A Low-Emission Vehicle Development and Dissemination Strategy

December 2001

Committee on Comprehensive Strategy for Development and Dissemination of Low Emission Vehicles

Low Emission Vehicle WG

Introduction

Amid a steady increase in motor vehicle ownership and an unabating increase in motor vehicle traffic volumes resulting from it, the impact of motor vehicles on global warming, caused by the emissions of carbon dioxide (CO_2) and other greenhouse gases, and air pollution, a problem which is particularly serious in large metropolitan areas, is still considerable, giving rise to an urgent need for the development and dissemination of low-emission vehicles, which are environmentally friendly in terms of both fuel efficiency and exhaust emission performance. Against this background, the Ministry of Land, Infrastructure and Transport set up the Committee on a Comprehensive Strategy for the Development and Dissemination of Low Emission Vehicles in May 2001, and has been investigating strategies for the development and dissemination of low-emission vehicles and development of next-generation low-emission vehicles through its Low Emission Vehicle WG and Next Generation Low Emission Vehicle WG.

1. Emergency Recommendations of Comprehensive Strategy Committee

Around the same time, the Government announced its policy to "gradually replace its motor vehicle fleets with low emission vehicles" through the Prime Minister's keynote speech.

In light of the recent amendment of the Automobile NOx Law and urgency of air pollution and other environmental problems in large metropolitan areas, the strategy committee recommended the intensive short-time-frame introduction of compressed natural gas (CNG) buses and trucks for large metropolitan areas and the development of diesel-alternative next-generation low-emission vehicles as near-future policy measures on July 4, 2001, and these recommendations were reflected in the preparation of the 2002 draft budget and other processes.

2. Action Plan for Development and Dissemination of Low Emission Vehicles

On July 11, the Ministry of Land, Infrastructure and Transport, the Ministry of Economy, Trade and Industry and the Ministry of the Environment adopted an Action Plan for the Development and Dissemination of Low Emission Vehicles. By doing so, they provided a clear-cut definition of low-emission vehicles[*1] (see 1) to 5) below) and set a dissemination target of "at least 10 million units by the earliest possible time before 2010," as well as agreeing to implement policy measures geared towards their development and dissemination through a concerted effort.

The development and dissemination of low-emission vehicles constitutes an area where all ministries concerned need to cooperate, and for this reason, it is necessary to strengthen

the ministerial cooperation structure in relation to the implementation of the action plan and other issues in the future[*2].

1) CNG vehicles
2) Electric vehicles
3) Hybrid-engine vehicles
4) Methanol vehicles
5) Certified fuel-efficient low-emission vehicles (hereinafter referred to as "low-emission gasoline vehicles")[*3]

*1 The scope of "low-emission vehicles" is the same as that of vehicles eligible for a tax concession under the green automobile tax scheme.

*2 Next-generation low-emission vehicles, such as fuel-cell vehicles, are to be investigated through the Next Generation Low Emission Vehicle WG.

*3 These are certified low-emission vehicles under the Low Emission Vehicle Certification Implementation Guidelines that also satisfy the fuel efficiency standards based on the Law concerning the Rationalization of Energy Use (hereinafter referred to as "Energy Conservation Law") — the so-called "top runner standards."

3. Moves geared towards Ratification of Kyoto Protocol

At COP7, held from October to November 2001, an agreement was reached on the details of the implementation rules for the Kyoto Protocol, adopted in December 1997, thus more or less putting in place an environment suitable for bringing it into force by the end of 2002.

On the heels of this, Japan decided to review the Climate Change Policy Program at a November 12 meeting of the Global Warming Prevention Headquarters, which is headed by the Prime Minister, with a view to ratifying the protocol by the end of 2002 and to put the preparatory work into full swing.

Eighty-eight percent of all CO_2 emissions from the transportation sector are attributable to motor vehicles, and private cars are responsible for 64% of this. From the viewpoint of reducing CO_2 emissions from motor vehicles while making the most of the convenience of an "automobile society," it is an important policy goal to reduce the environmental load of individual vehicles through the development and dissemination of low-emission vehicles, and the ratification of the Kyoto Protocol will make it even more so.

In response to these developments, the Low Emission Vehicle WG has finalized its views on a strategy for the development and dissemination of low-emission vehicles that are already at the practical application stage as shown below, by taking into consideration both the mitigation of global warming and reduction of air pollution, centering on large metropolitan areas.

Chapter 1 Necessity of Anti-Global Warming and Air Pollution Control Measures involving Motor Vehicles

When investigating a low emission vehicle development and dissemination strategy, the following points need to be considered:

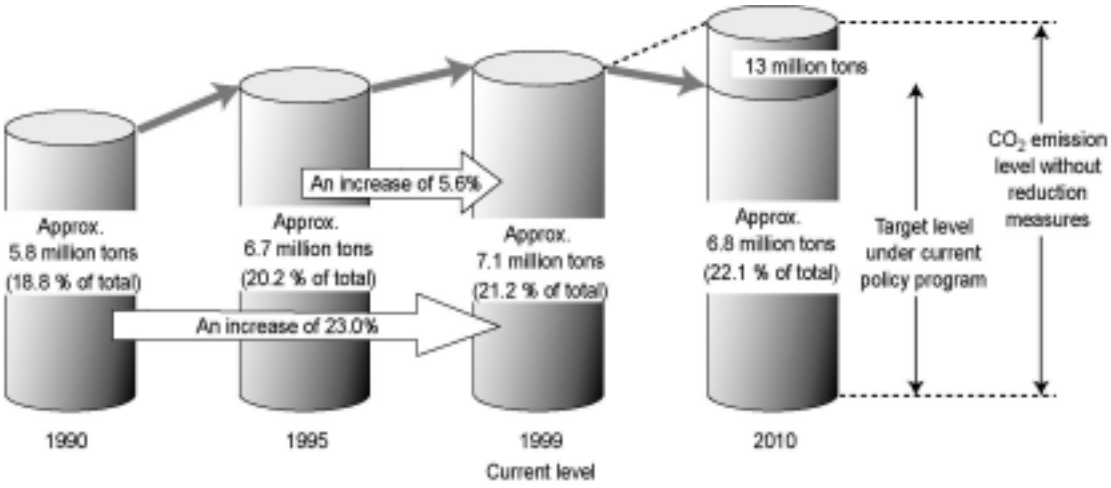
1. State of Global Warming

CO_2 emissions from the transportation sector rose significantly over the 1990s, posting a rate of increase of about 23% from 1990 to 1999 and about 6% from 1995 to 1999.

The biggest contributing factor was an increase in the traffic volume of motor vehicles, particularly private cars (40% from 1990 to 1999), leading to a dramatic 35% increase in CO_2 emissions from private cars.

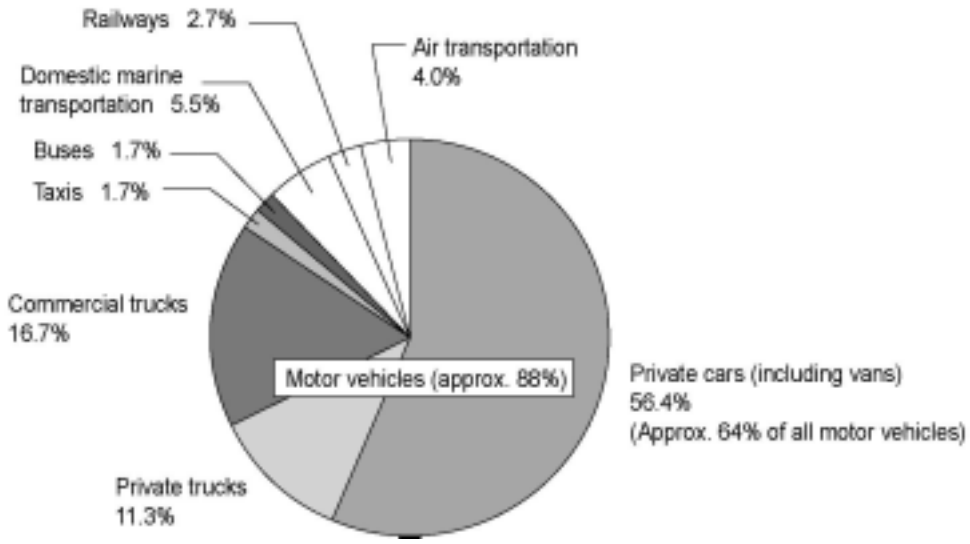
In recent years, motor vehicles have been undergoing an increase in body size (trend towards heavier vehicles) due to, among other things, user preference for luxury cars and recreational vehicles (RVs) and standard changes for light motor vehicles prompted by safety and other considerations. As a result, their average fuel efficiency only improved by about 7% from 1995 to 1999, instead of about 17% as estimated previously on the assumption that vehicle type mix would remain the same.

Trend of CO_2 Emissions from Transportation Sector (Carbon Equivalent)

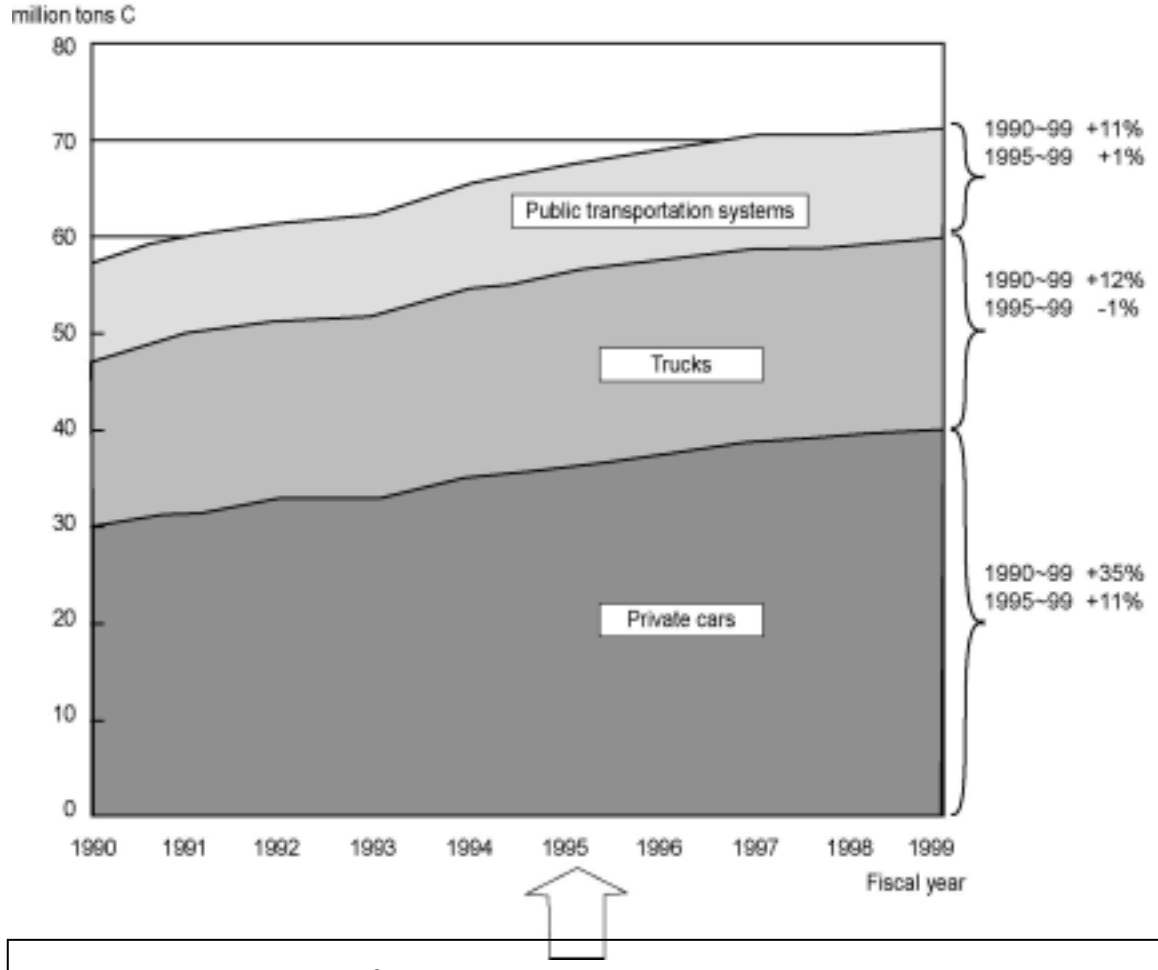


Note: The level of CO_2 emissions for each year shown is based on the 2001 emissions inventory submitted to the UNFCCC Secretariat. As the inventory has been compiled through a fresh review of various factors, the figures do not agree with those released in the past.

Breakdown of c Emissions by Mode of Transportation (FY 1999)



Trends in CO_2 Emissions from Transportation Sector (Carbon Equivalent)



1) Increases in number of units - private cars

1990–99 34.89 million → 50.97 million (+46%)

1995–99 44.81 million → 50.97 million (+14%)

2) Increases in travel distance - private cars

1990–99 346.2 billion km → 485.1 km (+40%)

1995–99 428.4 billion km → 485.1 km (+13%)

3) Increases in vehicle size (trend towards heavier vehicles) — share of regular-size gasoline-fueled passenger cars with an engine displacement of more than 2000 cc, including both private cars and commercial vehicles

1990–99 6% → 19%

1995–99 14% → 19%

Note: Share of regular-size vehicles 1990–99 6% → 26%

1995–99 18% → 26%

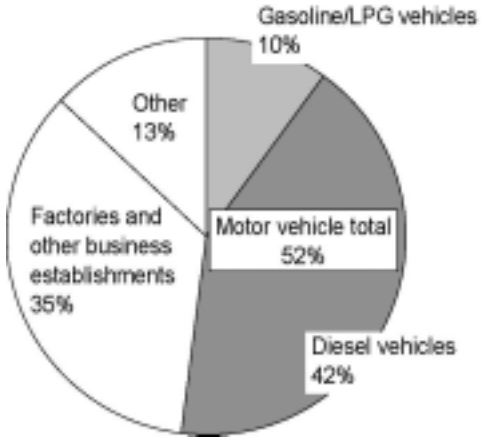
Source: Ministry of Land, Infrastructure and Transport and Japan Automobile Manufacturers Association

2. State of Air Pollution in Large Metropolitan Areas

Motor vehicles are responsible for 52% of nitrogen oxide (NOx) emissions and 43% of particulate matter (PM) emissions occurring in large metropolitan areas, with about 80% of the NOx emissions and all of the PM emissions attributed to diesel vehicles.

As a result of a series of regulatory tightenings, NOx and PM emissions from heavy diesel trucks that meet the latest control standards have fallen by 15% and 70%, respectively, compared to 1989 levels, and the environmental quality standard achievement rate has been improving as a long-term trend. Nevertheless, the problem remains amid ever increasing motor vehicle traffic volumes.

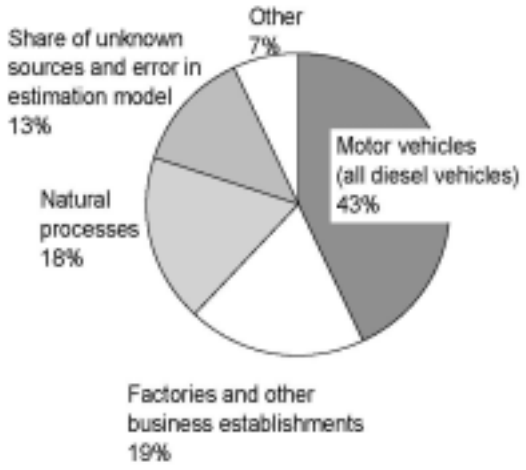
Breakdown by Source of Nitrogen Oxide Emissions in Specified Areas under Automobile NOx Law (FY 1997)



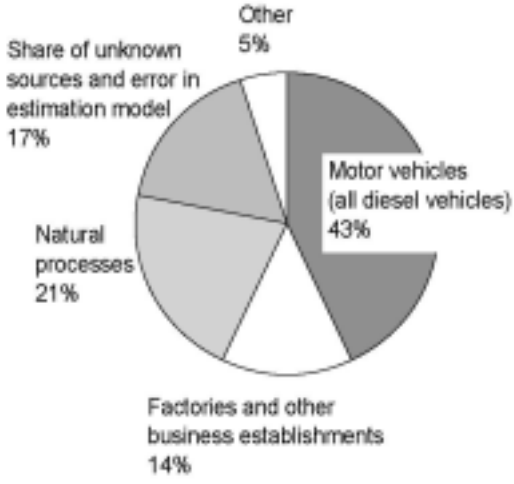
Compiled from the Report of the Discussion Group on Area-wide Motor Vehicle NOx Emission Reduction Measures (March 2000)

Contribution to Atmospheric Particulate Matter Concentration in Kanto and Kansai Regions by Source

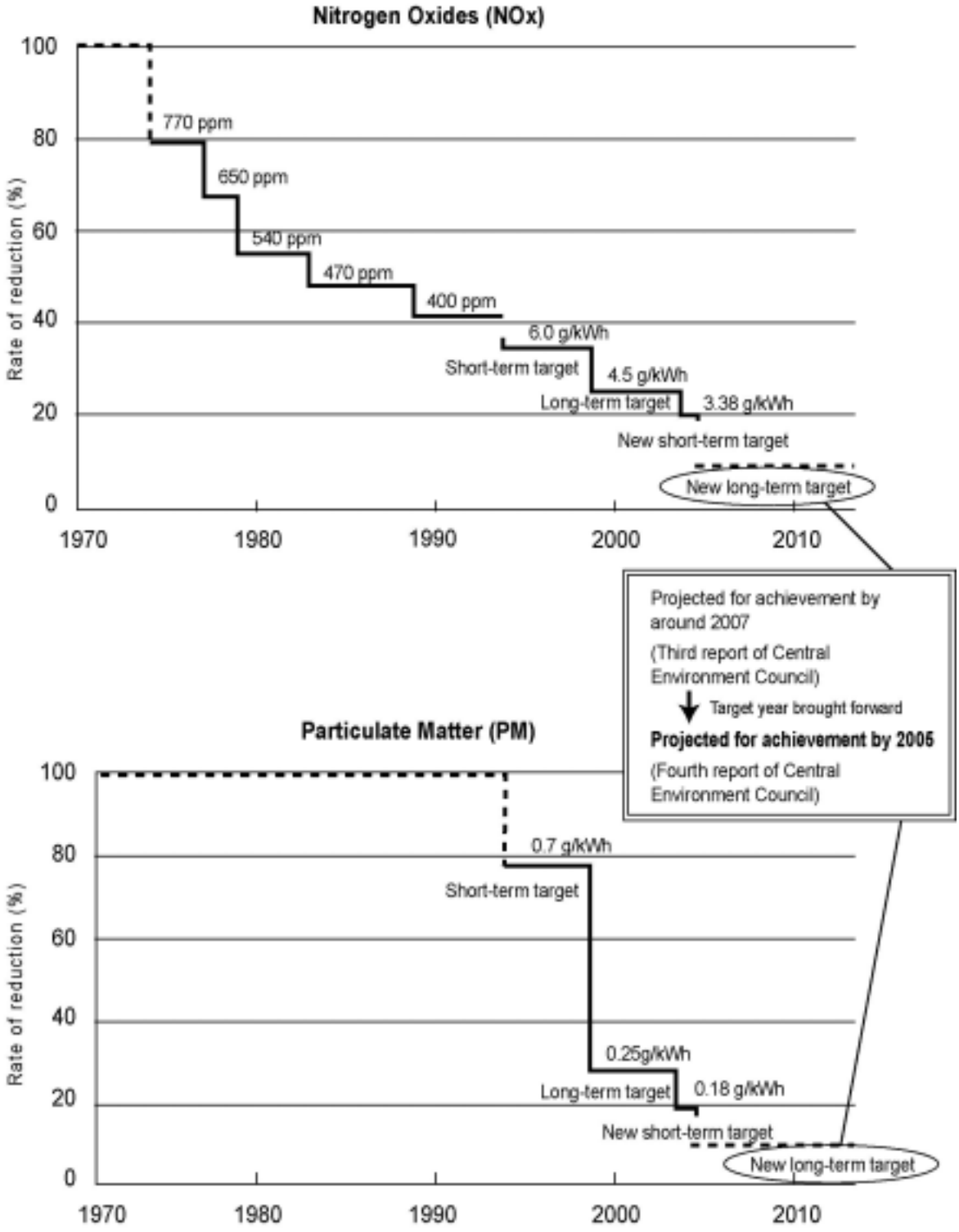
Average of Measurements from Automobile Exhaust Monitoring Stations in Kanto Region, FY 1994



Average of Measurements from Automobile Exhaust Monitoring Stations in Kansai Region, FY 1994



Trends in Diesel Vehicle Exhaust Emission Control Standards (Example of Heavy Trucks)



* Emission levels under the no-control-measures-taken scenario are estimates.

* The method of NOx emission control was changed from concentration-based control (ppm) to weight-based control(g/kWh) in 1994.

* The new long-term control target has been specified as about half the old short-term control target by the third report of the Central Environment Council.

According to the FY 2000 record for the achievement of environmental quality standards for nitrogen dioxide (NO_2), non-achieving air pollution monitoring stations were mostly distributed in Chiba, Tokyo, Kanagawa and Osaka Prefectures, while non-achieving automobile exhaust monitoring stations were often found in Hokkaido, Aichi, Mie, Kyoto and five other prefectures, in addition to the existing specified areas under the Automobile NOx Law. The achievement rate for automobile exhaust monitoring stations in the specified areas under the Automobile NOx Law as a whole reached 33.3% in FY 1996, and remained in the 30s until FY 1998 (35.7%). After this, it rose to 59.1% in FY 1999 and 62.8% in FY 2000. Although the improvement has been substantial, pollution is still severe. Areas where high atmospheric NO_2 concentrations were observed were concentrated in the Kanto and Kansai regions.

Regarding suspended particulate matter (SPM), the achievement rate among air pollution monitoring stations in specified areas under the Automobile NOx Law as a whole was 30.6% in FY 1996, and remained around 30% in subsequent years. More recently, it has shown marked improvements, rising to 74.9% in FY 1999 and 85.5% in FY 2000. The achievement rate has been lower with automobile exhaust monitoring stations as follows: 16.7% in FY 1996, 63.4% in FY 1999 and 52.0% in FY 2000.

3. Spread of Low-Emission Vehicle Use

The number of CNG vehicles, electric vehicles, hybrid-engine vehicles and methanol vehicles (hereinafter referred to as “CNG vehicles, etc.”) in use is about 60,000 as of the end of FY 2000, and this represents a remarkable sevenfold or so improvement over some 9000 recorded at the end of FY 1997, the immediate aftermath of the adoption of the Kyoto Protocol.

The number of low emission vehicles in use as of the end of FY 2000 is about 630,000, of which 570,000 are low-emission gasoline vehicles (excluding light motor vehicles).

However, they only account for about 1% of the total motor vehicle ownership registration*, and hopes are pinned on a surge in their use in the future.

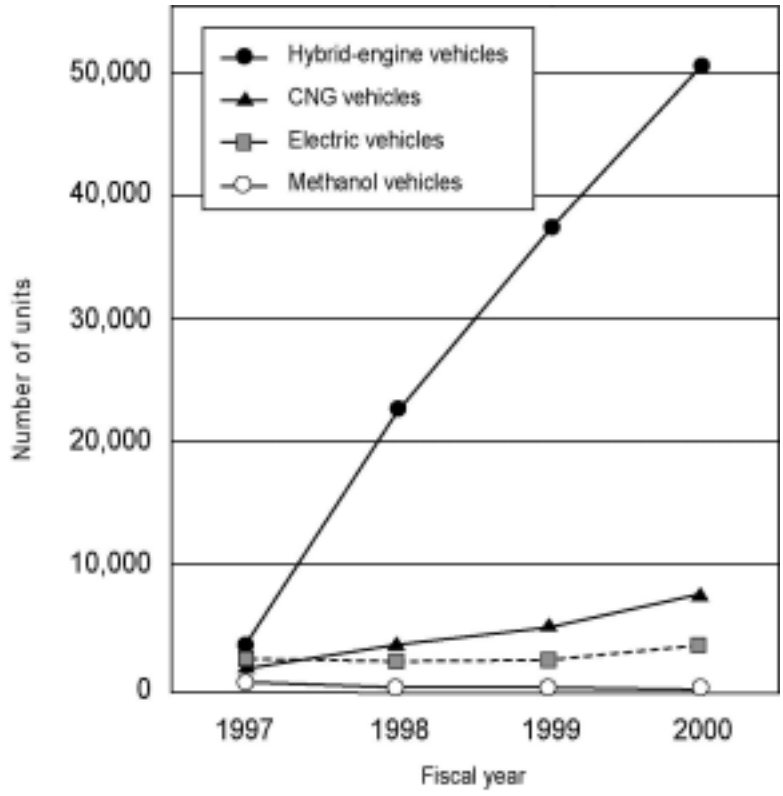
* Excluding light motor vehicles, light motorcycles, etc.

Number of Low-Emission Vehicles in Use in Japan
(Excluding Low-Emission Gasoline Vehicles)

(in units, as of end of fiscal year)

Type	1997	1998	1999	2000
Hybrid-engine vehicles	3,428	22,503	37,168	50,566
CNG vehicles	2,093	3,640	5,252	7,811
Electric vehicles	2,500	2,400	2,600	3,830
Methanol vehicles	328	297	234	176
Total	8,349	28,840	45,254	62,383

(Approximate figures)



Source: Ministry of Land, Infrastructure and Transport

Chapter 2 Basic Strategy for Reduction of CO2 Emissions from Transportation Sector and Direction of Development/Dissemination of Low-Emissions Vehicles

1. Basic Strategy for Reduction of CO_2 Emissions from Transportation Sector

(General direction)

Since the transportation sector forms a basis for people's daily lives and the nation's economic activities, it is desirable that measures aimed directly at restricting traffic volumes, etc. as a means of reducing CO_2 emissions be avoided as much as possible as their adverse impacts are likely to exceed their CO_2 emission reduction benefits.

Taking into consideration the recent advances in the "automobile society", a reduction in CO_2 emissions from the transportation sector needs to be achieved by implementing measures such as the reduction of the environmental load of individual motor vehicles and improvement of motor vehicle travel conditions through congestion reduction and other traffic flow improvement methods focusing on private cars, while making the most of the convenience of the "automobile society". It is also appropriate to pursue the curbing of motor vehicle traffic volumes, etc. by guiding passenger traffic towards public transportation systems, which have a lower environmental load, and improving the efficiency of physical distribution through a modal shift to rail and marine transportation.

(Concrete techniques)

Based on the above general direction, the reduction of CO_2 emissions in the transportation sector should be pursued through concrete techniques as described below, with concrete reduction targets set for each measure as part of the efforts geared towards the ratification of the Kyoto Protocol. The implementation of such measures is premised on steady progress in the development of road networks, elimination of traffic bottlenecks, improvement of road structures, and the like.

(1) To minimize the adverse impact on people's daily lives and the nation's economic activities, it is appropriate to focus on CO_2 emission reduction measures based on voluntary efforts, tax and other incentives and the introduction of new technologies, while avoiding the introduction of restrictive techniques as much as possible.

(2) The key to reducing CO2 emissions from the transportation sector rests with measures aimed at motor vehicles, which are responsible for nearly 90% of these emissions and show no sign of slowing down, particularly private cars, which account for about 64% of that.

The development and dissemination of low-emission vehicles has the potential to reduce CO_2 emissions from motor vehicles without imposing excessive burdens or restrictions on motor vehicle users, and could lead to an improvement in the competitiveness of Japanese industry by stimulating technological development. For these reasons, it should be identified as the main pillar of CO_2 emission reduction measures in the transportation sector.

(3) Alongside CO_2 emission reduction measures aimed at individual motor vehicles, it is important to introduce those targeting their use based on, among other things, the improvement of traffic flow, including curbs on motor vehicle traffic volume, road development, the introduction of ITS, elimination of bottleneck grade crossings, crackdowns on illegal parking, shortening of the duration of road construction work and the optimization of traffic signal control. It is also necessary to develop a system of transportation that is efficient and does not incur a large environmental load on a nationwide basis.

2. Targets for CO_2 Emission Reduction based on Development and Dissemination of Low-Emission Vehicles

(1) Widespread use of low-emission vehicles

Efforts should be made to raise the number of low emission vehicles in use to at least 10 million at the earliest possible time before FY 2010 based on the Low-Emission Vehicle Development and Dissemination Action Plan.

When conducting a review of the Climate Change Policy Program geared towards the ratification of the Kyoto Protocol, CO_2 emission reduction targets should be set by bringing forward the target deadlines for the spread of low-emission vehicle use as much as possible on the basis of manufacturers' and users' voluntary efforts and the provision of incentives and other government assistance at both national and local levels, with due regard given to the demands for exhaust control and safety measures.

(2) Improvement of fuel efficiency

When formulating a new Climate Change Policy Program, CO_2 emission reduction targets for gasoline vehicles should be set on the basis of an early supply of high-fuel efficiency vehicles, which could bring forward the target deadline for the achievement of fuel efficiency standards under the Energy Conservation Law, and the active promotion of the development and dissemination of vehicle types with superior fuel efficiency.

In light of the fact that the FY 2010 fuel efficiency standards are very strict control standards, further improvements in fuel efficiency should be treated as a goal to be

pursued through technological development, so that the strengthening of fuel efficiency control should be made conditional on a reasonable prospect for technological progress.

(3) Approach to achieving targets

Regarding the reduction of CO_2 emissions from the motor vehicle sector, it is desirable to set targets on the basis of (1) and (2) above for the time being. However, if a situation arises where (1) and (2) alone are not expected to be sufficient to set substantial reduction targets, the introduction of measures aimed at guiding potential buyers towards small-size (low-weight) vehicles and high-fuel efficiency vehicles and the like should be investigated.

3. Establishment of Monitoring and Evaluation System for Achievement of CO_2 Emission Reduction Targets and Policy Review Cycle

The Kyoto Protocol does not require that all CO_2 emission reduction measures to be taken in the lead up to and during the first commitment period (2008-2012) be finalized prior to its ratification. Rather, it allows the introduction of additional measures as necessary in light of the progress in the reduction of CO_2 emissions. The period between 2005 and 2007 has been set aside for monitoring purposes, and it is necessary to conduct a policy evaluation during that period, with a review of policy measures also undertaken if necessary.

In the event that CO_2 emission increases attributable to the performance of individual motor vehicles cannot be contained even after the ratification of the Kyoto Protocol, measures such as the inducement of consumers to purchase small-size (low-weight) vehicles and high fuel efficiency vehicles and a review of fuel efficiency standards will have to be introduced, taking into consideration monitoring results, technological development trends on the development and dissemination of low-emission vehicles and other factors.

Chapter 3 Recommendations on Concrete Measures for Development and Dissemination of Low-Emission Vehicles

1. Low-Emission Vehicle Development Promotion Measures

The working group has investigated the direction of the development of low-emission vehicles for the period up to about FY 2010 in terms of both exhaust emissions and fuel efficiency.

It is appropriate that the improvement of fuel efficiency and exhaust emission performance via the development and dissemination of low-emission vehicles be pursued through the provision of incentives, such as the utilization of a green automobile tax scheme, on the basis of voluntary efforts such as motor vehicle manufacturers' corporate efforts towards technological development.

Given that the last few rounds of fuel efficiency control tightenings have been instrumental in accelerating the development of low-emission vehicles in terms of fuel efficiency improvement, it is necessary to look further into this aspect by aiming towards the achievement of fuel efficiency standards that will exceed the FY 2010 fuel efficiency control standards, with a technological development promotion perspective and technological development trends taken into consideration. It is also necessary to advance technological development geared towards a further improvement in exhaust emission performance.

To speed up effective technological development, it is necessary to implement strategic measures in relation to the following:

(1) Overall strategy

1) Clarification of national policy direction

Generally speaking, technological development for a low-emission vehicle requires a long lead time and vast capital investment. For this reason, a firm national policy direction needs to be shown from the earliest possible time in terms of the evaluation of technologies, goals of technological development and the like so as to facilitate technological development by private enterprises.

Example: Clear specification of the level of improvement needed to be achieved in the exhaust emission standards of diesel (passenger) vehicles, which have a superior fuel efficiency, for these vehicles to become a target for government promotion of widespread use.

Technological development is primarily a matter to be pursued by manufacturers based on their management decisions as private enterprises. On the other hand, it is appropriate that the Government provide incentives for development by playing support roles such as the establishment of development targets, development of a suitable environment for the smooth implementation of public road tests, formulation of guidelines on research directions and establishment of a forum to enable companies to exchange information as far as is possible.

However, the Government should play a more active role in areas where there is little hope for adequate progress in research and development if left entirely to private enterprises due to a small demand, etc.

2) Promotion and assistance for technological development based on green automobile tax scheme

One of the purposes of the green automobile tax scheme is to spur manufacturers' efforts towards the development of low-emission vehicles by, among other things, characterizing low-emission vehicles as desired by the Government and encouraging concentrated capital investment in those areas.

Although the low-emission vehicle coverage of the green automobile tax scheme expanded from 79 types in December 2000 to 146 types at the end of September 2001 (an 85% increase), it is still desirable that incentive measures based on the tax scheme be enhanced to achieve dramatic progress in the development and dissemination of low-emission vehicles, with any necessary review of the details of the scheme undertaken by taking into consideration technological development trends.

3) Balanced exhaust emission performance and fuel efficiency improvement

There is a trade-off relationship between exhaust emission performance and fuel efficiency, so that an attempt to improve one tends to make it difficult to improve the other. For this reason, it is appropriate to pursue the improvement of exhaust emission performance and fuel efficiency while ensuring a balance between them by taking into consideration the characteristics of different vehicle types.

Examples A. An increase in the engine air-fuel ratio geared towards improving fuel efficiency would result in an increase in NOx emissions.

B. To control exhaust emissions effectively, it is necessary to remove sulfur and other substances that have been absorbed by the catalyst to prevent its performance from degrading, but this would worsen fuel efficiency due to the need for a greater fuel intake.

Although diesel vehicles naturally have superior fuel efficiency, the improvement of their exhaust emission performance remains an urgent task. It is therefore necessary to continue implementing measures that focus on the improvement of exhaust emission performance.

However, with gasoline vehicles, for which past technological innovations have led to quite high exhaust emission performance, it is appropriate to ensure that any future tightening of exhaust emission control will not interfere with further improvements in fuel efficiency from the viewpoint of simultaneously pursuing CO_2 emission reduction.

4) Improvements in fuel quality as basis of improvement of exhaust emission performance and fuel efficiency

Compliance with FY 2010 fuel efficiency standards for gasoline vehicles and further improvements in fuel efficiency will require improvements in fuel quality to reduce the combustion energy necessary to prevent catalyst performance degradation, and in that manner, exhaust emission performance improvement and fuel efficiency improvement, which are mutually exclusive, can be simultaneously achieved.

To dramatically reduce exhaust emissions from diesel vehicles, the supply of low-sulfur gas oil is essential. From this viewpoint, a decision has been made to start supplying low-sulfur gas oil with a sulfur concentration of 50 ppm or less, instead of the traditional 500 ppm or less, in large metropolitan areas by 2003.

In Europe, however, efforts to improve fuel characteristics even further towards developing zero sulfur fuels (gasoline, gas oil, etc. with a sulfur content of less than 10 ppm) are already under way.

To achieve a dramatic improvement in fuel efficiency and exhaust emission standards in Japan, therefore, it is desirable to step up existing efforts to reduce fuel sulfur content and announce the details of medium to long-term fuel quality improvement measures in advance, with the development of low-emission vehicles undertaken on that basis.

Along with the improvement of fuel quality, it is also necessary to investigate the feasibility of imposing a mandatory use of “fuel with a specified quality level or superior” on motor vehicle users as a safety and environmental protection measure with a so-called “illegal gas oil control” perspective.

5) Life cycle assessment

Technological development not only improves the environmental performance of motor vehicles but also contribute to a reduction in energy consumption and CO_2 emissions in the production stage, so that it must be identified and assessed as a total environmental

protection measure that encompasses the entire product life cycle, including recycling, based on the life cycle assessment (LCA) concept, rather than just a CO2 emission reduction measure.

(2) Strategy for diesel vehicles and diesel-alternative low-emission vehicles

1) Tightening of exhaust emission control for diesel vehicles (new vehicles)

Exhaust emission control for diesel vehicles (new vehicles) has been gradually strengthened since 1973, with NOx, CO, HC and black smoke targeted initially and PM added in 1994.

Control for diesel vehicles will be strengthened through the implementation of a new short-term control program (2002, 2003, 2004 and 2005), with the introduction of a new long-term control program to be brought forward by two years (2007 → 2005). Beyond the new long-term control regime, further strengthening of control should be investigated by taking into account progress in the achievement of environmental quality standards, developmental trends in technologies capable of achieving extremely low exhaust emissions and other factors.

In addition, a reduction in the sulfur content of gas oil (500 ppm → 50 ppm) should be introduced by the end of 2004.

2) Implementation of measures based on Automobile NOx/PM Law

With regard to nitrogen oxide air pollution, centering on large metropolitan areas, despite the range of measures that have been implemented - including emission control targeting factories and other fixed sources and motor vehicles, as well as control based on special emission standards established under the Automobile NOx Law (1992), i.e. vehicle type control, in which the use of vehicles belonging to any type that does not comply with NOx emission standards is restricted - the achievement of the environmental quality standards for NO2 air pollution by the year 2000, as has been targeted previously, now appears difficult.

The situation surrounding SPM air pollution also remains severe, and this has resulted in a need for additional measures targeting emissions from diesel vehicles. Against this background, the Automobile NOx Law has been amended as shown below, and efficient PM emission reduction measures need to be implemented based on the new law.

A Addition of PM as a pollutant targeted for control

B Expansion of areas targeted for control

C Strengthening of motor vehicle exhaust emission control (introduction of vehicle type control for PM, tightening of vehicle type control for other pollutants, and tightening of control measures aimed at businesses)

3) Development and dissemination of DPFs, oxidation catalysts, etc.

PM emissions from existing diesel vehicles need to be reduced by accelerating the development and dissemination of DPFs, oxidation catalysts, etc. designed to be fitted onto relatively new vehicles.

2. Low-Emission Vehicle Popularization Measures

To spread the use of low-emission vehicles at a faster rate, it is necessary to introduce more flexible popularization measures tailored to the needs of motor vehicle users and ensure accurate information supply, while developing a fuel supply infrastructure in a systematic manner, in addition to implementing existing measures geared towards vehicle price reductions and tax breaks.

It is appropriate to promote the use of low-emission vehicles in a manner that is in line with local characteristics and needs by, for example, emphasizing both air pollution control and fuel efficiency improvement in large metropolitan areas and focusing more on fuel efficiency in regional areas.

(1) Administrative and financial assistance measures

To promote the use of low-emission vehicles, it is necessary for the public sector, including the National Government, to take the lead in their introduction, utilize the green automobile tax scheme and boost budgetary and financial assistance measures aimed at encouraging the introduction of low-emission vehicles by private businesses and others.

(2) Implementation of promotion measures tailored to users

It is appropriate to promote the use of low-emission vehicles by introducing two sets of policy measures, one aimed at vehicles to be mainly used by individuals and the other at government, company and commercial vehicles (hereinafter referred to as “commercial vehicles, etc.”).

1) Systematic introduction of low-emission commercial vehicles, etc.

As local governments and businesses own commercial vehicles, etc. in large numbers, this sector is ideal for the systematic mass introduction of low-emission vehicles. In this regard, it is appropriate to foster a concerted effort by the public and private sectors

through, for example, national government purchases under the Green Purchasing Law, similar initiatives by local governments and systematic actions by private businesses.

In this regard, it is necessary to communicate the benefits of the introduction of low-emission vehicles, such as a reduction in fuel costs and discharge of corporate social responsibility through a contribution to the fight against environmental problems, to all parties concerned, particularly in view of the high initial economic cost to private businesses. At the same time, the National Government needs to take the lead in bolstering public education and awareness activities through, for example, the supply of accurate information on the types, performance levels, etc. of low-emission vehicles, including low-emission gasoline vehicles.

2) Promotion of introduction of low-emission vehicles for private use

With private users, measures designed to induce the selection of low-emission vehicles are considered effective, and the provision of incentives, such as tax breaks under the green automobile tax scheme, is a concrete example.

The effectiveness of the green automobile tax scheme, which was introduced in FY 2001, is apparent from the fact that the most widespread low-emission vehicles are those eligible for the tax scheme. Therefore, its active utilization as an effective low-emission vehicle popularization technique needs to continue in the future to facilitate the introduction of cutting-edge vehicle types for their superior environmental performance.

Public education activities need to be enhanced to improve user awareness of environmental problems.

(3) Reduction of prices (net economic burden on users)

To spread the use of low-emission vehicles, it is necessary to ensure that their prices, particularly those of hybrid-engine vehicles and CNG vehicles, are not set at excessively high levels relative to comparable gasoline or diesel vehicles. For this reason, it is necessary to actively utilize the tax breaks under the green automobile tax scheme, introduced in FY 2001, in promoting the purchase of low-emission vehicles to reduce the net economic burden on users, in addition to pursuing price reductions through the economies of scale, which would result from the popularization of these vehicles.

(4) Deregulation, etc. geared towards CNG vehicle price reductions

In some European countries, CNG vehicles that are only about 10% more expensive than comparable diesel vehicles are available. However, the prices of CNG vehicles are still high in Japan, ranging from 1.4 to 2 times those of comparable diesel vehicles in the case of small to medium-size trucks, though they have been falling.

To spread the use of CNG vehicles in large metropolitan areas, etc. at a faster rate, it is necessary to narrow the price gap with diesel vehicles in the future. To this end, it is necessary to reduce prices through: 1) pursuit of the economies of scale made possible by greater popularization, 2) relaxation of restrictions based on the High-pressure Gas Safety Law, and 3) promotion of the importation of overseas CNG vehicles via the international harmonization of CNG vehicle standards.

(5) Development of CNG refueling infrastructure

Of all low-emission vehicles, CNG vehicles require the development of a CNG refueling infrastructure (CNG stations) as a precondition for their widespread use. However, there are only 145 CNG stations throughout the country (as of the end of October 2001), a mere two-fifths of the level achieved in Italy (355 as of August 2001, scheduled to be raised to around 600), where 370,000 units of CNG vehicles are in use. For this reason, it is necessary to build as many CNG stations as possible in large metropolitan areas, which are the target of future selective popularization drives, as well as along arterial roads.

For CNG stations to be profitable, however, certain numbers of users must be secured, and this could add to the challenge of developing a CNG refueling infrastructure. It is therefore desirable that a relaxation of the regulatory restrictions, the rationalization of the operation of CNG stations and other measures designed to make it easier to select appropriate facility sizes and site locations be explored, as well as continuing with the utilization of existing assistance schemes. In addition, it is appropriate to investigate a review of regulations relating to staffing and safety, including the approval of self-serving CNG stations.

(6) Popularization of electric vehicles

Electric vehicles are free from exhaust emissions, including CO_2, and are therefore ideal in terms of environmental performance. However, they have their own setbacks, such as a limited power output, limited mileage between charges and long recharging time. For this reason, it is appropriate to promote their use in short-distance passenger transportation in urban areas and other selected areas where the advantages of electric vehicles can be fully utilized.

Chapter 4 Other Issues — Implementation of Policy Measures with Great Relevance to Development and Dissemination of Low-Emission Vehicles

1. Need for Acceptance of LPG Vehicles as Low-Emission Vehicles

Although liquefied petroleum gas (LPG) vehicles were traditionally not treated as low-emission vehicles, some LPG vehicles now stand shoulder to shoulder with low-emission vehicles in terms of both exhaust emission performance and fuel efficiency.

Such LPG vehicles should therefore be accepted as low-emission vehicles by establishing fuel efficiency standards under the Energy Conservation Law as soon as possible, with appropriate popularization measures, including eligibility for the green automobile tax scheme and the green purchasing program.

2. Introduction of Motor Vehicle Environmental Impact Assessment

So far, the improvement of motor vehicle fuel efficiency and exhaust emissions has been pursued mainly through control measures targeting new vehicles. However, to further reduce NOx and PM emissions, it is necessary to adopt a different approach based on the ascertainment of the quantities of exhaust gas actually emitted from motor vehicles during their use and other measures that reflect the actual behavior of motor vehicles in normal use.

From this point of view, it is necessary to investigate the introduction of “motor vehicle environmental impact assessment” as a tool to evaluate the environmental load of motor vehicles in their life cycles as soon as possible, with the announcement of environmental performance for each vehicle type, evaluation of environment-related parts, such as tires with a low rolling resistance, and the like undertaken.

3. Introduction of Mandatory Speed Limiters and their Utilization for Improved of Fuel Efficiency

Speed limiters, which are to be made mandatory for large trucks, need to be steadily introduced as they are able to cut CO_2 emissions by 10–20% through improved fuel efficiency by keeping the traveling speeds of motor vehicles at 90 km/h or below on expressways.

4. Popularization of Idling Stop System

The mounting of an idling stop system on passenger cars is estimated to achieve a substantial improvement in on-road fuel efficiency, ranging from 5 to 15% depending on travel conditions.

For this reason, it is desirable that idling stop systems be further spread among large buses and trucks (includes automatic models), where substantial inroads have already been made.

In the area of passenger cars, it is desirable that efforts be made to popularize idling stop systems for hybrid-engine vehicles and manual transmission vehicles, which are already more or less technically established, by giving due regard to safety and smooth traffic flow, with the necessary technological development undertaken with regard to automatic transmission vehicles.

5. Promotion of "Green Management" in Road Transportation Industries, etc.

It is desirable that green management, centering on 1) active introduction of low-emission vehicles and diesel vehicles compliant with the latest control standards, 2) observance of eco-driving and 3) adequate vehicle maintenance, be practiced in the truck, bus, taxi and other road transportation industries as a private-sector voluntary effort.

Regarding green management in the road transportation industries, it is appropriate to investigate the introduction of a third-party certification system through the cooperation of environmental organizations/experts and relevant industrial groups.

The environmentally-friendly use of motor vehicles based on, for example, the exercising of self-restraint with regard to private car commuting and the driving home of company cars in urban areas, where public transportation systems are available, and practicing of eco-driving, is required at all companies, including those in the road transportation industries.

6. Promotion of Voluntary Efforts by Private Car Users

Of all CO_2 emission reduction measures, those aimed at private cars are particularly important, as there are so many in use, and this gives rise to the important question of how voluntary efforts leading to an overhaul of their utilization mode can be induced.

It is appropriate to promote motor vehicle use with a low environmental load, including car sharing and carpooling, as well as educating the general public on the fuel saving and CO_2 emission reduction effects of eco-driving by discussing private car use in eco-household account books.

In this regard, it is necessary to investigate institutional frameworks for car sharing, etc., with their legal status in relation to existing systems, such as the rent-a-car business, clarified.

7. Improvement of Motor Vehicle Travel Conditions through Traffic Streamlining Methods

Enabling efficient motor vehicle travel through the elimination of traffic bottlenecks, etc. is a priority consideration in the development of transportation infrastructure, including roads and traffic signals, while the implementation of some “software-side” measures, such as the optimization of traffic signal control and elimination of illegal parking, is desired for its expected immediate benefits.

8. Curbing of Motor Vehicle Traffic through Streamlining of Physical Distribution via Modal Shift, etc.

To streamline physical distribution through a modal shift to rail and marine transportation, it is necessary to make such alternative modes of transportation easier to use, and for this to happen, government support for the boosting of transportation capacities, shortening of transportation time, streamlining stevedoring, etc. and cargo owner understanding and cooperation on modal shift are essential.

To effectively carry out the streamlining of physical distribution, it is necessary to devise measures along those lines and actively implement them.