

# Providing for Arizona's Future Mobility

3 Challenges, 3 Opportunities

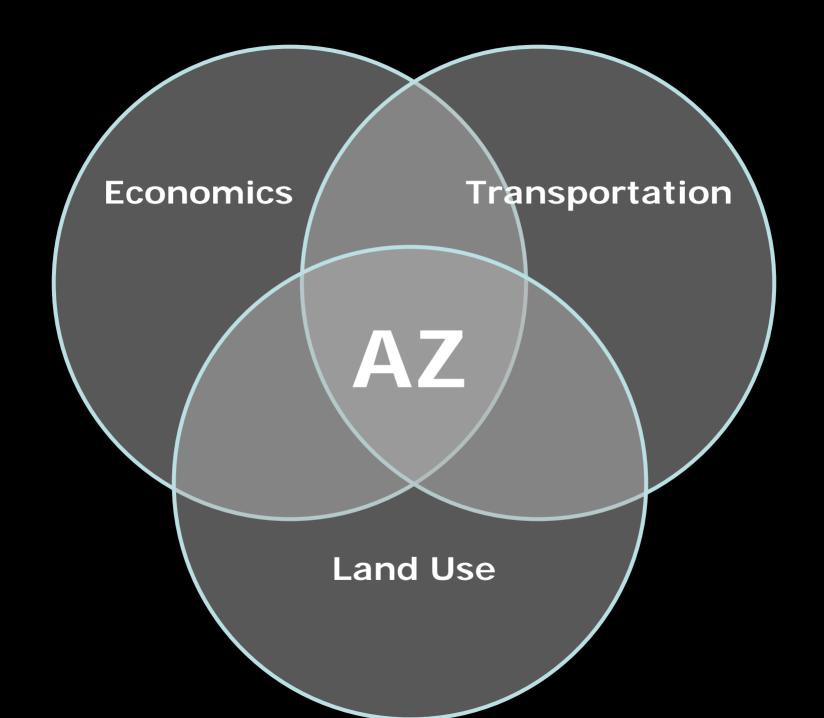
Charlier Associates, Inc.

#### My Proposal to You



- States Compete for Economic Growth [Some will thrive, others will suffer]
- But Economies are Local & Regional [Cities = Economies]
- Arizona's Future is in Her Cities

Small Differences Have Big Effects [Outcomes are decided at the margin]

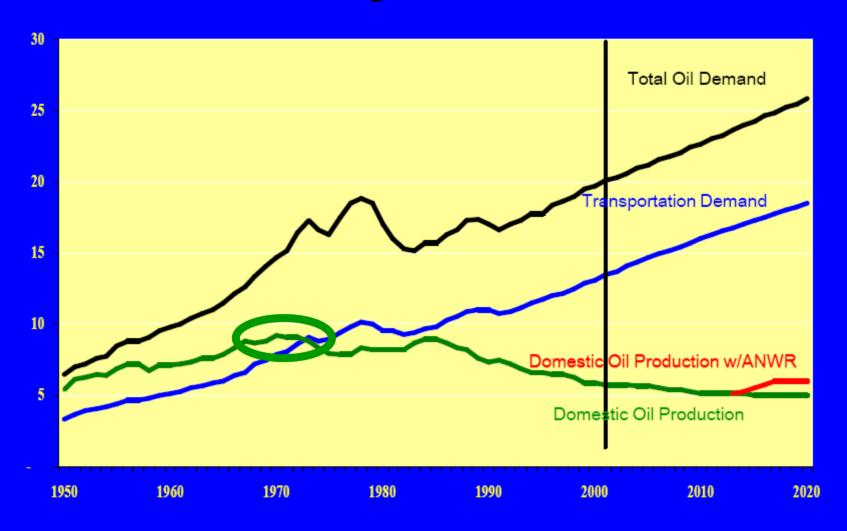


#### Three Challenges

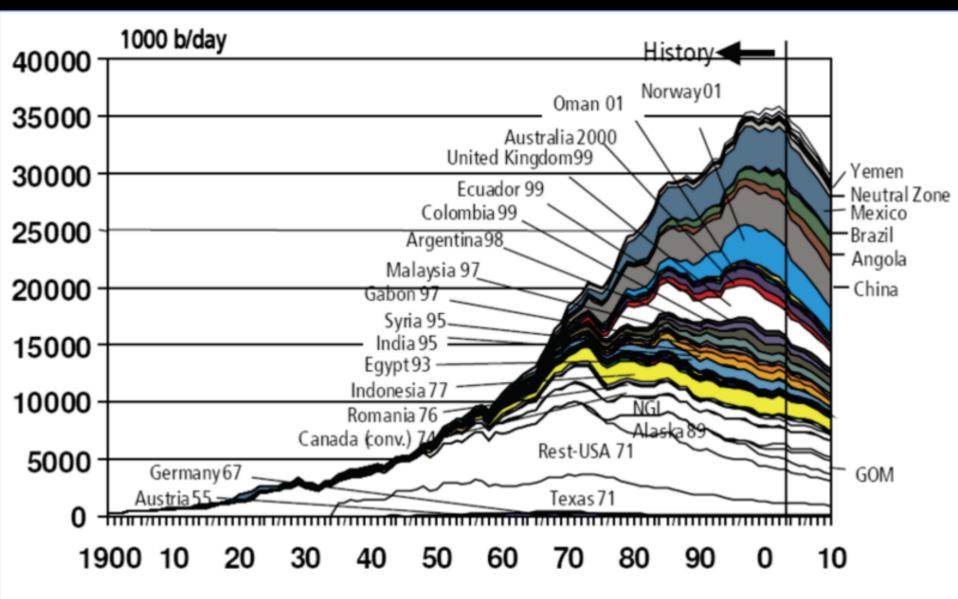


- 1. Petroleum Dependency
- 2. Climate Change
- 3. Location Efficiency

#### US Oil Consumption (million barrels per day)



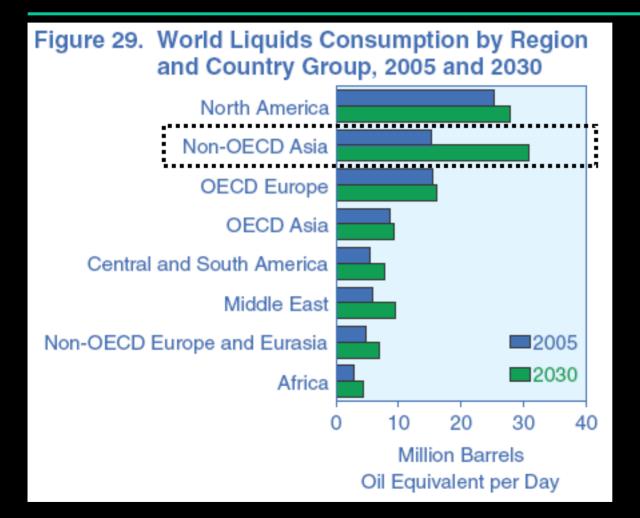
ELA, Annual Energy Outlook 2001; "Potential Oil Production from the Coastal Plain of ANWR," - ELA Reserves & Production Division



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

### Growth by World Region



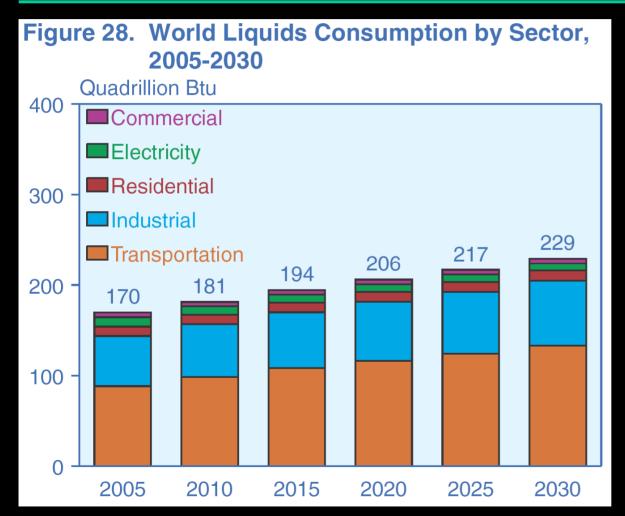


India and China will double their demand for petroleum by 2030

Source: United States Energy Information Administration, <u>International Energy Outlook 2008</u>, September 2008

#### Worldwide Growth in Demand





Transportation = 74% of increase in U.S. petroleum consumption

## We have not "run out of" oil





# The stone age did not end...

...because we ran out of stones

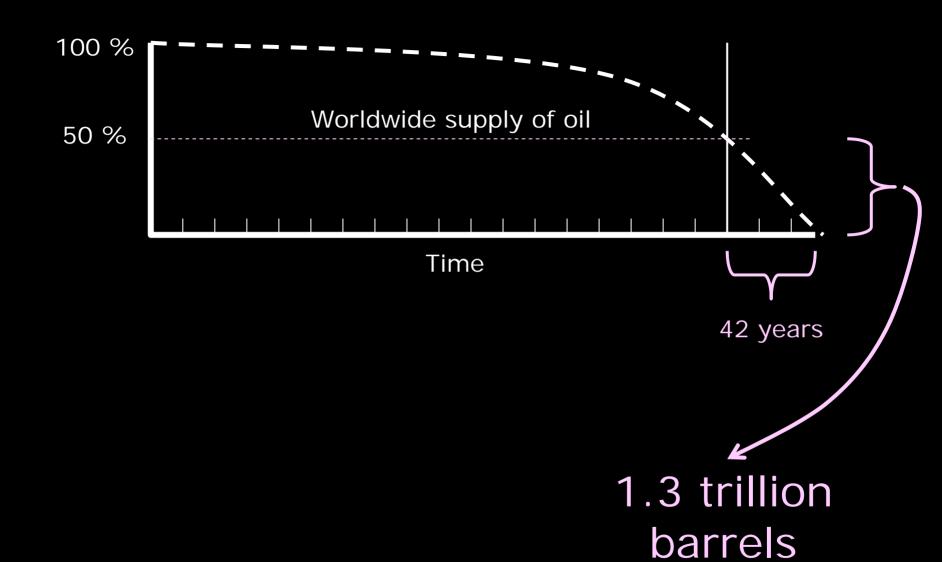


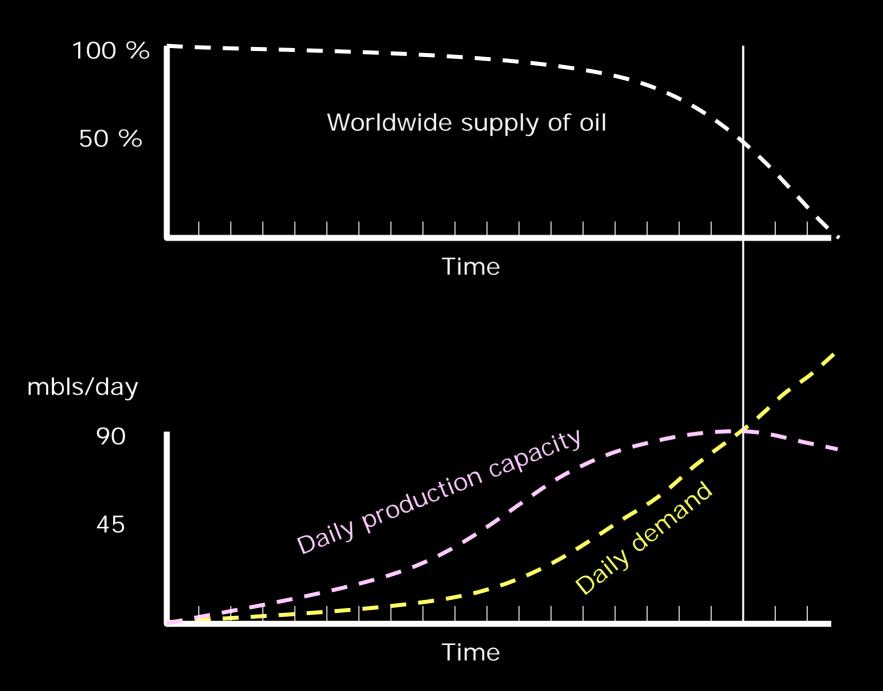
# We are at the end of the age of...

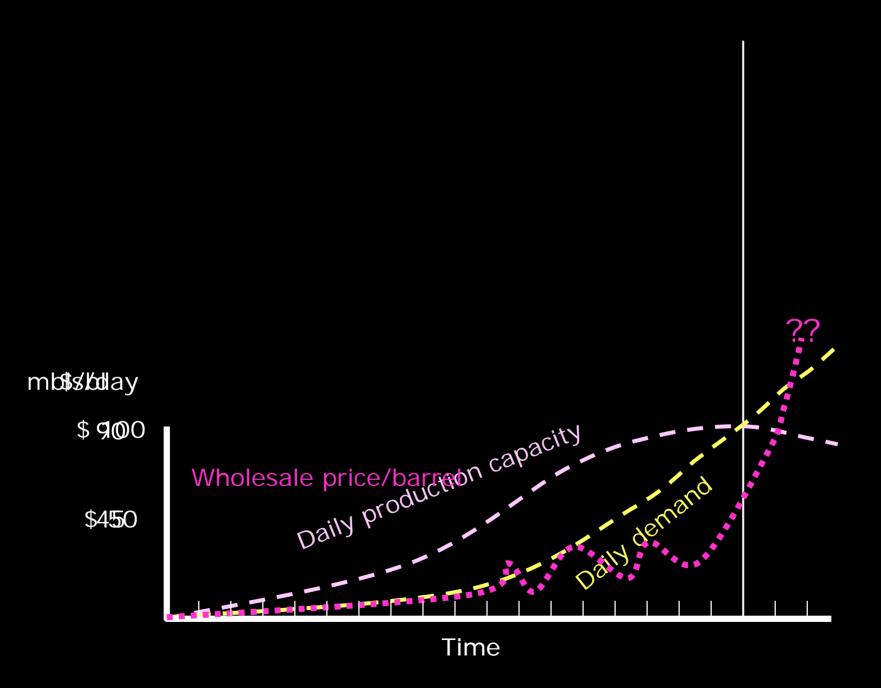


...cheap oil...

...and the beginning of the Post-Petroleum era.







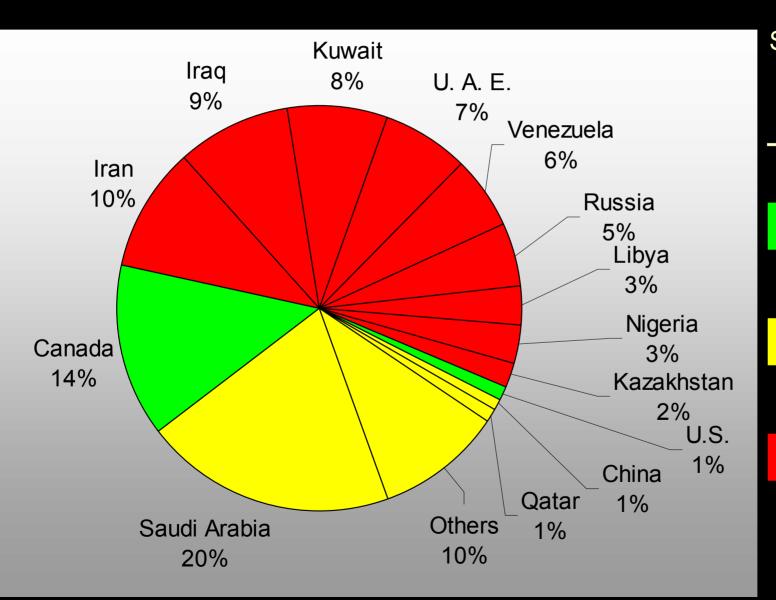
#### "Peak Oil"



- We are not "out of oil"
- But world-wide production capacity of petroleum-based fuels has peaked
- Demand will continue to rise
- Prices will rise and will be unstable



### Remaining Oil Reserves by Country



STABILITY OF U.S. RELATIONS

HIGH

15%

**MODERATE** 

32%

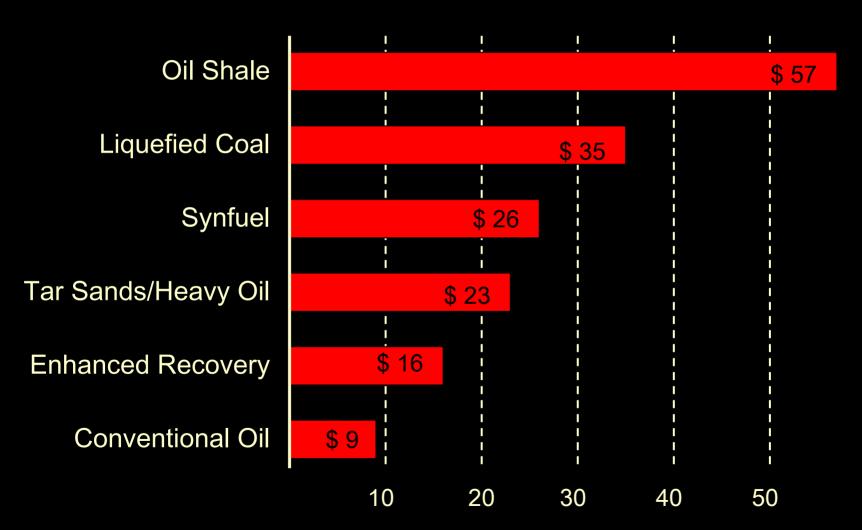
**LOW** 

53%

Source: Oil & Gas Journal

#### Production Cost – Sources of Oil

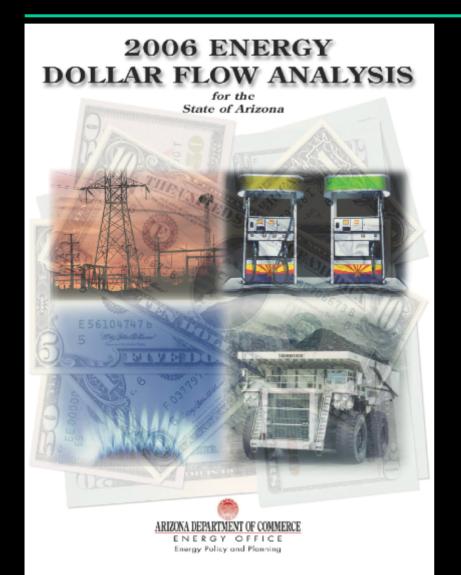
Production Cost Per Barrel of Oil - 2007



Source: Brandt & Farrell, UC Berkeley

## Az's Financial Drain - Energy







Dollars Retained 32%

\$9.9 Billion

#### Az's Financial Drain - Petroleum



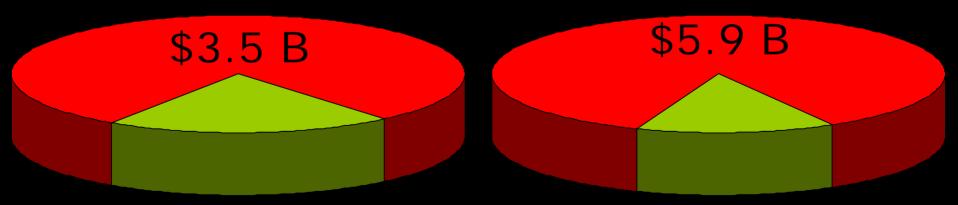
2003

2006

Dollars Exported 79%

+ 68%

Dollars Exported 86%



Dollars Retained 21% Dollars Retained 14%

#### Petroleum Dependency



#### Bottom Line:

- 1. Carbon-based energy will be more expensive & prices will fluctuate
- 2. Carbon-dependent economies will be at a disadvantage
- 3. Arizona has a carbon-dependent economy

#### Three Challenges



- 1. Petroleum Dependency
- 2. Climate Change
- 3. Location Efficiency



Receding Glaciers



**Stranded Polar Bears** 

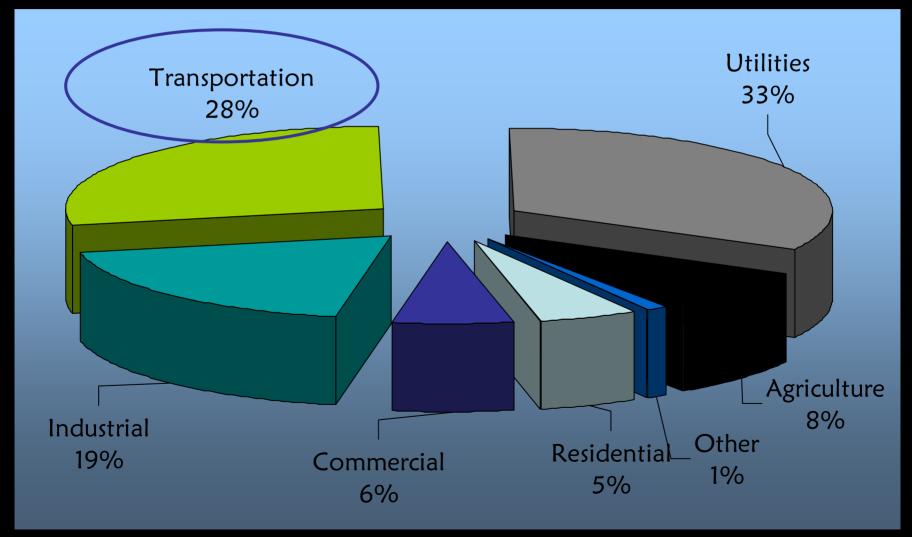
# Potential Responses to Climate Change



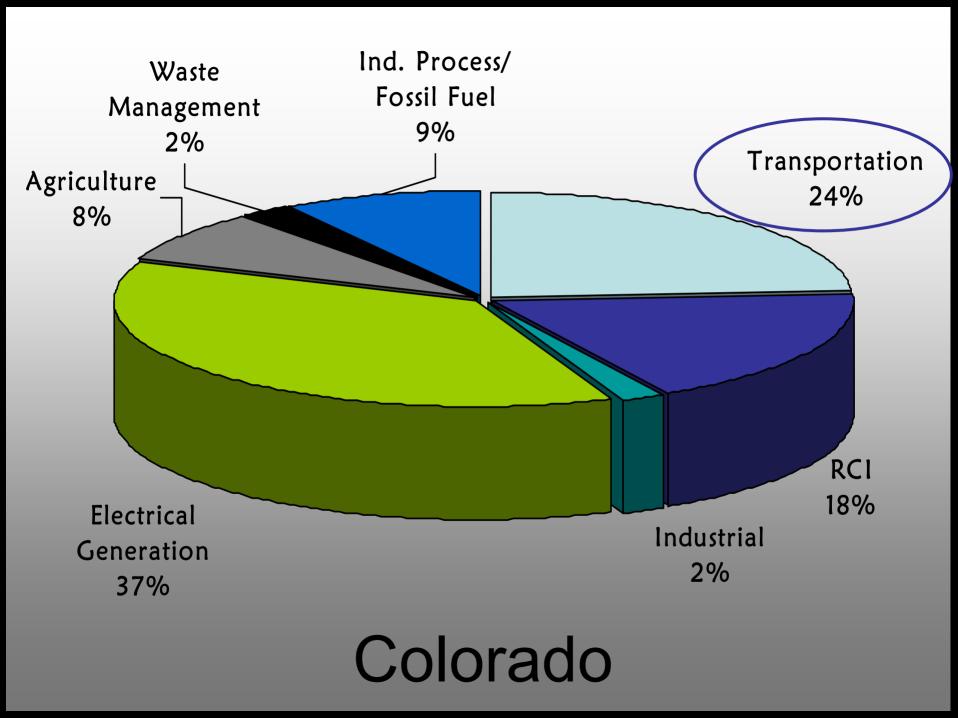
- Ignore
- Mitigate
- Adapt

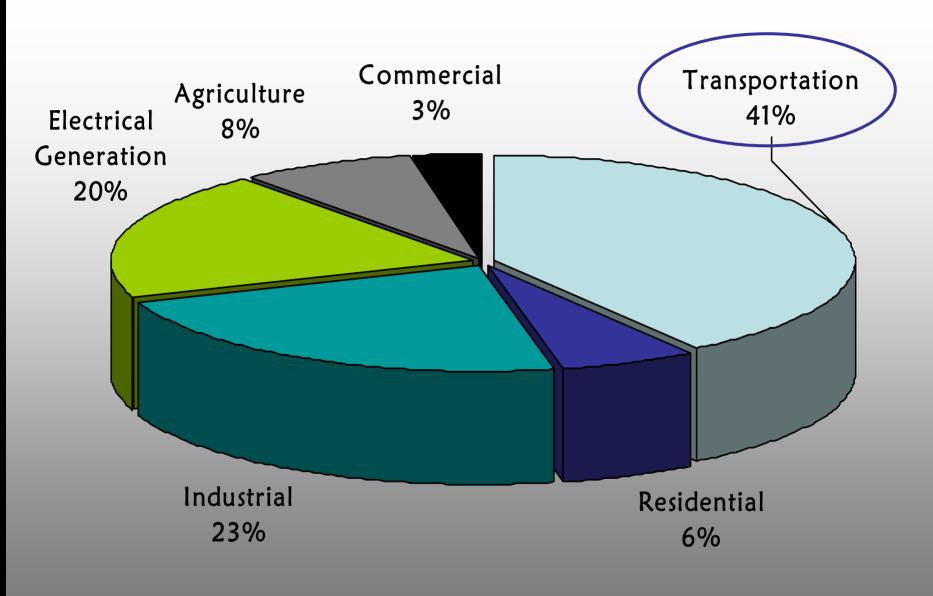
#### U.S. Greenhouse Gases











# California

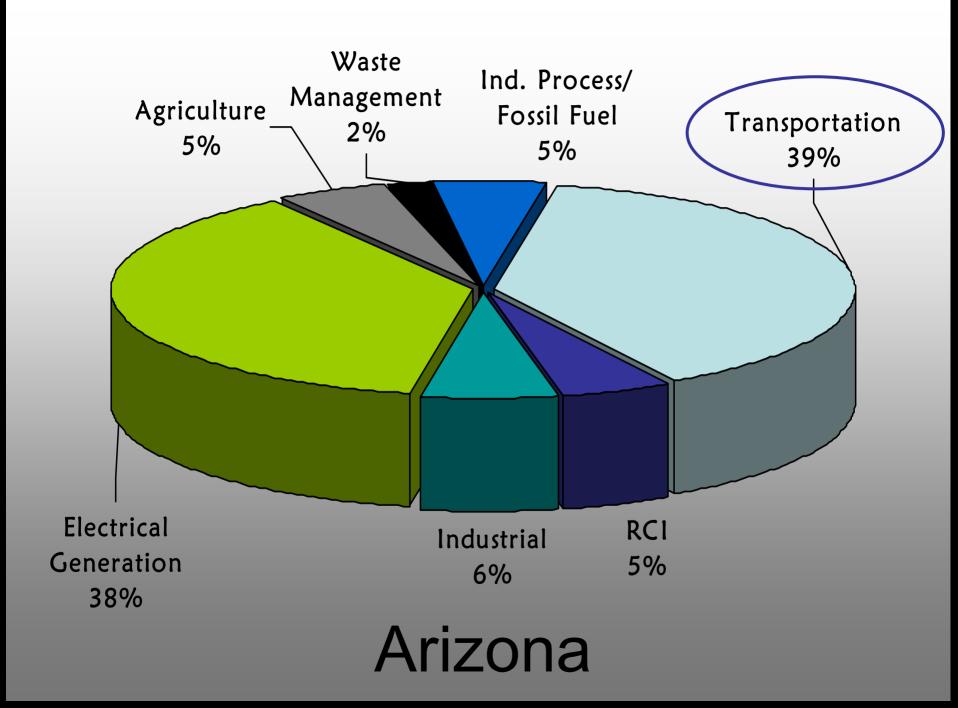
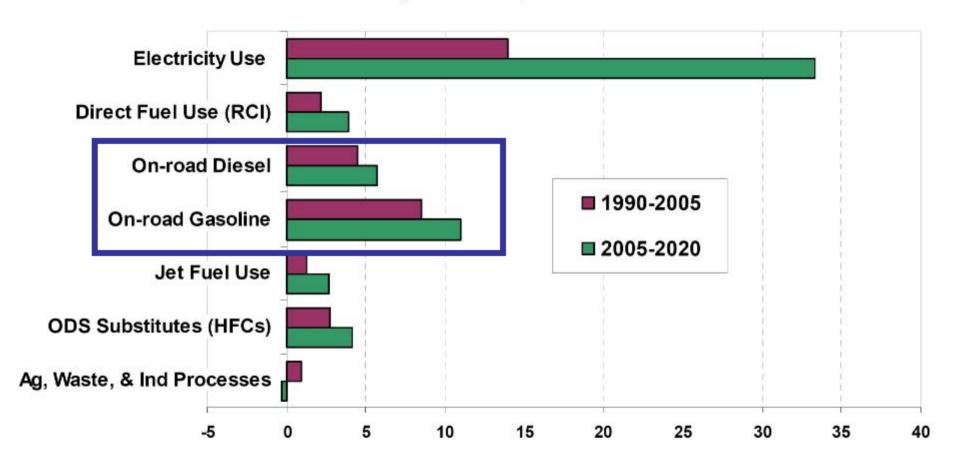


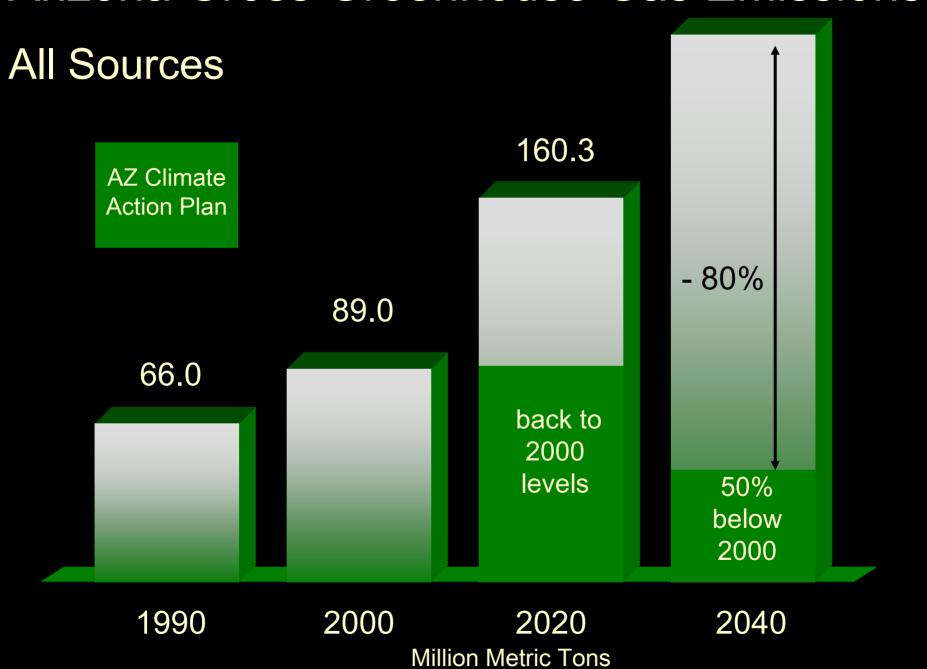
Figure 4. Contributions to Emissions Growth, 1990-2020: Reference Case Projections (MMTCO2e)



### Arizona Climate Change Policy

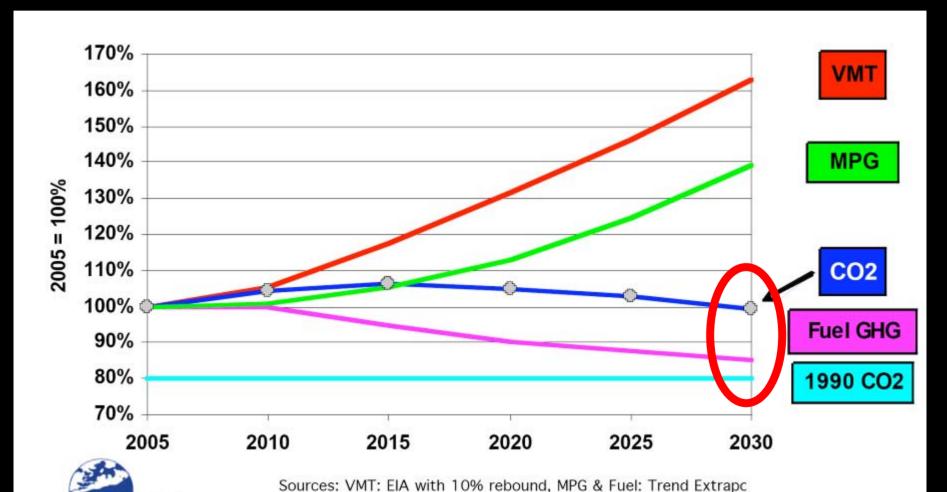


#### Arizona Gross Greenhouse Gas Emissions



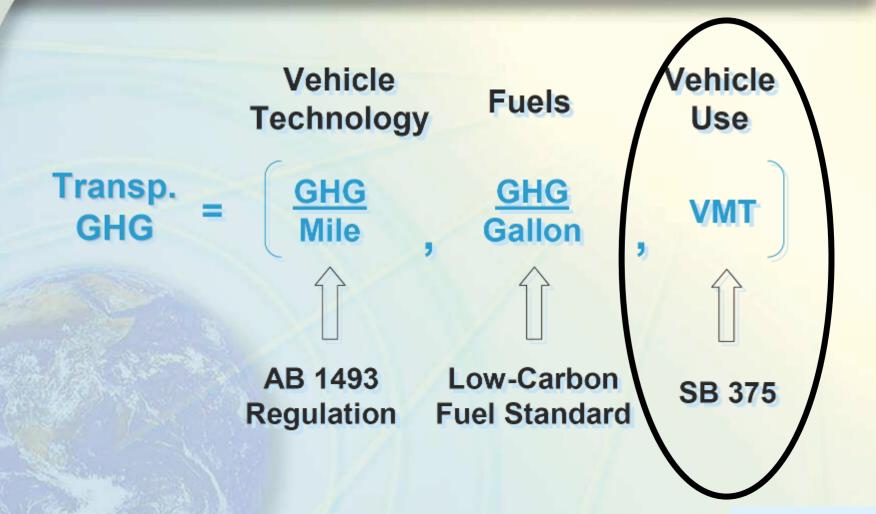
# Reducing Emissions at the Tailpipe Will Not Be Enough





enter for

# California's Approach to Transportation GHG



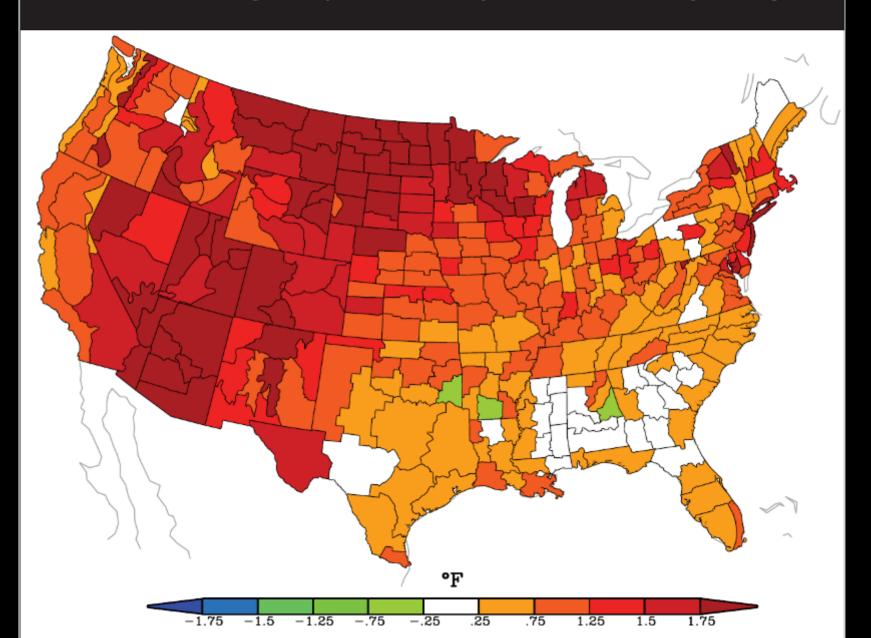
#### Potential Responses to Climate Change



- **Ignore**
- Mitigate
- Adapt

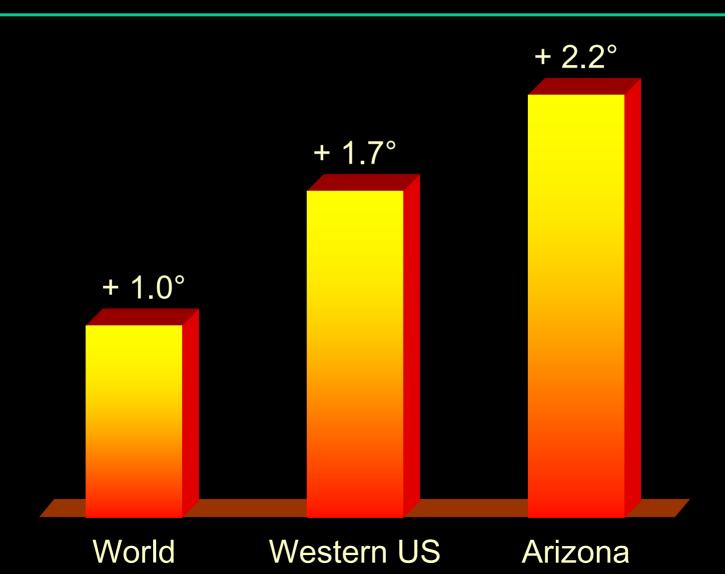


Figure 3. The Interior West: Epicenter of Warming in the Contiguous U.S. (2000 - 2007 Average Temperatures Compared to 20th Century Averages)



#### Ambient Temperature Change 1980 – 2007 (° F)







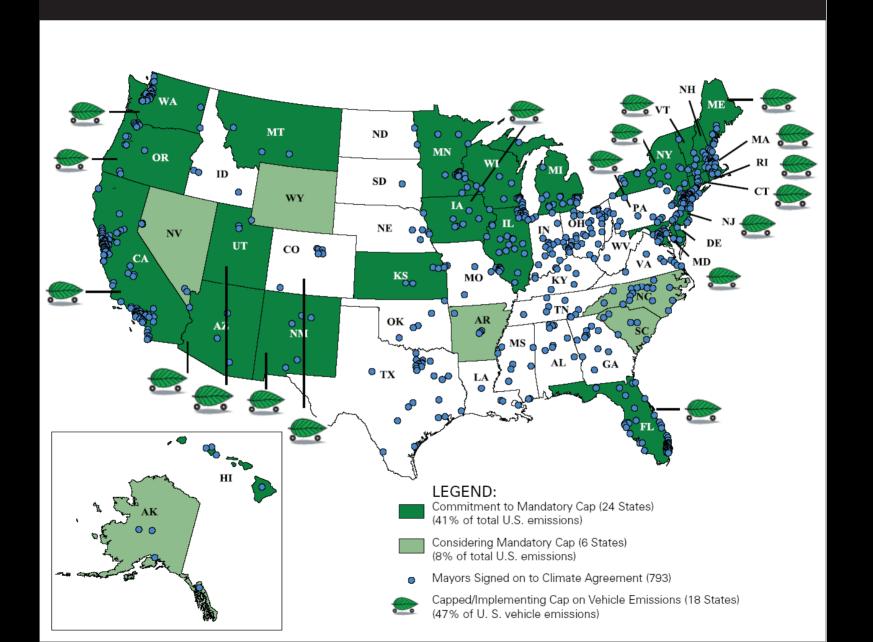
## Natural Inflow to Lake Powell Compared to Average Inflow<sup>22</sup>

| Year | Percentage of Average |
|------|-----------------------|
| 2000 | 62%                   |
| 2001 | 59%                   |
| 2002 | 25%                   |
| 2003 | 51%                   |
| 2004 | 49%                   |
| 2005 | 105%                  |
| 2006 | 73%                   |
| 2007 | 68%                   |



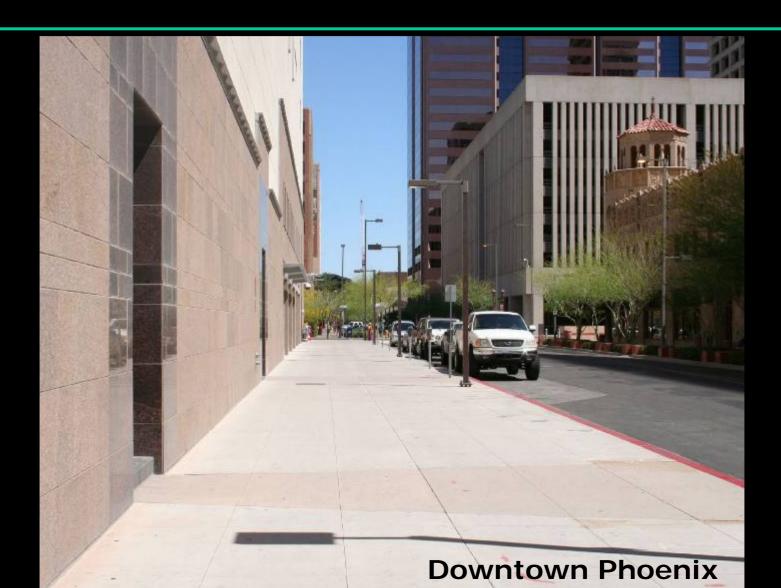
White "bathtub rings" show the pre-drought water level of Lake Powell.

Figure 6. The Rising Tide for Global Warming Solutions



## What Does "Adapt" Mean?





# Strategic Building Massing and Orientation





Credit: ASU and City of Phoenix

# Urban Streets As Linear Parks





Credit: ASU and City of Phoenix

# Cooler Pedestrian Environment in Urban District





Credit: ASU and City of Phoenix

### Climate Change



- Bottom Line:
  - 1. Az Must Mitigate GHG Emissions [this will be driven by regulations]
  - 2. Az Must Adapt to Climate Change [this will be driven by politics]
  - 3. A Late Start is a Bad Idea
    [the magnitude of these issues will be exponential over time]

### Three Challenges

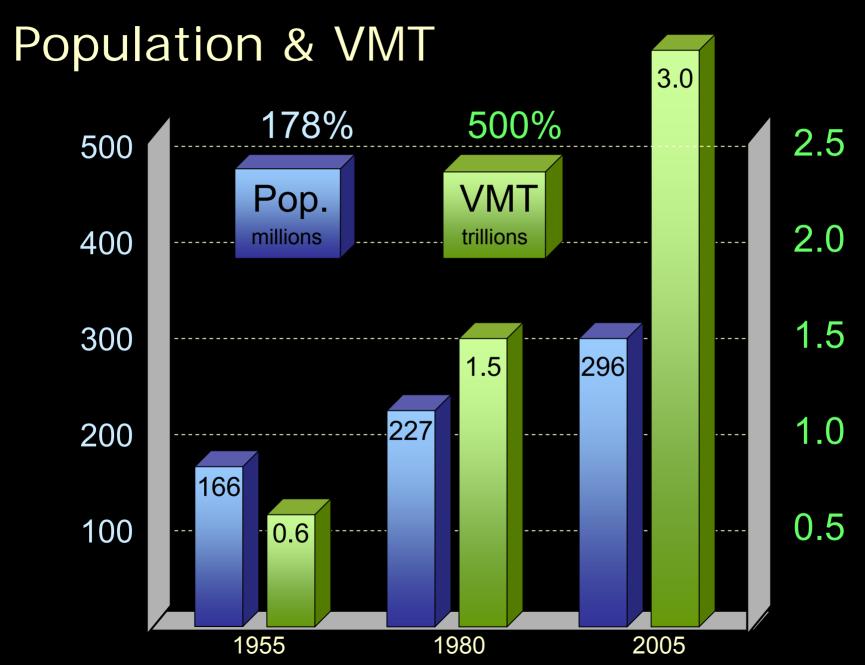


- 1. Petroleum Dependency
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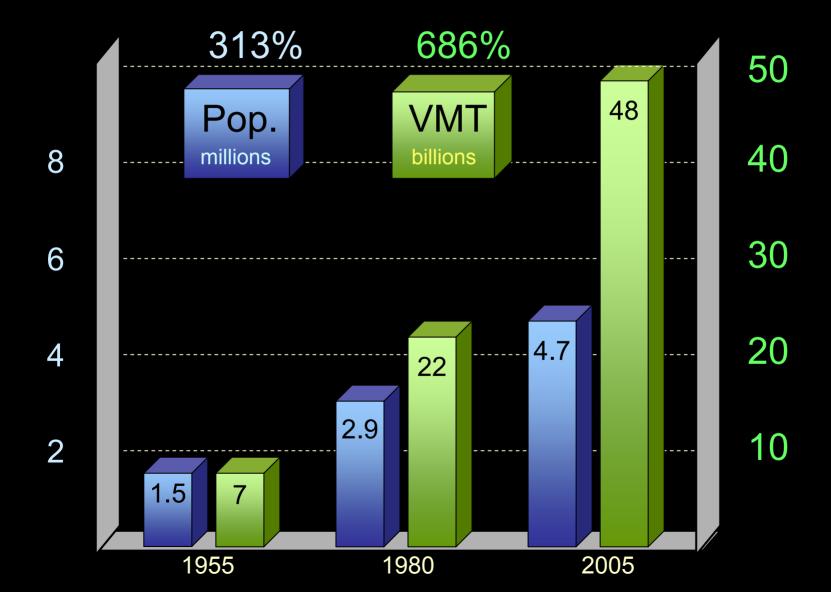
### def. "Location Efficiency"

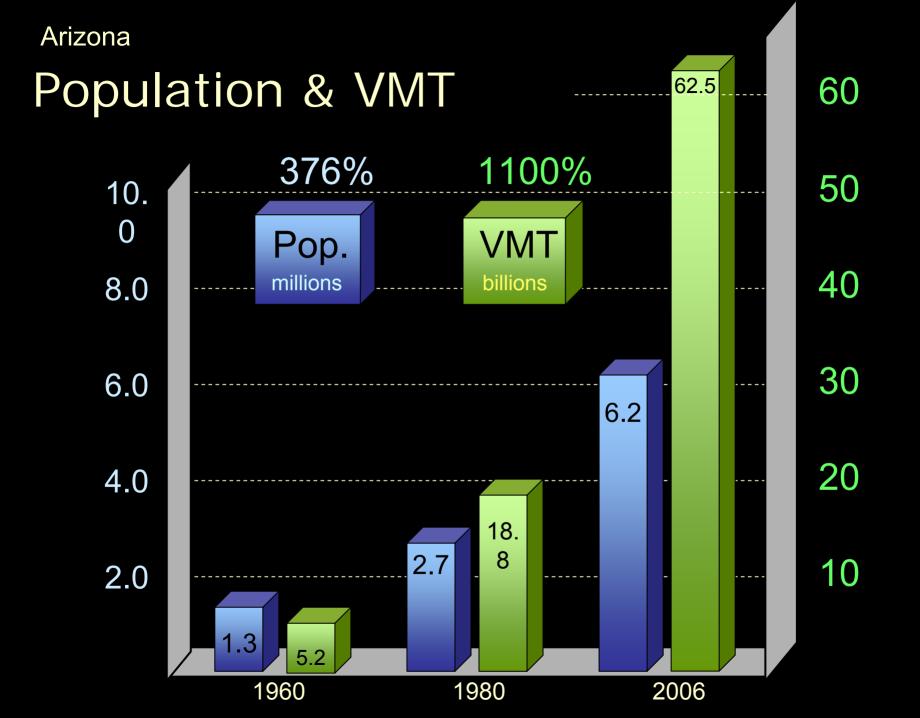


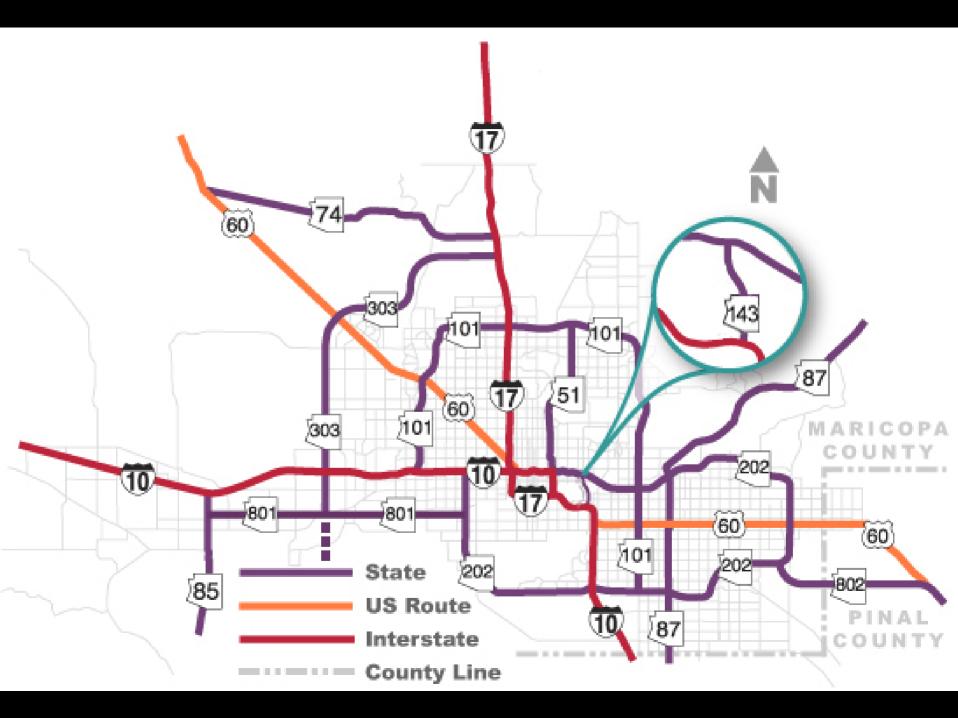
The intrinsic accessibility and mobility performance of a given land development pattern, measured in unavoidable transportation costs (incl. time) and associated secondary impacts of non-productive travel volumes



### Population & VMT







### Phoenix Valley Freeways



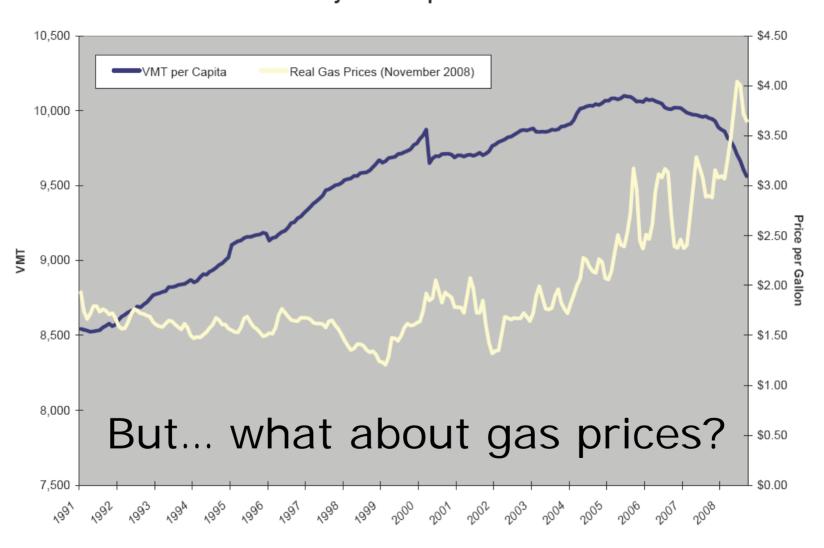
### TTI Data - 2007



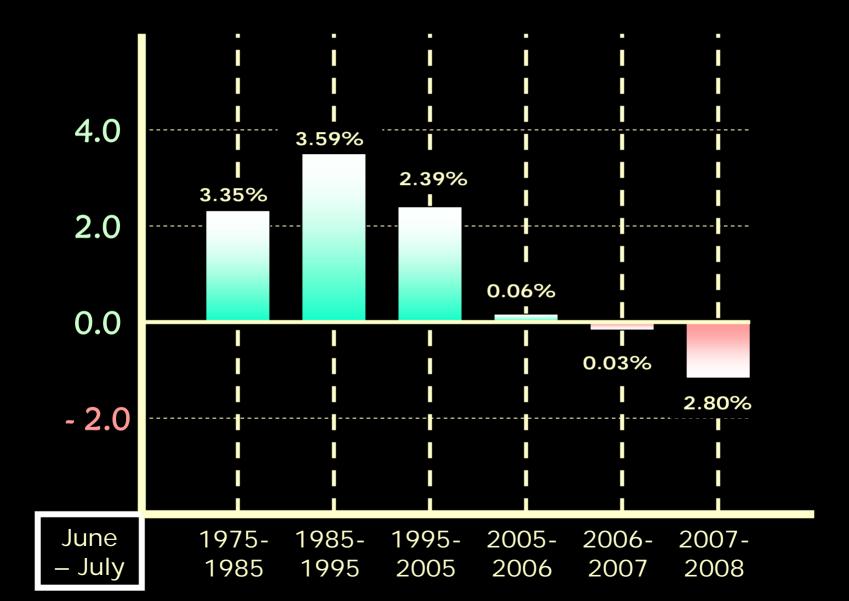
Source: Texas Transportation Institute

Figure 1b. U.S. Vehicle Miles Traveled Per Capita, Annualized and Real Gasoline Pump Prices,

January 1991–September 2008



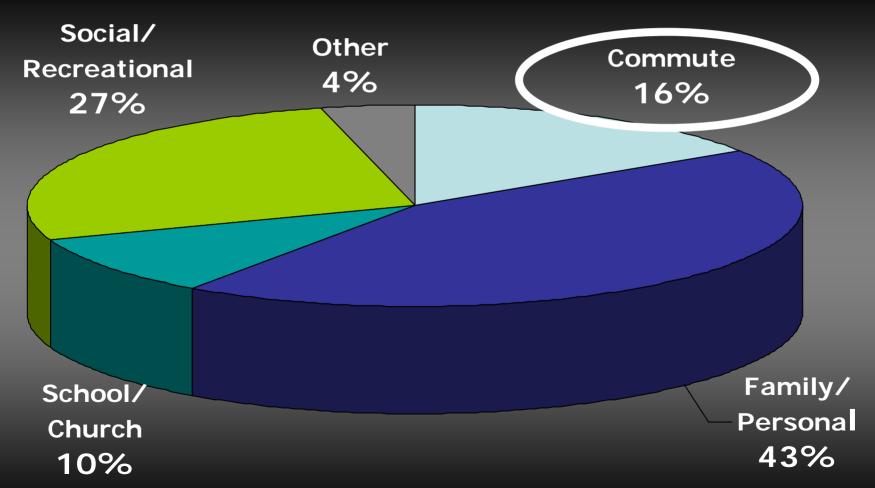
### United States Annual Rate of Change in VMT



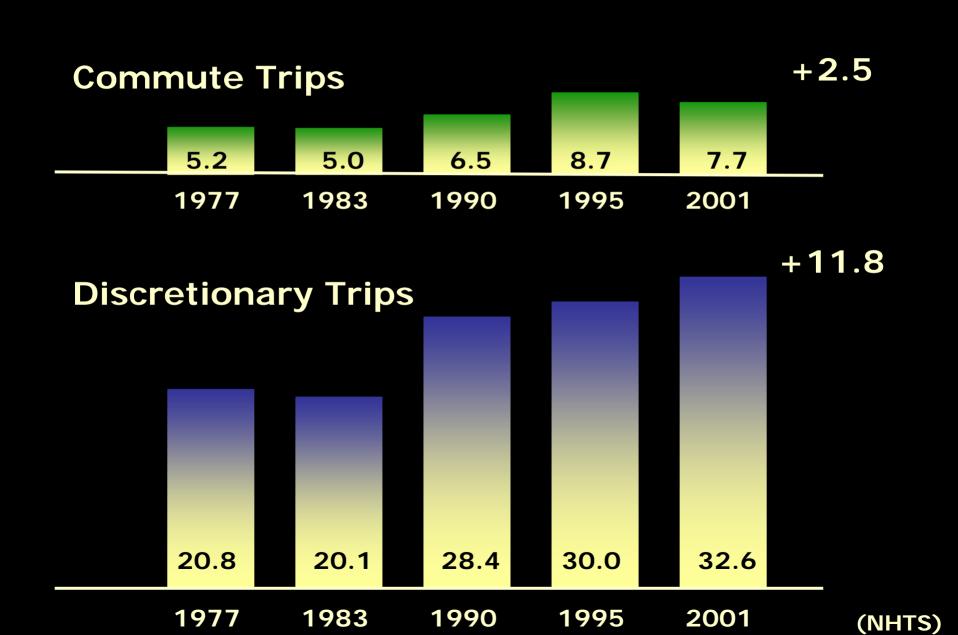
### Daily Trips/Person





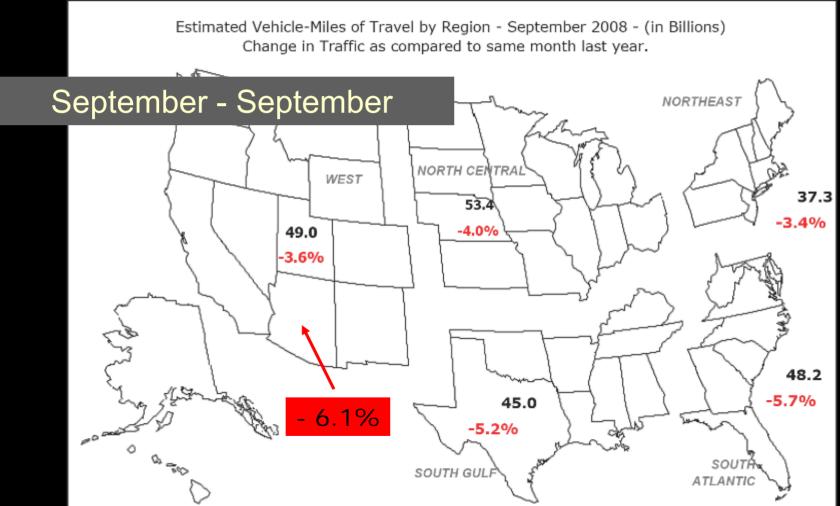


### Daily Miles of Travel Per Capita



### Monthly VMT Trend

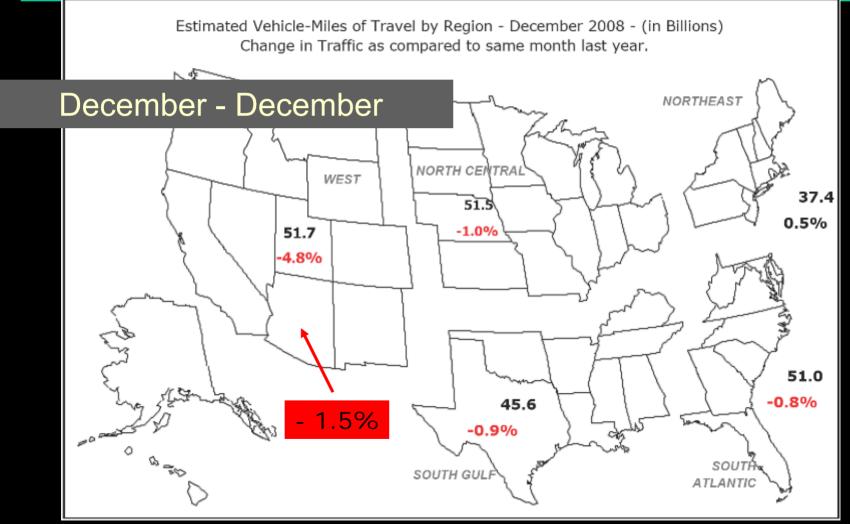




Source: United States Department of Transportation, <u>Traffic Volume Trends</u>, September 2008

### Monthly VMT Trend

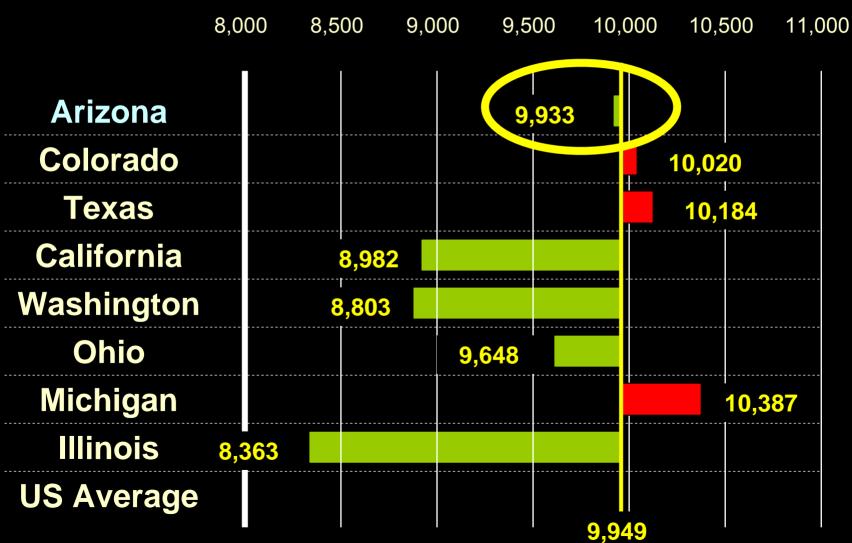




Source: United States Department of Transportation, <u>Traffic Volume Trends</u>, December 2008

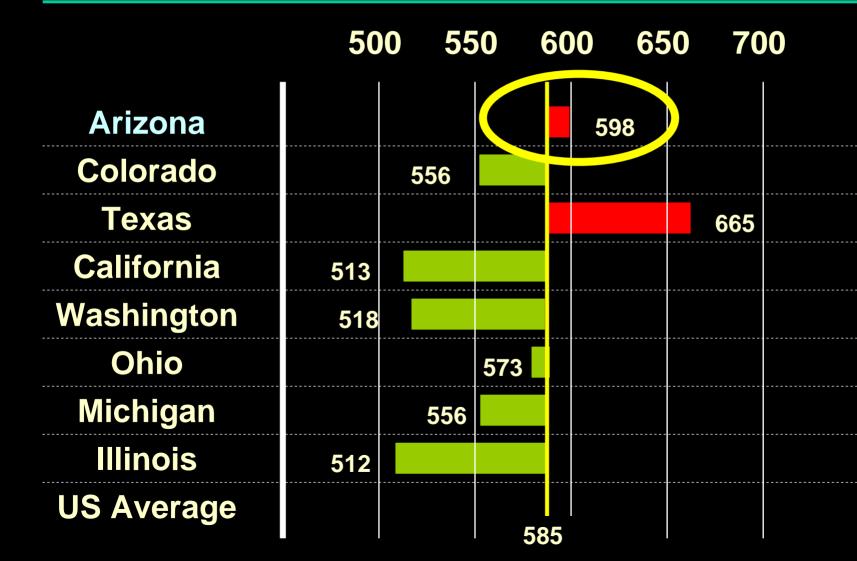
## VMT / Capita





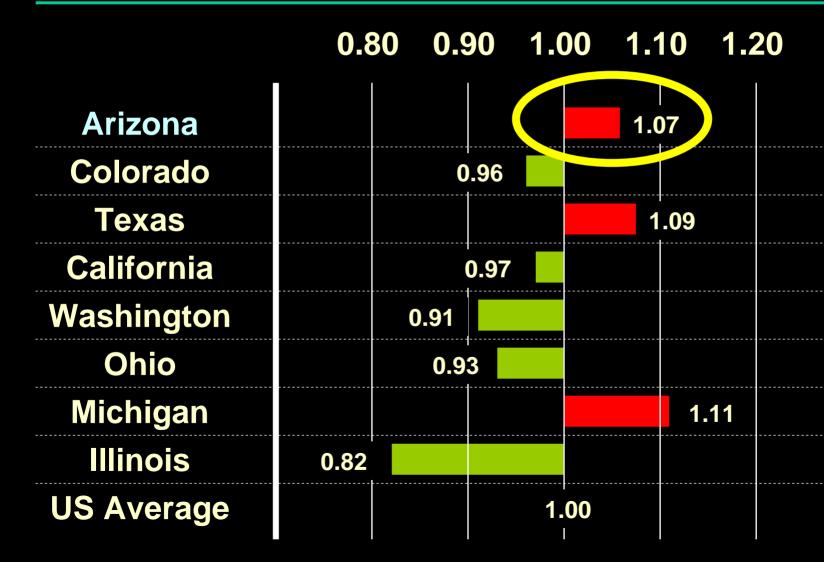
## Per Capita Use of Highway Fuels



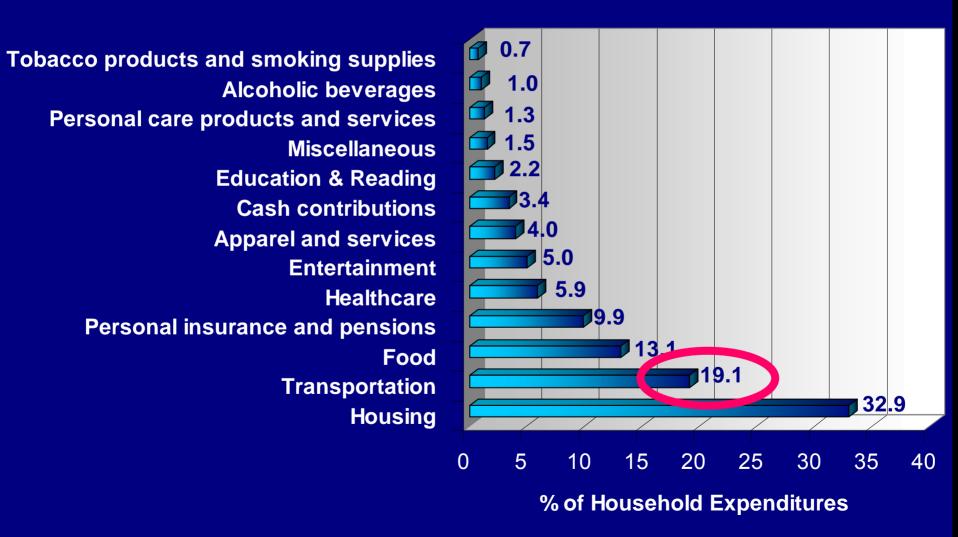


## VMT to Employment Index 2007



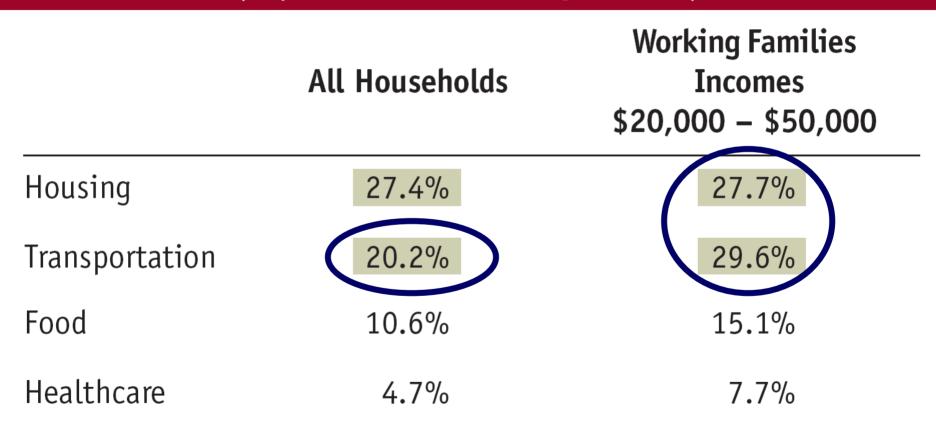


## Household Expenditures



## TYPICAL HOUSEHOLD BUDGET IN 28 METROPOLITAN AREAS

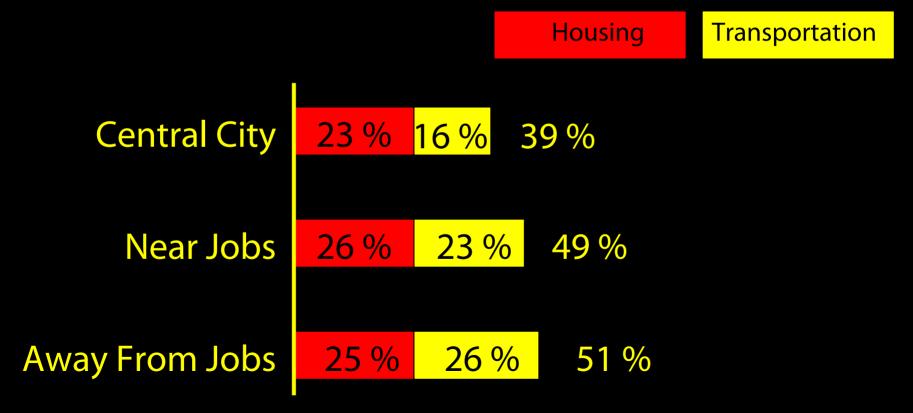
(Expenses as a share of income)



# Share of Family Income Spent On Housing & Transportation



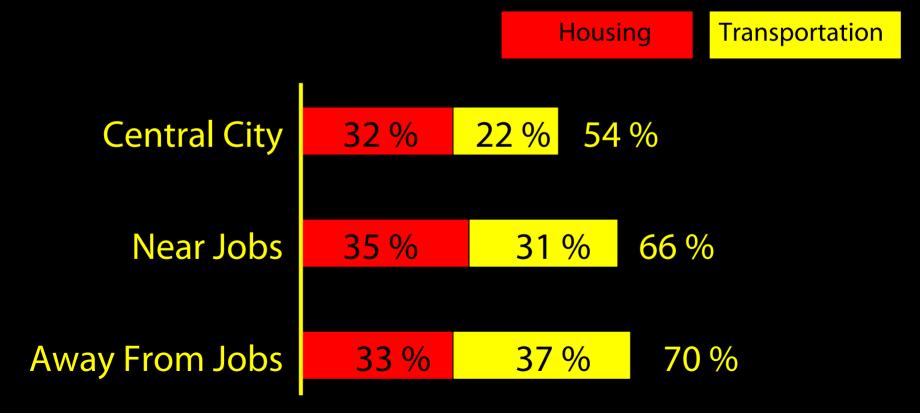
Family Income = \$35,000 - \$50,000



# Share of Family Income

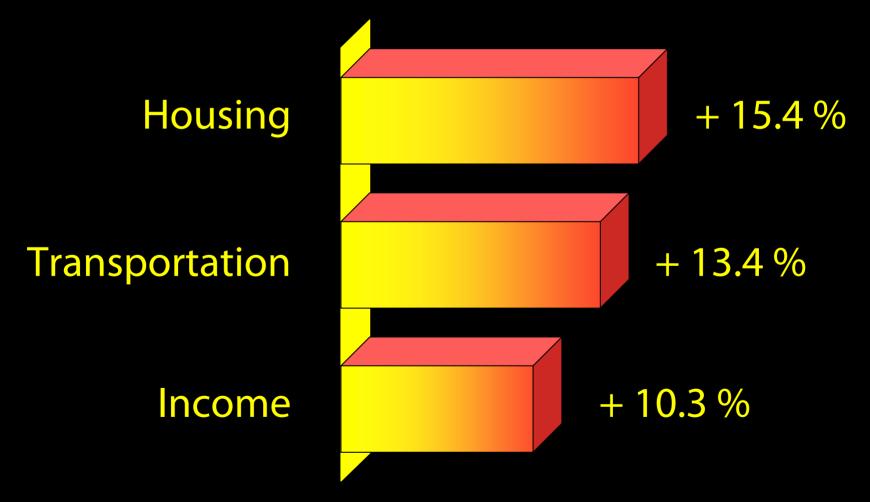


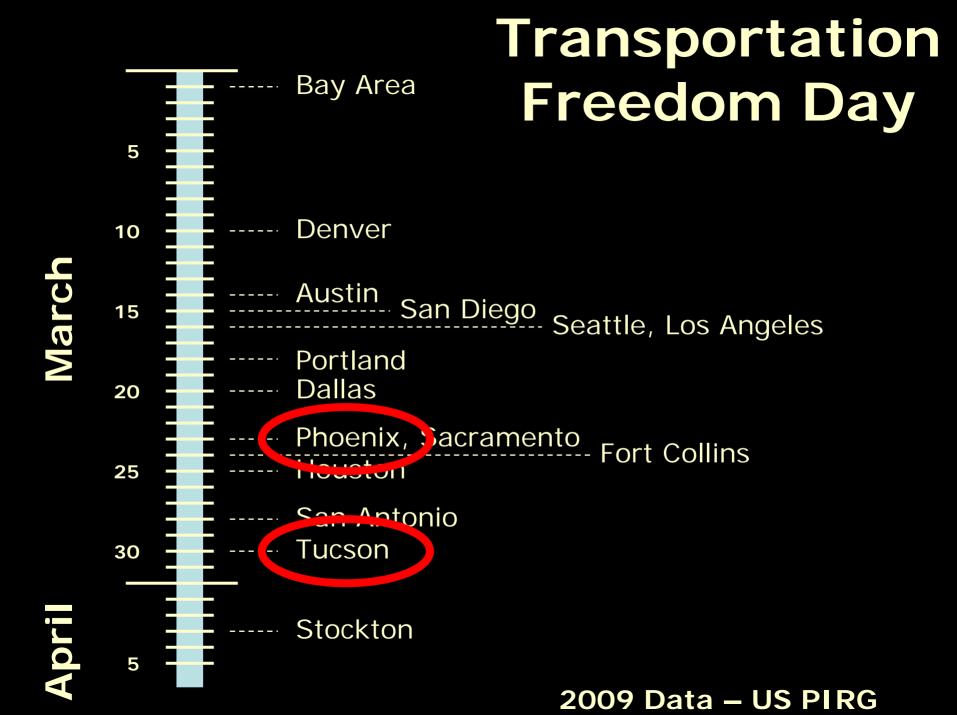
Family Income = \$20,000 - \$35,000



# Family Costs Rising Faster Than Incomes (2000 – 2005)







### **Emerging Trend**

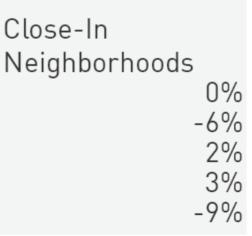


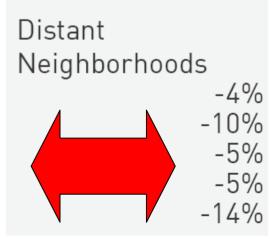
Table: The Effect of Centrality on Housing Price Changes

Change in Housing Prices Last 12 Months

| Metro Area  |
|-------------|
| Chicago     |
| Los Angeles |
| Pittsburgh  |
| Portland    |
| Tampa       |





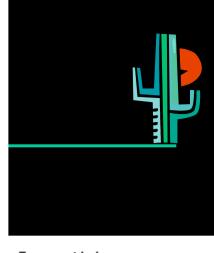


Source: Driven to the Brink: How the Gas Price Spike Popped the Housing Bubble and Devalued the Suburbs, Joe Cortright, May 2008. CEOs for Cities.

#### Transportation Spending by Neighborhood





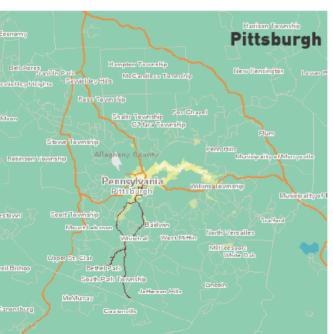


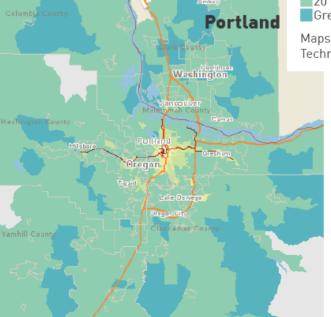
#### Housing + Transport Index

by Block Group Model Data Transportation Costs as Percent of Income

- Data not available
- 0 to 15%
- 15 to 18%
- 18 to 20%
- 20 to 28%
- Greater than or equal to 28%

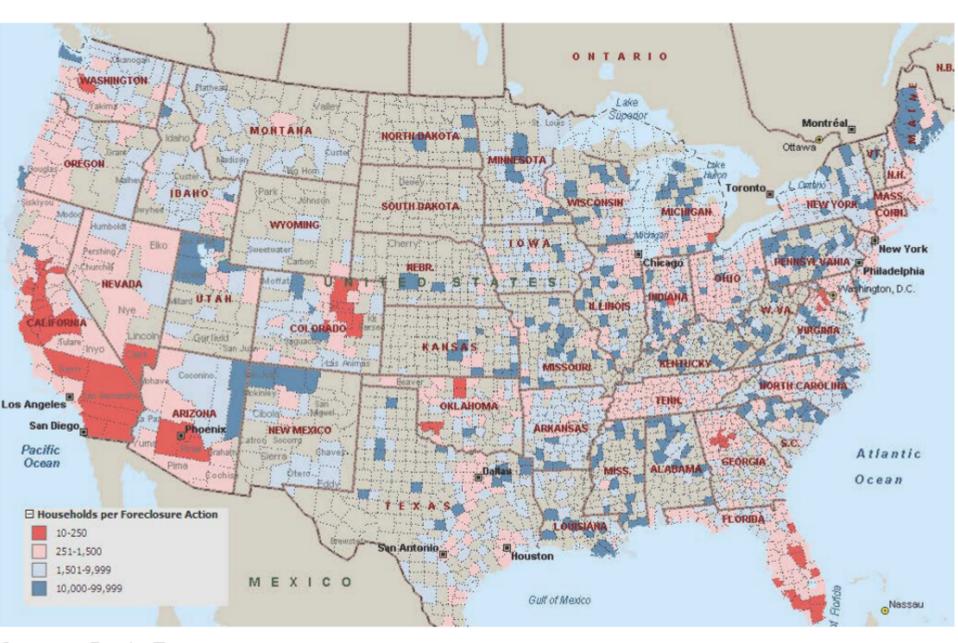
Maps Copyright (C) Center for Neighborhood Technology, 2008. Used with permission.





Source: IBID. Joe Cortright, May 2008. CEOs for Cities.

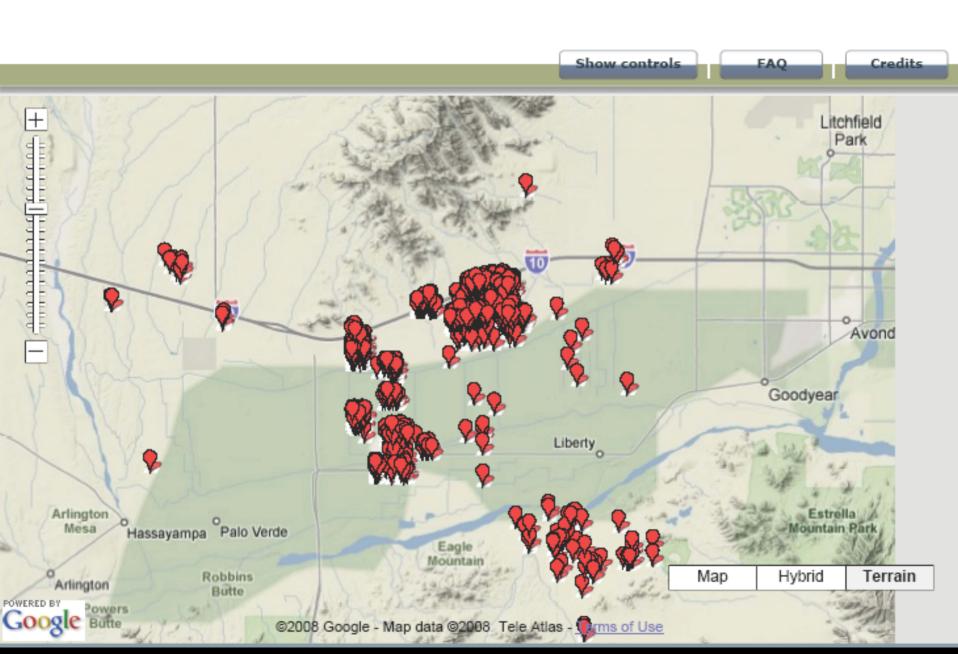
### Foreclosures by County, March 2008



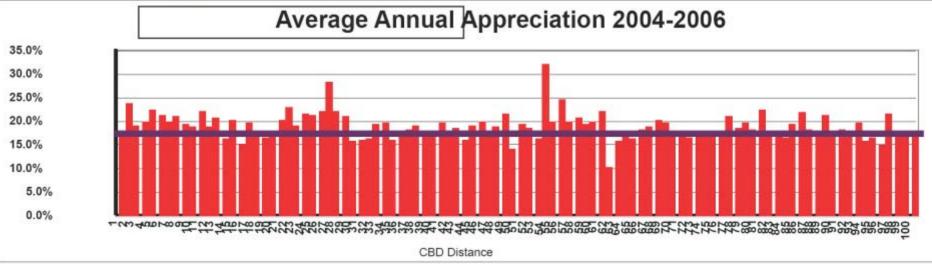
Source: RealtyTrac.com

### **FORECLOSURES BY ZIP CODE**

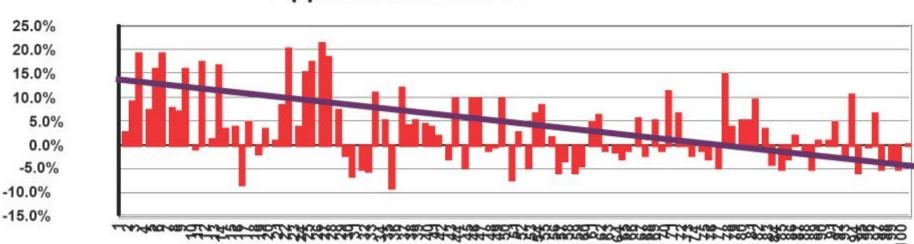




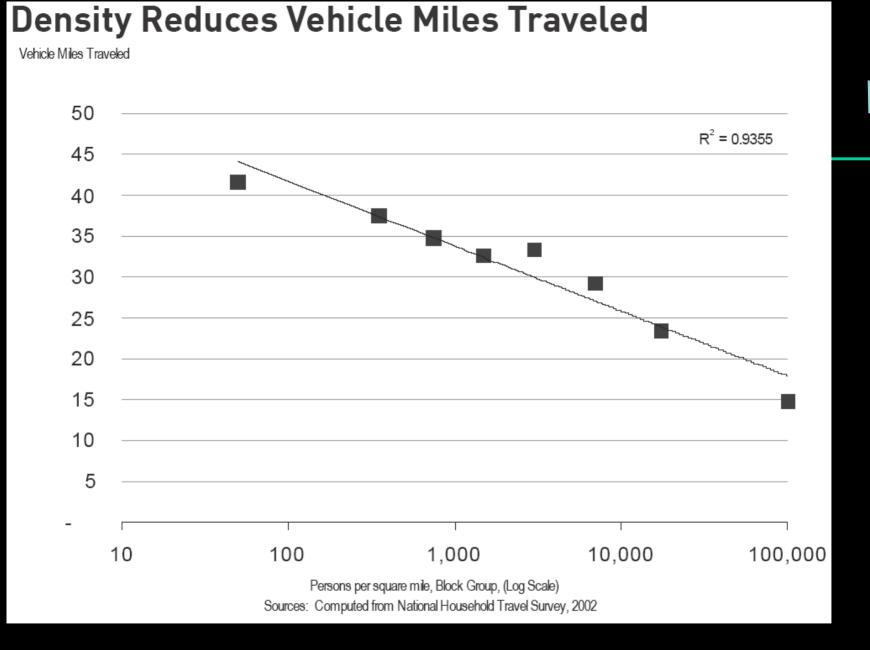
## Fringe Values Eroding: Phoenix



#### Appreciation 2006-07



**CBD** Distance



Source: Driven to the Brink: How the Gas Price Spike Popped the Housing Bubble and Devalued the Suburbs, Joe Cortright, May 2008. CEOs for Cities.

The crash of 2008 continues to reverberate loudly nationwide—destroying jobs, bankrupting businesses, and displacing homeowners. But already, it has damaged some places much more severely than others. On the other side of the crisis, America's economic landscape will look very different than it does today. What fate will the coming years hold for New York, Charlotte, Detroit, Las Vegas? Will the suburbs be ineffably changed? Which cities and regions can come back strong? And which will never come back at all?

BY RICHARD FLORIDA

#### How the Crash Will Reshape America

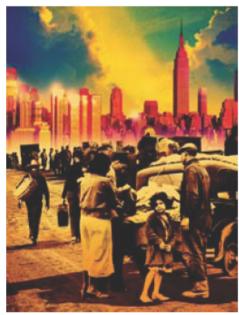


IMAGE CREDIT: SEAN MCCABE

The Atlantic

This article has been corrected since it was published in the print magazine.



#### The New York Times

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March 29, 2009

#### Reinventing America's Cities: The Time Is Now

#### By NICOLAI OUROUSSOFF

THE country has fallen on hard times, but those of us who love cities know we have been living in the dark ages for a while now. We know that turning things around will take more than just pouring money into shovel-ready projects, regardless of how they might boost the economy. Windmills won't do it either. We long for a bold urban vision.

With their crowded neighborhoods and web of public services, cities are not only invaluable cultural incubators; they are also vastly more efficient than suburbs. But for years they have been neglected, and in many cases forcibly harmed, by policies that favored sprawl over density and conformity over difference.

Such policies have caused many of our urban centers to devolve into generic theme parks and others, like Detroit, to decay into ghost towns. They have also sparked the rise of ecologically unsustainable gated communities and reinforced economic disparities by building walls between racial, ethnic and class groups.

Correcting this imbalance will require a radical adjustment in how we think of cities and government's role in them. At times it will mean destruction rather than repair. And it demands listening to people who have

#### Location Efficiency



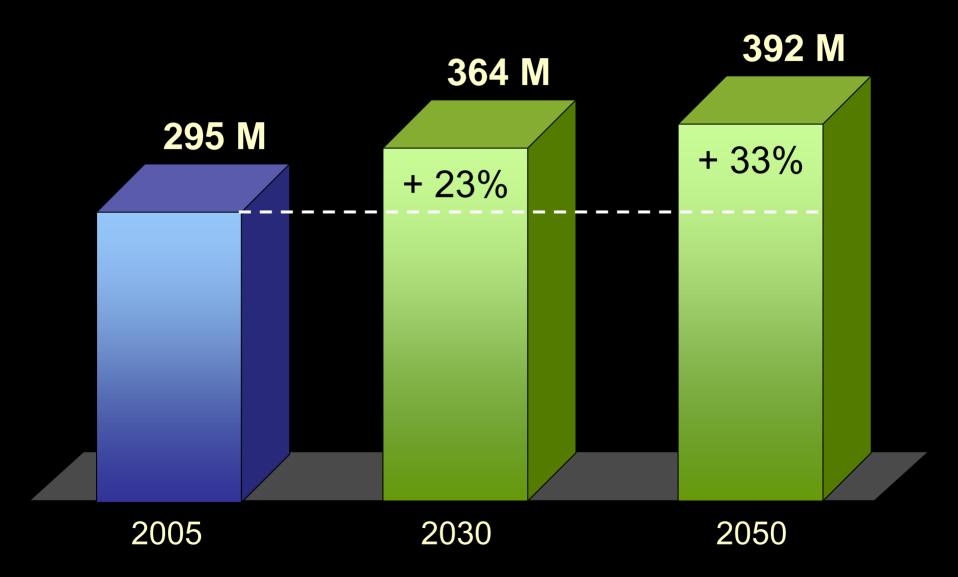
- Bottom Line:
  - Location Efficiency Shapes AZ Economy [excess transportation expenditures do not generate growth]
  - 2. Cities are the New Game [housing and employment markets have already changed]
  - 3. Every State Must Address This [Arizona has unique opportunities]

#### Three Opportunities



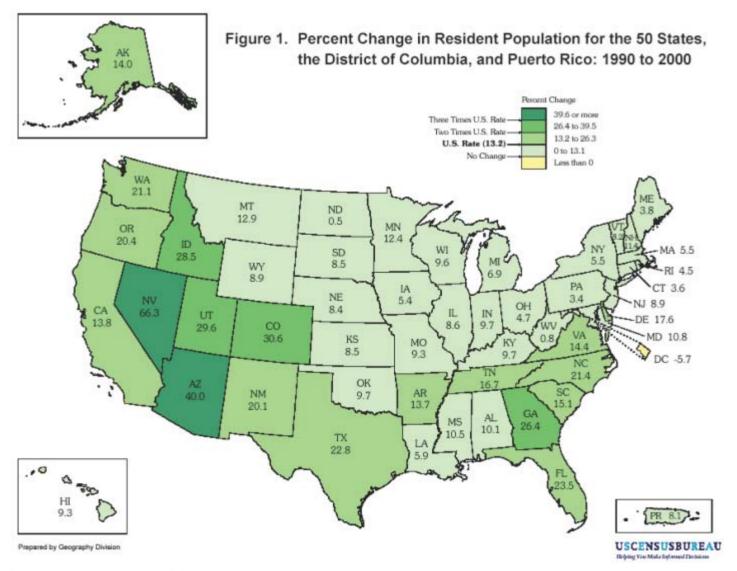
- 1. The Economic Engine of In-Migration
- 2. Shaping Urban Arizona with Transit
- 3. Connecting the Western Megapolitans

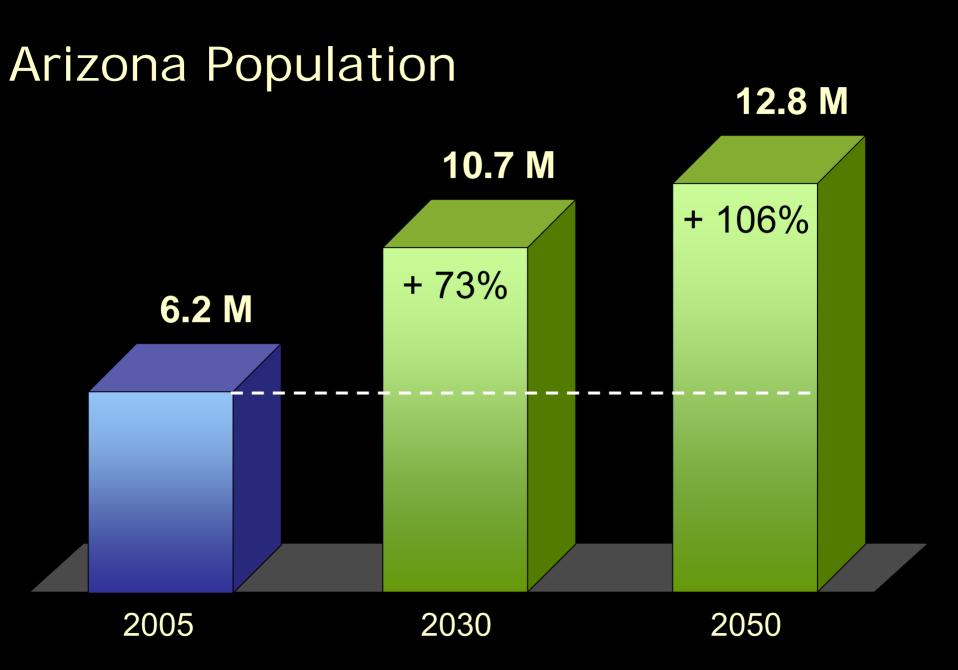
### **US** Population



Source: US Census Bureau, 12/08

#### Population Growth by States, 1990s

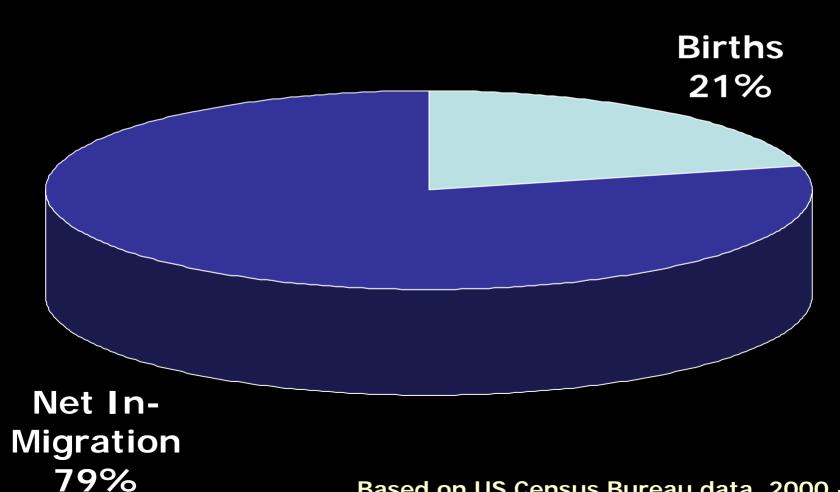




Source: US Census Bureau, 12/08

## Source of AZ Population Growth

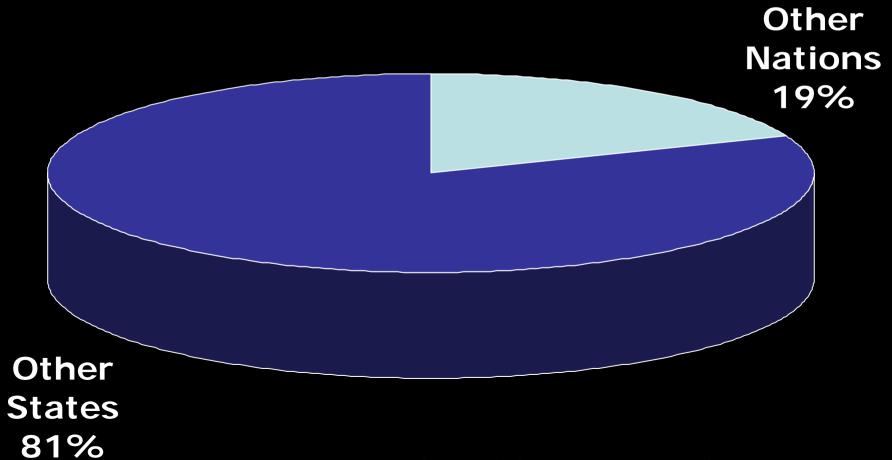




Based on US Census Bureau data, 2000 - 2007

## Source of AZ In-Migration

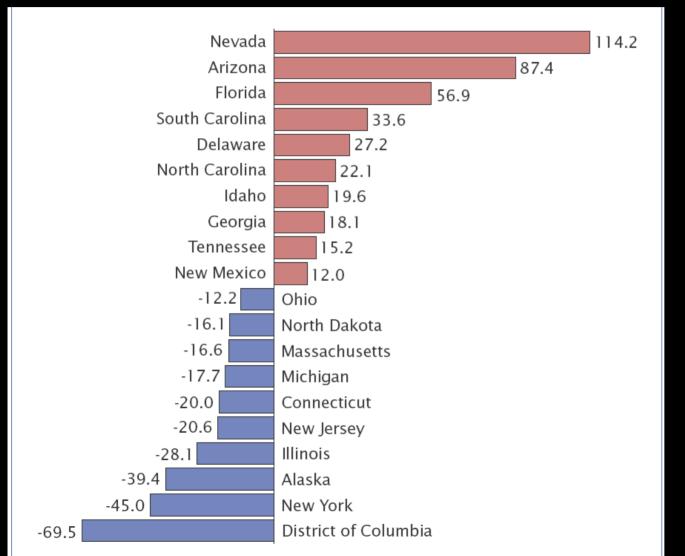




Based on US Census Bureau data, 2000 - 2007

### In-Migration – Ages 65 +

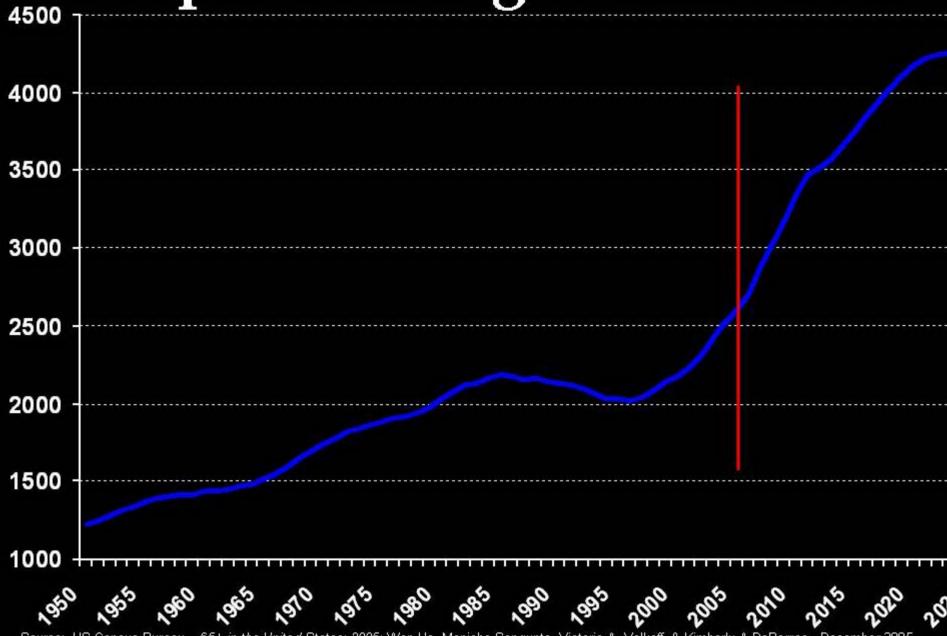




Net In-Migration per 1,000 Population > 65

**US Census Bureau** 

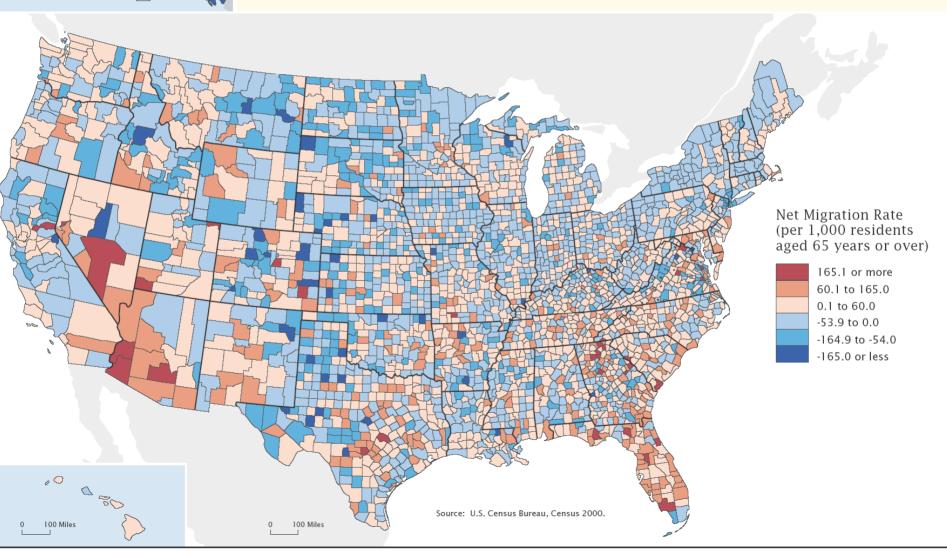
# People Turning 65 Each Year

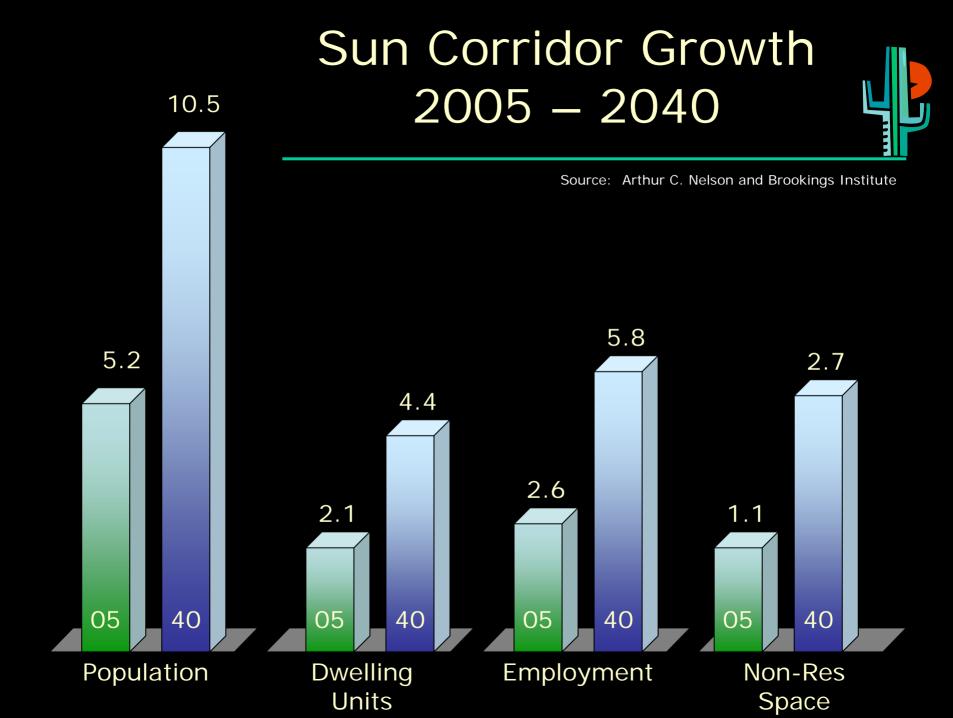


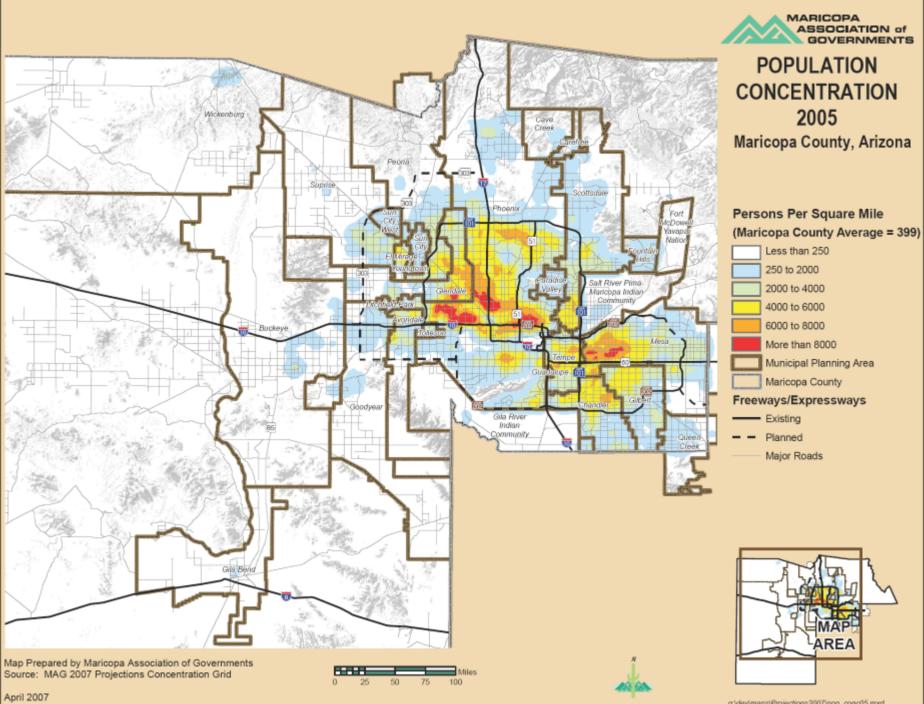


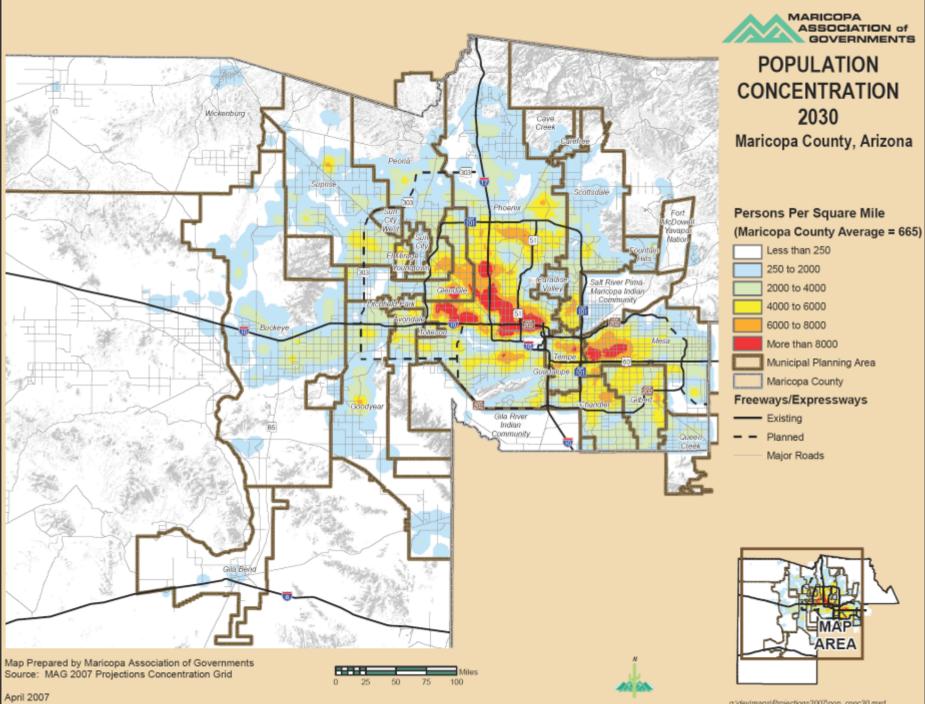
Net Migration Rates for the Population 65 Years and Over: 1995 to 2000

(Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see www.census.gov/prod/cen2000/doc/sf3.pdf)

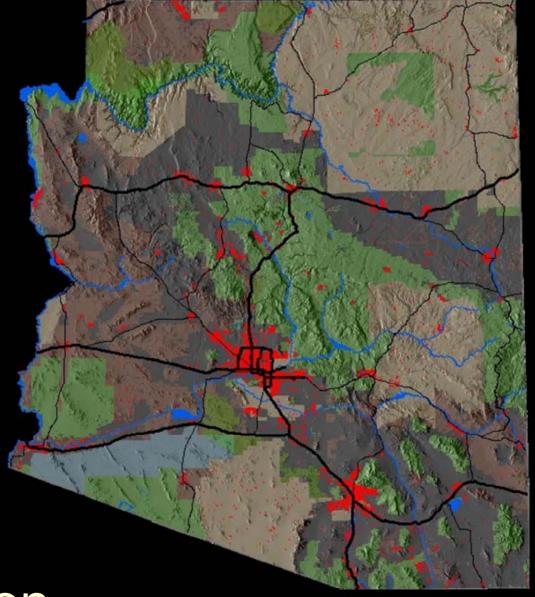








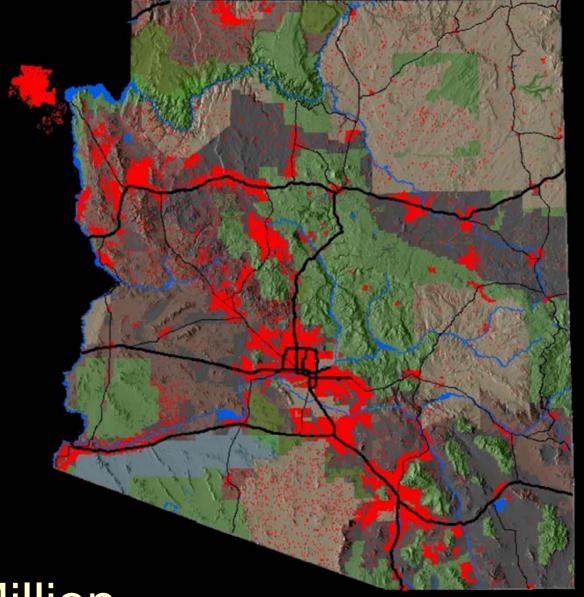
2000





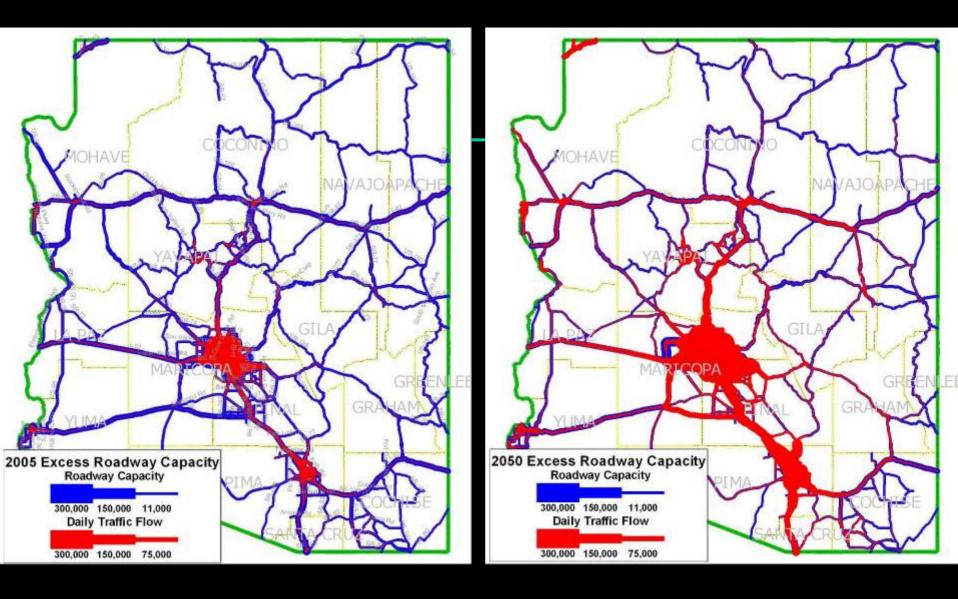
5.1 Million

2050





12.8 Million



## Economic Engine of In-Migration



- Bottom Line:
  - Key Choices Must Be Made
     [State & municipal policies could guide development of urban AZ]
  - Changes in Development Patterns are Urgently Needed [Arizona cannot afford more sprawl]
  - 3. Development Will Continue to Propel AZ Economy
    [less than ½ of future AZ is built]

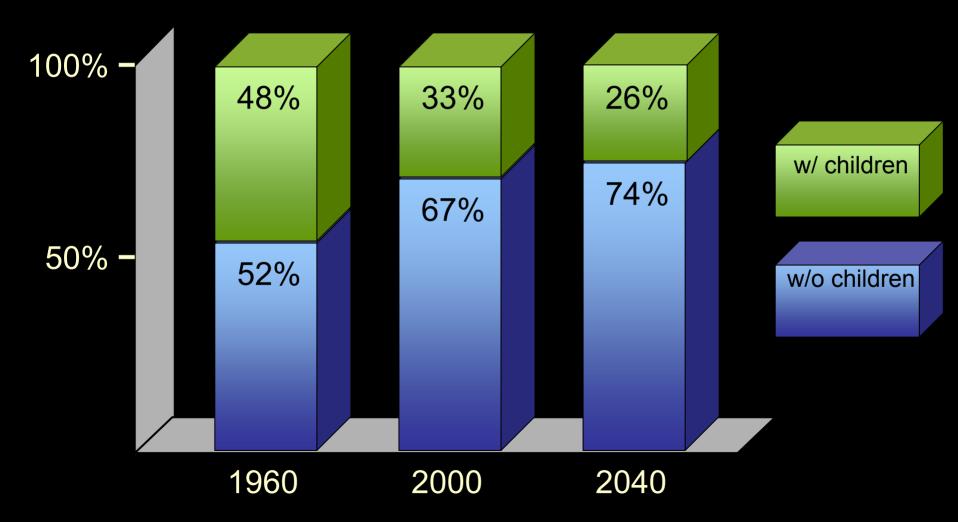
#### Three Opportunities



- 1. The Economic Engine of In-Migration
- 2. Shaping Urban Arizona with Transit
- 3. Connecting the Western Megapolitans

#### **US** Households

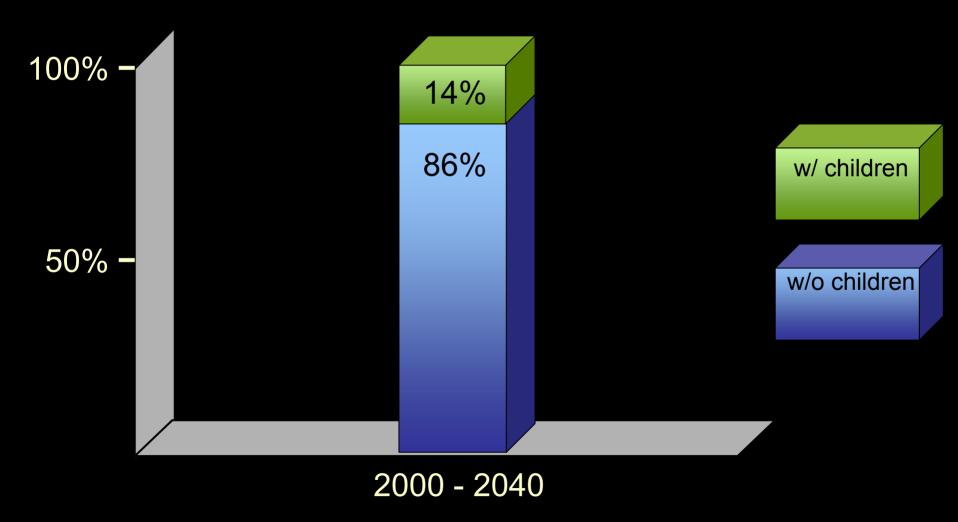




Source: Dr. Arthur Nelson, University of Utah

#### US Households - % of Growth





Source: Dr. Arthur Nelson, University of Utah

### Housing Preferences

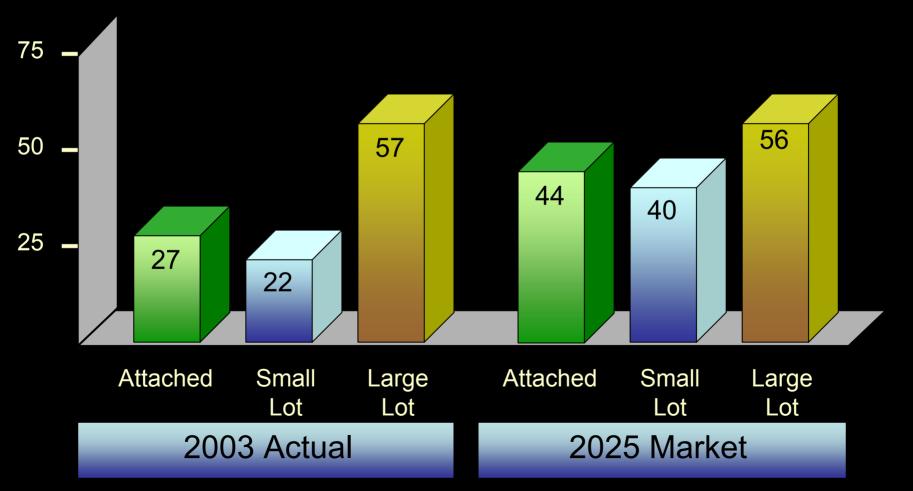


| Unit Type             | Share |
|-----------------------|-------|
| Attached              | 38%   |
| Apartments            | 14%   |
| Condos, Coops         | 9%*   |
| Townhouses            | 15%   |
| Detached              | 62%   |
| Small Lot (<7,000 sf) | 37%   |
| Large Lot (>7,000 sf) | 25%   |

Source: Low range of surveys reviewed by Arthur C. Nelson, "Planning for a New Era," Journal of the American Planning Association, Fall 2006.

### **US Dwelling Units**

Millions



## **US Dwelling Units**

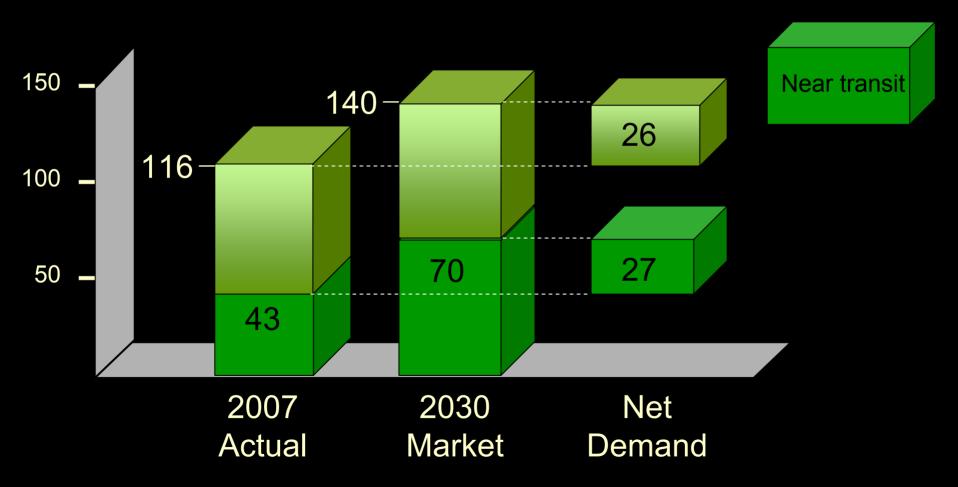


Millions



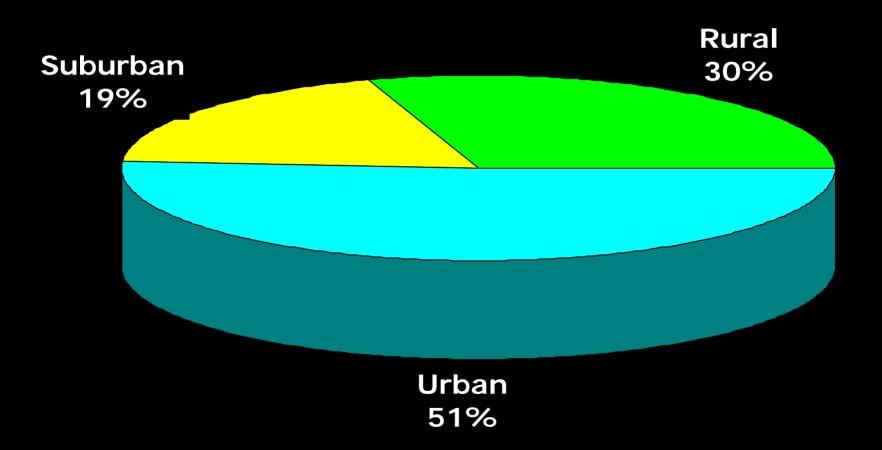
#### **US** Households





#### Retirement Preferences





# THE DENVER POST

Y, MARCH 19, 2009

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» BUSINESS, 9B

\$1 TRILLION MOVE LIKELY TO REDUCE MORTGAGE RATES



## TIPOFF TIME

Matt Bouldin and NCAA madness start the march at 10:30 a.m. »1C

e» It's still winter ... for one more day. Check the latest ski conditions. »denverpost.com/skireport

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# Growth goes urban

#### Denver trails only Douglas County in metro-area population gains

By Burt Hubbard The Denver Post

Forget suburbia. Denver is the new growth hot spot in the metro area.

A U.S. Census Bureau report released today shows Denver grew faster last year than all but one of its surrounding suburban counties.

"That is amazing. It doesn't surprise me (it grew), but I didn't realize it was at such a fast rate." said Denver City Councilman Michael Hancock.

Denver wasn't the only growth superstar in Colorado, according to the report. The Greelev metro area, consisting of Weld County, was the fourth-fastest growing metro area in the nation since 2000.

And five Western Slope counties, led by energy-rich Garfield County, ranked in the top 10 in population gains in Colorado in the 12 months ending in July 2008.

The report showed Denver's population grew

2.7 percent in the 12 months ending July 2008, adding about 16,000 people since July 2007 and falling just short of 600,000.

Only Douglas County, at 3.5 percent, grew faster in the seven-county metro area. It's the first time this decade that Denver has grown faster than most of its suburbs.

Jeff Romine, chief economist for the Denver Office of Economic Development, said a resurgence

#### Denver's growth

Denver's population last year grew faster than all but one of its neighboring suburban counties, the first time that has happened this decade.

Percent change 2001-02

Percent change 2007-08

6.4% 3.5% 2.6% 2.3% -0.5% Broomfield Douglas Arapahoe Denver lefferson Boulder The Denver Post

Source: U.S. Census Bureau

#### Residential Resale Indicators



| <u>Year</u> | SF+TH     | Condo/Coop |
|-------------|-----------|------------|
| 2006        | \$221,900 | \$221,900  |
| 2007        | \$217,900 | \$226,300  |
| 2008        | \$180,800 | \$185,400  |

Source: Arthur C. Nelson, Presidential Professor & Director of Metropolitan Research, University of Utah, adapted from National Association of Realtors monthly resale data accessed December 14, 2008. Figures are median resale prices; November 2008 used for 2008.

## 70s – Today: Urban Rail Transit





Rail Cities in the United States (as of 1971)



ENGINEES

FORT FERM

Rail Cities in the United States (as of 2008)



ENGINEES

FORT FERM

Rail Cities in the United States (by 2021)



ENGINEES

FORT FERM

## **Shaping Cities with Transit**



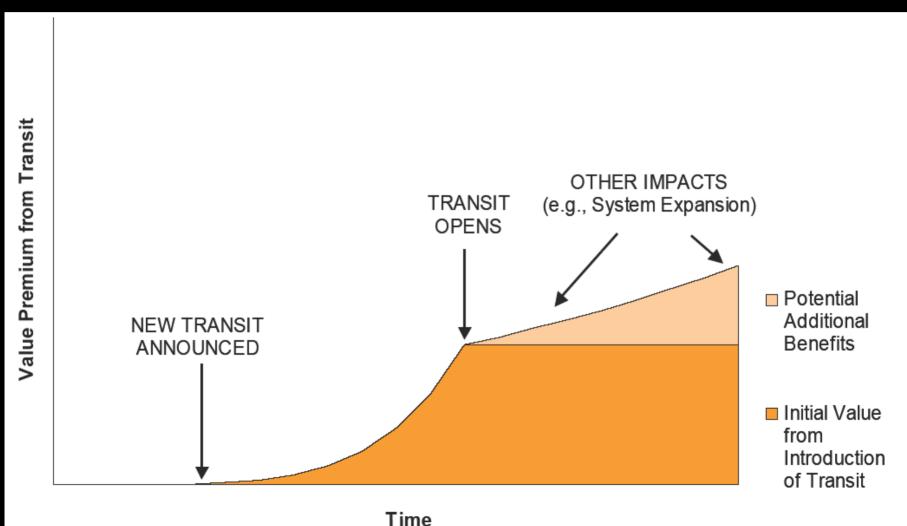


#### Dallas

| De                                      | scription         |                  | Value            |  |
|---|-------------------|------------------|------------------|--|
| Announced Value                         | •                 | \$ 4,902,800,000 |                  |  |
| Announced Value Attributable to DART    |                   | \$ 4,255,700,000 |                  |  |
| Cities                                  |                   |                  | \$ 4,255,700,000 |  |
| Taxable Property Value                  |                   | \$ 2,843,779,000 |                  |  |
| Property Tax Re                         |                   | \$               | 16,785,000       |  |
| Taxable Retail S                        |                   | \$ 665,552,000   |                  |  |
| Sales Tax Reven                         |                   | <b>y</b>         | 6,656,000        |  |
| Suies Tax Reven                         |                   |                  | 23,531,000       |  |
| Counties                                | \$4.              |                  | 23,331,000       |  |
| Taxable Property                        | JT.               |                  | 842,259,000      |  |
| Property Tax Re                         | •                 |                  | 6,593,000        |  |
| School Districts                        |                   |                  | 0,000,000        |  |
| Taxable Property                        | Billi             | OB               | 904,207,000      |  |
| Property Tax Re                         | DIIII             |                  | 46,380,000       |  |
| Community Colle                         |                   |                  | 40,200,000       |  |
| Taxable Property                        |                   | \$ 2,736,047,000 |                  |  |
|   | 1 1               |                  | 2,306,000        |  |
| Hospital District                       |                   |                  |                  |  |
| Taxable Property Value \$ 2,633,261,000 |                   | .633.261.000     |                  |  |
| Property Tax Revenues                   |                   | \$ 2             |                  |  |
| State of Texas                          |                   |                  |                  |  |
| Sales Tax Revenues                      |                   | \$               | 41,597,000       |  |
|   | ocal Tax Revenues | , , ,            |                  |  |

## The Value Curve - Timing

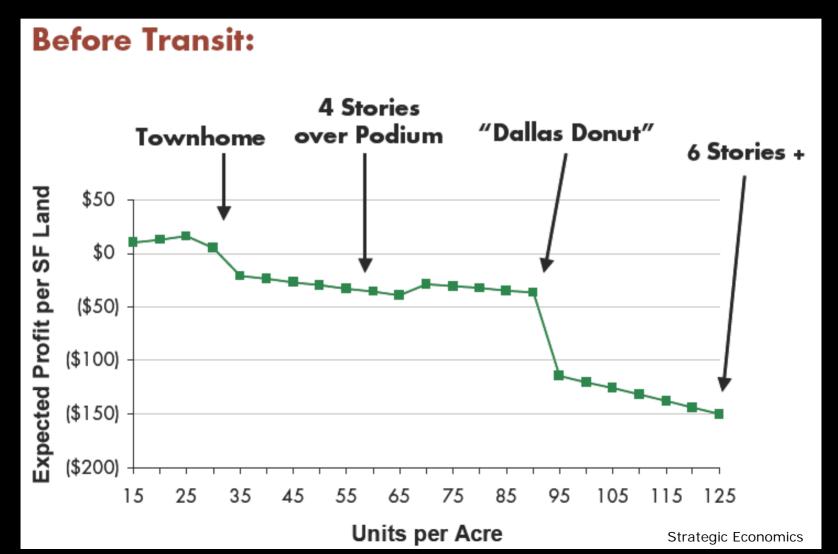




Source: Strategic Economics.

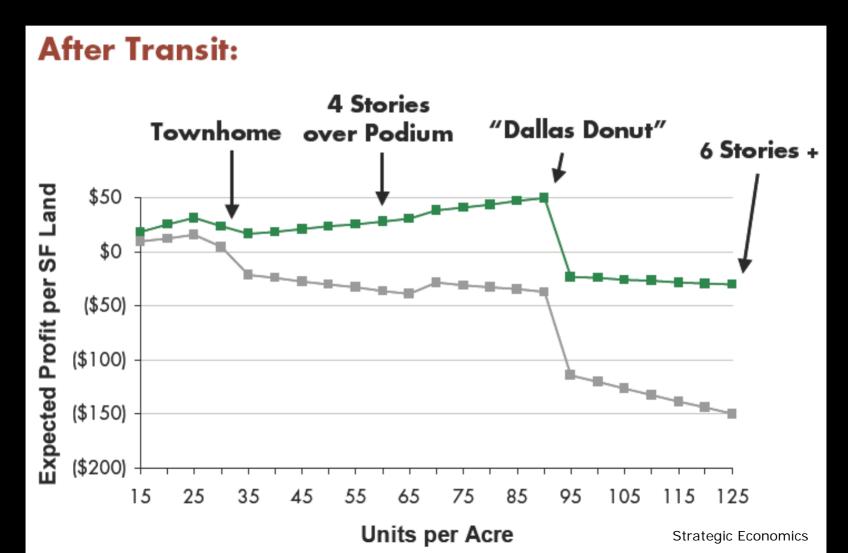
#### Effect of Transit on Density





#### Effect of Transit on Density













TRIBUNE PHOTO: KYLE GREE



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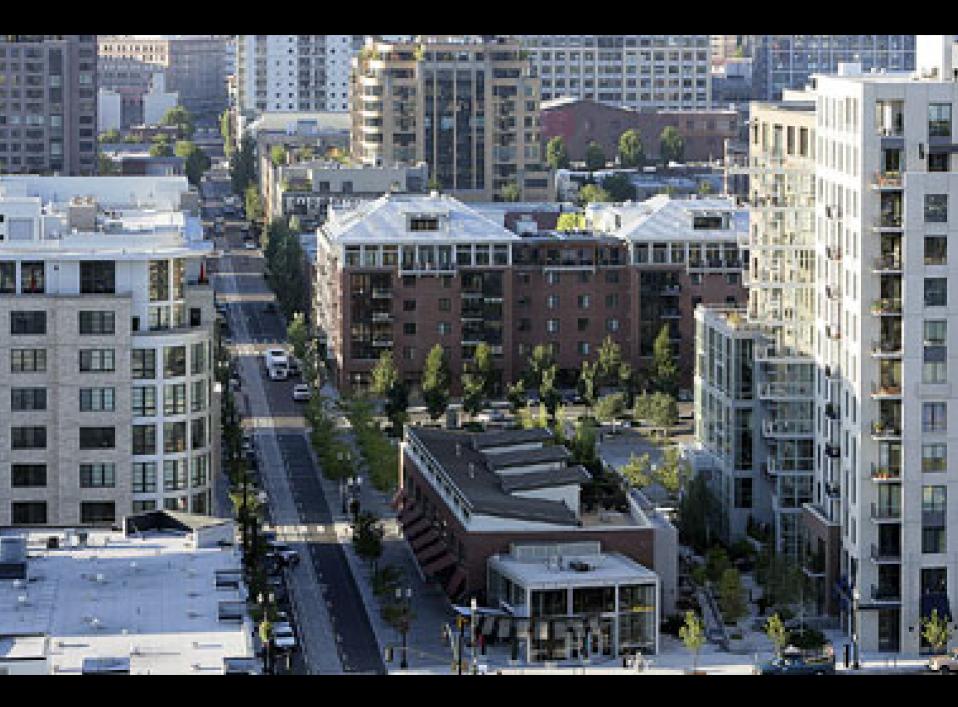
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### Portland Streetcar Brief History



- > 1992 City secures \$900,000 federal HUD grant
- > 1992 City matches with local funds
- 1995 May City issues RFP to design, build, operate, maintain
- > 1999 May Construction begins on 1st segment
- 2001 January Project Substantial Completion
- 2001 July Begin passenger service
- 2005 March Begin service to RiverPlace
- 2006 October Begin service to South Waterfront
   & Portland Aerial Tram Connection
- 2006 Loop Extension alignment selected
- > 2007 August Begin service to South Waterfront







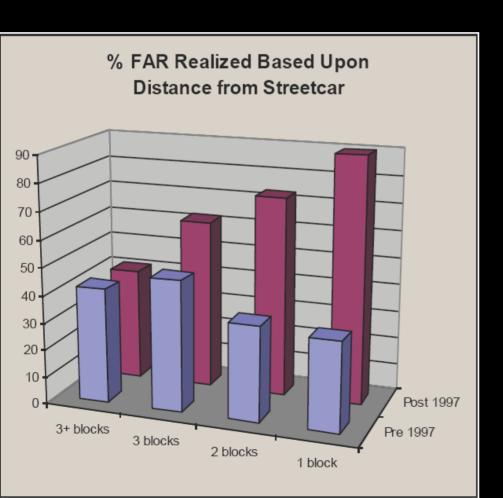
#### Leveraging: Portland Streetcar

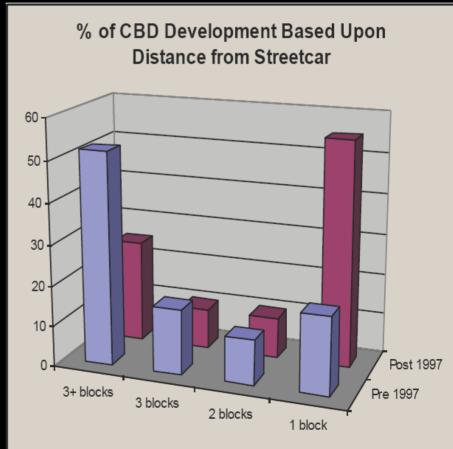


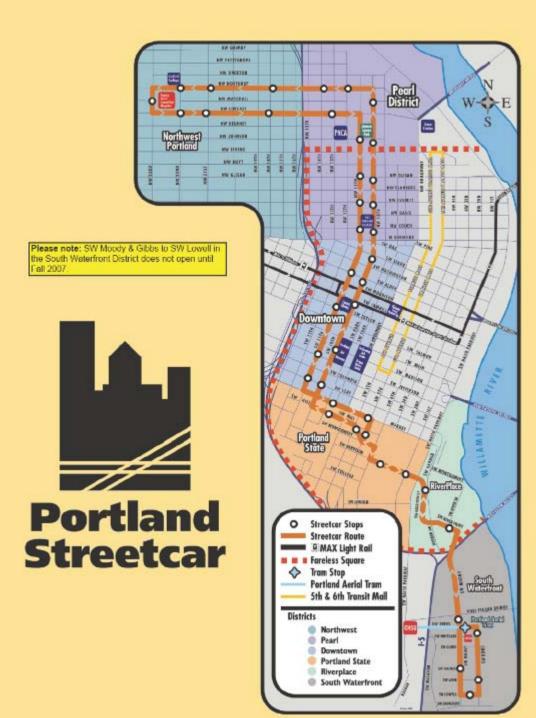
- System Cost: \$103 million
- Private sector investment (within 2 blocks of line)
  - Value: \$3.5 billion
  - 10,212 new dwelling units
  - 5.4 million sf commercial space
  - Lower parking ratios, higher profits

#### Leveraging: Portland Streetcar











#### Cost Estimate:

\$127 million Federal Project:

Federal Transit Administration \$75 million \$15 million Local Improvement District Portland Development Commission \$27 million Regional Funds \$4 million System Development Charge \$ 6 million TOTAL FEDERAL PROJECT \$127 Million VEHICLES FROM STATE OF OREGON \$20 Million TOTAL PROJECT \$147 Million



## Shaping Urban Arizona with Transit

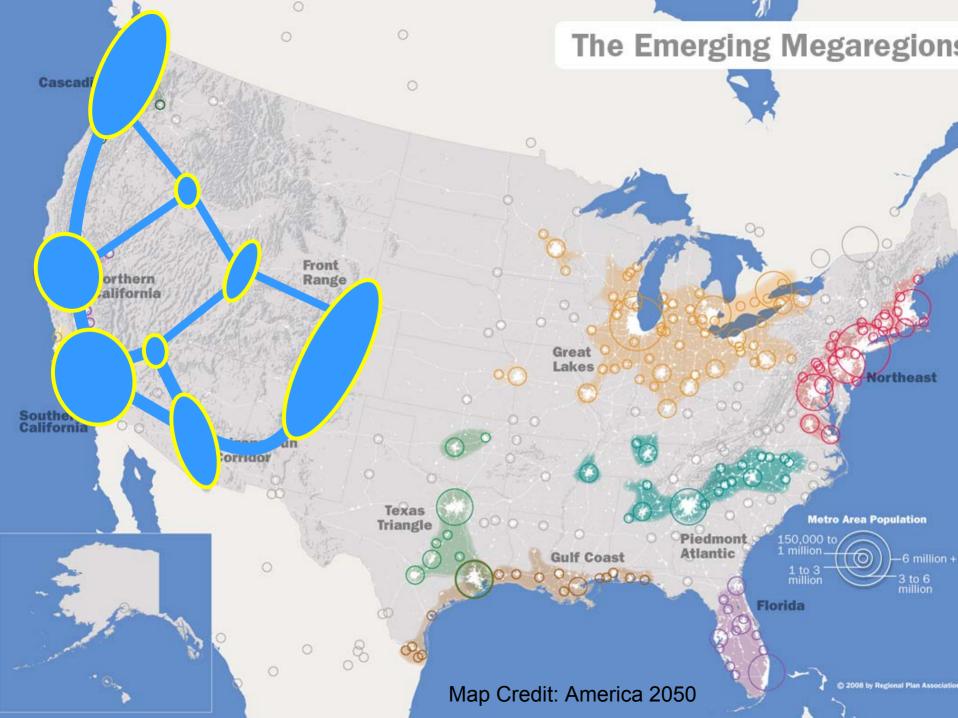


- Bottom Line:
  - 1. Residential Markets Have Changed [the City is in, the Suburb is out]
  - 2. Arizona is in a Position to Benefit [½ of urban AZ has yet to be built]
  - 3. Cities Must Move Quickly [LA lesson: retrofits are expensive]

#### Three Opportunities

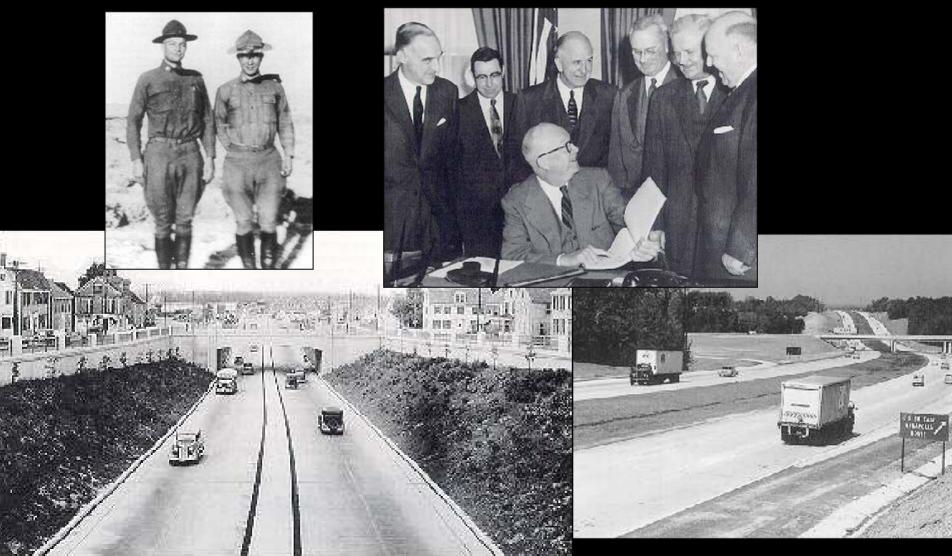


- 1. The Economic Engine of In-Migration
- 2. Shaping Urban Arizona with Transit
- 3. Connecting the Western Megapolitans



#### 50s – 70s: Interstate Highway System





# 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



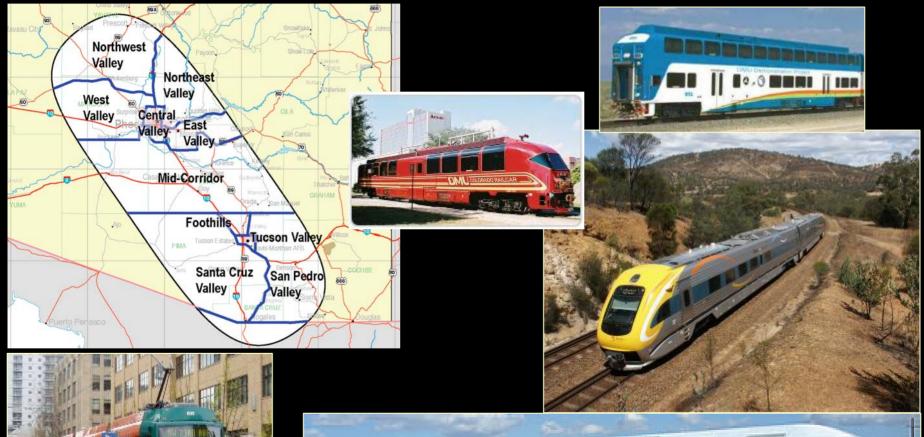
## The 20th Century Strategy





## 21<sup>st</sup> Century Strategy: Intercity Rail System









#### Criteria for High Speed Rail

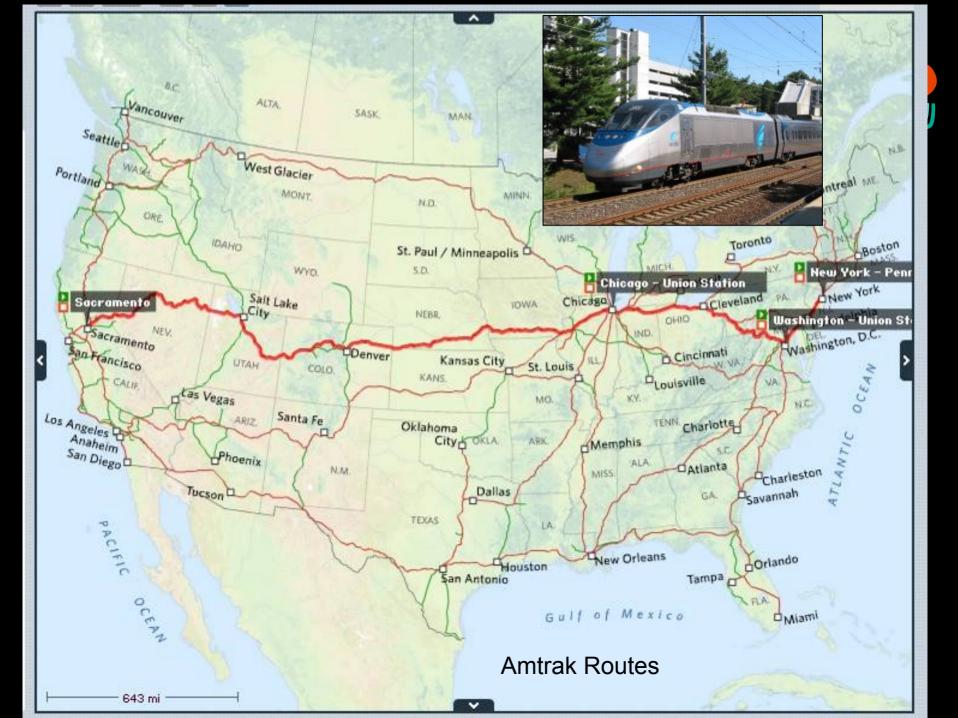


- Portal-to-portal distance
  - > 100 miles to compete with auto
  - < 500 miles to compete with air</p>
- Major airports at or near capacity
- Sufficient population in centers
- Potential to operate @ 90 150 mph

#### Intercity Rail Corridors



- Connect city pair economies
- Connect cities within megas
- ➢ Operate @ 65 90 mph
- Serve double duty as commuter rail corridors



## Officially Designated HSR Routes



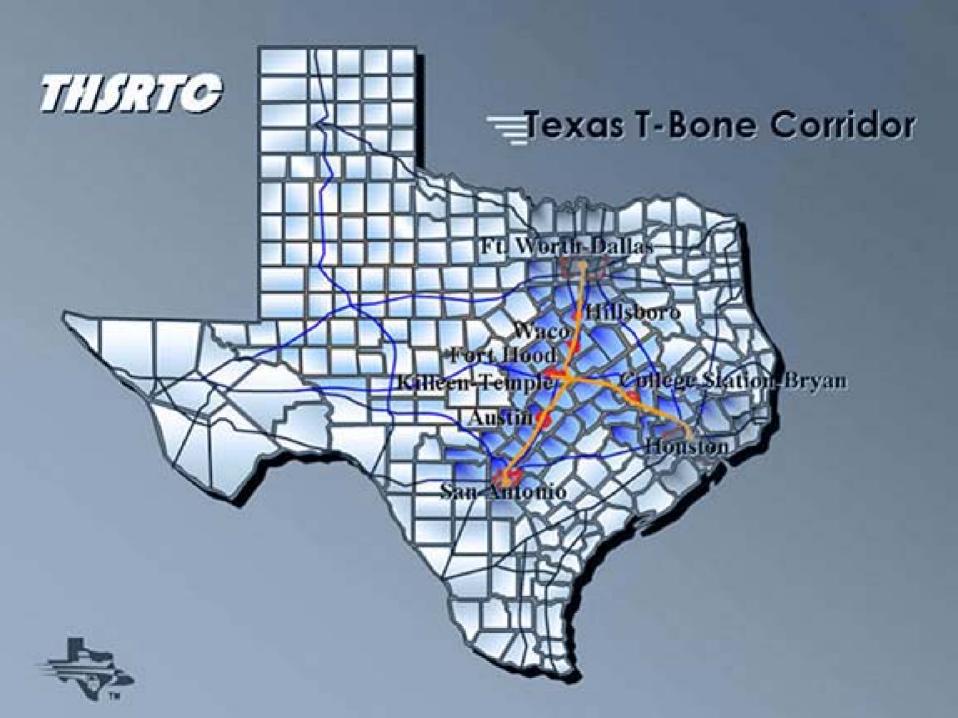
#### VISION for HIGH-SPEED RAIL in AMERICA



#### California

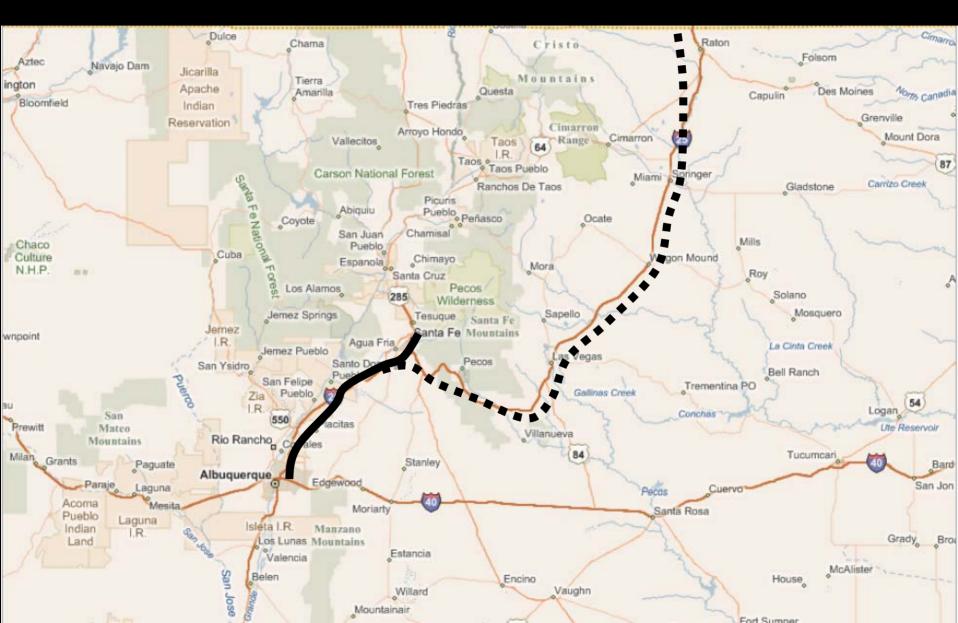
#### HSR



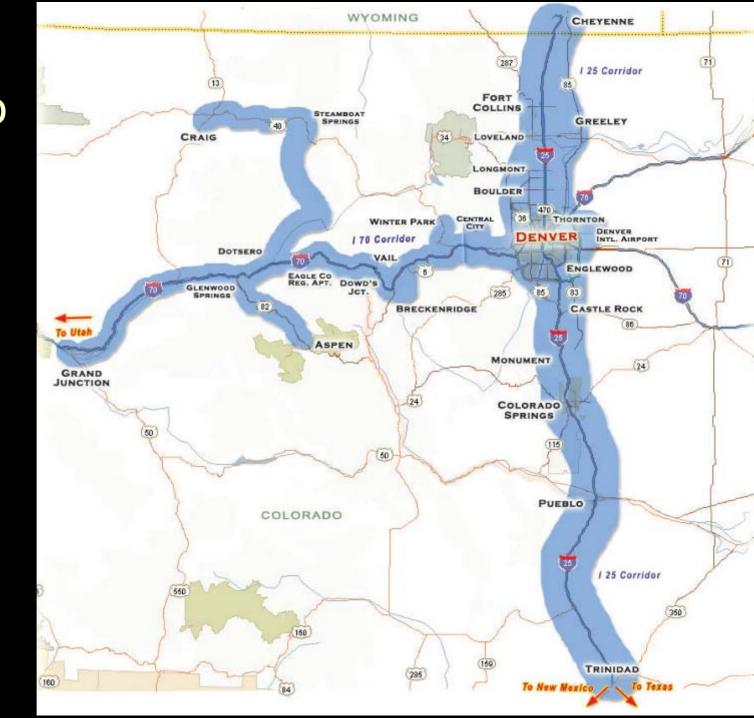


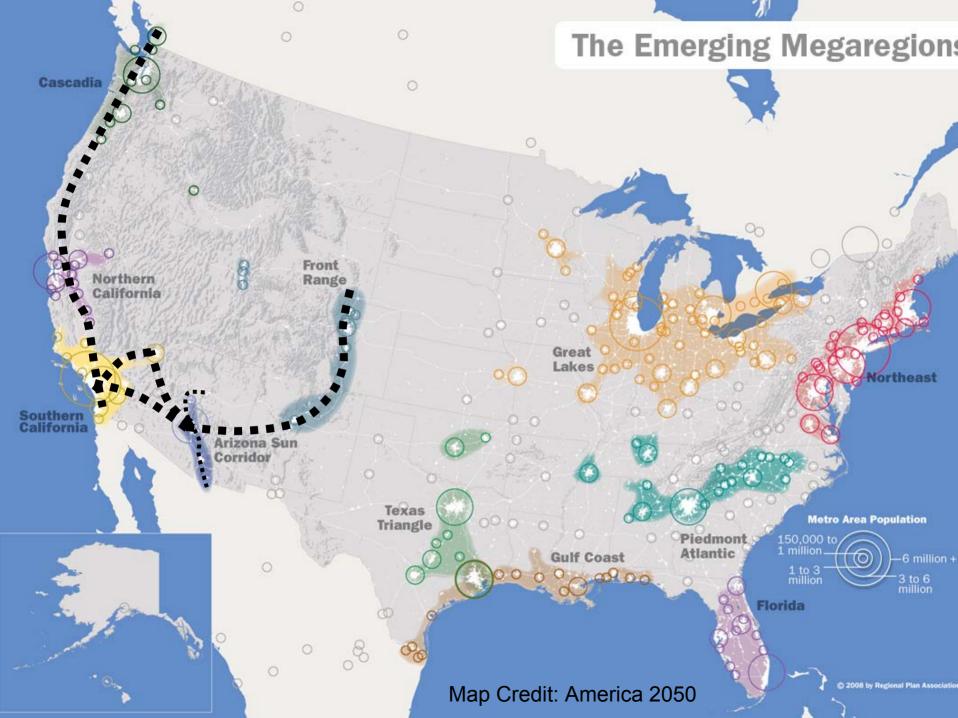


#### **New Mexico**



## Colorado Rail Corridor Study





### The Missing Interstate Link



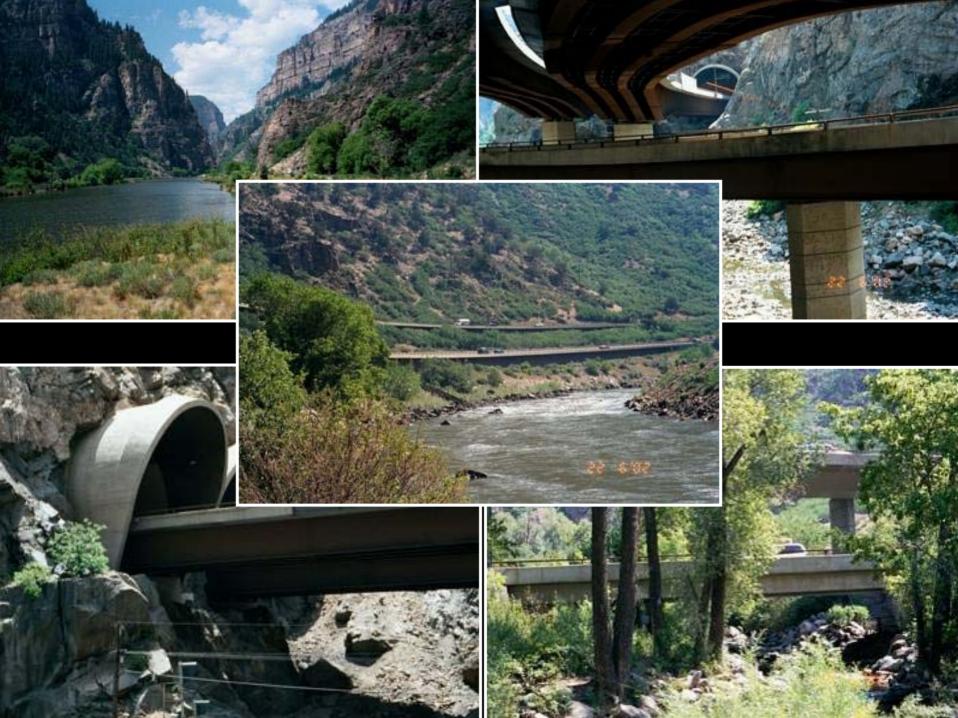


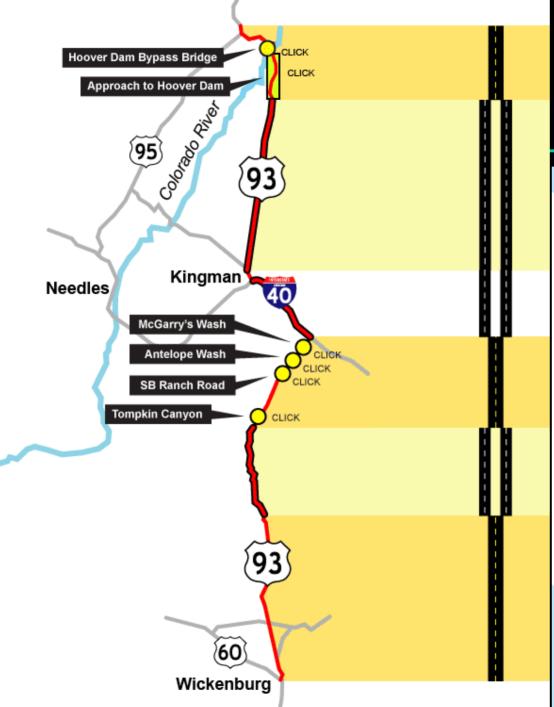
#### Criteria for New Highways



- Connect major cities or regions (pop > 1M) link economies & drive economic synergies
- No significant damage to fragile or unique environments, communities, neighborhoods or other unique resources (historical, cultural, etc.)
- Chartered with absolute control of access, limiting future connections to existing regional or interstate freeways (i.e. could only be freeways)
- Fully funded as a toll road all maintenance & capital money from revenues & bonding







#### Canamex





# Connecting the Western Megapolitans



- Bottom Line:
  - 1. City Economies Thrive on Synergy [city pairs and megapolitan areas]
  - 2. Arizona is Getting a Late Start [but you have advantages to exploit]
  - 3. The State Needs Your Support [you are late to the game]



## Wrapping Up

Providing for Arizona's Future Mobility

Charlier Associates, Inc.

#### Three Challenges



- 1. Petroleum Dependency
- 2. Climate Change
- 3. Location Efficiency

#### Three Opportunities



- 1. The Economic Engine of In-Migration
- 2. Shaping Urban Arizona with Transit
- 3. Connecting the Western Megapolitans

#### Resources

- Energy
  - United States Energy Information Administration, International Energy Outlook 2008, September 2008 <a href="http://www.eia.doe.gov/oiaf/forecasting.html">http://www.eia.doe.gov/oiaf/forecasting.html</a>
  - Arizona energy data, including dollar flow analysis
     http://apps1.eere.energy.gov/state\_energy\_program/publications\_by\_state.cfm/state=AZ
- Climate Change
  - Growing Cooler: The Evidence on Urban Development and Climate Change; Ewing, Keith Bartholomew, Winkelman, Walters, Chen – early versions available on the web; hardcover available on Amazon
  - Hotter and Drier: <a href="http://www.nrdc.org/globalWarming/west/contents.asp">http://www.nrdc.org/globalWarming/west/contents.asp</a>
  - Arizona Climate Action Plan and related resources: <a href="http://www.azclimatechange.gov/">http://www.azclimatechange.gov/</a>
- VMT Trends
  - State and national data <a href="http://www.fhwa.dot.gov/ohim/tvtw/tvtpage.cfm">http://www.fhwa.dot.gov/ohim/tvtw/tvtpage.cfm</a>
- Economics
  - Household cost of travel: A Heavy Load <a href="http://www.nhc.org/index/heavyload">http://www.nhc.org/index/heavyload</a>
  - Driven to the Brink: How the Gas Price Spike Popped the Housing Bubble and Devalued the Suburbs, Joe Cortright, May 2008. CEOs for Cities. <a href="https://www.ceosforcities.org/newsroom">www.ceosforcities.org/newsroom</a>
  - Raw foreclosure data national, state, local http://www.realtytrac.com/pub/landing/optimized\_c.asp?a=b&accnt=64807
  - Spending the federal ARRA stimulus funds: <a href="http://stimulus.smartgrowthamerica.org/">http://stimulus.smartgrowthamerica.org/</a>
  - Transit-Oriented Development and Joint Development in the United States: A Literature Review http://pubsindex.trb.org/document/view/default.asp?lbid=726711
  - Susan Handy trends in support for development types http://www.informaworld.com/smpp/content~content=a792286419~db=all~jumptype=rss
  - Arthur Nelson trends in demographics and implications for real estate development http://www.informaworld.com/smpp/content~content=a787405757~db=all~order=page
- Arizona and Transit
  - Arizona PIRG Arizona's New Frontier: Moving Our Transportation System into the 21st Century <a href="http://www.arizonapirg.org/home/reports/report-archives/smart-transportation/smart-transportation/smart-transportation/arizonas-new-frontier-moving-our-transportation-system-into-the-21st-century">http://www.arizonapirg.org/home/reports/report-archives/smart-transportation/smart-transportation/smart-transportation/smart-transportation-system-into-the-21st-century</a>



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