CO_2 Reducition and Automotive Technology: The Road Ahead

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JAMA
JAPAN AUTOMOBILE MANUFACTURERS ASSOCIATION, INC.

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About JAMA
(Japan Automobile Manufacturers Association, Inc.)

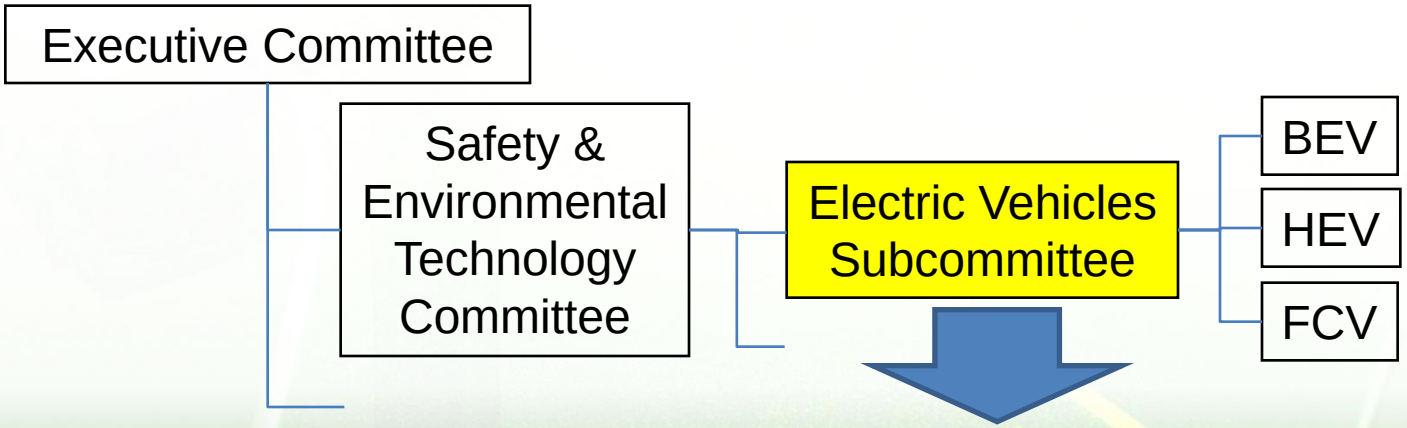
Objectives

To promote the sound development of the Japanese automobile industry and contribute to social and economic welfare.

Member Companies (14 in total)

Daihatsu, Hino, Honda, Isuzu, Kawasaki, Mazda, Mitsubishi, Mitsubishi Fuso, Nissan, Subaru, Suzuki, Toyota, UD, Yamaha

Organization (part of JAMA)

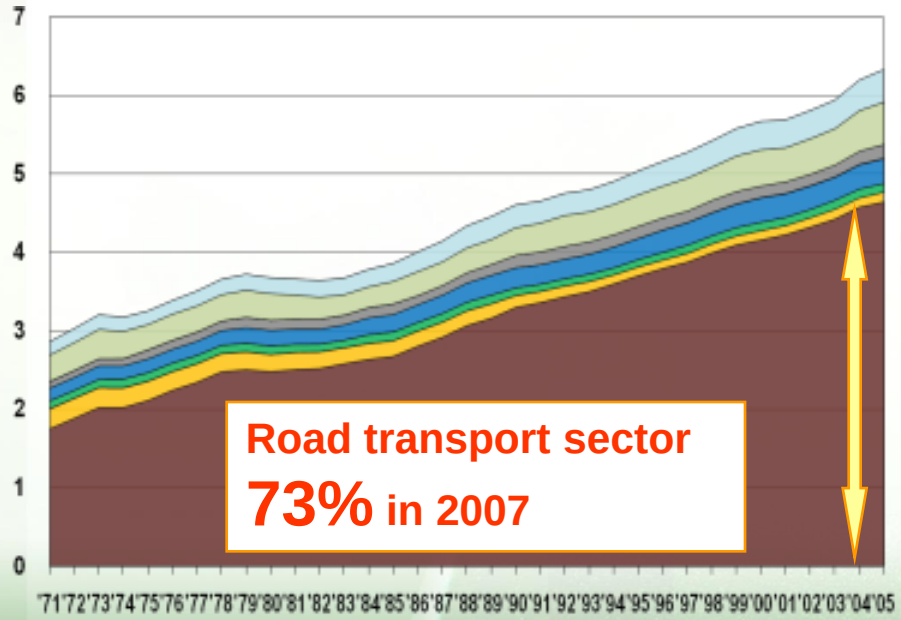


To promote the sound development of Electric-powered vehicles

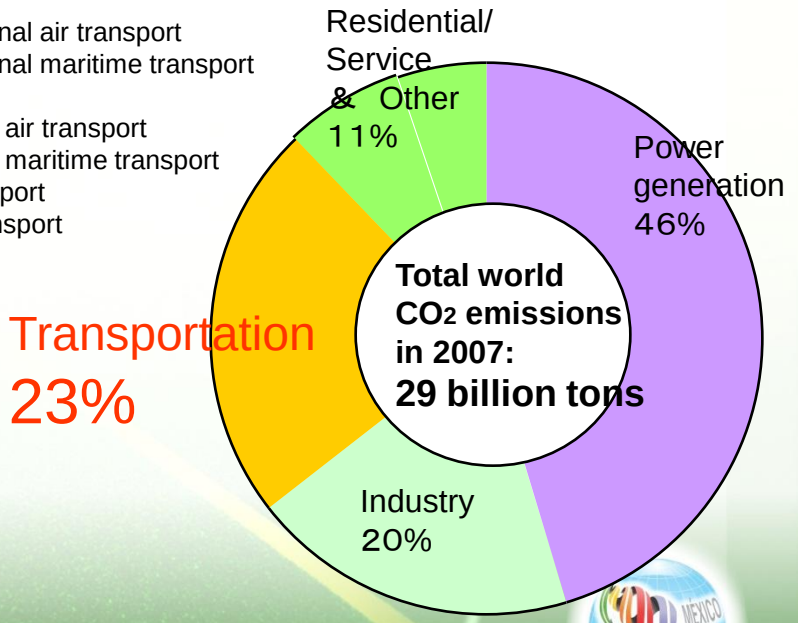
CO_2 Emissions in Transport: Global

- Steady increase to **29 billion tons** in Total
- About **23%** of total worldwide CO_2 emissions in 2007
- Roughly **73%** was generated by road transport.

CO_2 Emissions in the Global Transport Sector

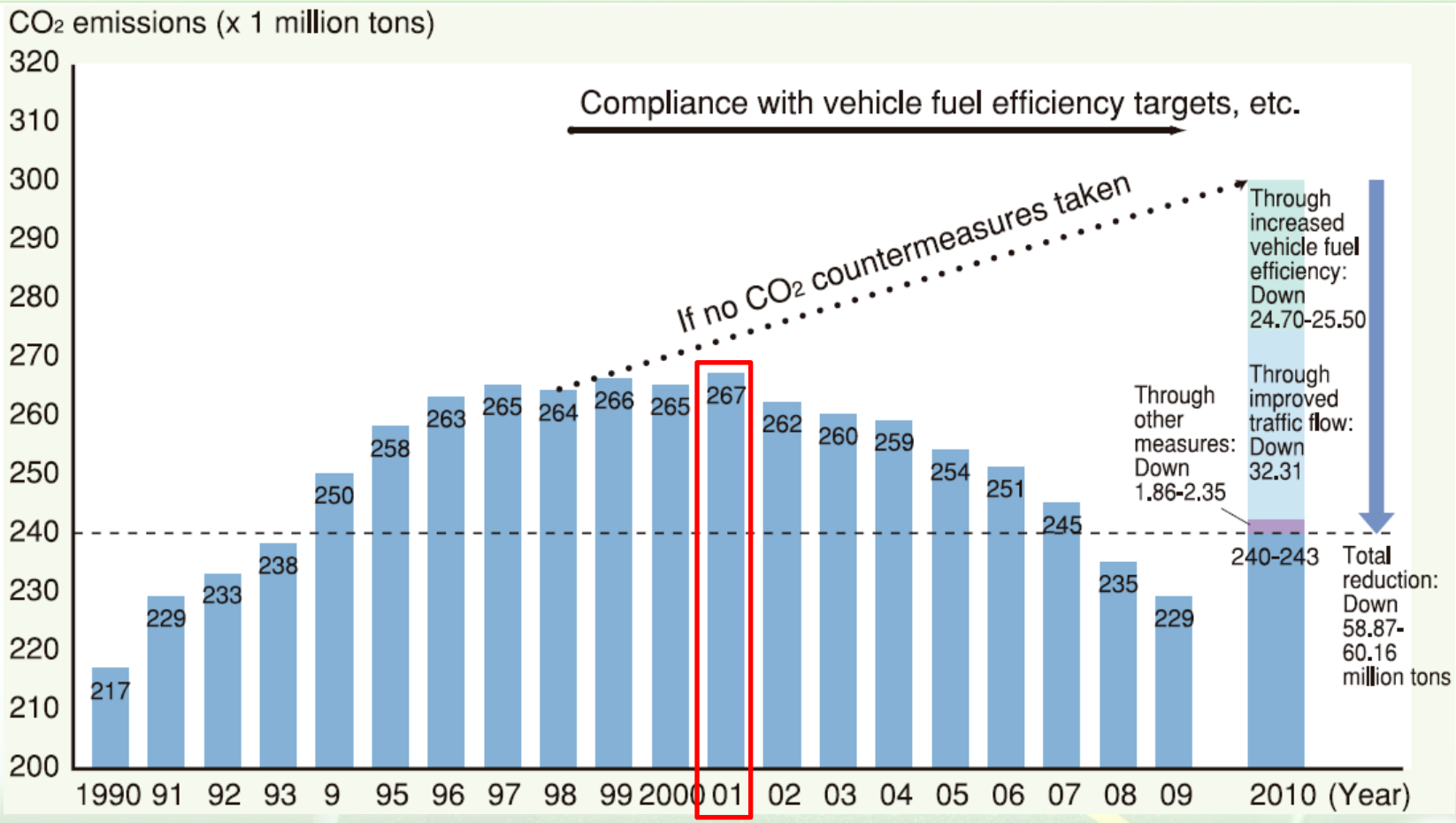


World CO_2 Emissions by Sector



Source: World Energy Outlook 2009, *International Energy Agency*

CO_2 Emissions in Road Transport: Japan



Peaked in 2001and declining ever since in Japan

Reducing CO_2 Emissions

Calculating CO_2 Emissions in Road Transport Sector

CO_2 emissions = Emissions intensity × Activity volume

= On-road fuel efficiency × CO_2 emissions coefficient × Total distance travelled

= Certified fuel efficiency $(km/\ell)^{-1}$ × Travelling coefficient × CO_2 emissions coefficient(gCO_2/ℓ) × Total distance travelled(v-km)

Improved by **Automotive Technologies**

Improved by **Congestion Mitigation & Eco-Driving**

Improved by **Bio-Fuels, Renewable energy**

Improved by **Modal Shifts**

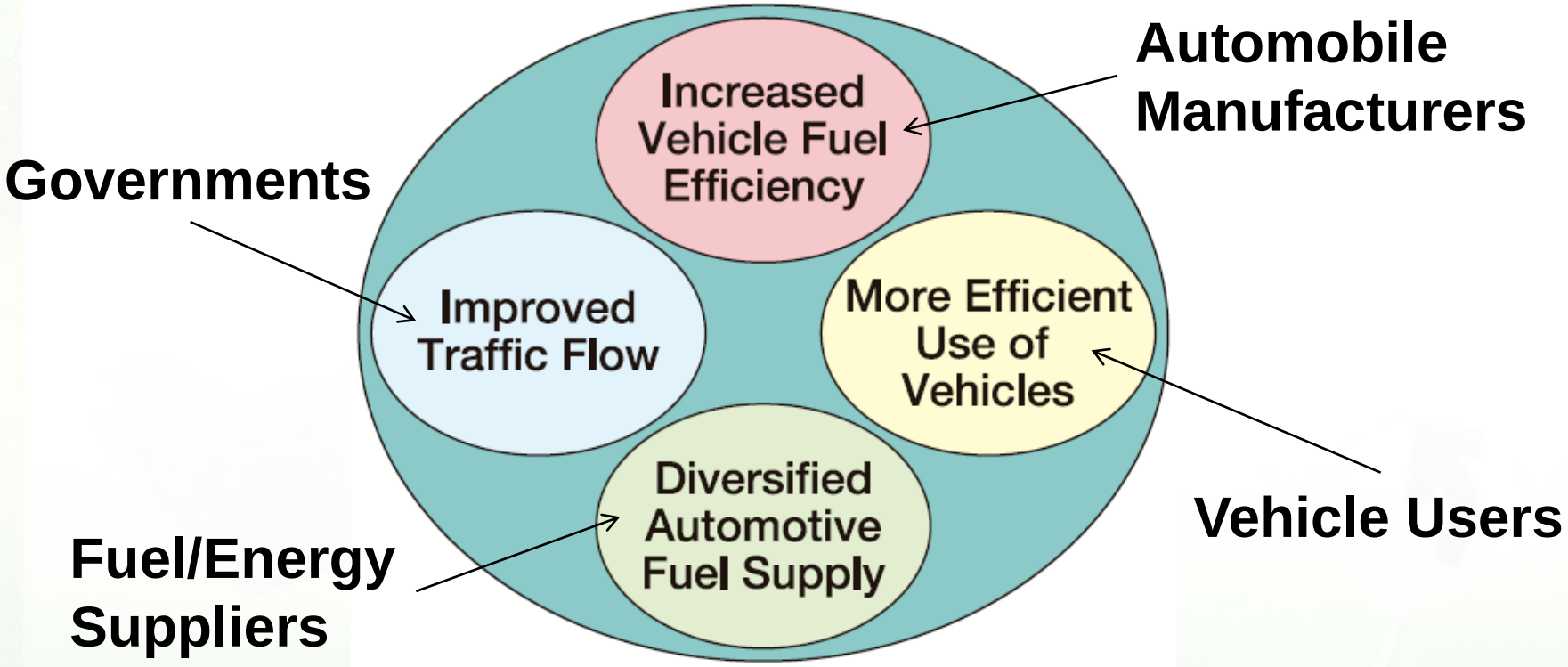
Automobile Manufacturers

Governments Vehicle Users

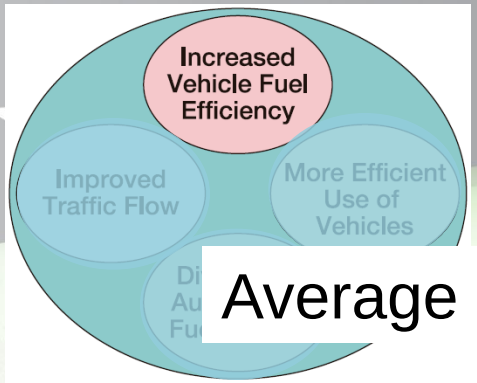
Fuel/Energy Suppliers

Integrated Approach to CO_2 Emissions Reduction

JAMA's recommended measures in four areas

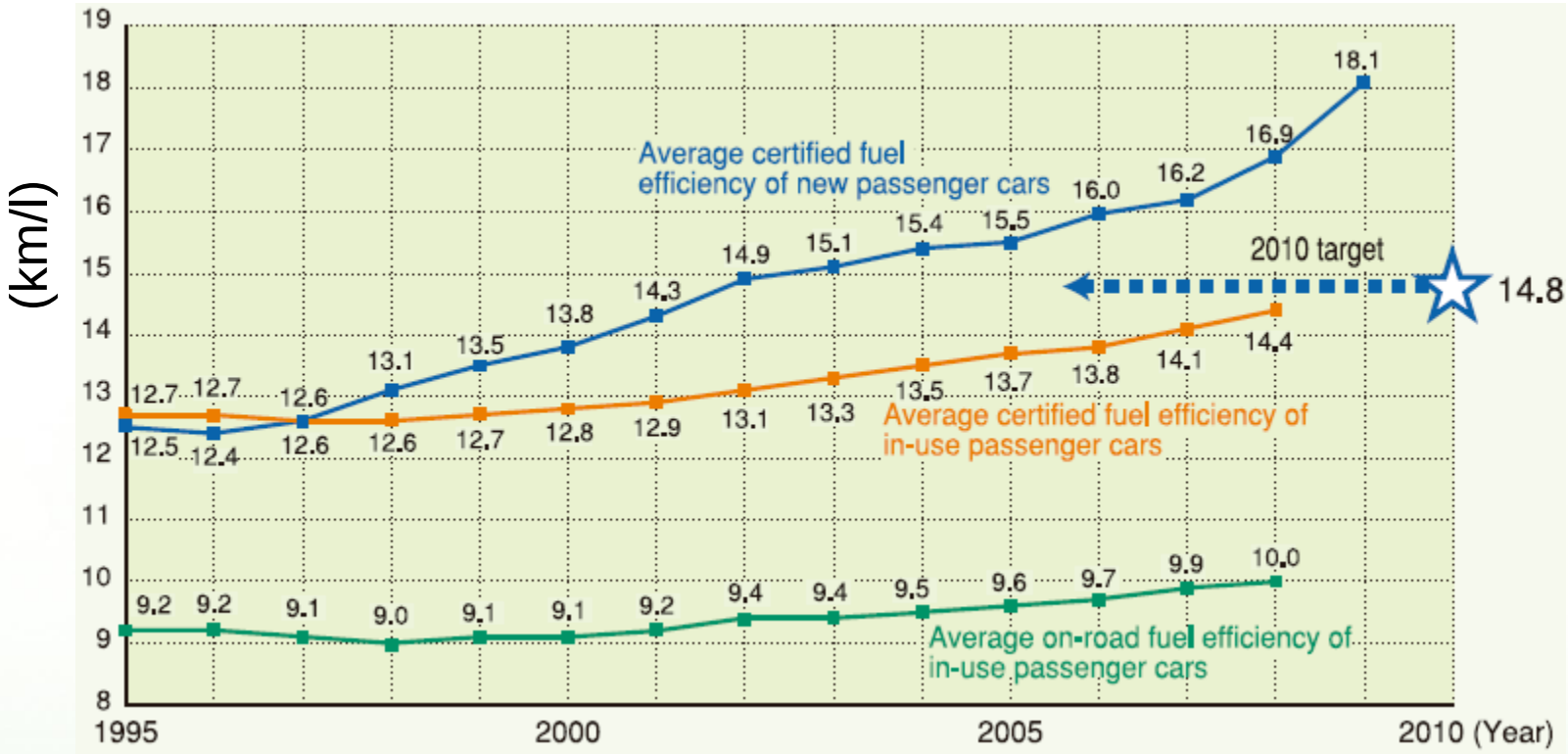


Cooperative efforts are needed among all the concerned parties



Increase Vehicle Fuel Efficiency

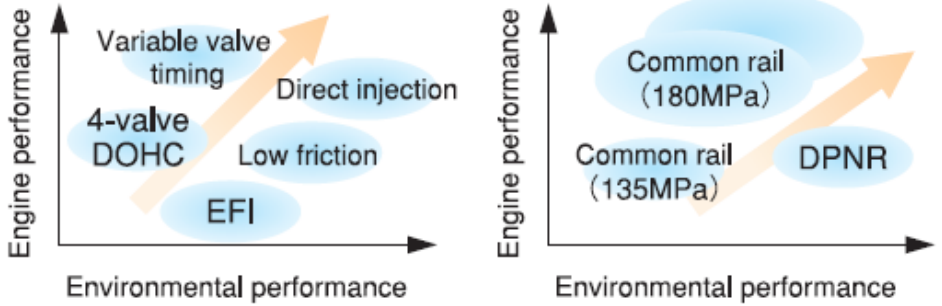
Average fuel efficiency of passenger cars in Japan



JAMA achieved steady increases in fuel efficiency and is expected to improve even further.

Vehicle Technologies Increasing Fuel Efficiency

Improved Engine Efficiency



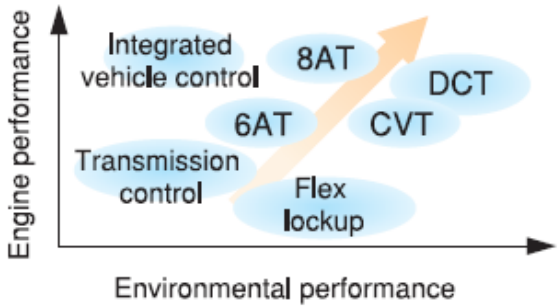
Improved Aerodynamics

Improved body configuration

Reduced Vehicle Weight

Expanded use of lightweight materials
Improved body structure

Improved Drive System



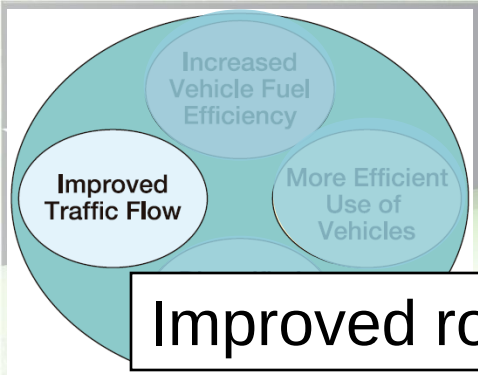
Reduced Rolling Resistance

Low rolling-resistance tires

Other

Electric power steering
Idling prevention
Hybridization

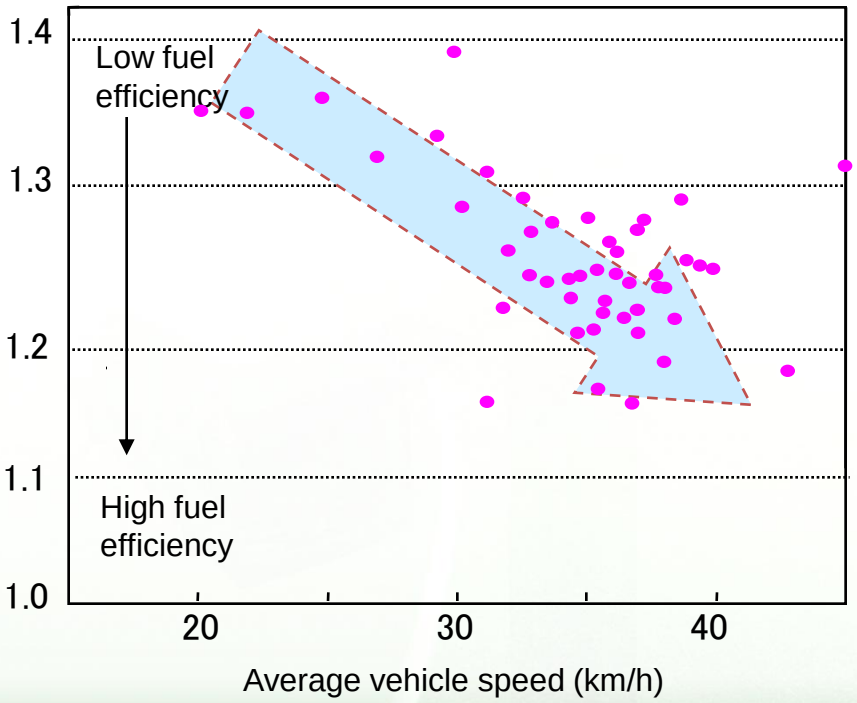
Fuel efficiency improvement is achieved through step-by-step advances in technology.



Improve traffic flow

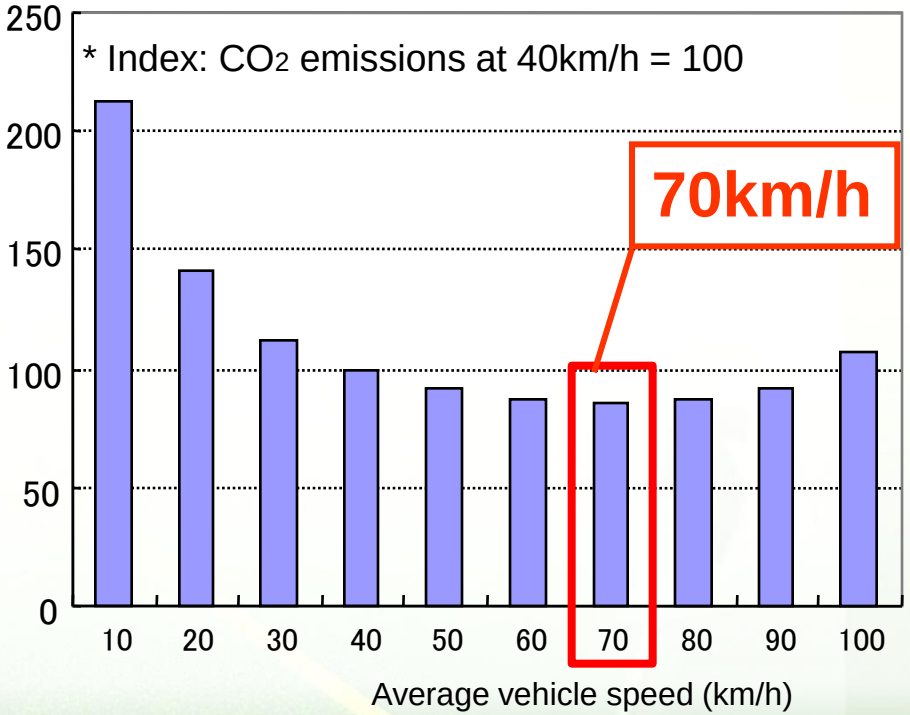
Improved road traffic flow increases vehicle travelling speed

Travelling Coefficient Values in Congested Traffic (Japan Case Study)



Source: "e-nenpi" car owner survey, *IRI Commerce & Technology Inc.*

Impact of Vehicle Speed on CO_2 Emissions



Source: Japan Automobile Research Institute

Upgrading road networks and infrastructure to reduced road transport CO_2 emissions

Improved traffic flow (Tokyo, Japan)

JAMA calculated CO_2 reduction by new bypass road as **20kt-CO_2** per year with our transportation static data.

A Tokyo Case Study

Central Tokyo

Bypass

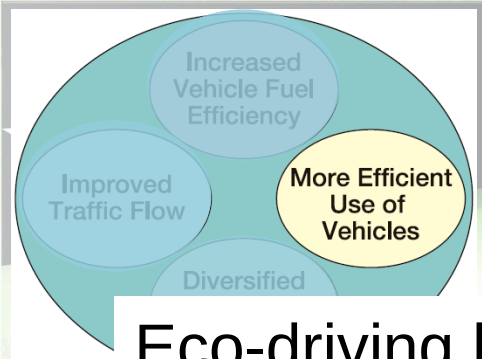
Improve traffic flow

- **Road congestion mitigation**

To improve traffic flow, road construction and road infrastructure developments are required, including the implementation of Intelligent Transport Systems.

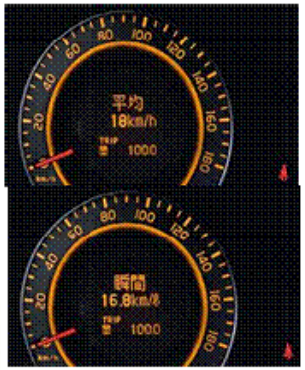
- **Urban planning**

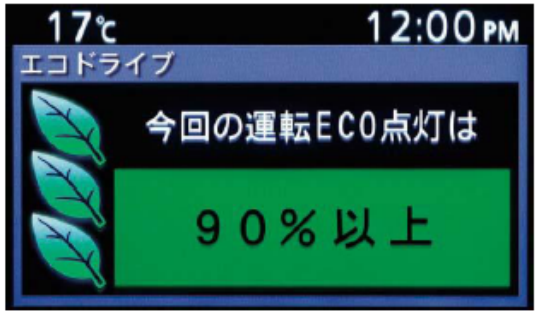
Low-carbon urban planning should incorporate effective road congestion mitigation measures, including road network development and ITS applications, from earliest stage of planning.



Efficient Use of Vehicles

Eco-driving helps reduce fuel consumption/CO_2 emissions, using fuel efficiency gauges and digital tacho-graphs .





Wide variety of eco-driving support tools are being installed

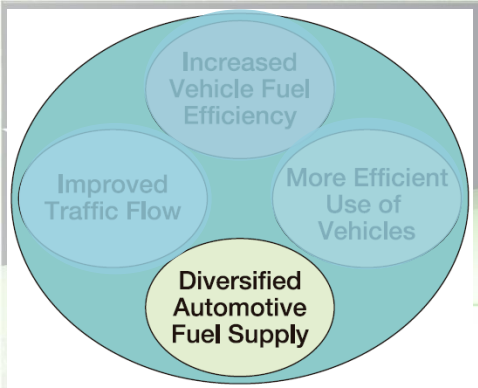
Efficient Use of Vehicles

On-road CO_2 emissions are estimated to decrease by roughly **10%** through the adoption of fuel-conserving eco-driving practices.

Impacts on Vehicle Fuel Efficiency of Selected International Eco-driving Program Initiatives

Country	Scope of Initiative	Impact (Short-Term)	Impact (Mid-Term)
Netherlands	National	Up 10-20%	Up 5-10%
Austria	National	Up 10-15%	Up 5-10%
Japan	-Driver training courses -Eco-driving contests	Up 12% Up 25%	
Germany	-National (new drivers) -Professional fleet drivers -Passenger-car driver training courses	Up 6-10% Up 10-25%	Up 6-10% Up 6-8% Up 10-15%
UK	Fleet operators/drivers	Up 10%	

Source: Workshop on Eco-driving, *International Energy Agency (2007)*



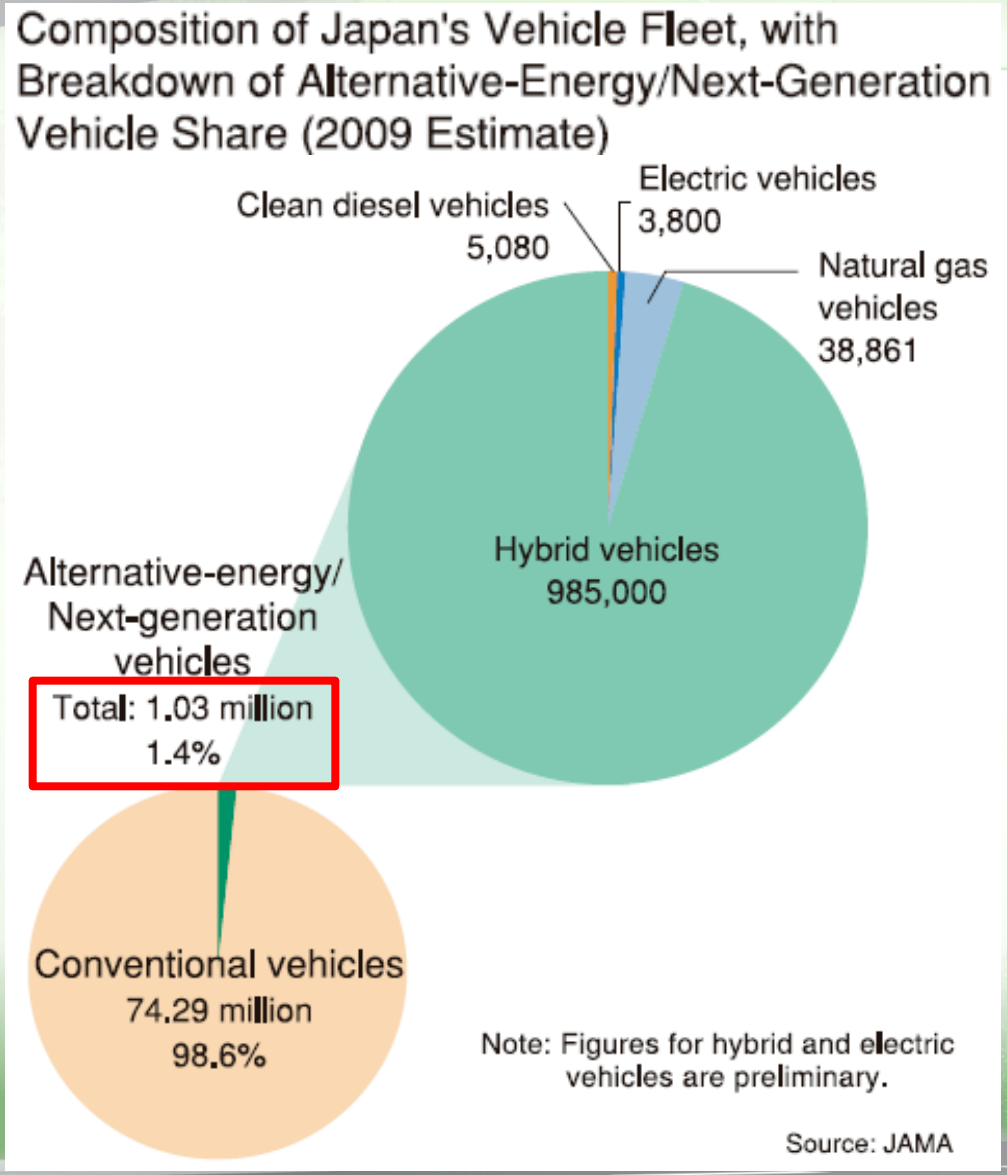
Diversify automotive fuel supply

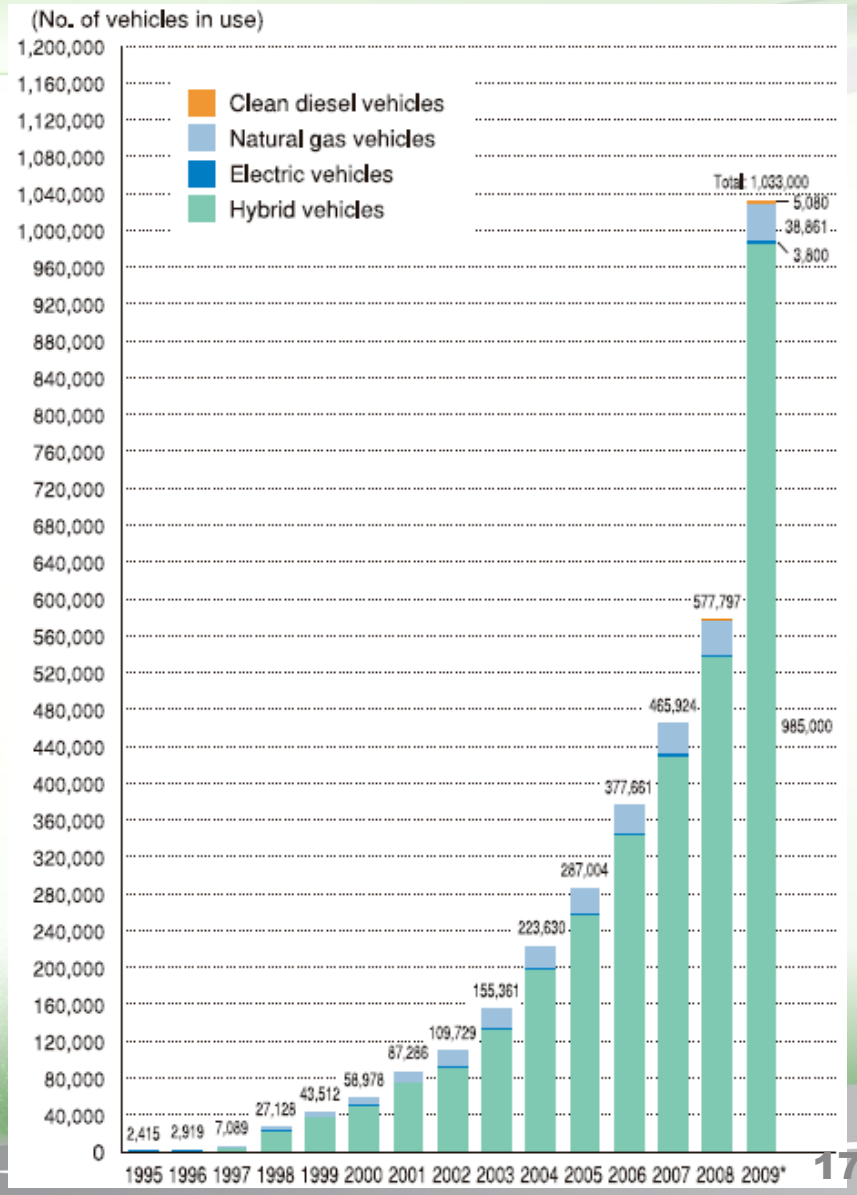
- Low-carbon fuels and sources of energy, such as biofuels and electric power generated by renewable energy, should be facilitated in line with national requirements
- Cellulosic ethanol and biomass-to-liquid fuels which have no adverse impacts on food supply and soil quality
- Technological development should be advanced through the cooperated efforts of industry, government and academia.

Next Generation Vehicles

Expanded to **26/571** models in 2009 in Japan

Next Generation Vehicles





Electric-powered Vehicle's Issues for widespread use

- **Hybrid & Plug-in Hybrid Vehicles**: are expected to be in widespread use in the near future assuming that cost reductions can be achieved and battery performance improved.

- **Battery Electric Vehicles**: The major challenges are their driving range, cost, and durability which will ultimately resolved mainly by breakthrough battery technology. Charging infrastructure implementations are necessary.

- **Fuel Cell Vehicles**: are expected to drastically reduce our dependence on fossil fuels. Breakthrough technologies are needed to reduce FC costs and improve their durability. Hydrogen-supply infrastructure developments are necessary.

Demonstration experiments in Japan

Town development with Eco-friendly Vehicle

Electric bus

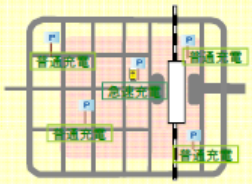
＜内容＞
電動バスの運行において充電（接触・非接触）に関わる技術的な検討

非接触タイプ　接触タイプ

＜地域＞**4都市**
青森県、東京都、京都市、奈良県

EV charging station

＜内容＞
駐車場などの充電施設の適切な配置・設置に関わる技術的な検討



＜地域＞**6都市**
青森県、さいたま市、神奈川県、京都市、大阪府、北九州市

Micro car

＜内容＞
超小型モビリティの車両の仕様、走行空間、駐車スペース、充電施設等に関わる技術的な検討

ミニカータイプ

走行空間イメージ

＜地域＞**6都市**
桐生市、千代田区、豊田市、京都府、福岡市、宗像市

Town Concept

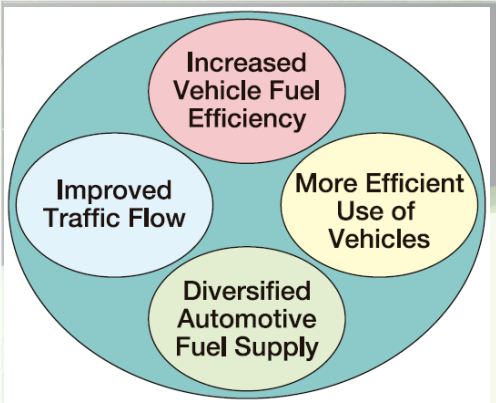
＜内容＞
環境対応車の特徴、普及を見据えた今後の都市におけるライフスタイルやまちのあり方を検討

Source:
Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

EV/PHV Town

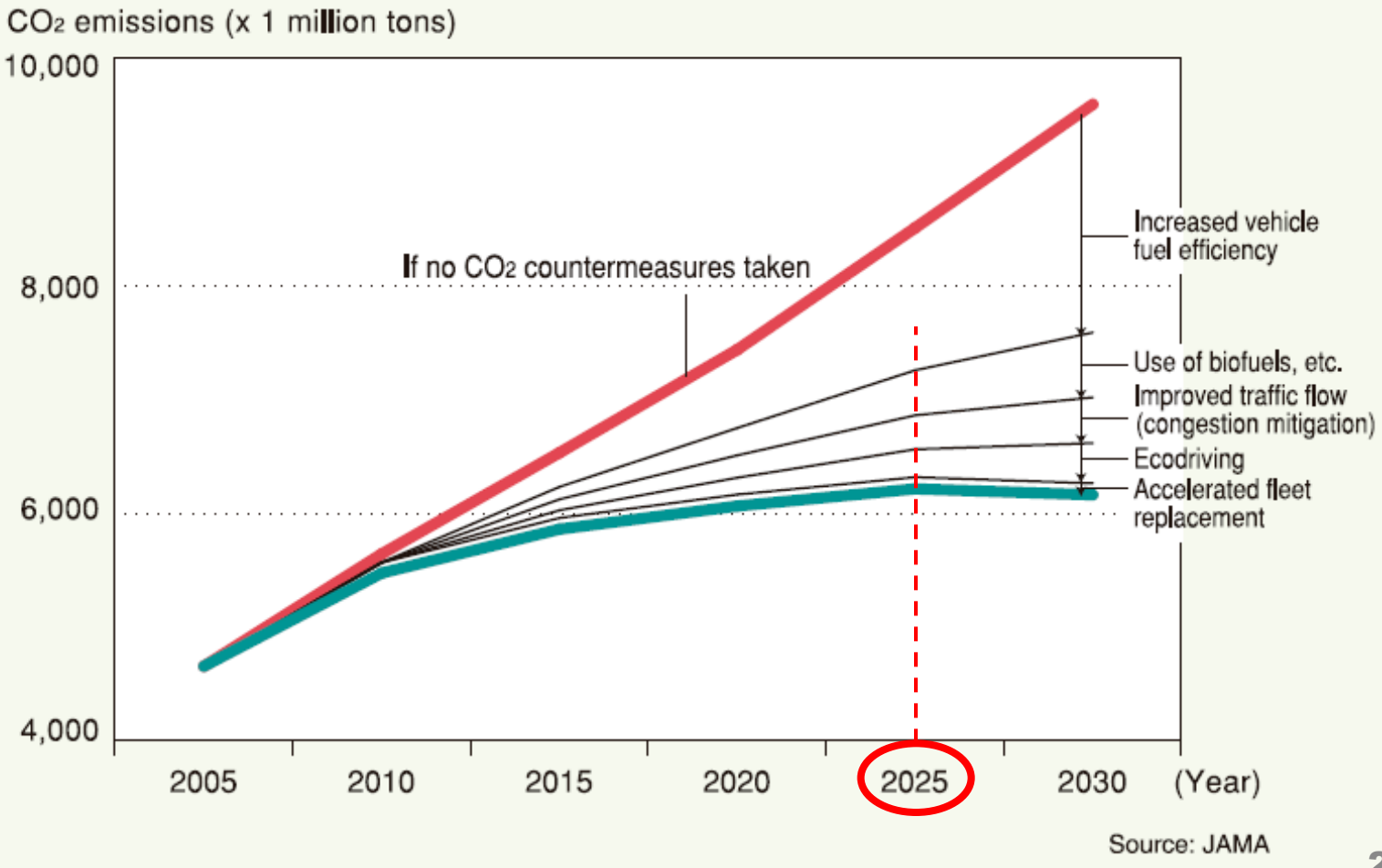
Source:
Minister of Economy, Trade and Industry (METI)

Conclusion



Impact of the integrated approach

CO_2 Emissions Reduction Potential in the Global Road Transport Sector assuming the implementation of recommended measures



Recommendation

Driving Sustainability through an Integrated Approach

Driving Sustainability

www.drivingsustainability.com

Thank you for your attention

Japan Automobile Manufacturers Association, Inc.
http//www.jama.or.jp