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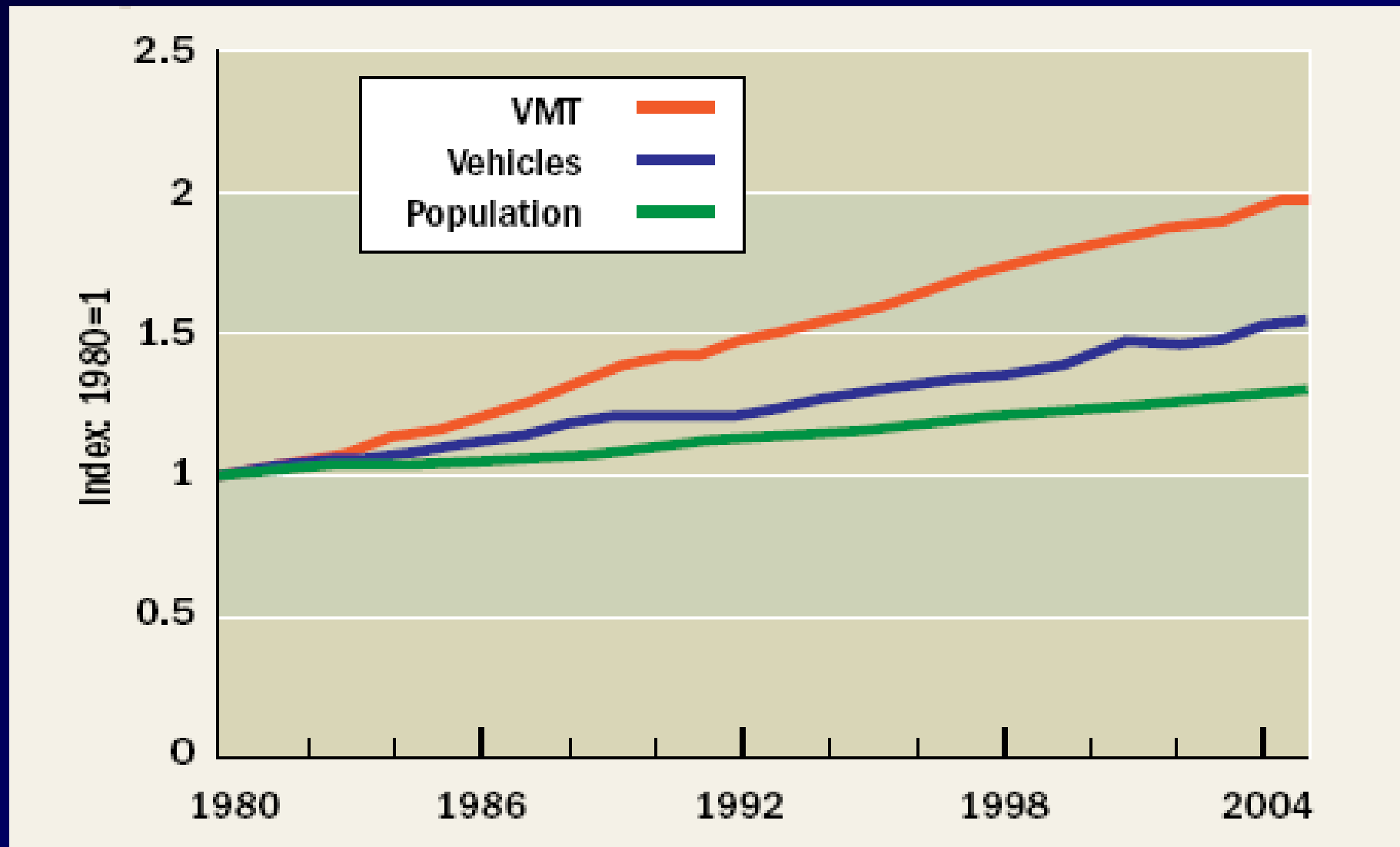
***Highway Building, Induced Travel, and  
Climate Change***

***Reid Ewing  
University of Utah***

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***“You Can’t Pave Your Way Out of  
Congestion”***

# Growth of VMT



# ***1995 Report on Induced Travel (with Minority View)***

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Special Report 245

## **EXPANDING METROPOLITAN HIGHWAYS**

*Implications for  
Air Quality and Energy Use*

Committee for Study of Impacts of  
Highway Capacity Improvements on  
Air Quality and Energy Consumption

TRANSPORTATION RESEARCH BOARD  
National Research Council

National Academy Press  
Washington, D.C. 1995

## ***Definition of Induced Traffic***

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***“... the increment of new traffic that would not have occurred at all without the capacity improvement.”***

***Issues:***

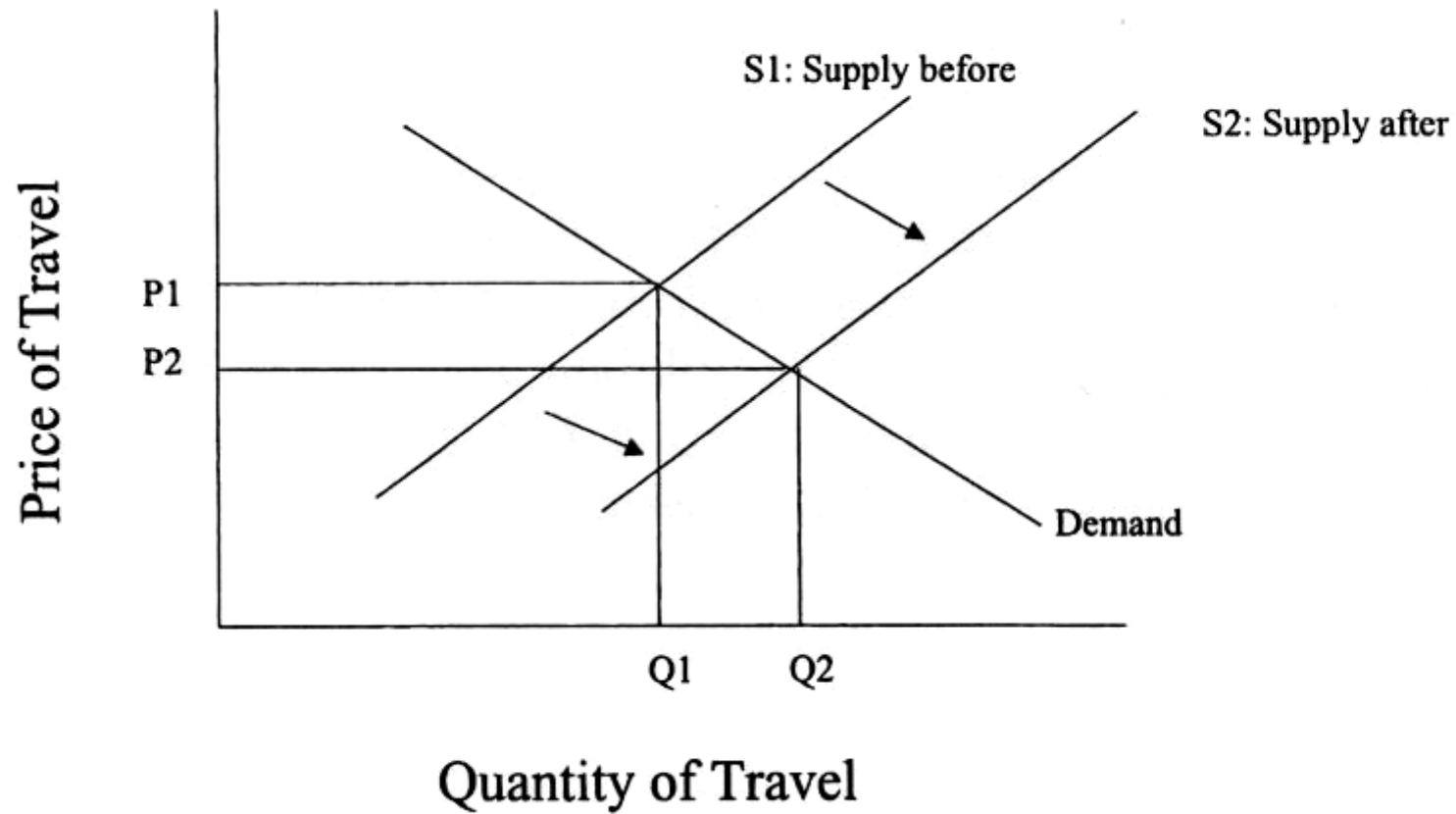
***Vehicle or person travel***

***Daily or peak hour***

***Region-wide or corridor-specific***

***Short-term or long-term***

# Short-Term Supply and Demand



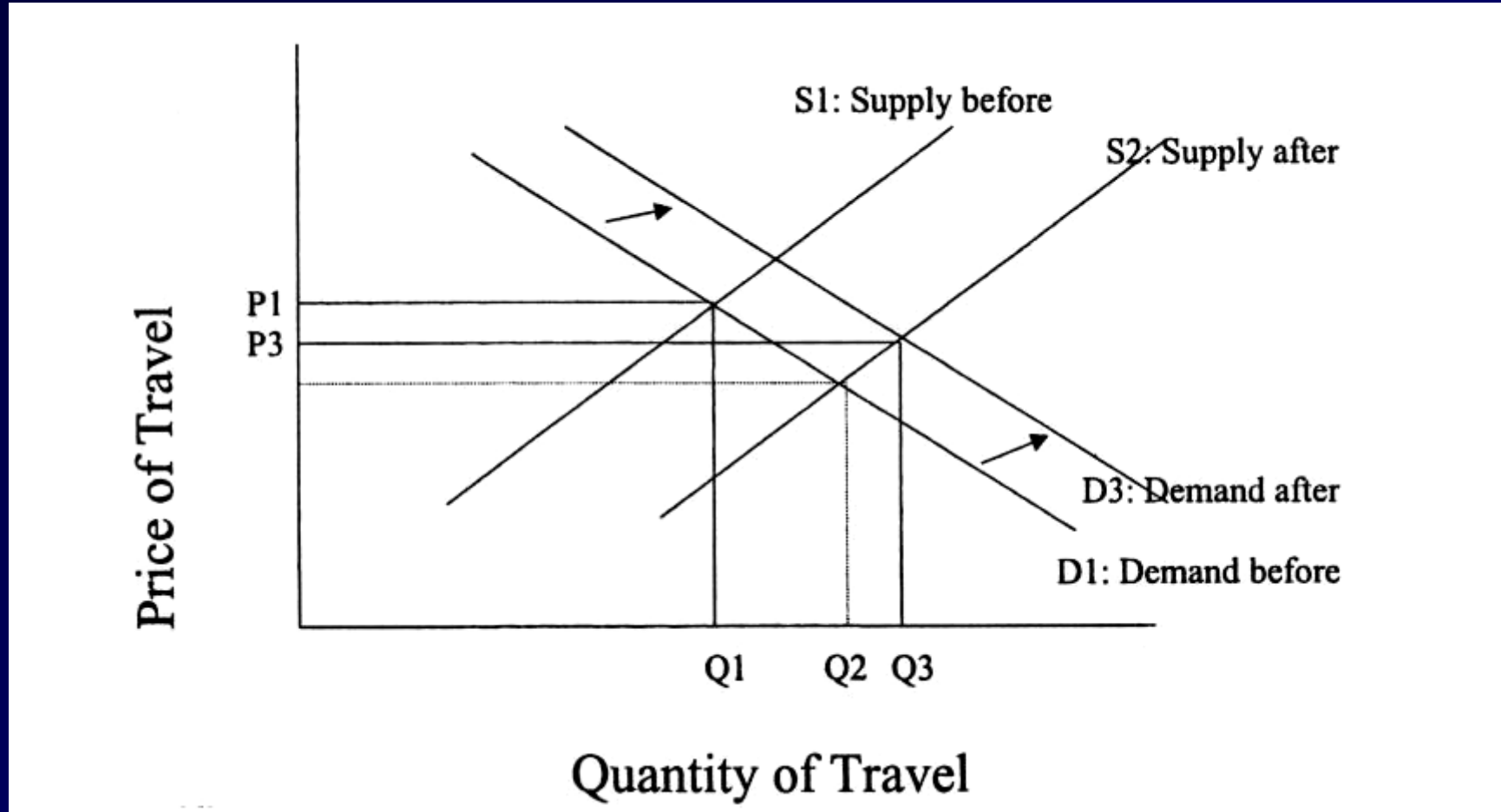
# ***Short-Term Increases in Traffic***

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- ***New Trips***
- ***More Distant Destinations***
- ***Mode Shifts***
- ***Route Shifts\****

***\* Most important effect according to Dowling et al., 1994***

# Long-Term Supply and Demand



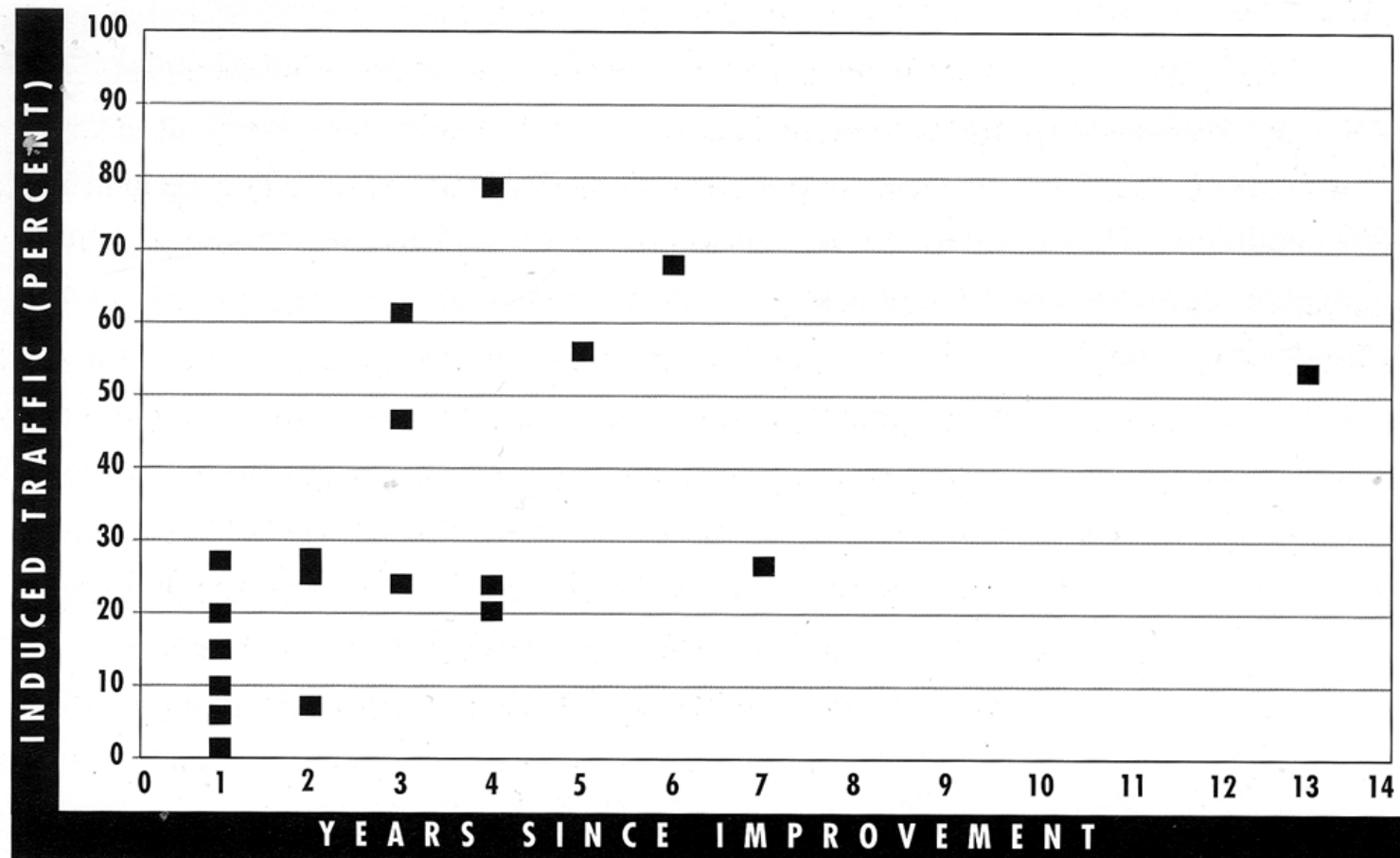
## ***Long-Term Increases in Traffic***

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- ***Higher Car Ownership***
- ***Reduced Transit Service***
- ***Activity Location Shifts\****

***\* Most important effect according to Cervero, 2002***

# Growth of Traffic Over Time



## ***Cervero's Bottom Lines***

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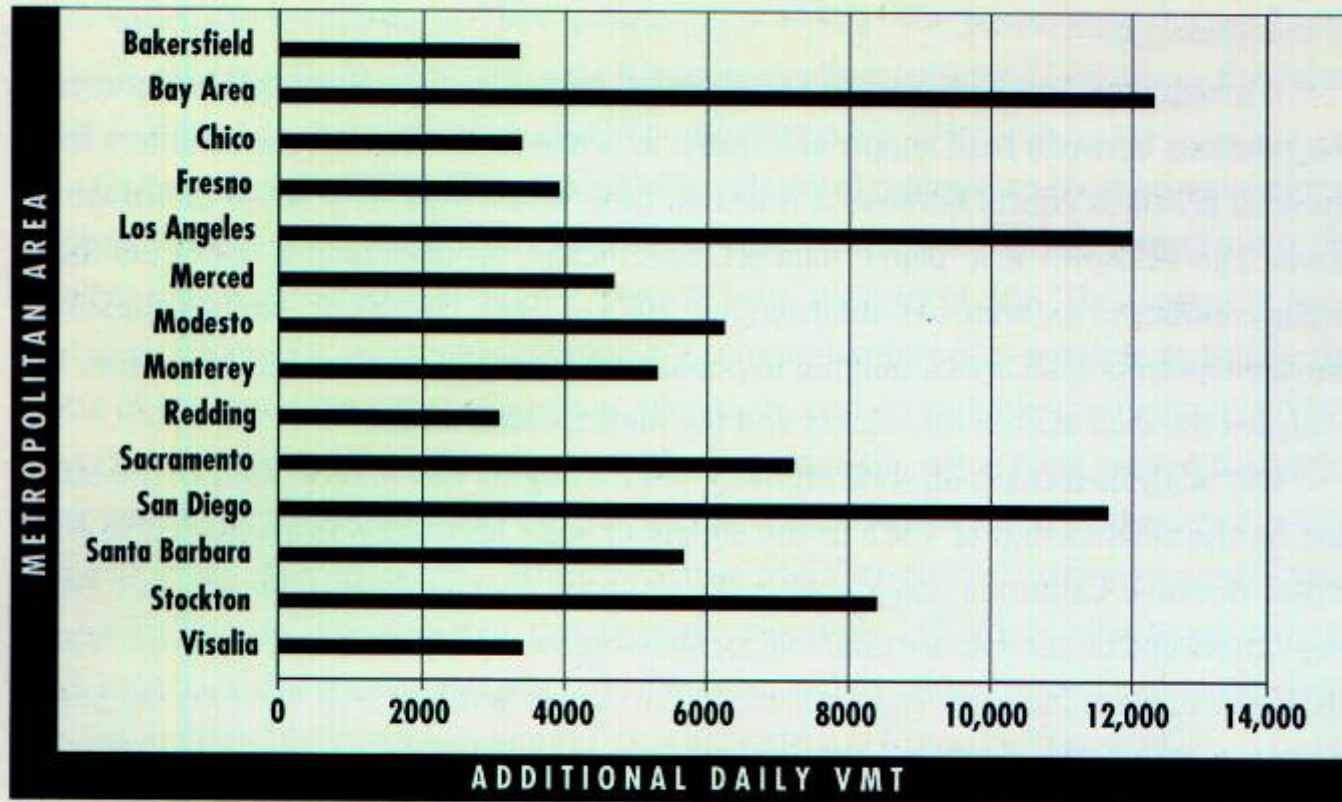
***“...the preponderance of research suggests that induced-demand effects are significant, with an appreciable share of added capacity being absorbed by increases in traffic.”***

# ***Average Elasticities***

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	<b><i>Facility-Specific Studies</i></b>	<b><i>Areawide Studies</i></b>
<b><i>Short-Term</i></b>	<b><i>0</i></b>	<b><i>0.4</i></b>
<b><i>Medium-Term</i></b>	<b><i>0.27</i></b>	<b><i>NA</i></b>
<b><i>Long-Term</i></b>	<b><i>0.63</i></b>	<b><i>0.73</i></b>

# *Additional VMT per Lane Mile*



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# ***Transit Induced Development***

## ***Different Technologies Have Different Impacts***

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- ***Heavy Rail***
- ***Light Rail***
- ***Commuter Rail***
- ***Bus***

## ***Conditions Must Be Right for TOD***

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### ***Knight and Trygg Study***

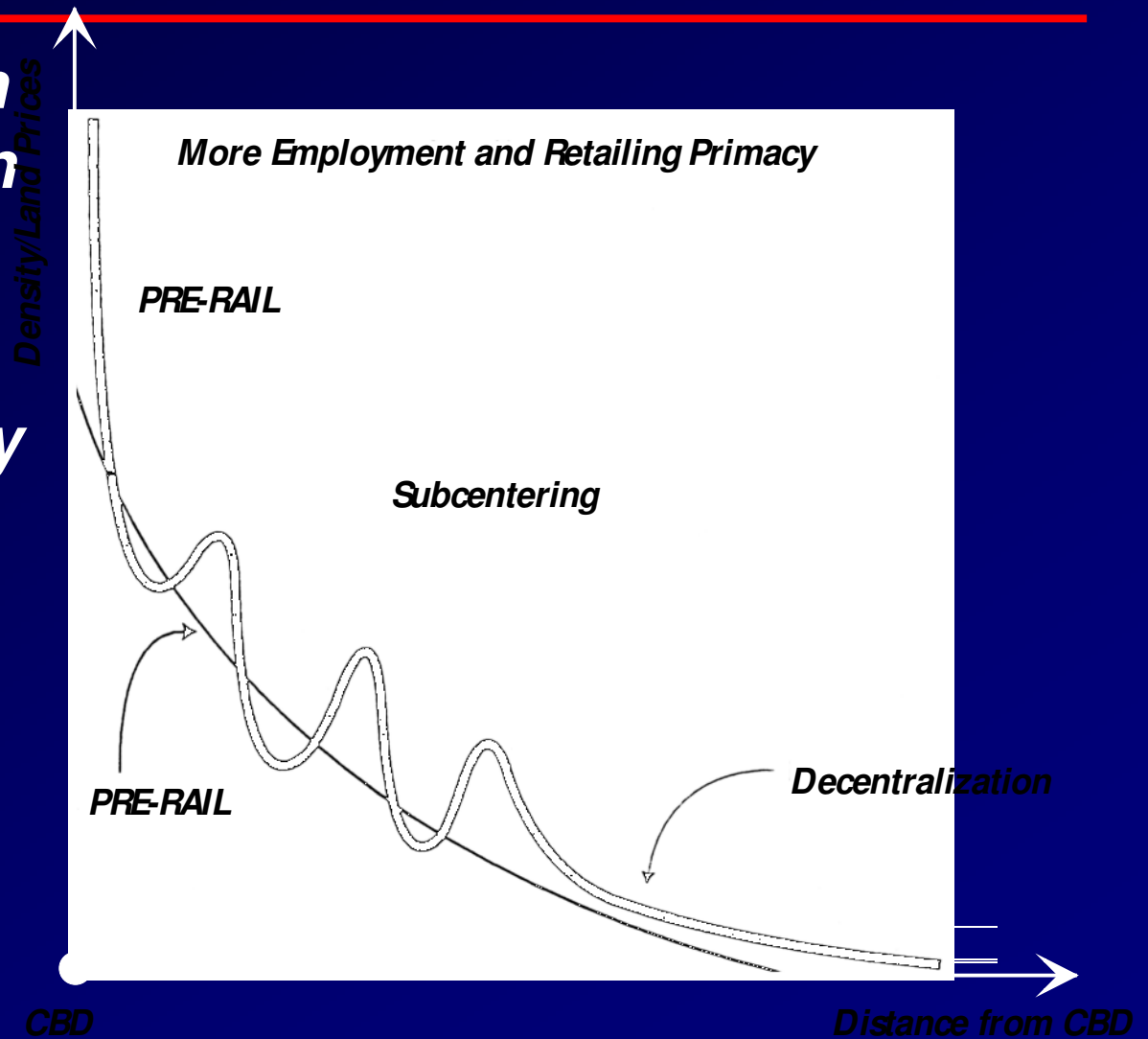
- ***Supportive land use policies***
- ***Availability of developable land***
- ***Market attractiveness of site***
- ***Healthy regional economy***

# **Force for Centralization and Decentralization**

**Radial Rail Systems can Strengthen Downtown Cores**

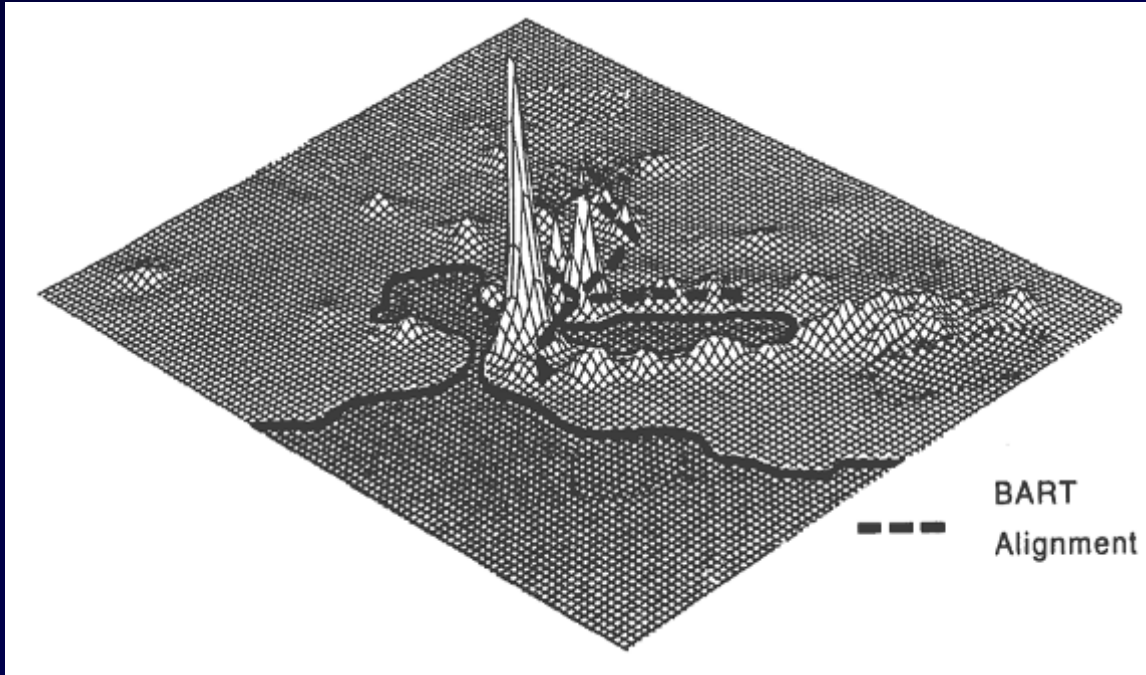
**Still, Regional Rail Investments Generally Reinforce Decentralization Trends**

**Pro-active Planning is Necessary if Decentralized Growth is to End Up in Subcenters**



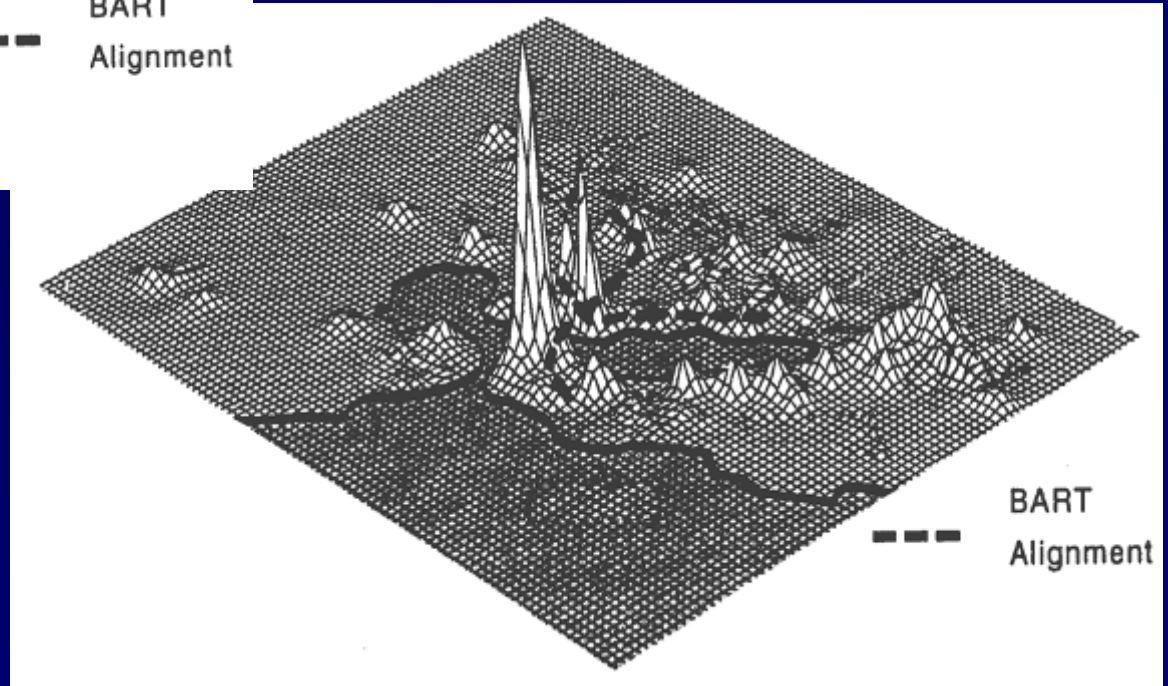
# *Impacts Are Highly Localized*

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**1980**

---  
BART  
Alignment



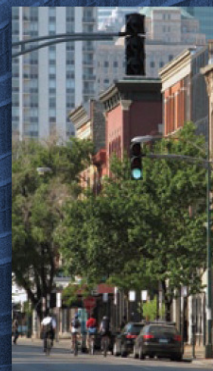
**1990**

---  
BART  
Alignment

# GROWING

THE EVIDENCE ON URBAN DEVELOPMENT AND CLIMATE CHANGE

# COOLER



**REID EWING**  
**KEITH BARTHOLOMEW**  
**STEVE WINKELMAN**  
**JERRY WALTERS**  
**DON CHEN**

 **Urban Land  
Institute**

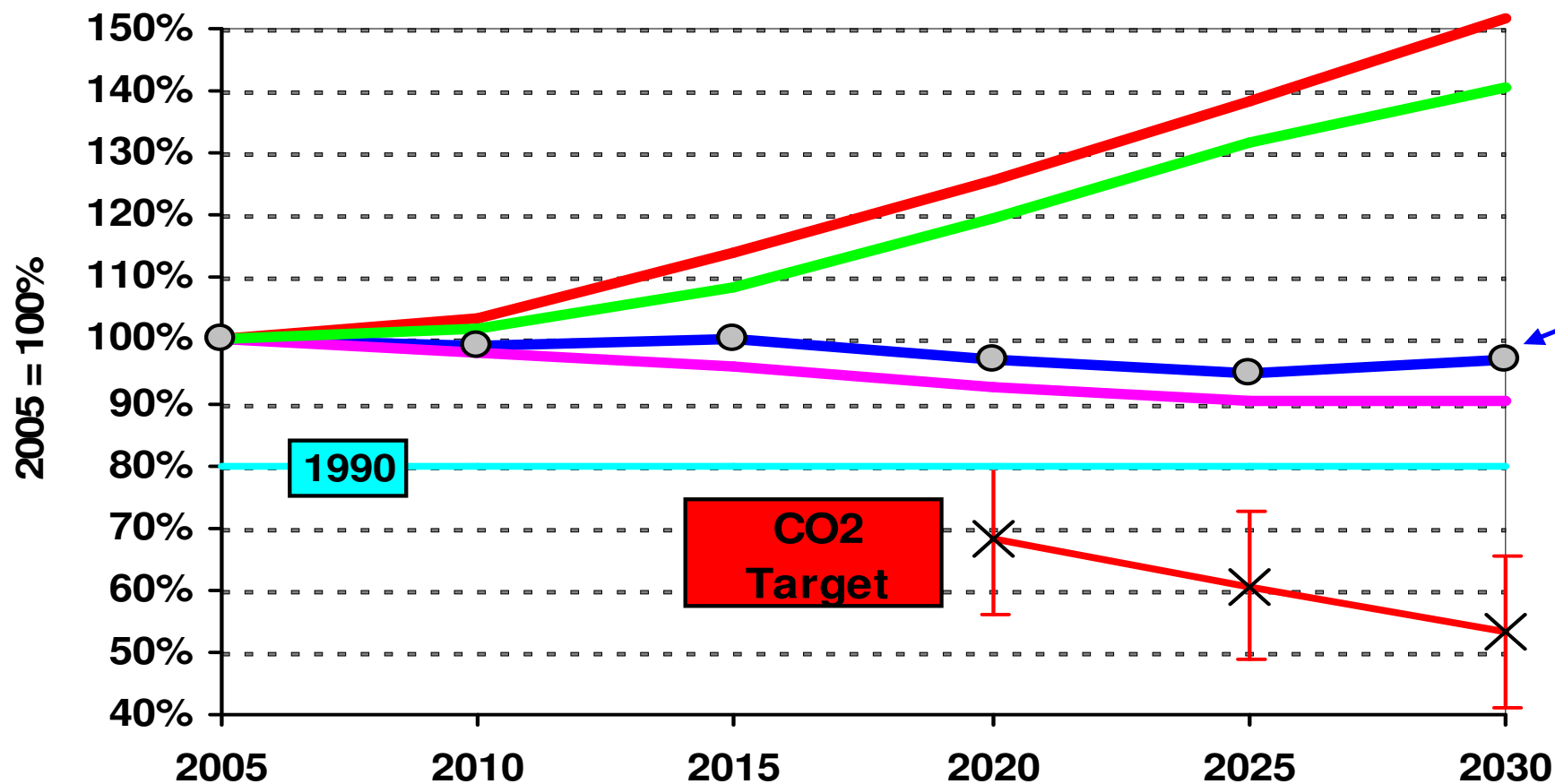
**Transportation CO<sub>2</sub>**

**Vehicles**

**Fuels**

**VMT**

# VMT Growth to Wipe Out Energy Bill Savings

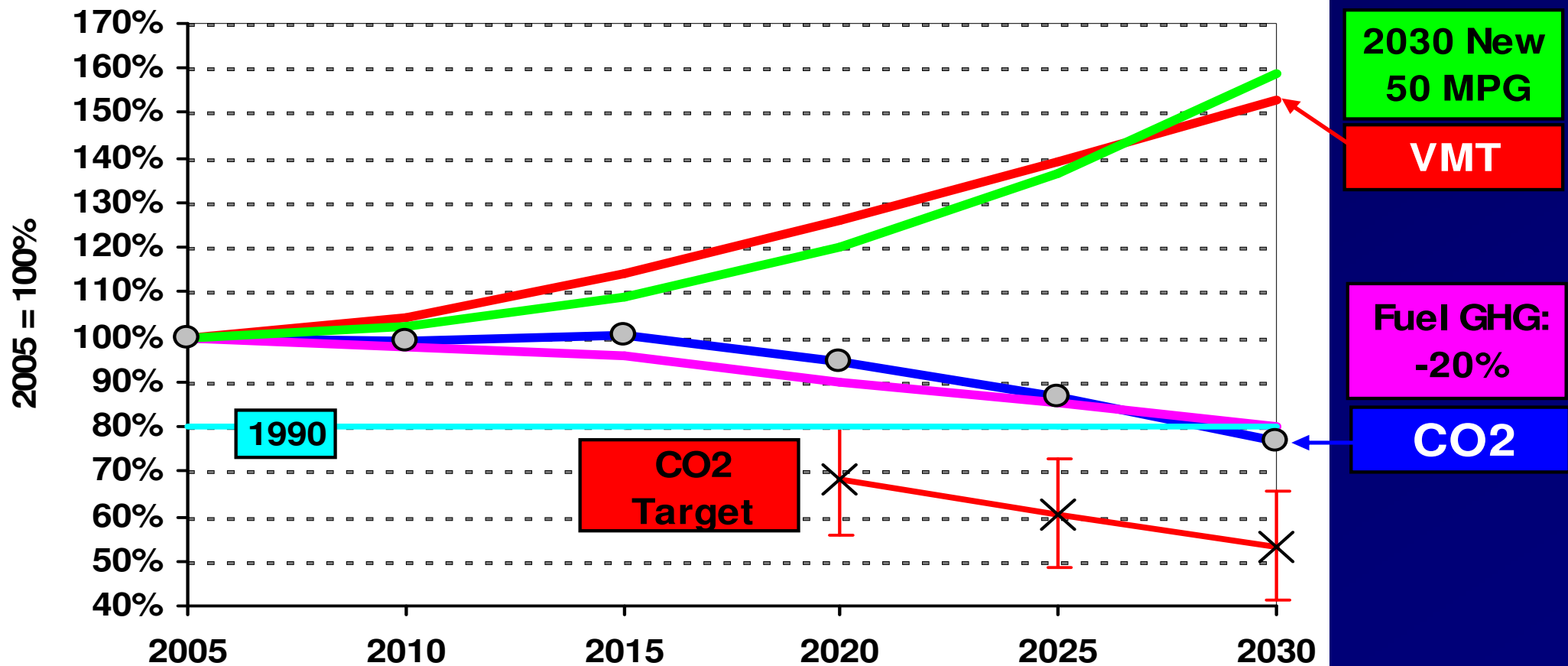


- VMT**
- 2020 New  
35 MPG**
- CO2**
- Fuel GHG:  
-10%**



Source: S. Winkelman based on EIA AEO 2008 (revised), HR6 and sources cited in *Growing Cooler*.

# Aggressive Case: 50 mpg in 2030 & -20% Fuel GHG



## ***What Would It Take?***

---

- ***What would it take to reach the 2030 CO<sub>2</sub> reduction target of 33 percent below 1990 levels?***
- ***Will compact development with supportive transportation policies be enough?***
- ***If not, how much VMT reduction must be achieved through pricing, and what price changes would be required?***

## ***Urban VMT Reduction***

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	<i>Elasticities of VMT with Respect to Policy Variables</i>	<i>Change in Annual Growth Rates of Policy Variables (% above/below Trend)</i>	<i>Effect on Annual VMT Growth Rate (% below Trend)</i>
<i>Population density</i>	<i>-0.30</i>	<i>1</i>	<i>-7.7%</i>
<i>Highway lane miles</i>	<i>0.55</i>	<i>-1</i>	<i>-11.4%</i>
<i>Transit revenue miles</i>	<i>-0.06</i>	<i>2.5</i>	<i>-4.6%</i>
<i>Real fuel price</i>	<i>-0.17</i>	<i>2.7</i>	<i>-14.4%</i>

---

**Compact Development**

**+**

**Transit**

**+**

**Road Pricing**

**-**

**Highway Expansion**

**=**

**38% VMT reduction by 2030**

---

# ***California Case Study***



## ***Recognition***

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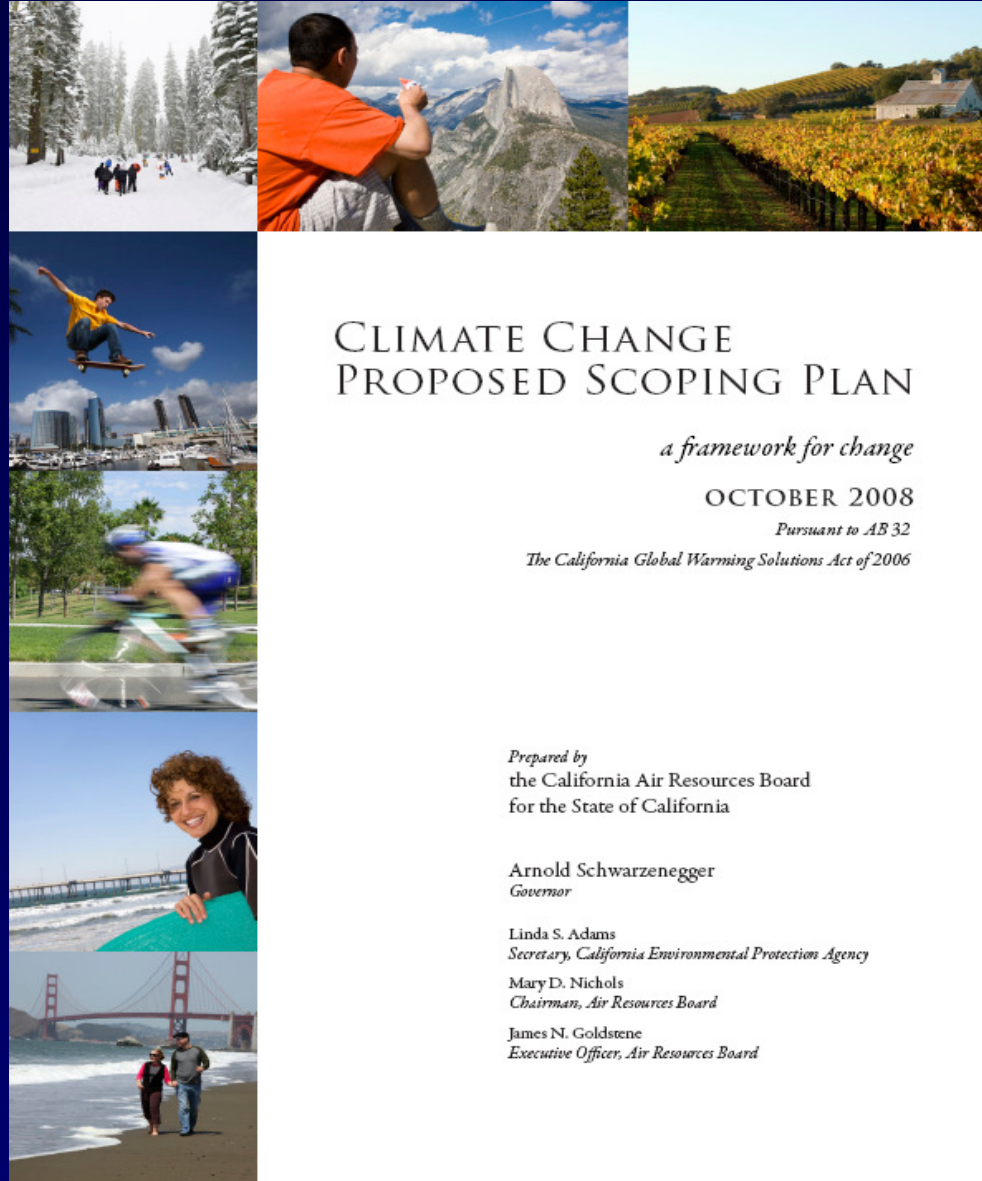
- ***Technology Won't Get Us There***
- ***Urban Development Makes a Difference (CAT's 18->10 MMTCO<sub>2</sub>e)***
- ***Smart Growth Can Produce Measurable Results (Haagen Smit Conference)***

## ***AB 32 – Global Warming Solutions Act of 2006***

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- ***Statewide GHG Emissions Limit (1990 Levels by 2020)***
- ***Annual Reporting, Monitoring, and Verification of GHG Emissions***
- ***Scoping Plan of Maximum TF and CE Measures by 2009***
- ***Enforceable Regulations by 2010***
- ***Reimbursement for Local Agencies***

# Implementation



## CLIMATE CHANGE PROPOSED SCOPING PLAN

*a framework for change*

OCTOBER 2008

*Pursuant to AB 32*

*The California Global Warming Solutions Act of 2006*

*Prepared by*  
the California Air Resources Board  
for the State of California

Arnold Schwarzenegger  
*Governor*

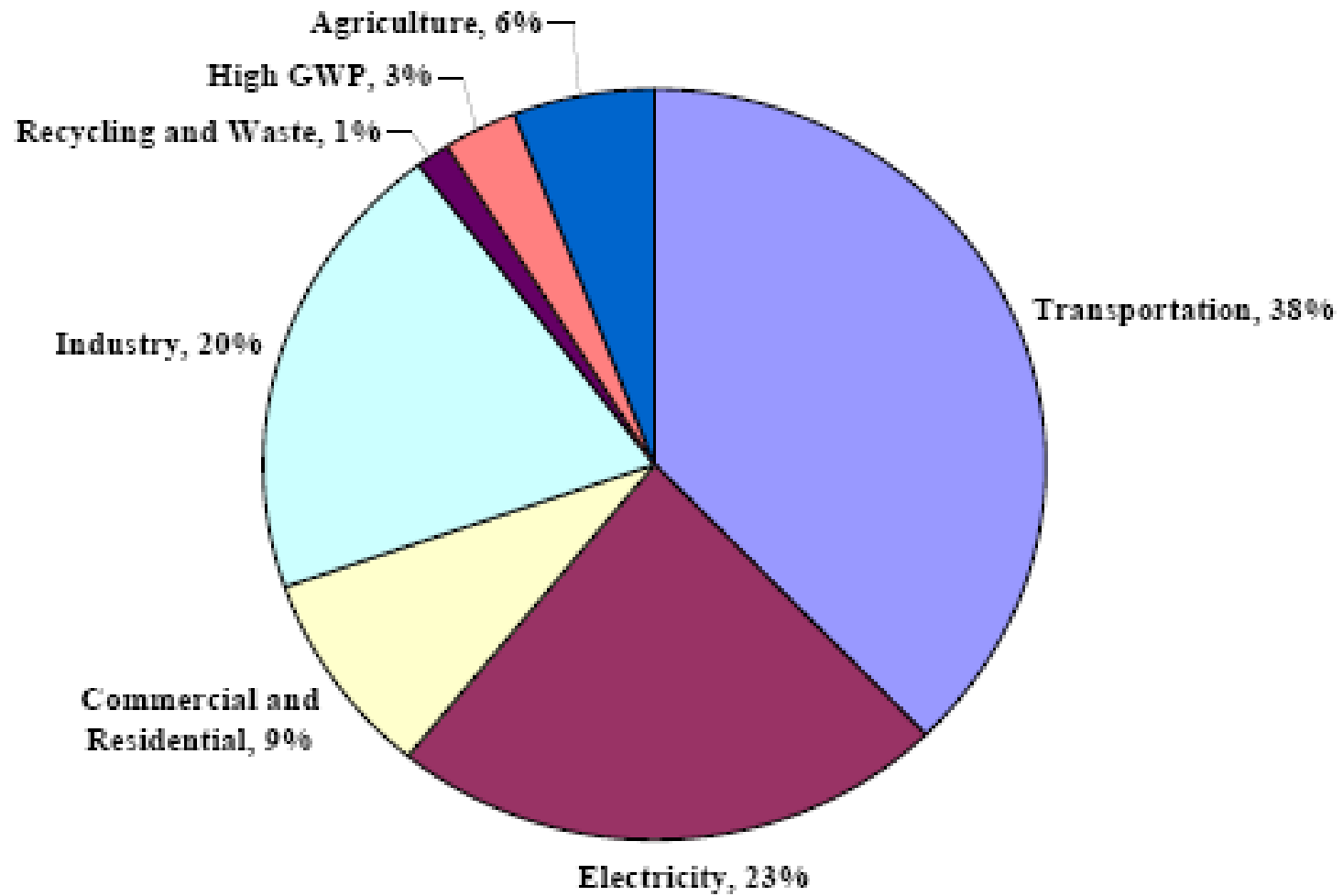
Linda S. Adams  
*Secretary, California Environmental Protection Agency*

Mary D. Nichols  
*Chairman, Air Resources Board*

James N. Goldstene  
*Executive Officer, Air Resources Board*

# CA's Greenhouse Gas Emissions

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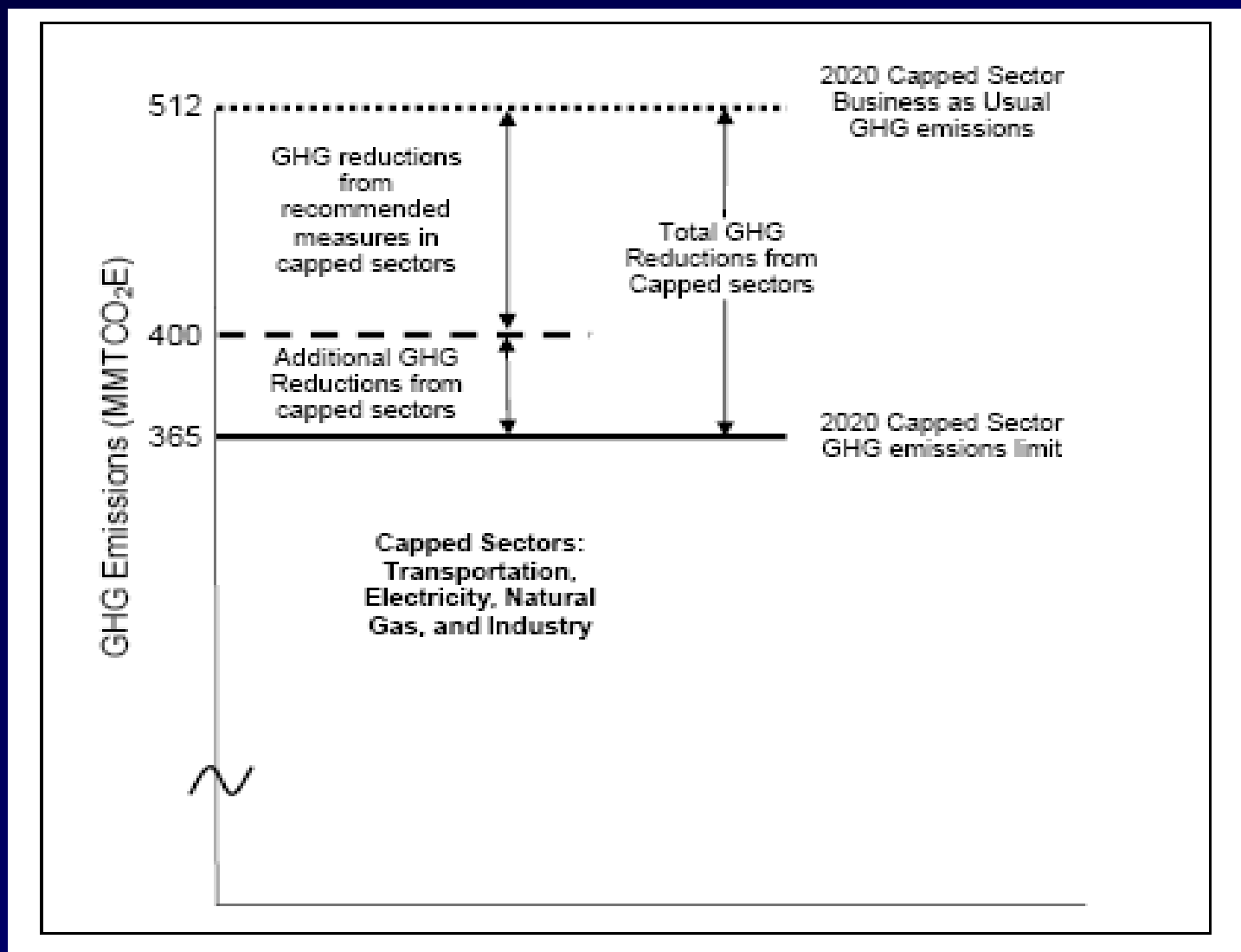
## ***Big Increase Projected***

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(MMTCO<sub>2</sub>E)

<b>Sector</b>	<b>2002-2004 Average Emissions</b>	<b>Projected 2020 Emissions</b>
Transportation	179.3	225.4
Electricity	109.0	139.2
Commercial and Residential	41.0	46.7
Industry	95.9	100.5
Recycling and Waste	5.6	7.7
High GWP	14.8	46.9
Agriculture	27.7	29.8
Forest Net Emissions	-4.7	0
<b>Emissions Total</b>	<b>469</b>	<b>596</b>

# Cap-and-Trade Program



## Other Measures

Measure No.	Measure Description	Reductions
E-1	Energy Efficiency (32,000 GWh of Reduced Demand) <ul style="list-style-type: none"> <li>• Increased Utility Energy Efficiency Programs</li> <li>• More Stringent Building &amp; Appliance Standards</li> </ul>	15.2
E-2	Increase Combined Heat and Power Use by 32,000 GWh (Net reductions include avoided transmission line loss)	6.9
Total		22.1

Measure No.	Measure Description	Reductions
F-1	Sustainable Forest Target	5
Total		5

Measure No.	Measure Description	Reductions
E-4	Million Solar Roofs (including California Solar Initiative and New Solar Homes Partnership) <ul style="list-style-type: none"> <li>• Target of 3000 MW Total Installation by 2020</li> </ul>	2.1
Total		2.1

Measure No.	Measure Description	Reductions
RW-1	Landfill Methane Control (Discrete Early Action)	1
Total		1

## Other Measures

---

Measure No.	Measure Description	Reductions
T-1	Pavley I and II – Light-Duty Vehicle GHG Standards	31.7
Total		31.7

Measure No.	Measure Description	Reductions
T-2	Low Carbon Fuel Standard (Discrete Early Action)	16.5
Total		16.5

Measure No.	Measure Description	Reductions
T-10	High Speed Rail	1
Total		1



CLIMATE CHANGE  
DRAFT SCOPING PLAN  
*a framework for change*

JUNE 2008 DISCUSSION DRAFT  
*Pursuant to AB 32*  
*The California Global Warming Solutions Act of 2006*

*Prepared by*  
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# Smart Growth Contribution

## 2.3 mm tons by 2020

# Much Bigger Numbers

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Table 9. Estimated CO<sub>2</sub> Reduction with Smart Growth in California (2010-2020)

	CO <sub>2</sub> Reduction (million metric tons)
VMT Reduction with Compact Development	4.1 – 5.7
VMT Reduction with Smart Transportation Policies	4.0
VMT Reduction with Measures Under Evaluation	3.3 – 4.6
<b>Total</b>	<b>11.4 – 14.3</b>
<i>Building Energy Savings</i>	<i>3.0 – 3.6</i>
<i>Total with Building Energy Savings</i>	<i>14.4 – 17.9</i>



## CLIMATE CHANGE PROPOSED SCOPING PLAN

*a framework for change*

OCTOBER 2008

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# Smart Growth Contribution

# 5 mm tons by 2020

## ***SB 375 – Climate Change Smart Growth Act of 2008***

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***To reduce GHG emissions from cars and light trucks through incentives for better development patterns so people can choose to drive less***

## ***Regional GHG Targets***

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- ***Air Resources Board sets Greenhouse Gas (GHG) Reduction Targets for each region***
- ***Targets are limited to emissions from the car and light truck sector***
- ***Targets must take into account other CARB strategies for reducing GHG emissions from this sector***

## ***Regional Transportation Planning***

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- ***Existing law requires regional transportation plans to include a development pattern for the region***
- ***SB 375 provides that the development pattern should be designed to achieve regional GHG reduction targets set by CARB***

## ***Regional Transportation Plans***

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***Under current law RTPs must have the following elements:***

- A policy element***
- An action element***
- A financial element***

***SB 375 adds a new element to the RTPs***

- Sustainable Communities Strategy***

## ***Alternative Planning Strategy***

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***If an agency cannot achieve the GHG Reduction Targets within the constraints of realistic funding and realistic land use plans, it must prepare an Alternative Planning Strategy showing how the Targets could be achieved***

## ***Only Incentives***

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- ***Future transportation funding would be directed to projects that implement the regional transportation plan***
- ***New provisions of CEQA would be available to local governments with local plans consistent with the regional plan***

## ***CEQA - Transit Priority Projects***

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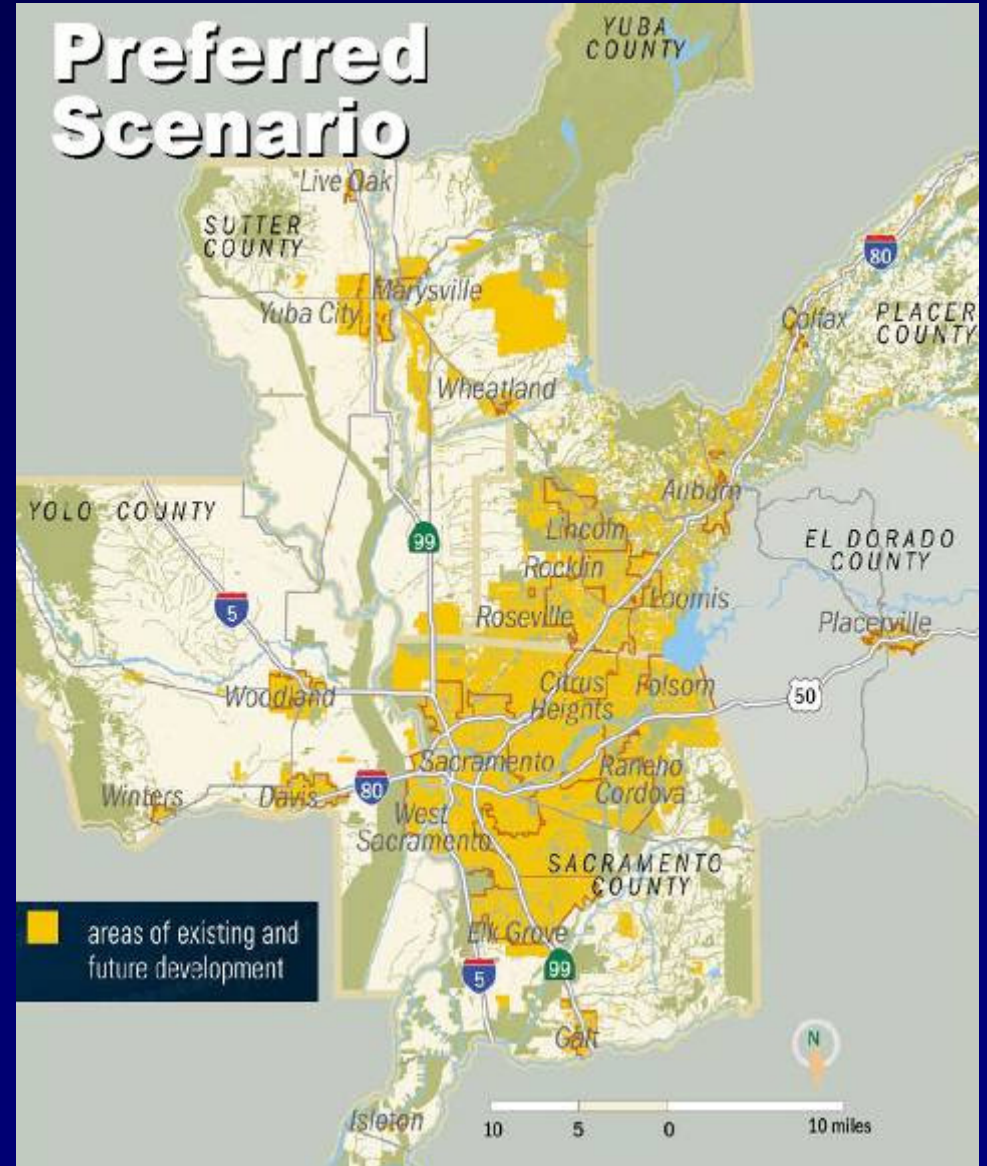
- ***Located within 1/2 mile of rail or ferry station or 1/2 mile of RTP designated fixed bus corridor with 15 minute headways***
- ***Minimum 20 dwelling units per net acre***
- ***Must be 75% residential or 50% residential if FAR at least 0.75***

# Blueprint Planning Process

## Basecase Scenario



## Preferred Scenario



## ***Simulation Results***

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26% reduction in VMT by 2050

15% reduction in CO<sub>2</sub> by 2050

## ***Who Said This?***

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***It's imagining new transportation systems. I'd like to see high speed rail where it can be constructed. I would like for us to invest in mass transit because potentially that's energy efficient. And I think people are a lot more open now to thinking regionally...***

***The days where we're just building sprawl forever, those days are over. I think that Republicans, Democrats, everybody... recognizes that's not a smart way to design communities. So we should be using this money to help spur this sort of innovative thinking when it comes to transportation.***

***That will make a big difference.***