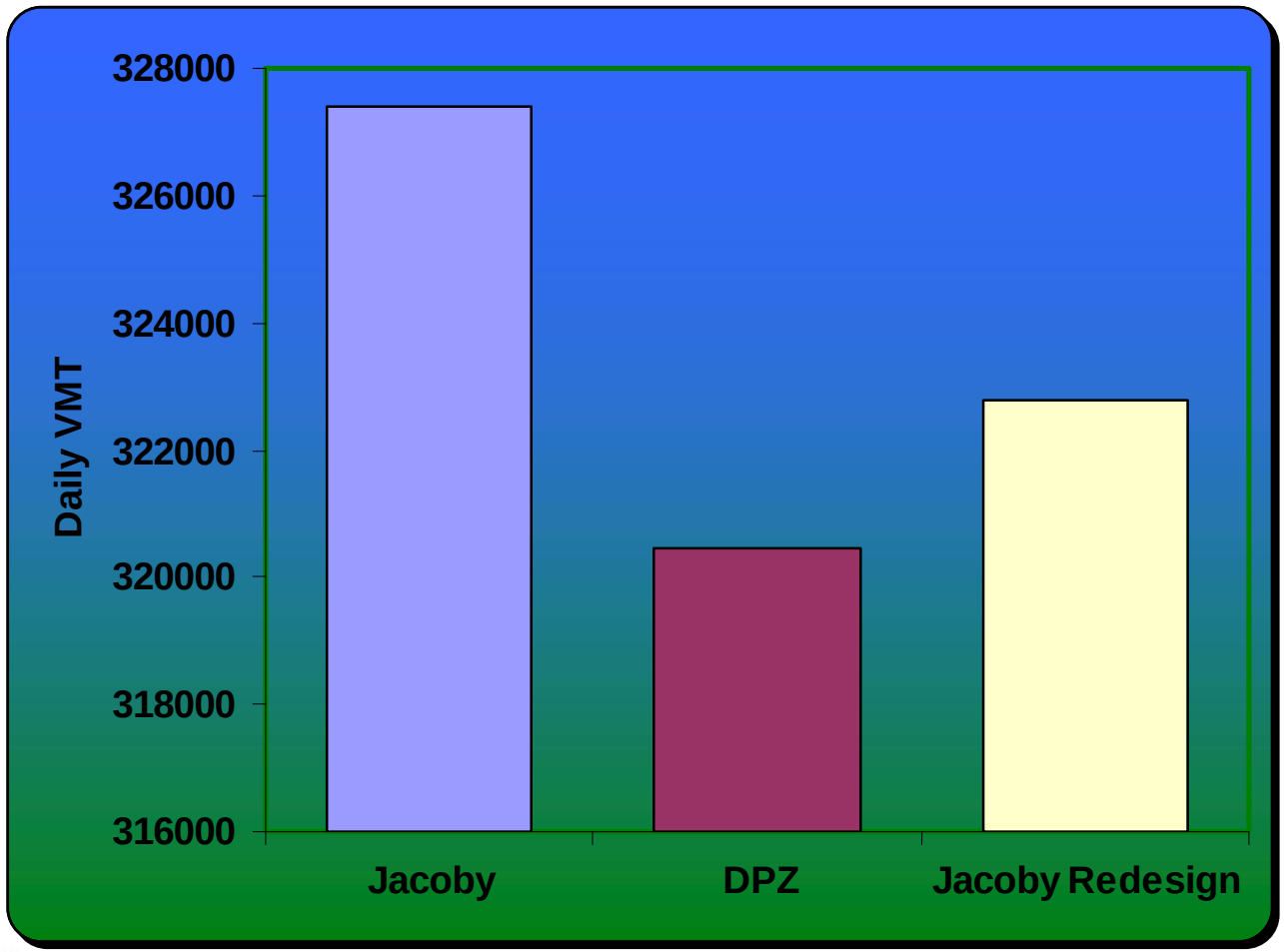
5% Savings Due to Site Design



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Thriving Community

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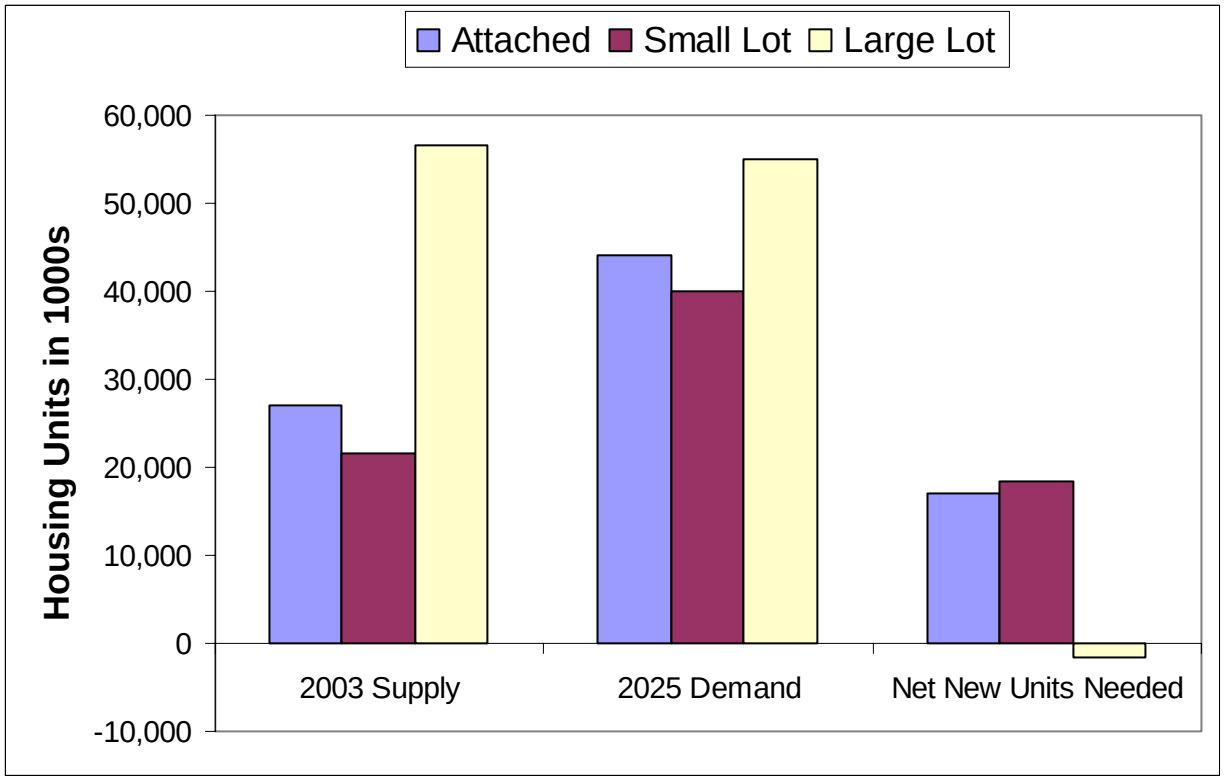
Answer to 1st Question

20-40% VMT Reduction for Each Increment of Compact Development

The Market Is Changing Dramatically



Nelson 2006

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Doing the Math through 2050

% VMT Reduction

x

% New Development

x

% Compact

=

12-18% Reduction in Metropolitan VMT

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Answer to 2nd Question

7-10% Reduction in Total CO_2 Emissions

Only Land Development Effects

Only Transportation Sector

And Essentially Permanent

Projected 2030 Savings from Compact Development

- Shifting 60% of new growth to compact patterns
  - » 85 million metric tons of CO2 in 2030
- Equal to a 28% increase in CAFE standards to 32 mpg in 2020
  - » Half the savings of the Senate's 35 mpg CAFE bill
- Fuel cost savings in 2030: $24 billion
  - » Cumulative: $250 billion

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Compact Development: As Good as a Hybrid!

- Living in a convenient neighborhood can reduce as much CO2 as using a hybrid
  - » Even better together!

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Smart Growth America

Better Choices For Our Communities

Market Trends and Policy Recommendations

Don Chen

Executive Director and C.E.O.

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Federal Policy Recommendations

- Require Transportation Conformity for Greenhouse Gases
- Use Cap-and-Trade (or Carbon Tax) Revenues to Promote Infill Development
- Enact "Green-TEA" Transportation Legislation that Reduces GHGs

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Federal Policy Recommendations

- Provide Funding Directly to Metropolitan Planning Organizations
- Develop a National Blueprint Planning Process that Encourages Transportation Choices and Better System Management
- Create a New Program to Provide Funding to "Rewrite the Rules"

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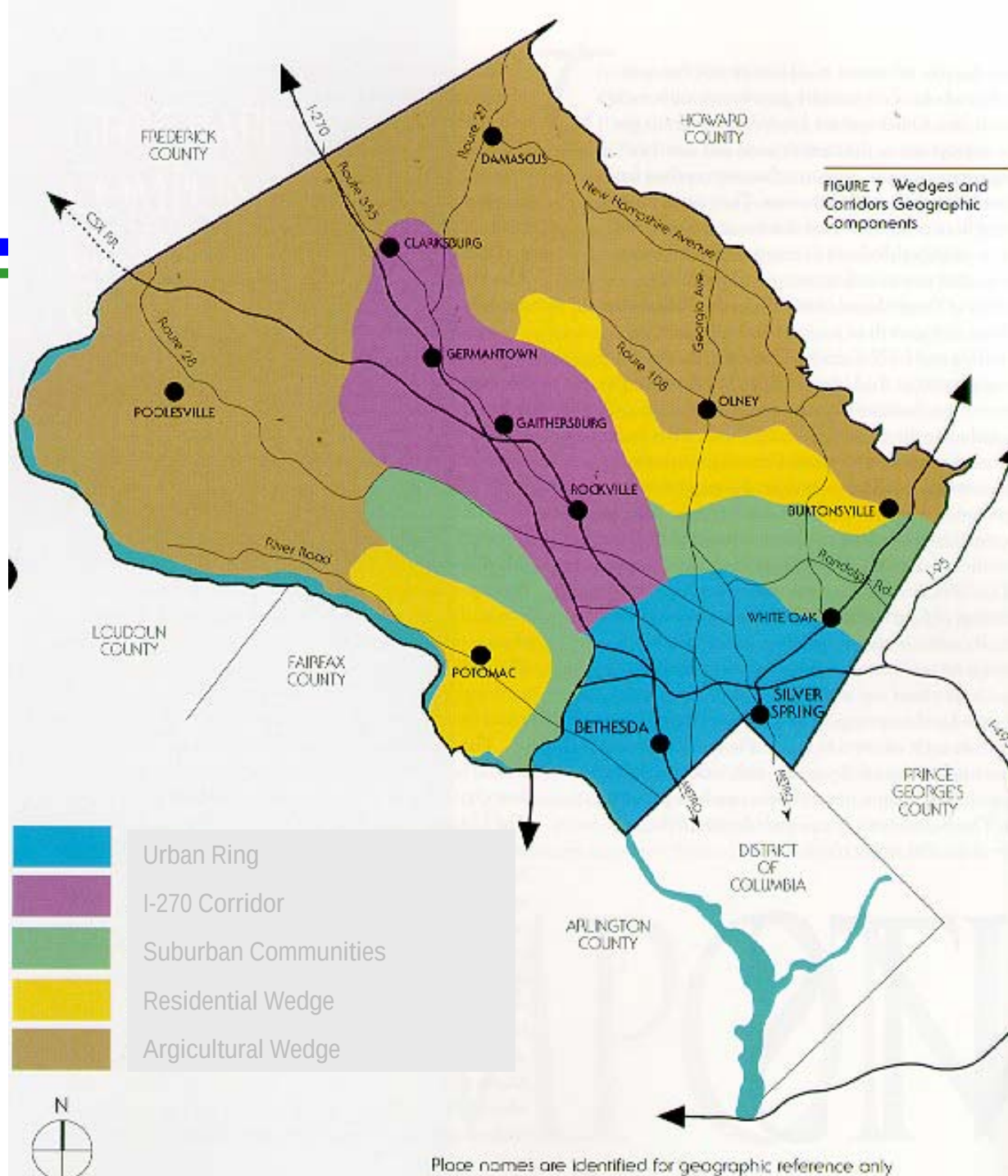
DC Region

Exceptionally Good in Some Respects but Challenged in Others

"Wedges and Corridors" in 1964



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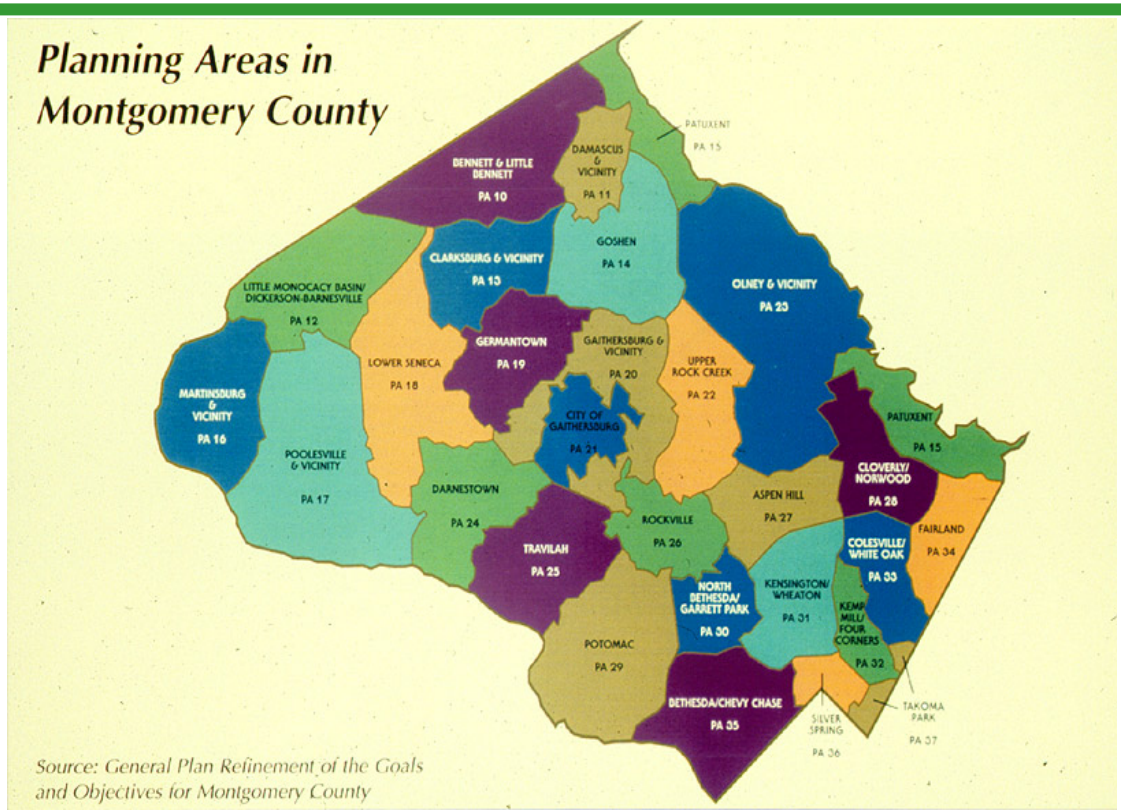
Planning Areas



Critical Lane Volume Standard	Policy Area
1450	Rural areas
1500	Clarksburg Damascus Germantown East Germantown Town Center Germantown West Montgomery Village/Airpark
1525	Cloverly Derwood North Potomac Olney Potomac R & D Village
1550	Aspen Hill Fairland/White Oak
1600	North Bethesda
1650	Bethesda/Chevy Chase Kensington/Wheaton Silver Spring/Takoma Park
1800	Bethesda CBD Grosvenor Shady Grove Silver Spring CBD Twinbrook Wheaton CBD White Flint

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Bethesda TOD

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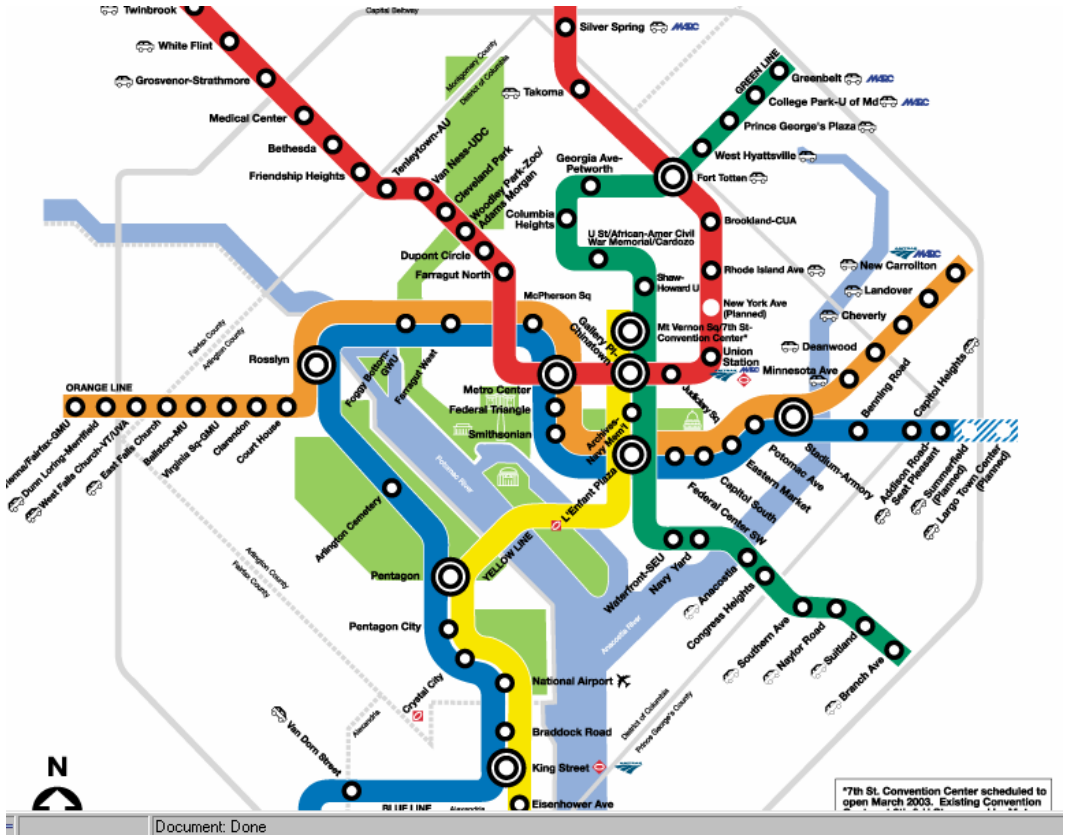
Metro System



Early New Town Planning

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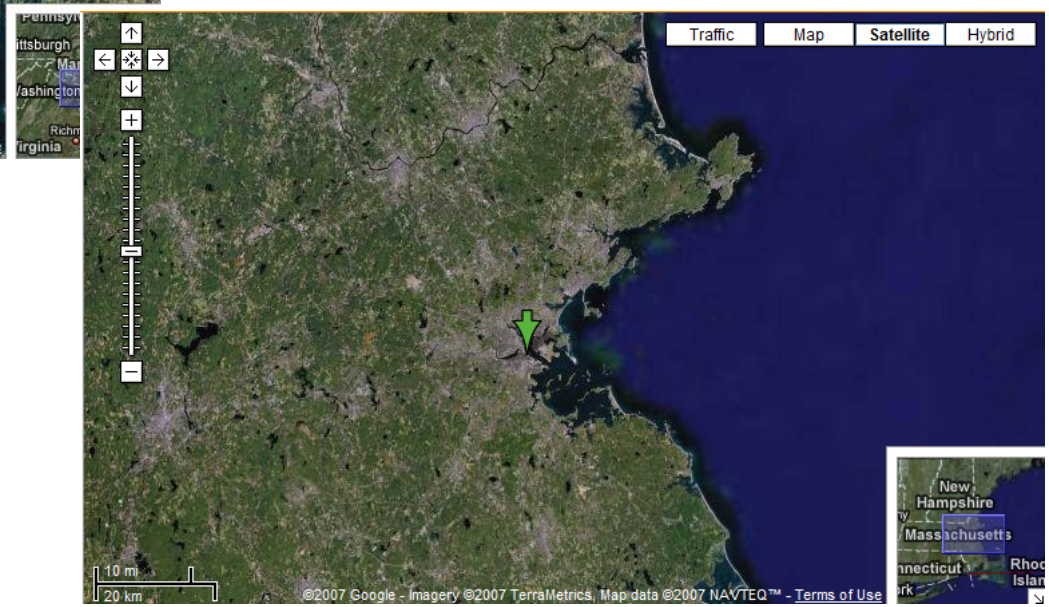
Early New Urbanism

Great Old Urbanism

But Also Challenges



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26th Most Sprawling of 83

22 Oklahoma City, OK MSA

23 Tampa--St. Petersburg--Clearwater, FL MSA

24 Birmingham, AL MSA

25 Baton Rouge, LA MSA

26 Worcester--Fitchburg--Leonminster, MA NECMA

27 Washington, DC--MD--VA MSA

28 Columbus, OH MSA

29 Jacksonville, FL MSA

30 Kansas City, MO--KS MSA

31 Cleveland, OH PMSA

32 Memphis, TN--AR--MS MSA

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4 Sprawl Factors for Washington MSA

- Density – Much Higher than Average
- Mixed Use – Much Lower than Average
- Centering – Lower than Average
- Street Accessibility – Lower than Average

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Travel Outcomes

- Average commute longer than average and increasing
- VMT per capita lower than average but increasing
- JTW transit use higher than average and going down
- JTW walking higher than average and going down

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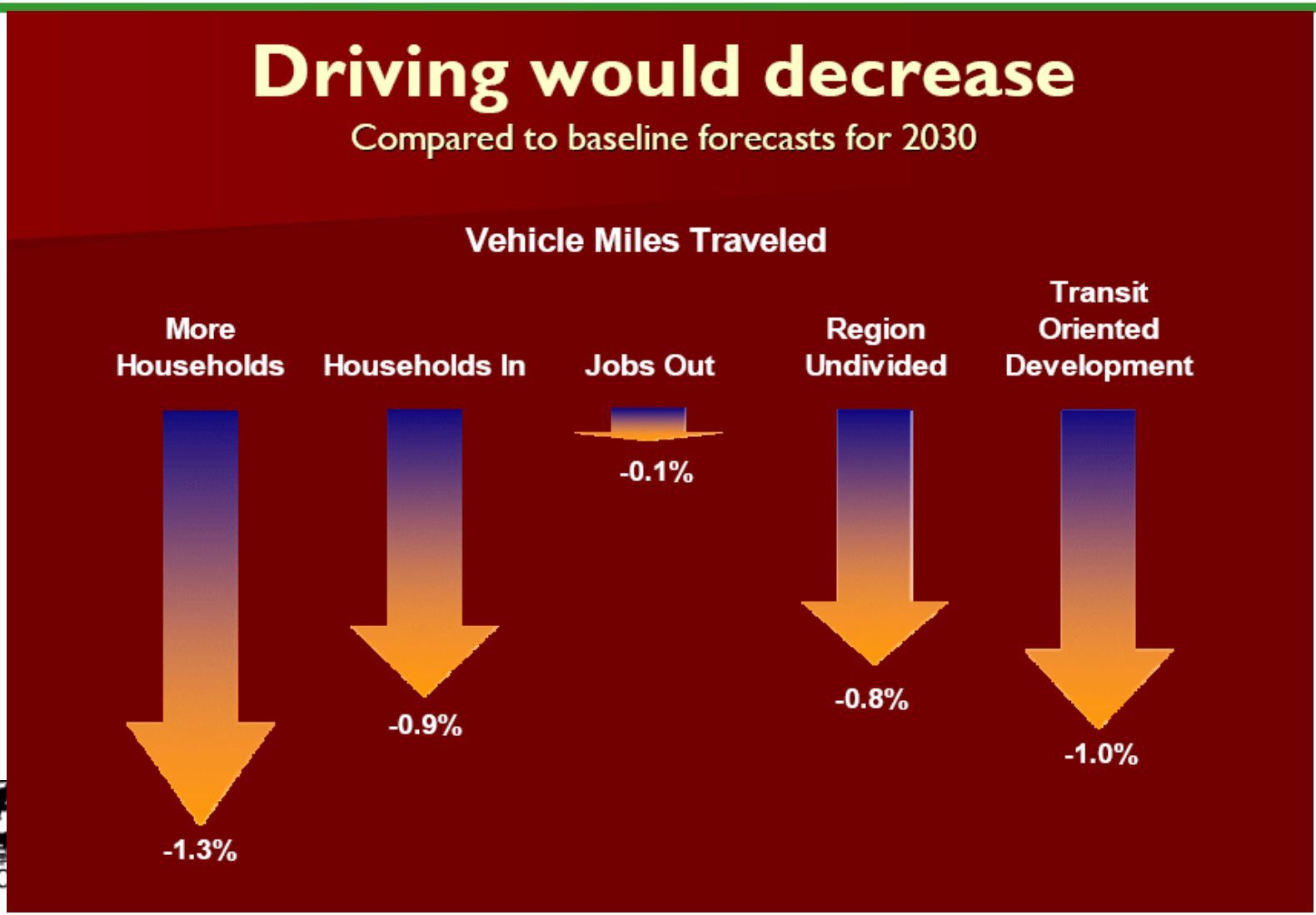
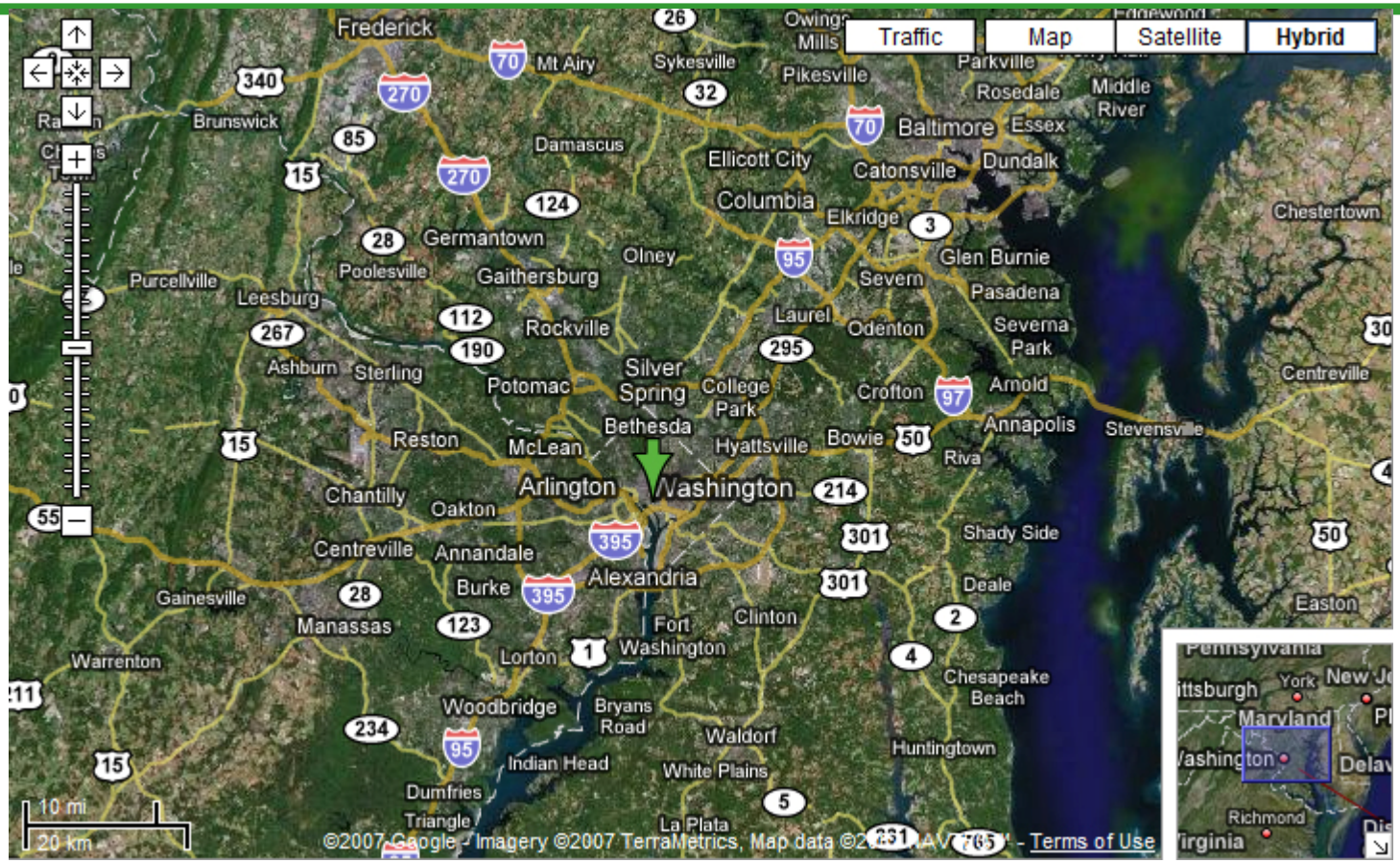
What If…?


Driving would decrease
Compared to baseline forecasts for 2030
Vehicle Miles Traveled
More Households
-1.3%
Households In
-0.9%
Jobs Out
-0.1%
Region Undivided
-0.8%
Transit Oriented Development
-1.0%

DC with Landmarks



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