Further Challenge in Automobile and Fuel Technologies for Better Air Quality

JCAP Cost Studies WG Report

February 22, 2002

Cost Studies WG
Purpose of Cost Studies WG

Evaluation on cost and air quality improvement effects of automobile and fuel emission reduction measures

Suggestion helpful for formulating policies on emission reduction measures
Activities of Cost Studies WG

1. Cost effectiveness evaluation
   - Evaporative emissions measures for Gasoline-powered vehicles
   - Vehicle emissions measures for Gasoline-powered vehicles
   - Vehicle emissions measures for Diesel-powered vehicles
   - Vehicles
   - Fuels
   - Tendency of focusing technology development

2. Expenses of reduction measures

3. Study on vehicle emission reduction, unresolved issues on air quality and policy suggestion
Content

• Study on vehicle emissions reduction measures
  ➢ Cost and effect evaluation
  ➢ Expenses of reduction measures
  ➢ Vehicle emission reduction, unresolved issues on air quality and policy suggestion
Study on vehicle emission reduction measures

• Cost and effect evaluation
  - Evaporative emissions measures for Gasoline-powered vehicles
  - Vehicle emissions measures for Gasoline-powered vehicles
  - Vehicle emissions measures for Diesel-powered vehicles
  - Vehicle emissions measures in Total emission inventory

<Reference>
PEC-1999JC-24: Report on commercial vehicle and fuel actual conditions estimation survey considering emission reduction technologies and the cost
Trend in vehicle emissions regulations for gasoline- and diesel-powered vehicles

Cost effectiveness evaluation

Case of new production vehicles sales

Target substances

CO-HC-NOx
Evaporative emissions

Nox-PM
HC-CO

Gasoline-powered vehicles

Diesel-powered vehicles

H12/10 (2000)
H14/9 (2002)
H14/10 (2002)
H17/9 (2005)

'78 reg.
'00 reg.
Long-term reg.
New short-Term reg.
Evaporative emissions for gasoline-powered vehicles

Cost effectiveness evaluation

- **HSL**: Hot Soak Loss
  - Evaporative emissions emitted from vehicles during parking after long-time running
- **DBL**: Diurnal Breathing Loss
  - Evaporative emissions emitted from vehicles during long-time parking in night and day
- **RL**: Running Loss
  - Evaporative emissions emitted during vehicle running

'00 reg. (Gasoline-powered vehicles)

2g/test Max. in
HSL in 1 hour + DBL in 1 day
(=1hrHSL+1DBL)
# Study Content

**Purpose**

- Evaporative emissions
- Emissions (Gasoline-powered vehicles)
- Emissions (Diesel-powered vehicles)

**Emissions Level**

- '78/'00 reg.
- Change @2 DBL to @3DBL in '00 reg.
- '78/'00 reg.
- Reduce 25-50-75% of '00 reg. (CO, HC, NOx all species)
- Long/New Short-term reg.
- Reduction rate (%) from New Short-term reg.

<table>
<thead>
<tr>
<th></th>
<th>NOx</th>
<th>PM</th>
<th>HC</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Case 2</td>
<td>50</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 3</td>
<td>30</td>
<td>70</td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>

**Fuel Properties**

- RVP in gasoline max. 60~78kPa
- Sulfur in gasoline max. 10~100ppm
- Sulfur in diesel max. 10~500ppm
Cost Calculation

Cost effectiveness evaluation

Cost distribution is differed by industries.

Adoption of Net Present Value (NPV) method
Net Present Value (NPV) method

Cost effectiveness evaluation

A conversion method of cash flow of future capital investment and fluctuating costs as present value

\[
\text{Net present value (NPV)} = \sum_{n=0}^{\infty} C_n \left(\frac{1}{1+r}\right)^n
\]

Cost is gathered by outsourced questionnaires to car manufacturers and oil companies

Total cost is obtained by refunding yearly cost till 2015 by 3.95% of discount rate, then added up as Net Present Value in 1999
Cost for evaporative emissions reduction measures

Cost taken for vapor pressure reduction (fuel) and Evaporative emissions reduction (vehicle) (Net Present Value from 2000 to 2005 as 1999 basis)

Although cost varied by cases, approx. 300 to 550 Billion yen is estimated.

Vapor pressure of fuel (max/ave. kPa)
- 78/68
- 72/65
- 65/60
- 60/55

Cost effectiveness evaluation
Effect of evaporative emissions reduction measures

Cost effectiveness evaluation

<Case of Reduction measures>

- 2000: 1DBL, 78kPa
- 2000 - 2004: 1DBL, 72kPa
- 2005 - 2015:
  - 1DBL, 72kPa
  - 1DBL, 65kPa
  - 1DBL, 60kPa
  - 2DBL, 72kPa
  - 2DBL, 65kPa
  - 2DBL, 60kPa
  - 3DBL, 72kPa
  - 3DBL, 65kPa
  - 3DBL, 60kPa

No intensification since 1999

Temperature data in summer 2000 (Aug. 3) is used.
Japan Clean Air Program

NOx reg. applied area

- Enacted as an air pollution control measures for NOx emitted from vehicles in metropolitan area
  - Target area in Kanto region: Tokyo, Kanagawa, Saitama, Chiba
  - Target area for the simulation is shown in red.

Cost effectiveness evaluation
Cost and effect of evaporative emissions reduction measures

Cost effectiveness evaluation

Cost taken for measures (sum of fuel and vehicle costs) is almost proportional to effect

Cost NPV (billion yen) @1999

Reduction rate (%) compared to “no intensification since ’99” case
Conclusion on evaporative emissions reduction measures for gasoline-powered vehicles

Cost effectiveness evaluation

• Reduction measures cost
  ➢ Cost for fuels and vehicles from 2000 to 2015 varies by cases, and is estimated approx. 300 to 550 billion yen in Net Present Value as 1999 basis.

• Effects by reduction measures
  ➢ Measures for vehicles make a long-term effect by penetrating regulation meeting vehicles into market place, measures for fuels make an immediate effect for in-use vehicles.

• Cost and effects
  ➢ No relationship is found between effects made by measures for fuels and those for vehicles, however, the accumulated effect till 2015 is almost proportional to the cost.
Vehicle emissions reduction measures for gasoline-powered Vehicles

Cost effectiveness evaluation

Estimation on new production vehicle sales volume ratio by emissions regulations level for Gasoline-powered passenger cars

Voluntary introduction Of low emission vehicles

Incentive effects

Low emission vehicles Increase rapidly

Estimation target: Gasoline-powered passenger cars except mini cars

Source: PEC-2000JC-18” Report on cost survey on vehicle emissions and evaporative emissions, and survey on vehicle diffusion estimation by emissions regulations to be met”
Effect of vehicle emissions reduction measures for gasoline-powered vehicles

Cost effectiveness evaluation

- Estimation on NOx emission inventory from Gasoline-Powered passenger cars in 2015
- Continuation of ’00 reg.: approx. 44% reduction
- Trial calculation with low emission vehicle
  Sales estimation: approx. 83% reduction

No intensification since 1999

Trial calculation with low emission vehicle
Sales estimation (diffusion of vehicles with 25-75% reduction of ’00 reg.)

-44%
-83%
Cost and effect of vehicle emissions reduction measures for gasoline-powered vehicles

Cost effectiveness evaluation

Cost obtained by trial calculation with Low emission vehicle sales estimation is approx. 4 trillion yen in NPV.

Cost effectiveness decreases compared with a case of continuation of ’00 reg.

Trial calculation with low emission vehicle Sales estimation (diffusion of vehicles with 25-75% reduction of ’00 reg.)

Continuation of ’00 reg.
Conclusion on vehicle emission reduction measures for gasoline-powered vehicles

Cost effectiveness evaluation

Rapidly increase of low emission vehicles volume from now on is estimated by voluntary introduction of low emission vehicles (including incentive).

Trial calculation based on low emission vehicle sales estimation

- Reduction measures cost is estimated approx. 4 trillion yen in Net Present Value as 1999 basis.
- Effect made by reduction measures makes approx. 83% reduction of NOx emission inventory.
- Cost effectiveness decreases compared with continuation of ’00 reg.

Due to introduction of incentive, cost taken more than the effects, however, emission reduction measures is proceeded.

Incentive is considered more important than intensification of regulations.
Effect of vehicle emission reduction measures for diesel-powered vehicles

Cost effectiveness evaluation

Estimation with combination of New Short-term reg. and cases 1 to 3 in 2015 compared with no intensification since 1999 case

PM: 69% Max. reduction

NOx: 56% Max. reduction

NOx: 56% Max. reduction

PM: 69% Max. reduction
Cost and effect of vehicle emission reduction measures for diesel-powered vehicles

Cost for combination measures of New Short-term reg. and Cases 1 to 3 is estimated approx. 2 trillion yen in NPV.

Estimation in 2015 with combination measures of New short-term reg. And Cases 1 to 3

- Cost effectiveness decreases Compared with continuation of New Short-term reg. case

NSTR: New Short-term regulations

- Estimation in 2015
- Calculation with 50ppm sulfur content
- N50P50=NOx50%. PM 50% reduction
Conclusion on vehicle emissions reduction measures for diesel-powered vehicles

Cost effectiveness evaluation

• Reduction measures cost
  - Cost taken for combination measures of New Short-term regulations with cases 1 to 3 is estimated approx. 2 trillion yen. In NPV.

• Effect by reduction measures
  - Due to combination measures of New Short-term regulations with cases 1 to 3, NOx and PM emission inventory will be reduced 56% and 69% respectively compared with no intensification of regulations since 1999.

• Cost and effects
  - According to estimation in 2015 with combination measures of New Short-term regulations and cases 1 to 3, cost effectiveness is considered to decrease compared with continuation of New Short-term regulations case.
Vehicle emission inventory in Total emission inventory (THC)

Cost effectiveness evaluation

Comprehensive study including measures for other sources is required For further THC reduction.

Contribution of vehicles for level 1 in 2015 decreases to approx. 5%.

Items of Total emission inventory (THC)

THC Emission inventory t/day

0 500 1000 1500

2000 2015 All vehicles replaced by level2

No intensification since '99

Introduction of Level 1

Introduction of Level 1 + 2

<level1>
- Gasoline Vehicle: '00 reg.
- Diesel Vehicle: New Short-term reg.

<Level2>
- Gasoline vehicle: 50% reduction of '00 reg.
- Diesel vehicle: from New Short-term reg. To measures of Case2 (NOx50%,PM70% reduction)

Items of vehicles

THC Emission inventory t/day

0 100 200 300

2000 2015

No intensification since '99

Introduction of Level 1

Introduction of Level 1 + 2

All vehicles replaced by level2

HSL

DBL

RL

Staring Motorcycles

Starting Diesel vehicles

Starting Gasoline vehicles

Running Motorcycles

Running Diesel vehicles

Running Gasoline vehicles

Vehicle emissions

Gas station, tanks

Painting

Printing

Other evaporative emissions

Household, Offices

Airplanes, vessels

Factories (Smoke stacks)

Nature origined
Japan Clean Air Program

Vehicle emission inventory in Total emission inventory (NOx)

Cost effectiveness evaluation

NOx reduction from now on is Required to focusing on measures for diesel-powered vehicles.

Contribution of vehicles for level 2 in 2015 decreases to approx. 30%.

• Starting Motorcycles
• Starting Diesel vehicles
• Starting Gasoline vehicles
• Running Motorcycles
• Running Diesel vehicles
• Running Gasoline vehicles

Items of Total emission inventory (NOx)

- Gasoline Vehicle: '00 reg.
- Diesel Vehicle: New Short-term reg.
- Gasoline vehicle: 50% reduction of '00 reg.
- Diesel vehicle: from New Short-term reg. To measures of Case2 (NOx50%, PM70% reduction)

Items of vehicles

- No intensification since '99
- Introduction of level 1
- Introduction of level 1 + 2
- All vehicles replaced by level 2

NOx emission inventory t/day

- Airplanes, vessels
- Household, offices
- Factories (Smoke stacks)

2000 2015
Vehicle emission inventory in Total emission inventory (PM)

Contribution of vehicles for levels 1 and 2 in 2015 decreases to approx. 10%.

Cost effectiveness evaluation

Comprehensive study including measures for other sources is required for further PM reduction.

- Gasoline Vehicle: '00 reg.
- Diesel Vehicle: New Short-term reg.

Items of Total emission inventory (PM)

- Starting Diesel vehicles
- Running Diesel vehicles
- Dust swirl PM
- Tire wear

- Gasoline vehicle: 50% reduction of '00 reg.
- Diesel vehicle: from New Short-term reg. To measures of Case2 (NOx50%, PM70% reduction)
Vehicle emission control measures in total emission inventory

Cost effectiveness evaluation

- THC emission inventory
  - Vehicle rate in total emission inventory in 2015 is estimated to reduce to approx. 5% in case of level 1.
  - For further THC reduction
    - Comprehensive study including cost effectiveness of measures for other sources is required.

- NOx emission inventory
  - Vehicle rate in total emission inventory in 2015 is estimated to reduce to approx. 30% in case of level 2.
  - For further NOx reduction
    - As for reduction from vehicles, focusing on diesel-powered vehicles and technology development including cost reduction are required.

- PM emission inventory
  - Vehicle rate in total emission inventory in 2015 is estimated to reduce to approx. 10% in case of combination of levels 1 and 2.
  - For further PM reduction
    - Comprehensive study including cost effectiveness of measures for other sources is required.
Environmental awareness and cost acceptance of consumers and businesses

- Survey on Environmental awareness and cost acceptance of consumers and businesses
  - Purpose / Method
  - Survey results
    - Environmental awareness and cost acceptance of consumers
    - Environmental awareness and cost acceptance of businesses
  - Conclusion
- Policies required from survey results

<Reference>
PEC-2001JC-24: Report on survey on Environmental awareness and cost acceptance of consumers and businesses
Purpose and methods of survey on environmental awareness and cost acceptance

Expenses of reduction measures

Grasp environmental awareness and cost acceptance of consumers and businesses as vehicle users regarding expenses of emissions reduction measures, and study measures effective for improving the acceptance.

• Method
  - Consumers: survey by using internet
  - Businesses (retail business, transportation business, bus business): survey by ordinary mail, survey by interview partially

• Area and period of survey
  - Tokyo and 8 prefectures in Kanto district
    - November to December, 2001

• Number of replied samples
  - Consumers: 2048
  - Retail business: 82
  - Transportation business: 642
  - Bus business: 162
Environmental awareness of consumers

-Approx. 90% of consumers feel that vehicles pollute the air.
-More than 80% of consumers feel that trucks and diesel-powered vehicles pollute the air.

Do you realize that vehicles pollute the air?

- Fairly yes
- Somewhat yes
- Not decided + not so much + absolutely no

Which type of vehicles pollutes the air?

- Trucks
- Diesel vehicles
- Buses
- Motorcycles
- Passenger cars
- Gasoline vehicles

Rate (%)

0  20  40  60  80  100
Important items thought by consumers for purchasing vehicles in the future

- Consumers consider that fuel consumption, price, safety, clean emissions are important.

Rate (%) Multiple reply

- Fuel consumption: 55%
- Price: 35%
- Safety: 30%
- Clean emissions: 30%
- Easy to drive: 25%
- Interior space: 20%
- Appearance: 20%
- Maintenance fee: 20%
- Convenience: 15%
- High performance: 10%
- Recycle: 5%
Cost increase acceptance of consumers

- Estimated cost increase of Vehicles and acceptable price of consumers
- Gap is found for SULEV.
- Almost equivalent for LEV and ULEV.

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount (10 thousand yen)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEV</td>
<td>Estimated cost increase</td>
</tr>
<tr>
<td></td>
<td>Price balancing rate of good and too expensive</td>
</tr>
<tr>
<td></td>
<td>Price for 50% of consumers consider good bargain</td>
</tr>
<tr>
<td>ULEV</td>
<td>Estimated cost increase</td>
</tr>
<tr>
<td></td>
<td>Price balancing rate of good and too expensive</td>
</tr>
<tr>
<td></td>
<td>Price for 50% of consumers consider good bargain</td>
</tr>
<tr>
<td>SULEV</td>
<td>Estimated cost increase</td>
</tr>
<tr>
<td></td>
<td>Price balancing rate of good and too expensive</td>
</tr>
<tr>
<td></td>
<td>Price for 50% of consumers consider good bargain</td>
</tr>
</tbody>
</table>
Supportive measures for LEV in view of consumers

- Systems providing good treatment to LEV and enterprises developing LEV is expected by lots of consumers.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsidy for enterprises developing LEV (control cost increase)</td>
<td></td>
</tr>
<tr>
<td>Good treatment for parking rate for LEV</td>
<td></td>
</tr>
<tr>
<td>Exemption of toll rate for center of urban area for LEV</td>
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<tr>
<td>Sticker for LEV (distinguish from other vehicles)</td>
<td></td>
</tr>
<tr>
<td>Tax increase for vehicles other than LEV</td>
<td></td>
</tr>
<tr>
<td>Compulsory abolition of vehicles with older model year</td>
<td></td>
</tr>
<tr>
<td>Promotion to purchase LEVs</td>
<td></td>
</tr>
</tbody>
</table>
Environmental awareness and action of businesses (ex.: retail business)

- Waste treatment: 70 to 80% of enterprises grapple with recycling
- Approx. 30% of enterprises grapple with Global warming and air pollution.

<table>
<thead>
<tr>
<th>Item</th>
<th>Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste treatment</td>
<td></td>
</tr>
<tr>
<td>Recycling</td>
<td></td>
</tr>
<tr>
<td>Air pollution</td>
<td></td>
</tr>
<tr>
<td>Global warming</td>
<td></td>
</tr>
</tbody>
</table>

[Graph showing percentage of businesses focusing on various environmental issues]
Important items for purchasing regulation meeting vehicles (ex: transportation business)

- Price, durability, fuel consumption, convenience are considered as important issues.

- Price
- Durability
- Fuel consumption
- Convenience corresponding to usage
- Subsidy provided
- Afterservice system
- Tax incentive
- Maintenance fee except fuels
- Company image
- Acceleration, engine power

Rate (%) Multiple reply
Cost increase acceptance by businesses (vehicles)

Cost increase acceptable for businesses for truck is Estimated as half of estimated cost increase of vehicle.

- Estimated cost increase for emission reduction for diesel vehicle
- Retail business
- Transportation
- Bus business

Acceptable cost increase

<table>
<thead>
<tr>
<th></th>
<th>LDT</th>
<th>MDT</th>
<th>HDT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated cost increase</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail business</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bus business</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Amount (10 thousand yen)
Cost increase acceptance by businesses (fuels)

Cost increase acceptable by businesses for low sulfur diesel fuel is estimated higher than estimated cost increase, 3 to 4 times the acceptable cost.

Estimated cost increase For low sulfur diesel fuel

Acceptable cost increase

<table>
<thead>
<tr>
<th>Amount (yen/kL)</th>
<th>Estimated cost increase</th>
<th>Retail</th>
<th>Transportation</th>
<th>Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>4000</td>
<td>3000</td>
<td>2000</td>
</tr>
<tr>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
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<tr>
<td>3000</td>
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<tr>
<td>5000</td>
<td></td>
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</tr>
</tbody>
</table>
Charge of cost increase of vehicle to fare (transportation business)

- Approx. 60% have no idea on fare increase.
- Major reasons are severe fare competition, consideration to consignors, and so on.

**Cost increase**
- No idea on fare increase
- Partially fare increase (expenses of consignors)
- Fare increase (Fully expenses of consignors)

**Reasons for not allowing cost increase**
- Severe fare competition
- Consideration to consignors
- No acceptance by consignors
- No system for charging the increase to fare
Comparison on distribution cost for distribution among consumers, retail businesses, transportation businesses

Compared with consumer acceptable cost

Cost of transportation businesses want to charge to retail businesses and acceptable cost for distribution by retail businesses are quite low.

<table>
<thead>
<tr>
<th>Cost acceptable by consumers</th>
<th>Acceptable in distribution by Retail businesses</th>
<th>Cost in distribution to Retail businesses converted by transportation businesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,885</td>
<td>36</td>
<td>229</td>
</tr>
</tbody>
</table>

Target: Tokyo and 8 pref.
Cost converted by bus businesses and cost acceptable for users

Fare increase rate intended by bus businesses is quite low compared with fare increases acceptable by bus users.
Expected supportive actions for vehicle and diesel cost up (transportation businesses)

More than 60% of transportation businesses expect subsidy and tax incentive for diesel fuels and vehicle (Equal in case of bus business)

- **Subsidy needed**
- **Tax incentive needed**
- **Interest supply needed**
- No measures required as expenses will be paid by own company.
Conclusion on survey results-1

Expenses of reduction measures

• Environmental cost awareness of consumers
  ➢ **Environmental awareness** including Global warming is high.
  ➢ As for expenses of cost resulted from vehicle emission reduction measures for passenger cars, *cost acceptance almost corresponding to cost increase of vehicles in average* is found.
  ➢ Increase of living expenses according to reduction of emissions from trucks and buses is also found to be somewhat acceptable.
  ➢ **Good treatment** for LEV and companies developing LEV is expected by many people.
Environmental cost awareness of businesses

- Environmental awareness is not so low, however, a strong tendency to focus on economy than environment preservation is found.
- Cost for using LEV and low sulfur fuel is somewhat acceptable, however, charging the cost to price and fare is considered to be difficult.
- Supportive actions such as tax incentive, subsidy, expenses of interest is expected by many businesses.
Policies obtained from survey results

Expenses of reduction measures

- **Restraint of cost increase in fuels and vehicles** due to emission control measures such as struggling voluntarily in fuel and vehicle industries, subsidy for development.
- **Policies easy to charge the cost to price and fare** by businesses
- **Supportive actions such as tax incentive** for environment protection measures taken by consumers and businesses.
- **Positive information supply and enlightenment** on environment protection measures to consumers and businesses.
Unresolved issues of vehicle emission reduction and air quality improvement, and policy suggestion

• Suggestion from Cost Studies WG
  ➢ Fuel and vehicle technology development
  ➢ Diffusion promotion of Low emission diesel-powered vehicles
  ➢ Expenses for measures

• Unresolved issues and requests on Cost study evaluation
Suggestion from Cost Studies WG -1

• Fuel and vehicle technology development
  ➢ Automobile and Petroleum industries will deal with NOx and PM reduction technologies of diesel-powered vehicles to further improvement of air quality.

• Diffusion of low emission diesel-powered vehicles
  ➢ Introduction of appropriate incentive is required for early diffusion of low emission vehicles and low sulfur content fuels.
  ➢ Policies for accelerating diffusion such as a social system enjoyable advantages directly and indirectly in using low emission vehicles and low sulfur content fuels is required.
Suggestion from Cost Studies WG -2

• Expenses for measures

- Automobile and Petroleum industries will deal with cost reduction.
- The administration will provide supportive actions for low emission vehicles and fuels such as tax incentive, subsidy, and so on.
- Effective policies both on information supply making easy to charge costs and systems are required.

Cost acceptance on environmental preservation measures by consumers is high. Based on the beneficiary payment principle, policies that accelerate businesses to charge costs to consumers is required to enact.
Unresolved issues and requests of cost study evaluation

• Contribution rate of vehicle emission inventory in total emission inventory decreases. For realizing further air quality, **study including cost study evaluation on emission inventory reduction measures for not only emissions from vehicles but also all sources is required.**

• **Study on cost study evaluation including various benefits evaluation (ex. reduction of health damage) resulted from air quality improvement is also required.**

For resolving the issues, a comprehensive study by the Administration concerned and industries is required.

➔ **The administration is requested to deal with the study.**