Possible Sector Approaches to Road Transportation CO$_2$ Reduction

Introduction to Japan’s Efforts

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Japan Automobile Manufacturers Association, Inc.
Necessity of Road Transport Sector Approach

Travel distances of individuals and goods increase with economic growth. Motorization will continue to increase in the future, especially in developing countries, and so will travel distances.
A comprehensive approach such as improving vehicle fuel efficiency, development of alternative fuels, upgrading of road infrastructure and effective utilization of vehicles make it possible to balance with economic growth.

\[
\text{CO}_2 \text{ Emissions} = \text{Actual fuel consumption} \times \text{Carbon density} \times \text{Total travel distance}
\]
After reaching the peak in 2001, CO₂ emissions in the transport sector have been on the decrease. The CO₂ reduction in the transport sector is attributable to: 1) decreased travel distance, 2) increased fuel efficiency, and 3) improved traffic flow.
The average fuel efficiency of newly registered vehicles in Japan is increasing year by year.
Steady step-by-step technological progress is required for improving fuel efficiency. As a result of full mobilization of human and financial resources in a concentrated period of time, Japan’s auto makers succeeded in largely increasing fuel efficiency. They are striving hard to increase actual fuel efficiency as well as modal efficiency.

**Engine technologies**
- Improvements in thermal efficiency
  - Direct injection
  - Variable mechanism (variable cylinder, VVT, etc.)
- Reduction of friction loss
  - Piston & ring friction reduction
  - Low-friction engine oil
  - Variable auxiliary drive

**Reduction of vehicle weight**
- Expanded use of lightweight materials
- Improved body structure

**Improved drive system**
- Expansion of lockup area
- Expanded number of transmission gears
- CVT (continuously variable transmission)

**Reduced resistance to airflow**
- Improved body configuration

**Other**
- Electrical power steering
- Idling prevention
- Hybridization

**Reduction of roll resistance**
- Low roll-resistance tires

Source: JAMA
Various approaches have been going on for alternative fuel vehicles aiming low carbon and high energy efficiency.

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Improvement of Road Traffic Flow

Smother traffic flow increases traveling speed and fuel efficiency, and thus contributes to CO₂ reduction.

**Measures to improve traffic flow:**

- Optimum route guidance and goods distribution by use of ITS technologies,
- Upgrading of road infrastructure,
- Advanced signal control systems,
- Minimization of on-street parking,

etc.
Effective Utilization of Motor Vehicles

- Park and ride systems
- Car sharing
- Use of public transportation systems
- Eco-friendly driving practices
Conclusions

- Integrated approach is needed to promote CO₂ emission reduction in the road transport sector, including improvement of vehicle fuel efficiency, development of alternative fuels, improvement of traffic flow, popularization of eco-driving habits. This approach make it possible to reduce CO₂ while economic growth can be kept.

For the purpose of implementing these comprehensive measures, all the stakeholders, i.e. the government, the auto industry, auto users, and others must take their own share of responsibility and work in cooperation with each other.

All countries are recommended to bring the best practice on CO₂ reduction measures taking into account their countries’ actual circumstances, setting up realizable targets where benchmarking is possible, so that framework can be created that all countries needs to try their best contribution to the world’s most urgent requirement---CO₂ reduction.