TELVENT

Smart Information for a Sustainable World

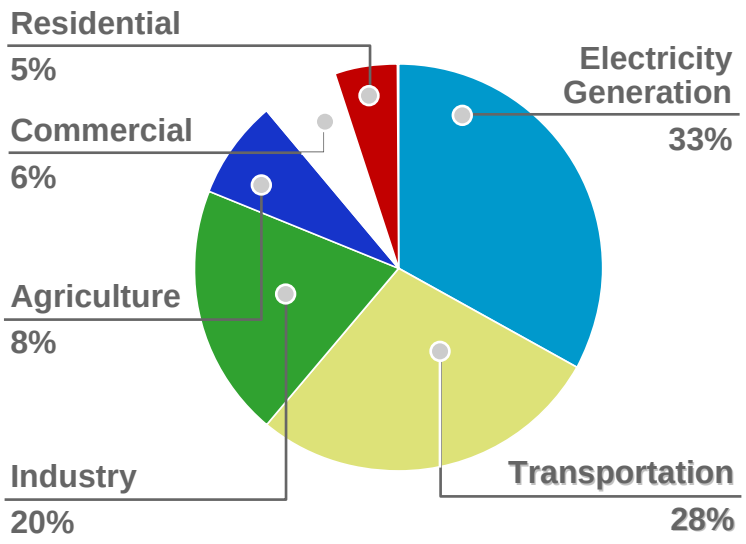
Environmental Challenges Facing the ITS Community

Larry Yermack
President, Telvent Transportation North America
Chair, ITS America Environmental Task Force

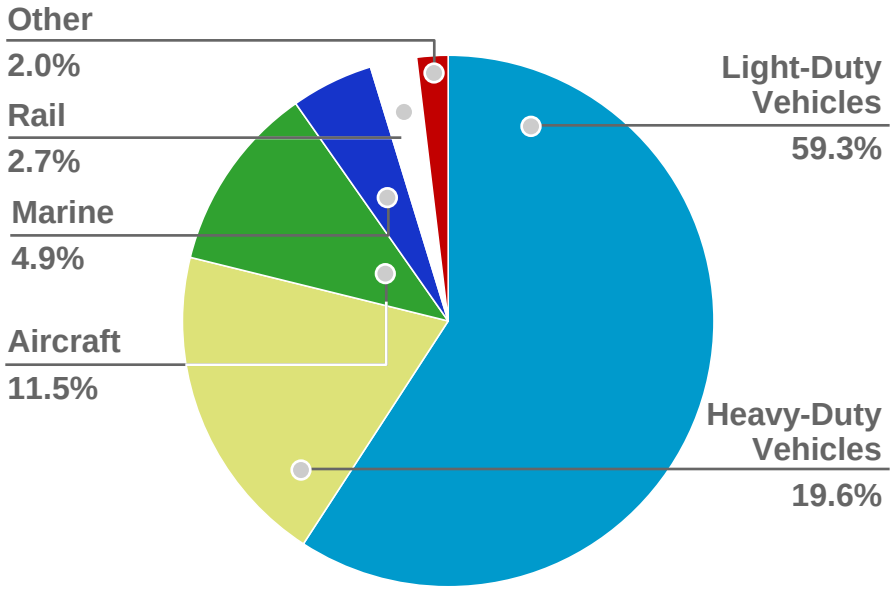
AL GORE

Do I need to say anything else?

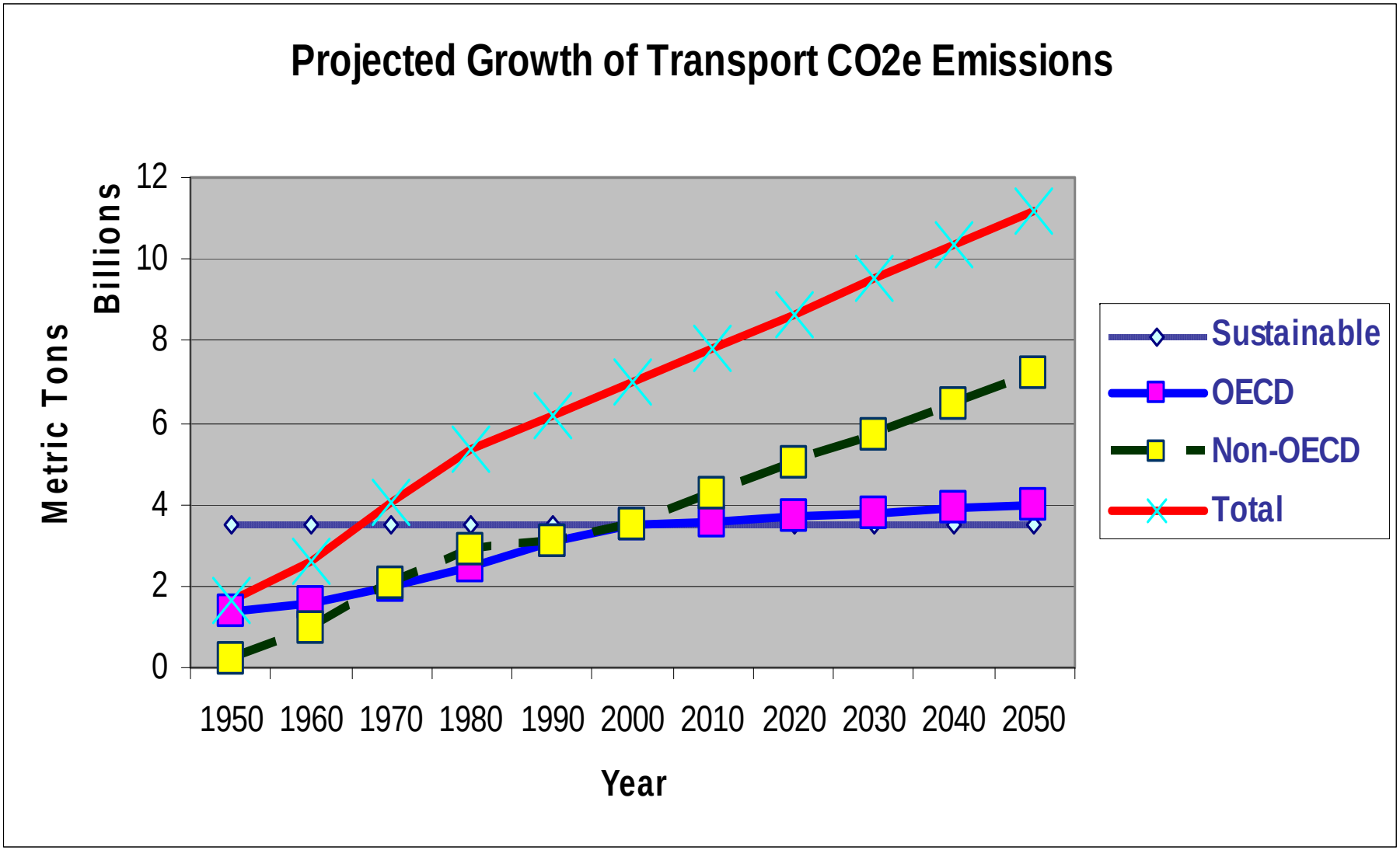
U.S. GHG Emissions by End Use Economic Sector 2006



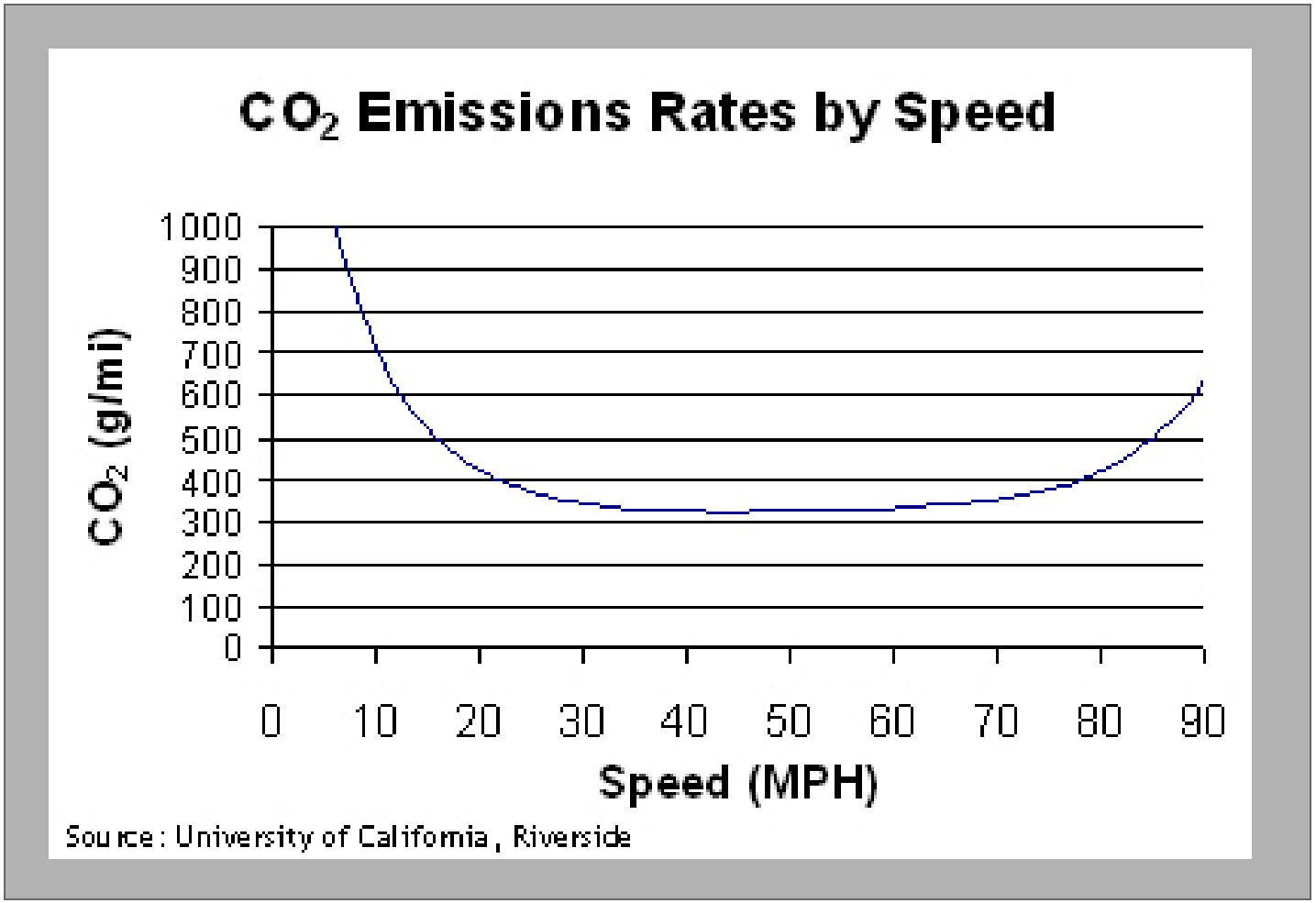
U.S. GHG Emissions Breakdown by Mode



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.


Projected Growth of Transport CO2e Emissions
Metric Tons
Billions
12
10
8
6
4
2
0
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
Year
Sustainable
OECD
Non-OECD
Total

GHG Emissions



Sustainable Transportation as defined by ITSA

"Sustainable transportation" can be defined as meeting, and sometimes re-defining, the mobility needs of the present without compromising the ability of future generations to meet their needs.

The Four Legged Stool of Sustainable Transportation

- Technology
  - CAFE Standard and Beyond
- Fuels
  - Bio Ethanol
  - Plug in Electrics
  - Hydrogen
  - Compressed Air
- Travel Activity
- Vehicle/Systems Operations
  - Intelligent Transportation Systems

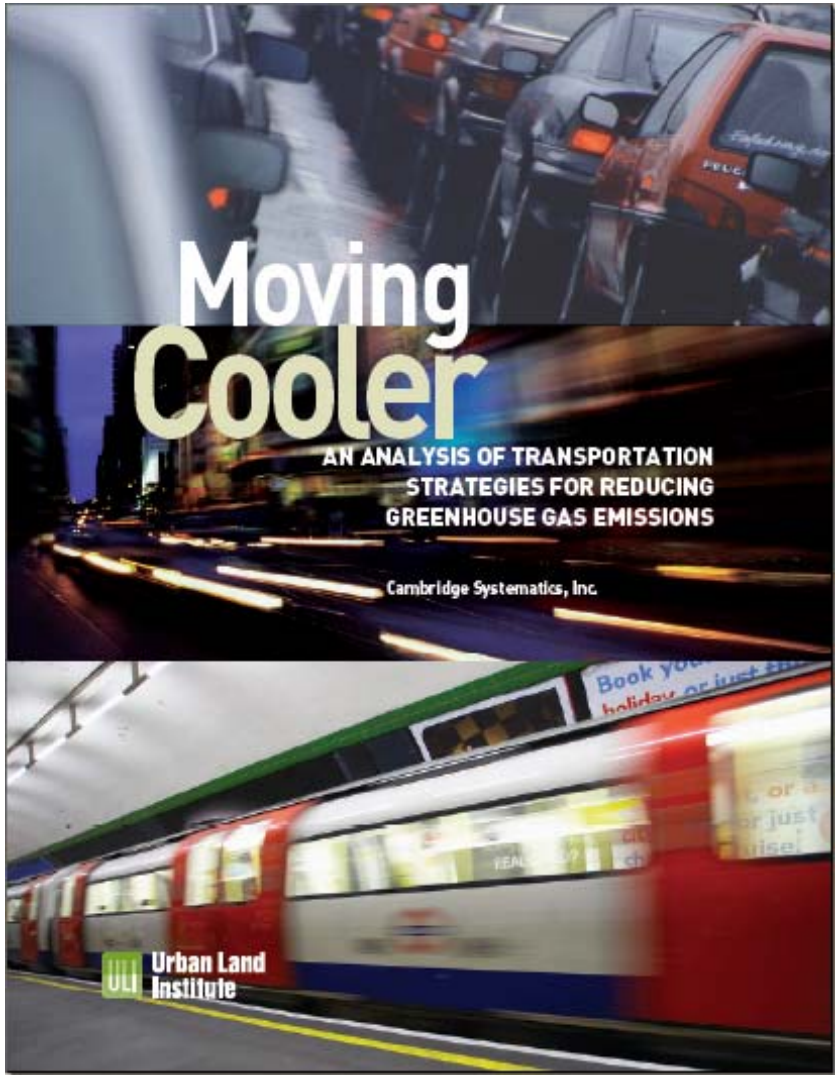
Transportation Technology 1

- Traffic Signal Synchronization
  - Adjust the timing of traffic signals
- Transit Signal Priority
  - Transit vehicle to get extra green time
- Traffic Management Centers
  - Synthesize data and dispatch emergency vehicles
- Electronic Toll Collection
  - To include ORT
- iPark
  - Real time information and reservations
- Speed Management
  - Help enforce speed laws

Transportation Technology 2

- Road Weather Information
  - Remote weather and surface conditions
- Demand Responsive Transit Service
  - Dispatch small transit vehicles
- 511 Traveler Information
  - Telephone traveler information
- Dynamic Route Guidance
  - In-vehicle using GPS and map databases
- Fleet and Freight Administration
  - Bypass truck weigh stations
- Crash Avoidance
  - Intersection collision avoidance
- Historical Traffic Data
  - Aggregated data for planners

Data Driven Process: Moving Cooler



The Team

- 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
  - ITS America
  - Shell Oil
  - Natural Resources Defense Council
  - Kresge Foundation
  - Surdna Foundation
  - Rockefeller Brothers Fund
  - Rockefeller Foundation
  - Urban Land Institute

Moving Cooler

ITS America Participation

- First Real Data for Data Driven Process
- Can Demonstrate not just Assert
- ITS Community support for Environmental Community

Objectives

- Examine the potential of travel efficiency strategies to reduce 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

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**

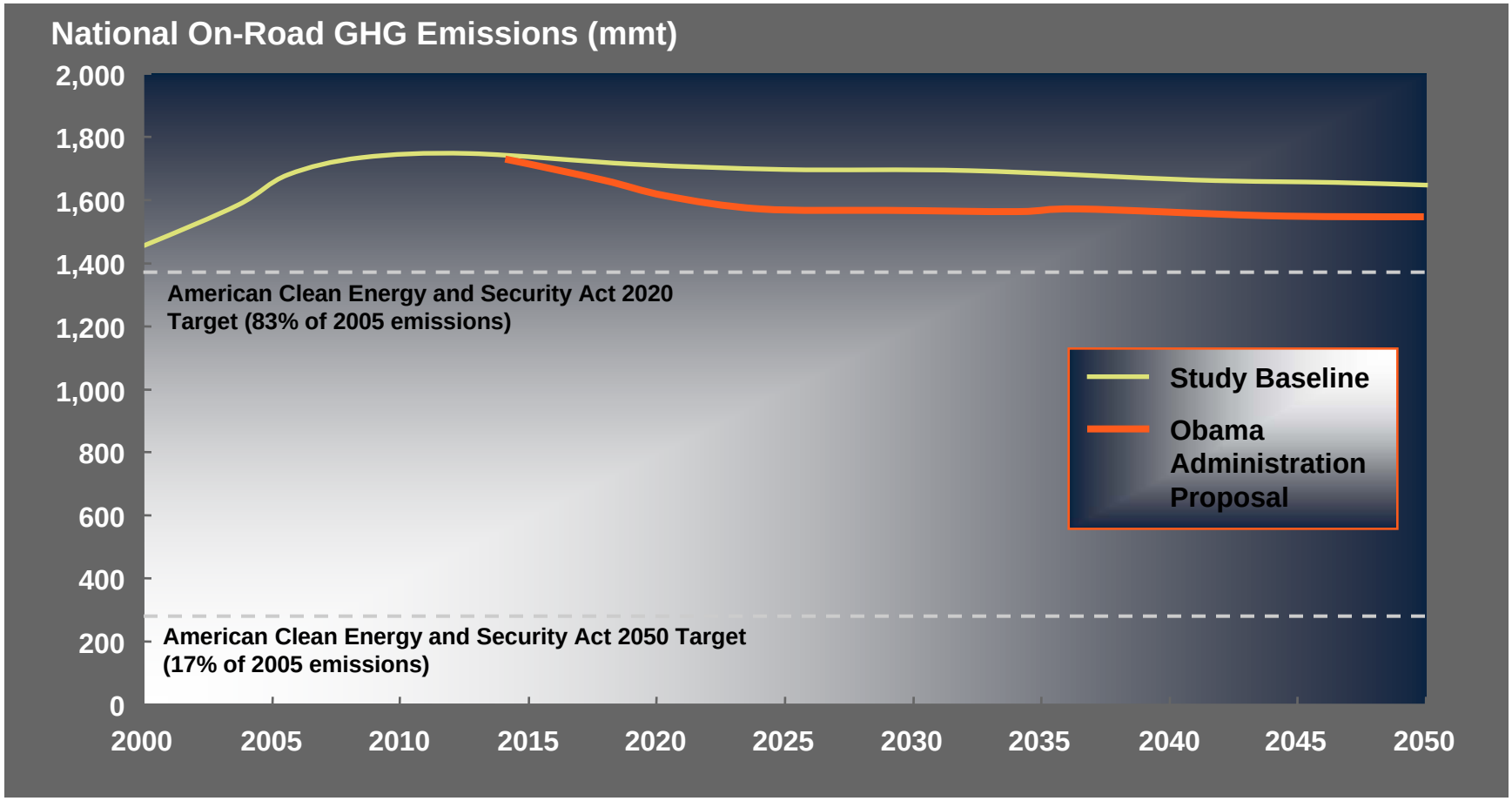
Moving Cooler

Moving Cooler Baseline

- Innovations in vehicle and fuel technology will have a substantial impact on GHGs, but these gains will largely be offset by increases in travel along with growth in the U.S. population

Moving Cooler

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.

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

Moving Cooler

Components of System operations and Management Strategies

- Eco Driving
- Ramp Metering
- Variable Message Signs
- Active Traffic Management
- Integrated Corridor Management
- Incident Management
- Road Weather Management
- Signal Control Management
- Traveler Information
- Vehicle Infrastructure Integration

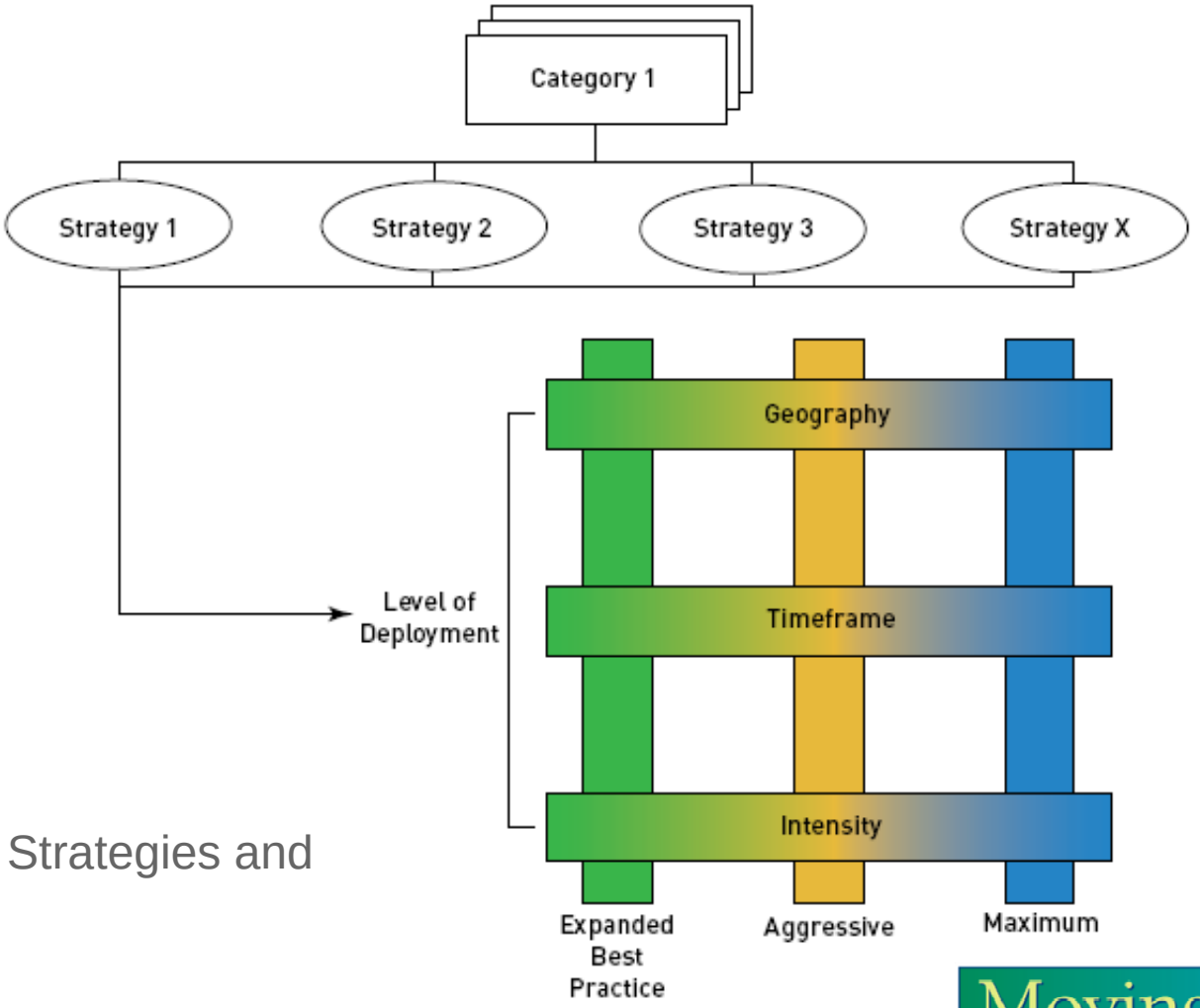
Moving Cooler

Components of Land Use/Transit/ Nonmotorized Bundle

- Parking Pricing/parking restrictions
- Congestion Pricing
- Land Use
- Pedestrian/Bicycle
- Transit Fare Reduction
- Increased Transit Service
- Urban Transit Expansion
- High-speed rail/intercity passenger rail expansion
- HOV expansion
- Car Sharing
- Signal Enhancement
- Traveler Information
- Urban Consolidation Centers (freight)

Moving Cooler

Deployment Levels



Hierarchy of Strategies and Deployment

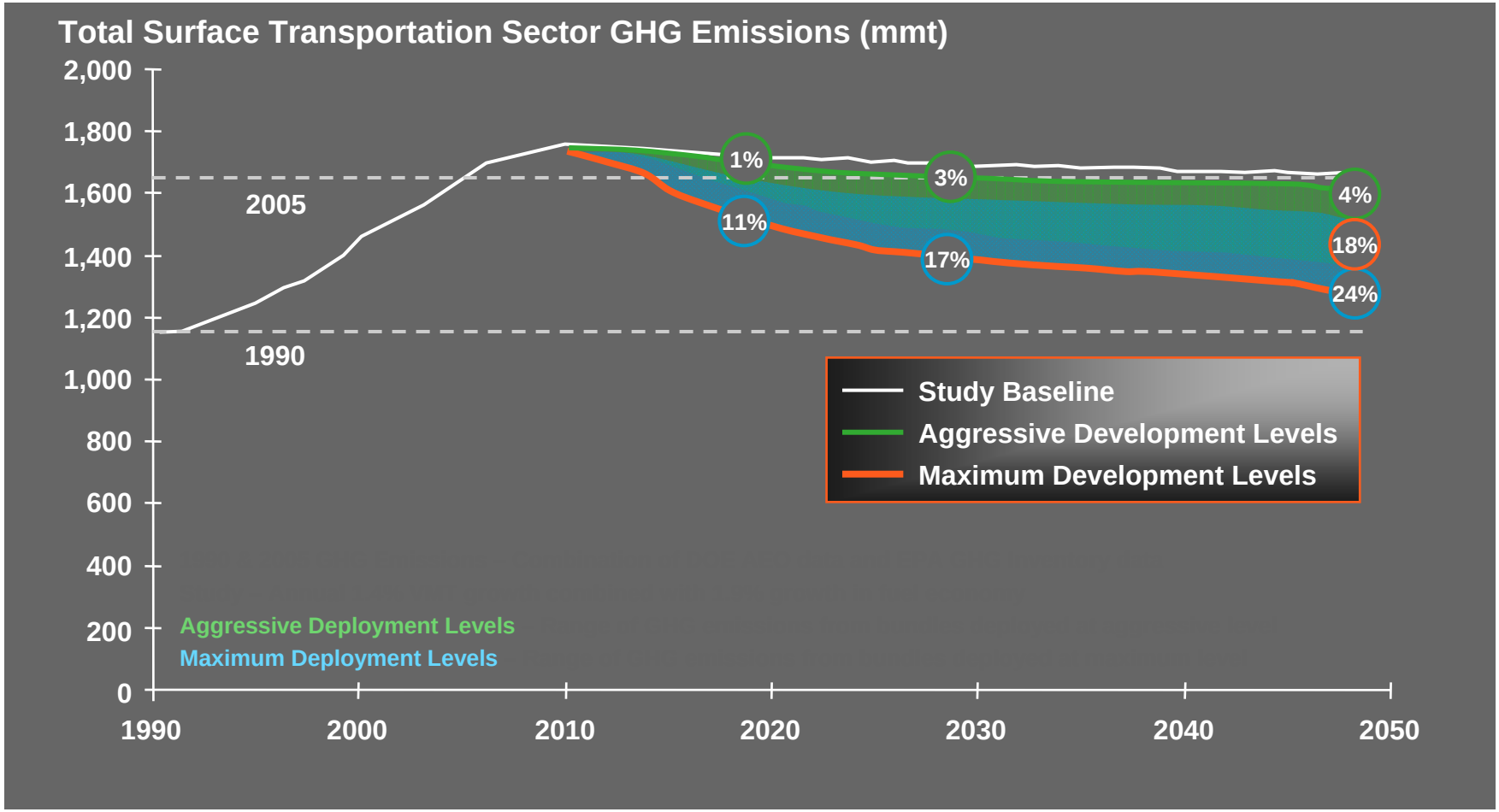
Moving Cooler

Analytic Approach

- Estimate the GHG reduction of each individual strategy (change in fuel consumption)
  - Cumulative reduction through 2030 and through 2050
- "Bundle" the strategies and examine the combined impacts
  - Effectiveness
  - Interactions, synergies, antagonistic effects
  - Cost
  - Equity effects

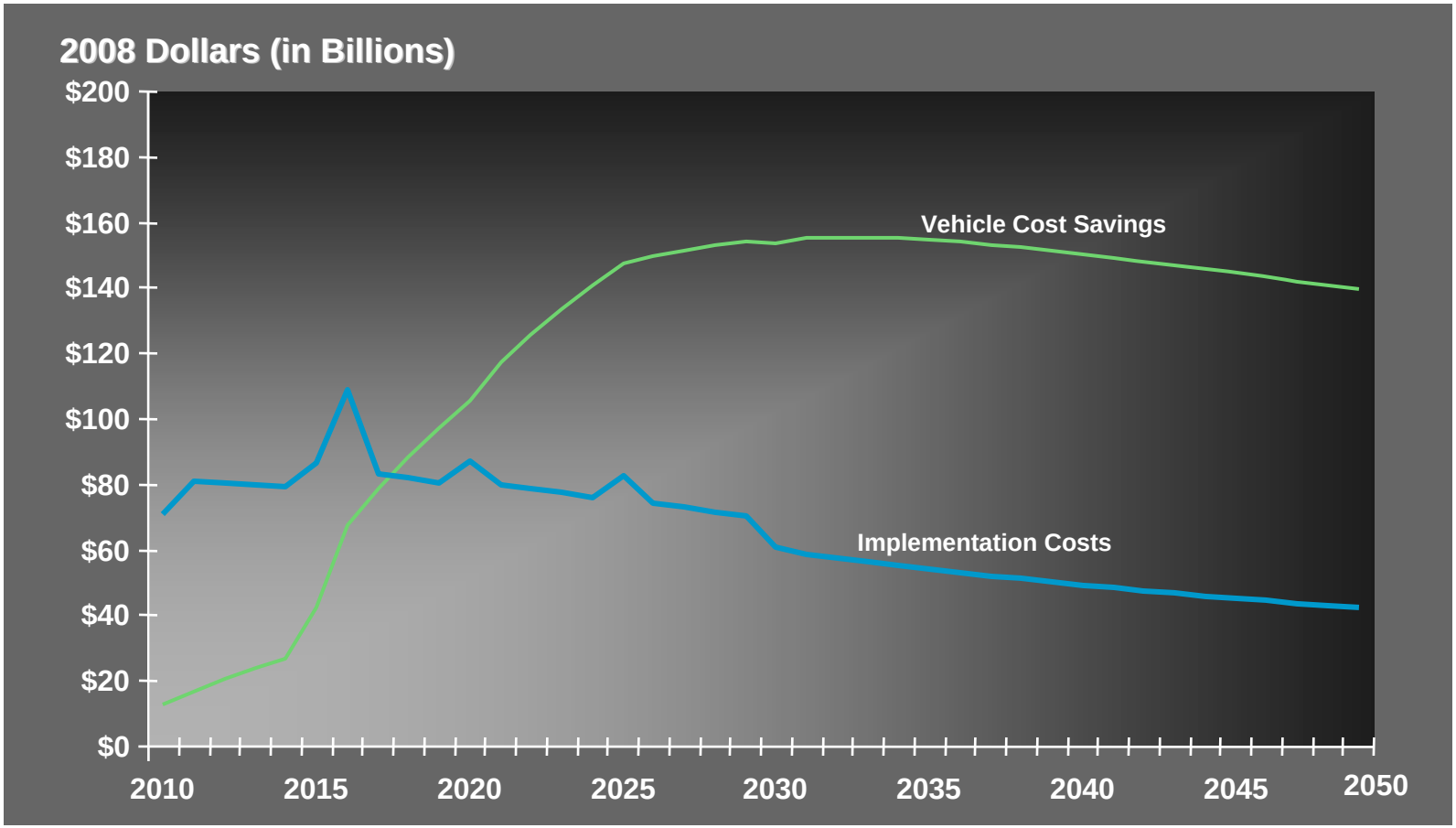
Moving Cooler

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



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.

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.

Summary of Bundle Results (2010 to 2050 – Aggressive Deployment)

	GHG Reduction (Gt)	Implement. 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

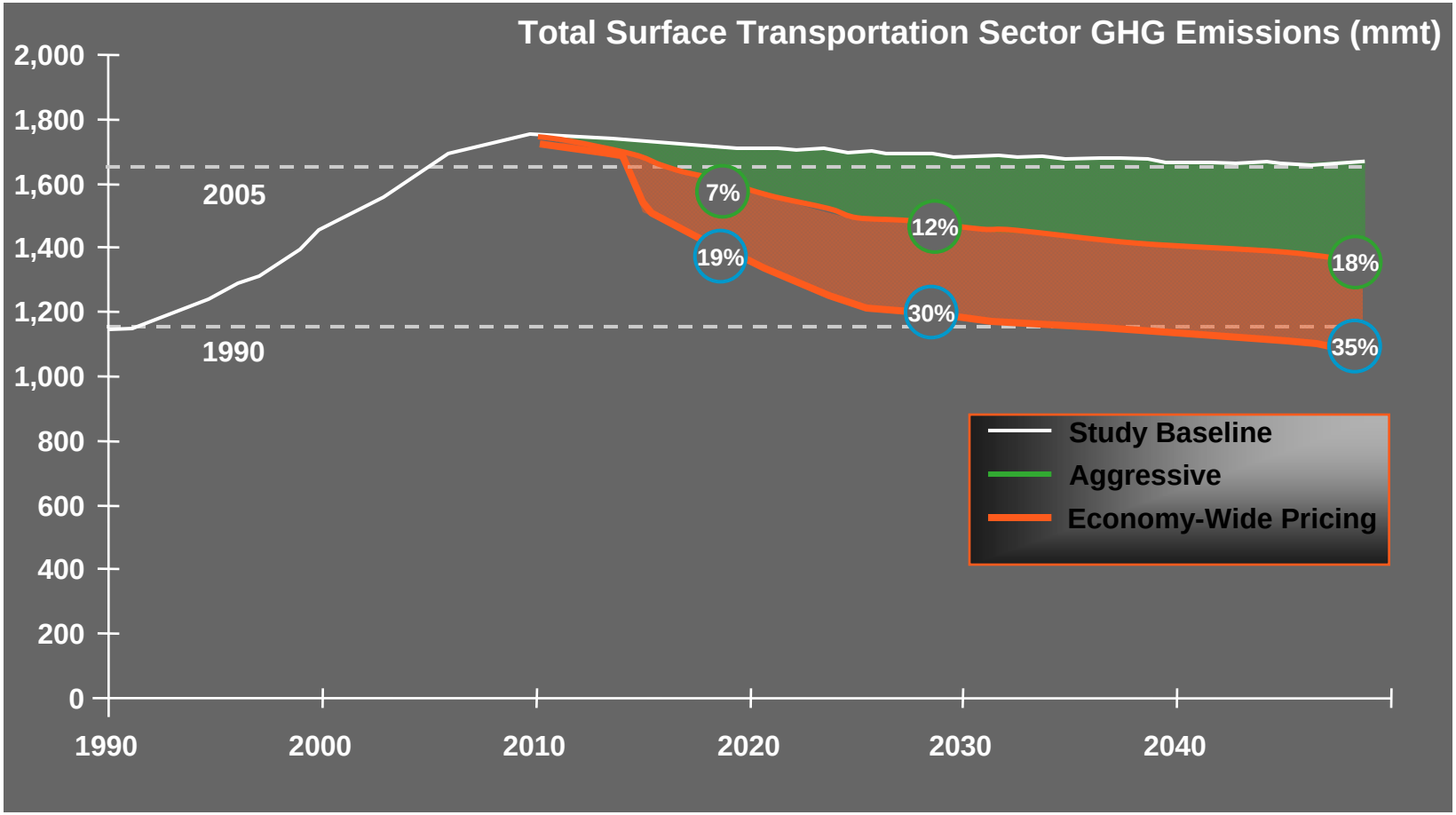
Moving Cooler

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 vehicle-miles traveled (VMT)
  2. More rapid technology advances

Moving Cooler

Economy-Wide Pricing

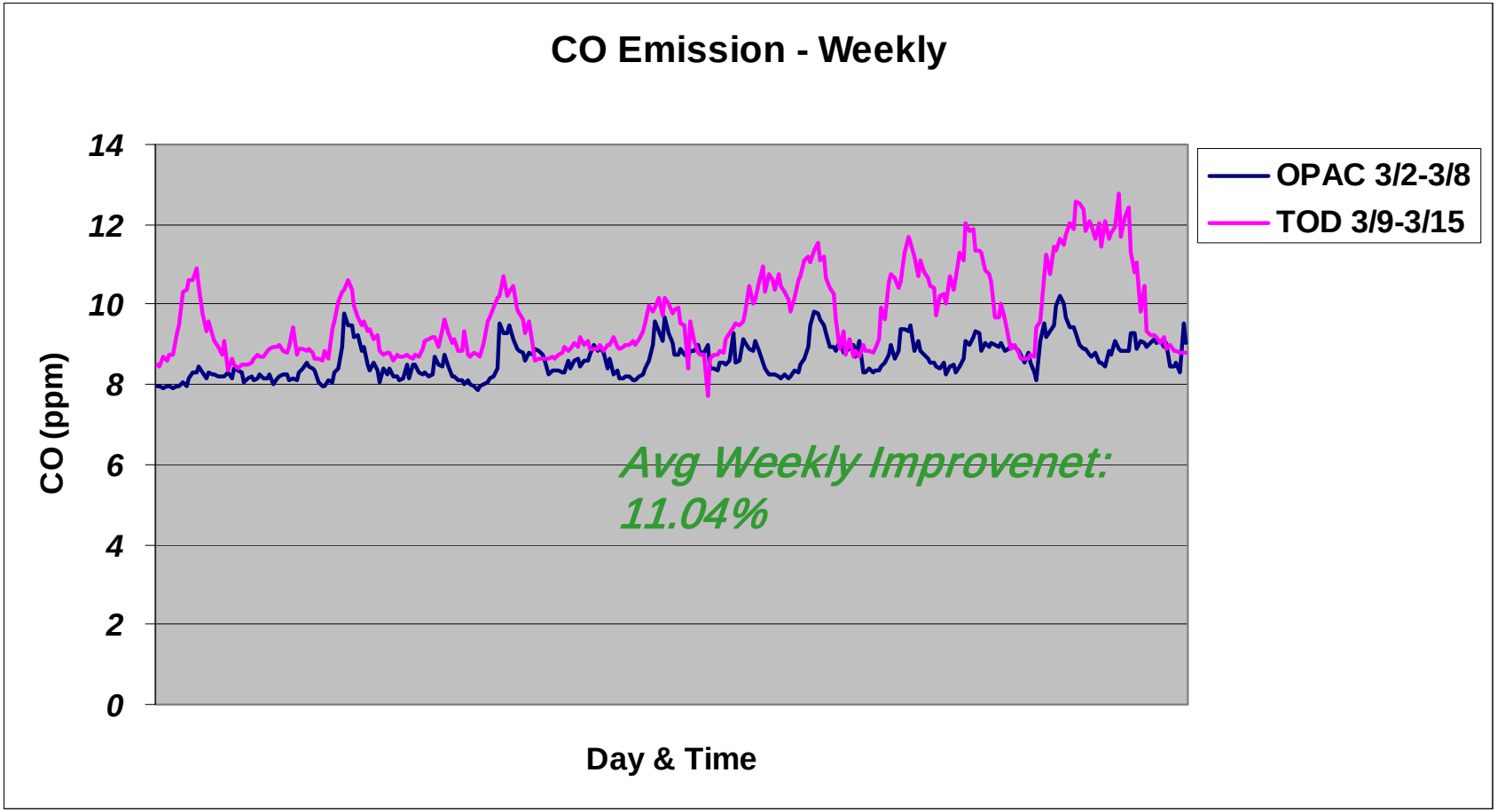


Moving Cooler

Case Study: Adaptive Signal Control Measuring AQ Parameters

- Measuring several pollutants in a modular platform with ambient air analyzers
- Currently measuring CO, NOx, PM2.5

Case Study: OPAC Adaptive vs. TOD Carbon Monoxide (CO)



- Matt Barth (U-Cal) 2008 TRB paper – “Each of three methods could potentially lower CO^2 by 7-12%”
  - Congestion mitigation strategies that reduce severe congestion allowing traffic to flow at better speeds (incident management)
  - Speed management techniques (enforcement)
  - Shock wave suppression techniques (variable speed limits / ATM)

"If you are not part of the solution, you are part of the problem."

Eldridge Cleaver

"If nobody knows you are part of the solution, then you are still part of the problem."

Larry Yermack

Waxman Markey Bill

- Reduce GHG Levels 17% below 2005 by 2020
- Reduce GHG Levels 83% below 2005 by 2050
- Absolute Cap on Emissions
- Allow trading of permits (allowances)
- Upstream mandates on Petroleum/Gas
- Downstream mandates on electric generation, industrial sources, natural gas local distribution
- Provision for domestic and international offsets

Waxman-Markey

- 1% of allowances for Transportation
- State's and Metropolitan Areas to develop GHG Reduction Plans
- SmartWay Transportation Efficiency Program

Boxer-Kerry Bill

- Very similar to Waxman Markey
- More aggressive on targets-20% reduction by 2020
- 1.5% for Transportation
- ITS is an explicit inclusion

SmartWay Program

- EPA program to quantify, demonstrate and promote technologies and strategies to reduce GHG emissions from mobile sources
- EPA to develop measurement protocols and quantifiable thresholds for certification
- EPA to utilize financial incentives including grants, loans and contracts

ITSA Agenda

- Continuing to advocate for additional transportation funding (e.g., increasing the 1 – 1.5 percent level)
- Ensuring that ITS reductions can qualify as early action credits, offsets, emissions credits
- Promoting additional ITS research
- Inclusion of ITS projects in state and metropolitan transportation GHG reduction plans
- Ensuring that ITS is eligible and incentivized under the SmartWay Transportation Efficiency program

TELVENT

Smart Information for a Sustainable World