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Driving Commuter Choice in America

Expanding Transportation Choices Can Reduce Congestion, Save Money and Cut Pollution

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Our nation's "driving boom" may be going bust. Americans have been driving more and more miles each year since World War II,[1] but in 2004 that trend began to reverse. Yet Americans still drive a lot of miles. In fact, for the past decade, we have averaged close to three trillion miles a year, according to the U.S. Department of Transportation—enough to get to the sun and back more than 16,000 times.[2]

With rising gas prices, drivers stuck with long commutes are burning up their time and money. They are also burning up the atmosphere. Personal transportation use—driving cars, trucks, SUV's to and from work, school, shopping and recreation—is responsible for about 20 percent of all greenhouse gas emissions (GHG) in the United States.[3]

This study examines opportunities for Americans to reduce the impacts of transportation by altering how often we drive, particularly when it comes to commuting. The focus is on opportunities and potential outcomes for individual and combined changes to driving behavior, which can lead to substantial cost savings and other benefits.

Specifically, this analysis identifies and describes typical characteristics of segments of the U.S. population, based on where people live and whether they regularly commute by car; it outlines some individual actions that people can take to reduce the amount of driving they do; it describes the potential impacts on travel activity and transportation spending from these individual actions for typical drivers from each segment; and it presents the potential aggregate effects on GHG emmissions and fuel use if large segments of the U.S. population were to adopt the recommended actions.

By adopting the strategies contained in the report, NRDC experts estimate that individuals can reduce their total annual vehicle miles traveled (VMT) by nearly 10 to 50 percent. Moreover, if commuters integrate carpooling, public transit, and telecommuting into their daily commutes, they could individually save more than $1,800 annually, according to this analysis. In fact, the four types of commuters in America—city, suburban, rural and town, and non-commuters—could see the greatest amount of savings between $400–$1,800 per person if they switched to carpooling every day. Savings from using more transit for commuting (rather than driving) range from nearly $450 to $600 per person annually. If 25 percent of Americans adopted one of these alternative commuting choices, we could reduce annual transportation greenhouse gas emissions by 3 to 12 percent, reduce transportation fuel use by billions of gallons per year, and save consumers tens of billions of dollars in transportation spending each year.

Recommended changes for individual commuters include:

- **Increase transit use:** Switching from driving to riding transit for the commute to and from work on four days each month (equal to eight one-way trips) can reduce driving costs by 14 to 26 percent.
- **Increase carpooling:** Switching to carpooling 20 days per month reduces the number of driving trips and vehicle miles traveled, and can reduce driving costs by about 40 to 50 percent.
- **Increase trip-chaining:** Combine trips (mostly by planning them in advance) to reduce non-commute driving by 75 percent per month could reduce driving costs by 10 to 15 percent.
- **Move closer to work:** Moving 25 percent closer to work would reduce daily vehicle miles traveled by about 20 percent and driving costs by about 20 to 25 percent.
- **Increase telecommuting:** Telecommuting four days each month could reduce driving costs by 11 to 14 percent. Although not all commuters have the opportunity to telecommute, a significant proportion of jobs could theoretically be accomplished away from the office; for others, increased carpooling can provide a similar effect.

Already, more Americans are moving to neighborhoods offering compact, walkable, transit-oriented neighborhoods. The integration of smarter land use and better transportation solutions will make our communities more sustainable while improving our infrastructure, lessening traffic congestion, decreasing oil dependence, reducing harmful air and climate pollution, and improving our quality of life. To move communities toward a future with more transportation choices, NRDC experts recommend the following policies:

- greater federal, state and local investment in alternatives to driving, most notably public transportation;
- metropolitan regional transportation and growth plans that blend transportation solutions and good growth, fostering more transit-friendly, walkable neighborhoods;
- federal tax incentives to encourage the use of public transportation incentive as opposed to tax breaks that help pay for parking near workplaces; and
- federal performance management requirements aimed at complementing our road network with more transit to open up more transportation choices for more commuters.

SEGMENTS OF TYPICAL AMERICAN TRAVELERS

To help identify how changes in travel behavior can lead to reduced negative impacts from driving, this report identifies four broad segments of American commuters.[4,5] Note that the segments are described in general terms so that readers can determine for themselves which group they best match.

City commuter: City commuters live in the urban parts of large metropolitan areas. For the purpose of this report, this category includes the entire population of city dwellers. This area is typically located within beltway highways, which surround several cities, and frequently features commercial and residential zones in close proximity, more grid streets with sidewalks, and smaller residences and yards. Cities tend to have more transit service than do suburban and rural areas—with more frequent "headways" for transit systems.

Suburban commuter: These commuters live in the outer portions of large metropolitan areas and are employed outside the home (meaning that they travel to and from work on a regular basis). Suburban areas tend to have separate residential and commercial zones, are outside beltline highways, and have more single-family housing. Transit usually serves these areas, but not as conveniently as in the urban sectors. Suburbs can also include small towns that have been enveloped by the expansion of a large metropolitan area.

Rural and town commuter: Rural and town commuters live outside urban and suburban areas, are employed outside the home, and regularly commute to work. They may work near where they live, but many have jobs in metropolitan regions that require them to travel farther—typically about 45 minutes, potentially longer in larger regions.
Rural areas tend to be outside city or town limits, and their populations are dispersed. Lots are usually large, and there is little or no transit service. Rural areas around large urban areas are frequently called "exurbs." A good rule of thumb is that areas more than 30 minutes driving time from urban downtown areas are probably rural.
Towns are the smaller communities that are not part of large metropolitan regions. They too tend to be more than 30 minutes from urban downtown areas. Towns tend to be older than suburbs and have a distinct downtown, grid streets, and walkable neighborhoods.

Suburban, rural, and town non-commuter: This category includes anyone not employed outside the home. It can include retirees, students, homemakers, teleworkers, and those with home businesses.

These segments are discrete, meaning that the entire U.S. population (16 years or older) fits into one of these segments, and a person can fall into only one segment. In other words, someone cannot simultaneously live in both a city and a rural area, or simultaneously be employed outside the home and not employed outside the home.

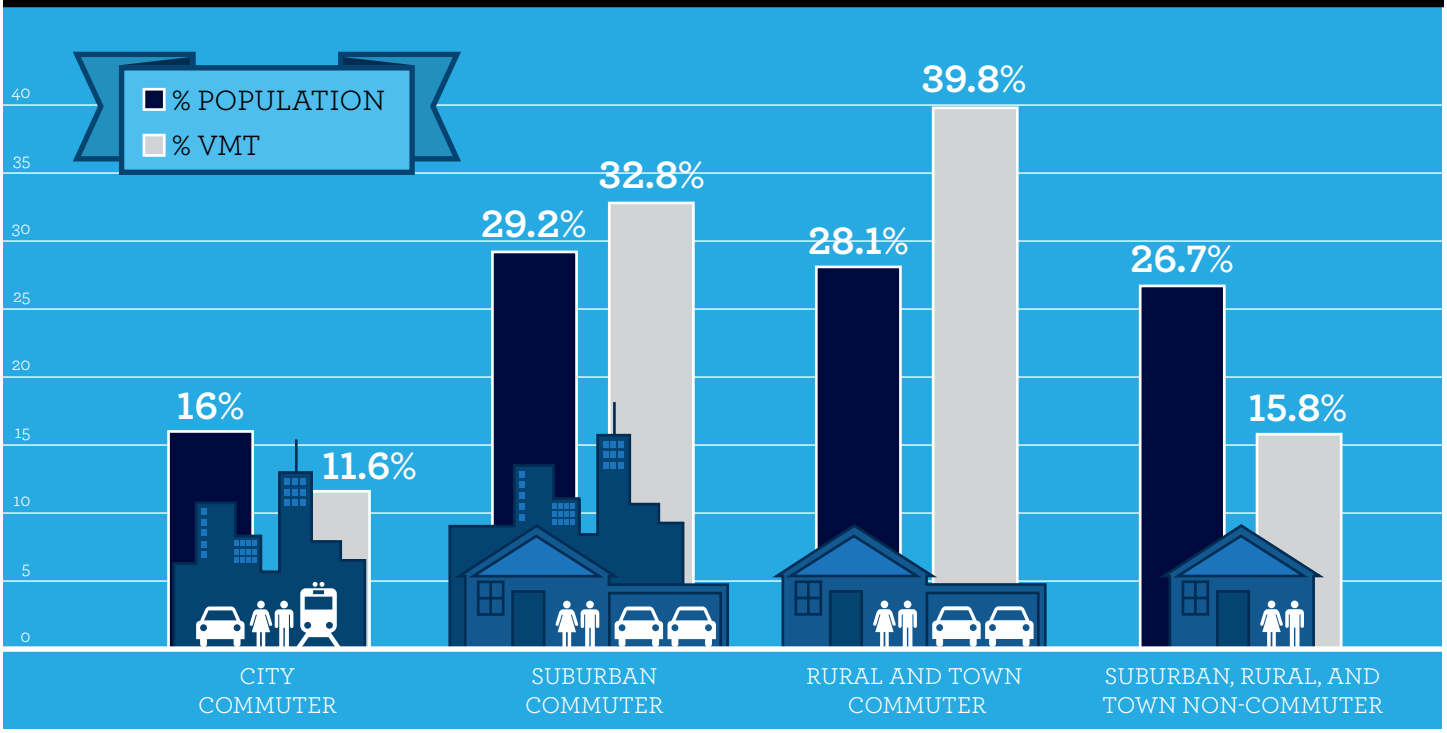
Table 1 shows the national totals for each segment. It summarizes how many people each segment represents, the share of total vehicle miles (VMT) traveled, and the GHG emissions from each segment.

Table 1: Aggregate Measures of Segments and Characteristics

Measure	City Commuter	Suburban Commuter	Rural & Town Commuter	Suburban, Rural, and Town Non-Commuter
Total population (million)	33.9	62.0	59.7	56.7
Percent of population	16.0%	29.2%	28.1%	26.7%
Total annual VMT (billion miles)	238	672	815	323
Percent of total VMT	11.6%	32.8%	39.8%	15.8%
Total annual CO_2 emissions (Mt)	111	311	385	164
Percent of total transportation CO_2 emissions	11.5%	32.0%	39.7%	16.9%

Source: 2009 National Household Travel Survey.

Figure 1: Shares of Population and Total Driving



Source: 2009 National Household Travel Survey.

Table 2 below shows the average (statistical mean) travel, transportation spending, and GHG emissions characteristics for the population of each segment. Terms that are not self-explanatory are defined here:

Public transit commute share: The portion of the population from each segment that used public transit eight or more times in the month prior to the survey.

Carpool commute share: The portion of the population from each segment that shared a ride to or from work at least once in the month prior to the survey. The other passenger(s) can be from the individual's family or part of a traditional carpool.

Telecommute share: The portion of the population from each segment that was employed outside the home but worked from home at least one day each month. Self-employed residents are not included.

Average annual operating costs: The annual vehicle miles traveled multiplied by 12.5 cents per mile. These costs include typical maintenance expenses, insurance, taxes, tires, etc. They do not include depreciation or fuel costs.

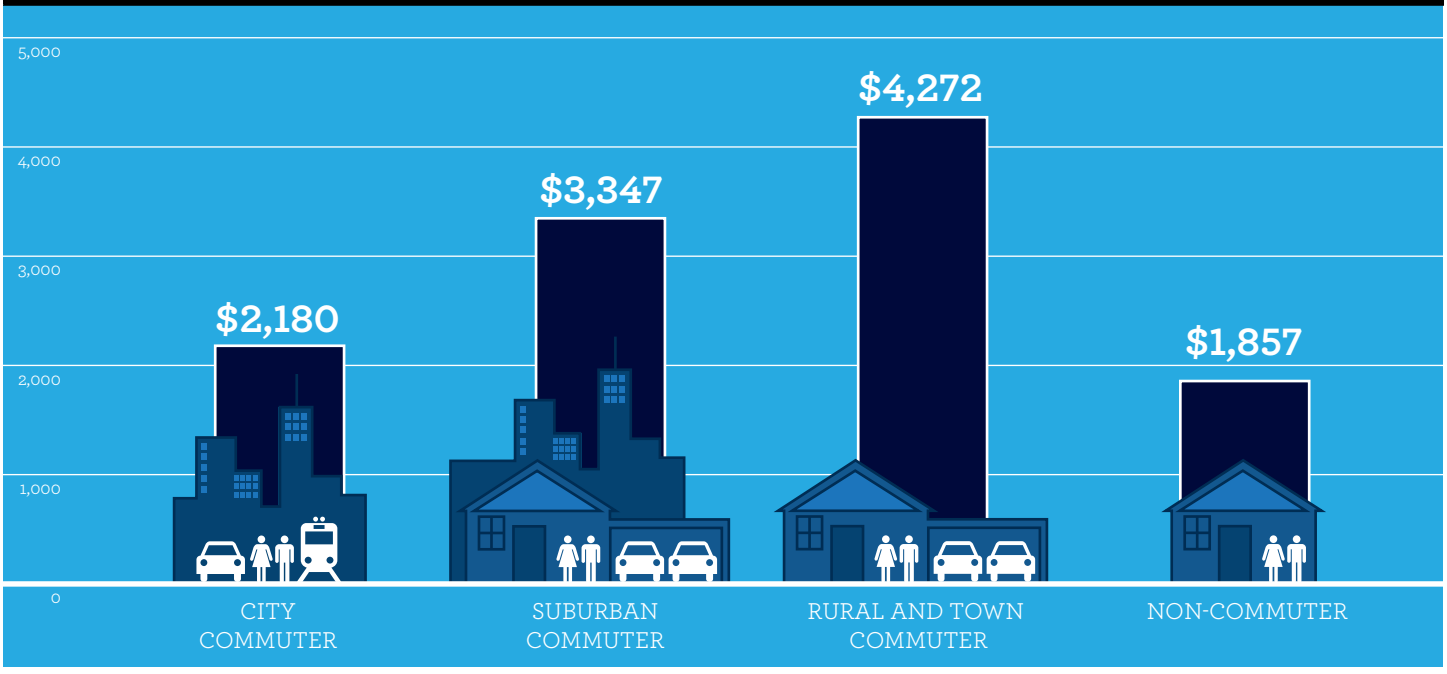
Average annual fuel costs: The annual vehicle miles traveled, divided by the fuel economy, then multiplied by the cost of fuel. For this report, we use $3.50 per gallon. Fuel prices have fluctuated substantially over the past few years, and these changes obviously affect spending on fuel. A higher fuel price would increase fuel costs and probably make the changes described in this report more attractive to more drivers.

Table 2: Average Individual Measures of Segments and Characteristics

Measure	City Commuter	Suburban Commuter	Rural & Town Commuter	Suburban, Rural, and Town Non-Commuter
Annual VMT (miles)	7,008	10,841	13,651	5,694
Average daily VMT (miles)	19.2	29.7	37.4	15.6
Public transit commute share	23.2%	6.3%	2.2%	3.5%
Carpool commute share	9.5%	15.1%	15.0%	--
Telecommute share (1+/month)	7.1%	18.1%	6.1%	--
Avg. annual vehicle operating cost (@ 12.5¢/mile)	$876	$1,354	$1,705	$710
Avg. annual fuel cost ($3.50/gallon)	$1,304	$1,993	$2,567	$1,147
Avg. annual driving costs (sum of operating and fuel costs)	$2,180	$3,347	$4,272	$1,857

Source: 2009 National Household Travel Survey.

Figure 2: Annual driving costs (typical traveler)[6]



Source: 2009 National Household Travel Survey.

PEOPLE CAN MAKE BETTER TRANSPORTATION CHOICES AND REDUCE THEIR VEHICLE MILES TRAVELED

Simply stated, by reducing vehicle travel, people spend less on fuel and other vehicle operating costs. The five actions detailed below are admittedly aggressive, but they promise the largest impacts on vehicle miles and costs. Each could also be adopted in a more modest form; this would achieve more modest results but might be easier to accomplish or more appealing to drivers wanting to test these changes before committing to them fully. Some actions have an impact only on the number of commuting trips; in these cases, comparable changes for non-commuters are given when possible.

Increase transit use: For those with access to it, each trip on public transportation reduces the number of driving trips and vehicle miles traveled.

- *Potential action*: Switch from driving to riding transit for the commute to and from work on four days each month (an increase equivalent to the average for city commuters); for non-commuters, the rough equivalent would be reducing daily vehicle travel by about 12.5 miles a day, four days a month (an 80 percent reduction in travel for those days).

Increase carpooling and van pooling: Switch to carpooling every day (20 days per month, although we assume that driving is shared between four participants); there is no comparable action for non-commuters.

- *Potential action:* Switch to carpooling every day (20 days per month); there is no comparable action for non-commuters.

Increase telecommuting: Telecommuting is working from home for a full day when otherwise typically employed outside the home. Although not all commuters have the opportunity to telecommute, a significant proportion of jobs could theoretically be accomplished away from the office; for others, increased carpooling can provide a similar effect.[7]

- *Potential action*: Telecommute four days each month. There is no comparable action for non-commuters.

Increase trip-chaining: Trip-chaining is combining trips—frequently by reducing separate non-work trips—so that overall travel is reduced. Examples include running errands on the way to or from work rather than as separate trips on weekends, evening, or during lunch breaks; i.e., stopping for groceries while on the drive home from work, rather than taking a separate trip from home. Nearly all drivers could reduce their overall travel by increasing trip-chaining.

- *Potential action:* Use trip-chaining (mostly by planning trips in advance) to reduce non-work travel by 75 percent per month, which would eliminate about 15 to 20 percent of average daily vehicle miles traveled.

Move closer to work: Living closer to where one works reduces the distance of commute trips, which makes up the largest component of daily vehicle miles traveled. Moving closer to work also makes biking and walking to work more viable options, both of which are low-cost, low-polluting options. This is probably the most challenging behavioral change because of the potential changes in non-travel costs (possibly higher rent or mortgage payments, smaller dwellings, etc.), and not all commuters could even make such a move. In current economic conditions, with more frequent job changes, people might consider simply moving closer to employment centers. This probably also means moving into areas with more diverse land uses, which could result in fewer non-work travel miles as well.

- *Potential action:* Move 25 percent closer to work. Non-commuters—who travel an average of 15.6 miles each day—could either move to reduce the distances they drive to regular or significant destinations, or find ways to trip-chain in order to reduce travel by a comparable amount. Moving 25 percent closer to work locations would reduce daily VMT by about 20 percent.

RESULTS OF INDIVIDUAL BEHAVIORAL CHANGES

Tables 3 to 6 show the changes to VMT and transportation costs that would occur for average individual drivers from each population segment. Results for the same actions vary between segments, but in general, the behavioral change of switching to carpooling generates the largest potential savings, while increasing transit use by eight trips per month and moving 25 percent closer to work offer the second- and third-highest savings, depending on the population segment. Trip-chaining and telecommuting have the fourth- and fifth-highest potential savings. The amount of savings is basically proportional to the amount spent on transportation: Rural and town commuters, with the highest average costs, also have the largest potential savings; non-commuters have the lowest costs and the lowest potential savings from individual actions.

These results were calculated using the summary information from Table 2 for each population segment and the estimated reduction in daily individual vehicle miles yielded by each behavior change. Savings in total driving costs are proportional to the amount of reduced VMT, although the costs are at slightly different rates because vehicle fuel economy is used to calculate the annual fuel cost savings.

Figure 3: Annual Individual Spending After Changes (City Commuters)

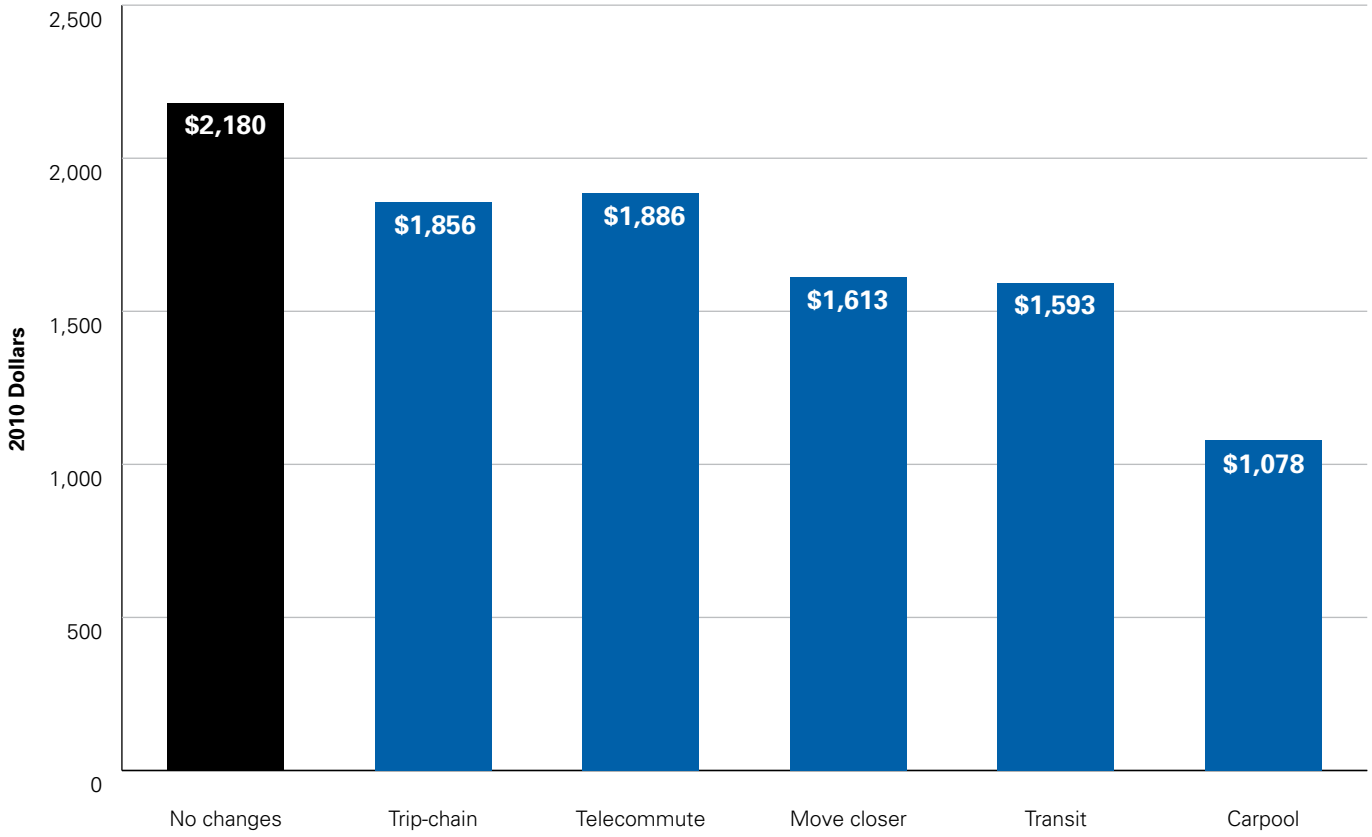


Table 3: Impact of City Commuters Taking Individual Actions

Individual Action	Average Annual VMT	Average Daily VMT	Annual Operating Costs	Annual Fuel Cost Savings	Total Driving Costs
Average values (with no action taken)	7,008	19.2	$876	$1,304	$2,180
Increase transit use by 8 trips/month	–1827	–5.0	–$228	–$340	–$568 (–26%)
Switch to all carpooling commutes	–3,541	–9.7	–$443	–$659	-$1,102 (–51%)
Telecommute 1 day/week	–944	–2.6	–$118	–$176	–$294 (–14%)
Increase trip-chaining	–1,040	–2.9	–$130	–$194	–$324 (–15%)
Move closer to work	–1,770	–4.9	–$221	–$329	–$550 (–25%)

Although carpooling appears to offer the greatest pocketbook savings for city commuters, these quantitative results could be a bit misleading. The average saving is calculated correctly—a city commuter who starts carpooling instead of driving alone will save about $1,100 per year. But because there is already higher transit usage and carpooling by city commuters, a smaller proportion of the population will be able to take this individual action. In addition to vehicle operating cost savings, reducing driving should also lead to less spending on total commute costs; these include parking, which averages $160/month for downtown areas. Also, less driving for commutes might allow households with more than one car to reduce the number of cars they own; doing so could further reduce spending (on payments, insurance, taxes, maintenance, etc.) by thousands of dollars per year.8

Figure 4: Annual Individual Spending After Changes (Suburban Commuters)

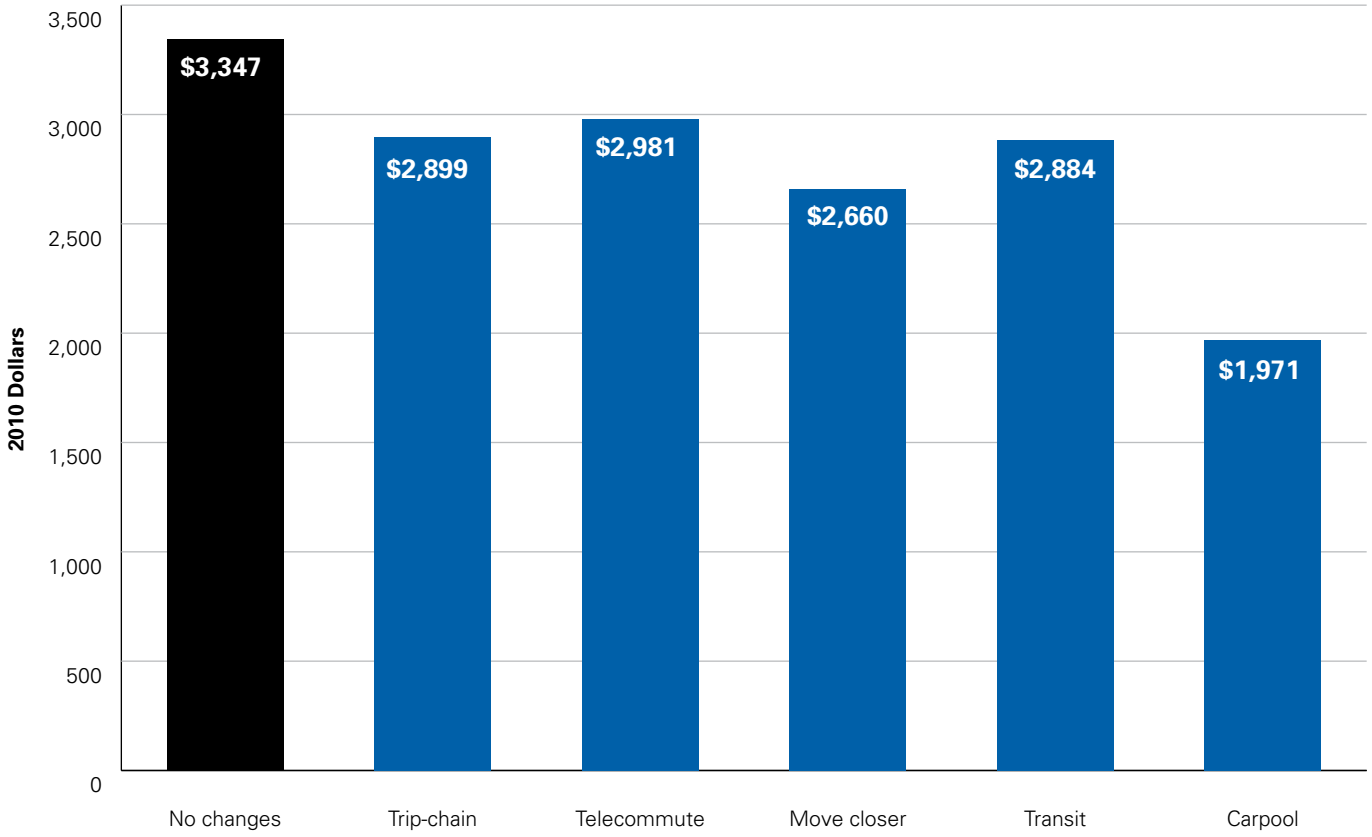


Table 4: Impact of Suburban Commuters Taking Individual Actions

Individual Action	Average Annual VMT	Average Daily VMT	Annual Operating Costs	Annual Fuel Cost Savings	Total Driving Costs
Average values (with no action taken)	10,841	29.7	$1,354	$1,993	$3,347
Increase transit use by 8 trips/month	–1502	–4.1	–$187	–$276	–$463 (–14%)
Switch to all carpooling commutes	–4,453	–12.2	–$557	–$819	–$1,376 (–41%)
Telecommute 1 day/week	–1,187	–3.3	–$148	–$218	–$366 (–11%)
Increase trip-chaining	–1,451	–4.0	–$181	–$267	–$448 (–13%)
Move closer to work	–2,227	–6.1	–$278	–$409	–$687 (–21%)

Figure 5: Annual Individual Spending After Changes (Rural and Town Commuters)

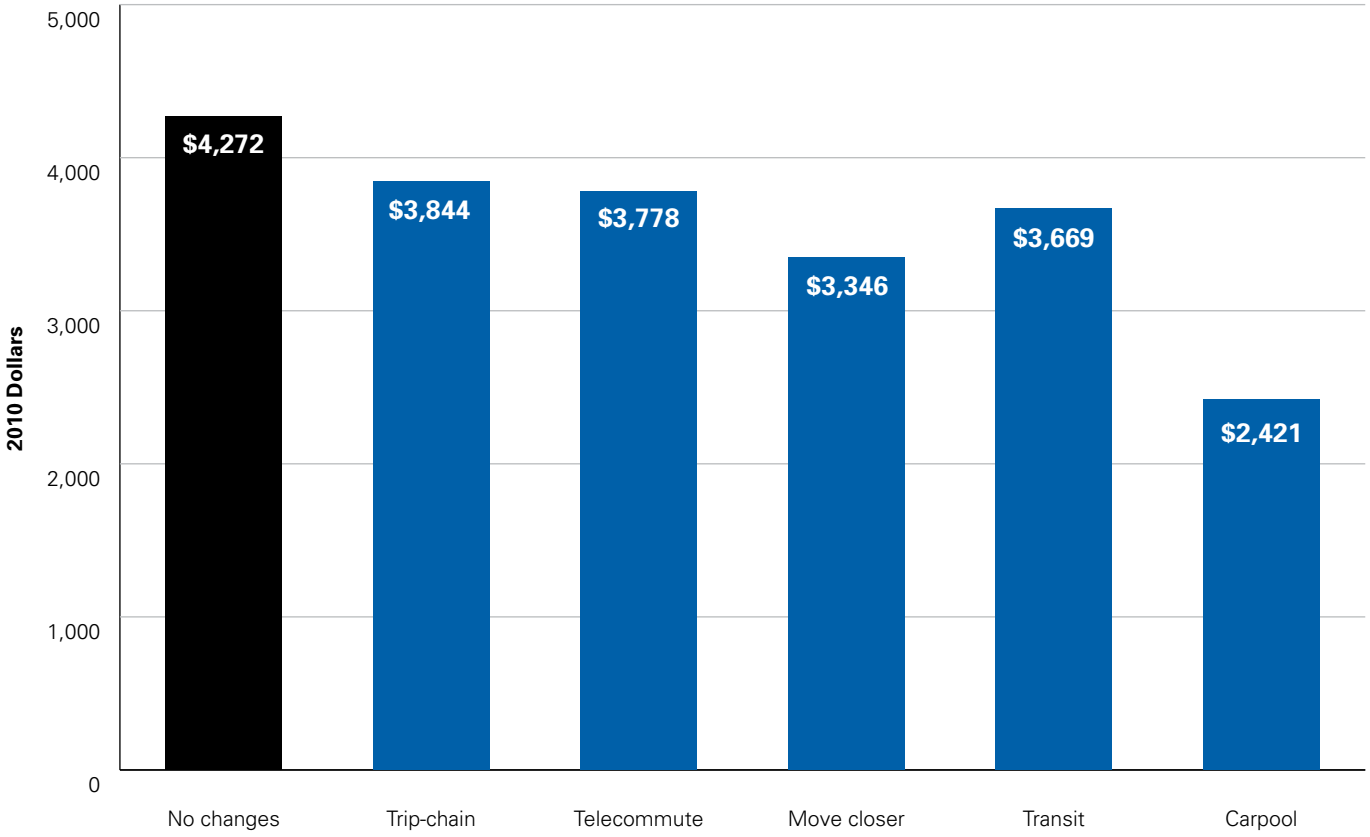


Table 5: Impact of Rural & Town Commuters Taking Individual Actions

Individual Action	Average Annual VMT	Average Daily VMT	Annual Operating Costs	Annual Fuel Cost Savings	Total Driving Costs
Average values (with no action taken)	13,651	37.4	$1,705	$2,567	$4,272
Increase transit use by 8 trips/month	–1,924	–5.3	–$241	–$362	–$603 (–14%)
Switch to all carpooling commutes	–5,913	–16.2	–$739	–$1,112	–$1,851 (–43%)
Telecommute 1 day/week	–1,577	–4.3	–$197	–$297	–$494 (–12%)
Increase trip-chaining	–1,369	–3.8	–$171	–$257	–$428 (–10%)
Move closer to work	–2,957	–8.1	–$370	–$556	–$926 (–22%)

AGGREGATE SCENARIO BENEFITS

Clearly, individual behavioral changes have the potential to generate substantial reductions in the amount of money people spend on transportation. Beyond this, large-scale adoption of these actions would lead to broad impacts, reducing energy use and greenhouse gas emissions at the national level.

To examine these potential aggregate effects, the proportional impact from each population segment adopting individual behaviors at specified levels were calculated and added together. The report calculated effects for 5 percent, 10 percent, and 25 percent of the population (16 years or older) adopting each of the behaviors. Tables 6 to 8 show these estimated effects.

Table 6: Key Outcomes with Moderate Adoption (5% of Population)

	Annual VMT (billions)	Annual Fuel Spending (billion $)	Annual GHG Emissions (million tonnes)
Baseline annual values (with no action taken)	2,047	$386.1	971
Increase transit use by 8 trips/month	–15.2	–$2.9	–7.2 (–0.7%)
Switch to all carpooling commutes	–49.9	–$7.0	–23.4 (–2.4%)
Telecommute 1 day/week	–10	–$1.9	–4.7 (–0.5%)
Increase trip-chaining	–13.6	–$2.6	–6.5 (–0.7%)
Move closer to work	–22.8	–$4.3	–10.8 (–1.1%)

Table 7: Key Outcomes with Higher Adoption (10% of Population)

	Annual VMT (billions)	Annual Fuel Spending (billion $)	Annual GHG Emissions (million tonnes)
Baseline annual values (with no action taken)	2,047	$386.1	971
Increase transit use by 8 trips/month	–30.4	–$5.7	–14.4 (–1.5%)
Switch to all carpooling commutes	–99.8	–$14.0	–46.8 (–4.8%)
Telecommute 1 day/week	–20	–$3.8	–9.4 (–1.0%)
Increase trip-chaining	–27.2	–$5.2	–13.0 (–1.4%)
Move closer to work	–45.6	–$8.6	–21.6 (–2.2%)

Table 8: Key Outcomes with Wide Adoption (25% of Population)

	Annual VMT (billions)	Annual Fuel Spending (billion $)	Annual GHG Emissions (million tonnes)
Baseline annual values (with no action taken)	2,047	$386.1	971
Increase transit use by 8 trips/month	–76.1	–$14.3	–30.6 (–3.7%)
Switch to all carpooling commutes	–249.7	–$34.9	–116.9 (–12.0%)
Telecommute 1 day/week	–49.9	–$9.3	–23.4 (–2.4%)
Increase trip-chaining	–67.9	–$12.9	–32.4 (–3.3%)
Move closer to work	–113.8	–$21.5	–54.1 (–5.6%)

Table 8 shows that wide adoption of individual actions by 25 percent of the U.S. population could reduce annual transportation GHG emissions by 3 to 12 percent, reduce transportation fuel use by billions of gallons per year, and save consumers tens of billions of dollars in transportation spending each year. (These results would be increased with concurrent improvements in fuel efficiency.) There would be other substantial benefits from the reduced VMT, such as less congestion in large urban areas, less need for new infrastructure, and less wear and tear on roads, leading to lower maintenance costs.

CONCLUSION

Generally speaking, as a nation we need to invest more of our limited transportation dollars to expand transportation choices. We need to make it easier and more convenient for people to enjoy the freedom of being able to travel shorter distances or less often by car. And we need to build more transit-friendly, walkable neighborhoods. The integration of better transportation solutions and smarter land use—fostering good growth over gridlock—will make our communities more sustainable while strengthening transportation infrastructure, lessening traffic congestion, decreasing oil dependence, reducing harmful air and global warming pollution, and improving our quality of life.

How to do this? First of all, governments need to get incentive structures right. For example, employees who drive get a federal tax break to help pay for parking near workplaces. Public transportation gets a similar benefit, but those tax breaks are set to expire at the end of the year. Fortunately, bipartisan proposals have recently been offered that would equalize these benefits in perpetuity. Telecommuting is similarly hampered by state governments double-taxing commuters who working virtually across state lines, something which could be remedied with "telecommuter fairness" legislation introduced in previous Congresses but not yet in play in the current one. Local, state and federal policies such as these tax code issues should be changed to deliver clear incentives for commuting by means other than solo driving.

In addition, at the local level, regional transportation and development plans need to be revisited. Many of them contain legacy projects and zoning that may have made sense in the 1960s but are a poor fit for the coming decades. Overhaul of metropolitan growth plans, with real and sustained follow-up by towns, cities and counties tasked with implementing them, would deliver more opportunities for commuters and non-commuters alike to reduce solo car trips through smart growth policies and enhanced public transportation. All across the country, a shift is taking place. Increasingly, Americans are choosing to live in walkable communities, where they have more transportation choices that allow them to live closer to their jobs, and shops and schools, rather than stuck in traffic. Along with the personal freedom these communities provide, it's exactly the kind of growth our country needs to cut pollution, save money and create a vibrant quality of life.

Last, we don't have the luxury of basing our transportation decisions on a rear-view-mirror perspective anymore. Congress and the Obama administration should build on the performance management requirements in the new federal transportation law to hold regions accountable so our tax dollars aren't wasted anymore by overwhelmingly catering to auto commuters. For instance, federal support for seemingly endless paving projects ends up burdening our towns, cities and counties which own more than three-quarters of transportation assets, so they end up holding the bag when a highway or road is underutilized.

Now is the time for our federal government to lead the way by delivering a more diverse portfolio of investments, complementing our road network with more transit to open up more transportation choices for more commuters.

It's an exciting time for policymakers, with ample public interest in more commuter choices. Public opinion polls show strong support for public transportation, as evidenced by the fact that transit ridership in the U.S. is at an all-time high. Many Americans may still be in love with their cars, but most are fed up with traffic and frustrated with the lack of options for adequate, reliable public transit service. More investment to expand transportation choices—especially for commuters—would mean less congestion in large urban areas, less need for new infrastructure, less wear and tear on roads, and lower maintenance costs. It's time to get to work delivering transportation infrastructure and options that consumers demand and deserve.

APPENDIX

The four segments of typical travelers were developed using the person-level data file from the 2009 National Household Travel Survey (NHTS).[9] This data set includes information about 308,901 people in 150,147 households.[10] All responses in the NHTS are population-weighted, so survey results can be used to generate estimates for the entire U.S. population. Traveler segments were determined by using the Nielson-Claritas "PRIZM" segmentation system (represented in the NHTS by the "HBHUR" variable), which categorizes locations where people live as urban, suburban, second city, and town and country.[11] (These categories were renamed for this report: "Urban" became "city," "second city" and "suburban" were combined into "suburban," and "town and country" was renamed "rural and town." These changes in terminology were made for easier understanding. The categories themselves were defined earlier in this report.) Commuter status was determined by whether the person was employed ("WORKER" variable) and reported using some form of transportation to get to work ("WRKTRANS" variable). This approach allows all people to fall into one of the four segments.

Characteristics for typical travelers from each segment were also derived from population-weighted 2009 NHTS person-level data. All reported values are mean values for each population segment and are provided for comparative purposes. An individual's falling into a particular category does not imply that the individual will be like the typical traveler for that segment; for example, it is entirely reasonable to expect some people who live in cities to have longer commutes than some people who live in rural areas. To assume that an individual is similar to the average person from any given segment simply because he or she falls within that segment is called "ecological fallacy" and should be avoided whenever considering aggregated population-level data.

Annual miles traveled were calculated with the "YEARMILE" variable; daily VMT is 1/365th of annual miles traveled. Distance to work was determined from the reported one-way distance to workplace ("DISTTOWK") variable. Public transit commute share was derived from the trips using transit modes (buses, rail, and paratransit) reported in the "WRKTRANS" variable, while average transit trips per month was reported in the "PTUSED" variable. Carpooling share was derived from the number of people reported in vehicles for trips ("CARRODE"); any anybody who rode with more than one other person was considered to be participating in some form of carpool. Similarly, telecommute share was calculated using the number of respondents who reported working from home at least once in the previous month ("WKFMHMXX" variable).

Average vehicle fuel economy was calculated using the vehicle-level NHTS data file; the typical vehicle fuel efficiency for each vehicle in each segment was reported by the Energy Information Administration's derived MPG variable ("EIADMPG") and was then reduced by 15 percent to adjust for actual on-road driving conditions.[12,13] This is a measure of the existing fleet of vehicles, not new purchases, which typically account for no more than 10 percent of the total fleet. Fuel efficiency was also statistically weighted by household population.

Calculations for vehicle operating costs and fuel costs both used multipliers derived from national-level values, and the multipliers did not vary between segments. Vehicle operating costs were estimated at 12.5 cents per mile; this value is slightly lower than the AAA "Your Driving Costs" values for 2009, which are dependent on the specific vehicle type.[14] Because this report derived only the average fuel economy of vehicles for each segment, we selected a slightly lower per-mile value for operating costs to avoid overestimating this cost component for some travelers. For the same basic reason, an estimated fuel price of $3.50 per gallon was used for fuel cost calculations, to avoid regional variations that were impractical to differentiate in this report. Using these standard and consistent values for all segments allowed the report to focus on changes that could be achieved by behavioral actions, rather than describing minor variations stemming from vehicle types and regional differences.

Endnotes

1 U.S. PIRG, *A New Direction: Our Changing Relationship with Driving and the Implications for America's Future*, Spring 2013, http://uspirg.org/reports/usp/new-direction.

2 U.S. Department of Transportation, Federal Highway Administration, *Traffic Volume Trends*, February 2013, www.fhwa.dot.gov/policyinformation/travel_monitoring/13febtvt/13febtvt.pdf.

3 S.C. Davis et al., *Transportation Energy Data Book*, 31, 2012, U.S. Department of Energy, cta.ornl.gov/data/index.shtml.

4 The variables and methodology used to determine these categories are provided in the "Methodology Notes" section of this report.

5 The National Household Travel Survey is a review of travel activity in about 26,000 American households. More information about the NHTS can be found at nhts.ornl.gov/introduction.shtml. The segments developed for this report used information collected from the 2009 survey regarding place of residence, commuting activity, and household vehicles. The 2009 NHTS is the most recent version, making its findings the best currently available data at the national level about driving and travel behavior.

6 Typical values are provided in Table 2, but there is substantial variation in actual travel behavior within each segment; just because someone lives in a segment does not mean that they are necessarily described by the typical (average) characteristics for that segment. For example, it is entirely possible for someone in the "Rural and Town Commuter" segment to travel less per year than someone in the "City Commuter" segment.

7 J. Horner, Telework: Saving Gas and Reducing Traffic from the Comfort of your Home, March 2011, Mobility Choice Coalition, mobilitychoice.org/MCtelecommuting.pdf.

8 For example, a recent report by the American Public Transportation Association estimated that eliminating one car for a 2-person household would save nearly $10,000 per year. See: http://www.apta.com/mediacenter/pressreleases/2013/Pages/130530_Transit-Savings.aspx.

9 U.S. Department of Transportation, National Household Travel Survey Dataset (Person File), 2010, nhts.ornl.gov/download.shtml. U.S. Department of Transportation, National Household Travel Survey Data Dictionary, 2010, nhts.ornl.gov/2009/pub/DataDictionaryPU.xls.

10 U.S. Department of Transportation, National Household Travel Survey User's Guide, 2011, nhts.ornl.gov/2009/pub/UsersGuideV2.pdf.

11 Nielsen Company, "My Best Segments: What Is Nielsen Segmentation?" www.claritas.com/MyBestSegments/Default.jsp?ID=100&pageName=What%2Bis%20Segmentation&menuOption+learnmore.

12 The person-level NHTS data file does not report vehicle information, but this information is included in the vehicle data file. Because these data are also weighted and can be segmented using the PRIZM location descriptions, it was not necessary to know the vehicle fuel economy for each driver; the mean for each segment can be calculated from different data sources as long as the segments represent the same measures.

13 The discrepancy between fuel economy ratings and actual on-road performance is widely documented. See, for example: K.G. Duleep, "Maximizing Benefits from Current Technology," presentation at California Air Resources Board Passenger Vehicle GHG Symposium, April 2008, www.arb.ca.gov/cc/ccms/meetings/042108/4_21_current_techn_2_duleep.pdf. Also see: "Fuel-Economy Claims Need a Reality Check," *Consumer Reports* "Viewpoints," October 2005, www.webcitation.org/query.php?url=http://www.consumerreports.org/cro/aboutus/mission/viewpoint/fueleconomyclaimsneedarealitycheck1005/index.htm&refdoi=10.1186/1476-069x-7-14; and M. Mintz et al., "Differences Between EPA Test and In-Use Fuel Economy: Are the Correction Factors Correct?" *Transportation Research Record* 1416, 1993, p. 124-130. Estimates from these and other sources suggest a discrepancy of about 20 percent to 30 percent. Because various improvements to fuel economy test cycles have been implemented over the past 5 to 10 years, this report uses a more conservative estimate of 15 percent to avoid overstating the discrepancy.

14 Automobile Association of America, *Your Driving Costs,* 2009, newsroom.aaa.com/tag/your-driving-costs/.

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