

# FHWA Forecasts of Vehicle Miles Traveled (VMT): Spring 2016

Office of Highway Policy Information

Federal Highway Administration

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## Highlights

### Long-Term Economic Outlook

- Based on the IHS Spring 2016 Baseline economic outlook, the U.S national economy is expected to grow at an average annual rate of 2.21% through 2044. Over the same period, real disposable income per Capita is projected to grow 1.65% per year.
- Population growth is expected to average 0.65% annually through 2044, while employment is expected to increase at an annual rate of 0.82%.
- Following their recent decline, global oil prices are expected to increase gradually to about \$90 per barrel (in 2009\$) by the mid-2020s, and then to remain relatively stable through the remainder of the forecast period. This forecast represents a subdued outlook for gasoline and diesel prices subdued during the 30 year forecast horizon, with a 30-year growth rate in gasoline prices of only 0.14% per year, and an average annual decline of -0.10% for diesel from its 2014 value.

### Nationwide Vehicle Travel Outlook

- Using the IHS Baseline economic outlook, Table 1 shows growth in total VMT by all vehicle types is projected to average 0.92% annually over the next 20 years (2014-2034). Over the entire 30-year forecast period (2014-2044) the average annual growth rate is projected to be 0.61% annually, as growth is projected to slow to 0.30% annually during the last decade (2034-2044). This outlook represents a significant slowdown from the growth experienced over the past 30 years, when growth in total VMT averaged 2% annually, although more detailed analysis shows that growth in overall motor vehicle travel per Capita was already slowing throughout most of that period.
- Under the Baseline outlook, travel by light-duty vehicles –the largest category of total motor vehicle travel – is forecast to grow at an average annual rate of 0.81% over the next 20 years, as Table 1 indicates. Growth in light-duty vehicle use is expected to slow during the following decade, thus reducing its average annual rate over the 30 year forecast period to 0.47%.
- Table 1 also shows that combination truck VMT is projected to grow at an average annual rate of 2.08% over the next 20 years and 1.87% over the next 30 years, while growth in travel by single-unit trucks is projected to average 1.73% and 1.50% per year over those same periods. Thus, growth in truck use is also expected to slow in the final decade of the forecast period.
- Table 1 shows that under the alternative forecasts of U.S. economic growth reflected in the IHS High and Low economic outlooks (and incorporating statistical uncertainty in FHWA's VMT forecasting models), the 30-year forecast of growth in total VMT ranges from a low of 0.53% to a high of 0.65% per year.

**Table 1. Projected Growth in Vehicle Miles Traveled (VMT): Spring 2016**

Vehicle Class	Compound Annual Growth Rates					
	Low Economic Growth Outlook*		Baseline Economic Growth Outlook*		High Economic Growth Outlook*	
	2014 - 2034 (20 Year)	2014 - 2044 (30 Year)	2014 - 2034 (20 Year)	2014 - 2044 (30 Year)	2014 - 2034 (20 Year)	2014 - 2044 (30 Year)
<i>Light-Duty Vehicles</i>	0.69%	0.44%	0.81%	0.47%	0.80%	0.46%
<i>Single-Unit Trucks</i>	1.31%	1.05%	1.73%	1.50%	2.00%	1.72%
<i>Combination Trucks</i>	1.59%	1.44%	2.08%	1.87%	2.48%	2.24%
<i>Total</i>	0.76%	0.53%	0.92%	0.61%	0.96%	0.65%

\*See the following sections for detailed descriptions of the Baseline and alternative economic outlooks.

## FHWA Forecasts of Vehicle Miles Traveled (VMT): Spring 2016

### Overview

The Federal Highway Administration's spring 2016 long-term forecasts of nationwide VMT are based on long-term economic and demographic forecasts produced by the economic forecasting firm IHS.<sup>1</sup> FHWA's national VMT forecasts are produced using statistical models that incorporate factors affecting historical variation in motor vehicle use through 2014; these models are then used to develop forecasts that begin in 2015 and extend through 2044. The following sections highlight the IHS Baseline forecasts of the key economic and demographic factors that are expected to influence future growth in passenger and freight travel, and discuss their influence on the resulting VMT forecasts. Following this is a brief discussion of the alternative forecasts of U.S. economic performance provided by IHS and their implications for future VMT growth.

### Baseline Economic Outlook

Table 2 summarizes the IHS spring 2016 long-term Baseline forecast of key measures of U.S. economic activity that are used to develop FHWA's VMT forecasts. As it shows, the U.S. population is projected to grow 0.65% annually over the 30-year forecast period, a rate well below its 1.02% annual growth over the previous 30 years. Aggregate economic output, measured by real GDP (2009\$) is anticipated to increase 2.21% annually through 2044, which represents a slowdown of about 0.6% in the yearly growth rate that the U.S. economy has experienced in recent decades.

**Table 2. IHS Baseline Long-Term Forecast: Spring 2016**

<b>Demographic and Economic Indicators</b>	<b>Historical Growth Rate</b>	<b>Forecast Growth Rate: 2014-44</b>
<b>U.S. Population<sup>2</sup></b>	1.02%	0.65%
<b><i>GDP (Real 2009\$)</i></b>	2.84%	2.21%
<b><i>Real Goods Component of GDP (Real 2009\$)</i></b>	3.18%	2.95%
<b><i>Disposable Personal Income per Capita (Real 2009\$)</i></b>	1.94%	1.65%
<b><i>Gasoline Price per Gallon (Real 2009\$)</i></b>	1.34%	0.14%

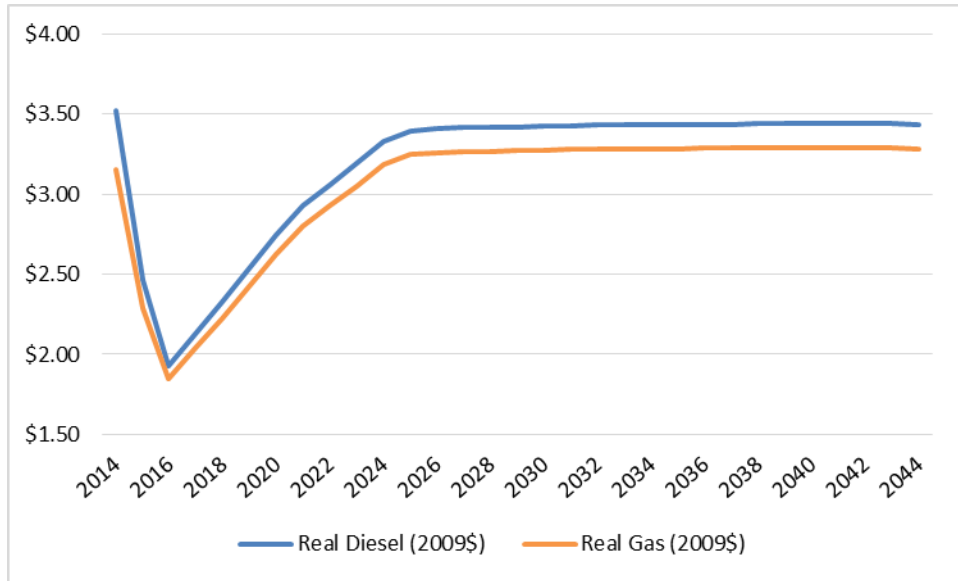
The IHS baseline forecast projects that growth in disposable personal income per Capita will average 1.65% annually over the 30-year forecast period, slightly lower than its growth over the past few decades, which averaged almost 2% annually. The goods producing sector of the economy is expected to outpace overall economic growth, continuing the shift back towards manufacturing production. The long-term economic outlook also projects that the sharp decline in fuel prices that began during 2014

<sup>1</sup> <http://www.ihs.com/index.aspx>

<sup>2</sup> The IHS population forecast is based on the Census Bureau's long-term population projections.

will continue into 2016, but that fuel prices will slowly return to a long run average of around \$3.30 per gallon (in 2009\$) by about 2025, and remain there through the end of the forecast period. Figure 1 presents the long run forecasts from 2014 to 2044 of the real price per gallon of gasoline and diesel.

**Figure 1. Price per Gallon Diesel and Gas (2014-2044, 2009\$)**



### Growth in Vehicle Travel under the Baseline Outlook

Under the IHS Baseline economic outlook, steady growth in employment, business investment, and productivity are expected to lead to continuing gradual increases in real economic output (Gross Domestic Product) and personal income, while, after increasing during the coming decade, energy prices remain relatively stable. These trends combine with moderating population growth to generate sustained increases in both passenger vehicle and truck travel, although at significantly slower rates than were experienced in recent decades.

In 2014, travel by light-duty vehicles – including automobiles and light-duty trucks used primarily for passenger travel – amounted to 2.71 trillion miles, which accounted for 90% of total U.S. motor vehicle travel. As Table 3 reports, growth in light-duty VMT is projected to average 0.81% per year from 2014-2034. Over the following decade, however, growth in light-duty vehicle travel is expected to slow significantly, so that across the entire 30-year forecast period, its growth is projected to average only 0.47% per year.

**Table 3. Baseline Forecasts of VMT Growth**

Vehicle Class	Compound Annual Growth Rates	
	2014 – 2034 (20 Year)	2014 – 2044 (30 Year)
<i>Light-Duty Vehicles</i>	0.81%	0.47%
<i>Single-Unit Trucks</i>	1.73%	1.50%
<i>Combination Trucks</i>	2.08%	1.87%
<i>Total</i>	0.92%	0.61%

Truck travel in the U.S reached 279 billion miles in 2014, accounting for almost all of the remaining 10% of U.S. motor vehicle use.<sup>3</sup> Table 3 shows that truck travel is projected to grow more rapidly than light-duty vehicle travel under the Baseline economic outlook, but is also expected to slow slightly during the last decade of the forecast period.

Growth in VMT by single-unit trucks is projected to average 1.73% per year from 2014-34, and 1.50% annually for the entire 30-year period from 2014-44. VMT by combination trucks is expected to grow somewhat more rapidly, reflecting the outlook for sustained growth in U.S. goods manufacturing and international trade, but its growth is also anticipated to slow toward the end of the forecast period. Combination truck VMT is projected to increase by 2.08% annually for the 20 years from 2014-34, and by 1.87% per year over the complete 30 year forecast period.

Finally, Table 3 reports that aggregate VMT by all vehicle classes is projected to grow at an average annual rate of 0.92% over the 20 years from 2014-34. Reflecting the projected slowing of growth in use of both passenger vehicles and trucks during the last decade of the forecast period, growth in total VMT is expected to average 0.61% annually for the entire 30-year forecast period.

### **Alternative Economic Outlooks and VMT Forecasts**

Changes in vehicle use over the past two decades, particularly during the 2008-09 recession and prolonged recovery, have highlighted the uncertainty that surrounds forecasts of future growth in motor vehicle travel. Important sources of such uncertainty include concerns about future prospects for economic growth, alternative interpretations of the causes and likely persistence of recent declines in vehicle ownership and use (particularly among younger Americans), and the potential effects on vehicle use of dramatic innovations in technology such as the advent of autonomous vehicles. To acknowledge this uncertainty, FHWA provides a range of alternative forecasts for future VMT growth that reflects

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<sup>3</sup> Motorcycles and buses, which are excluded from the forecasts reported in Table 3, together accounted for only about 1% of all U.S. motor vehicle travel during 2014.

uncertainty about the outlook for future economic growth, travel behavior, and vehicle technology, while also incorporating statistical uncertainty in its VMT forecasting models.<sup>4</sup>

To develop these alternative forecasts, FHWA used projections of population growth, U.S. economic output and its composition, growth in personal income, and energy prices from the Optimistic and Pessimistic scenarios reported as part of IHS' spring 2016 30-year economic outlook. FHWA's alternative forecast of higher total VMT growth relies on IHS' Optimistic economic outlook, which projects stronger growth in productivity, labor force participation, employment, and business investment levels than under the Baseline outlook.

These factors combine with a more robust recovery in the housing sector and lower energy prices to produce stronger growth in real GDP, goods production, and disposable income than in the Baseline outlook. In turn, these developments produce significantly faster growth in freight shipments and truck VMT under the Optimistic economic outlook. Under this scenario, passenger vehicle VMT growth is predicted to remain relatively unchanged when compared with the baseline. This is caused primarily by the specification of the passenger travel model, which accounts for the effect of increasing income on the cost of traveling and the dampening influence it is expected to have on VMT demand as personal disposable income continues to increase.<sup>5</sup> Essentially, the forecast model attempts to capture the non-linear relationship between the cost of time spent driving and rising income levels.

In contrast, FHWA's alternative forecast of lower growth in vehicle use reflects the Pessimistic economic outlook from IHS' spring 2016 forecast. This alternative outlook predicts weaker growth in productivity, labor force participation, and business investment, together with higher interest rates and more rapid price inflation. These factors combine with less robust activity in the housing sector and higher energy prices to dampen projected future growth in real GDP and personal income compared to the Baseline economic outlook. Under this scenario, slower economic growth leads to lower demand for personal travel, and passenger vehicle use increases primarily as a result of U.S. population growth. At the same time, slower growth in goods manufacturing, freight shipments, and construction activity dampen growth in truck use significantly from the levels projected in the Baseline forecast.

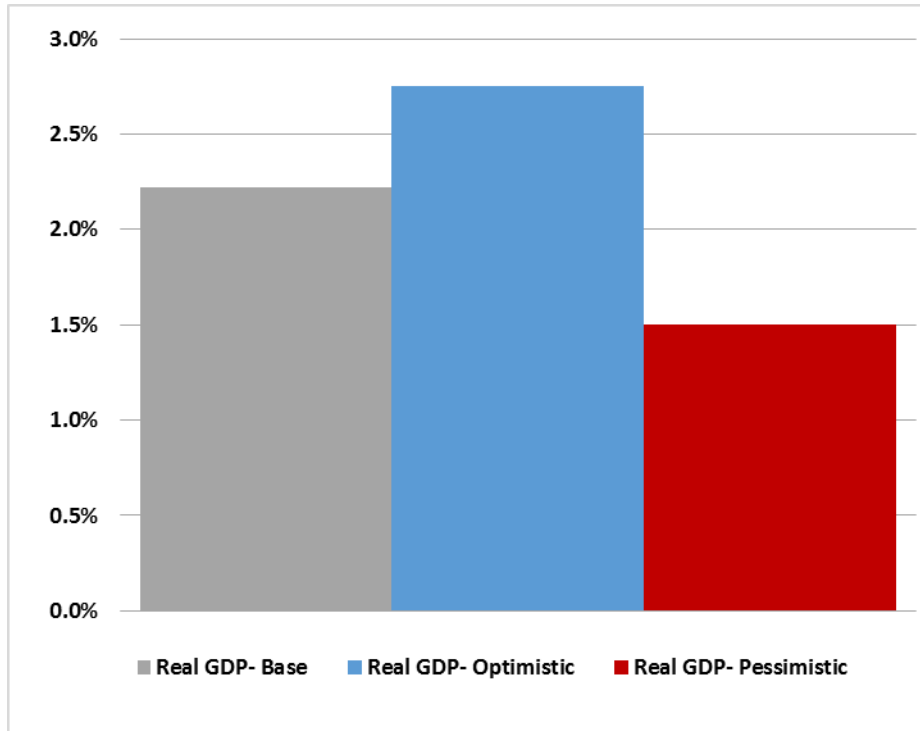
To illustrate the important differences in future economic trends affecting vehicle use among the alternative economic outlooks, Figures 2-4 below compare forecast growth in real GDP, personal disposable income, and gasoline prices in the Pessimistic and Optimistic scenarios to the Baseline outlook. As Figure 2 shows, real GDP is anticipated to grow about 2.76% per year over the 30-year forecast period under the Optimistic outlook, compared to 2.21% annual growth projected for the Baseline scenario, but is projected to average only about 1.47% annually in the Pessimistic scenario.

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<sup>4</sup> Uncertainty about future VMT growth arising from the potential for fundamental changes in travel behavior or vehicle technology is likely to be resolved only with the passage of time, the availability of more detailed information about personal travel, and experience with real-world deployment of advanced vehicle technologies. Thus FHWA's forecasts of future VMT growth do not attempt to incorporate these sources of uncertainty.

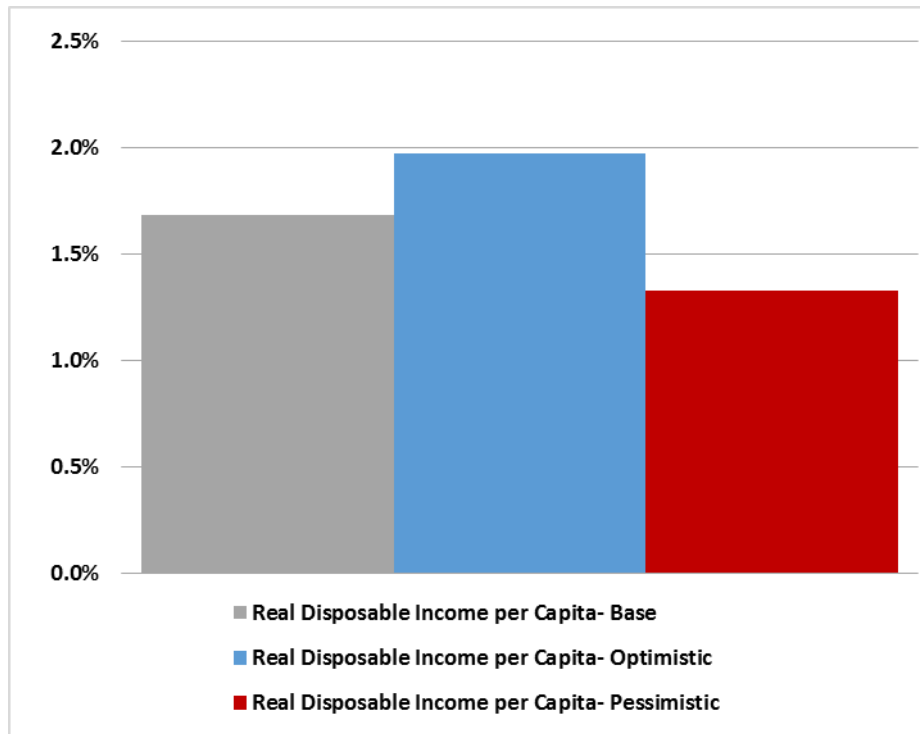
<sup>5</sup> For more information on the VMT models, please refer to the technical document at: [http://www.fhwa.dot.gov/policyinformation/tables/vmt/vmt\\_model\\_dev.cfm](http://www.fhwa.dot.gov/policyinformation/tables/vmt/vmt_model_dev.cfm)

**Figure 2. Real GDP Growth under Alternative Economic Outlooks  
(30-Year Average Annual Growth)**



Similarly, Figure 3 shows that growth in real personal disposable income per person is forecast to average about 1.94% per year in the Optimistic scenario, only slightly above its projected annual growth of 1.65% in the Baseline outlook, but well above the 1.28% annual rate projected under the Pessimistic economic outlook. Figure 4 illustrates that inflation-adjusted retail gasoline prices are expected to decline at a rate averaging 0.36% annually under the Optimistic scenario, whereas the Baseline and Pessimistic economic outlooks predict average yearly increases of 0.14% and 0.54%.

**Figure 3: Growth in Real Personal Disposable Income per Capita under Alternative Economic Outlooks (30-Year Average Annual Growth)**



**Figure 4: Changes in Real Gasoline Prices under Alternative Economic Outlooks (30-Year Average Annual Change)**

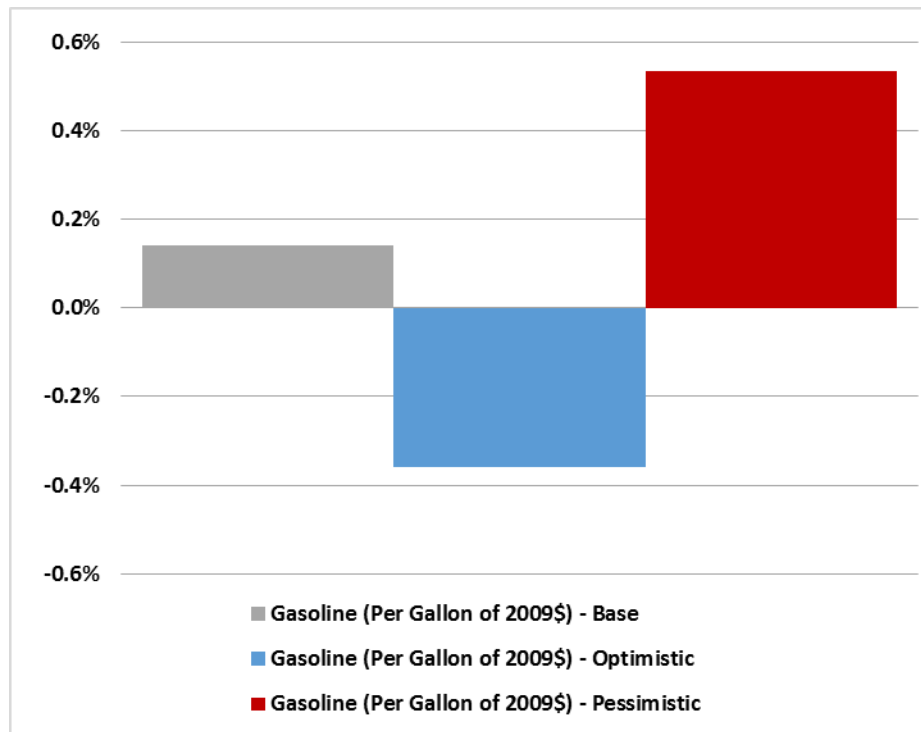




Table 4 reports alternative forecasts of future growth in VMT under the Optimistic and Pessimistic economic outlooks; the range between them reflects the effect of uncertainty about future economic growth. These alternative outlooks have little effect on the forecast of future growth in light-duty vehicle use, primarily because the forecasts of growth in disposable personal income and gasoline prices do not deviate significantly from the baseline, and the model specification will tend to maintain the forecasts within a certain range. As Table 4 also shows, the difference between the forecasts of long-term growth in truck travel between the Optimistic and Pessimistic economic outlooks is much larger, since they reflect contrasting forecasts for the investment and manufacturing sectors of the U.S. economy. Because light-duty vehicles account for the largest share of total VMT, however, the long-term forecast of total VMT varies only within a comparatively narrow range between the Optimistic and Pessimistic economic outlooks.

**Table 4. Alternative Forecasts of VMT Growth**

Vehicle Class	Compound Annual Growth Rates			
	Pessimistic Economic Outlook		Optimistic Economic Outlook	
	2014-2034 (20 Year)	2014-2044 (30 Year)	2014-2034 (20 Year)	2014-2044 (30 Year)
<i>Light-Duty Vehicles</i>	0.69%	0.44%	0.80%	0.46%
<i>Single-Unit Trucks</i>	1.31%	1.05%	2.00%	1.72%
<i>Combination Trucks</i>	1.59%	1.44%	2.48%	2.24%
<i>Total</i>	0.76%	0.53%	0.96%	0.65%

## Acknowledgement

*Volpe, The National Transportation Systems Center, U.S. Department of Transportation has performed the modeling underlying these forecasts and provided technical assistance to the FHWA.*