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Study Findings

Rail-Volution
October 30, 2009

presented by
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Transportation leadership you can trust.

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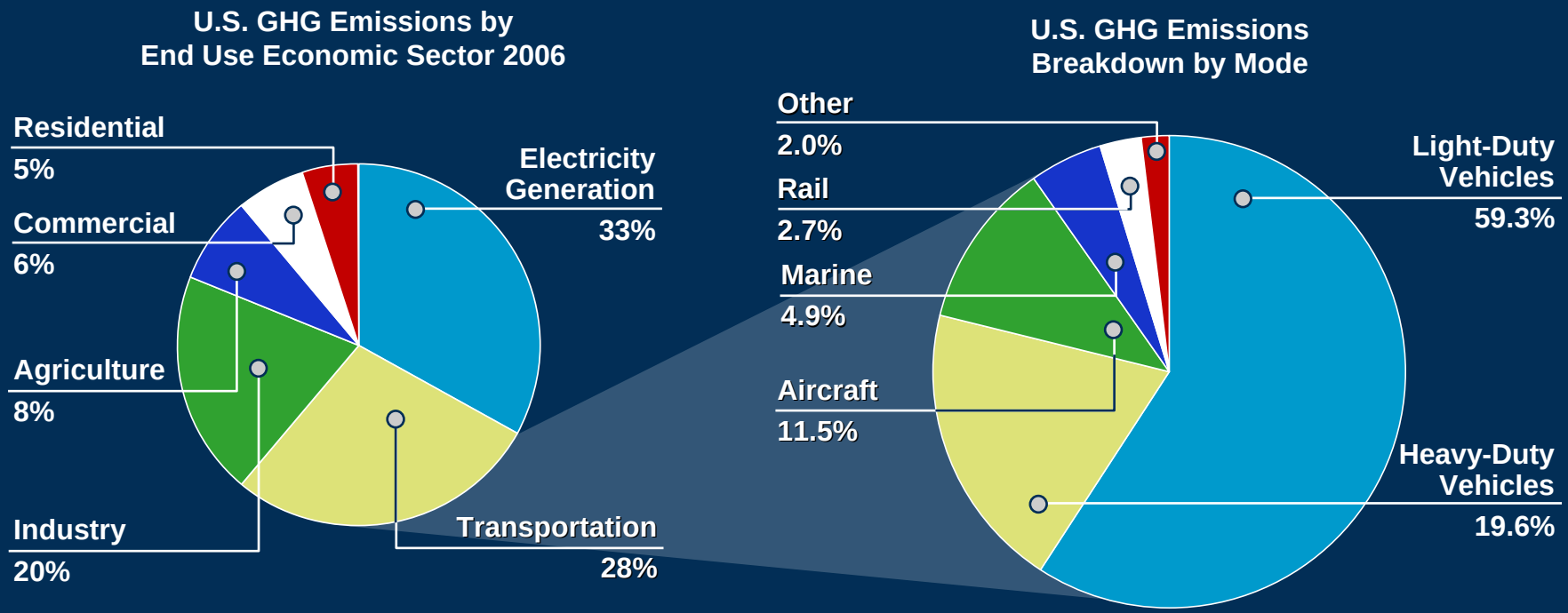
Transportation's Contribution to U.S. GHG



Source: Environmental Protection Agency (EPA). "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007," April 2009, http://epa.gov/climagechange/emissions/usinventory.html.

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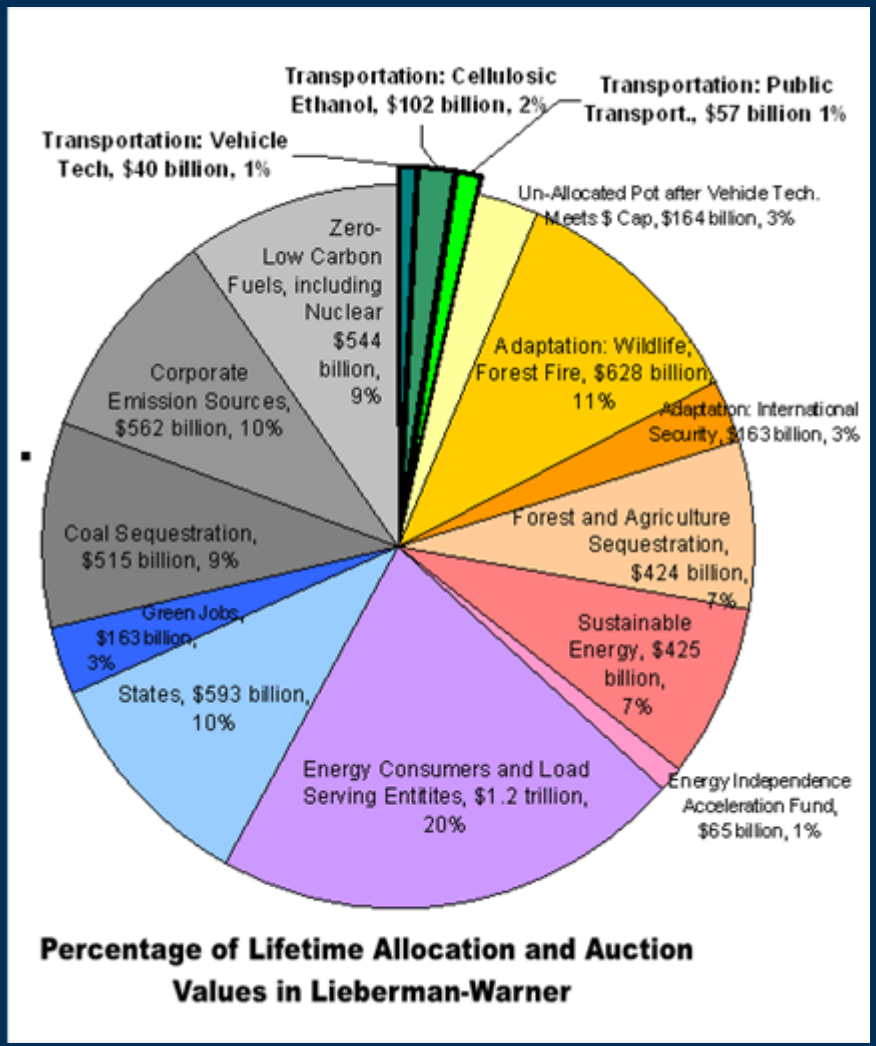
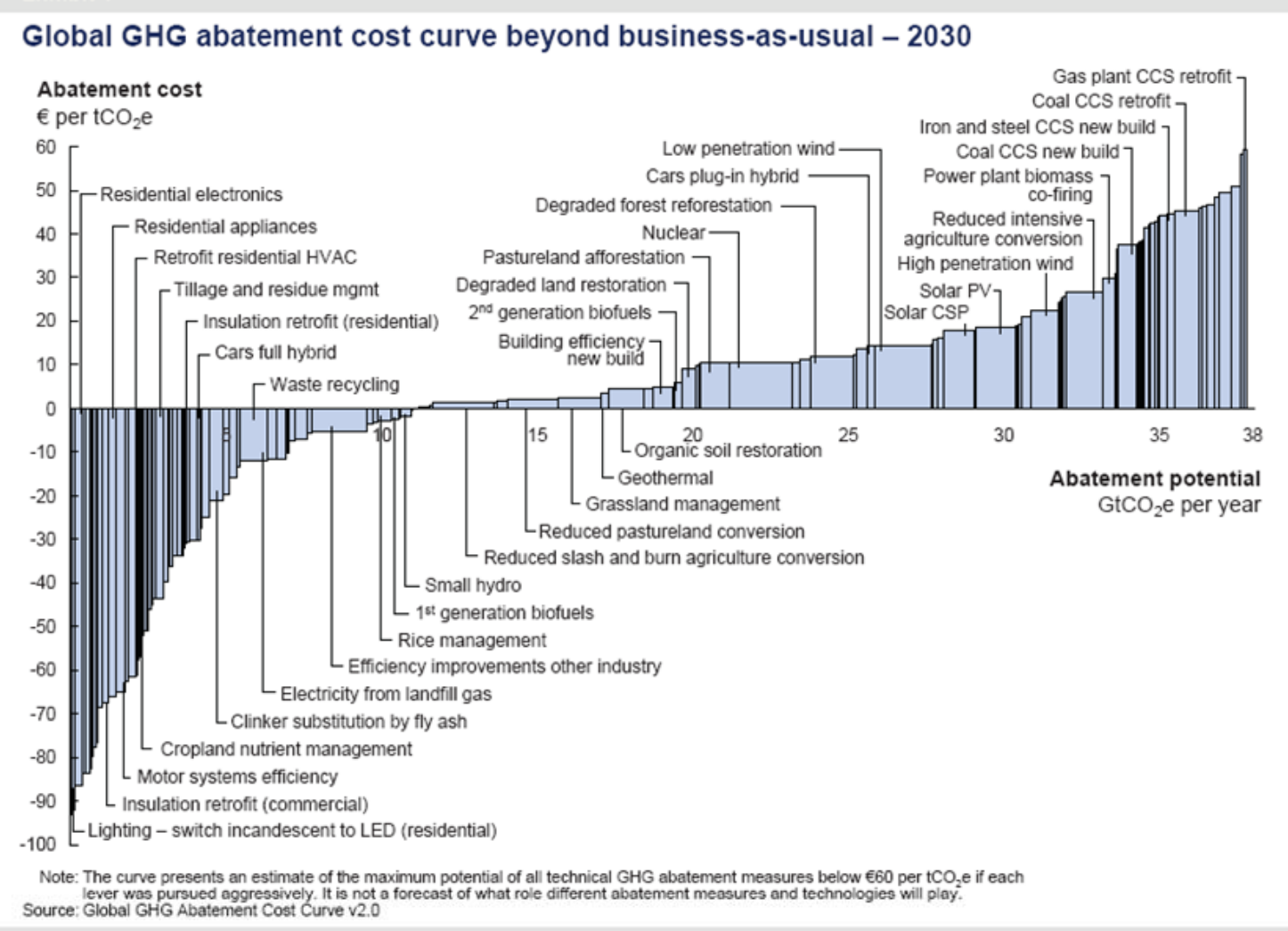
Policy Gap
Small Role for Transportation in Current Policy



Percentage of Lifetime Allocation and Auction Values in Lieberman-Warner

- America's Climate Security Act (2007)
- Climate MATTERS (2008)
- Investing in Climate Action and Protection (2008)
- Dingell-Boucher Energy & Commerce Discussion Draft (2008)
- America's Clean Energy and Security Act (2009)

Knowledge Gap
McKinsey – Pathway to a Low-Carbon Economy



Filling the Gap
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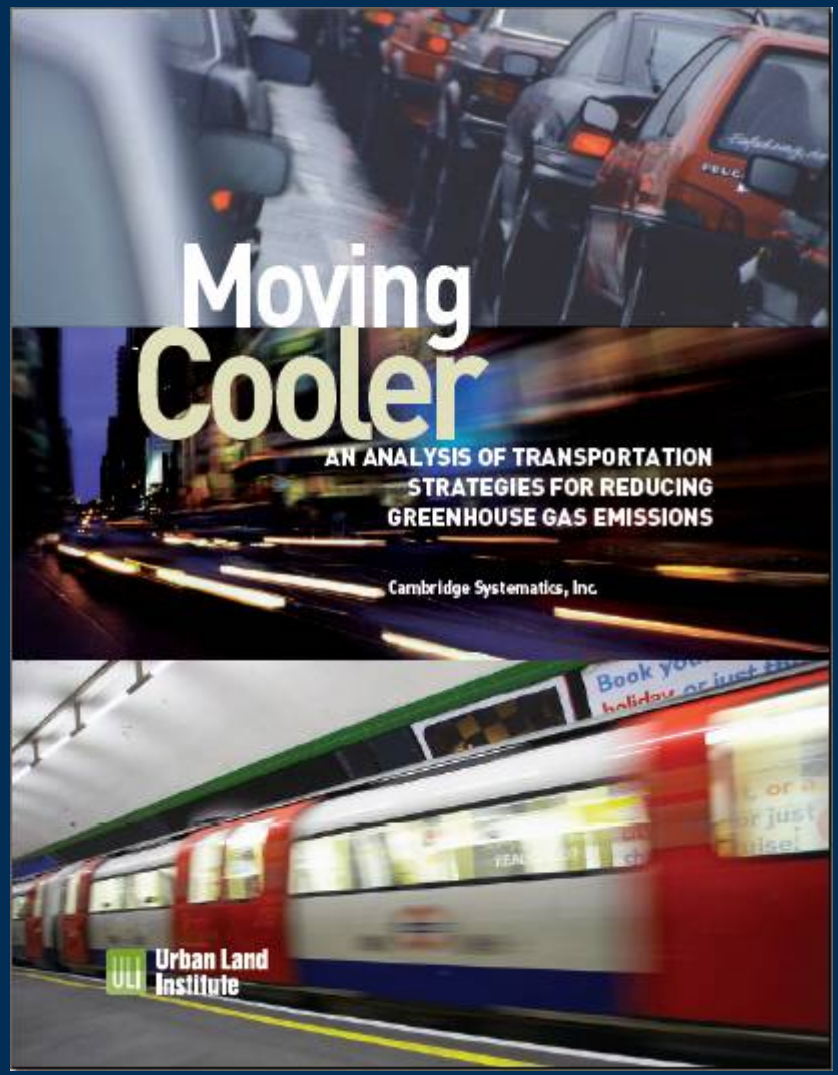

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- **Analytic Team – Cambridge Systematics**
- **Multiple Partners on Steering Committee**
  - U.S. Environmental Protection Agency
  - U.S. Federal Highway Administration
  - U.S. Federal Transit Administration
  - American Public Transportation Association
  - Environmental Defense
  - ITS America
  - Shell Oil
  - Natural Resources Defense Council
  - Kresge Foundation
  - Surdna Foundation
  - Rockefeller Brothers Fund
  - Rockefeller Foundation
  - Urban Land Institute

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Objectives

- **Examine the potential of travel efficiency strategies to reduce greenhouse gas (GHG) emissions**
  - **Consistent analysis across strategy types**
  - **Stand-alone strategies and synergies (bundles)**
- **Multiple parameters for analysis**
  - **Effectiveness in reducing GHG emissions**
  - **Cost of implementation**
  - **Externalities and co-benefits**
  - **Impacts on equity**

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Assumptions for Baseline

- **Travel continues to grow**
  - **Vehicle miles traveled (VMT) growth of 1.4% per year**
  - **Transit ridership growth 2.4%/year**
- **Fuel prices increase**
  - **1.2% per year, beginning at $3.70/gallon in 2009***
- **Fuel economy improves steadily**
  - **Light-duty vehicles at 1.91% annually, to ~75 mpg by 2050**
  - **Heavy duty at 0.61%**

*AEO high fuel price scenario

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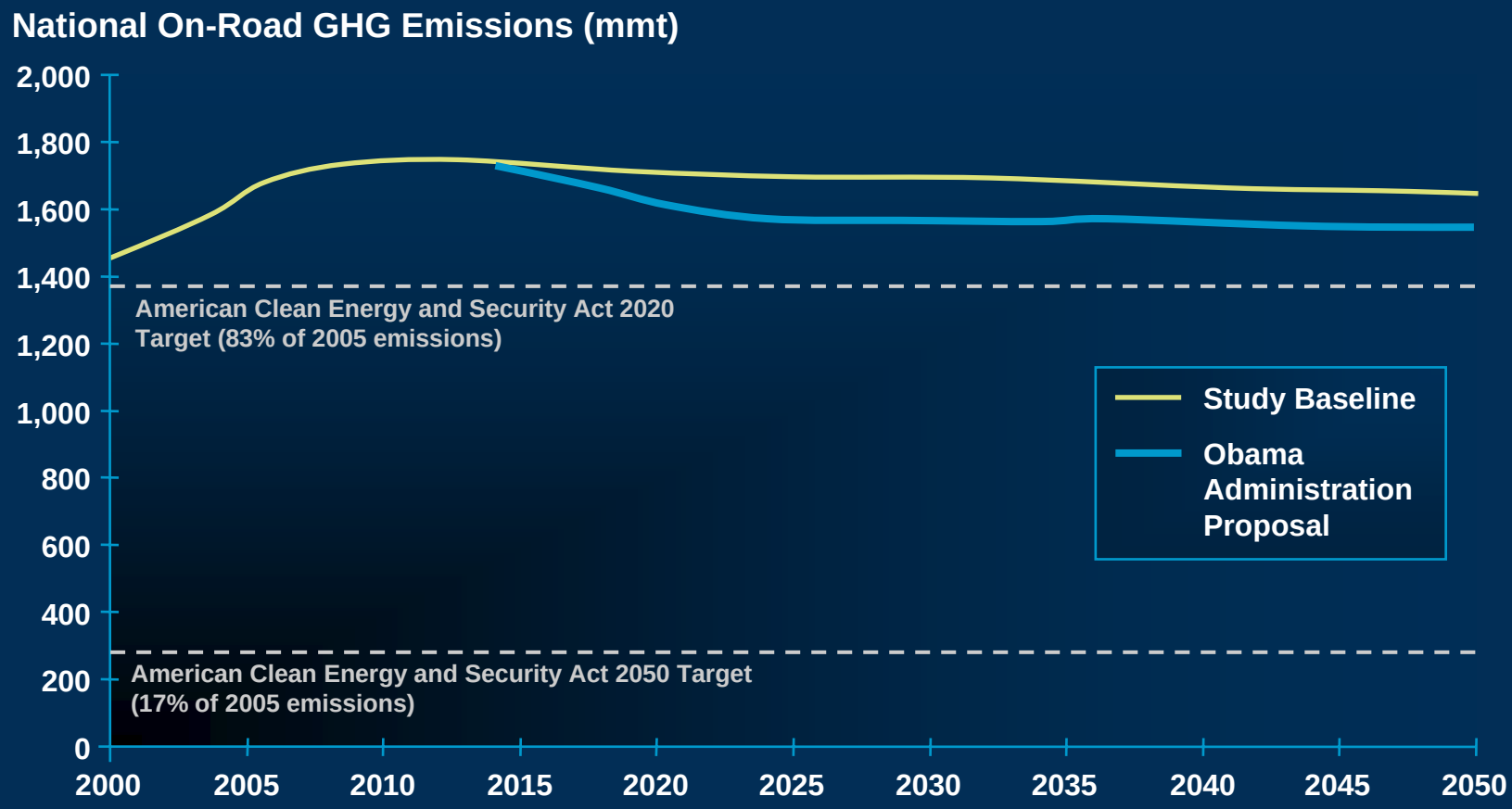
Moving Cooler Baseline to 2050



Note: This figure displays National On-Road GHG emissions as estimated in the Moving Cooler baseline, compared with GHG emission estimates based on President Obama's May 19, 2009, national fuel efficiency standard proposal of 35.5 mpg in 2016. Both emission forecasts assume an annual VMT growth rate of 1.4 percent. The American Clean Energy and Security Act (H.R. 2454) identifies GHG reduction targets in 2012, 2020, 2030, and 2050. The 2020 and 2050 targets applied to the on-road mobile transportation sector are shown here.

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Wide Range of Strategies Examined

- Pricing, tolls, PAYD insurance, VMT fees, carbon/fuel taxes
- Land use and smart growth
- Nonmotorized transportation
- Public transportation improvements
- Regional ride-sharing, commute measures
- Regulatory measures
- Operational/ITS strategies
- Highway capacity/ bottleneck relief
- Freight sector strategies

Strategy Bundles
Illustrative Analysis

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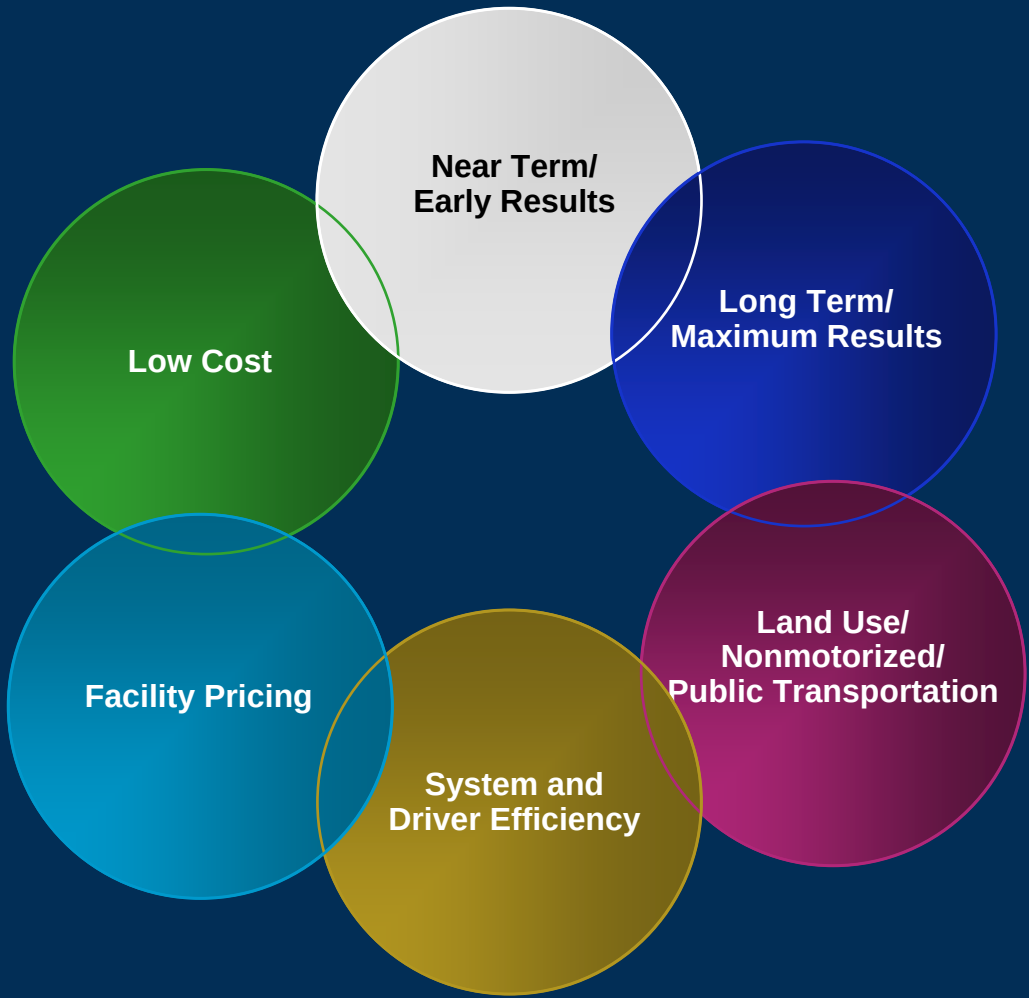

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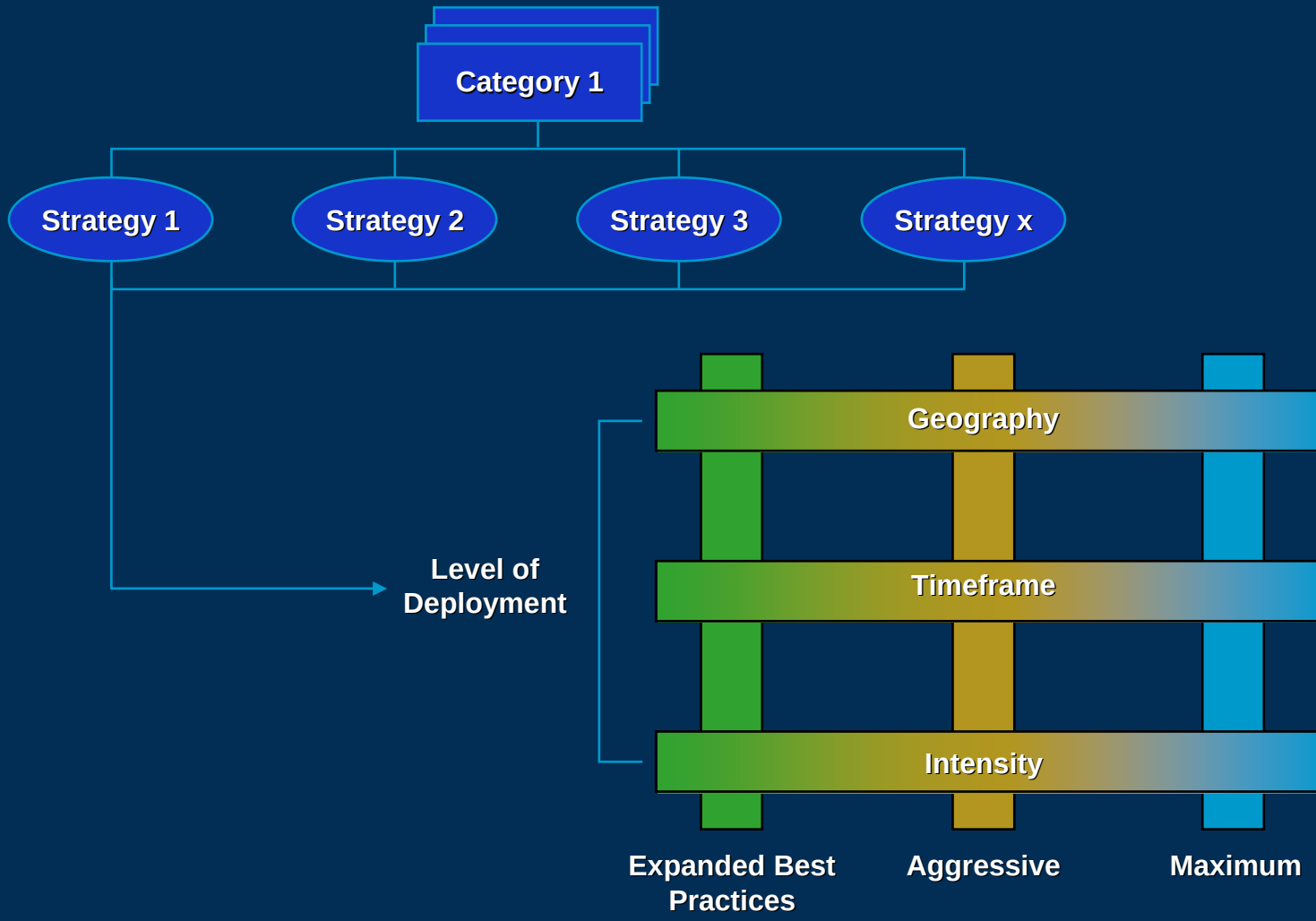
Deployment Levels



Evaluation of Implementation
Costs/GHG Reduction Effectiveness

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- Estimates direct implementation costs and GHG effectiveness
- *Not* a full cost-benefit analysis – therefore not a complete basis for decisions
  - GHG benefits only
  - Direct agency monetary implementation costs
  - Vehicle operating costs (savings) – fuel, ownership, maintenance, insurance
- Allows comparison to McKinsey Report findings on fuels and technology

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Range of Annual GHG Reductions of Six Strategy Bundles
(Aggressive and Maximum Deployment)

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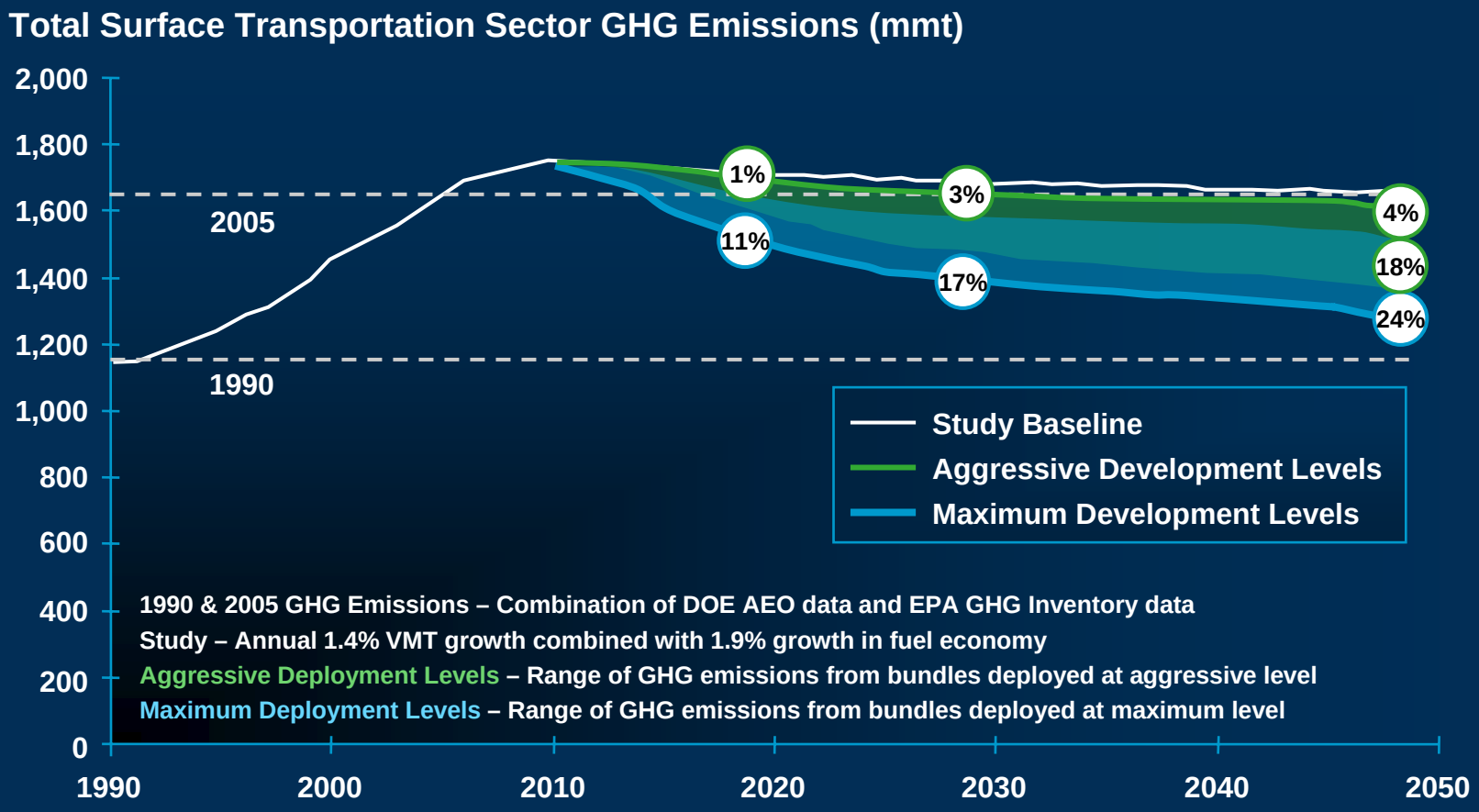

Note: This figure displays the GHG emission range across the six bundles for the aggressive and maximum deployment scenarios. The percent reductions are on an annual basis from the Study Baseline. The 1990 and 2005 baseline are included for reference.

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Direct Vehicle Costs and Costs of Implementing Strategy "Bundles"

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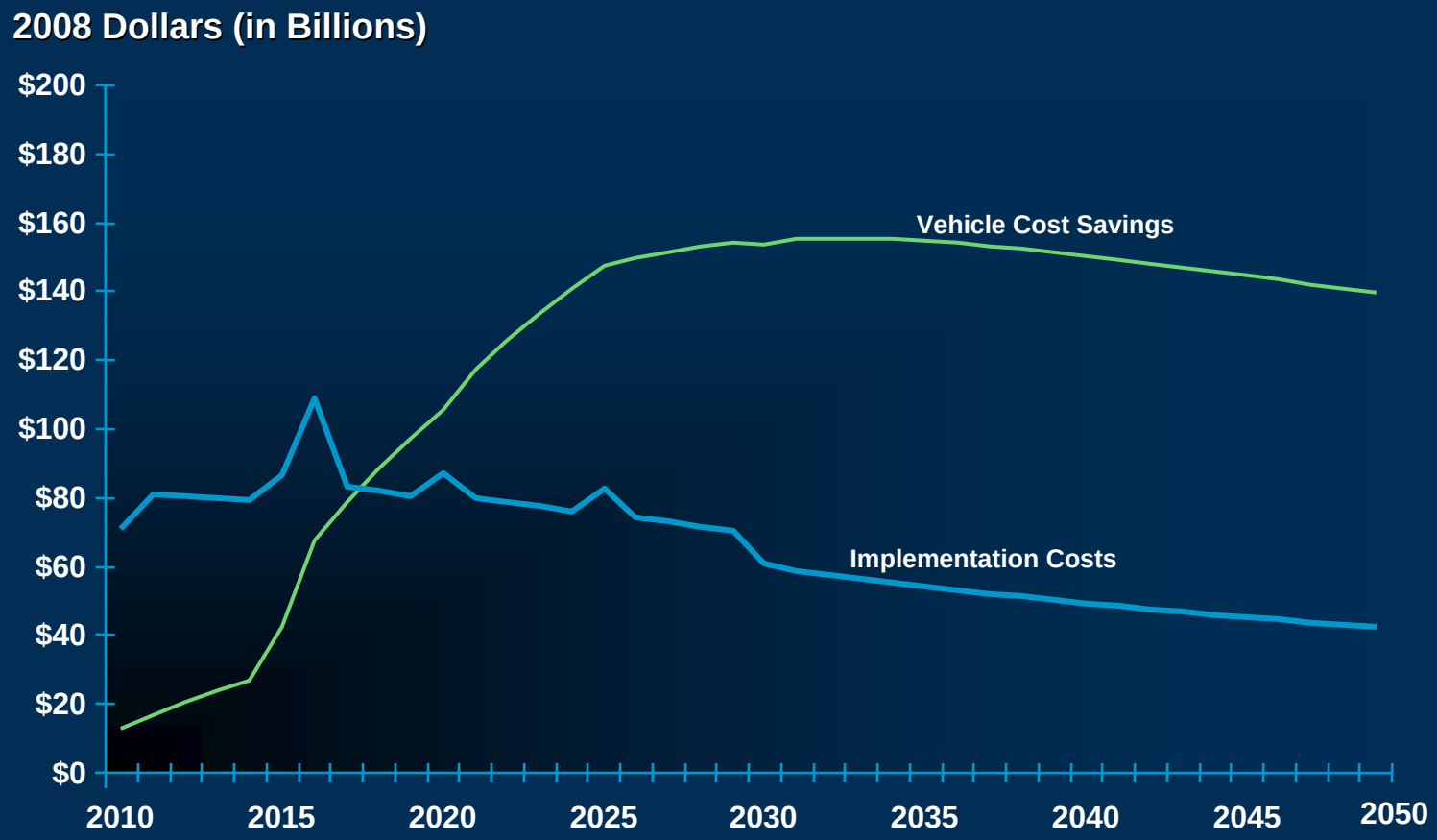

Note: This figure displays estimated annual implementation costs (capital, maintenance, operations, and administrative) and annual vehicle cost savings [reduction in the costs of owning and operating a vehicle from reduced vehicle-miles traveled (VMT) and delay. Vehicle cost savings DO NOT include other costs and benefits that could be experienced as a consequence of implementing each bundle, such as changes in travel time, safety, user fees, environmental quality, and public health.

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Summary of Bundle Results
2010 to 2050 – Aggressive Deployment

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	GHG Reduction (Gt)	Implementation Costs	Change in Vehicle Costs	Net Cost per Tonne
1. Near Term/ Early Results	7.1	$676	-$3,211	-$356
2. Long Term/ Maximum Results	7.6	$2,611	-$4,846	-$293
3. Land Use/Transit/ Nonmotorized Transportation	3.8	$1,439	-$3,270	-$484
4. System and Driver Efficiency	5.0	$1,870	-$2,214	-$69
5. Facility Pricing	1.4	$2,371	-$1,121	$891
6. Low Cost	7.5	$599	-$3,499	-$387

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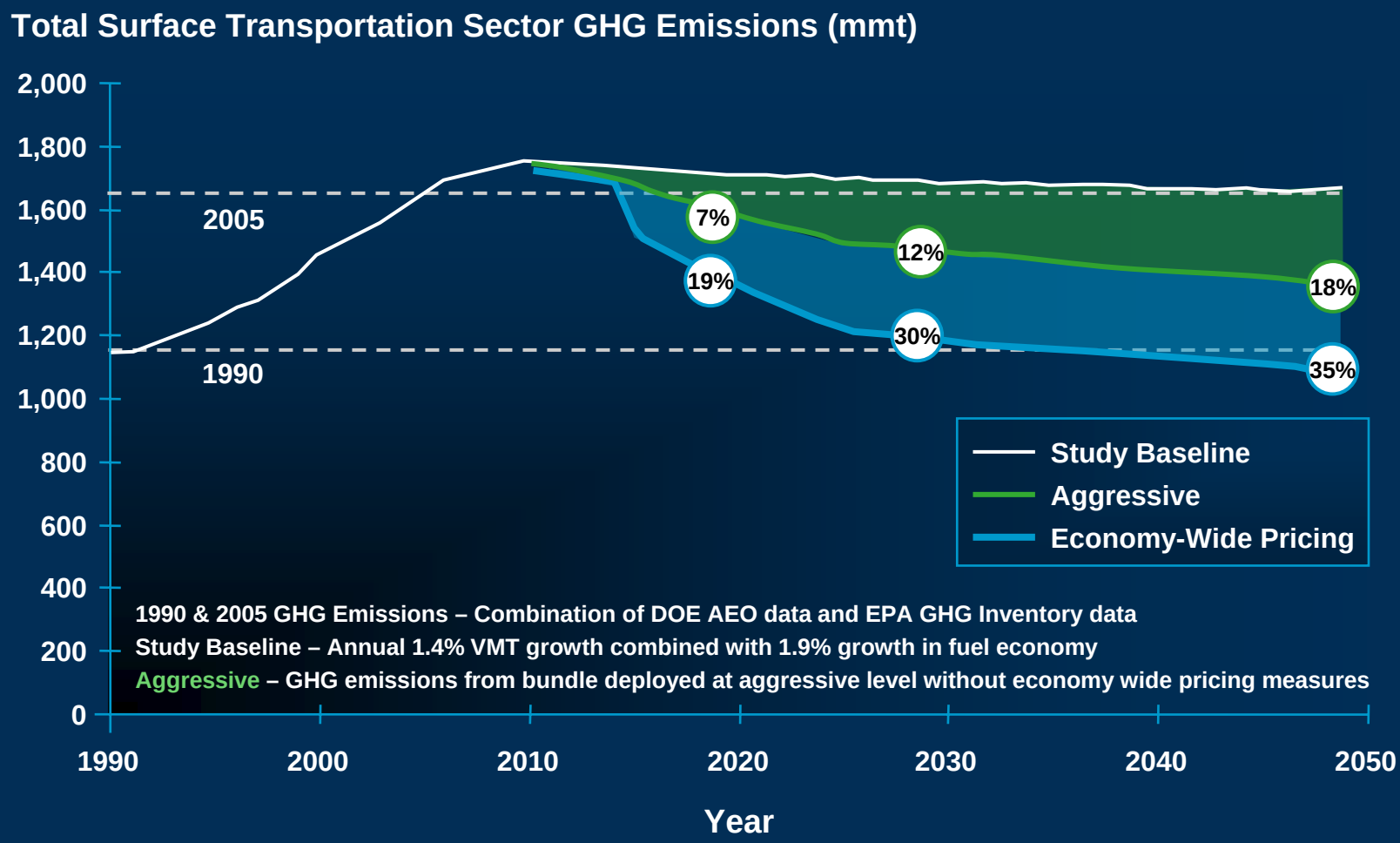
Economy-Wide Pricing

- Mechanisms – Carbon pricing, VMT fee, and/or Pay As You Drive (PAYD) insurance
- Strong economy-wide pricing measures added to "bundles" achieve additional GHG reductions
  - Aggressive deployment – additional fee (in current dollars) starting at the equivalent of $0.60 per gallon in 2015 and increasing to $1.25 per gallon in 2050 could result in an additional 17% reduction in GHG emissions in 2050
- Two factors would drive this increased reduction
  1. Reduction in VMT
  2. More rapid technology advances

Economy-Wide Pricing (continued)



Gallons of Fuel Saved at Aggressive Deployment

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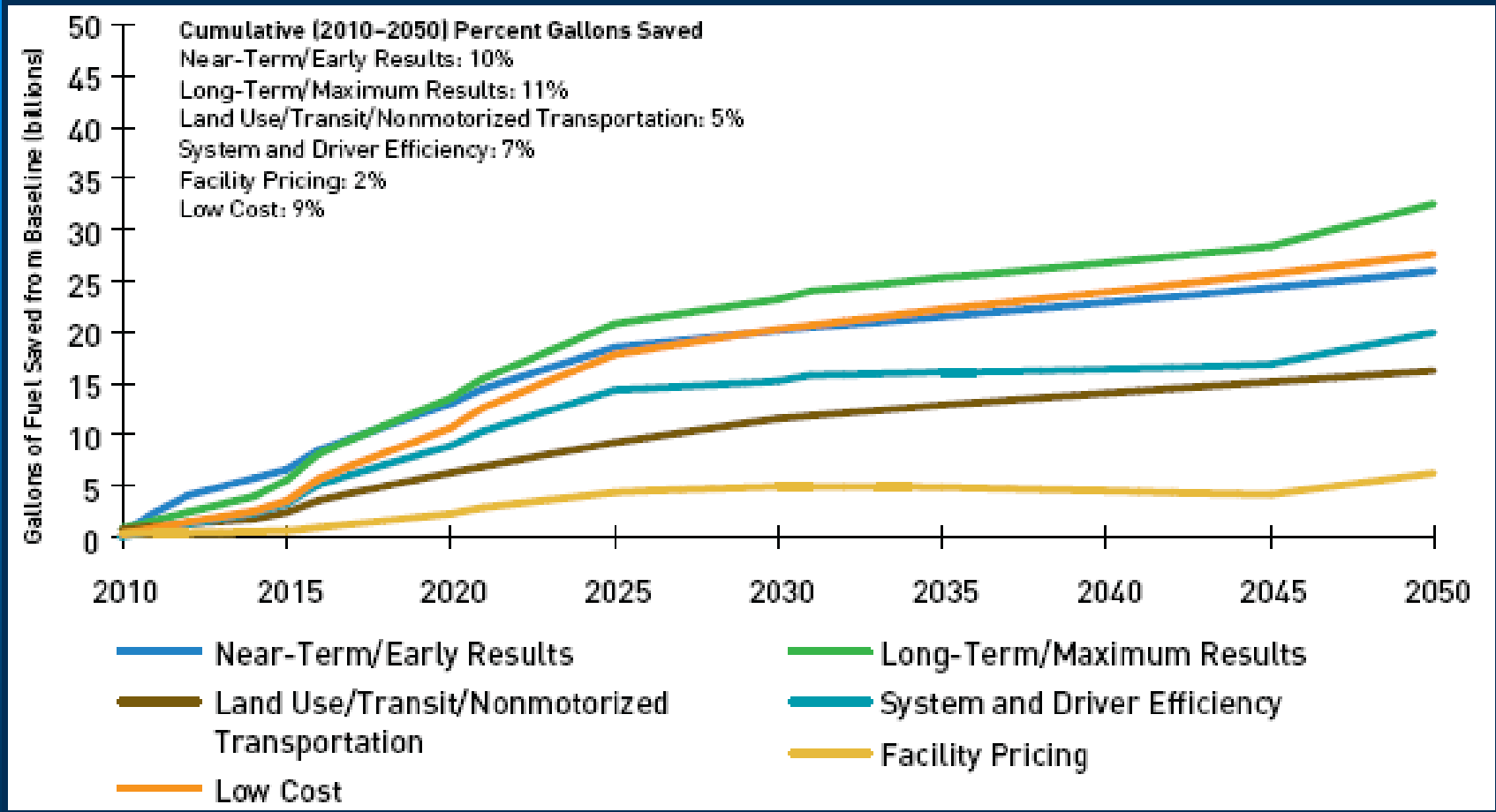

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Near-Term and Long-Range Strategies

- **Some strategies are effective in achieving near-term reductions, reducing the cumulative GHG challenge in later years**
  - **Near-term strategies include – speed limits, congestion pricing, eco-driving, expanded transit service**
- **Investments in land use and improved travel options involved longer timeframes but would have enduring benefits**
  - **Substantial investments and policy changes required**

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Implications of Report Findings

- Net costs per ton positive – transportation savings outweigh implementation costs
- Implementation costs are significant – funding needed for transportation strategies, not just planning
- System approach most effective – synergies of transit, land use, parking, pricing, etc.
- Both national level and state/regional/local strategies are important
- Strategies contribute to other social, economic, and environmental goals while reducing GHGs

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Land Use/Transit/Nonmotorized Bundle

- Urban transit
  - Fare reduction
  - Increased transit service
  - Urban transit expansion
- Land use
- Pedestrian/bicycle
- Parking pricing/parking restrictions
- Congestion pricing
- High-speed rail/intercity passenger rail expansion
- HOV expansion
- Car sharing
- Signal enhancement
- Traveler information
- Urban consolidation centers (freight)

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Public Transportation
Key Assumptions

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- Fare measures – 25-50% decrease
- LOS improvements – signal prioritization, limited-stop service, and other enhancements improve travel speeds by 10-30%
- Increased service levels and fixed guideway expansion at rate of 2.4-4.7% annually
- Load factors increase from 10.5 passengers per bus in 2006 to 12 in 2030
  - Investments assumed to be targeted in areas of high population density/ridership potential

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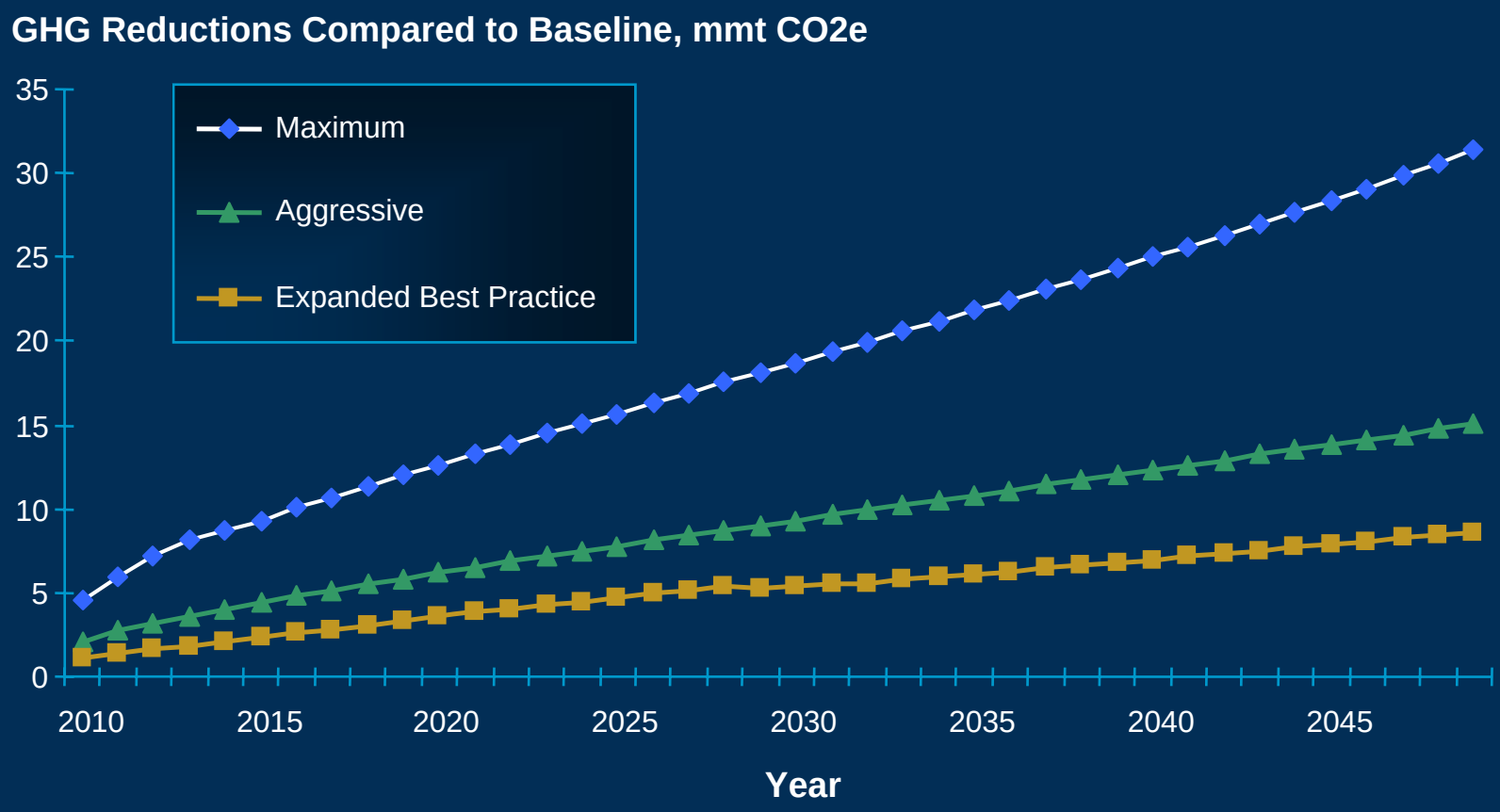
Total Additional GHG Reductions from Transit



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Land Use
Key Assumptions

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- 43-90% of new urban development occurs in “compact neighborhoods”
  - >4,000 persons per square mile
  - Walkable, mixed-use neighborhood centers
- VMT/capita 35% lower in compact versus “sprawl” neighborhoods; 60% lower for highest-density versus lowest-density census tracts
- Turnover rates – residential 6%/decade, commercial 20%/decade

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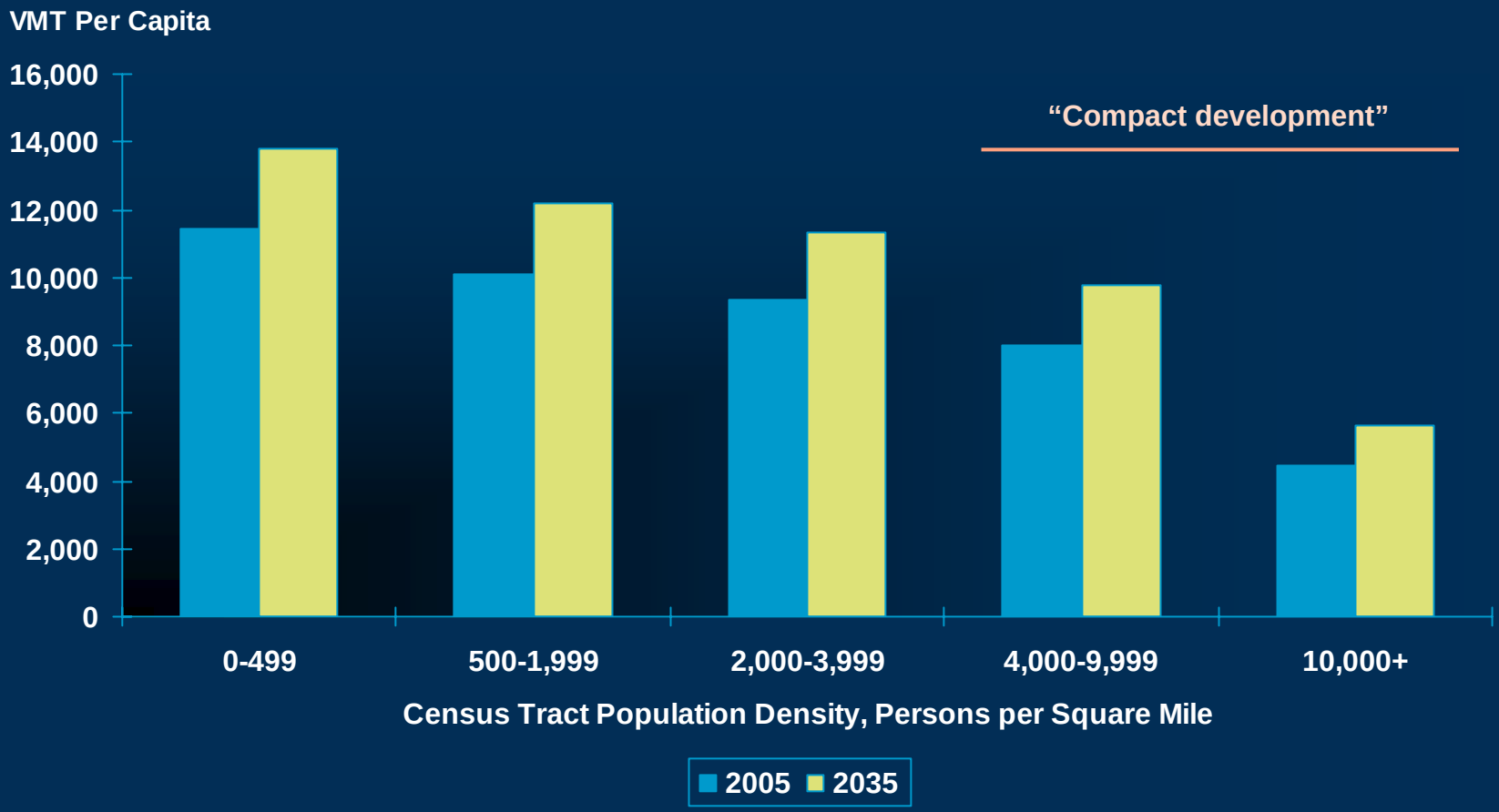
VMT Per Capita by Population Density



Source: S. Polzin, et al. VMT forecasting model, Center for Urban Transportation Research at University of South Florida, based on 2001 National Household Travel Survey & 2000 Census.

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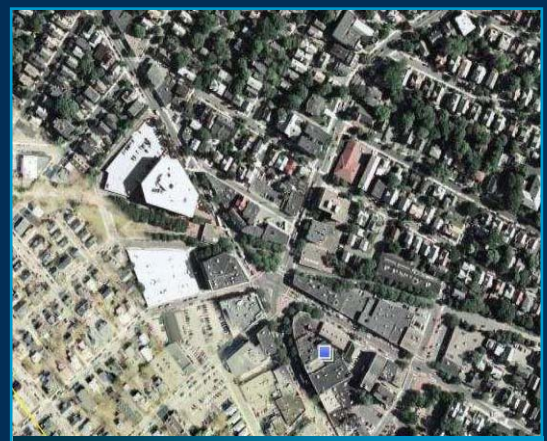
Tract Density Ranges

Concord, MA:
500-2,000 ppsm

Lexington, MA:
2,000-4,000 ppsm

Watertown, MA:
4,000-10,000 ppsm



Somerville, MA:
>10,000 ppsm

Image source: TeleAtlas and Google Earth.

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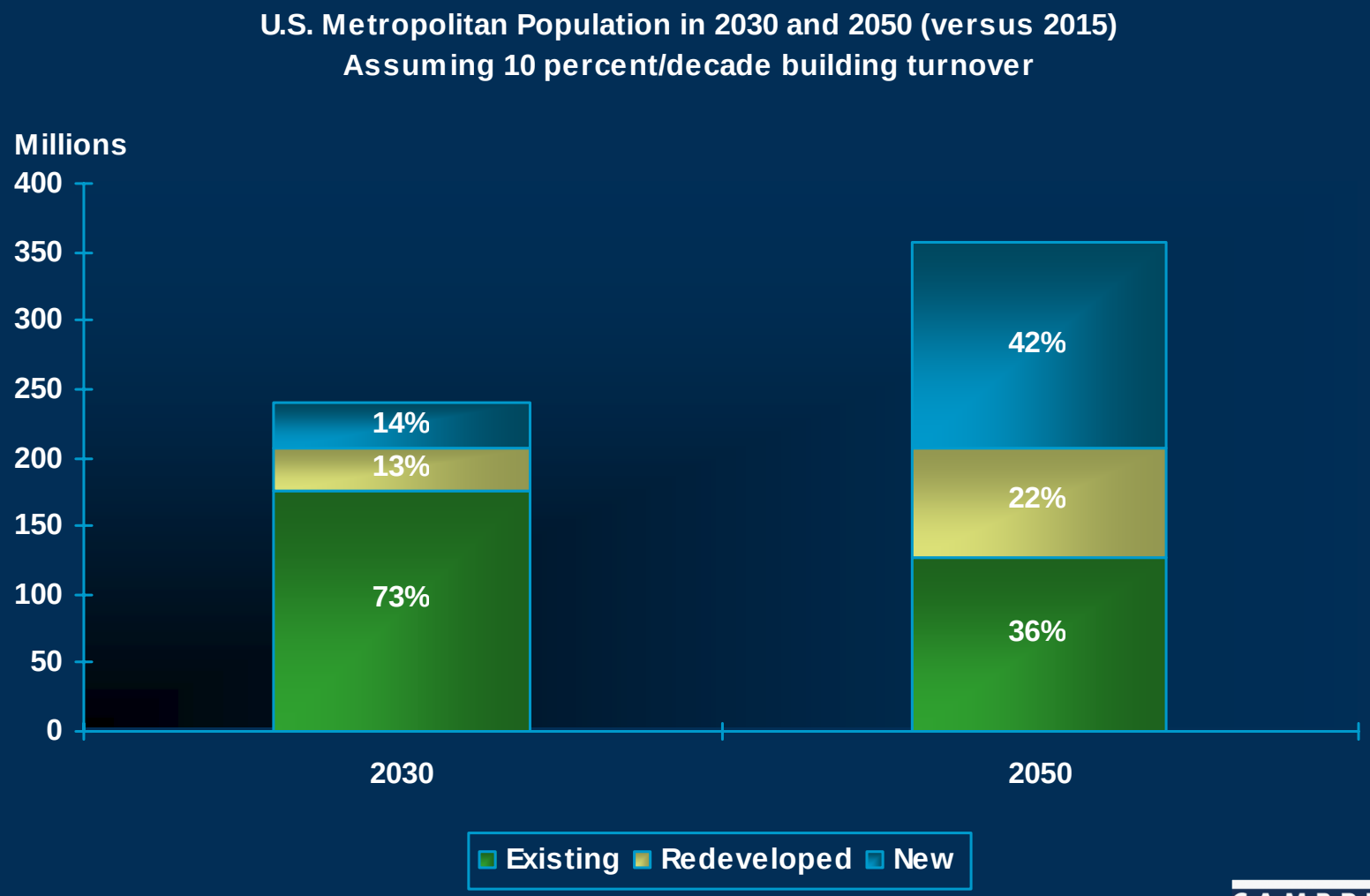
Total "New" and "Redeveloped" Population



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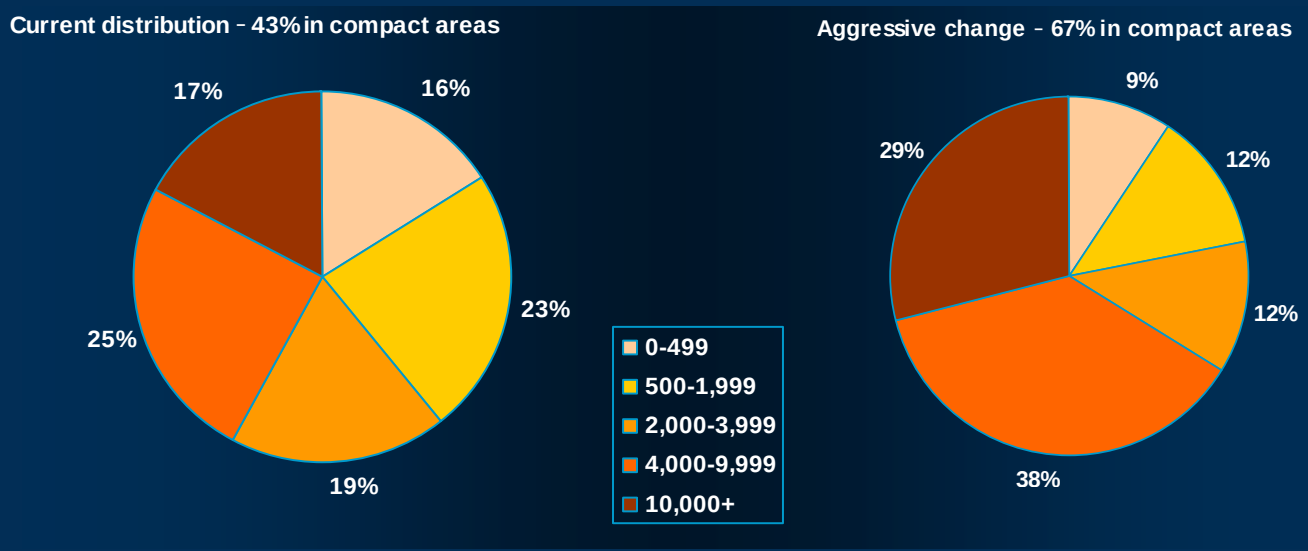
Land Use Results

- VMT reduction (urban light-duty VMT)

	Percent of New Development in "Compact" Neighborhoods	VMT Reduction	
		2030	2050
Incremental	43%	0.5%	6.2%
Aggressive	90%	1.7%	12.6%

- Total U.S. metro population by density (2050)



For More Information…

www.movingcooler.info

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