

Sustainable Mobility & Location Efficiency



Blue Ribbon Task Force: Transportation Finance & Implementation
September 25, 2007



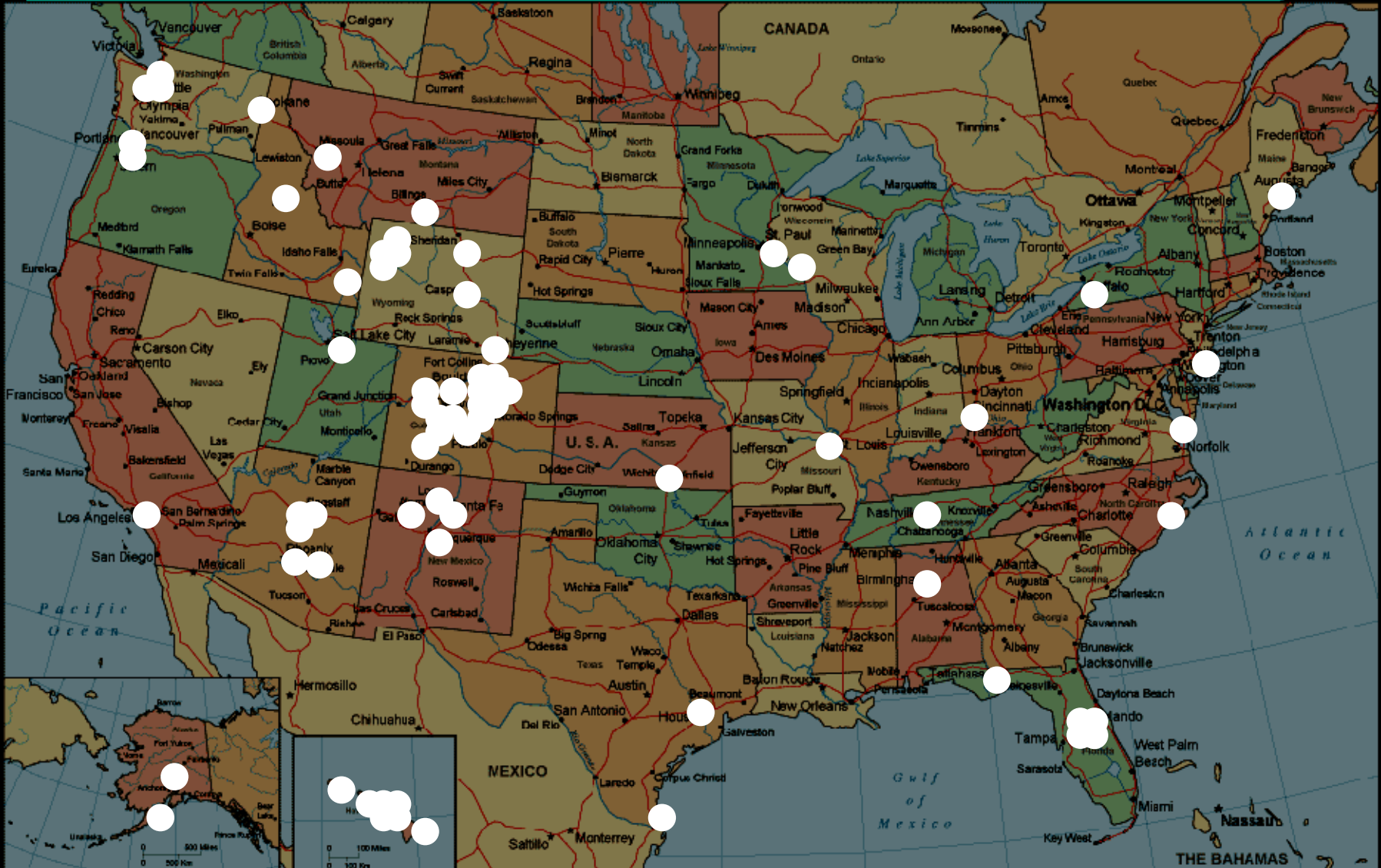
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This Presentation is Drawn From

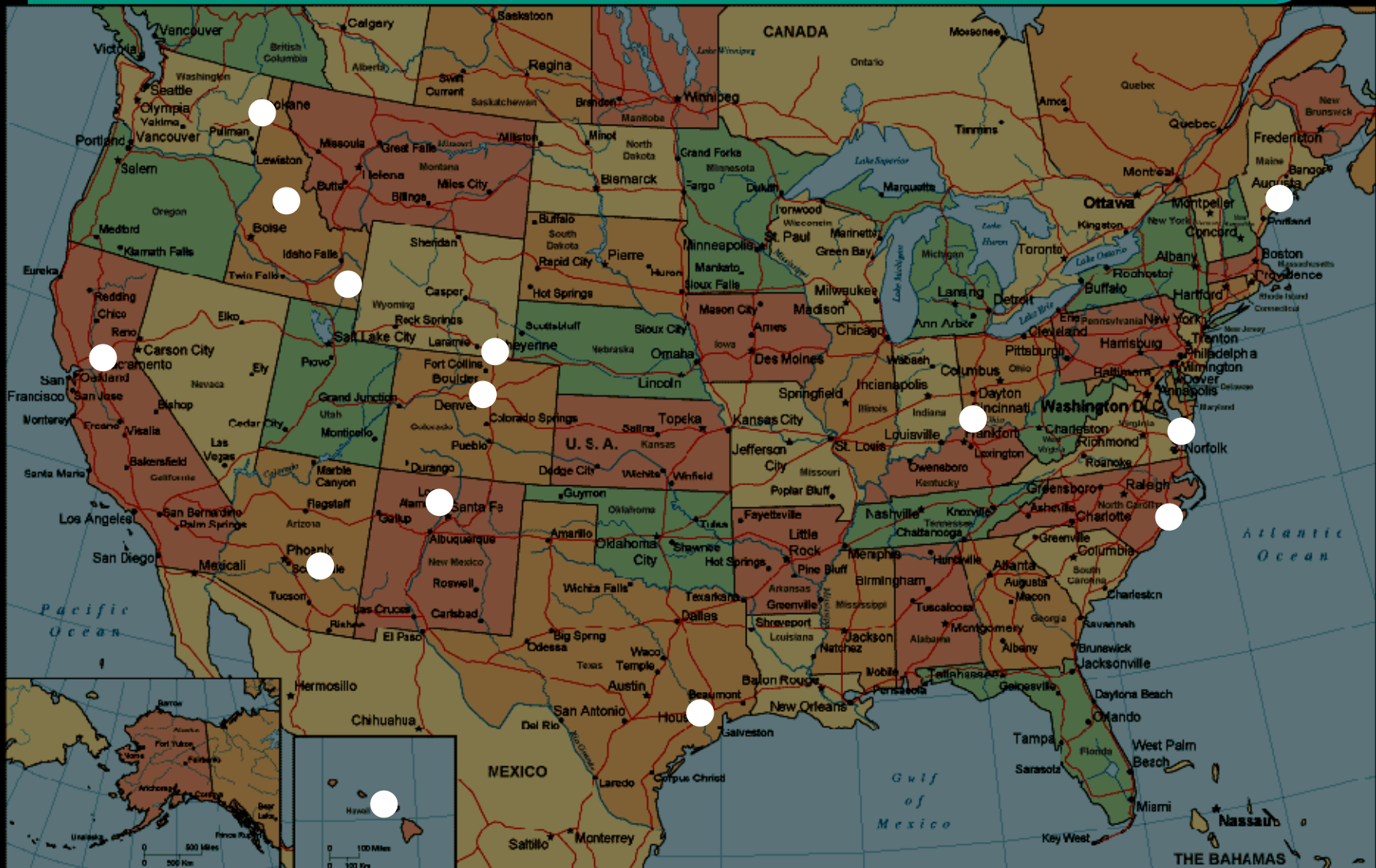


- Our work with:
 - EPA Smart Growth Implementation Assistance Program
 - Governor's Institute on Community Design
 - Mayor's Institute on Community Design
- Our projects in 27 states

Our Clients



EPA Smart Growth Implementation Assistance Program



Agenda



- Introduction – Sustainable Mobility
- 21st Century Transportation Planning
- Location Efficiency
- Colorado Policy Choices

Introduction

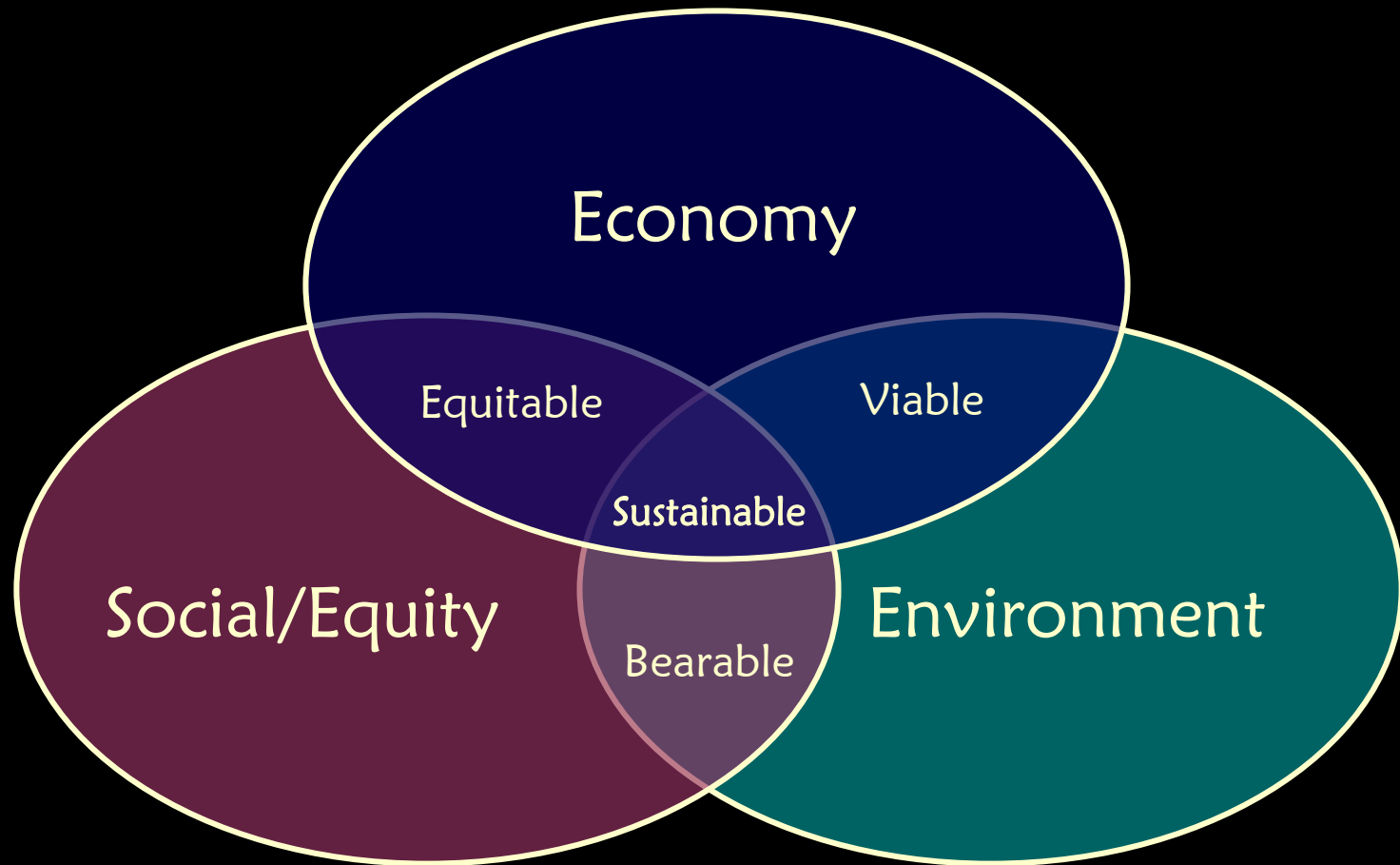


Sustainable Mobility



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Classic Sustainability



Why Care About Sustainable Mobility?



- We should “do the right thing”
- Because Al Gore said so
- We have to stop global warming

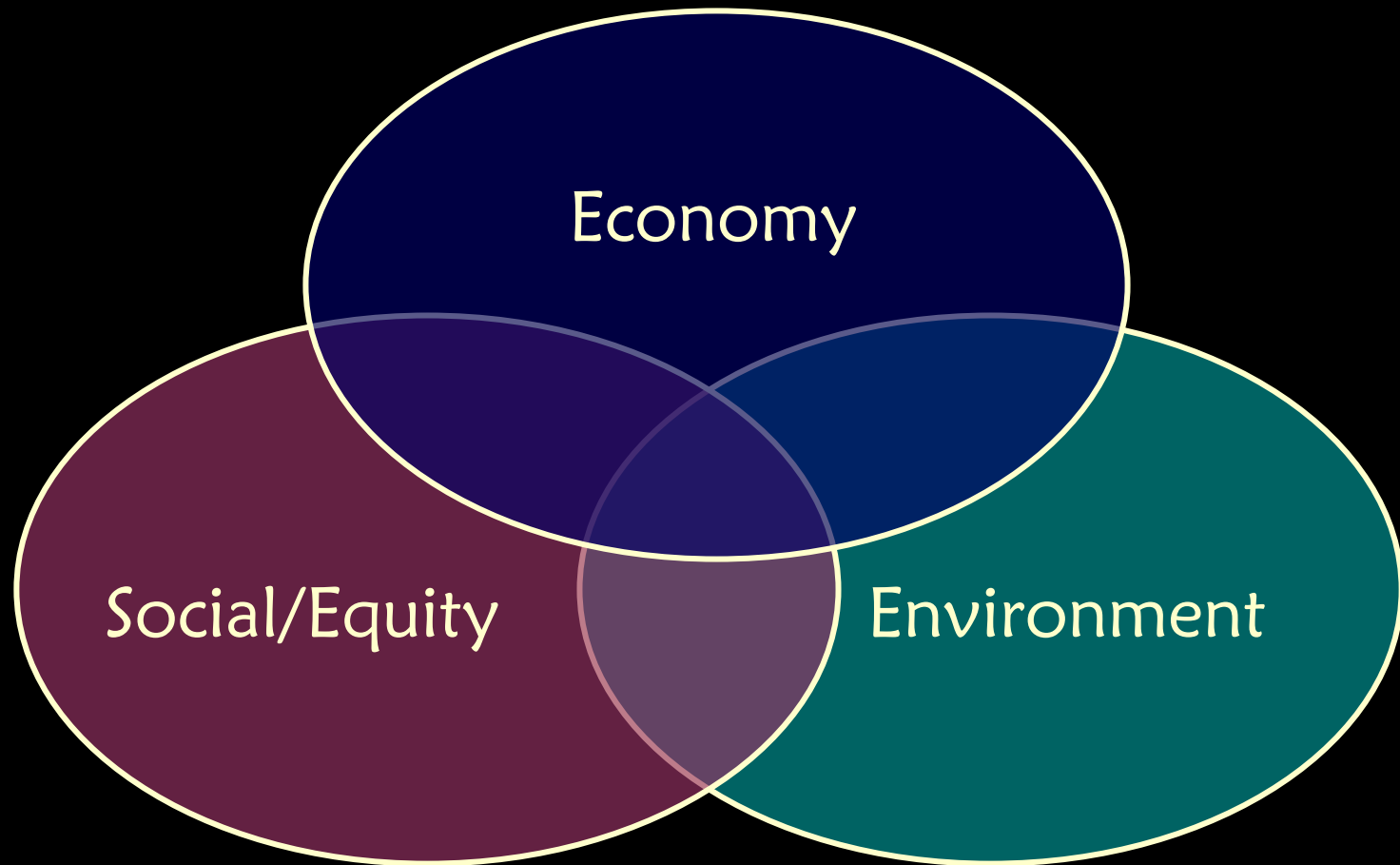
Why Care About Sustainable Mobility?



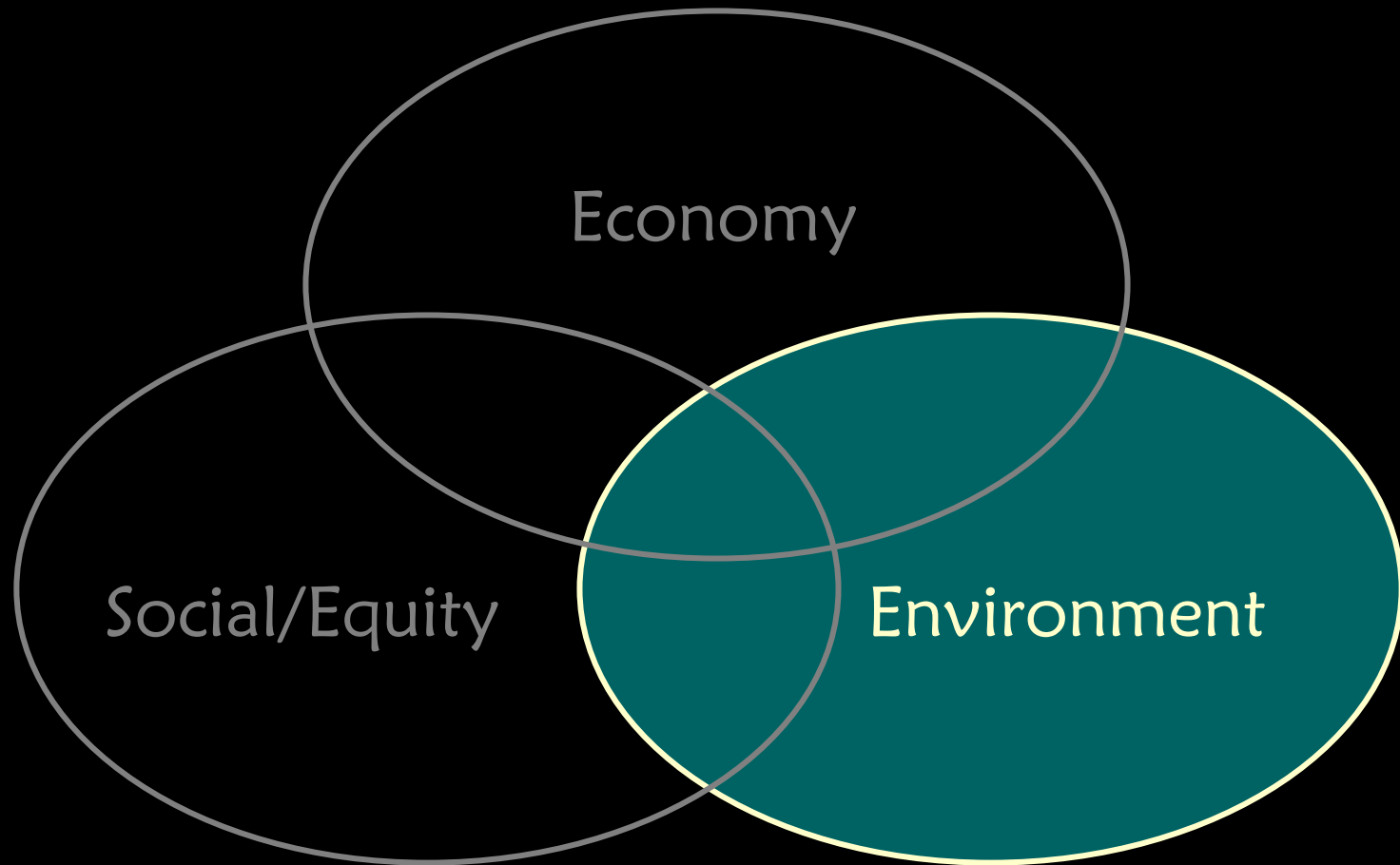
Colorado – Strategic Perspective

- Reduce our **vulnerability to change**
- Gain (or maintain) our **competitive edge**
- Ensure a high **quality of life**

“Sustainability”



“Sustainability”

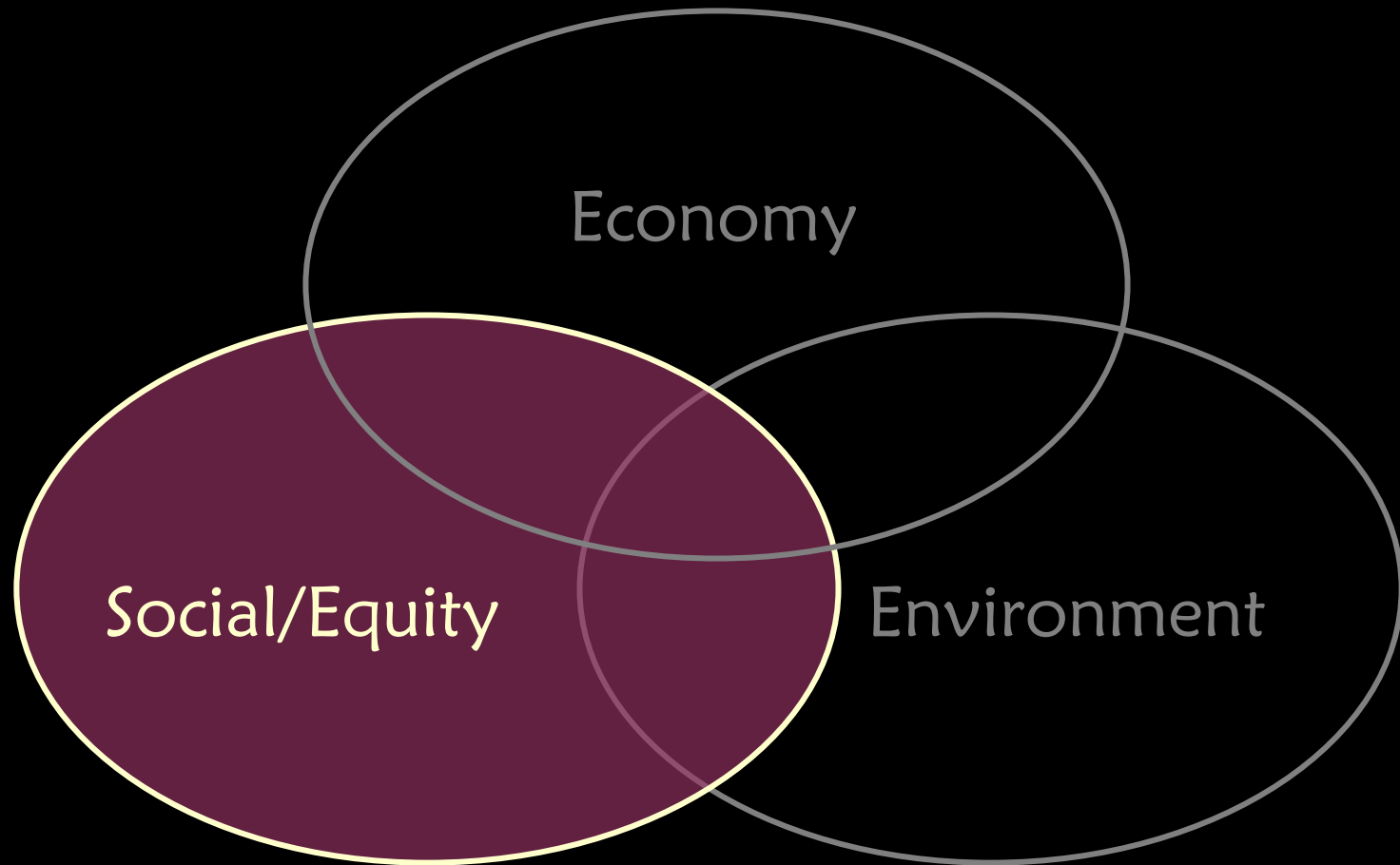


Environment



1. Climate Change
2. Pollution
3. Energy Use
4. Landscape
5. Resource Efficiency

“Sustainability”

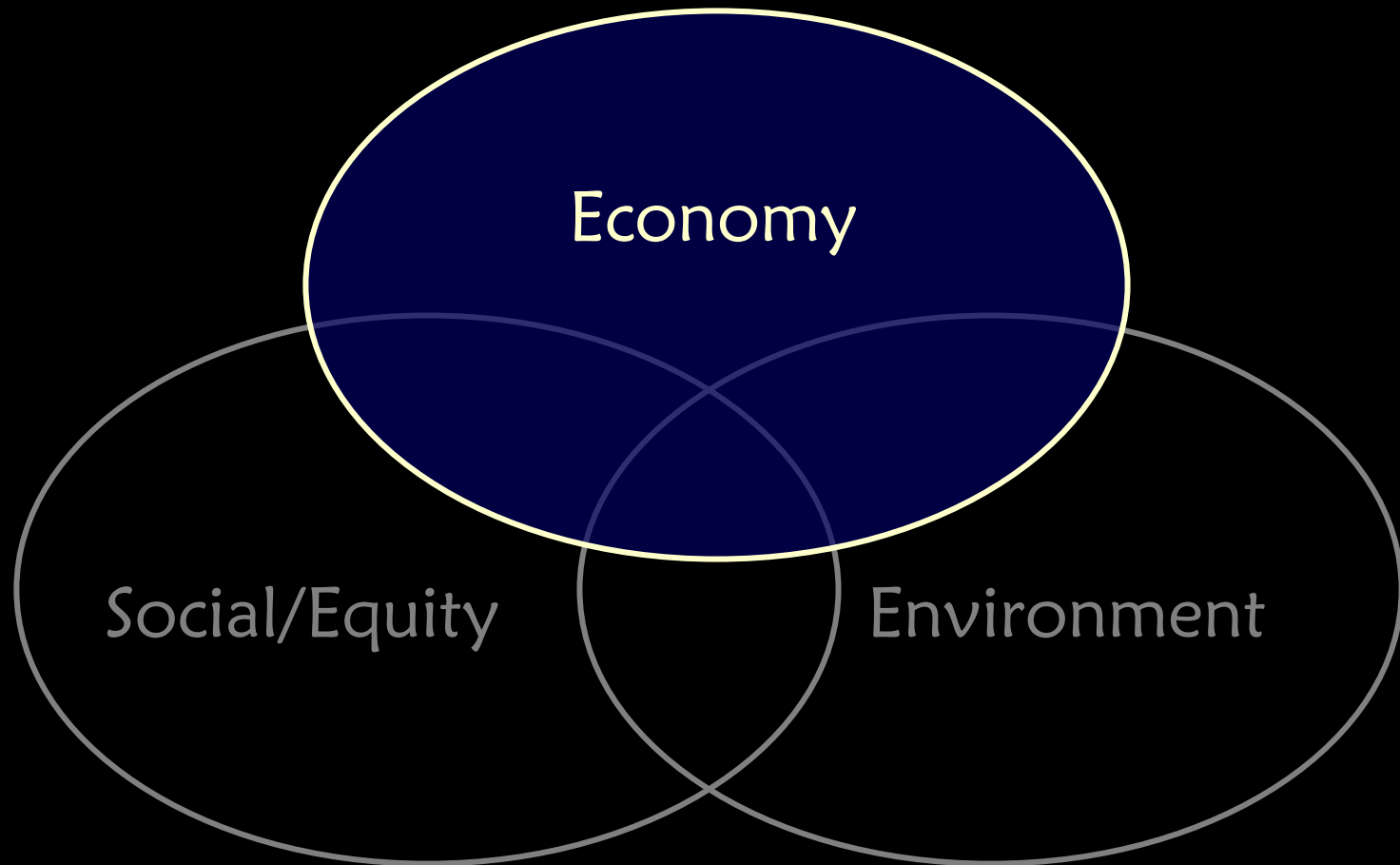


Social/Equity



- 6. Mobility Choices
- 7. Healthy Societies
- 8. Community Legacy

“Sustainability”



Economy



9. Access to Jobs


10. Economic Resiliency

Today



1. Climate Change
2. Pollution
3. Energy Use
4. Landscape
5. Resource Efficiency
6. Mobility Choices
7. Healthy Societies
8. Community Legacy
9. Economic Resiliency

21st Century Transportation Planning



Sustainable Mobility



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1. Climate Change



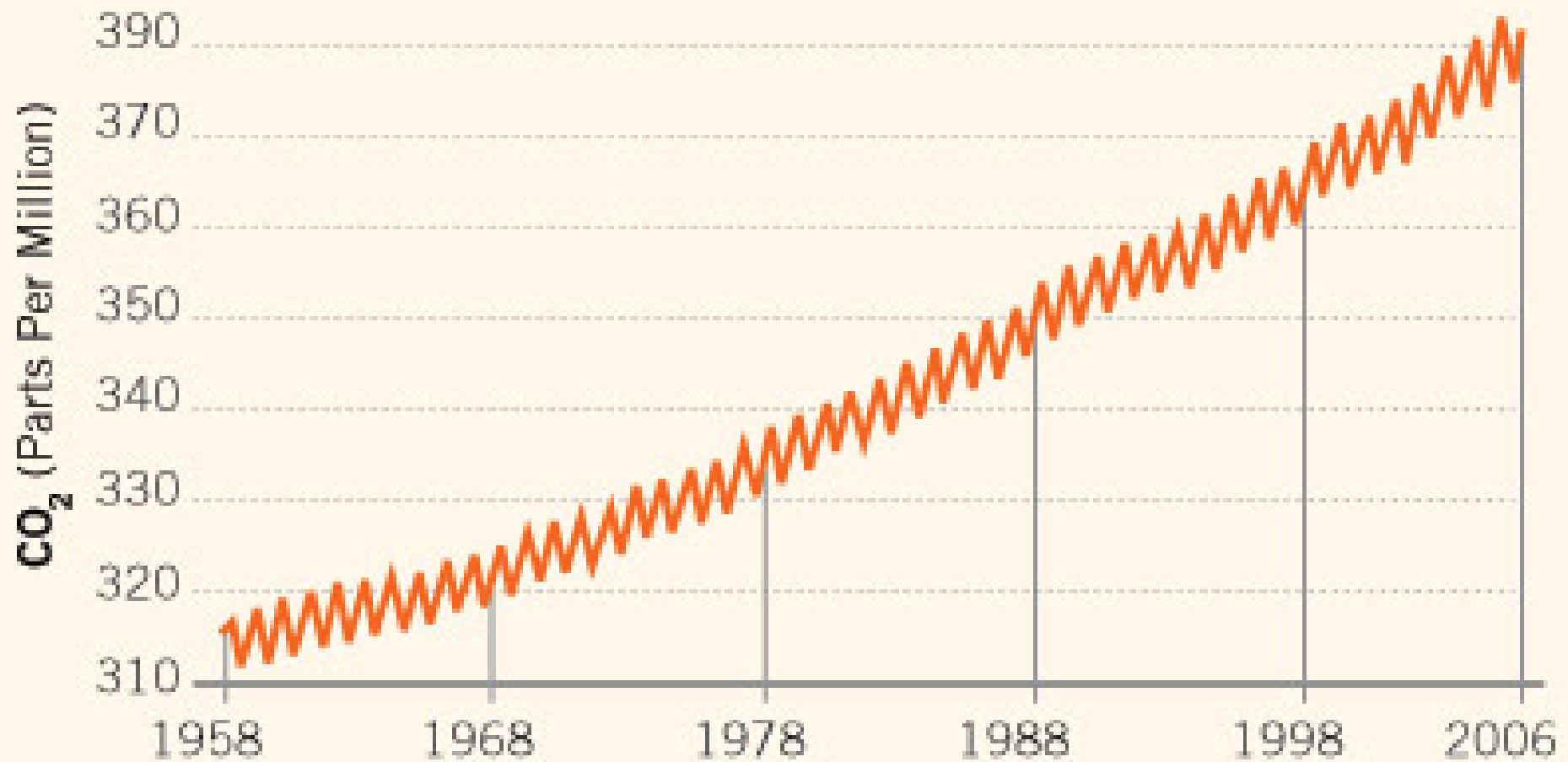
Stranded Polar Bears





Receding Glaciers

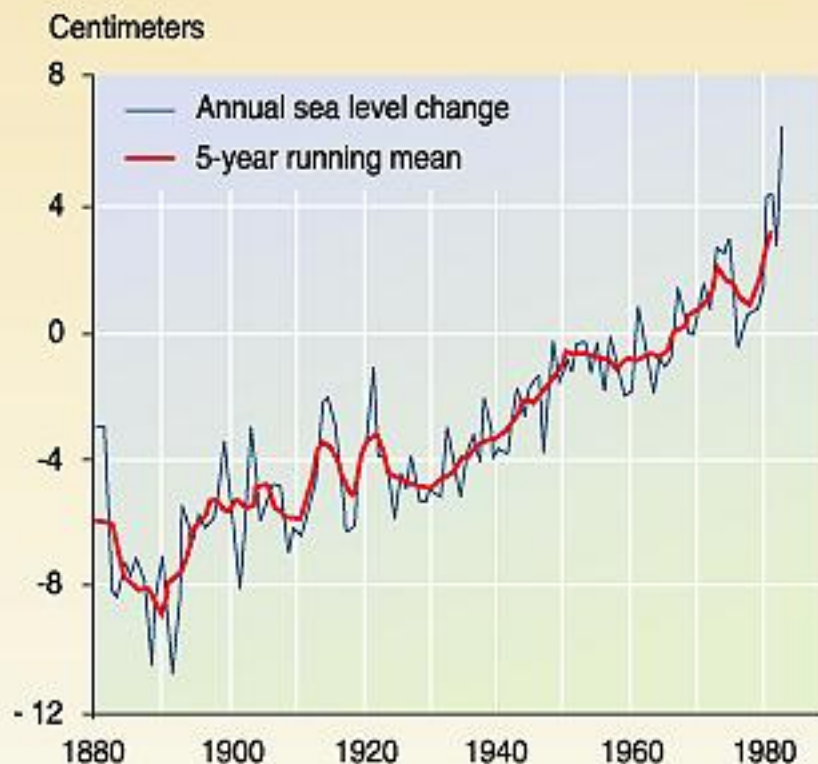
The Keeling Curve



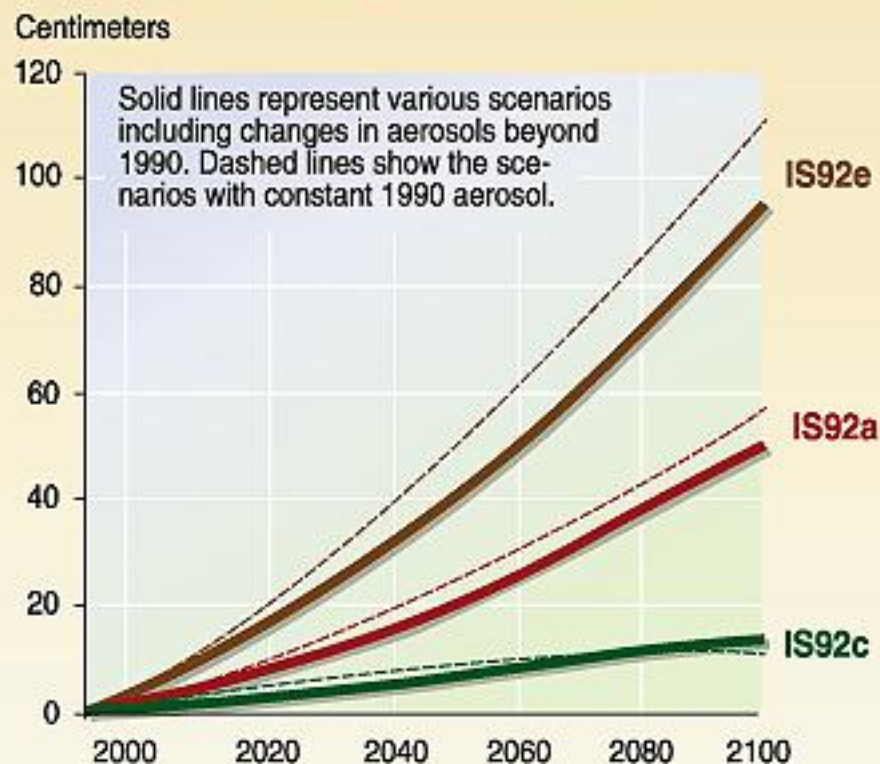
SOURCE: Scripps Institute of Oceanography

Sea level rise due to global warming

Sea level rise over the last century



Sea level rise scenarios for 2100



GRID
Arendal UNEP

GRAPHIC DESIGN: PHILIPPE REKACEWICZ

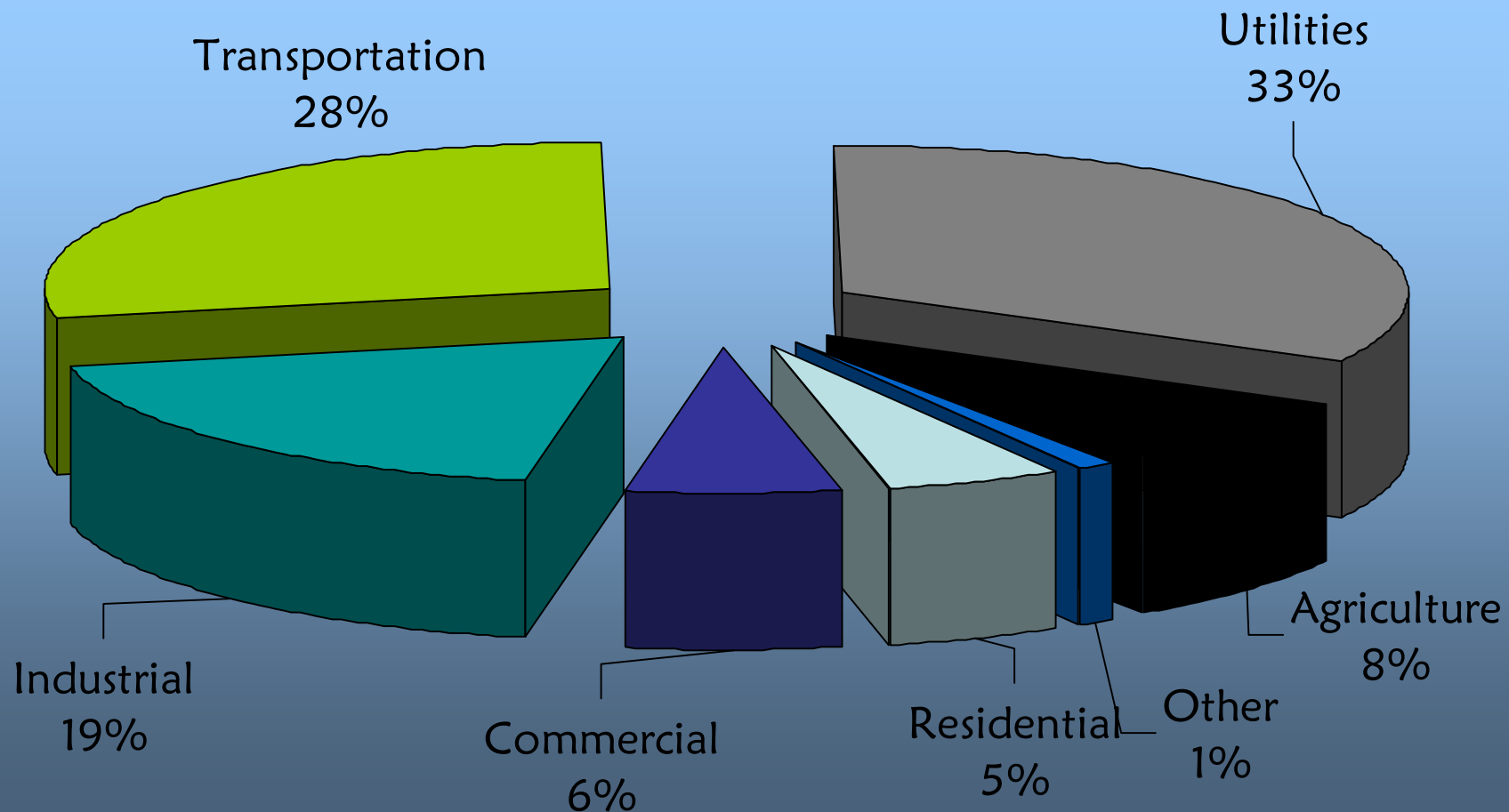
Source: Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge university press, 1996; Sea level rise over the last century, adapted from Gornitz and Lebedeff, 1987.

Overview: Climate Change

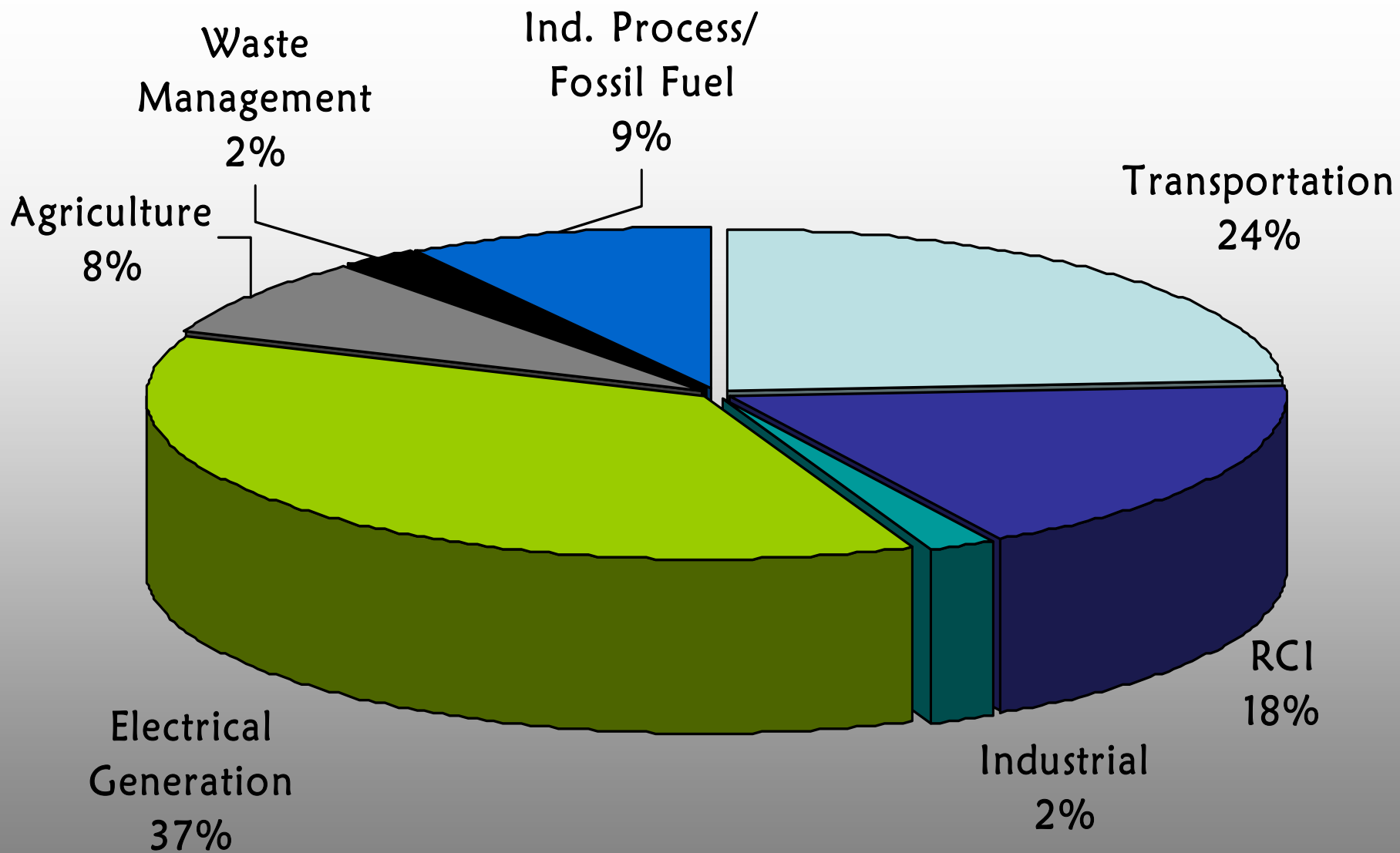


- Greenhouse gases associated with human activities are contributing to global warming with potentially serious consequences
- Emerging U.S. policy:
 - Limit temperature increase to no more than 2° to 3° Centigrade
 - By cutting GHG emissions by 60% to 80% below 1990 levels by 2050

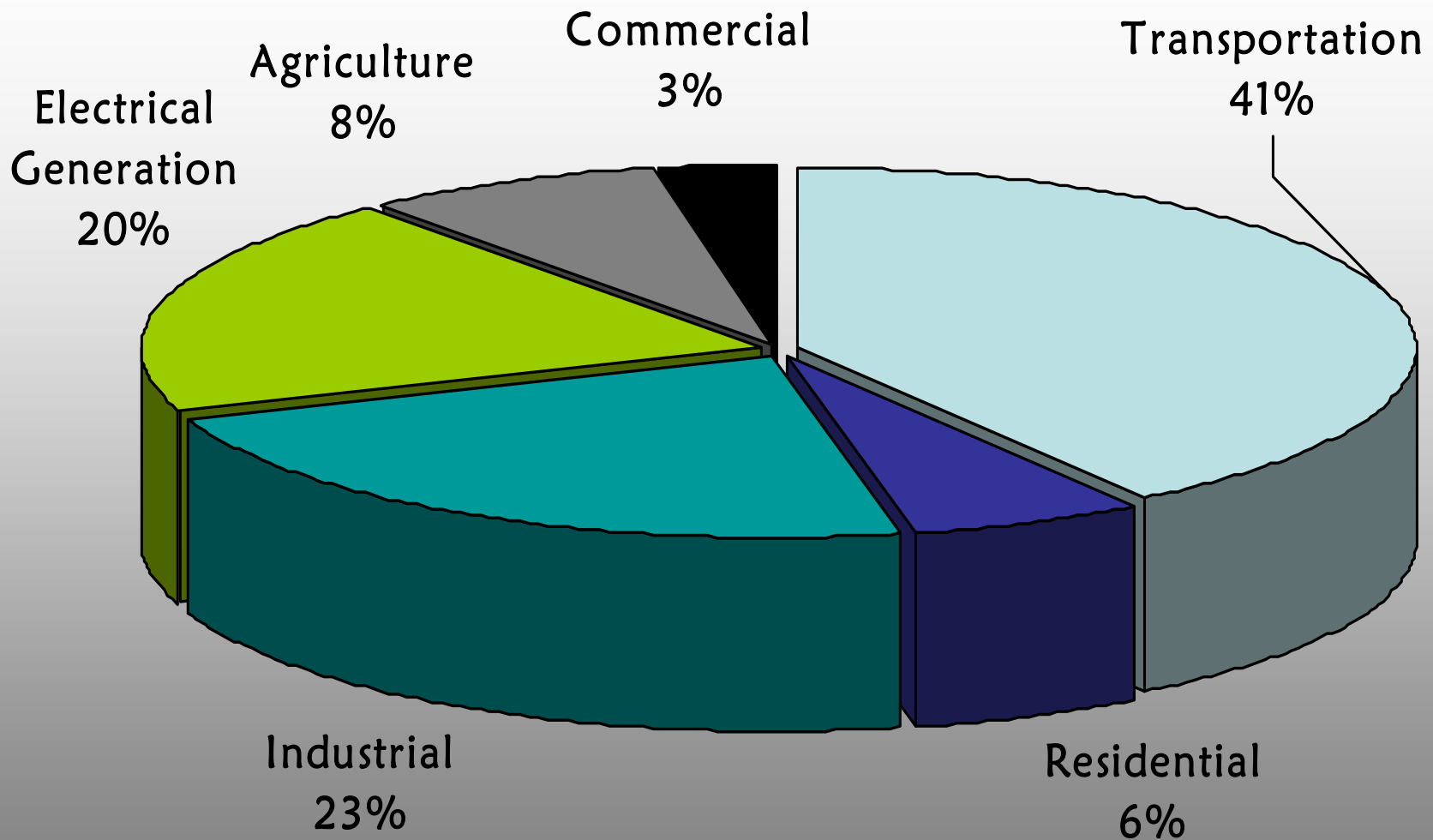
U.S. Greenhouse Gases







Colorado



California

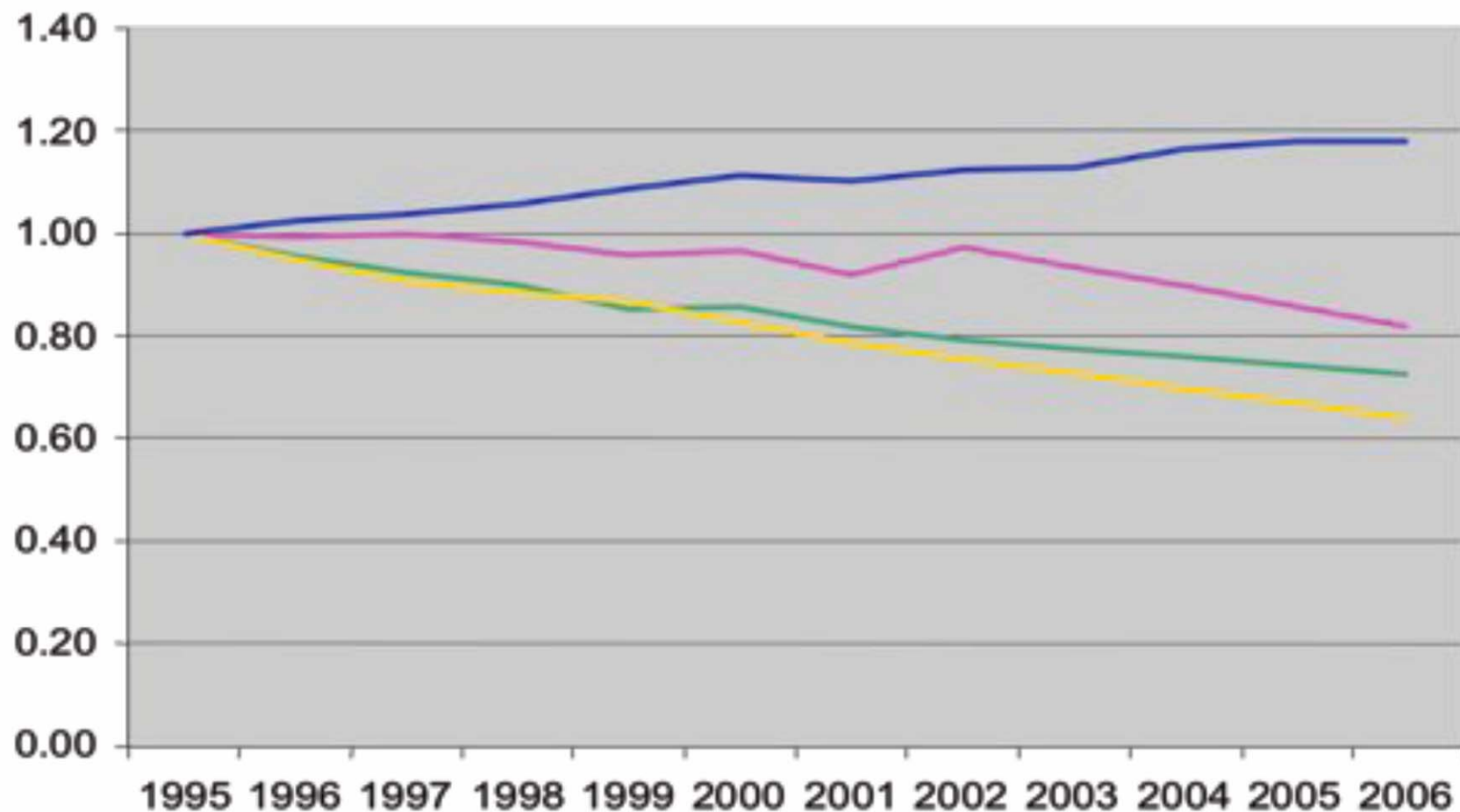
U.S. Transportation Emissions



Source: EPA

Index (1995 = 1)

CO NOX VOC CO₂

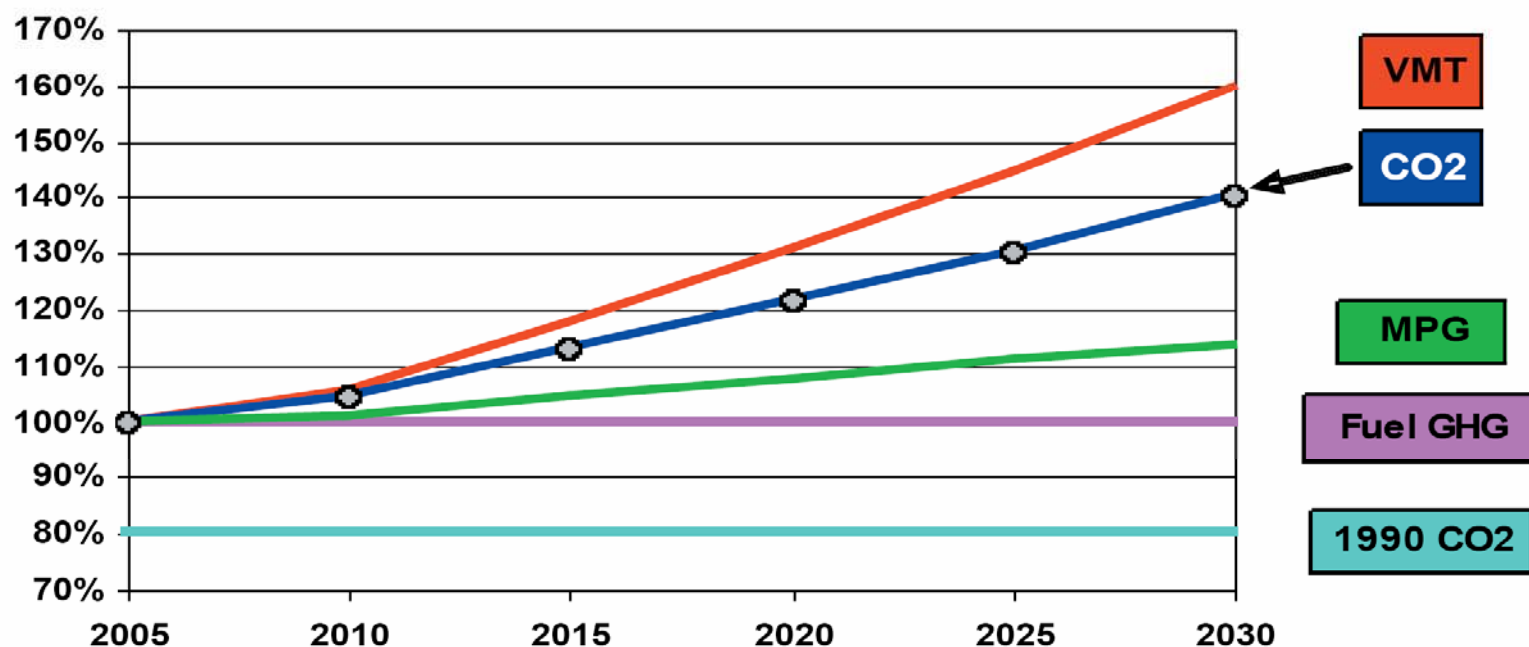


Motor Vehicles & CO₂



FIGURE O-2

PROJECTED GROWTH IN CO₂ EMISSIONS FROM CARS AND LIGHT TRUCKS

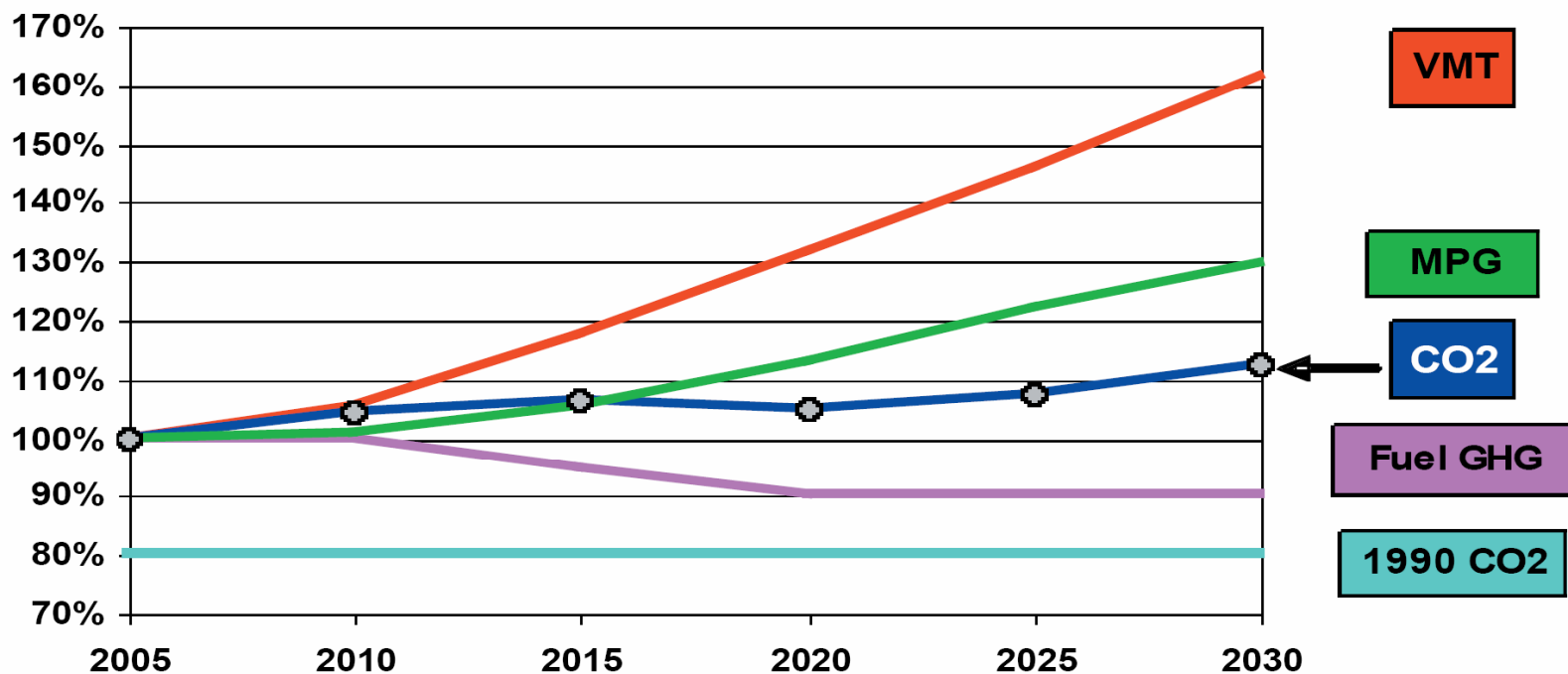


Vehicle Technology Alone Cannot Solve the Problem



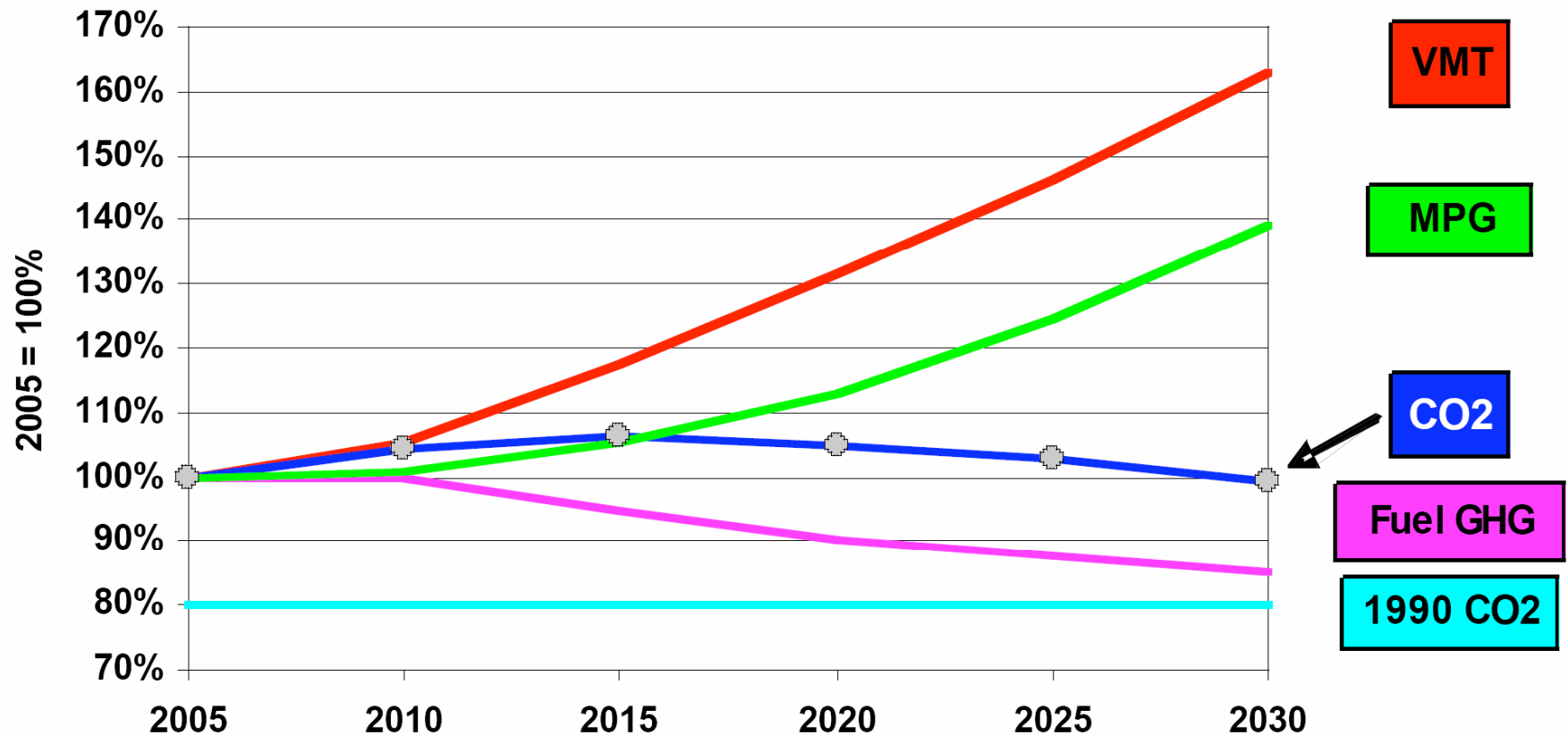
PROJECTED GROWTH IN CO₂ EMISSIONS FROM CARS AND LIGHT TRUCKS ASSUMING STRINGENT NATIONWIDE VEHICLE AND FUEL STANDARDS*

*WITH SENATE CAFE LEVELS -- NEW PASSENGER VEHICLE FUEL ECONOMY OF 35 MPG IN 2020
AND CALIFORNIA LOW CARBON FUEL STANDARD OF -10% IN 2020 APPLIED NATIONALLY.



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

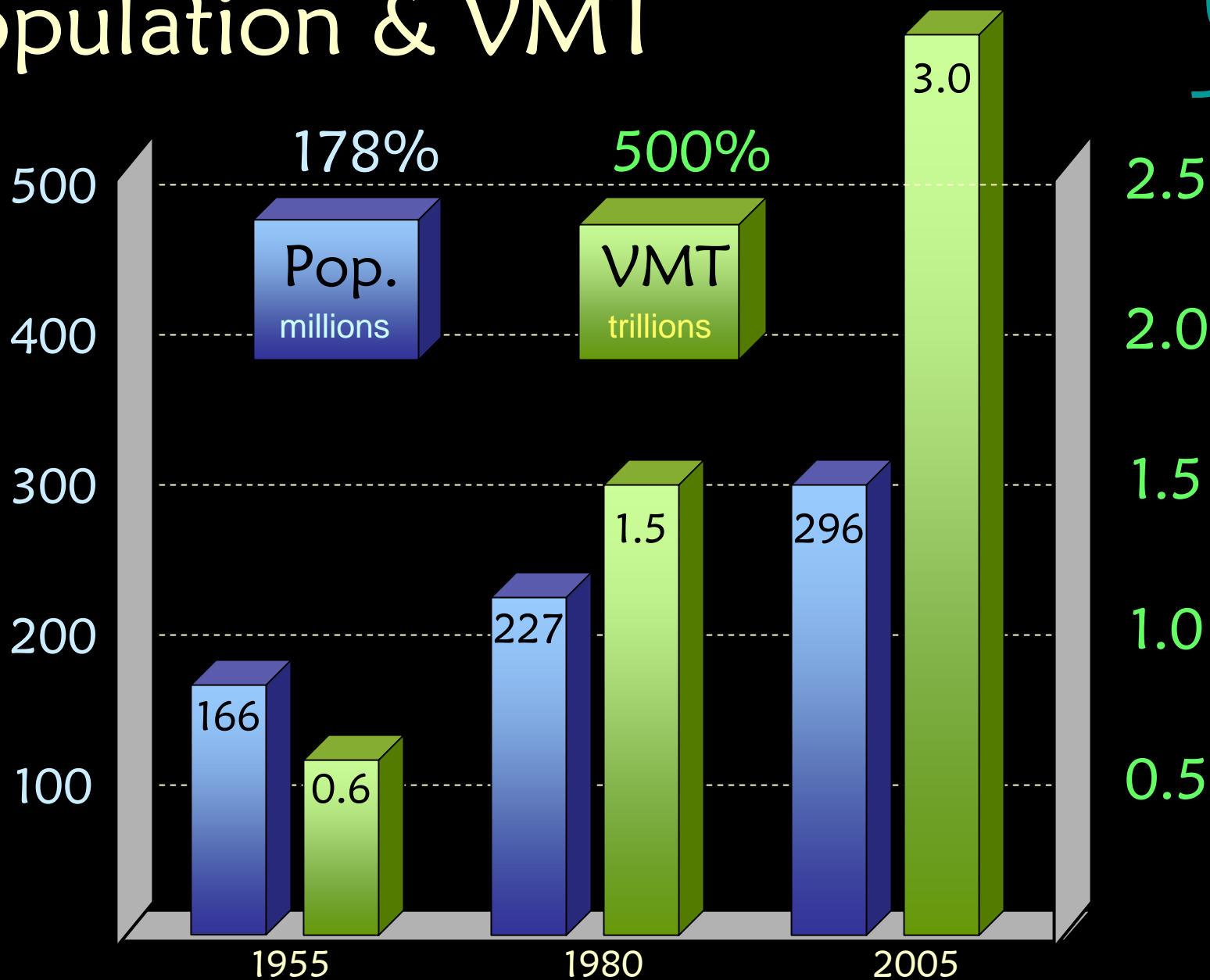
...Even With Very Stringent Standards



Sources: VMT: EIA with 10% rebound, MPG & Fuel: Trend Extrapolation

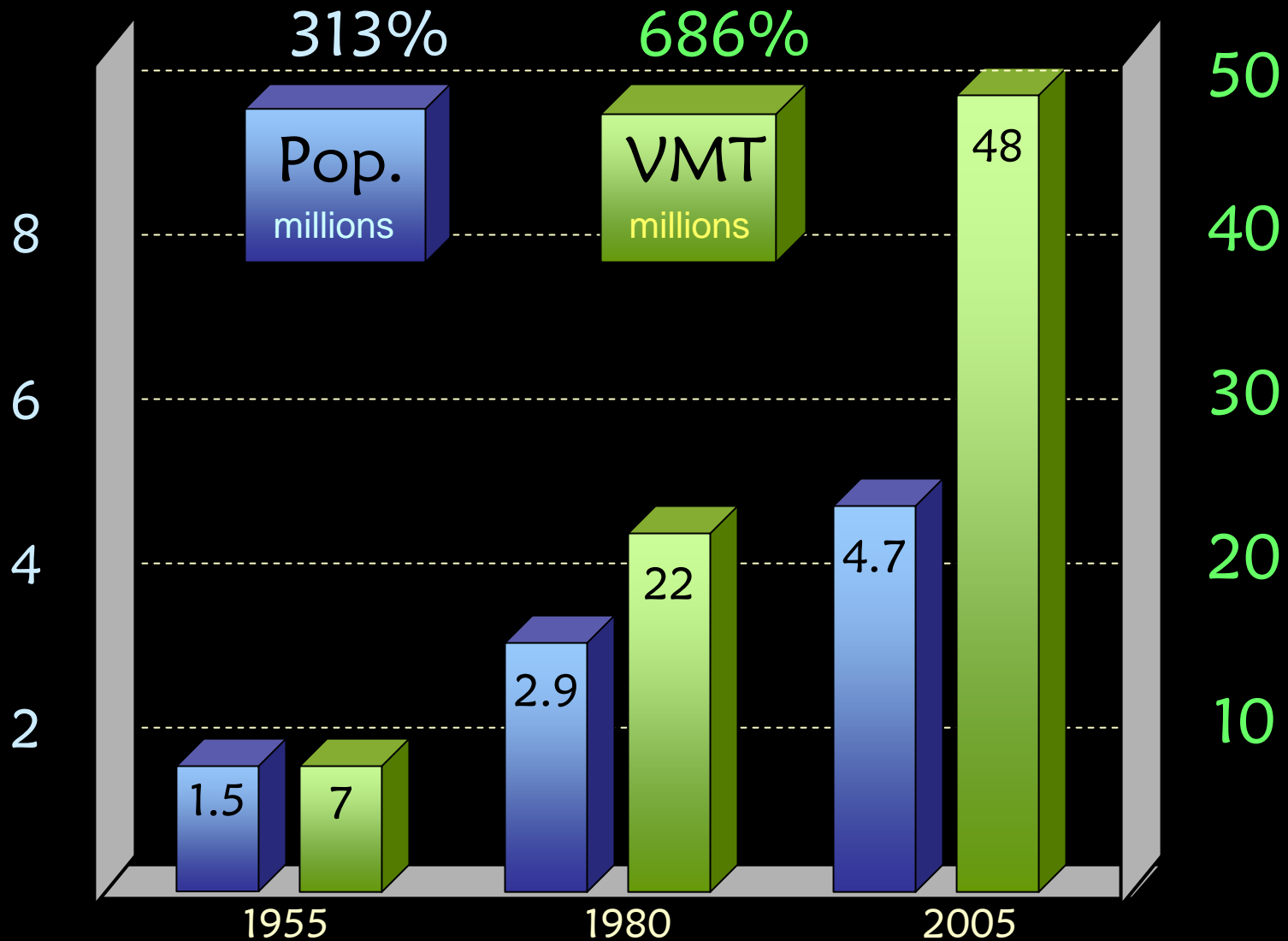
United States

Population & VMT



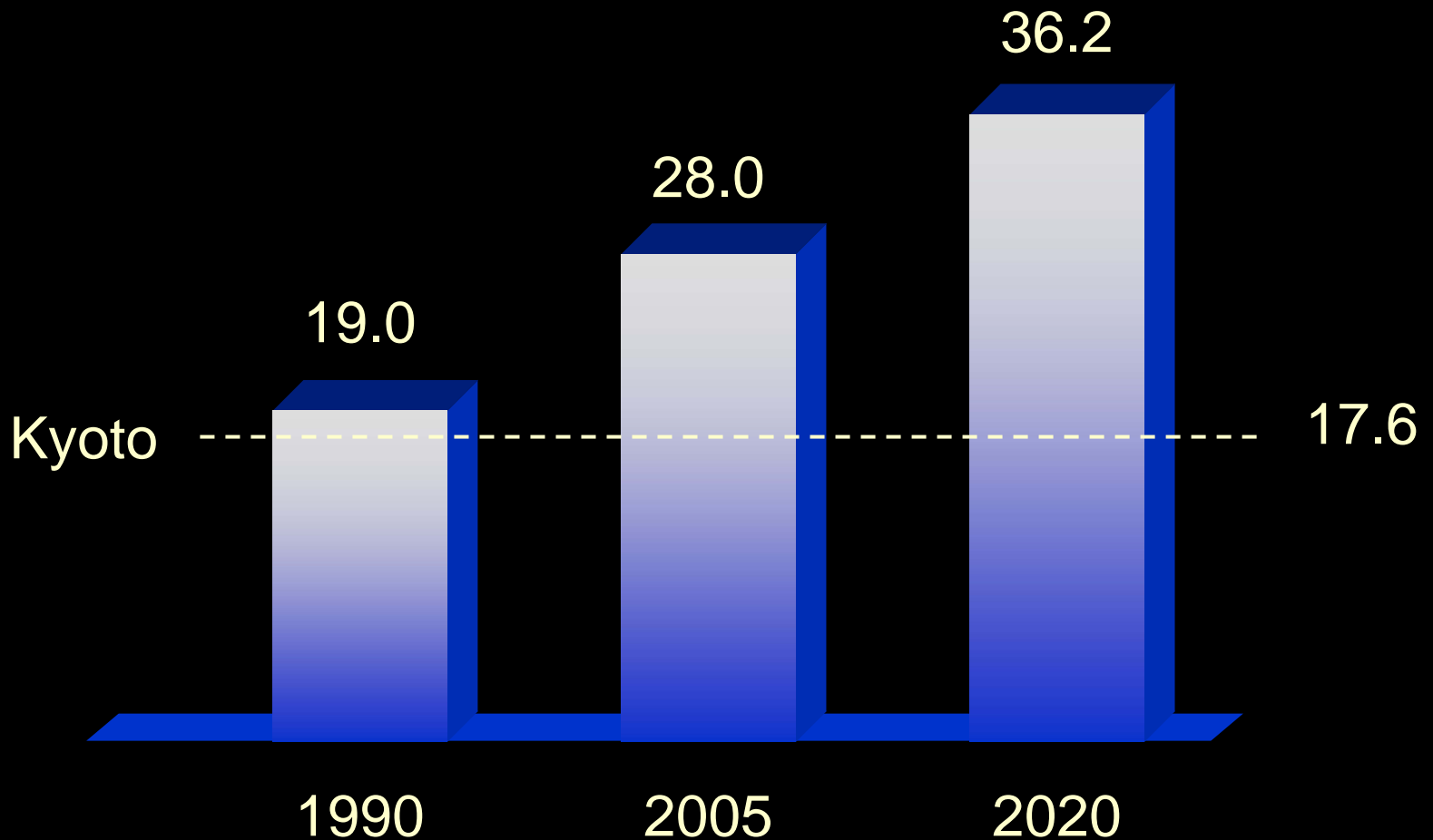
Colorado

Population & VMT



Gross Greenhouse Gas Emissions

Transportation – Colorado



Supply-Side Failure



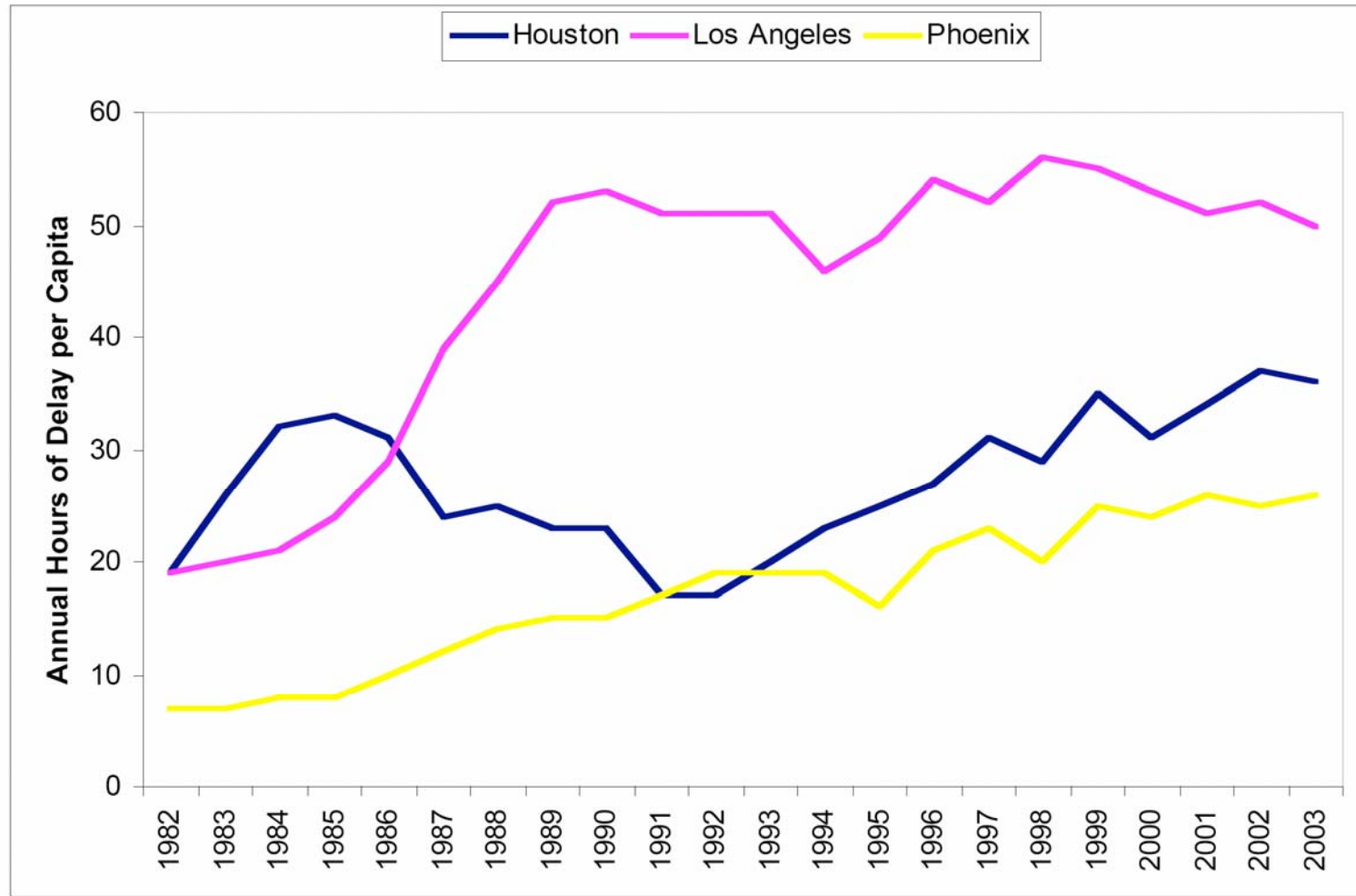
- VMT has grown twice as fast as highway capacity in the nation's urbanized areas
- Highway building itself induces more traffic, induces low efficiency development patterns and accelerates CO₂ emissions

Road Building Has Not Reduced Delay



Figure 1-6 Growth of Annual Hours of Delay per Capita

Source: Schrank and Lomax 2005.

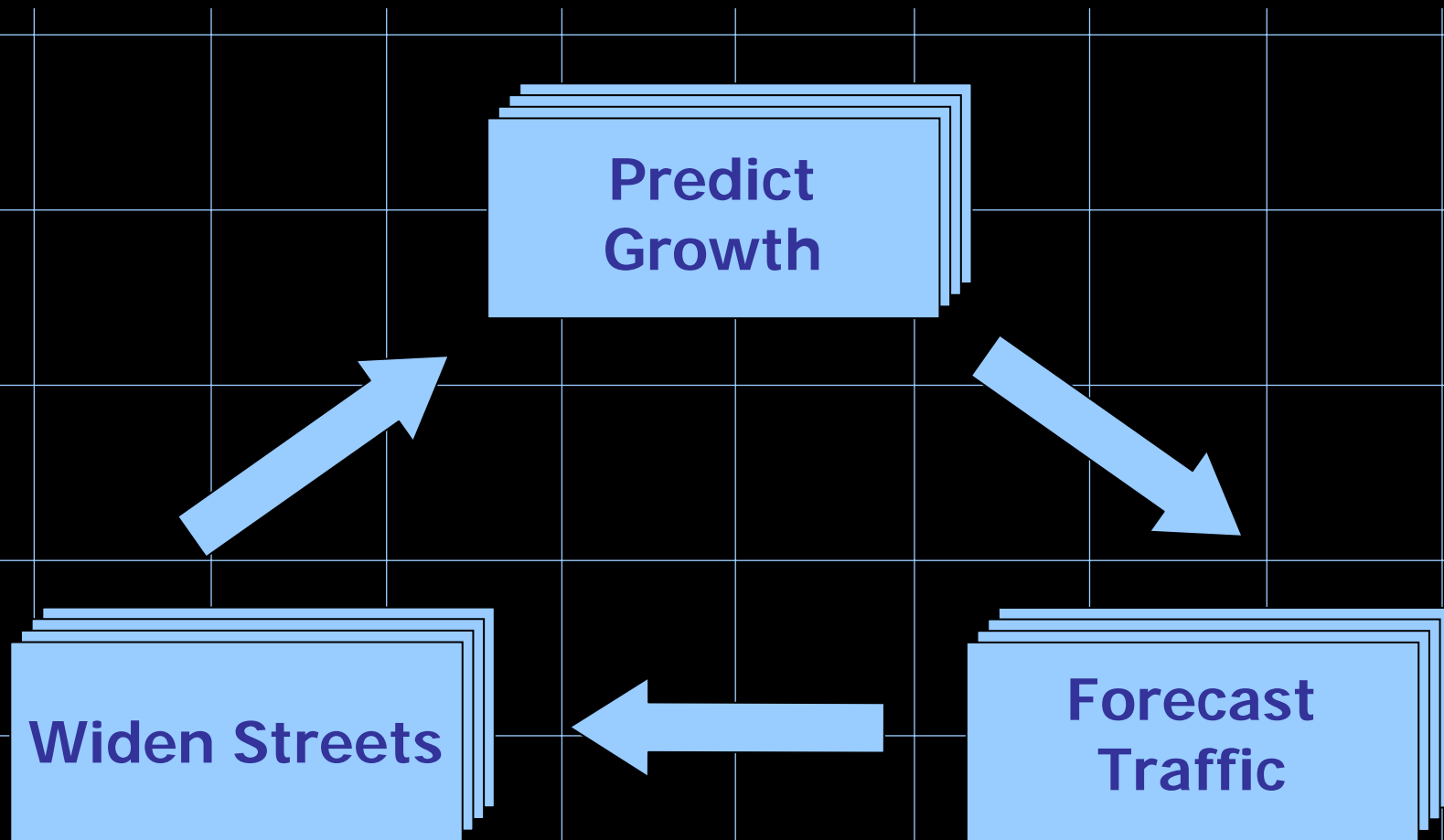


Traffic Forecasting \neq Planning



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Have you ever noticed...?

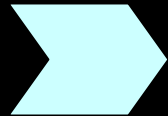


Rational “Planning”



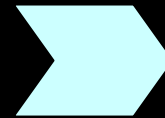
1.

What do
we
want?



2.

How
much
traffic
will
there be?



3.

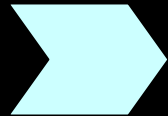
What
should
we do?

Actual “Planning”



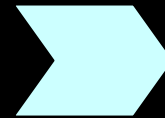
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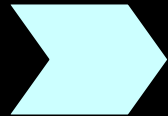
What
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Actual “Planning”



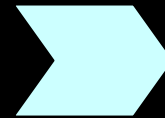
1.

How
much
traffic
will
there be?



2.

What
should
we do?



3.

What do
we get?

Induced Traffic



Types of Induced Traffic



Changes in travel route Immediate

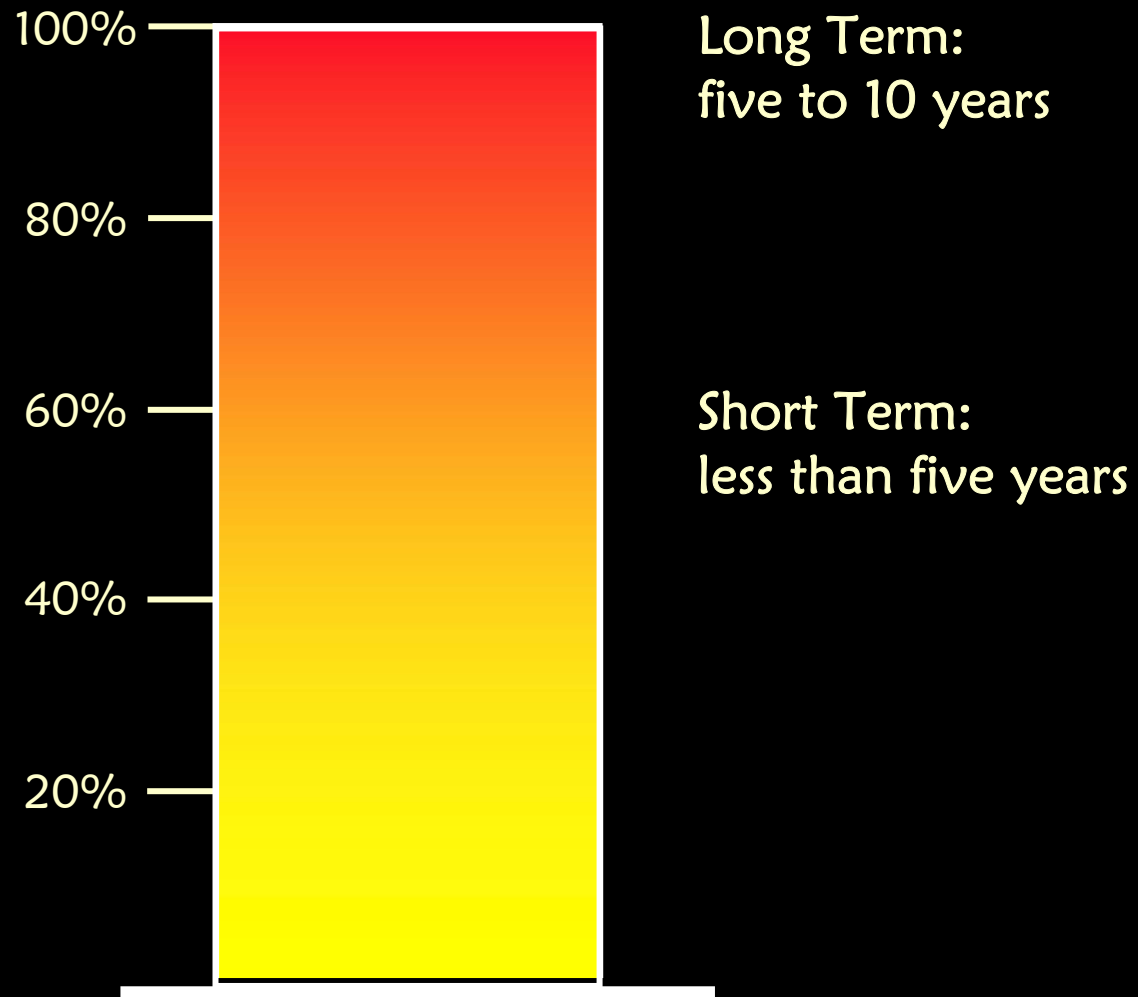
Changes in mode of travel < 6 months

Changes in time of travel < 6 months

Changes in amount of travel < 6 months

Changes in origins & destinations < 10 years

% of new capacity consumed by induced traffic...





If you build it . . .
. . . they will come



If you build it . . .
. . . they will come



Are we responding to traffic growth...
...or are we causing it?

“Project & Provide”

Effects of “Project & Provide”



- Higher rates of driving & vehicle ownership
 - Family budgets
 - Housing cost pressure
- Higher levels of air pollution, esp. ozone
 - Health implications
 - Upcoming federal sanctions
- Higher risk of accidents
 - More fatalities
 - Property damage – economic impacts
- Lower rates of walking
 - Personal health
 - Quality of life – especially children
- No reduction in congestion delay

Summary: Motor Vehicles & CO₂



- The opportunity to reduce emissions of CO₂ at the tailpipe are limited
 - Higher fuel economy
 - Non-internal combustion engines
- Growth in VMT = Growth in CO₂
- The federal government will soon regulate motor vehicle emissions of greenhouse gases, including CO₂
- The amount of change required is large

3. Energy Use



Are we running out of gas?



The stone age did not end...
...because we ran out of stones

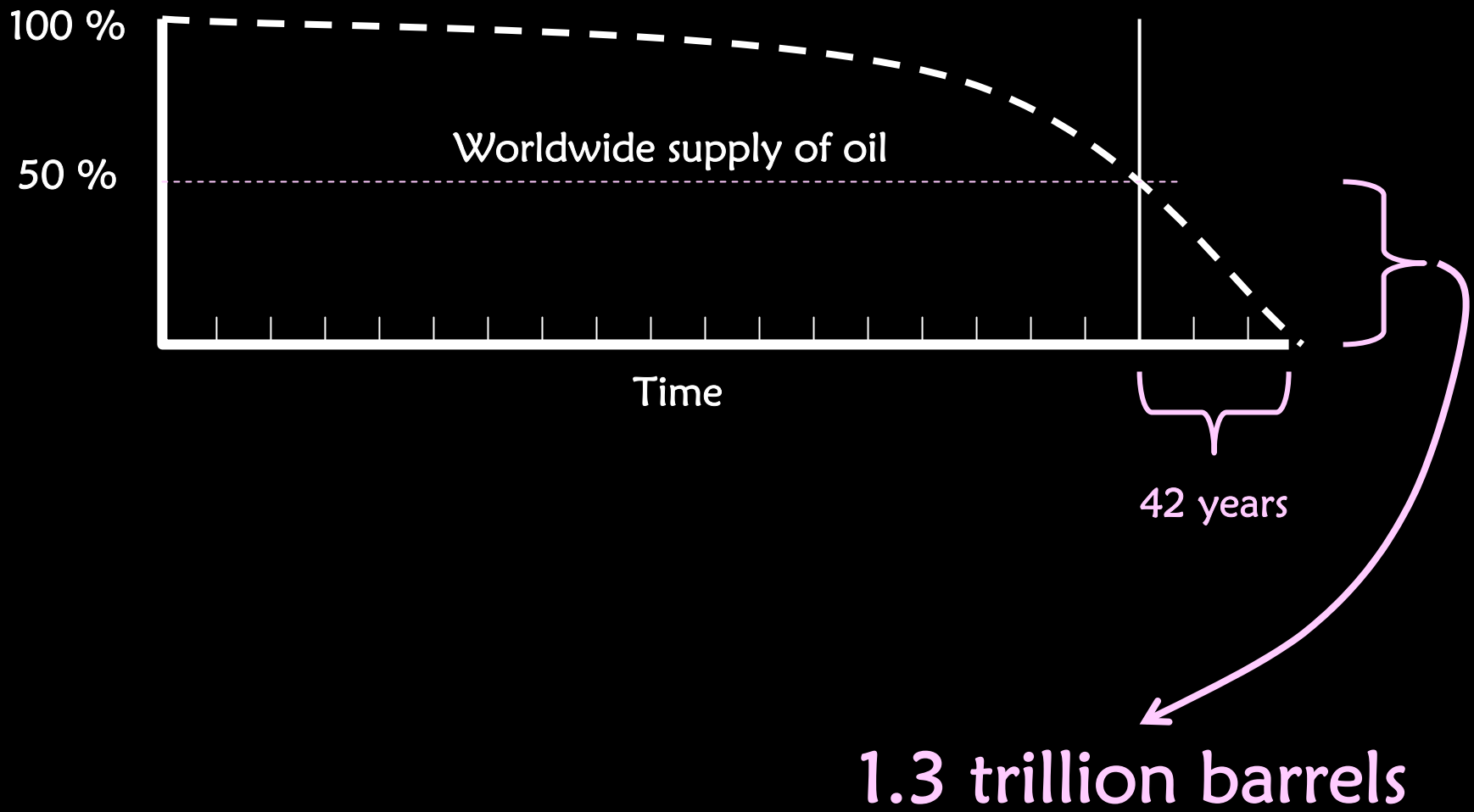


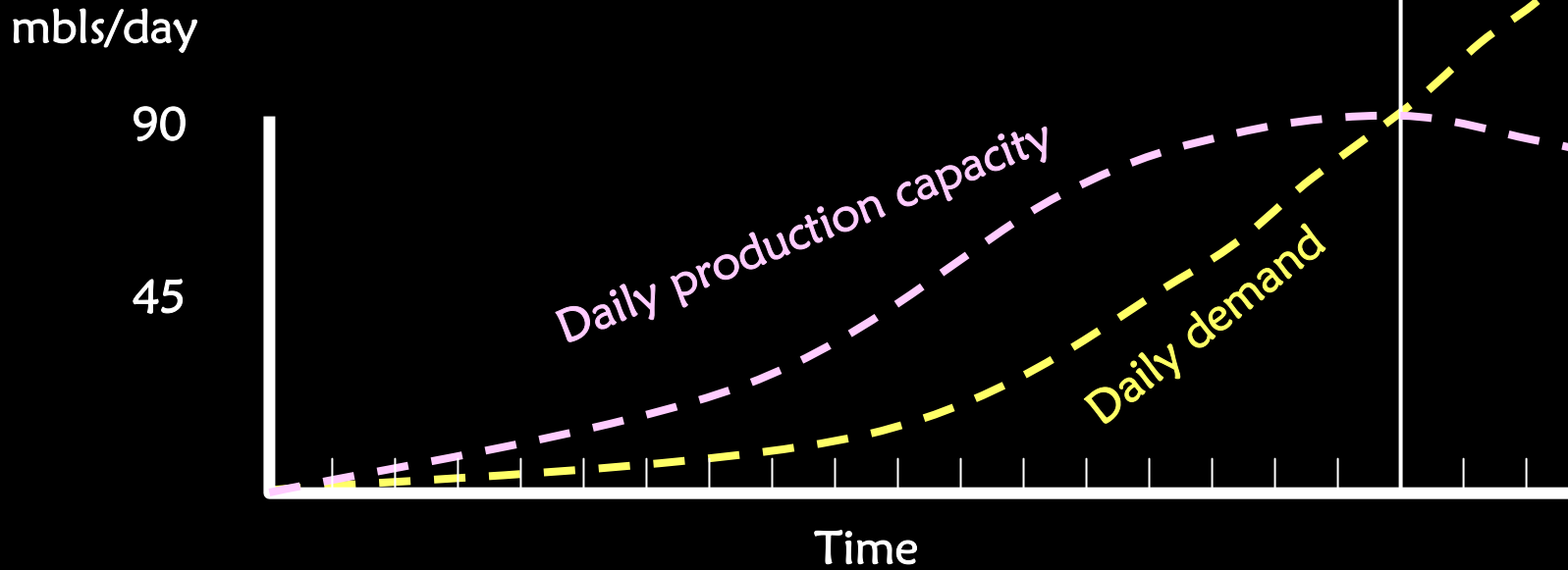
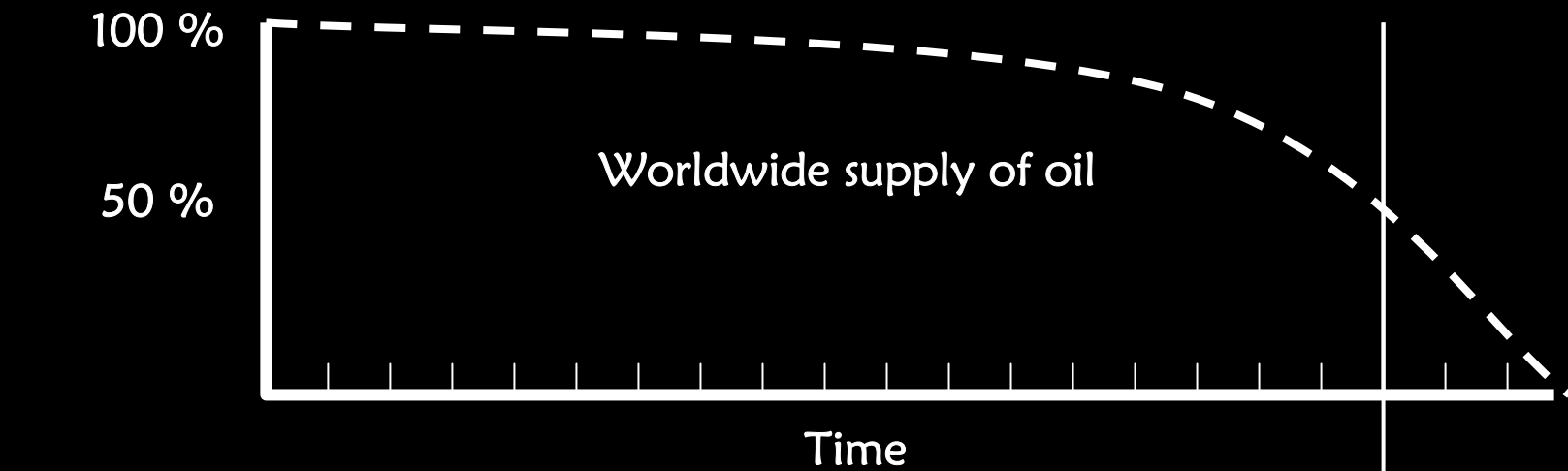
The end of the age of...



...cheap oil







mbbl/day

\$900

\$450

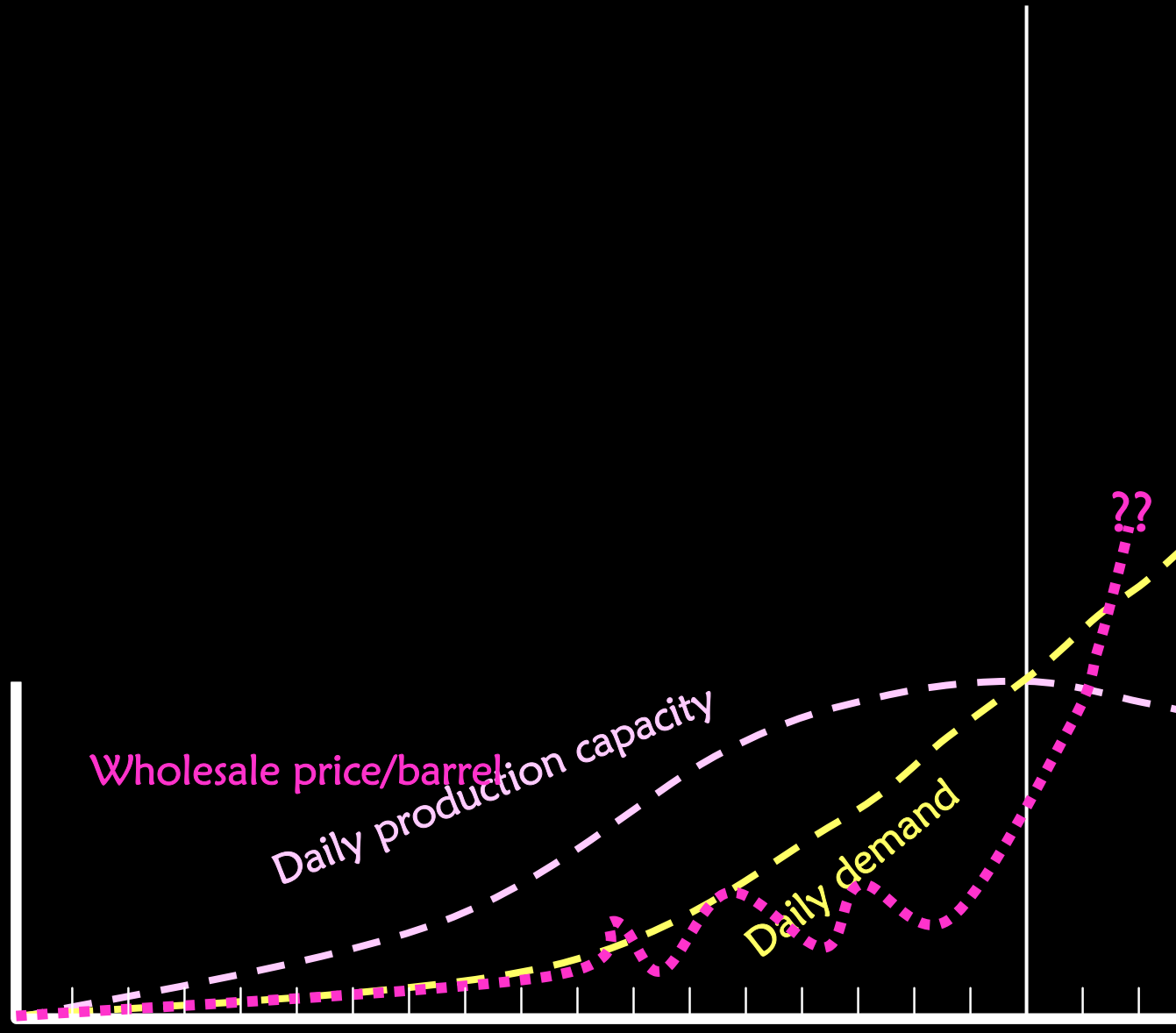
Wholesale price/barrel

Daily production capacity

Daily demand

??

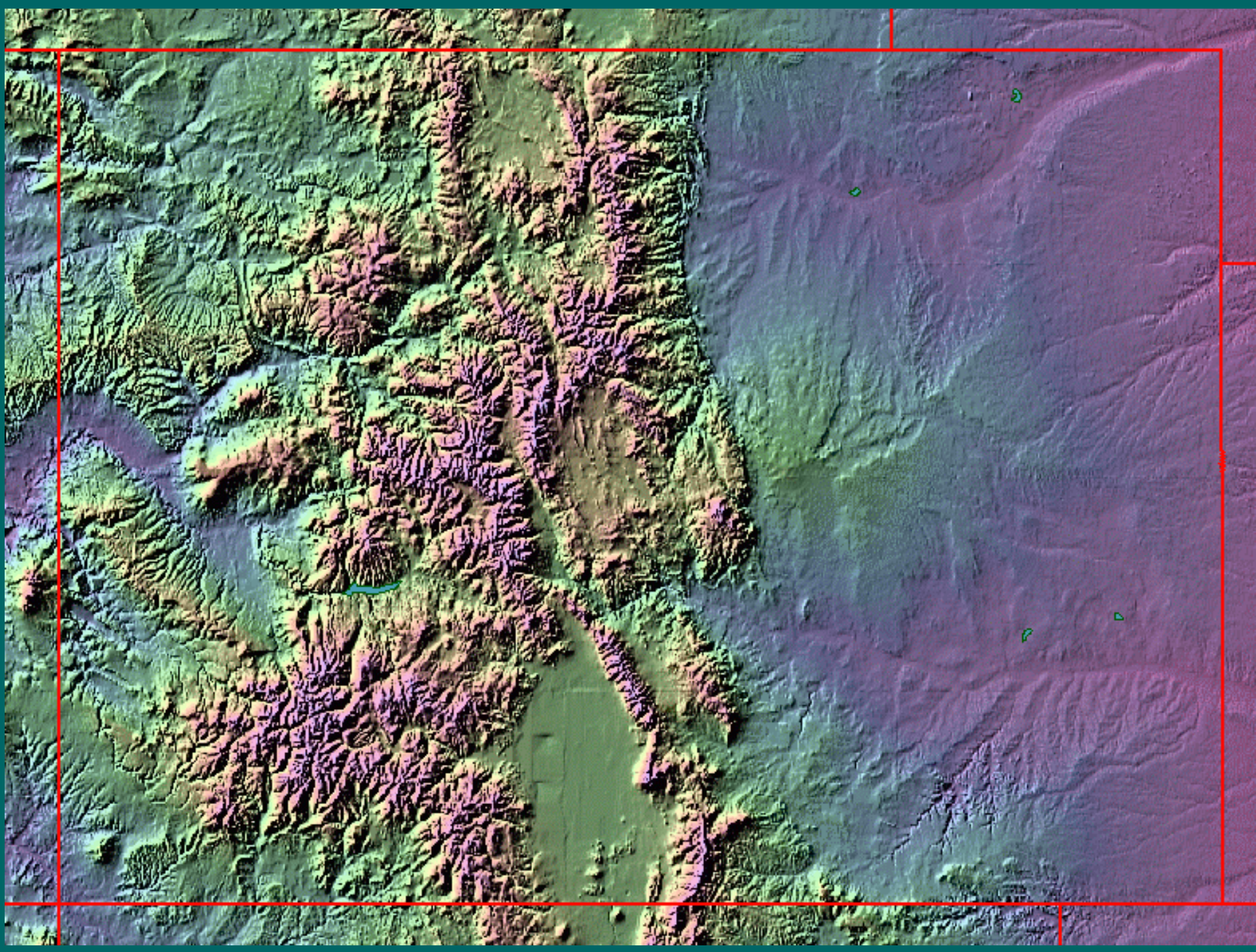
Time



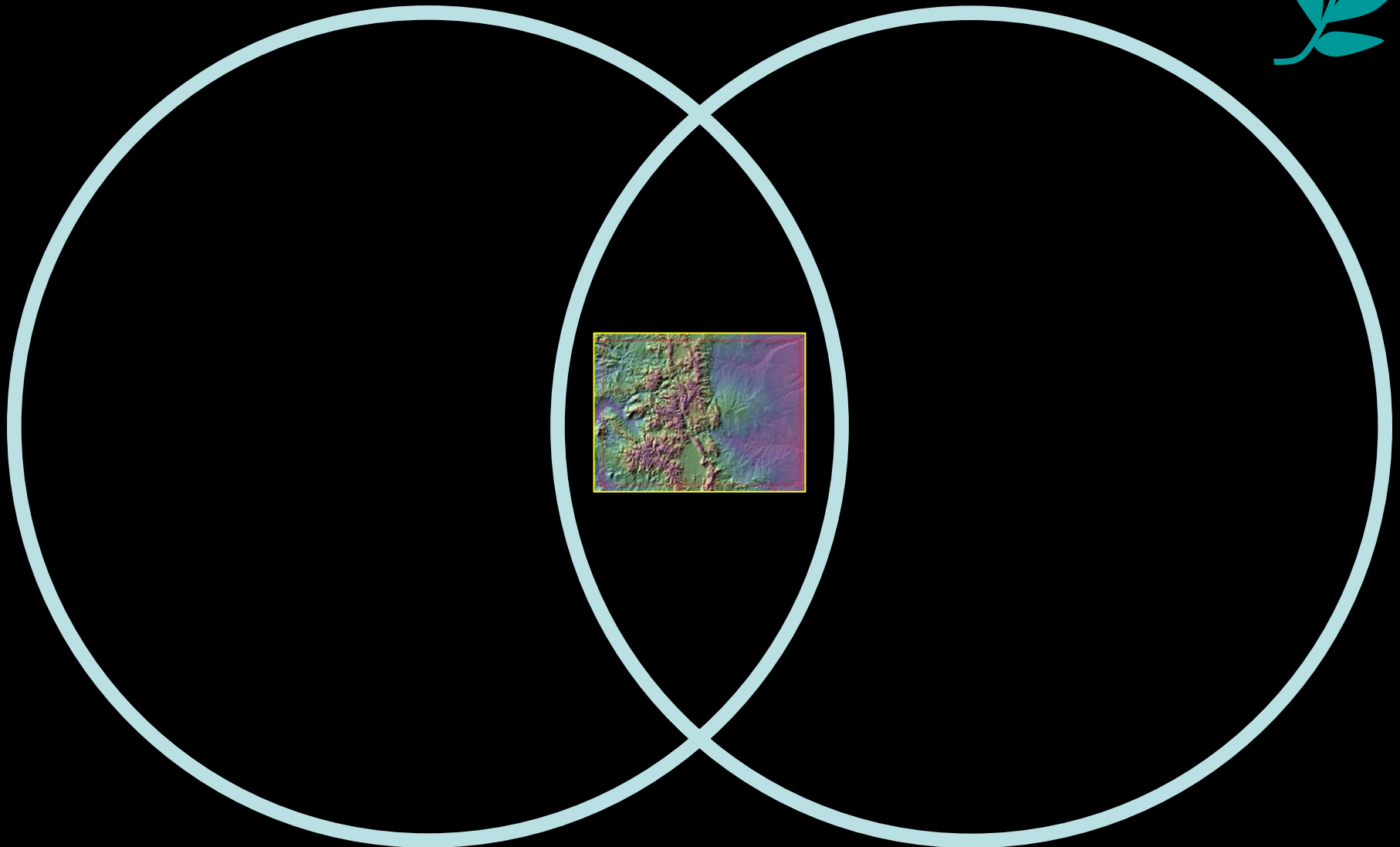
Impacts On Colorado



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Interconnected Systems



Global Warming

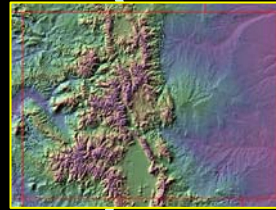
Energy Demand

Interconnected Systems



Greenhouse Gas
Emissions

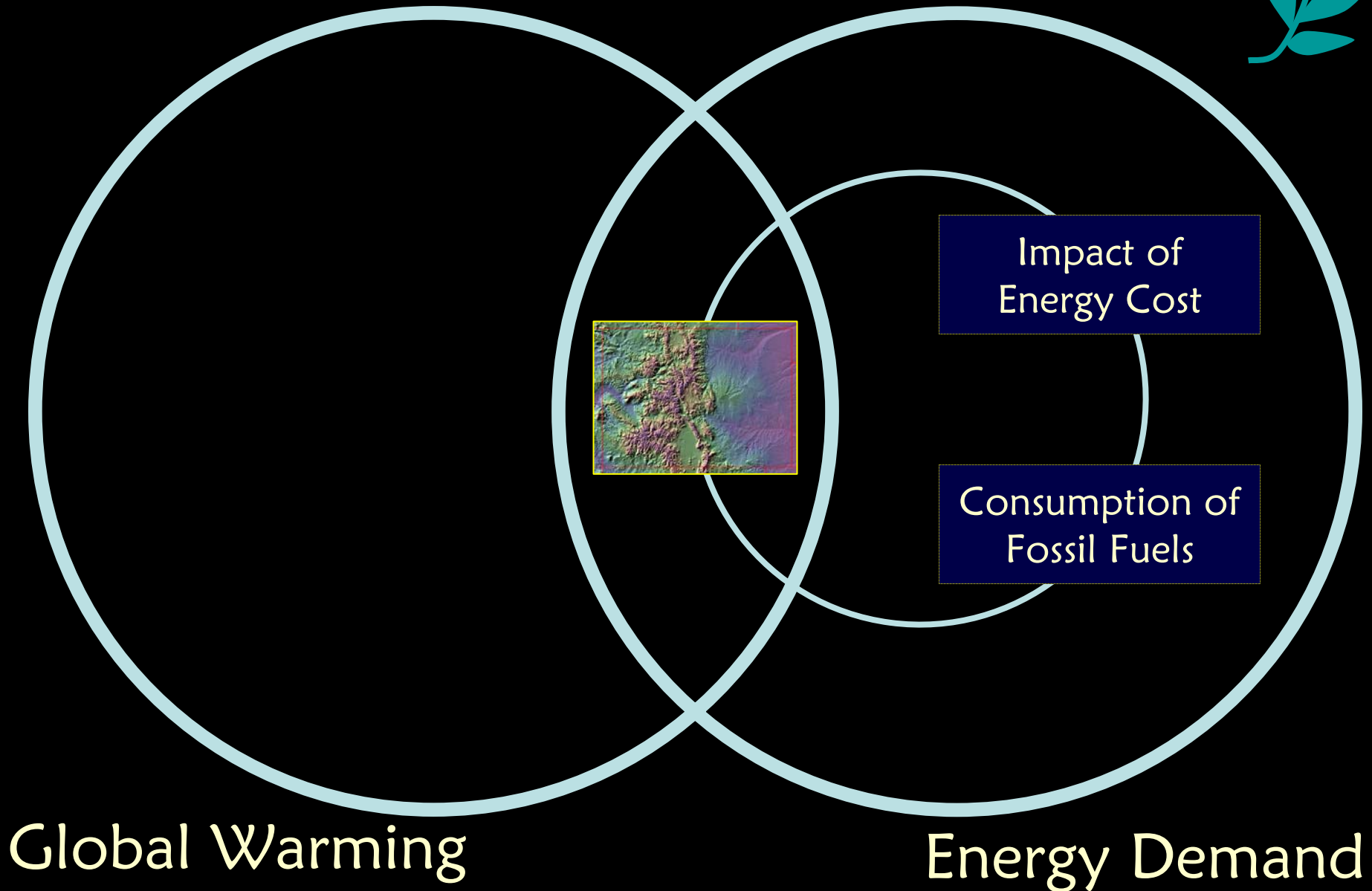
Climate Change
Impacts



Global Warming

Energy Demand

Interconnected Systems



Interconnected Systems

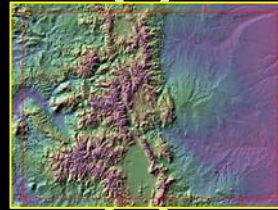


Greenhouse Gas
Emissions

Impact of
Energy Cost

Climate Change
Impacts

Consumption of
Fossil Fuels



Global Warming

Energy Demand

Bottom Line



Transportation policy, energy
policy and climate change policy
are inseparable

Transportation Policy Implications



- We will not be able to build new roadway capacity at a rate matching growth in traffic demand
- Our roads will be much more congested in the future than they are today
- To reduce our greenhouse emissions, Colorado will have to reduce VMT/capita
- Higher energy prices will change the structure of a state and local economies
- Our future mobility, economic vitality and quality of life depend on how well we address these issues

The Land Use Connection



Sustainable Mobility

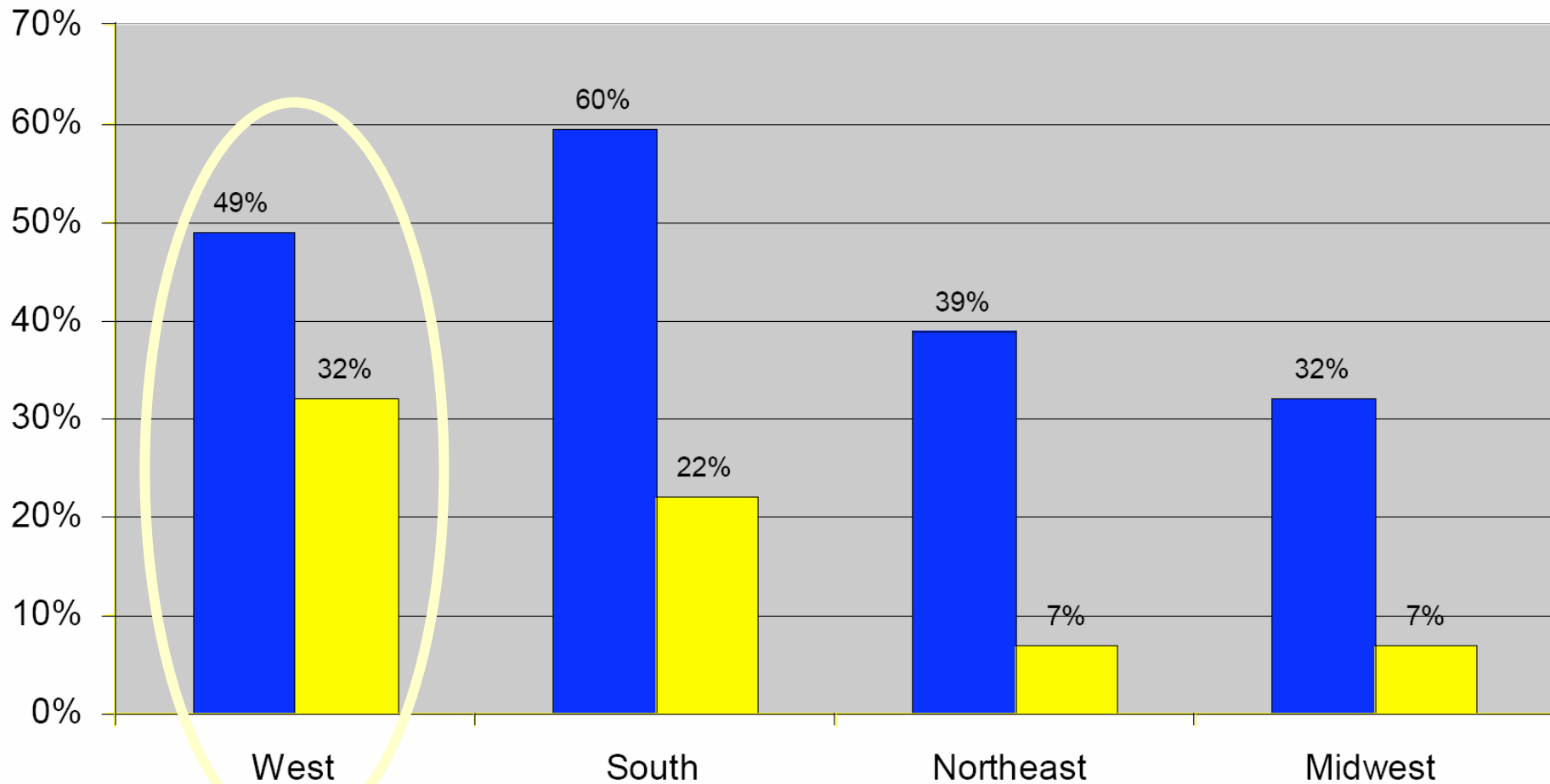


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Development Patterns



■ Change in Urbanized Land ■ Change in Metropolitan Population

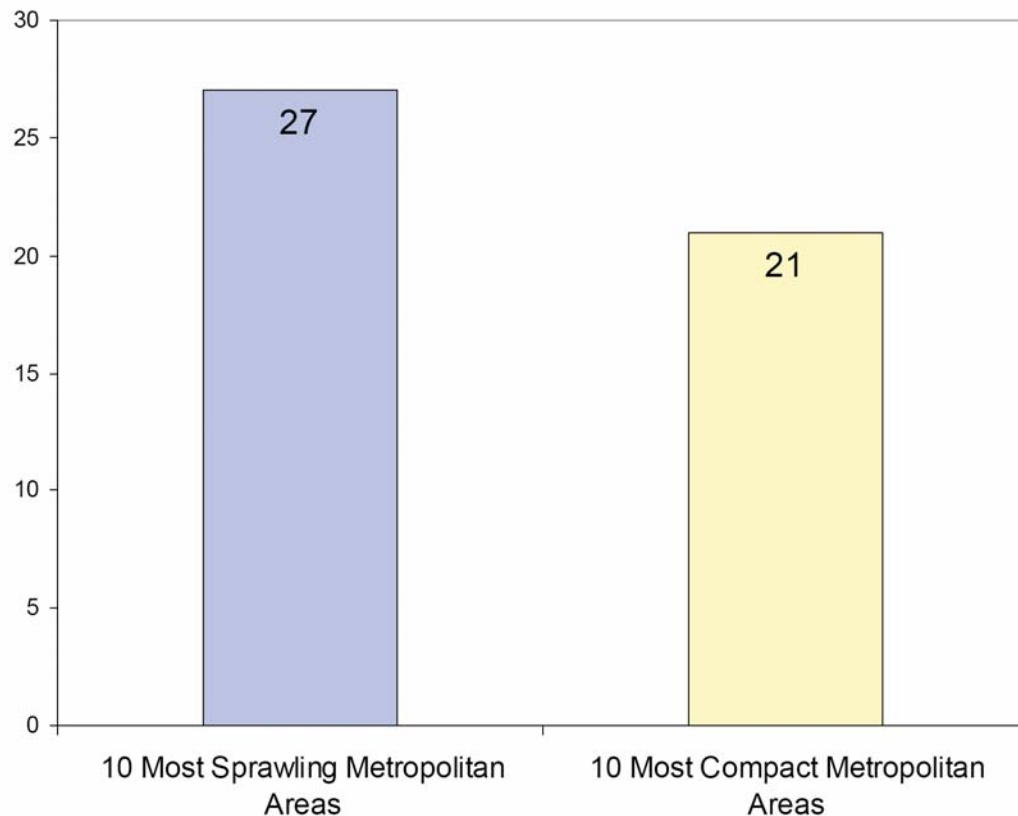


Urban Design & VMT



FIGURE O-5

AVERAGE DAILY VEHICLE MILES TRAVELED



SOURCE: EWING, PENDALL, AND CHEN 2002, P. 18.

- Compact cities generate less VMT/capita
- The difference (>20%) is more than can be achieved thru either alt. fuels or improved fuel economy

Measuring Smart Growth



Part A: Land Use

1. Gross Population Density
2. % of Population in Low Density Settings
3. Land Use Mix (diversity, proximity)
4. Site Design (building orientation, walkability, street trees, barriers)
5. Presence of Centers (employment, retail and housing)

Measuring Smart Growth



Part B: Transportation System

1. Street Network Connectivity
2. Pedestrian Environment (PEF)
3. Destination Accessibility (distance to jobs and shopping from housing)
4. Distance to Transit

Research Findings 1



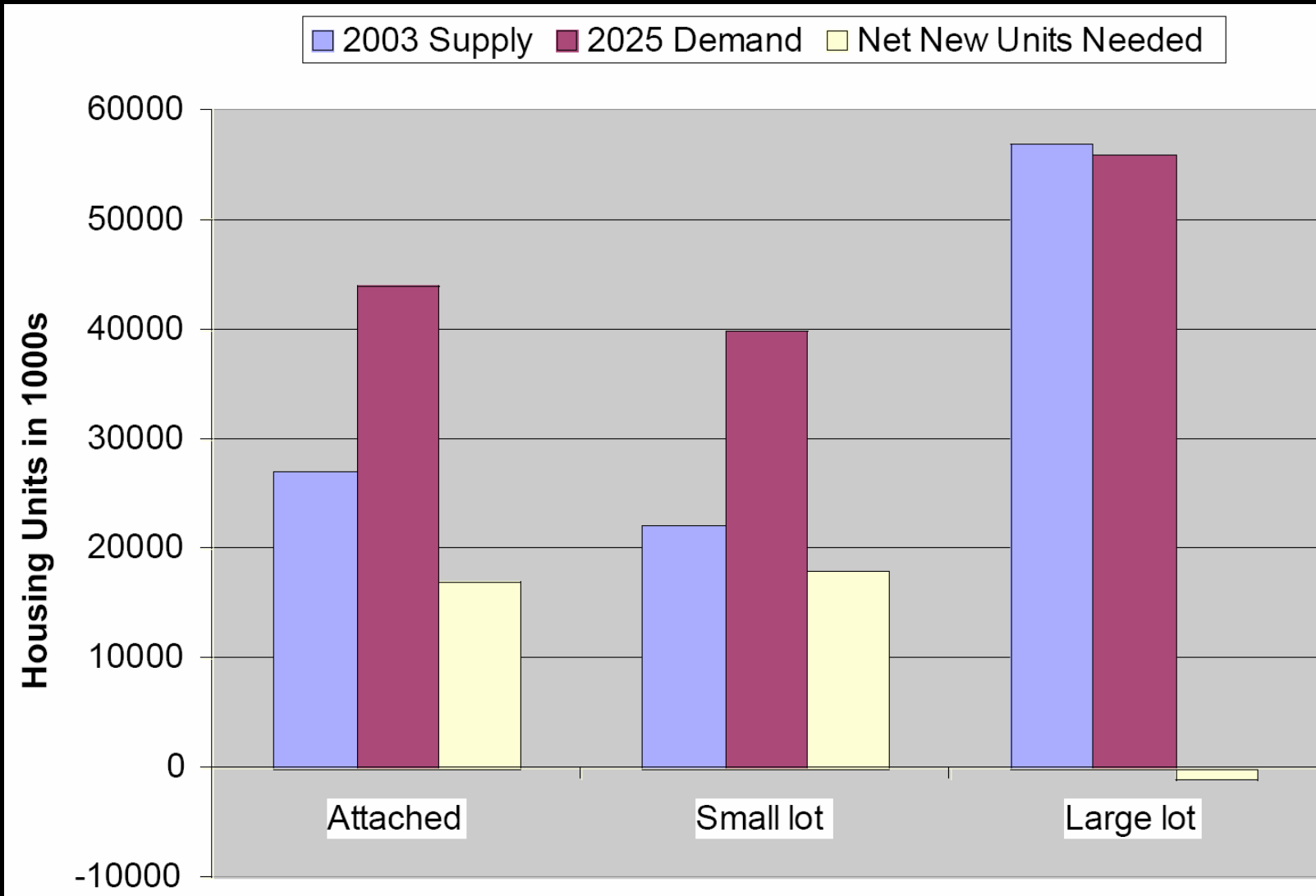
- No significant correlation between high density/mixed use development and congestion or delay
- Sprawl does not consistently increase or reduce congestion
- Land use mix alone can account for >20% reduction in VMT/household

Research Findings 2



- Higher gross density reduces VMT/household (big cities and smaller towns)
- Connected street networks do not reduce delay, but do reduce VMT/household
- Residents of sprawl areas exhibit lower physical activity, higher levels of obesity and other health problems

Housing Supply & Demand



Build for New Choices



In a national survey, 6 out of 10 prospective homebuyers chose a higher-density, mixed use community.



» Source: Smart Growth America and National Association of Realtors

Well Designed Density



It is not this:



Well Designed Density



Well Designed Density



Neighborhood Commercial Center



Transit-Oriented Areas



Industrial Sites



Location Efficiency



Sustainable Mobility



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def. “Location Efficiency”



- Compact regional development
- Redevelopment & infill rather than exurban “greenfields” development
- New development focused in centers
- Centers feature mixed uses
- Network connectivity is provided
- New urban growth is concentrated in transit served districts, incl. TODs

Benefits: Location Efficiency



- Reduced rate of growth in VMT
- Managed transportation expenditure rather than “project and provide”
- Preserved open space & ag lands
- Higher quality of life
- Greater economic resiliency
- Overall higher sustainability

Cumulative Effects: Location Efficiency



- Fuel economy, alt. fuels and other vehicle technology solutions have little cumulative effect on GHG accumulations
- Location efficiency improvements are semi-permanent and cumulative over the long term

Challenges: Location Efficiency



- Different needs in rural, suburban and urban jurisdictions
- Political support for sprawl
- No current mandate for improvement
- State (Colorado) historically not involved in land planning or guiding land development

Colorado Policy Choices



Sustainable Mobility



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Clear Policy Direction



If Colorado is going to:

- Reduce our vulnerability to change
- Gain (or maintain) our competitive edge
- Ensure a high quality of life

We must:

- Begin to reduce the growth in VMT
- Pull land use & transportation into an integrated policy framework

Political Landslide 1



- June 1992: UN Framework Convention on Climate Change, opened for signatures at the “Earth Summit” in Rio de Janeiro, calls for stabilizing GHG concentrations in the atmosphere. United States is a signatory.
- December 1997: Kyoto Protocol establishes GHG emission targets for developed countries. (US does not ratify.)
- June 2002: U.S. government acknowledges that human activity is contributing to global warming. (Report issued by the U.S. EPA)
- June 2006: A committee convened by the National Academies of Science concludes human activities are largely responsible for recent global warming.
- September 2006: California becomes first state to adopt legislation requiring regulations and market actions to reduce GHG emissions to 1990 levels by 2020. Eighteen other states later adopt similar targets or mandates.

Political Landslide 2

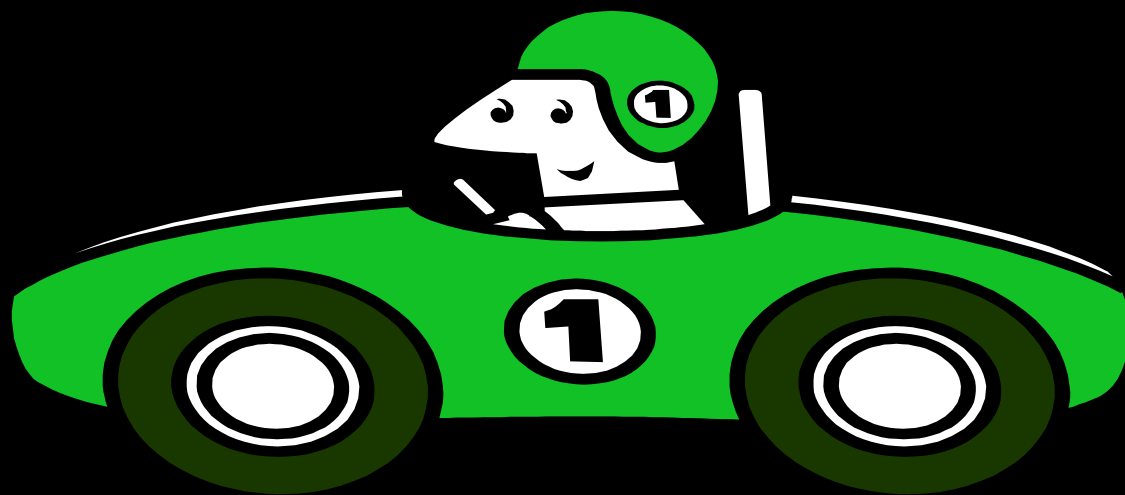


- January 2007: Major U.S. corporations and environmental groups, banding together as U.S. Climate Action Partnership, call for a 10 - 30 percent reduction in CO₂ emissions within 30 years (USCAP 2007).
- April: U.S. Supreme Court rules EPA has authority to regulate GHG emissions and has the duty to do so unless it can provide a scientific basis for not acting.
- May: Tulsa, becomes 500th city to sign U.S. Mayors Climate Protection Agreement to reduce GHG emissions.
- June: In largest international public opinion survey ever taken, most of the world identifies environmental degradation as greatest danger—above nuclear weapons, AIDS and ethnic hatred (Pew Research Center 2007).
- July: Congressional lawmakers have introduced more than 125 bills, resolutions, and amendments addressing global climate change and GHG emissions.

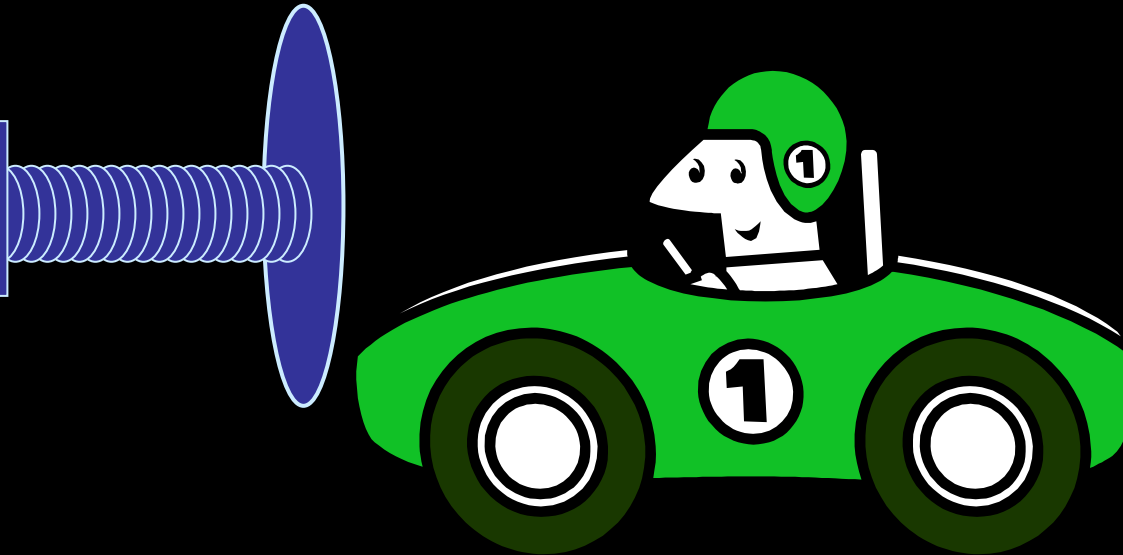
Colorado Climate Change Panel



- Recommendations (yesterday)
 - Governor should establish a goal of reducing greenhouse gas emissions in Colorado
 - Goal should be “in the vicinity of” of a 20% reduction in emissions by 2020 and an 80% reduction by 2050 (2005 base)
 - Adoption of California vehicle emission standards for new cars & trucks



Resource
Depletion



Resource
Depletion



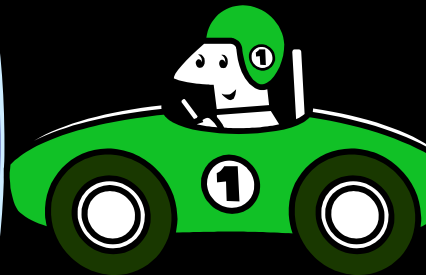
Air & Water
Pollution

Cost of Travel

Resource
Depletion

Air & Water
Pollution

Greenhouse Gas
Emissions

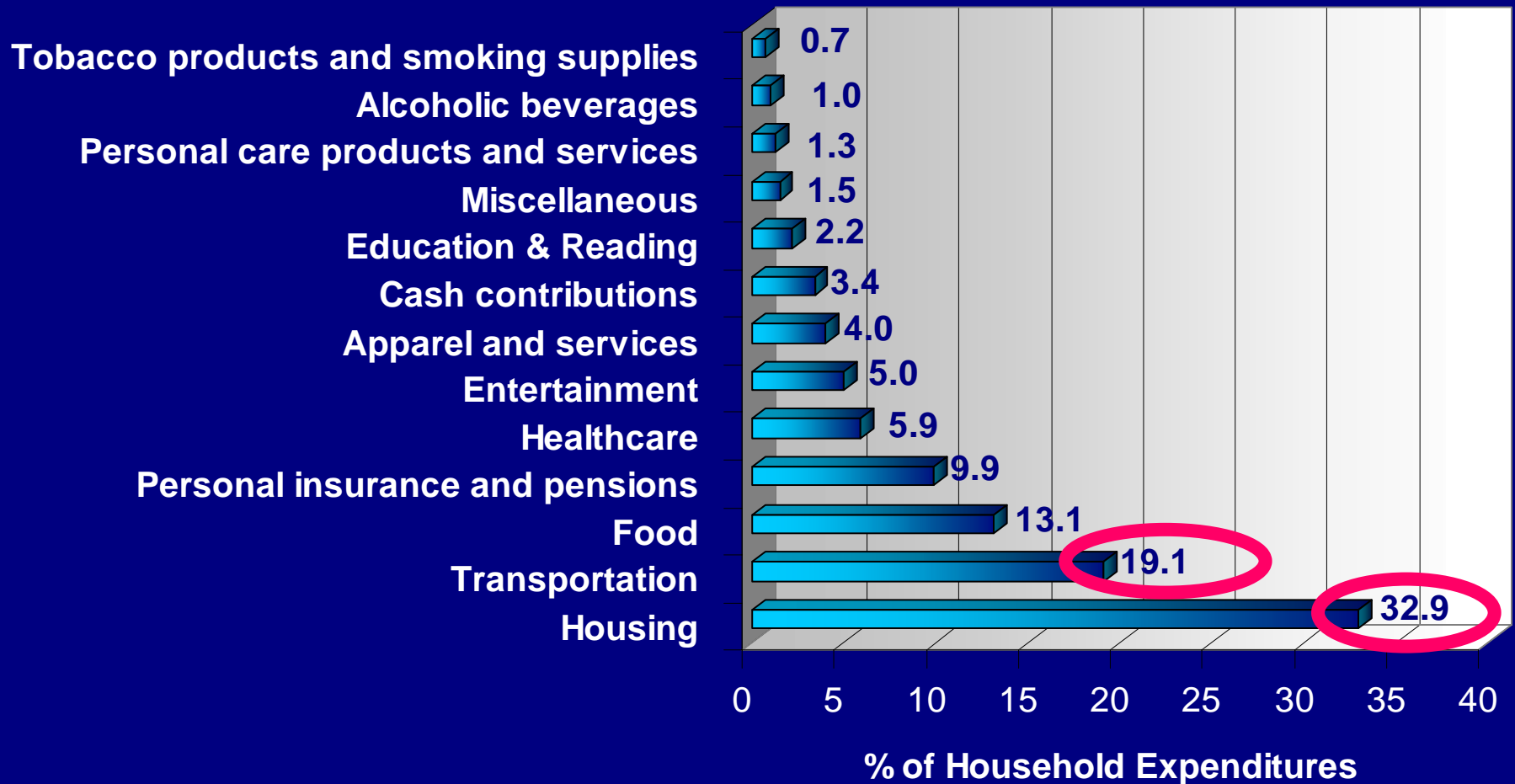


Economy: Reasonable Objectives



- Developing in a way that benefits our communities
- Avoiding infrastructure deficits
- Supporting resiliency & viability of local commerce
- Avoiding sharp cycles – “boom & bust”
- Avoiding unnecessary local tax burden
- Ensuring jobs & personal opportunity

Household Expenditures



Three Car Family



	Mom	Dad	Daughter
Monday	SOV	SOV	SOV
Tuesday	SOV	SOV	SOV
Wednesday	SOV	SOV	SOV
Thursday	SOV	SOV	SOV
Friday	SOV	SOV	SOV
Saturday	--	SOV	--
Sunday	varies	varies	varies

Two Car Family



	Mom	Dad	Daughter
Monday	SOV	Transit	SOV
Tuesday	SOV	SOV	Bike
Wednesday	SOV	Transit	SOV
Thursday	SOV	SOV	Bike
Friday	Bike	Transit	SOV
Saturday	--	SOV	--
Sunday	varies	varies	varies

Driving Costs

2005 Chevrolet
TrailBlazer LS
6-cyl. (4.3-liter)
2WD 4-door sport utility

2005 Dodge
Caravan SXT
6-cyl. (3.3-liter)
passenger van

Operating Costs

	per mile	per mile
gas	10.8 cents	8.9 cents
maintenance	5.3 cents	5.7 cents
tires	0.9 cents	0.6 cents
cost per mile	17.0 cents	15.2 cents

Ownership Costs

	per year	per year
full-coverage insurance	\$1,398	\$1,130
license, registration, taxes	\$435	\$389
depreciation (15,000 miles annually)	\$4,300	\$3,755
finance charge (10% down; loan @ 6%/5 yrs.)	\$891	\$739
cost per year	\$7,024	\$6,013
cost per day	\$19.24	\$16.47

Total Cost Per Mile

10,000 miles a year	per year	per year
cost per mile x 10,000 miles	\$1,700	\$1,520
cost per day x 365 days	\$7,024	\$6,013
decreased depreciation***	-\$950	-\$925
total cost per year	\$7,774	\$6,608
total cost per mile*	77.7 cents	66.1 cents

Cost of Vehicle Ownership

Source: AAA, *Your Driving Costs*, 2005



One less car = - \$4,000/yr.
(net about \$3,500)*

At least \$50,000 in additional
mortgage capacity

* assumes 2nd or 3rd car for household

Policy Options



Location Efficiency



Basics



- Recognize that the State DOT cannot do much without major legislation
- Gubernatorial direction & leadership will be essential
- Legislative action will be needed
- Public support must be built carefully

Leading Options



1. Establish Governor's Growth Cabinet
2. Set State Objectives for GHG Emissions and VMT Growth
3. Develop True State Transportation Plan
4. Establish State Direction on Infrastructure Investment
5. Adopt "Fix It First" Law
6. Work to Eliminate Perverse Local Financial Incentives (Sales Tax Reliance)

1. Establish Growth Cabinet



- Major agencies collaborate on policy
- Governor chairs meetings
- Performance objectives and monitoring
- Coherent state policy and strategy
- Examples:
 - Massachusetts
 - Maryland
 - Arizona pending

2. State GHG & VMT Objectives



- Implement Colorado climate change recommendations
- Establish a clear sense of mission
- Communicate with public, build popular support for change in direction
- Examples: California, Washington, Utah, Oregon, New York, Arizona pending

3. Develop State Transportation Plan



- Address multimodal needs as state priorities
- Show realistic forecast of federal funding & policy direction
- Set state policy for GHG emissions & reduced VMT growth
- Improve technical planning capability, especially transportation models
- Create performance monitoring system
- Examples:
 - California
 - Delaware
 - New Jersey
 - Arizona pending
 - Many others

4. Infrastructure Investment Direction



- **Prioritize**
 - Maintenance, rehabilitation and repair
 - City center and downtown redevelopment
 - Transit oriented development
 - Connected networks
- **Discourage**
 - Capacity “improvements”
 - Exurban development inducing projects
 - Set maximum lane standards
- **Emphasize community character through context sensitive planning and design**
- **Examples:**
 - Massachusetts, Florida, Maryland, Washington, Delaware, California, many others

5. Fix It First Law



- Set sustainable standards for maintenance, rehabilitation and repair
- Reduce backlog of bridge deficiencies
- Avoid unnecessary widening and “flow improvements”
- Improve pavement management
- Reduce % of program going into new roadway construction
- Examples:
 - New Jersey “Fix It First”
 - Michigan “Preserve First”
 - Massachusetts “Fix It First”
 - Under consideration: many states

6. Change Local Financial Incentives



- Twin Cities revenue sharing
- Arizona “Growing Smarter”
- Massachusetts education “hold harmless”
- Dayton, Ohio
- Hackensack, New Jersey
- Rochester, New York

Upcoming Federal Policy



Sustainable Mobility



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Current Federal Policy Initiatives



- Transportation Conformity for GHG
- “Cap and Trade” (Carbon Tax) and use revenues to incent infill, TOD, etc.
- GreenTEA
 - Accountability for GHG impacts of transportation projects
 - Prioritize funding for mobility choices
 - Prioritize maintenance, rehabilitation & repair
 - Major revision of funding formulas
 - Increase funding to MPOs
 - National Blueprint planning process

Resources



- Growing Cooler: The Evidence on Urban Development and Climate Change (ULI, September 2007)
- Recommendations: Colorado Climate Change Action Panel
- “Measuring Sprawl and It’s Transportation Impacts” (Ewing, et al, Journal of the TRB)
- “Climate Change 2007: The Physical Science Basis” IPCC
- “Visualizing Density “Lincoln Institute of Land Policy (Web Resource)
- “This is Smart Growth” Smart Growth Network
- “Planning for Smart Growth: 2002 State of the States” APA

Thank You



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