



*Further Challenges in
Automobile and Fuel Technologies
For Better Air Quality*

5th JCAP Conference

**Outline of New Research Programs for
Vehicle/ Fuel Technologies and
Improvement in Air Quality**

February 23, 2007

**JCAP Promotion Department
Japan Petroleum Energy Center**

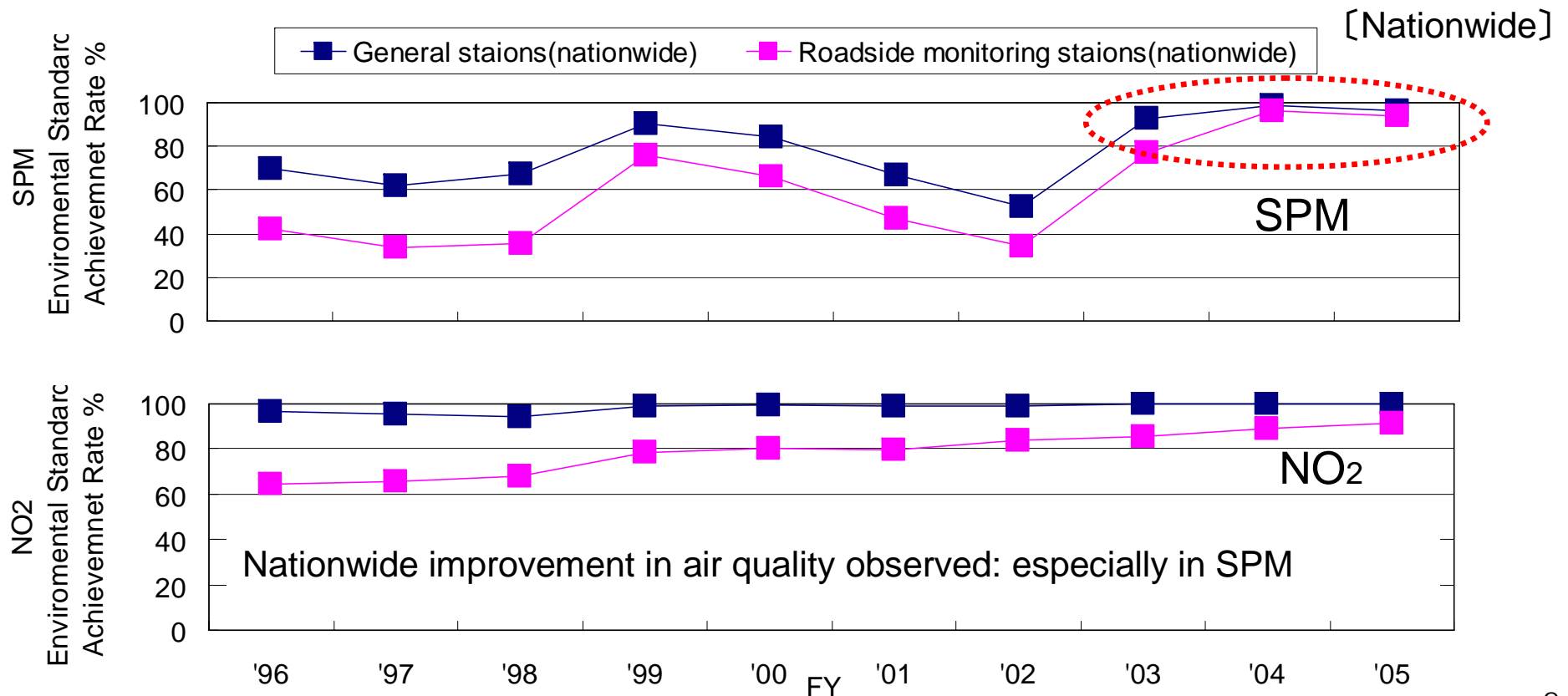




Achievements of JCAP II

- Clearly identified the direction of future automobile technologies for cleaner air in the form of “combination of aftertreatment system and ultra low sulfur fuel” → the early introduction of S10 ppm fuel and vehicles with latest aftertreatment system
- Developed a high-accuracy air quality simulation model, estimated future air environment, and proposed specific measures → Released as a tool for evaluation of air environment improvement measures

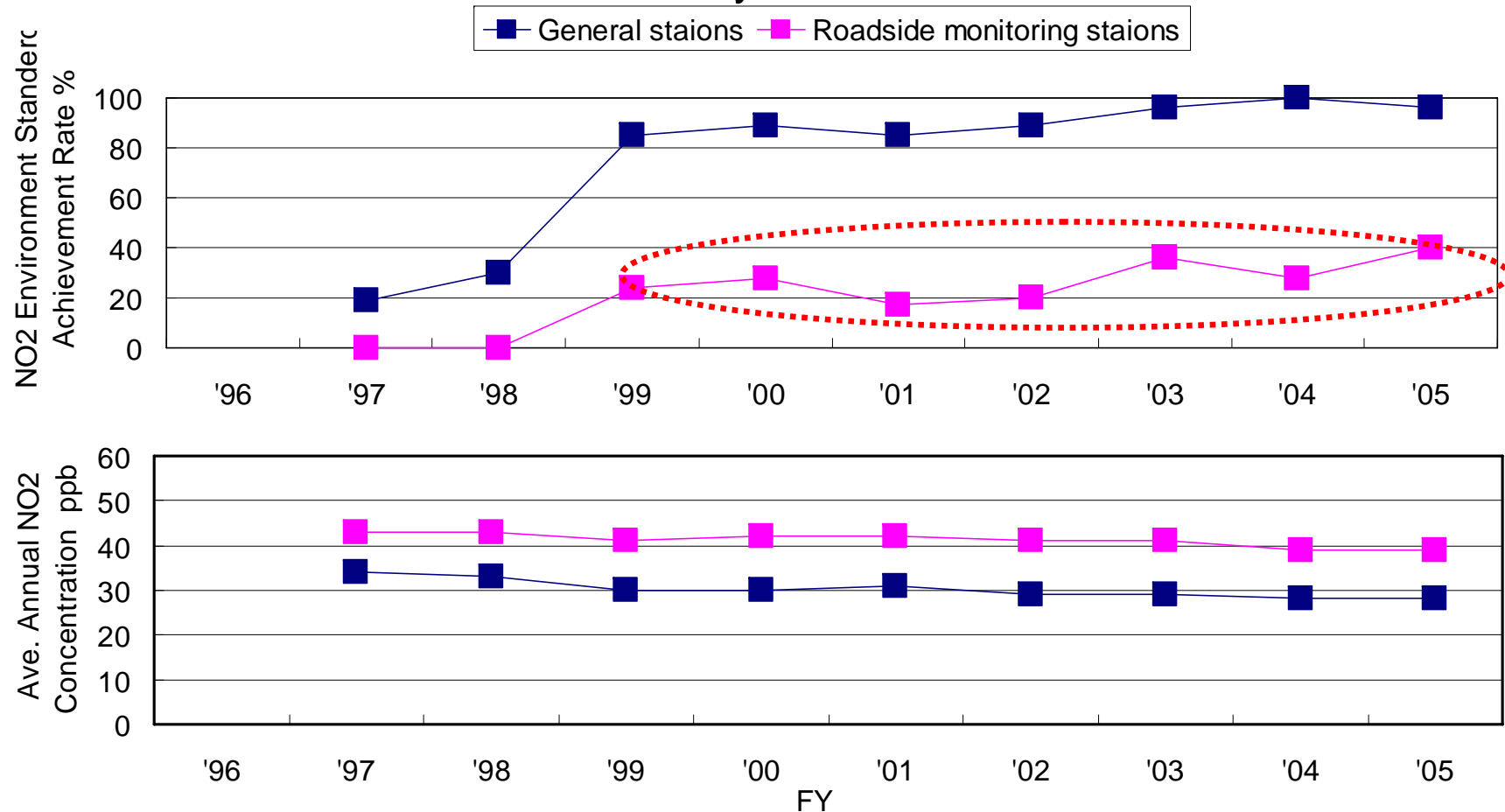
Trend of achievement rate of environmental standards for SPM and NO₂





Current State of Atmosphere in Urban Areas

Achievement trends of NO₂ environmental standard within Tokyo 23 wards

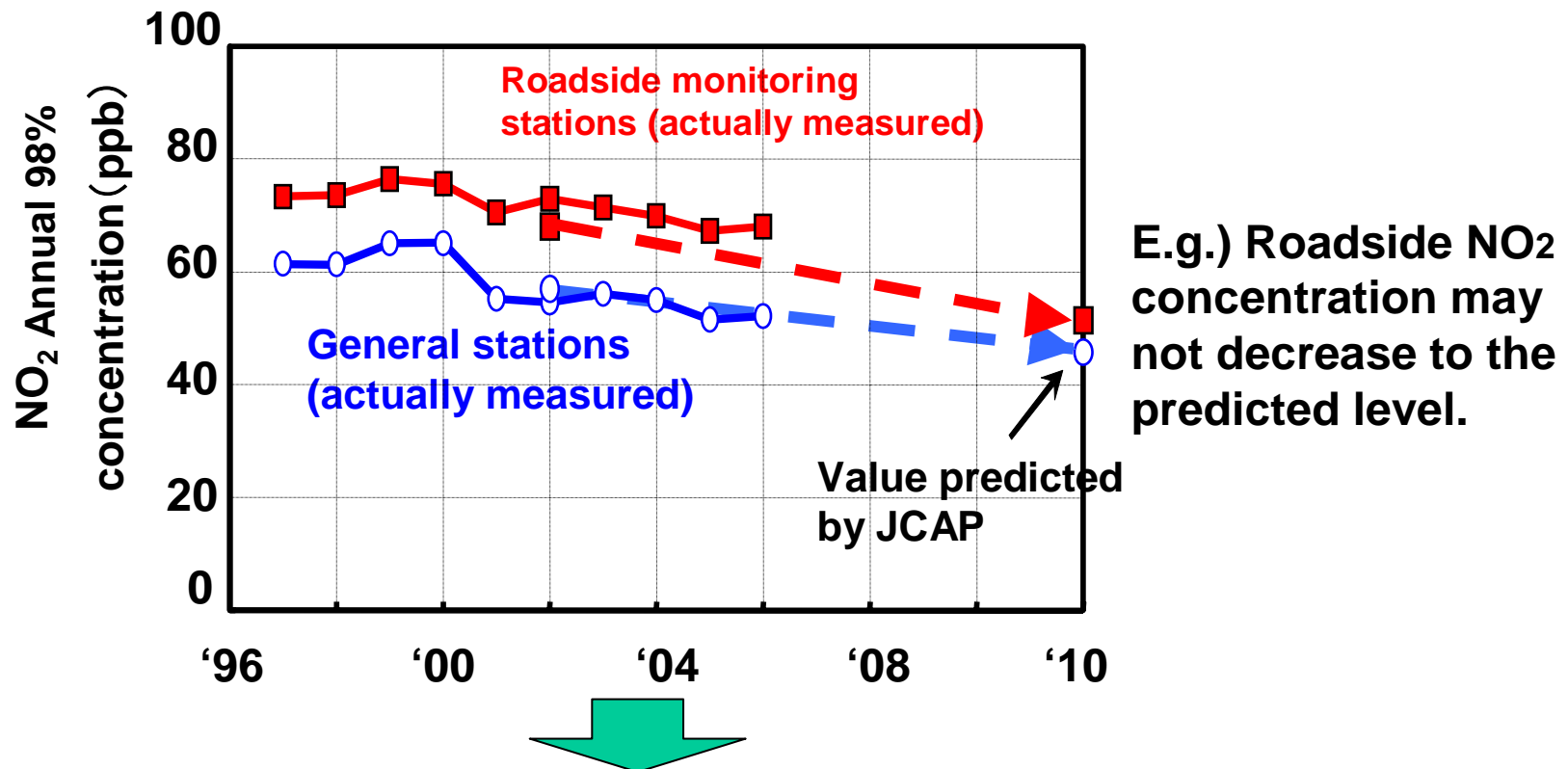


- As for urban areas, no improvement in achievement rate of NO₂ environmental standard at roadside monitoring stations since 2000
- Average concentration also shows no significant decrease since 2000



Air Quality Issues for the Future

Issues such as roadside NO₂ concentration and roadside fine particles (including generation of secondary particles) are expected to attract a lot of attention in the future.



Need to evaluate and implement countermeasures comprehensively to deal with these issues from an automobile/non-automobile standpoint.



Next Research Program on Air Quality Improvement

- Policy and objective
 - As part of the next research program related to air quality improvement, the aim will be to develop and utilize a high-accuracy air quality prediction simulation model for the research of issues related to future air quality improvement, and to provide data for the further promotion of air quality improvement.
- Budget (for FY2007): 320 million yen

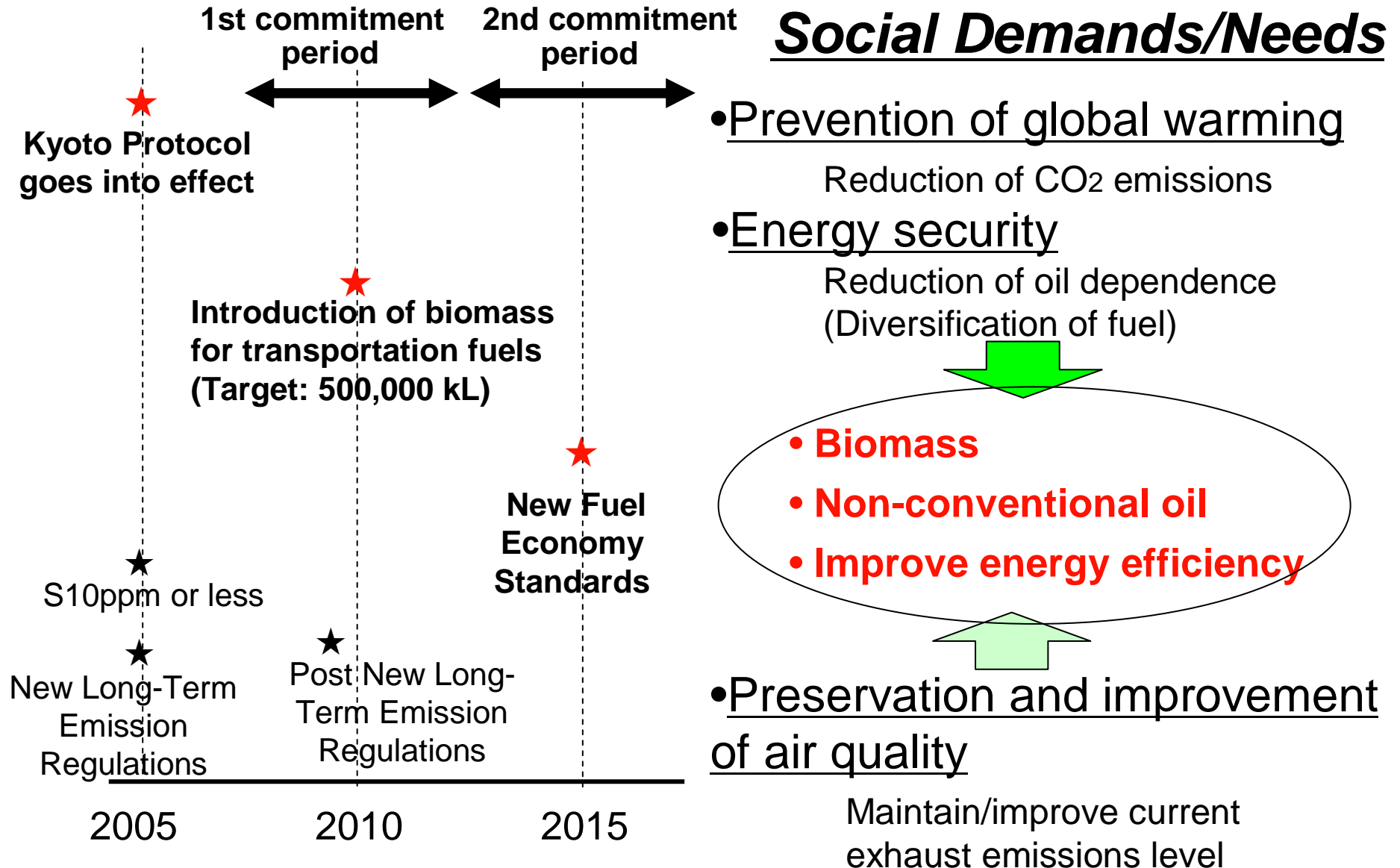


Outline of Next Research Program on Air Quality Improvement

- Target of research program
 - Roadside NO₂, Roadside fine particles (including generation of secondary particles)
- Contents of research program
 - To clarify the generation mechanism of roadside NO₂ and fine particles (focusing on contribution made by automobiles)
 - To clarify the contribution of background area
 - To study NO₂ reduction measures such as traffic flow control, etc.
 - To update emission inventories (accuracy improvement)
 - Automobile emission inventory
 - Non-automobile emission inventories
 - To maintain and utilize the JCAPII model



Regulatory and Social Trends Related to Automobile and Fuel





Examples of Research programs Related to Automobile and Fuel

Technology area

Examples of programs

Use of Biomass

Use of bioethanol

Use of biodiesel

Use of FT diesel

Use of Non-conventional oil

Use of non-conventional petroleum oil

Shift to diesel

Improve energy efficiency (Reduction of CO₂)

Octane rating improvement

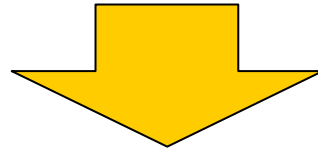
New combustion technologies (HCCI, etc.) and fuel quality

Engine oil



New Joint Research Program Related to Automobile and Fuel

- Selected a “Joint Research Program”, which currently requires cooperation between automobile and fuel industries, from the examples of programs related to automobile and fuel.



- To start research activities in FY2007 for a new joint research program, “Research on usage of biodiesel fuel (BDF)”
- To implement additional programs which require cooperation between automobile and fuel industries in the future where appropriate



Next Auto-Oil Joint Research Program

- Next auto-oil joint research program
 - Research on high concentration usage of biodiesel fuel (BDF)
- Objectives
 - To identify technical problems with the use in automobiles of high-concentration biomass fuel blended (by over 5%) with diesel fuel on automobiles.
 - To conduct analytical examination including countermeasures on both automobiles and fuels for problems identified in the above study.
 - To obtain technical knowledge which can contribute to standardization and market introduction of biodiesel fuel based on the studies.
- Budget (FY2007): 270 million yen



Research on High-concentration Usage of Biodiesel Fuel

•Background of research

- Current mainstream biodiesel fuel is composed of fatty acid methyl ester (FAME) which is produced by the transesterification of vegetable oil. Especially in Europe, FAME 5%-blended diesel fuel is widely distributed.
- In Japan, the specifications for FAME 5%-blended diesel fuel will be implemented by the end of FY2006.
- High concentration blend of FAME (by over 5%) with diesel fuel is under consideration in Europe and the United States, etc.
- There are some problems with FAME, such as low oxidation stability. High-concentration usage of FAME requires further examination from both fuel quality and vehicle technology standpoints.
- Besides FAME, new types of diesel fuel using substances such as hydrogenated vegetable oil, BTL, etc. have come into consideration.



Research on High-concentration Usage of Biodiesel Fuel

- Plan to examine influences of the following elements
 - Fuel properties
 - Stability
 - Exhaust emissions
 - Durability of after-treatment device
 - Low temperature stability
- Fuel types (planned)
 - Vegetable oil methyl esters (rapeseed, soy bean, palm, etc.)
 - Hydrogenated vegetable oil, FT diesel fuel (biomass-derived), etc.