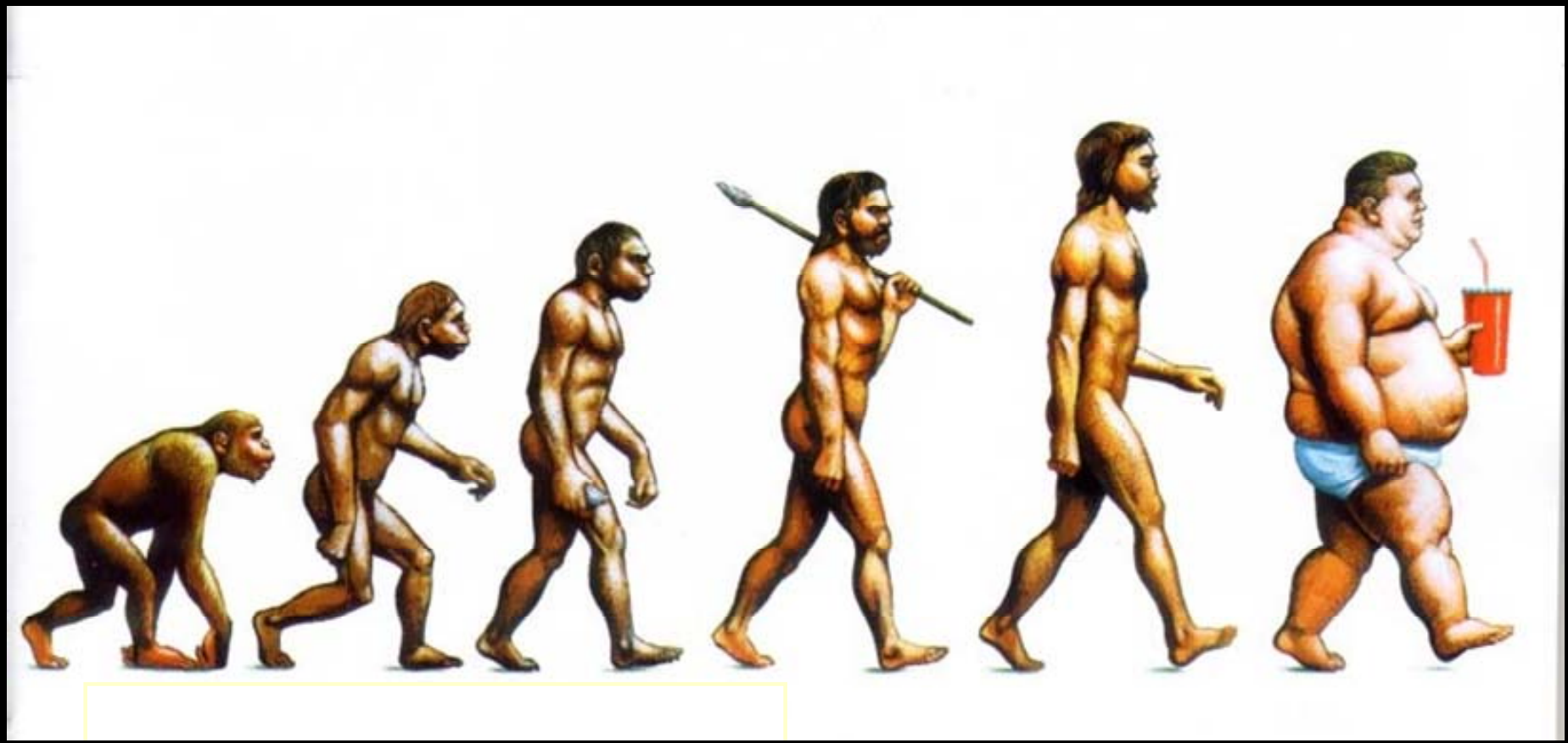
Challenges and Opportunities

Regional Approaches to Transportation Systems

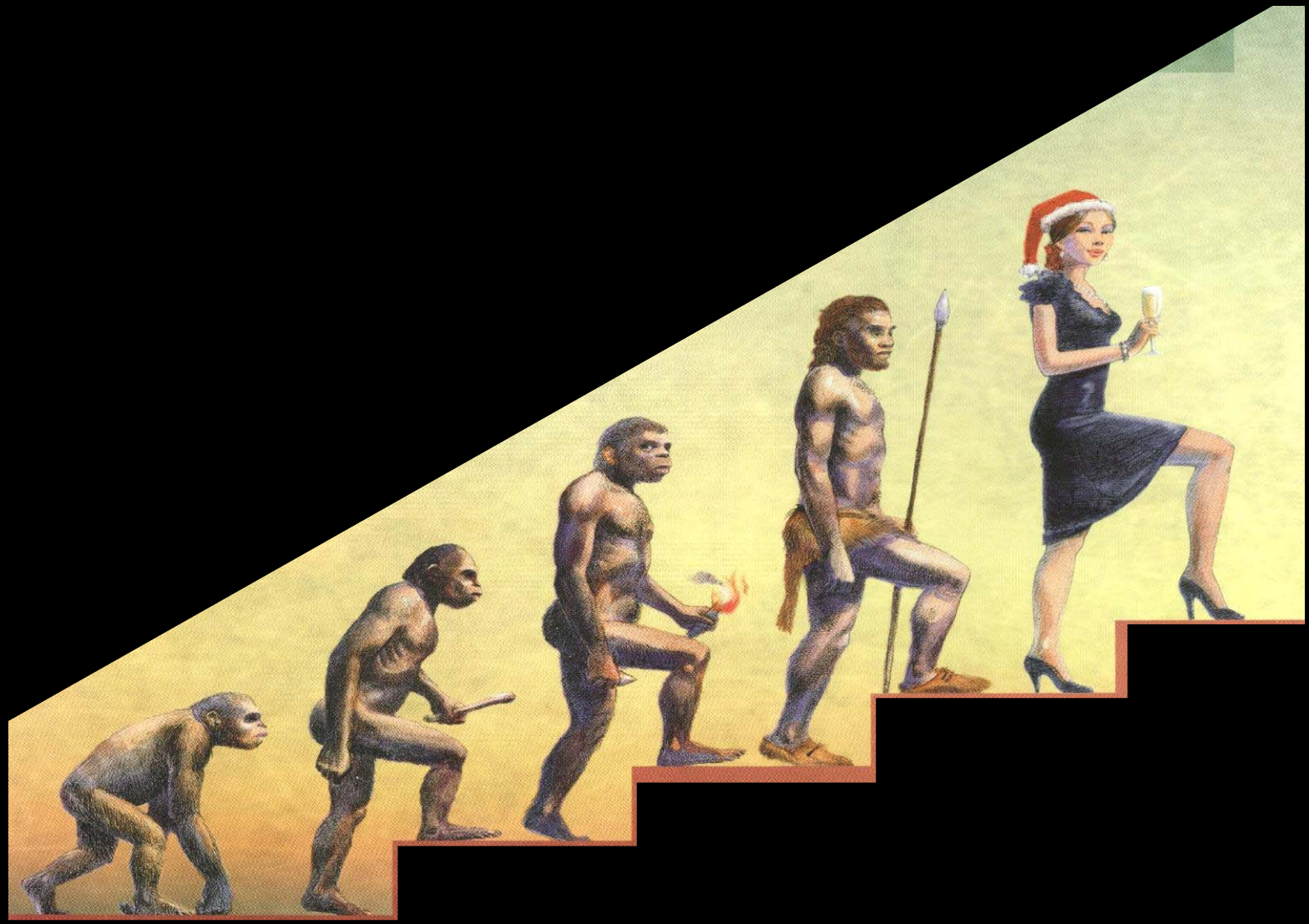
Charlier Associates, Inc.

Transportation Planning??

Transportation Planners

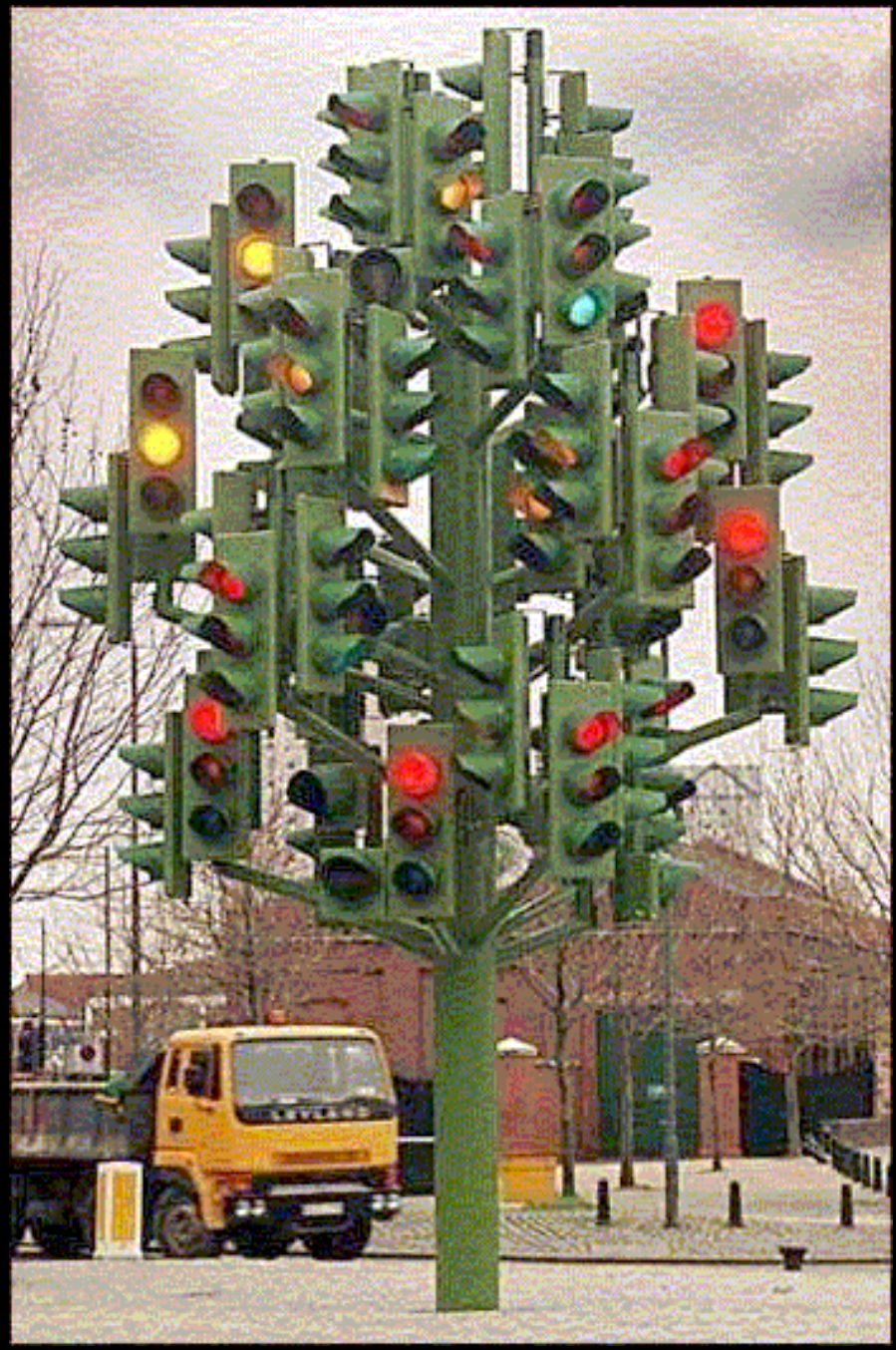


Transportation Planners



Public Frustration

Engineering Solutions



Better Yet

How Americans Feel About Public Transit


BEGIN
ONEAWA ST
KAILUA RD
CERTAIN DEATH
IF ENTERED

Best Practices


European
Know-How

New Traffic Calming Strategies


SOTR

Regional Approaches

- Challenges
- Opportunities

Challenges

Regional Approaches

Challenges

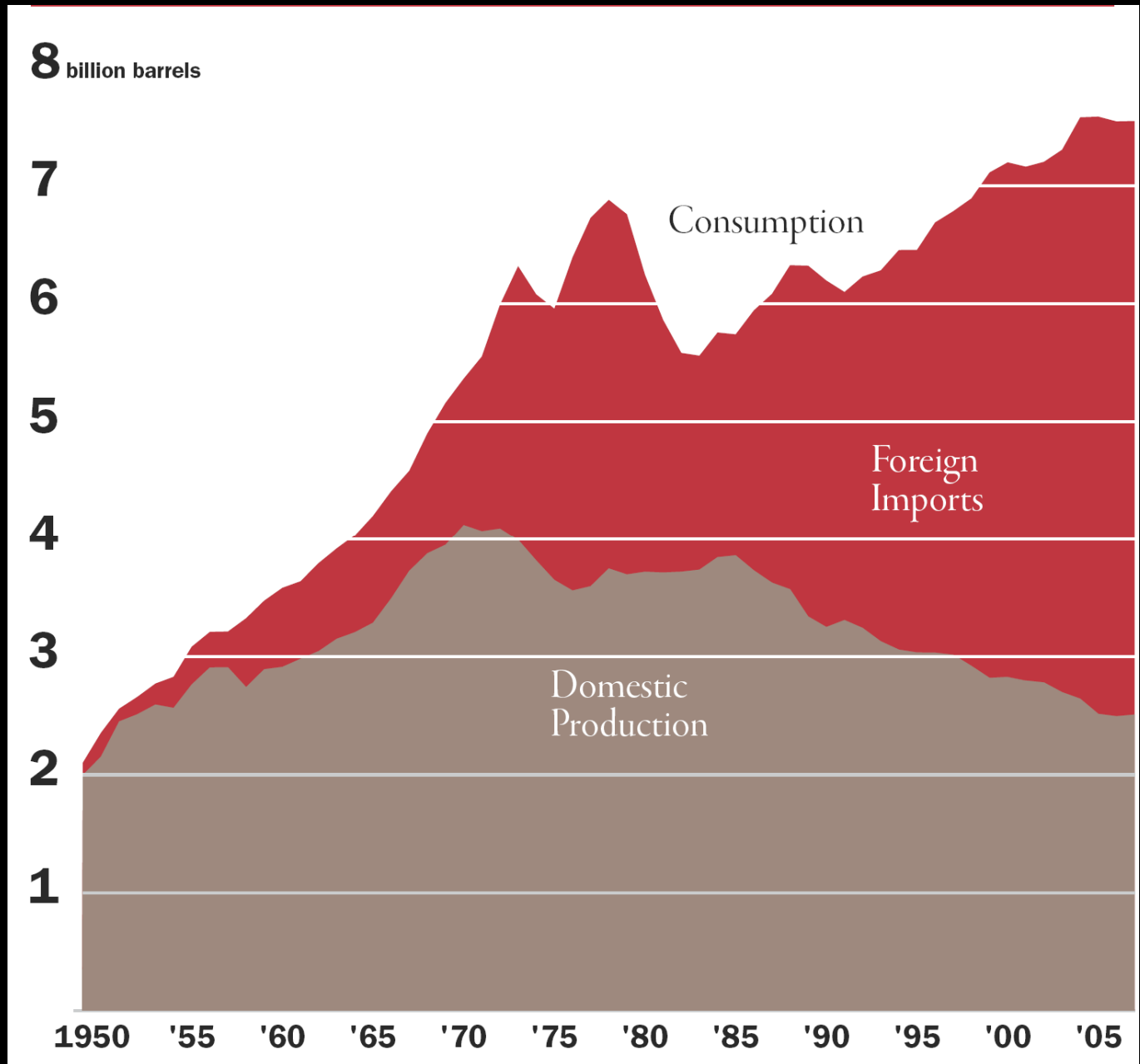
1. Preparing for the post-petroleum era
2. Deciding where the people should live
3. Providing for prosperity

Challenge 1.
Preparing for the Post-Petroleum Era

Regional Approaches

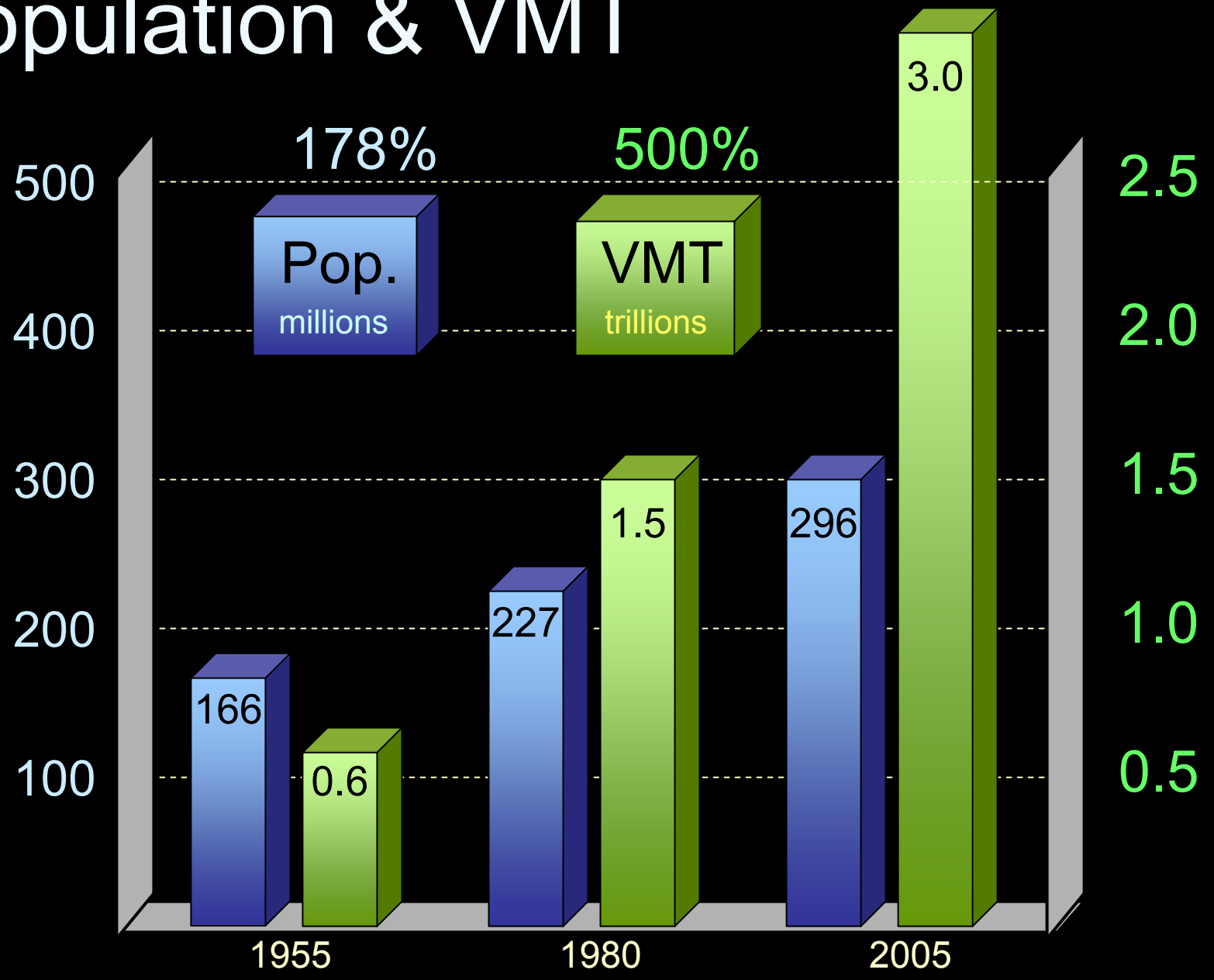
Charlier Associates, Inc.

US Annual Petroleum Consumption



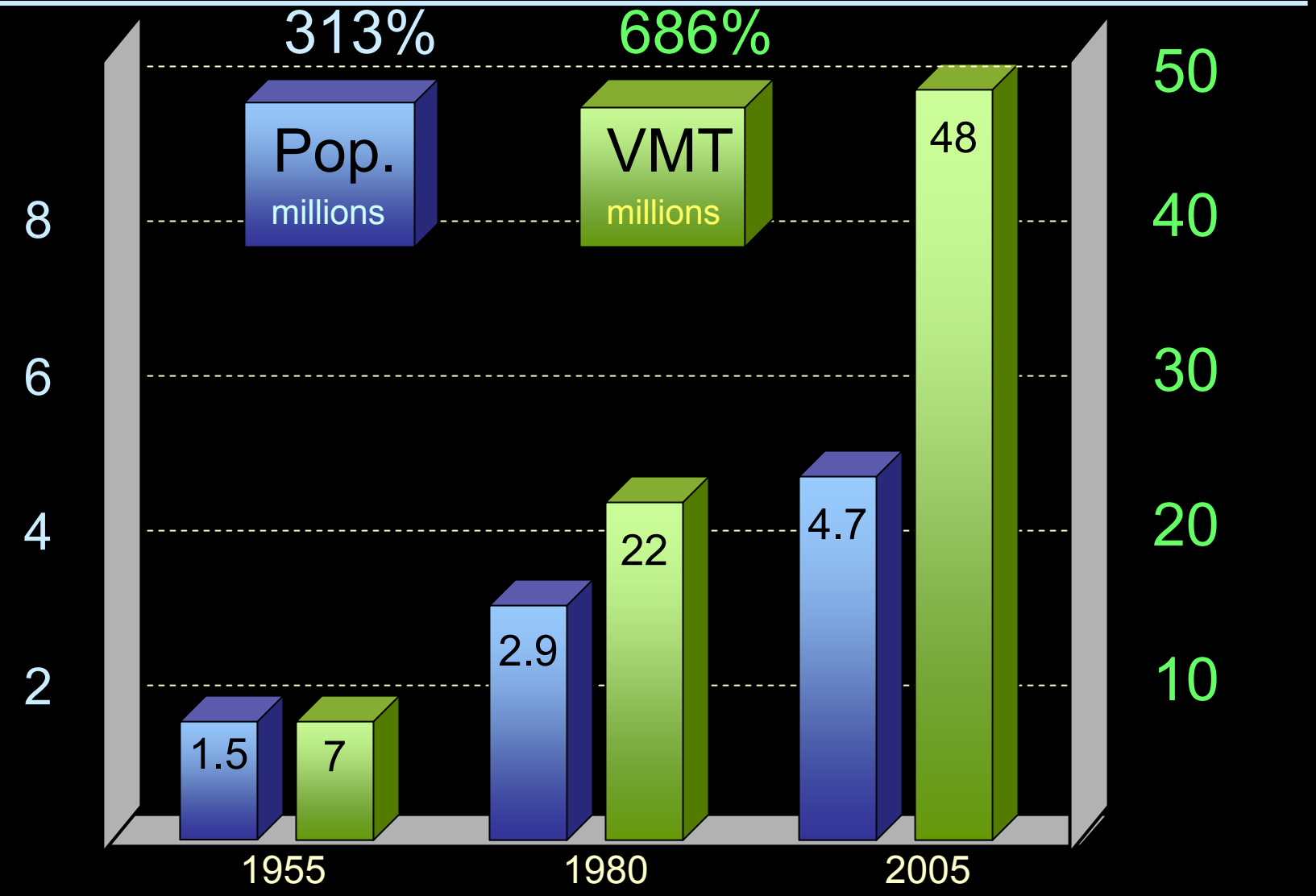
United States

Population & VMT



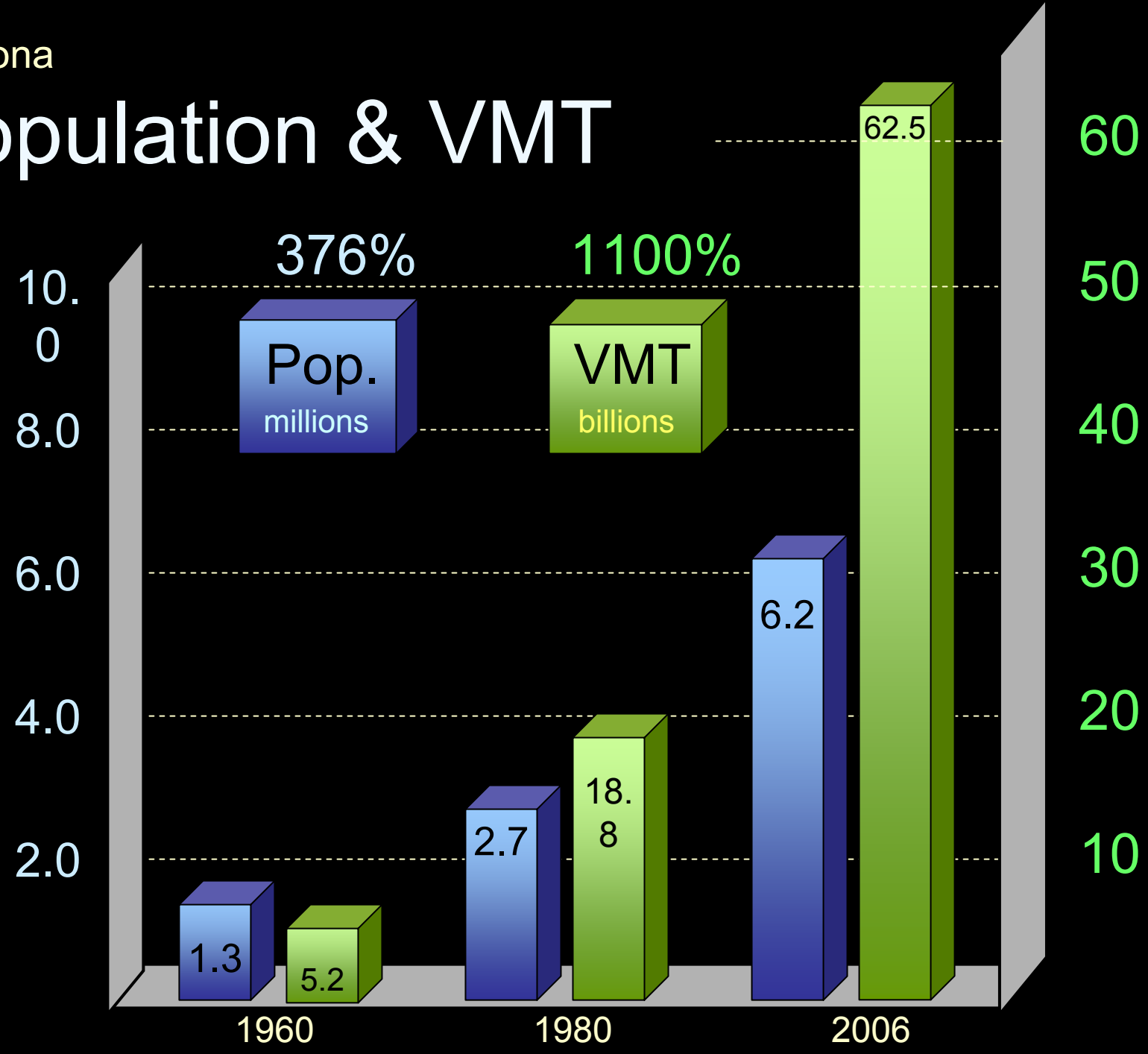
Colorado

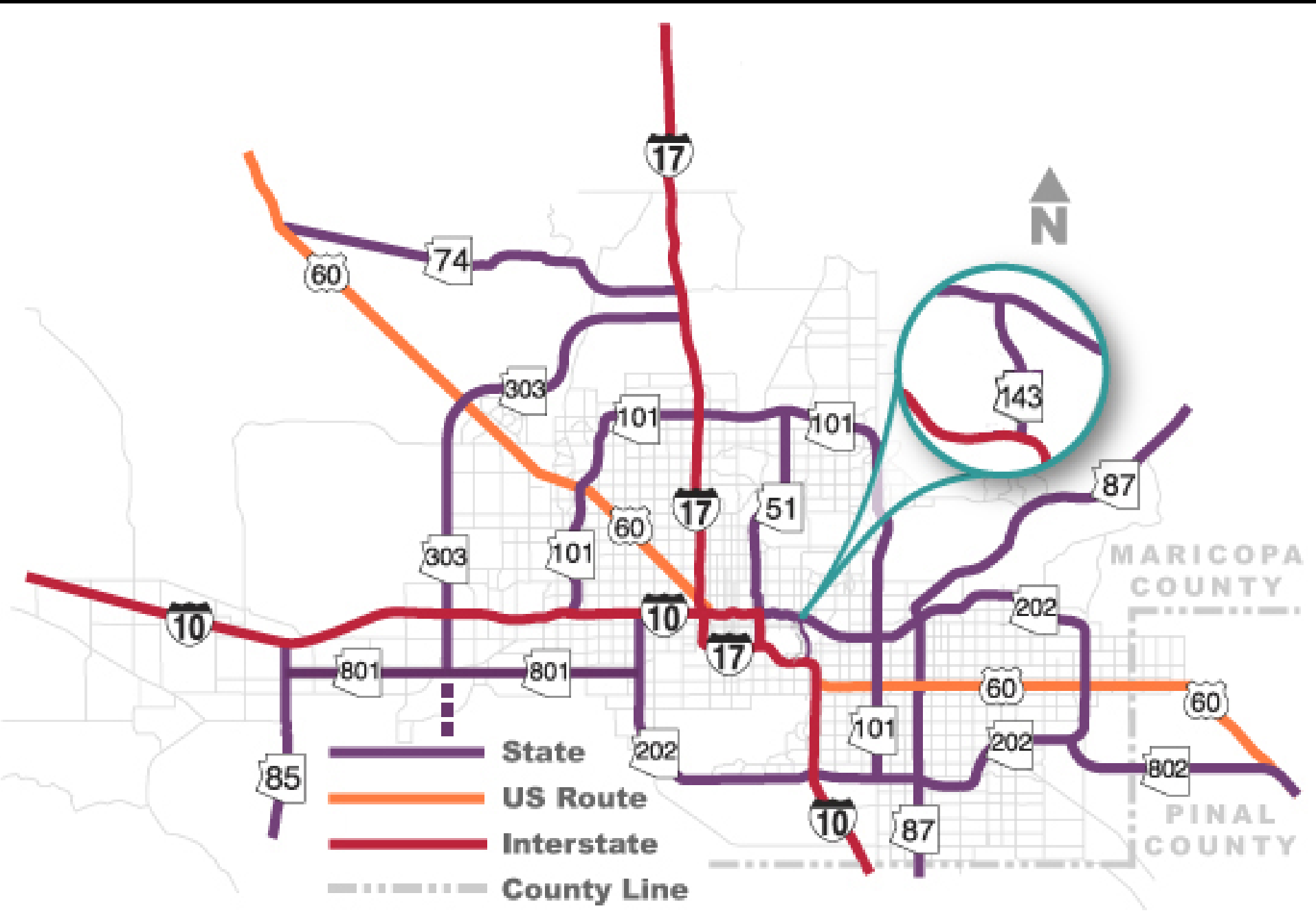
Population & VMT



Arizona

Population & VMT



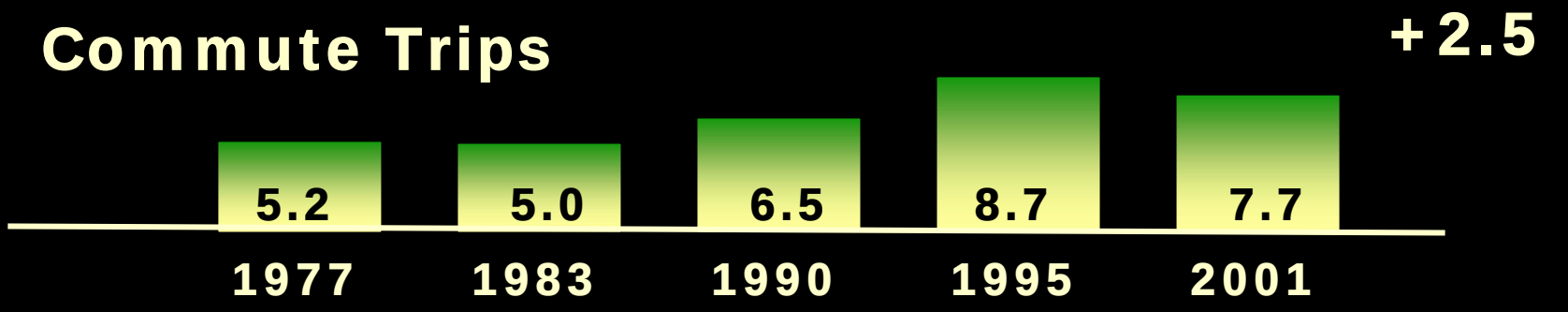

N
17
74
60
303
101
101
143
87
51
17
60
303
101
MARICOPA
COUNTY
10
10
17
202
801
801
60
60
101
202
85
202
802
State
US Route
Interstate
County Line
10
87
PINAL
COUNTY

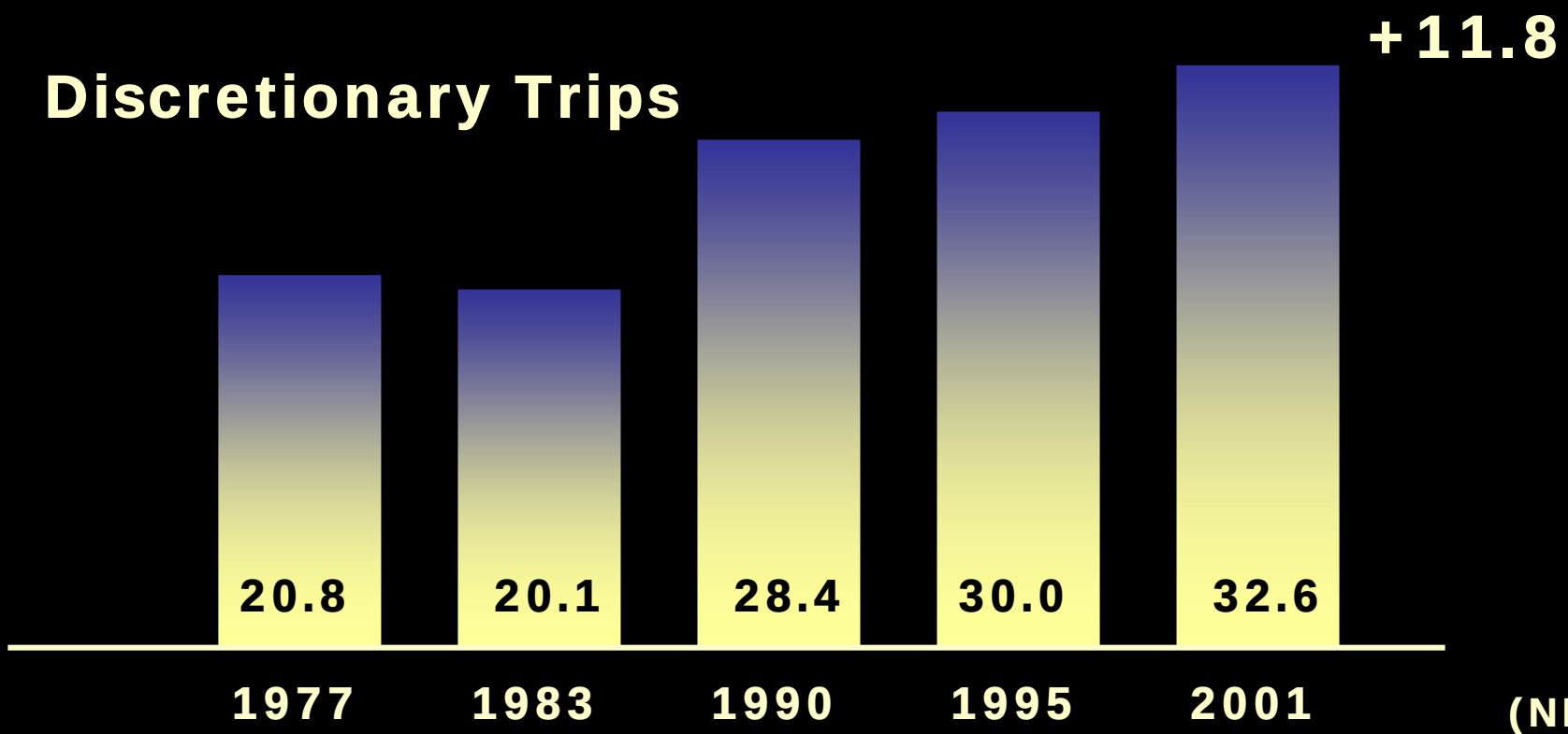
Phoenix Valley Freeways

TTI Data - 2007

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

Daily Miles of Travel Per Capita

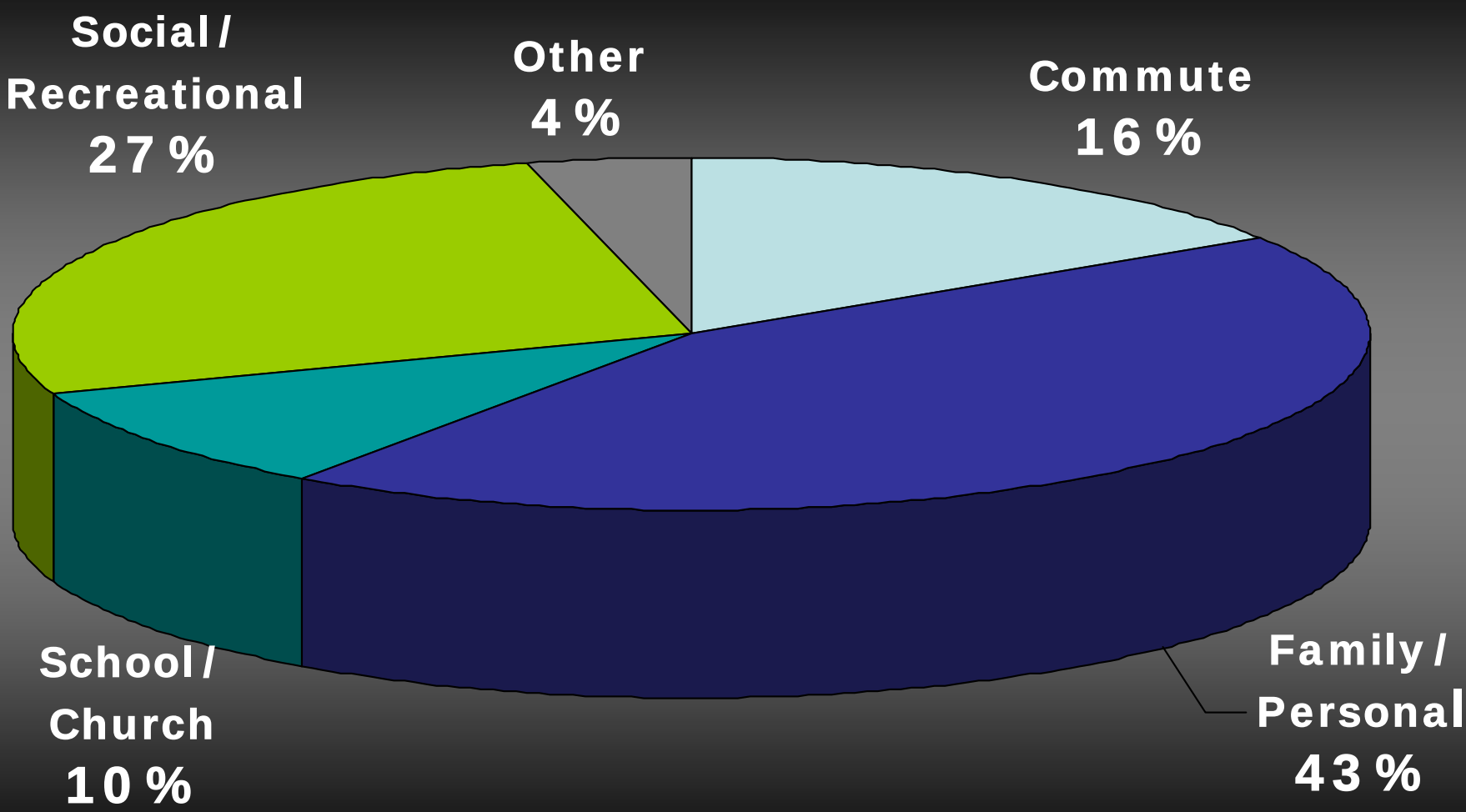




(NHTS)

Daily Trips/Person

Source: US 2001 NHTS



United States

Annual Rate of Change in VMT

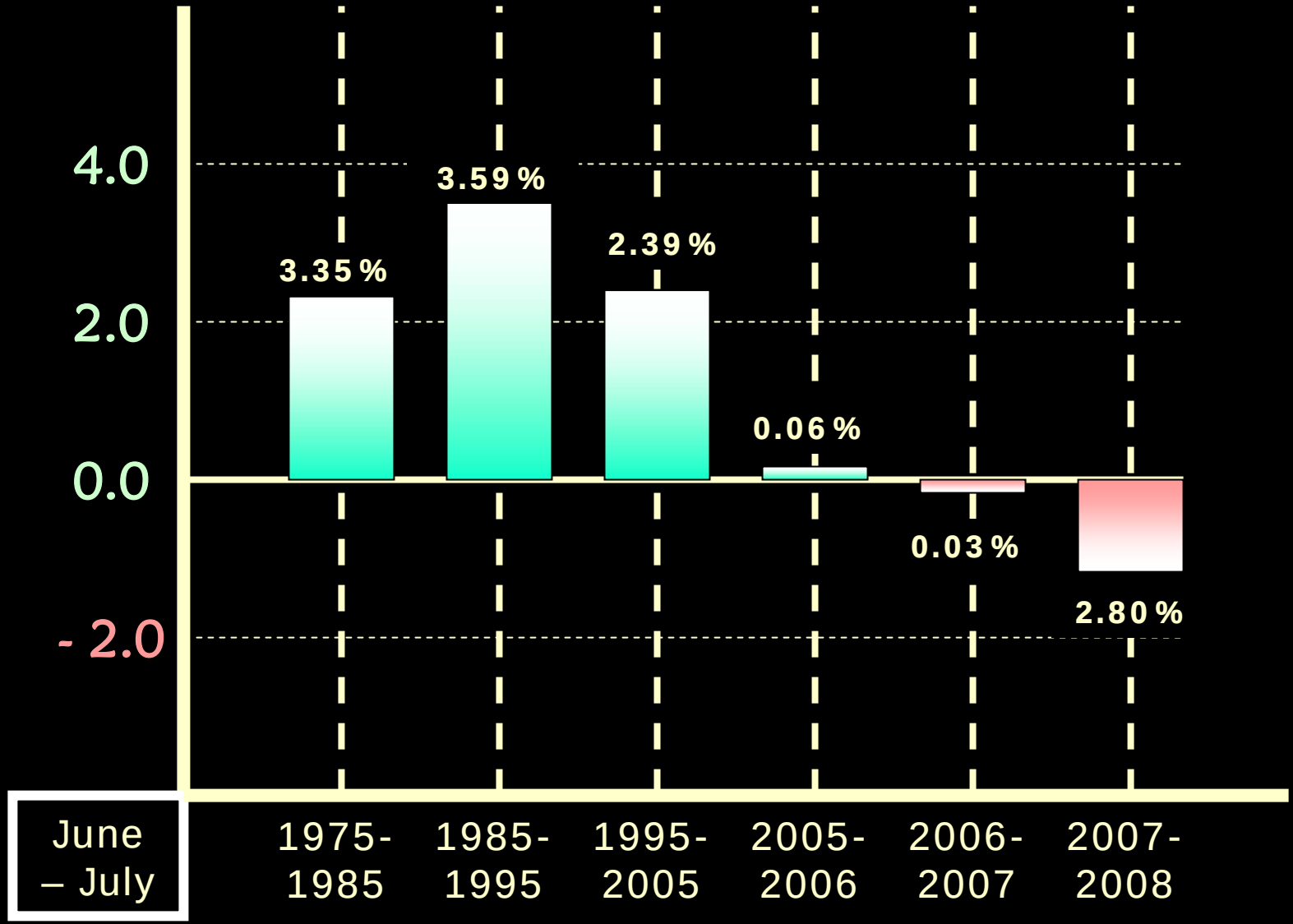
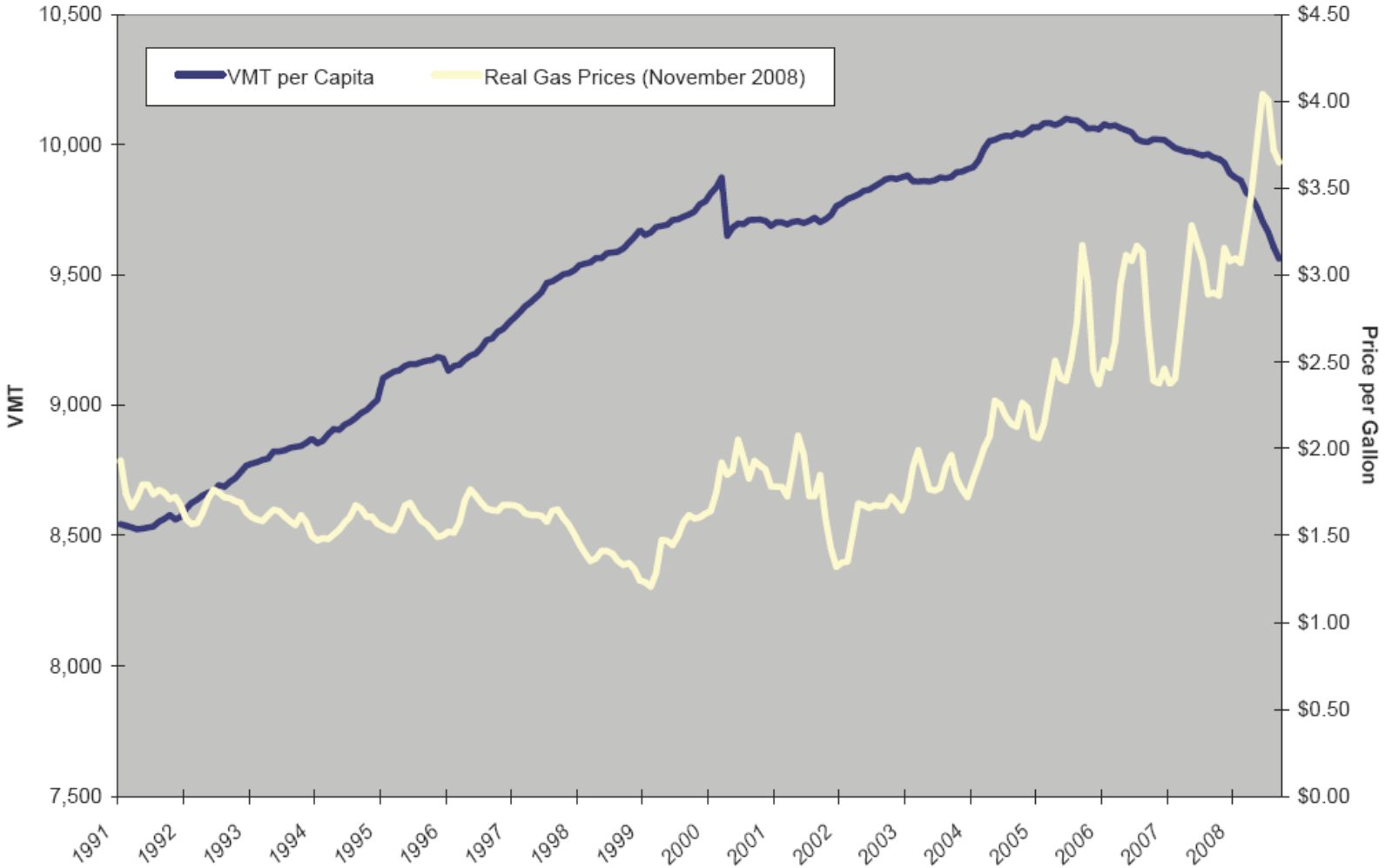
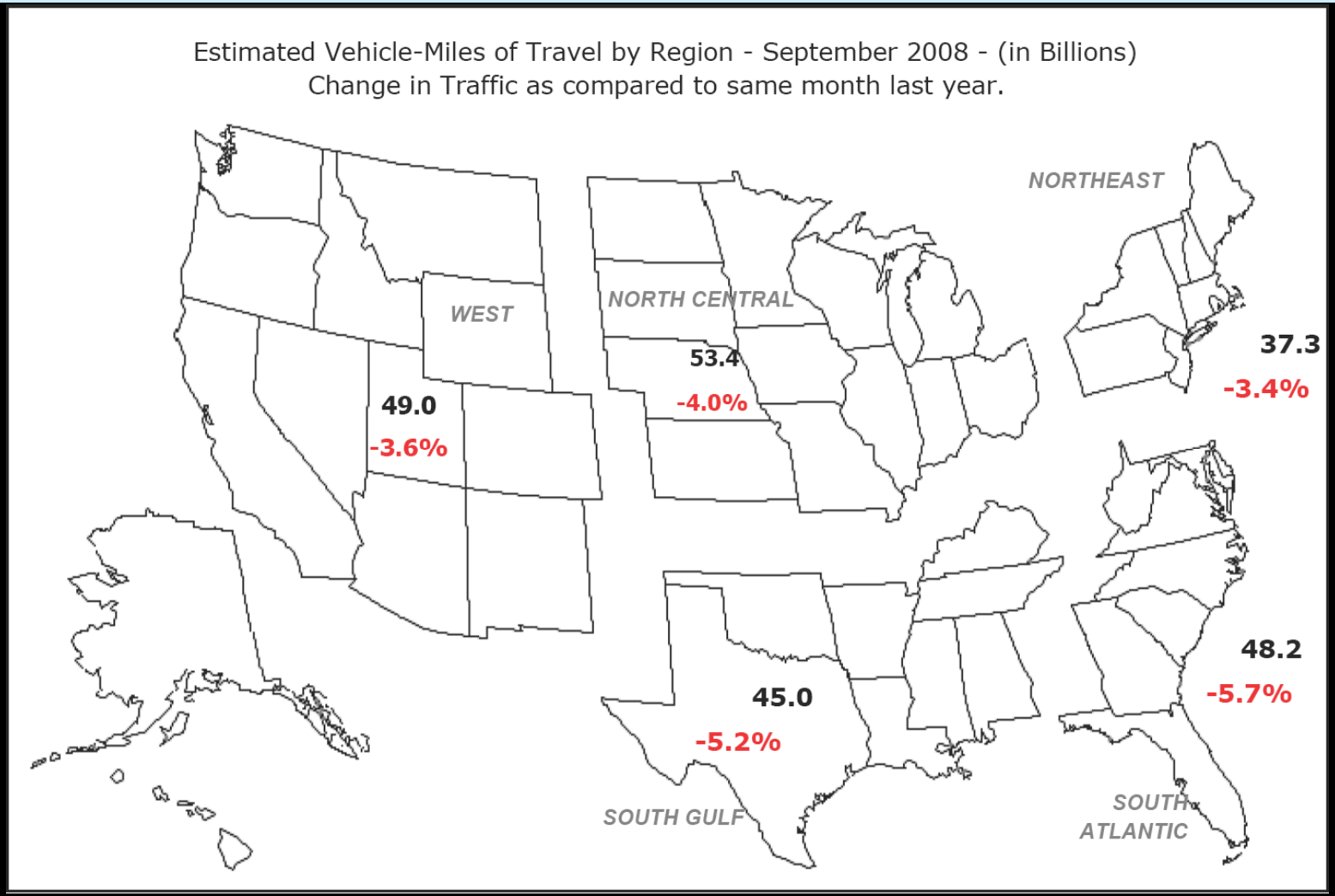


**Figure 1b. U.S. Vehicle Miles Traveled Per Capita, Annualized and Real Gasoline Pump Prices,
January 1991–September 2008**



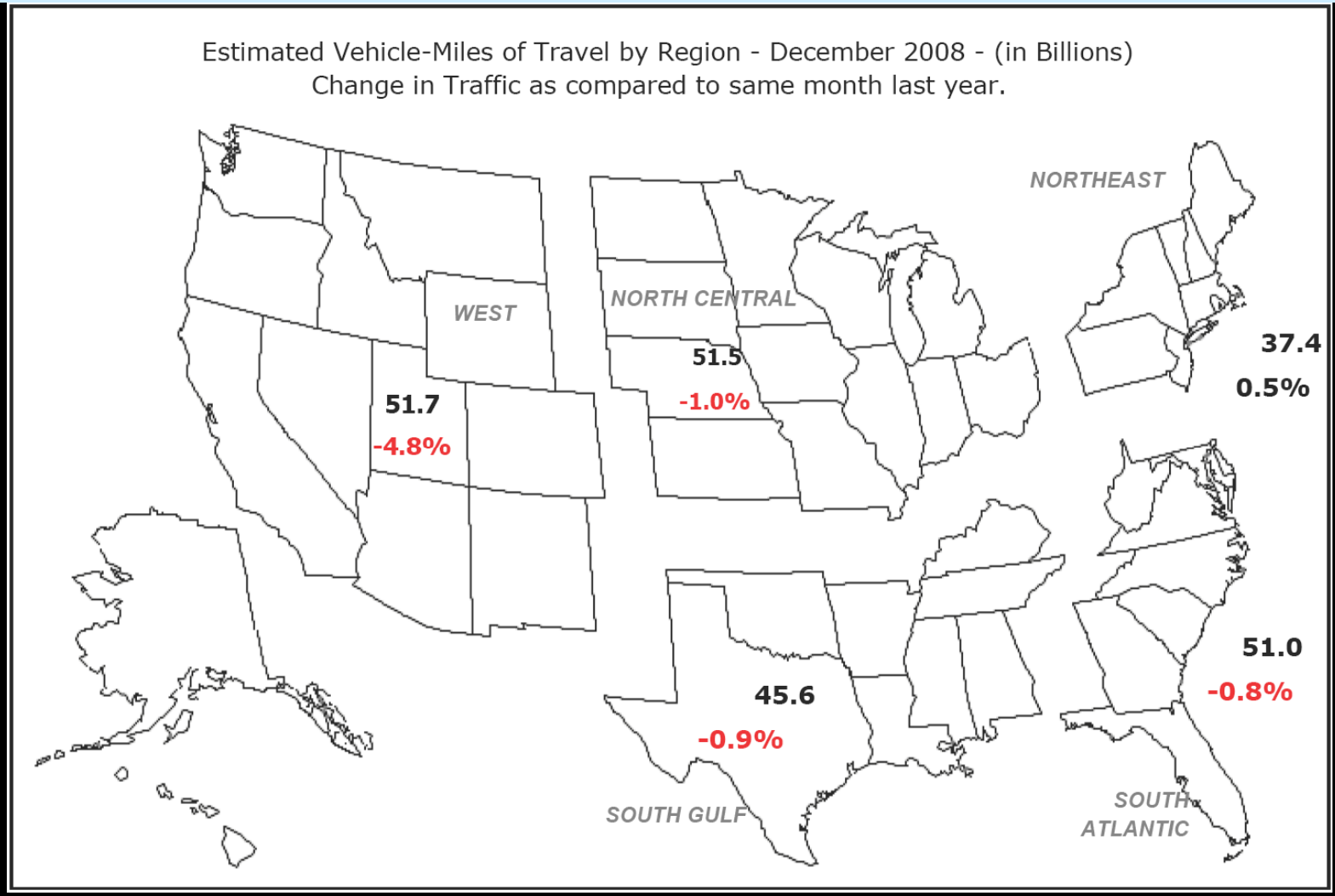
Source: Traffic Volume Trends and Energy Information Administration

Monthly VMT Trend



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

Monthly VMT Trend

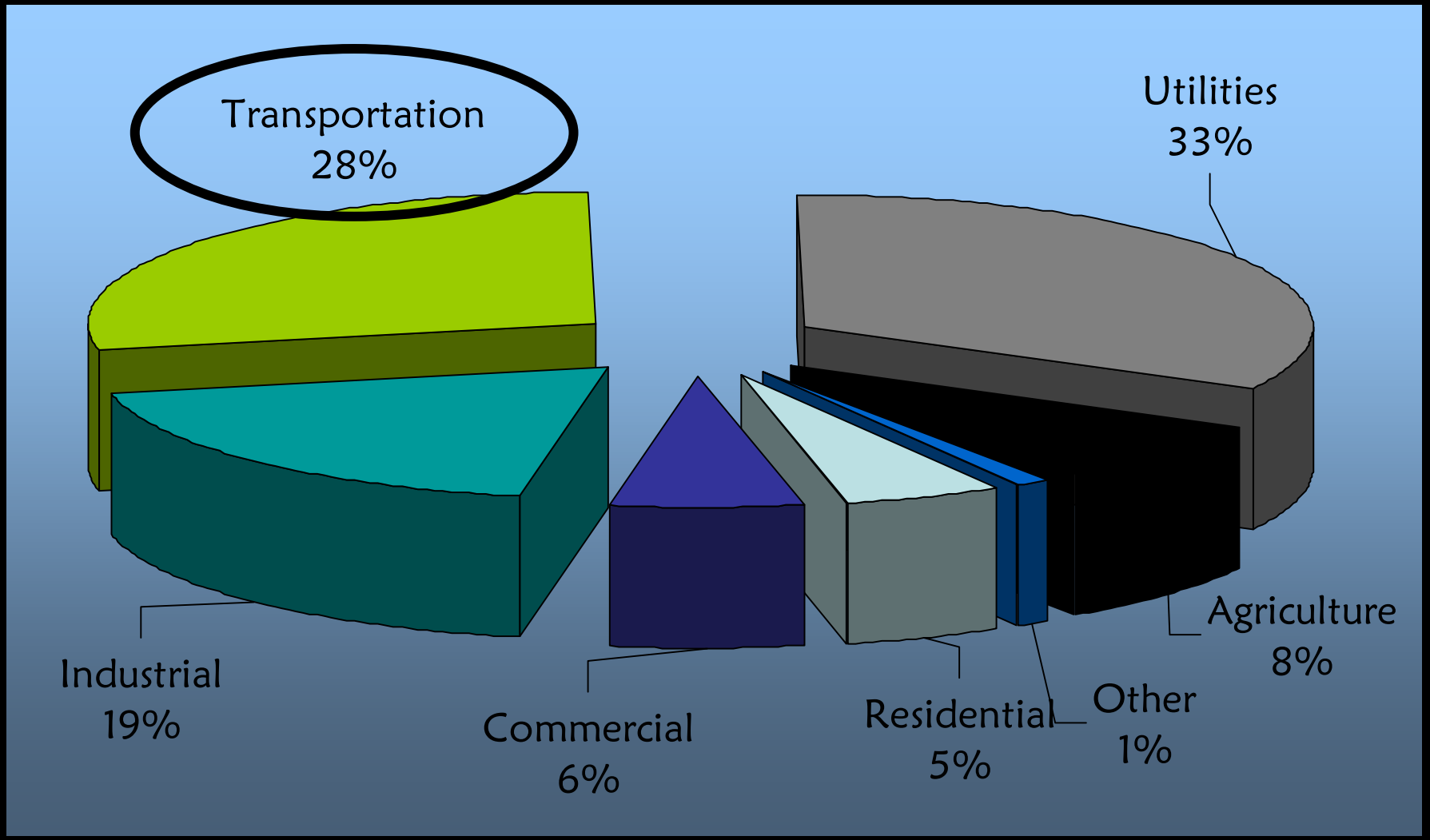


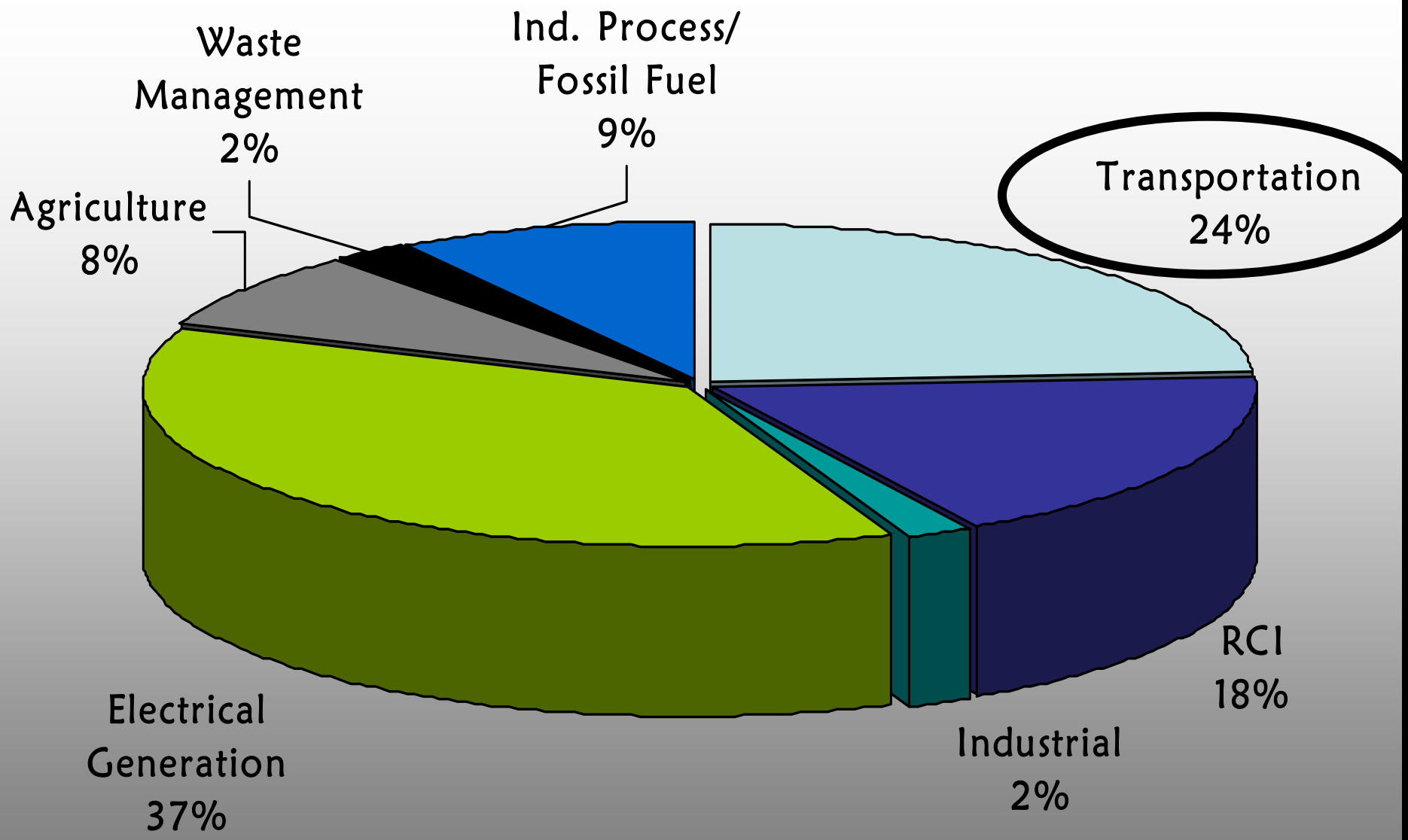
Source: United States Department of Transportation, Traffic Volume Trends, December 2008

Why the VMT Trend Has Turned

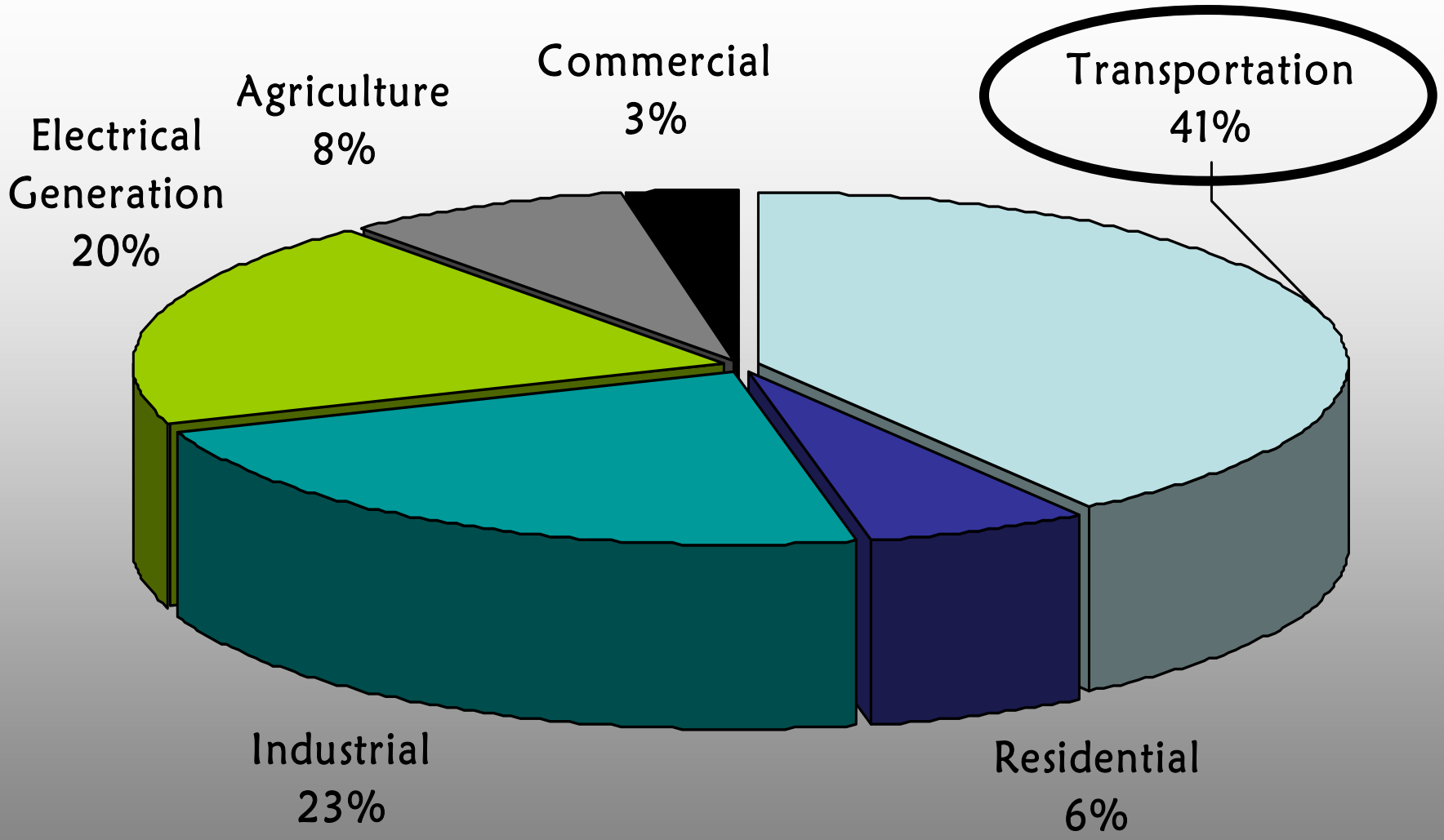
- People do not believe the recent drop in oil prices is permanent
- Households have less money to spend and are hoarding cash

U.S. Greenhouse Gases

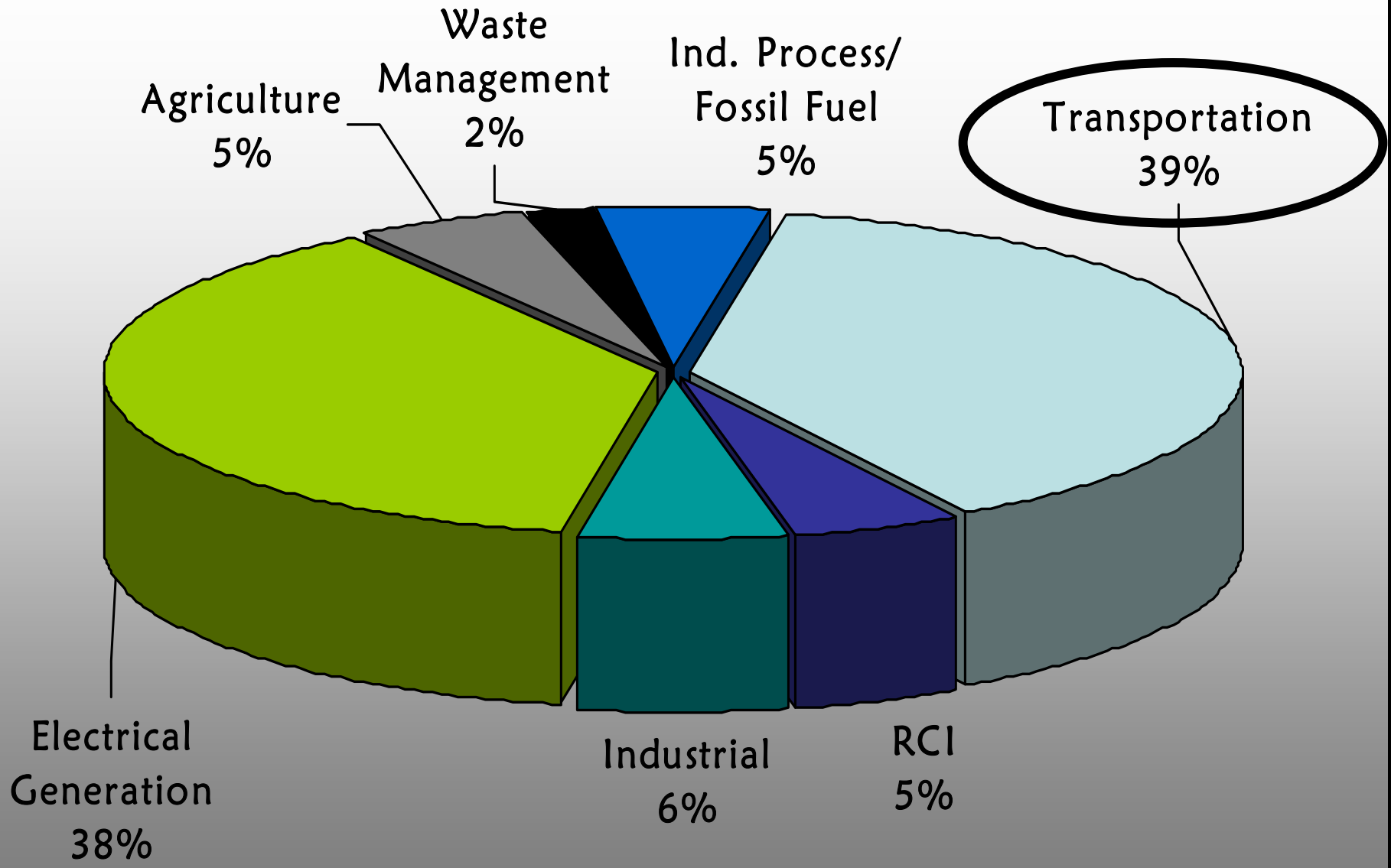



Waste Management 2%
Ind. Process/ Fossil Fuel 9%
Transportation 24%
Agriculture 8%
RCI 18%
Electrical Generation 37%
Industrial 2%

Colorado


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

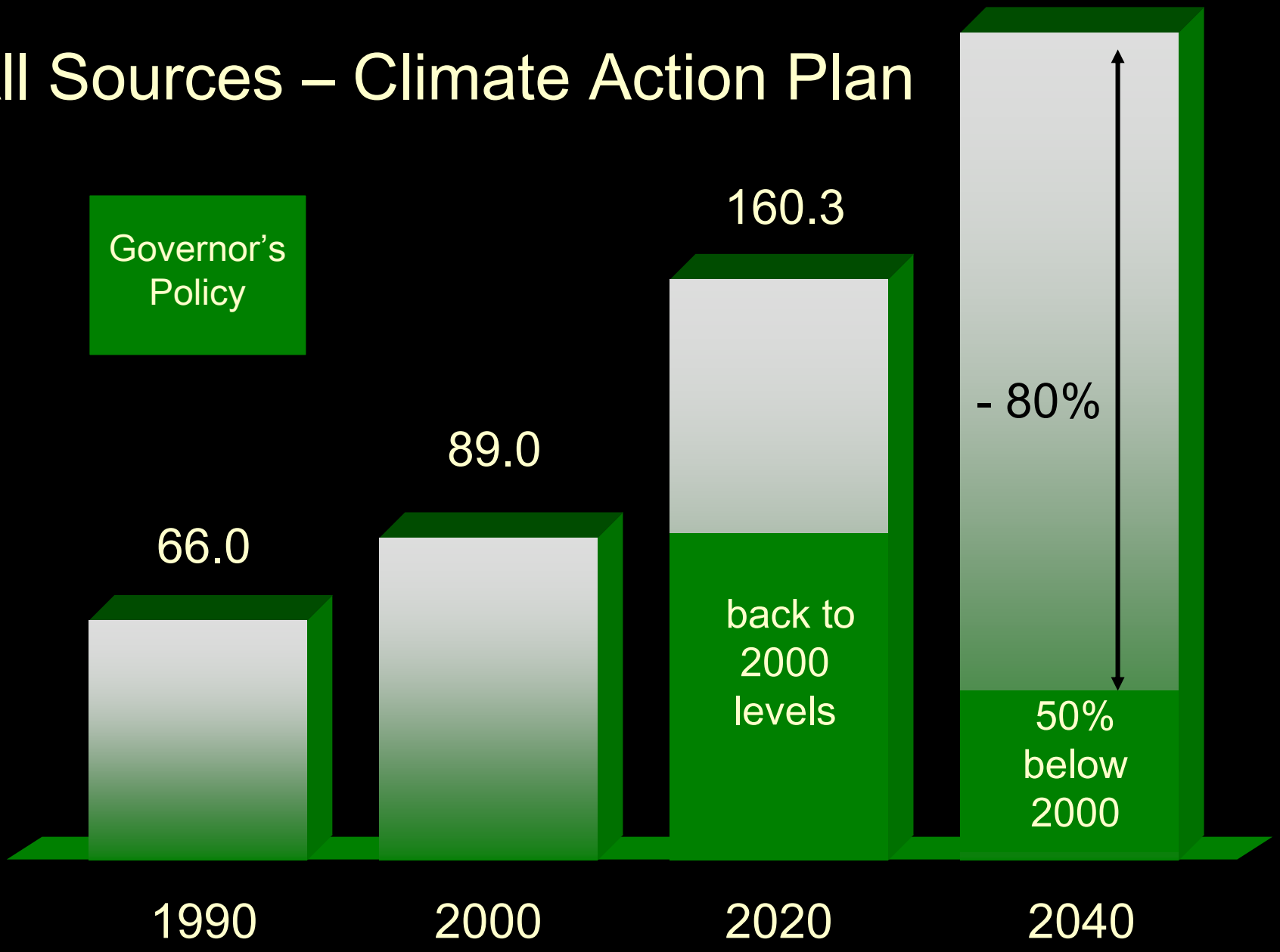
California


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

Arizona

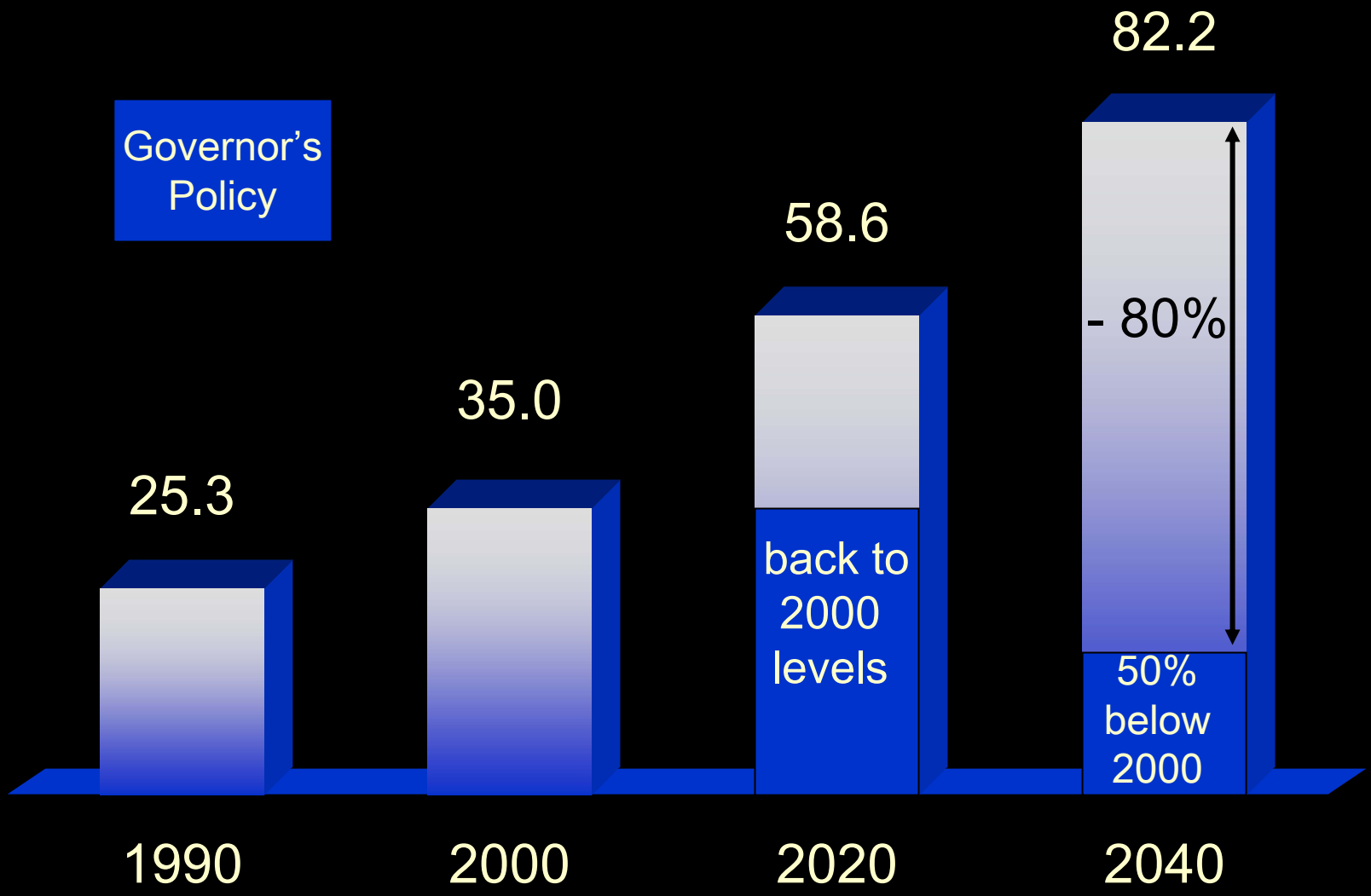
Arizona Gross Greenhouse Gas Emissions

All Sources – Climate Action Plan

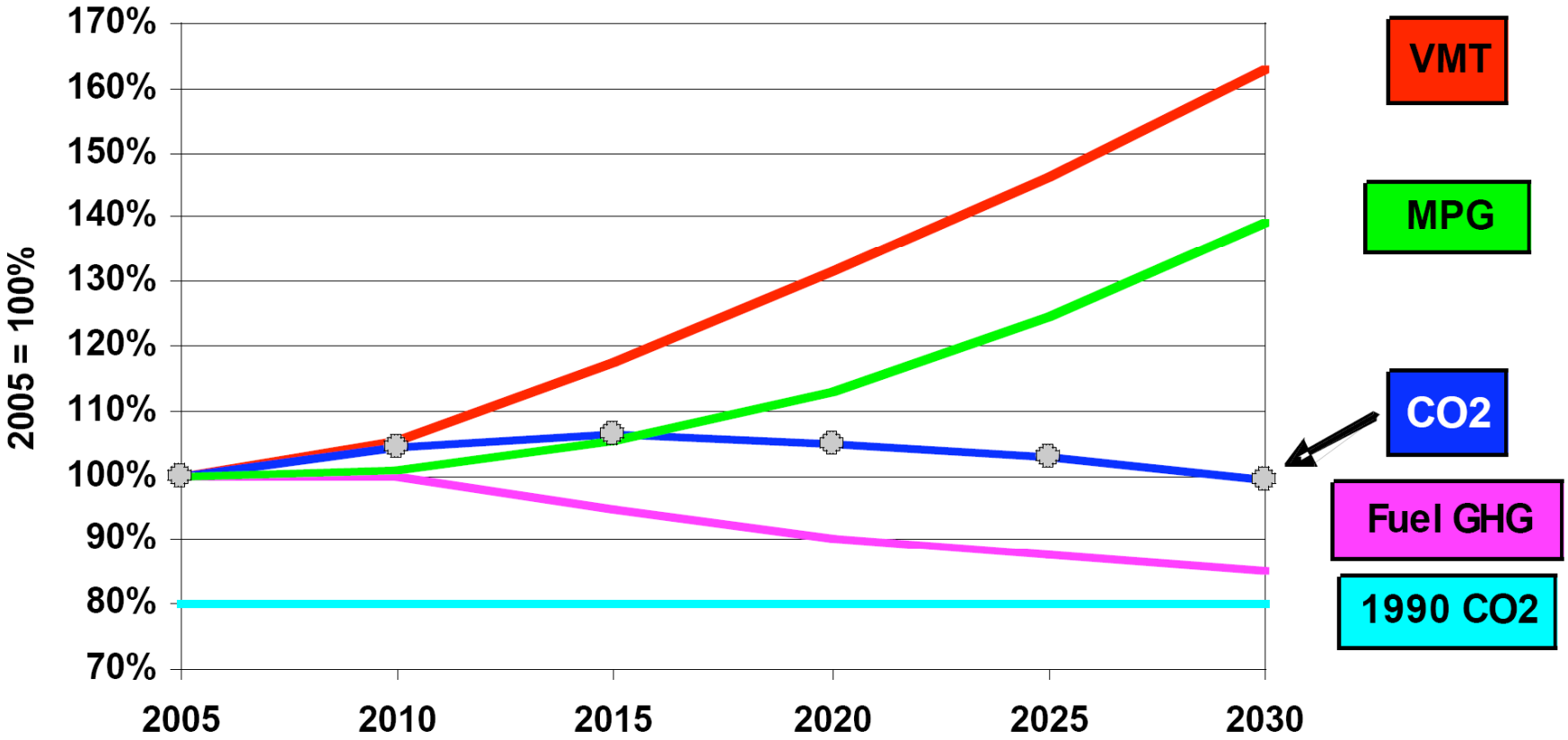


Arizona Gross Greenhouse Gas Emissions

Transportation Sources



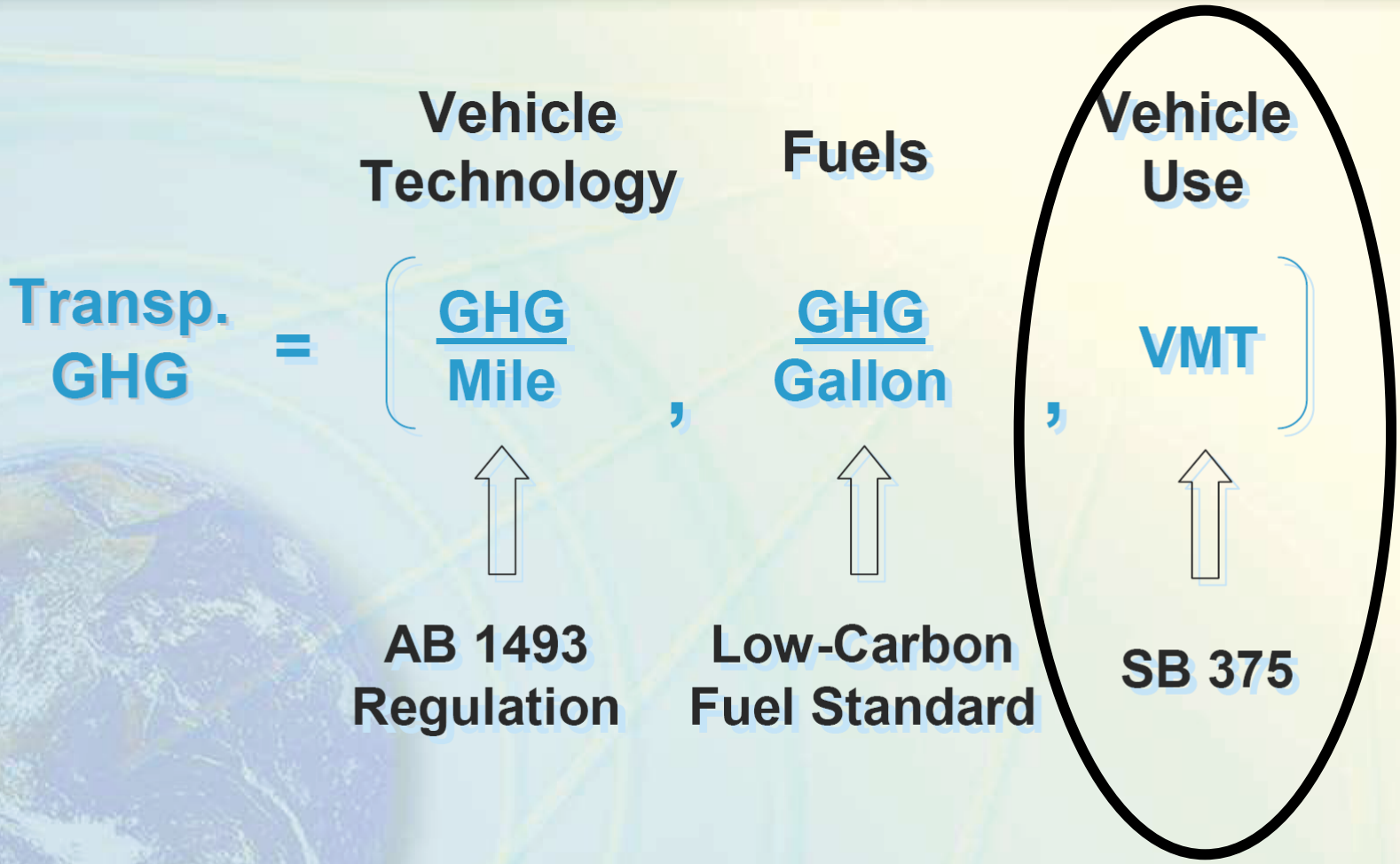
…Even With Very Stringent Standards



Center for Clean Air Policy

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

California's Approach to Transportation GHG



Bottom Line:
Preparing for the Post-Petroleum Era

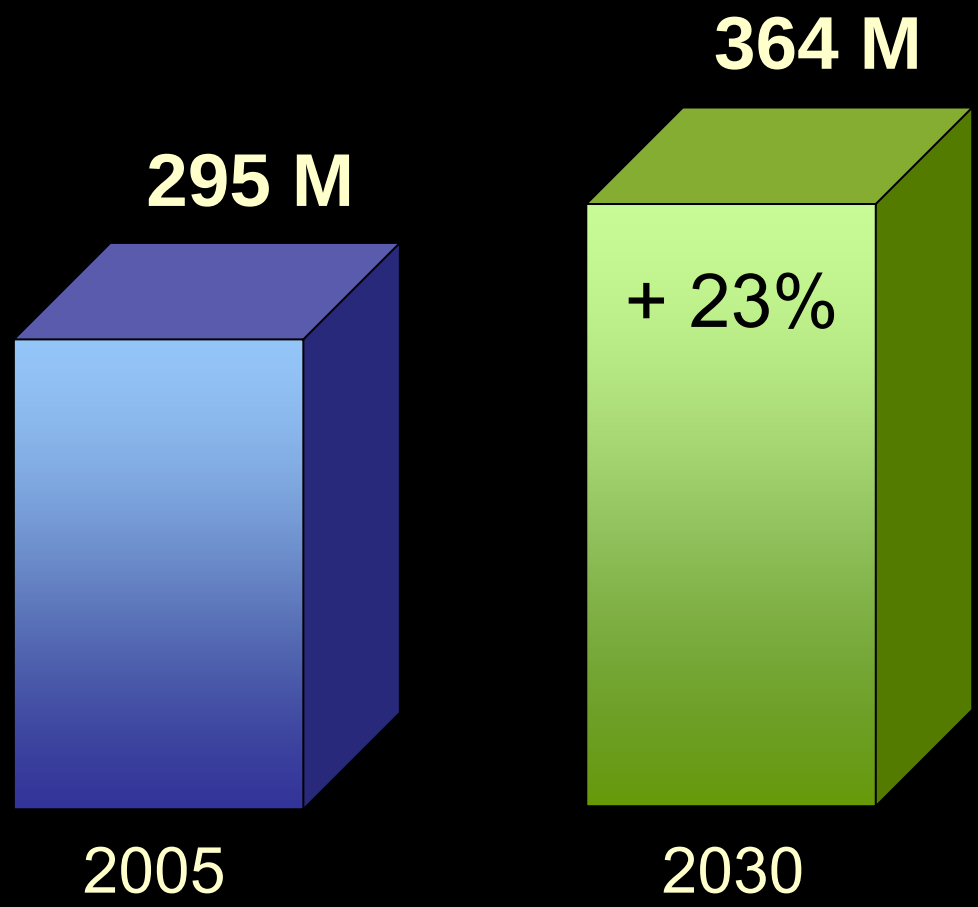
- The post-petroleum era IS NOT the post-car era, but VMT growth will abate
- Your traffic forecasts are wrong
- The VMT trend is being driven by household economics, not by policy
- Local & regional actions to reduce GHG emissions will be driven by economics & federal policy, not volunteerism

Challenge 2.
Deciding Where the People Should Live

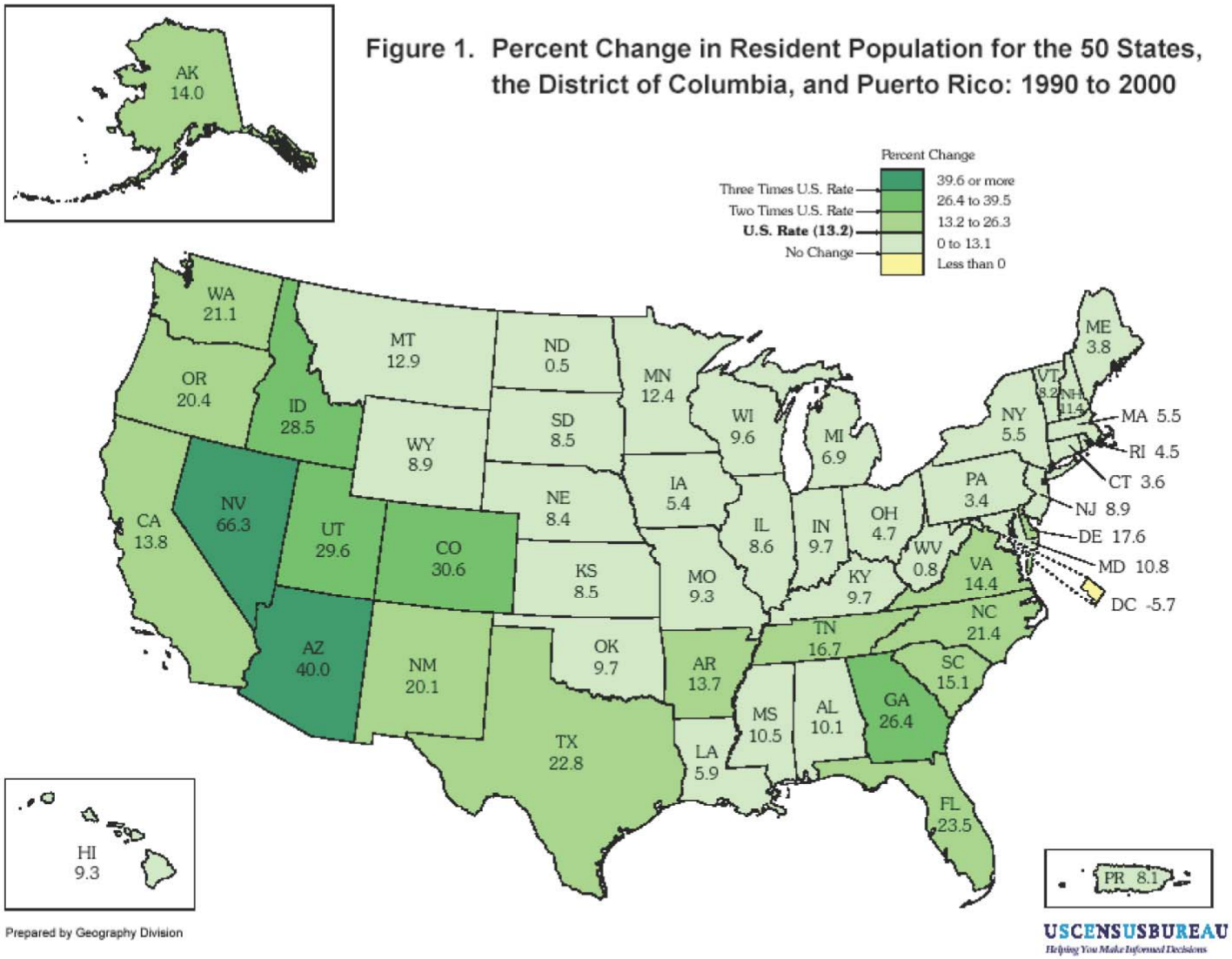
Regional Approaches

They Are Coming

US Population



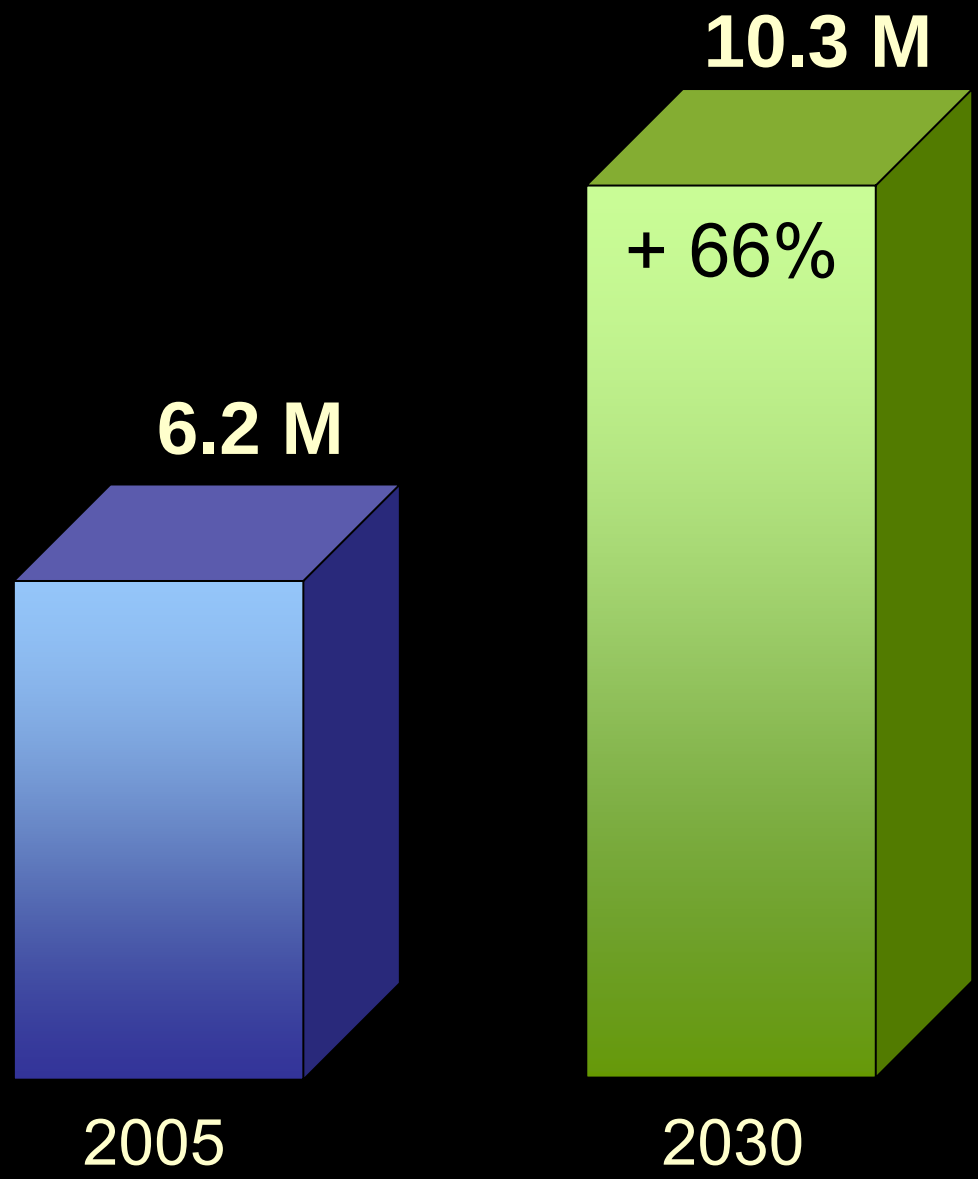
Population Growth by States, 1990s



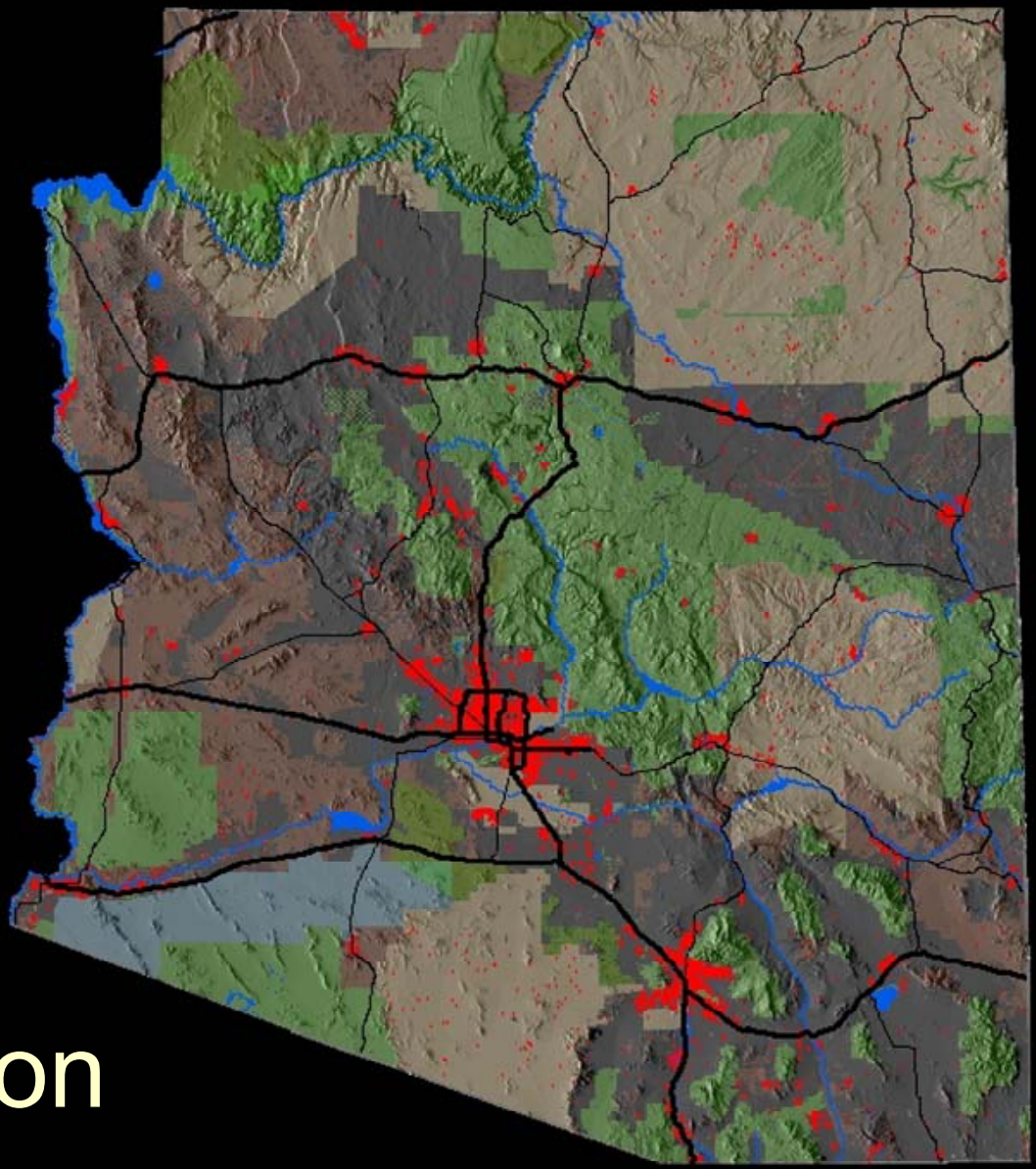
Colorado State Demography Office

They Are Coming

Arizona Population



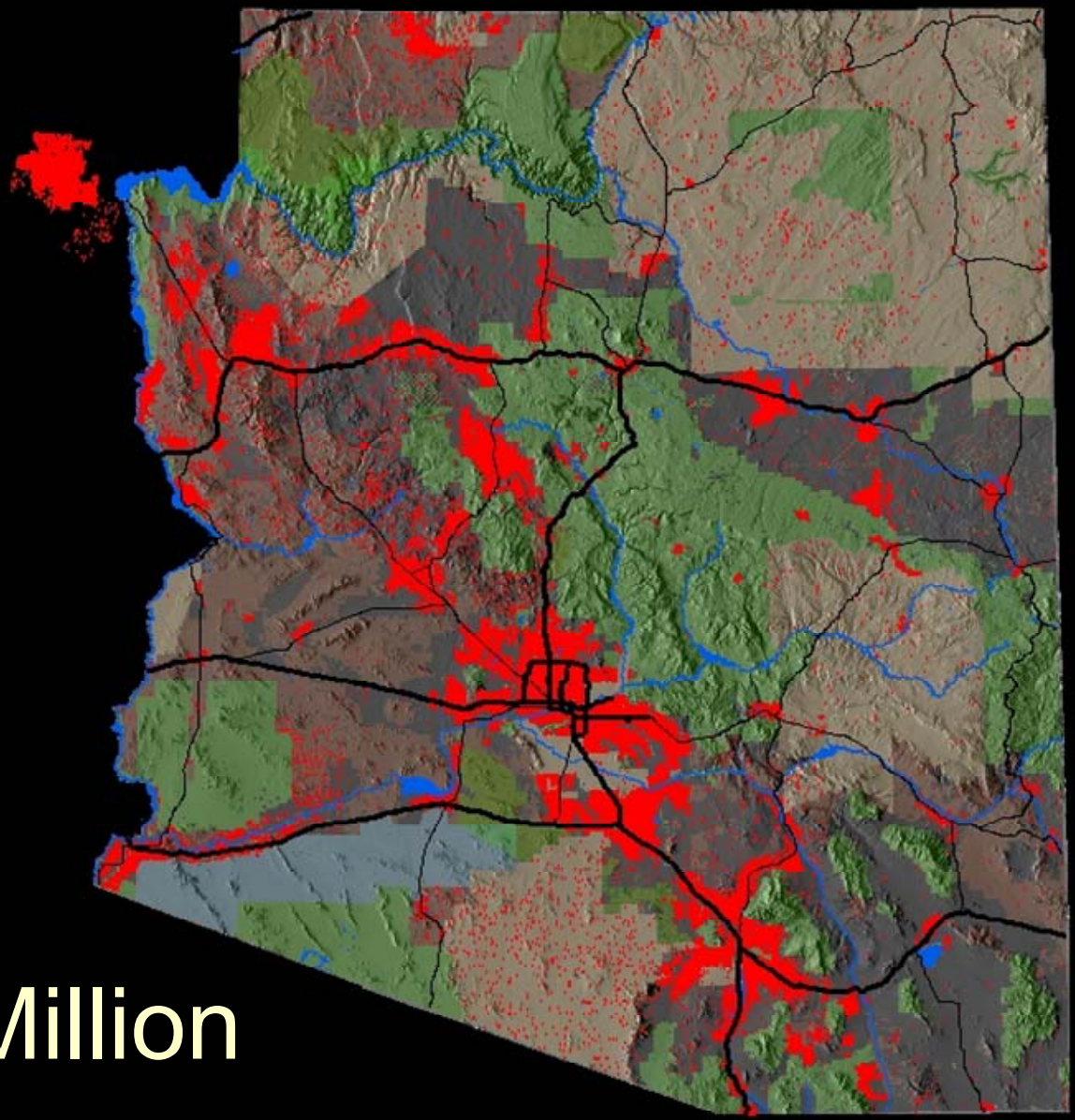
2000



5.1 Million
People

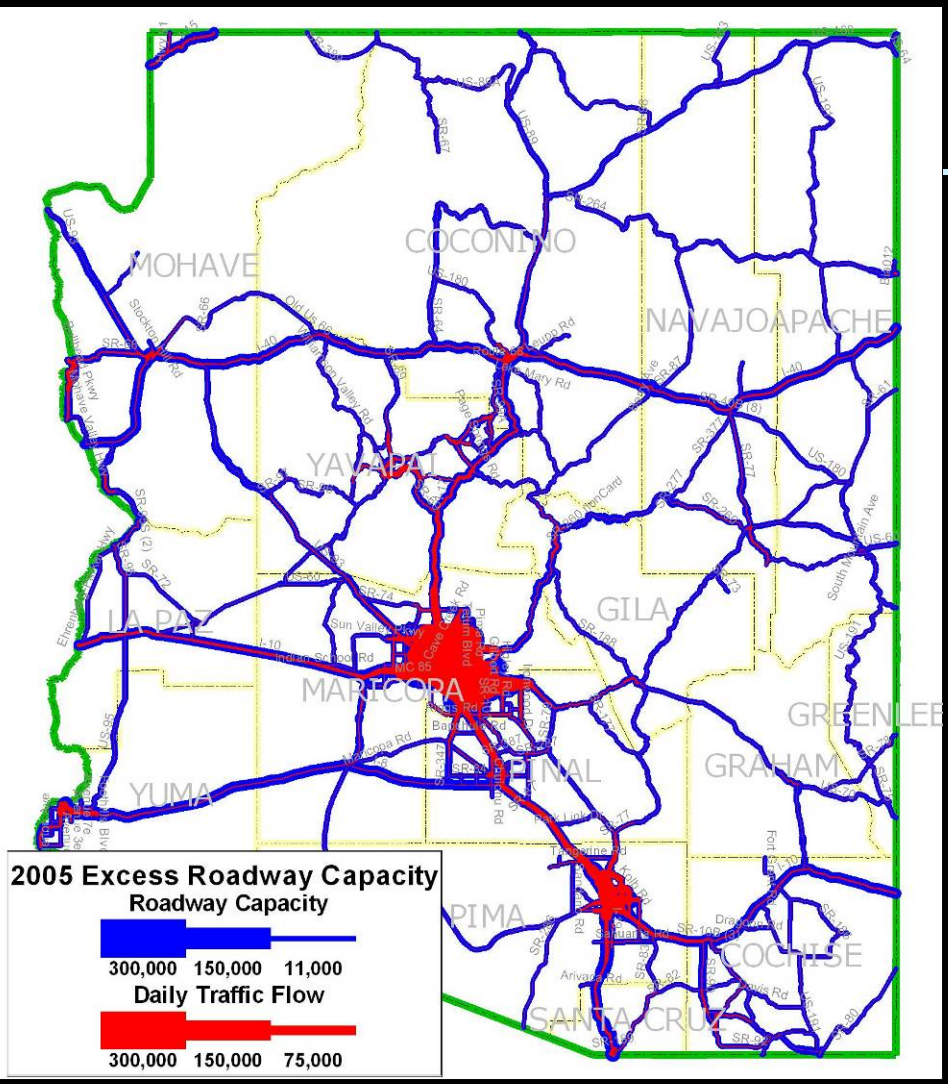
MARICOPA ASSOCIATION of GOVERNMENTS

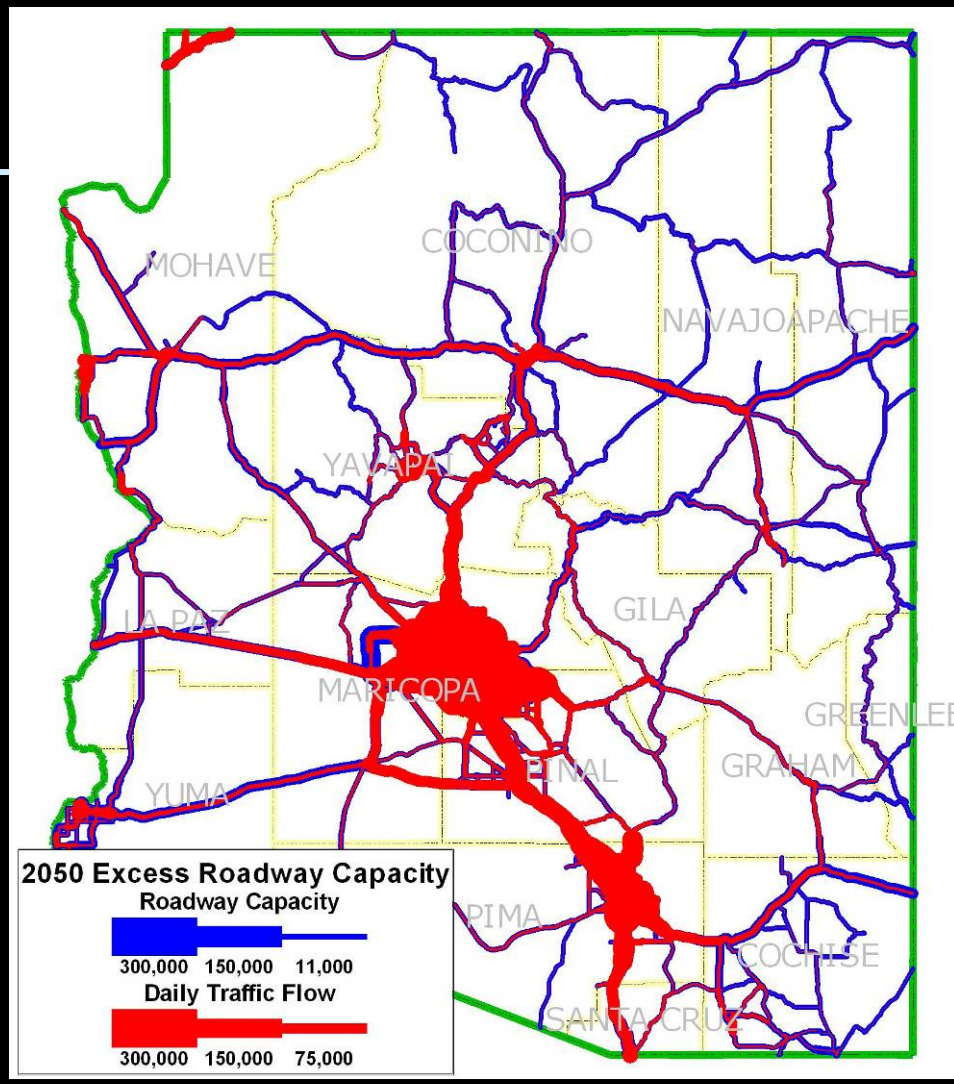
2050



14.1 Million People

MARICOPA ASSOCIATION of GOVERNMENTS


MOHAVE
COCONINO
NAVAJO
APACHE
YAVAPAI
LA PAZ
GILA
MARICOPA
GREENLEE
PINAL
GRAHAM
YUMA
PIMA
COCHISE
SANTA CRUZ
2005 Excess Roadway Capacity
Roadway Capacity
300,000 150,000 11,000
Daily Traffic Flow
300,000 150,000 75,000


MOHAVE
COCONINO
NAVAJO
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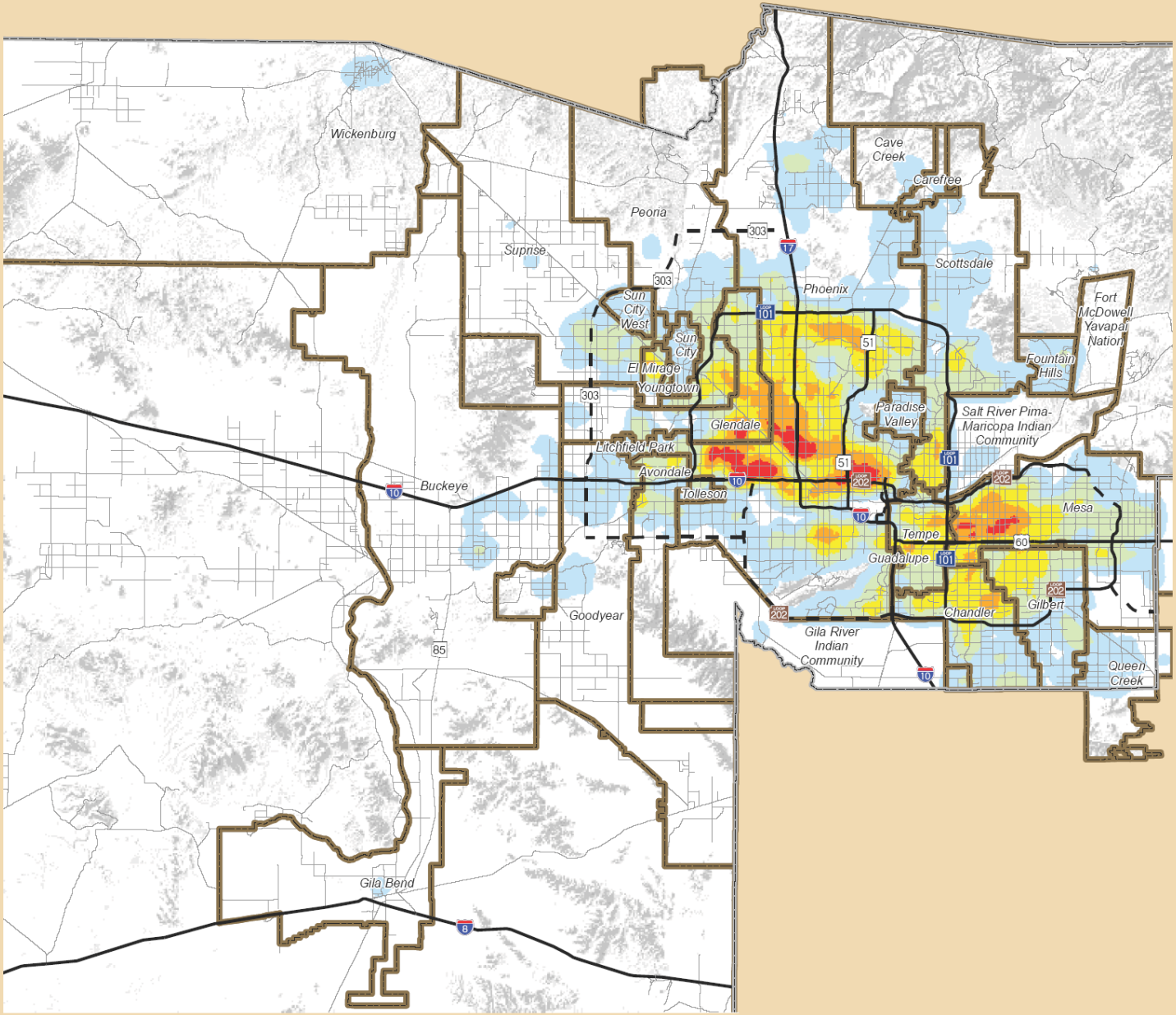
LA PAZ
GILA
MARICOPA
GREENLEE
PINAL
GRAHAM
YUMA
PIMA
COCHISE
SANTA CRUZ
2050 Excess Roadway Capacity
Roadway Capacity
300,000 150,000 11,000
Daily Traffic Flow
300,000 150,000 75,000

MARICOPA ASSOCIATION of GOVERNMENTS

POPULATION CONCENTRATION 2005

Maricopa County, Arizona

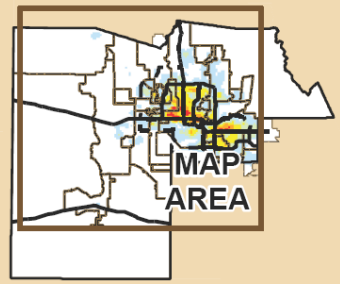


Persons Per Square Mile
(Maricopa County Average = 399)

- Less than 250
- 250 to 2000
- 2000 to 4000
- 4000 to 6000
- 6000 to 8000
- More than 8000
- Municipal Planning Area
- Maricopa County

Freeways/Expressways

- Existing
- Planned
- Major Roads



Map Prepared by Maricopa Association of Governments
Source: MAG 2007 Projections Concentration Grid

April 2007

Miles
0 25 50 75 100

N

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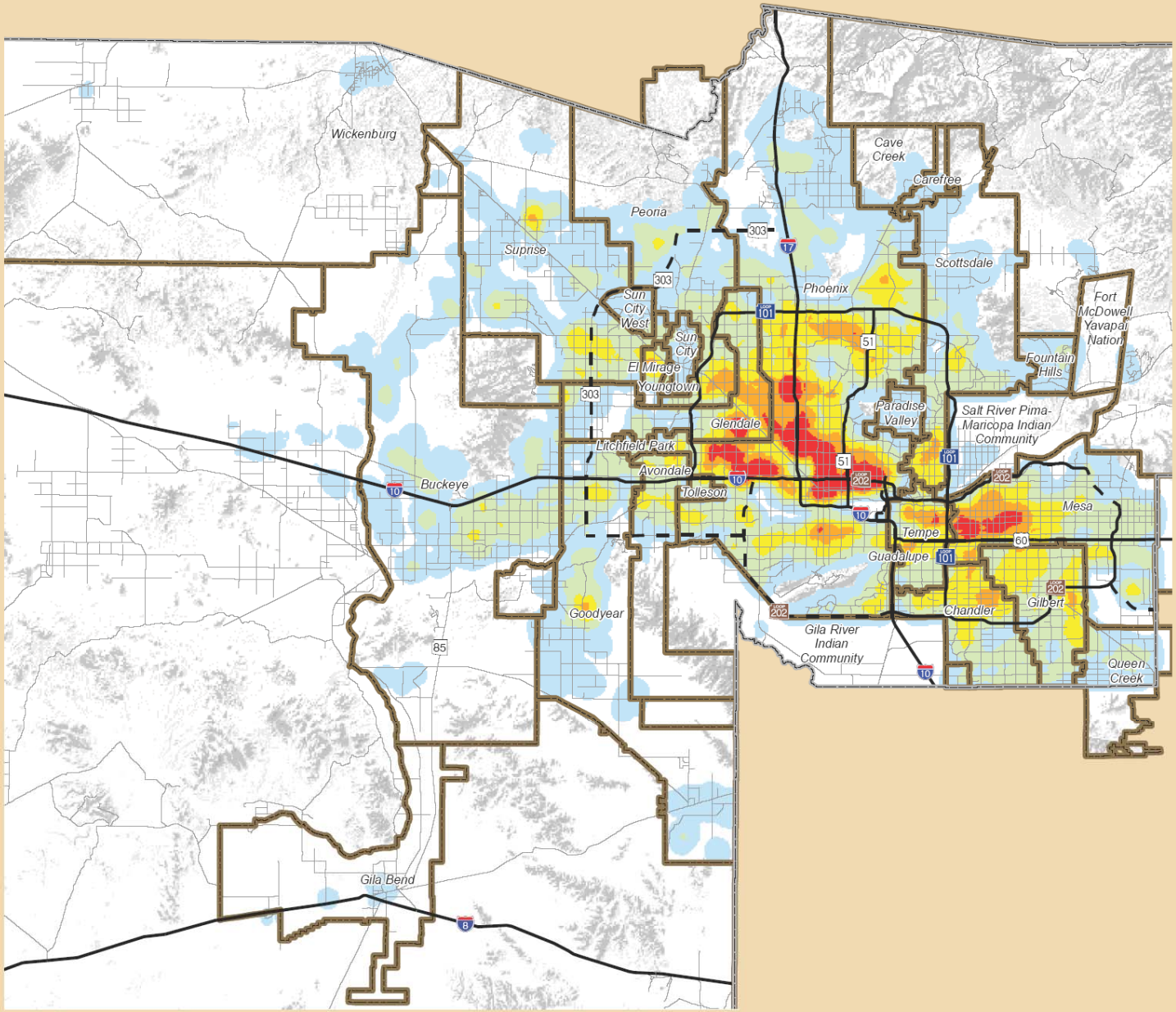
MARICOPA ASSOCIATION of GOVERNMENTS

POPULATION CONCENTRATION 2030

Maricopa County, Arizona

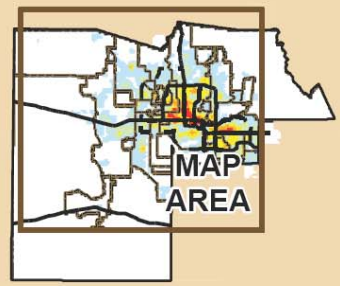


Persons Per Square Mile
(Maricopa County Average = 665)

- Less than 250
- 250 to 2000
- 2000 to 4000
- 4000 to 6000
- 6000 to 8000
- More than 8000
- Municipal Planning Area
- Maricopa County

Freeways/Expressways

- Existing
- Planned
- Major Roads



Map Prepared by Maricopa Association of Governments
Source: MAG 2007 Projections Concentration Grid

April 2007

0 25 50 75 100 Miles

N

g:\dev\maps\Projections2007\pop_conc30.mxd

Bottom Line:

Deciding Where the People Should Live

- Western states must absorb millions of new people within the next two decades
- Will we plan for them? Where?

Existing Cities

- TODs
- Other infill, refill

New Cities

- TODs
- Other

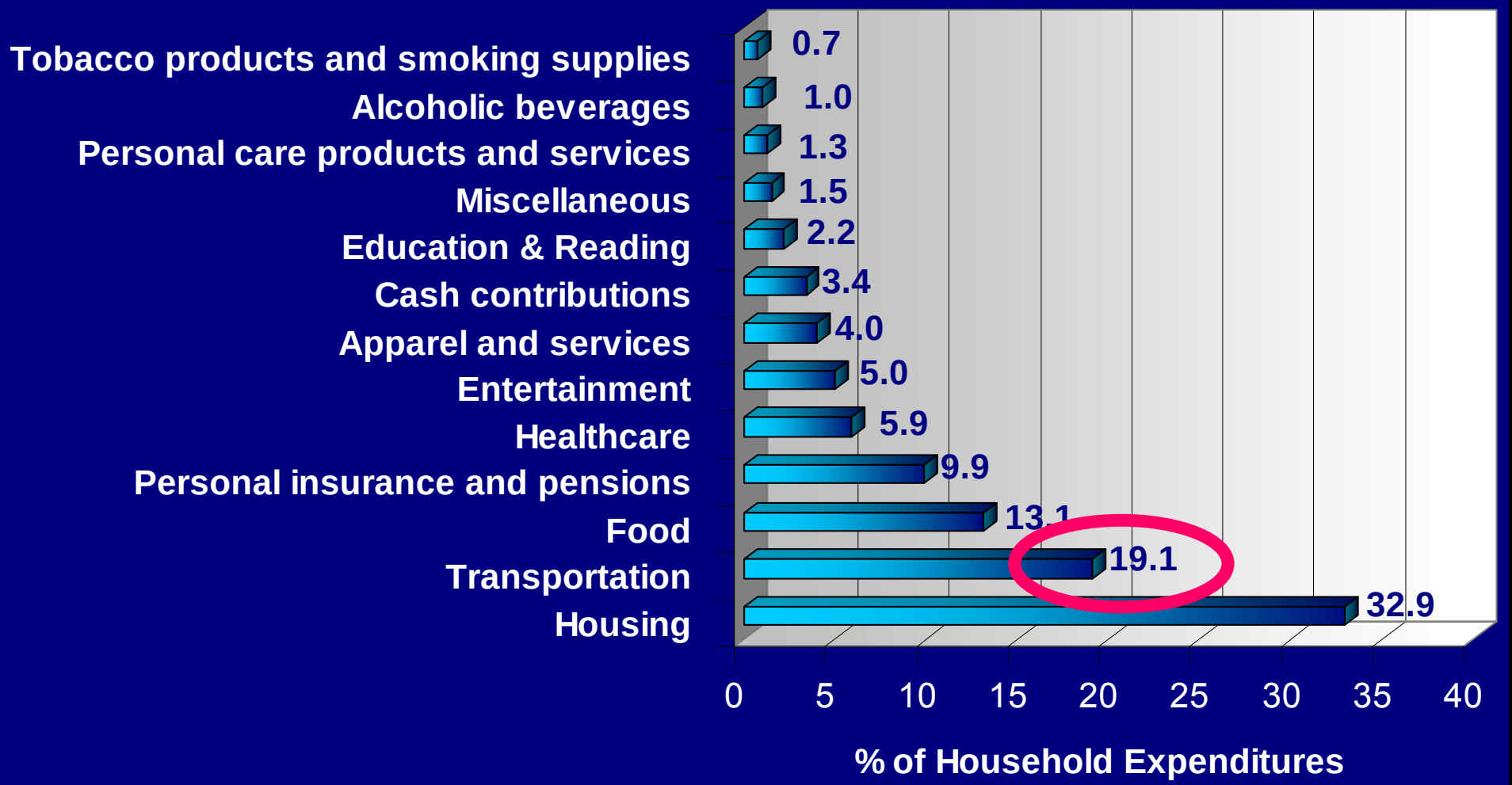
Sprawl

Challenge 3.
Providing for Prosperity

Regional Approaches

Charlier Associates, Inc.

Household Expenditures



TYPICAL HOUSEHOLD BUDGET IN 28 METROPOLITAN AREAS

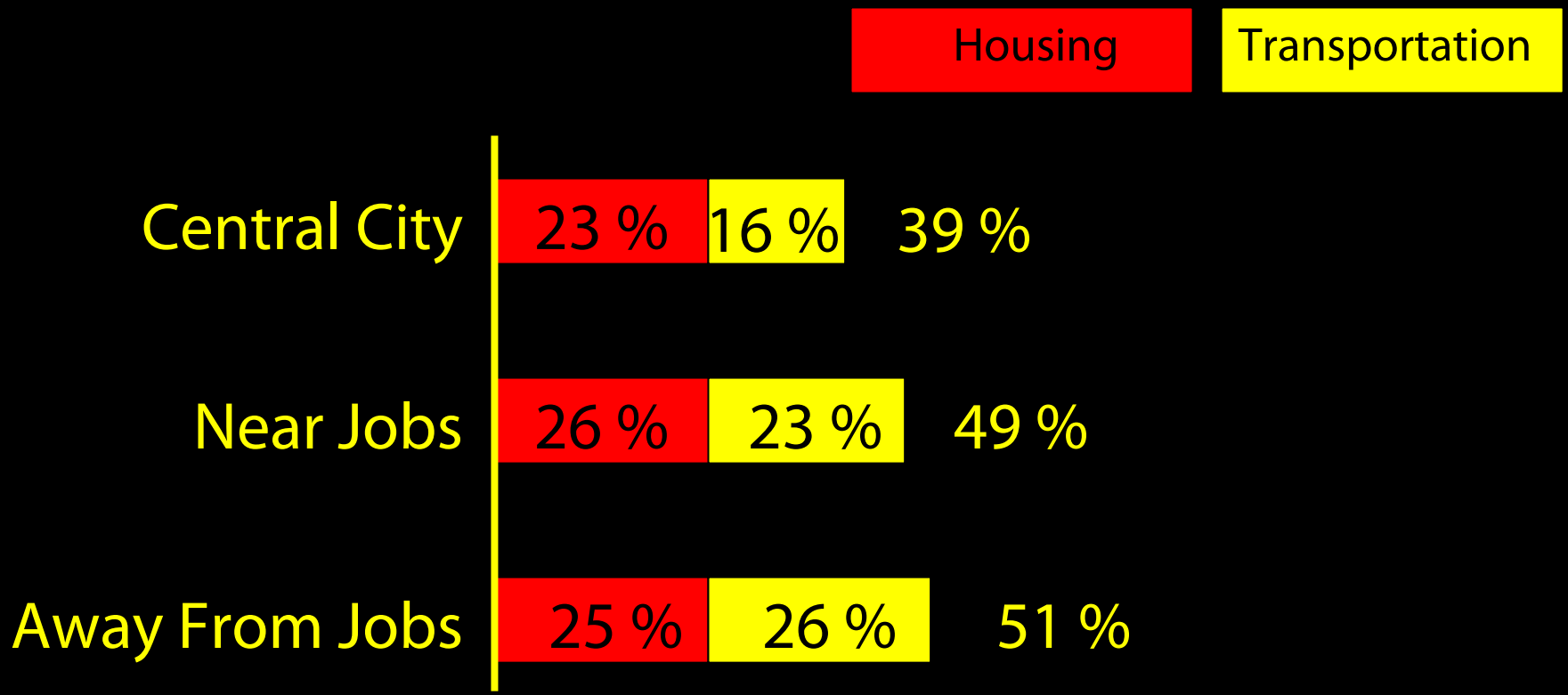
(Expenses as a share of income)

	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%

Source: A Heavy Load, Center for Neighborhood Technology

Share of Family Income Spent On Housing & Transportation

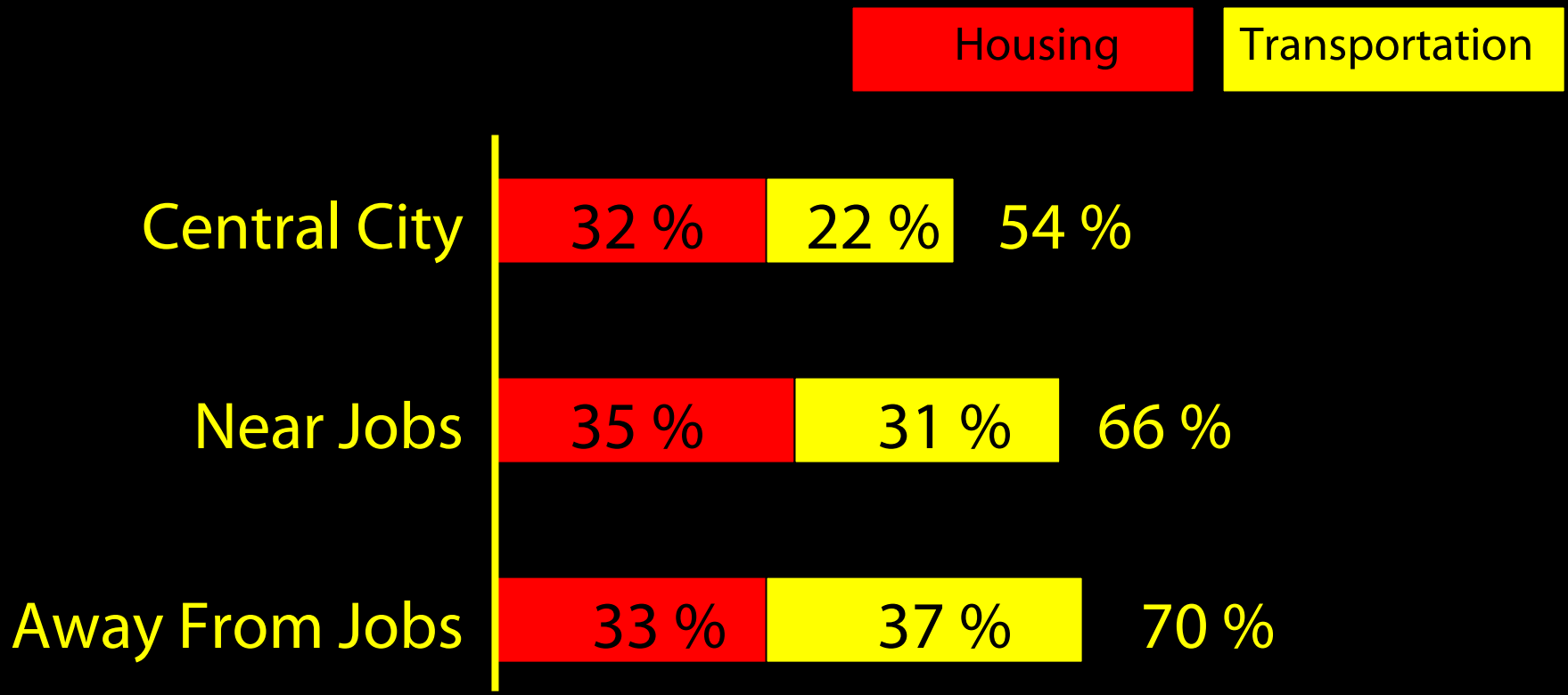
Family Income = $35,000 - $50,000



Source: A Heavy Load, Center for Neighborhood Technology

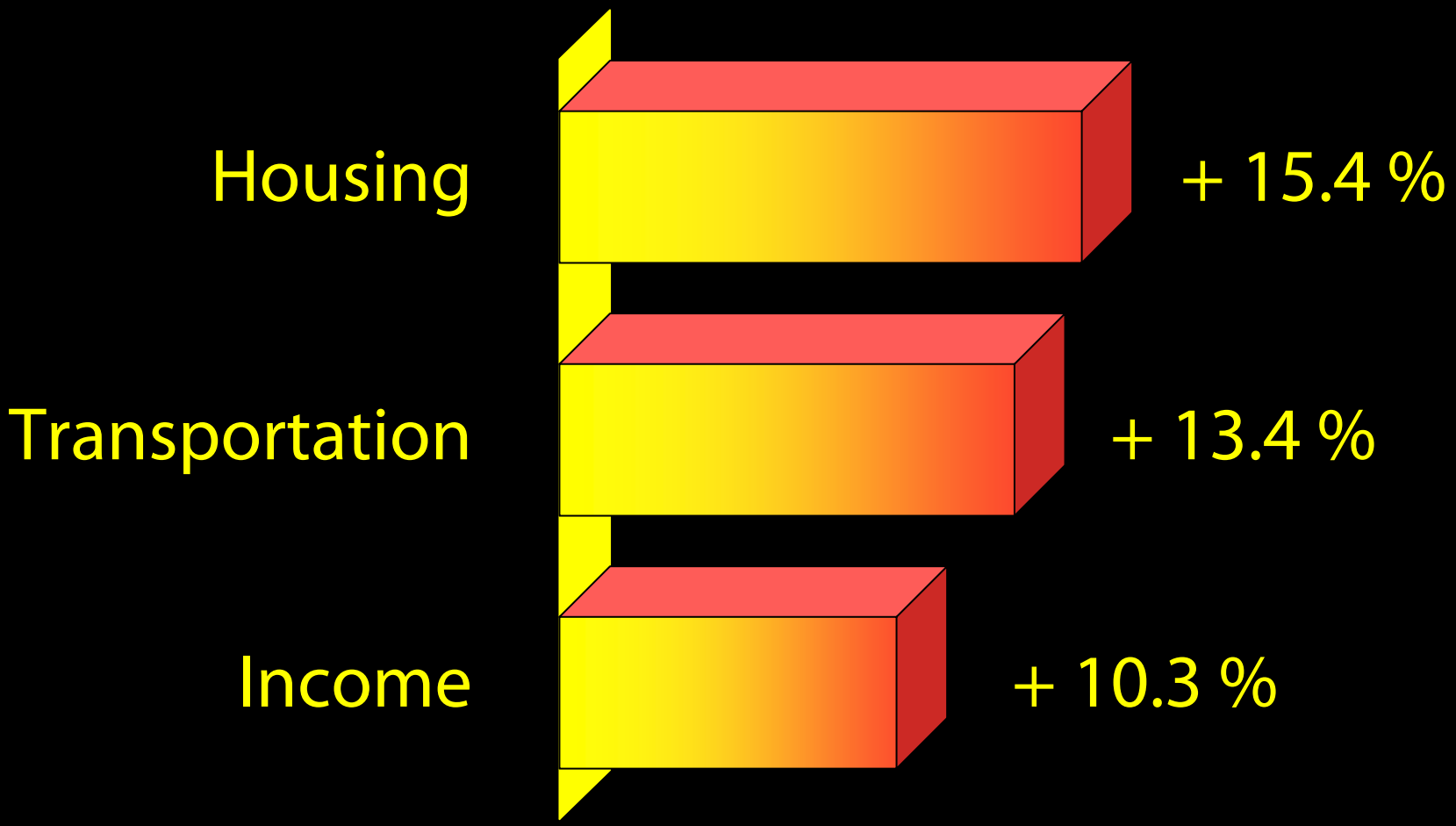
Share of Family Income Spent On Housing & Transportation

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



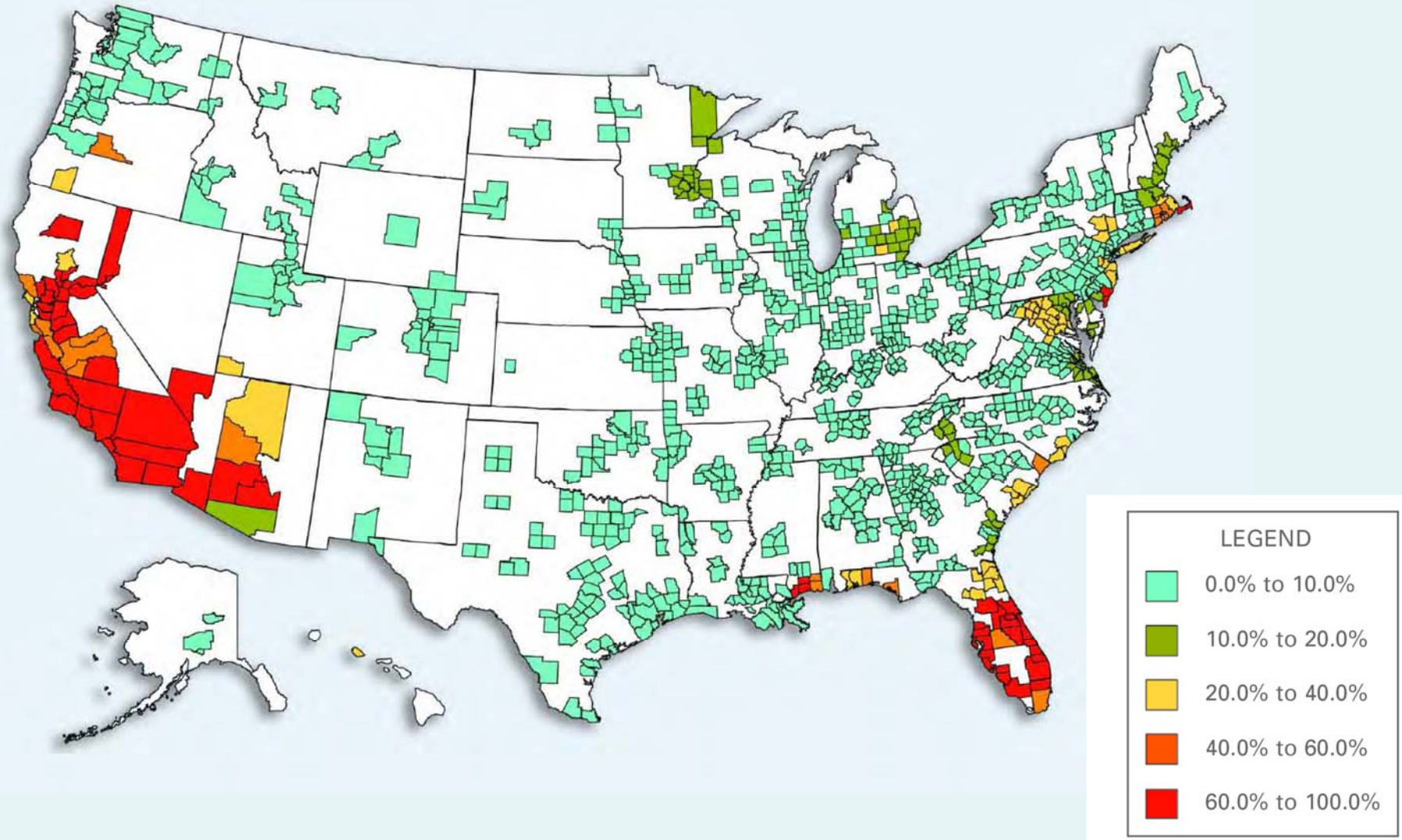
Source: A Heavy Load, Center for Neighborhood Technology

Family Costs Rising Faster Than Incomes
(2000 – 2005)



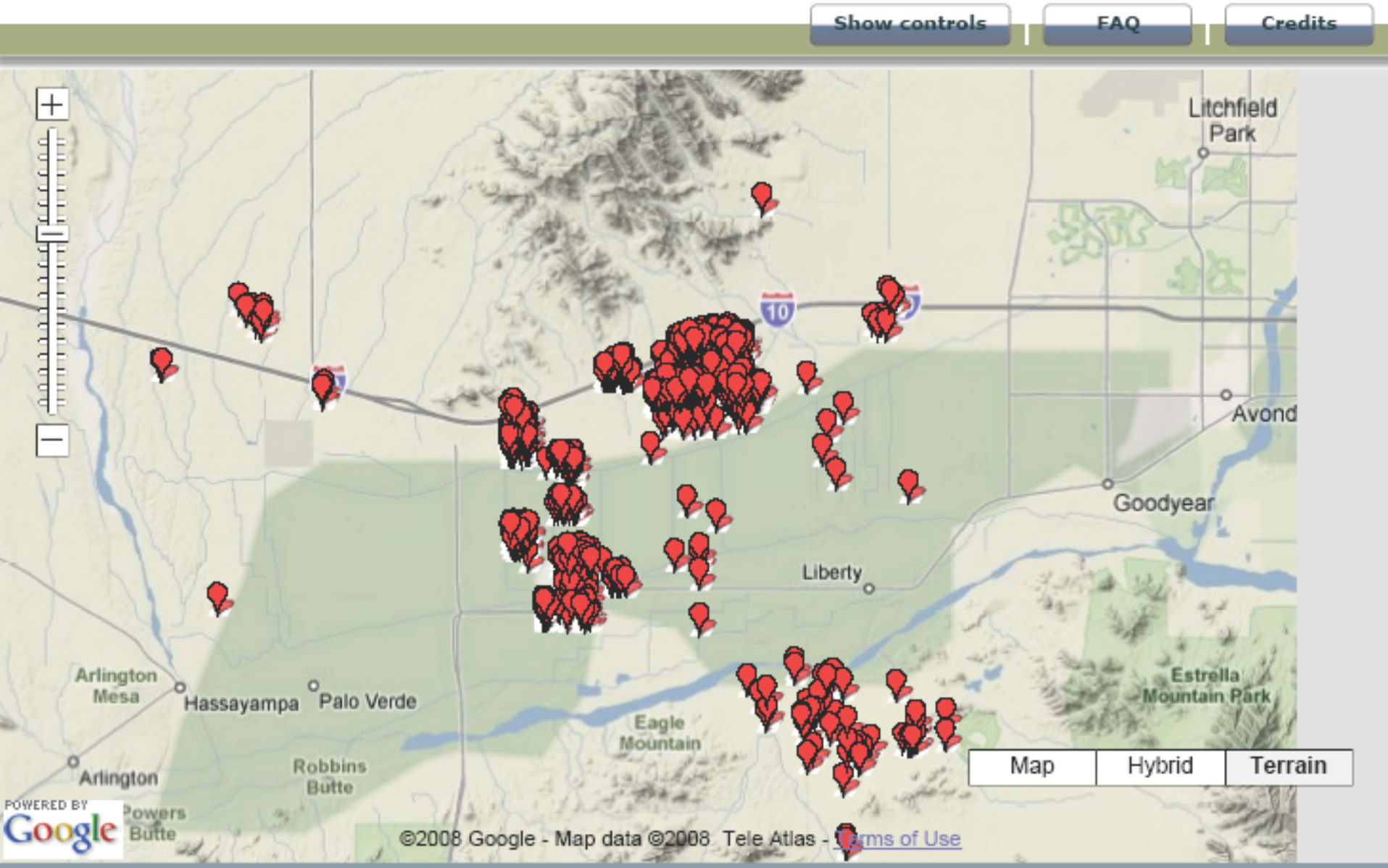
Source: A Heavy Load, Center for Neighborhood Technology

Geographic Distribution of
HOUSE PRICE RISK



FORECLOSURES BY ZIP CODE

azcentral.com



Bottom Line:
Providing for Prosperity

- Mobility is costing households & businesses too much
- If we are to have a large middle class, we must re-tool our jobs-housing relationships & our supporting transportation systems
- The market for exurban sprawl has shrunk… and may be gone entirely
- Cities are about to become very popular places to live

Opportunities

Regional Approaches

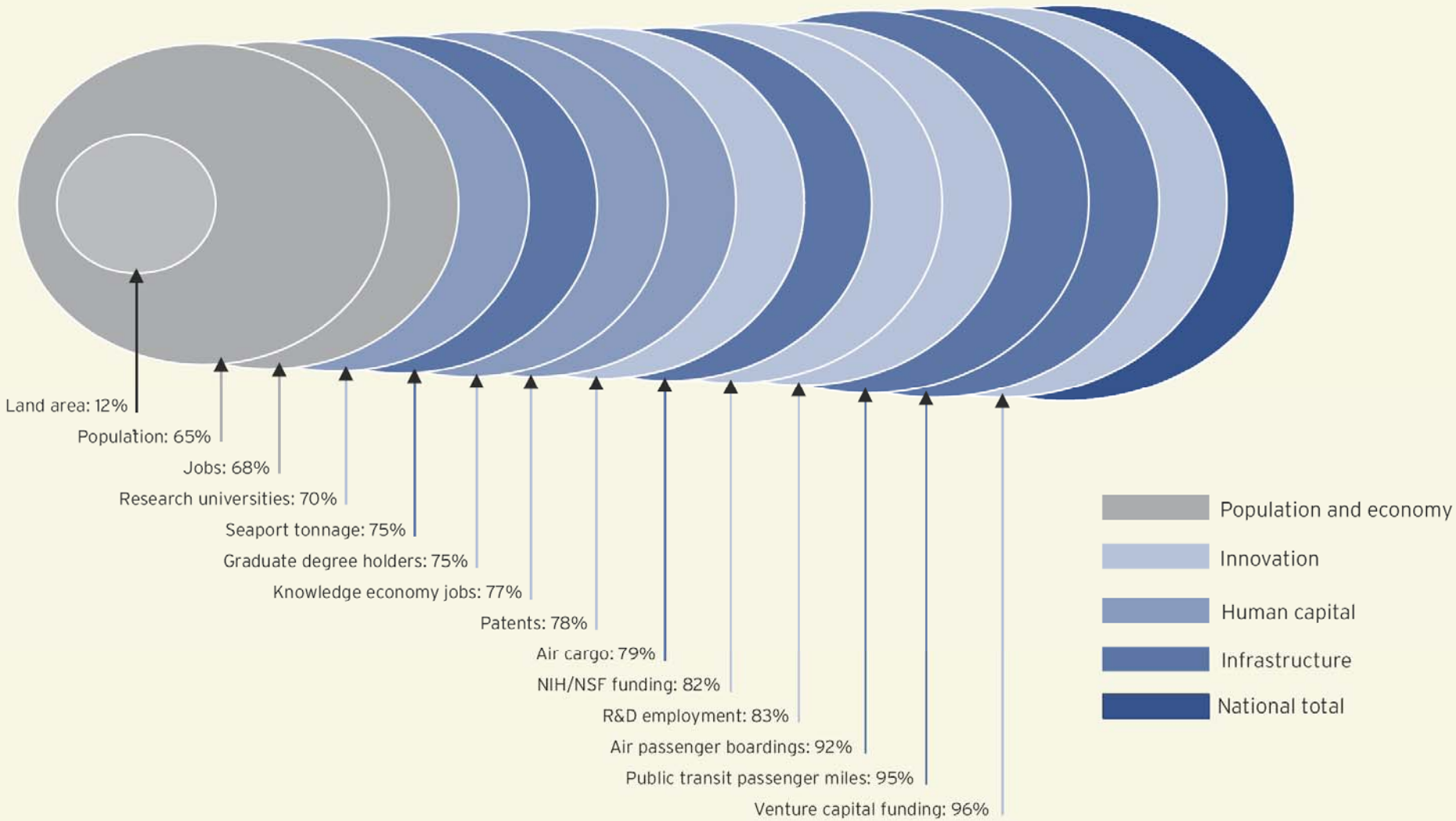
Opportunities

1. Cities that work
2. Intercity rail corridors
3. Regional scenario planning
4. Reinventing transportation finance

Opportunity 1. Cities that Work

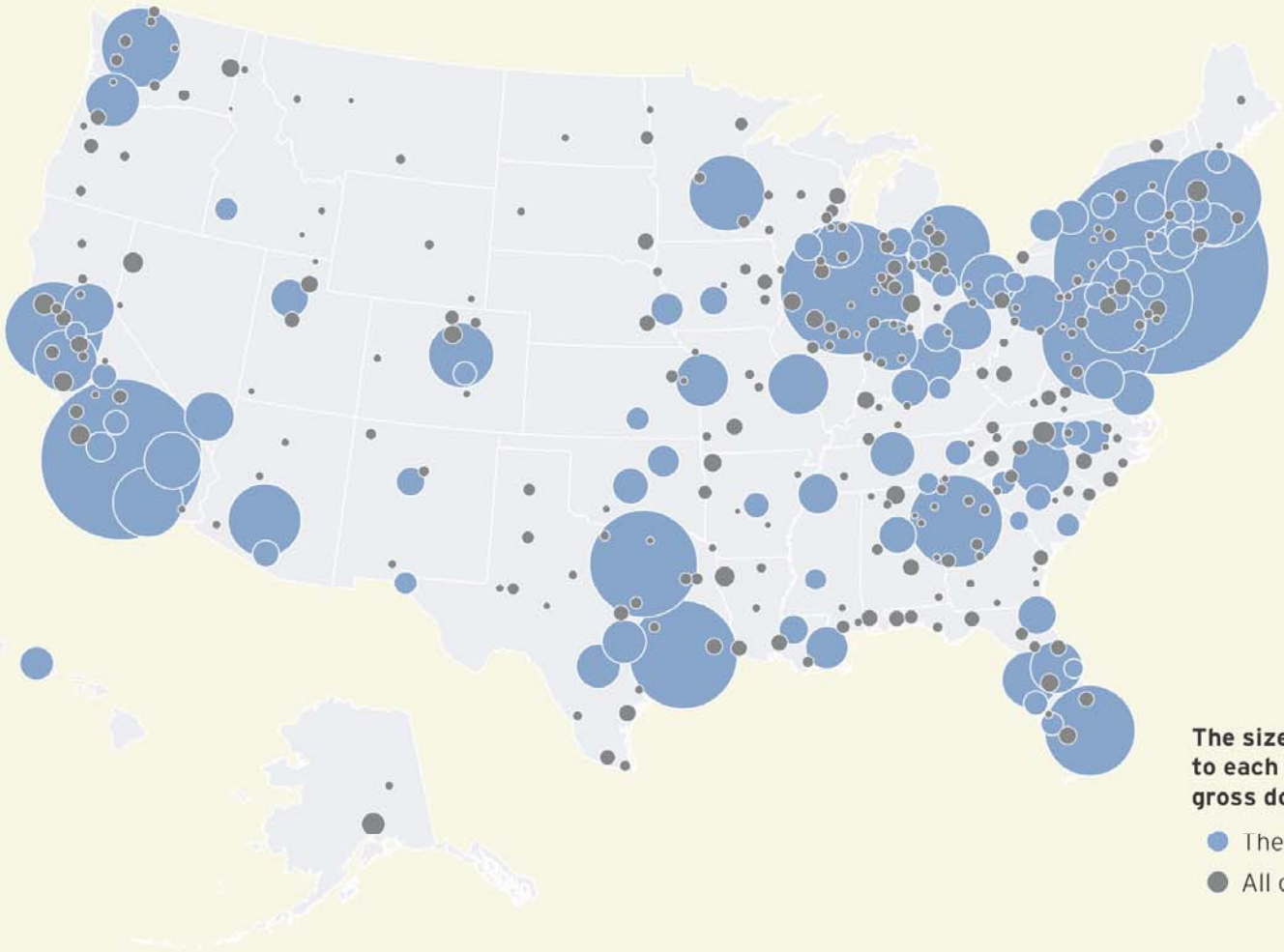
Regional Approaches

Major metros aggregate fundamental drivers of national prosperity



BROOKINGS Blueprint for American Prosperity

The 100 largest U.S. metros generate 75 percent of the nation's annual GDP



The size of each circle is proportional to each metro's share of the nation's gross domestic product (GDP)

- The 100 largest metros
- All other metros

Source: Brookings analysis of Bureau of Economic Analysis data.

BROOKINGS Blueprint for American Prosperity

Well Designed Density, Mixed Use

It is not this:

Well Designed Density, Mixed Use

Well Designed Density, Mixed Use

Well Designed Density, Mixed Use

Well Designed Density, Mixed Use

Well Designed Density, Mixed Use

Well-Planned Access & Circulation Systems

Charlotte

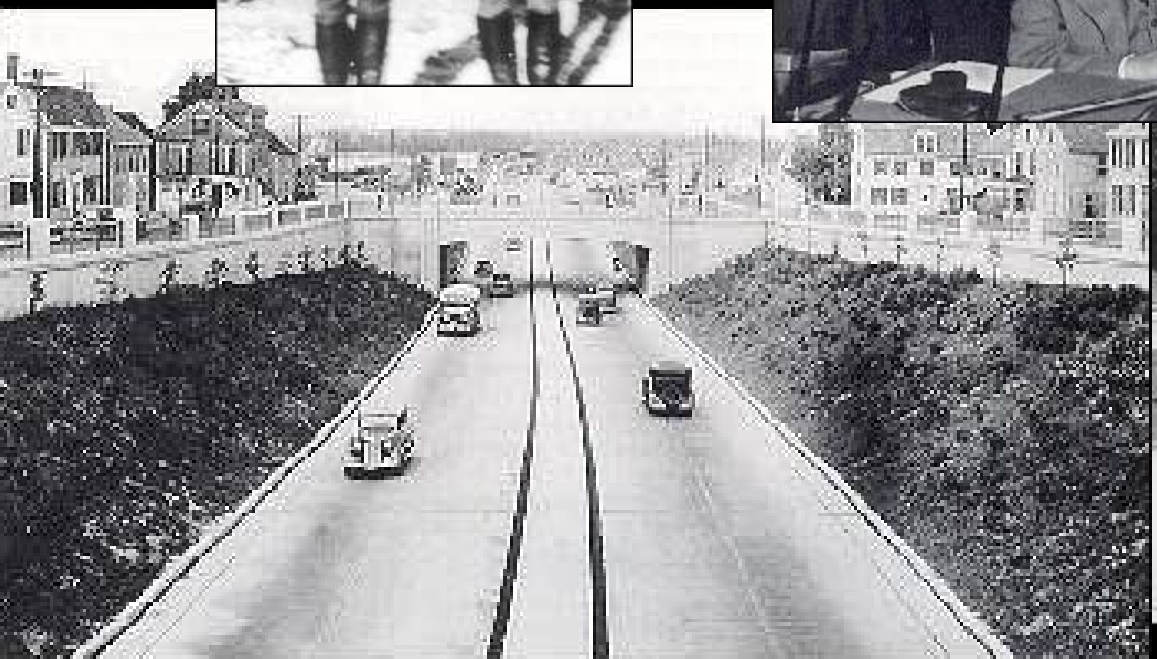

Charlotte
TRACK
2

Opportunity 2. Intercity Rail Corridors

Regional Approaches

Charlier Associates, Inc.

50s – 70s: Interstate Highway System

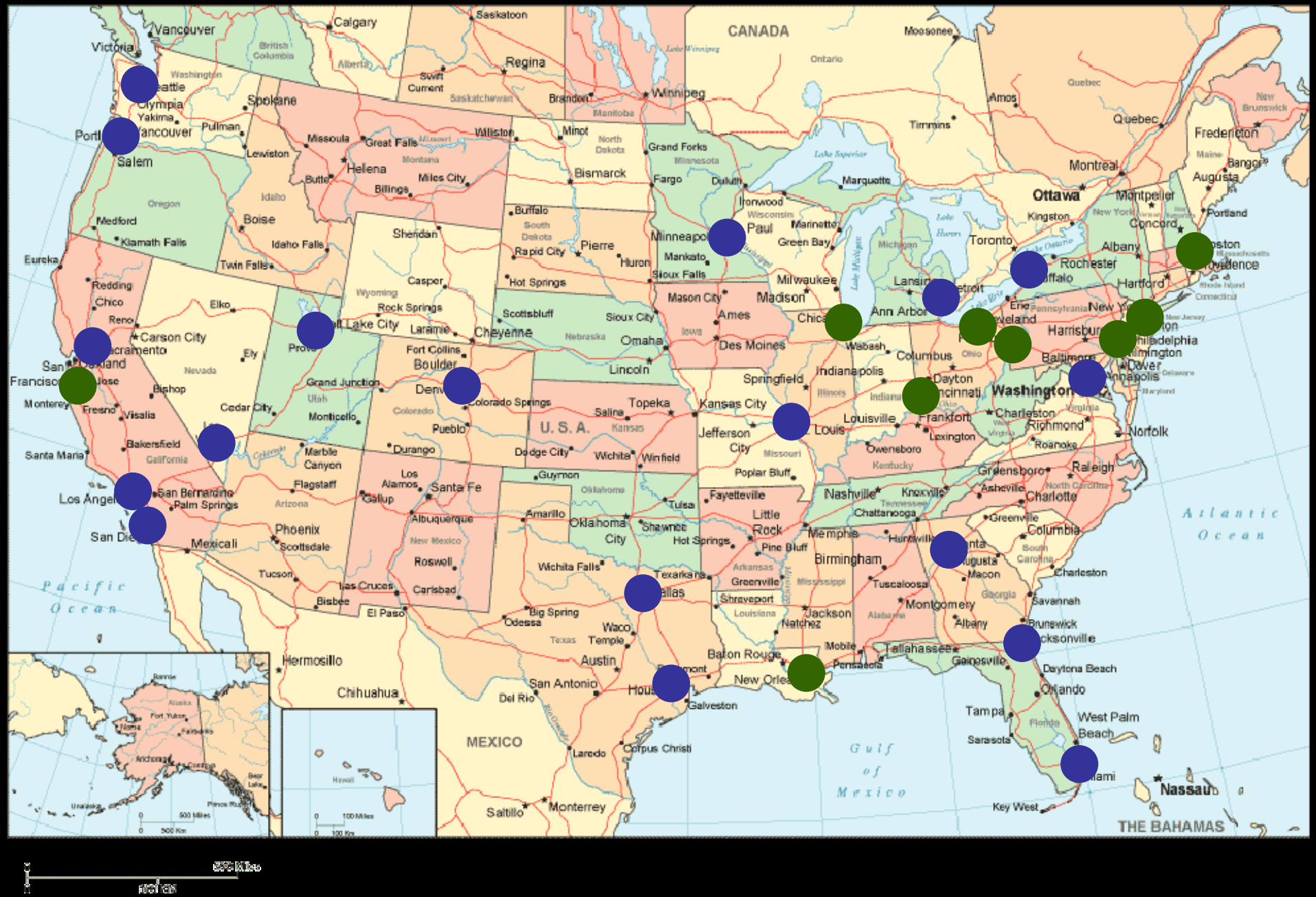


Canada
United States
Mexico
Russia
Alaska
Hawaii
Pacific Ocean
Atlantic Ocean
Gulf of Mexico
Bering Sea
Arctic Ocean
Bahama Islands
Nassau
Vancouver
Calgary
Victoria
Regina
Winnipeg
Seattle
Bellevue
Olympia
Tacoma
Spokane
Washington
Portland
Salem
Eugene
Oregon
Idaho
Boise
Helena
Montana
North Dakota
Bismarck
Minnesota
Saint Paul
Minneapolis
Wisconsin
South Dakota
Pierre
Sioux Falls
Wyoming
Madison
Milwaukee
Michigan
Lansing
Flint
Detroit
Toledo
Toronto
Hamilton
Buffalo
Rochester
Syracuse
Albany
Ottawa
Montreal
Quebec
Fredericton
Maine
Augusta
Montpelier
Vermont
New York
New Hampshire
Concord
Lowell
Boston
Massachusetts
Providence
Rhode Island
Hartford
Connecticut
New Haven
Stamford
Newark
New Jersey
Trenton
Philadelphia
Dover
Delaware
Pennsylvania
Harrisburg
Allentown
Erie
Cleveland
Akron
Pittsburgh
Ohio
Columbus
Dayton
Cincinnati
Baltimore
Annapolis
Washington D.C.
Maryland
Richmond
Virginia
Virginia Beach
Norfolk
West Virginia
Charleston
Nevada
Reno
Carson City
Sacramento
Santa Rosa
Vallejo
Oakland
San Francisco
Modesto
San Jose
Salinas
Fresno
California
Bakersfield
Las Vegas
Henderson
Santa Clarita
Pasadena
Oxnard
Los Angeles
San Bernardino
Long Beach
Anaheim
Oceanside
Escondido
San Diego
Tijuana
Mexicali
Utah
Salt Lake City
Provo
Great Salt Lake
Colorado
Fort Collins
Cheyenne
Denver
Lakewood
Aurora
Colorado Springs
Pueblo
Nebraska
Lincoln
Omaha
Iowa
Des Moines
Cedar Rapids
Rockford
Chicago
Gary
Fort Wayne
Illinois
Peoria
Springfield
Indiana
Indianapolis
Kansas
Topeka
Kansas City
Wichita
Missouri
Jefferson City
Saint Louis
Evansville
Louisville
Frankfort
Lexington
Kentucky
Arizona
Phoenix
Glendale
Scottsdale
Tempe
Tucson
New Mexico
Santa Fe
Albuquerque
Amarillo
Oklahoma
Oklahoma City
Tulsa
Arkansas
Little Rock
Memphis
Tennessee
Nashville
Knoxville
Chattanooga
Huntsville
Winston-Salem
Greensboro
Raleigh
North Carolina
Charlotte
Columbia
South Carolina
Augusta
Atlanta
Macon
Columbus
Georgia
Savannah
Birmingham
Alabama
Montgomery
Mississippi
Jackson
Lubbock
Texas
Abilene
Fort Worth
Dallas
Plano
Waco
Shreveport
El Paso
Ciudad Juarez
Austin
San Antonio
Houston
Beaumont
Pasadena
Baton Rouge
Lafayette
Louisiana
New Orleans
Mobile
Tallahassee
Jacksonville
Florida
Orlando
Tampa
Clearwater
Saint Petersburg
Coral Springs
Fort Lauderdale
Hialeah
Miami
Piedras Negras
Laredo
Corpus Christi
McAllen
Monterrey
Guadalupe
Brownsville
Rio Grande
Anchorage
Juneau
Kauai
Niihau
Oahu
Honolulu
Molokai
Lanai
Maui
Kahoolawe
0 500 Miles
0 500 Km
0 100 Miles
0 100 KM
0 250 Miles 500 Miles
0 250 KM 500 KM
LEGEND
State Capitals
Cities 500,000+
Cities 100,000-499,999
National Boundaries
Major Rivers
Lakes
Toll Roads and Bridges
Interstate Highways
U.S. Highways

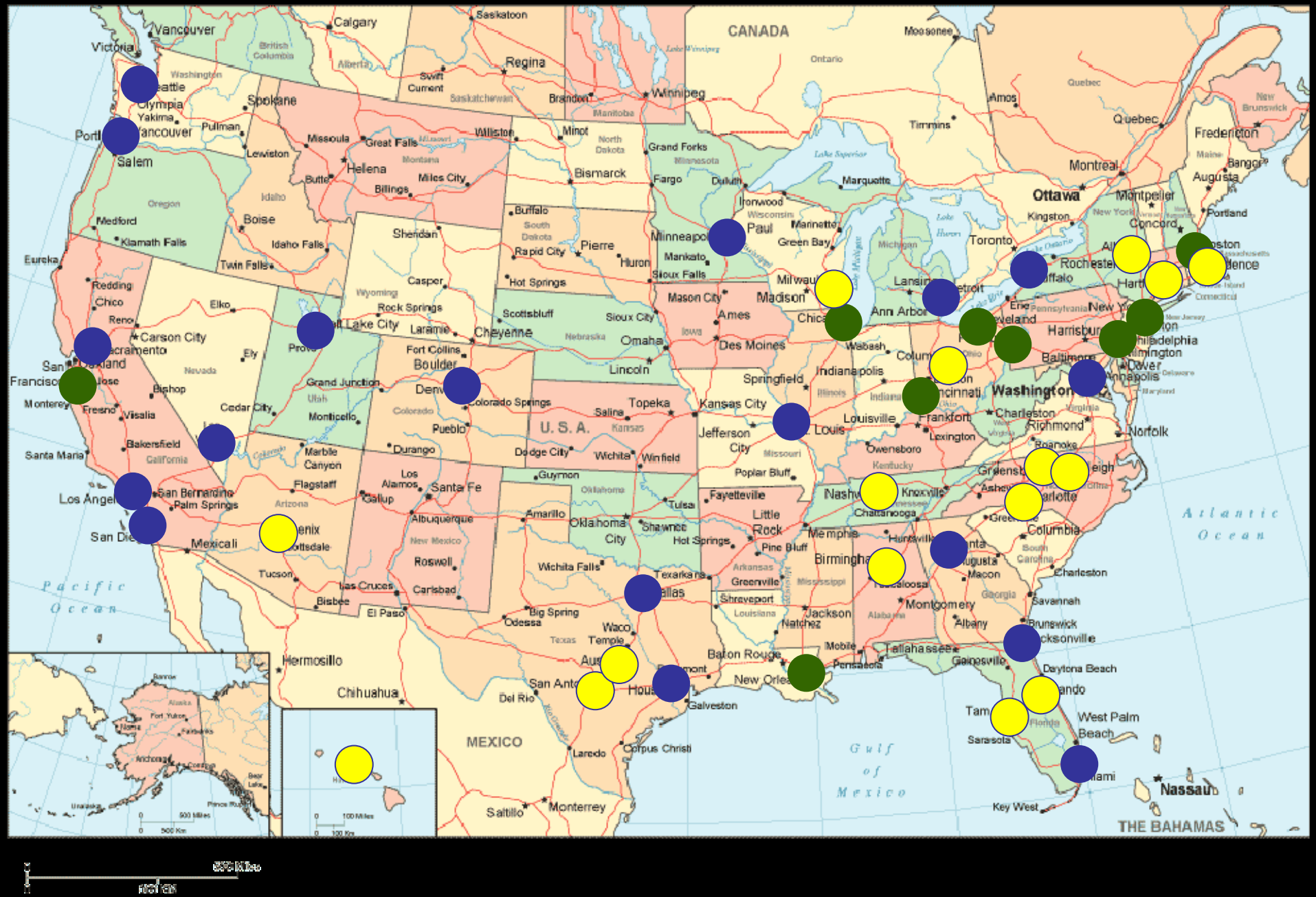
70s – Today: Urban Rail Transit

Rail Cities in the United States (as of 1971)

Rail Cities in the United States (as of 2006)



Rail Cities in the United States (by 2021)

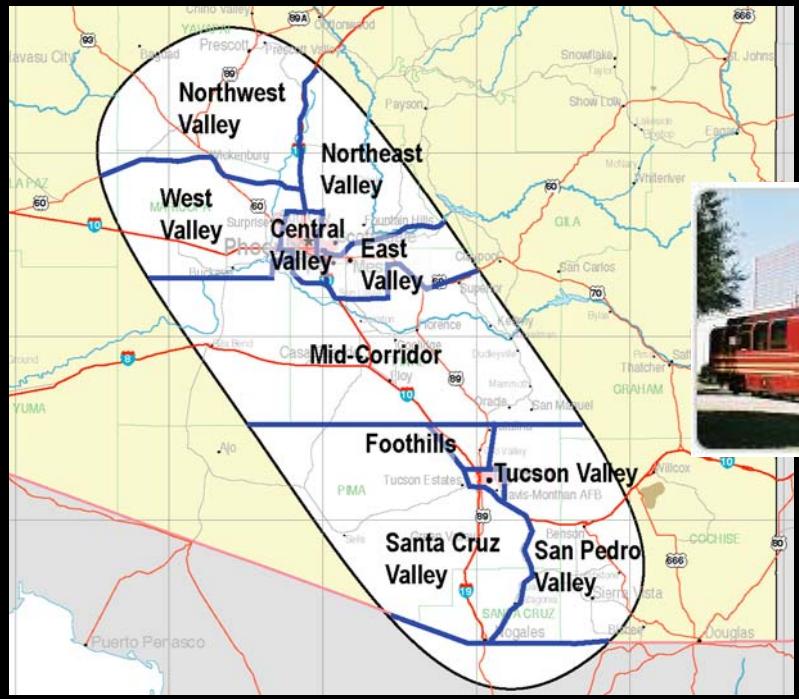


Interstate 40 corridor and supporting routes truck freight flow (tons per year)

Multi-axle trucks as a % of total traffic:

- ≥ 20% in many arterial corridors
- ≥ 40% on most of the rural interstate system

21st Century: Intercity Rail System



Officially Designated HSR Routes

Federal Railroad Administration

Vancouver
Seattle
Portland
West Glacier
St. Paul / Minneapolis
Toronto
Boston
New York – Penn
Chicago – Union Station
Chicago
Cleveland
New York
Washington – Union St
Washington, D.C.
Sacramento
Salt Lake City
Denver
Kansas City
St. Louis
Cincinnati
Louisville
Las Vegas
Santa Fe
Oklahoma City
Memphis
Charlotte
Los Angeles
Anaheim
San Diego
Phoenix
Tucson
Dallas
Atlanta
Charleston
Savannah
Houston
San Antonio
New Orleans
Orlando
Tampa
Miami
B.C.
ALTA.
SASK.
MAN.
WASH.
ORE.
MONT.
N.D.
MINN.
IDAHO
WYO.
S.D.
WIS.
MICH.
N.Y.
N.B.
ME.
MASS.
N.H.
PA.
OHIO
IND.
ILL.
W. VA.
VA.
N.C.
TENN.
S.C.
NEV.
UTAH
COLO.
NEBR.
IOWA
KANS.
MO.
KY.
CALIF.
ARIZ.
N.M.
OKLA.
ARK.
MISS.
ALA.
GA.
LA.
TEXAS
FLA.
DEL.
PACIFIC OCEAN
ATLANTIC OCEAN
Gulf of Mexico
643 mi

Amtrak Routes

Criteria for High Speed Rail

- Portal-to-portal distance
  - > 100 miles to compete with auto
  - < 600 miles to compete with air
- Major airports at or near capacity
- Sufficient population in centers
- Potential to operate @ 90 – 150 mph

California

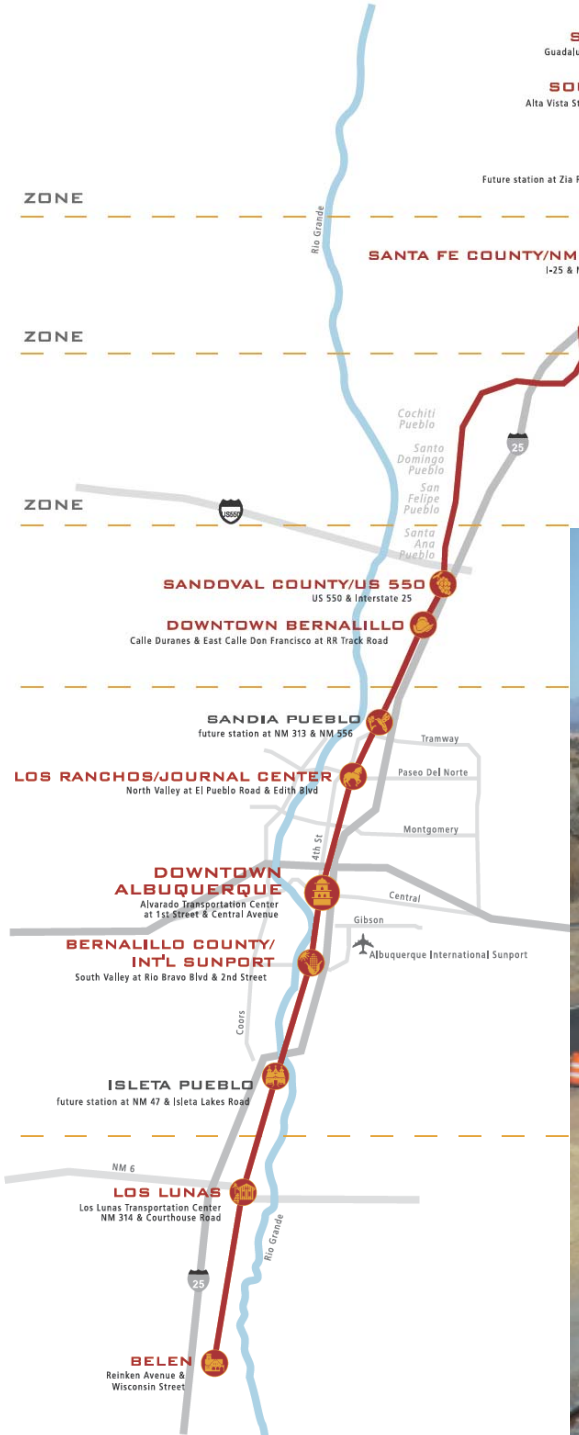
HSR

Intercity Rail Corridors

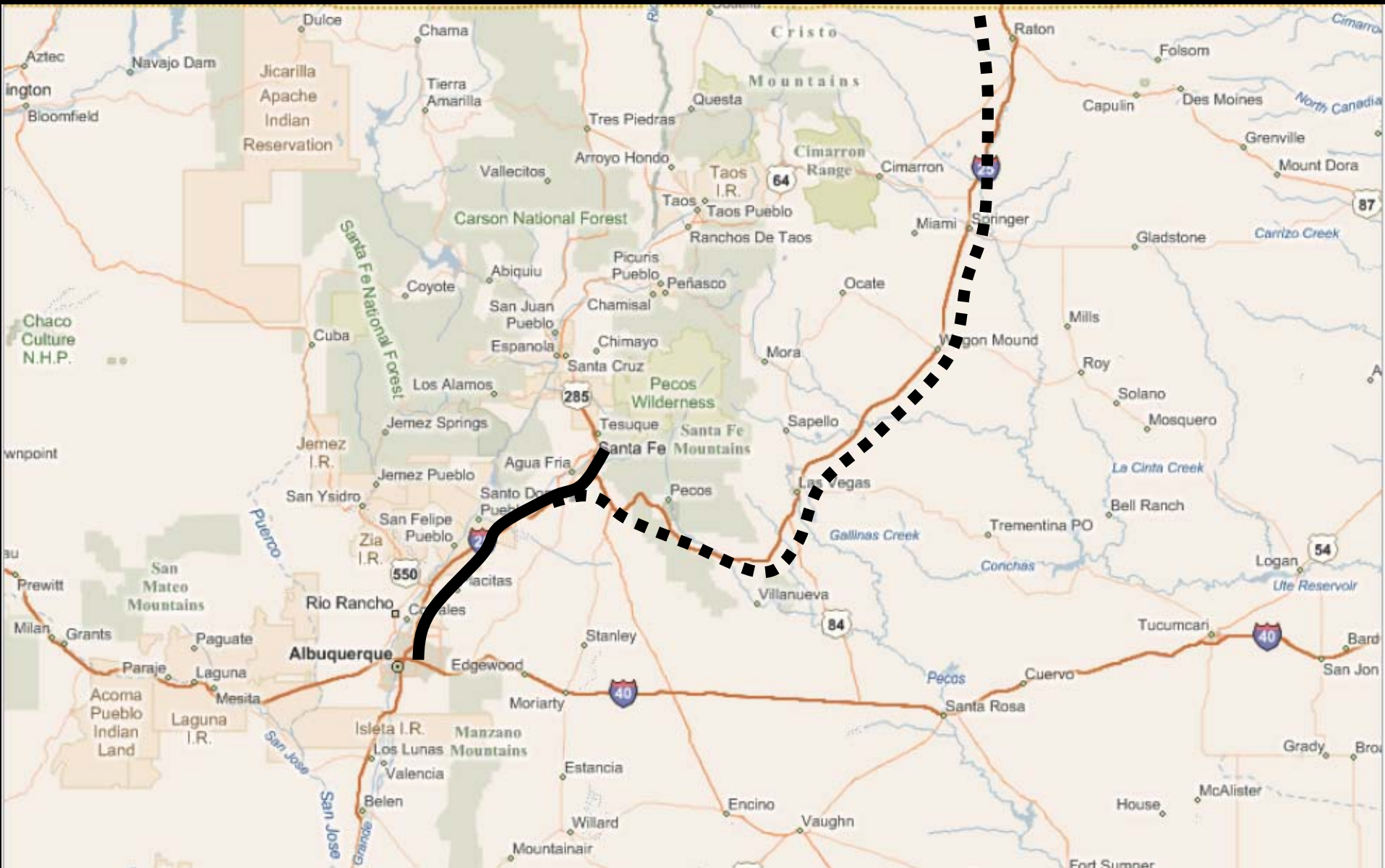
- Connect the economies of city pairs
- Operate @ 65 – 90 mph
- Serve double duty as commuter rail corridors

New Mexico

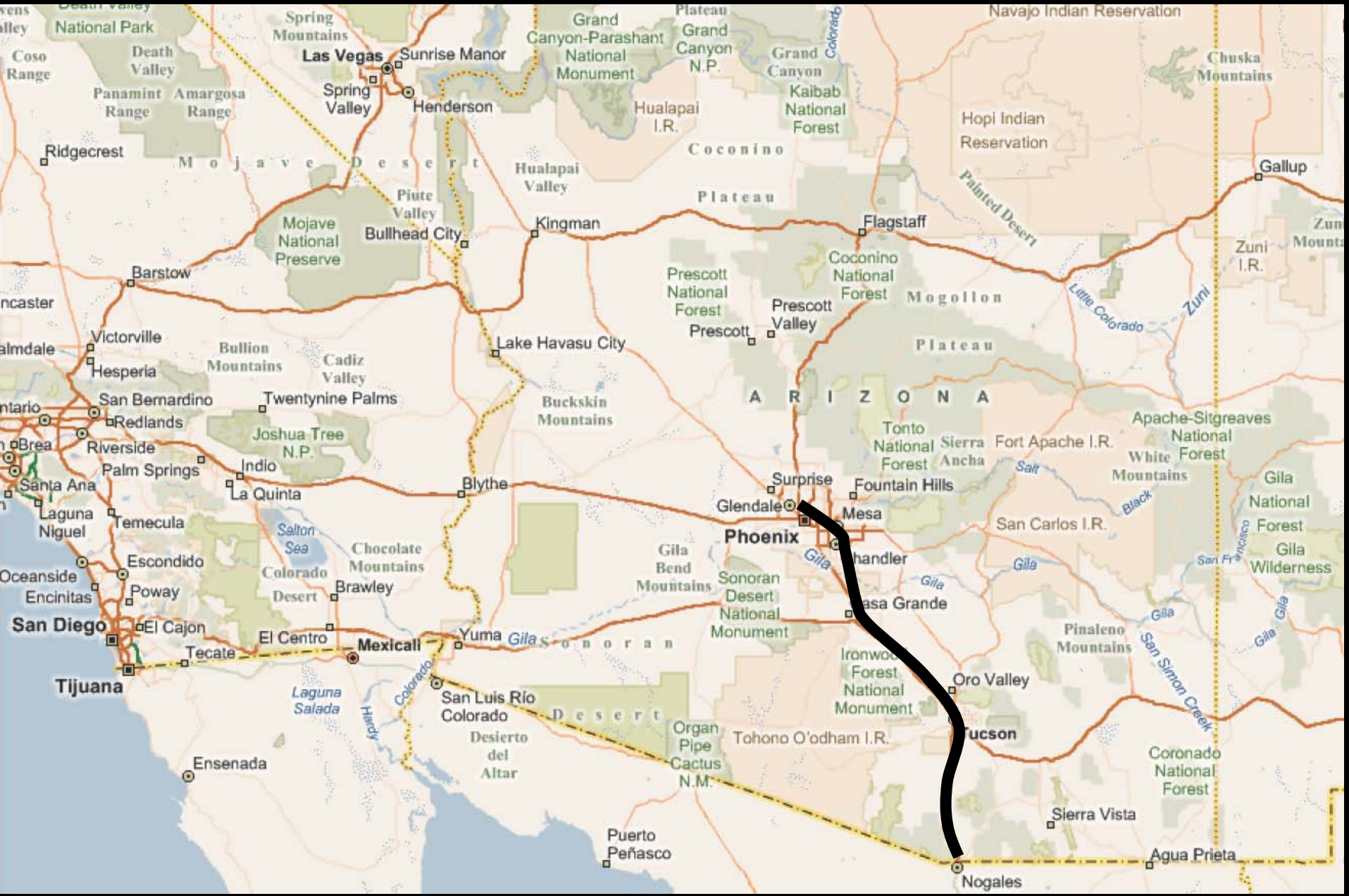
RailRunner



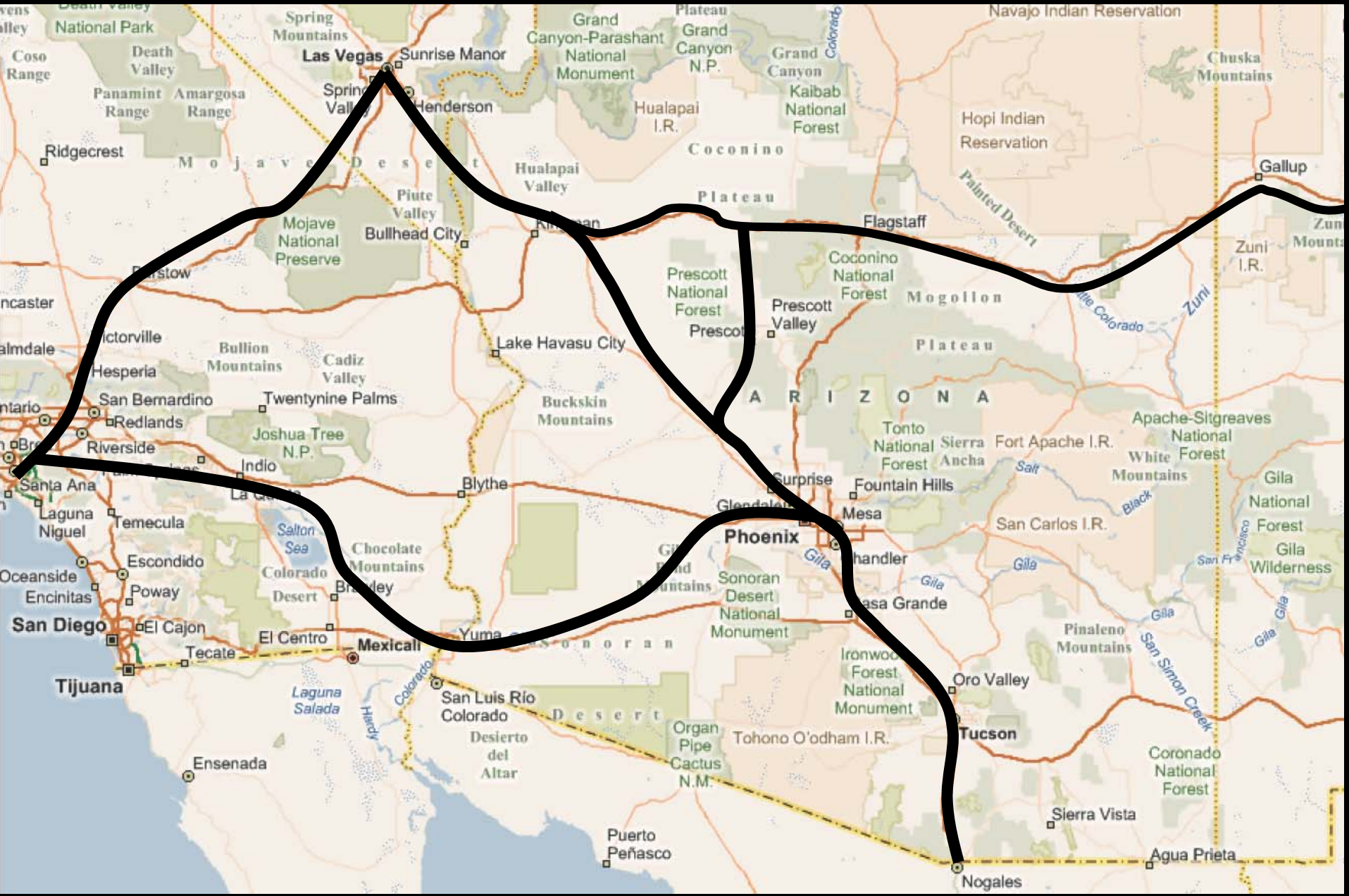
New Mexico


Dulce
Chama
Aztec
Navajo Dam
Jicarilla Apache Indian Reservation
Tierra Amarilla
Bloomfield
Cristo Mountains
Questa
Tres Piedras
Raton
Folsom
Capulin
Des Moines
North Canadian
Grenville
Mount Dora
Arroyo Hondo
Vallecitos
Taos I.R.
Taos
Taos Pueblo
Ranchos De Taos
Cimarron Range
Cimarron
Carson National Forest
Santa Fe National Forest
Miami
Springer
Gladstone
Carrizo Creek
Abiquiu
Coyote
Picuris Pueblo
Peñasco
Ocate
San Juan Pueblo
Chamisal
Chaco Culture N.H.P.
Cuba
Espanola
Chimayo
Santa Cruz
Mora
Wagon Mound
Mills
Roy
Solano
Mosquero
Los Alamos
Pecos Wilderness
Jemez Springs
Tesuque
Santa Fe
Santa Fe Mountains
Sapello
Jemez I.R.
Agua Fria
Jemez Pueblo
La Cinta Creek
San Ysidro
Pecos
Las Vegas
Bell Ranch
San Felipe Pueblo
Zia I.R.
Gallinas Creek
Trementina PO
Puerco
Conchas
Logan
Ute Reservoir
San Mateo Mountains
Prewitt
Rio Rancho
Villanueva
Milan
Grants
Paguate
Albuquerque
Stanley
Tucumcari
Paraje
Laguna
Edgewood
Cuervo
Acoma Pueblo Indian Land
Mesita
Moriarty
Pecos
Santa Rosa
Laguna I.R.
Isleta I.R.
Manzano Mountains
Los Lunas
Valencia
Estancia
Grady
San Jose
Belen
Encino
House
McAlister
Willard
Vaughn
Mountainair

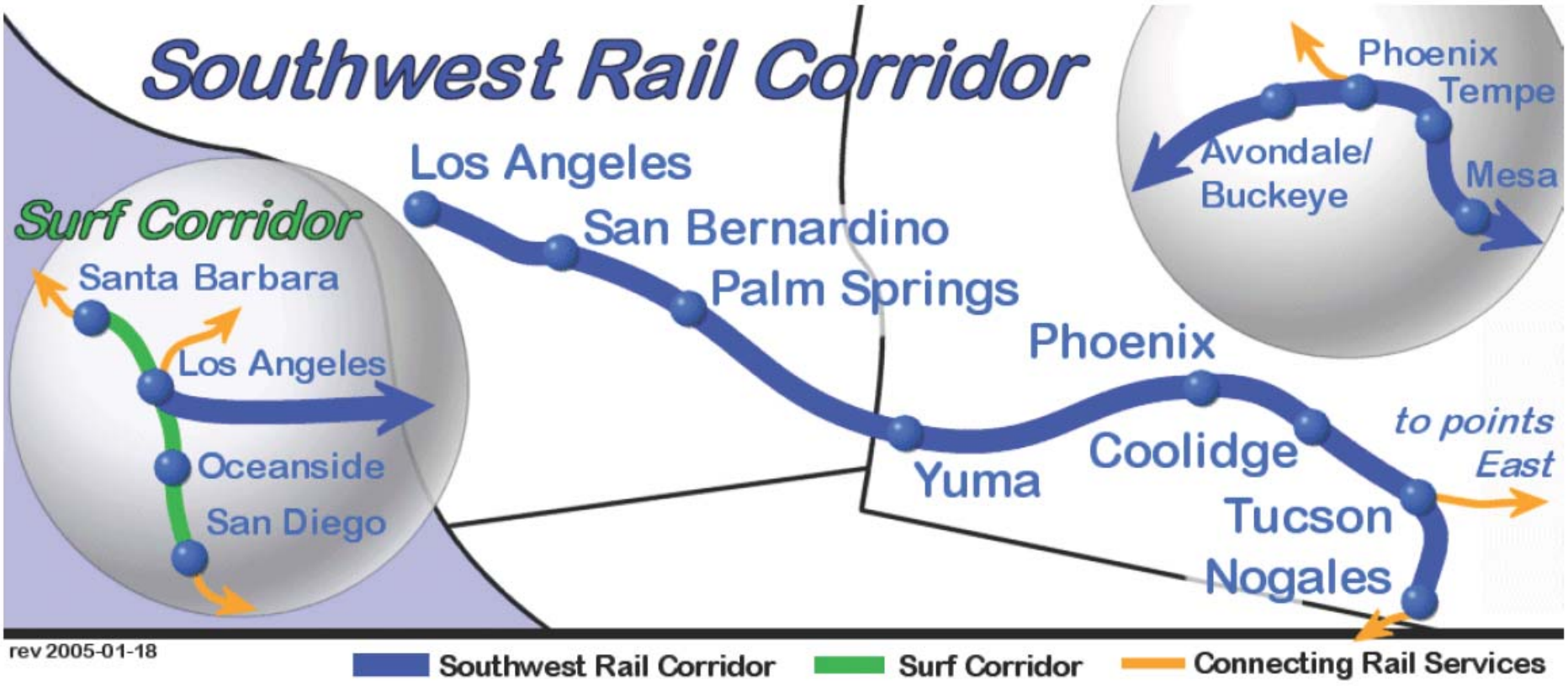
Arizona


Las Vegas
Sunrise Manor
Spring Valley
Henderson
Ridgecrest
Barstow
Victorville
Hesperia
San Bernardino
Redlands
Riverside
Palm Springs
Indio
La Quinta
Twentynine Palms
Joshua Tree N.P.
Santa Ana
Laguna Niguel
Temecula
Escondido
Oceanside
Encinitas
Poway
San Diego
El Cajon
Tecate
Tijuana
Ensenada
El Centro
Mexicali
Brawley
Salton Sea
Yuma
San Luis Río Colorado
Puerto Peñasco
Blythe
Lake Havasu City
Kingman
Bullhead City
Mojave National Preserve
Grand Canyon-Parashant National Monument
Grand Canyon N.P.
Hualapai I.R.
Kaibab National Forest
Navajo Indian Reservation
Hopi Indian Reservation
Chuska Mountains
Gallup
Flagstaff
Coconino National Forest
Prescott
Prescott Valley
Prescott National Forest
Zuni I.R.
Surprise
Glendale
Phoenix
Mesa
Fountain Hills
Tonto National Forest
Fort Apache I.R.
Apache-Sitgreaves National Forest
White Mountains
Gila National Forest
Gila Wilderness
San Carlos I.R.
Chandler
Casa Grande
Sonoran Desert National Monument
Gila Bend Mountains
Ironwood Forest National Monument
Oro Valley
Tucson
Tohono O'odham I.R.
Organ Pipe Cactus N.M.
Coronado National Forest
Sierra Vista
Agua Prieta
Nogales
Pinaleno Mountains
San Simon Creek
Death Valley National Park
Panamint Range
Amargosa Range
Coso Range
Spring Mountains
Mojave Desert
Piute Valley
Hualapai Valley
Coconino Plateau
Painted Desert
Mogollon Plateau
Bullion Mountains
Cadiz Valley
Buckskin Mountains
Chocolate Mountains
Colorado Desert
Laguna Salada
Desierto del Altar
Sonoran Desert
Gila
Salt
Black
San Francisco
Little Colorado
Zuni
Hardy
Colorado

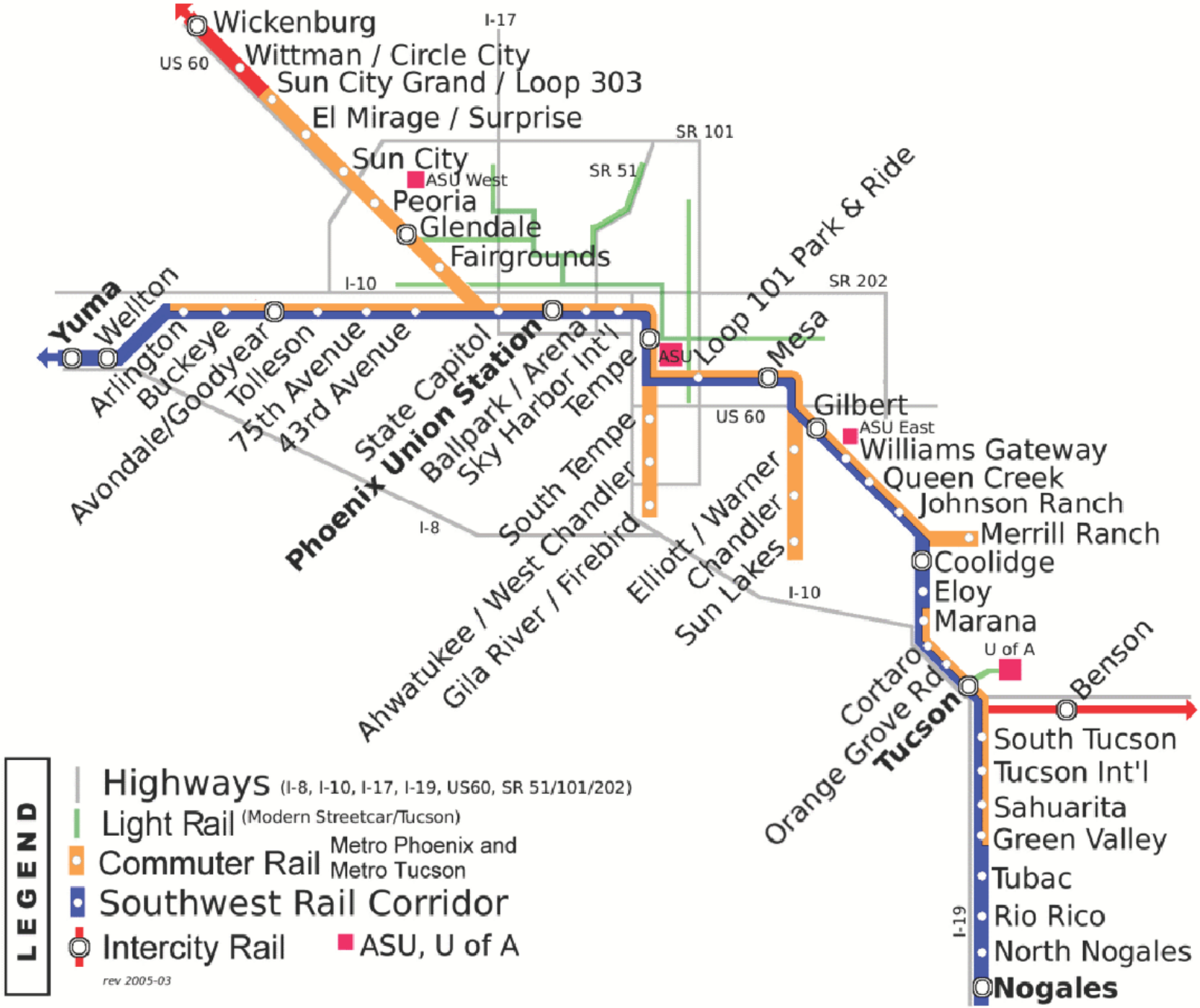
Arizona, California, Nevada, New Mexico

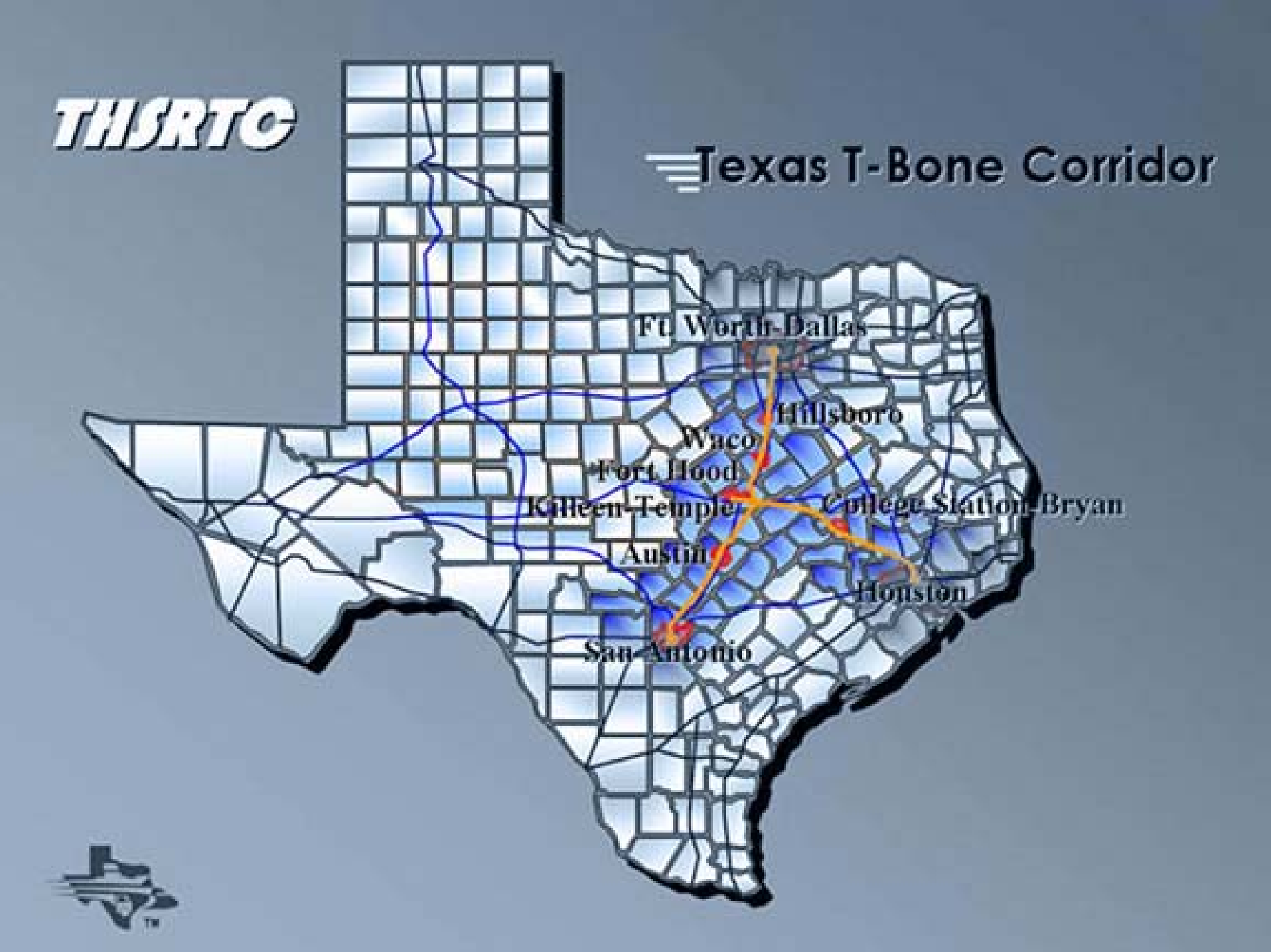


Southwest Rail Corridor

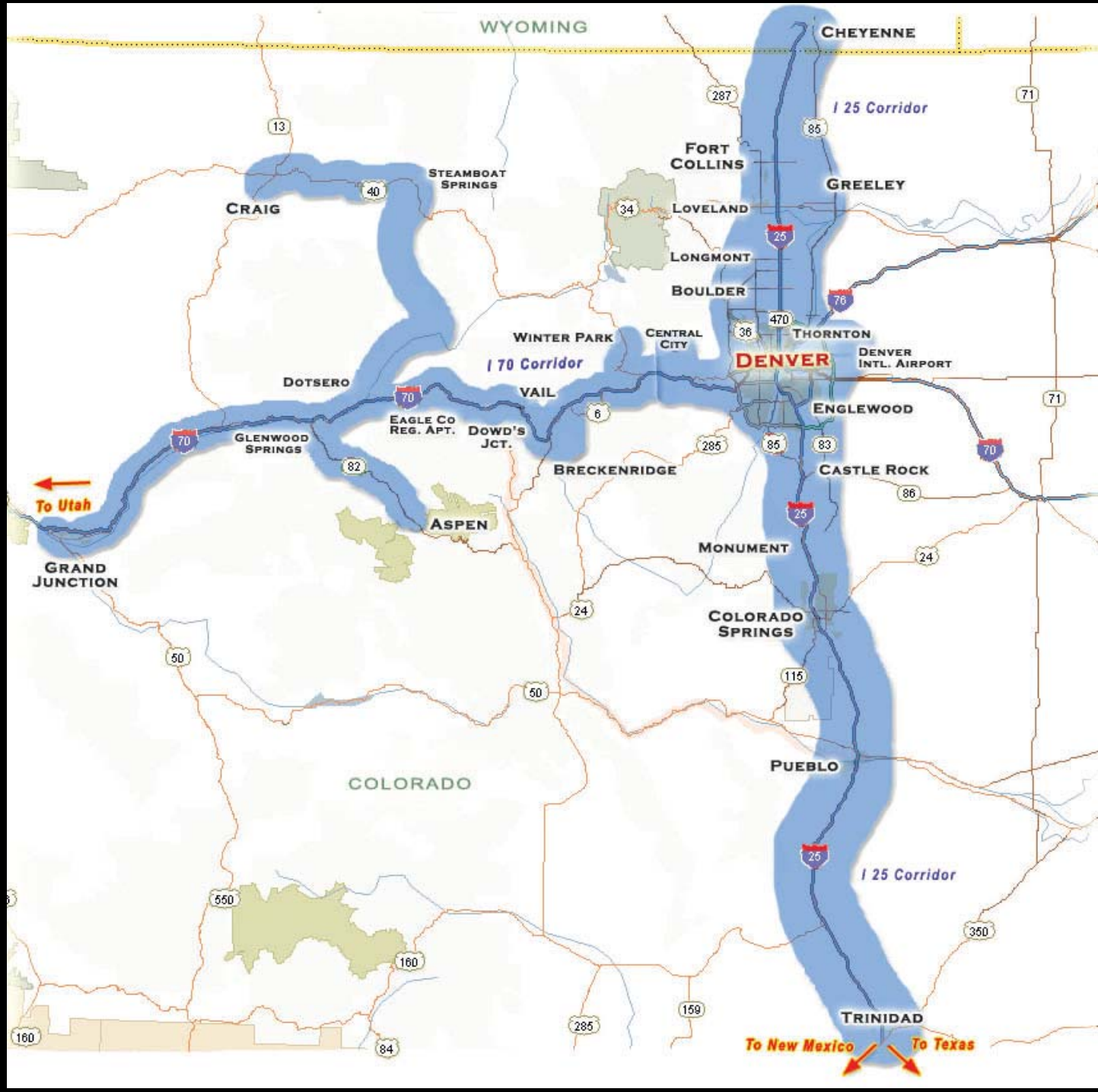


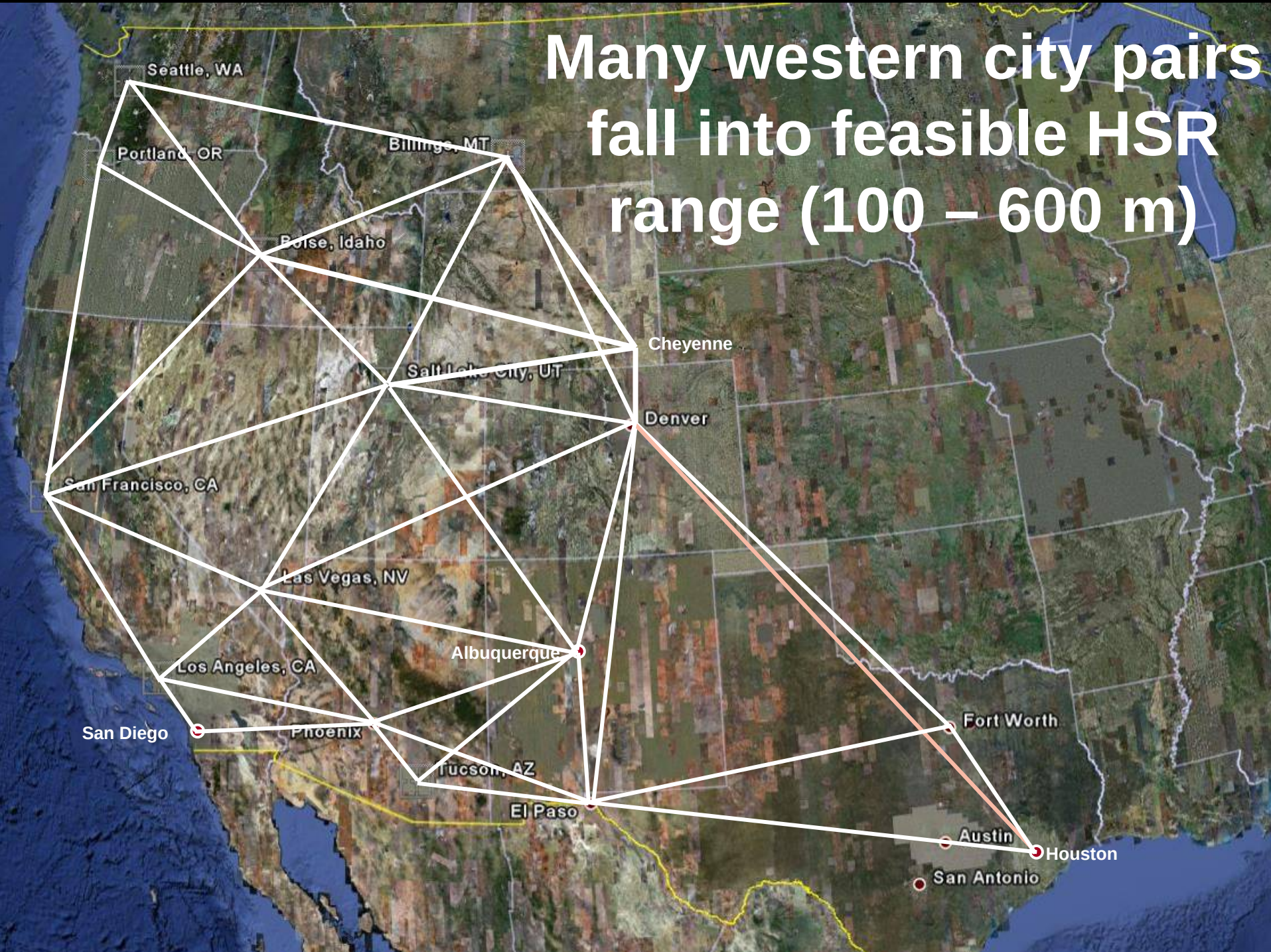
June 2005

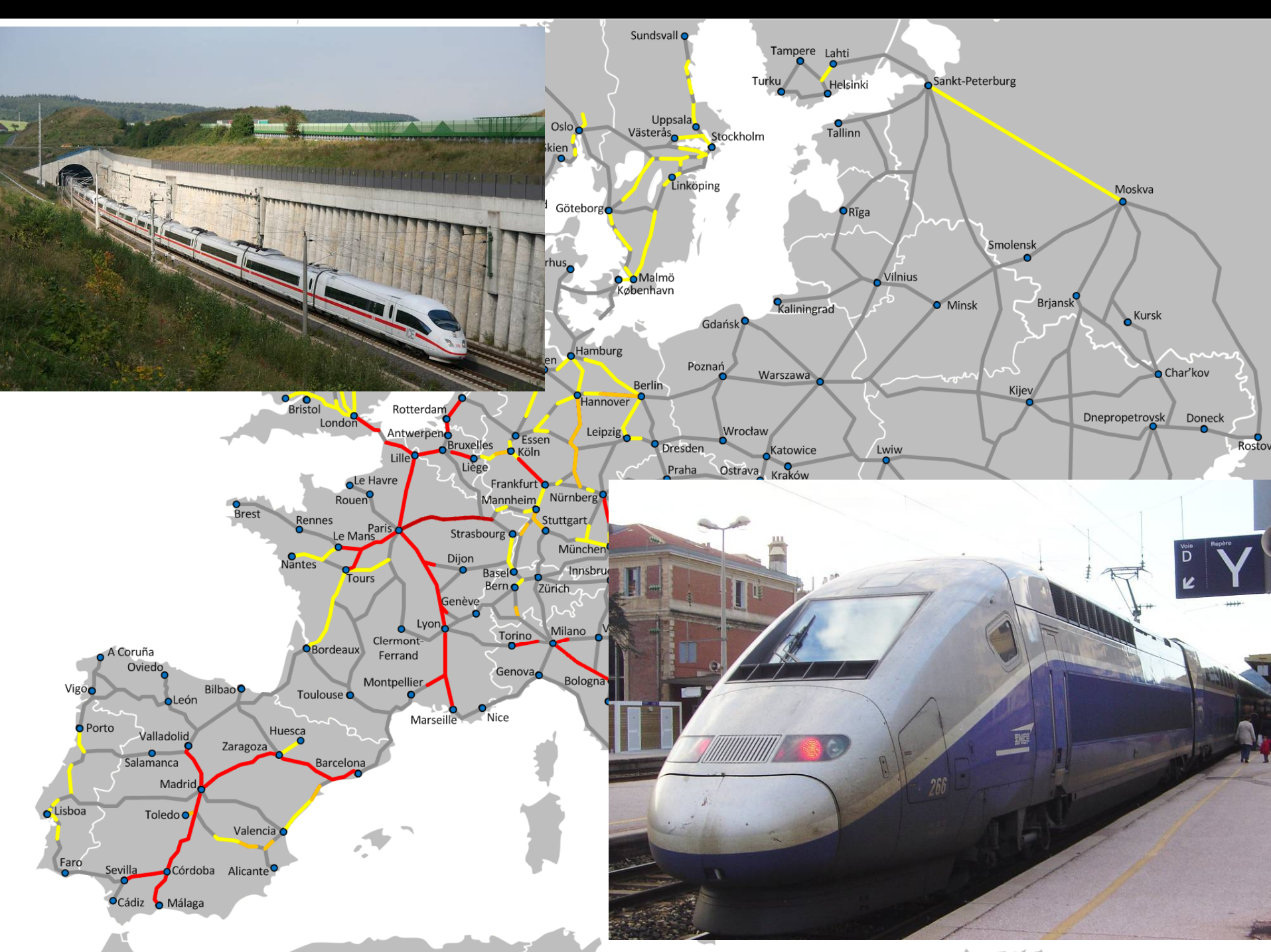

Wickenburg
I-17
US 60
Wittman / Circle City
Sun City Grand / Loop 303
El Mirage / Surprise
SR 101
Sun City
ASU West
SR 51
Peoria
Glendale
Fairgrounds
I-10
SR 202
Loop 101 Park & Ride
Yuma
Wellton
Arlington
Buckeye
Avondale/Goodyear
Tolleson
75th Avenue
43rd Avenue
State Capitol
Phoenix Union Station
Ballpark / Arena
Sky Harbor Int'l
Tempe
ASU
Mesa
US 60
Gilbert
ASU East
Williams Gateway
Queen Creek
Johnson Ranch
Merrill Ranch
Coolidge
Eloy
Marana
U of A
Cortaro
Orange Grove Rd
Tucson
Benson
South Tucson
Tucson Int'l
Sahuarita
Green Valley
Tubac
Rio Rico
North Nogales
Nogales
I-19
South Tempe
Chandler
Ahwatukee / West Chandler
Gila River / Firebird
I-8
Elliott / Warner
Chandler
Sun Lakes
I-10
LEGEND
Highways (I-8, I-10, I-17, I-19, US60, SR 51/101/202)
Light Rail (Modern Streetcar/Tucson)
Commuter Rail Metro Phoenix and Metro Tucson
Southwest Rail Corridor
Intercity Rail
ASU, U of A
rev 2005-03


THSRTC
Texas T-Bone Corridor
Ft Worth-Dallas
Hillsboro
Waco
Fort Hood
Killeen-Temple
College Station-Bryan
Austin
Houston
San Antonio

Colorado Rail Corridor Study




Many western city pairs fall into feasible HSR range (100 – 600 m)
Seattle, WA
Portland, OR
Billings, MT
Boise, Idaho
Cheyenne
Salt Lake City, UT
Denver
San Francisco, CA
Las Vegas, NV
Albuquerque
Los Angeles, CA
San Diego
Phoenix
Tucson, AZ
El Paso
Fort Worth
Austin
Houston
San Antonio

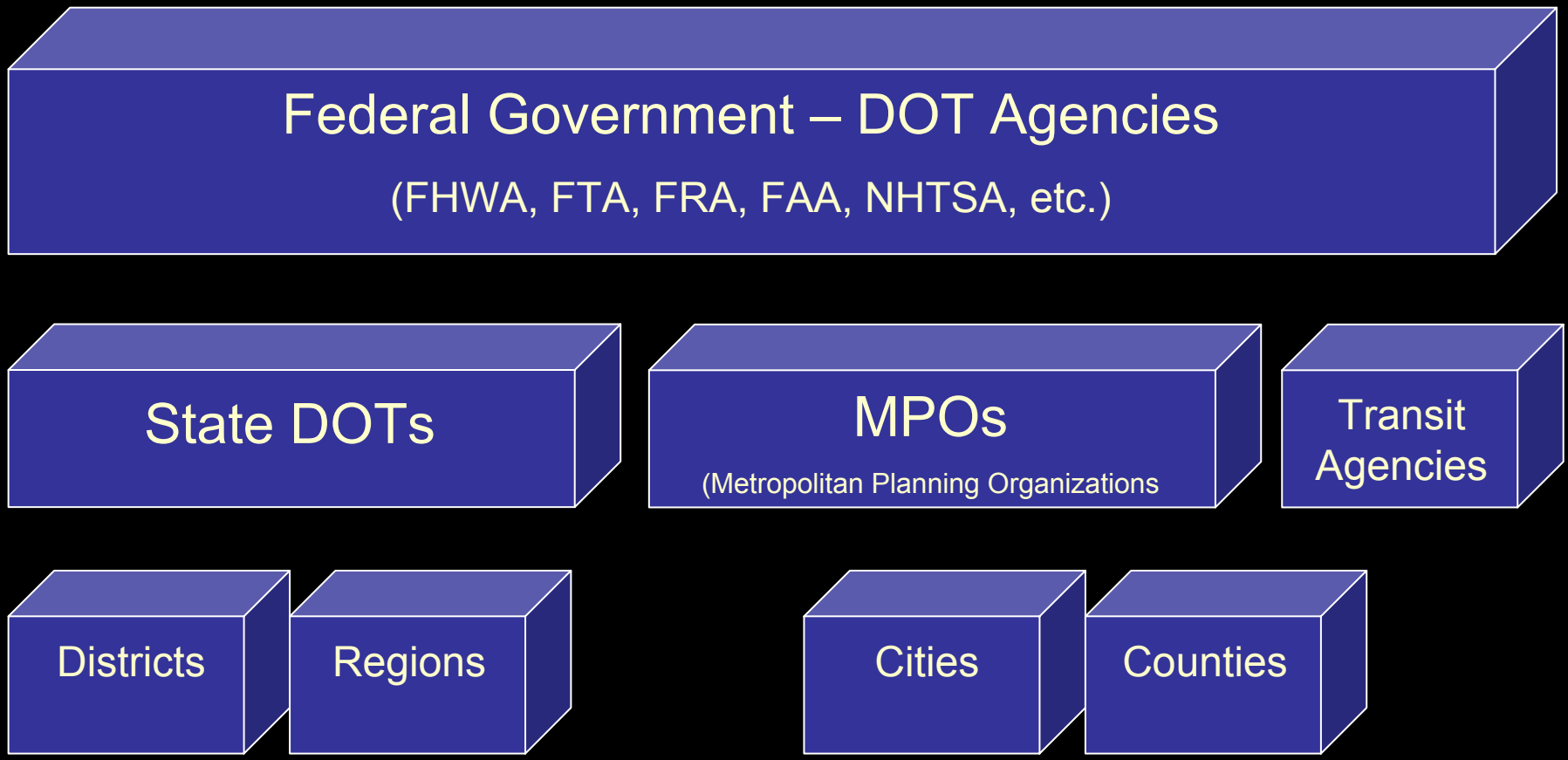

Sundsvall
Tampere
Lahti
Turku
Helsinki
Sankt-Peterburg
Uppsala
Oslo
Västerås
Stockholm
Tallinn
Linköping
Moskva
Göteborg
Rīga
Smolensk
Malmö
København
Vilnius
Kaliningrad
Minsk
Brjansk
Kursk
Gdańsk
Hamburg
Poznań
Warszawa
Char'kov
Berlin
Kijev
Hannover
Bristol
London
Rotterdam
Antwerpen
Bruxelles
Essen
Köln
Leipzig
Wrocław
Dnepropetrovsk
Doneck
Lille
Liege
Dresden
Katowice
Lwiw
Praha
Ostrava
Kraków
Le Havre
Rouen
Frankfurt
Mannheim
Nürnberg
Brest
Rennes
Paris
Le Mans
Strasbourg
Stuttgart
Nantes
Dijon
Tours
Basel
Bern
Zürich
Genève
Lyon
Torino
Milano
Clermont-
Ferrand
Bordeaux
A Coruña
Oviedo
Genova
Montpellier
Vigo
Bilbao
León
Toulouse
Marseille
Nice
Porto
Valladolid
Huesca
Zaragoza
Salamanca
Barcelona
Madrid
Lisboa
Toledo
Valencia
Faro
Sevilla
Córdoba
Alicante
Cádiz
Málaga

Voie
D
Repère
Y
266

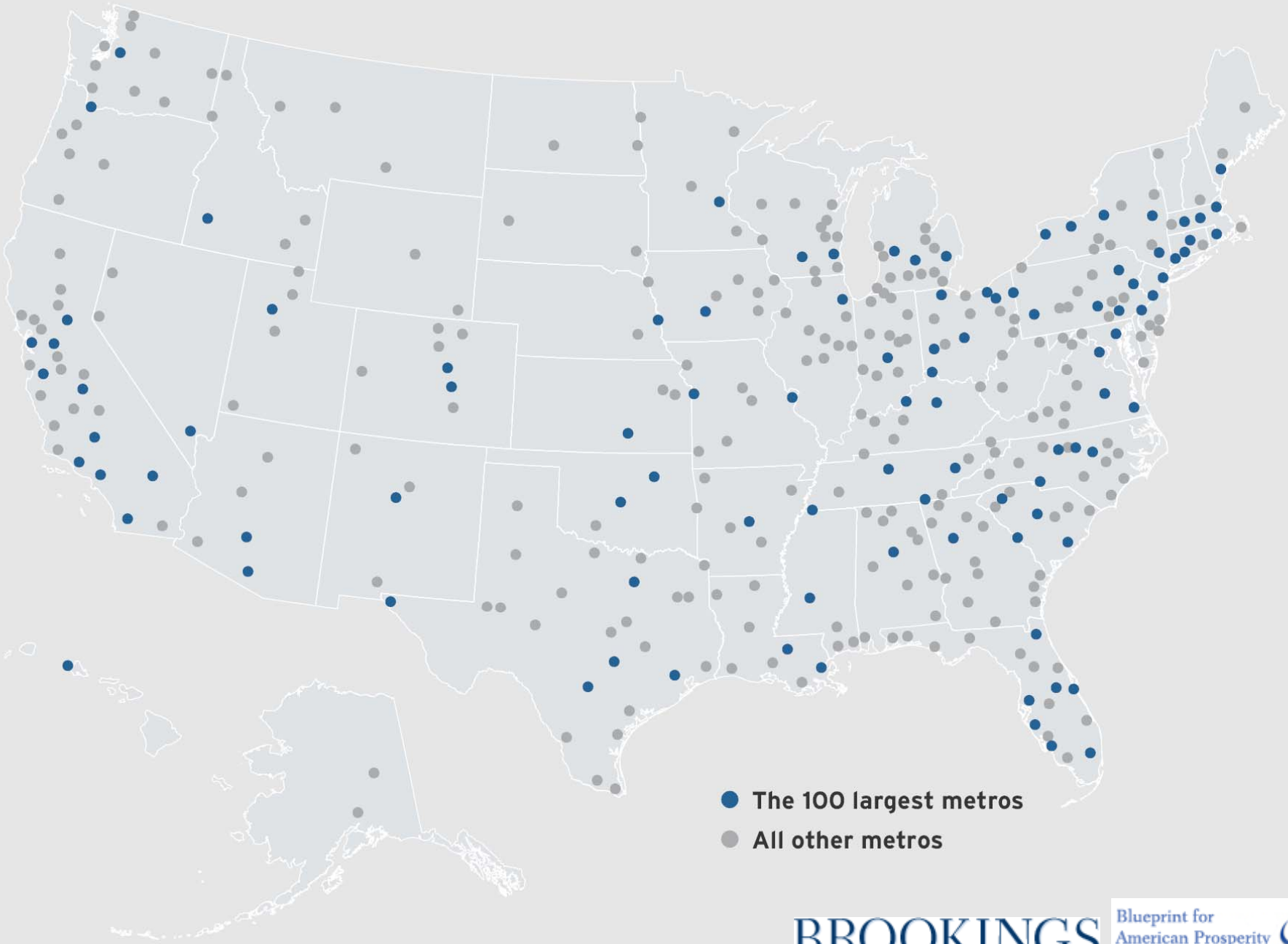
Opportunity 3.
Regional Scenario Planning

Regional Approaches

Current Transportation Planning Structure

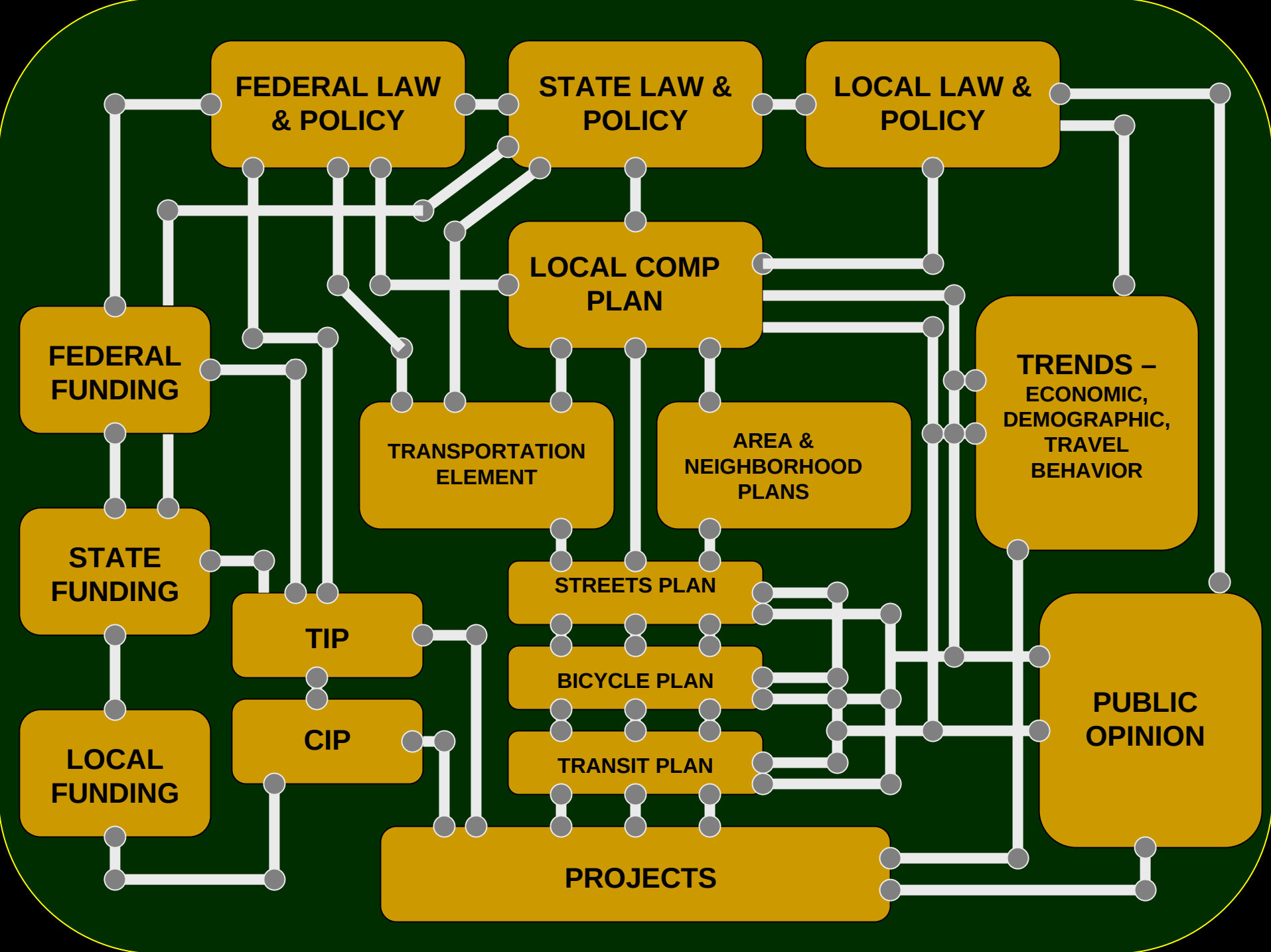


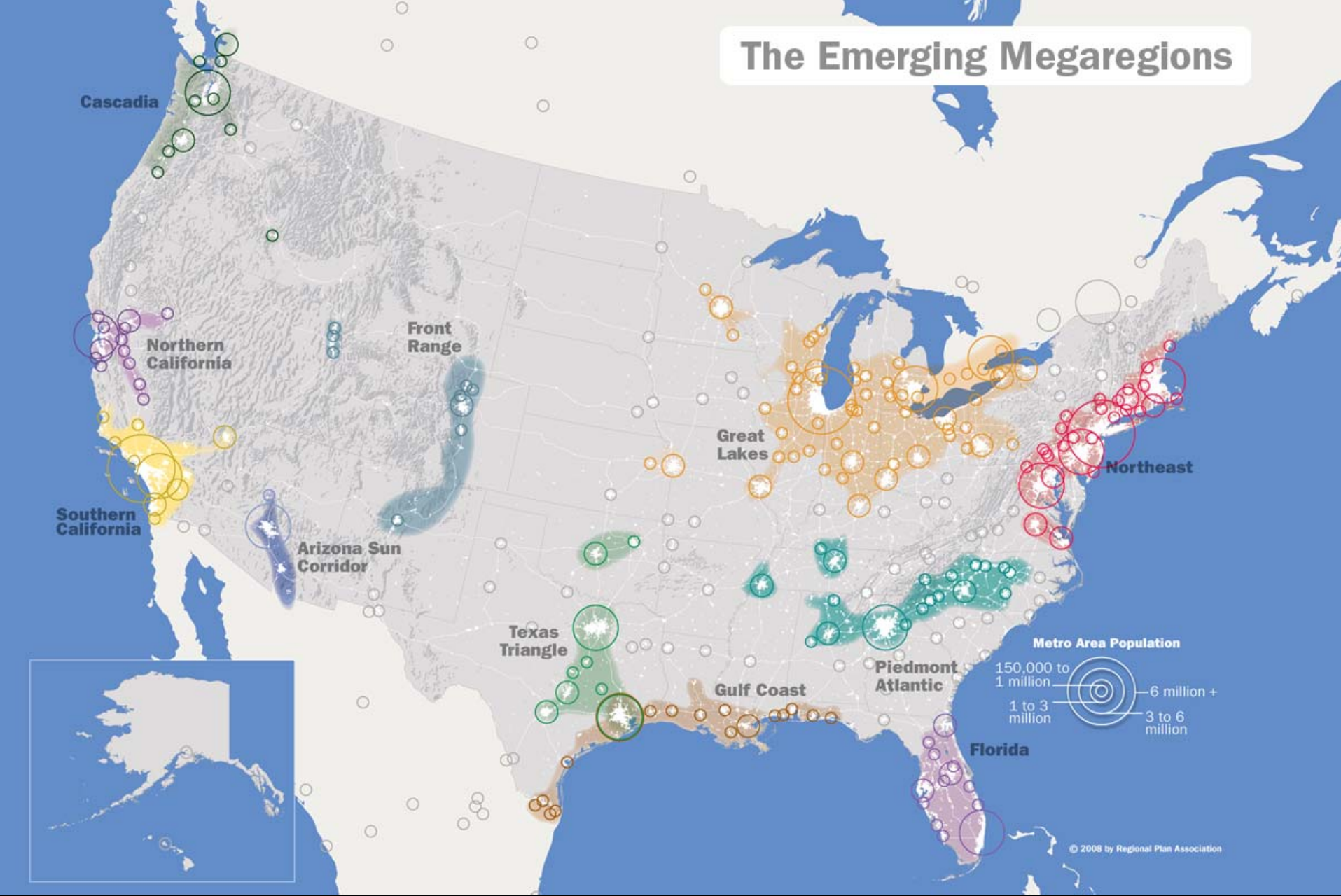
The 100 largest metros are located in every region of the country



BROOKINGS

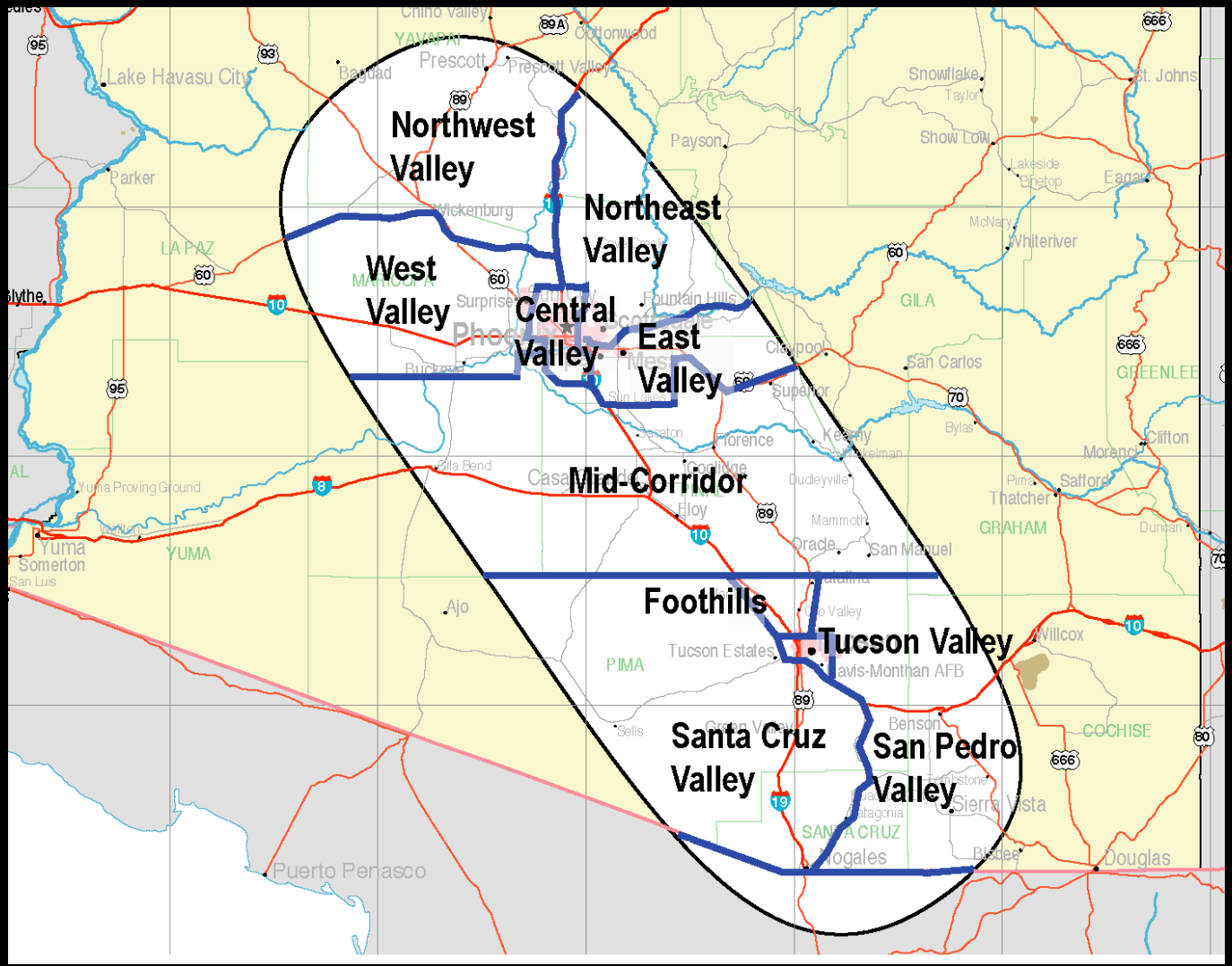
Blueprint for American Prosperity


FEDERAL LAW & POLICY
STATE LAW & POLICY
LOCAL LAW & POLICY
LOCAL COMP PLAN
FEDERAL FUNDING
TRANSPORTATION ELEMENT
AREA & NEIGHBORHOOD PLANS
TRENDS – ECONOMIC, DEMOGRAPHIC, TRAVEL BEHAVIOR
STATE FUNDING
STREETS PLAN
TIP
BICYCLE PLAN
PUBLIC OPINION
CIP
TRANSIT PLAN
LOCAL FUNDING
PROJECTS



America 2050

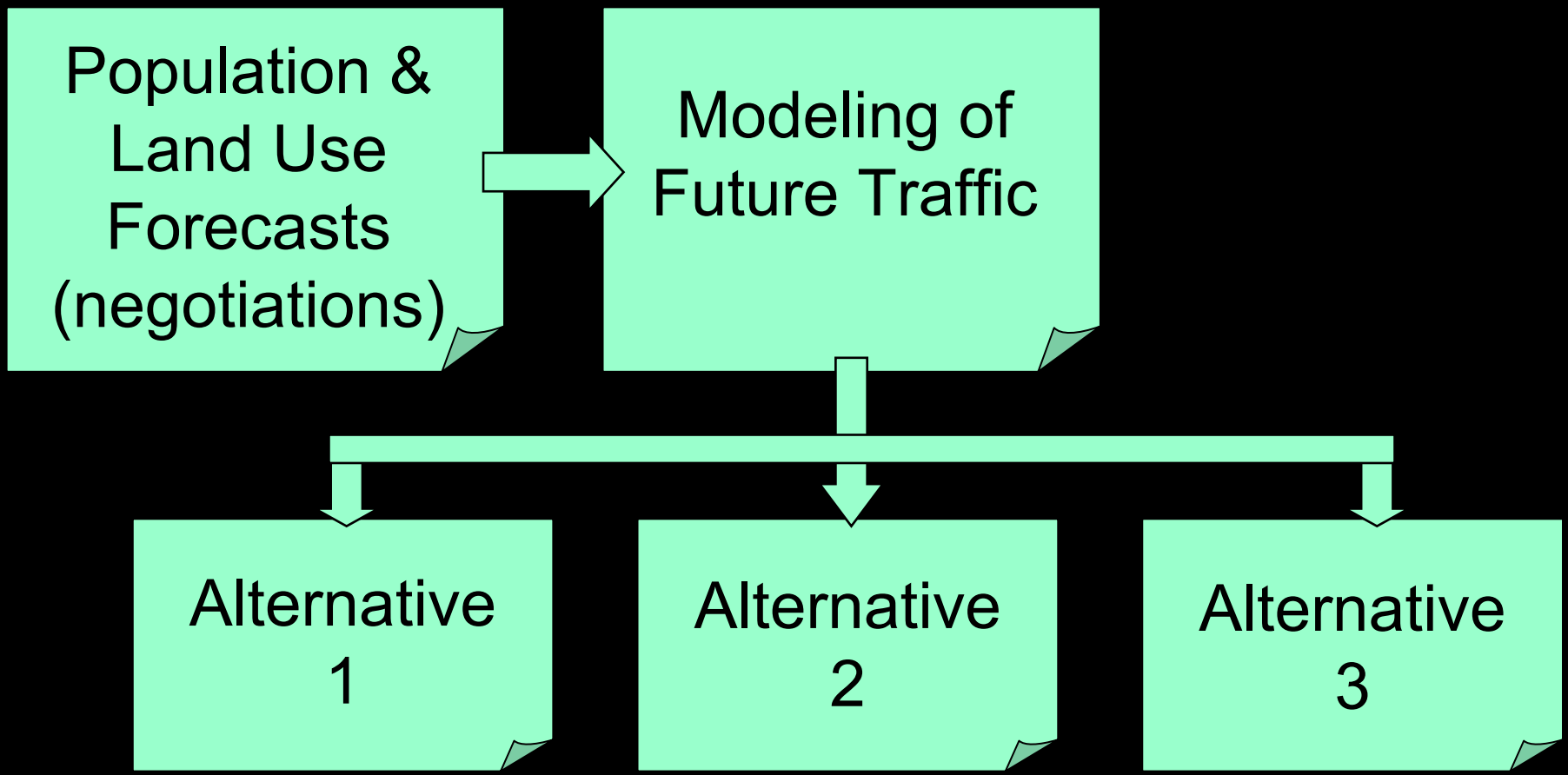
Arizona Sun Corridor



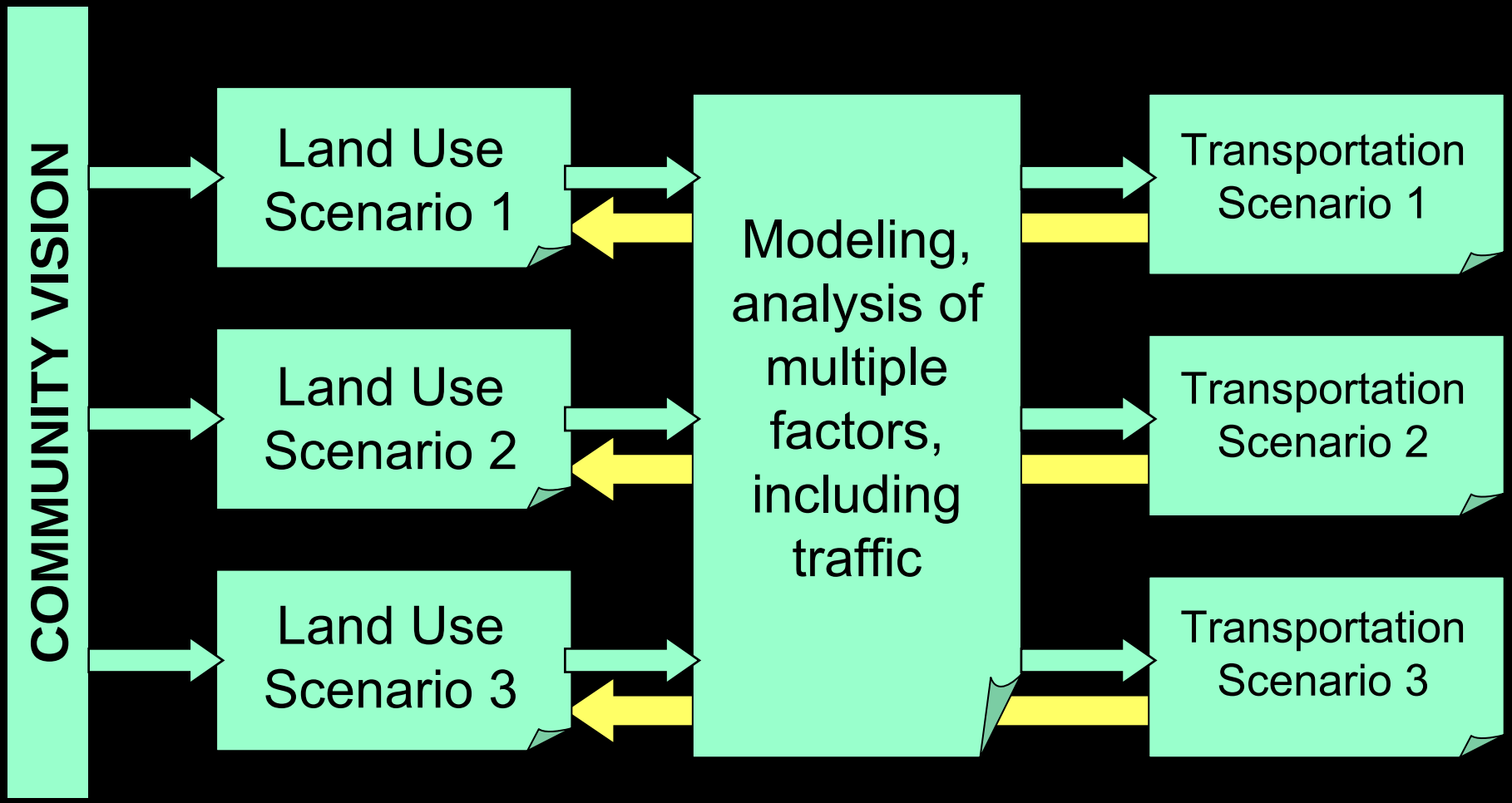
A New Era of “Regional” Planning

- Imperative for city pairs to collaborate on transportation & land use planning
- Need for cities in adjacent states (and state DOTs) to collaborate
- Moving beyond MPOs to megaregions
- Scenario planning (incl. California Blueprint Planning)

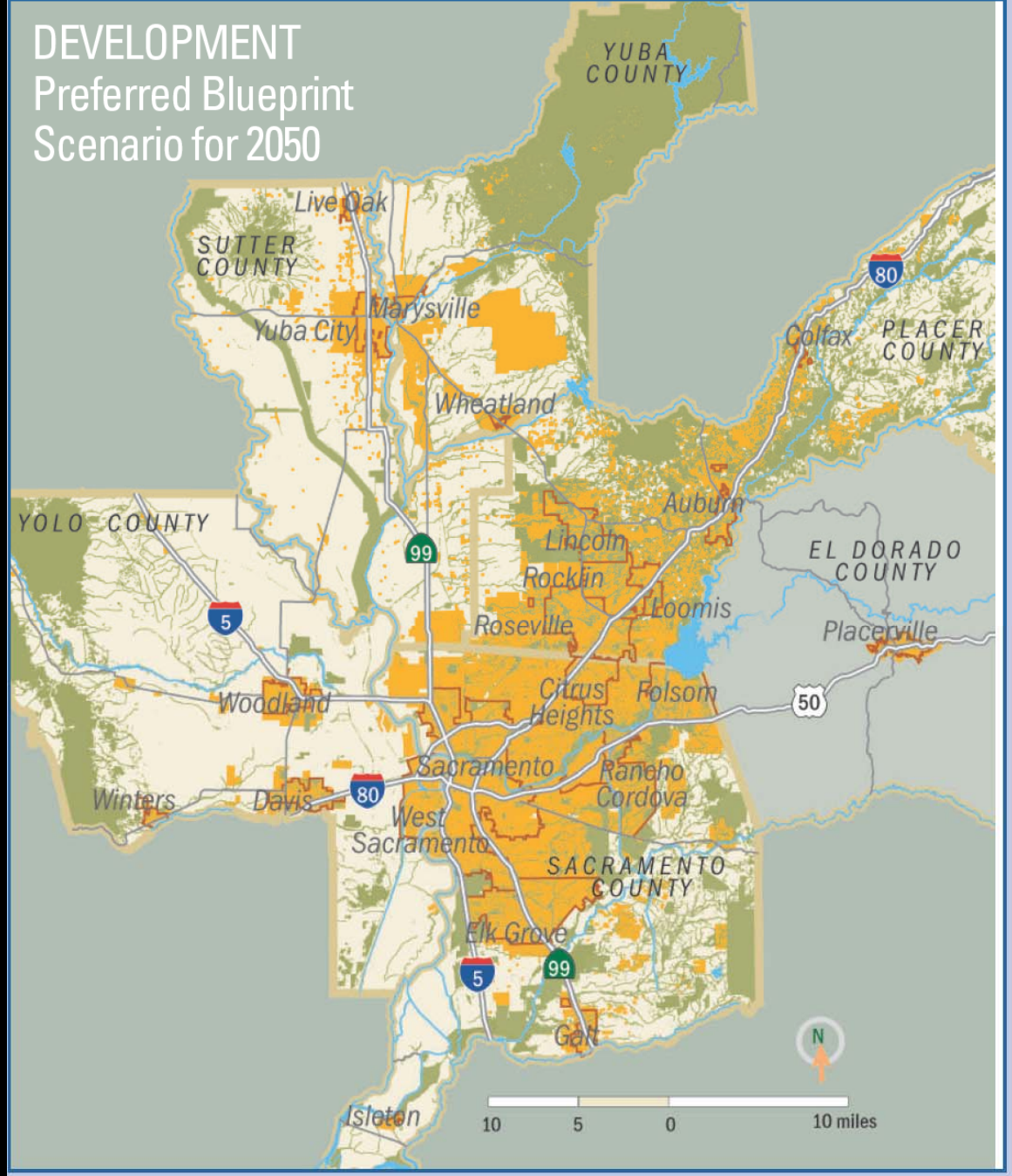
Old School Transportation Planning



Scenario Planning



Scenario Planning Projects



Key to the Map

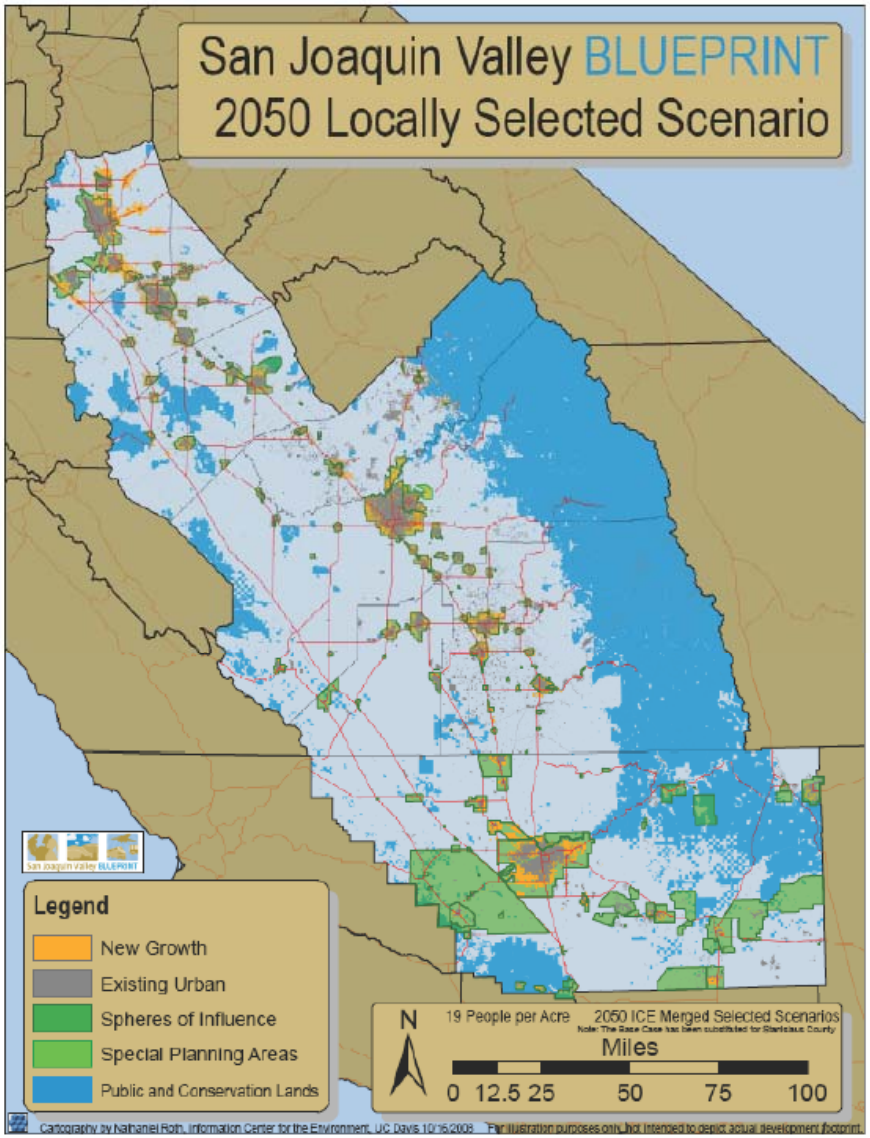
- areas of existing and future development
- green areas (e.g. open space, parks, wetlands, vernal pools, stream corridors, hardwood stands)
- agriculture and other undeveloped lands
- rivers, streams and lakes
- city boundaries
- highways
- county boundaries

Note: Some vernal pools in Yuba, Sutter and southwest Placer counties are preserved, but are not shown on these maps.

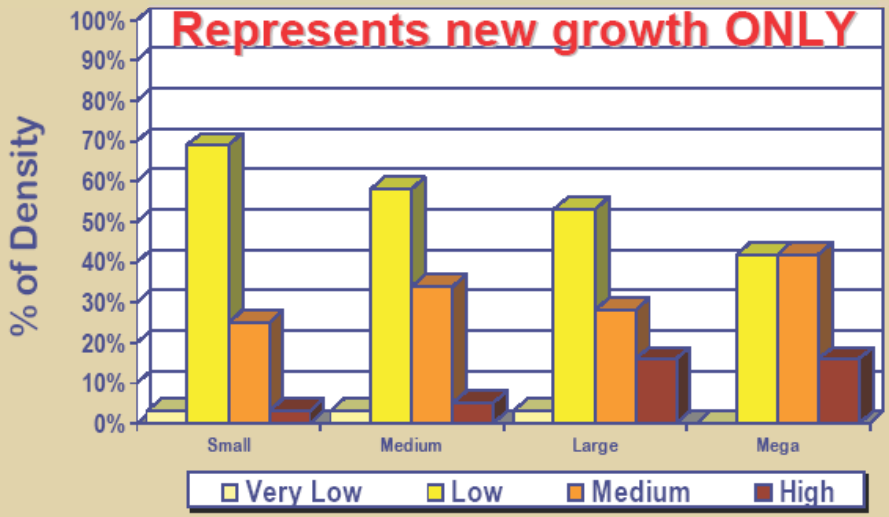
Note: El Dorado County elected not to directly participate in this phase of the Blueprint process due to ongoing issues associated with their General Plan.

For detailed information

To view the complete land use maps, including where industry, homes, shopping and other uses would be located in the region, please go to **www.sacregion-blueprint.org** and click on "The Project" tab at the top of the page. There you may view maps for each city and major county area in the region and a variety of statistical and narrative information about the scenarios.



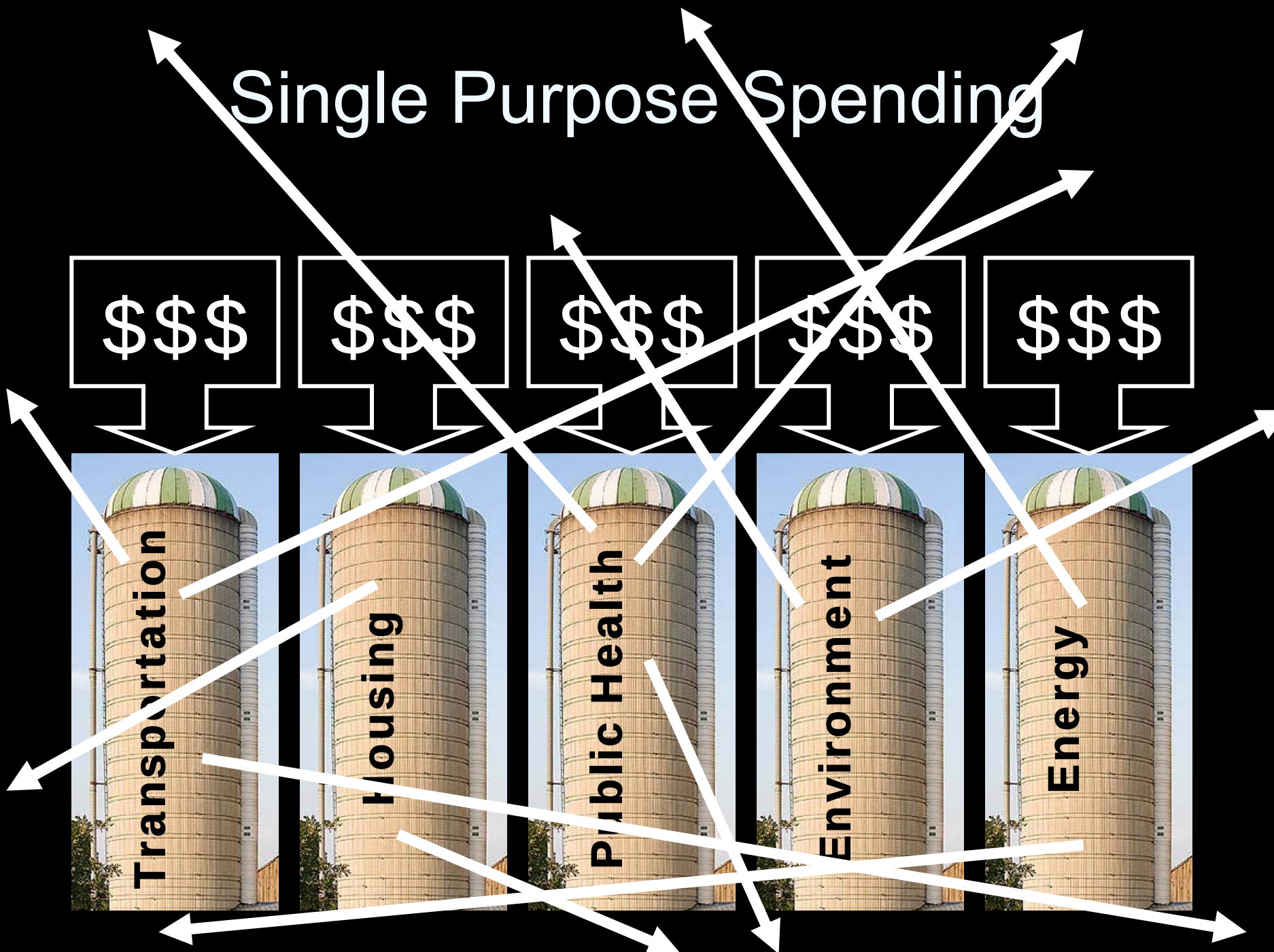
- # Scenario B
  - Created by Individual Counties
  - Increased residential densities
  - Limits agricultural and environmental impacts



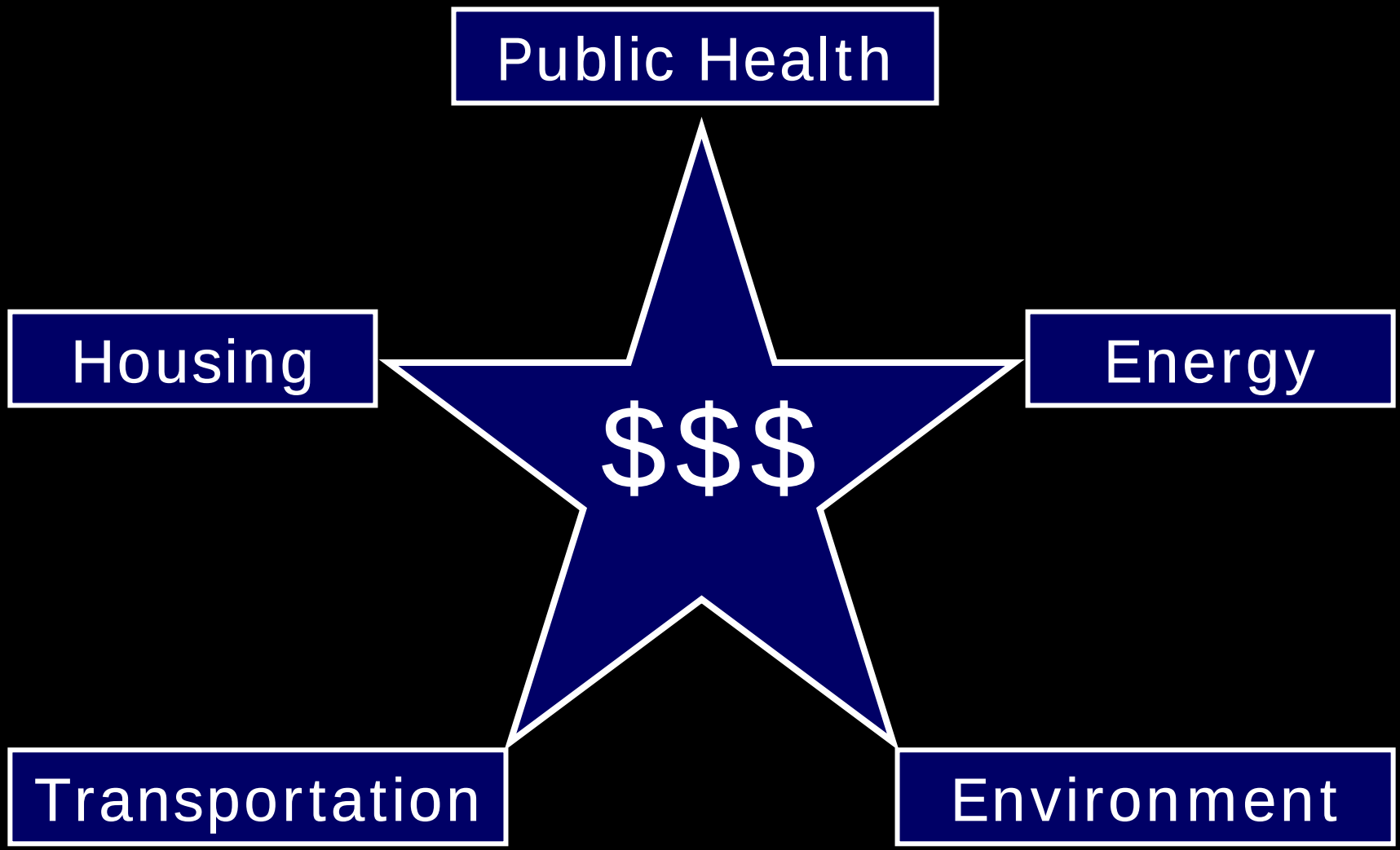
Opportunity 4.
Reinventing Transportation Finance

Regional Approaches

Single Purpose Spending



Integrated, Strategic Investment



Thanking You

Charlier Associates, Inc.

www.charlier.org