

An automotive industry's view

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In the Kaya identity, the terms denoting population and GDP per capita are fundamental human rights for the nation to grow, whereas the terms CO₂ intensity of energy and energy intensity of GDP need to be addressed by means of innovation, evolution and deployment of technologies. While the world population is expected to grow from 6.3 billion in 2003 to 8.9 billion in 2050, in the same period the owned vehicles in the world are expected to grow from 0.8 billion to 1.1 billion (assuming 13% ownership rate, same as in 2003) or 1.3 billion (assuming 15% ownership rate).

Historical experience has shown that passenger-km per capita has grown with the GDP per capita in all nations, although the growing rate differs among different countries. Passenger-km per capita has grown in the USA at a much faster rate than in Western Europe and Pacific OECD. This indicates that the rate of transport demand growth can be influenced by appropriate strategies, especially in developing countries who are likely to witness higher growth in GDP per capita in the future.

CO₂-equivalent GHG emissions up to 2050 can be reduced to approximately the same level as in 2000 by a combination of following options:

- Diesel vehicles (LDVs)
- Hybrid vehicles (LDVs and MDTs)
- Biofuels (from 80% low-GHG sources by 2050)
- Fuel cells (from fossil originated hydrogen)
- Fuel cells (from 80% low-GHG hydrogen by 2050)
- 10% improvement in fuel economy
- 10% vehicle travel reduction

Setting benchmarked standards can play an important role to achieve efficiency improvements, as happened through the 'front runner' approach in Japan. In the 'front runner' approach, fuel efficiency standard for each category of vehicles are set based on the most efficient vehicle on the latest available year. This mechanism urges innovations towards improvement of engine efficiency and powertrain, and results in a faster deployment of hybrid systems. Front runner standard was introduced in Japan in 1998, and CO₂ emissions from its transport sector began declining from then onwards to their current level of about 262 million tons CO₂ per year.

Innovative technology such as plug-in hybrid can significantly reduce the well-to-wheel GHG emissions. Combining with biofuels will further reduce the emissions. Several approaches are being pursued using hybrid technology, including the further development of gasoline, diesel and alternative fuel engines, and fuel cell hybrid vehicles (FCHVs) which could have a major impact on emission reduction.