FUTURE POLICY FOR MOTOR VEHICLE EXHAUST EMISSION REDUCTION

(FIFTH REPORT)

APRIL 16, 2002

THE CENTRAL ENVIRONMENT COUNCIL

Chukanshin No.20

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To: Mr. Hiroshi OHKI
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Subject: **FUTURE POLICY FOR MOTOR VEHICLE EXHAUST EMISSION REDUCTION (FIFTH REPORT)**

The Central Environment Council has conducted studies and deliberated on "Future Policy for Motor Vehicle Exhaust Emission Reduction," concerning which, inquiry had been made to the said Council through Consultation No.31, dated May 21, 1996. The Council has reached the following conclusions and hereby reports them.

Future Policy for Motor Vehicle Exhaust Emission Reduction (Fifth Report)

As regards Inquiry No. 31, dated May 21, 1996, "Future Policy for Motor Vehicle Exhaust Emission Reduction," the Central Environment Council submitted a series of reports as follows:

An Interim Report, dated August 18, 1996, on the countermeasures to be implemented urgently from a viewpoint of reducing hazardous air pollutants.

Second Report, dated November 21, 1997, advising as follows: l) reduce exhaust emissions from gasoline- and liquefied petroleum gas (LPG)-fueled motor vehicles (hereinafter referred to as "gasoline LPG motor vehicles") over the period from 2000 to 2002 and accomplish further reduction to less than one half (hereinafter referred to as the "new long-term gasoline motor vehicle targets") by 2005, and 2) introduce exhaust emission regulations for special motor vehicles (large-sized special motor vehicle and small-sized special motor vehicles provided under the Road Vehicle Act).

The Third Report, dated December 14, 1998, advising as follows: 1) reduce exhaust emissions from motor vehicles powered by diesel fuel (hereinafter referred to as "diesel motor vehicles") over the period from 2002 to 2004 and accomplish further reduction to about one half (hereinafter referred to as the "new long-term targets for diesel motor vehicles") the level achieved by 2007.

Fourth Report, dated November 1, 2000, advising as follows; 1) front-load achievement of the new long-term diesel targets to 2005 and determine new long-term target values by the end of fiscal year 2001, 2) reduce permissible limits for the sulfur content of diesel fuel to one tenth of the current level by the end of 2004, and front-load achievement of the reduction targets for special motor vehicles by 2003.

As a result of continual deliberations by the Experts Committee on Motor Vehicle Exhaust Emissions (hereinafter referred to as "the Committee"), the attached Fifth Report of the Committee was compiled.

Upon receiving the aforesaid Fifth Report, the Air Quality Committee conducted deliberations and concluded that in order to accurately promote motor vehicle exhaust emission reduction measures in the future, it would be appropriate to adopt the Committee's Fifth Report and determine new long-term targets for diesel- and gasoline-powered motor vehicles, while continuing to deliberate on the general policy for motor vehicle exhaust emission reduction measures.

Hence, the Central Environment Council has compiled the following report.

1. Exhaust Emission Reduction Measures for Diesel-powered Motor Vehicles

1.1. New Long-term Target Values

As regards exhaust emissions from diesel-powered motor vehicles, countermeasures focused on particulate matters should be strengthened based on the report by the working committee for the study on diesel exhaust particle (DEP) risk assessment. Thus, in order to strengthen exhaust emission reduction measures, in accordance with the new exhaust emission test procedure indicated in chapter 3 of this Report and assuming 50ppm for the sulfur content of diesel fuel, it is appropriate to reduce emissions of particulate matters (PM), NOx, non-methane hydrocarbons (NMHC) and CO by the end of 2005 in line with the permissible limit target values indicated in the attached Table 1.

Accomplishment of the new long-term targets calls for the adoption of new technologies, such as diesel particulate filters (DPFs). However, as they currently pose some problems, such as deterioration of durability and fuel efficiency, motor vehicle manufacturers are required to promote technological development, while motor vehicle users need to conduct proper inspection and maintenance. In the meantime, the urea addition type NOx reduction catalyst and the like suggest the possibility to significantly reduce NOx emissions, giving rise to expectations for further technological development. Hence, it is desirable to also conduct studies concerning consolidation of an infrastructure for urea supply.

Incidentally, the need on the part of motor vehicle manufacturers to address multiple regulations in a short period of time is expected to cause a sharp, temporary increase in the number of processes, subsequently resulting in increased burdens and the concentration of approval proceedings. At the same time, they are also required to address the new exhaust emission test procedure. Given these conditions, it is necessary to give due considerations so that smooth compliance with the new regulations can be achieved.

In the future, through further reduction of the sulfur content in diesel fuel, the applicability of the after-treatment systems will increase, enabling exhaust emissions to be further reduced. With regard to further reduction of the sulfur content in diesel fuel, urgent studies are necessary, while promoting technological development and taking into consideration trends in other countries. At the same time, it is appropriate to also conduct examinations concerning further strengthening of exhaust emission regulation.

2. Exhaust Emission Reduction Measures for Gasoline LPG Motor Vehicles

2.1. New Long-term Target Values and Timing of Accomplishment

(Permissible Limit Target Values)

With respect to the exhaust emissions from gasoline LPG motor vehicles, countermeasures should be strengthened focusing on NOx and non-methane hydrocarbons. At the same time, it is also necessary to see to it that technological development is promoted in such a way that both the exhaust emission and the fuel consumption reduction technologies become compatible. In the case of motor vehicles with highly efficient lean-burn engines, such as cylinder direct injection engines, exhaust emissions and fuel economy, in particular, are in a marked trade-off relationship, making it extremely difficult to significantly reduce exhaust emissions while improving fuel efficiency, at the same time. In order to prevent global warming, it is also important to reduce CO_2 emissions, making it appropriate to aim at maximum achievable reduction in implementing exhaust emission reduction measures, while seeing to it that such measures are compatible with those designed to reduce CO_2 emissions.

Accordingly, in order to reduce exhaust emissions from gasoline LPG motor vehicles, based on the exhaust emission test procedure indicated in chapter 3 of this Report, it is appropriate to address the reduction of NOx, non-methane hydrocarbon and CO emissions in line with the permissible limit target values shown in the Table 2. In doing so, it is appropriate to aim at 50ppm as the sulfur content of gasoline and achieve it by the end of 2004.

Furthermore, given the possibility of being able to reduce exhaust emissions below the new long-term targets, it is appropriate to continue to popularize motor vehicles with low exhaust emissions through the low exhaust emission motor vehicle approval system, which takes into account the exhaust emission technical guidelines for low exhaust emission motor vehicles and so on (April 26, 2000, notice of the Air Quality Bureau, Environment Agency), as well as the popularization and promotion policies, such as alleviation of automobile taxes on such motor vehicles.

Incidentally, with regard to the further reduction of permissible limit target values for the sulfur content of gasoline, from the viewpoint of making both the exhaust emission and the fuel consumption reduction technologies compatible, it is appropriate to examine the need for such measure and urgently reach a conclusion, while also taking into consideration the trends in other countries.

(Timing of Accomplishment)

With regard to passenger cars, light-duty motor vehicles (trucks and buses with a gross vehicle weight of 1,700kg or less), medium-duty motor vehicles (trucks and buses with a gross vehicle weight of over 1,700kg and 3,500kg or less) and heavy-duty motor vehicles (trucks and buses with a gross vehicle weight of over 3,500kg), it is appropriate to achieve the targets by the end of 2005 through efficient execution of design, development and production preparation. However, as regards mini-sized trucks, it is appropriate to achieve the targets by the end of 2007 due to technical problems unique to them.

2.2. Fuel Evaporative Emission Countermeasures

2.2.1. Fuel Evaporative Emission Countermeasures for Parked and Running Motor Vehicles

In order to curb fuel evaporative emissions, not only countermeasures in terms of motor vehicle structures, but also those designed to curb the evaporativity of fuels are effective. As regards further reduction of the Reid Vapor Pressure (RVP) of gasoline supplied during summer time, it is appropriate for the fuel producers to voluntarily reduce it to 65kPa or less from the summer of 2005.

Of the fuel evaporative emissions, extension of the measurement time for those discharged from motor vehicles parked for long hours including nighttime and daytime using the ambient temperatures as the heat source (Diurnal Breathing Loss: DBL) and introduction of a test procedure for those discharged from running motor vehicles using the vehicles themselves and the heat radiated from the road as the heat source (Running Loss: RL) were taken up as the subjects of study in the Second Report. However, considering that the length of time most motor vehicles are parked is less than 24 hours and also that the amount of RL emissions from them, which are in compliance with the current test procedure including 24-hour DBL measures, are decreasing, it is appropriate to continue the current test procedure.

With regard to these fuel evaporative emissions, it is necessary to continue further examination, while also continuing to identify the real state of emissions and considering state of examination concerning fuel evaporative emission countermeasures at filling stations.

2.2.2. Fuel Evaporative Emission Countermeasures at Filling Stations

As regards the policy concerning fuel evaporative emission countermeasures at the time fuel is supplied to motor vehicles, it is appropriate to examine the feasibility of any countermeasure to be introduced, technical matters, such as the condition of RVP, which is necessary to ensure efficient recovery of fuel evaporative emissions, and the effect of the countermeasure. At the same time, it is also appropriate to urgently come to a conclusion, while taking into account the contribution of such emissions to the total amount of HC emissions, the state of studies concerning the HC emission countermeasures applied to other sources and the situations in the United States and Europe.

It is strongly desired that fuel evaporative emission countermeasures at the time fuel is supplied from tankers to the underground tanks also be promoted.

2.2.3. Comprehensive Suspended Particulate Matter Countermeasures

Fuel evaporative emissions constitute substances which generate suspended particulate matters (SPM) and photochemical oxidants. Thus, in particular, in order to achieve compliance with the air quality standard concerning SPM, it is necessary to deepen discussion on its reduction during the deliberation process aimed at formulating and implementing comprehensive countermeasures against motor vehicle exhaust emissions and stationary emission sources.

3. Exhaust Emission Test Procedure and Others

3.1. Exhaust Emission Test Procedure

With regard to passenger cars, mini-sized trucks and light- and medium-duty motor vehicles to which 10.15 and 11 modes of the chassis-based test procedure (a test method to assess the total emissions from a motor vehicle: vehicle-based test procedure) are applied, in order to more accurately assess the performance of exhaust emissions from motor vehicles that comply with the new long-term target-based regulations, it is appropriate to change them to the new measurement mode of exhaust emission test (hereinafter referred to as the “test mode”) presented in the Figure 1. As regards exhaust emission measurement based on the new test mode, it is appropriate to conduct the test under both hot and cold driving cycles and change the measurement method to the one capable of assessing the values of exhaust emissions based on the computed values which weight the proportion of each cycle obtained through the surveillance of actual driving patterns.

As for the heavy-duty motor vehicles to which the diesel 13 and gasoline 13 modes of the engine-based test procedure (a test method to assess emissions from the engines) are applied, in order to properly assess the performance of exhaust emissions from engines that comply with the new long-term target-based regulations, it is appropriate to change them to the new transient test mode established based on the representative driving mode shown in the Figure 2. The engine-based test mode is determined for each engine by converting the representative running mode to engine speed and load. In order to reflect differences in the engine speeds and loads used by individual engines, conversion is computed based on the engine and vehicle specifications, along with the gearshift timing and positions. Incidentally, as regards heavy-duty diesel-powered motor vehicles, in setting the test mode, it is appropriate to take into consideration the number of processes involved in approval examination. In the meantime, concerning heavy-duty gasoline-powered motor vehicles, as in the case of the chassis-based test mode, it is appropriate to pre-set the gearshift timing. While for exhaust emission measurement based on the new test mode, like the current test procedure, it is appropriate to conduct only the hot cycle test for the time being.

In the case of diesel-powered motor vehicles, for those whose gross vehicle weight is over 2,500kg and less than 3,500kg, as with gasoline-powered motor vehicles, it is appropriate to reclassify them as being in the medium-duty category in terms of exhaust emission control and apply regulations based on the chassis-based test procedure. Meanwhile, for those having a gross vehicle weight of over 3,500kg, it is appropriate to continue to apply the engine-based test procedure for the time being

because of the difficulty in implementing the chassis-based test procedure as a measurement method.

As regards the adoption of the partial dilution filter-based capturing method in synch with the implementation of regulations based on the new long-term diesel targets, it is necessary to conduct studies, taking into account the feasibility of implementing the method in approval tests and so forth.

3.2. Timing of Application

In applying the new test mode, it is appropriate to introduce it in a phased manner, taking smooth compliance with the regulations into account.

As regards the engine-based test mode, it is appropriate to introduce it from 2005 when regulations based on the new long-term targets are to be implemented.

As for the chassis-based test mode, considering the number of processes for development and production preparation as well as institutional consistency with fuel consumption countermeasures based on the Rationalization of Energy Consumption Act (Energy-Saving Act) concerning the rationalization of energy use, it is appropriate to introduce cold cycle exhaust emission measurement from 2008 and hot cycle from 2011.

3.3. In-use Performance Maintenance Techniques

3.3.1. Onboard Diagnostic System (OBD System)

As regard the OBD system, it is appropriate to urgently introduce an advanced OBD system with functions capable of automatically detecting any deterioration in performance of the exhaust emission reduction device and alerting the driver. In the future, it is appropriate for the government to conduct repeated technical studies and urgently determine detection items, detection values and assessment techniques. Motor vehicle manufacturers, on the other hand, will be required to equip their passenger cars, mini-sized trucks and light- and medium-duty motor vehicles with advanced OBD systems in the manufacturing process, from 2008. In that event, as they are obliged to comply with the regulations based on the long-term targets, while also being required to address the new exhaust emission test procedure, it is necessary to see to it that smooth compliance with such regulations take place. Meanwhile, the motor vehicle users are required to constantly confirm the proper functioning of exhaust emission reduction devices using the OBD system and perform inspection and maintenance whenever necessary.

As regards heavy-duty motor vehicles, OBD systems shall continue to be used to monitor any functional deficiency of exhaust emission reduction devices under the new

short-term regulations for the time being. However, it is appropriate to introduce advanced OBD systems once technical solutions emerge.

3.3.2. Diesel Smoke Control

Regarding diesel smoke, it is appropriate to apply the current regulations because they are effective in confirming PM emissions from in-use motor vehicles. However, in the event that the motor vehicles are equipped with advanced OBD systems capable of monitoring deterioration in the performance of after-treatment devices in future, it is appropriate to reexamine the need for such regulations.

3.4. Others

The current regulations implement control in terms of total hydrocarbons (THC). However, as regards the long-term target values, it is appropriate to set them in terms of non-methane hydrocarbons (NMHC), excluding methane.

Meanwhile, with regard to exhaust emission countermeasures under running and test conditions other than those assumed for the test mode, it is necessary to urgently examine specific measures and their contents. While conducting the examination, it is also necessary to assess the effectiveness of measures.

Concerning carbon monoxide (CO) emission reduction measures in cold regions, it is appropriate to apply the current regulations for the time being.

4. Future Measures for Motor Vehicle Exhaust Emission Reduction

4.1. Future Subjects for Review

1) As regards diesel-powered motor vehicles, by making sure of the potential for exhaust emission reduction, studies will be made concerning new reduction targets, including further reduction of the sulfur content in diesel fuel. As for the establishment of specific permissible limit targets for the sulfur content in diesel fuel, the government, motor vehicle manufacturers and fuel producers will cooperate with one another, promote research on the effects of exhaust emission reduction achieved through various combinations of improvements in motor vehicle technology and fuel quality and conduct studies based on the results. In doing so, studies will also be made on the quality of other fuels and lubricants. Meanwhile, given concerns that the ash and sulfur content in lubricants could affect the performance of after-treatment systems, such as DPFs, it is hoped that the motor vehicle manufacturers and fuel producers will work together to address those concerns by urgently reexamining the standards for lubricants, despite there currently being no regulations concerning their quality.
2) Concerning gasoline LPG motor vehicles, while identifying the state of their compliance with the regulations based on the new long-term targets, potential progress in technological development and the effect of various countermeasures, examination of new reduction targets will be made whenever necessary. In that event, with regard to the quality of fuels and lubricants, involving sulfur and other contents in gasoline, the government, motor vehicle manufacturers and fuel producers will cooperate to promote research on the exhaust emission reduction effects to be achieved through various combinations of improvements in motor vehicle technology and fuel quality, and based on the results, future fuel and lubricant countermeasures will be examined.
3) With regard to two-wheeled motor vehicles, by making sure of the state of their compliance with regulations implemented based on the Interim Report, potential progress in technological development and the effects of various countermeasures, studies will be made on the new reduction targets whenever necessary. In that event, introduction of fuel evaporative emission regulations will also be examined and cold start requirements reviewed.
4) In the case of diesel-powered special motor vehicles, for those with rated output of over 19kW and under 560kW, introduction of new reduction targets will be examined whenever necessary, by making sure of their compliance with the regulation implemented based on the Fourth Report, potential progress in technological

development and the effects of various countermeasures, while also considering the trends in other countries.

5) In the case of diesel-powered special motor vehicles, for those with rated output of below 19kW and 560kW or more, and gasoline LPG special motor vehicles, for which no exhaust emission reduction targets have been established yet, introduction of exhaust emission regulations will be studied whenever necessary, by making sure of the state of air pollution, trends of their contribution to exhaust emissions and the state of technological development for exhaust emission reduction.
6) With regard to the micro particles emitted from diesel-powered motor vehicles, identification of the state of emissions, such as the number of particles, establishment of measurement procedures and research on the health risk of such emissions will be promoted and, in the future, the need to introduce regulations will be examined based on the results.
7) In order to improve or secure the performance of motor vehicle exhaust emissions, it is important to improve or secure fuel quality. In recent years, a variety of fuels, such as bio-diesel and dimethyl ether (DME) have emerged. Thus, investigation and research will be promoted concerning their effects on exhaust emissions when they were used or mixed, and measures to prevent air pollution will be studied whenever necessary based on the results.

   Incidentally, in carrying out examination and measures concerning the aforesaid subjects, considering that exhaust emission reduction measures for motor vehicles have many factors commonly shared internationally because they are globally distributed products, it is vital to work out international harmonization of standards and so forth as much as possible so long as it does not hinder environment conservation activities in Japan.

4.2. Various Related Policies

As policies designed to complement the countermeasures presented in this Report, it is hoped that the following related policies, such as the promotion of comprehensive motor vehicle exhaust emission countermeasures, will be carried out from now on.

(Promotion of Comprehensive Motor Vehicle Exhaust Emission Countermeasures)

As for the comprehensive motor vehicle exhaust emission countermeasures, it is necessary to strengthen motor vehicle category regulation, substantiate motor vehicle exhaust emission control measures required of business establishments and comprehensively promote policies, such as the popularization of low pollution motor

vehicles, based on the Amended Motor Vehicle NOx/PM Act (legislation to amend part of the Special Measures Act for Reduction of Overall Amount of Motor Vehicle NOx Emissions in Designated Areas) promulgated on June 27, 2001.

(Promotion of Popularization of Low Pollution Motor Vehicles)

It is hoped that the government offices concerned will cooperate in further promoting popularization of low pollution motor vehicles in line with the "Action Plan for Popular Development of Low Pollution Motor Vehicles" formulated on July 11, 2001.

(Exhaust Emission Reduction Measures for In-use Motor Vehicles)

As countermeasures for in-use diesel-powered motor vehicles, it is necessary to promote policies, such as the popularization of DPFs and so on, in line with the "Diesel Motor Vehicle Countermeasures Technical Assessment Meeting Report" compiled on May 18, 2001.

In addition, as the Fourth Report suggested, it is important to have in-use motor vehicles in general, such as gasoline LPG and diesel-powered ones, maintain good exhaust emission performance by encouraging inspection and maintenance and confirming the functionality of exhaust emission reduction devices at the time of motor vehicle inspection pursuant to the Road Vehicle Act as well as on-street guidance and control

Moreover, in order to confirm that the performance of the exhaust emission reduction devices is being maintained in normal use condition, it is desirable to examine a scheme for introducing random surveillance, along with the need to do so.

(Cost Burdens and Others)

In the process of promoting exhaust emission reduction measures based on this Report, the impact of such measures on motor vehicle prices, fuel costs, engine durability, fuel economy and maintenance costs is conceivable. Hence, it is necessary for motor vehicle makers, fuel producers and users to share these costs based on the concept of internalizing environmental costs associated with the use of motor vehicles.

Meanwhile, in order to smoothly promote a switchover to motor vehicles which comply with the latest regulations and improve fuel quality, considerations in terms of financial and tax incentives are also necessary.

(Investigation of Real State of Emissions from Uncontrolled Sources and Countermeasures)

As indicated in the Fourth Report, it is necessary to continue to investigate the real

state of emissions from various uncontrolled sources and study the need for countermeasures, while also examining what institutional systems are needed to implement them.

(Hazardous Air Pollutants Countermeasures)

As indicated in the Fourth Report, as regards hazardous air pollutants emitted from motor vehicles, it is desired to develop measurement methods, improve measurement accuracy, consolidate the infrastructure to identify the amount of emissions from motor vehicles and devise measures based on the information obtained.

At the same time, it is also necessary to strive to identify the effects of engine combustion technologies, after-treatment technologies, such as catalysts, and the quality of fuels and lubricants on the amount of hazardous air pollutants from motor vehicles.

(Improvement of Motor Vehicle Exhaust Emission Measurement Accuracy)

Now that significantly more stringent regulations being applied to gasoline LPG motor vehicles as well as diesel-powered motor vehicles are seen pushing down the exhaust emission values, making it important to accurately identify the reliability of measurement and the levels of quality control in the production process, it is necessary to promote research in order to improve measurement accuracy.

(Substantiation of Effect Forecast and Measurement)

As indicated in the Fourth Report, in line with the progress made in developing regulation of motor vehicle exhaust emission and comprehensive motor vehicle exhaust emission countermeasures, accurate forecasting of the effects of these measures will become more and more important, along with effect measurement based on accurate monitoring, in order to facilitate planning and implementation of necessary policies. In particular, the accuracy in measuring the amount of emissions, such as PM and HC, discharged from mobile sources other than motor vehicles, stationary sources, such as factories and business establishments, and various other natural sources, is still not enough. Also, as it now stands, the contribution of each source to the secondary formation of SPM and photochemical oxidants in the air has not been fully identified. Thus, development of techniques to measure and forecast the effects of each measure for the improvement of air quality is desired, along with the consolidation of a system to identify the effects of countermeasures on the roadside.

Table 1. TARGET VALUES FOR PREMISSIBLE LIMITS FOR DIESEL MOTOR VEHICLES

Motor Vehicle Category		Target Values for Premissible Limits (Mean Values)			
		Nitrogen oxides	Non-methane hydrocarbons	Carbon monoxide	Particulate matters
Ordinary- and small-sized motor vehicles fueled by diesel fuel and used exclusively for carriage of passengers with a capacity of 10 persons or less (excluding two-wheeled motor vehicles)	Those with an equivalent inertia weight of 1,250kg or less.	0.14kg/km	0.024g/km	0.63g/km	0.013g/km
	Those with an equivalent inertia weight of over 1,250kg.	0.15g/km	0.024g/km	0.63g/km	0.014g/km
Ordinary- and mini-sized motor vehicles fueled by diesel fuel (excluding those used exclusively for carriage of passengers with a capacity of 10 persons or less and two-wheeled motor vehicles)	Those with a gross vehicle weight of 1,700kg or less.	0.14g/km	0.024g/km	0.63g/km	0.013g/km
	Those with a gross vehicle weight of over 1,700kg and 3,500kg or less.	0.25g/km	0.024g/km	0.63g/km	0.015g/km
	Those with a gross vehicle weight of over 3,500kg.	2.0g/kWh	0.17g/ kWh	2.22g/ kWh	0.027g/ kWh

※ With regard to motor vehicles with a gross vehicle weight of 3,500kg or less, the above-mentioned target values will be applied to the sum of the value obtained by multiplying the 11-mode measurement value by 0.12 and that obtained by multiplying 10•15-mode measurement value by 0.88 beginning in 2005, the sum of the value obtained by multiplying the value measured in the new cold test mode shown in Figure 1 by 0.25 and the value obtained by multiplying the measured value in 10•15 test mode by 0.75 beginning in 2008, and the sum of the value obtained by multiplying the measured value of the test mode in cold state by 0.25 and the value obtained by multiplying the measured value of the new test mode in warm state by 0.75 beginning in 2011.

※ As regards those with a gross vehicle weight of over 3,500kg, the above-mentioned target values will be applied to the measured value of the new test mode in warm state established based on Figure 2.

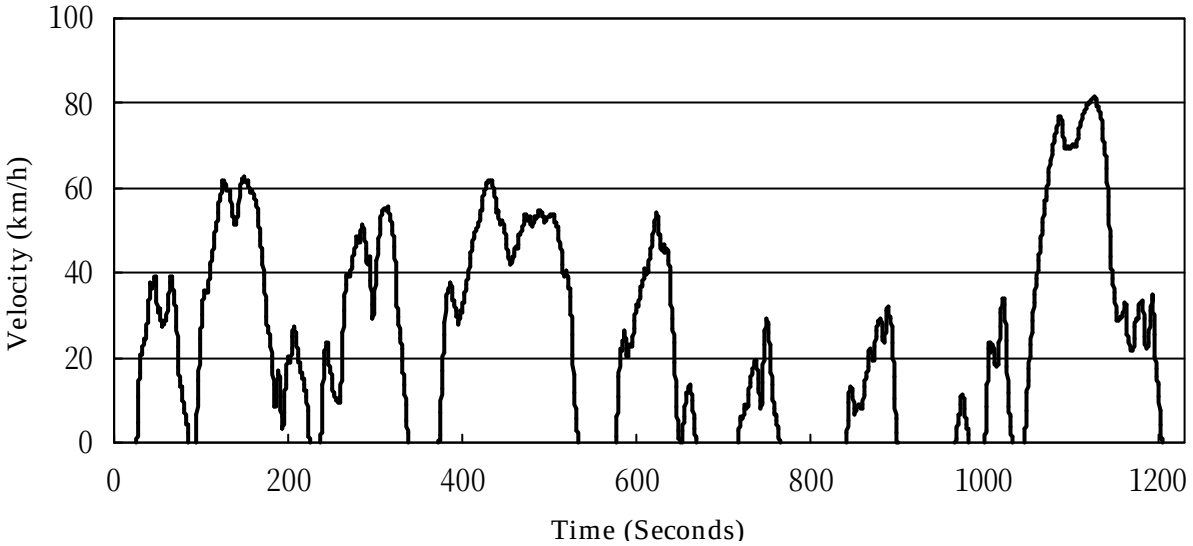
Table 2 TARGET VALUES FOR PREMISSIBLE LIMITS FOR GASOLINE MOTOR VEHICLES

Motor Vehicle Category		Target Values for Premissible Limits (Mean Values)		
		Nitrogen oxides	Non-methane hydrocarbons	Carbon monoxide
Ordinary-, small- and mini-sized motor vehicles fueled by gasoline or LPG and used exclusively for carriage of passengers with a capacity of 10 persons or less (excluding two-wheeled motor vehicles)		0.05kg/km	0.05g/km	1.15g/km
		0.05g/km	0.05g/km	4.02g/km
Mini-sized motor vehicles fueled by gasoline or LPG (excluding those used exclusively for carriage of passengers with a capacity of 10 persons or less and two-wheeled motor vehicles)	Those with a gross vehicle weight of 1,700kg or less.	0.05g/km	0.05g/km	1.15g/km
	Those with a gross vehicle weight of over 1,700kg and 3,500kg or less.	0.07g/km	0.05g/km	2.55g/km
	Those with a gross weight of over 3,500kg.	0.7g/kWh	0.23g/ kWh	16.0g/ kWh

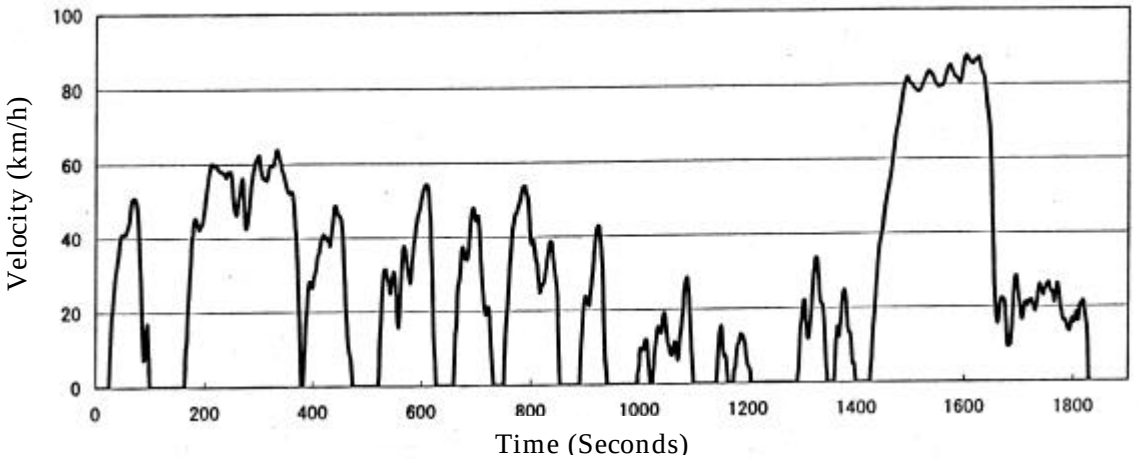
※ With regard to motor vehicles with a gross vehicle weight of 3,500kg or less, the above-mentioned target values will be applied to the sum of the value obtained by multiplying the 11-mode measurement value by 0.12 and that obtained by multiplying the 10•15-mode measurement value by 0.88 beginning in 2005, the sum of the value obtained by multiplying the measurement value of the test mode in cold state shown in Figure 1 by 0.25 and the value obtained by multiplying the 10•15-mode measurement value by 0.75 beginning in 2008, and the sum of the value obtained by multiplying the measurement value of the new test mode in cold state by 0.25 and the value obtained by multiplying the measurement value of the new test mode in warm state by 0.75.

※ As regards those with a gross vehicle weight of over 3,500kg, the above-mentioned target values will be applied to the measurement values of the new test mode established based on Figure 2.

Test Mode Applied to Motor Vehicles with Gross Vehicle Weight of 3,500kg or less



Representative Running Mode As the Basis of Test Mode for Motor Vehicles with Gross Vehicle Weight of over 3,500kg



FUTURE POLICY FOR MOTOR VEHICLE EXHAUST EMISSION REDUCTION (FIFTH REPORT)

MARCH 6, 2002

EXPERTS COMMITTEE ON MOTOR VEHICLE EXHAUST EMISSIONS,

AIR ENVIRONMENT COMMITTEE,

THE CENTRAL ENVIRONMENT COUNCIL

Future Policy for Motor Vehicle Exhaust Emission Reduction (Fifth Report)

Experts Committee on Motor Vehicle Exhaust Emissions,
Air Quality Committee,
Central Environment Council

Contents

[Attachments]

1.Introduction

1.1. History of Motor Vehicle Exhaust Emission Regulation in Japan

Regulation of motor vehicle exhaust emissions started in 1966 in Japan when the concentration of carbon monoxide (CO) in the emissions from ordinary- and small-sized gasoline-powered motor vehicles came to be controlled. Then, mini-sized motor vehicles, motor vehicles fueled by liquefied petroleum gas (LPG) and those powered by diesel fuel (hereinafter referred to as "diesel motor vehicles") were added to the list of motor vehicles subject to exhaust emission regulation. In the meantime, additions were also made to the substances subject to regulation one after another. As a result, carbon monoxide (CO), hydrocarbons (HC) and nitrogen oxides (NOx) are currently listed as substances subject to regulation in the case of gasoline- or LPG-powered motor vehicles (hereinafter referred to as "gasoline LPG motor vehilces"), while in the case of diesel-powered motor vehicles, particulate matters (PM) and diesel smoke are also subject to regulation in addition to these three already mentioned substances.

Furthermore, amendment of the ordinance issued by the Prime Minister's Office in 1997 led to the addition of two-wheeled gasoline-powered motor vehicles to the list of motor vehicles subject to exhaust emission regulation. The decision was followed by implementation of the regulation in 1998 for first class motor-driven cycles and small-sized two-wheeled motor vehicles and the regulation in 1999 for second class motor-driven cycles and mini-sized two-wheeled motor vehicles. In addition, by 2003, regulation will extend to diesel-powered large- and small-sized special motor vehicles (hereinafter referred to as "diesel special motor vehicles") powered by engines with rated output of 19kW or more, but less than 560kW.

Incidentally, the Air Pollution Control Law was partially amended in 1995 and, as a result, permissible limits of automotive fuel quality were set forth for gasoline and diesel fuel. Based on the provision, the motor vehicle fuel quality regulation has been implemented since 1996.

1.2. History of Deliberations at the Central Environment Council

Measures to reduce motor vehicle exhaust emissions in recent years have followed the goals set forth in the "Future Policy for Motor Vehicle Exhaust Emission Reduction" report submitted by the Central Environment Council in December 1989 (hereinafter referred to as the "1989 Report"). It called for the following measures: 1) drastic reduction of NOx, particulate matters and other substances emitted from diesel-powered motor vehicles, etc., over two stages according to short- and long-term targets and 2) in terms of motor vehicle fuel quality, reduction of the sulfur content in diesel fuel to around one tenth the ongoing level (0.5% of the mass to 0.2% and further down to 0.05%) over two stages according to short- and long-term goals. By 1999, all of these

recommended measures had been implemented.

As full implementation of the targets indicated in the 1989 Report was in sight, the Director General of the Environment Agency made an inquiry concerning "Future Policy for Motor Vehicle Exhaust Emission Reduction" (May 21, 1996, Inquiry No. 31) to the Central Environment Council in May, 1996. Based on the inquiry, deliberations were started at the Air Quality Committee of the Central Environment Council and also at the Experts Committee on Motor Vehicle Emissions (hereinafter referred to as "the Committee") which was put in place anew within the Air Quality Committee.

On October 18, 1996, the Air Quality Committee received from the Experts Committee an interim report on the study results concerning motor vehicle exhaust emission reduction measures, which would call for implementation as quickly as possible in view of the importance and urgency of dealing with hazardous air pollutants. On the same day, based on the report, "Future Policy for Motor Vehicle Exhaust Emission Reduction" (October 18, 1996, Central Environment Council No. 83: hereinafter referred to as the "Interim Report") was put together. Based on this Interim Report, various measures were implemented by 1998 or 1999 in terms of exhaust emission regulation and as of January, 2000, in terms of fuel quality regulation. These measures are: 1) introduction of exhaust emission control regulation and reduction of hydrocarbon and other emissions from two-wheeled motor vehicles, 2) reduction of hydrocarbon and other emissions from gasoline LPG motor vehicles, and 3) reduction of benzene content in gasoline (5% of volume to 1% of volume) with regard to motor vehicle fuel quality.

On November 21, 1997, the Experts Committee on Motor Vehicle Emissions submitted its second report on ways to strengthen measures for exhaust emission reduction for gasoline LPG motor vehicles and diesel-powered special motor vehicles to the Air Quality Committee. On the same day, the second report, "Future Policy for Motor Vehicle Exhaust Emission Reduction" (November 21, 1997, Central Environment Council No. 120: hereinafter referred to as the "Second Report"), was put together. The Second Report called for the implementation of these initiatives: 1) strengthen measures focused on the reduction of NOx and HC emissions from gasoline LPG motor vehicles over the period from 2000 to 2002 (hereinafter referred to as the "new short-term gasoline targets") and take on technological development aimed at further reducing such emissions to one half the levels of the new short-term gasoline targets by 2005 or so (hereinafter referred to as the "new long-term gasoline targets"), 2) through modification of the fuel evaporative emission test procedure for gasoline-powered motor vehicles, strengthen measures to reduce fuel evaporative emissions at the same time as achieving the aforementioned targets, and 3) introduce exhaust emission regulations for diesel-powered special motor vehicles from 2004. Based on the report, as regards the

new short-term gasoline targets and fuel evaporative emissions from gasoline-powered motor vehicles, necessary actions, such as amendment of the public notice on "Motor Vehicle Emission Limits" (hereinafter referred to as the "Emission Limits") issued under the Air Pollution Control Act, were taken in September, 1998.

On December 14, 1998, the Experts Committee submitted its third report on the results of its study concerning the strengthening of measures to reduce exhaust emissions from diesel-powered special motor vehicles to the Air Quality Committee. Upon its receipt, the third report, "Future Policy for Motor Vehicle Exhaust Emission Reduction" (December 14, 1998, Central Environment Council NO. 144: hereinafter referred to as the "Third Report") was put together, calling for strengthening of measures focused on the reduction of NOx and PM emissions from diesel-powered motor vehicles over the period from 2002 to 2004 (hereinafter referred to as the "new short-term diesel targets") and taking on technological development aimed at further reducing such emissions to one half the new short-term diesel targets by 2007 or so (hereinafter referred to as the "new long-term diesel targets"). As regards the new short-term diesel targets, necessary measures, such as amendment of the emission limits, were taken in September, 2000.

On September 25, 2000, the Experts Committee's fourth report on the study results concerning the timing to achieve the new long-term diesel targets was received by the Air Quality Committee. Based on the report, the fourth report, "Future Policy for Motor Vehicle Exhaust Emission Reduction" (November 1, 2000, Central Environment Council No. 139: hereinafter referred to as the "Fourth Report"), was put together. The Fourth Report called for the following actions to be taken:

1) Achieve the new long-term diesel targets by 2005, two years earlier than 2007 originally set forth by the Third Report. Determination of new long-term diesel target values scheduled for the end of fiscal year 2001 shall also consider further reducing PM emissions to one half or so of the new short-term diesel targets based on the results of risk assessment concerning diesel exhaust particles (DEP).
2) Reduce the permissible limits of sulfur content in diesel fuel to one tenth of the current level by the end of 2004.
3) Front-load achievement of reduction targets for diesel-powered special motor vehicles by one year to 2003.

Based on the report, necessary measures, such as amendment of permissible emission limits, were taken for diesel-powered special motor vehicles in August, 2001.

(History and Outline of Deliberations on the Report)

In accordance with the study policy indicated in the Fourth Report, the Experts Committee carried out deliberations on 29 different occasions, including on-site

investigations of automobile manufacturers, along with the hearings from industry associations as well as automobile makers conducted by the working committee established in the Experts Committee, leading to conclusions concerning the motor vehicle exhaust emission reduction measures. The study results will be reported in the following sections:

Section 2: On the need to strengthen motor vehicle exhaust emission reduction measures; Section 3: On exhaust emission test procedure, etc.; Section 4: On exhaust emission reduction measures for diesel-powered special motor vehicles; Section 5: On exhaust emission reduction measures for gasoline LPG motor vehicles; and Section 6: On challenges to be addressed in Part l and the points of view of the Experts Committee in Part 2.

2. Need to Strengthen Motor Vehicle Exhaust Emission Reduction Measures

In its Second to Fourth reports, the Experts Committee presented its basic awareness about motor vehicle exhaust emission reduction measures.

Considering the relationship between air pollutants and motor vehicle exhaust emissions (see the summary below) in reducing motor vehicle exhaust emissions, it is necessary to powerfully promote measures to reduce PM and NOx emissions, first of all. While from the point of view of curbing the secondary formation, such as suspended particulate matters (SPM) and photochemical oxidants, and also of measures to deal with hazardous air pollutants, such efforts must also address reduction of HC.

With regard to PM, the level of compliance with the environmental standard still remains low for SPM primarily along the roadside. In addition, there are concerns about its possible health risk, such as cancer, bronchial asthma and hey fever, while the relationship between the concentration of micro particulate matters in atmospheric environment, which are a kind of SPM but smaller in diameter, and health risk is also drawing attention anew. Given these developments, it is necessary to promote measures to reduce PM emissions while keeping in mind that a majority of PM emitted by diesel-powered motor vehicles comprises nano-sized particulate matters.

(Relationship Between Air Pollutants and Motor Vehicle Exhaust Emissions)

- Reduction of PM emissions from motor vehicles is effective for reducing SPM concentration in the atmospheric environment and emission of hazardous air pollutants. Hence, the need for exhaust emission reduction measures is extremely great.
- Reduced NOx emissions from motor vehicles is not only effective in reducing concentrations of NO_2, SPM and photochemical oxidants in atmospheric environment, it is also effective as a measure to deal with acid rain. Hence, the need for exhaust emission reduction measures is extremely great in terms of their effectiveness in reducing NOx emissions, in particular.
- Reduced HC emissions from motor vehicles is not only effective in reducing concentrations of NOx, SPM and photochemical oxidants in atmospheric environment and emissions of hazardous air pollutants, it is also effective as a measure to deal with acid rain. Hence, the need for exhaust emission reduction measures is great.

In promoting motor vehicle exhaust emission reduction measures, the Experts Committee follows the basic awareness as mentioned above although it is also necessary to consider the following situations:

1) Japan has taken a variety of measures, such as strengthening of motor vehicle exhaust emission control, in order to prevent air pollution. However, as it now stands, air pollution caused by SPM, NO_2 and other pollutants still remains serious. In particular, SPM and NOx emissions from diesel-powered motor vehicles are found to contribute significantly to SPM and NO_2 in atmospheric environment along the

roadside making reduction of PM and NOx emissions from such motor vehicles an important issue to be addressed.

2) As regards PM emissions (DEP: Diesel Exhaust Particles) from diesel-powered motor vehicles, diesel smoke control has been in force since 1972 as a countermeasure, and in 1993, control of PM emissions was additionally started and followed by tighter control introduced over the period from 1997 to 1999. However, on December 31, 2000, in the first trial of the Amagasaki air pollution litigation, the Kobe district court handed down a judgement which embraced the cause and effect relationship between SPM and injury to human health for the first time. (The case was settled out of court in December of the same year.) Elsewhere, a municipal government introduced a regulation whereby in-use diesel-powered motor vehicles are mandated to be equipped with micro particle removal filters (DPF). Thus, concern over DEP has quickly increased in recent years. Moreover, given the concerns over the relationship between DEP and cancer or bronchial asthma, the Environment Agency is currently conducting risk assessment of DEP by holding DEP risk assessment study meetings. In a report compiled in March, 2002, the agency stated its view that, "Judging from comprehensive knowledge obtained so far, we consider there to be strong indications that DEP possesses cancer-inducing qualities."

3) In order to deal with exhaust emissions from in-use motor vehicles, based on the "Enforcement Cabinet Order for Legislation for Reduction of Overall Amount of Vehicle NOx Emissions in Designated Areas" (hereinafter referred to as the "NOx Law") which was promulgated in 1992, various measures, such as motor vehicle category regulation were implemented. However, due to increased motor vehicle traffic and other reasons, it became difficult to achieve most of the NO_2 environment standards, the aim of the measures. Thus, while tightening the conventional policies toward NOx, partial amendment of the motor vehicle NOx Law (Legislation for Partial Amendment of the Cabinet Order for Legislation for Reduction of Overall Amount of Vehicle NOx Emissions in Designated Areas) passed the Diet and was promulgated on June 27, 2001.

4) In recent years, the problem of global warming has emerged as one of the most critical challenges to humankind, and in November 2001, the Seventh Conference of the Parties to the UN Framework Convention on Climate Change (COP7) adopted detailed, documented rules for putting the Kyoto Protocol in practice. In response, each country involved is currently working toward conclusion of the Protocol. In Japan, for instance, the Headquarters for Global Warming Countermeasure Promotion chaired by the Prime Minister decided upon the "Future Policy Toward the Conclusion of the Kyoto Protocol" on February 13, 2002, and pledged to "approve the conclusion of the Kyoto Protocol in the current ordinary session of the Diet and pass the collateral legislation by all means." In addition, given a significant increase in the amount of CO_2 emissions from the transportation sector (23% more in 1999 than in 1990) in Japan, in implementing exhaust emission reduction measures, it is also necessary to take into consideration trends in technological development for

increased fuel efficiency, which will lead to curbing CO_2 emissions.

Taking these situations into consideration, the Experts Committee has concluded that it is necessary to identify the current state and future potential of technological development for motor vehicle exhaust emission reduction, conduct studies, while also identifying the necessary cost of implementing such measures, and promote the measures prescribed in Sections 4 and 5 of this Report, based on the exhaust emission test procedure indicated in Section 3.

3. Exhaust Emission Test Procedure and Others

3.1. Exhaust Emission Test Procedure

As regards the exhaust emission test procedure, as the Second, Third and Fourth Reports pointed out, now that the current test procedure has been in use for more than ten years, there is a possibility of changes during the period in actual running patterns of motor vehicles. In addition, it is also a possibility that a need to improve the test procedure has emerged in order to properly assess changes in the performance of exhaust emissions as the result of progress made in exhaust emission reduction technology due to the increased accuracy of electronic control technology as well as the adoption of new after-treatment devices, along with improvement of motor vehicle performance. Thus, based on the survey results concerning the actual running patterns of motor vehicles, reviews of the chassis-based test procedure (a test method to assess the total emissions from a motor vehicle: vehicle-based test procedure) and the engine-based test procedure (a test method to assess emissions from the engines) were made as indicated below, including the measurement mode of exhaust emission tests (hereafter referred to as the "test mode"). Incidentally, in developing the new test mode, a new technique was used to reflect the real state in more detail based on the survey results.

Under the current regulations, the chassis-based test procedure is applied to passenger cars, mini-sized trucks, light-duty vehicles (trucks and busses with a gross vehicle weight of 1,700kg or less) and medium-duty motor vehicles (trucks and buses with a gross vehicle weight of over 1,700kg and 3,500kg or less, and those with a gross vehicle weight of 2,500kg or less if diesel-powered). Meanwhile, the engine-based test procedure is applied to heavy-duty motor vehicles (trucks and buses with a gross vehicle weight of over 3,500kg, and those of over 2,500kg if diesel-powered).

3.1.1. Chassis-based Test Procedure

1) Measurement Mode for Exhaust Emission Test

In the case of gasoline LPG motor vehicles, the catalyst works to purify their exhaust emissions. As the purification rate varies according to the air fuel ratio, by measuring the concentration of residual oxygen in exhaust emission, high-accuracy control is in practice to constantly maintain optimal air fuel ratios. When the exhaust emission values are as low as the levels of the new long-term targets, the performance of exhaust emissions depends significantly upon the technical levels of air fuel ratio control. As the difficulty or ease of air fuel ratio control increases according to changes in running conditions, such as acceleration and deceleration, it is necessary to examine the frequency of acceleration or deceleration during the test mode so that the technical levels of air fuel ratio control can be properly assessed.

As for acceleration during the test mode, although its effect on exhaust emissions is substantial, acceleration is set within a range capable of securing trackability to the test mode based on the performance of vehicles with small output in relation to their gross vehicle weight, such as mini-sized trucks, at the time (1989) the current test mode was established. However, given the improved performance and increased

output of motor vehicles in recent years, along with an expanded range of trackable acceleration, it is necessary to examine acceleration in the test mode.

In view of this awareness, in order to accurately assess the performance of motor vehicle exhaust emissions consistent with the regulation based on the new long-term targets, it is appropriate to alter the test mode to the one indicated in Figure 1.

2) Procedure for Assessing Exhaust Emission Measurement Values

Gasoline LPG motor vehicles discharge significantly more exhaust emissions at the time of cold start than when the engines have warmed up because in order to secure smooth start-up and operability right after the start, the engine are fed a rich air-fuel mixture, while the catalysts are still inert due to the cold temperature. Therefore, for the reduction of cold-start exhaust emissions, gasoline LPG motor vehicles are currently regulated by 11 mode running cycles, in addition to 10.15 mode.

Likewise, under the current regulations, assessment of the performance of exhaust emissions is carried out under two separate conditions, when the engine is cold and when it has warmed up. However, in actual operations, as cold engines eventually warm up, a procedure capable of identifying the performance of exhaust emissions in such a manner as to reflect actual vehicle operation is more reasonable. In addition, now that the proportion of exhaust emissions on cold start is getting relatively bigger as a result of more stringent exhaust emission control, it is necessary to reflect this as much as possible.

Therefore, as regards the measurement of exhaust emissions, it is appropriate to measure them in two ways, when the engine is cold and when it has warmed up, and then assess the exhaust emission values based on those computed by weighting the relative proportion of the two conditions obtained from studies of actual vehicle operations.

In the meantime, diesel-powered motor vehicles are equipped with ignition auxiliary devices, such as glow plugs, in order to secure compression ignition on cold start. Therefore, the increase of HC emissions due to the discharge of unburned fuel is small. NOx emissions do not significantly increase either in comparison with warm starts because, at present, such vehicles are not subject to NOx purification using catalyst. Thus, diesel-powered motor vehicles are regulated by only 10.15 mode for warm start.

Nevertheless, in the case of passenger cars to which the chassis-based test procedure is applied, the distance in each running cycle from turning on the engine to turning it off is short, while use of cars is also infrequent. Thus, considering frequent use of cold starts and also assuming that vehicles consistent with the regulation based on the new long-term targets would be required to be equipped with after-treatment devices using catalysts, it is also necessary to add the cold-start test to the test procedure for diesel-powered motor vehicles. In that event, as is the case with gasoline LPG motor vehicles, it is appropriate to measure exhaust emissions in two

ways, such as when the engine is cold and when it has warmed up, and assess the exhaust emission values based on those computed by weighting the relative proportion of the two conditions obtained from the studies of actual vehicle operations.

3.1.2. Engine-based Test Procedure

1) Measurement Mode for Exhaust Emission Test

It is assumed that heavy-duty diesel-powered motor vehicles will be mandated to be equipped with after-treatment devices, such as DPF, in order to comply with the new long-term targets. Exhaust emission purification rates of the after-treatment devises vary depending upon the temperature of the exhaust emissions. However, as the current test mode is incapable of reproducing actual temperature changes of exhaust emissions, making it impossible to properly assess the after-treatment devices, it cannot be used as a test mode for regulation based on the new long-term targets.

In addition, in the current test mode, the same test is applied to all engines although the gross vehicle weight of heavy-duty motor vehicles vary widely, while engine speed and load also differ between vehicles with large engine output in relation to their gross vehicle weight and those with small output even when they are operated at the same speed and acceleration. Advancement of electronic control in recent years has enabled fine engine control, suggesting that changes in exhaust emissions due to differences in engine speed and load could become discontinuous. Thus, in the event of test mode alteration, it is necessary to finely reflect the actual speeds and loads of engines as much as possible.

In this context, in order to properly assess the performance of exhaust emissions from engines complying with the regulations based on the new long-term targets, it is appropriate to change the current test mode to the transient test mode newly established based on the representative running test mode indicated in Figure 2. The engine-based test mode is determined by converting the representative running mode for each engine to engine speed and load. In order to reflect each engine's different speed and load, this conversion can be obtained by calculating the specifications of engines and vehicles as well as the gearshift timing and positions which are set according to the principles indicated below. In this case, considering actual operating conditions, half-loading is assumed.

Incidentally, as regards heavy-duty diesel-powered motor vehicles, it is appropriate to take into consideration the number of certification processes in establishing the test mode since the types of vehicles using the same engine are huge in number. Meanwhile, heavy-duty gasoline LPG motor vehicles must be addressed using a different concept of setting the gearshift timing and positions because their running characteristics differ from those of heavy-duty diesel-powered motor vehicles. In addition, as the types of such vehicles mounted with the same engines are limited in number, it is appropriate to pre-set the gear positions as in the chassis-based test

mode.

(Principles of Setting Gear Positions and Stages)

1. Engine speed shall be set within a specified range.
2. The gear position for starting shall be second speed with the clutch to be engaged at a specified engine speed.
3. During acceleration, in the event that the driving force after gearshift satisfies a specified rate of power in reserve (a value obtained by dividing the maximum driving force at the engine speed reached after gearshift by required driving force), the gears shall be shifted to one speed higher position.
4. Within a range where trackability to the test mode can be secured, selection of a two speed higher position may be made.
5. Change of gears shall assume a condition whereby the position after the gearshift can be sustained for a specified length of time.
6. In the event of acceleration from the state of deceleration or constant speed, selection of lower gear position may be made if necessary.
7. During deceleration, gears shall not be changed and the clutch shall be disengaged at the specified engine speed.

2) Procedure for Assessing Exhaust Emission Measurement Values

As regards exhaust emission measurement by the new test mode, it is appropriate to conduct the test only in the warm state like the current test procedure for the time being, because compared with vehicles subject to the chassis-based test, heavy-duty motor vehicles subject to the engine-based test not only travel longer distances per cycle from start to stop, but they are also used more frequently, resulting in less frequent cold starts.

3) Classification of Exhaust Emission Regulations

With regard to diesel-powered motor vehicles, exhaust emission reduction by the engine-based test has been pursued so far as far as those with a gross vehicle weight of over 2,500kg are concerned. However, considering that gasoline LPG motor vehicles with a gloss vehicle weight of over 2,500kg to below 3,500kg have been reclassified as medium-duty motor vehicles under the new short-term regulations, and also that in foreign countries, the cold-start test mode in the chassis-based test procedure has been applied even to vehicles with a gross vehicle weight of over 2,500kg, it is appropriate to reclassify those vehicles with a gross vehicle weight of over 2,500kg and below 3,500kg as medium-duty motor vehicles and apply regulations based on the chassis-based test procedure. In the meantime, as application of the current chassis-based test procedure to those with a gross vehicle weight of over 3,500kg is difficult, it is appropriate to continue application of the engine-based test procedure for the time being.

4) Particulate Matter Measurement Procedure

The partial dilution filter capturing method has advantages over the current total mass dilution capturing method in that its ability to maintain stable and constant

test conditions is expected to improve measurement accuracy, and also because it is compact and inexpensive. Although there was a problem regarding its applicability to the transient running mode, now that its significant correlation with the current measurement procedure has been established as a result of technical studies led by the International Standardization Organization (ISO), the procedure is scheduled to become the official international standard. Thus, in view of its potential application to certification tests and others, it is necessary to consider its adoption in synch with implementation of regulations based on the new long-term targets for diesel-powered motor vehicles.

3.1.3. Timing of Application

In applying the new test mode, phased introduction is appropriate, taking into consideration smooth compliance with the regulation.

As regards the engine-based test mode, considering that its relevance to the total amount of exhaust emissions from all motor vehicles subject to regulation is significant and also that a new test procedure is indispensable for assessing engines with after-treatment devices, it is appropriate to apply the procedure beginning in 2005 in synch with implementation of regulations based on the new long-term targets.

In the meantime, concerning the chassis-based test mode, it is appropriate to introduce the procedure to cold-start exhaust emission measurement beginning in 2008 and warm-start measurement starting in 2011, as vehicle models and types subject to regulation are diverse, suggesting difficulty in addressing development and production preparations in terms of the number of processes, and also due to the need to secure institutional consistency with the fuel economy enhancement measures based on the Rationalization of Energy Consumption Act (Energy-Saving Act).

3.2. In-use Performance Maintenance Measures

3.2.1. Onboard Diagnostic System (OBD System)

Equipment for OBD systems has become mandatory under the short-term regulations in order to monitor malfunctioning of the exhaust emission reduction devices due to broken wires and so forth. However, in order to maintain low exhaust emission values consistent with the new long-term target levels, it is necessary to upgrade the system. For example, by providing the system with functions capable of alerting the drivers to the deteriorating performance of exhaust emission reduction devices, such as catalysts, early repairs will become possible, resulting in in-use improvement of exhaust emissions. In addition, easy identification of problem parts can be expected at the time of repair.

Thus, it is appropriate to introduce highly advanced OBD systems, such as the one discussed above, sooner. To this end, it is appropriate for the government of Japan to urgently determine the detection items and values, along with the assessment techniques, upon repeated technical examinations, and for the motor vehicle manufacturers to equip their passenger cars, mini-sized trucks and light- and medium-

duty vehicles with advanced OBD systems during production, beginning in 2008. In doing so, as they are required to address regulations based on the new long-term targets as well as the new exhaust emission test procedure, considerations aimed at ensuring smooth compliance with the regulations are necessary. Besides, for motor vehicle users, it is appropriate to constantly confirm normal operation of the exhaust emission reduction devices using the OBD system and conduct inspection and maintenance whenever necessary.

As regards heavy-duty motor vehicles, application of advanced OBD systems is technically difficult because of the need to develop advanced sensors. Thus, the use of OBD systems for monitoring malfunctions in light of the new short-term targets will continue for the time being although it is appropriate to introduce advanced OBD systems as soon as technical solutions emerge. In that event, in addition to the need to develop technologies capable of achieving compliance with regulation based on the new long-term targets, it is also necessary to address the new exhaust emission test procedure. In this context, it is necessary to take into consideration the fact that it is extremely difficult to introduce advanced OBD systems at the same time as they are introduced in passenger cars, mini-sized trucks and light- and medium-duty motor vehicles.

3.2.2. Diesel Smoke Control

As diesel smoke control is effective in confirming PM emissions from in-use motor vehicles, it is appropriate to continue the current regulation for the time being. However, in the event that advanced OBD systems capable of monitoring deterioration in the performance of after-treatment devices, such as diesel particulate filter (DPF), are mounted on motor vehicles in future, it will be appropriate to reexamine the need for such regulations.

3.3. Others

3.3.1. Change of Controlled Substances (Shift to Non-methane Hydrocarbons)

Under the current regulations, total hydrocarbons (THC) are controlled although the methane component of THC is not hazardous, while its contribution to the secondary formation, such as SPM, is also negligible. Besides, although it is one of the greenhouse gasses, its amount is small compared with CO_2, a greenhouse gas emitted from motor vehicles. Indeed, the proportion of methane component of THC is small at present. However, as methane is difficult to control using catalysts, its proportion in THC will increase in relation to the lower exhaust emission values consistent with the new long-term-targets. As it is important to accurately reduce other components of THC, which is hazardous and contributes significantly to the secondary formation of SPM, it is appropriate to set the new long-term target values for non-methane hydrocarbons (NMHC), excluding methane. However, considering the need to upgrade measuring instruments, by the end of 2008, it is appropriate to multiply measured THC values by 0.8 for gasoline LPG motor vehicles and by 0.98 for diesel-powered motor vehicles and

regard the values thus obtained as the measured NMHC values.

3.3.2. Exhaust Emission Reduction Measures in Other Running Cycles Than the Test Mode (Off-cycle Countermeasures)

The test mode represents highly frequent and average running patterns among a variety of patterns which could take place in reality. Therefore, they don't include running conditions, such as high-speed, fast acceleration driving, and high (low) temperatures and high altitudes, which are less frequent. However, as the new long-term target values are extremely stringent, if off-cycle exhaust emission amount is significant enough, such emissions could diminish the effect of regulations though such cases might arise only infrequently. In addition, now that advancements in electronic control have brought about precision engine control systems, enabling a variety of conditions to be controlled, cases could arise whereby, depending upon the control system, exhaust emissions could increase when tested under off-cycle conditions. Thus, except for cases where the use of such systems is acknowledged as being necessary for engine protection, it is necessary to curb the increase of such exhaust emissions as much as possible.

For instance, off-cycle measures in the United States require: 1) advance reports from motor vehicle manufacturers concerning the method used to control exhaust emission reduction systems, which could affect the performance of exhaust emissions, 2) statement of policies concerning the method used to control exhaust emission reduction systems as a minimal means to protect engines and so on so that motor vehicle manufacturers can use the information during engine development, and 3) implementation of confirmation tests under off-cycle running and test conditions wherein increases of exhaust emissions are highly likely depending upon the exhaust emission reduction control method used.

In consideration of this, there is an urgent need to examine specific countermeasures and contents concerning exhaust emissions under off-cycle running and test conditions. While making the examination, it is also necessary to assess the effectiveness of the measures at the same time.

3.3.3. CO Emission Reduction Measures During Winter in Cold Regions

As regards CO emission reduction measures during winter in cold regions as pointed out in the Second Report, it is appropriate to apply the current regulation for the time being for these reasons: CO concentrations in the cold regions of Japan are significantly lower than the environment standards; the temperatures in such regions are higher than those in the United States and Europe where CO regulations in low temperatures have been introduced; and implementation of emission reduction measures in normal temperatures also work to reduce CO emissions in low temperatures.

4. Exhaust Emission Reduction Measures for Diesel-Powered Motor Vehicles

4.1. Exhaust Emission Reduction Technologies

Major technologies for the reduction of exhaust emissions from diesel-powered motor vehicles include increased fuel injection pressures and optimization of combustion chamber configurations in terms of PM countermeasures and increased electronic control precision of fuel injection ratios, along with cooling and increased volume of EGR gas in the Exhaust Gas Recirculation System (EGR System), in terms of NOx emission countermeasures.

In order to achieve the very lofty new long-term targets for diesel-powered motor vehicles, it is imperative that after-treatment devices be adopted, in addition to the improvement of engine combustion already discussed. As for the after-treatment devices, in addition to oxidation catalysts already in use, continuous regenerative-type DPF and NOx reduction catalysts are promising. In order to increase the applicability of these technologies, timed to achievement of the new long-term targets, reduction of diesel fuel sulfur content from 500ppm to 50ppm was advised in the Fourth Report.

Some problems regarding continuous regenerative-type DPF still need to be solved in terms of restrictive conditions, such as exhaust temperature and NOx/PM ratios in exhaust emissions, and also durability. Nevertheless, they have the potential to significantly reduce PM. In addition, due to the effect of the oxidation catalyst as part of DPF, they can also reduce not only HC and CO emissions but also hazardous air pollutants. Thus, they are being applied to some models primarily in Europe, indicating development progress.

In the meantime, with regard to NOx reduction catalysts for diesel-powered motor vehicles, development of two kinds, NOx adsorbers occlusion type utilizing existing technology for gasoline LPG motor vehicles and selective catalytic reduction (SCR) systems using urea as an additive, is under way. As it stands, the NOx adsorbers not only call for diesel fuel with lower sulfur content than the DPF, they also present some problems in terms of effectiveness and durability. Based on this particular technology, a technology to reduce both PM and NOx at the same time has already been developed. However, due to unavoidable deterioration of durability caused by the exposure to poisonous sulfur and aggravated fuel efficiency due to recovery from the exposure to poisonous sulfur, application of the technology on large trucks which require high durability is difficult right now. That said, however, it is seen to be applicable to diesel-powered motor vehicles up to light trucks. As for the urea addition type, development is being centered around Europe. This technology is less vulnerable to poisonous sulfur exposure, resulting in decreased aggravation of fuel efficiency compared with other after-treatment devices. Nevertheless, it still presents problems in terms of effectiveness, restraint of ammonium emission, development of an infrastructure for urea supply and on-board vehicle installation.

4.2. New Long-term Target Values

With the need for motor vehicle exhaust emission reduction measures described

earlier in 2 of this Report in mind, the Experts Committee has conducted technical reviews of the exhaust emission reduction measures in terms of motor vehicle structures as described in 4.1. for each motor vehicle category assuming 50ppm sulfur content in diesel fuel, while also taking into consideration the possibility of future development. As a result, the Committee has reached a conclusion that it is appropriate to strive toward reduction of PM, NOx, NMHC and CO emissions by the end of 2005 in line with the target values set for permissible limits as described in Table 1.

In setting the new long-term target values, it is necessary to set the target values for PM from diesel-powered motor vehicles as stringent as possible given the contents of the report of the DEP risk assessment review meeting compiled in March, 2002, in which the health risk of DEP has become clear. Technically, as PM and NOx emissions are in a trade-off relationship, significant reduction of PM emissions makes reduction of NOx difficult. In view of the urgency of DEP countermeasures, it is appropriate to give priority to PM reduction rather than NOx as far as the new long-term target values are concerned. In this context, it has been judged that with the continuous regenerative type DPF, it is possible to considerably reduce PM emissions. Although they are undergoing actual operation tests on board in-use motor vehicles in Japan, use of fine filter meshes in order to achieve high PM removal rates tends to cause clogging, leading to system problems depending on the running conditions. Thus, motor vehicle manufacturers are required to overcome such problems through technological development, while motor vehicle users are required to conduct proper inspection and maintenance.

Meanwhile, the NOx adsorber-applied new technology and cooling and increased volume of EGR are expected to reduce NOx emissions. Nevertheless, given the trade-off relationship with PM, it is difficult to achieve reductions as significant as in the case of PM.

Incidentally, the SCR, development of which is under way, offers the potential to considerably reduce NOx. Therefore, although the technology has some problems as described in 4.1., considering the possibility of further technological development, it is hoped that studies concerning the development of an infrastructure for urea supply and the like will be made.

Elsewhere, with regard to NMHC, it has been judged that due to the effect of the oxidation catalyst contained in the continuous regenerative DPF, significant reduction of NMHC is possible. Meanwhile, concerning CO emissions, it has been decided to continue application of the new short-term targets because they are significantly lower than the environmental standard.

In the meantime, as there are concerns that the adoption of these exhaust emission reduction measures could adversely affect fuel economy, motor vehicle manufacturers are required to promote technological development and minimize such aggravation.

In the future, the applicability of after-treatment devices will increase due to further reduction of the sulfur content in diesel fuel, while further reduction of exhaust emissions will also become possible. Overseas, the United States, for instance, is

scheduled to introduce regulations to reduce the sulfur content in diesel fuel to 15ppm, while also reducing the current regulated values for PM and NOx from heavy-duty diesel- and gasoline-powered trucks by 90% and 95%, respectively, beginning in 2007. Likewise, the EU is also studying plans to reduce the sulfur content in diesel fuel to less than 10ppm in a phased manner beginning in 2005 and introduce the measure to its all areas from 2009.

Given these developments, it is necessary to promote technological development and, at the same time, implement urgent studies concerning further reduction of the sulfur content in diesel fuel, taking into consideration overseas trends. As a means to promote popular use of diesel fuel with a smaller sulfur content through the use of incentives, such as those being implemented in Sweden and Germany, are considered effective.

In doing so, it is appropriate to also conduct studies concerning more stringent exhaust emission control, at the same time.

For that matter, it is necessary to see to it that smooth compliance with the regulations take place, because:

- Motor vehicle manufacturers will be required to address the issue based on the new short-term diesel regulation and the new long-term diesel targets in a short period of time, forcing them to accelerate compliance with the new long-term targets for diesel-powered motor vehicles and address the regulation based on the new long-term targets for gasoline-powered motor vehicles, at the same time. These conditions are expected to place an increased burden on automakers due to the sharp increase in the number of processes, along with the concentration of certification procedures, within a set time frame.
- A period for preparing test facilities and others in order to address the new exhaust emission test procedure will become necessary.

In the meantime, motor vehicle manufacturers have stated their commitment to begin supplying motor vehicles with significantly reduced PM emissions to the market sometime between 2003 and 2004 on a voluntary basis. It is hoped that they will fulfill their commitment, accordingly.

4.3. Effect of Exhaust Emission Reduction

The effect of exhaust emission reduction will be discussed in 5.5. together with gasoline LPG motor vehicles.

5. Exhaust Emission Reduction Measures for Gasoline LPG Motor Vehicles

5.1. Exhaust Emission Reduction Technologies

Primary exhaust emission reduction technologies for gasoline-powered motor vehicles include those for: improvement of combustion through optimization of the combustion chamber configuration; improvement of the fuel injectors, increased accuracy of air fuel ratio control; addition of EGR device and application of electronic control; increased volume of EGR gas; early activation of catalyst (positioning nearer the engine, addition of front catalyst, reduced heat mass through the use of thinner walls for catalyst carrier, low temperature heat capacity, etc.) and improved purification efficiency (increased volume of catalyst, increased amount of rare metal content in the catalyst, improved rare metal content, etc.).

As regards LPG-powered motor vehicles, application of electronically controlled fuel injectors can be cited, in addition to almost same exhaust emission reduction measures applied to gasoline-powered motor vehicles.

In recent years, in the area of passenger cars in particular, exhaust emission reduction technology has significantly improved at home and abroad, centering around improved purification performance and durability of the catalyst and increased accuracy of various controls brought about by advancements in computer-aided control technologies. As a result, coupled with the low exhaust emission motor vehicles approval program, which has taken into account the exhaust emission technical guidelines for low exhaust emission motor vehicles (April 26, 2000, Notice from the Director, Air Quality Bureau, Environment Agency), and measures to disseminate and promote automobile tax credits for vehicles approved under the program, very low exhaust emission motor vehicles have started to be sold..

In the meantime, significant reduction of exhaust emissions can cause fuel economy to deteriorate. In recent years, the issue of global warming has acutely called for both international and national actions and, in response, in order to curb the emissions from the transportation sector where CO_2 emissions are on the increase, development of a variety of technologies for increased fuel efficiency is under way. In promoting motor vehicle exhaust emission reduction measures, it is necessary to consider overall environment conservation measures and, for that matter, it is also necessary to see to it that technological development is promoted in such a manner as to make exhaust emission reduction compatible with increased fuel efficiency. To be specific, motor vehicles with lean-burn engines, such as cylinder direct injection gasoline engines, normally discharge less CO_2 emissions compared with ordinary gasoline LPG motor vehicles. However, since problems still remain regarding the purification performance of catalysts suitable for lean-burn engines, which are needed to reduce exhaust emissions, as well as their durability, special attention need to be paid to such vehicles.

5.2. New Long-term Target Values and Timing of Achievement

(Target Values for Permissible Limits)

Keeping in mind the need for motor vehicle exhaust emission reduction discussed in

Section 2, the Experts Committee conducted technical review concerning exhaust emission reduction through measures involving the structure of motor vehicles, while also taking into account the potential for future development. As a result, the Committee has reached a conclusion that it is appropriate to address the reduction of NOx, NMHC and CO emissions in line with the target values for permissible limits indicated in Table 2.

In motor vehicles with lean-burn engines that have excellent fuel efficiency, in particular, a marked trade-off relationship exists between exhaust emissions and fuel economy, making it very difficult to achieve compatibility between significant reduction of exhaust emission and improved fuel economy. From the point of view of global warming prevention, reduction of CO_2 emissions is also important and in this respect, as CO_2 emissions from gasoline LPG motor vehicles account for as much as about 60% of such emissions from all types of motor vehicles, it has been judged appropriate for the exhaust emission reduction measures to attain maximum achievable reduction for the time being, while also taking into consideration the compatibility with CO_2 emission reduction measures. Also, with regard to some types of passenger cars, it is possible to reduce exhaust emissions to a level lower than that prescribed by the new long-term targets. Thus, through the low exhaust emission motor vehicle approval program, which is based on the technical guidelines for exhaust emissions from such vehicles, as well as dissemination and promotion of incentives, such as alleviation of automobile tax on such vehicles, it is appropriate to continue to work on popularizing motor vehicles with reduced exhaust emissions.

In the meantime, the displacement of engines for mini-sized trucks is 660cc or smaller, but in comparison with other motor vehicle categories, they are frequently used at high engine speeds due to their small driving force. Given these unique technical constrictions, it is necessary to consider modification of the vehicle layout in order to reduce exhaust emissions as low as those from passenger cars or light-duty motor vehicles.

Incidentally, as regards CO emissions, it has been decided to maintain the new short-term regulation levels because CO emissions are significantly lower than the level prescribed by the current environmental standard, and also because their trade-off relationship with NOx caused by the characteristics of the catalyst used for purification, further reduction of CO emissions will make reduction of NOx emissions difficult.

(Timing of Achievement)

It is appropriate to achieve the permissible limit target values for passenger cars, and light-, medium- and heavy-duty motor vehicles indicated in Table 2 by the end of 2005, through efficient design, development, production preparation and so forth. As regards mini-sized trucks, given the technical problems discussed earlier, it is appropriate to achieve the targets by the end of 2007.

5.3. Fuel Quality Countermeasures

While further promotion of motor vehicle exhaust emission countermeasures is

necessary, the reduction of CO_2 emissions from motor vehicles is needed as well from a viewpoint of global warming prevention. Thus, it is necessary to achieve compatibility between the technology for exhaust emission reduction and that for increased fuel efficiency.

The lean-burn engine, which represents one of the technologies for CO_2 emission reduction, uses the PeNOx catalyst. However, it is known that the catalyst fails to function fully due to its exposure to poisonous sulfur contained in gasoline. In order to achieve a high purification rate even in this case, it is necessary to temporarily stop lean-burning and switch to stoichiometric burning like the conventional engine. However, this will diminish the effect of CO_2 emission reduction.

For these reasons, in order to reduce exhaust emissions while maintaining the effect of CO_2 emission reduction, it is necessary to reduce the sulfur content in gasoline. Nevertheless, further reduction of the sulfur content from less than 50ppm could give rise to concerns regarding the potential effect on other properties.

Therefore, in view of the need to achieve the new long-term targets for gasoline sooner, it is appropriate to set 50ppm as the permissible target value for the sulfur content by the end of 2004. Also, as regards further reduction of permissible limit target values, it is appropriate to review the need for further reduction and so on, and urgently find a solution while considering trends in foreign countries, from a viewpoint of making the technology to reduce exhaust emission and that to reduce fuel consumption compatible.

5.4. Fuel Evaporative Emission Countermeasures

Gasoline is highly evaporative and in gasoline-powered motor vehicles, the amount of gasoline vapor in their fuel storage and feed systems increases as the ambient and engine temperatures rise. Evaporated gasoline is discharged from motor vehicles as well as filling stations into the atmosphere as HC, which is called fuel evaporative emission. As an indicator of gasoline evaporativity, Reid Vapor Pressure (RVP) is used. Higher EVP translates to increased aptitude for gasoline to vaporize.

Fuel evaporative emissions include:

- Gasoline vapor from running motor vehicles using their own heat as well as that radiating from the road as the heat source (Running Loss: RL).
- Gasoline vapor from motor vehicles parked immediately after running using their own heat as the heat source (Hot Soak Loss: HSL).
- Gasoline vapor from motor vehicles parked for long periods night and day using the ambient temperature as the heat source (Diurnal Breathing Loss: DBL).

In addition, there are also:

- Gasoline vapor from the fuel tanks of motor vehicles during refueling.
- Gasoline vapor from the underground tanks at filling stations when tankers replenish supplies.

Fuel evaporative emission reduction measures can be classified to those aimed at curbing emissions through structural reworking of motor vehicles, those aimed at

curbing emission through reduced evaporativity of the fuel, and those aimed at curbing emission through measures taken at filling stations. In Japan, the HSL in motor vehicles has been regulated. Besides, given the Second Report, additional introduction of DBL regulations sometime between 2000 and 2002 has been decided. Meanwhile, as regards fuel quality countermeasures, the petroleum industry has voluntarily implemented measures to reduce RVP of gasoline supplied during summer time to below 72kPa from 2001.

As the challenges for reduction of fuel evaporative emissions, the Second Report cited the need for studies on prolonging DBL measurement periods, introduction of RL test method, further reduction of RVP of gasoline during summer time and fuel evaporative emission reduction measures at filling stations.

Through technical reviews on these matters concerning the strengthening of fuel evaporative emission countermeasures, the Experts Committee has concluded as follows.

5.4.1. Fuel Evaporative Emission Countermeasures for Running and Parked Motor Vehicles

With regard to further reduction of RVP of gasoline supplied during summer time, it is appropriate for fuel producers to lower it to below 65Pa from the summer of 2005 on a voluntary basis.

Concerning the fuel evaporative emission test procedure, it is appropriate to continue the current test procedure, because most motor vehicles are parked for less than 24 hours and RL emissions from motor vehicles complying with the current test procedure, which requires 24-hour DBL measurement, have decreased.

Incidentally, it is necessary to further examine fuel evaporative emissions, while constantly identifying the real state of emissions and also taking into account the state of studies on the fuel evaporative emission countermeasures at filling stations.

5.4.2. Fuel Evaporative Emission Countermeasures at Filling Stations

Considering that emissions from exhaust pipes are on the decrease due to more rigorous regulations, while the proportion of HC emissions from filling stations are relatively on the increase, the need for countermeasures against fuel evaporative emissions at filling stations is rising.

Fuel evaporative emissions from filling stations include those which are discharged during the transfer of fuel from tankers to the underground tanks and those discharged at the time of refueling motor vehicles. The countermeasures for the former are taken at filling stations (called Stage 1 in the United States), which is to return evaporative emissions to tankers by connecting the tankers and the air pipe used to release such emissions at the time of fuel reception using a hose. Meanwhile, countermeasures for the latter include action to be taken by the filling stations (called Stage 2 in the United States) and another to be applied to motor vehicle structure (ORVR: Onboard Refueling Vapor Recovering). Stage 2 calls for equipping the refueling pump with a fuel evaporative emission sucking device in order to recover such emissions at the time of

refueling and return them to the underground tank. On the other hand, ORVR requires the motor vehicle to be fitted with a fuel evaporative emission recovering device in order to collect and store such emissions in a canister or the like filled with activated charcoal, and feed them to the running engine for recycling.

With regard to countermeasures for fuel evaporative emissions at the time of motor vehicle refueling, a measure similar to that in Stage 2 has been introduced in some regions in Europe. Moreover, in the United States, in addition to Stage 2, phased introduction of ORVR began in 1998.

Concerning what fuel evaporative emission countermeasures to take at the time of motor vehicle refueling, in view of the situations discussed earlier, it is appropriate to study implementation feasibility, technical challenges, such as RVP condition necessary to secure evaporative emission recovery efficiency, and the effect of the measure. In doing so, it is also appropriate to quickly arrive at a conclusion, while taking into account the contribution of such emissions to total HC emissions, the state of studies concerning HC countermeasures for other sources, and the situations in the United States and Europe.

Measures to deal with fuel evaporative emissions when supplying fuel to underground tanks from tankers have not only been adopted in the United States and Europe, but also by some municipal governments in Japan. Promotion of such countermeasures is strongly desired.

5.4.3. Comprehensive Countermeasures for Suspended Particulate Matters

Fuel evaporative emissions constitute substances which generate suspended particulate matters (SPM) and photochemical oxidants. Thus, in particular, in order to achieve compliance with the air quality standard concerning SPM, it is necessary to deepen discussion on its reduction during the deliberation process aimed at formulating and implementing comprehensive countermeasures against motor vehicle exhaust emissions and stationary emission sources.

5.5. Exhaust Emission Reduction Effect

According to one estimate by the Ministry of the Environment, the amount of air pollutants emitted from motor vehicles across Japan in 2000 totaled about 64,000 tons in terms of PM, about 640,000 tons in terms of NOx and about 200,000 tons in terms of HC (excluding special motor vehicles and two-wheeled ones). Of these, total emissions from diesel-powered motor vehicles and their proportion in each pollutant were estimated to be about 64,000 tons or almost 100% of PM, about 510,000 tons or about 80% of NOx, and about 120,000 tons or about 63% of HC.

The numbers below show the results of trial calculations conducted on the effect of countermeasures based on the new long-term targets for diesel and gasoline LPG motor vehicles, assuming various scenarios.

(Effect of Total Motor Vehicle Exhaust Emission Reduction)

1) When growth of motor vehicle traffic, change of motor vehicle category mix and

popularization rates of motor vehicles complying with various regulations until the introduction of the new long-term targets for diesel-powered vehicles are assumed.

Compared with the total motor vehicle exhaust emissions in 2000, those in 2010 will be reduced as follows:

About 67% reduction in PM (from about 64,000 tons to about 21,000 tons).

About 44% reduction in NOx (from about 640,000 tons to about 360,000 tons).

About 70% reduction in HC (from about 200,000 tons to about 60,000 tons).

2) Assuming that motor vehicle traffic volume remains the same as that in 2000 and that all motor vehicles subject to regulation are replaced with those complying with the regulation based on the new long-term targets for diesel and gasoline LPG motor vehicles.

Compared with 2000, total motor vehicle exhaust emissions in 2010 will be reduced as follows:

About 94% reduction in PM (from about 64,000 tons to about 4,000 tons).

About 66% reduction in NOx (from about 640,000 tons to about 210,000 tons).

About 93% reduction in HC (from about 200,000 tons to about 14,000 tons).

Nevertheless, should the significant growth of traffic volume and the enlargement of motor vehicles as seen in the past be repeated, then the reduction effect based on this trial calculations is likely to diminish. Thus, in order for the regulations based on the new long-term targets to be effective, it is necessary to continue to implement comprehensive measures for motor vehicle exhaust emission reduction.

6. Future Measures for Motor Vehicle Exhaust Emission Reduction

6.1. Future Subjects for Review

1) As regards diesel-powered motor vehicles, by making sure of the potential for exhaust emission reduction, studies will be made concerning new reduction targets, including further reduction of the sulfur content in diesel fuel. As for the establishment of specific permissible limit targets for the sulfur content in diesel fuel, the government, motor vehicle manufacturers and fuel producers will cooperate with one another, promote research on the effect of exhaust emission reduction achieved through various combinations of improvements in motor vehicle technology and fuel quality, and conduct studies based on the results. In doing so, studies will be also made on the quality of other fuels and lubricants. Given the concerns that the ash and sulfur contents of lubricants could affect the performance of after-treatment devices, such as DPF, it is hoped that the motor vehicle manufactures and fuel producers will work together to address these concerns by urgently reexamining the standards for lubricants, despite there currently being no regulations concerning their quality.
2) Concerning gasoline LPG motor vehicles, while identifying the state of their compliance with the regulations based on the new long-term targets, potential progress in technological development and the effect of various countermeasures, examination of new reduction targets will be made whenever necessary. In that event, as regards the quality of fuels and lubricants, involving the sulfur and other contents in gasoline, the government, motor vehicle manufacturers and fuel producers will cooperate to promote research on the exhaust emission reduction effects to be achieved through various combinations of improvements in motor vehicle technology and fuel quality, and based on the results of the research, future fuel and lubricant countermeasures will be examined.
3) With regard to two-wheeled motor vehicles, by making sure of the state of their compliance with regulations implemented based on the Interim Report, potential progress in technological development and the effects of various countermeasures, studies will be made on the new reduction targets whenever necessary. In that event, introduction of fuel evaporative emission regulations will be examined and cold start requirements reviewed.
4) In the case of diesel-powered special motor vehicles, for those with rated output of over 19kW and under 560kW, introduction of new reduction targets will be examined whenever necessary by making sure of their compliance with the regulations based on the Fourth Report, potential progress in technological development, the effect of various countermeasures and the trends in other countries.
5) In the case of diesel-powered special motor vehicles, for those with rated output of below 19kW and 560kW or more and gasoline LPG special motor vehicles, for which no exhaust emission reduction targets have been established yet, introduction of exhaust emission regulations will be studied whenever necessary by making sure of the state of air pollution, trends of their contribution to exhaust emissions and the state of technological development for exhaust emission reduction,

6) Control of exhaust emissions from diesel-powered motor vehicles relating to PM is currently in force based on the weight of such emissions. However, there are rising concerns both at home and abroad that like the weight, the quality of particles (number of nano particles, their composition, etc.) might be seriously related to health risks. In spite of this, however, since there is as yet no established method of measuring the quality of such particles emitted from diesel-powered motor vehicles, the real state of such emissions still remains unidentified. In addition, there is also a view pointing up emission of extremely fine particles from lean-burn engines which are gaining popularity in terms of fuel efficiency improvement although the real state of the matter also remains unknown. For these reasons, by promoting research to identify the real state of PM emissions and establish a measurement method, the need for regulations to be introduced will be studied based on the research results.

7) In order to improve or secure the performance of emissions from motor vehicles, it is important to improve or secure the fuel quality. In recent years, a variety of fuels, such as bio-diesel and dimethyl ether (DME), have emerged. Thus, investigation and research will be promoted concerning their effect on exhaust emissions when they are used or mixed and measures to prevent air pollution will be studied whenever necessary based on the results.

Incidentally, in carrying out examination and measures concerning the aforesaid subjects, considering that exhaust emission reduction measures for motor vehicles have many factors commonly shared internationally because they are globally distributed products, it is vital to work out international harmonization of standards and so forth as much as possible so long as it does not hinder environment protection in Japan. Therefore, Japan should vigorously contribute to international standard harmonization activities currently under development in the areas of exhaust emission testing of heavy-duty motor vehicles, OBD, off-cycle countermeasures and exhaust emission testing of two-wheeled motor vehicles, and work to realize such international harmonization within a possible framework.

The international harmonization of standards will bring about the following benefits:

- For motor vehicle manufacturers, reduction of development and production costs through the promotion of technological development as a result of increased R&D efficiency and sharing of costs.
- For motor vehicle users, lower purchasing prices.

6.2. Various Related Policies

To complement the countermeasures presented in this Report, it is hoped that the following related policies, such as the promotion of comprehensive motor vehicle exhaust emission countermeasures, will be carried out from now on.

(Promotion of Comprehensive Motor Vehicle Exhaust Emission Countermeasures)

As for comprehensive motor vehicle exhaust emission countermeasures, it is necessary to strengthen motor vehicle category regulation, substantiate motor vehicle

exhaust emission control measures required of business establishments and comprehensively promote policies, such as the popularization of low pollution motor vehicles, based on the Amended Motor Vehicle NOx/PM Act (legislation to amend part of the Special Measures Act for Reduction of Overall Amount of Motor Vehicle NOx Emissions in Designated Areas) promulgated on July 27, 2001.

(Promotion of Popularization of Low Pollution Motor Vehicles)

It is hoped that the government offices concerned will cooperate in further promoting the popularization of low pollution motor vehicles in line with the "Action Plan for Popular Development of Low Pollution Motor Vehicles" formulated on July 11, 2001.

(Exhaust Emission Reduction Measures for In-use Motor Vehicles)

As countermeasures for in-use diesel-powered motor vehicles, it is necessary to promote policies, such as the popularization of DPFs and so on, in line with the "Diesel Motor Vehicle Countermeasures Technical Assessment Meeting" report compiled on May 18, 2001.

In addition, as the Fourth Report suggested, it is important to have in-use motor vehicles in general, such as gasoline LPG and diesel-powered motor vehicles, maintain good exhaust emission performance by encouraging inspection and maintenance and confirming the function of exhaust emission reduction devices at the time of motor vehicle inspection based on the Road Vehicle Act as well as on-street guidance and control.

Moreover, in order to confirm that the performance of exhaust emission reduction devices is being maintained in normal use condition, it is desirable to examine a scheme for introducing random surveillance, along with the need to do so.

(Cost Burden and Others)

In the process of promoting exhaust emission reduction measures based on this Report, there will be a conceivable impact on motor vehicle prices, fuel prices, engine durability, fuel economy and maintenance costs. These burdens have to be shared appropriately by the makers of motor vehicles and fuels and their users as expenses associated with motor vehicle use.

Meanwhile, in order to smoothly promote a switchover to motor vehicles which comply with the latest regulations and improve fuel quality, considerations in terms of financial and tax incentives are also necessary.

(Investigation of Real State of Emissions from Uncontrolled Sources and Countermeasures)

As indicated in the Fourth Report, it is necessary to continue to investigate the real state of emissions from various uncontrolled sources and study the need for countermeasures, while also examining what institutional systems are needed to implement them.

(Hazardous Air Pollutants Countermeasures)

As indicated in the Fourth Report, as regards hazardous air pollutants emitted from motor vehicles, it is desired to develop measurement methods, improve measurement accuracy, consolidate the infrastructure to identify the amount of emissions from motor vehicles and devise measures based on the information obtained.

At the same time, it is also necessary to strive to identify the effect of engine combustion technologies, after-treatment technologies, such as catalysts, and the quality of fuels and lubricants on the amount of hazardous air pollutants from motor vehicles.

(Improvement of Motor Vehicle Exhaust Emission Measurement Accuracy)

Now that significantly more stringent regulations being applied to gasoline LPG motor vehicles as well as diesel-powered motor vehicles are seen pushing down the exhaust emission values, making it important to accurately identify the reliability of measurement and the levels of quality control in the production processes, it is necessary to promote research in order to improve measurement accuracy.

(Substantiation of Effect Forecast and Measurement)

As indicated in the Fourth Report, in line with the progress made in developing regulations of motor vehicle exhaust emission and comprehensive motor vehicle exhaust emission countermeasures, accurate forecasting of the effect of these measures will become more and more important, along with the effect measurement based on accurate monitoring, in order to facilitate planning and implementation of necessary policies. In particular, the accuracy of measuring the amounts of emissions, such as PM and HC discharged from mobile sources other than motor vehicles, stationary sources, such as factories and business establishments, and various other natural sources is still not enough. Also, as it now stands, the contribution of each source to the secondary formation of SPM and photochemical oxidants in the air, has not been fully identified. Thus, development of techniques to measure and forecast the effect of each measure on the improvement of air quality is desired, along with the consolidation of a system to identify the effects of countermeasures on the roadside.

Table 1 TARGET VALUES FOR PREMISSIBLE LIMITS FOR DIESEL MOTOR VEHICLES

Motor Vehicle Category		Target Values for Premissible Limits (Mean Values)			
		Nitrogen oxides	Non-methane hydrocarbons	Carbon monoxide	Particulate matters
Ordinary- and small-sized motor vehicles fueled by light oil and used exclusively for carriage of passengers with a capacity of 10 persons or less (excluding two-wheeled motor vehicles)	Those with an equivalent inertia weight of 1,250kg or less.	0.14kg/km	0.024g/km	0.63g/km	0.013g/km
	Those with an equivalent inertia weight of over 1,250kg.	0.15g/km	0.024g/km	0.63g/km	0.014g/km
Ordinary- and mini-sized motor vehicles fueled by light oil (excluding those used exclusively for carriage of passengers with a capacity of 10 persons or less and two-wheeled motor vehicles)	Those with a gross vehicle weight of 1,700kg or less.	0.14g/km	0.024g/km	0.63g/km	0.013g/km
	Those with a gross vehicle weight of over 1,700kg and 3,500kg or less.	0.25g/km	0.024g/km	0.63g/km	0.015g/km
	Those with a gross vehicle weight of over 3,500kg.	2.0g/kWh	0.17g/ kWh	2.22g/ kWh	0.027g/ kWh

※ With regard to motor vehicles with a gross vehicle weight of 3,500kg or less, the above-mentioned target values will be applied to the sum of the value obtained by multiplying the 11-mode measurement value by 0.12 and that obtained by multiplying 10•15-mode measurement value by 0.88 beginning in 2005, the sum of the value obtained by multiplying the value measured in the new cold test mode shown in Figure 1 by 0.25 and the value obtained by multiplying the measured value in 10•15 test mode by 0.75 beginning in 2008, and the sum of the value obtained by multiplying the measured value of the test mode in cold state by 0.25 and the value obtained by multiplying the measured value of the new test mode in warm state by 0.75 beginning in 2011.

※ As regards those with a gross vehicle weight of over 3,500kg, the above-mentioned target values will be applied to the measured value of the new test mode in warm state established based on Figure 2.

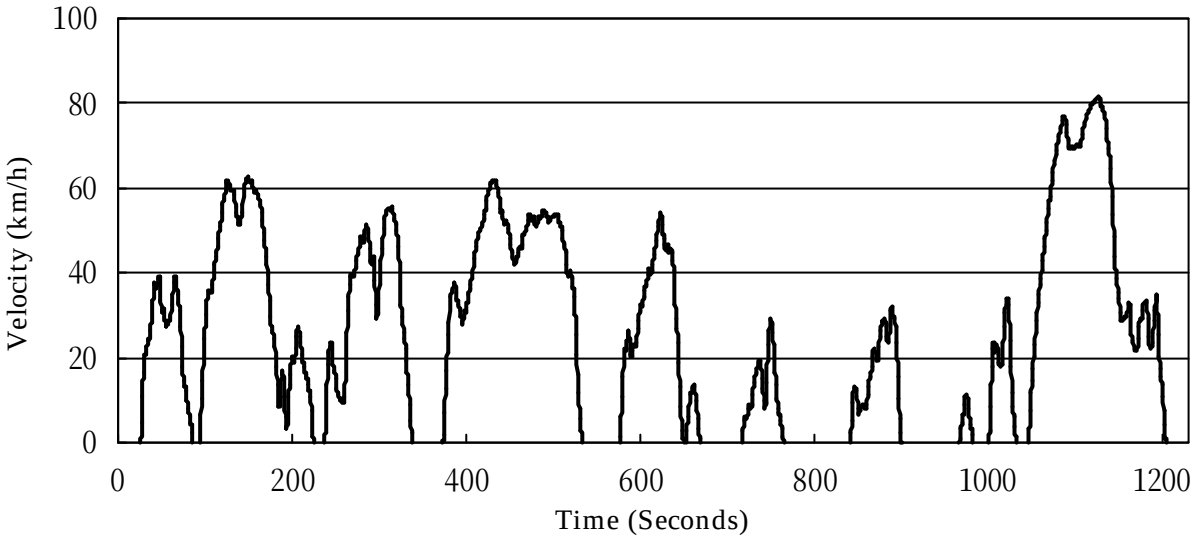
Table 2 TARGET VALUES FOR PREMISSIBLE LIMITS FOR GASOLINE MOTOR VEHICLES

Motor Vehicle Category		Target Values for Premissible Limits (Mean Values)		
		Nitrogen oxides	Non-methane hydrocarbons	Carbon monoxide
Ordinary-, small- and mini-sized motor vehicles fueled by gasoline or LPG and used exclusively for carriage of passengers with a capacity of 10 persons or less (excluding two-wheeled motor vehicles)		0.05kg/km	0.05g/km	1.15g/km
		0.05g/km	0.05g/km	4.02g/km
Mini-sized motor vehicles fueled by gasoline or LPG (excluding those used exclusively for carriage of passengers with a capacity of 10 persons or less and two-wheeled motor vehicles)	Those with a gross vehicle weight of 1,700kg or less.	0.05g/km	0.05g/km	1.15g/km
	Those with a gross vehicle weight of over 1,700kg and 3,500kg or less.	0.07g/km	0.05g/km	2.55g/km
	Those with a gross weight of over 3,500kg.	0.7g/kWh	0.23g/ kWh	16.0g/ kWh

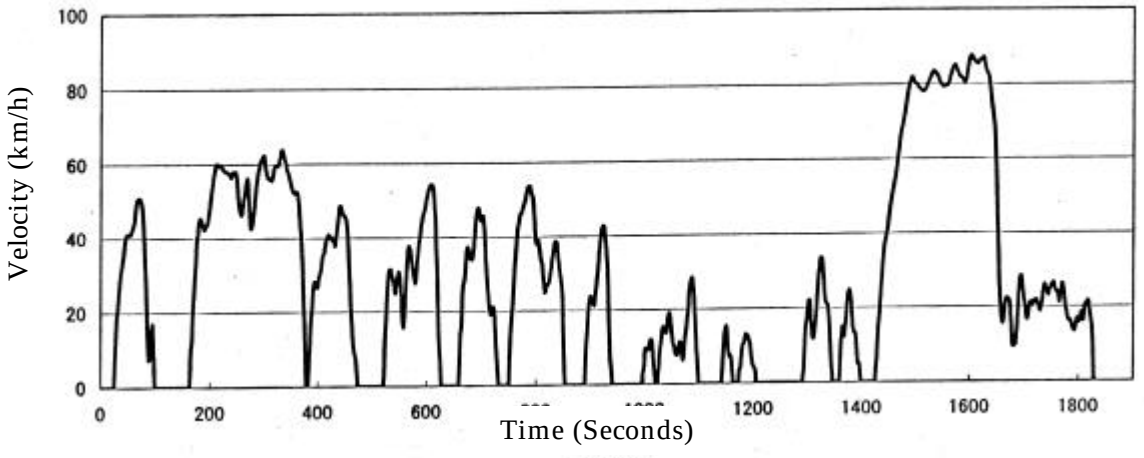
※ With regard to motor vehicles with a gross vehicle weight of 3,500kg or less, the above-mentioned target values will be applied to the sum of the value obtained by multiplying the 11-mode measurement value by 0.12 and that obtained by multiplying the 10•15-mode measurement value by 0.88 beginning in 2005, the sum of the value obtained by multiplying the measurement value of the test mode in cold state shown in Figure 1 by 0.25 and the value obtained by multiplying the 10•15-mode measurement value by 0.75 beginning in 2008, and the sum of the value obtained by multiplying the measurement value of the new test mode in cold state by 0.25 and the value obtained by multiplying the measurement value of the new test mode in warm state by 0.75.

※ As regards those with a gross vehicle weight of over 3,500kg, the above-mentioned target values will be applied to the measurement values of the new test mode established based on Figure 2.

Test Mode Applied to Motor Vehicles with Gross Vehicle Weight of 3,500kg or less



Representative Running Mode As the Basis of Test Mode for Motor Vehicles with Gross Vehicle Weight of over 3,500kg.



Members of the Experts Committee on Motor Vehicle Exhaust Emissions, and the Working Committee Air Quality Committee, of the Central Environment Council.

Classification	Name	Affiliation	Working Committee
Chairman, Special Member	Michikata Kono	Prof., Graduate School University of Tokyo	○
Special Member	Kazuhiko Sakamoto	Prof., Graduate School Saitama University	
Special Member	Yasuhiro Daisho	Prof., School of Science and Engineering Waseda University	○
Expert Member	Takashi Ibusuki	Manager, Environment Management Research National Institute of Advanced Industrial Science and Technology	
Expert Member	Masakazu Iwamoto	Prof., Chemical Resources Laboratory Tokyo Institute of Technology	
Expert Member	Matsuo Odaka	Manager, Environment and Energy National Traffic Safety and Environment Laboratory	○
Expert Member	Takeshi Saito	Manager, Traffic National Research Institute of Police Science National Police Agency	
Expert Member	Masahiro Shioji	Prof., Graduate School of Energy Science Kyoto University	○
Expert Member	Hiroyasu Nagae	Prof., Emeritus Nihon University	
Expert Member	Yasuhiro Fukuma	Japan Automobile Research Institute	
Expert Member	Hidetsuru Matsushita	Prof., Emeritus Shizuoka University	
Expert Member	Makoto Misonou	Prof., Dept. of Environmental Chemistry Engineering Kogakuin University	

Glossary

COP3 [The 3rd Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change]

Kyoto Protocol on the Prevention of Global Warming.

DBL [Diurnal Breathing Loss]

Of fuel evaporative emissions, those discharged from motor vehicles parked for long hours during both daytime and nighttime using the ambient temperature as the heat source.

DEP [Diesel Exhaust Particles]

Particulate matters emitted from diesel-powered motor vehicles. In terms of mass, most of the particles are 1-0.3 microns in diameter, while in terms of quantity, most are in the 0.005-0.05 micron range.

DME [Dimethy Ether]

Formed from either natural or coal gas, DME is used primarily as a spray jet. For possible use of DME as an alternative diesel fuel, studies are being made of recent regarding its effect on the durability of motor vehicles, along with the problems to be addressed for commercial use.

DPF [Diesel Particulate Filter]

Fitted to the exhaust system for the engine, this filter captures PM in motor vehicle exhaust emissions and removes it using electrically heated wire or catalysts. Those using catalysts are called continuous regenerative-type DPF.

EGR [Exhaust Emission Recirculation]

A function to curb the emission of nitrogen oxides by mixing the intake air with part of the exhaust emissions. An emission curbing effect is achieved due to the temperature decline that results from such mixing.

GRPE [Working Party on Pollution and Engery]

Working Party on Pollution and Energy, Working Committee on the Construction of vehicles, UN Economic Commission for Europe: a sub-organization of the United nations working on the formulation of a single standard for the mutual approval of type certification related to motor vehicle exhaust emissions, fuel economy, etc.

HSL[Hot Soak Loss]

Of fuel evaporative emissions, those discharged from motor vehicles parked immediately after running using the vehicles themselves as the heat source.

ISO [International Standardization Organization]

An international organization for the purpose of standardizing industrial and agricultural product standards.

LPG [Liquefied Petroleum Gas]

Mixture of propane, butane, etc., liquefied under cold pressurization.

NMHC [Non-methane Hydrocarbon]

Remnant of total hydrocarbons (THC) after exclusion of methane.

NOx Sensor [NOx Sensor]

A sensor for detecting the concentration of NOx in emissions and converting the information into electrical signals. Used for monitoring functional deterioration of exhaust emission reduction devices.

OBD System [Onboad Diagnostic System]

Onboard diagnostic system used for monitoring problems.

ORVR [Onboard Refueling Vapor Recovery]

A kind of onboard vehicle device for recovering evaporative emissions discharged during motor vehicle refueling at the filling stations. ORVR is so designed as to capture and store evaporative emissions in a canister filled with activated charcoal and feed them to the running engine for regenerative use. In the United States, it has been introduced in a phased manner.

PM [Particulate Matter]

Particulate matters emitted from motor vehicles are roughly classified to disel smoke, sulfates and soluble organic fractions (SOFs). Sulfate is the generic name for sulfate compounds formed by oxidization of the sulfur content in fuel. A large amount of sulfate is formed when the engine is under substantial load or when catalysts with strong oxidization power are involved. Meanwhile, SOF represents organic fractions soluble at a relatively low boiling point. Specifically, it refers to unburned parts of fuel and lubricants.

RL [Running Loss]

Of fuel evaporative emissions, those discharged from running motor vehicles using the vehicle themselves and heat radiated from the road as the heat source.

RVP [Reid Vapor Pressure]

RVP is an indicator of gasoline evaporativity.

SHED [Shield Housing for Evaporative Determinations]

Used to measure the amount of fuel evaporative emissions from motor vehicles, it is a shielded housing which can accommodate a motor vehicle and is capable of temperature control.

SPM [Suspended Particulate Matter]

SPM is the generic name for particulate matters floating in the atmosphere, whose diameters are 10 microns or less. An environmental standard is established for them. SPM is largely classified into primary particles emitted directly from the source and secondary particles formed through the reaction or condensation of the vaporized emissions.

Stage 1

This term is used in the United States for a device that is designed to recover evaporative emissions discharged at the time fuel is supplied from tankers to underground tanks at filling stations. It is so designed to return such evaporative emissions to the tanker by connecting the air pipe used to release evaporative emissions during fuel reception to the tanker using a hose. A measure similar to Stage 1 has been introduced in Europe and several municipalities in Japan based on local government ordinances.

Stage 2

This is the generic term for devices fitted to the pumps at filling stations in order to recover evaporative emissions during motor vehicle refueling. It is designed so as to suck up evaporative emissions using a pump and return them to the underground tank. In addition to the United States, similar Stage 2-like measures have also been introduced in some European regions.

THC [Total Hydrocarbon]

Total hydrocarbons including methane. In terms of internal combustion engines, it refers to the unburned components of exhaust emissions.

Gross Vehicle Weight

The term means the mass of a motor vehicle. Under the Road Vehicle Act of Japan, it is identified by the term gross vehicle weight.

Secondary Formation

This refers to photochemical oxidants and suspended particulate matters which are formed through reactions of nitrogen oxides and/or hydrocarbons in the atmosphere.

Bio-diesel

An alternative diesel fuel produced from vegetable oils, such as rapeseed oil. Outside of Japan, primarily vegetable oil itself is used as the raw material, while in Japan, vegetable oils used for frying or the like (waste vegetable oil) are used in many cases. In Europe, in order to prevent it from adversely effecting injection jumps, the mixing ratio of vegetable oil is limited to 5% or less of diesel fuel.

Hazardous Air Pollutants

Hazardous air pollutants refer to substances which are feared to impair human health when continuously inhaled. As the cause of air pollution, benzene and other components of such pollutants are subject to emission reduction through monitoring of the atmosphere based on the Air Pollution Control Law and also to the voluntary control programs of businesses.

Source: “Japanese-English Dictionary for Automobiles” (1997) published by the Japan Society of automotive Engineers, etc.

PRESS RELEASE

ABOUT

“FUTURE POLICY FOR MOTOR VEHICLE EXHAUST EMISSION REDUCTION (FIFTH REPORT)”

Ministry of the Environment
Government of Japan

Press Release

Date: April 16, 2002

Central Environment Council Presents "Future Policy for Motor Vehicle Exhaust Emission Reduction (Fifth Report)"

Upon completion of the report, "Future Policy for Motor Vehicle Exhaust Emission Reduction (Fifth Report)," by the Air Quality Committee (chaired by Prof. Makoto Ikegami, of the Engineering Dept., Fukui University of Technology,) of the Central Environment Council held on April 6, the Chairman of the Council submitted the Report to the Ministry of the Environment on the same day.

The main content of the Report are related to the New Long-term Targets for diesel-powered motor vehicles as outlined in the attached paper.

Upon receiving the Report, the Ministry of the Environment will initiate the necessary procedures to tighten the regulations based on the Report.

In the meantime, the Central Environment Council will continue deliberations on the future policy for motor vehicle exhaust emission reduction.

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Outline of “Future Policy for Motor Vehicle Exhaust Emission Reduction (Fifth Report)”
Presented by the Central Environment Council

I. Exhaust Emission Reduction Measures for Diesel-powered Motor Vehicles (New Long-term Targets)

(Target Values)

- Against a backdrop of serious air pollution due to suspended particulate matters (SPM), nitrogen dioxides (NOx) and others, the health risk from particulate matters emitted from diesel-powered motor vehicles has been identified as being high. Hence, countermeasures focusing on particulate matters (PM) shall be implemented, while also reducing NOx and other pollutants. In particular, PM emissions from heavy-duty motor vehicles (over 3.5 tons in gross vehicle weight) shall be significantly reduced.

  Meanwhile, as regards carbon monoxide (CO), the New Short-term target values shall be used as is because CO concentration complies with the environmental quality standards (EQS).
- A study shall be made as to the motor vehicle exhaust emission reduction measures (new reduction targets) to be applied after the New Long-term Targets have been achieved. In doing so, fuel countermeasures, such as reduction of the sulfur content in diesel fuel, will also be examined.

(Remarks)

The timing for accomplishment is to be “by the end of 2005” as stated in the Fourth Report.

II. Exhaust Emission Reduction Measures for Gasoline-powered Motor Vehicles (New Long-term Targets)

(Target Values)

- NOx and other pollutants shall be reduced, while seeing to it that the exhaust emission and carbon dioxide reduction measures are compatible with one another.

  Meanwhile, as regards carbon monoxide (CO), the New Short-term target values shall be used as is because CO concentration complies with the EQS.

- A study shall be made as to the motor vehicle exhaust emission countermeasures (new reduction targets) to be applied after the New Long-term Targets have been achieved. In doing so, fuel countermeasures, such as reduction of the sulfur content in gasoline, will also be examined.

(Timing of Accomplishment)

- Compliance shall be achieved by the end of 2005. However, it shall be by the end of 2007 for mini-sized trucks.

(Fuel Evaporative Emission Countermeasures)

- Fuel evaporative emissions lead to SPM and photochemical oxidants. Hence, in order to achieve SPM compliance with the EQS, it is necessary to advance studies on comprehensive countermeasures which combine the countermeasures for motor vehicles and those for stationary emission sources.

(Others)

- Through the low exhaust emission motor vehicle approval certification program and others, it is appropriate to continue to work on the popularization of low exhaust emission motor vehicles.

III. Exhaust Emission Test Mode

- In order to accurately assess the performance of exhaust emissions, the test mode shall be changed.
- The new test mode shall be phased in over the period from 2005 to 2011. (Heavy-duty vehicles: 2005; passenger cars, etc.: 2008-2011.)

IV. Fuel Countermeasures

(Gasoline)

- The sulfur content shall be reduced to 50ppm (currently 100ppm) by the end of 2004.
- As regards the Reid Vapor Pressure of gasoline supplied during summer, it is appropriate for fuel producers to reduce to 65Pa or less after 2005 on a voluntary basis.

New Long-term Target Values for Diesel- and Gasoline-powered Motor Vehicles

(Diesel Motor Vehicles)

		PM	NOx	NMHC	CO	Achievement Timing
Passenger Cars	Small-sized	0.013	0.14	0.024	0.63	2005
	Medium-sized	0.014	0.15	0.024	0.63	2005
Trucks & Buses	Light-duty (Less than 1.7tons in Gross Vehicle Weight)	0.013	0.14	0.024	0.63	2005
	Medium-duty (over 1.7tons and less than 3.5tons in Gross Vehicle Weight)	0.015	0.25	0.024	0.63	2005
	Heavy-duty (Over 3.5tons)	0.027	2.0	0.17	2.22	2005

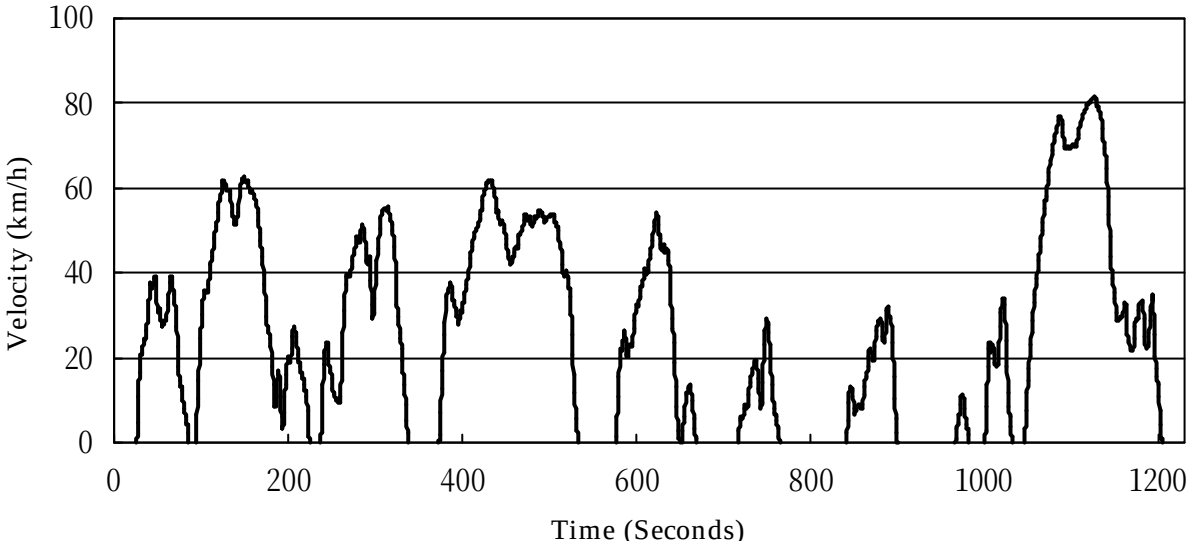
(Gasoline Motor Vehicles)

		NOx	NMHC	CO	Achievement Timing
Passenger Cars, Mini-sized passenger Cars		0.05	0.05	1.15	2005
Mini-sized Trucks		0.05	0.05	4.02	2007
Trucks & Buses	Light-duty (Less than 1.7tons in Gross Vehicle Weight)	0.05	0.05	1.15	2005
	Medium-duty (over 1.7tons and less than 3.5tons)	0.07	0.05	2.55	2005
	Heavy-duty (Over 3.5tons)	0.7	0.23	16.0	2005

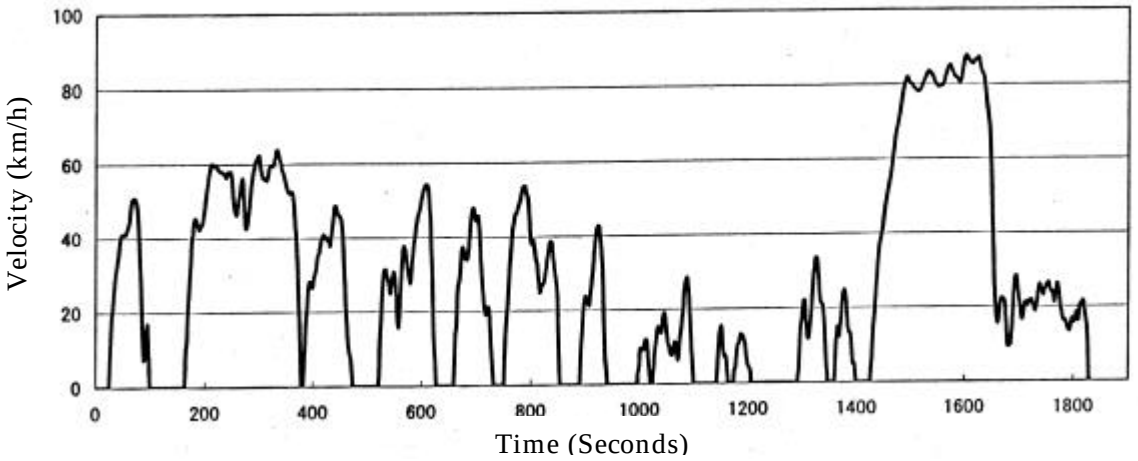
Notes: 1) Unit of target values: g/kWh (heavy-duty trucks & buses), g/km (all others).

2) GVW: Gross Vehicle Weight. NMHC: Non-methane Hydrocarbon.

Test Mode Applied to Motor Vehicles with Gross Vehicle Weight of 3,500kg or less



Representative Running Mode As the Basis of Test Mode for Motor Vehicles with Gross Vehicle Weight of over 3,500kg.



[History]

1. State of Deliberations at the Air Quality Environment Committee (formerly Air Quality Committee)

1996: May 21

12th Air Quality Committee (Inquiry) *"Future Policy for Motor Vehicle Exhaust Emission Reduction"*

Oct. 18

15th Air Quality Committee Interim Report *"Interim Report"* on the same day

- Introduction of regulations for two-wheeled motor vehicles, etc.
- Reduction of benzene content in gasoline

1997: Nov. 21

20th Air Quality Committee Second report *"Second Report"* on the same day

- Stronger regulations for gasoline-powered motor vehicles
- Introduction of regulations for off-road motor vehicles, etc.

1998: Dec. 14

22nd Air Quality Committee Third report *"Third Report"* on the same day

(Strengthening of regulations for diesel-powered motor vehicles, etc.)

2000: Nov. l

30th Air Quality Committee Fourth report *"Fourth Report"* on the same day

(Front-loading the New Long-term Targets for diesel motor vehicles)

2001: Mar. 6

3rd Air Quality Environment Committee On subjects for deliberation by the Experts Committee on Motor Vehicle Exhaust Emissions, etc.

Mar. 7 – Apr. 4

Public comments (No change of content due to this procedure).

Apr. 16

4th Air Quality Environment Committee Fifth report *"Fifth Report"* on the same day

- New Long-term Target values for diesel motor vehicles.
- Strengthening of regulations for gasoline-powered motor vehicles (New Long-term Targets).
- Motor vehicle exhaust emission test procedure, etc.

2. State of Deliberations by the Experts Committee (After the Fourth Report)

Experts Committee: 9 meetings (including on-site surveys)

Working Committee: 20 meetings

(Hearings from motor vehicle manufacturers at home and abroad, including one from the Petroleum Federation.)

The working committee is installed within the Experts Committee.