

## ECONOMIC AND ENVIRONMENTAL IMPACTS OF AB 2628

California AB 2628 proposes that up to 75,000 hybrid vehicles (meeting particular standards) would be allowed access to high-occupancy vehicle (HOV) lanes with only one occupant. What might be the fuel consumption and environmental impacts of adding 75,000 such hybrid vehicles? Here I calculate certain characteristics of the current California vehicle fleet, “non-hybrid” 2004 vehicles, and qualifying hybrid vehicles. Then I consider scenarios under which 75,000 hybrids might replace vehicles in the current fleet, or be added to the fleet instead of other new vehicles.

According to the California Air Resources Board<sup>1</sup>, in 2000, California vehicles each traveled about 12,000 miles, and emitted 44 kilograms of the pollutants unburned hydrocarbons (HC) and oxides of nitrogen (NOx) per year. Fleet average fuel economy (in 2003) was 20.8 miles per gallon (MPG)<sup>2</sup>. As the combustion of one gallon of gasoline releases 19.63 lbs. of carbon dioxide (CO<sub>2</sub>) per gallon<sup>3</sup>, 75,000 such vehicles consume 43 million gallons of gasoline, and emit 3,300 metric tons of (HC + NOx) and 385 thousand metric tons of CO<sub>2</sub> per year.

New 2004 vehicles (excluding hybrids), on average, achieve 27.5 MPG and emit 14.9 pounds of (HC + NOx) per 15,000 miles<sup>4</sup>. 75,000 such vehicles consume 33 million gallons of gasoline, and emit 507 metric tons of (HC + NOx) and 292 thousand metric tons of CO<sub>2</sub> per year, in 12,000 miles driven each.

Toyota Prius, Honda Insight, and Honda Civic hybrids as sold in California, as a group, achieve 53.2 MPG and emit 0.97 pounds of (HC + NOx) per 15,000 miles<sup>4</sup>. 75,000 such vehicles consume 17 million gallons of gasoline, and emit 26 metric tons of (HC + NOx) and 151 thousand metric tons of CO<sub>2</sub> per year, in 12,000 miles driven each.

**Scenario 1:** If 75,000 such hybrid vehicles replaced a like number of the current California vehicle fleet, **gasoline consumption would be reduced by 26 million gallons, (HC + NOx) emissions would be reduced by 3274 metric tons, and CO<sub>2</sub> emissions would be reduced by 234 thousand metric tons per year.**

**Scenario 2:** If instead, 75,000 such hybrid vehicles were added to the California vehicle fleet instead of other new 2004 vehicles, **gasoline consumption would be reduced by 16 million gallons, (HC + NOx) emissions would be reduced by 481 metric tons, and CO<sub>2</sub> emissions would be reduced by 141 thousand metric tons per year.**

Reducing fleet fuel consumption in California offers clear advantages, especially under conditions of fuel shortage. Reducing pollutant and carbon dioxide emissions may reduce the costs of other California emissions abatement programs. In addition, there may be other economic benefits as a result of not having to administer vehicle emissions tests for these SULEV and PZEV vehicles (I have not attempted to quantify this here). Implementation of AB 2628 will be of economic and environmental benefit to California.

## Footnotes

1. <http://www.arb.ca.gov/html/brochure/history.htm>

Year 2000 was their most recent posted data. These include passenger vehicles of all size classes, and excludes commercial vehicles.

2. <http://www.commondreams.org/headlines03/0729-10.htm>

CARB did not report average fuel economy in the document cited above and this value of 20.8 MPG is a realistic approximation.

3. <http://www.calepa.ca.gov/EMS/SiliconEMS/FAQ.htm>

Several values are reported for pounds CO<sub>2</sub> produced per gallon of gasoline burned, ranging from 17-20.

4. <http://www.epa.gov/greenvehicles/index.htm>:

To approximate the pollutant emissions and MPG for 2004 vehicles, I averaged the midpoint vehicles within each of the EPA size classes and obtained 19.7 pounds of (HC + NO<sub>x</sub>) over 15,000 miles, and 20.9 mpg. Knowing that the CAFE standard is now 27.5 MPG and that the average above does not account for different market shares, I adjusted the MPG upward by a factor of 1.32 and reduced the pollutant emissions by the same factor. Other approximations would yield slightly different results.

To obtain overall values for the hybrid vehicles, I assumed 40% were 2001-2003 Toyota Prius, 40% were 2004 Toyota Prius, 5% were Honda Insight with manual transmission, 5% were Honda Insight with automatic transmission, 5% were Honda Civic with manual transmission, and 5% were Honda Civic with automatic transmission. Other approximations would yield slightly different results.

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