

# The Transportation Sector and Green House Gas Emissions In Massachusetts

April 13, 2010

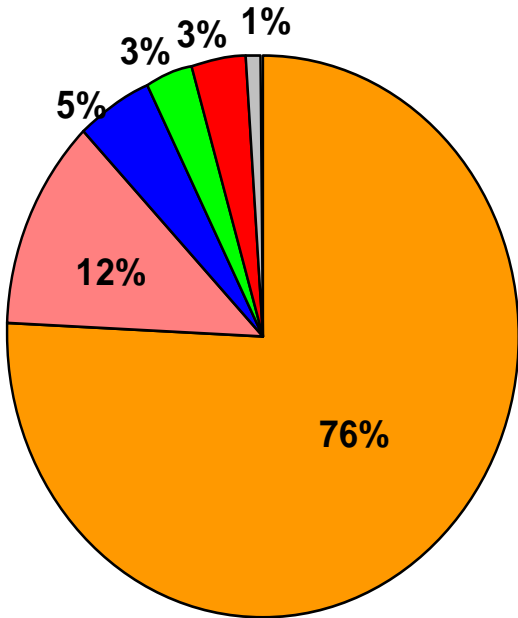
Ned Codd, MassDOT

# Greenhouse Gas Emissions in the Transportation Sector

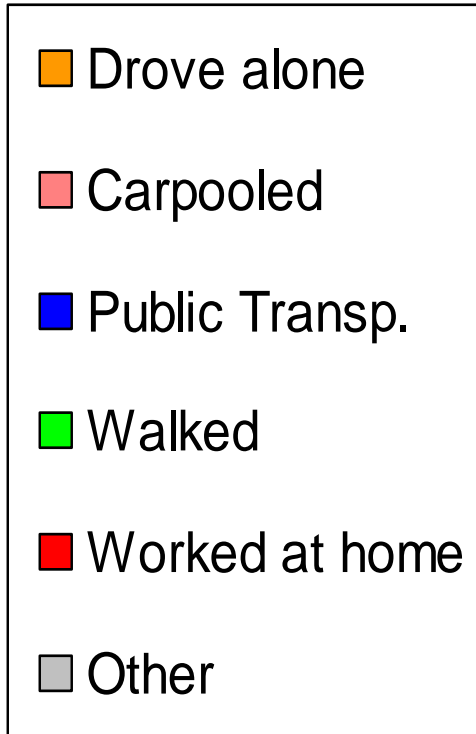
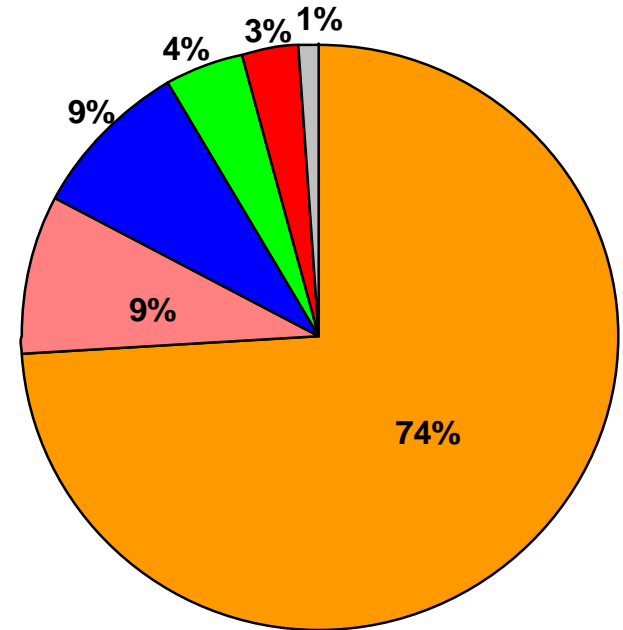
- A. Travel Behavior in Massachusetts
- B. Vehicles and Fuel in Massachusetts
- C. Green House Gas Emissions from Transportation

# Commuter Modes - 2000 US Census

## United States



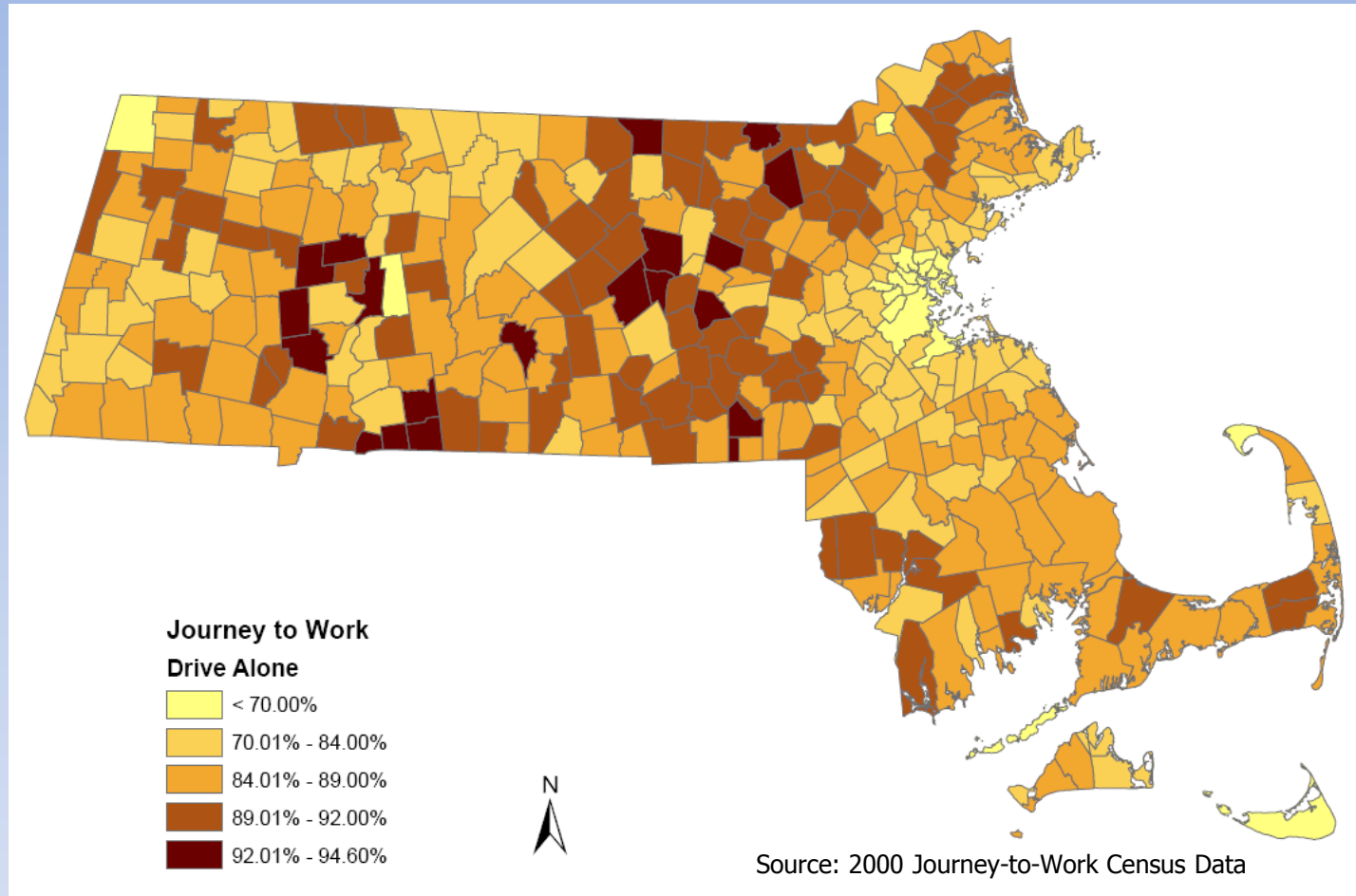
## Massachusetts



Source: Census 2000 Journey to Work Brief, March 2004

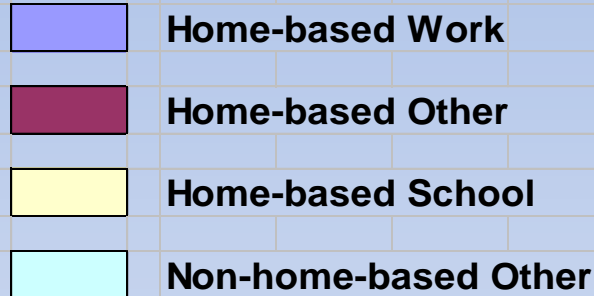
More Massachusetts workers use public transportation and walk than the U.S. population in general.

# Percent Drive Alone by Community in 2000

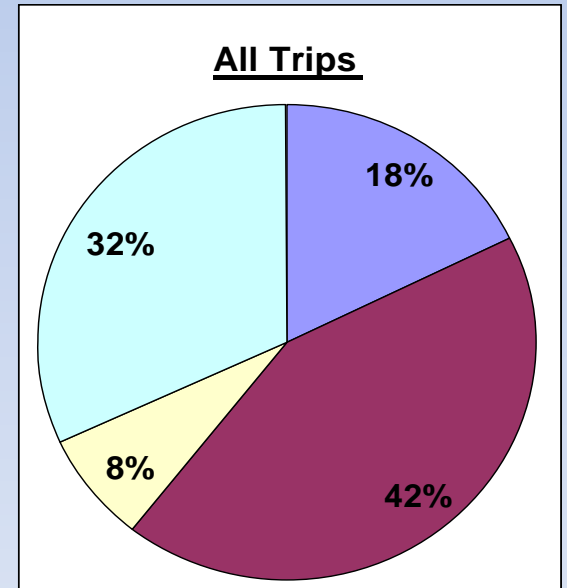
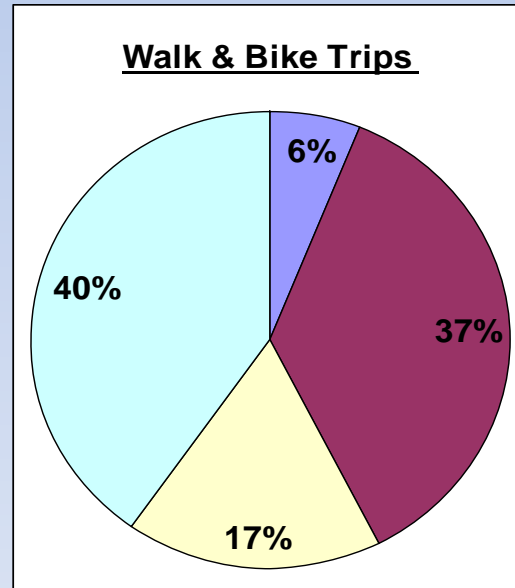
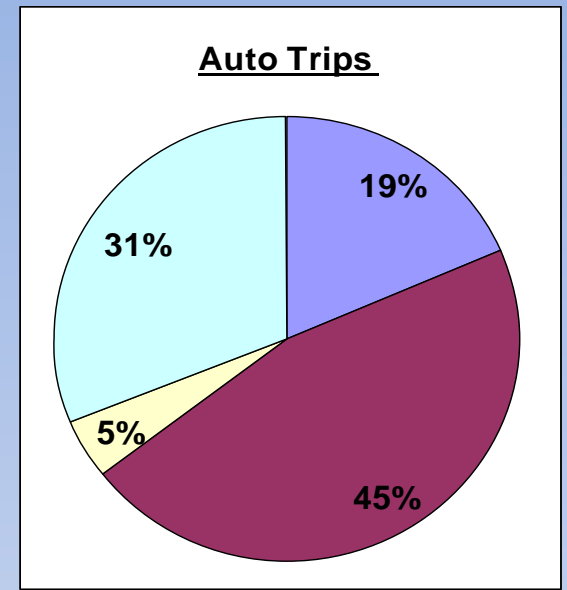
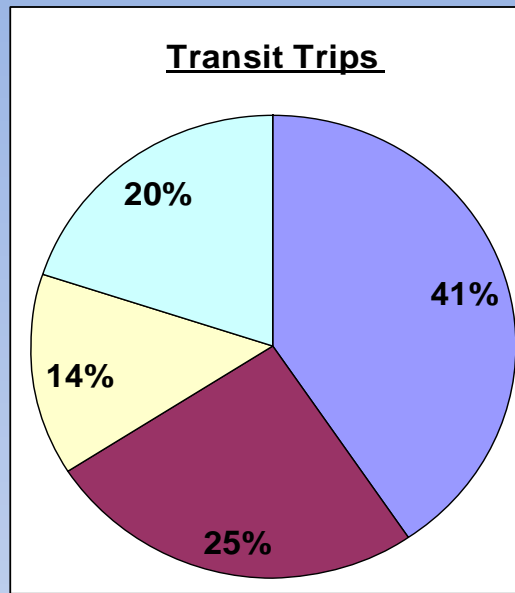


- High drive-alone communities are in suburban and rural areas
- Dense urban development and good public transit reduce drive-alone share

# Metro Boston Area Trips by Purpose



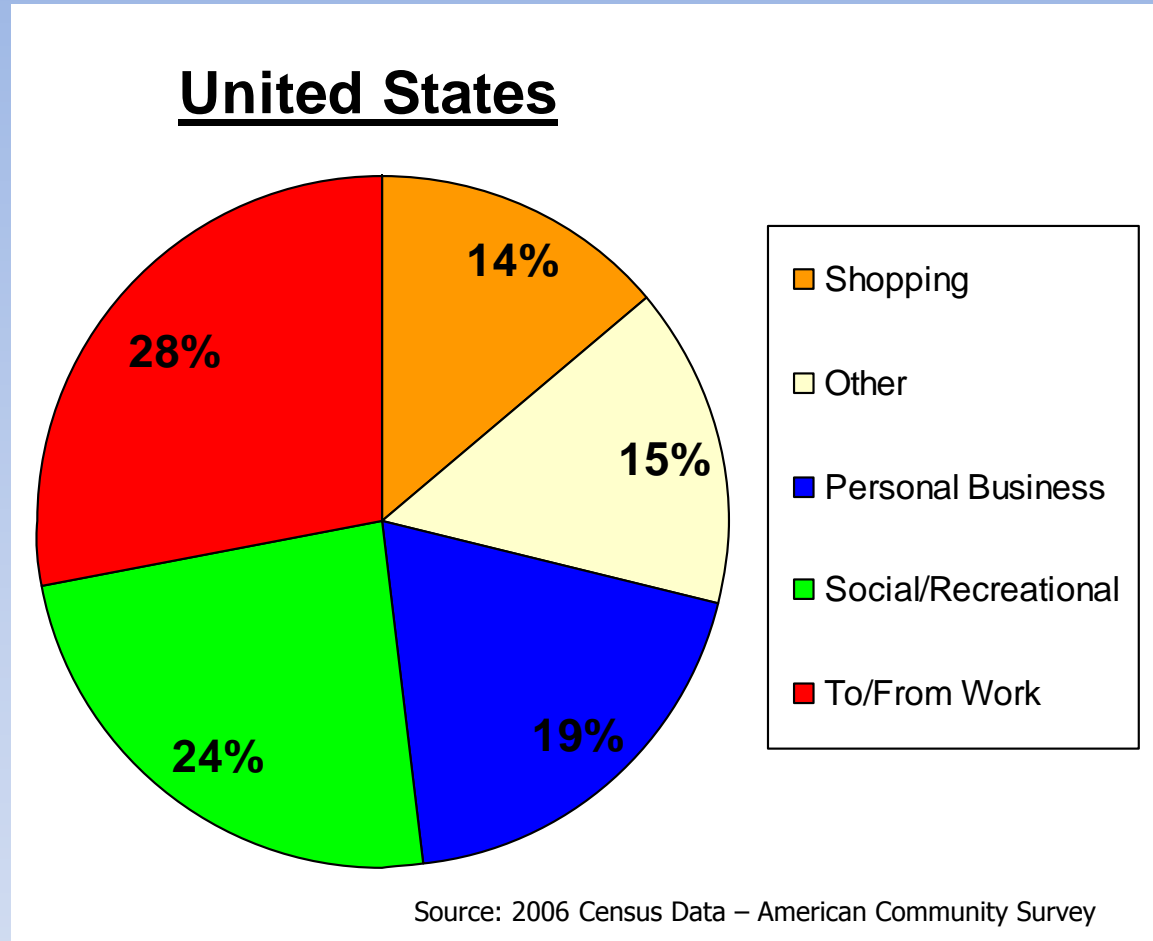
- Most trips are home-based “other”
- Transit trips skew to commute
- Many walk trips non-home-based



Source: Central Transportation Planning Staff  
Regional Travel Demand Model, 2008 Travel

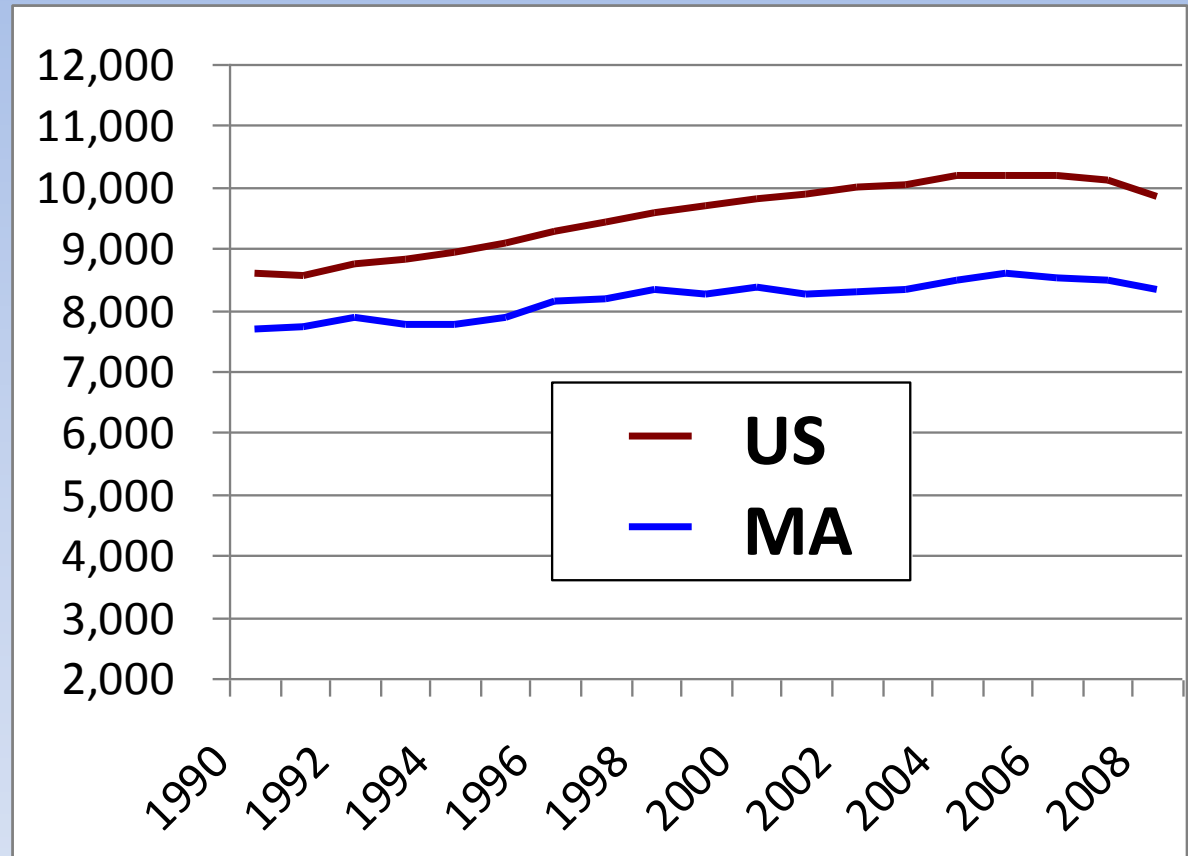
# National Travel Demand by Trip Purpose

- Work trips account for highest share of vehicle miles traveled (VMT)
- Personal business and recreational together almost half of all VMT



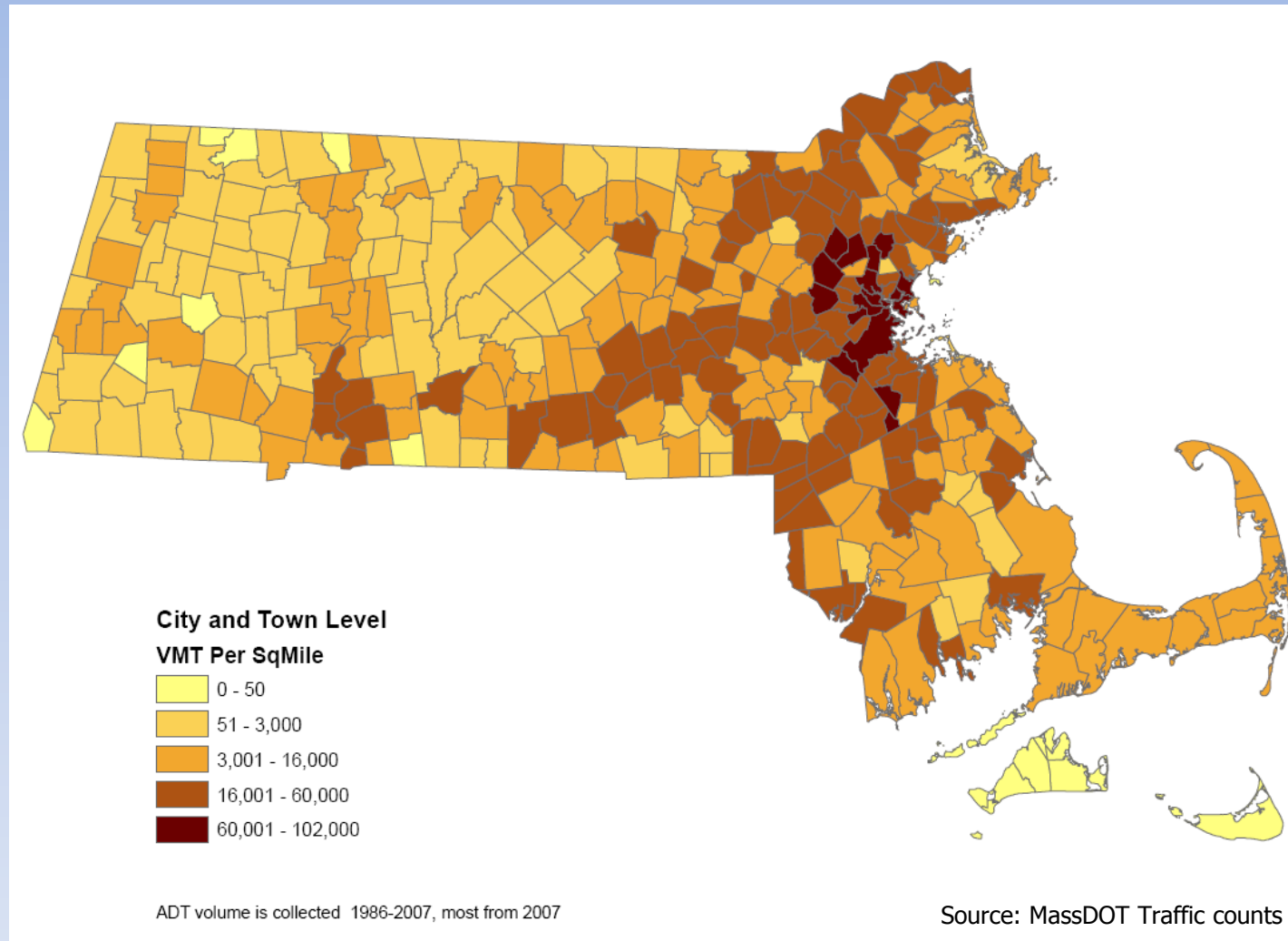
# Vehicle Miles Traveled per Capita

- VMT rose steadily in US and MA until 2008
- VMT lower in MA than US as a whole: shorter trips, more public transit



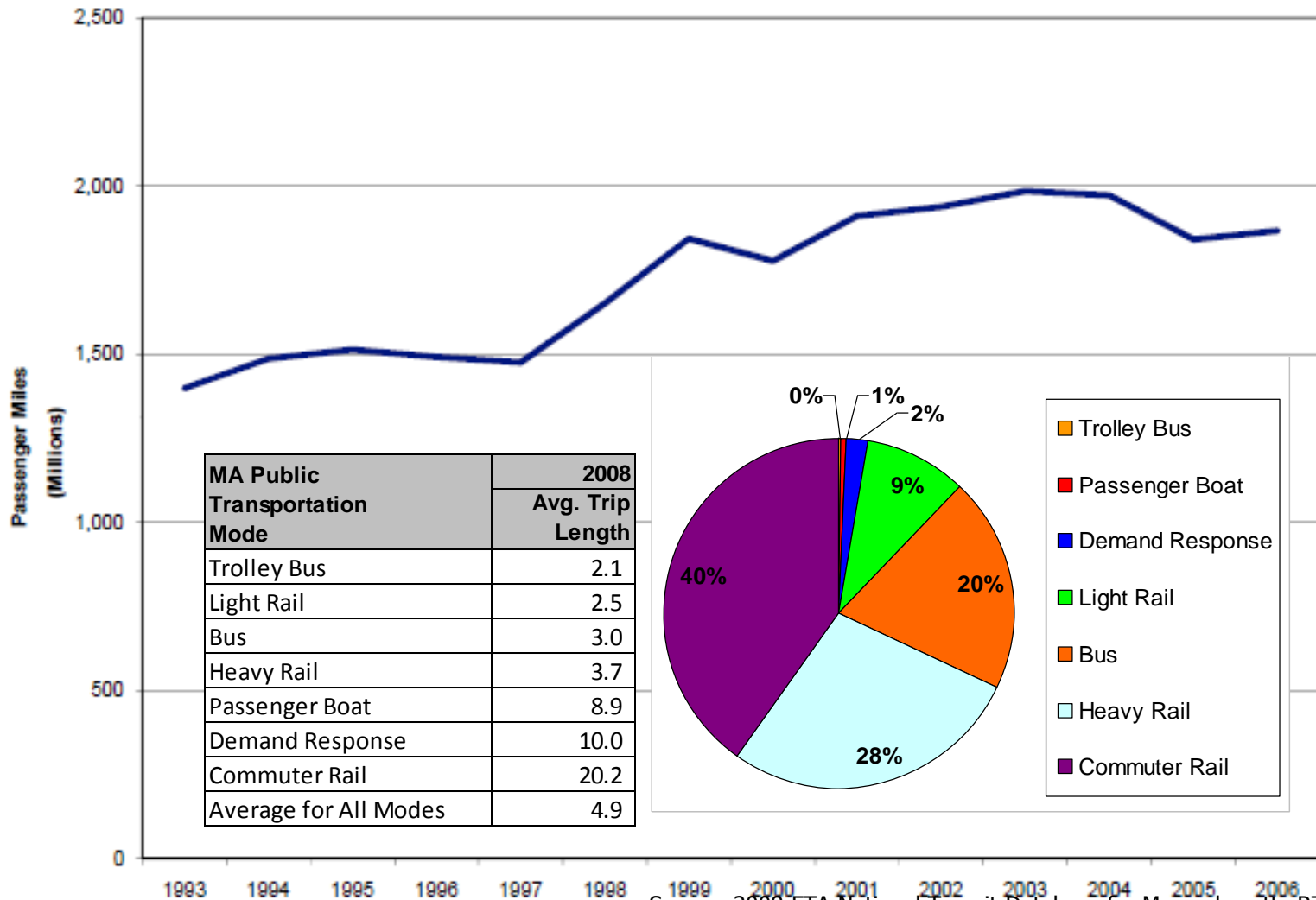
Source: MassDOT Highway Performance Monitoring System for Daily VMT and FHWA(VM-2) Highway Statistics Report, BTS 2009

# Density of Daily Vehicle-Miles by Community



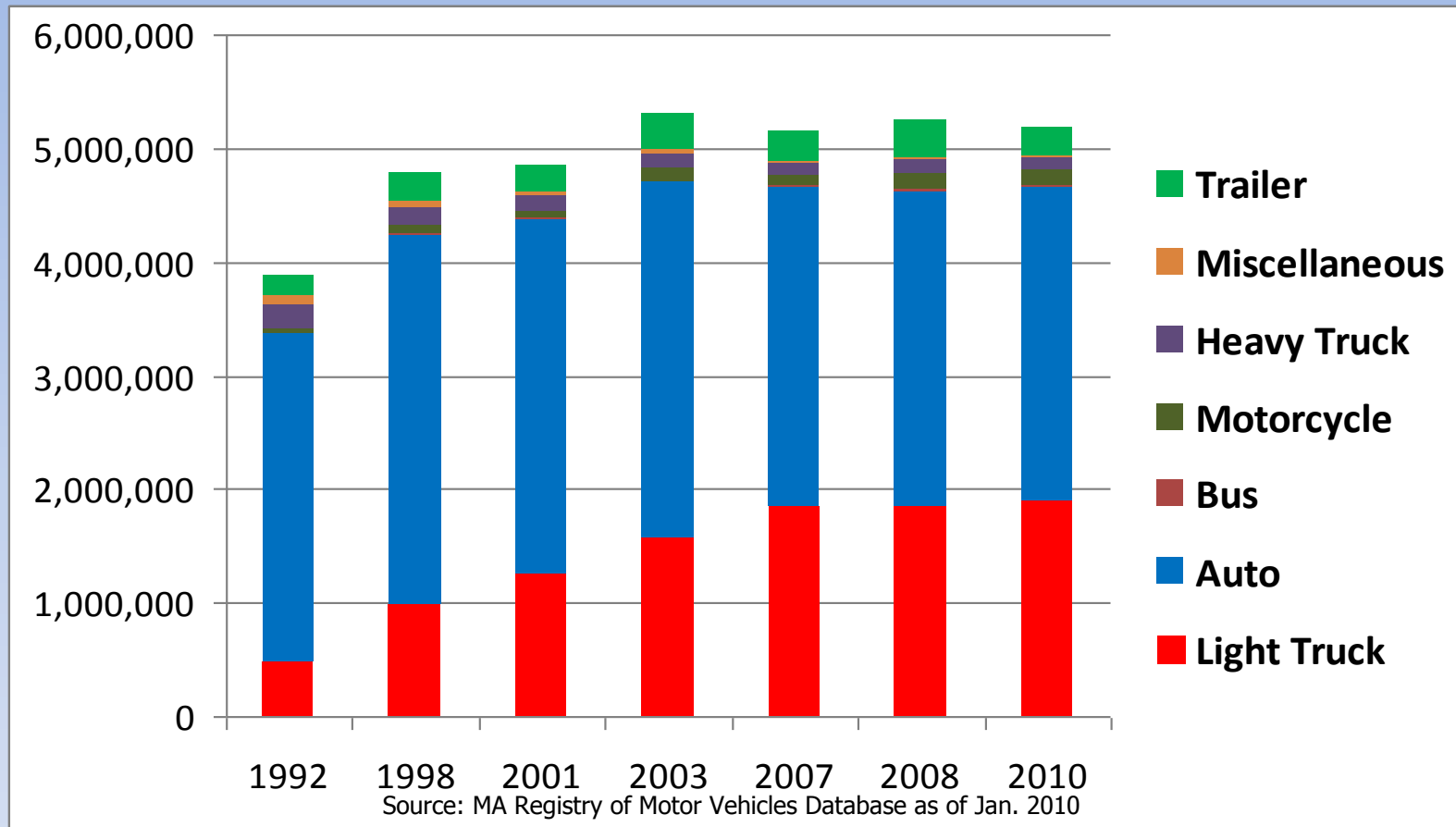


# 2008 Transit Passenger Miles of Travel in MA



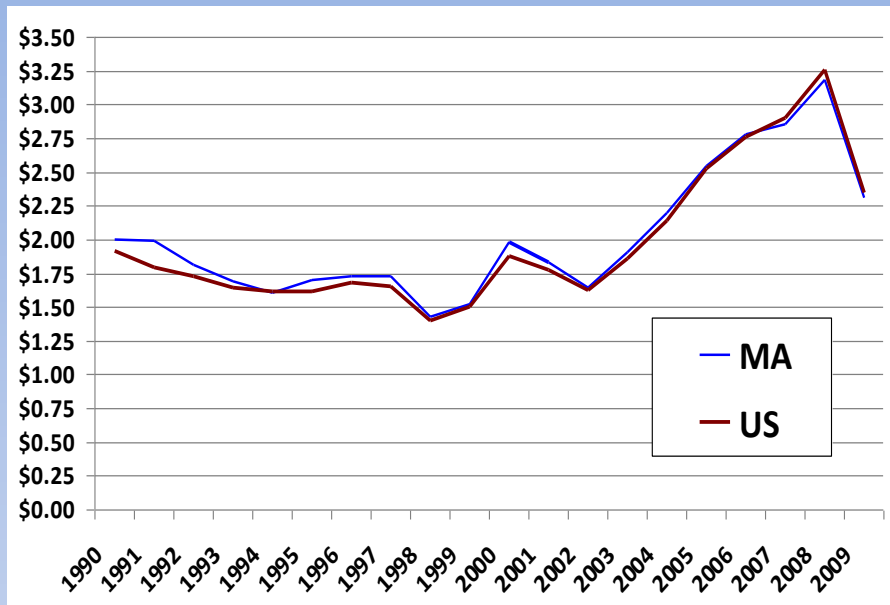
Source: 2008 FTA National Transit Database for Massachusetts RTAs

# MA Vehicle Registrations Since 1992



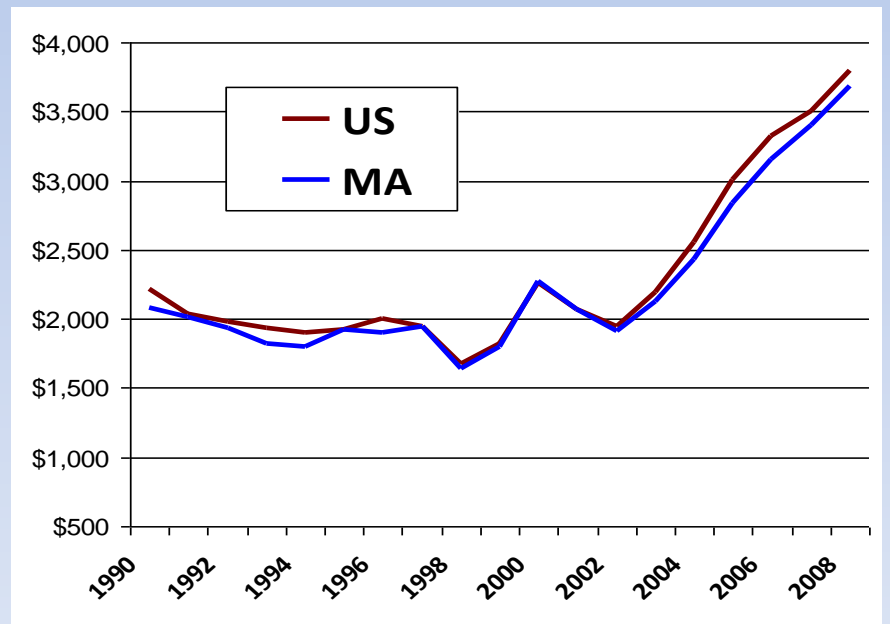
- MA vehicle registrations grew significantly through the 1990s
- Light truck registrations have grown greatly, even after totals leveled off

# Average Historical Gas Prices in 2009 Dollars

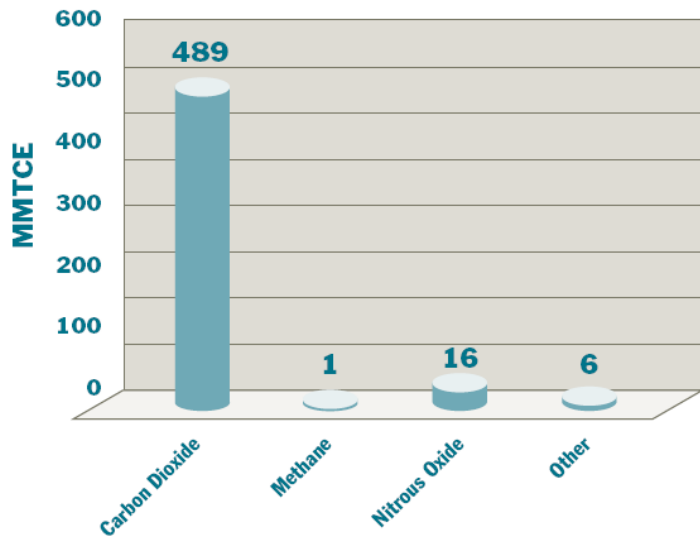


# Annual Cost of Gas per Household (2009 \$)

- Gas prices increased steadily until a sharp drop in 2008
- Sharp increase in cost per household through 2000s



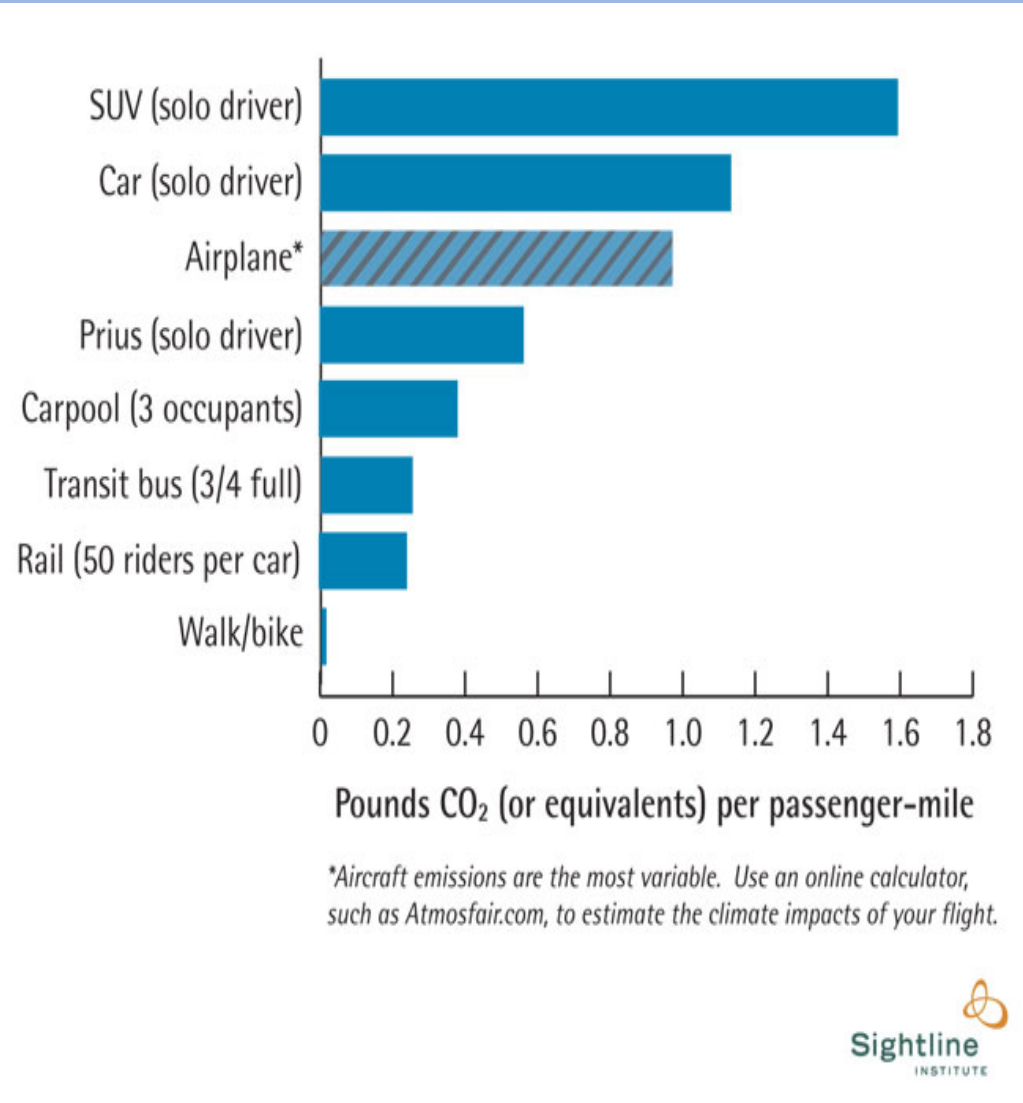
# Green House Gas Emissions by Mode



MMTCE = million metric tons of carbon-equivalent

Source: U.S. EPA, 2002.

Source: Pew Center for Climate Change: Reducing GHG Emissions from U.S. Transportation, May 2003



Pounds CO<sub>2</sub> (or equivalents) per passenger-mile

\*Aircraft emissions are the most variable. Use an online calculator, such as Atmosfair.com, to estimate the climate impacts of your flight.

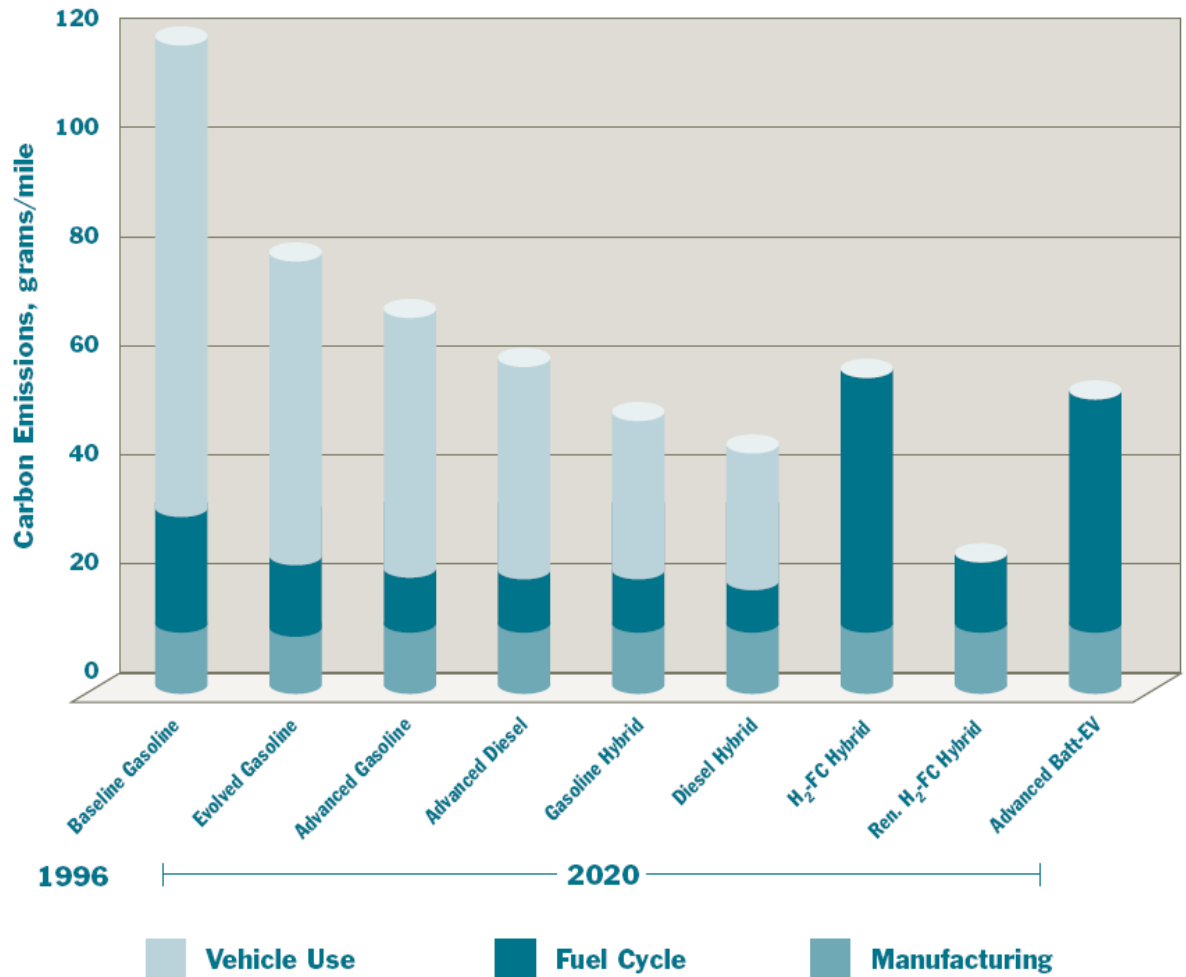
Source: Sightline Institute website, March 2010



**Global Warming Solutions Act**

# “Well to Wheel” Carbon Emissions by Fuel Type

- Fuel technology improvements reducing vehicle carbon emissions
- Fuel cycle carbon emissions expected to increase
- Carbon emissions from manufacturing not expected to change



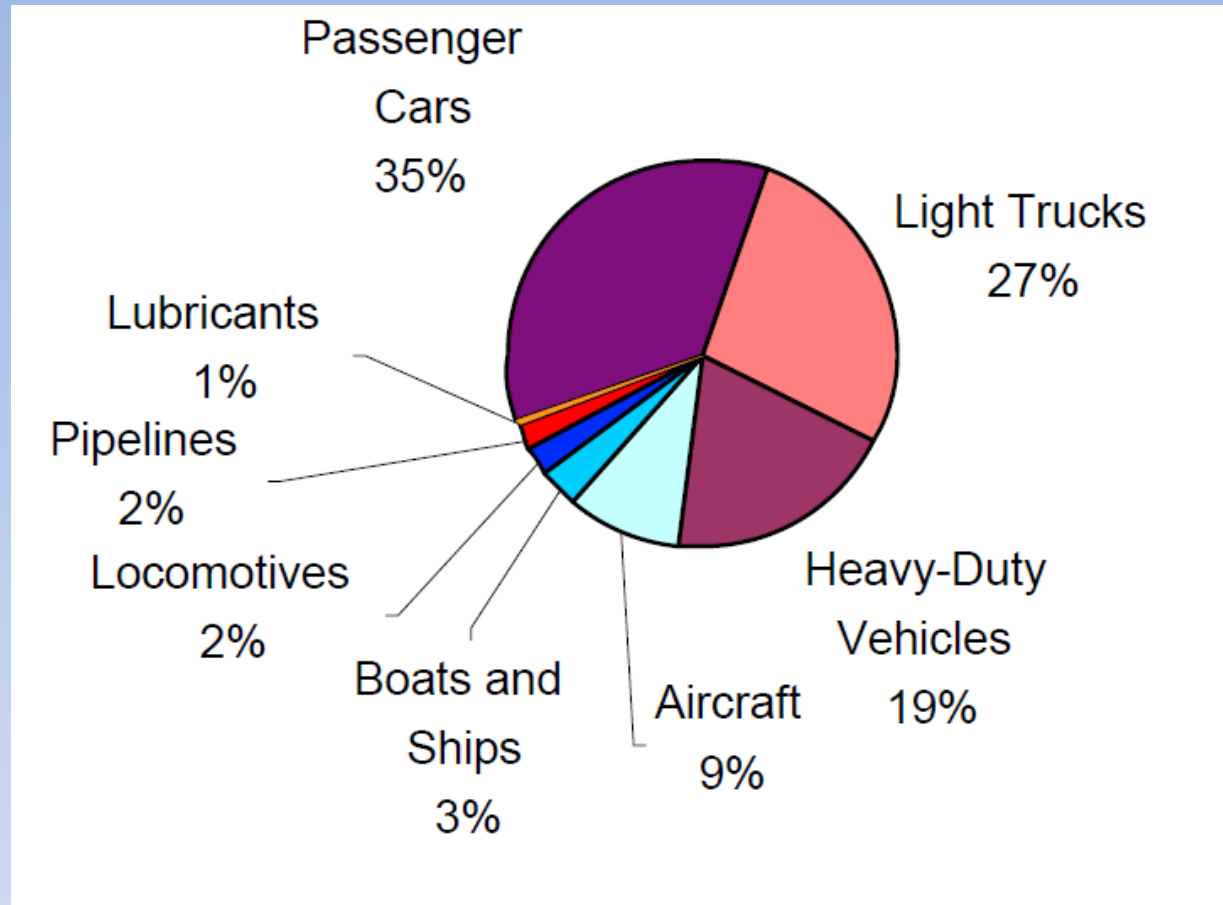
Notes: For the H<sub>2</sub>-FC Hybrid, the hydrogen fuel is produced from natural gas. For the Ren. H<sub>2</sub>-FC Hybrid, the hydrogen is produced from electrolysis using renewable power, but is compressed using a mix of power sources from the grid.

Source: Weiss, M., et al. (2000).

Source: Pew Center for Climate Change: Reducing GHG Emissions from U.S. Transportation , May 2003

# Carbon Emissions by Transportation Mode in the United States

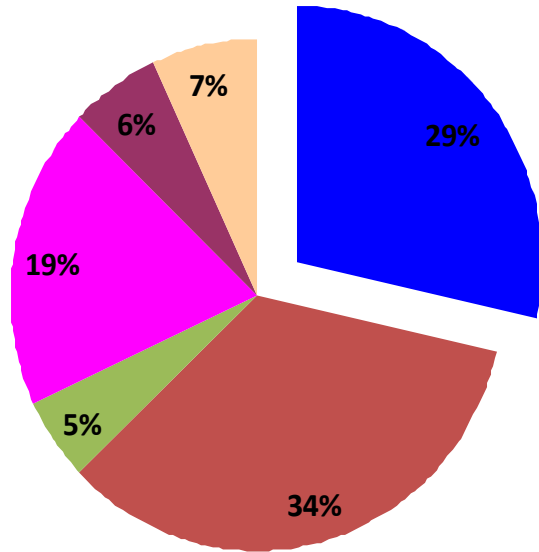
- Roadway emissions account for over 80% of transportation emissions
- Cars and light trucks account for over 60% of transportation emissions



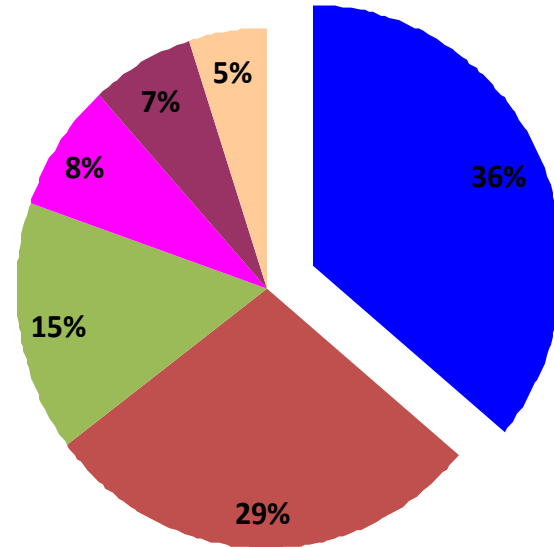
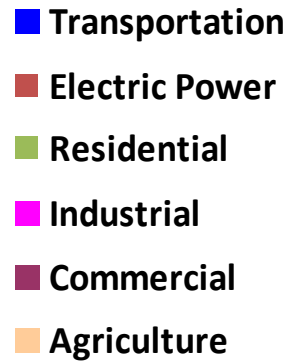
Source: Greenhouse Gas Emissions from the US Transportation Sector 1990-2003, EPA Office of Air Quality March 2006

# Share of Carbon Emissions by Sector in 2005

United States



Massachusetts

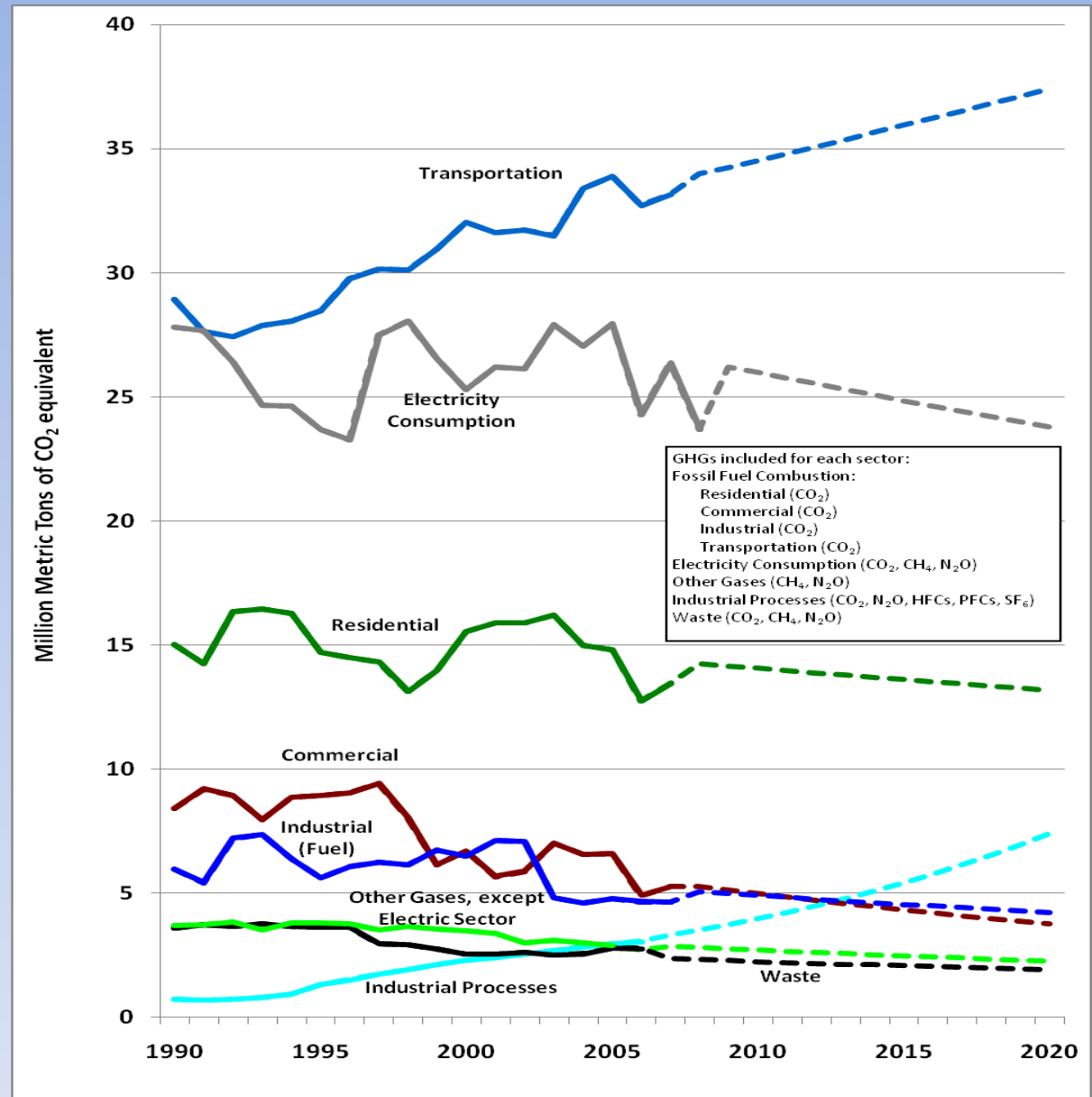


Source: Emission estimates are based on 2005 energy consumption data from EIA's State Energy Consumption, Price, and Expenditure Estimates (SEDS) . CO2 Emissions from Fossil Fuel Combustion - Million Metric Tons CO2 (MMTCO2) by sector as a percent of total emissions.

- Transportation is largest share of CO2 emissions in Massachusetts
- Transportation accounts for larger share of CO2 emissions than national average due to lower level of industrial and electric power emissions

# Carbon Emissions by Sector in Massachusetts

- Transportation has long been greatest CO2 emitter in Massachusetts
- Transportation emissions expected to continue to grow under “business as usual” scenario



Source: Statewide Greenhouse Gas Emissions Levels: 1990 Baseline and 2020 Business as Usual Projections, MA DEP July 1<sup>st</sup>, 2009



# MassDOT Policies and Initiatives for Reducing GHG

- GWSA coordination and implementation
- Transportation planning and project programming to reduce GHG and promote smart growth
- Complete Streets design standards to accommodate all modes
- Promotion of healthy transportation modes: walking, bicycling, public transit

# Discussion