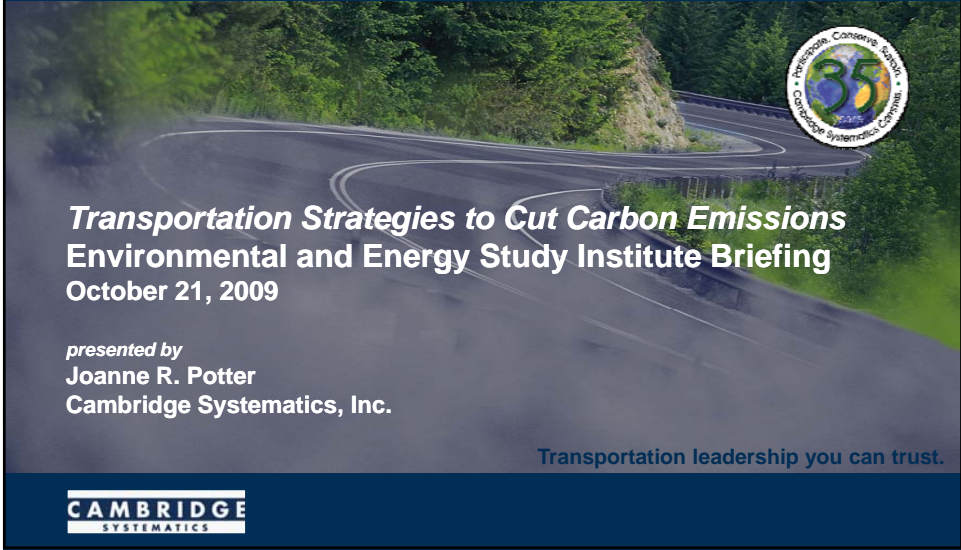


Moving Cooler Study Findings

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Transportation Strategies to Cut Carbon Emissions
Environmental and Energy Study Institute Briefing
 October 21, 2009

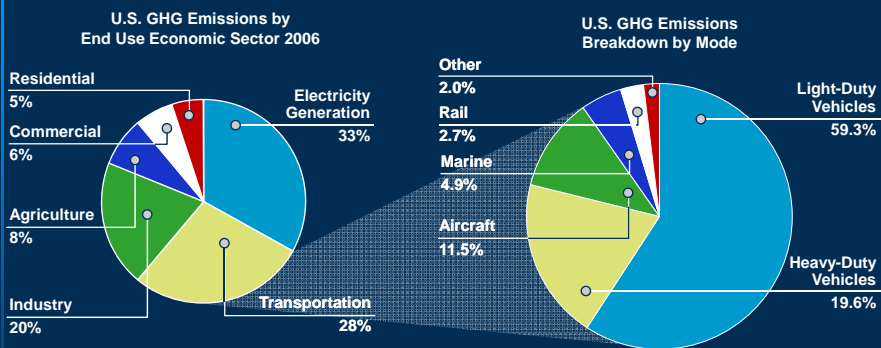
presented by
Joanne R. Potter
 Cambridge Systematics, Inc.

Transportation leadership you can trust.



Transportation's Contribution to U.S. GHGs

Moving Cooler



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



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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

- **Fill a gap left by McKinsey and others who analyzed future technologies and fuels but not travel behavior**
- **Goal of consistent analysis across strategy types**
- **Multiple parameters**
 - Effectiveness in reducing GHGs
 - Cost
 - Externalities/co-benefits
 - Equity

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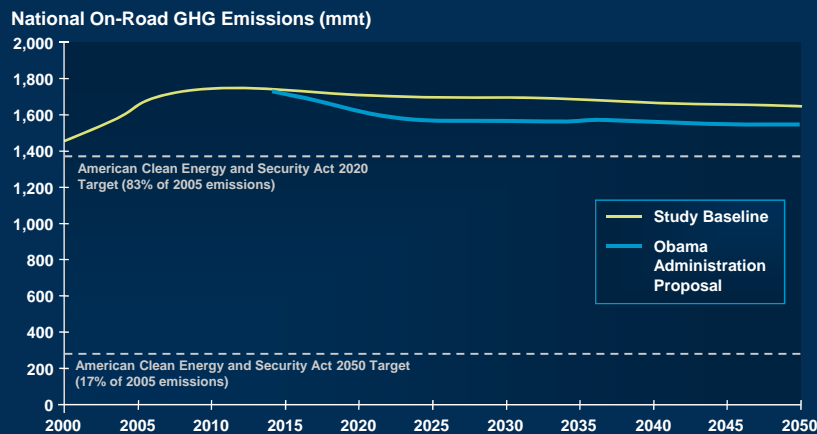
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Assumptions for Baseline

- Travel continues to grow
 - 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
 - Heavy duty at 0.61%

*AEO high fuel price scenario

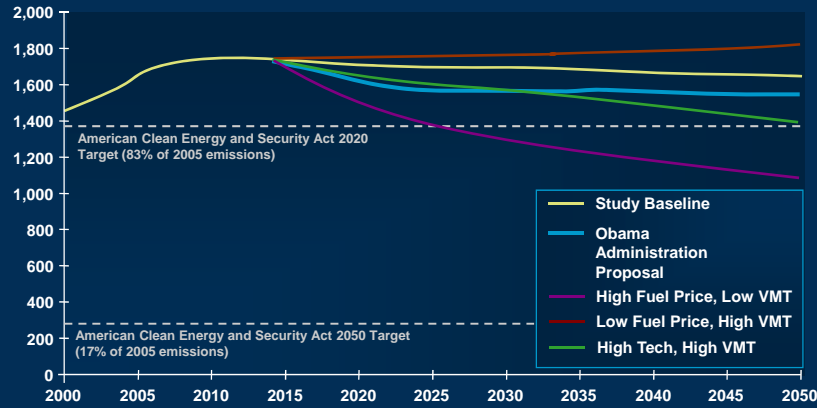
Moving Cooler Baseline to 2050



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.

Moving Cooler Sensitivity Tests to 2050

National On-Road GHG Emissions (mmt)



- ❖ High Fuel Price/Low VMT: Fuel prices increase dramatically, resulting in lower VMT and improved vehicle technology.
- ❖ Low Fuel Price/High VMT: Lower fuel prices drive higher VMT growth and less investment in improved technology.
- ❖ High Technology/High VMT: Technology progresses rapidly, leading to decreased driving cost and higher VMT.

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Wide Range of Strategies Examined

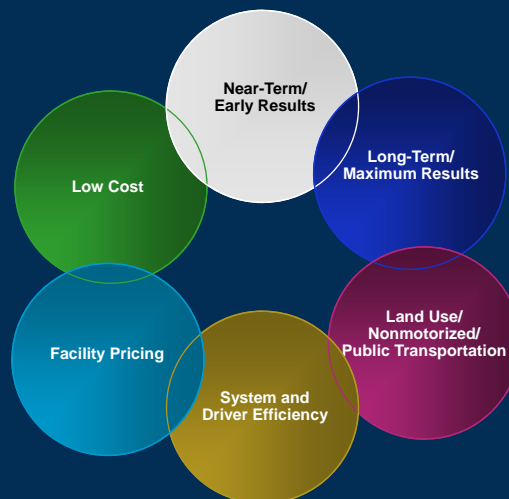
- Pricing, tolls, PAYD insurance, VMT fees, carbon/fuel taxes
- Land use and smart growth
- Nonmotorized transportation
- Public transportation improvements
- Regional ride-sharing, commute measures
- Regulatory measures
- Operational/ITS strategies
- Capacity/bottleneck relief
- Freight sector strategies

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Analytic Approach

1. Estimate the GHG reduction of each individual strategy (change in fuel consumption)
 - Cumulative reduction through 2030 and through 2050
 - Annual reductions in critical target years
 - 3 levels of intensity of implementation
2. “Bundle” the strategies and examine the combined impacts
 - Effectiveness
 - Interactions, synergies, antagonistic effects
 - Cost
 - Other societal impacts / co-benefits / externalities
 - Equity effects

Strategy Bundles Illustrative Analysis



Findings: Individual Strategies

- **Individual strategies achieve varying levels of GHG reductions, ranging from <0.5% to over 4.0% cumulatively to 2050**
- **Examples:**
 - Speed limit reductions, eco-driving
 - PAYD insurance, VMT fees
 - Operational and ITS improvements

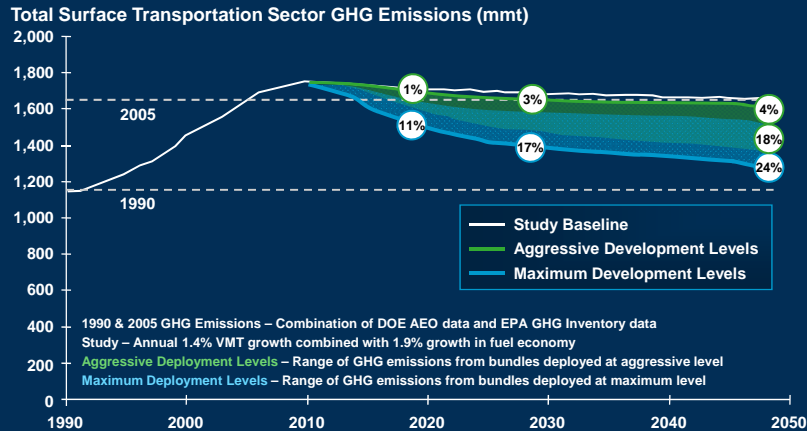
Findings: “Bundles”

- **Combinations of transportation strategies can achieve GHG reductions from transportation**
 - Less than 4% to 16% annual GHG reductions from baseline* in 2050 (aggressive deployment) (without economy-wide pricing)
 - Up to 24% annual GHG reductions from baseline* in 2050 (maximum deployment)
- **These strategies complement the important reductions anticipated from fuel and technology advancements**

* Projections for on-road surface transportation GHG emissions

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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Economy-Wide Pricing

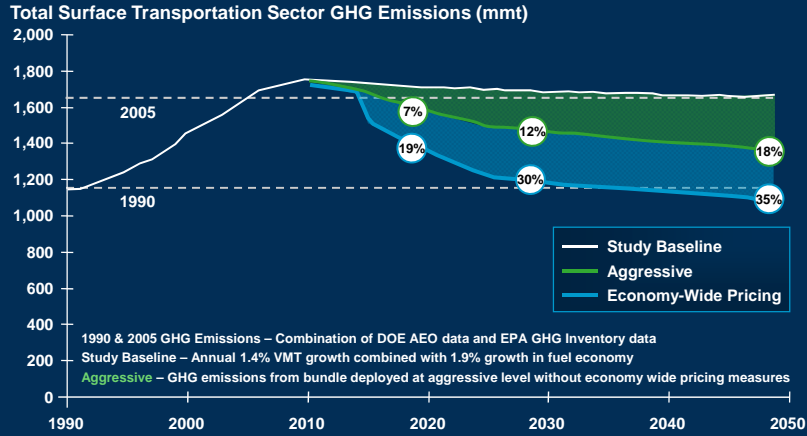
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- **Mechanisms: Carbon pricing, VMT fee, and/or Pay As You Drive (PAYD) insurance**
- **Strong economy-wide pricing measures added to “bundles” achieve additional GHG reductions**
 - Aggressive deployment: additional fee (in current dollars) starting 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 vehicle-miles traveled (VMT)
 2. More rapid technology advances

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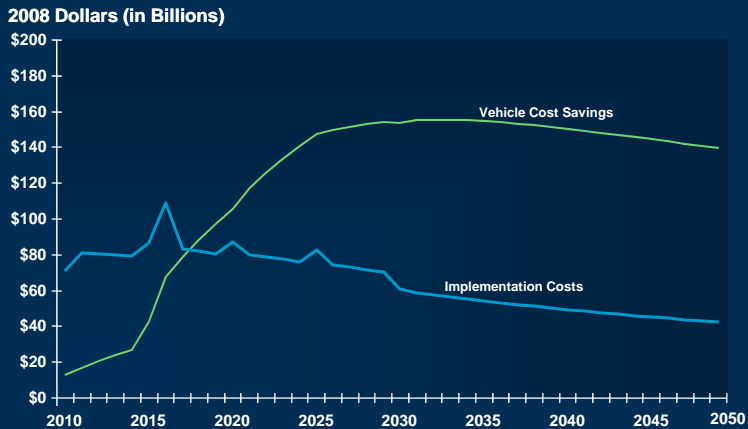
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Economy-Wide Pricing



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Direct Vehicle Costs and Costs of Implementing Strategy “Bundles”



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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Near-Term and Long-Range Strategies

- Some strategies are effective in achieving **near-term** reductions, reducing the cumulative GHG challenge in later years
- Investments in land use and improved travel options involved **longer timeframes** but would have enduring benefits

Other Societal Goals

- Many strategies contribute to other social, economic and environmental goals while reducing GHGs
- Some strategies have significant equity implications that should be examined and addressed
- Both national level and state/regional/local strategies are important

For More Information...

- <http://movingcooler.info>
- <http://www.uli.org/Books>
- jpotter@camsys.com