WHERE WE STAND

An Update from

EAST-WEST GATEWAY
Council of Governments

Creating Solutions Across Jurisdictional Boundaries

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# WHERE WE STAND UPDATE: TRANSPORTATION EMISSIONS

**Since its first publication in 1990, *Where We Stand* has come to be recognized as an authoritative source of information about the competitive position of the St. Louis region in the national marketplace. We track over 100 variables that together tell a story about the health of our region compared to 34 peer MSAs.[1] These regions are our domestic competition and provide a consistent yardstick to gauge "Where We Stand." Now in its sixth edition, *Where We Stand* is issued about every three years with periodic updates in between each publication. These briefings provide an opportunity to update the St. Louis region's standing with new data or provide further insight on a specific topic. This issue introduces new indicators, comparing St. Louis to the 34 peer regions on vehicle miles traveled (VMT) and transportation-related emissions.**

## Transportation-Related Emissions

According to the EPA, transportation accounts for approximately 27 percent of all greenhouse gas (GHG) emissions nationwide, making it the second largest contributing sector.[2] The industrial sector is the largest, contributing 30 percent, with residential, commercial, and agriculture comprising the remaining 43 percent. Over the last 20 years, the transportation sector had the highest absolute increase in emissions of the five sectors.[3]

In the St. Louis region, transportation-related emissions are substantial. The average St. Louis metro resident emitted 1.71 tons of carbon dioxide from highway transportation in 2005, which is higher than the average of the 100 largest metro areas (1.31 tons per capita) and higher than the national average (1.44 tons per capita).[4]

Based on estimates of travel by residents on all roads in 2007, the St. Louis region had 8.54 tons of transportation-related GHG emissions per household. In comparison to our 34 peer regions, the St. Louis MSA ranks 14th, which is 0.15 tons above the peer average of 8.29 tons per household. This measure of GHG emissions is based on national average fuel efficiency and average emissions factor per gallon of gasoline.

***Greenhouse gases are compounds that prevent heat from escaping the earths' atmosphere, and are created by both natural and man-made processes. The primary types of GHG emissions are carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$).[5] Each gas has a unique ability to trap heat, which is measured by its Global Warming Potential (GWP). Total GHG emissions are measured in carbon dioxide equivalents, which are calculated by converting each gas according to its GWP.***

Transportation GHG Emissions
Tons per Household, 2007

| | | |
|---|---|---|
| 1 | Nashville | 9.43 |
| 2 | Atlanta | 9.43 |
| 3 | Charlotte | 9.15 |
| 4 | Kansas City | 8.97 |
| 5 | Austin | 8.89 |
| 6 | Cincinnati | 8.89 |
| 7 | Indianapolis | 8.78 |
| 8 | Columbus | 8.67 |
| 9 | Minneapolis | 8.65 |
| 10 | Oklahoma City | 8.62 |
| 11 | Dallas | 8.58 |
| 12 | Salt Lake City | 8.56 |
| 13 | Memphis | 8.55 |
| **14** | **St. Louis** | **8.54** |
| 15 | Houston | 8.48 |
| 16 | Louisville | 8.44 |
| 17 | Washington, DC | 8.39 |
| 18 | San Diego | 8.36 |
| 19 | San Antonio | 8.35 |
| **Average** | | **8.29** |
| 20 | Phoenix | 8.27 |
| 21 | Baltimore | 8.25 |
| 22 | Pittsburgh | 8.20 |
| 23 | Detroit | 8.12 |
| 24 | Portland | 8.11 |
| 25 | Boston | 8.05 |
| 26 | Milwaukee | 8.01 |
| 27 | Seattle | 8.00 |
| 28 | Cleveland | 7.95 |
| 29 | Philadelphia | 7.67 |
| 30 | Chicago | 7.66 |
| 31 | Denver | 7.48 |
| 32 | Miami | 7.45 |
| 33 | San Francisco | 7.43 |
| 34 | Los Angeles | 7.20 |
| 35 | New York | 6.48 |

Source: Center for Neighborhood Technology

1 The U.S. Census Bureau defines a MSA, or metropolitan statistical area, as "that of a large population nucleus, together with adjacent communities having a high degree of social and economic integration with that core. MSAs comprise one or more counties…the Office of Management and Budget (OMB) defines metropolitan areas for purposes of collecting, tabulating, and publishing federal data. Metropolitan area definitions result from applying published standards to Census Bureau data."

2 *Fast Facts: U.S. Transportation Sector Greenhouse Gas Emissions 1990 – 2010*, Office of Transportation and Air Quality, EPA, 2012.

3 The EPA study provides one analysis of GHG emissions. Other methods and parameters are used to analyze GHG emissions, which produce different results.

4 Brown, Marilyn A., Frank Southworth, and Andrea Sarzynski. *Shrinking the Carbon Footprint of Metropolitan America*. Metropolitan Policy Program at Brookings, 2008.

5 *Inventory of U.S. Greenhouse Emissions 1990 – 2010*, EPA, 2012.

CHANGE IN AVERAGE DAILY VMT ON FREEWAYS AND ARTERIALS,

Percent Change, 1991 - 2011

| | | |
|---|---|---|
| 1 | Charlotte | 208.8 |
| 2 | Austin | 131.2 |
| 3 | Nashville | 99.0 |
| 4 | Phoenix | 89.6 |
| 5 | Cincinnati | 82.8 |
| 6 | Atlanta | 81.9 |
| 7 | Miami | 80.7 |
| 8 | San Antonio | 79.5 |
| 9 | Columbus | 78.2 |
| 10 | Denver | 77.5 |
| 11 | Houston | 72.7 |
| 12 | Washington, DC | 67.8 |
| **13** | **St. Louis** | **67.0** |
| **Average** | | **62.2** |
| 14 | Louisville | 61.8 |
| 15 | Indianapolis | 61.6 |
| 16 | New York | 61.5 |
| 17 | Dallas | 60.9 |
| 18 | Memphis | 59.2 |
| 19 | Oklahoma City | 58.1 |
| 20 | Minneapolis | 56.9 |
| 21 | Portland | 52.4 |
| 22 | Chicago | 48.5 |
| 23 | Salt Lake City | 48.3 |
| 24 | Seattle | 47.1 |
| 25 | Boston | 46.0 |
| 26 | Philadelphia | 45.0 |
| 27 | Kansas City | 43.2 |
| 28 | Baltimore | 42.2 |
| 29 | Cleveland | 40.2 |
| 30 | Milwaukee | 34.3 |
| 31 | San Diego | 33.9 |
| 32 | San Francisco | 21.0 |
| 33 | Detroit | 17.8 |
| 34 | Los Angeles | 13.8 |
| 35 | Pittsburgh | 5.0 |

Source: Urban Mobility Report, 2012, Texas Transportation Institute

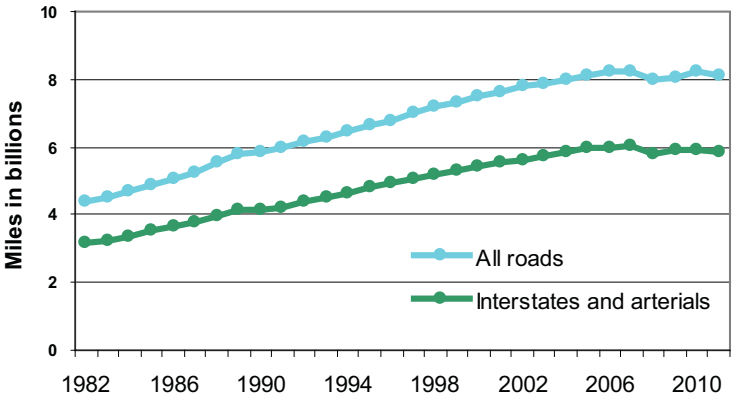
CHANGE IN AVERAGE DAILY VMT ON FREEWAYS AND ARTERIALS,

Percent Change, 2001 - 2011

| | | |
|---|---|---|
| 1 | Charlotte | 46.7 |
| 2 | Austin | 35.9 |
| 3 | Phoenix | 26.5 |
| 4 | Nashville | 26.1 |
| 5 | Washington, DC | 25.1 |
| 6 | New York | 22.2 |
| 7 | Portland | 20.8 |
| 8 | Cincinnati | 20.2 |
| 9 | Columbus | 19.3 |
| 10 | Miami | 19.2 |
| 11 | San Antonio | 18.3 |
| 12 | Oklahoma City | 18.0 |
| 13 | Chicago | 18.0 |
| 14 | Indianapolis | 17.7 |
| 15 | Louisville | 17.0 |
| 16 | Denver | 15.9 |
| 17 | Milwaukee | 15.2 |
| **Average** | | **15.2** |
| 18 | Salt Lake City | 14.5 |
| 19 | Boston | 14.2 |
| **20** | **St. Louis** | **13.7** |
| 21 | Seattle | 13.6 |
| 22 | Baltimore | 12.3 |
| 23 | Philadelphia | 11.0 |
| 24 | Houston | 10.7 |
| 25 | Dallas | 10.5 |
| 26 | Memphis | 10.3 |
| 27 | Cleveland | 9.7 |
| 28 | San Francisco | 8.7 |
| 29 | Minneapolis | 7.2 |
| 30 | Atlanta | 6.4 |
| 31 | San Diego | 6.0 |
| 32 | Kansas City | 5.4 |
| 33 | Los Angeles | 0.9 |
| 34 | Detroit | -1.9 |
| 35 | Pittsburgh | -4.4 |

Source: Urban Mobility Report, 2012, Texas Transportation Institute

**Figure 1: Average Daily VMT in the United States, 1982-2011**




Source: Traffic Volume Trends, Federal Highway Administration

Note: VMT on interstates and arterials from 1982 to 1989 is based on VMT for all roads multiplied by the average proportion of VMT driven on freeways and arterials from 1990 to 2011.

## Change in Traffic Volume

Traffic volume is one of the key determinants of GHG emissions from transportation. Traffic volume is measured by the total number of miles traveled by each vehicle, also known as Vehicle Miles Traveled (VMT). For comparison between the peer metro regions, the best available data on traffic volume is VMT on freeways and arterial roads in each metro region's "urban area," as defined by the Texas Transportation Institute.

Over the last twenty years, the average daily VMT on freeways and arterials in St. Louis increased from just under 30 million miles per day in 1991 to about 50 million miles per day in 2011, a 67.0 percent increase. The increase in average daily VMT in St. Louis is just above the average increase for the 35 peer regions.

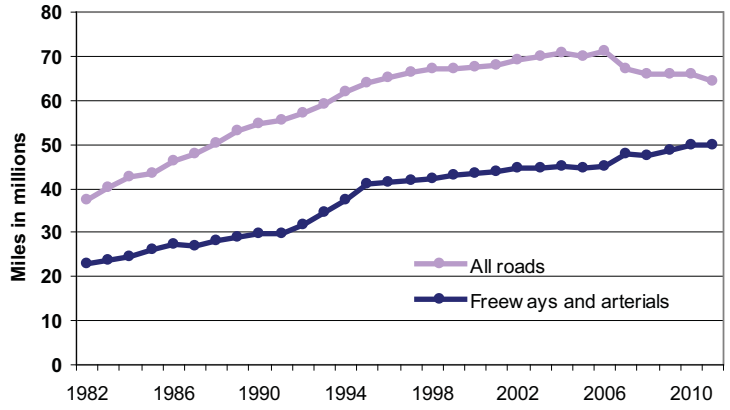
In the last ten years the growth in average daily VMT slowed in the peer regions. From 1991 to 2001 the peer region average increase in VMT was 39.7 percent, whereas from 2001 to 2011 the peer region average increase was only 15.2 percent. St. Louis also experienced this trend, with a 46.9 percent increase in VMT from 1991 to 2001, compared to a 13.7 percent increase from 2001 to 2011. The St. Louis region had slightly lower growth in average daily VMT than peer regions from 2001 to 2011.

Nationwide, VMT on all roads and on interstates and arterials increased almost every year between 1982 and 2011, with several annual decreases since 2007 (See Figure 1). The total growth in VMT for both road categories over this time span was approximately 86 percent.

In the St. Louis region, VMT on all roads and on freeways and arterials has stagnated or declined in recent years (See Figure 2).[6] Between 1982 and 2011, VMT on all roads grew by 72.5 percent, with an average annual increase of 3.4 percent between 1982 and 2000, and an average annual decline of 0.4 percent between 2000 and 2011. VMT on freeways and arterials grew by 116.6 percent between 1982 and 2011, with an average annual increase of 2.6 percent between 1982 and 2000 and an average annual increase of 1.3 percent between 2000 and 2011.

6 VMT data on all roads is based on the eight county region, and VMT data on freeways and arterials is based on a slightly smaller "urban area" defined by the Texas Transportation Institute.

**Figure 2: Average Daily VMT in the St. Louis Region, 1982-2011**




Source for all roads: HPMS, Federal Highway Administration
Source for freeways and arterials: Urban Mobility Report, Texas Transportation Institute

AVERAGE DAILY VMT PER CAPITA ON FREEWAYS AND ARTERIALS, 2011

| | | |
|---|---|---|
| 1 | Oklahoma City | 24.1 |
| 2 | Houston | 23.1 |
| 3 | Indianapolis | 23.1 |
| 4 | Nashville | 23.0 |
| 5 | Kansas City | 21.4 |
| 6 | Charlotte | 21.4 |
| **7** | **St. Louis** | **21.3** |
| 8 | Atlanta | 21.3 |
| 9 | Columbus | 21.2 |
| 10 | San Antonio | 20.8 |
| 11 | Detroit | 20.6 |
| 12 | Dallas | 20.3 |
| 13 | Memphis | 20.2 |
| 14 | San Francisco | 20.1 |
| 15 | Louisville | 20.0 |
| 16 | Minneapolis | 19.7 |
| 17 | Washington, DC | 19.5 |
| 18 | Los Angeles | 19.3 |
| **Average** | | **19.1** |
| 19 | San Diego | 19.1 |
| 20 | Cincinnati | 19.0 |
| 21 | Denver | 18.6 |
| 22 | Seattle | 18.6 |
| 23 | Cleveland | 18.1 |
| 24 | Boston | 17.9 |
| 25 | Baltimore | 17.9 |
| 26 | Milwaukee | 17.8 |
| 27 | Phoenix | 17.6 |
| 28 | Austin | 17.6 |
| 29 | Miami | 17.2 |
| 30 | Salt Lake City | 16.4 |
| 31 | Pittsburgh | 15.7 |
| 32 | Portland | 15.1 |
| 33 | Philadelphia | 14.9 |
| 34 | Chicago | 13.3 |
| 35 | New York | 12.1 |

Source: Urban Mobility Report, 2012, Texas Transportation Institute

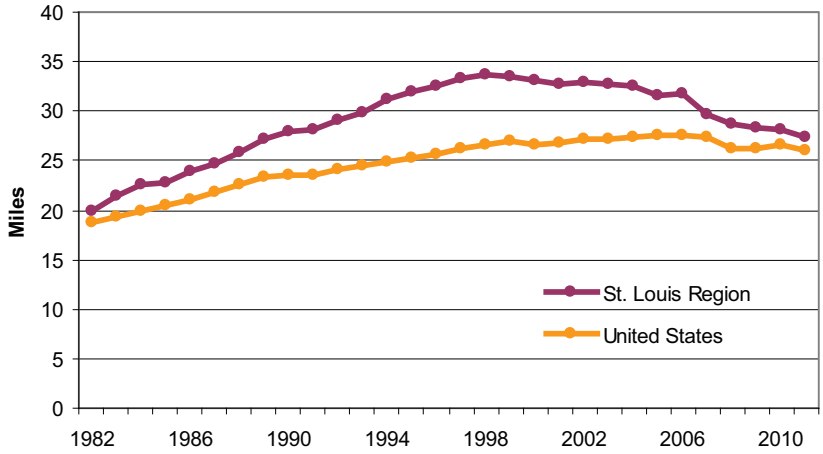
## VMT per Capita

Traffic volume is affected by many factors, including population, density, household size, car ownership, labor force participation, the economy, and gas prices. Per capita VMT reflects the combined effect of factors other than population size, and enables comparison between regions. In 2011, the average St. Louis resident drove 21.3 miles per day on freeways and arterials, ranking 7th among the peer regions, and 2.2 miles per day higher than the peer region average.

Over the last several decades VMT per capita on all roads in the St. Louis region had a greater increase than the United States followed by a greater decline than the United States (See Figure 3). Average daily VMT per capita peaked in the St. Louis region in 1998 at 33.6 miles per day, and declined by 18.6 percent to 27.4 miles per day in 2011. In the U.S., average daily VMT per capita peaked in 2005 at 27.5 miles per day, with a decline of 5.3 percent to 26.1 miles per day in 2011. Both the St. Louis region and the United States had similar overall increases in VMT over this time span, with a 37.7 percent increase in average daily VMT per capita in St. Louis and a 38.3 percent increase in the United States.

Unlike the United States, which had a decline of 3.4 percent in average daily VMT per capita on interstates and arterials from 2001 to 2011, the peer metro regions averaged a slight increase of 1.1 percent. In St. Louis, the average daily VMT per capita increased 0.7 percent, ranking 16th among the 35 peer regions.

**Figure 3: Average Daily VMT Per Capita, 1982-2011**




Sources: HPMS, Federal Highway Administration; Traffic Volume Trends, Federal Highway Administration; and Resident Population Estimates, U.S. Census Bureau

CHANGE IN AVERAGE DAILY VMT PER CAPITA ON FREEWAYS AND ARTERIALS,

Percent Change 2001 - 2011

| | | |
|---|---|---|
| 1 | Charlotte | 18.6 |
| 2 | Cleveland | 15.2 |
| 3 | Chicago | 11.7 |
| 4 | New York | 11.0 |
| 5 | Washington, DC | 9.3 |
| 6 | Miami | 7.9 |
| 7 | Milwaukee | 7.8 |
| 8 | Cincinnati | 7.8 |
| 9 | Philadelphia | 5.7 |
| 10 | Columbus | 5.5 |
| 11 | San Francisco | 4.2 |
| 12 | Boston | 4.1 |
| 13 | Salt Lake City | 2.6 |
| 14 | Detroit | 2.1 |
| 15 | Memphis | 2.1 |
| **Average** | | **1.1** |
| **16** | **St. Louis** | **0.7** |
| 17 | Baltimore | 0.2 |
| 18 | Denver | 0.0 |
| 19 | Portland | -0.2 |
| 20 | Phoenix | -0.3 |
| 21 | Indianapolis | -1.7 |
| 22 | Houston | -2.6 |
| 23 | Oklahoma City | -2.8 |
| 24 | Austin | -3.0 |
| 25 | Pittsburgh | -4.1 |
| 26 | San Antonio | -4.3 |
| 27 | Los Angeles | -5.0 |
| 28 | Kansas City | -5.2 |
| 29 | Seattle | -5.3 |
| 30 | Minneapolis | -5.5 |
| 31 | San Diego | -5.6 |
| 32 | Atlanta | -6.1 |
| 33 | Nashville | -6.4 |
| 34 | Louisville | -7.2 |
| 35 | Dallas | -12.6 |

Source: Urban Mobility Report, 2012, Texas Transportation Institute

## Conclusion

The St. Louis region has higher transportation-related GHG emissions and higher VMT per capita than the peer region average. However, VMT and VMT per capita in St. Louis have increased slowly or declined in recent years, paralleling the slower growth in VMT found in the peer regions and nationally. There are several factors that make it likely that VMT will continue this slower growth pattern, including the projected continuation of high gasoline prices, the aging of the workforce, and the increasing preferences of younger generations for less auto-oriented lifestyles.[7]

The slower growth in VMT should have a positive effect on GHG emissions, since smaller increases in driving will limit the increase in GHG emissions from transportation. To eliminate increases in transportation-related emissions a variety of strategies are necessary, including increasing fuel efficiency, supporting alternative fuel vehicles, and promoting alternative modes of transportation.

These strategies and the overall reduction in VMT present an obstacle for transportation funding. The slower growth in VMT has reduced gasoline tax revenue, the primary source of funding for highways, which is already strained due to increases in fuel efficiency and the effects of inflation.[8] The reduction in gas tax revenue has made it more difficult to finance transportation projects and the projected continuation of slow growth in VMT will increase this strain. However, the slow growth in VMT also presents an opportunity to consider alternative transportation options and funding sources to provide a better transportation system.

7 Dutzik, Tony and Phineas Baxandall. A New Direction: Our Changing Relationship with Driving and the Implications for America's Future. U.S. PIRG Education Fund and Frontier Group, 2013.

8 Ibid.