policy notes

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An Estimate of the Fuel Efficiency of Oregon Passenger Vehicles and Light Trucks

Predicting revenue generated by the state fuel tax requires estimates of both vehicle miles of travel (VMT) and the fuel consumption rate for those vehicles. Typically an estimate based on the U.S. passenger fleet has been used, but it is possible the Oregon fleet differs in composition and fuel efficiency. This study estimates the average fuel efficiency of Oregon passenger vehicles.

The study employed three data sources: DMV supplied data on all registered motor vehicles, R.L. Polk, Inc. provided a method of decrypting vehicle identification numbers (VIN) into motor vehicle categories, and the Environmental Protection Agency (EPA) provided estimates on fuel efficiency.

The 'combined' EPA estimates for 'city' and 'highway' mileage were used, using a ratio of 59.75% city and 40.25% highway. Data were available for 2,656,532 vehicles.

Estimates of Fuel Efficiency

The Miles Per Gallon (MPG) figure for light vehicle[1] fuel efficiency used by ODOT for the revenue forecast is derived from DRI-WEFA's national estimate. Their current national MPG figure is 19.9 MPG. The figure obtained through our analysis of light vehicles, model year 1981 and up, registered in Oregon as of January 14, 2002, is 21.54 MPG. Almost half of the registered vehicles (47.03%) had EPA ratings between 19 and 24 MPG. The data also exhibit a trailing off in the direction of higher MPG ratings, with 101,243 vehicles (4.08%) reporting better than 30 MPG. Only 27,871, or 1.12%, reported an EPA estimate of less than 13 MPG.

MPG Estimates Over 22 Model Years

Mileage differences by year of manufacture were also examined. These year-to-year differences are not great, ranging from 20.4 in 1981 to 21.6 in 2002, with a peak of 22.4 MPG in 1988. Still, the MPG data alone shows no clear and systematic pattern.

Growth in Average Motor Vehicle Weight

Data were available to look at average vehicle weight within the Oregon light vehicle fleet by model year. Since the 1988 model year, the average weight of light motor vehicles registered in Oregon has increased by nearly 800 pounds. Almost all of this weight growth occurred between 1988 and 1999, when the average weight of vehicles increased by 27.4%.

Average Motor Vehicle Weight and MPG Estimates Combined

Motor vehicle weight is related to MPG estimates, and this relationship holds true regardless of the year of manufacture of the motor vehicle. Vehicle weight is a significant factor in MPG up through the 5,200 pound category. This relationship holds true when controlling for the age of the vehicle based on the year of manufacture.

This issue of Policy Notes was written by Vincent Van Der Hyde, Research Analyst, ODOT Policy Section, and does not necessarily reflect the views of the Oregon Department of Transportation. Author can be reached by email at Vincent.A.VANDERHYDE@odot.state.or.us or call (503) 986-3419.

Oregon Department of Transportation, Policy Section
John Merriss, Policy Section Manager
555 13th Street NE, Suite 2, Salem, Oregon 97301-4178
(503) 986-3466

When examining average vehicle MPG by weight class over time, two findings are apparent. First, lighter classes of vehicles got much better mileage than heavier classes of vehicles over the entire time period. Second, while there has been some improvement over the years in the fuel efficiency of lighter vehicles, there has been much less improvement in MPG for vehicles in the heavier weight categories.

Sensitivity Analysis—Adjustments for Effect of Vehicle Age on MPG

There is an argument to be made that passenger vehicles lose fuel efficiency as they age. This study examined the impact of two age adjustment strategies on the overall estimate of the fuel efficiency of passenger vehicles. The results of these adjustments are provided to serve as sensitivity analysis.

Strategy 1—based on a paper published in the Transportation Research Record #1366 by Fwa and Ang, fuel efficiency is degraded by 1% per year of vehicle age. This strategy reduced the overall fuel efficiency estimate of the Oregon fleet from 21.54 MPG to 19.67 MPG, a reduction of 8.7%.

Strategy 2—an accelerating efficiency reduction suggested by an Oregon DOT financial analyst that reduces MPG of each vehicle in a series of steps until it stabilizes at 78% of the original EPA MPG. This strategy reduced the Oregon fleet fuel efficiency estimate from 21.54 MPG down to 18.96 MPG, a reduction of 12.0%.

Conclusions

- Oregon's fleet appears to have a higher fuel efficiency than the overall US average.

- While the average weight of vehicles has increased, especially since 1988, the impact is mitigated by the increasing fuel efficiency of lighter vehicles. The increased demand for SUVs and other heavier and larger vehicles, when coupled with a greater number of fuel-efficient vehicles like hybrid electric and electric vehicles, may result in a stable statewide fleet average MPG in the near future.

- Lighter weight vehicles consistently get better fuel efficiency than heavier vehicles.

- Newer vehicles in the lightest weight category have had an approximate 6 MPG improvement in fuel efficiency over the 1981 models still registered in Oregon. Newer vehicles in heavier weight classes show less improvement.

[1] Light trucks are defined as trucks licensed as passenger vehicles and weighing less than 8,000 pounds.