



Transit and Reducing Greenhouse Gases: A Look at the Numbers

Presentation for Rail~Volution 2008

Tina Hodges
Program Analyst
Office of Budget and Policy
Federal Transit Administration

October 29, 2008



Why Look at the Numbers

- Determine what overall reduction level is needed.
- Determine what role transit can play.
- Communicate transit's benefits.
- Access new sources of funding.
- Inventory and decrease emissions from transit agency operations.
- Report to Climate Registry and other agencies.



What Level of Reduction is Needed?

IPCC approach:

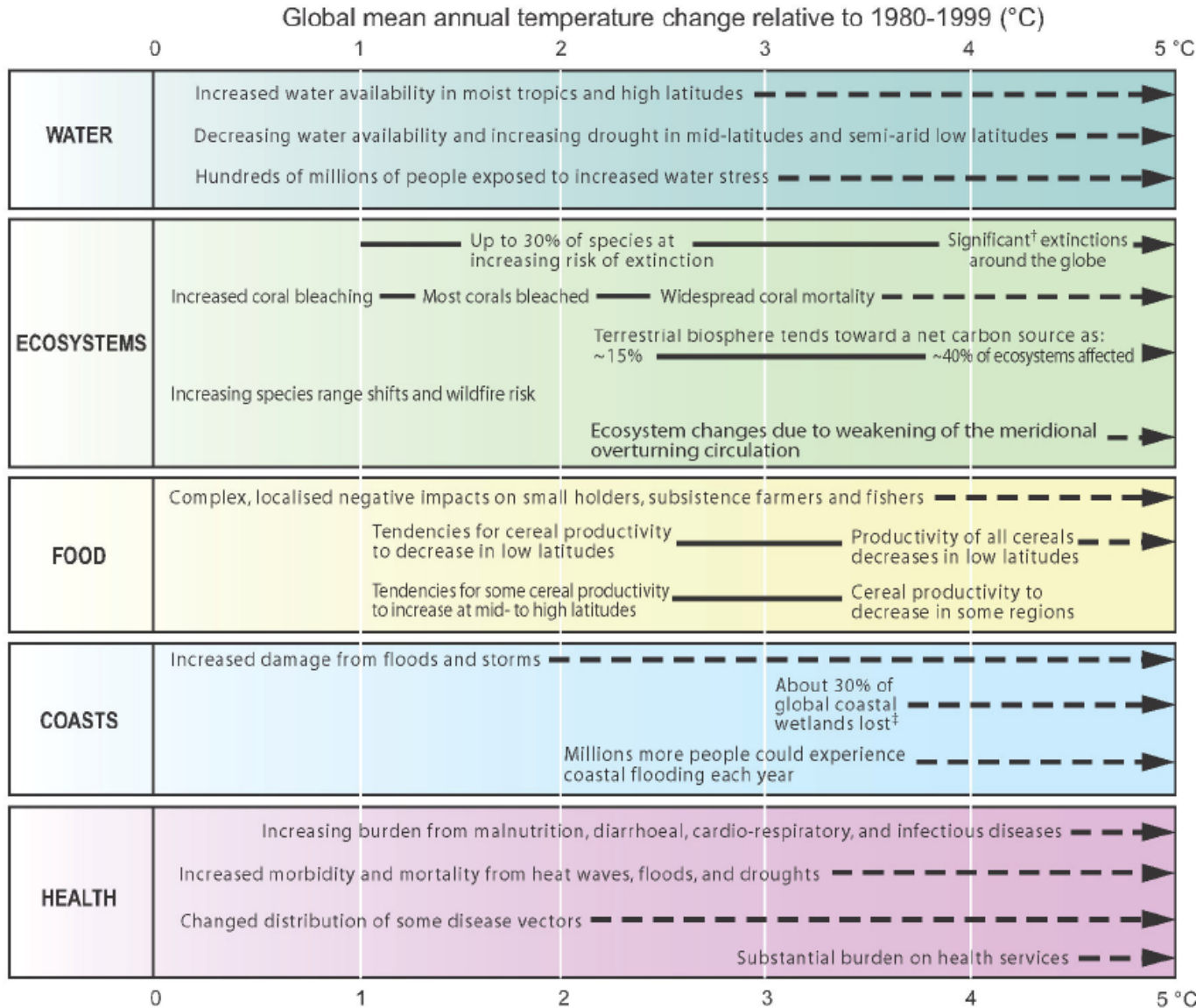
- Look at impacts at different temperature levels
- Let policy-makers determine what level to target based on impacts

What is IPCC:

- Intergovernmental Panel on Climate Change
- Represents consensus of worlds leading climate scientists; U.S. scientists and U.S. government officials well represented
- Issued fourth assessment report in 2007



Examples of impacts associated with global average temperature change (Impacts will vary by extent of adaptation, rate of temperature change, and socio-economic pathway)



Reproduced from:
Intergovernmental
Panel on Climate
Change Fourth
Assessment Report

[†]Significant is defined here as more than 40%. [‡]Based on average rate of sea level rise of 4.2 mm/year from 2000 to 2080.



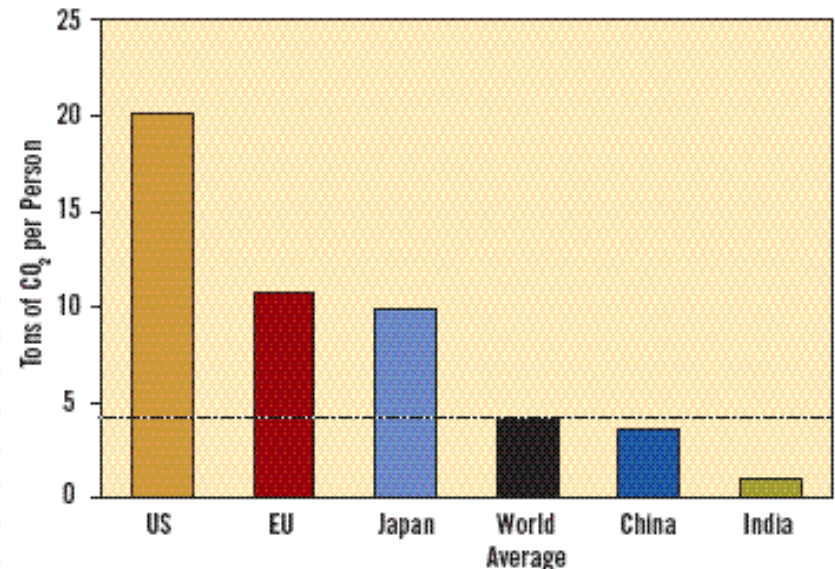
Large Cuts in GHG Emissions Needed

- IPCC: To limit warming to 2–2.4 C (3.6–4.3 F):
 - stabilize greenhouse gas emissions by 2015, and
 - decrease emissions to 50 to 85% below 2005 levels by 2050.

- Target for developed countries likely on high end, ~ 80%

Graphic Credit:
Pew Center on
Global Climate
Change

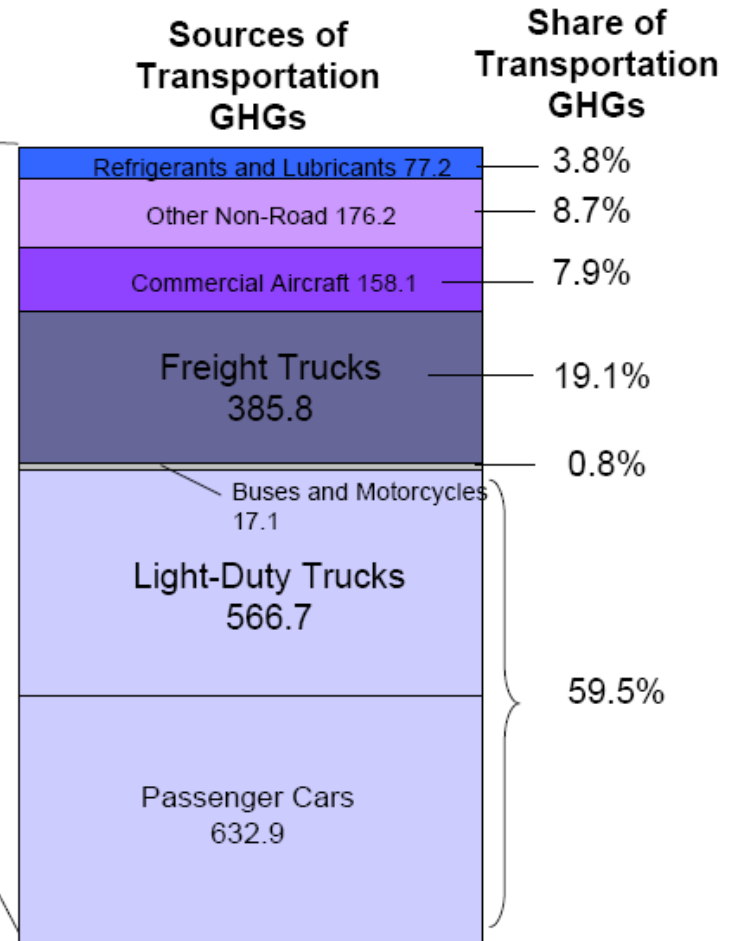
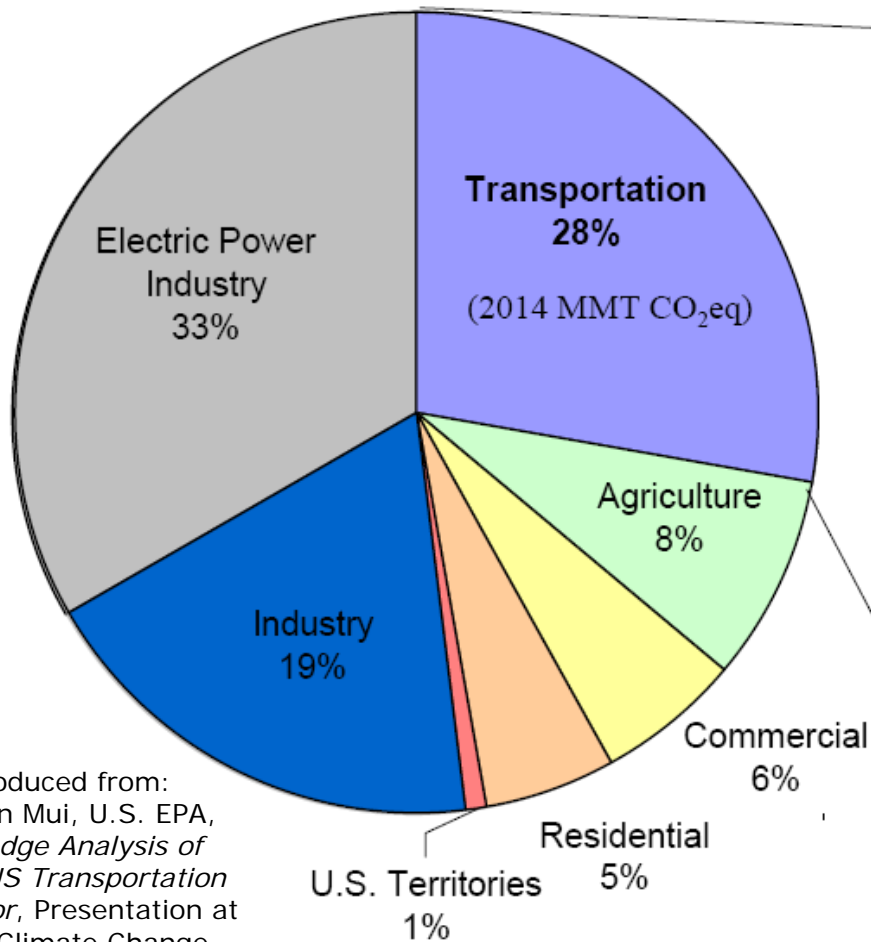
Per Capita CO₂ Emissions: 2004





U.S. Greenhouse Gas Emissions Inventory

U.S. Total: 7261 MMT CO₂eq



Reproduced from: Simon Mui, U.S. EPA, *A Wedge Analysis of the US Transportation Sector*, Presentation at DOT Climate Change Forum, October 24, 2007.

Source: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005 6



Transportation Solutions

Vehicle efficiency

- Fuel economy standards
- Research & development – hybrids, plug-in hybrids, fuel cells, light weight materials, etc.
- Feebates

Carbon content of fuel

- Renewable fuels standard
- Emissions performance standard
- Research on alternative fuels

Vehicle Miles Traveled (VMT)

- Road pricing, parking fees, pay as you drive insurance
- System efficiencies (reduce circuitry, idling, congestion)
- Carpooling, telecommuting
- Land use and transportation planning
- Invest in public transportation and other low GHG modes

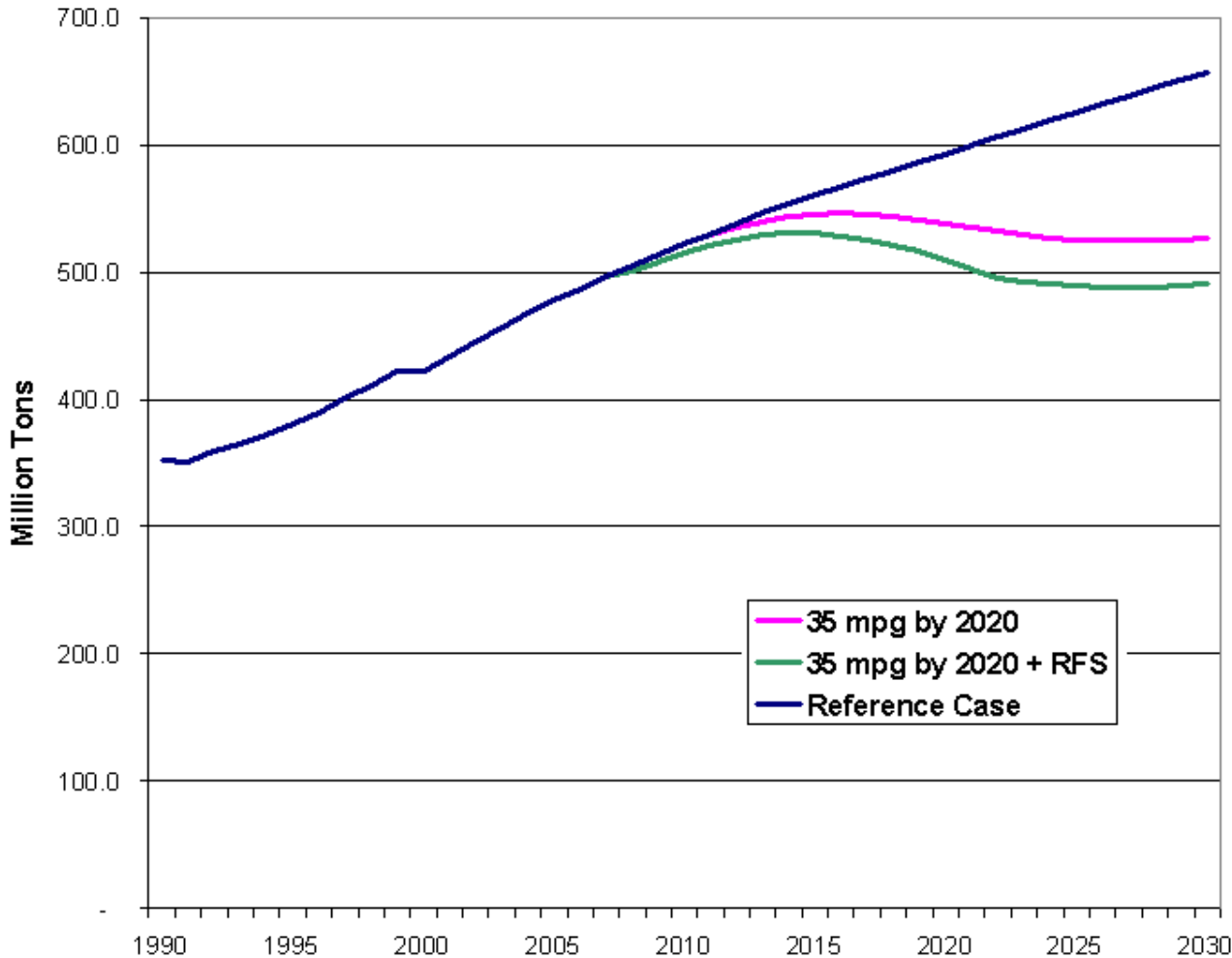
Effect all 3:

- Cap and trade
- Carbon tax
- Fuel tax



VMT increases cancel out improvements in efficiency and carbon content

Light-Duty Vehicle CO₂ Emissions



business as usual

new CAFE standard

new CAFE standard plus
renewable fuel standard
(RFS)

Reproduced from: Therese Langer, American Council for an Energy Efficient Economy, *Reducing Vehicle Miles Traveled as a Climate Change Strategy*, Presentation to DOT Climate Change Forum, January 9, 2008.



Transit's Role in Reducing GHG Emissions

By moving more people in fewer vehicles, transit can reduce VMT and greenhouse gas emissions.



40 commuters
traveling by car



40 commuters
traveling by bus.

Photo Credit:
City of Ottawa

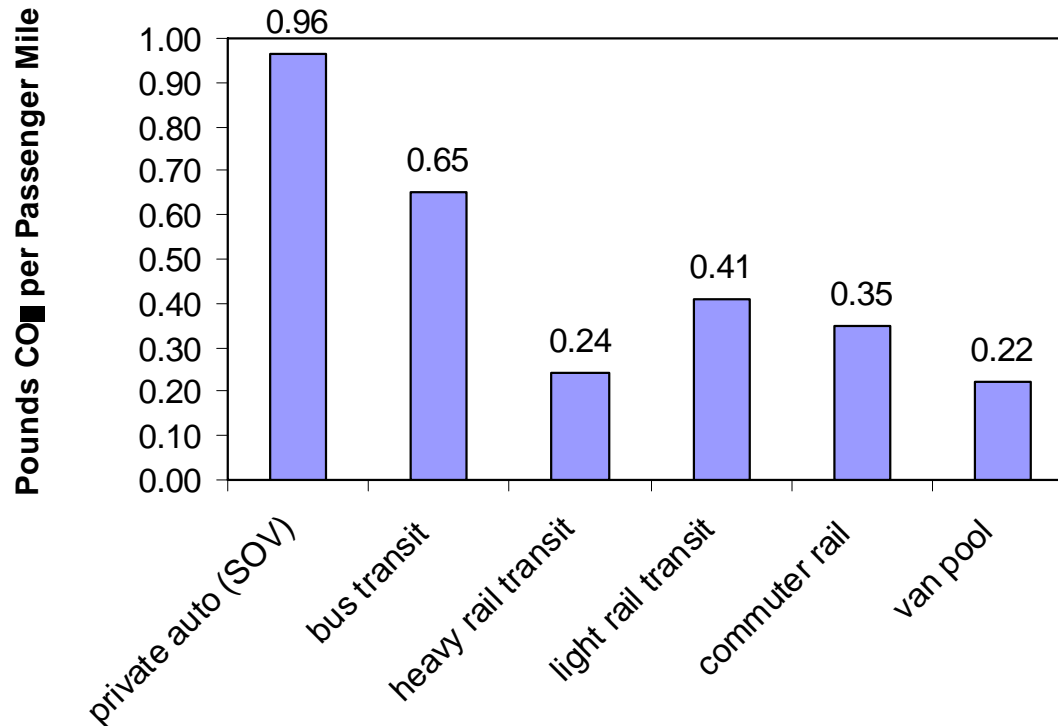


Investments in Transit can Cut Emissions

Transit has lower emissions per passenger mile.

Efficiencies would be even higher at higher transit ridership levels.

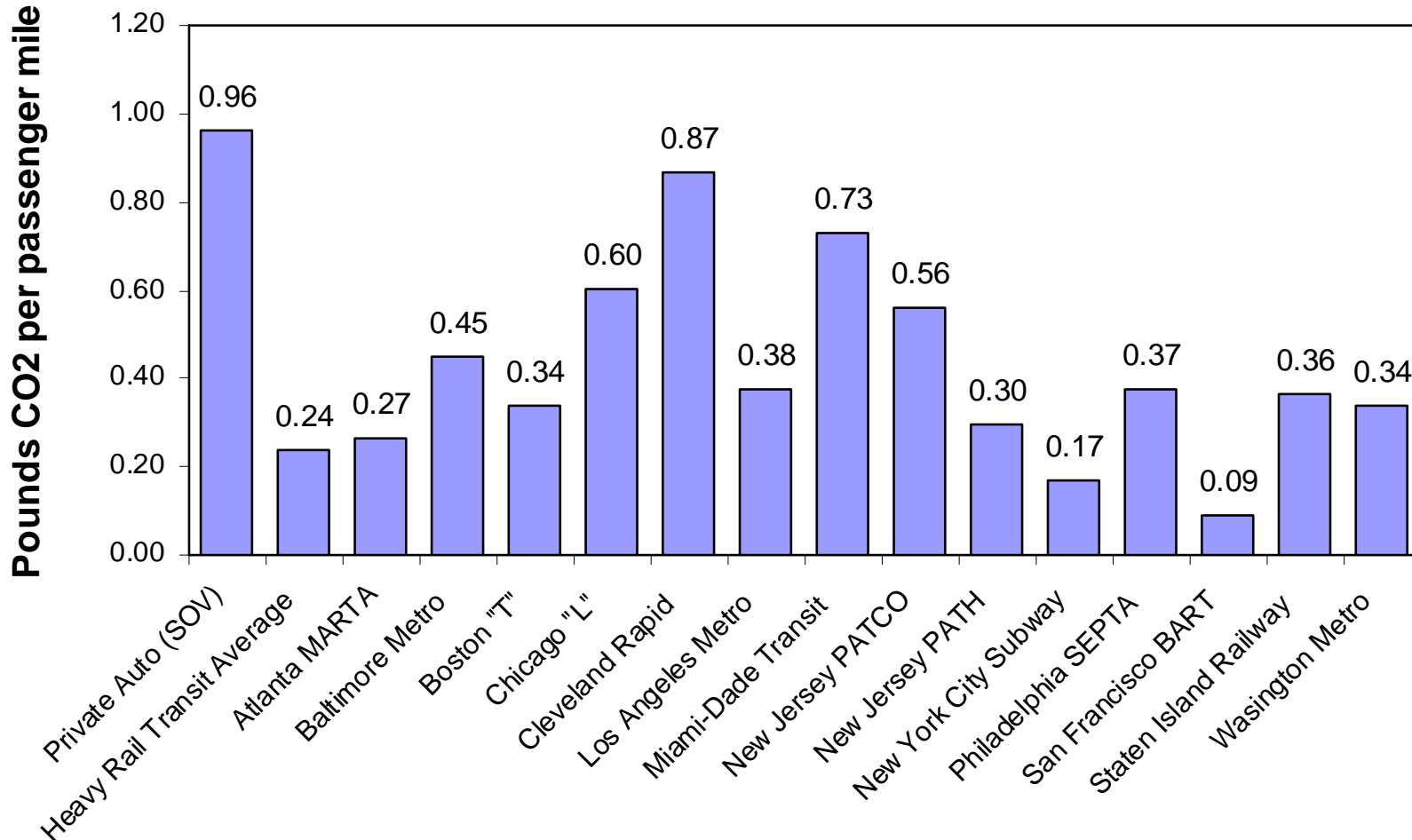
Estimated CO₂ Emissions per Passenger Mile for Transit and Private Autos



Data Sources: Private auto: single occupancy, 20.3 mpg average fuel economy, U.S. Environmental Protection Agency. Transit modes: Based on passenger miles and fuel and electricity consumption in the Federal Transit Administration's 2007 National Transit Database. Figures are national averages weighted by passenger miles. Emissions factors for fuels from U.S. Department of Energy. Emissions factors for electricity from eGRID subregion data, U.S. Environmental Protection Agency.



Heavy Rail Transit Systems CO₂ Emissions



Data Sources: Private auto: single occupancy, 20.3 mpg average fuel economy, U.S. Environmental Protection Agency. Transit modes: Based on passenger miles and fuel and electricity consumption in the Federal Transit Administration's 2007 National Transit Database. Figures are national averages weighted by passenger miles. Emissions factors for fuels from U.S. Department of Energy. Emissions factors for electricity from eGRID subregion data, U.S. Environmental Protection

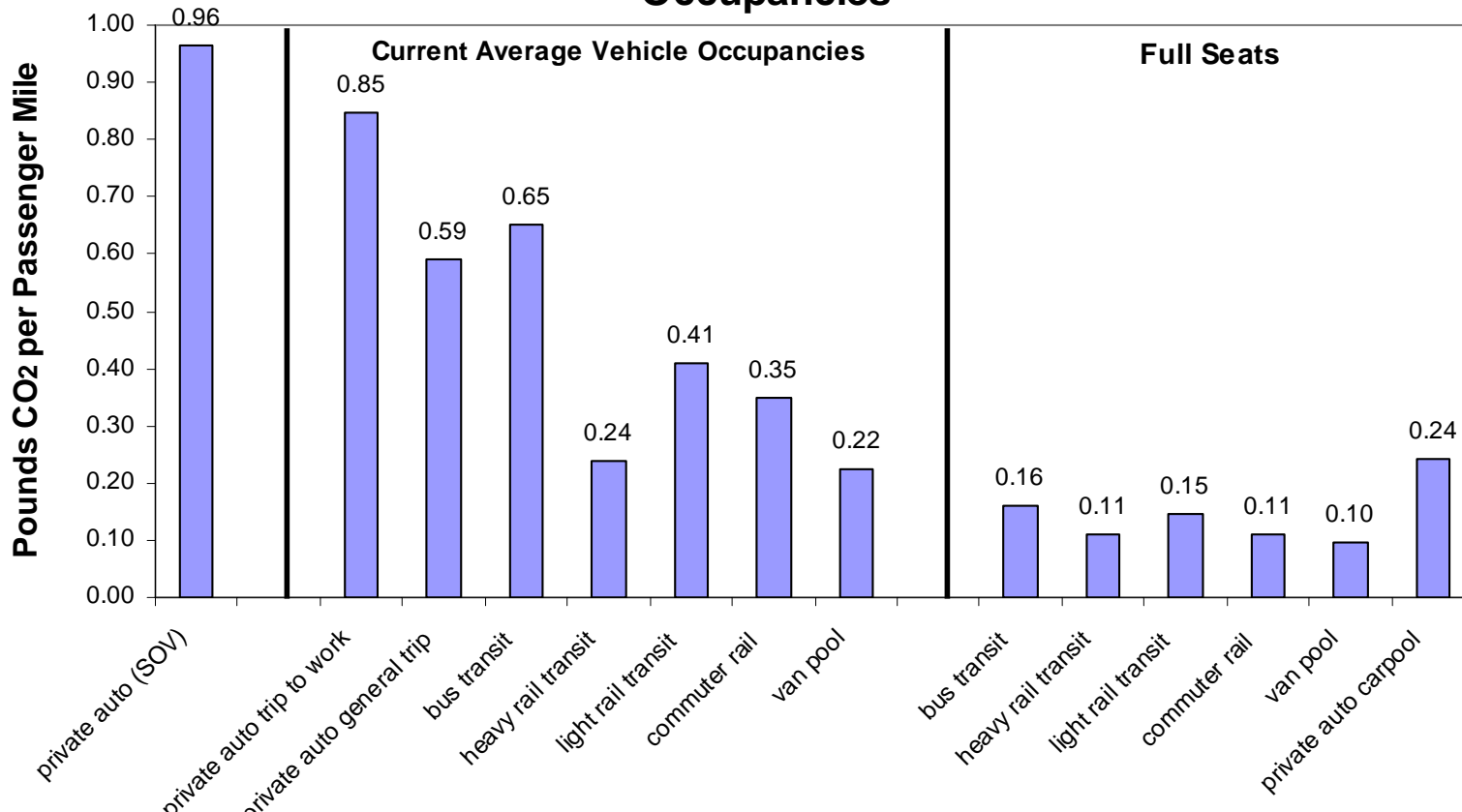


State	Heavy Rail System	Lbs CO2/ passenger mile	KWH/seat mile (Efficiency of Vehicle)	Average % of seats full (Ridership)	Pounds CO2/ MWH for eGRID subregion (Carbon Content)
NY	New York City Subway	0.171	0.108	58%	922
DC, MD, VA	Washington Metro	0.336	0.098	32%	1,096
CA	San Francisco BART	0.089	0.071	32%	399
IL	Chicago "L"	0.604	0.132	34%	1,556
GA	Atlanta MARTA	0.265	0.067	37%	1,490
MA	Boston "T"	0.336	0.163	44%	909

Data Sources: Private auto: single occupancy, 20.3 mpg average fuel economy, U.S. Environmental Protection Agency. Transit modes: Based on passenger miles and fuel and electricity consumption in the Federal Transit Administration's 2007 National Transit Database. Figures are national averages weighted by passenger miles. Emissions factors for fuels from U.S. Department of Energy. Emissions factors for electricity from eGRID subregion data, U.S. Environmental Protection Agency.



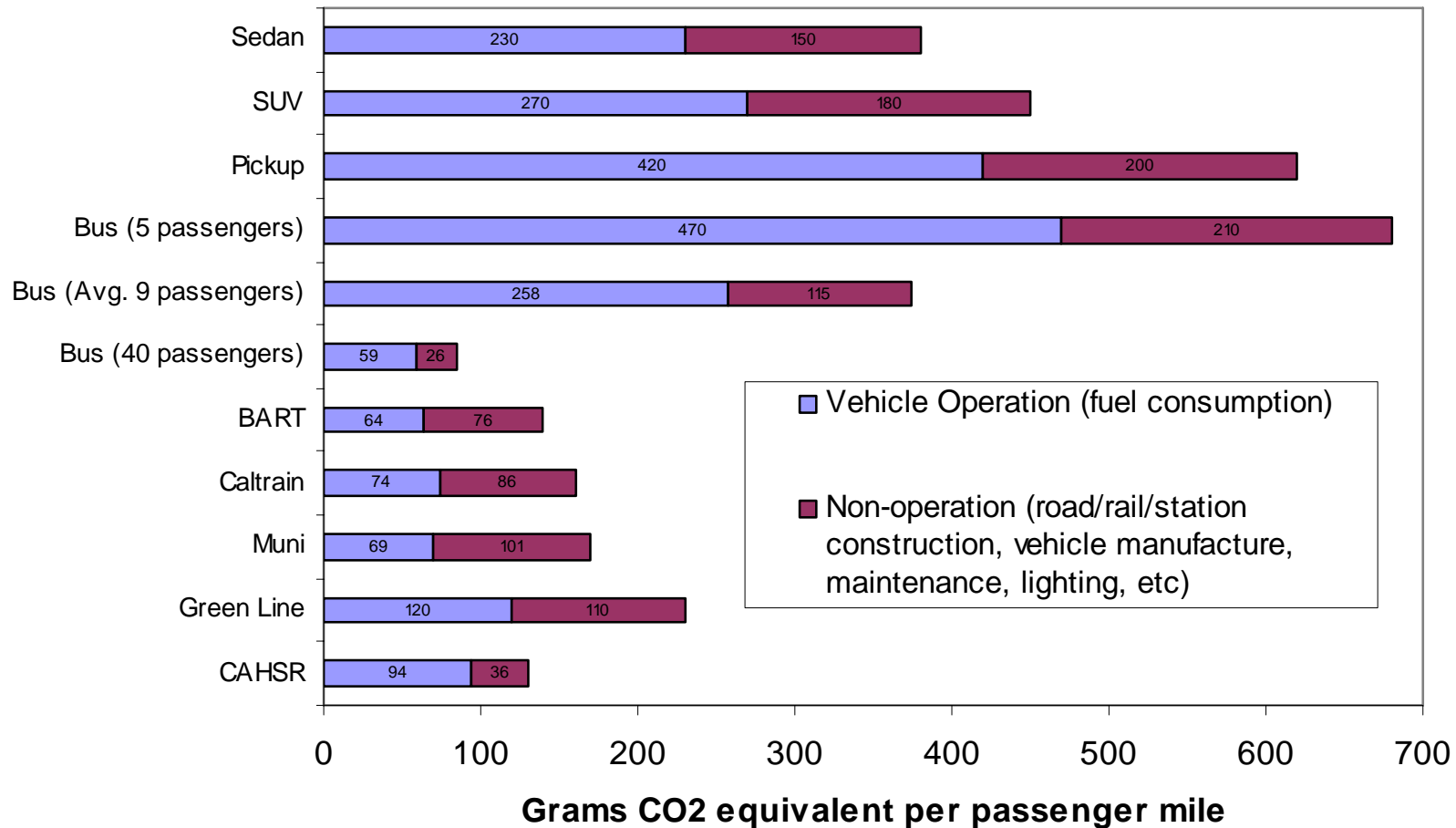
Estimated CO₂ Emissions per Passenger Mile at Different Occupancies



Private auto trip to work 1.14 passengers, private auto all trip purposes 1.63 passengers, according to 2001 National Household Transportation Survey. Private auto carpool 4 passengers. Data Sources: Private auto: single occupancy, 20.3 mpg average fuel economy, U.S. Environmental Protection Agency. Transit modes: Based on passenger miles, vehicle miles, seating capacity and fuel and electricity consumption in the Federal Transit Administration's 2007 National Transit Database. Figures are national averages weighted by passenger miles. Emissions factors for fuels from U.S. Department of Energy. Emissions factors for electricity from eGRID subregion data, U.S. Environmental Protection Agency.



Greenhouse Gas Emissions from Full Life Cycle, including Operation, Construction, and Maintenance



Source: Mikhail Chester, August 2008. Note: 9 passenger case is calculated from 5 and 40 passenger cases presented in study.



Transit's Land Use Effects

- Greater impact on reducing GHGs than mode shift. About twice as large, ICF study.
- By facilitating compact land use, reduces driving trip distances and supports walking/biking.
- Combining transit and supportive land use policies offers synergies that increase each strategy's impact.
- Quantitative results will be available from new study, *Moving Cooler*, in the spring.
- APTA Methodology for measuring transit carbon footprint includes land use effects.





Minimizing its Own Impact

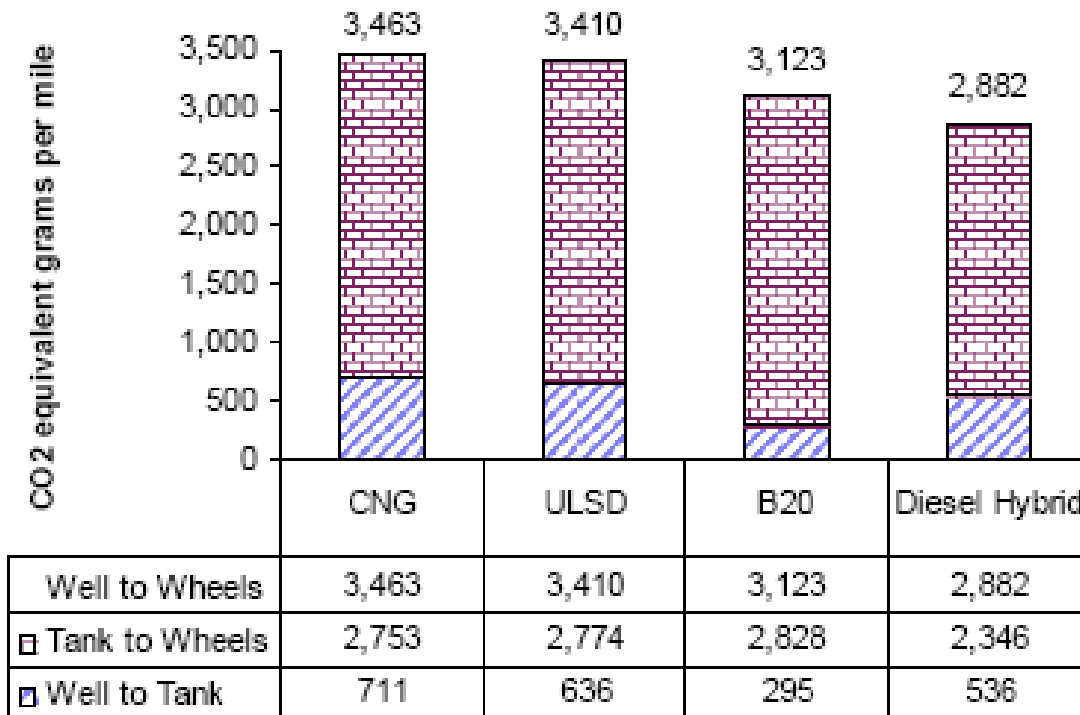
- Transit agencies can use efficient vehicles, alternative fuels, and green building materials decrease impact of construction and operations.





Minimizing its Own Impact

Well-to-wheels greenhouse gas emissions per mile for transit buses



Key to Acronyms

- CNG = compressed natural gas
- ULSD = ultra low sulfur diesel
- B20 =: 20% Biodiesel, 80% ULSD
- Diesel Hybrid

Reproduced from: Federal Transit Administration, *Transit Bus Life Cycle Cost and Year 2007 Emissions Estimation*, July 2, 2007.

Figure 18 Average well-to-wheels GHG emissions prediction per year



FTA Climate Change Activities

- Transit GHG Management Compendium
- FTA Transit and Sustainability Website
- Support for DOT Climate Change Center
 - Report to Congress on how to reduce GHGs from transportation
 - Information Clearinghouse (FHWA lead)
 - Integration of Climate Change Considerations into Planning (FHWA lead)
- Transit greenhouse gas impacts programmatic review for NEPA documents
- Improving assessment of transit environmental benefits in New Starts process
- National Fuel Cell Bus Program & other technology research
- Proposals for addressing climate change in reauthorization (under development)
- Engaging Transit to Address Sustainability in Transportation Planning - with AMPO and APTA; Technical Assistance in Transit-Focused Sustainability - with APTA
- APTA Standards Development Program, Climate Change Group - developing standard for measuring transit agency carbon footprint (FTA funded)
- Moving Cooler (FTA is co-sponsor)



Resources

- FTA Transit and Sustainability Webpage:
http://www.fta.dot.gov/index_8510.html
- DOT Climate Change Center
<http://www.climate.dot.gov>
- *Understanding and Responding to Climate Change: Highlights of National Academies Reports, 2008.*
<http://dels.nas.edu/basc/climate-change/>
- U.S. Climate Change Science Program
www.climatechange.gov
- U.S. EPA Climate Change Website:
<http://www.epa.gov/climatechange/index.html>



Thank You!

Tina Hodges
Program Analyst
Office of Budget and Policy
Federal Transit Administration
Washington, DC
202-366-4287
Tina.Hodges@dot.gov