



APPENDIX AVAILABLE ON REQUEST

Special Report 17

Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects

Chapter 2. Emissions from Motor Vehicles

HEI Panel on the Health Effects of Traffic-Related Air Pollution

Appendix A. Global Trends in Motor Vehicle Types by Region and Pollution Controls

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APPENDIX A. GLOBAL TRENDS IN MOTOR VEHICLE TYPES BY REGION AND POLLUTION CONTROLS

Gasoline Cars

The new gasoline fueled car market is expected to grow from roughly 30 million in 2005 to over 41 million by 2020 as shown in Figure A-1, with China projected to be the fastest growing new car market during this time span.

By 2010, about 70% of the new vehicles are estimated to be equipped with LEV2 or Euro 5 or Euro 6 type technology and this grows to over 95% by 2020.

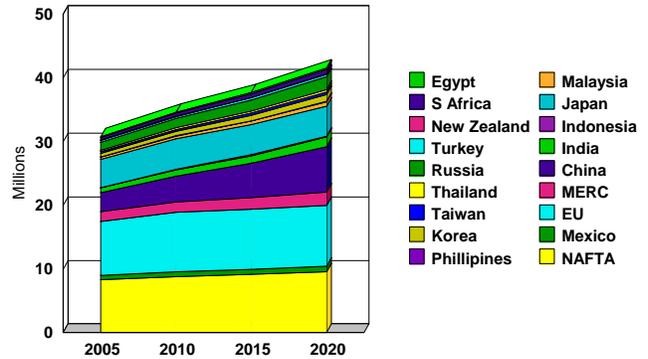


Figure A-1. Global gasoline fueled car sales forecast

Light Duty Gasoline Trucks

Just as the EU dominates the light duty diesel vehicle market, the US dominates the light duty gasoline truck market as shown in Figure A-2 with China’s fleet projected to grow rapidly out to 2020. While the US emissions standards dominates the current market today, the portion of light trucks following the EU requirements is gradually increasing and will be on a par with the US by 2020.

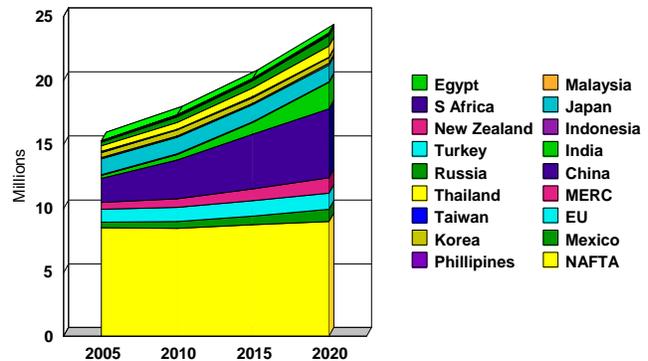


Figure A-2 Global light duty gasoline truck sales forecast

Light Duty Diesel Cars and Trucks

Light duty diesel car sales are expected to rise from slightly more than 8 million units in 2005 to almost 12 million units in 2020. The EU market is estimated to continue its diesel dominance although healthy light duty diesel growth is forecast for other countries such as China and India.

Because of the size of the EU light diesel market and the fact that other high growth countries such as China and India are following the EU emissions roadmap, it is not surprising to see that most diesel cars through 2020 are dominated by the EU type technologies and underscores that the weaker Euro 5 and Euro 6 emissions standards will likely effect air quality in these high growth regions.

The annual sales of light duty diesel trucks is expected to be relatively flat in North America and Europe after 2010 but will continue to grow rapidly in China and India. Europe and the EU regulations also dominate the light duty diesel truck market as they do the diesel car market, with 70% of the new light duty diesel trucks in 2020 expected to be designed to meet the EU requirements.

Heavy Duty Diesel Trucks

Estimating the size of the heavy duty diesel truck market is especially difficult because the EU

has not yet decided on the Euro VI standards. The range of options under consideration is quite wide and the potential technologies to meet whatever requirements are finally decided are evolving rapidly.

For taking CI (compression ignition) engines from Euro IV towards Euro VI, emissions of NOx and PM have to be reduced and NH₃ emissions have to be kept low. Especially the reduction of the NOx emissions is a challenge for the industry, since further NOx emissions reduction (using engine measures) is counter productive with low fuel consumption, one of the main market drivers for HD vehicles. In this light the industry stressed that the technology choices would be dictated by meeting Euro VI emission limit values, without (as far as possible) sacrificing Euro IV fuel consumption achievements. These fuel consumption achievements were the main reason why Euro V vehicles equipped with SCR-DeNOx were on the market in 2006.

Global sales of heavy duty diesel trucks are forecast to increase from 4 million to 7 million over the next 15 years. As the highest growth areas will be in China and India, this will add to the large EU based diesel control technology with the expectation that 90% of new trucks in 2020 will be following the EU emissions roadmap.

Motorcycles

As shown in Figure A-3, continued high growth in new motorcycle sales is forecast, with sales approaching 50 million annually by 2020. While production of motorcycles is growing very rapidly, especially in China, several forces are at work which could significantly impact future growth in this market. Several cities in China have begun to ban motorcycles because of concerns regarding safety; at the same time there is a significant shift to electric motorcycles; China produced approximately 10 million electric motorcycles in 2006. Finally, as economic conditions improve, more and more people can afford to buy cars rather than motorcycles; as noted earlier, growing affluence is fueling the rapid growth of new cars in China and India. Whether this economic change will eventually lead to a decline motorcycles is not known. If such a fall were to occur, it is estimated that it would not be before 2020. With China and Taiwan indicating their intention to implement the Euro III requirements in the next few years, advanced catalysts will quickly become the norm.

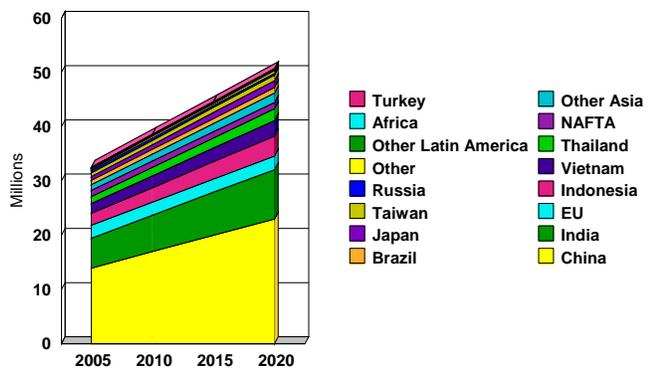


Figure A-3 Motorcycle sales forecast