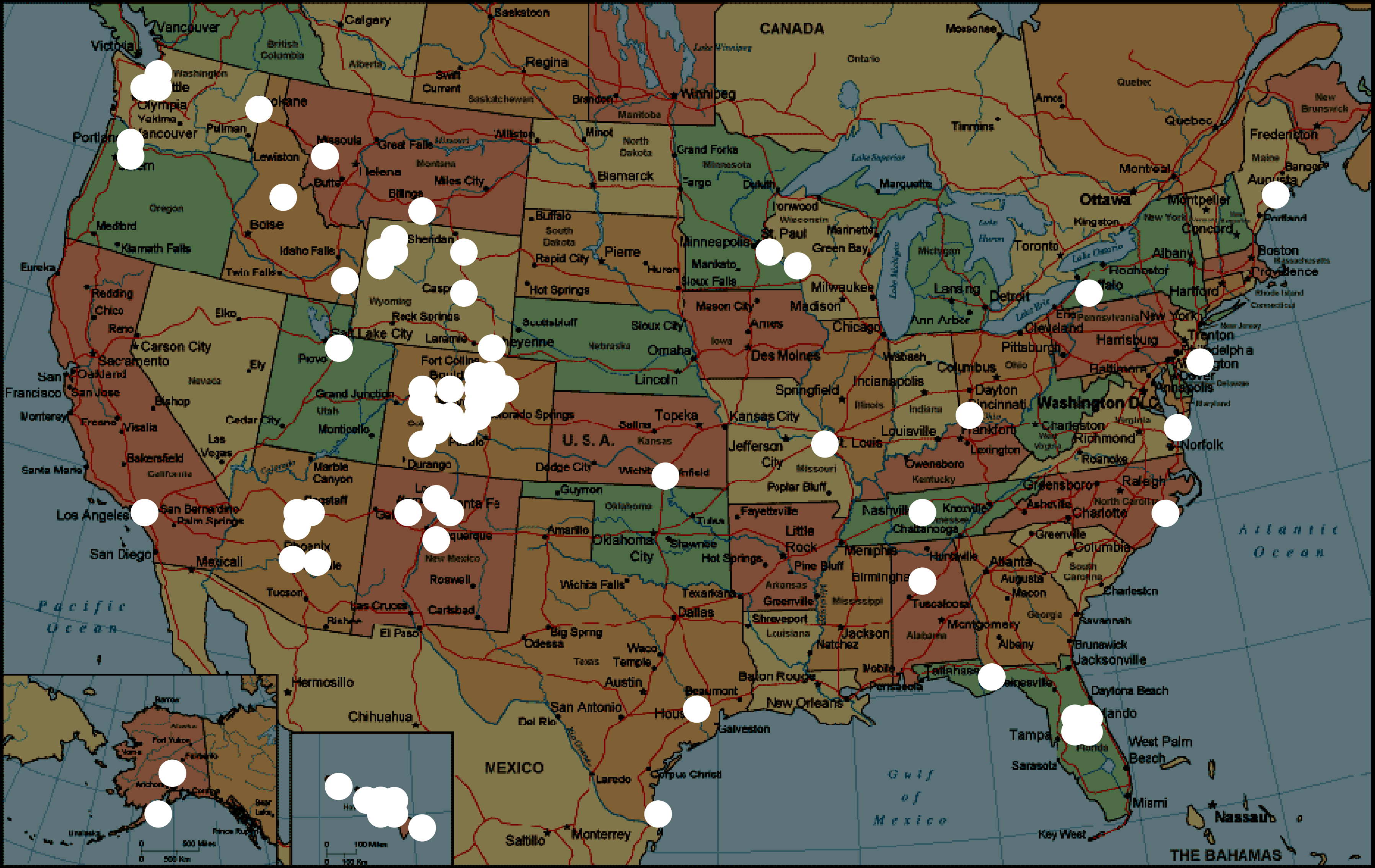
Smart Growth & Mobility

Opportunities for Arizona & Pima County

Charlier Associates, Inc.

Our Work



This Afternoon

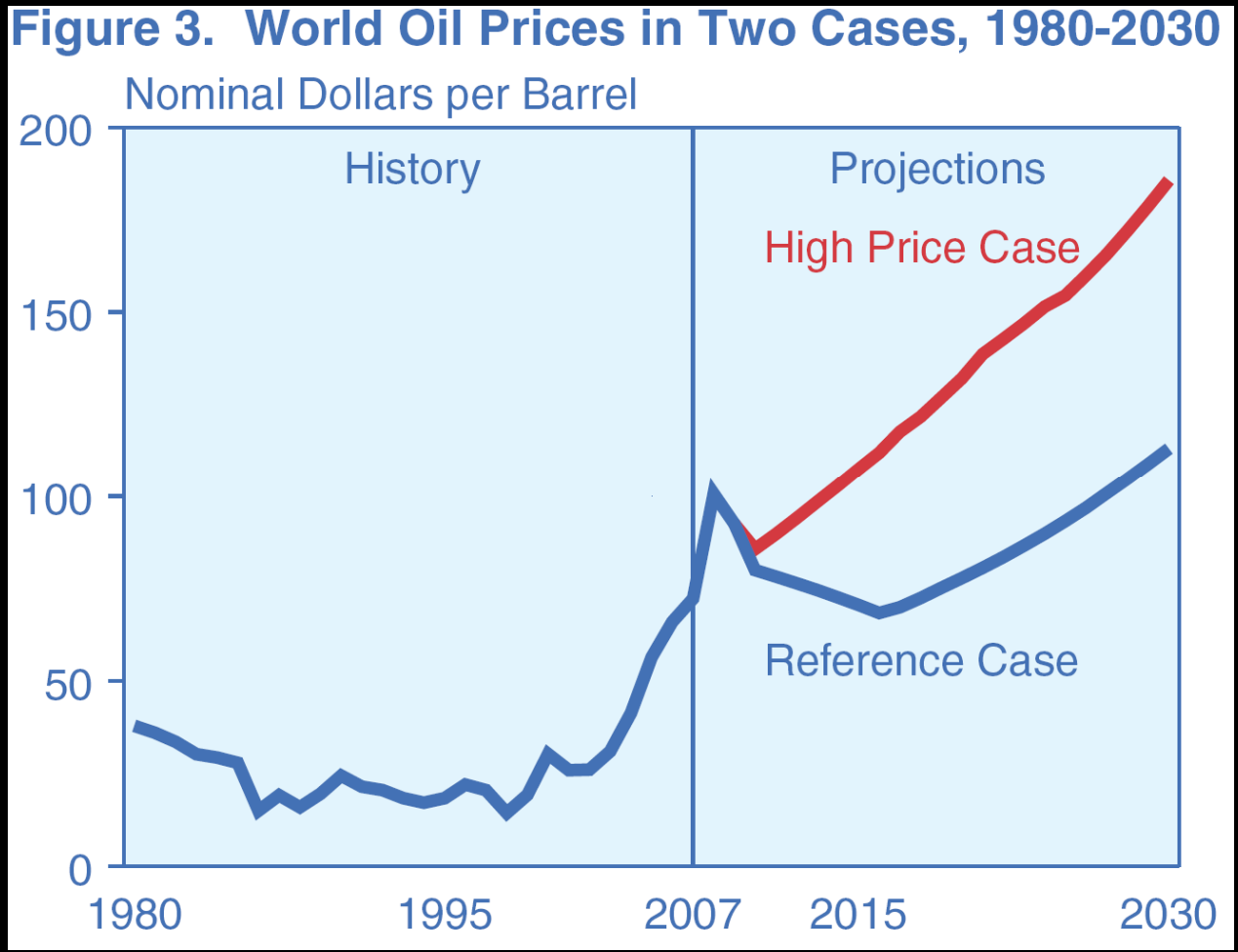
1. Entering the Post-Petroleum Era
2. Transportation Trajectories
3. Locating the Leading Edge in the US
4. Arizona/Pima County Opportunities

1. Entering the Post-Petroleum Era

Smart Mobility – Arizona & Pima County

Charlier Associates, Inc.

The Official Price Forecast

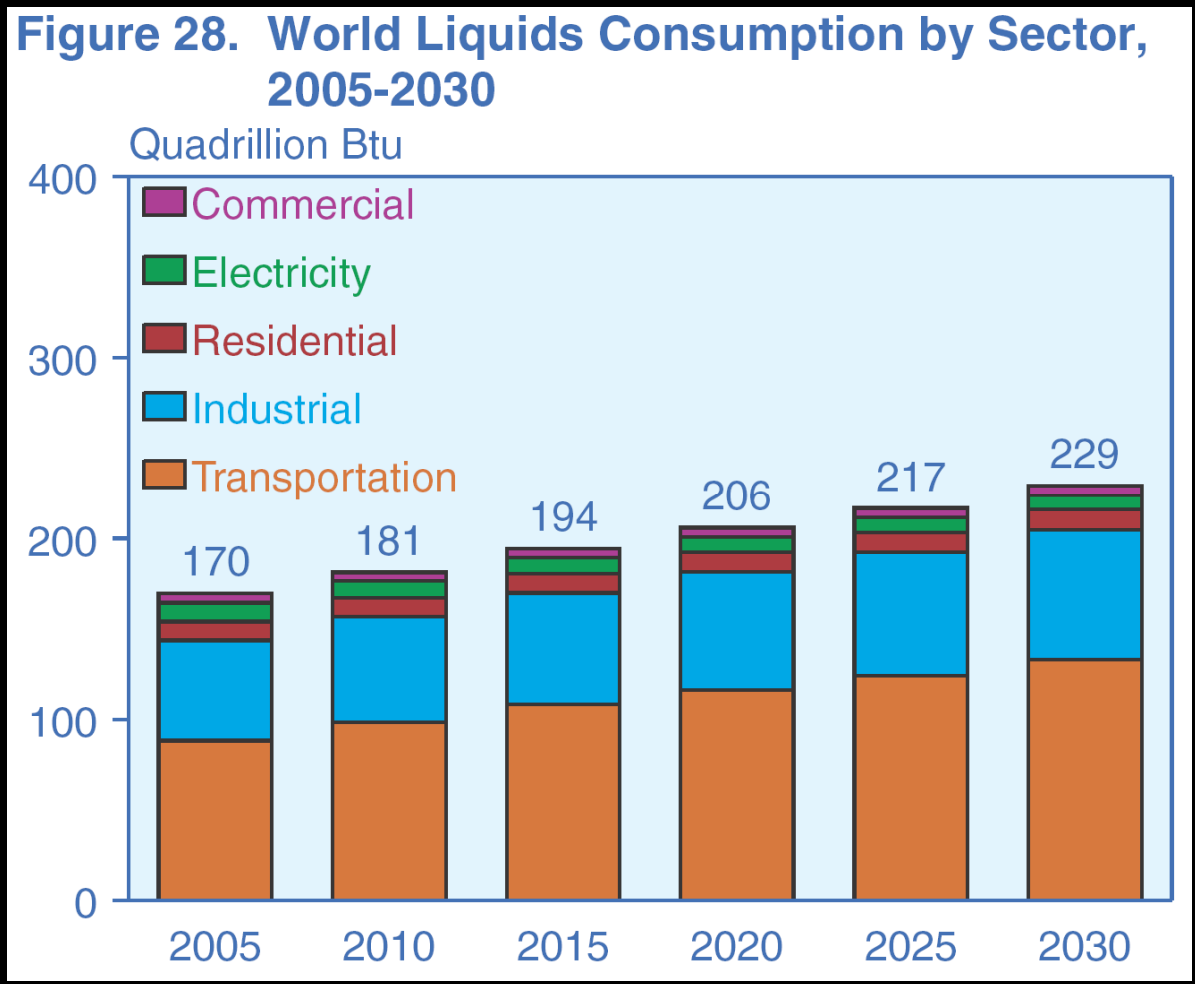


$186/barrel

-13% Consumption

Source: United States Energy Information Administration, International Energy Outlook 2008, September 2008

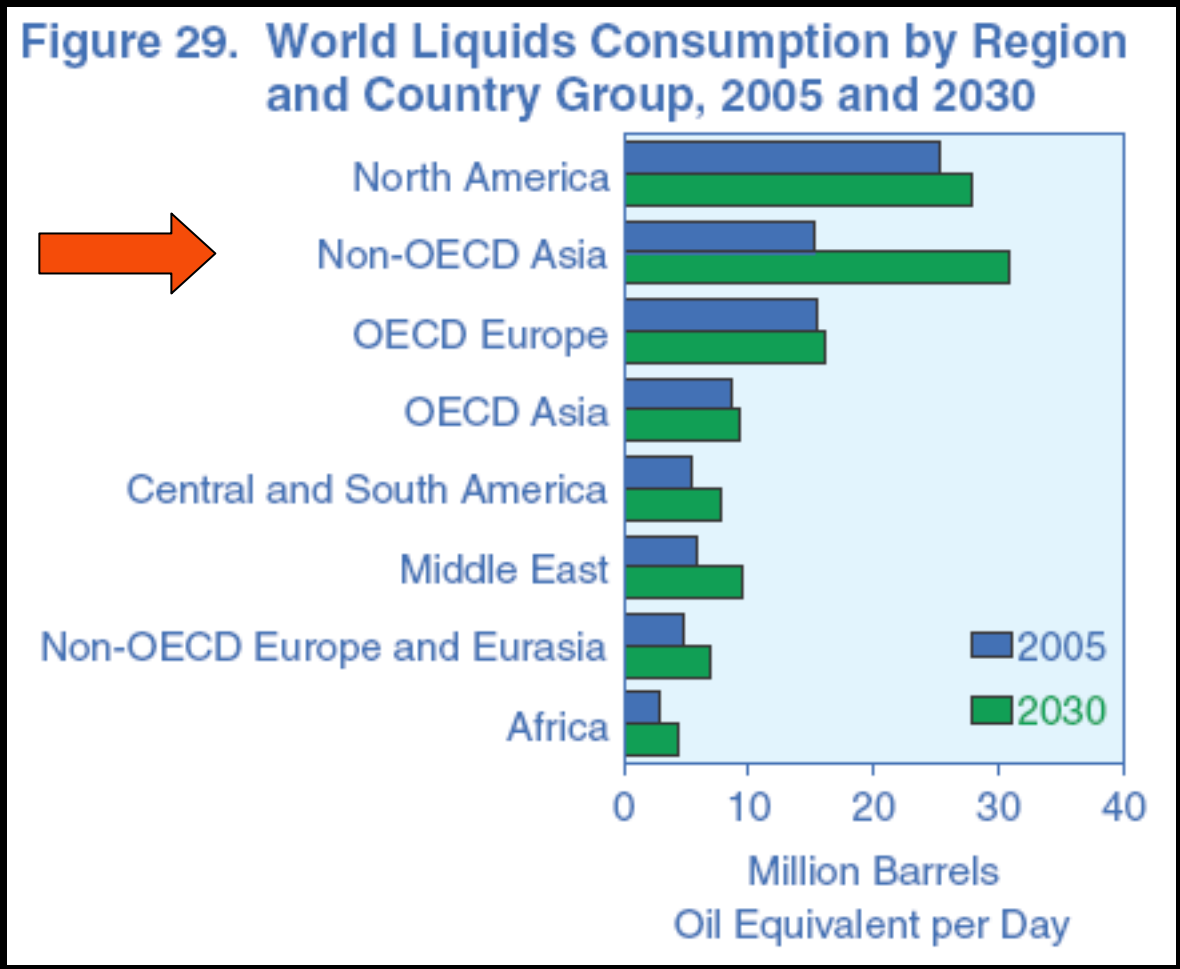
The Official Demand Forecast



Transportation = 74% of growth in oil consumption

Source: United States Energy Information Administration, International Energy Outlook 2008, September 2008

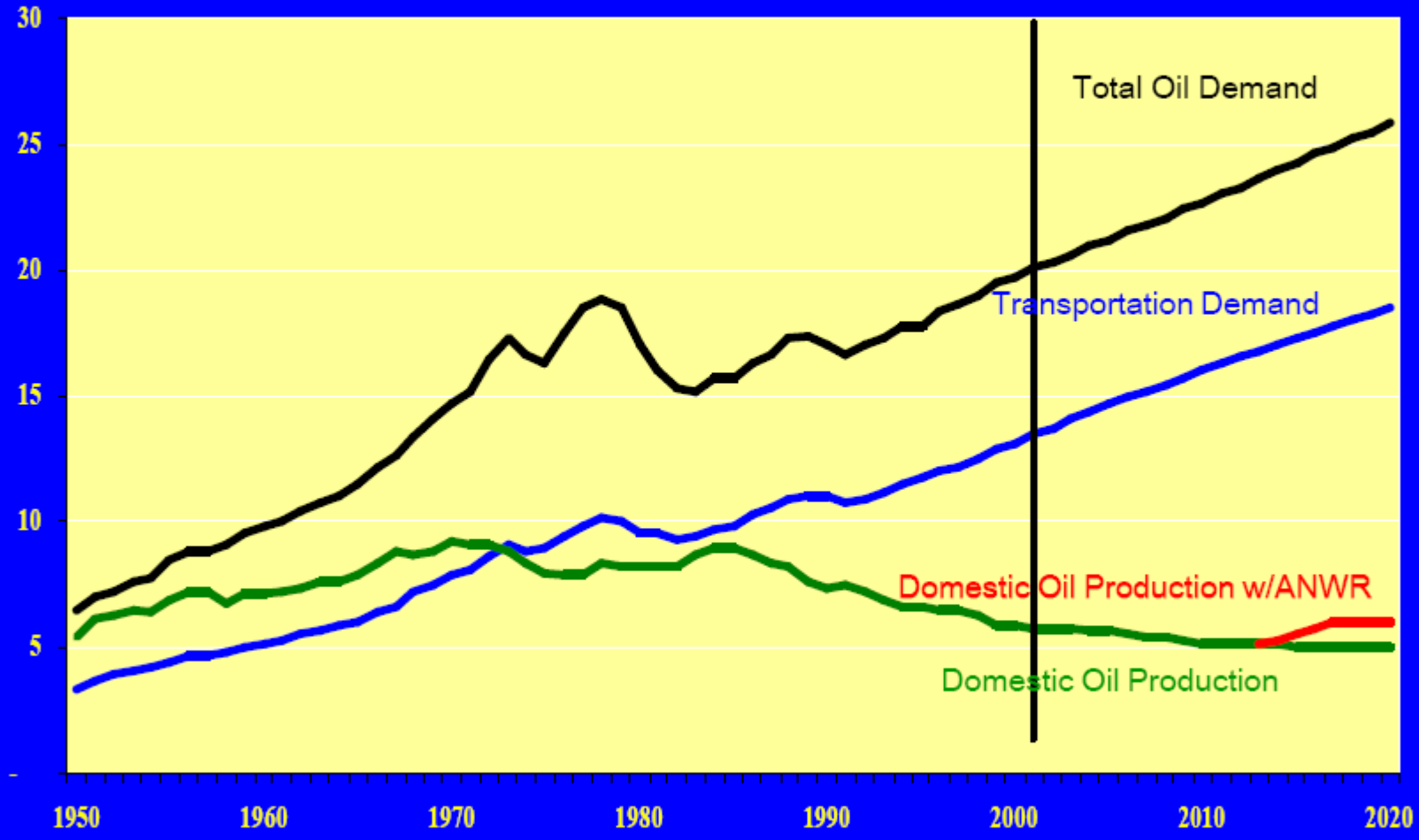
The Official Demand Forecast



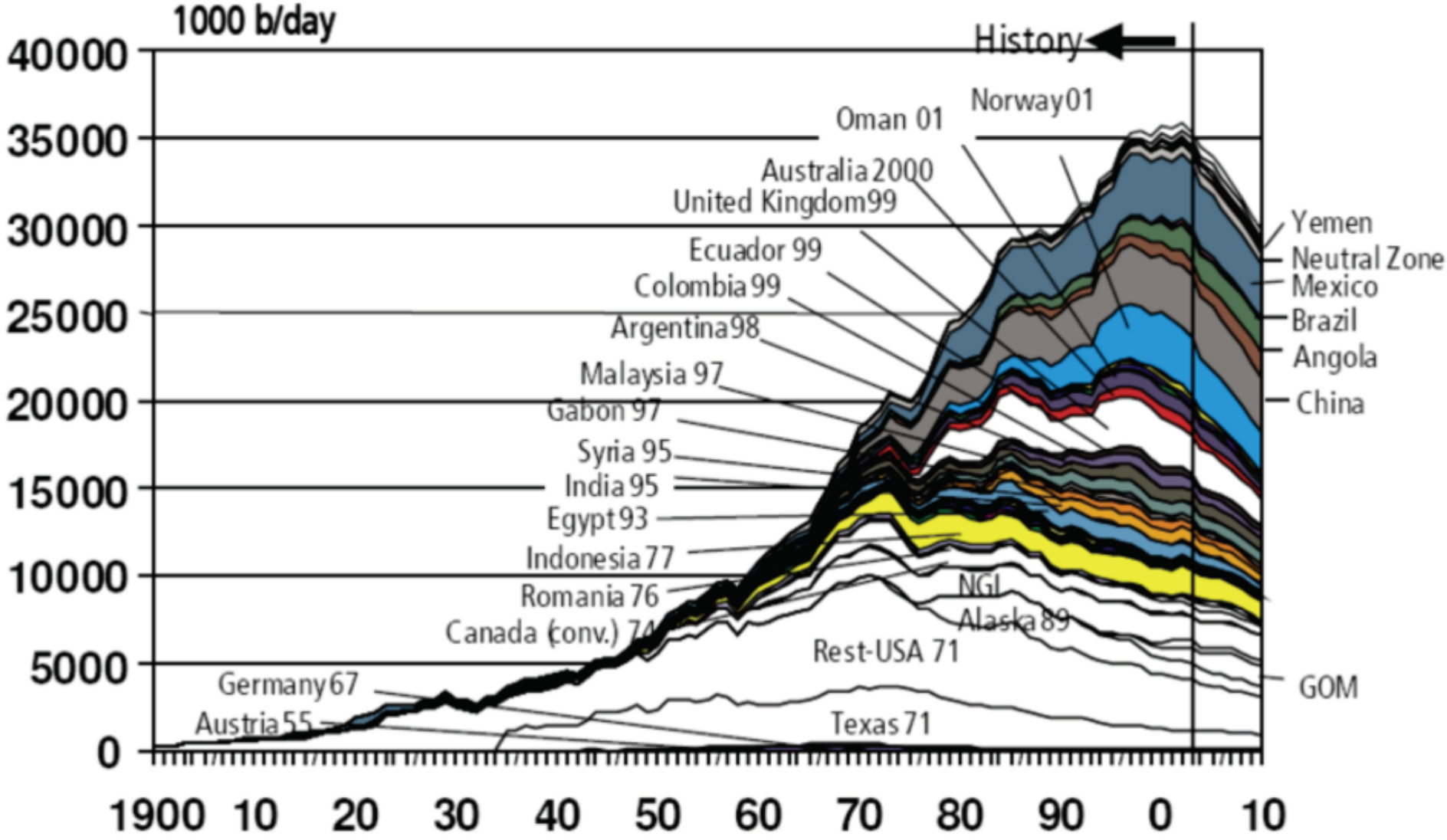
India & China will at least double their petroleum demand

Source: United States Energy Information Administration, International Energy Outlook 2008, September 2008

US Oil Consumption (million barrels per day)

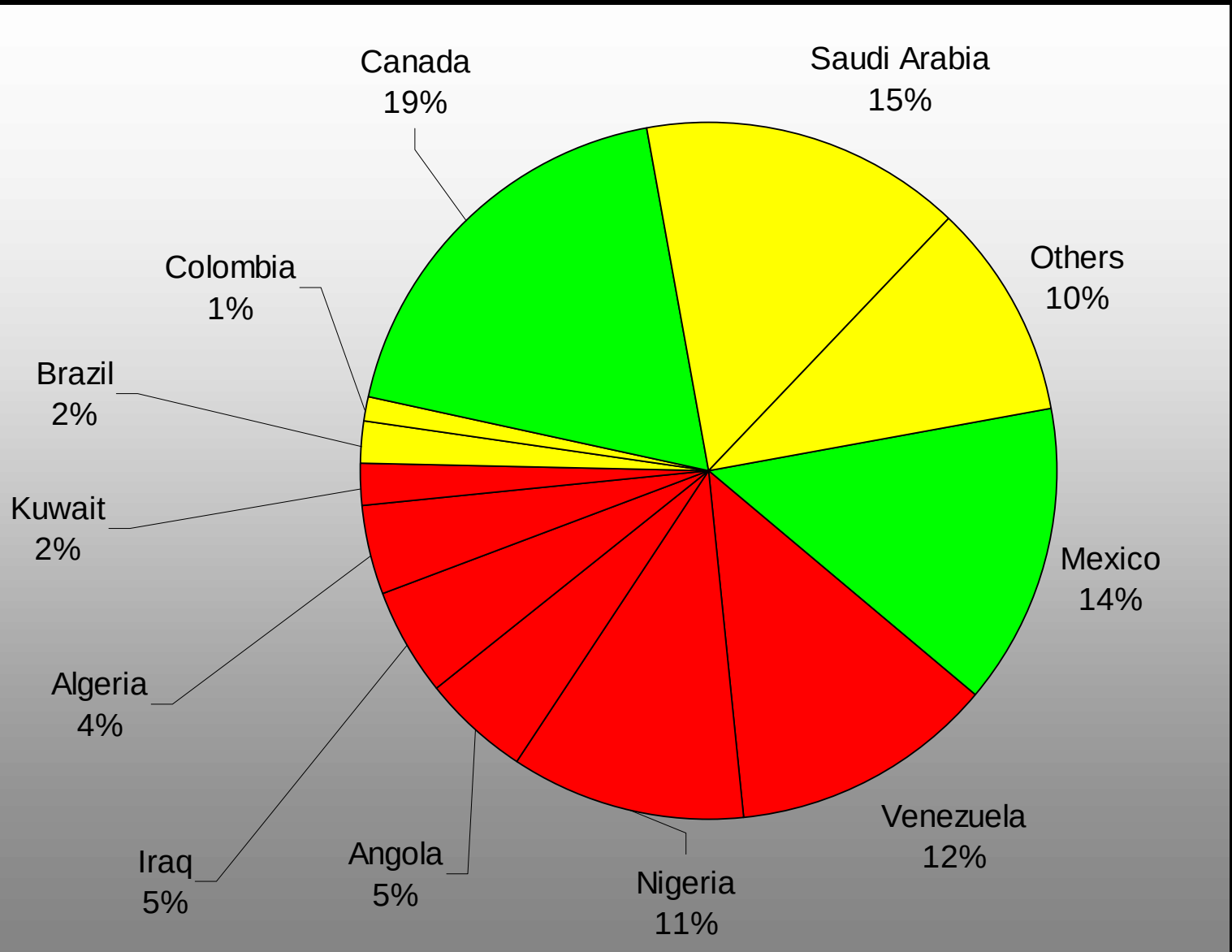


EIA, Annual Energy Outlook 2001; "Potential Oil Production from the Coastal Plain of ANWR," - EIA Reserves & Production Division



Source: Industry database, 2003 (IHS 2003)
OGJ, 9 Feb 2004 (Jan-Nov 2003)

2007 US Oil Imports by Country



STABILITY OF U.S. RELATIONS

HIGH

31%

MODERATE

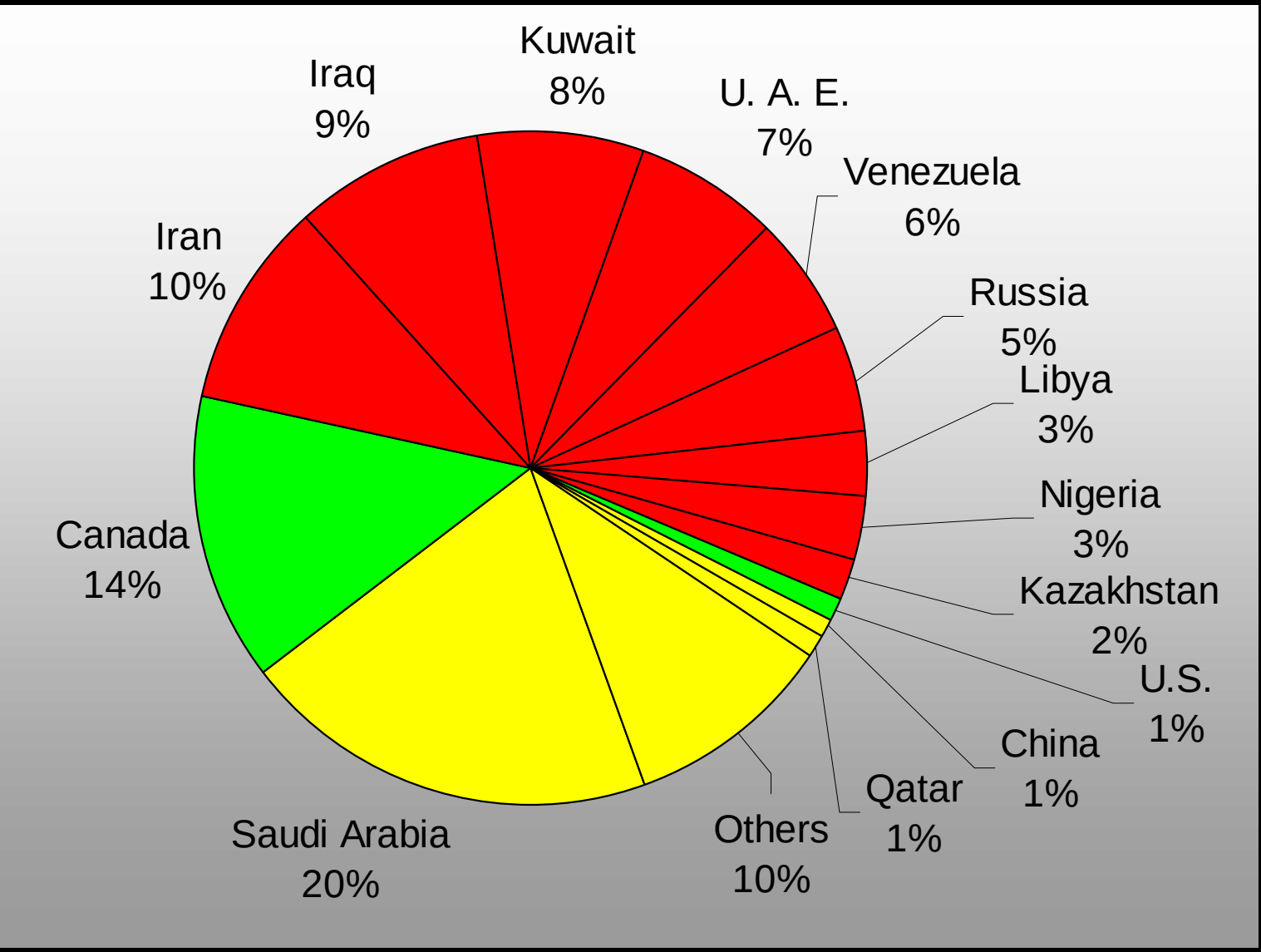
28%

LOW

41%

Source: Oil & Gas Journal

Remaining Oil Reserves by Country



STABILITY OF U.S. RELATIONS

HIGH

15%

MODERATE

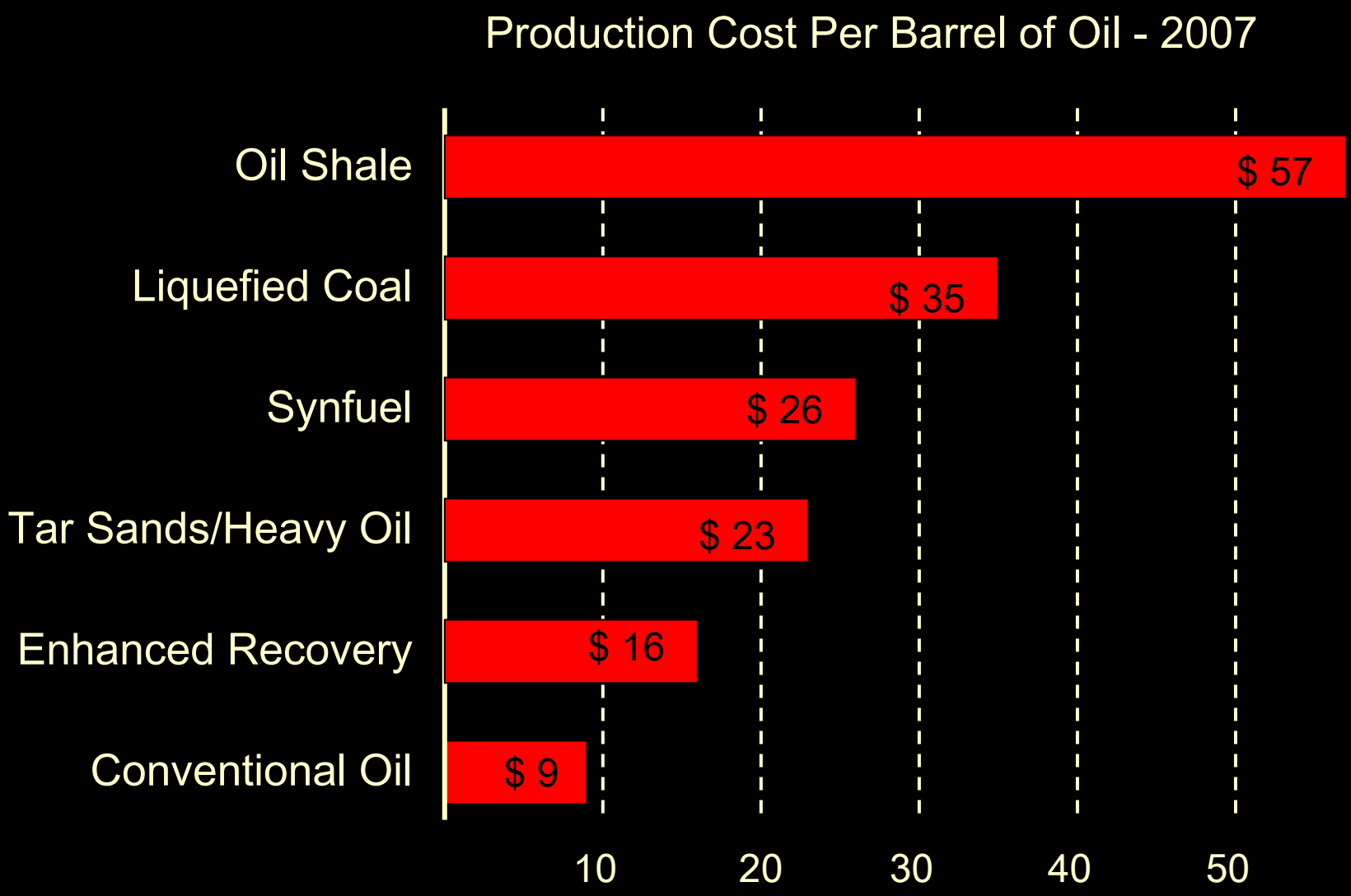
32%

LOW

53%

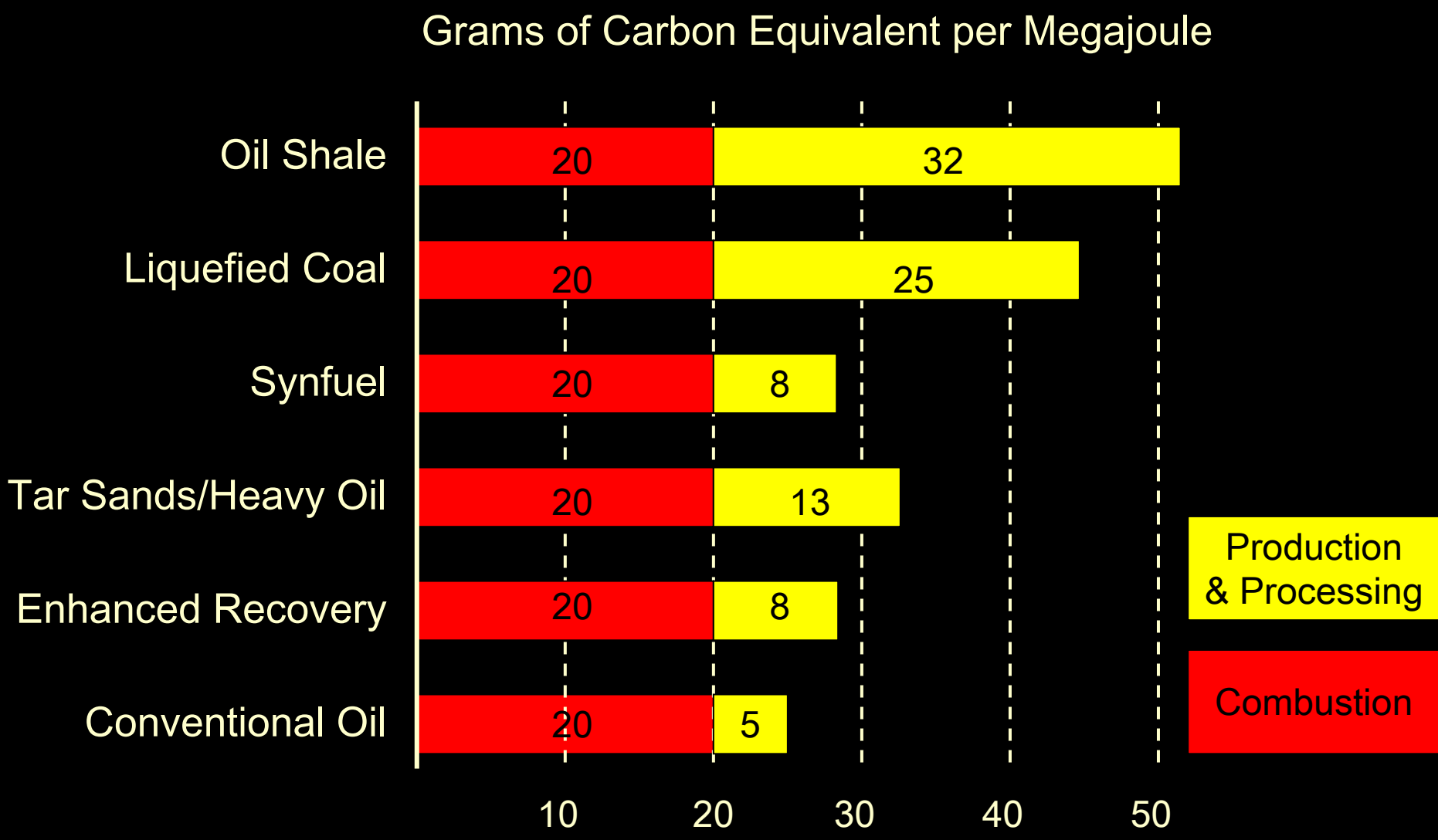
Source: Oil & Gas Journal

Production Cost – Sources of Oil



Source: Brandt & Farrell, UC Berkeley

GHG Emissions – Sources of Oil



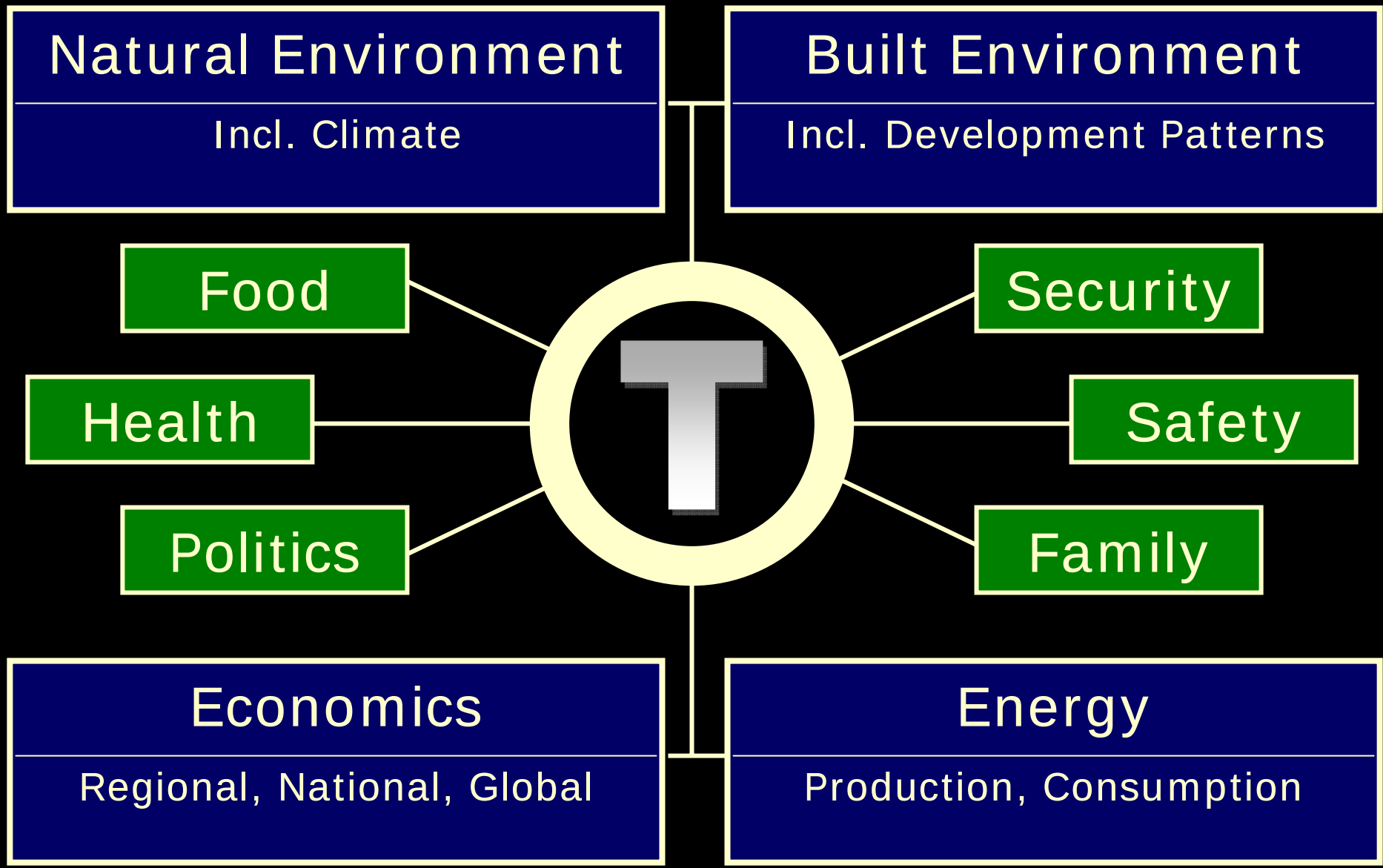
Source: Brandt & Farrell, UC Berkeley

Energy Bottom Line

- Petroleum demand will far exceed supply
- Prices will rise considerably by 2030
- Prices will also tend to be unstable
- 95% of transportation energy today is provided by imported petroleum
- Transportation is the fastest growing petroleum end use category - worldwide
- Energy security will not be achievable until we reduce our reliance on oil for transportation

2. Transportation Trajectories

Smart Mobility – Arizona & Pima County


Natural Environment
Incl. Climate
Built Environment
Incl. Development Patterns
Food
Health
Politics
Security
Safety
Family
T
Economics
Regional, National, Global
Energy
Production, Consumption

Trajectories

- VMT and Traffic Congestion
- Climate Change
- Family Budgets
- Personal Health
- Food

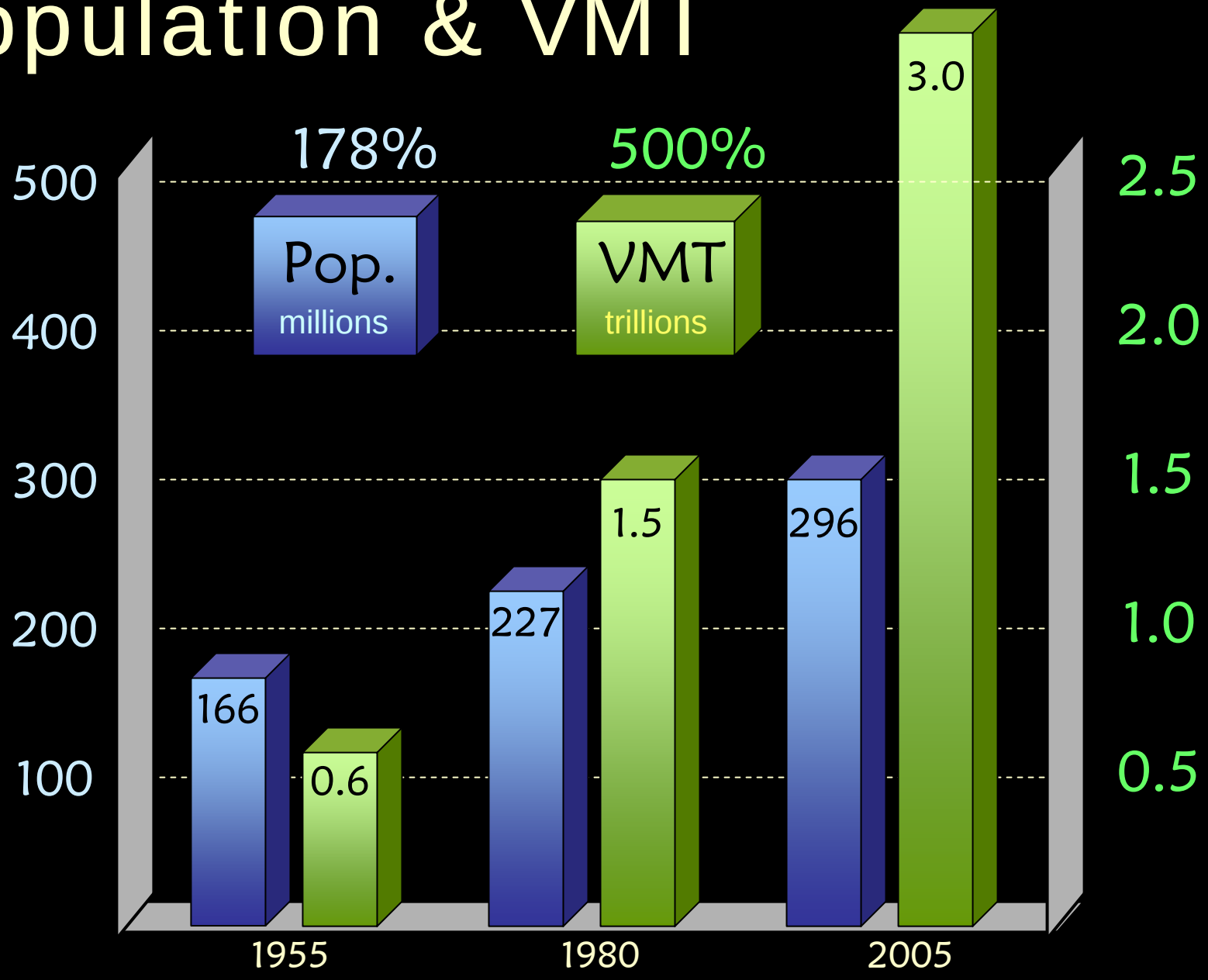
VMT and Traffic Congestion

Transportation Trajectories

Charlier Associates, Inc.

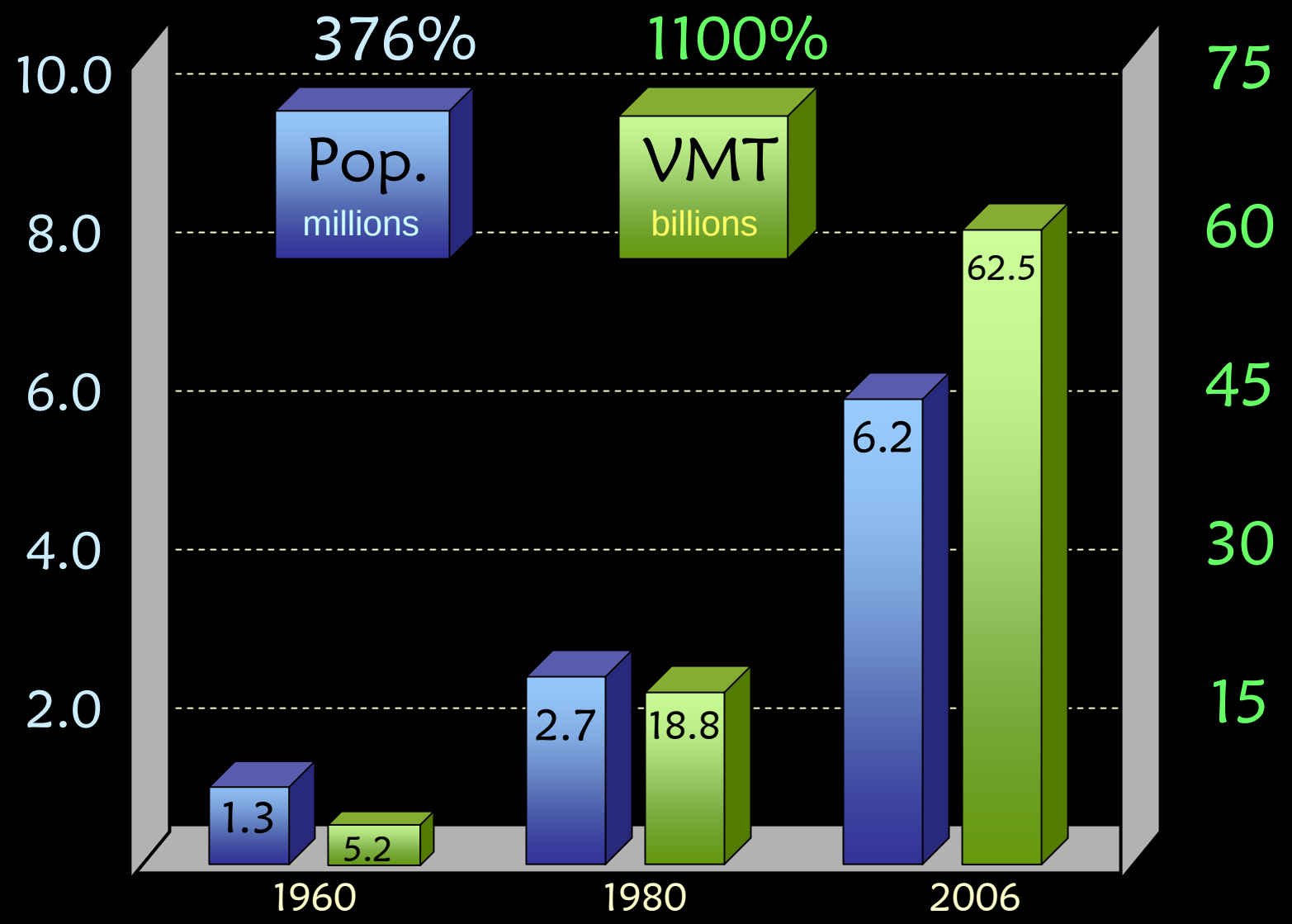
United States

Population & VMT



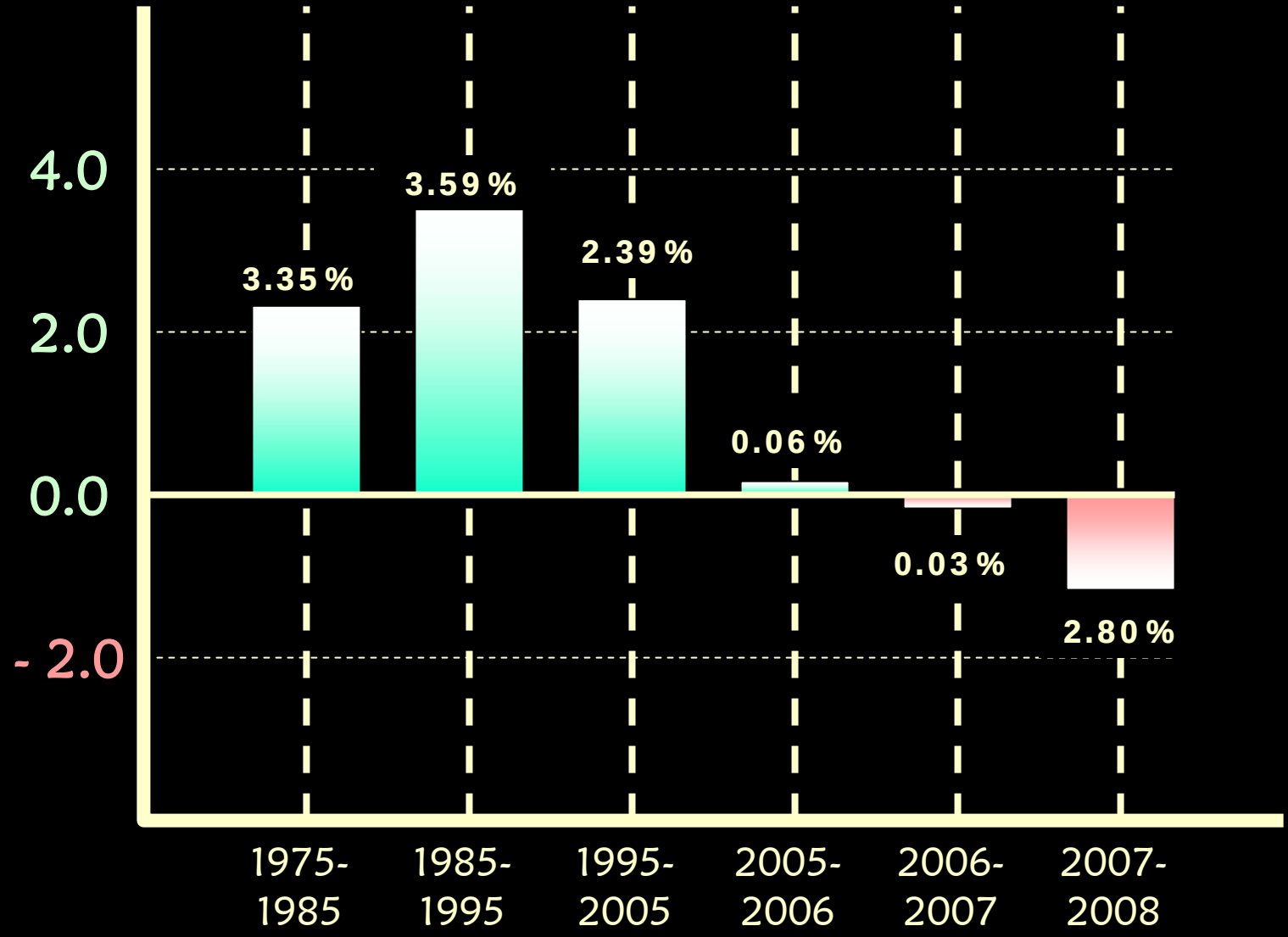
Arizona

Population & VMT

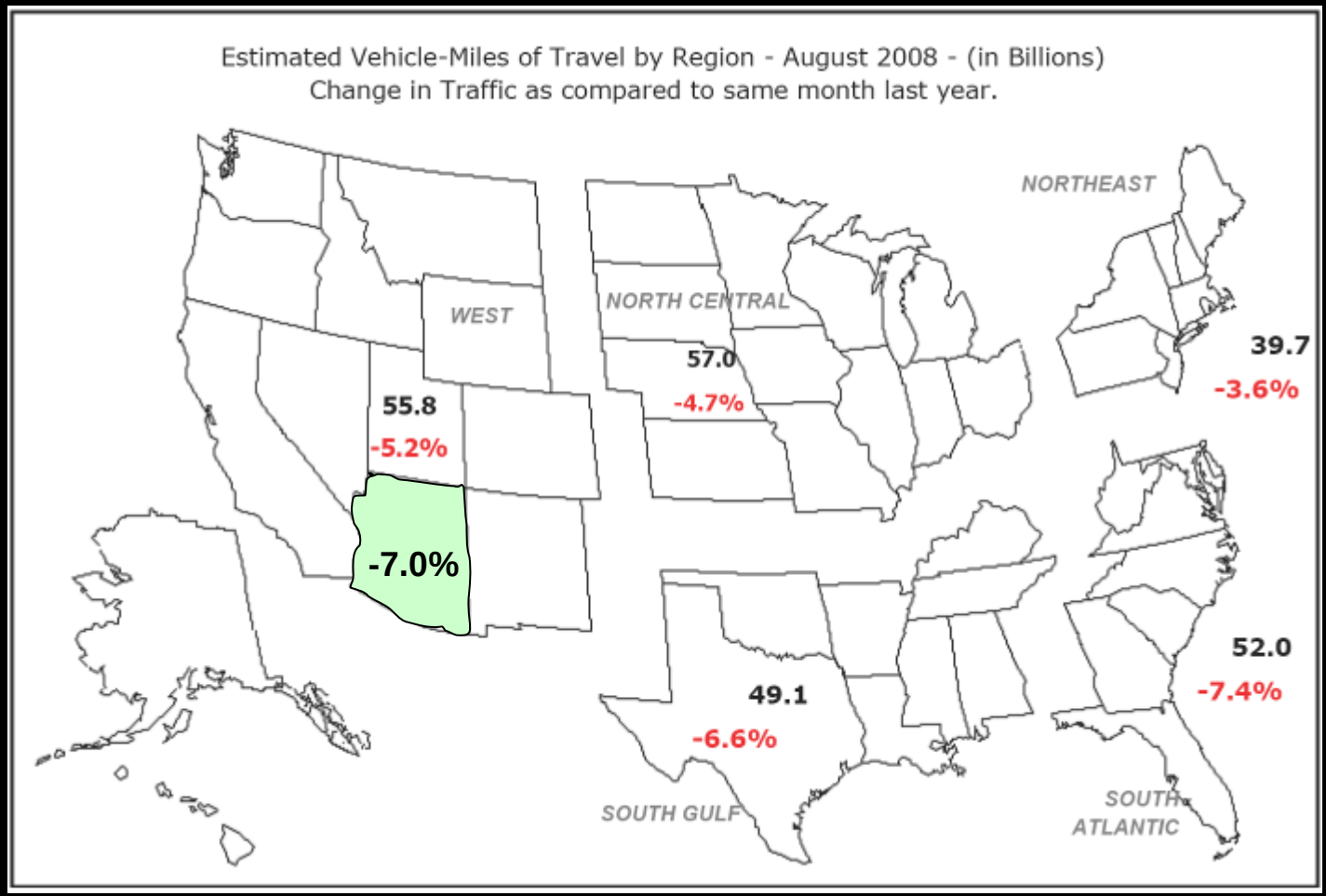


United States

Annual Rate of Change in VMT



VMT Trend in 2008



Source: United States Department of Transportation, Traffic Volume Trends, October 2008

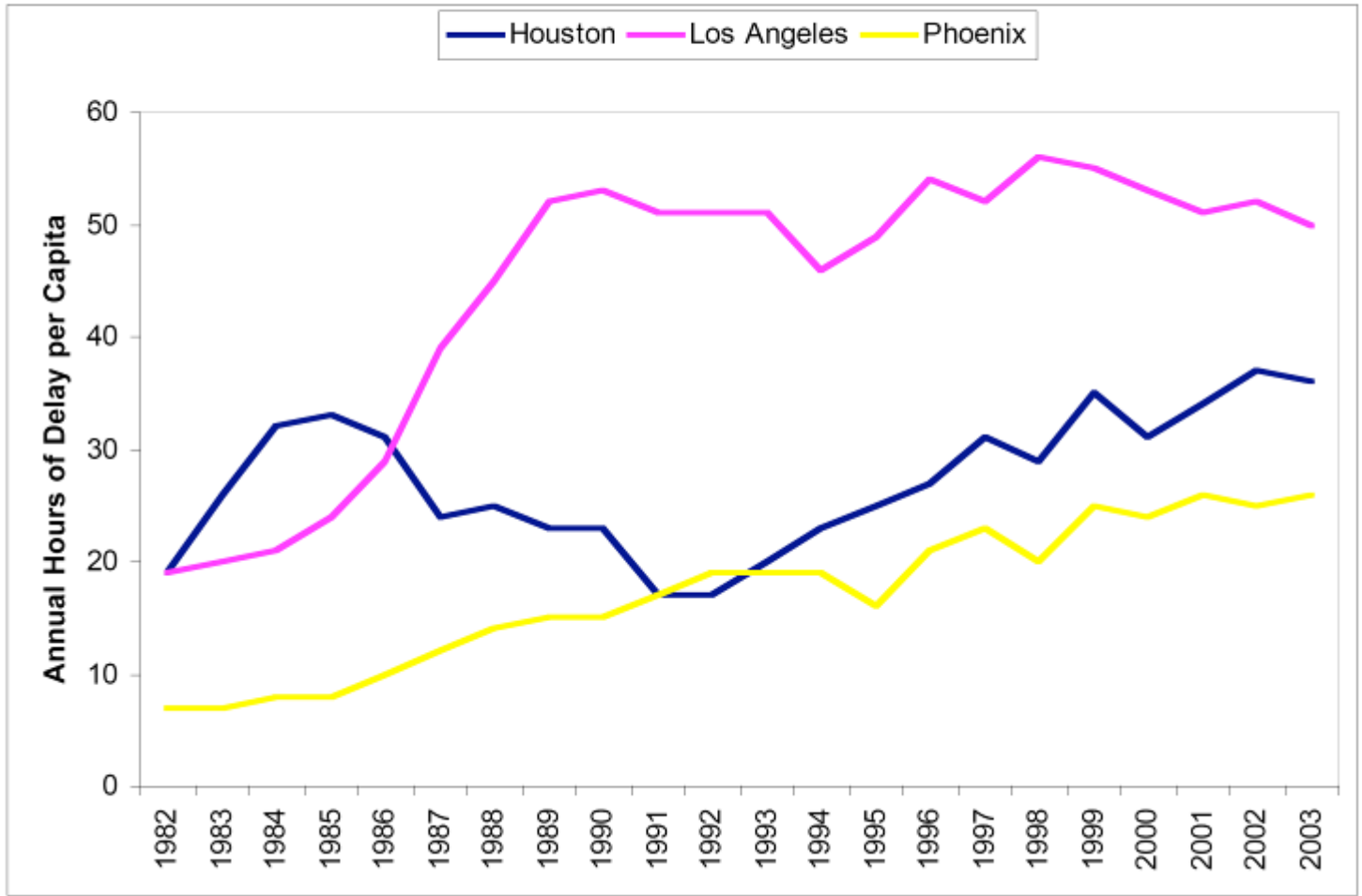
Phoenix Valley Freeways

TTI Data - 2007

New roads needed to avoid increase in congestion:
412 lane miles per year

Road Building Has Not Reduced Delay

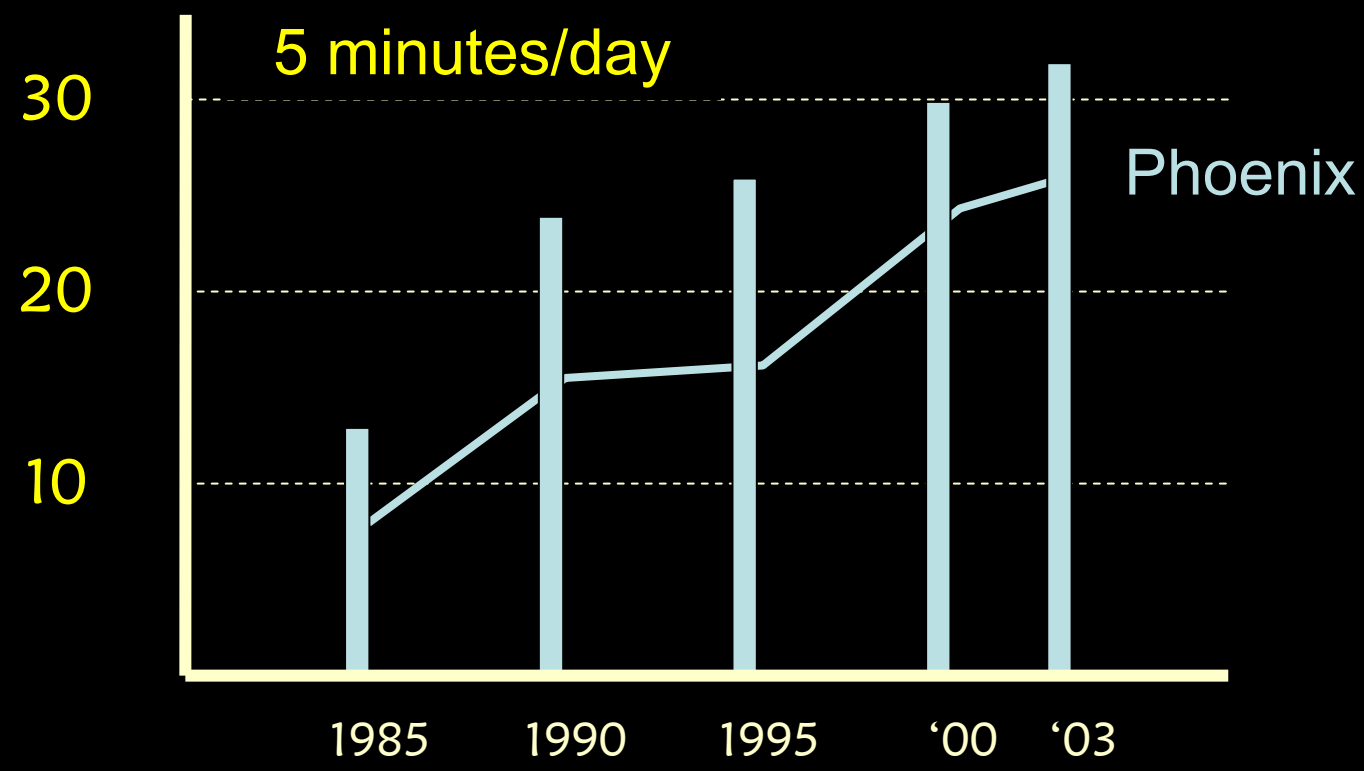
Figure 1-6 Growth of Annual Hours of Delay per Capita
Source: Schrank and Lomax 2005.



United States

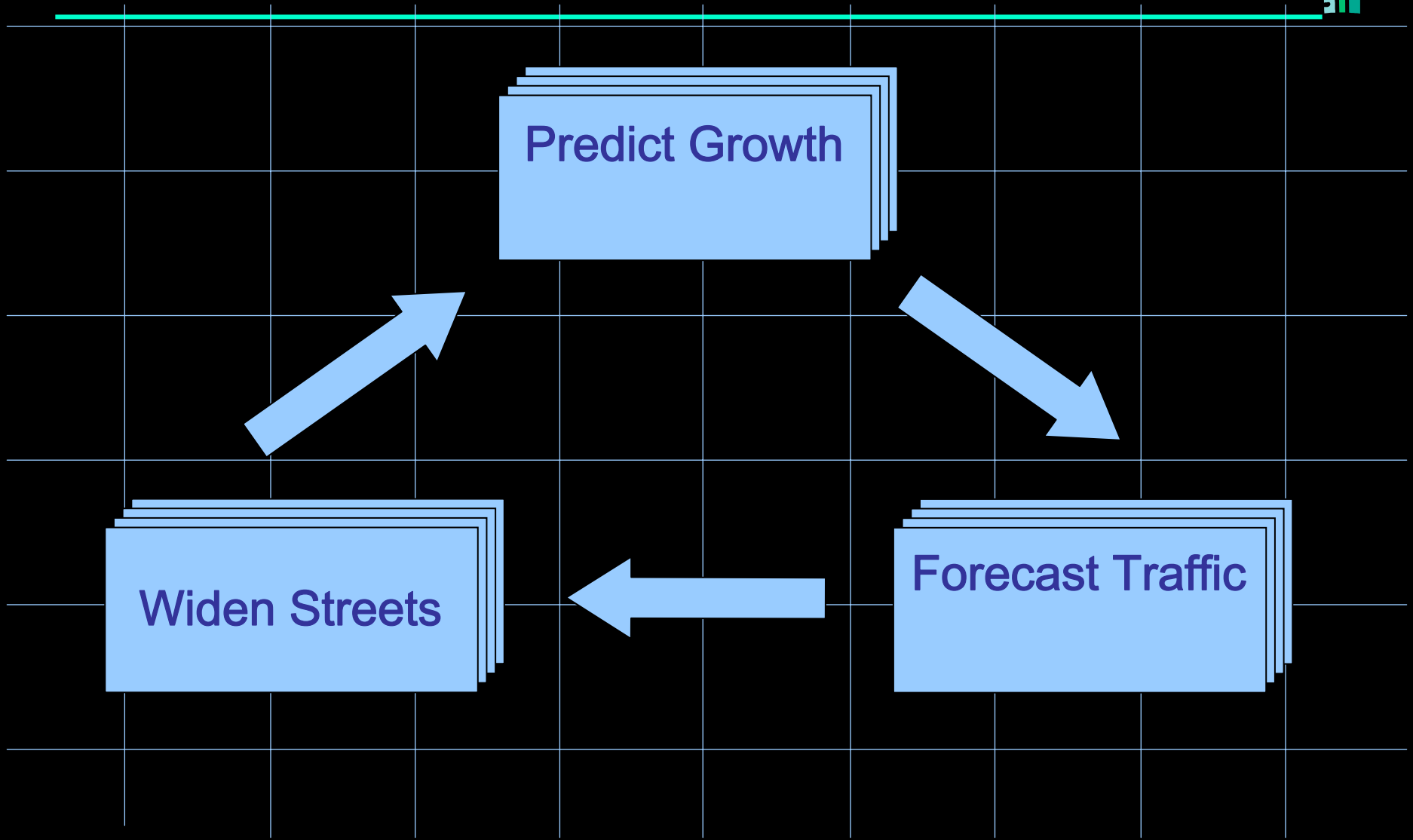
Per Capita Traffic Delay

(person hours per year)

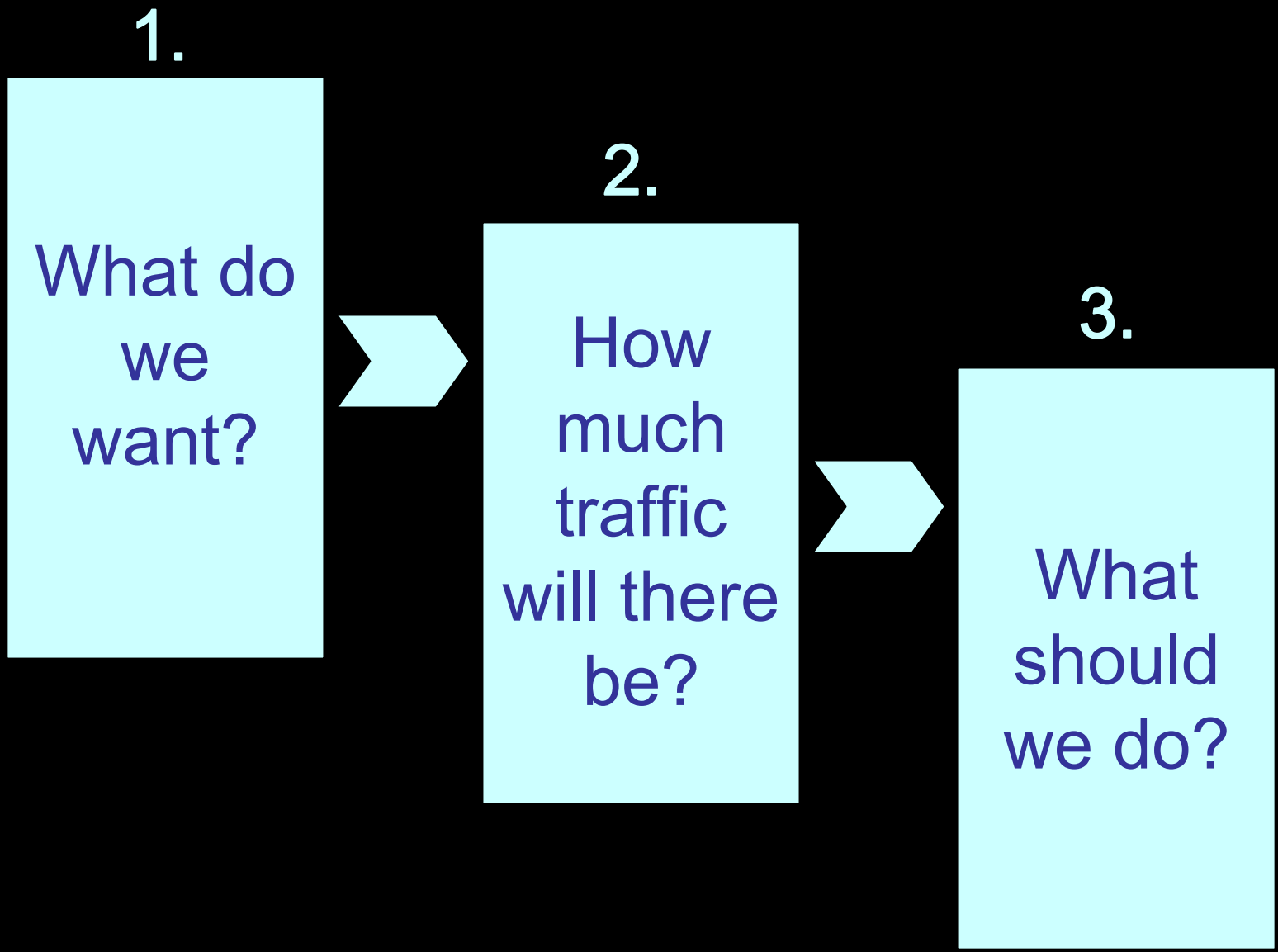


What about congestion alleviation?

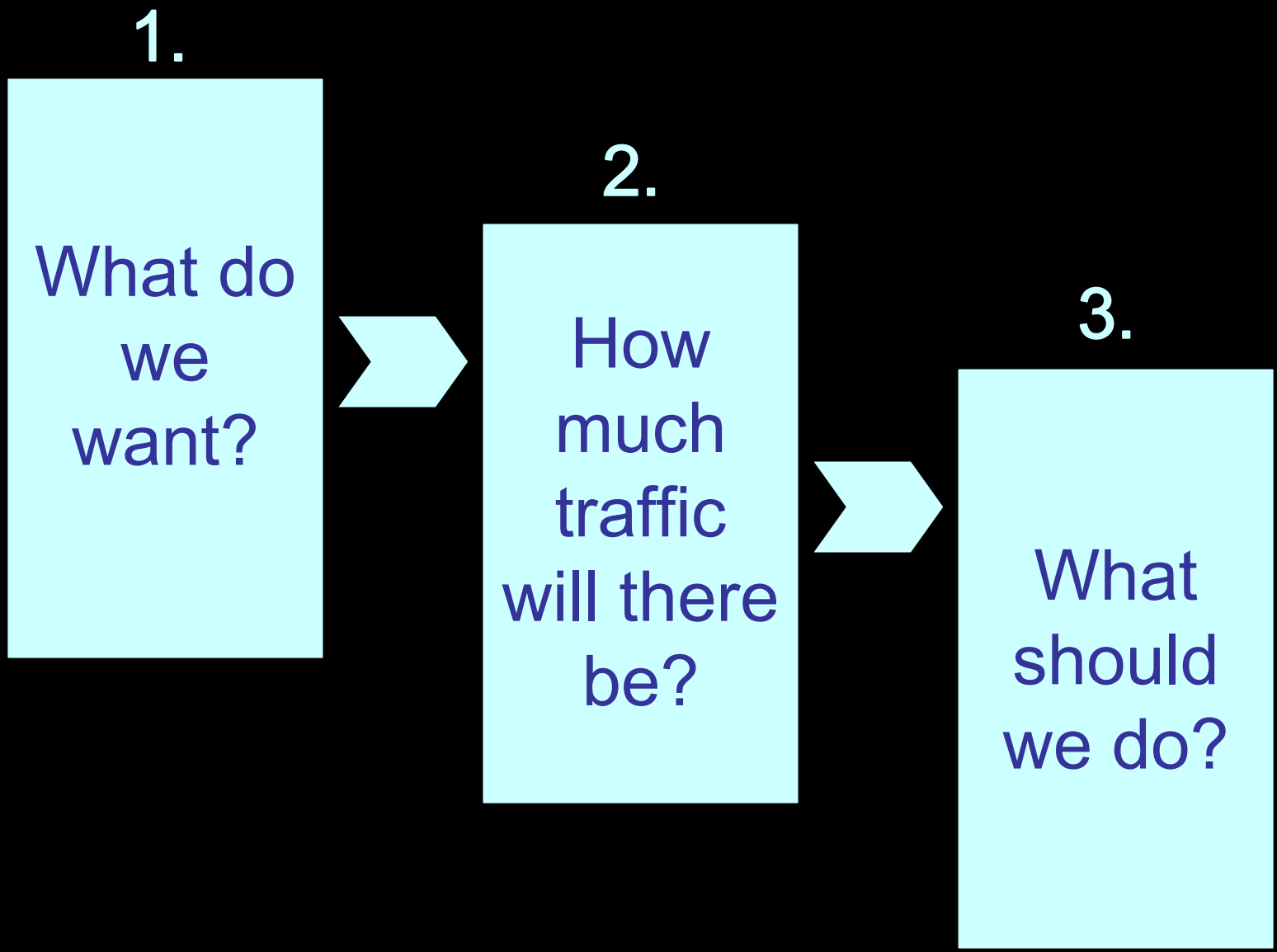
Have you ever noticed...?



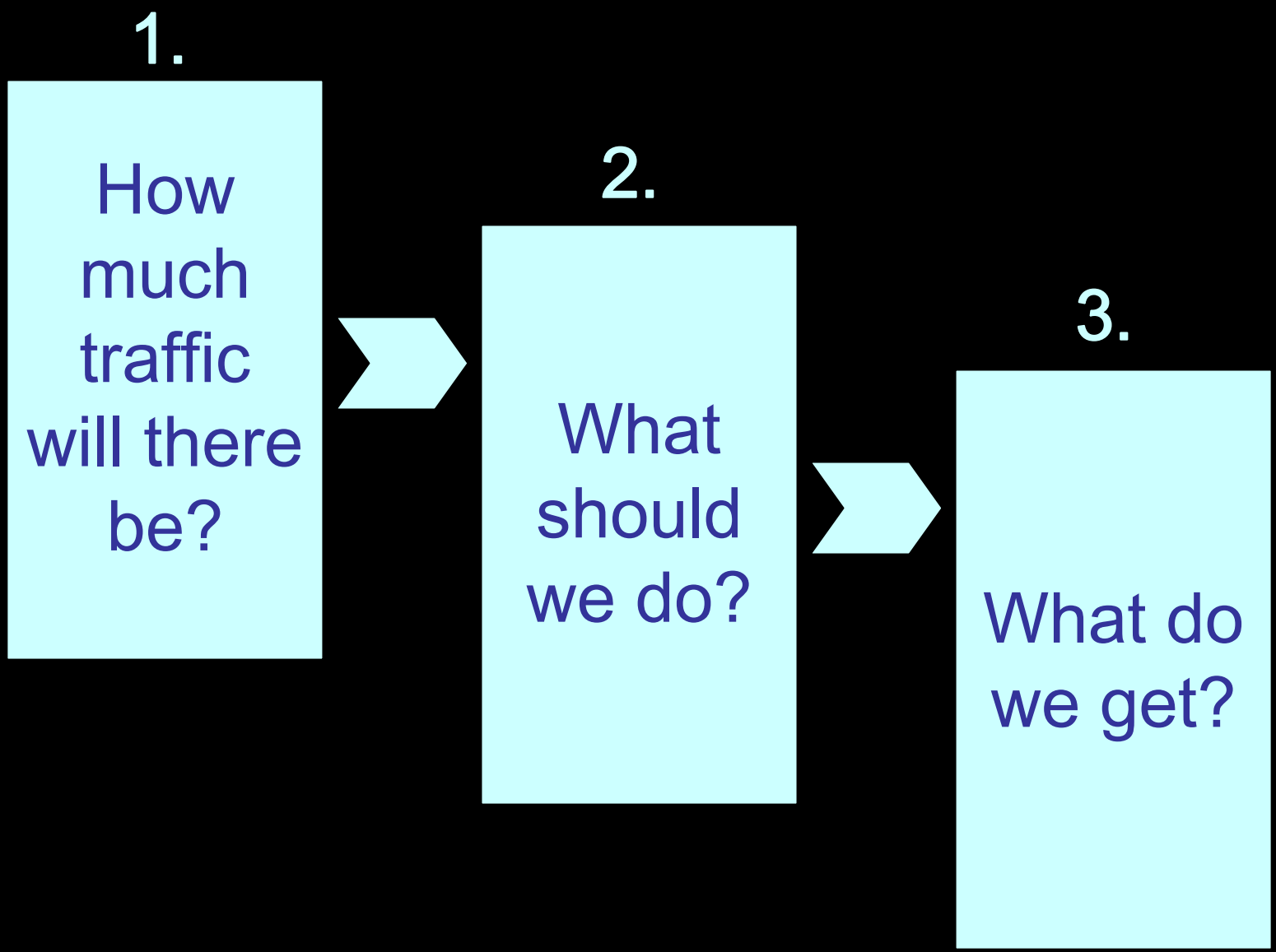
Rational Transportation “Planning”



Actual Transportation “Planning”



Actual Transportation “Planning”



Induced Traffic

Types of Induced Traffic

Changes in travel route …… Immediate

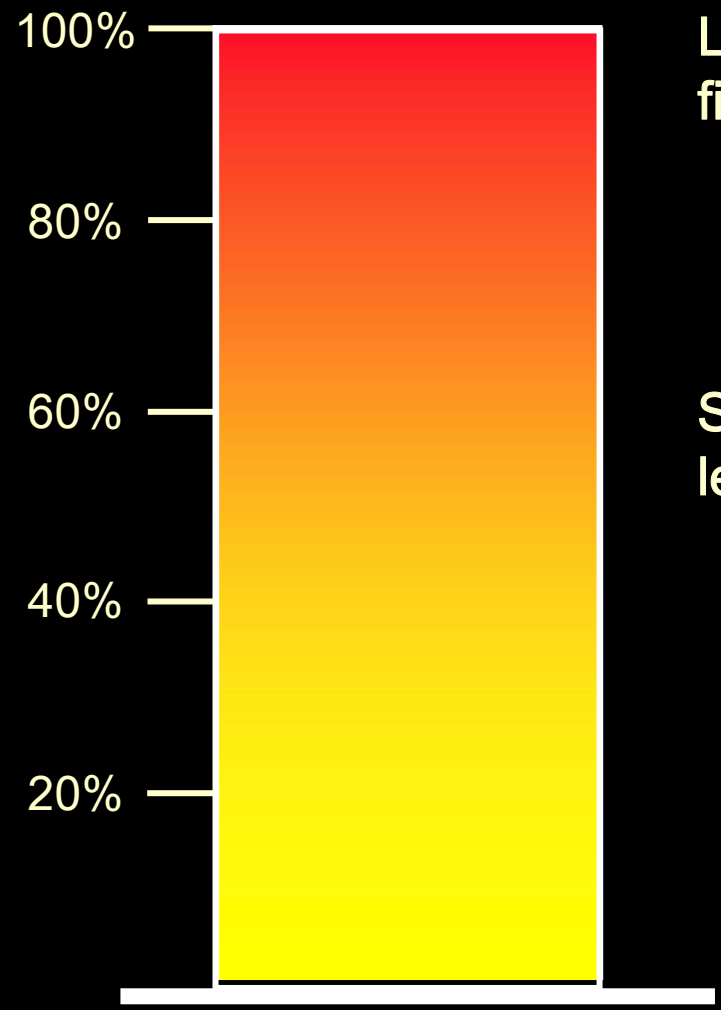
Changes in mode of travel …… < 6 months

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…



Long Term:
five to 10 years

Short Term:
less than five years

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”

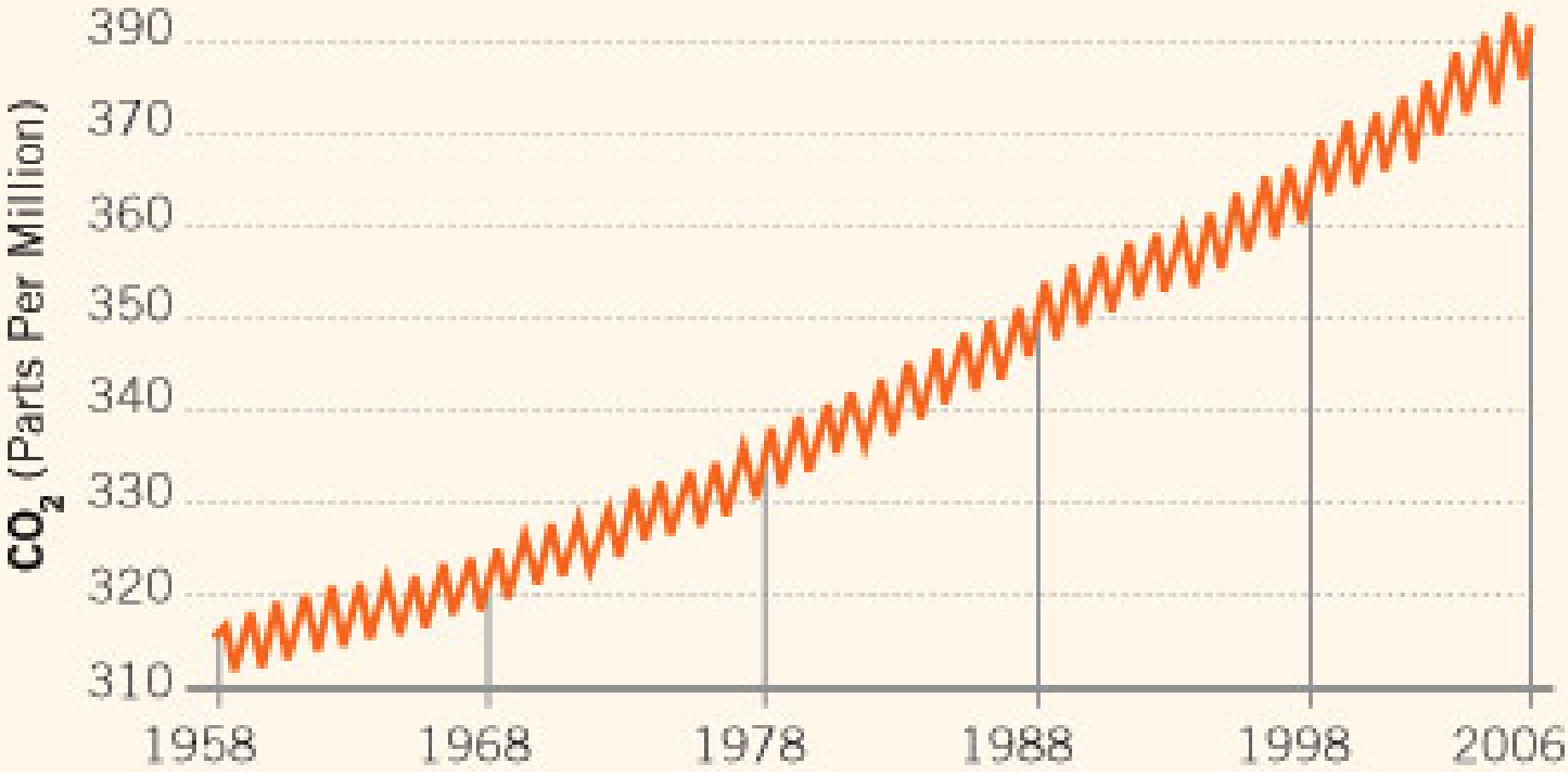
- High rates of driving & vehicle ownership
- High risk of accidents
- Lower rates of walking
- Higher levels of air pollution, esp. ozone
- High levels of GHG emissions
- **No reduction in congestion delay**

Climate Change

Transportation Trajectories

Charlier Associates, Inc.

The Keeling Curve

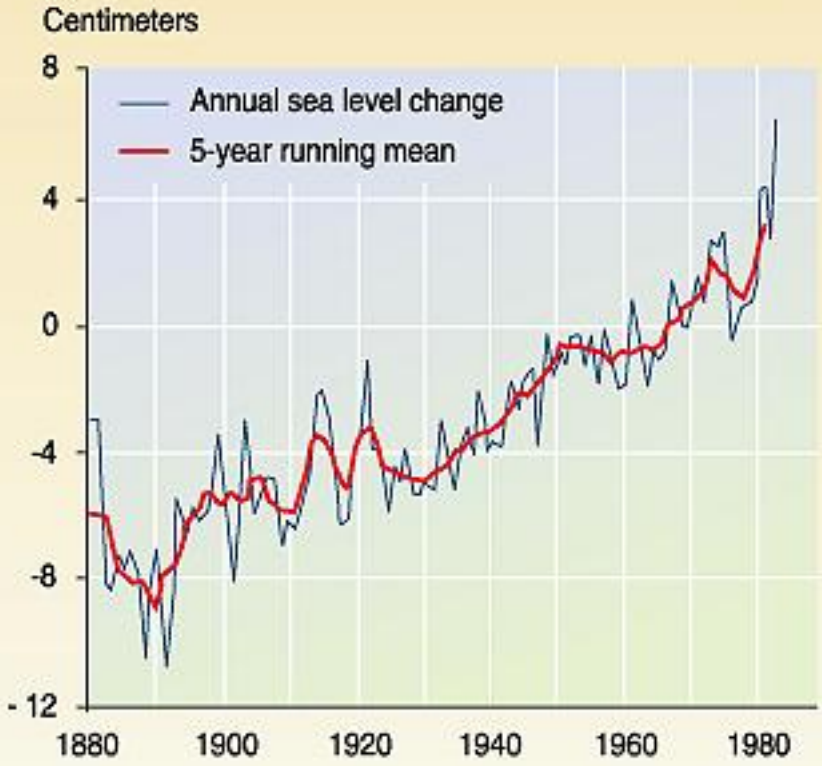


SOURCE: Scripps Institute of Oceanography

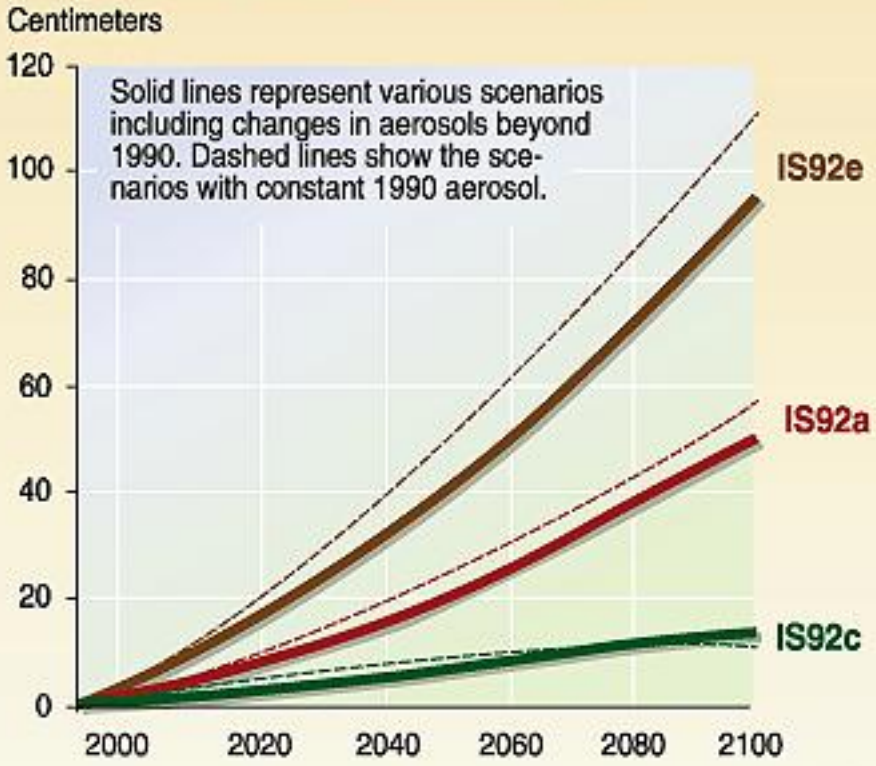
Receding Glaciers

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.

Basics: Climate Change 1

- Greenhouse gases associated with human activities are contributing to global warming with potentially serious consequences

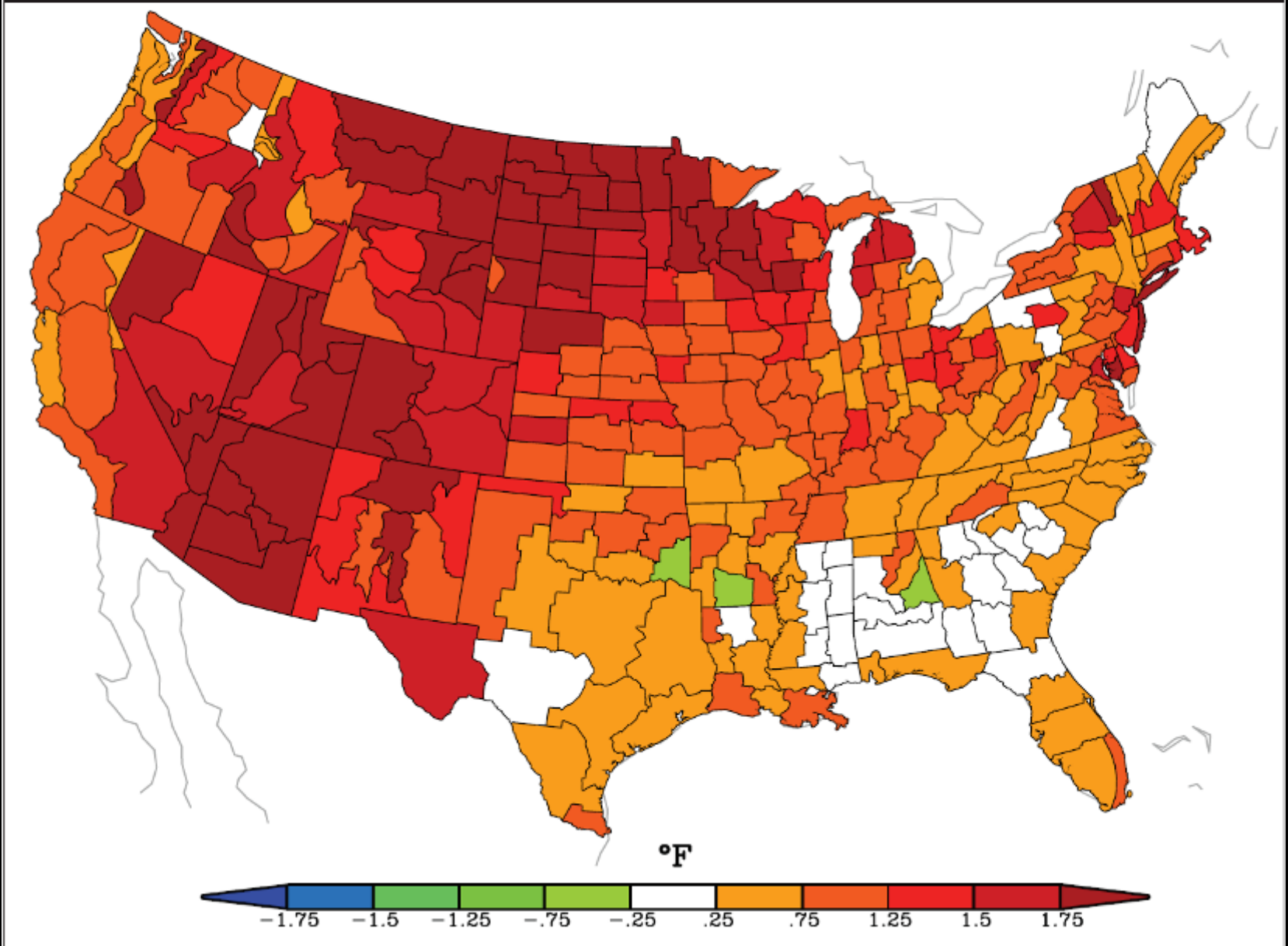
Basics: Climate Change 2

- Scientific consensus:
  - ✓We must limit global temperature increases to no more than 2° to 3° C
  - ✓To do that we must cut GHG emissions by 60% to 80% below 1990 levels by 2050

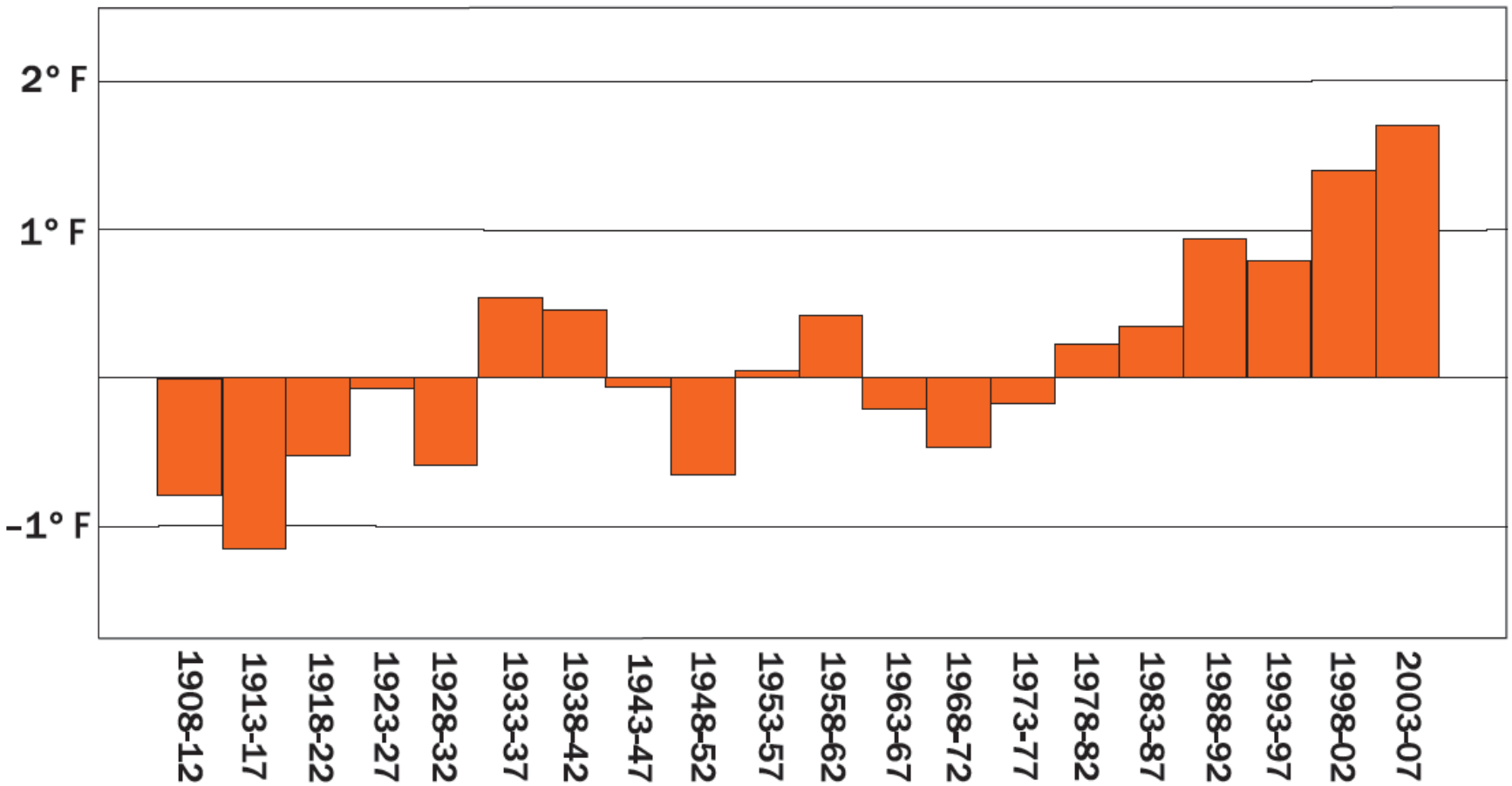
Basics: Climate Change 3

- GHGs persist in the atmosphere – we do not start over each year
- If we hesitate to begin reducing GHG emissions, the amount we have to reduce in later years increases EXPONENTIALLY
- What we do now is more important than what we do in 2050

Figure 3. The Interior West: Epicenter of Warming in the Contiguous U.S. (2000 - 2007 Average Temperatures Compared to 20th Century Averages)

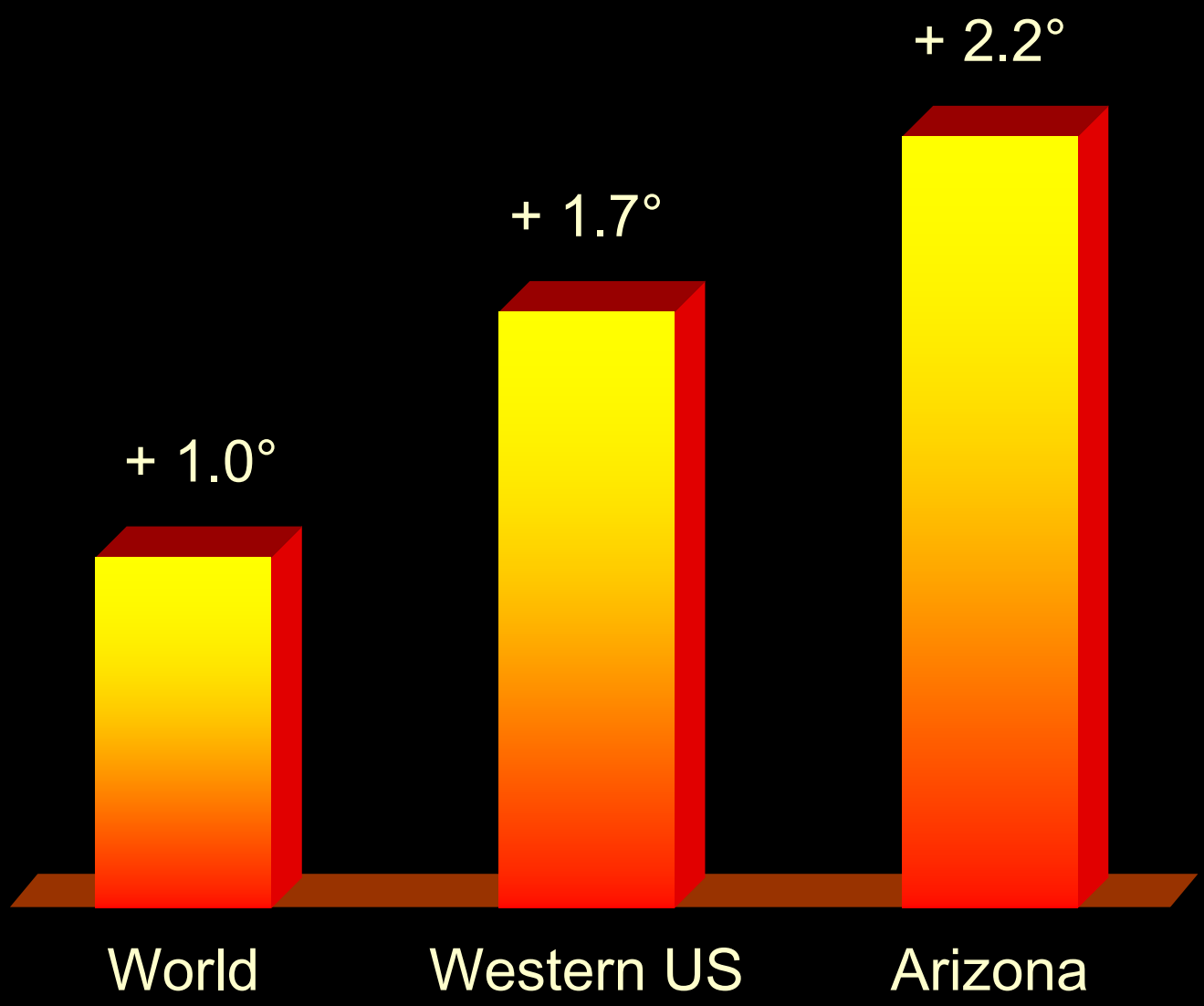


A Warmer West: Five-year Average Temperatures in 11 Western States Compared to 20th Century Average

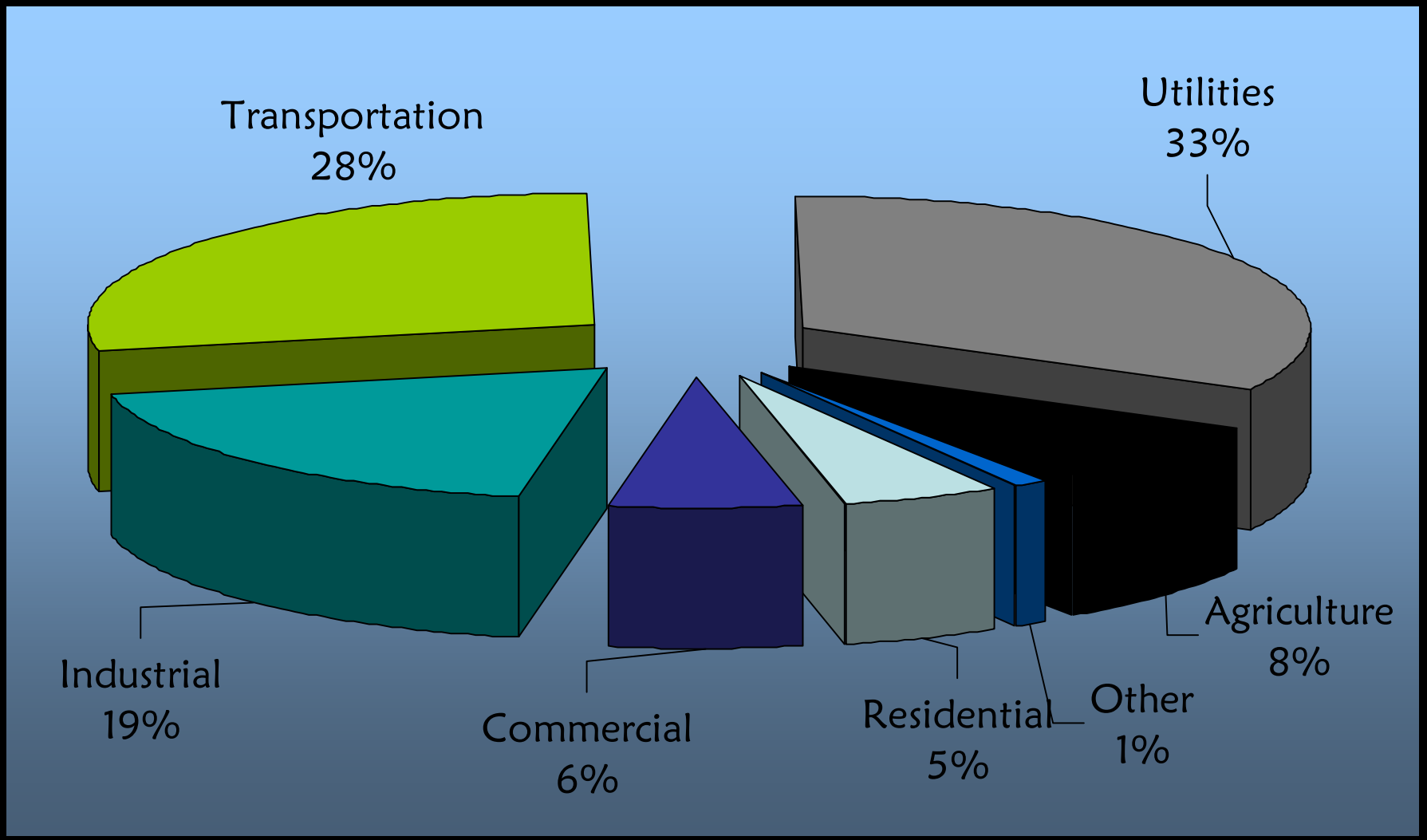


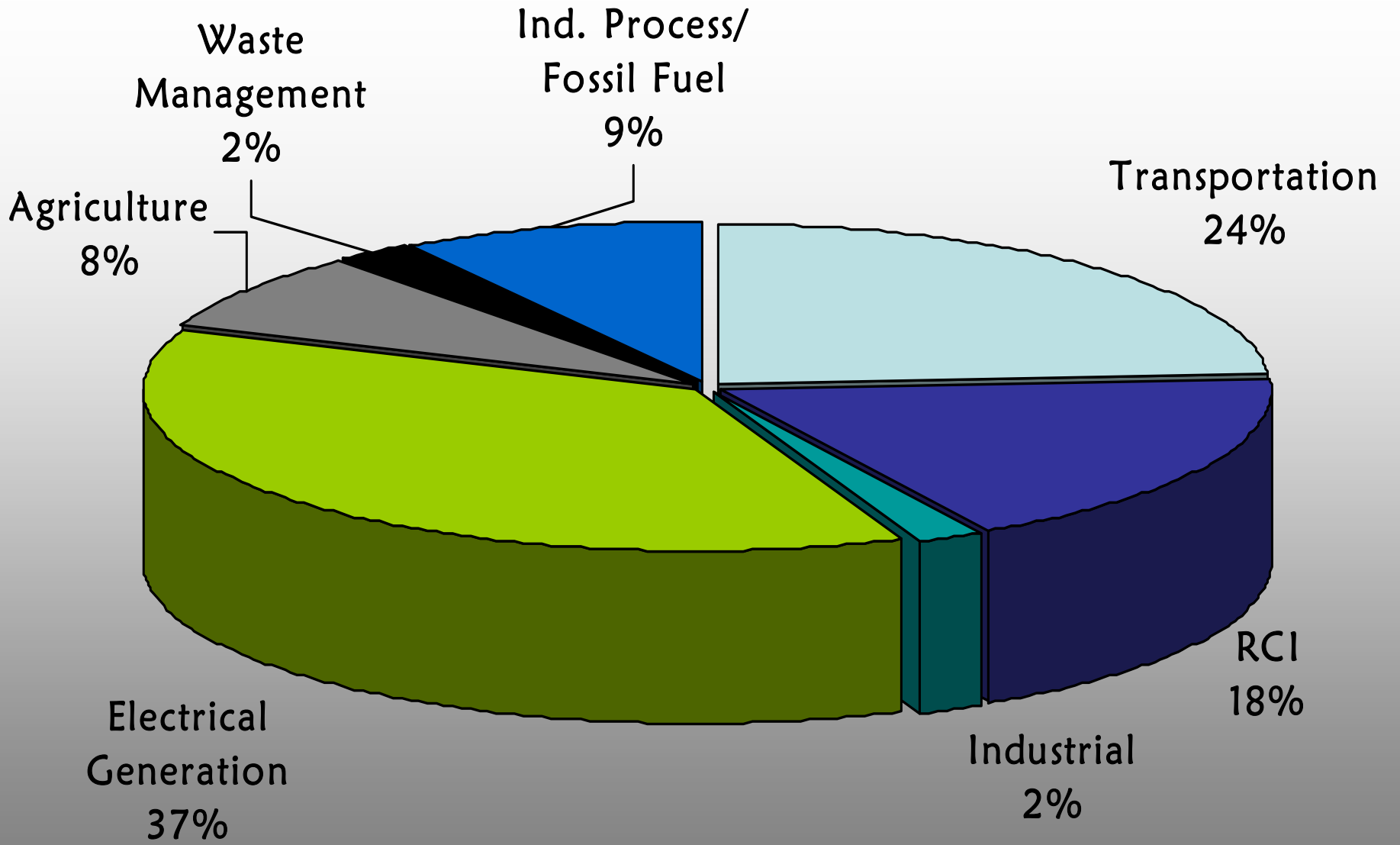
Data from the National Oceanic and Atmospheric Administration's climate division series. Analysis by the Rocky Mountain Climate Organization.

Ambient Temperature Change
1908 – 2007 (° F)

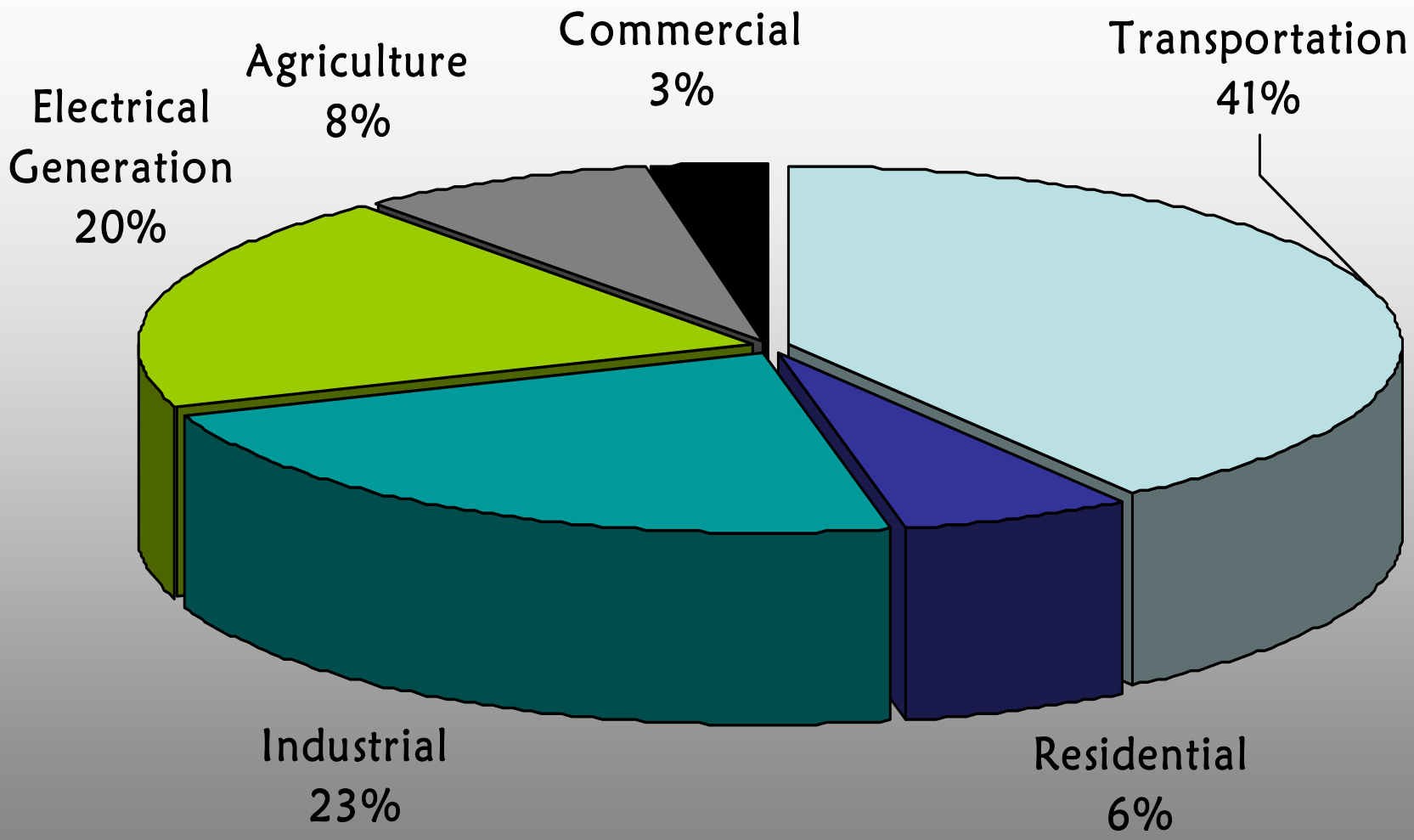


U.S. Greenhouse Gases

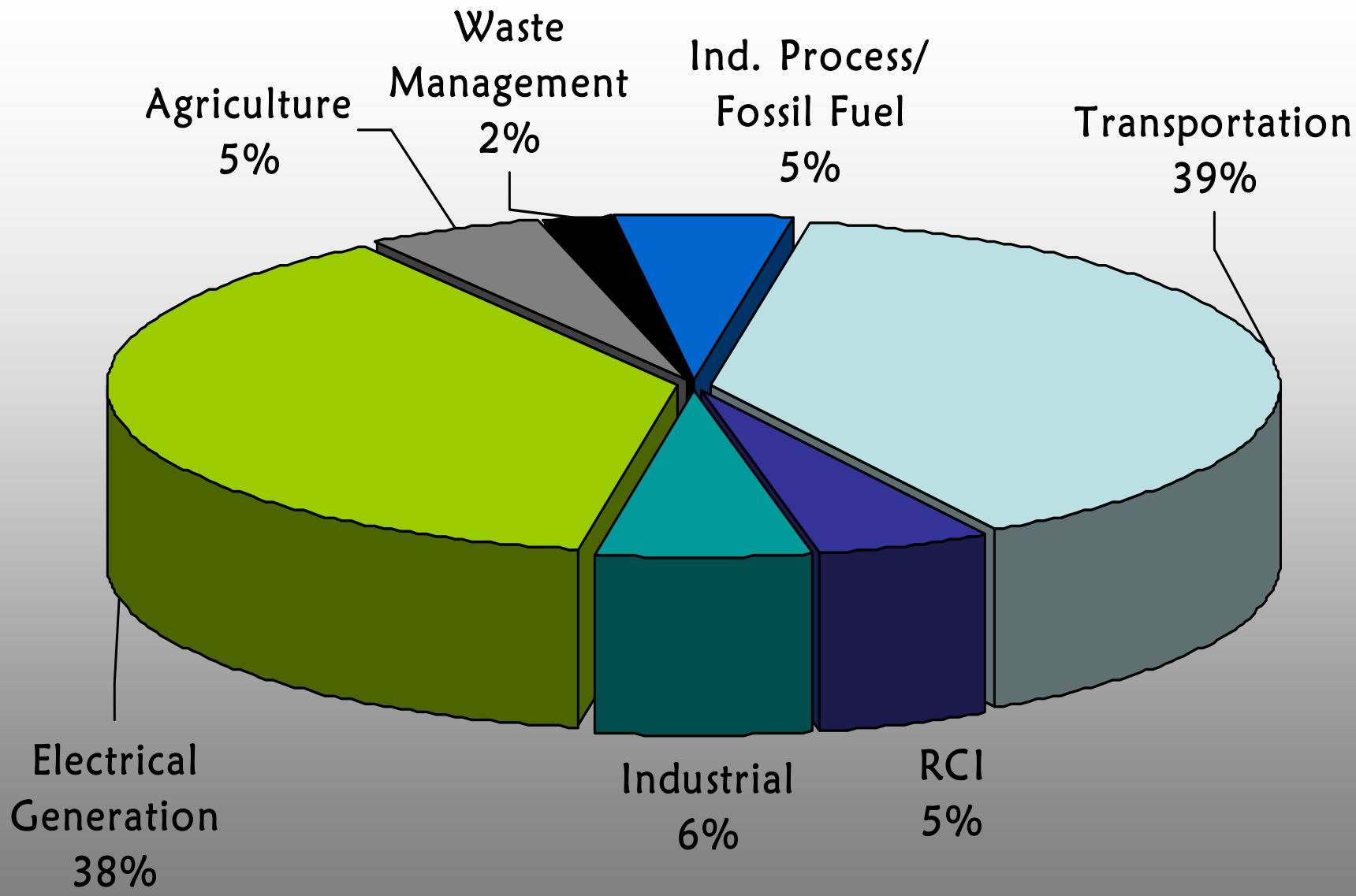



Waste Management 2%
Ind. Process/ Fossil Fuel 9%
Transportation 24%
Agriculture 8%
RCI 18%
Electrical Generation 37%
Industrial 2%

Colorado

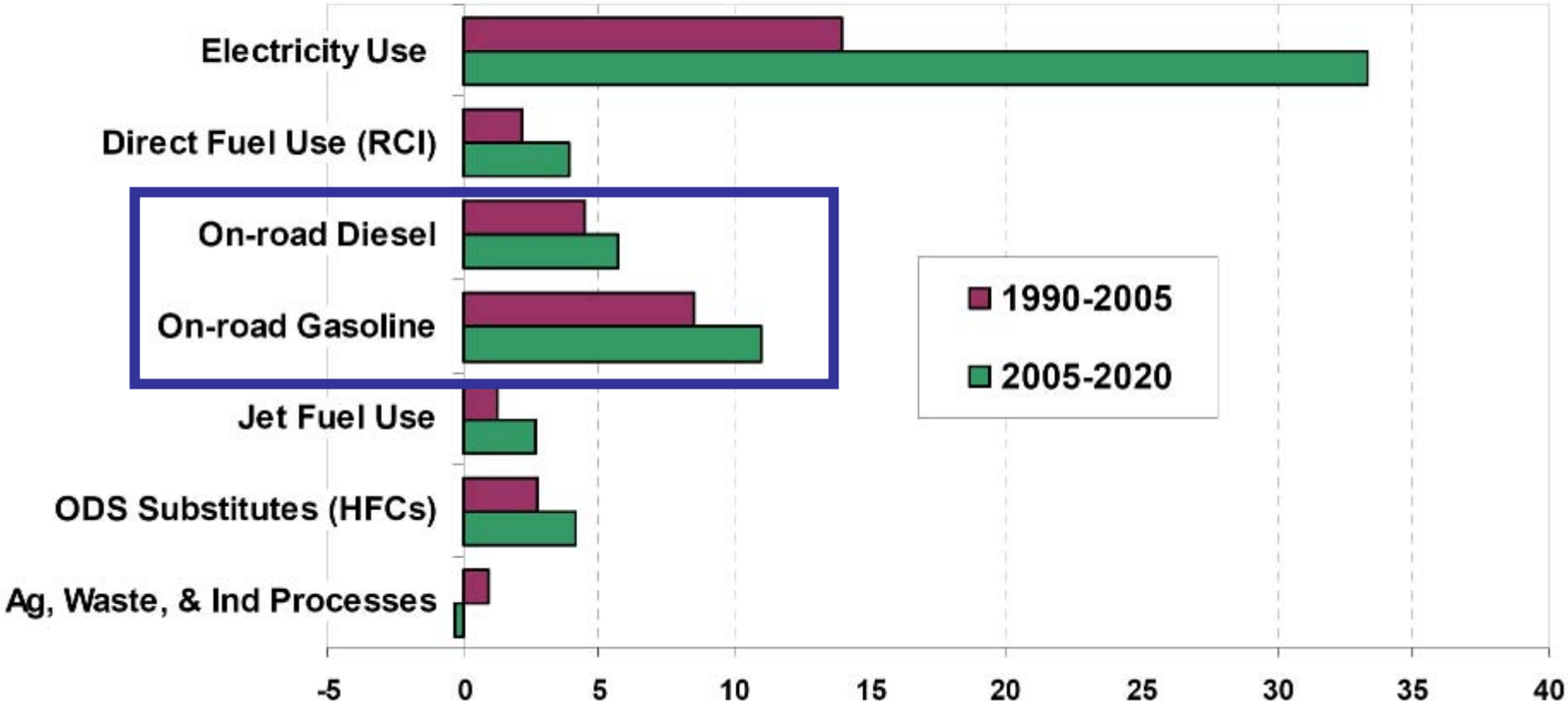

Commercial
3%
Transportation
41%
Agriculture
8%
Electrical
Generation
20%
Industrial
23%
Residential
6%

California


Agriculture
5%
Waste
Management
2%
Ind. Process/
Fossil Fuel
5%
Transportation
39%
Electrical
Generation
38%
Industrial
6%
RCI
5%

Arizona

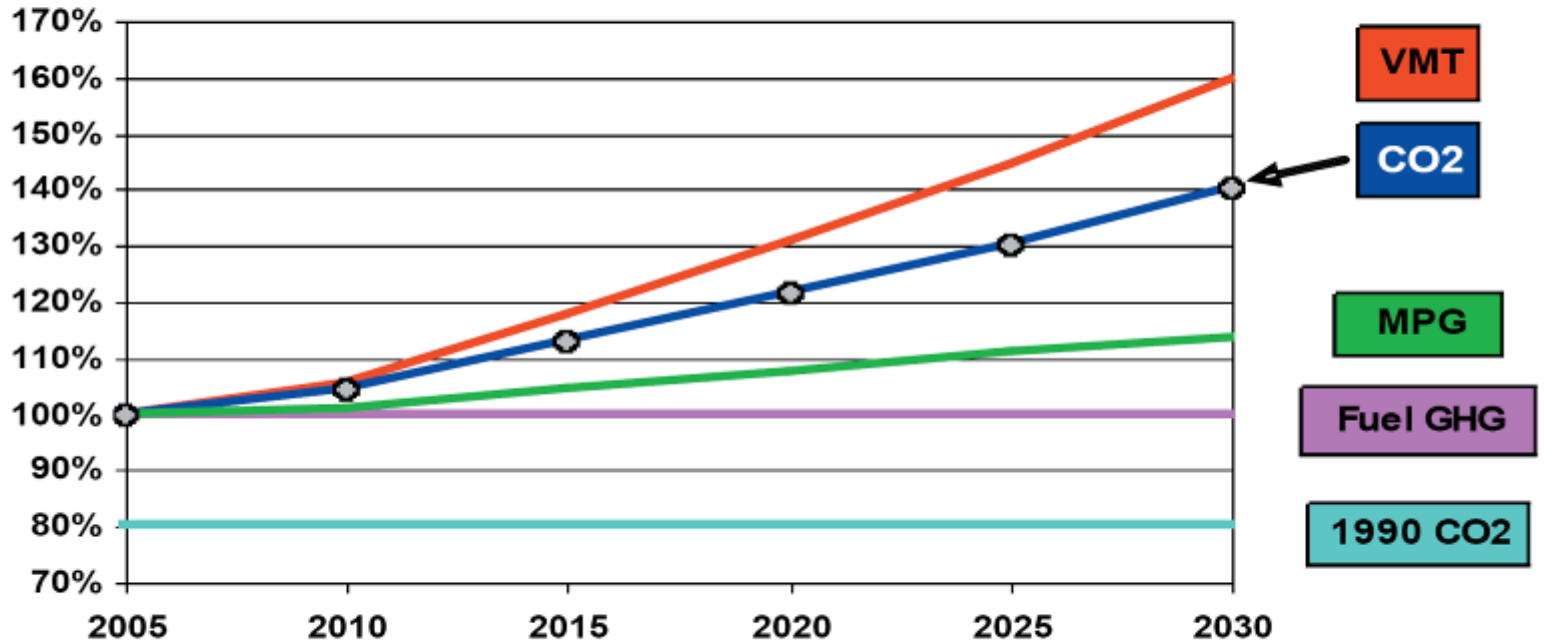
Figure 4. Contributions to Emissions Growth, 1990-2020: Reference Case Projections (MMTCO2e)



Motor Vehicles & CO_2

FIGURE 0-2

PROJECTED GROWTH IN CO_2 EMISSIONS FROM CARS AND LIGHT TRUCKS



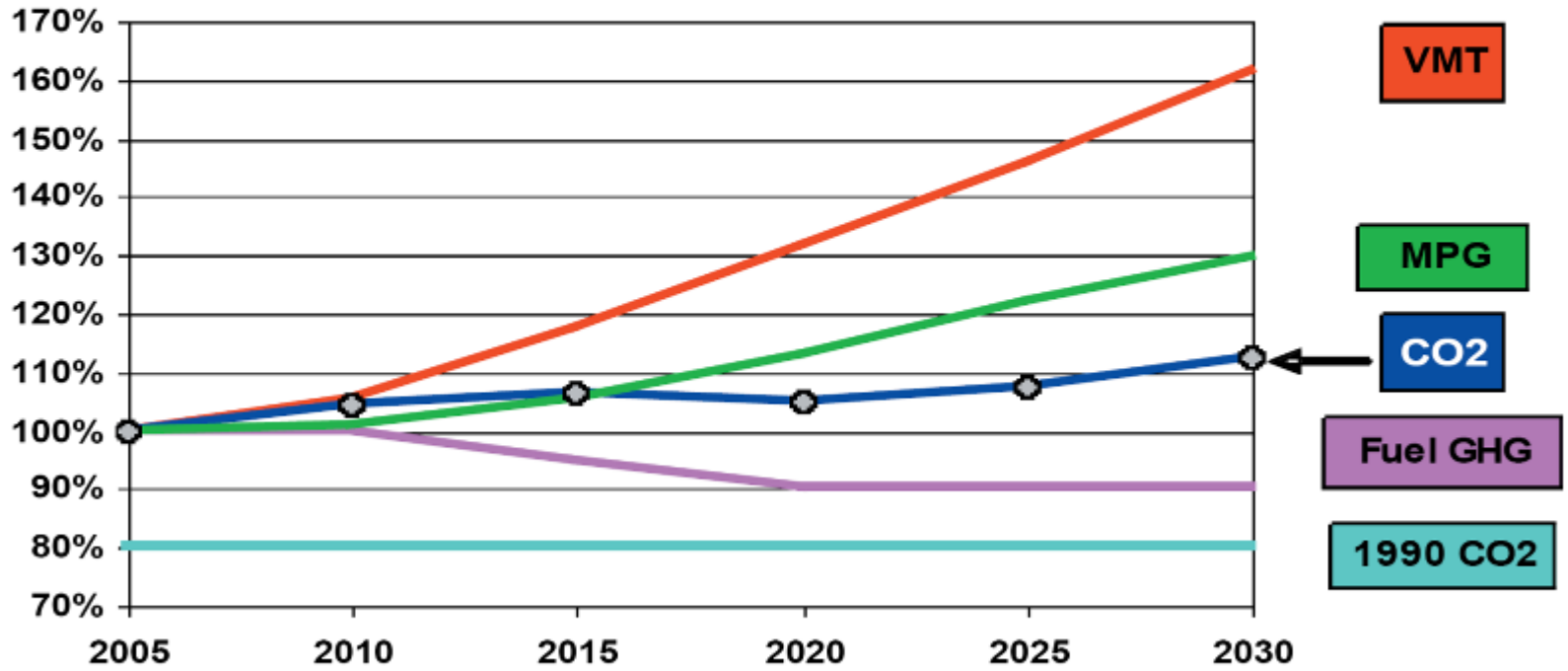
Center for Clean Air Policy

SOURCE: EIA 2007.

Vehicle Technology Alone Will Not Solve the Problem

Projected Growth in CO_2 Emissions from Cars and Light Trucks Assuming Stringent Nationwide Vehicle and Fuel Standards*

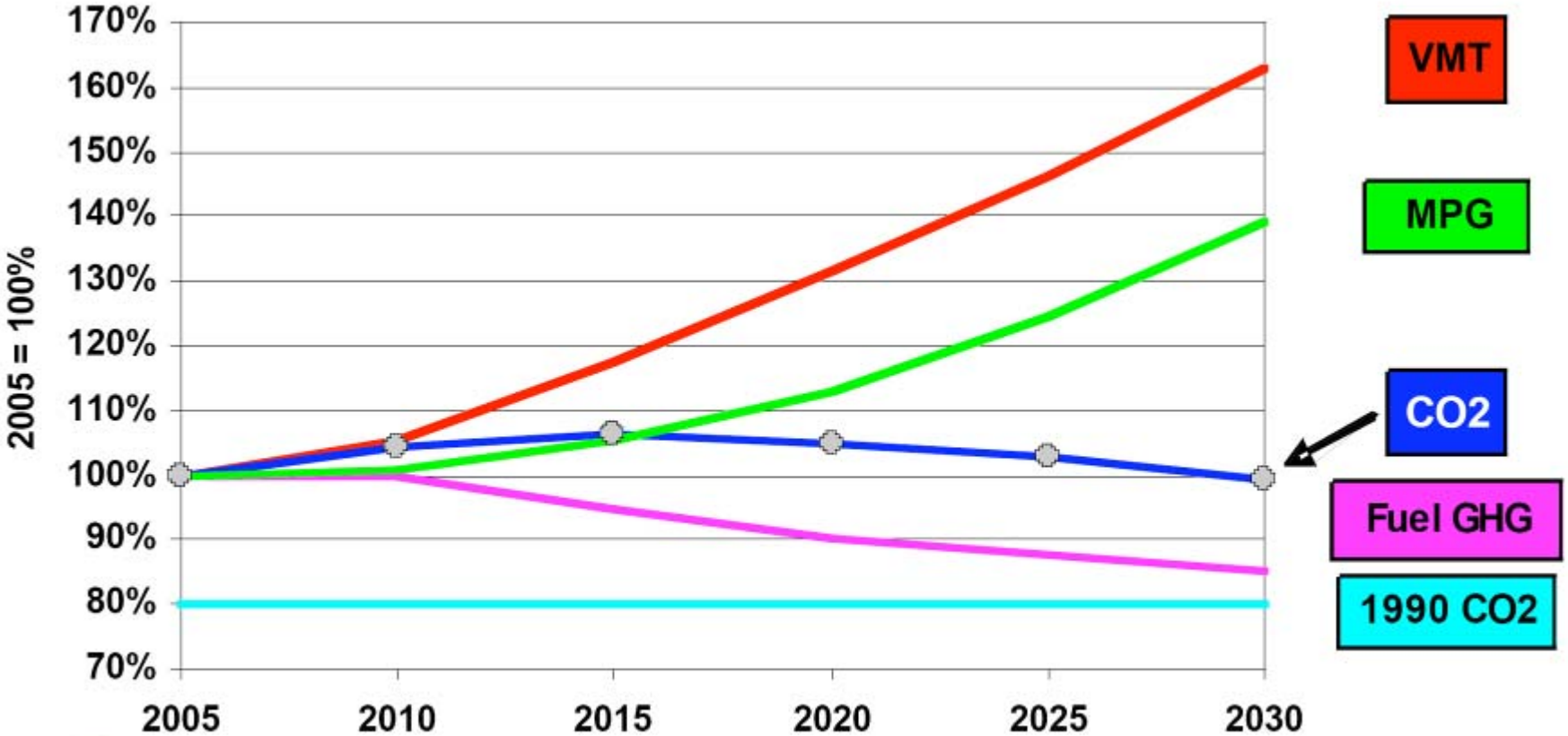
*With Senate CAFE levels -- New Passenger Vehicle Fuel Economy of 35 mpg in 2020 and California Low Carbon Fuel Standard of -10% in 2020 applied nationally.



Center for Clean Air Policy

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

...Even With Very Stringent Standards

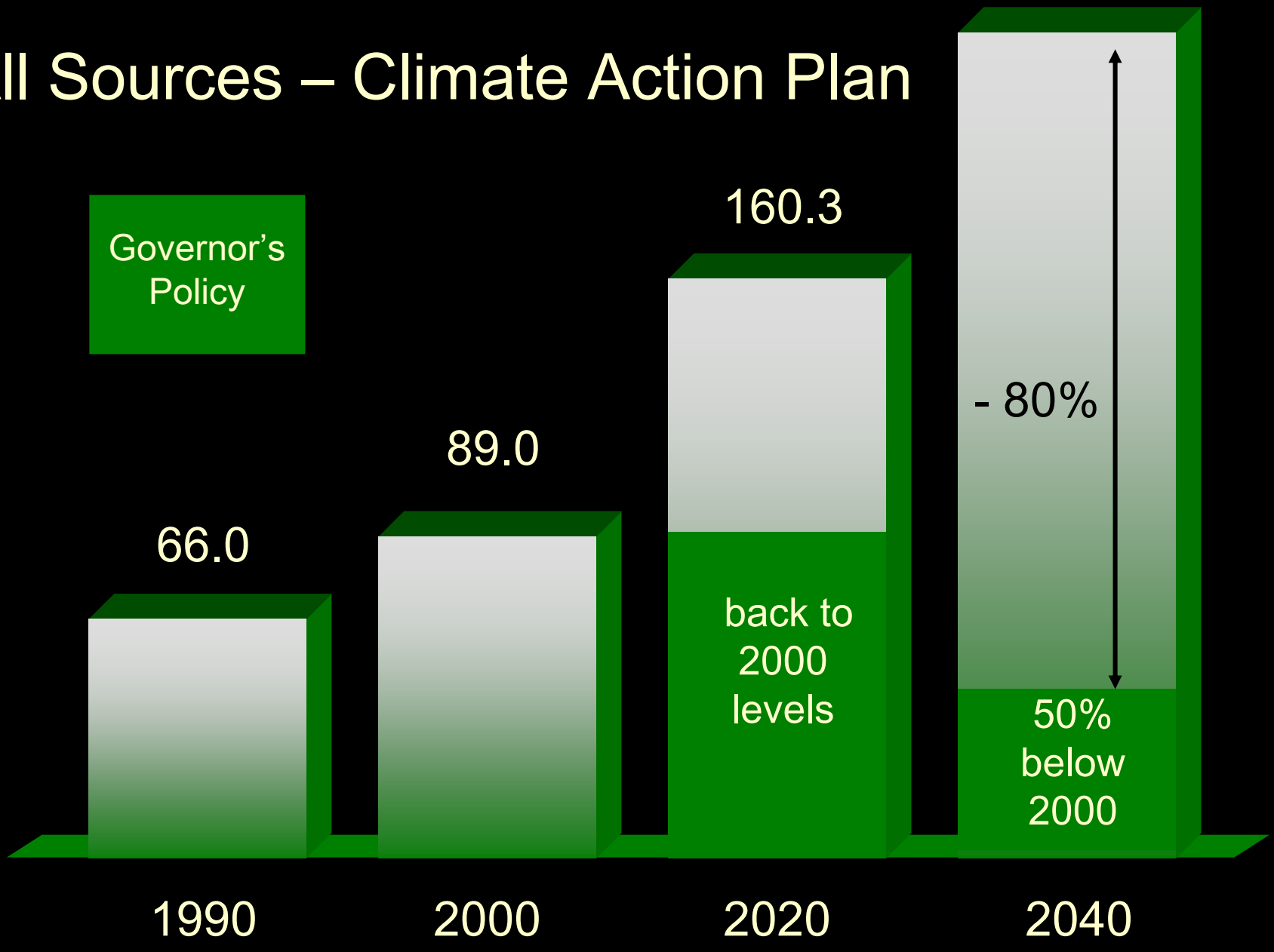


Sources: VMT: EIA with 10% rebound, MPG & Fuel: Trend Extrapc

Center for

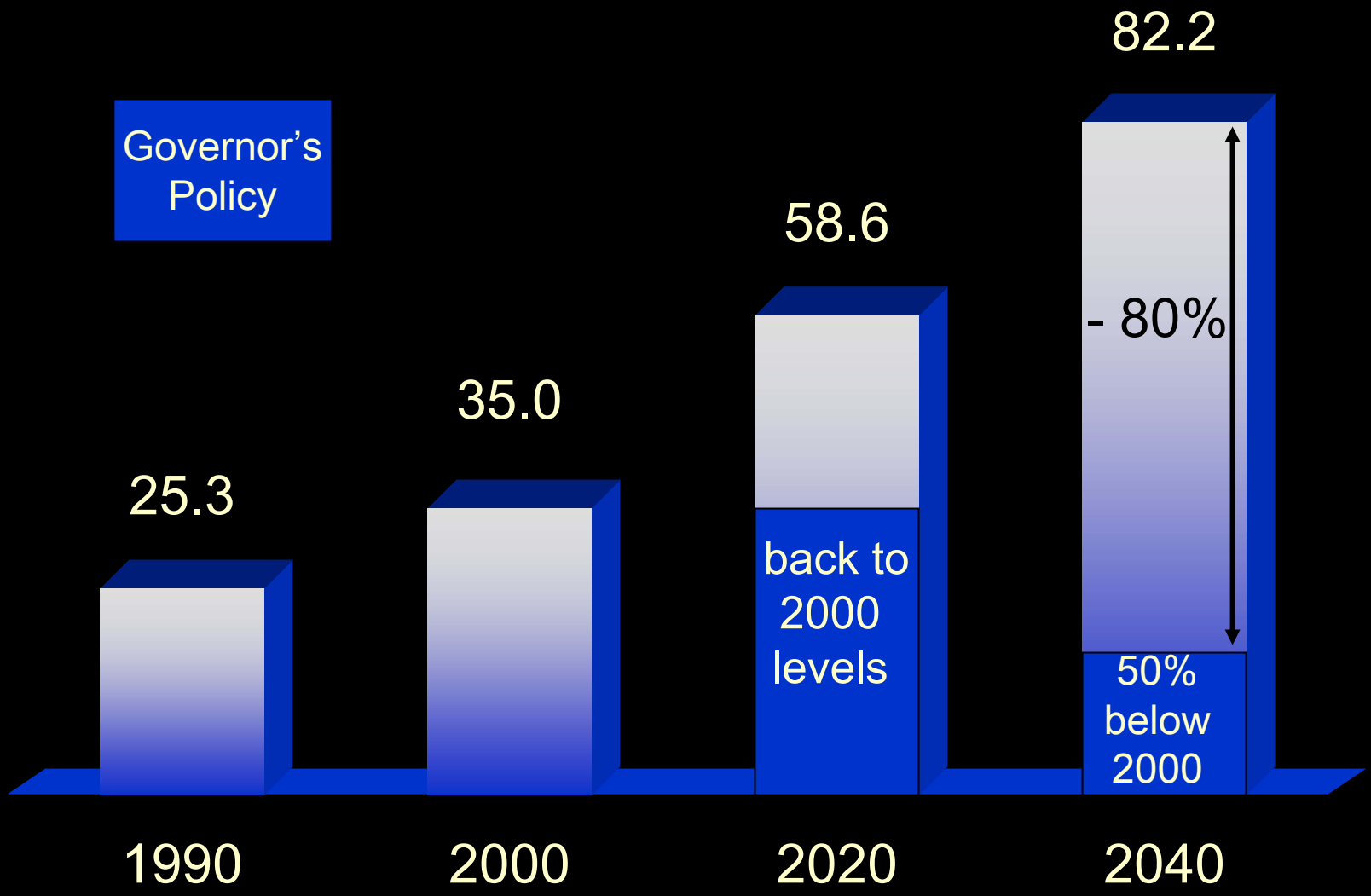
Arizona Gross Greenhouse Gas Emissions

All Sources – Climate Action Plan

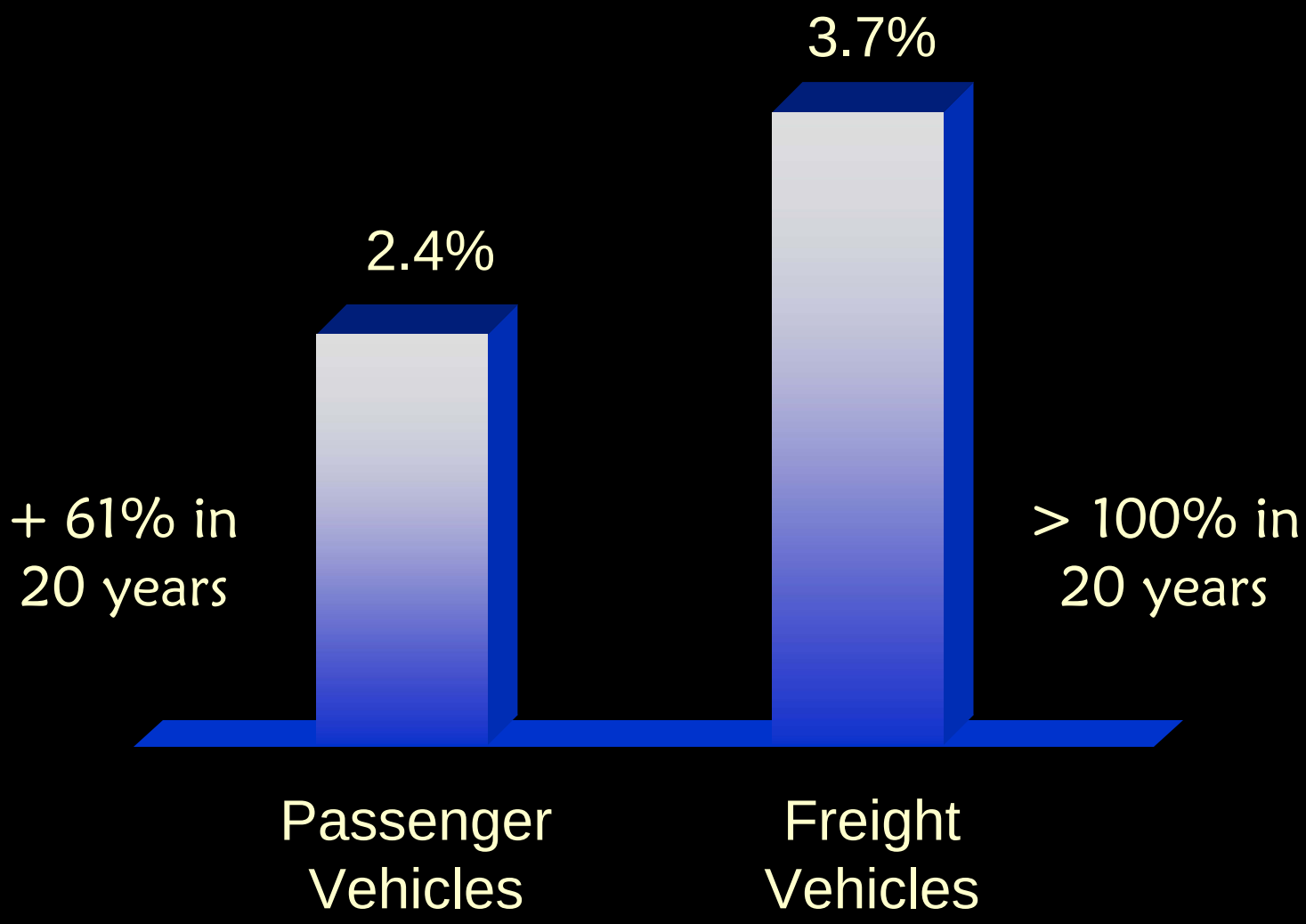


Arizona Gross Greenhouse Gas Emissions

Transportation Sources



Annual Growth Rate to 2020: AZ Vehicle Miles of Travel



Summary: Climate Change

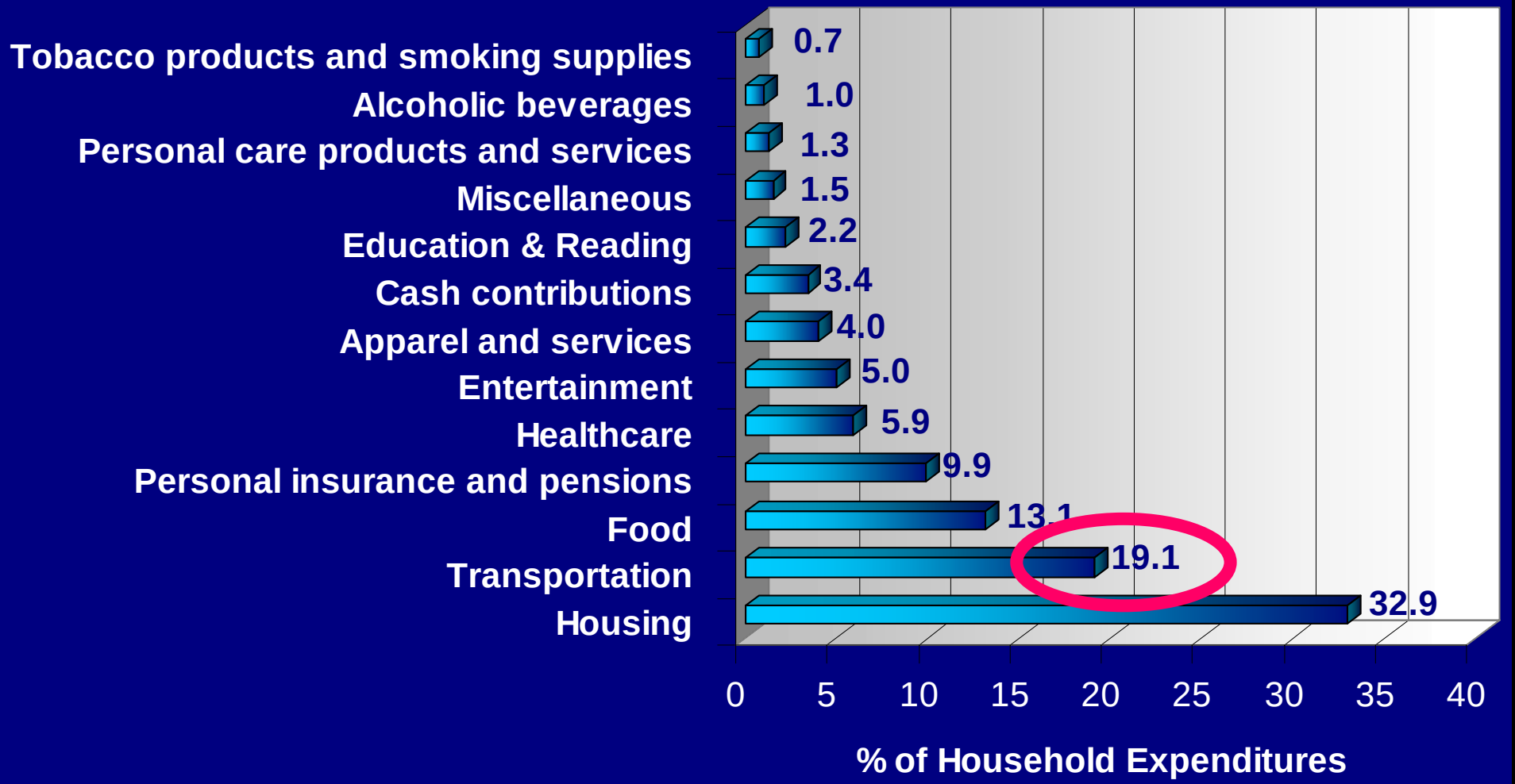
- Arizona must reduce its emissions of greenhouse gases – including those from transportation
- The required reduction cannot be achieved through alternative fuels or new technologies
- We must begin efforts to reduce growth in per capita VMT
- Delay in starting will add to the cost

Family Budgets

Transportation Trajectories

Charlier Associates, Inc.

Household Expenditures



A HEAVY LOAD:

The Combined Housing and Transportation Burdens of Working Families

Center for Housing Policy

October 2006

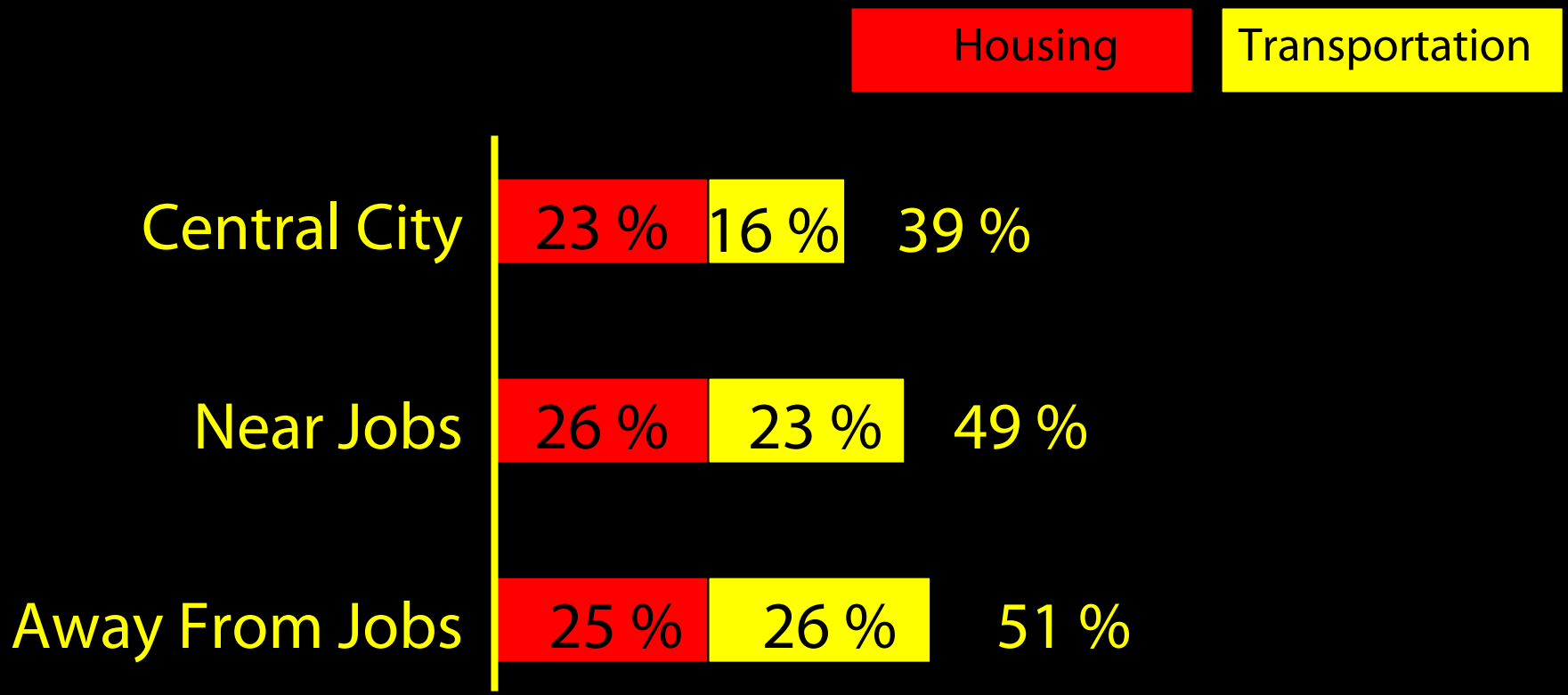
TYPICAL HOUSEHOLD BUDGET IN 28 METROPOLITAN AREAS

(Expenses as a share of income)

	All Households	Working Families Incomes $20,000 – $50,000
Housing	27.4%	27.7%
Transportation	20.2%	29.6%
Food	10.6%	15.1%
Healthcare	4.7%	7.7%

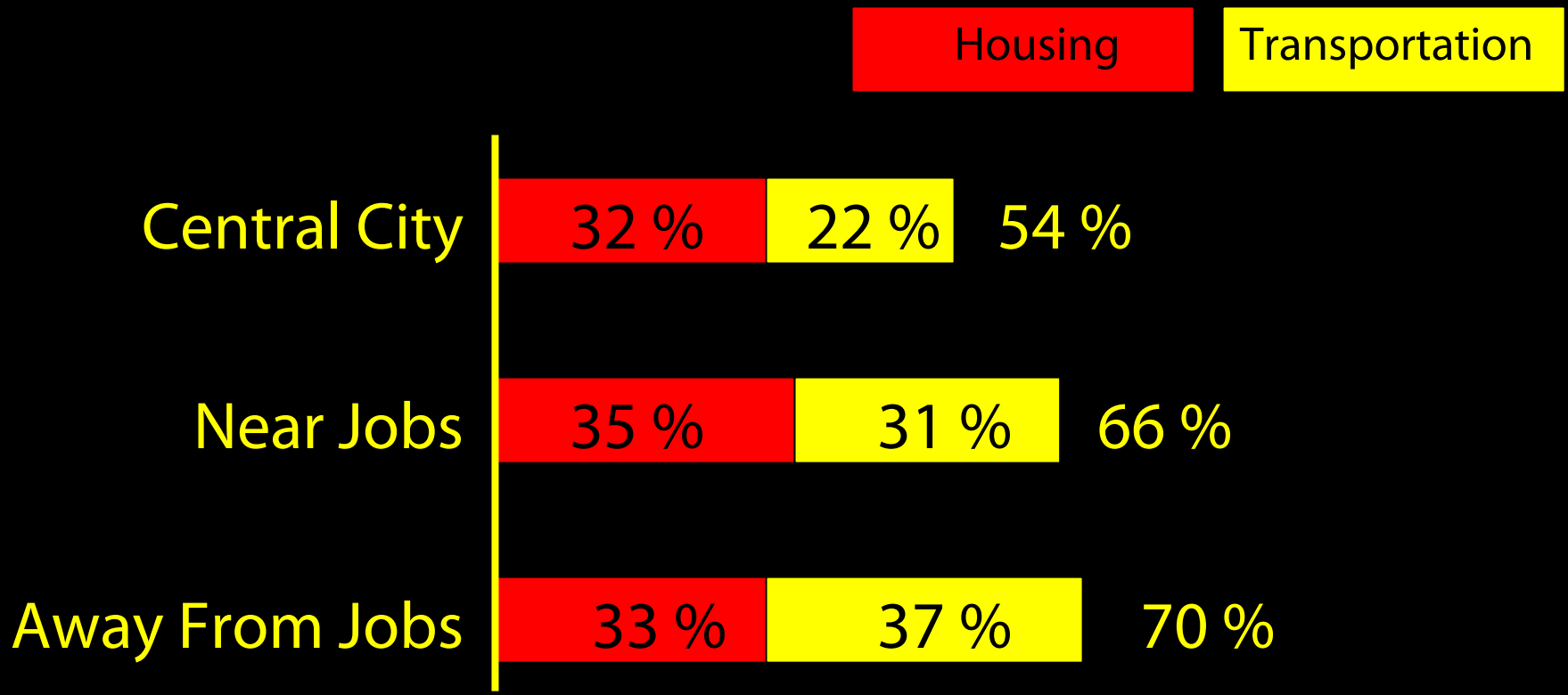
Share of Family Income Spent On Housing & Transportation

Family Income = $35,000 - $50,000

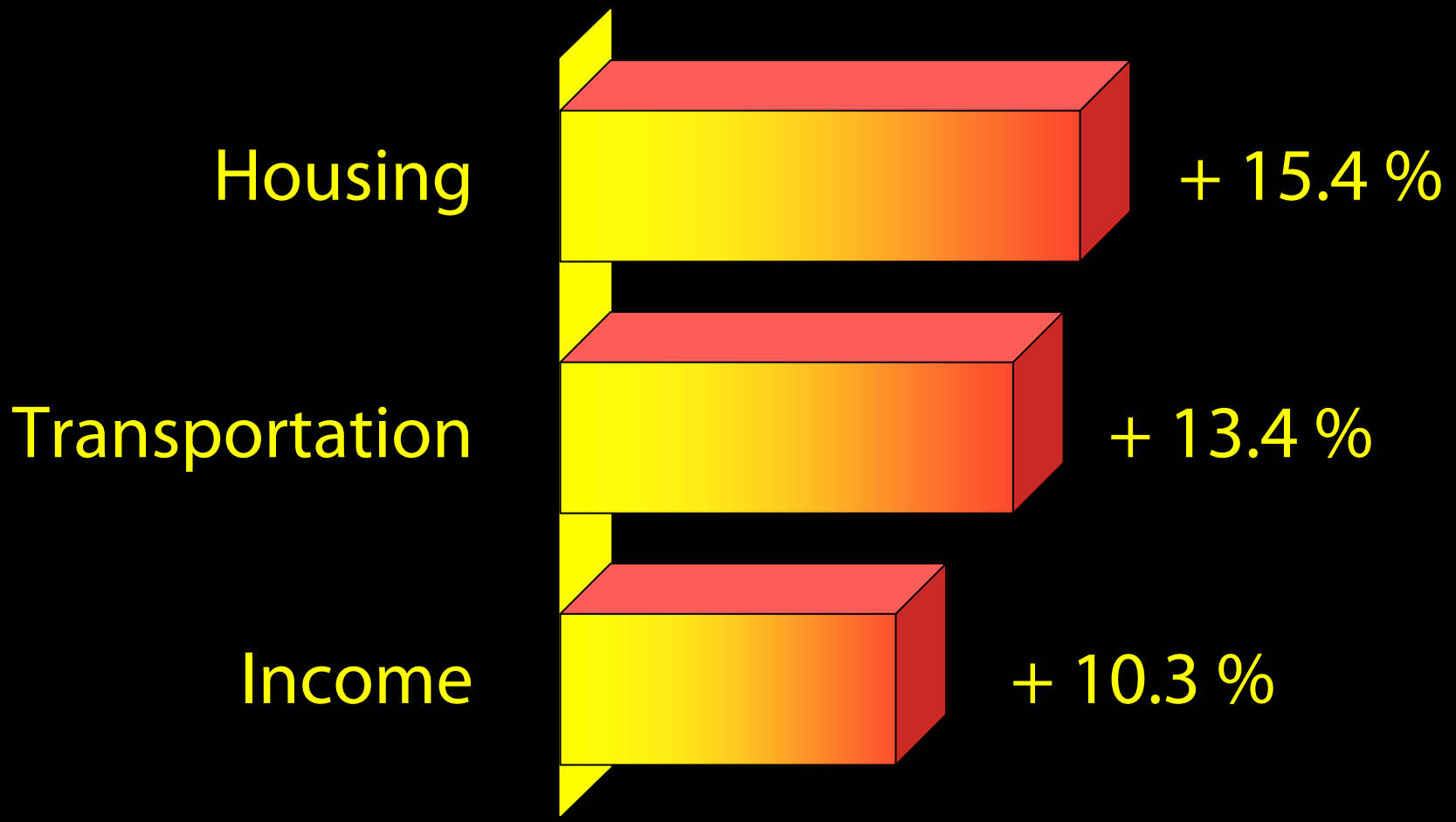


Share of Family Income Spent On Housing & Transportation

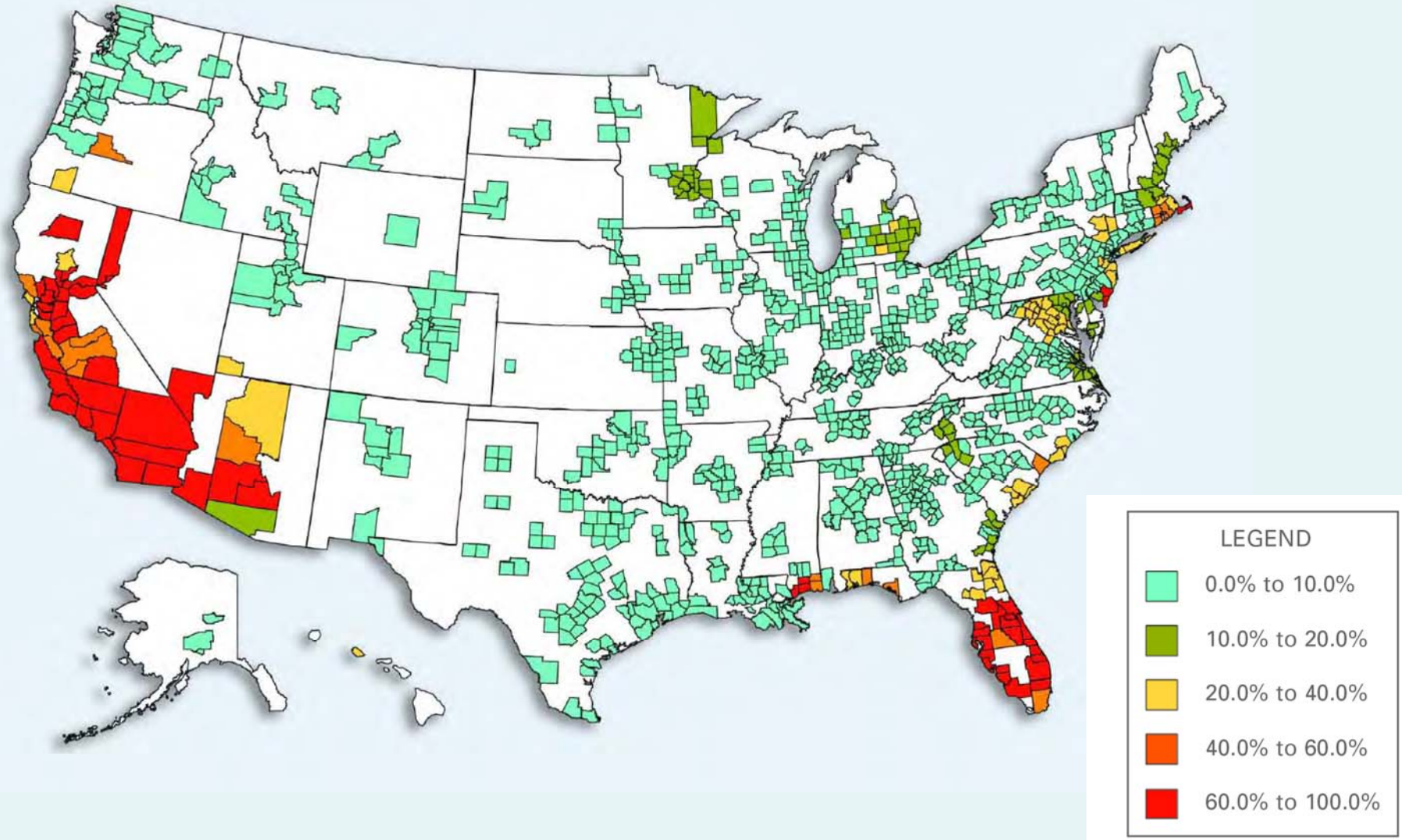
Family Income = $20,000 - $35,000



Family Costs Rising Faster Than Incomes (2000 – 2005)



Geographic Distribution of
HOUSE PRICE RISK



Personal Health

Transportation Trajectories

Charlier Associates, Inc.

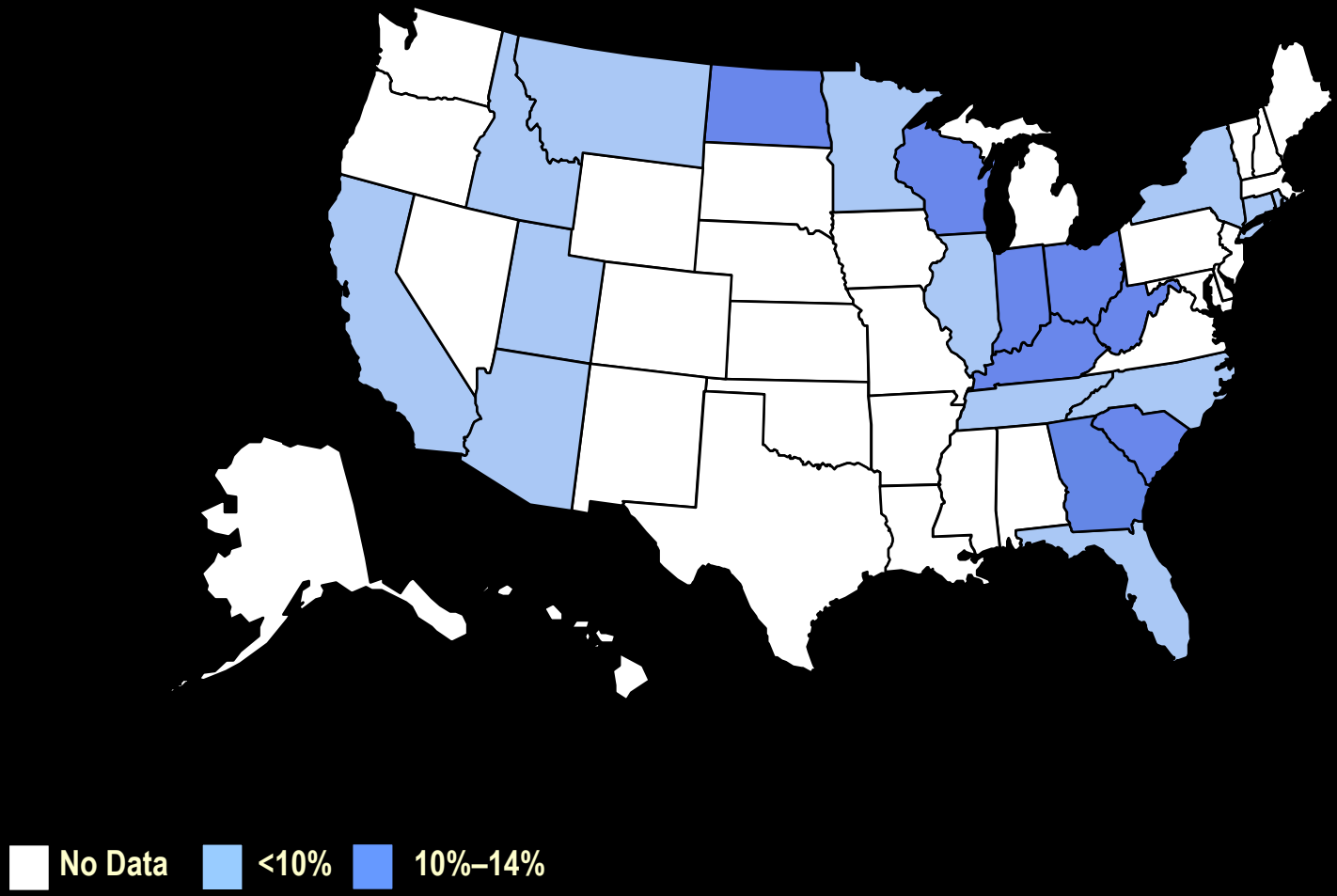
Human History


SERVICE

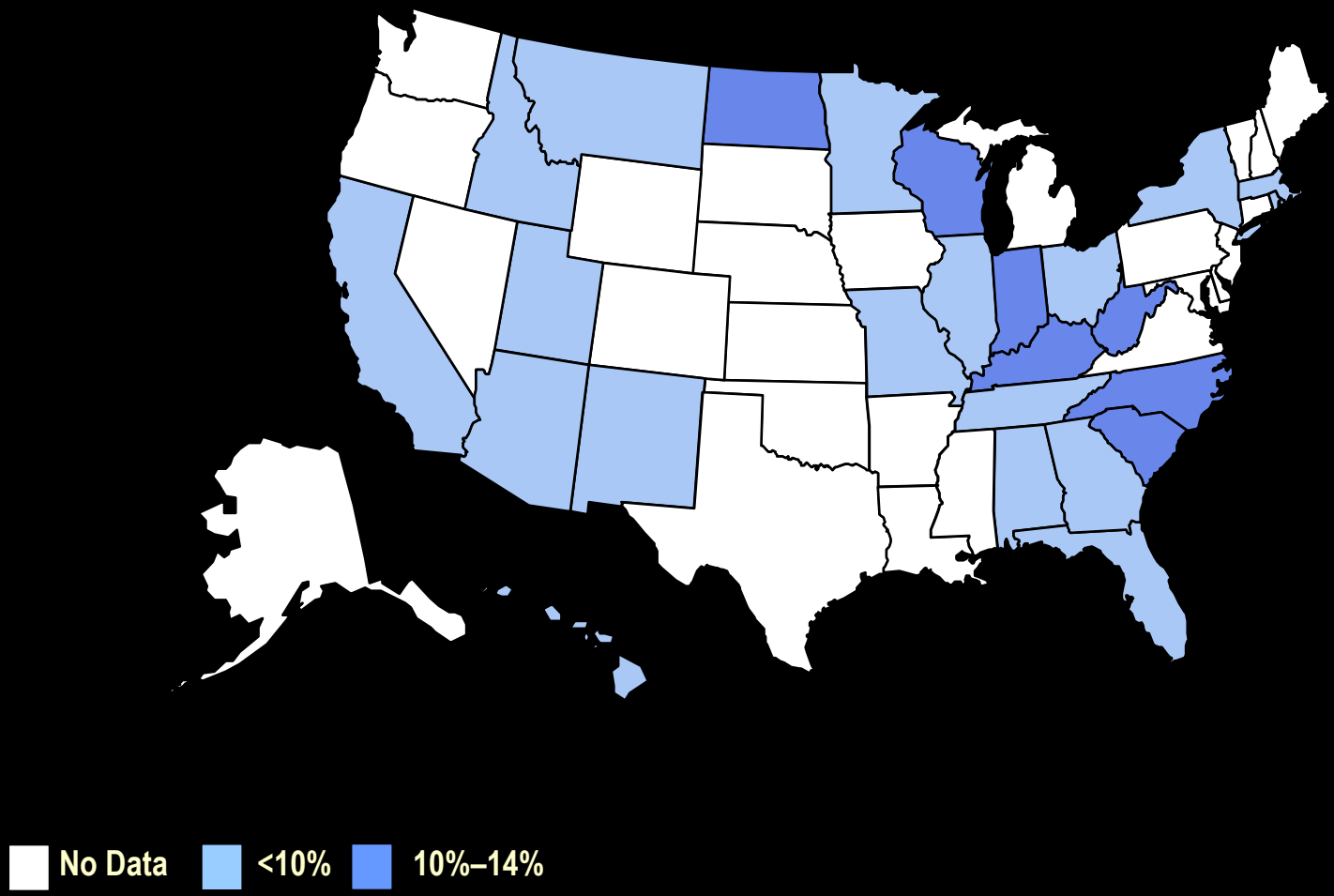
We cannot escape our DNA…

…no matter how hard we try

1985 Obesity Trends* Among U.S. Adults



1986



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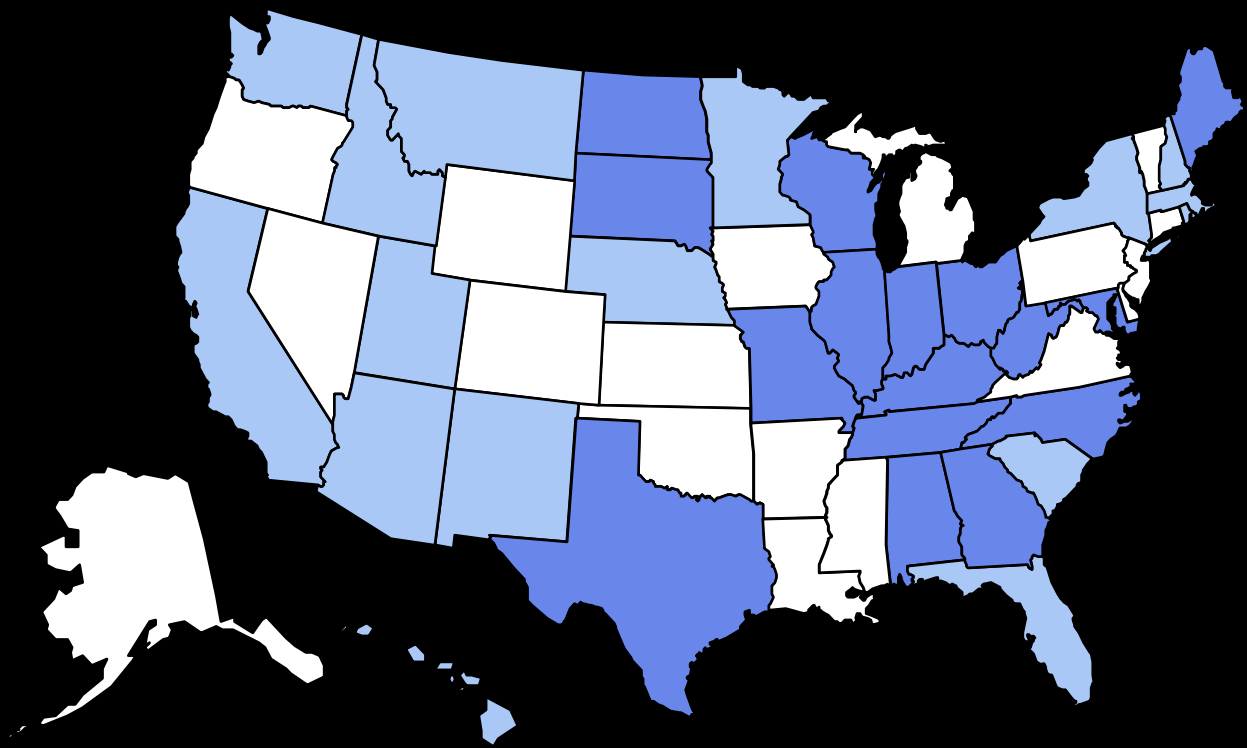

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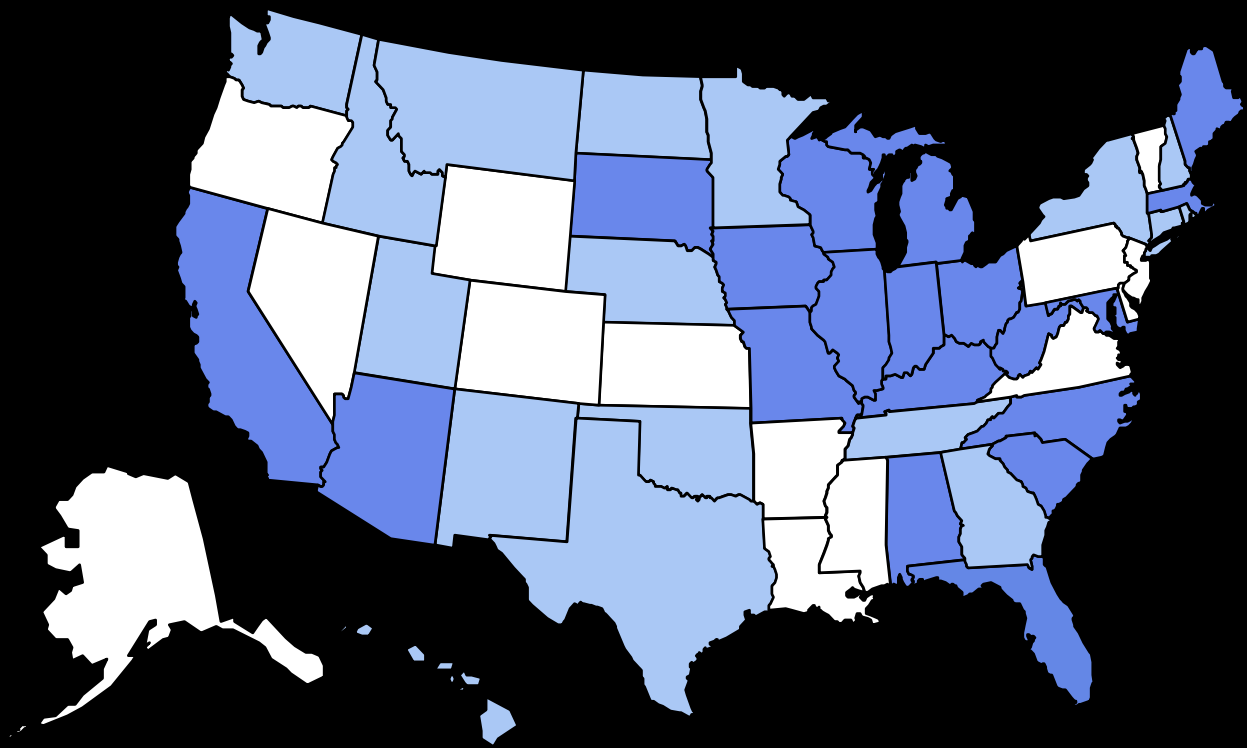

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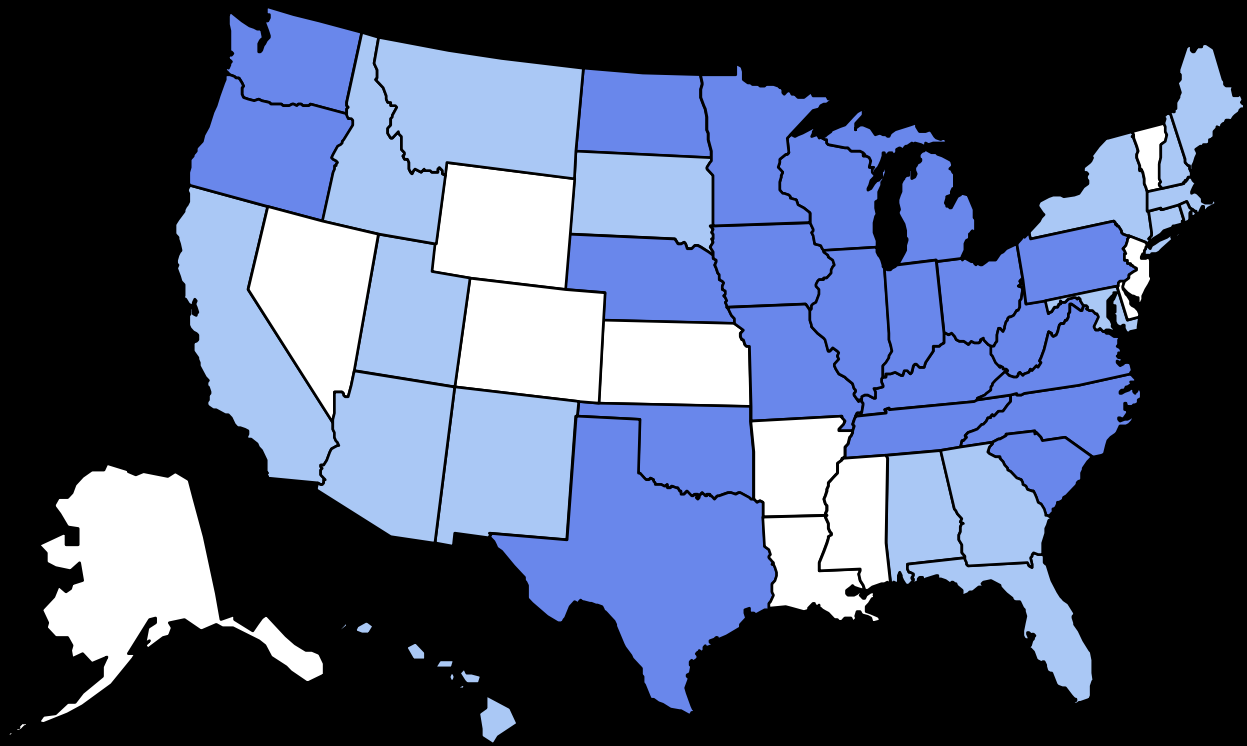

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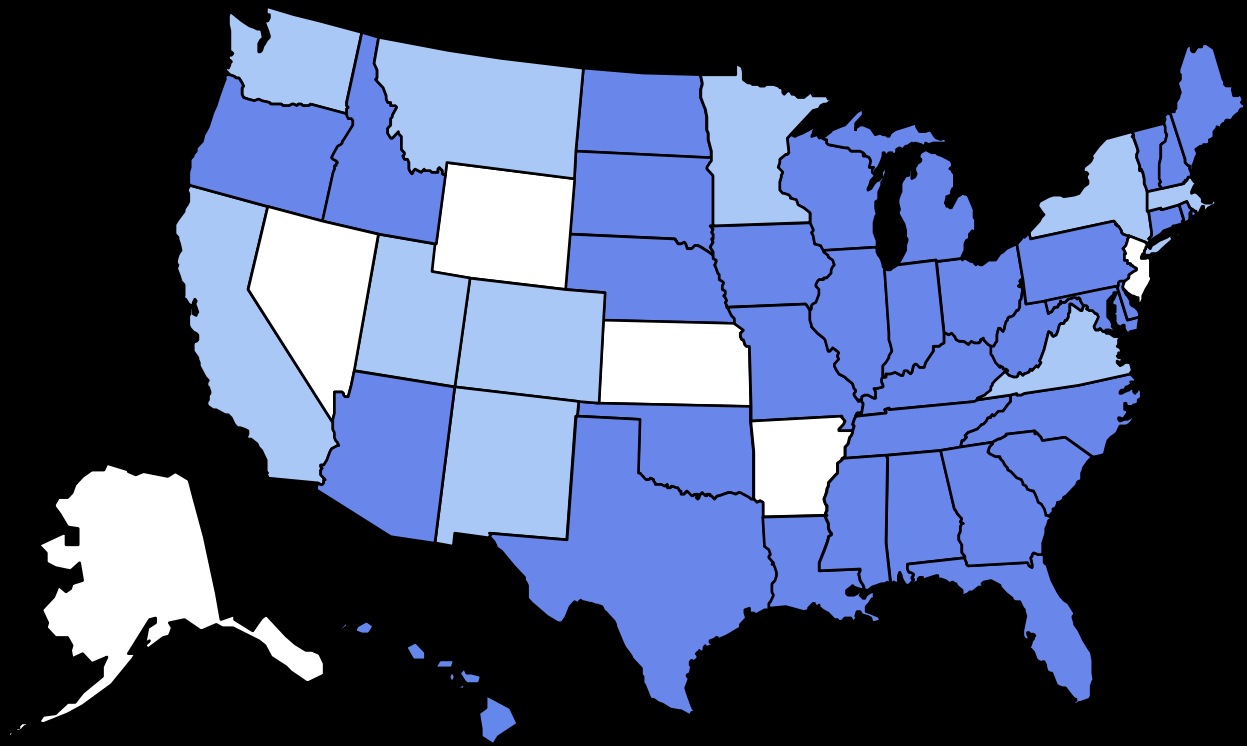

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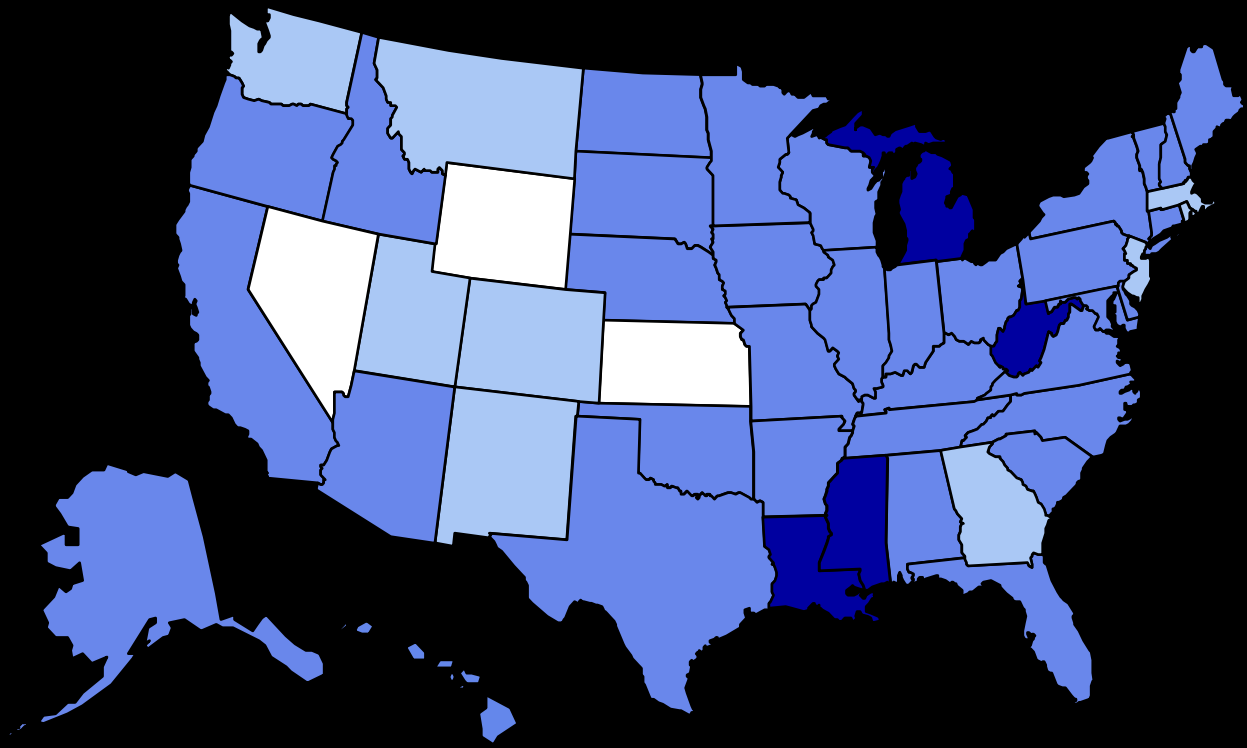

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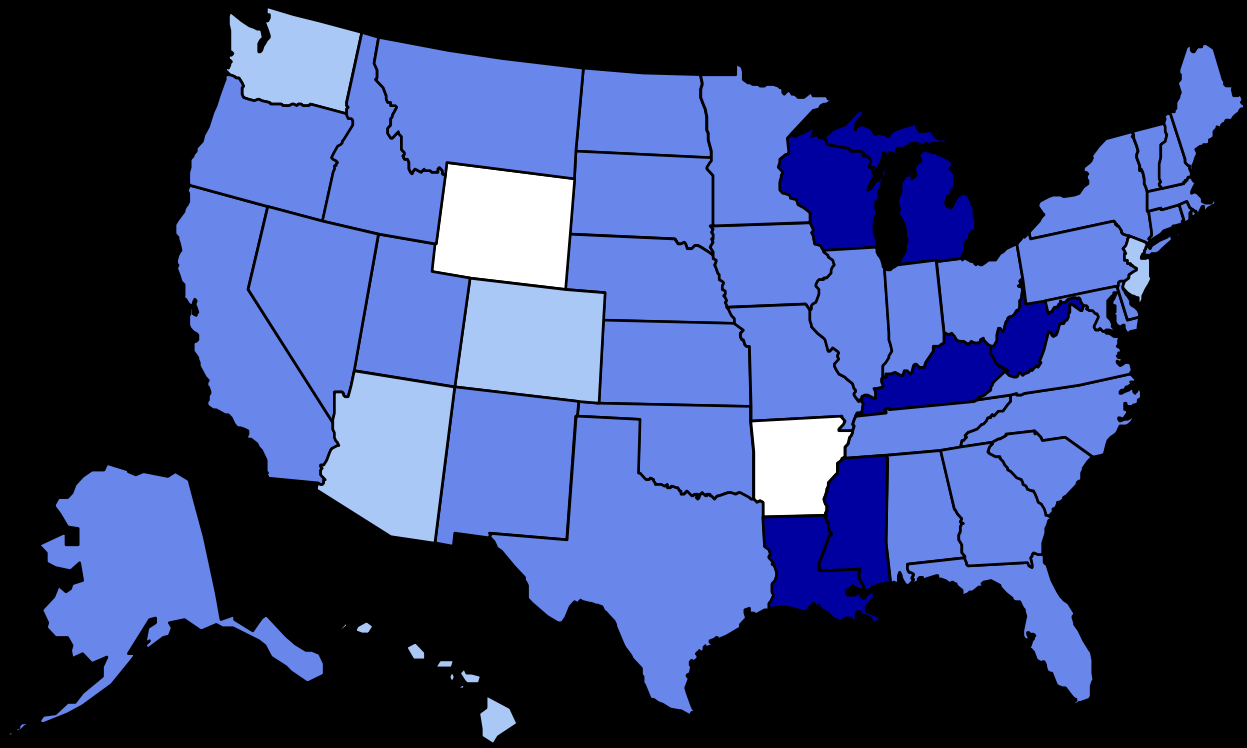

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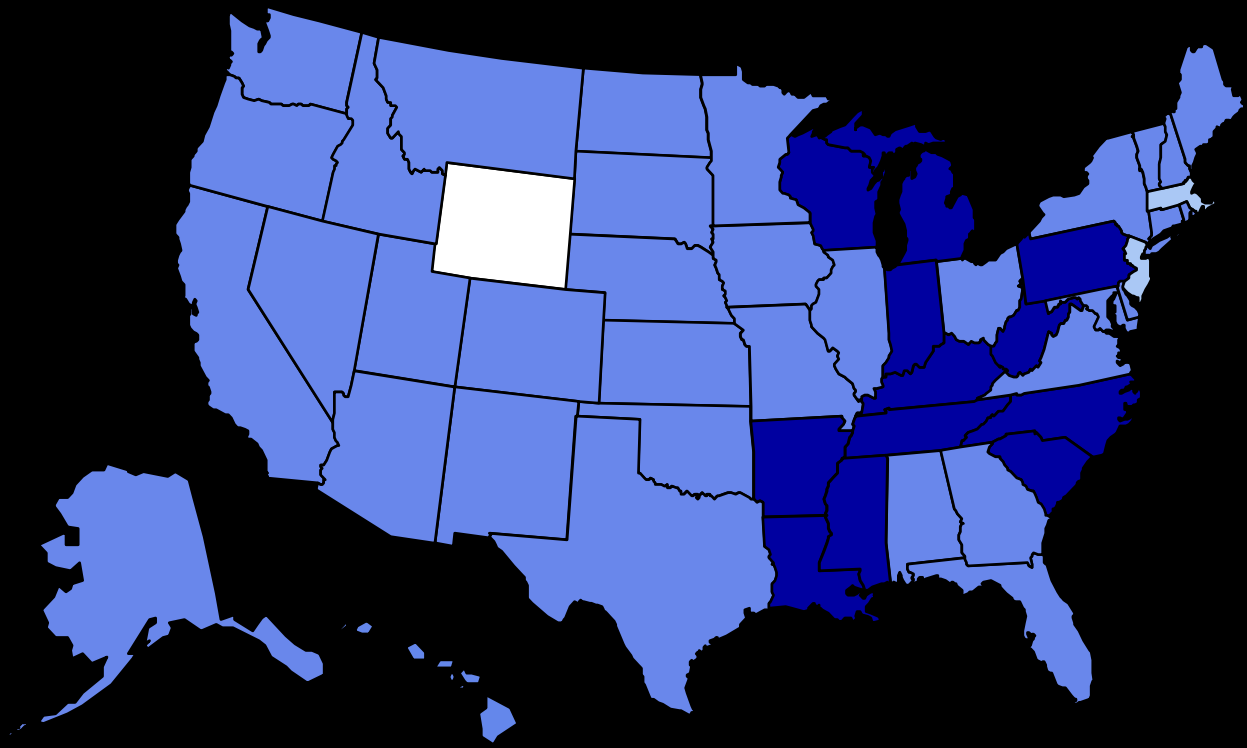

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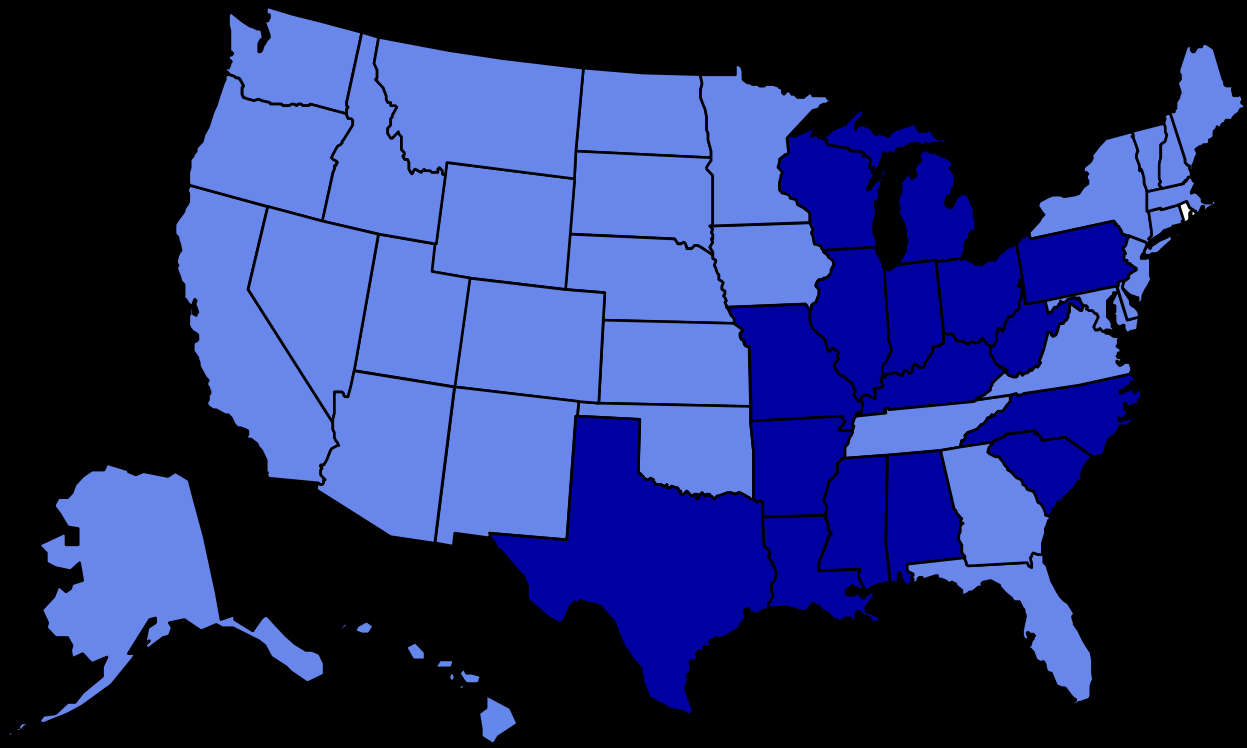

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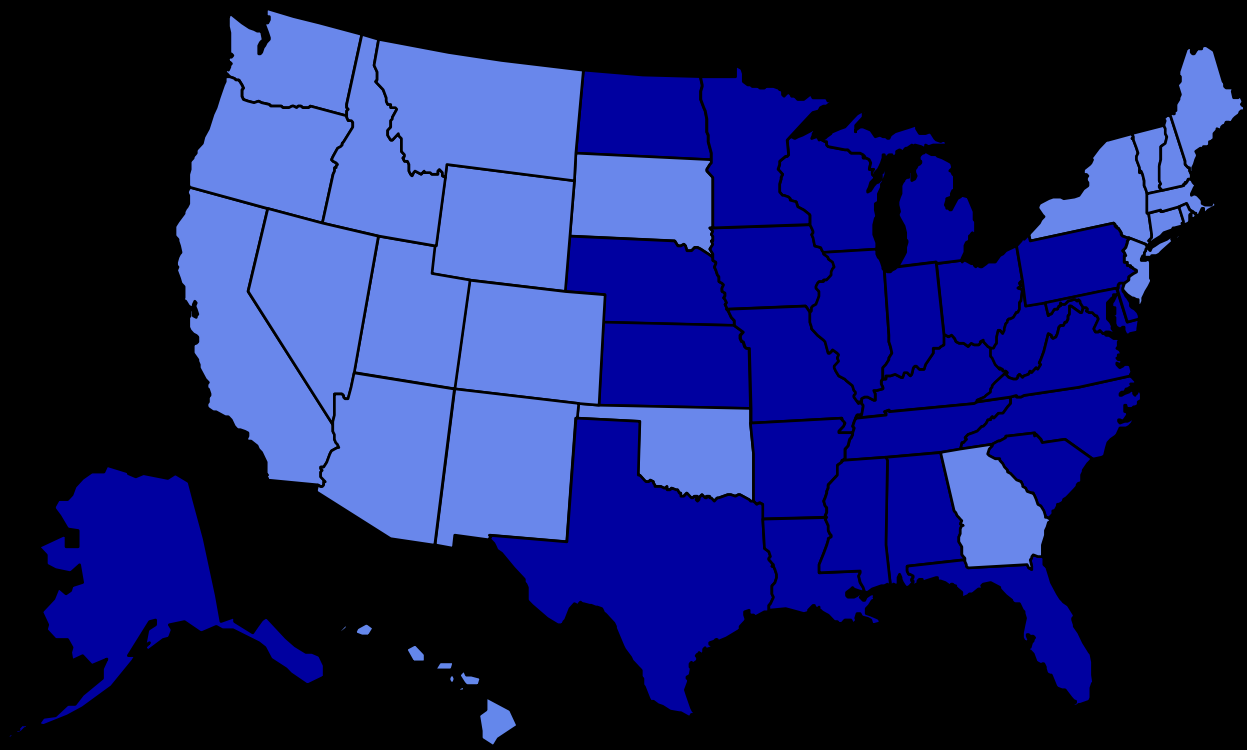

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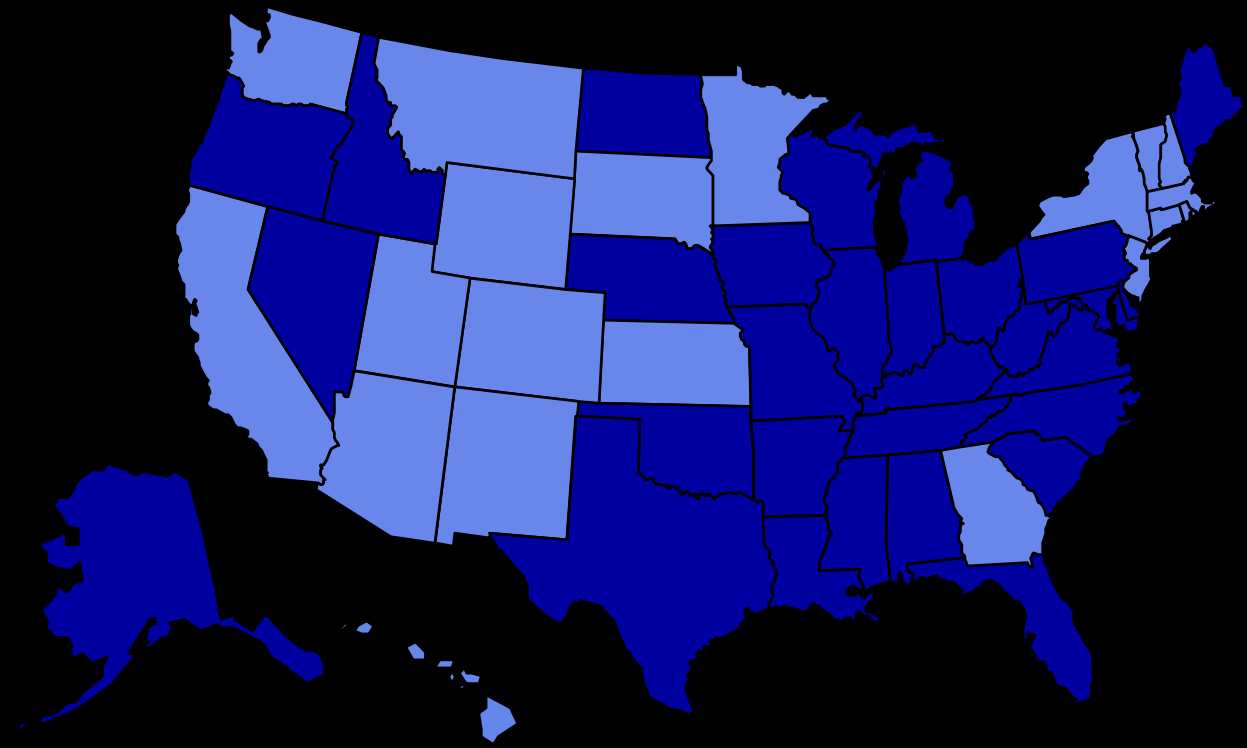

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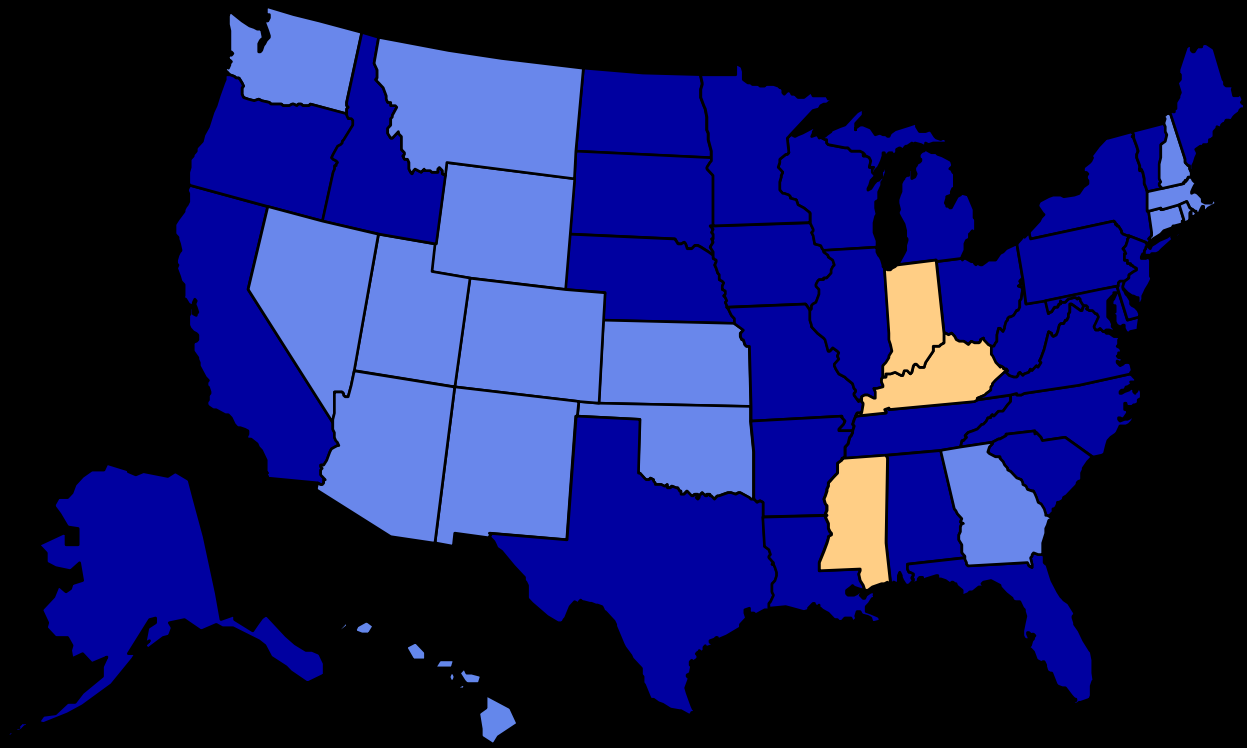

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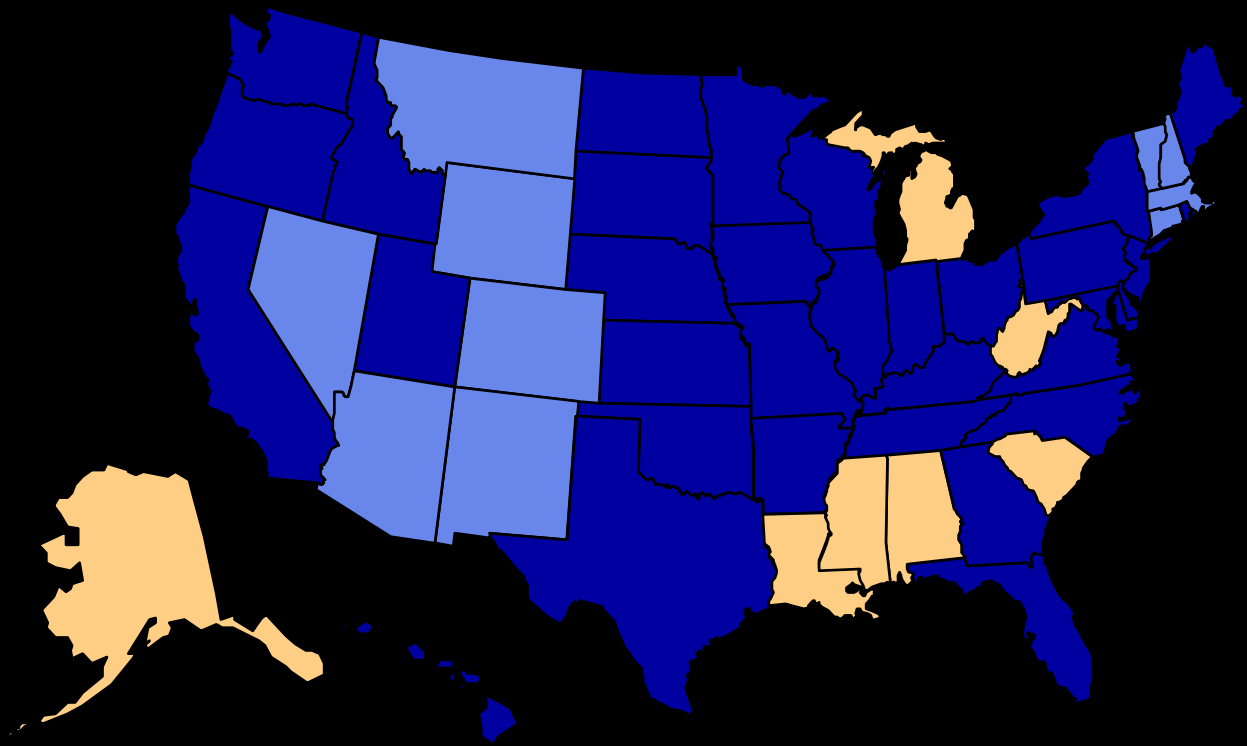

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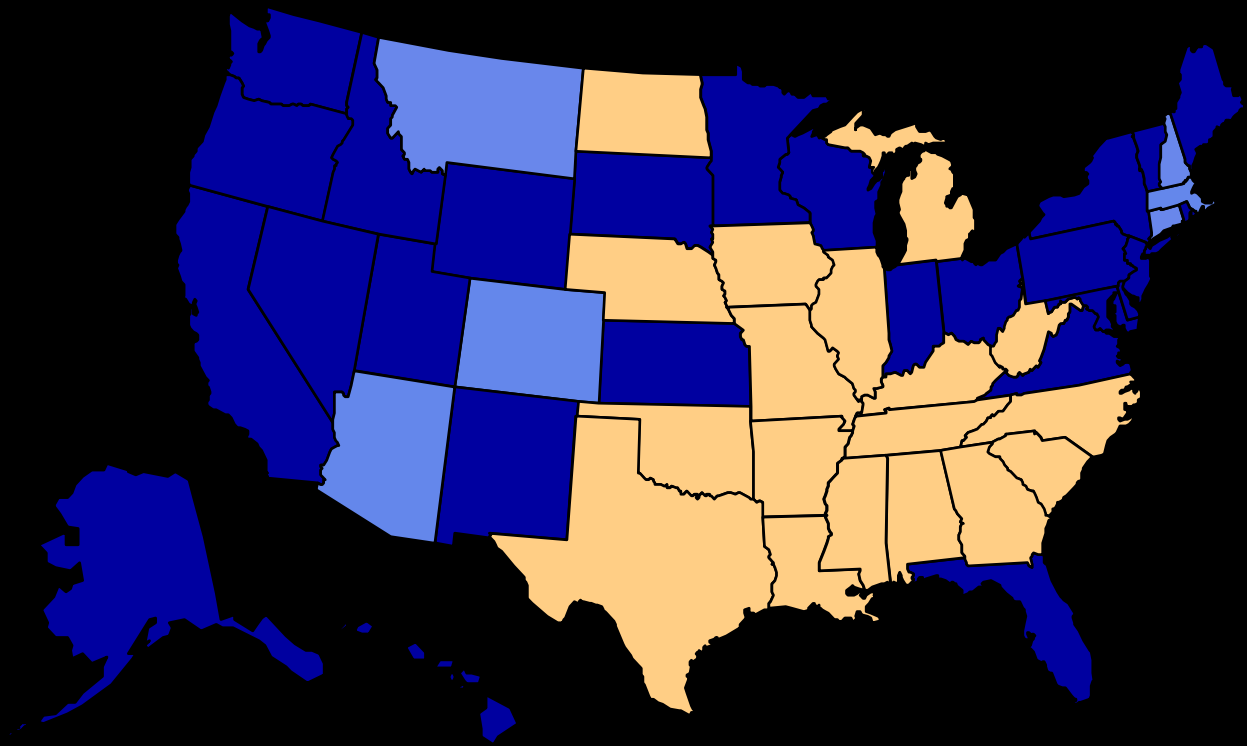
1999



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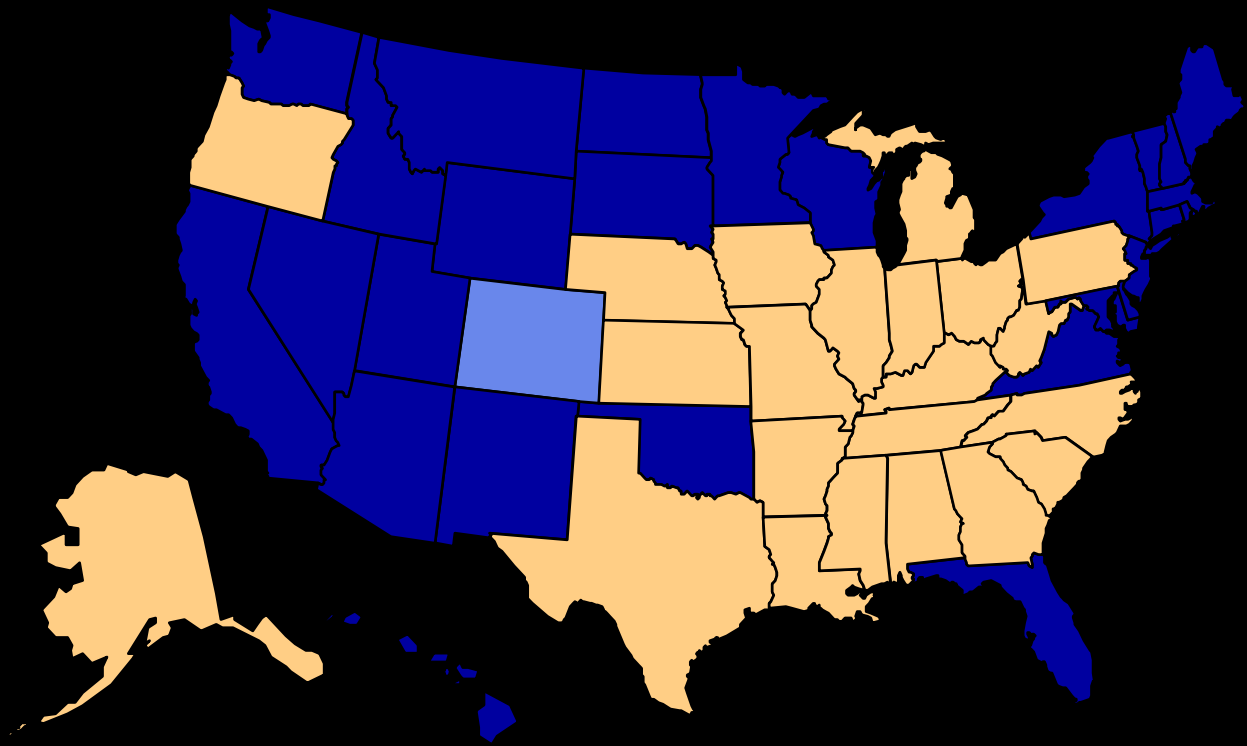
2000



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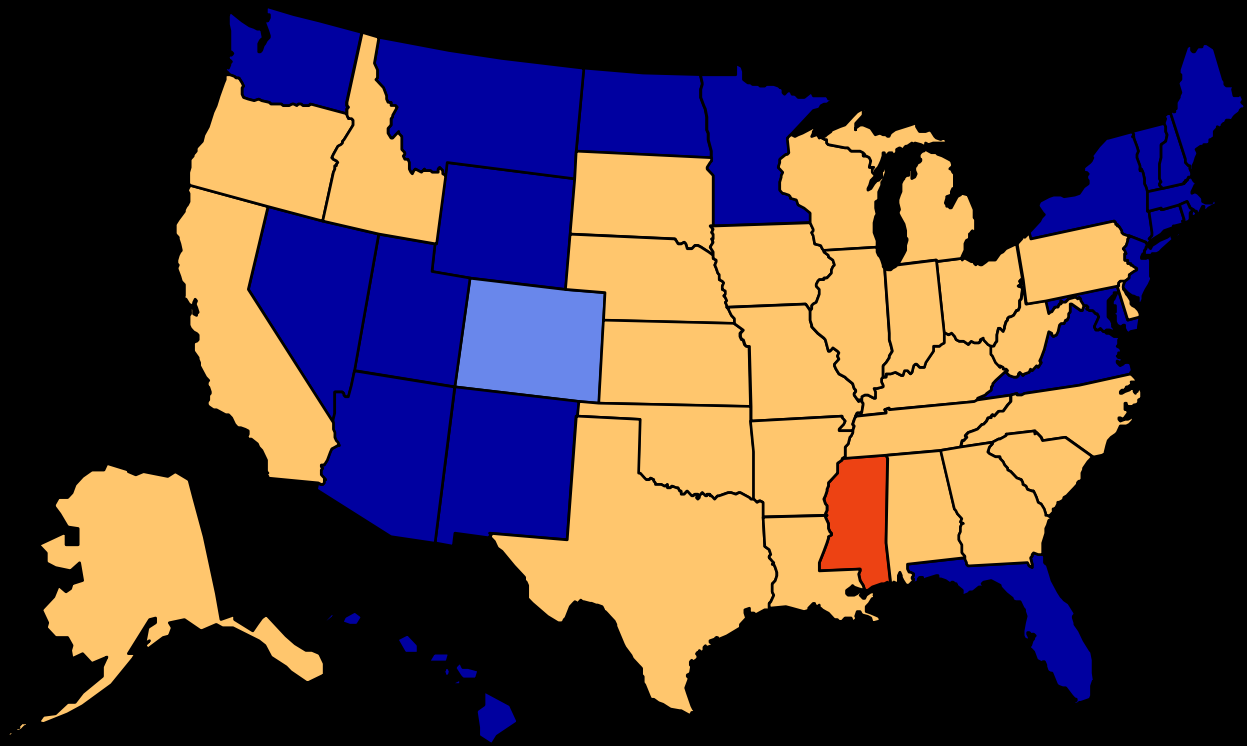

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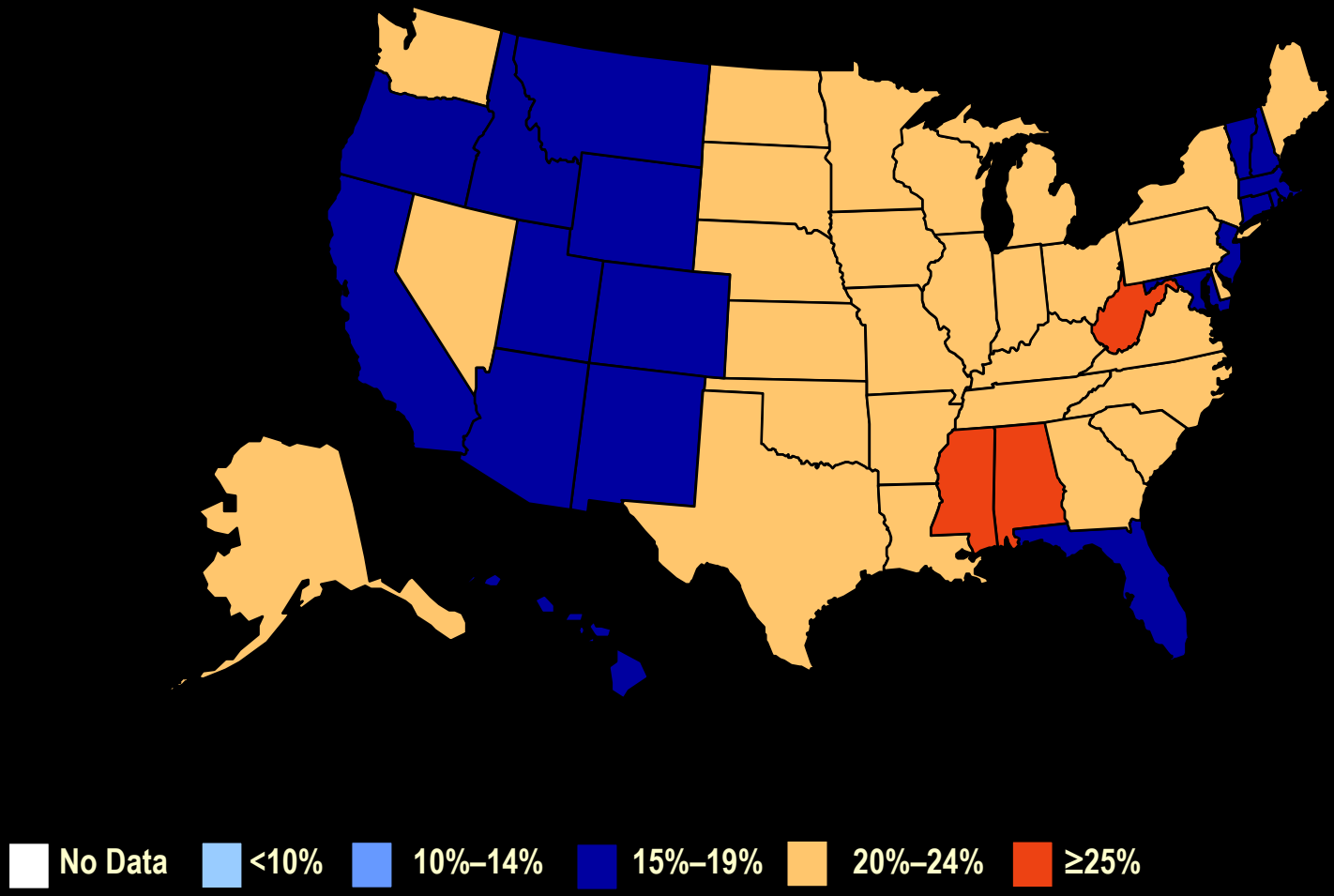
2002



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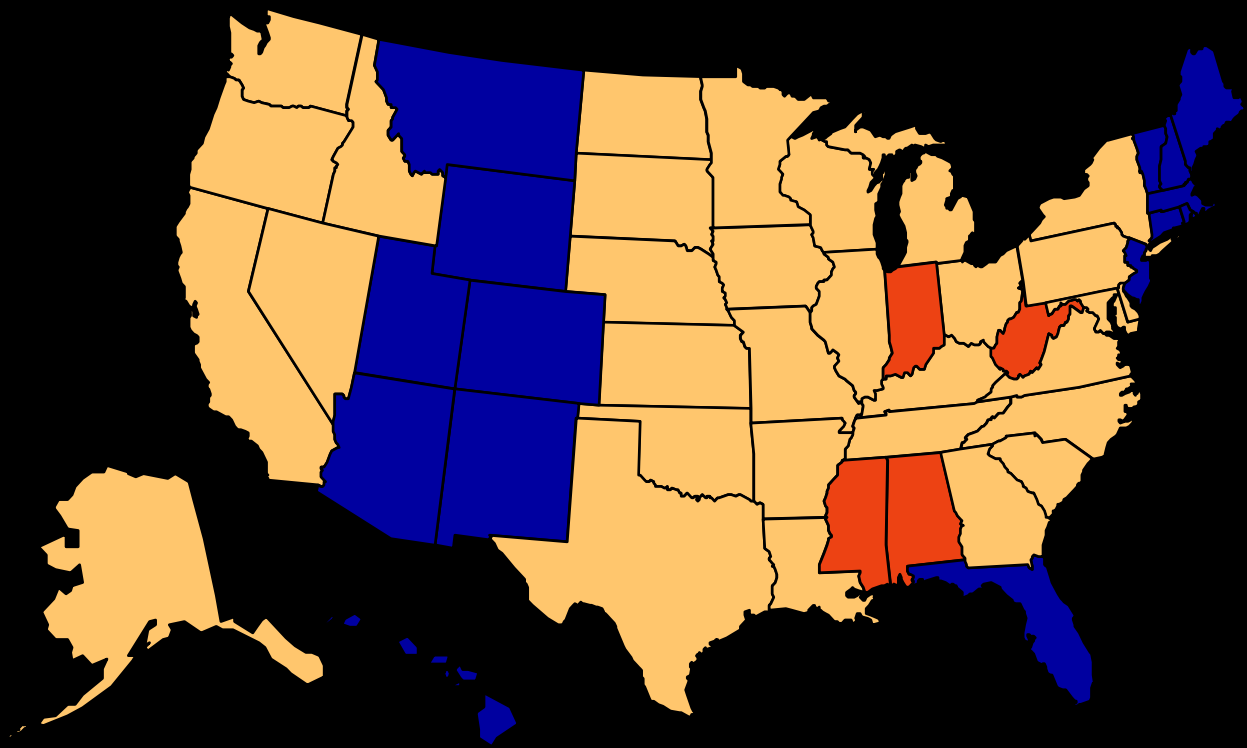

No Data | <10% | 10%–14% | 15%–19% | 20%–24% | ≥25%

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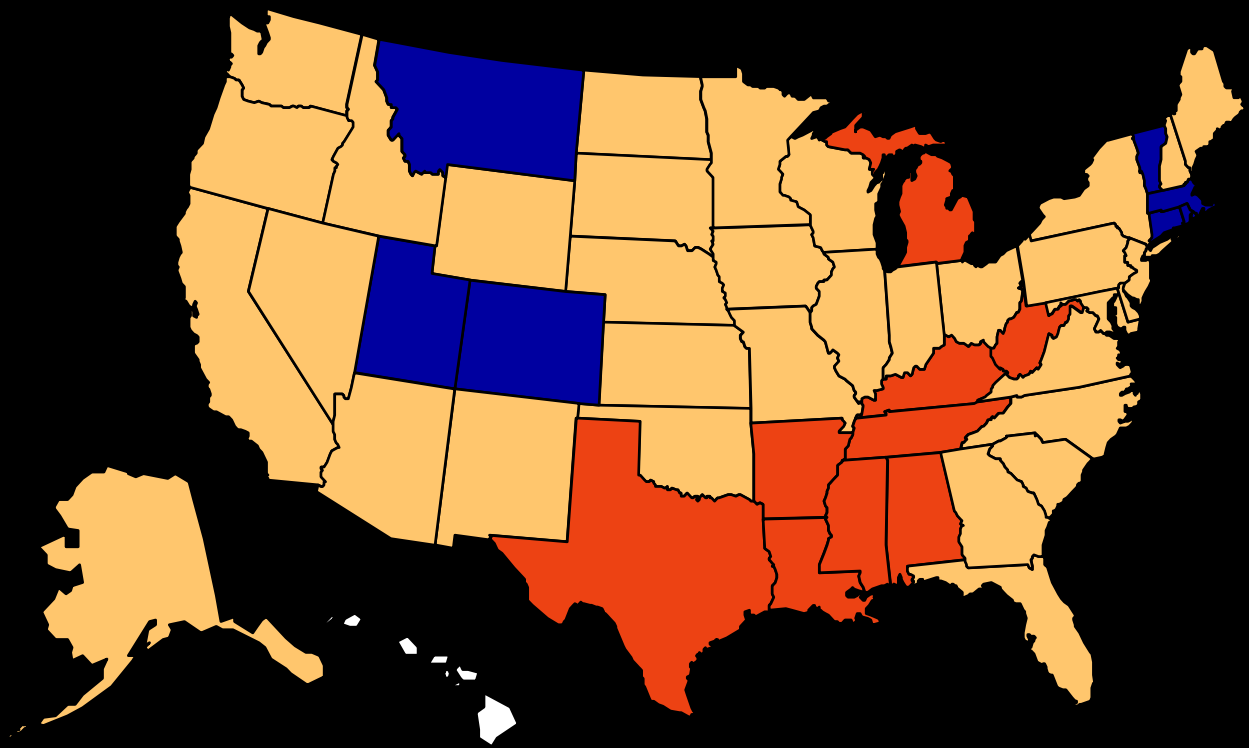

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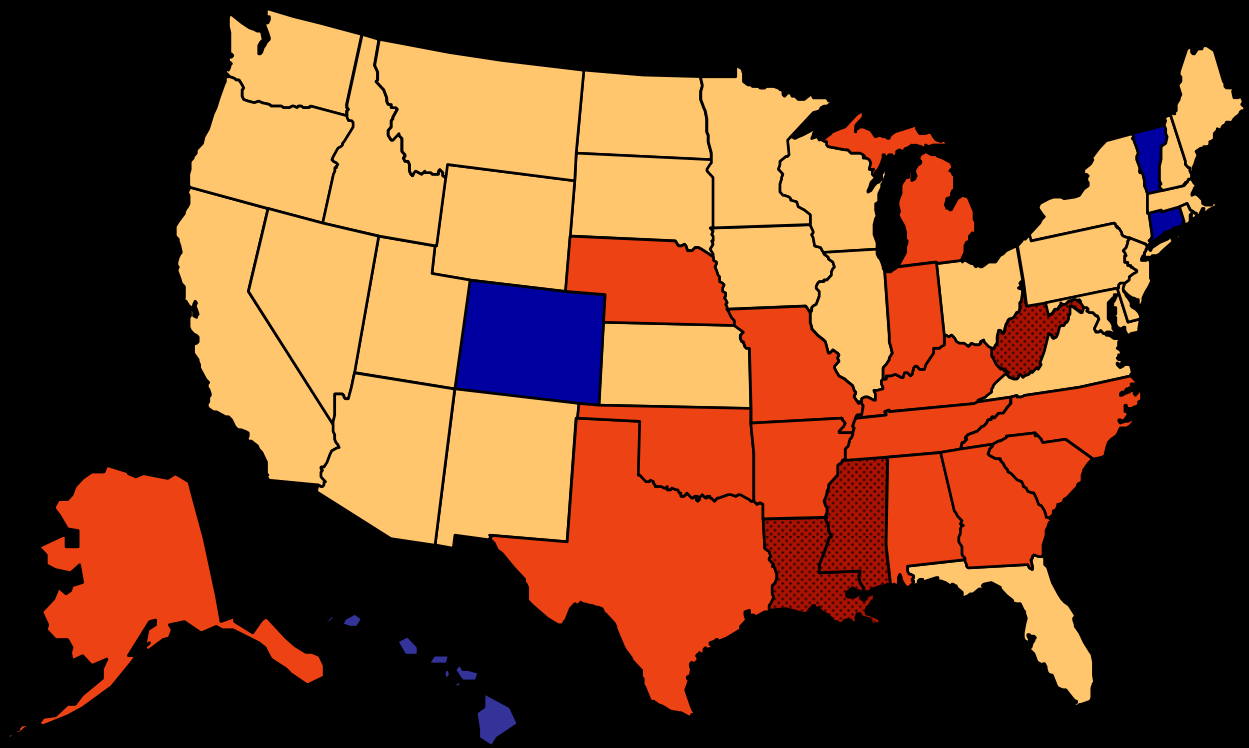
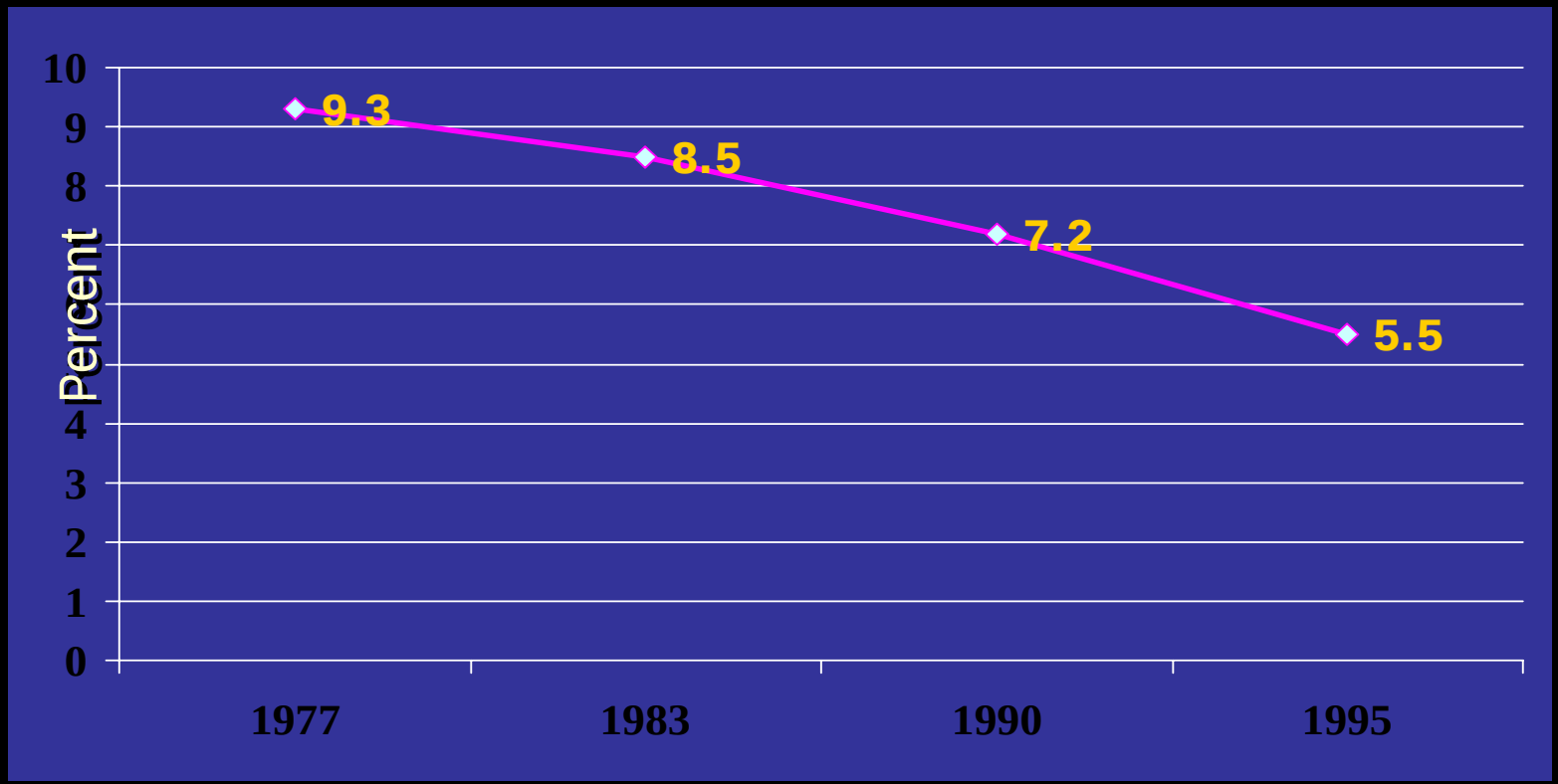
2005



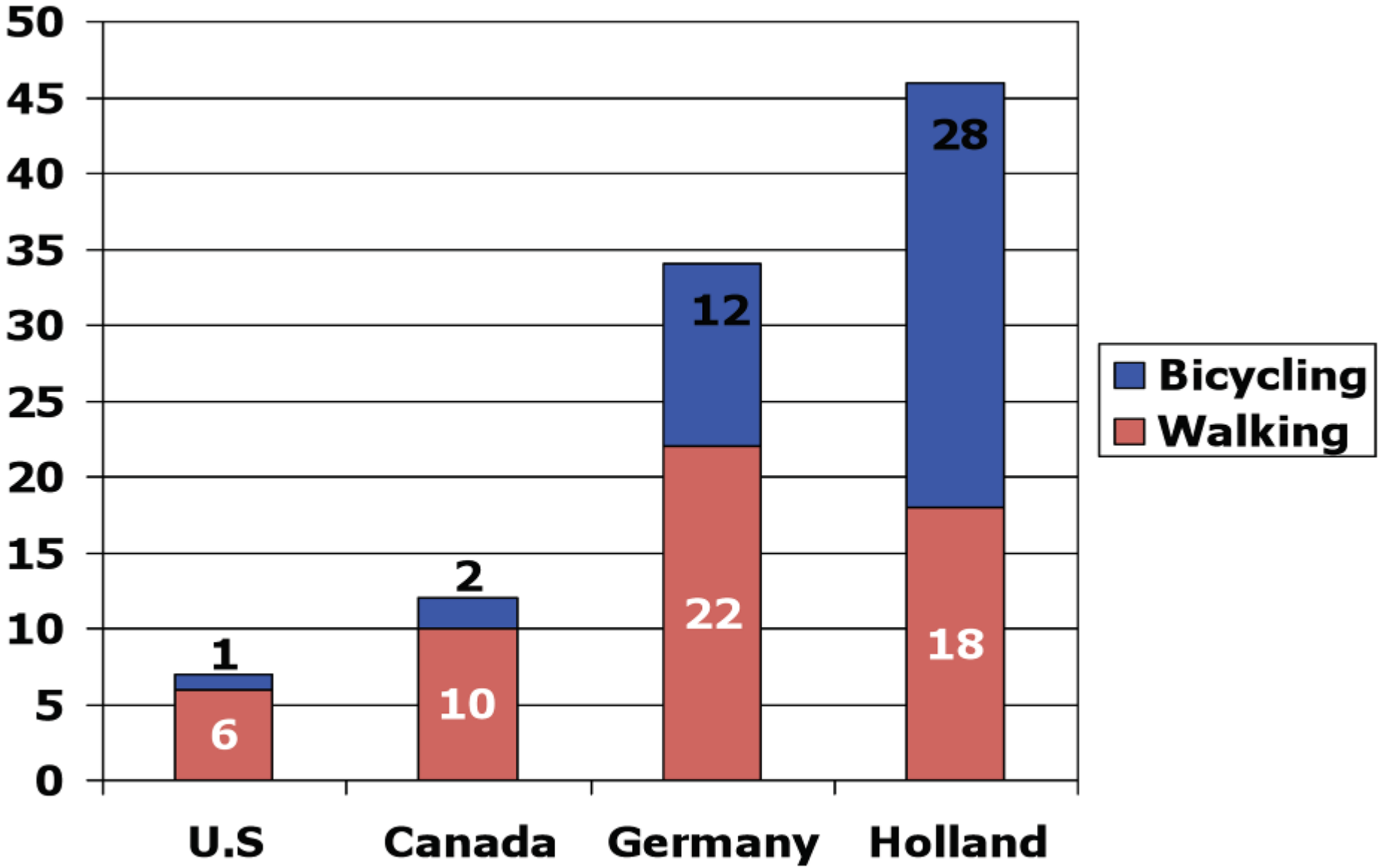
No Data | <10% | 10%–14% | 15%–19% | 20%–24% | 25%–29% | ≥30%

U.S. Walk Trips 1977-1995



Source: Nationwide Personal Transportation Survey, 1995

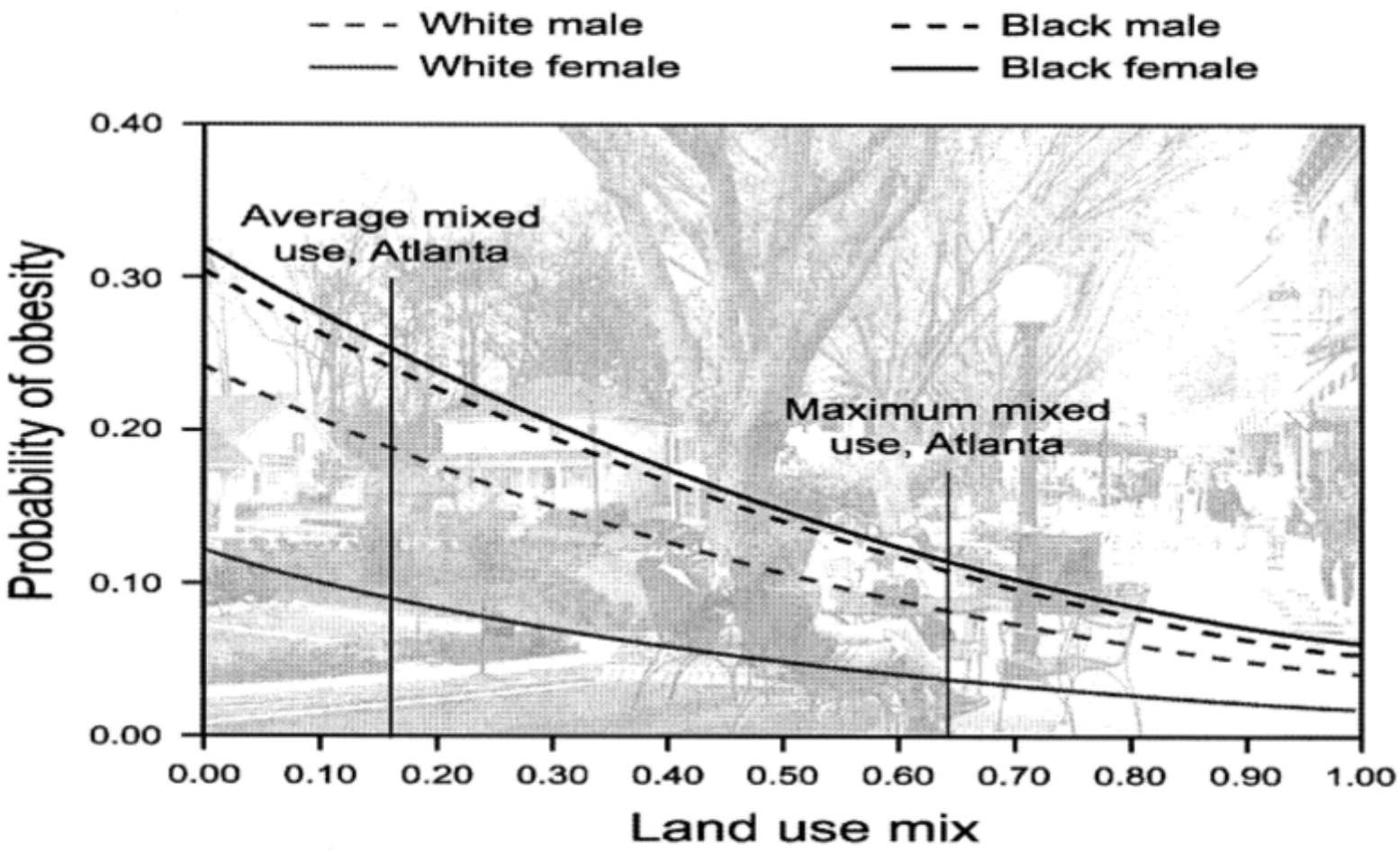
% of Trips in Urban Areas – 1995



Pucher J and Dijkstra L. Promoting Safe Walking and Cycling to Improve Public Health: Lessons From The Netherlands and Germany. AJPH, September 2003;93(9):1509-16.


Auto Zone
Discount Auto Parts

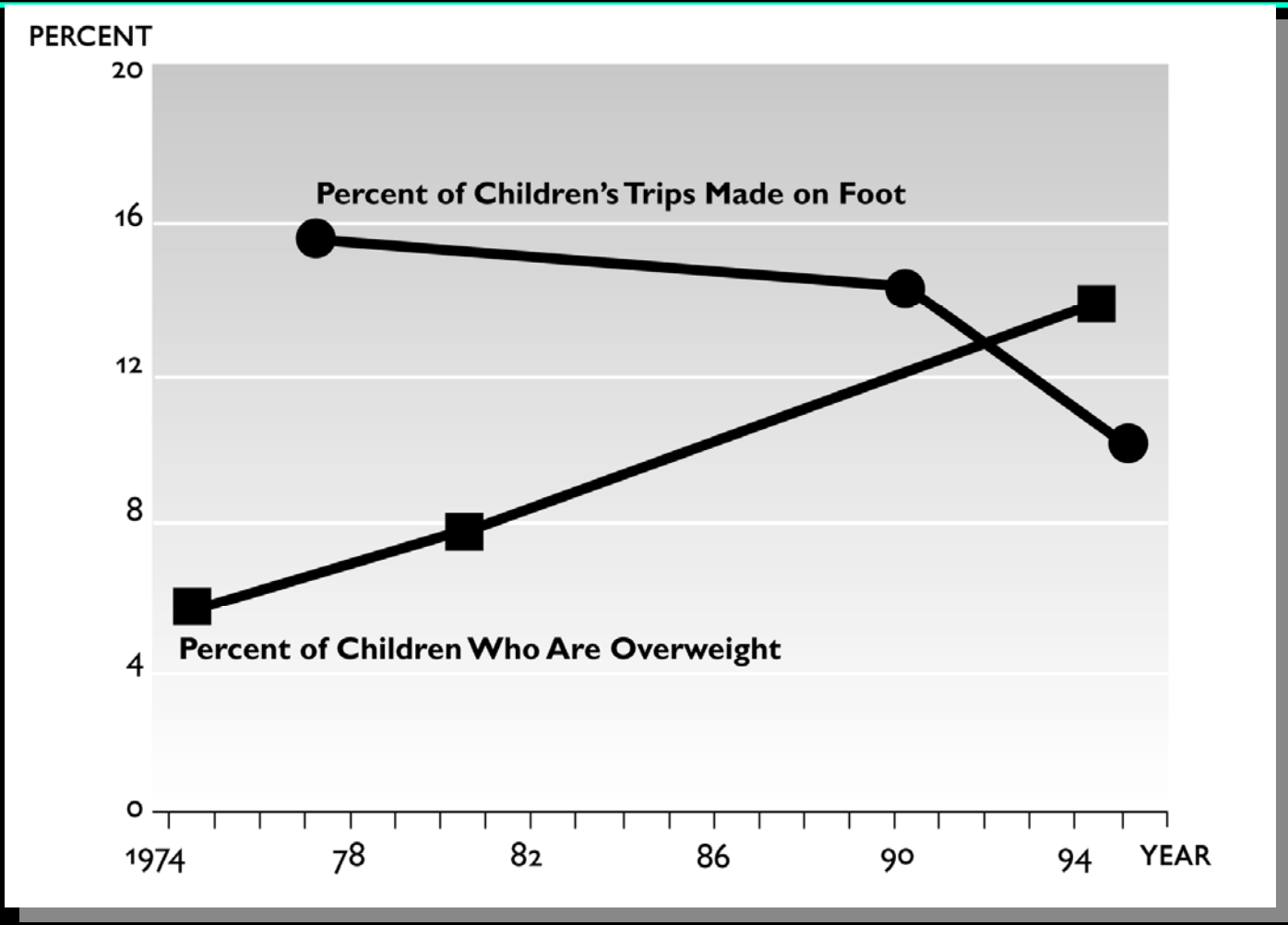
Higher density and connectivity: lower obesity– Atlanta study 2004



Obesity Relationships with Community Design, Physical Activity, and Time Spent in Cars

Lawrence D. Frank, PhD, Martin A. Andresen, MA, Thomas L. Schmid, PhD

Children Are Walking Less and Becoming Increasingly Overweight

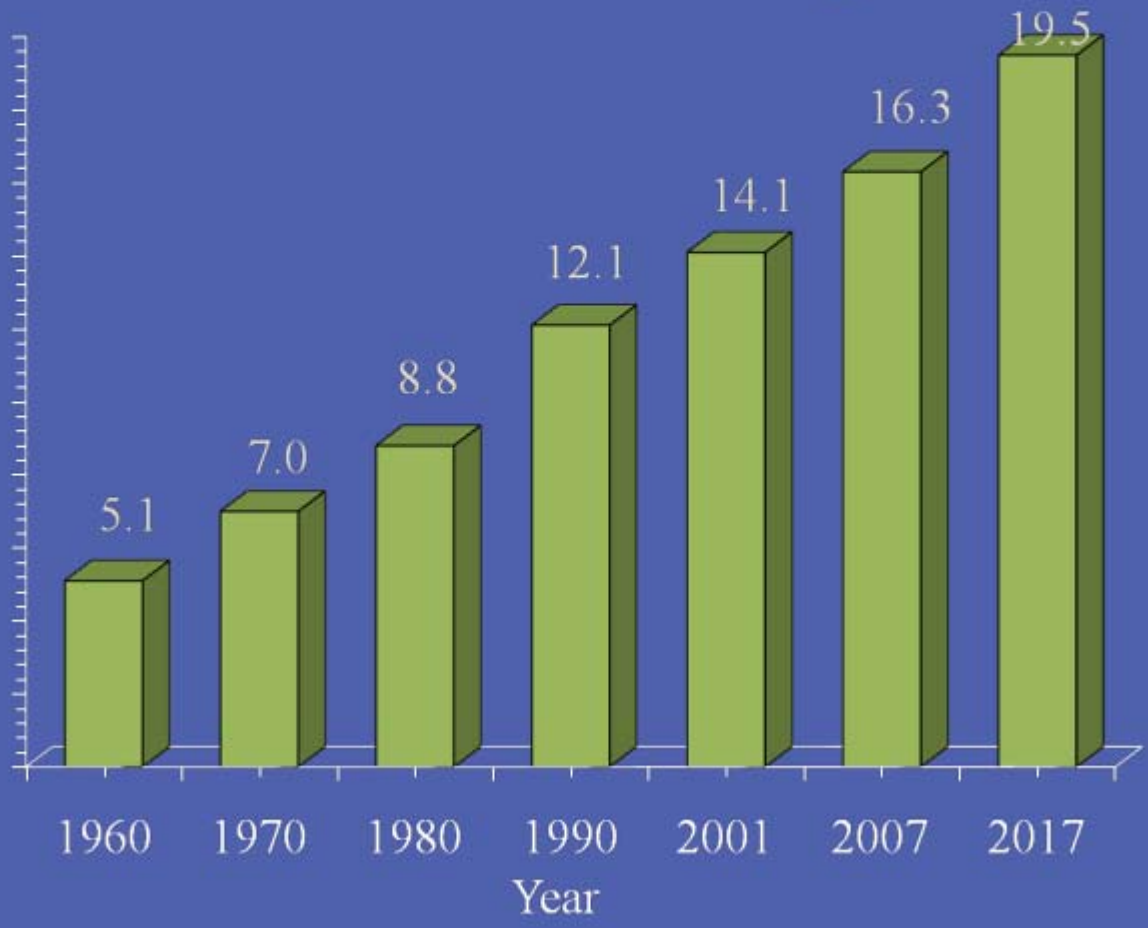


Surface Transportation Policy Project Data Analysis - 2001

Walk/Bike to School

- 1974: 66% of children
- 2000: 13% of children

U.S. Health Care Expenditures as Percent of GDP Projections

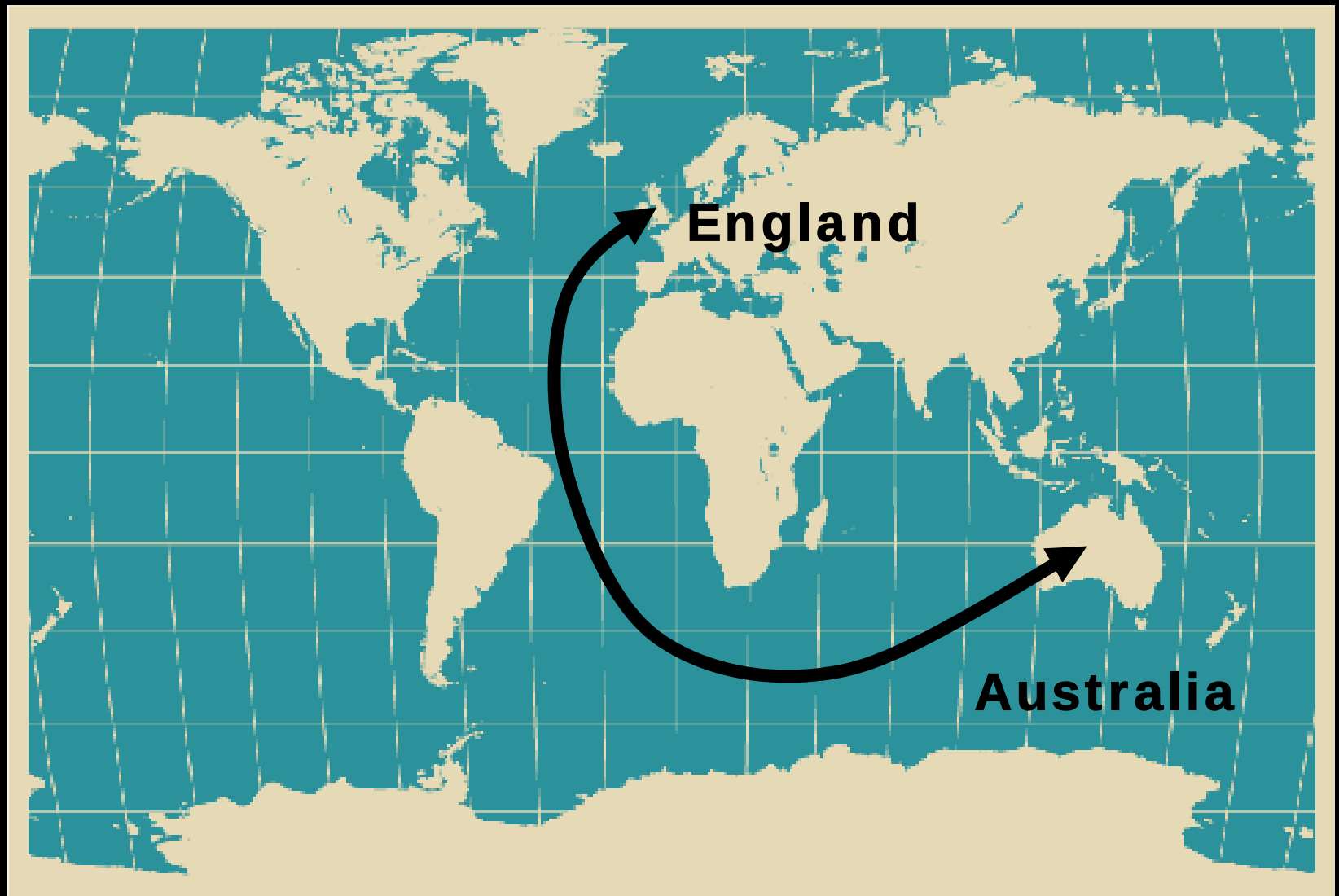


Keehan et al:
Health Affairs
March/April 2008 27:
145-155

Food

Transportation Trajectories

20 tons of bottled water annually



Salmon

Caught in Alaska

Served in California

Filleted in China

Cost of Shipping One Standard 40’ Container

Oil Price Per Barrel	Cost to Ship
$20.....	$3,000
$125.....	$8,000
$200.....	$15,000

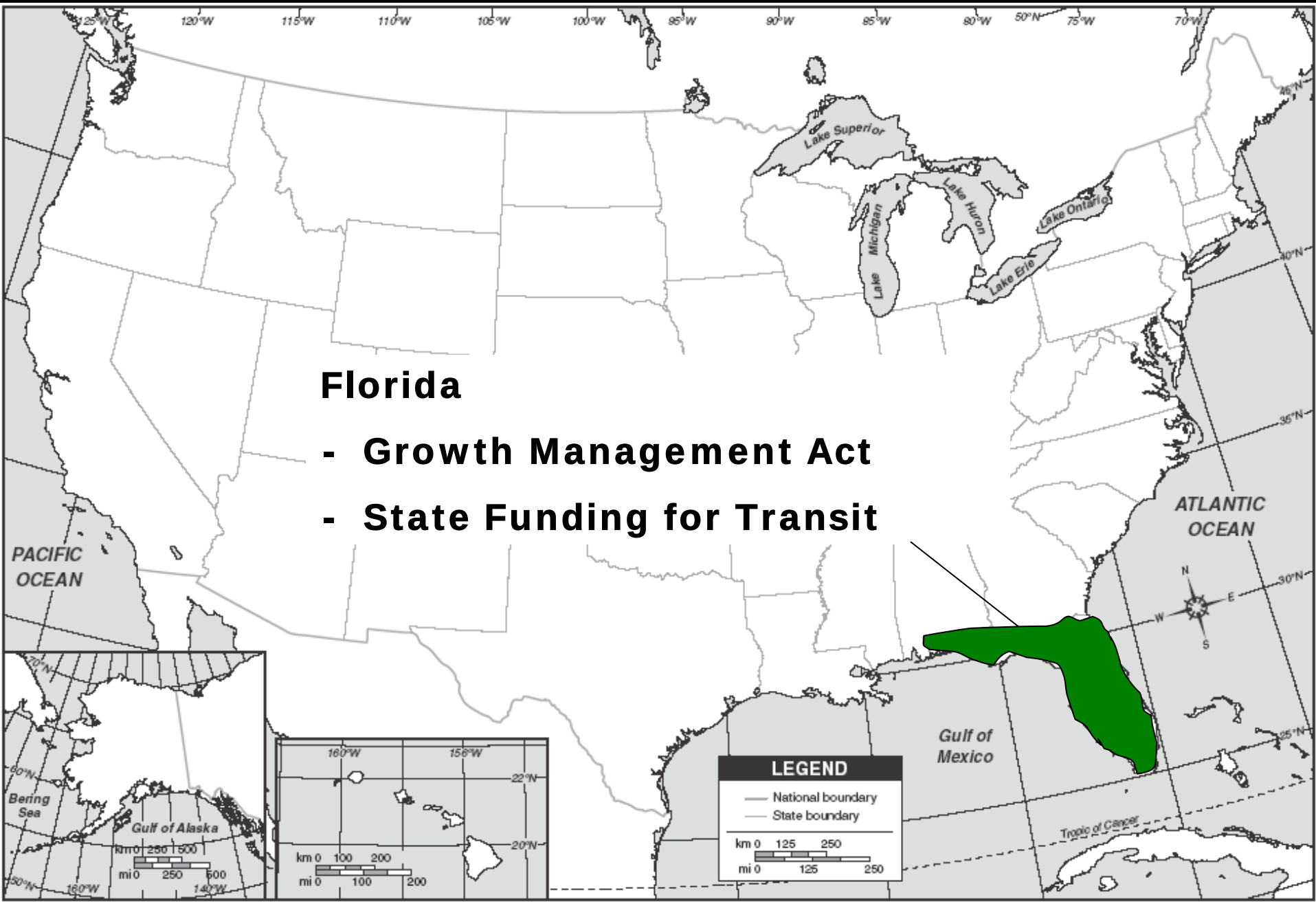
Source: CIBC World Market On Line, May 27, 2008

3. The Leading Edge in the US

Smart Mobility – Arizona & Pima County

Leading Edge

- State of Florida
- State of Washington
- State of California

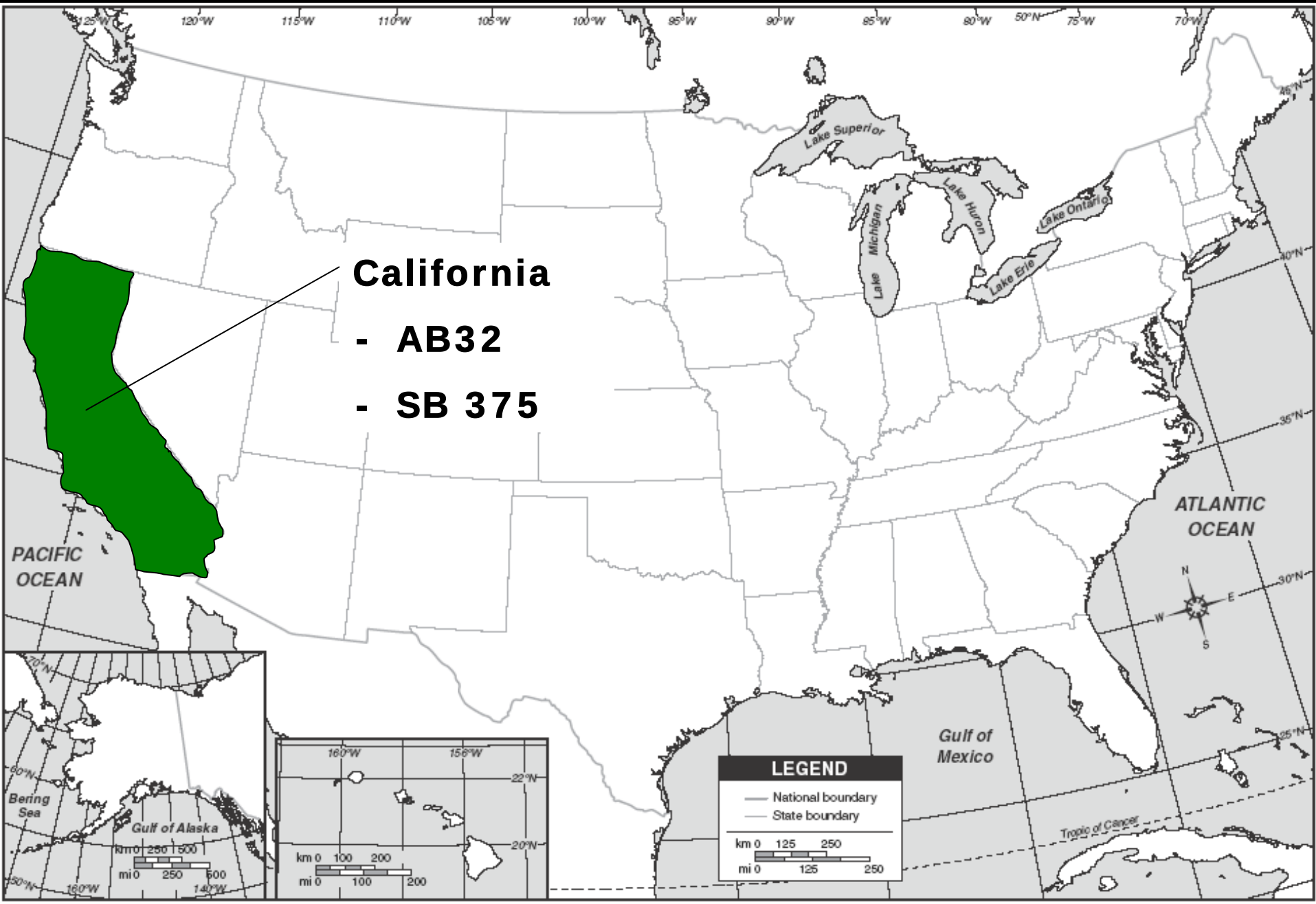

Florida
- Growth Management Act
- State Funding for Transit
PACIFIC OCEAN
ATLANTIC OCEAN
Gulf of Mexico
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
LEGEND
National boundary
State boundary
Gulf of Alaska
Bering Sea
Tropic of Cancer

Florida Growth Management Act

- All counties, cities have growth plans
- Plans reviewed by state for compliance
- Citizens, other counties & cities have right to review & comment (and sue)
- Concurrency requirement
- Plans must be updated frequently
- Plans must include implementation elements

Florida Transit Block Grants

- Implemented in 1990
- Allocated by state law from the proceeds of state sales taxes
- Only capital projects are eligible
- Program > $70 million annually
- Funds are used match federal transit capital grants


California
- AB32
- SB 375
PACIFIC OCEAN
ATLANTIC OCEAN
Gulf of Mexico
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Bering Sea
Gulf of Alaska
Tropic of Cancer
LEGEND
National boundary
State boundary
km 0 125 250
mi 0 125 250
km 0 250 500
mi 0 250 500
km 0 100 200
mi 0 100 200

California AB 32

1. Establishes regulatory & market mechanisms to achieve GHG reductions
2. Air Resources Board (ARB) responsible for monitoring & reducing GHG emissions
3. Climate Action Team coordinate state efforts
4. Authorizes Governor to invoke safety valve in event of extraordinary circumstances, catastrophic events or the threat of significant economic harm, for up to 12 months at a time

CARB Will:

- Establish statewide GHG emissions cap for 2020, based on 1990 emissions by January 1, 2008.
- Adopt mandatory reporting rules for significant sources of greenhouse gases by January 1, 2008.
- Adopt a emissions plan by Jan 1, 2009 outlining needed regulations, market mechanisms and other actions.
- Adopt regulations by January 1, 2011.
- Convene an Environmental Justice Advisory Committee and an Economic and Technology Advancement Advisory Committee.
- Ensure public notice & opportunity for comment for all ARB actions.
- Evaluate impacts on state economy, environment, and public health; equity between regulated entities; electricity reliability, conformance with other environmental laws, and ensure rules do not disproportionately impact low-income communities.
- Adopt discrete, early action measures by July 1, 2007 that can be implemented before January 1, 2010.

California SB 375

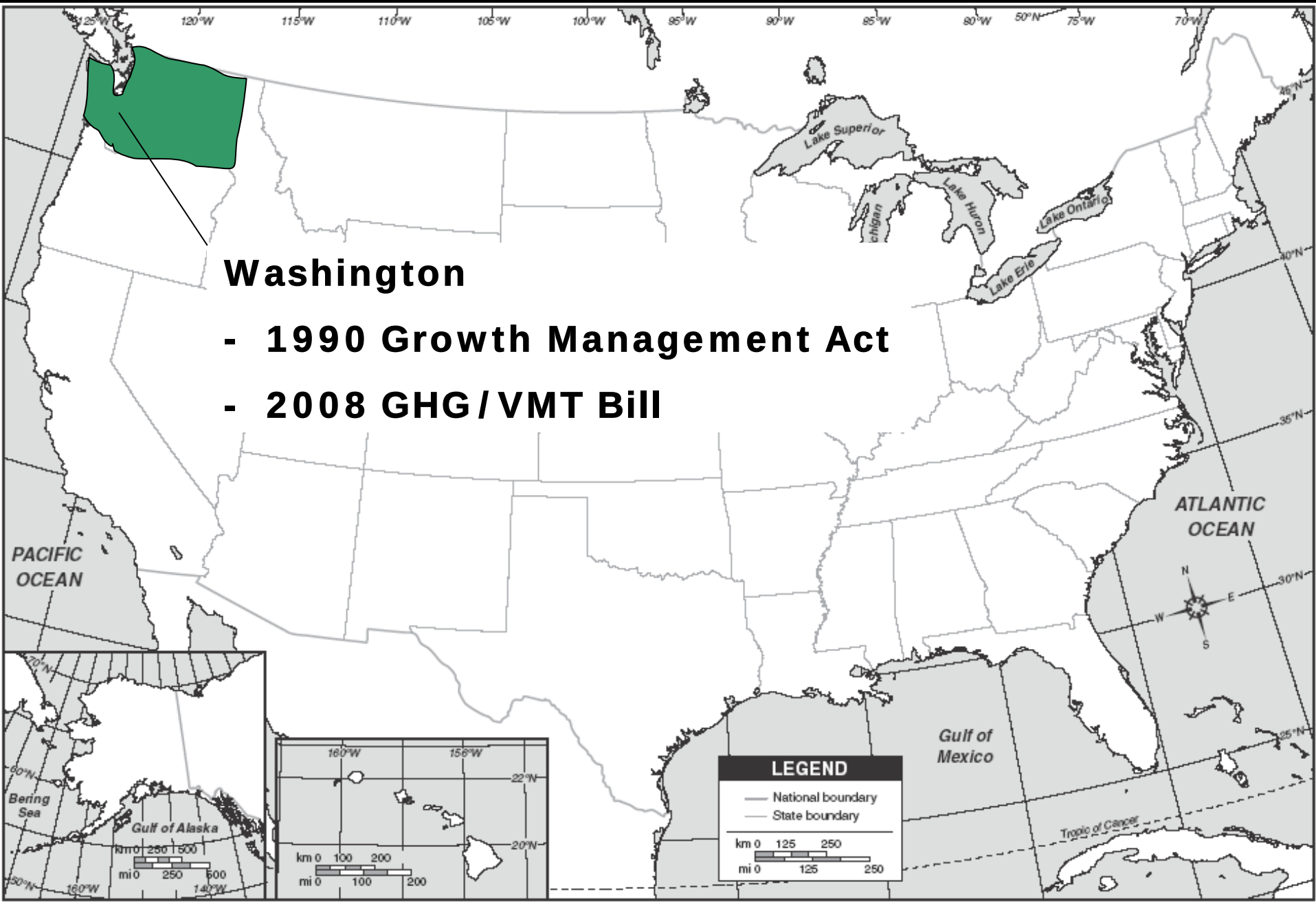
1. Creation of regional targets for GHG emissions reduction tied to land use

2. Requirement that regional planning agencies create a plan to meet those targets, even if that plan is in conflict with local plans

3. Requirement that regional transportation funding decisions be consistent with this new plan.

4. Directly connecting regional transportation planning and housing efforts for the first time.

5. CEQA exemptions and streamlining for projects that conform to the new regional plans, even if they conflict with local plans


Washington
- 1990 Growth Management Act
- 2008 GHG/VMT Bill
Lake Superior
Lake Huron
Lake Ontario
Lake Erie
PACIFIC OCEAN
ATLANTIC OCEAN
Gulf of Mexico
Bering Sea
Gulf of Alaska
Tropic of Cancer
LEGEND
National boundary
State boundary

Wa GMA Comp Plan Elements

- Land Use
- Housing
- Capital Facilities Plan
- Utilities
- Rural Element
- Transportation
- Economic Development
- Parks and Recreation

Wa GMA & Transportation

- Six-Year Transit Plans
- Non-Motorized Transportation
- Roadway LOS
- Collaborative Plan Review/Project Review
- Functional Classification of Highways
- Ten-Year Programs
- Urban Arterial Trust Account
- Regional Transportation Plan

Wa 2008 GHG, VMT Bill

- State GHG emission reduction goals:
  - ✓Reduce emissions to 1990 levels by 2020
  - ✓Reduce emissions to 25 percent below 1990 levels by 2035
  - ✓Reduce emissions to 50 percent below 1990 levels by 2050 (70% below forecast)

Wa 2008 GHG, VMT Bill

- State to achieve emission reduction goals by:
  - ✓ Participating in design of a regional multi-sector market-based system for regulating emissions
  - ✓ Improving accountability through a system for reporting, monitoring & tracking emissions
  - ✓ Adopting statewide goals to reduce annual per capita vehicle miles traveled (VMT) by 2050
  - ✓ Ensuring that the state has a well-trained “clean energy” workforce

Wa 2008 GHG, VMT Bill

- Statewide baseline of 75 billion VMT used to establish benchmarks:
  - ✓Reduce annual per capita VMT by 18% by 2020
  - ✓Reduce annual per capita VMT by 30% by 2035
  - ✓Reduce annual per capita VMT by 50% by 2050

4. Opportunities for Arizona & Pima

Smart Mobility – Arizona & Pima County

What Would "Smart" Transportation Policy Do?

- Improve personal mobility
- Reduce energy used/mile of travel
- Decouple transportation from imported petroleum
- Increase % of family travel budgets that are avoidable
- Use "smart growth" policies to improve transportation viability:
  - ✓Shorten trip lengths
  - ✓Facilitate mode shifts

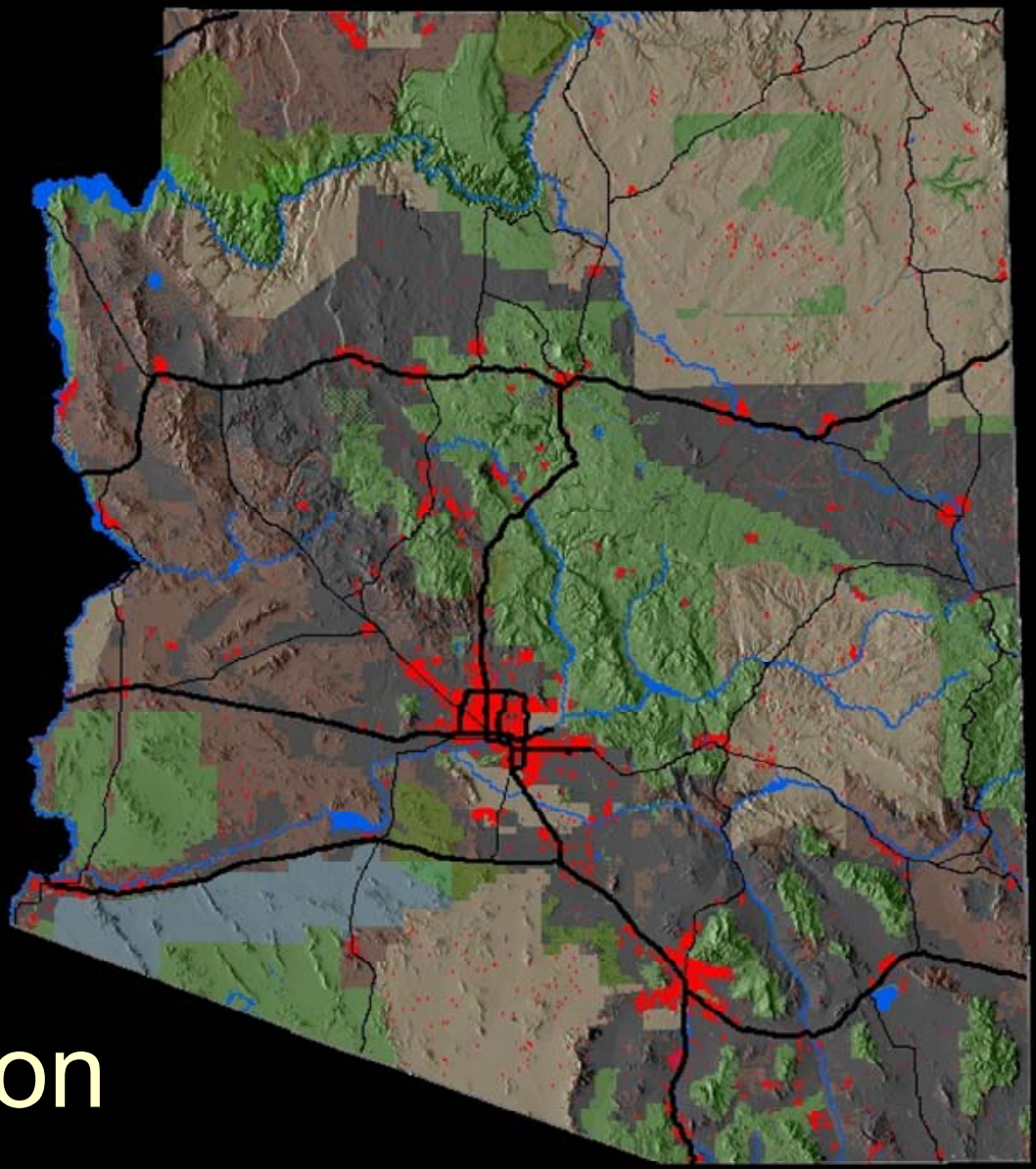
Opportunities

- Location Efficiency
- Context Sensitive Facilities
- Complete Streets
- 20-Minute Neighborhoods
- Transit & Intercity Rail

Location Efficiency

Opportunities

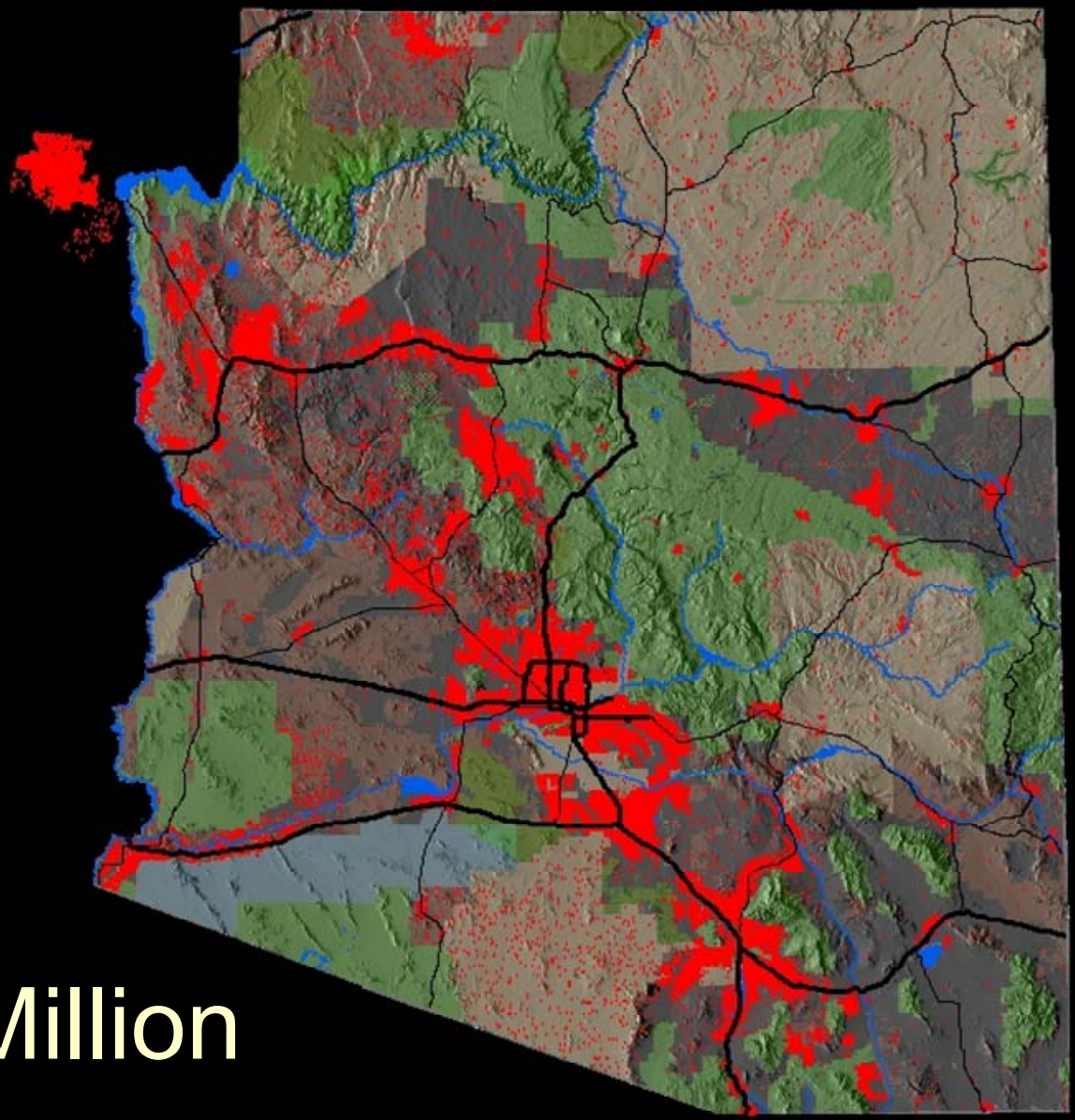
2000



5.1 Million
People

MARICOPA ASSOCIATION of GOVERNMENTS

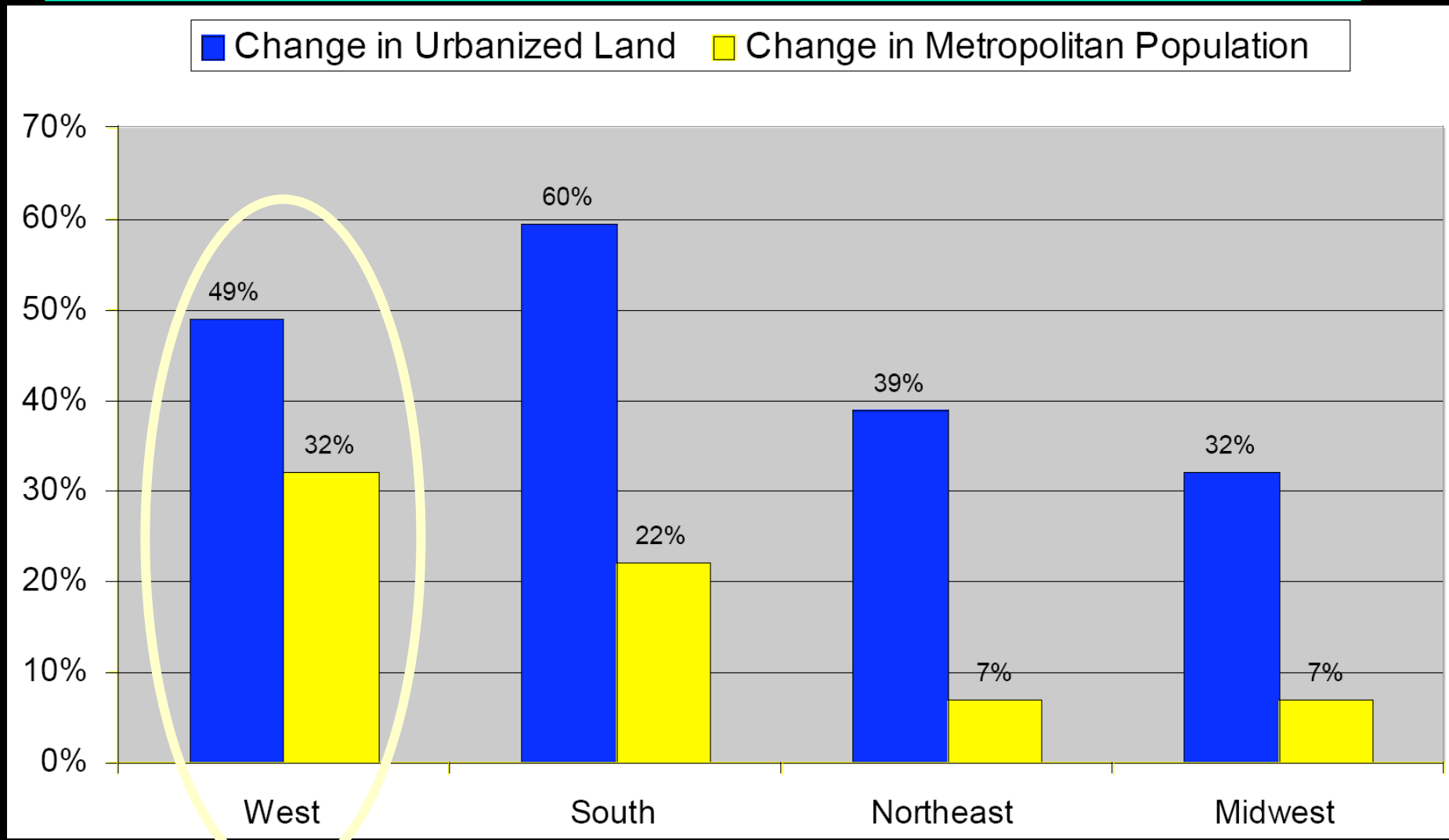
2050



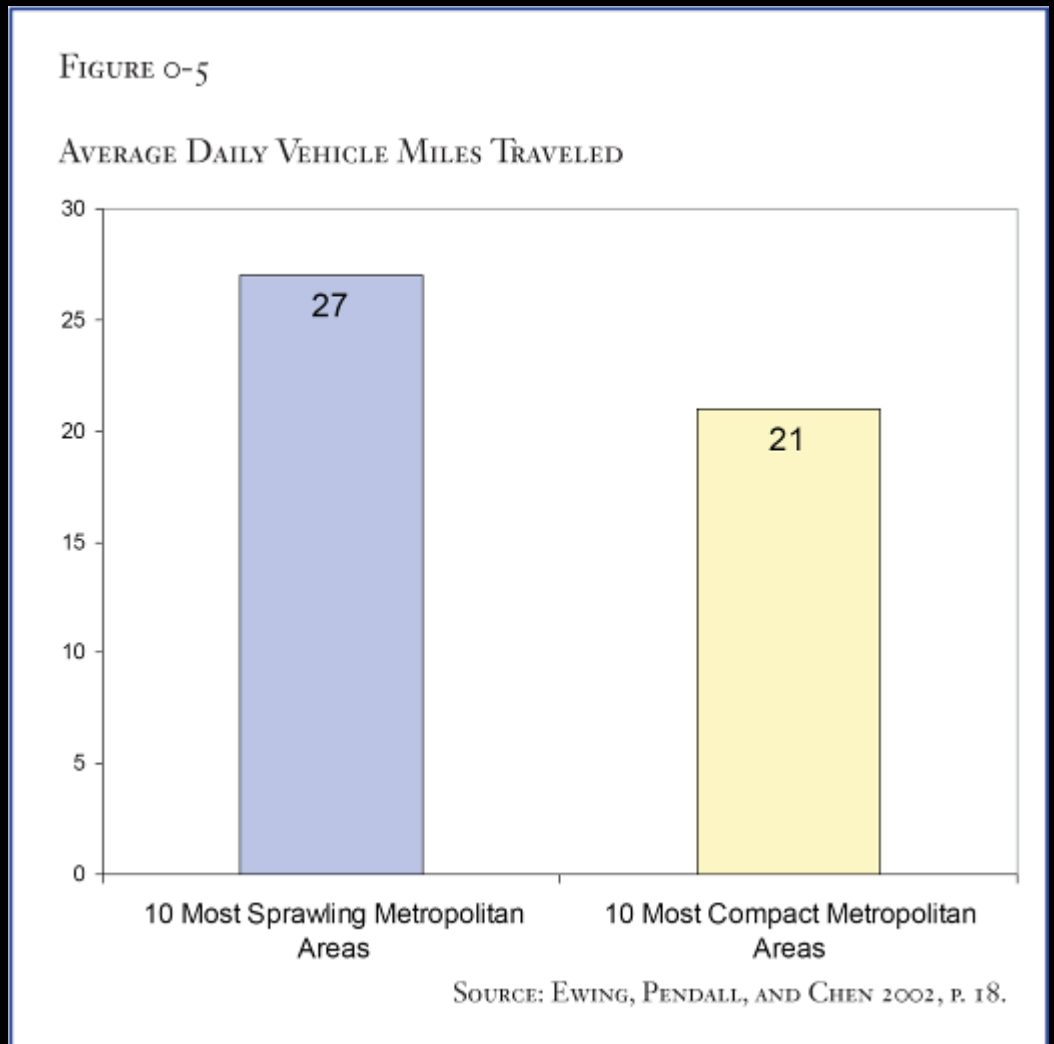
14.1 Million People

MARICOPA ASSOCIATION of GOVERNMENTS

Development Patterns



Urban Design & VMT



- Compact cities generate less VMT/capita
- The difference (>20%) is permanent

Source: Growing Cooler

Location Efficiency

- Compact regional urban form
- Focus commercial development in transit-served centers
- Mixed use/functional neighborhoods
- Walkable environments
- New residential growth oriented to transit-served districts

Location Efficiency Benefits

- Less traffic, less driving (20 - 40%)
- Reduced public expenditure/capita
- Preserve open space and ag lands
- Higher quality of life
- Greater economic resiliency
- Improved overall sustainability

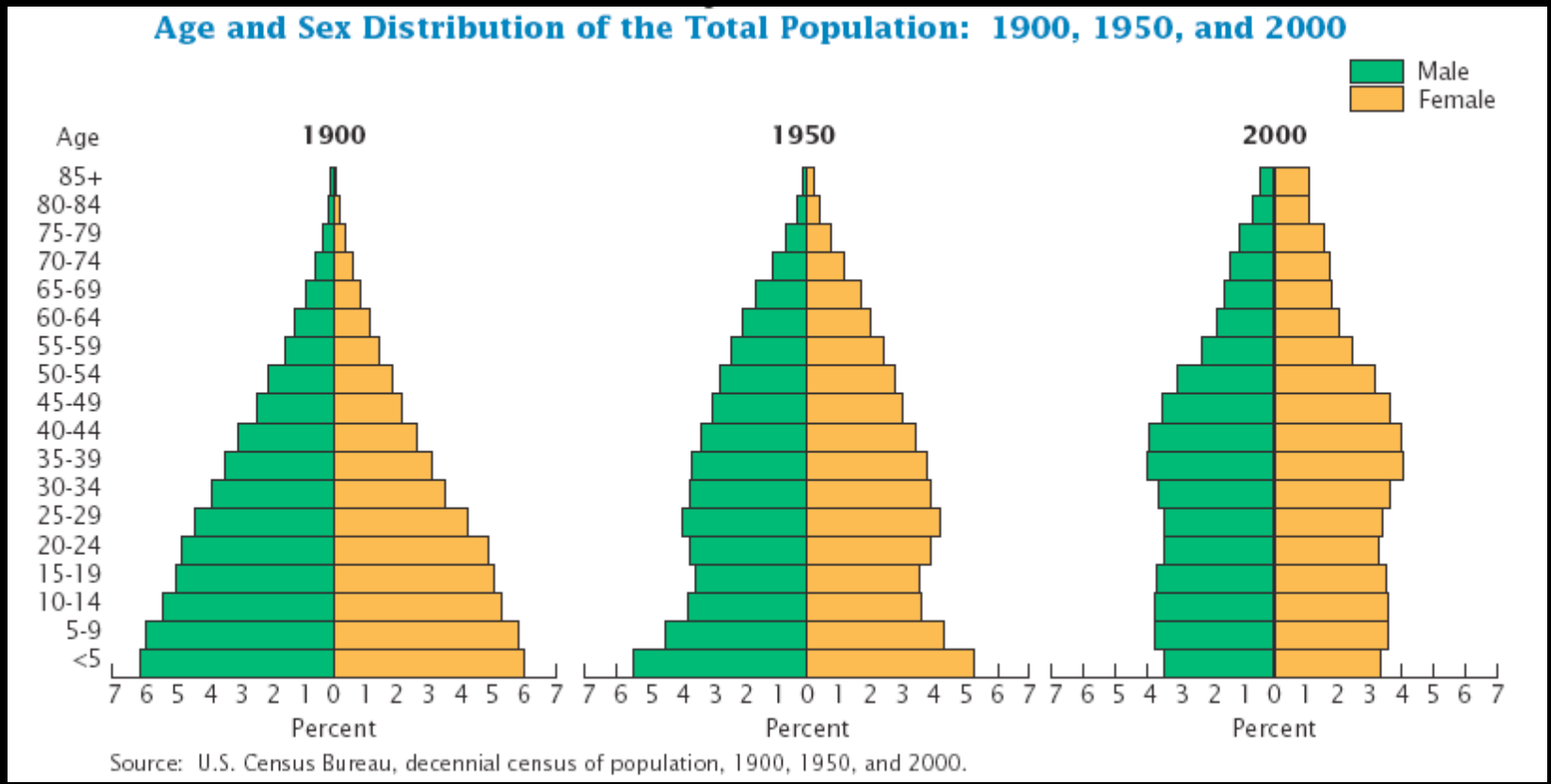
The Changing Demographics of Metro Areas

- Married couples with kids are no longer dominant
- “Empty-Nesters” are on the rise
- Single-person households want “urbanity”
- “The Rise of the Creative Class”

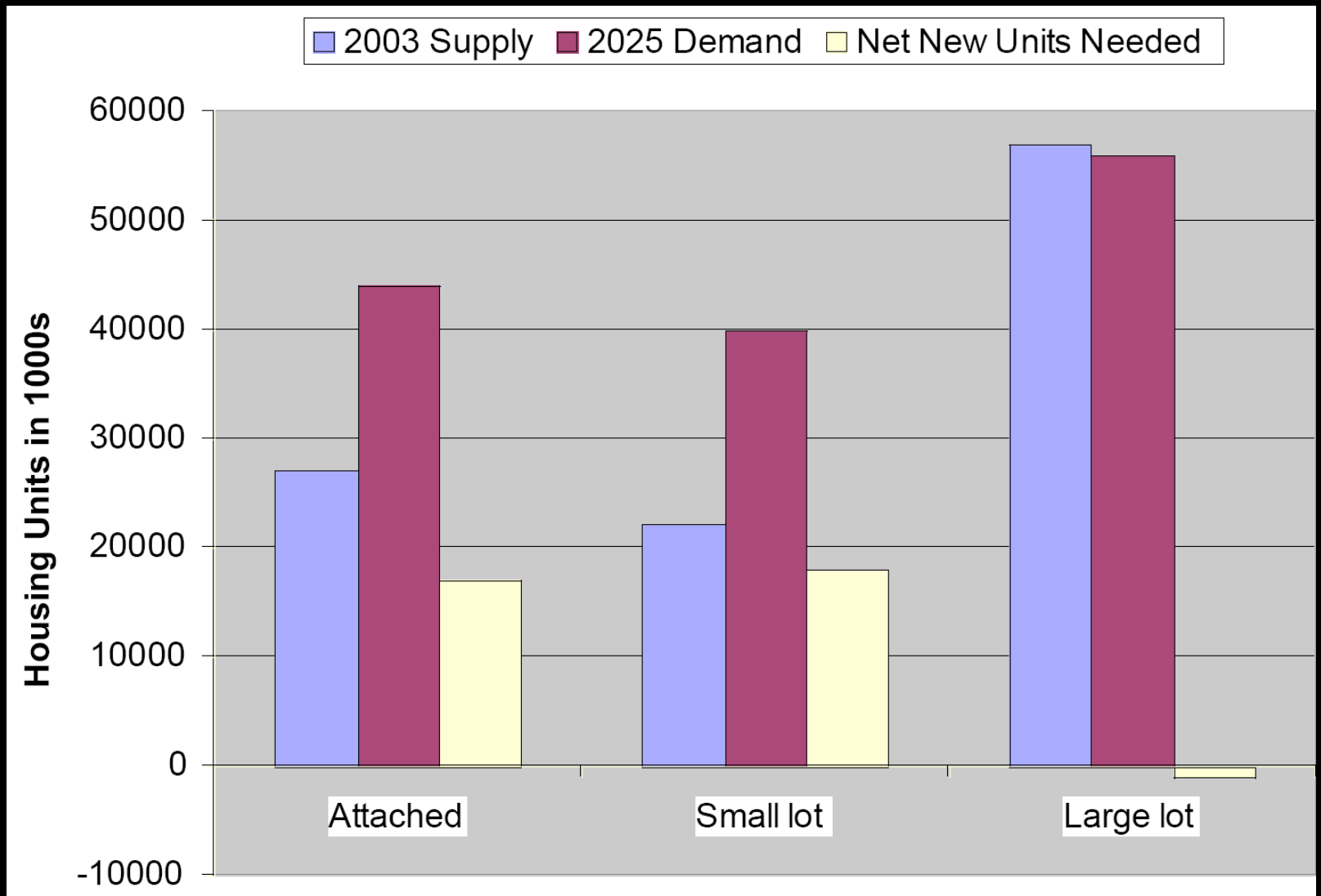
Married Couples with Children No Longer Dominant

- 27 % of households in 1990
- 23 % of households today

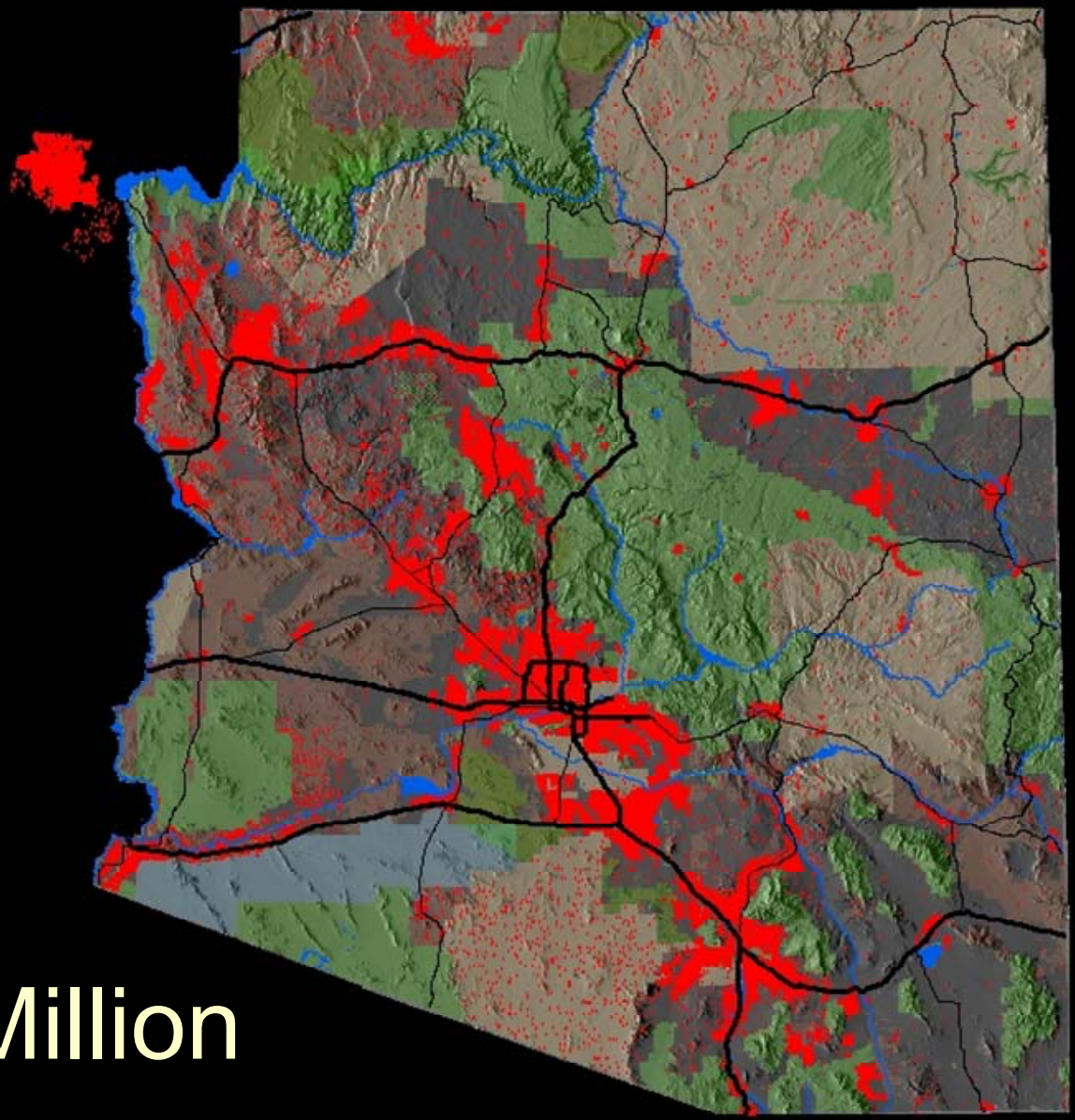
Empty-Nesters: The Effect of Aging Baby Boomers on the U.S. Population



Housing Supply & Demand



2050



14.1 Million People

MARICOPA ASSOCIATION of GOVERNMENTS

Context Sensitive Facilities

Opportunities


St. Louis Region
EAST
30

Newbury, Boston


Neighborhood
Street
Abutting Property


Boulder


2:00 AM
TO 5:00 AM
2 HR
PARKING
8:00 AM
TO 6:00 PM
WEEKDAYS
Longmont


Brooklyn

Portland


Boulder


Anywhere, USA
DIRT CHEAP
CIGARETTES & BEER
SUPER REGULAR
ONE WAY
DO NOT ENTER
WRONG WAY

Complete Streets

Opportunities


ADOPT A HIGHWAY
LITTER CONTROL
NEXT 2 MILES
DTRIC INSURANCE
ROAD
STARTS APR
M-F 8:30AM
ANTICIPATE
NCP 670

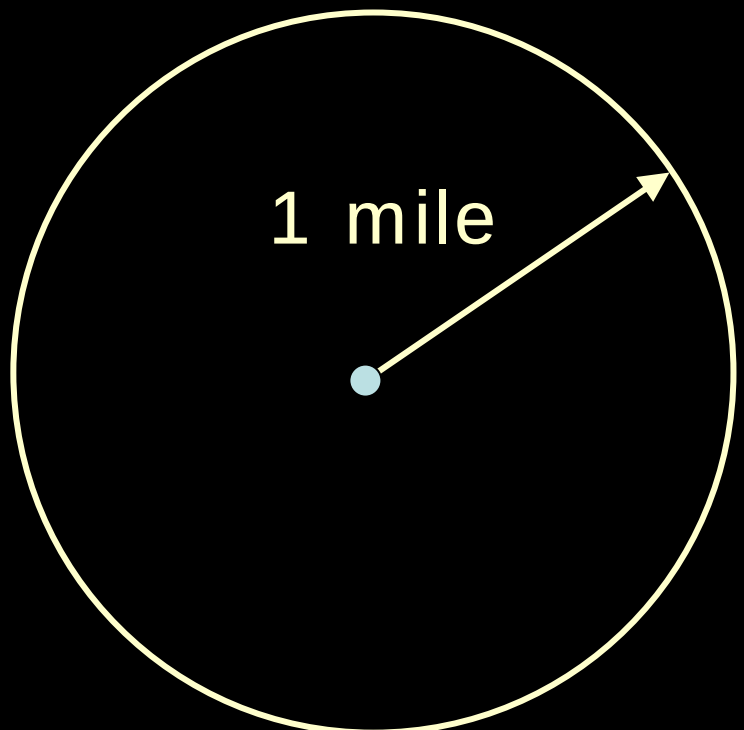
Streets Designed for Use by All Modes

The 20-Minute Neighborhood

Opportunities

Charlier Associates, Inc.

PORTLAND PLAN



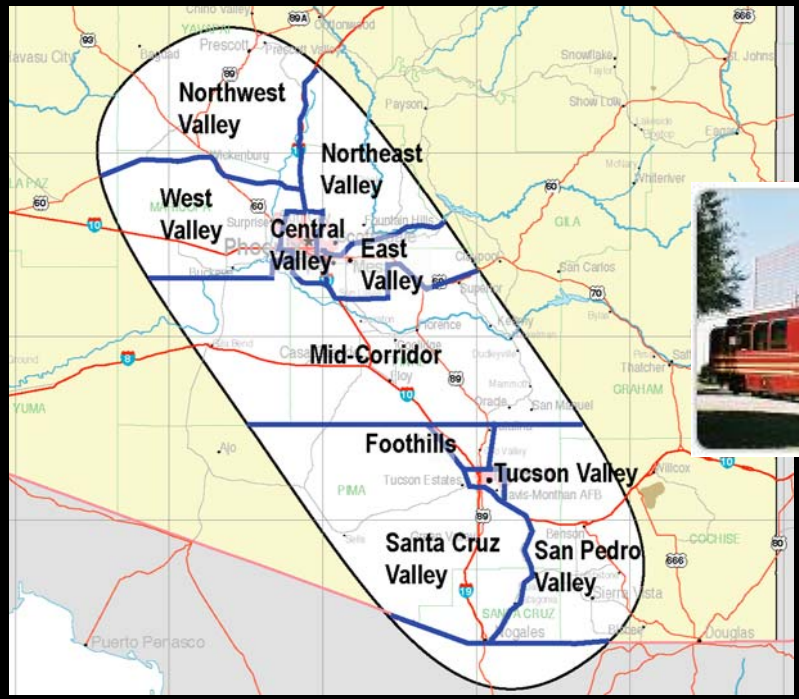
20-Minute Neighborhood:

- Walk to essential services
- Walk to retail
- Walk to work
- Walk to school
- Walk to amenities

Transit & Intercity Rail

Opportunities

Intercity Rail



Active Intercity Rail Corridors

Thank You

Food for thought:

“We are all faced with a series of great opportunities…

… brilliantly disguised as insoluble problems.”

John W. Gardner