

CLIMATE CHANGE IS HEATING UP

NADO-AMPO Webinar
May 21, 2009

The Latest Information,
Resources, and Ideas for
Transportation Planning
Agencies

Climate Change is Heating Up

- Introductions
 - Sponsored by NADO and AMPO
- Moderator
 - Carrie Kissel, NADO
- Presenters
 - Cindy Burbank, Parsons Brinkerhoff
 - Harrison Rue, ICF International

Webinar Overview

1. Science
2. Federal and State Legislation
3. Economic Impacts and Opportunities
4. Strategies to Reduce GHG
5. Climate Adaptation
6. Resources
7. Q&A

Recognizing Differences among Rural, Small, Medium, and Large Planning Areas

- The transportation climate discussion has often focused on larger metropolitan areas
- For rural areas and small/medium MPOs there may be some commonality
- But rural areas and small/medium MPOs face differences in:
 - Financial resources
 - Technical capabilities
 - Effective strategies for reducing GHG
 - Ability to influence national/state legislation
 - Priorities

SCIENCE: Key Conclusions

- “Warming of the climate system is unequivocal...”

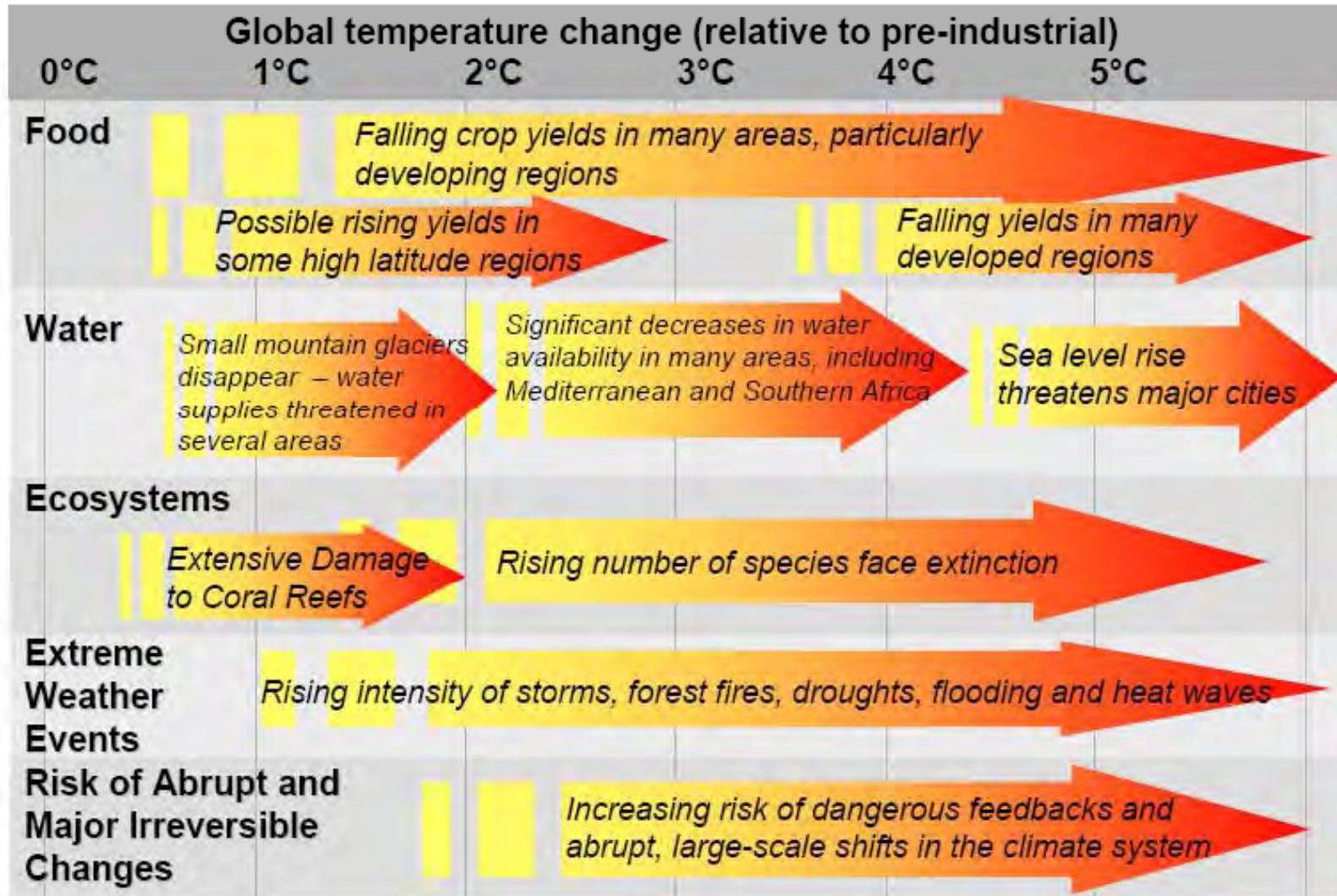
-- Intergovernmental Panel on Climate Change

- “An overwhelming body of scientific evidence paints a clear picture: climate change is happening, it is caused in large part by human activity, and it will have many serious and potentially damaging effects in the decades ahead.”

-- Pew Center on Climate Change

SCIENCE: Impacts Intensify as Temperature Rises

Projected impacts of climate change



SCIENCE: Potential Impacts on Transportation Infrastructure



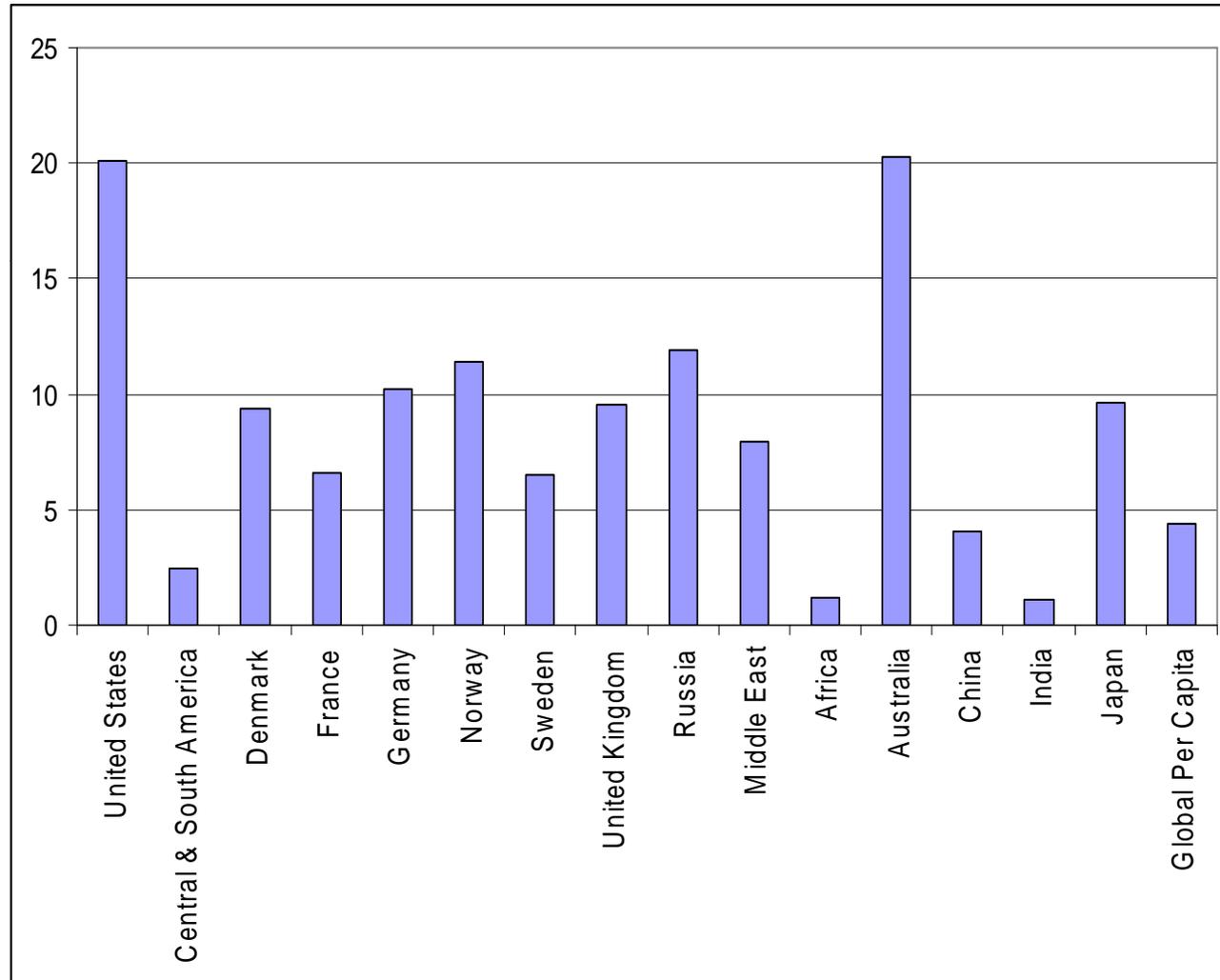
Charts do not include periodic hurricane storm surge, e.g., Isabel 10+ feet.

Source: U.S. DOT, *The Potential Impacts of Global Sea Level Rise on Transportation Infrastructure*, Federal Research Partnership Workshop, October 1-2, 2002, plus ICF follow-on East Coast study

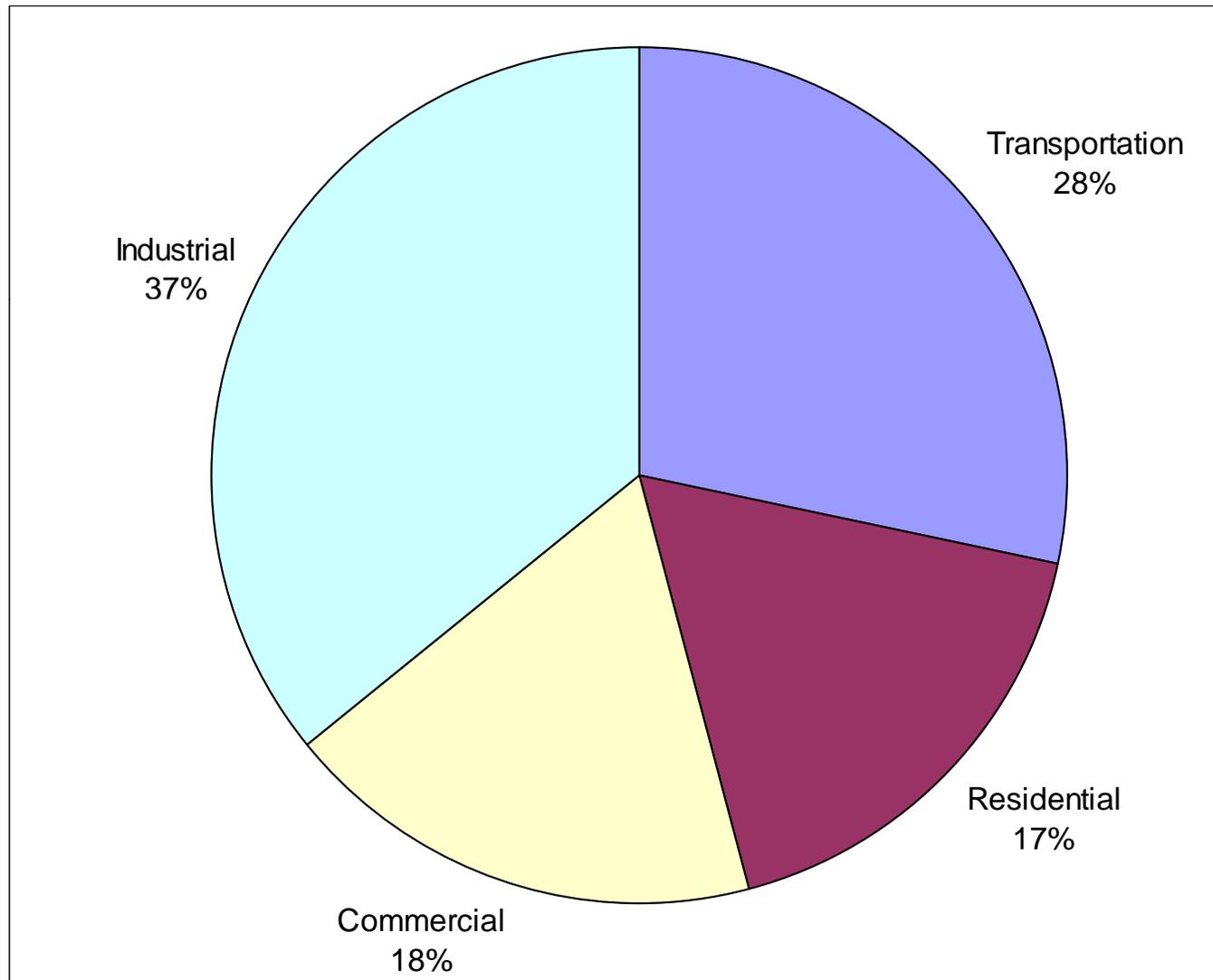
SCIENCE: Latest News

- “Climate Change Accelerating, Top Scientists Warn”
- “Globe Warming Faster than Forecast”
- “Urgent Action Needed”
- “ARCTIC: A feedback loop threatens the Earth’s air conditioner”
- “Climate Models Understate the Reality”
- “OCEANS: Pollock fishery, nation’s largest, faces a crisis”
- “SCIENCE: Prior Warnings of Sea Level Rise May be Understated”
- “Over 2 Trillion Tons of Ice Melted in Arctic Since ‘03”

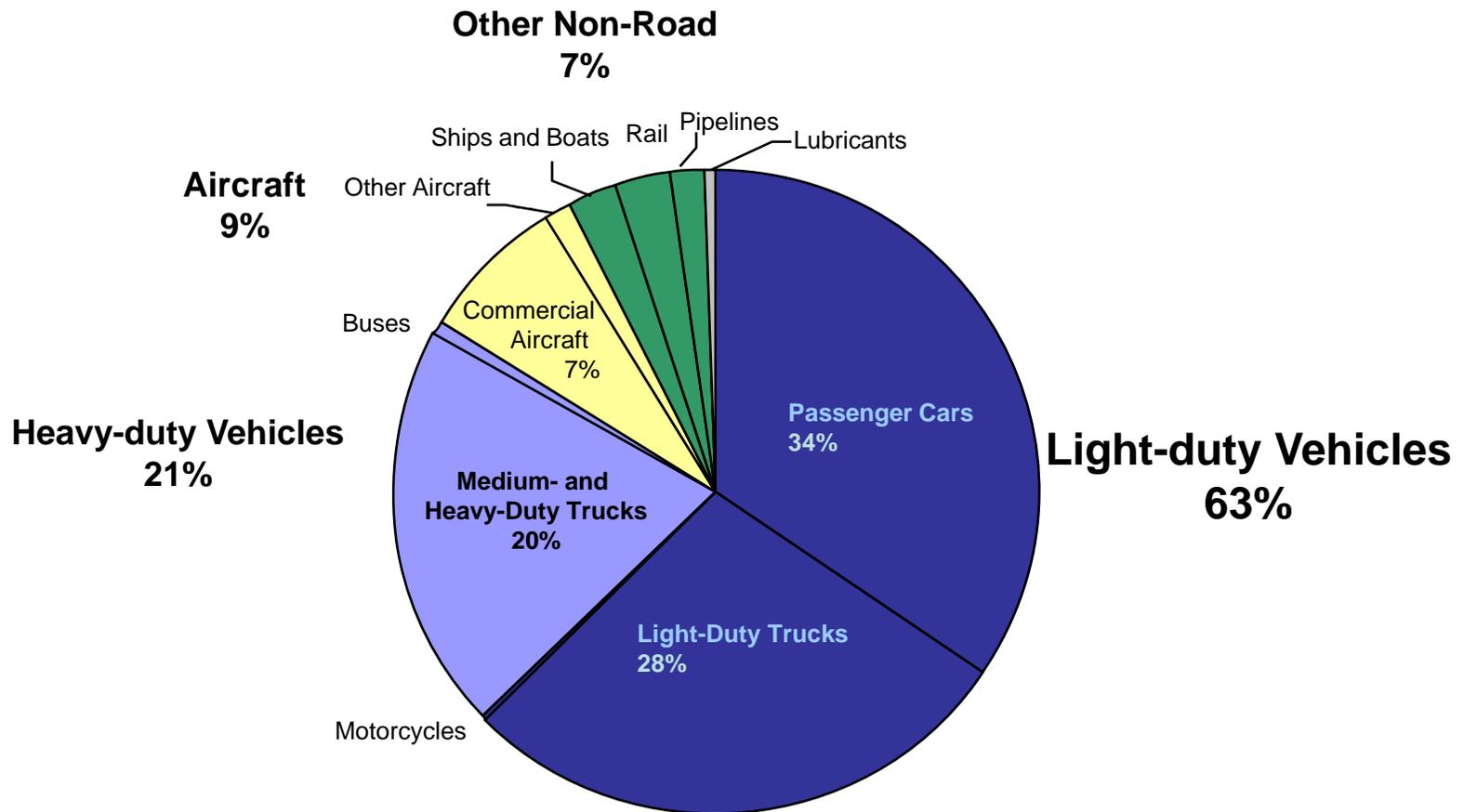
SCIENCE: US Emits 4 Times CO₂ Per Capita As the Global Average



SCIENCE: Cars/Lt Trucks = 17% of U.S. GHG



U.S. Transportation GHG Emissions by Source, 2006



Source: U.S. Environmental Protection Agency,
Inventory of Greenhouse Gas Emissions and Sinks, 1990-2006.

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Legislation

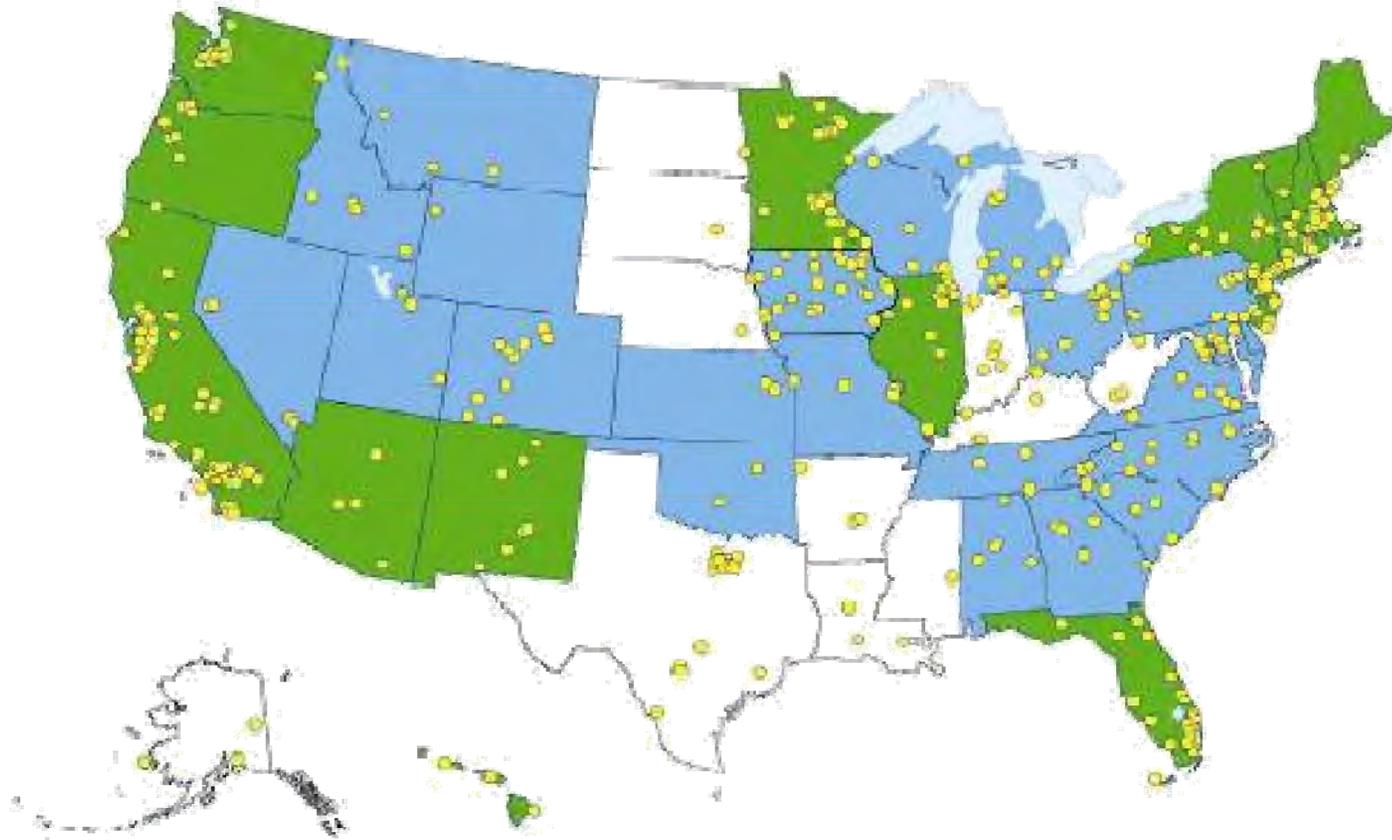
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LEGISLATION: Targets

- Scientists recommend 80% GHG reduction below 1990 by 2050
- Many states and other countries have adopted this target
- President Obama's budget: 80% reduction below 2005 by 2050
- Waxman-Markey bill: 20% below 2005 by 2020 and 83% below 1990 by 2050

LEGISLATION: State Activity

State and Local Participation in Selected Climate Change Initiatives



- States with Greenhouse Gas Emission Targets and Participating in the Climate Registry (17)
- States Participating in the Climate Registry without a Greenhouse Gas Emissions Target (22)
- Cities Participating in the U.S. Mayors Climate Projection Agreement (780)

LEGISLATION: State Activity

Over 30 state climate action plans:

- Highly “aspirational”
- Managed by state environmental agencies
- Most state plans are not legislated but may influence legislation
- Transportation involvement was usually at a technical advisory level
- Transportation elements widely divergent from state to state

LEGISLATION: State Climate Plans

Transportation Elements are Widely Divergent

State	Year	Vehicle	Low Carbon Fuels	Smart Growth & Transit	Other
MN	2025	15%	35%	25%	25%
NC	2020	35%	12%	38%	15%
SC	2020	14%	55%	29%	1%
CT	2020	51%	38%	8%	2%
ME	2020	53%	25%	21%	1%
MD	2025	24%	12%	45%	20%
NY	2020	59%	11%	27%	4%
PA	2025	45%	36%	18%	0%
RI	2020	46%	10%	31%	14%
VT	2028	21%	14%	49%	17%

Climate Change in Metropolitan Transportation Plans

MPO Region	Status of LRTP	Trends & Challenges	Vision & Goals	Policies & Strategies	Performance Measures
Abany, NY	draft August 2007			■	
Baltimore	adopted Nov 2007	■		■	
Chicago	updated June 2007		■		
Denver	adopted Dec 2007				
Eugene, OR	final draft Sep 2007			■	
Grand Rapids, MI	adopted April 2007	■			
Houston-Galveston	updated Oct 2007	■			
Missoula, MT	adopted May 2004		■		
Philadelphia	adopted 2005				
Portland, OR	final draft Jan 2008	■	■	■	■
Sacramento	draft Nov 2007	■		■	
Salt Lake City	adopted May 2007				
San Diego	adopted Nov 2007	■	■	■	
San Francisco	draft goals 2008		■		■
Santa Fe, NM	draft due 2009				
Seattle	adopted Spring 2008**	■	■	■	■
Southern California	adopted May 2008	■			■
Washington, DC	adopted Oct 2006				

- Climate Change Mitigation
- Climate Change Mitigation & Adaptation

Source: ICF International, *Integrating Climate Change Considerations into the Transportation Planning Process*. Prepared for Federal Highway Administration, July 2008.

LEGISLATION: California SB 375 (enacted 2008)

- Aims to leverage land use changes with transportation
 - CARB sets metropolitan GHG targets
 - MPOs prepare Sustainable Communities Strategies (SCS) to meet targets
 - If SCS doesn't achieve targets, MPO prepares Alternative Planning Strategy
 - Does not supersede local planning authority, but provides incentives for local governments to adopt land use plans that reduce GHG

CA SB 375 metrics issues

Three Key Decisions

Reduction from Current Year Conditions	or	Reduction from Future Year Conditions
Uniform Statewide	or	MPO-specific
Absolute (ton)	or	Relative (%, per unit)

LEGISLATION: Cap and Trade

Cap and Trade takes many different forms:

- Imposes a cap on GHG emissions that declines over time
- May apply to power plants, oil importers and refiners, industrial sources
- For transportation, the cap is “upstream” – applies to oil importers and refiners – would raise the price of fuel, encouraging conservation, efficiency, biofuels, etc.
- Significant economic effects likely
- One multi-state (northeastern) program established in 2008 for power plants
- Several other multi-state programs are being developed (western states and midwestern states)
- Federal cap and trade legislation is pending in Congress

LEGISLATION: Federal Cap and Trade Legislation

- President Obama and Congressional leaders support cap and trade
- Waxman-Markey “discussion draft” is in play in the House
- Many thorny issues will have to be negotiated
- Regional issues, sectoral issues, economic issues, urban/rural issues
- Action may carry over into 2010

LEGISLATION: Possible Federal Transportation Provisions

- More stringent auto and fuel standards, plus intensive R&D *just announced!*
- Transportation planning requirements
- Land use planning provisions (like SB 375 and the new HUD/DOT sustainable communities plans)
- GHG or VMT reduction targets
- GHG conformity requirement
- GHG performance standards
- New funding provisions
-

LEGISLATION: Transport Provisions in Waxman-Markey Bill

- Section 841 of ACESA bill, as of 5-15-09
- Each state shall:
 - Submit to EPA goals for transportation GHG reductions
 - Ensure MPOs over 200K submit a plan to EPA and USDOT to achieve such goals “as part of each transportation plan or TIP”
 - Develop GHG goals in concurrence with state AQ agencies and state DOTs; in consultation with MPOs over 200K and local AQ and transport agencies; and with public involvement
 - Update the goals every 4 years

GHG reduction goals:

- Must be in 4, 10, and 20-year periods
- Must be on a statewide basis and also for MPOs over 200K
- May be established on voluntary basis for other MPOs

GLOBAL
CLIMATE
CHANGE

Transportation's
Role in Reducing
Greenhouse Gas
Emissions



Waxman-Markey Bill (cont)

MPO GHG plans must:

- Be based on models, methodologies, etc. developed established by EPA
- Be certified by EPA as likely to meet GHG goal
- Use scenario analysis for transportation and land use
- Have public involvement
- Be developed in consultation with state/local housing, public health, economic development, land use, environment, and public transportation agencies
- Be coordinated regionally with other MPOs, localities, and state; also with AQ, environmental health, and transportation agencies for the state and region

States and MPOs must consider these strategies in their GHG plans:

- transit, zoning updates, "complete streets policy," bike/ped, telecommuting, AWS,, pricing, intermdoal freight, parking policies, intercity rail service, TDM, HOV restrictions; reduced vehicle idling, retrofit technologies; etc.

GLOBAL
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Waxman-Markey Bill (cont)

EPA must:

- Issue regs on improved models, methodologies, data collection, etc, to be used in developing GHG reduction plans
- Assess progress in reducing transport GHG every 6 years
- Publish transport GHG plans on website with analysis of effects on GHG and oil consumption

Enforcement:

- EPA shall impose prohibition under 179(b)(1) on states or areas of states that fail to submit plan or revised plan in accord with requirements

Competitive Grants:

- EPA may award grants to support goals, plans, modeling, monitoring, plan implementation, etc.
- Priority for awards must be based on total GHG reduction, per capita reduction, cost-effectiveness, potential for both short- and long-term reductions, and other factors EPA deems appropriate

Nothing in bill may be construed to infringe on existing land use authorities

GLOBAL
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Q&A: Science and Legislation



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Economics

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ECONOMICS: Two Contrasting Views

Sir Isaac Stern Report (2007):

- Reducing GHG will be expensive, but doing nothing now will be much more expensive later
- Invest 1-2% of global gross domestic product (GDP) in GHG reductions now, *or*
- Prepare for a future with 20% lower GDP

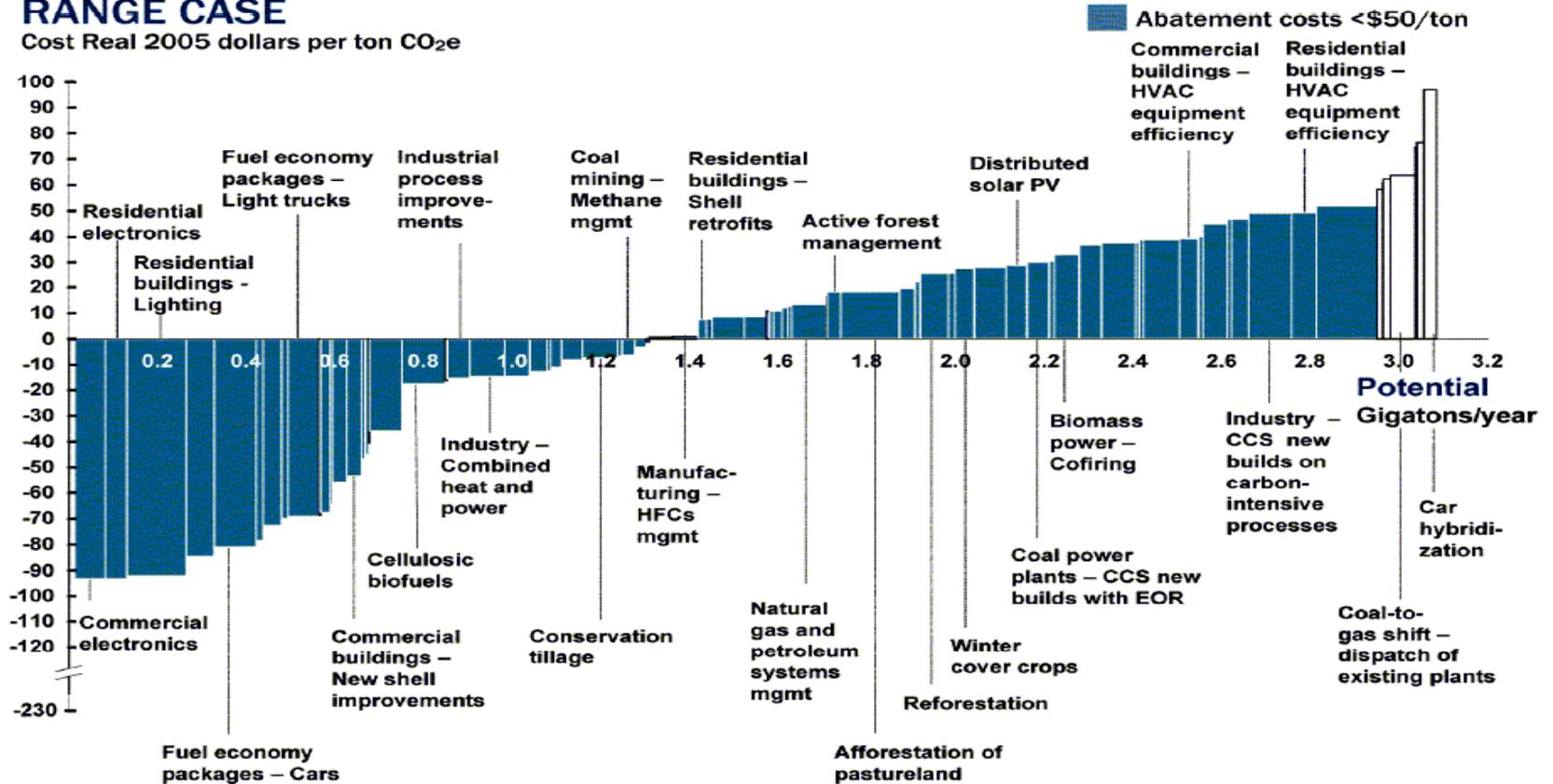
New View from Peter Huber (2009):

- Most GHG reductions by developed countries will be futile and counter-productive due to economics of developing countries
- Instead, emphasize GHG sequestration technology and nuclear power

ECONOMICS: How Much Will it Cost to Reduce GHG Emissions?

GHG REDUCTION OPPORTUNITIES WIDELY DISTRIBUTED - 2030 MID-RANGE CASE

Cost Real 2005 dollars per ton CO₂e



The analysis found that abatement options are highly fragmented and widely spread across the economy. Almost 40 percent of abatement could be achieved at “negative” marginal costs, i.e., the savings over the lifecycle of these options would more than pay for the incremental investment, operating, and maintenance costs. Realizing the potential of many negative-cost options would require overcoming persistent barriers to market efficiency.

ECONOMICS: Cost-Effectiveness

- Estimate the cost-effectiveness of each GHG reduction strategy (as cost/ton of GHG reduced)
- Lowest cost strategies minimize the impact to the economy
- McKinsey identifies many technologies that cost less than \$50/ton
- More study needed – limited C-E research has been done on strategies that require changes to consumer behavior (land use, TDM, transit, etc.) but they have many added benefits

ECONOMICS: Opportunities

- Being a leader in low-GHG technology = economic growth opportunity for countries, states, and local governments
- Being a leader in low-GHG growth and transportation = economic and quality of life opportunities
- The trick is how each area can capitalize on opportunities

ECONOMICS: Opportunities

- Smaller, well-organized regions may have an advantage in building effective initiatives across transport, environment, housing, economic development, and business
- Regional partnerships to address climate change can also focus on green business & jobs, green building and energy conservation, etc.

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GHG Reduction Strategies

STRATEGIES: Transportation GHG Reduction Has FIVE Legs

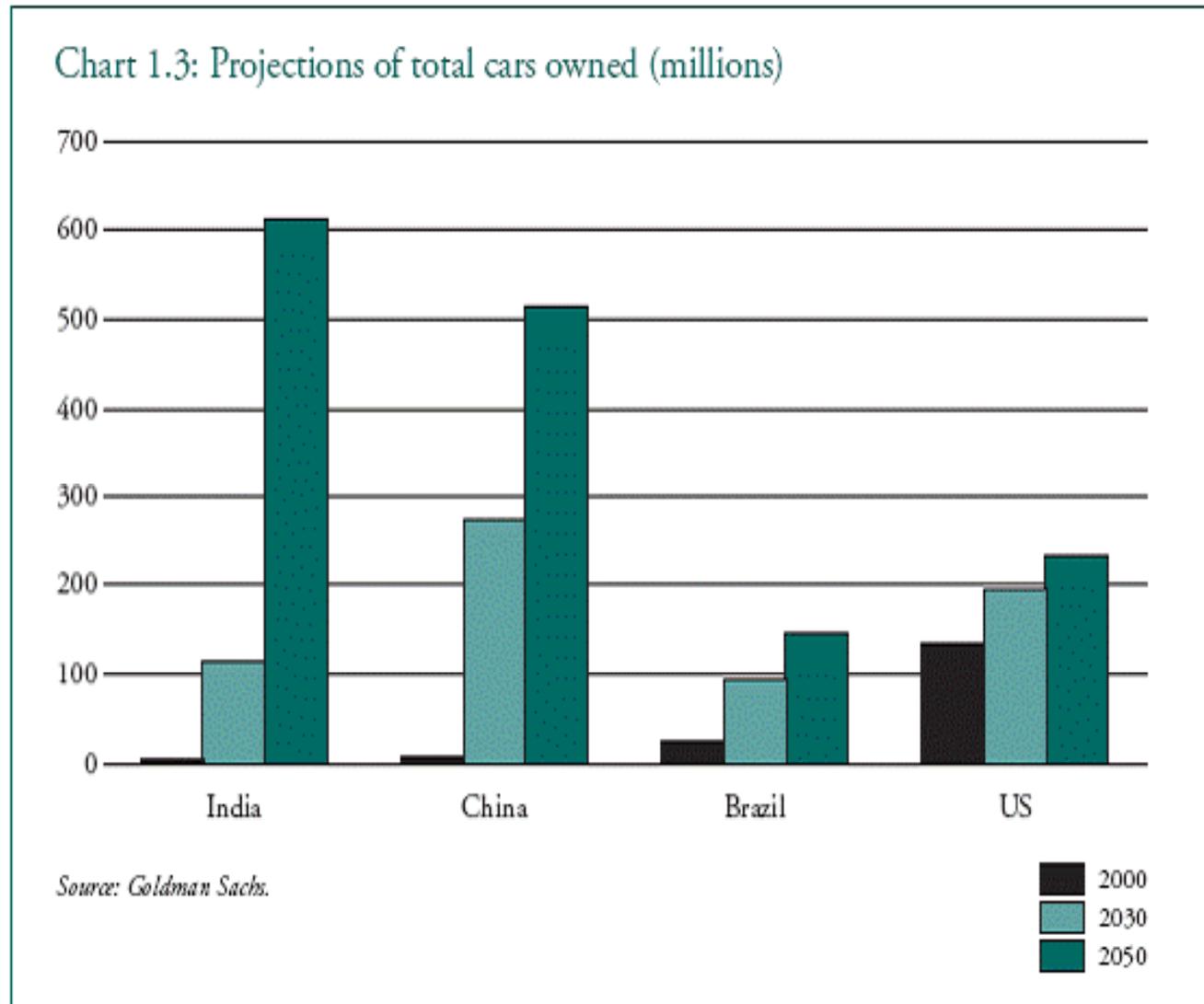
The 3-legged stool gets most attention:

- 1. Vehicle Efficiency**
- 2. Low-carbon Fuels**
- 3. VMT Reductions**

But there are two more legs:

- 4. Vehicle/System Operations**
- 5. Construction, Maintenance, and Agency Operations**

STRATEGIES: Decarbonizing Vehicles and Fuels is Critical



STRATEGIES: Vehicle Decarbonization is Critical

“In the long term, carbon free road transport fuel is the only way to achieve an 80-90% reduction in emissions, essentially “decarbonization.”

-- The King Review for the U.K. Government, by Professor Julia King, Vice-Chancellor of Aston University and former Director of Advanced Engineering at Rolls-Royce plc, March 2008

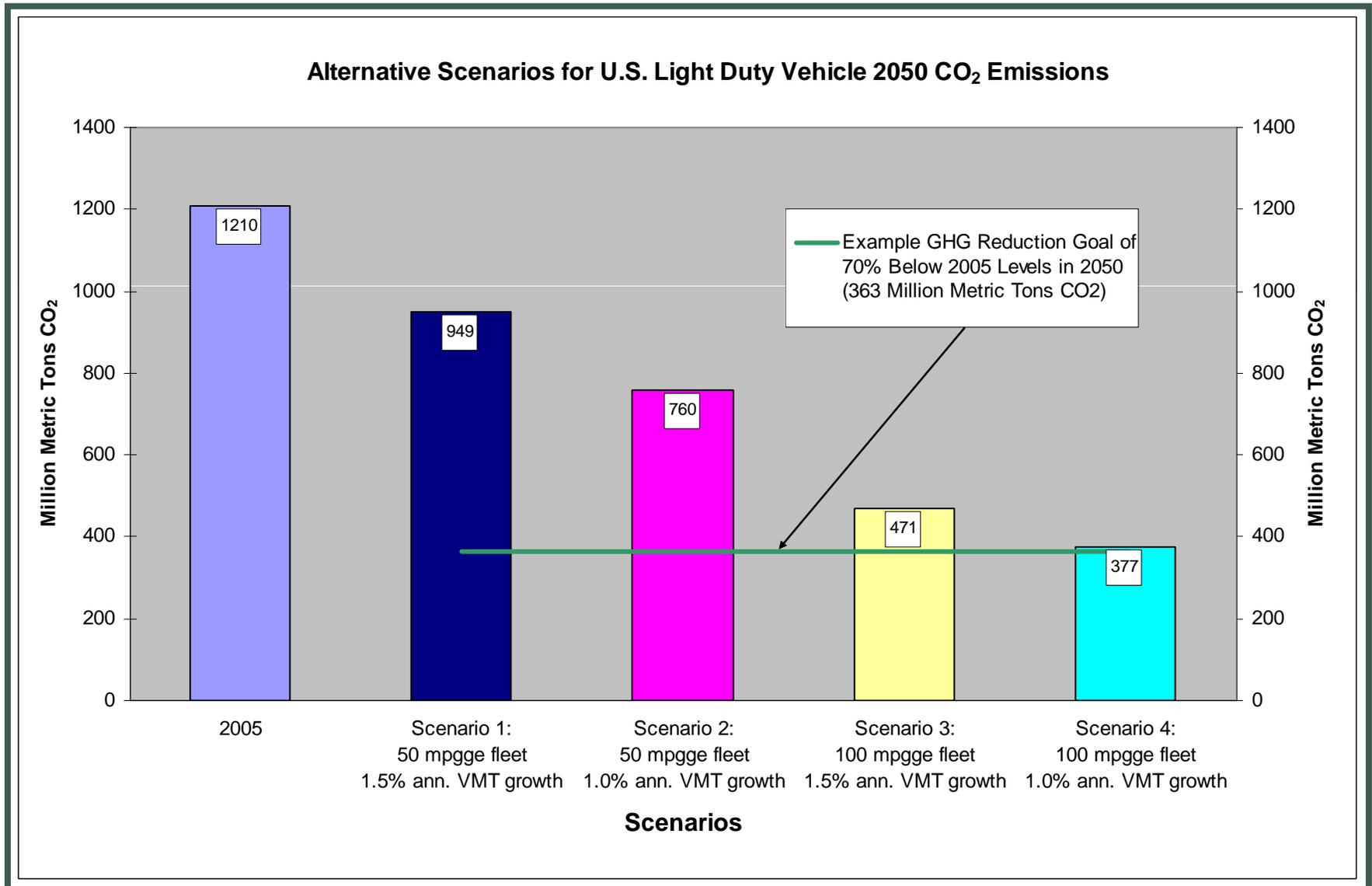
“[I]n the period beyond 2100, total GHG emissions will have to be just 20% of current levels. It is impossible to imagine this without decarbonization of the transport sector.”

-- Sir Nicholas Stern, Stern Review to the U.K. Government, 2007

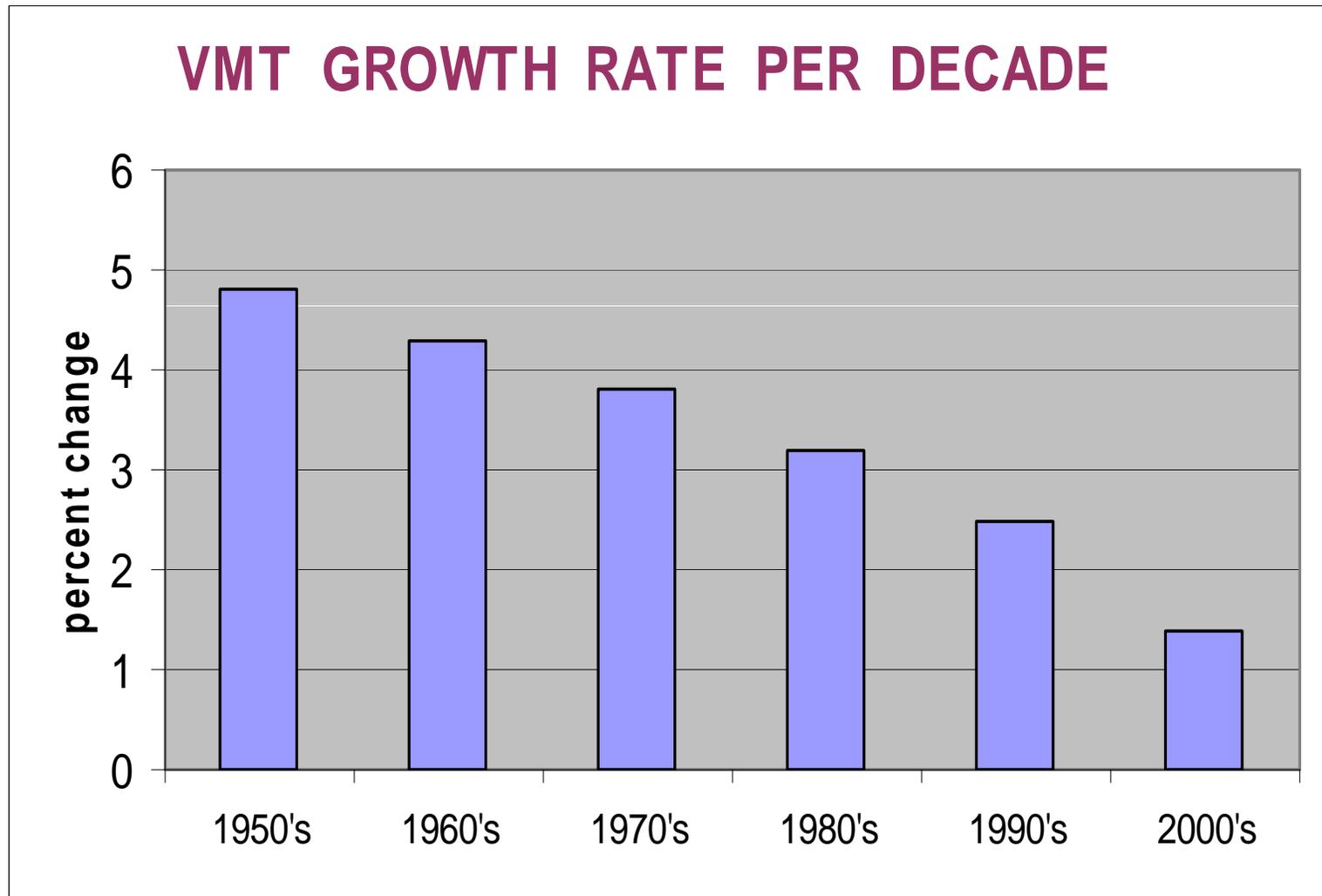
STRATEGIES: Vehicle/Fuel Decarbonization Potential

- 50% cut in GHG/mile is feasible by 2030 from conventional technologies and biofuels
- **Almost complete decarbonization** of transport vehicles/fuels by 2050 is a **“realistic ambition,”** with advanced technology/fuels
- Electric vehicles and new low-carbon fuels are promising paths to decarbonization – but must overcome many technology/economic issues
- **BUT**: Decarbonization by itself is not enough, not soon enough to meet GHG targets

STRATEGIES: Slowing VMT growth to 1% or less (*or actual decrease*) also needed



STRATEGIES: VMT Growth Has Been Slowing – in the U.S.



Source: Alan Pisarski and Cambridge Systematics

STRATEGIES: How to Reduce VMT Growth?

- Pricing
- Mode Shifts (carpool/vanpool, bike/ped, transit, freight rail, barges)
- Telecommuting, Alternative Work Schedules, and Trip Chaining
- Land Use & Transport Coordination

STRATEGIES: Transportation Demand Management Strategies



- Reducing vehicle travel, through:
 - Improved multimodal options, including transit, ridesharing, bicycling and walking
 - Eliminating trips through telecommuting
 - Developing economic incentives to positive actions, such as through parking pricing and management, commuter benefits, Pay-As-You-Drive Insurance
 - Public education and outreach
- Reducing fuel use associated with driving
 - Shifting trips to off-peak periods
 - Combining trips, ridesharing, more efficient travel
 - Targeting traffic congestion associated with work zones, special events, etc.

STRATEGIES: Pricing is Powerful and Essential for Reducing GHG

- Higher energy prices are essential to promote energy conservation and new technologies in all sectors
- In transport, pricing can be powerful:
 - Pay as you drive (PAYD) Insurance
 - Mileage fees
 - Carbon or fuel tax
 - Parking pricing
 - Congestion pricing
 - Vehicle “feebates”

STRATEGIES: Mode Shifts

CO₂e Emissions by Mode Per Passenger Mile

NATIONAL AVERAGE*	Energy Intensities		Load Factor	CO₂e
	(Btu or kWhr per vehicle mile)	(Btu or kWhr per passenger mile)	Persons Per Vehicle	(Estimated Pounds CO₂e Per Passenger Mile)
SOV Light Duty Vehicles (Cars & Personal Trucks)	5,987	5,987	1.00	0.99
Personal Trucks	6,785	4,329	1.72	0.71
Transit Bus	37,310	4,318	8.80	0.71
Cars	5,514	3,496	1.57	0.58
Electric Trolley Bus**	5.2	0.39	13.36	0.52
HOV (2+) Light Duty Vehicles (Cars & Personal Trucks)	5,987	2,856	2.10	0.47
Intercity Rail (Amtrak)***	54,167	2,760	20.50	0.39
Light and Heavy Rail Transit***	62,797	2,750	22.50	0.39
Motorcycles	2,226	2,272	1.20	0.37
Commuter Rail***	92,739	2,569	31.30	0.36
Vanpool	8,048	1,294	6.10	0.21
Walking or Biking	-	-	1.00	0.00
REGIONAL EXAMPLE (SEATTLE/PUGET SOUND REGION)	Energy Intensities		Load Factor	CO₂e
	(Btu or kWhr per vehicle mile)	(Btu or kWhr per passenger mile)	Persons Per Vehicle	(Estimated Pounds CO₂e Per Passenger Mile)
Cars (64%) and Personal Trucks (36%)	5,987	4,468	1.34	0.74
King County Metro Diesel and Hybrid Buses	33,024	2,854	11.57	0.47
Sound Transit Buses	33,024	2,517	13.12	0.42
King County Electrically-Powered Trolley Buses**	5.33	0.44	12.12	0.11

STRATEGIES:

Carpooling and Vanpooling

- Under-recognized, under-appreciated
- There are 7 times as many work carpool/vanpool PMT as transit PMT (*but individual trips longer*)
- Carpooling/vanpooling costs government little; saves transport costs for users
- Effective in all kinds of areas – rural, small urban areas, suburban, urban
- High potential to reduce GHG
- Nearer-term payoff than most transport strategies
- Can supplement/complement transit – likely to carpool when destinations walk+transit-friendly

STRATEGIES: Telecommuting, Alternative Work Schedules, Trip Chaining

- Meaningful GHG reductions possible, up to 5% of *work trip* emissions for each:
 - Telecommuting
 - Alternative work schedules (*esp. 4-day week*)
 - Trip chaining
- Easily implemented, low cost, politically acceptable

research program, Western Australia/EU

- Informal TDM marketing by dedicated activists, focused on switch from SOV to walk/bike, carpool, transit
- TravelSmart pilot showed extensive behavioral change - driving dropping 10 percent and a “first year rate of return of 48 percent to public transport”
- Costs \$60-\$70 per household – but the return on investment is up to 70 to one.
- In 200 projects over three continents, including 4 US pilots, TravelSmart programs have averaged **decreasing driving** more than **8%** annually
- Follow-up survey indicates people who have changed auto behavior become apostles for change

(Per Brog, Ker, Newman & Salzman)

STRATEGIES: Transit

- APTA: Transit reduced GHG by 6.9 million metric tons in 2005 in one study, 5 times that in a second study
- This is 0.3% to 1.7% of U.S. transportation GHG
- European Ministers of Transport caution:
 - “Modal shift policies are usually weak in terms of the quantity of CO₂ abated Modal shift measures can be effective when well targeted, particularly when integrated with demand management measures. **They can not, however, form the corner-stone of effective CO₂ abatement policy.....**”
- Transit serves other goals – and is seen as key to land use changes (transit commute supports multiple walk/bike trips at both work and home)

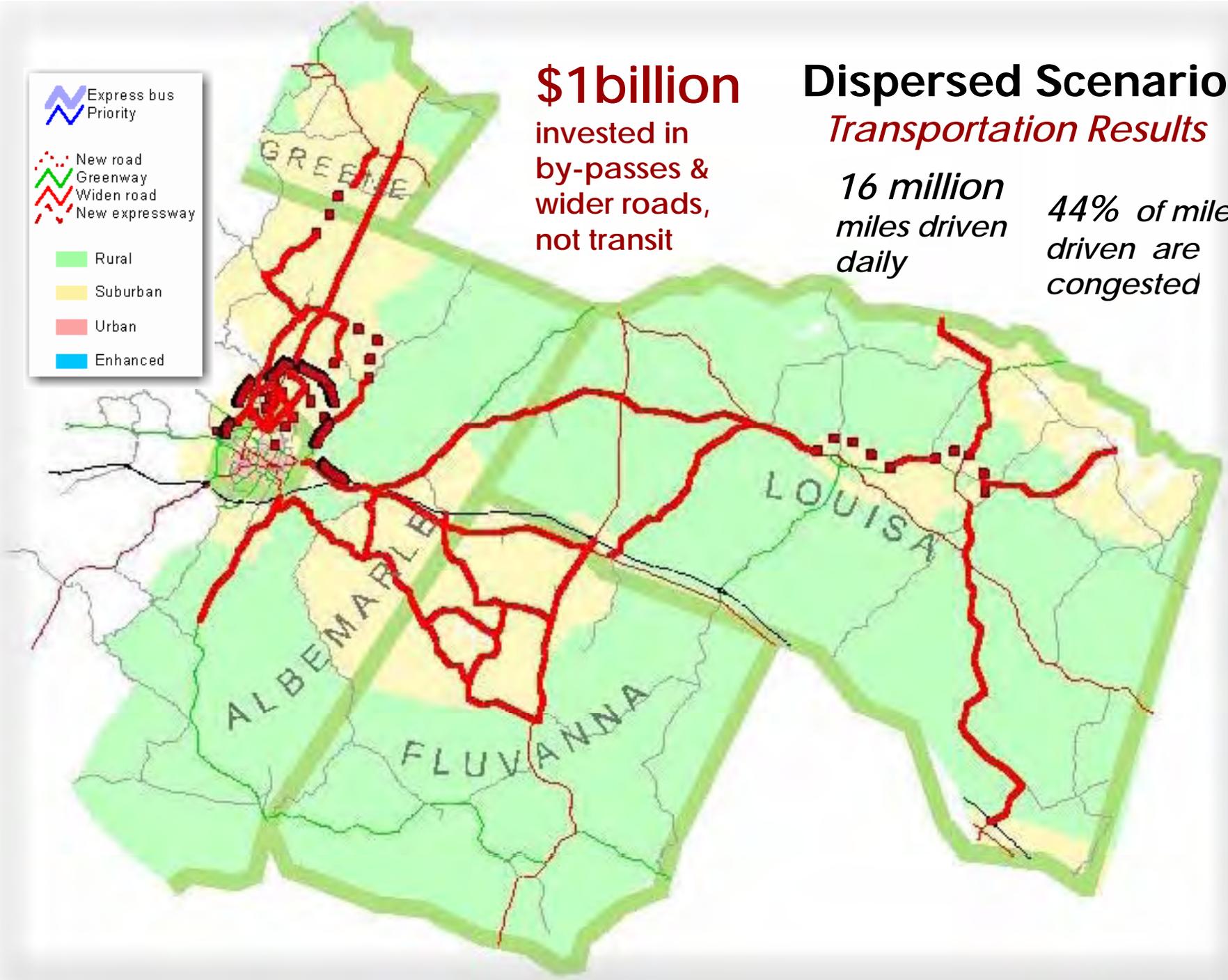
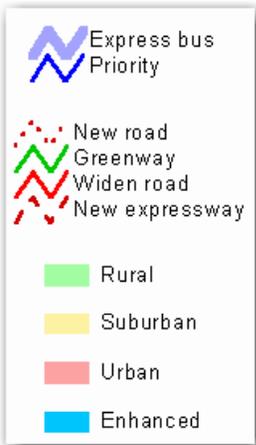
STRATEGIES: Transit Ready Development

How new development & redevelopment can:

- Incorporate transit-supportive strategies early on
- Grow into transit-oriented development over time
 - Mixed land uses & housing types, compact, walkable and connected street grid
 - Transit routes and stops that are incorporated into current development or factored into future plans
 - Transit planning across jurisdictions & agencies
 - Public and commercial facilities designed as Transit Targets and community focal points
- Transit supports primary walk/bike trips within the compact development & destinations

STRATEGIES: Land Use Changes

- Compact land use helps reduce GHG
 - More walk, bike, & transit trips, shorter driving trips
- “Growing Cooler” finds 3.5 - 5% reduction in transportation GHG with compact, mixed-use development over 43 years
- “Growing Cooler” assumptions are optimistic:
 - 67% of all development in place in 2050 will be constructed or rehabilitated after 2005
 - 60-90% of that development is 13.3 housing units/acre (gross density)
 - 30% VMT reduction in compact development compared to very sprawling development



\$1 billion
 invested in
 by-passes &
 wider roads,
 not transit

Dispersed Scenario
Transportation Results

16 million
miles driven
daily

44% of miles
driven are
congested

Town Centers Scenario

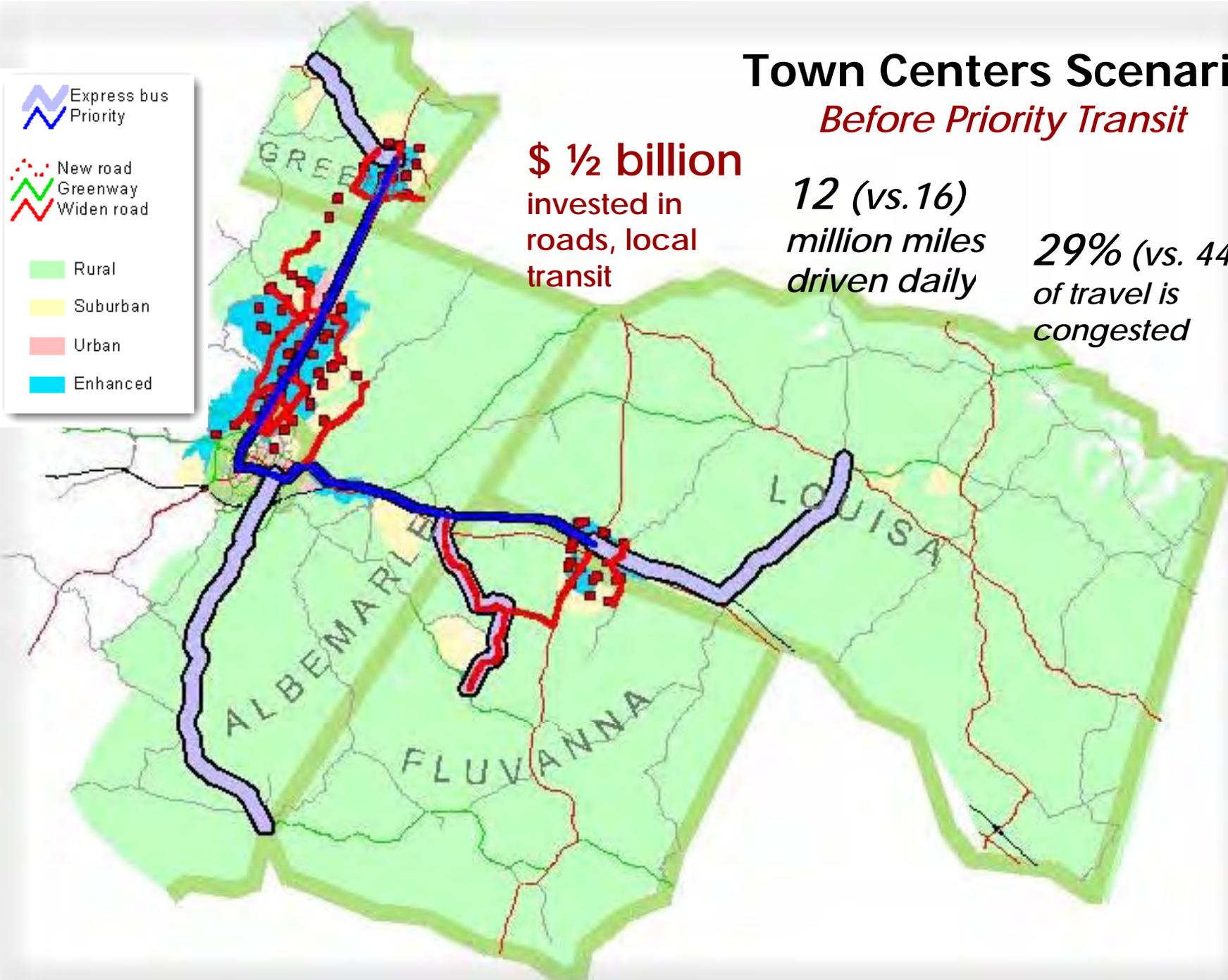
Before Priority Transit

\$ ½ billion
invested in
roads, local
transit

12 (vs. 16)
million miles
driven daily

29% (vs. 44%)
of travel is
congested

- Express bus (blue line with 'M' shape)
- Priority (blue line)
- New road (red dotted line)
- Greenway (green line with 'M' shape)
- Widen road (red line with 'M' shape)
- Rural (light green)
- Suburban (yellow)
- Urban (red)
- Enhanced (blue)



STRATEGIES: Land Use/GHG Questions

- How much land use change is desired?
 - HBR: 40-70% of market wants more compact, walkable, mixed-use neighborhoods with parks, transit and shopping nearby (*Nat. Assoc of Realtors 2004*); 75% of market wants either attached or small-lot single-family (6+ units/acre) (*Arthur C. Nelson 2006*)
 - CJB: Probably more than before, but variable among different areas and different socio-economic groups. Social desirability bias in surveys. Ultimately, economics is powerful influence.
- How much land use change is feasible?
 - HBR: Depends on multiple policy & market factors, but can be substantial. Four decades (to 2050) is 2/3 of the history of sprawl.
 - CJB: Maybe 10%, due to local fragmentation, slower growth.

STRATEGIES: Land Use/GHG Questions

- How much transportation GHG reduction is likely + when?
 - HBR: 7 to 10 % possible by 2050, but only if significant policy and market shifts occur; some sooner by restoring complete streets/networks and aggressive TDM
 - CJB: Less than 5%, over 43 years, even with major LU change
- What are the implications - congestion, quality of life, mobility, etc.?
 - HBR: More travel choice, active lifestyles, reduced costs and env. impacts, less congestion
 - CJB: Also possibly higher costs, smaller living space, limited private yards, less privacy, more concentrated pollution, more congestion

STRATEGIES: Land Use/GHG Questions

- What are the best levers to achieve land use change?
 - HBR: Regional scenario planning; multimodal corridor plans; change local plans, codes, ordinances, street standards; Transit Oriented and Transit Ready Development
 - CJB: Prices first, then changed codes, ordinances, standards, then complementary transportation investments
- What is the role of transport agencies?
 - HBR: Plan transportation in synch with localities' land use plans and codes; Sustainable communities plans (HUD/DOT & CA); Fund and implement supportive projects
 - CJB: Support/implement better transportation pricing, encourage code changes, make complementary transportation system changes

STRATEGIES: Vehicle/ System Operations

10-20% Light Duty Vehicle GHG reduction potential by:

- Managing speed (35-55 MPH is optimal; speed limits/enforcement could reduce fuel use 2-4%)
- Reducing congestion, accel/decel
- Reducing poor signal timing (could reduce 1.315 MMT CO₂/yr)
- Roundabouts (multiple benefits)
- Reducing car and truck idling
- “Eco driving” (priority in Europe)
- And more.....

STRATEGIES: Construction, Maintenance, & Agency Operations

- Significant sources of GHG and energy use
- Should be accounted for in new initiatives
- Many opportunities to reduce GHG and energy cost from current system:
 - LED lights
 - Alt fuel buses
 - Low carbon pavement
 - Energy-efficient buildings
 - Reduced roadside mowing
 - Solar panels on ROW
 - Alt fuels and hybrid vehicles in DOT fleets

Q&A: Economics & GHG Strategies



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Adaptation

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CLIMATE ADAPTATION: As Important as GHG Reductions

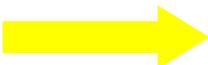
- “Climate change will affect transportation primarily through increases in several types of weather and climate extremes... very hot days; intense precipitation events; intense hurricanes; drought; and rising sea levels, coupled with storm surges and land subsidence.”
- “The impacts ... will be widespread and costly in both human and economic terms and will require significant changes in the planning, design, construction, operation, and maintenance of transportation systems.”

CLIMATE ADAPTATION: Context

- Impacts are less well understood than GHG emissions
- Climate models cannot yet predict local impacts with any certainty
- Impacts will be highly variable across the US; approaches will be heterogeneous as well
- Most agencies focusing on awareness and research
 - Examples: MTC, ODOT, ConnDOT, PSRC

CLIMATE ADAPTATION: Bridging the Gap

*What are you
managing for?*

- Planning 
- Project Design 
- Construction 
- Operations 
- Maintenance 
- Use 

*How will climate
impact you? (e.g.,)*

- Development location
- Bridge scouring decisions
- Project timing
- Snow removal
- Grass cutting
- Evacuation routes

CLIMATE ADAPTATION: Research Examples

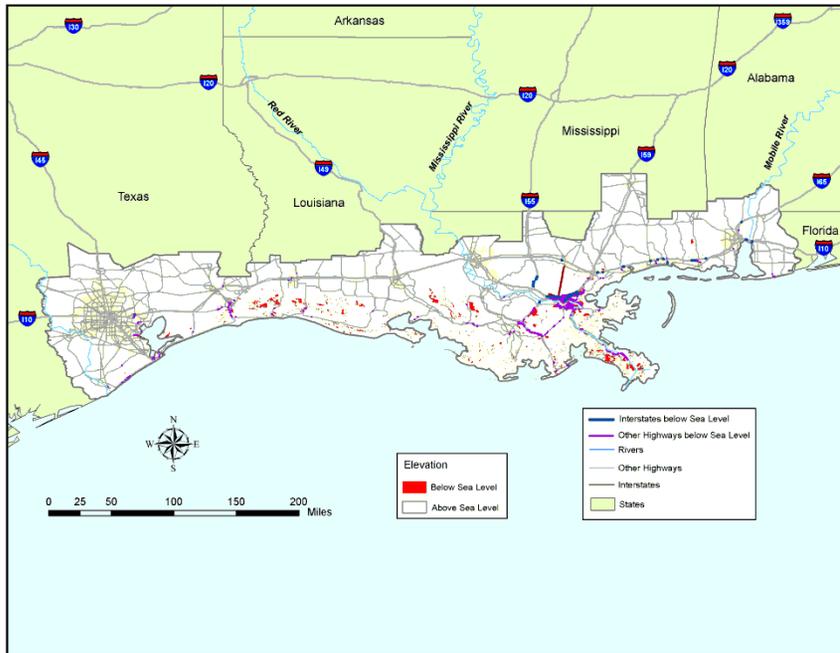
- UK Highways Agency Adaptation Risk Framework
- FHWA Adaptation Framework (*Underway*)
- TRB Special Report 290
- Mid-Atlantic Study
- Local studies in Alaska, Boston, etc.
- Gulf Coast Study (*see next slides*)

U.S. DOT / USGS Gulf Coast Study

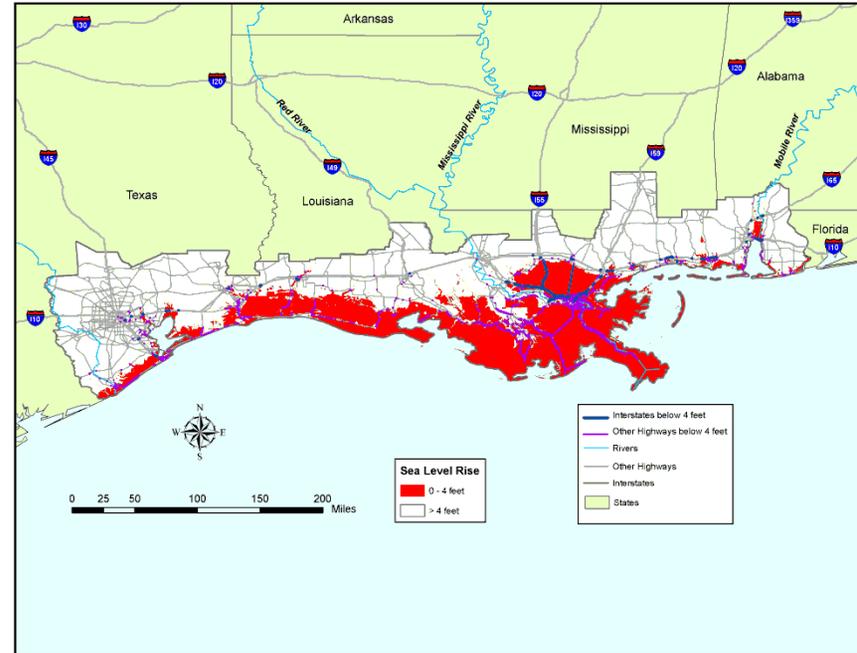
*Potential Impacts of Climate Change and Variability
on Transportation Systems and Infrastructure*

Highways Vulnerable to Relative Sea Level Rise

Baseline (Present Day)



4 Feet of Sea Level Rise



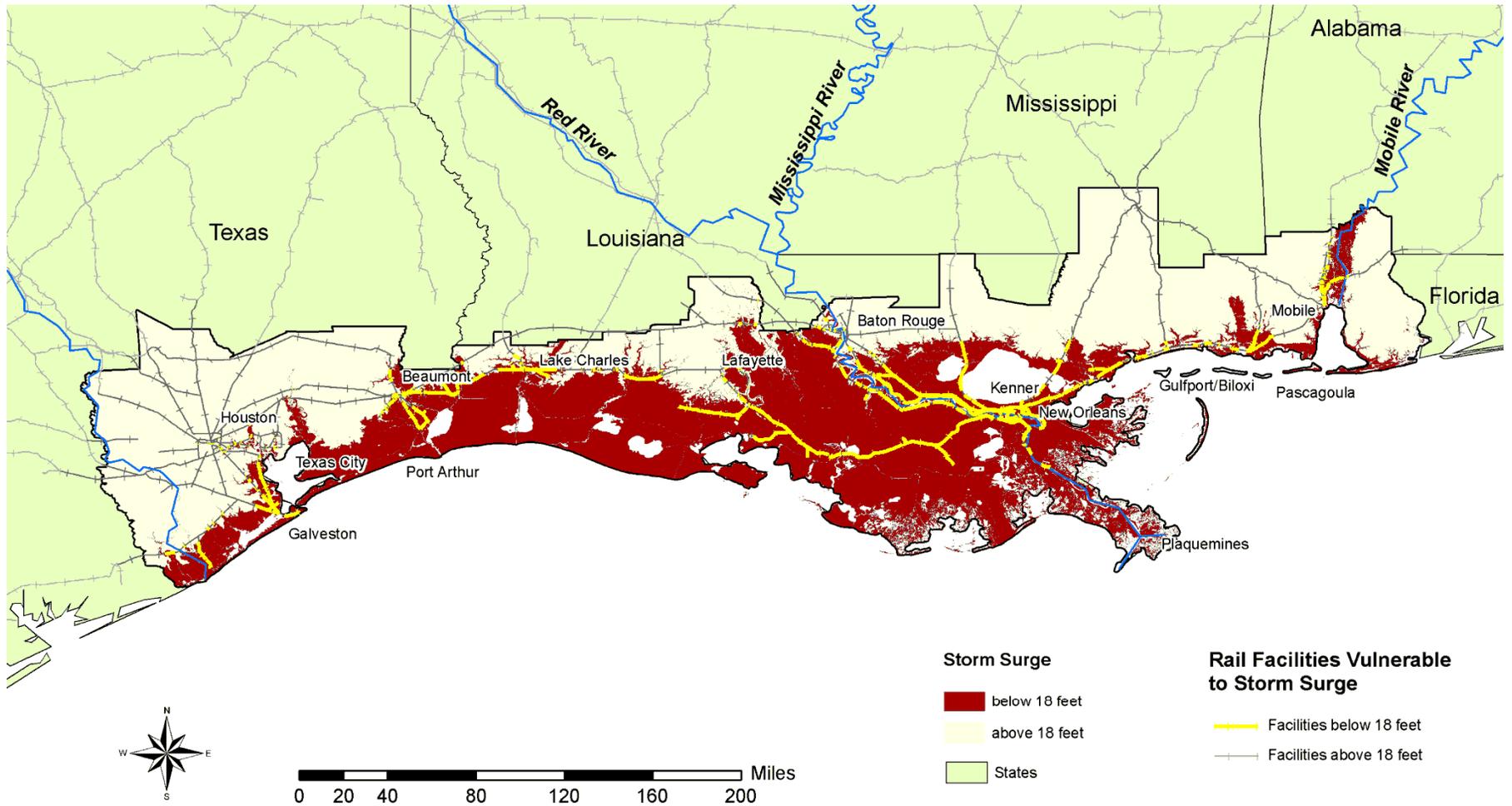
***Results* – Gulf Coast Study**

Vulnerability Due to... Relative Sea-Level Rise

- **Relative sea level rise (due to climate change and subsidence) of 4 feet could permanently flood:**
- 24% of interstate miles, 28% of arterial miles, New Orleans Transit (*2X the miles and all transit – storm surge*)
- 72% of freight / 73% of non-freight facilities at ports
- 9% of the rail miles operated, 20% of the freight facilities, no passenger stations
- 3 airports (*22 airports – storm surge*)
- Temporary flooding in low-lying areas due to increased heavy downpours will broaden affected areas
- *Given the connectivity of the intermodal system, a small flooded segment may render much of the infrastructure inoperable*

Results – Gulf Coast Study Vulnerability Due to... Storm Surge

Freight Rail Lines Potentially Vulnerable to Storm Surge of 18 feet



Hazard Mitigation Planning

Smaller regions and states may have related experience

- Before climate change 'heated up' – many regions prepared **Regional Hazard Mitigation Plans:**
- Primary purpose of hazard mitigation planning is to identify potential risks (flood plains, drought, fire, wind, etc.) and develop plans to make communities and businesses more resistant to damage from natural hazards.
- Seeks to develop ways to lessen the impact of natural disasters on the region's resources through strategic, long range planning, to save lives and reduce property damage.
- Disaster Mitigation Act of 2000 required HM Plan to be eligible for post-disaster Hazard Mitigation Grant Program. Many COGs, RPOs, development districts completed HM plans, assessed risks and developed strategies in cooperation with state agencies.
- Some of this approach could be transferable in looking at CC issues

CLIMATE CHANGE IS HEATING UP

Resources

NADO-AMPO Webinar
May 21, 2009

RESOURCES: Information

- Intergovernmental Panel on Climate Change (IPCC):
<http://www.ipcc.ch/>
- Climate Literacy: <http://www.climateliteracynow.org/>
- The Center for Climate Strategies:
<http://www.climatestrategies.us/>
- The Pew Center on Global Climate Change:
<http://www.pewclimate.org/>
- U.S. Environmental Protection Agency:
<http://epa.gov/climatechange/index.html>
- US Climate Change Science Program:
<http://www.climatescience.gov/Library/sap/default.htm>
- US Global Change Research Information System:
<http://www.gcrio.org/>
- US DOT Transportation and Climate Change Clearinghouse:
<http://climate.dot.gov/index.html>

RESOURCES: Information



Transportation and Climate Change
CLEARINGHOUSE

The Transportation and Climate Change Clearinghouse is designed as a one-stop resource for information on transportation and climate change issues.



www.climate.dot.gov

RESOURCES: Information

US DOT Transportation and Climate Change Clearinghouse: <http://climate.dot.gov/index.html>

- One-stop resource on transportation and climate change; provides info and resource links related to:
- Greenhouse gas inventories and forecasts
- Methods and tools for analyzing transportation GHG impacts
- Strategies for reducing transportation-related GHG
- Potential impacts of climate change on transportation infrastructure
- Approaches for integrating climate change considerations into transportation decision making

RESOURCES: Funding

- Planning orgs need funding for planning, research, and implementation (HUD/DOT programs)
- Energy Conservation Block Grant Program (\$3.2 billion, new in 2009, in ARRA, www.eecbg.energy.gov)
- TIGGER (\$100 M, new in 2009, in ARRA)
- Pooled funding opportunities for research and planning?
- New funding in transportation legislation in 2010...2011...2012?
- Funding opportunities in Cap and Trade (Federal and multi-state)?

CONCLUSION: Many Strategies Needed to Reduce Transport GHG

1. Decarbonize vehicles and fuels*
2. Adopt pricing measures to reward conservation and spur technology innovation*
3. Encourage/reward public shift to energy efficiency of vehicles*
4. Push “eco driving” and system/speed management **
5. Adopt more efficient land use**
6. Support carpools & vanpools, biking, walking, transit use, trip chaining, telecommuting**
7. Adopt low carbon, energy-conserving strategies in construction, maintenance, and agency operations*

Degree of influence for transportation planning agencies:

* **Small influence**

** **Greater influence**

Q&A: Adaptation & Resources



Thank you!

For more information:

www.nado.org

www.ampo.org

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