

In Introducing Diesel Vehicle Control

The Tokyo Metropolitan Government is currently conducting the "Illegal Diesel Vehicle Elimination Campaign" in final preparation to ensure the thorough implementation of new travel restrictions on diesel-powered vehicles, set to commence in the coming months.

Automotives represent a mobile pollution source that travel across administrative boundaries of various local governments. It should therefore be the task of the national government to introduce anti-pollution measures, such as controls on automotive emissions. However, in the absence of sufficient government measures, Tokyo saw no improvement in the state of air pollution (particularly the level of particulate matter [PM] and nitrogen oxides [NOx]).

It was under this situation that Shintaro Ishihara assumed Tokyo governorship with an election pledge of regulating diesel vehicles. Since then, TMG has abandoned its conventional approach of "lobbying the national government" to adopt the stance of "initiating national changes from Tokyo", launching a campaign to raise awareness on the reality of Tokyo's air pollution and actions against diesel vehicles. This is what was called the "Say No to Diesel Vehicles" campaign.

In response to the campaign-induced public debates on the issue, and deliberations / recommendations by TMG's Environmental Council, the Tokyo Metropolitan Assembly passed, in December 2000, the nation's first-ever ordinance for regulating diesel vehicles. It was called the Ordinance on Environmental Preservation to Secure the Health and Safety of Citizens of the Tokyo Metropolitan Area (commonly known as the Environmental Preservation Ordinance), introduced as the first overhaul of Tokyo's pollution prevention ordinance in 30 years.

The tide of Tokyo-initiated reforms, which started with the "Say No to Diesel Vehicles" campaign, has progressed ahead of the somewhat reluctant national government, and achieved significant results in various areas, thereby transforming the way Japan deals with automotive pollution.

Low sulfur diesel fuel and continuous regeneration DPF, which had not existed in Japan before the start of the campaign, are now in wide circulation, thanks to active initiatives by relevant industries. Powerful leadership of local government leaders, solidarity of eight major prefectures and cities in Greater Tokyo Area, cooperation of related industries, citizens campaigns and public momentum, have combined together to supercede the national government, and achieve a policy that can influence the broader industrial community.

What's more, Greater Metropolitan prefectures and municipalities have united in introducing similar ordinances and squarely taking on air pollution, an issue that has been widely believed as the domain of the national government, as they stand against diesel vehicles traveling from across the nation. The move should be noted as a model of innovative environmental administration under the initiative of local governments.

The attitude of the national government during these developments has been nothing but regrettable. Since Governor Ishihara assumed office, TMG has bravely initiated a campaign against diesel vehicles, and implemented various measures ahead of the national government. The Governor sent a message to the Prime Minister (May 9, 2003), questioning the content of national diesel vehicle measures, which the PM had described as the strictest in the world. Their response was less than sufficient, failing to demonstrate any sense of crisis or reflection as a directly involved party. Observing such a stance, TMG renews its resolve to leading the national government into the reforms.

With the introduction of diesel vehicle restrictions in October 2003 approaching, TMG has compiled this brochure to summarize the advantages and disadvantages of past policies by the national and Tokyo governments (as well as other Metropolitan prefectures / municipalities and relevant industries), and introduce TMG efforts to initiate environmental reforms to wider communities.

It is our hope that people in a range of fields gain a correct understanding on the significance of TMG's "Say No to Diesel Vehicles" campaign and the roles various entities have fulfilled thus far in the automotive pollution measures of the past few years. This kind of understanding is certain to help our society explore the future policy direction on automotive pollution.

For restoring clean air in Tokyo

September 2003 Bureau of Environment, Tokyo Metropolitan Government

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Restore Clean Air in Tokyo!

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Current status of Tokyo's air pollution

Since the late 1960s, various measures including control on factory emission of dust and smoke, have significantly improved the level of air pollution caused by sulfur dioxide and carbon monoxide.

As for suspended particulate matter and nitrogen oxides, the national government's delay in regulating diesel vehicles, which emit these kinds of pollutants, has kept their average concentrations high, leaving the nation with a low level of compliance to the national environmental quality standards.

According to a FY2000 study by the Environment Ministry, 5 of the ten air pollution monitoring stations that registered the worst PM concentrations, and 7 of those with the worst NO2 concentrations, were located in Tokyo, indicating that Tokyo's air pollution remains to be in a serious situation.

【National Government's Inadvertency 1】 Japan's PM (particulate matter) regulation seriously lagging behind that of the U.S. and Europe

- (1) Japan introduced PM regulations in 1994, six years behind the United States and two years behind Europe. Yet, the regulation standard was over 5 times more laxed than equivalent standards in the west.
- (2) The current Japanese PM standard (Long-Term Regulation introduced in 1998) has only just caught up with the level western standards reached in the early 90s, a real-term delay of almost ten years. This has allowed the atmospheric release of a massive amount of PM, linked to cancer. The serious air pollution Tokyo suffers today is attributed to this regulatory inadvertency of the
- <u>national government.</u>
 (3) The government cites prioritizing nitrogen oxide regulation as the cause for PM control delay, but Japan's NOx regulation has never been particularly tighter than western equivalents.

Slow and lenient PM control on new vehicles

The first problem of Japan's automotive emission control is that, despite lingering air pollution of grave severity in Tokyo and other large cities, the government acted slowly and leniently in controlling particulate matter (PM), which have been linked to serious health problems including lung cancer, chronic respiratory illnesses and hay fever.

In the United States, diesel PM's carcinogenic property and effects on the respiratory system came to light in the early 80s. PM regulations started in 1988, and have since been tightened gradually. In Europe, EU-wide control on PM began in 1992.

In contrast, Japan did not start regulating PM until 1994, six years behind the United States and two years behind EU.

What's more, the level of PM control as of 1994 was over 5 times more lenient than western standards.

Japan did not catch up with the level of PM control the west enforced in the early 90s, until the introduction of the current regulation (Long-Term Regulation) that started in 1998, practically representing an almost ten-year delay behind western nations.

The transport industry and businesses requiring the use of large trucks had no other option than to use diesel-fueled vehicles, and was obliged to operate vehicles built under a substandard emission control. The national government's delay in introducing appropriate regulations has allowed diesel vehicles spreading a massive amount of PM to stay on roads throughout Japan.



Showing a PET bottle containing PM discharged from diesel vehicles

NOx (nitrogen oxides) regulations far from strict

The national government cited their prioritization of NOx control over PM control as the reason for the delayed PM regulation.

"We acknowledge the fact that Japan's PM control levels have been more lenient than those of

western nations until now. However, take note of the tighter control we have enforced on nitrogen oxides than western regulations. Japan, the United States and Europe have different approaches to air pollution. The differences arise from the relationship of the technological trade-off between NOx and PM reduction."

(Environment Minister's response to the Tokyo Governor on May 19, 2003)

It is true that PM measures and NOx measures are in the relationship of a technological trade-off. However, Japan's delay in PM control is not on the scale that can be justified with such a technical argument.

As mentioned earlier, when Japan finally introduced PM control in 1994, the regulatory figures were 5 times and 2 times (to expand to 5 times soon after) more laxed than the US and EU regulations respectively. At this time, as Graph 2 shows, Japan's NOx standard was around the same as that of the United States, and only around 30% stricter than EU.

Compared to the Japanese method, the US and European emission testing method on new vehicles, which forms the premise of such regulatory figures, includes driving tests on heavier vehicles. In the United States, the engine test for heavy-duty vehicles also uses the transient mode, a testing pattern closer to actual on-road driving. EU demands testing with a greater engine load, e.g. at the time of starting a vehicle.

In view of these aspects, it is questionable whether Japanese NOx control was really ever tighter than western standards. In addition, such a superficial and negligible "difference" has shrunk year after year, with the US standards surpassing Japanese figures in 2004 and 2007.

The national government's move to justify its delay in PM control as a matter of "different approach", demonstrates its lack of sincere reflection upon the belated regulations, which have been linked to serious health effects.



[National Government's Inadvertency 2] Failure to ensure early distribution of "low sulfur diesel fuel", essential for PM reduction

- (1) Low-sulfur diesel fuel is essential to ensure effective functioning of PM reducing devices (Diesel Particulate Filter or DPF).
- (2) EU, in preparation for a tight diesel emission control to go into effect in 2005, set out the schedule of introducing low sulfur diesel fuel in December 1998. Around the same time, the Japanese Central Environment Council failed to even define the target year for introducing low sulfur diesel fuel in its set of recommendations to the government.
- (3) EU countries has provided tax incentives and other measures for low sulfur diesel fuel, thereby achieving its early distribution ahead of target years defined in their respective regulations. Japan has so far failed to even attempt to take such measures.

The national government that could not even define the target year for introducing low sulfur diesel fuel

In December 1998, the EU already set out a clear policy of "reducing the sulfur content of diesel fuel to 50ppm or under by January 1, 2005".

The EU adopted this timeframe because achieving a low sulfur content in diesel fuel was essential for effective use of emission purification devices, needed to clear the tough diesel emission regulation called Euro 4, slated for enforcement in 2005.

When EU defined the sulfur content target of 50ppm in December 1998, Japan's Central Environment Council released a set of recommendations, which referred to the then-target of 500ppm as follows:

"<u>As for fuel quality required for achieving the new long-term target (by around 2007)...</u> we must explore a further reduction in the sulfur content."

"Regarding the new long-term target, it is appropriate to determine specific target values for the allowable limit, achievement timeframe, measures for attaining the required fuel quality, etc. by around the end of FY2002."

Later, in November 2000, the Council defined the end of 2004 as the deadline for introducing low sulfur diesel fuel with the sulfur content of 50ppm. The national government initially planned to finalize the introduction timeframe by the end of FY2002, i.e. end of March 2003. By this time, however, as explained later (Achievement 2), the Petroleum Association of Japan responded to TMG requests and led an industry initiative to commence actual distribution of low-sulfur diesel fuel at gas stations across the nation. This example is a clear demonstration of the government's lack of leadership.

There is a stark contrast in the stances between the EU, which led other regions in setting out the timeframe for introducing low sulfur diesel fuel so as to strengthen emission control, and Japan, which only managed to release an ambiguous policy.

EU's tax cut programs

In addition, some EU countries who even offered tax cuts to accelerate the timeframe and achieve the goal before the 2005 target.

For example, Britain, in a bid to promote the introduction of diesel fuel with the sulfur content of 50ppm or lower, cut the excise by approx. 5 yen (3 pence) per liter, starting 1998. Consequently, most diesel fuel, distributed in Britain, has already switched to low-sulfur types.

Similar tax reduction measures have been introduced in Germany, Sweden, Finland, Switzerland, Belgium, the Netherlands, etc., achieving the distribution of low sulfur diesel fuel significantly



ahead of the EU-defined deadline of January 1, 2005.

Another belated action by the Japanese government regarding sulfur-free diesel fuel

In March 2003, the EU took the next step of declaring new goals, i.e. to commence the distribution of sulfur-free diesel fuel, with the sulfur content of 10ppm or less, by January 1, 2005, and achieve its full distribution by January 1, 2009.

Like at the time of low-sulfur diesel fuel with the sulfur content of 50ppm, Britain is set to offer similar tax cuts to promote sulfur-free diesel fuel. Germany and Sweden have already cut their excise to achieve early distribution, with a significant portion of the markets having switched to sulfur-free diesel fuel with the sulfur content of 10ppm or less.

The United States leads others, having declared in January 2001 to start the distribution of diesel fuel with sulfur content of 15ppm in 2006.

Moves toward switching to a sulfur-free diesel fuel are also being accelerated in Japan, with TMG lobbying the central government for its early introduction, and the Petroleum Association of Japan announcing its readiness to start partial distribution of 10ppm sulfur-free diesel fuel in 2005 and its full distribution by 2007. In May, the Governor of Tokyo sent a letter to the national government, urging them to take urgent measures toward the early distribution of sulfur-free diesel fuel.

In July this year, the government's advisory council finally responded, recommending a westernlevel target of starting a distribution of diesel fuel with the sulfur content of 10ppm or less in 2007.

The Japanese government must urgently compile the necessary support measures to respond to private-sector efforts and facilitate a nationwide distribution of sulfur-free diesel fuel as early as possible.

【National Government's Inadvertency 3】 Turning its back on in-use diesel vehicles, the primary source of air pollution

- (1) Many diesel vehicles, manufactured during the days of insufficient emission control, remain on the road today, spreading a large amount of PM and NOx. Action on such vehicles is an urgent task in order to improve air pollution in Tokyo.
- (2) However, the national government has been reluctant to develop a DPF (Diesel Particulate Filter), which could effectively reduce the amount of PM in-use diesel vehicles emit.
- (3) What's worse, the national vehicle registration system only checks for black exhaust smoke, does not even measure the level of PM / NOx emission, which is crucial in determining whether the vehicle has maintained its engine performance since it was new.

Government turning its back on in-use vehicles

Delay and leniency in enforcing PM control on new vehicles continued to increase the number of vehicles manufactured to pre-regulation standards, letting out black smoke that contains a massive amount of PM, thereby polluting the air. Despite tighter regulations on new vehicles, their effects show only gradually in line with the pace of users replacing their in-use vehicles.

Approximately 500,000 diesel vehicles are registered in Tokyo. To swiftly resolve the issue of serious air pollution, it was necessary to not only regulate new vehicles but also pay urgent attention to pre-regulation vehicles that continued to release PM. Nevertheless, the national government was reluctant in addressing the matter.

Passively observing the development of PM reduction devices

Other than waiting for user replacement, the effective emission measure for old diesel vehicles is the installation of retrofit emission (PM) reduction devices.

As to be mentioned later (Achievement 3), TMG has actively promoted technological development in this area, developing DPF (Diesel Particulate Filter) for reducing PM since 1988, and forging partnerships with various Japanese / overseas manufacturers in conducting operation tests for such devices since 1999, the year when the "Say No to Diesel Vehicles" campaign was launched.



PM reduction device fitted to a diesel vehicle

As for the national government, the then Environment Agency, Ministry of International Trade and Industry and the Ministry of Transport jointly established a study group on assessing diesel-related technologies in March 2000, and released its findings on PM reduction measures for in-use vehicles in May 2001. The report, however, made the following assertion:

<u>"Diesel-fueled vehicles that comply with the regulation of 1988 or earlier</u> (when there was no PM emission control), have driven for a substantial number of years since their first registration. Except for vehicle types with a particularly long average service life, these have only a limited number of years remaining on the road, and will not utilize DPF for much longer even if such devices are fitted. Therefore the need to give incentives to promote DPF installation is not very high."

Referring to future tasks, the report says:

"DPF itself is expected to become a promising emission reduction technology for new vehicles, if

combined with technologies for engine control, etc. designed on the premise of such filter's installation."

The statement puts an emphasis on the application of DPF as emission a reduction technology for new vehicles.



No PM measurement in vehicle inspections

In order to prevent diesel emission of existing vehicles from worsening further, it is imperative to improve the current vehicle registration / regular inspection systems. The current vehicle registration system involves a simple check on soot, without measuring PM / NOx concentration in automotive emission. There is no way of knowing whether a tested vehicle has maintained engine performance of a new vehicle.

In its response to TMG's letter, the central government claims that checking for soot can substitute PM control. In reality, however, PM is not just soot, but a collection of particulates such as SOF (soluble organic fraction) and sulfur oxides. Inspecting for visible black smoke alone would not control PM.

TMG has long demanded that the vehicle registration system cover PM / NOx concentrations and tighten emission tests on pre-regulation vehicles, so as to ensure their emission performance remains unchanged from the time of new-car registration. It is only recently that the national government has finally started exploring methods for conducting such tests.

Application of the NOx / PM law delayed to decelerate switching to low-pollution vehicles

Over 30% of diesel-powered vehicles in Tokyo remain those manufactured before the "1988 regulation", subject to no PM control. In principle it is undoubtedly desirable to replace those with low-pollution vehicles. However, as explained in the next section (Inadvertency 4), the national government has postponed the application of the "Automotive NOx and PM Law", allowing continued use of in-use diesel vehicles, and decelerating their replacement process.

<u>The national government is slowing down a switch to low-pollution vehicles, while showing a passive stance in the development of DPF, which is the next-best option for addressing air pollution. This by-stander attitude is nothing short of being irresponsible.</u>

[National Government's Inadvertency 4] Postponement of the finally revised Automotive NOx and PM Law, letting off old diesel vehicles

- (1) <u>The national government revised laws in 2001 at long last to make PM subject to control in</u> addition to NOx released from in-use diesel vehicles. However, despite TMG's repeated opposition, it delayed the revision's enforcement by up to two and a half years from originally planned.
- (2) The move consequently allowed approx. one million old diesel cargo trucks, not subject to PM control, to continue to drive in three major cities, releasing a massive amount of PM in their paths. This doubled the number of vehicles subject to TMG's diesel vehicle control from 94,000 to 202,000.

Finally revising the NOx law to introduce the Automotive NOx and PM Law

The national government ignored demands from TMG, etc. for tighter control on PM-releasing inuse diesel vehicles, and delayed the revision of the Automotive NOx Law, enacted in 1992.

It acted only in response to TMG's "Say No to Diesel Vehicles" campaign and Environmental Preservation Ordinance, as well as the Kobe District Court ruling on the Amagasaki pollution case that highlighted the government's delay in addressing automotive emission. The Diet passed and promulgated the Automotive NOx and PM Law in June 2001, revising the Automotive NOx Law to include PM from old diesel vehicles subject to control.

Forced postponement of enforcement and extension of the grace period

However, the national government abruptly postponed the enforcement of the Law by almost half a year from May to October 2002, citing the need for sufficient time to publicize the changes. Also claiming the need for a measure "for alleviating drastic changes" and a period for further preparation, the government extended the original grace period, and expanded its application to in-use diesel vehicles built with no PM control, which were to be banned from 2003 onwards. This effectively delayed the regulation on such vehicles by up to two and a half years.

Soon after the law's promulgation, in acknowledgement of the importance of urgently regulating old diesel vehicles, TMG submitted a proposal to the national government in September 2001, seeking to shorten the original grace period. When we learned of the enforcement postponement and extension of the grace period in December, a letter of protest was sent to the national government.

The Law mandates that the government hold a hearing with prefectural governors who represent local residents. At the hearing in January 2002, TMG reiterated its strong opposition.

<u>Nevertheless, in March of the same year, the national government ignored TMG's repeated</u> opposition and forced the implementation of the extension measures.



National government's moves for regulation postponement

Going counter to the purport of the Law

Thus far, the national government has attributed chronic air pollution to the increase in automotive traffic and diesel-powered vehicles, as well as a slow switch to compliant vehicles resulting from extended use of old diesel vehicles. It is therefore evident that it is aware of the importance of early replacement of non-compliant vehicles.

The national government's move to ignore TMG's opposition and extend the enforcement of new regulations by up to two and a half years, constitutes a breach of trust, slighting the public who continues to suffer from air pollution. It also goes counter to the purport of the Law, which newly places old diesel vehicles, in addition to new ones, subject to emission control so as to achieve their early replacement with compliant vehicles.

National government showing absolutely no concern despite the serious impact of the postponement

The postponement has given an additional grace period to approx. one million old diesel cargo trucks, which were manufactured before 1993 with no PM emission control, and were originally slated for replacement with compliant vehicles by 2003. This has allowed such vehicles to continue releasing a large amount of PM as well as NOx at the rate of obsolete emission standards.

The permission to give additional service years to these vehicles has posed a major obstacle to the diesel vehicle control, due to be implemented by Tokyo and three other prefectures. The number of diesel vehicles that this ordinance has to regulate, increased from 94,000 to 202,000 (those registered in Tokyo).

(The case of an ordinary cargo truck with the gross vehicle weight of over 2.5 tons, originally registered in 1994)

Frustrated by the national government's reluctance to take effective measures on old diesel vehicles, the Governor of Tokyo submitted a letter to the Prime Minister and the Minister of Environment in May 2003, demanding that the national government lead the rest of the world in automotive pollution measures.

In the response to the Governor, the national government justified the two-and-a-half-year postponement in the enforcement of the Automotive NOx & PM Law as follows:

"<u>This transitional measure gives an additional grace period</u> for switching to compliant vehicles, but also reinforces automotive emission control on several stages at the same time, thereby prompting the introduction of low-emission vehicles as replacements. As you can see, <u>this is an appropriate</u> measure that pays consideration to miscellaneous elements and effects."

However, it is clear that the measure was designed to delay improvement in the already serious problem of air pollution.

These inadvertencies by the national governments have left the Japanese public exposed to grave urban problems of air pollution and health damage with no improvement in sight. The extension measure, which will impose further agony and endurance on the public, should never be justified.

Despite facing the obligation of resolving air pollution as soon as possible, the national government continues to take an insincere stance that lacks the sense of crisis in flat disregard to public lives and health, as demonstrated in its insistence that the postponement of the Automotive NOx & PM Law two and a half years is entirely appropriate.

No action to in-bound vehicles exempt from the provisions of the Automotive NOx & PM Law

The Automotive NOx & PM Law follows the poor example set by the previous Automotive NOx Laws, limiting the scope of application to vehicles registered in local areas where the provisions are enforced. In the case of the Greater Metropolitan Area, for example, approx. 15% of all automotive traffic in Tokyo and three neighboring prefectures (in the case of ordinary cargo vehicles) come from outside the area, and are therefore exempt from the regulation.

By taking this attitude, the national government is turning its back against the residents of the Metropolitan area, who are longing for some improvement in air pollution caused by automotive emission. This dampens the efforts of local governments implementing various initiatives to protect the lives / health of local citizens, and metropolitan business operators actively cooperating new regulations despite the harsh business environment.

[National Government's Inadvertency 5] Preferential excise on diesel fuel increasing diesel-powered vehicles

- (1) Tokyo's air pollution has seen little improvement because of insufficient control on new and existing diesel vehicles, as well as an overall increase in the number of diesel vehicles.
- (2) For compact and mid-sized vehicles, diesel models are more popular than petrol-fueled models. This is because, although manufacturing costs are roughly the same between diesel fuel and gasoline, the national government's preferential excise system on diesel fuel has created a "disparity in fuel prices", i.e. cheaper diesel fuel and more expensive gasoline.
- (3) In fact, the number of diesel vehicles has increased to coincide the expansion in fuel price differences. In view of the trend, TMG has consistently demanded that the preferential excise system be rectified, but the national government has not even explored any possibility.

Increase of diesel vehicles preventing improvement of air pollution in Tokyo

The environmental quality standards are defined as benchmark figures to be maintained so as to protect people's health and preserve our living environment. PM and NOx emission, for which Tokyo has yet to achieve the standards, mostly come from automotives. In fact, diesel vehicles are blamed for almost all of the PM emission and around 70% of the NOx emission.

Despite reinforcement of the conventional automotive emission control, Tokyo's air pollution has seen little improvement because of the national government's slow and lenient control on new diesel vehicles (Inadvertency 1) and its failure to act on regulating old diesel vehicles (Inadvertencies 3 and 4). Another reason is the increase in the number of diesel-powered vehicles, which come under more lenient emission control than gasoline-fueled vehicles.

Compared to gasoline-based vehicles, diesel vehicles indeed represent a major contributing factor in Tokyo's air pollution. Despite this, diesel vehicles that spread PM, NOx and other pollutants total around 500,000 units in Tokyo, the second highest prefectural total only after Aichi Prefecture.

Increase in diesel cargo vehicles attributed to fuel cost disparity (economy)

In Tokyo, there are around 300,000 diesel cargo trucks, which are blamed for a large part of diesel emission. They account for approx. 60% of cargo vehicles in Tokyo. In contrast, there are around 220,000 gasoline-fueled cargo vehicles, representing just 40% of all cargo vehicles.

However, diesel vehicles did not traditionally hold the majority position among cargo vehicles. Until FY1980, over 70% of cargo vehicles were gasoline-fueled, with diesel equivalents accounting for only around 20%. In Tokyo, the number of diesel cargo vehicles surpassed that of their gasoline counterparts just 15 years ago in FY1988.

Today, asked why they prefer diesel vehicles for cargo purposes, some point to the good fuel economy or engine strength compared to gasoline vehicles. However, as indicated below, past trends clearly indicate that economical running cost, due to disparity in fuel prices, is the primary factor in users are choosing diesel models in compact and mid-sized vehicles offering both gasoline and diesel options.

Gasoline prices have always been higher than that of diesel fuel, but the price gap was only just over 10 yen until the early 1970s.



The oil crisis of 1973, however, triggered government control on commodity prices, widening the price difference to 45 yen in 1974. The difference of around 40 or 50 yen continued through to the early 1990s. As two rounds of oil crisis raised overall fuel prices, it was economically speaking, only natural for transport businesses, which use a large amount of fuel in their operations, shift from gasoline vehicles to diesel equivalents as a cost cutting exercise.

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Note: The prices shown are wholesale prices for the final week of each fiscal year, excluding consumption tax. (Automotive fuels)

Artificially manipulated "economy" of diesel vehicles: Excise difference between diesel fue and gasoline causing an increase of diesel vehicles

Although diesel fuel and gasoline have almost identical pre-excise prices at the manufacturing stage, diesel fuel ends up being more affordable than gasoline because of the markedly low preferential excise on diesel fuel (32.1 yen per liter), over 20 yen lower than the gasoline excise (53.8 yen per liter).

In other words, a diesel vehicles' running economy is an artificially crafted situation, attributable to the national government's preferential excise system.

In a move to promote a shift from diesel vehicles to gasoline equivalents and other low-pollution vehicles, TMG has widely appealed in the "Say No to Diesel Vehicles" campaign to rectify this preferential excise system, which artificially makes diesel fuel cheaper than gasoline.

TMG has consistently demanded a review on this preferential excise system since 1997, but the national government has yet to even give specific considerations to our request.



[National Government's Inadvertency 6] Lack of action on "illicit diesel fuel", which facilitates serious tax evasion and threatens the health of Tokyo citizens

- (1) "Illicit diesel fuel", prepared by mixing kerosene, diesel fuel, etc. with heavy oil, provides a hotbed for tax evasion, emits more PM and NOx than usual, and generates, in its manufacturing process, a substance called "sulfate pitch" that threatens health and the environment.
- (2) <u>TMG has actively cracked down on illicit diesel fuel, but the national government has taken almost no action, leaving it to circulate freely</u>. The national government must take fundamental measures, e.g. introducing a legal ban on the manufacturing of illicit diesel fuel.

No action on illicit diesel fuel, which has adverse effects on health and the environment

Using illicit diesel fuel (heavy oil blended with kerosene, diesel fuel, etc. and is fraudulently sold as diesel fuel to avert the diesel fuel transaction excise) to fuel diesel vehicles facilitates tax evasion and has adverse effects on health and the environment.



Rate of PM / NOx increase when using illicit diesel fuel (compared to normal diesel fuel) (at the average vehicle speed of 18km per hour)



In 2000, the Tokyo Metropolitan Research Institute for Environmental Protection tested emission from diesel trucks, fueled with illicit diesel fuel with the heavy oil content of 50%, and found that, compared to normal diesel fuel, the fuel generates 15% more PM (linked to respiratory illnesses and cancer) and 7% more NOx (attributed to photochemical smog).

Also, manufacturing illicit diesel fuel generates a substance called "sulfate pitch" during the process of adding oil of vitriol to remove coumarin, an oil marker contained in heavy oil and kerosene. Sulfate pitch is a tar-like mixture of waste acid and waste oil, containing hydrosulfate, sulfate and asphalt components, and releases a foul odor. It also contains toxic chemicals such as benzene and toluene. Unsuspecting people may suffer chemical burns when coming in contact with sulfate pitch, leaked from steel drums abandoned outdoors. It also releases sulfur dioxide (SO2) gas in high concentration to cause respiratory illnesses, contaminates soil / groundwater when leaked, and creates the problem of illegal dumping throughout the nation.

<u>Illicit diesel fuel also has a high sulfur content, which may hamper the performance of PM reduction devices. Despite its clear harmful effects, the national government has taken no action against it.</u>

Absence of a government ban on illicit diesel fuel manufacturing

Quality of automotive fuel is regulated with the Law concerning quality control of gasoline and other oils. However, this law is designed to regulate the distribution of non-compliant fuel, and does not prevent compliant heavy oil from being mixed with diesel fuel after sales for use in diesel vehicles.

The Fire Prevention Law mandates regular inspections on facilities storing heavy oil, diesel fuel, etc., allowing authorities to make on-site investigations. However, the law does not control the act of manufacturing illicit diesel fuel itself.

The Local Tax Law includes a provision that mandates advance approval for fuel blending, etc., but does not serve to prevent tax evasion through the use of illicit diesel fuel. These factors have combined to make it difficult to control the manufacturing and sales operations of illicit diesel fuel, which are becoming more widespread and sophisticated by the year.

In a bid to stem the trend, TMG has introduced the Environment Preservation Ordinance to ban the use and sales of illicit diesel fuel as automotive fuel, and demanded that the national government crack down on it and increase penalties in existing laws. The national government, however, issued no response.

In its response to Governor's letter in May 2003, the national government took a irresponsible "all-words" stance, insisting that it had been trying to regulate it. However, as active campaigns by TMG and other local governments begin to highlight the reality of illicit diesel fuel manufacturing and illegal dumping of sulfate pitch, the national government has finally decided to set up a liaison council of relevant ministries / agencies to explore countermeasures for the illegal dumping of sulfate pitch.

The national government's inaction on illicit diesel fuel thus far is nothing short of a grave problem. From now on, the national government is expected to implement effective and fundamental countermeasures, such as a ban on illicit diesel fuel manufacturing, with its own responsibility, rather than continuing to rely on the initiatives of TMG and other local governments.

[Column 1] TMG initiative links diesel vehicle emission to cedar pollen-triggered hay fever

In order to uncover the association between diesel vehicle emission and hay fever, TMG established a committee of experts in epidemiology, environmental science and clinical medicine in September 2001 to launch its own investigation. In May 2003, the findings were released in a report, "New Insight into the Effects of Diesel Vehicle Emission on Hay Fever".

(1) <u>Diesel Emission Particulates directly linked to the onset and aggravation of the symptoms</u> of cedar pollen-triggered hay fever in humans (first time in Japan)

Past animal tests have directly linked diesel emission particulates (DEP) to hay fever. The latest study, in which DEP was added to the blood of hay fever sufferers in test tubes, has found that the presence of DEP increases a substance that starts or aggravates the symptoms of cedar pollen-triggered hay fever.

(2) <u>Diesel vehicle emission's effects on unborn babies uncovered (world's first)</u>

The study using rat samples has found that exposure to diesel vehicle emission in the prenatal or lactation stage, before the establishment of the immune system, makes the rats more susceptible to cedar pollen-triggered hay fever in later life.

Experiment involving the blood of hay fever sufferers (test-tube experiment) Adding DEP to the samples' blood increases the substance that starts cedar pollentriggered hay fever (IL-5). (DEP: Diesel Emission Particulates)



[National Government's Inadvertency 7] Lodging an appeal in a Tokyo litigation in disregard to the urgent need to save air pollution victims

- (1) The Tokyo Air Pollution Lawsuit is a litigation lodged by sufferers of air pollution-related illnesses against the backdrop of the national government's delay in regulating automotive emission. The district court partially acknowledged the plaintiffs' claim of health damage and compensation, but fell short of referring to the national government's regulatory responsibility.
- (2) <u>TMG decided against appealing the ruling, giving priority to saving victims of air pollution.</u> <u>However, the national government's decision to appeal, rather than conceding its responsibility</u> for failing to act on air pollution, is completely unjust.

National government's slow action on automotive emission attributed to the Tokyo Air Pollution Lawsuit



Transition in the number of recognized patients in asthma, etc. (Tokyo)

Note 1: A system of the national government, providing compensation to persons suffering from health damage caused by air pollution or water contamination. No new recognitions have been extended under this Law since 1988. Note 2: A system of the Tokyo Metropolitan Government, subsidizing medical costs to persons under the age of 18 suffering from illnesses caused by air pollution. According to the government's Basic Survey on Public Living Conditions, the number of asthma sufferers in Tokyo increased from 77,000 in 1989 to 134,000 in 1998.

As explained earlier (Inadvertency 1), the national government did not start regulating PM in automotive emission until 1994. Even then, the PM regulation figure was less than sufficient. The

significant delay, compared to the U.S. and Europe, in regulating pollutants led to protracted serious air pollution in Tokyo, with the number of asthma sufferers continuing to rise in the city.

Against this backdrop, Tokyo citizens suffering from health damage lodged a lawsuit against the national government, TMG, Metropolitan Expressway Public Corporation (MEX) and seven auto manufacturers in what is now known as the Tokyo Air Pollution Lawsuit.

In October 2002, the district court recognized emission-induced health damage of some of the plaintiffs who live along major motorways, and granted them with damages. However, the ruling only acknowledged the responsibility of the national government, TMG, MEX, etc. as road management authorities, and failed to refer to the emission regulating responsibility of the national government, the central issue of the litigation.

TMG decides not to appeal, giving priority to saving victims

The national government's slackness in regulating automotive emission is the fundamental cause of air pollution. TMG does not wholeheartedly agree to the content and logic of the ruling, as it fails to refer to the national government's responsibility.

The issue has since evolved into a social problem, with many others with health damage lodging similar lawsuits across the country. In view of the situation, TMG decided not to appeal so as to give priority to tighter emission control by the national government and the salvation of persons suffering from health damage, rather than extending the legal fight and delaying the conclusion of the case.

The national government's unjust appeal, rejecting any causal relation and responsibility

Upon receiving the ruling, TMG strongly urged the national government not to appeal in recognition of its responsibility for failing to address air pollution, and demanded that it to reinforce emission measures and establish a system for saving air pollution victims.

However, the national government appealed the ruling, refusing to acknowledge a causal relationship between emission and health damage, or its responsibility as a road management authority.

This is a totally unjust action, with no acknowledgement of or reflection on the fact that its slow and insufficient action on emission control has caused health damage to the people of Tokyo. The national government is deprecating its regulatory responsibility, without fully examining the effects on people's health.

[Column 2] Health damage resulting from diesel emission (research findings in various countries)

Particulate matter (PM) in diesel emission mainly consist of soot, SOF (soluble organic fraction) and sulfur oxides, but also contains small amounts of harmful substances, such as carcinogenic PAH (polycyclic aromatic hydrocarbon). In addition, PM particulates are extremely small and can reach deep inside human lungs, thereby triggering respiratory illnesses.

(1) <u>Carcinogenic property</u>

- The Japanese Environment Ministry set up a study group on the risk of diesel emission particulates (DEP). Its report, compiled in March 2002, <u>points to strong indications that DEP</u>, <u>contained in diesel emission</u>, is carcinogenic.
- According to a study by Germany's Federal Environment Ministry (1999), the carcinogenic risk of diesel emission is more than 10 times that of gasoline vehicle emission.
- <u>The Harvard Six Cities Study (1993) indicated a very strong correlation between DEP (PM 2.5)</u> <u>concentration in long-term exposure and the rate of lung cancer mortality.</u>

• Also, the City of Los Angeles reported that diesel PM accounts for 70% of cancer risks posed by all air pollution substances (1995 – 1997).

(2) Asthma and hay fever

- According to the National Institute for Environmental Studies in Japan (1999), <u>inhaling DEP or</u> diesel emission plus allergens (allergy-causing substances) causes symptoms of asthma and hay <u>fever</u>.
- A Dutch study (1997) shows that the more children are exposed to automotive emission (at motorways, for example), the lower their lung functions become.

(3) Effects on learning and behaviors

• According to a study by Professor Ken Takeda (Tokyo University of Science) in July 2003, DEP contains various endocrine disruptors. The study indicates the <u>possibility that prenatal exposure</u> to diesel emission may affect the development process of mice's brains after birth.

(4) Reduced reproductive capacity

- In the aforementioned study by the National Institute for Environmental Studies in (2), mice that inhaled diesel emission suffered deterioration in sperm production capacity, an effect similar to that of endocrine disruptors.
- The aforementioned study in (3) suggested the possibility that DEP may affect the formation of male reproductive organs.



(Provided by Professor Masaru Sagai of Aomori University of Health and Welfare)



Comparison of PM10, PM2.5 and ultra-fine PM

(Source: TMG Environment Bureau)

[TMG's Achievement 1] Partnership of eight major prefectures and cities to implement diesel vehicle control ahead of the national government

- (1) With the national government postponing the enforcement of the Automotive NOx & PM Law and therefore improvement in air pollution, Tokyo and three neighboring prefectures have joined forces to introduce an ordinance regulating diesel emission. <u>This means, starting October 1, 2003, diesel vehicles that do not meet PM emission standards, defined in the ordinance, will be banned across Saitama, Chiba, Tokyo and Kanagawa, in an initiative that goes ahead of the national government's progress in the matter.</u>
- (2) The Diesel vehicle control Headquarters, jointly established by eight major prefectures and cities in Greater Tokyo Area, has promoted compliance of diesel vehicles in the Greater Metropolitan Area, and urged other local governments to follow suit, publicizing the regulations and expanding the DPF installation assistance program to the rest of the nation.

TMG's Environmental Preservation Ordinance leads to diesel vehicle control in Tokyo and three neighboring prefectures

The national government has been very lenient in regulating automotive emission, and slow in controlling automotive pollution under existing laws, when Tokyo's air pollution continued to worsen with pollutants released from diesel vehicles. In fact, in FY1998, the year before TMG launched the "Say No to Diesel Vehicles" campaign, all of Tokyo's air pollution monitoring stations registered SPM concentrations above the environmental quality standards (as was in the latest research in FY2002).

Alarmed by the findings, TMG introduced the Ordinance on Environmental Preservation to Secure the Health and Safety of Citizens of the Tokyo Metropolitan Area (commonly known as the Environmental Preservation Ordinance) in December 2000. In a move that goes ahead of the national government in existing diesel vehicle control, TMG banned the use of diesel vehicles that do not comply with the Ordinance's PM emission standards across Tokyo.

The diesel vehicle control, advocated by TMG, eventually spread to Saitama Prefecture (July 2001), Chiba Prefecture (March 2002) and Kanagawa Prefecture (September 2002), all of which adopted similar ordinances with the aim of reducing air pollution.

The development has led to a joint enforcement of the non-compliant diesel vehicle ban across Tokyo and the three neighboring prefectures from October 1, 2003.

Tokyo and three prefectures have had close socio-economic ties, with approx. 80% of Tokyo's inbound automotive traffic coming from these prefectures. A wide-area joint initiative like this has been essential in alleviating serious air pollution in Tokyo and other areas.

The diesel vehicle control targeting 34 million people in the Greater Metropolitan Area is an unprecedented initiative, unseen



Education brochure by eight major prefectures and cities

anywhere else in the world. The joint action of eight major prefectures and cities provides a model for pioneering environmental administration under the initiative of local governments.

Joint designation of PM reduction devices

Based on past research findings on PM reduction devices for busses and trucks, TMG defined the nation's first guidelines on offering certification for such devices in 2001. Upon application from manufacturers, PM reduction devices are put to screening, and are given certification if successful.

The system has since been expanded to a joint certification program by eight major prefectures and cities, with the member local governments offering financial assistance and loans to business operators fitting their fleet with certified devices.

Stickers reading "Vehicle Compliant with Diesel Vehicle Control by Eight Major Prefectures / Cities", to be pasted on vehicles installed with PM reduction devices



Eight Major prefectures / cities establish the Diesel Countermeasure Promotion Headquarters

In November 2002, one year before the enforcement of the diesel vehicle control in the Greater Metropolitan Area, leaders of seven Metropolitan prefectures and cities agreed to set up the Diesel Countermeasure Promotion Headquarters as an entity for reinforcing mutual coordination between the local governments and promoting compliance, e.g. early installation of PM reduction devices.

The leaders also adopted a joint declaration, demanding that the national government implement the necessary measures to address air pollution in acknowledgement of its emission control responsibility.

Since then, the group of eight major prefectures / cities has taken various initiatives for the smooth implementation of the diesel vehicle control, asking for the cooperation of other prefectures and major cities, and requesting that other local governments nationwide publicize the measure in their official gazettes.

<u>These joint initiatives have motivated other local governments, resulting in wide publicity on</u> <u>diesel vehicle control, and the nation-wide expansion of the subsidy scheme for PM reduction</u> <u>devices.</u>

Joint implementation of proliferation / education activities

In order to win broad business support for the diesel vehicle control, the Diesel Countermeasure Promotion Headquarters has sought cooperation of the trucking / bus industry, auto service industry and diesel vehicle manufacturers, while also implementing an awareness campaigns via joint events, posters and the Internet.

"Diesel vehicle control" initiatives by leaders of eight major prefectures and cities in Greater Tokyo Area

Joint initiatives by eight major prefectures and cities in Greater Tokyo Area began with the agreement reached in the 1999 summit meeting of seven Metropolitan prefectures and cities (originally Tokyo, Saitama Prefecture, Chiba Prefecture, Kanagawa Prefecture, Chiba City, Yokohama City and Kawasaki City, joined by Saitama City in 2003).

1999 summit meeting

• Agrees to join forces to launch a Metropolitan initiative for diesel vehicle control

(e.g. urging the national government to swiftly develop emission reduction devices and tighten emission control)

2000 summit meeting

- Adopts a joint statement on automotive emission measures in the Greater Metropolitan Area
- \rightarrow Urging the national government to implement effective automotive emission measures

2001 summit meeting

- Promotion of the proliferation of low-pollution vehicles
- ➔ Promoting the spread of fuel supply facilities and tightening designation standards of seven prefectures / cities for low-pollution vehicles

2002 summit meeting

- Establishes the "Diesel Countermeasure Promotion Headquarters
- → Strengthening partnership in preparation for the ordinance enforcement in one year
- Adopts a declaration on diesel emission countermeasures
- ➔ Demanding that the government
 - take necessary measures on air pollution, and
 - introduce measures that support switching to low-pollution vehicles

January 2003

- Seeks the cooperation of other prefectures and major cities across Japan for the coming diesel vehicle control
- → Requesting PR through official gazettes of local governments across the nation, exchanging opinions with local governments surrounding the Greater Metropolitan Area, and requesting support measures

[TMG's Achievement 2] Partnership with the Petroleum Association of Japan for early distribution of low sulfur diesel fuel

- (1) Just four years ago in August 1999, when TMG launched the "Say No to Diesel Vehicles" campaign, no gas stations sold low sulfur diesel fuel anywhere in Japan.
- (2) However, <u>efforts by the Petroleum Association of Japan (PAJ) in sincere response to TMG</u> request, led to the nationwide distribution of low sulfur diesel fuel in April 2003, 21 months earlier than what the national government's regulation foresaw.

Nationwide distribution of low sulfur diesel fuel started in April this year

Low sulfur diesel fuel, with the sulfur content of 50ppm or lower, is now available at almost all gas stations across Japan, from Hokkaido to Kyushu. The national government's regulation is scheduled to start at the end of 2004, one and a half years from now. As explained below, <u>the</u> Petroleum Association of Japan initiated a nationwide distribution of low sulfur diesel fuel in April 2003 in response to TMG's request, bringing forward the slow schedule devised by the national government.

Low sulfur diesel fuel was once a precious commodity



Ceremony marking early distribution of low sulfur diesel fuel

When the "Say No to Diesel Vehicles" campaign

was started in August 1999, no gas stations across Japan sold low sulfur diesel fuel. Just four years ago, low sulfur diesel fuel, available in Japan, was a small quantity of samples for use in laboratory experiments, prepared only on special orders. It was a precious commodity worth 1,200 yen per liter.

In the "Say No to Diesel Vehicles: Step 2" campaign, announced in December 1999, TMG pointed out that Europe had already slated the introduction of 50ppm low sulfur diesel fuel for 2005, and that the Japanese government and petroleum industry consider urgent distribution of this type of diesel fuel in Japan.

At this point, some estimated that the reduction in sulfur content of diesel fuel would cost 500 billion to 600 billion yen nationwide. However, TMG presented is own estimation that, if the cost was absorbed over ten years, the price of diesel fuel would only rise by one yen per liter, asserting that a such level of financial burden should not justify delaying the distribution of low sulfur diesel fuel.

Slating the introduction of low sulfur diesel fuel for 2005

TMG began negotiations with the Petroleum Association of Japan on January 18, 2000. In the case of Japan, crude oil, the raw material of diesel fuel and gasoline, mostly comes from the Middle East. Unlike North Sea crude oil in Europe, where the move for low sulfur diesel fuel was more advanced, Middle East crude oil has a higher sulfur content, raising Japan's hurdle for lowering diesel fuel's sulfur content.

However, as to be mentioned in Achievement 4, the Petroleum Association of Japan responded to TMG's request, and announced its readiness to make (early) distribution of low sulfur diesel fuel on March 16, 2000, provided that auto manufacturers developed and marketed low

emission diesel vehicles that require low sulfur diesel fuel at an early stage.

This effectively decided that the sulfur content of diesel fuel would be reduced to 50ppm by 2005 at the latest, a remarkable progress from the previous state whereby no timing or level of sulfur content reduction had been finalized.

Metropolitan busses to become first to run on low sulfur diesel fuel

This was a major step forward, but was still insufficient for TMG, which had been considering the introduction of an ordinance to regulate diesel vehicles by 2003.

TMG wanted an immediate distribution of low sulfur diesel fuel so as to promote the development of DPF and oxidation catalysts, essential for cleaning the emission of existing diesel vehicles. TMG also lobbied oil manufacturers individually, and initiated the nation's first distribution of low sulfur diesel fuel for fueling Metropolitan busses in November 2000.

Based on the achievement, "Tokyo Vision 2000", drawn up in December 2000, announced a two-year program starting



Tokyo Governor receives a memorandum of low sulfur diesel fuel distribution from the PAJ President.

FY2001 to subsidize up to 10 yen per liter to oil manufacturers supplying low sulfur diesel fuel in a bid to promote wide distribution. The subsidization program was participated by all of Japan's major oil manufacturers, thereby accelerating the production of low sulfur diesel fuel.

Agreement with PAJ on full distribution of low sulfur diesel fuel in the Greater Metropolitan Area

The subsidization program convinced not only Metropolitan busses but also other main bus operators in Tokyo to switch to low sulfur diesel fuel. Yet, the quantity, although after a dramatic increase, represented just 8% of all fuel used to power diesel vehicles in Tokyo.

In order to smoothly enforce the diesel vehicle control, scheduled to start in October 2003 under the Environmental Preservation Ordinance, TMG needed to ensure a more comprehensive switch to low sulfur diesel fuel at least six months before the regulation kicks in (April 2003).

TMG conducted active negotiations with PAJ and reached an agreement on November 22, 2001 on the distribution of low sulfur diesel fuel in many parts of the Greater Tokyo Area including all of Tokyo starting April 2003, so as to enable the use of DPF and oxidation catalysts certified by TMG (and later eight major prefectures / cities).

Accelerated start of the nationwide distribution of low sulfur diesel fuel 21 months ahead of the national government's schedule

Ahead of the agreed metropolitan distribution, PAJ's cooperation enabled the advance distribution of low sulfur diesel fuel at 151 gas stations across Tokyo in September 2002 (See the photograph at the top of this section).

On September 25, 2002, efforts by PAJ in sincere response to a TMG request, led to the nationwide distribution of low sulfur diesel fuel to truck / bus operators across the nation in April 2003, 21 months earlier than what the national government's regulation foresaw.

[TMG's Achievement 3] Practical application and mass proliferation of PM reduction devices

- (1) For many years, TMG has conducted R&D for practical application of effective DPF as a means of reducing PM in the emission of old diesel vehicles. It has implemented operation tests with Japanese and overseas manufacturers, and introduced the latest DPF that started to circulate in the west, in a bid to promote the development of DPF.
- (2) The national government's move to extend the grace period of the Automotive NOx & PM Law, created an urgent need to provide DEP for trucks and busses manufactured under no PM control before the introduction of the 1988 regulation. It was a difficult task, but cooperation from manufacturers has enabled the development of such devices.
- (3) In preparation for the introduction of low sulfur diesel fuel in April 2003, TMG has developed an "oxidation catalyst", an alternative PM reduction device more affordable than DPF, which can be installed on diesel vehicles manufactured after the introduction of the initial PM control.

(Note: Diesel vehicles manufactured before the introduction of the first 1988 PM control require high-performance DPF, as an oxidation catalyst cannot reduce their PM concentration to the level required under the ordinance.)

Retrofit devices essential for controlling the emission of older vehicles

TMG's third achievement in regulating diesel vehicle emission is the practical application and mass proliferation of retrofit PM reduction devices (DPF and oxidation catalyst), which are essential in controlling the emission of existing diesel vehicles.

As explained earlier (Inadvertency 1), Japan was slow in launching PM control on new vehicles, and it was only at a very low level.

This means the nation's roads are still full of diesel vehicles manufactured under no PM control before the introduction of the initial 1988 regulation, and those manufactured under very lenient Short Term Regulation.

The most desirable countermeasure for such vehicles would be to replace them with new low-pollution models. However, when that proves to be difficult (e.g. when the vehicle has been used only for a short period), the only alternative would be to fit them with emission cleaning devices. Yet, the national government was less than enthusiastic on the matter, as described in Inadvertency 3.

TMG initiating R&D on retrofit devices 15 years ago

Unlike new vehicles, engine improvement is not an option for cleaning the emission of existing vehicles. It has not been an easy task to develop retrofit PM reduction devices that can effectively work on many of the diesel vehicles on the road.

The national government has shown little enthusiasm in adopting measures on existing diesel vehicles through, for example, DPF development. In contrast, TMG has worked on R&D of DPF at the Tokyo Metropolitan Research Institute for Environmental Protection for 15 years since 1988, verifying the possibility of applying such devices to busses and large trucks in cooperation with Japanese and overseas manufacturers.



Emission experiment using a large vehicle (Tokyo Metropolitan Research Institute for Environmental Protection)

Since the launch of the "Say No to Diesel Vehicles" campaign in 1999, in particular, TMG has actively promoted the development of PM reduction devices in cooperation with numerous catalyst manufacturers and auto manufacturers both at home and abroad. TMG's efforts include introducing the catalyst-based "continuous regeneration" processing device, which was starting to circulate in western countries, in the "DPF symposium", and actively conducting operation tests at the Tokyo Metropolitan Research Institute for Environmental Protection and also with metropolitan busses.

Use of low sulfur diesel fuel for higher performance of oxidation catalyst

When the Environmental Preservation Ordinance was established in December 2000, the Metropolitan Assembly adopted an accompanying resolution for the promotion of R&D for PM reduction devices.

At the time of the Ordinance's establishment, there was an assumption that the national government would revise the Automotive NOx Law, banning the use of most diesel trucks manufactured before the introduction of the 1989 emission control. This is why TMG initially promoted the development of PM reduction devices for use on vehicles that were to be allowed to remain operational for an extended period of time under the revised law, namely busses manufactured before the 1989 emission control and trucks manufactured under the Short Term Regulation.

The major achievement of our technological development is the enhanced performance of oxidation catalyst. It was previously believed that even post-1988 existing diesel vehicles require the installation of DPF to meet the standards set in the Ordinance.

However, the introduction of low sulfur diesel fuel dramatically improved the performance of the oxidation catalyst, to a level whereby its installation, which is much cheaper than DPF, could meet the Ordinance's standards.

Since the technology was not sufficient to reduce PM of pre-1988 vehicles to the stipulated standards, the development of high-performance DPF also progressed for application on pre-1988 busses.

Overcoming the national government's postponement in enforcing the Automotive NOx & PM Law

While TMG was achieving technological development required for smooth enforcement of the Ordinance, the national government abruptly announced in March 2002 that the implementation of the Automotive NOx & PM Law would be postponed by up to two and a half years, as explained earlier (Inadvertency 4). The move increased demands for DPE for use in pre-1988 diesel trucks, which could legally remain on the road as long as they install PM reduction devices for compliance with the Ordinance.

It was a tough challenge to develop DPF with a performance high enough for installation in pre-1988 diesel trucks manufactured under no emission control, which therefore release massive PM and come in varying conditions compared to busses from the same period. However, active initiatives by catalyst manufacturers have made it possible to apply several generic DPF models for these vehicles.



Installation of a PM reduction device

During this period, TMG and other local governments established a subsidization program for

the installation of PM reduction devices. Tokyo and other neighboring prefectures and cities also

issued a joint call for cooperation to manufacturers of such devices in April and November 2002, seeking their increased supplies, performance enhancement and price reduction.

Today (as of the end of July, 2003), eight major prefectures and cities in Greater Tokyo Area have a common certification system for PM reduction devices, granting certification to 20 models of DPF by 16 companies and 31 models of oxidation catalysts by 9 companies.

[TMG's Achievement 4] Collaboration with the industrial circle to accelerate the "New Long-Term Regulation" by two years

- (1) In the "Say No to Diesel Vehicles" campaign launched in 1999, TMG called for an accelerated and enhanced implementation of the "New Long-Term Regulation", originally scheduled to start in 2007. Strong requests were also sent to the Japan Automobile Manufacturers Association (JAMA) and the Petroleum Association of Japan (PAJ) to develop automotive technologies for lower PM / NOx emission, and distribute low sulfur diesel fuel, essential in achieving the task.
- (2) In response to TMG's repeated request for a schedule acceleration and the joint statement by JAMA and PAJ in March 2000 expressing their resolve to address TMG's request actively (toward accelerated implementation), the national government finally decided in November this year to implement the "New Long-Term Regulation" two years ahead of schedule (2005 enforcement) and tighten emission control.
- (3) However, the Japanese regulations remain insufficient, compared to those of the United States, and require further tightening.

TMG's enthusiasm building up a momentum and forcing related industries into action

Regarding the "New Long-Term Regulation" on automotive emission, the national government's Central Environment Council compiled the third round of recommendations in December 1998, aiming to halve automotive emission from the level defined in the New Short-Term Regulation by FY2007.

However, replacement of existing vehicles to models compliant with the latest regulatory standards would require several years after the implementation of the New Long-Term Regulation. It was therefore imperative to accelerate the enforcement of the New Long-Term Regulation itself to urgently alleviate air pollution in Tokyo.

In the "Say No to Diesel Vehicles" campaign in August 1999, TMG began calling for the accelerated implementation of the New Long-Term Regulation and tighter emission control. TMG appealed that automotives that clear the New Long-Term Regulation, slated for enforcement in 2007, should be developed as soon as possible to enable acceleration of the Regulation. The call was a reflection of Tokyo's determination to protect the health of Tokyo citizens at as early stage as practically possible.

We also stimulated public debates on the need for tighter diesel emission control through organizing discussion sessions with the Governor and online debate, issuing so-called Green Paper environmental reports, and arranging public debate meetings.

Joint statement by JAMA and PAJ

In November 1999, TMG invited representatives of seven Japanese diesel vehicle manufacturers to the TMG complex, where Governor Ishihara demanded that they actively pursue technological

development and develop / produce / market diesel vehicles with low PM emission as soon as possible so as to protect the lives of Tokyo citizens.

Since the distribution of low sulfur diesel fuel is crucial in achieving this goal, TMG also issued a strong request that PAJ urgently reduce the sulfur content of diesel fuel to a level that enables practical application of new emission purification technologies.



Tokyo Governor issuing a request to JAMA

In response, JAMA and PAJ issued a joint statement in March 2000, expressing their resolve to "actively facilitate early implementation of the New Long-Term Regulation on PM emission from diesel vehicles, scheduled for implementation in around 2007, through developing and marketing PM-reduced diesel vehicles and coinciding it with the distribution of low sulfur diesel fuel".

It was a moment when TMG's enthusiasm successfully forced the two industries into action, representing the "first significant achievement" of the "Say No to Diesel Vehicles" campaign. Around this time, TMG also repeatedly made various requests to the national government by itself or in partnership with other bcal governments, seeking early enforcement of the New Long-Term Regulation and tighter emission control.

Slow and insufficient response of the national government, approving two-year acceleration

TMG's strong resolve on diesel vehicle control and its campaign on related industries were combined with active response from JAMA and PAJ to TMG requests, to finally force the national government into action.

In its fourth round of recommendations, the Central Environment Council recommended the implementation of the New Long-Term Regulation on PM in 2005, "two years" ahead of the initial schedule.

The recommendations also stated to consider a tighter regulation standard than the original target of "half the target defined in the New Short-Term Regulation (0.18g/kWh)". The specific standard was set (0.027g/kWh) in the Council's fifth round of recommendations, released in April 2002 (for diesel cargo vehicles weighing over 3.5 tons).

It is needless to say that these recommendations were largely attributable to TMG's persistent campaign for accelerated "New Long-Term Regulation" and tighter PM control.

However, it should be noted that the United States plans to introduce an even tighter regulation (0.013g/kWh, around half the standard set in the New Long-Term Regulation) in 2007, just two years after the New Long-Term Regulation goes into effect.

A letter of question to the Prime Minister to verify the national government's commitment

Hearing that the national government is determined to "enforce the world's tightest emission control (statement by the Prime Minister)" TMG sent a letter in May 2003 to the government (Prime Minister and Environment Minister), calling for the introduction of a tighter regulation standard than that of the United States to officially lead the rest of the world in automotive pollution measures.

In its response, the national government indicated to consider tighter control, but failed to set out future course of regulatory progress that would outperform the United States. The response lacked specific detail such as regulation standards and implementation timings, and did not show any sense of crisis on the matter. In the seventh round of recommendations released in July of the same year, the Central Environment Council promised to explore future regulations to follow the New Long-Term Regulation, but failed to include any specifics.

In a bid to protect the health and lives of Tokyo citizens, TMG will continue to collaborate with eight major prefectures and cities in Greater Tokyo Area<u>as well as companies / business</u> operators that work sincerely toward the prevention of automotive pollution, in pressuring the national government to implement fundamental countermeasures.

[TMG's Achievement 5] Promoting the proliferation of clean and low-pollution trucks

- (1) Starting 1999, as part of the "Say No to Diesel Vehicles" campaign, TMG has advocated replacing diesel vehicles with low-pollution vehicles. <u>In 2000, the "New Market Creation Strategy Council" was established together with auto manufacturers, gas station operators and corporate diesel users in a bid to promote the proliferation of extremely low-pollution vehicles powered with LPG and CNG.</u>
- (2) As a result, the number of LPG vehicles in Tokyo has increased 2.3 times to 3,888, while that of CNG vehicles has surged 13 folds to 3,048 over the past four years.

Long-standing advocate of low-pollution vehicles as replacement for diesel vehicles

In 1999, TMG focused on the adverse health effect of PM discharged from diesel vehicles, and launched the "Say No to Diesel Vehicles" campaign based on the conviction that diesel vehicles, as they were in those days, were unsuitable for use in Tokyo. The campaign contains five proposals, one of which was to "replace business-use diesel vehicles with bw-pollution vehicles wherever practically possible".

While the national government was slow to act on diesel control, TMG initiated a campaign for advocating low-pollution vehicles in addition to demanding tighter regulatory control. There are LPG- and CNG-fueled low-pollution alternatives available in small and medium-size cargo vehicles.

LPG- and CNG-fueled vehicles as low-pollution trucks

LPG vehicles are powered with liquid petroleum gas (commonly known propane as gas), CNG whereas vehicles operate on compressed natural gas, the raw material for producing city gas for household distribution.

LPG vehicles are now available at prices comparable to diesel vehicles in terms of both vehicle and fuel costs.

Both of these types represent lowpollution vehicles, discharging little soot or PM and minimal NOx emission. Comparison of emission characteristics by fuel (2-ton cargo vehicles)



(Ratio) Note: Figures are when the NOx / PM content in diesel emission is defined as one Source: TMG Environment Bureau

"New Market Creation Strategy Council" as a vehicle for proliferation promotion

Despite various public support measures, the proliferation of LPG vehicles and CNG vehicles stagnated due to the reluctance of three parties involved. Users were reluctant to buy such vehicles because of limited access to such fuel, while auto manufacturers were reluctant, citing slow sales. Operators of fuel infrastructures did not increase stations offering such fuel because of these vehicles' low proliferation.

In order to break the deadlock by "mass purchase, cheap production and enhanced fuel access", and replace diesel vehicles with low-pollution vehicles for expanded proliferation, TMG set up the "New Market Creation Strategy Council" with private-sector businesses in 2000, with the aim of creating a new market for LPG and CNG vehicles. The council conducted several energetic meetings.

As a result, the council successfully compiled joint initiatives of over 200 participating companies for increasing accessibility of low-pollution fuel, reducing prices of low-pollution vehicles and encouraging users to adopt low-pollution vehicles. It also adopted and announced the "Tokyo Declaration for New Market Creation" detailing initiatives for expanding the proliferation of LPG and CNG vehicles.

TMG Environmental Preservation Ordinance mandating the introduction of low-pollution vehicles

The Environmental Preservation Ordinance stipulates that businesses that us e 200 or more vehicles, must introduce low-pollution vehicles to their fleet at a set ratio specified by TMG at a minimum by the end of FY2005.

TMG will also arrange loans or provide subsides to small and medium sized enterprises purchasing low-pollution vehicles or replacing their diesel vehicles with latest regulation compliant vehicles.

In February 2002, TMG invited auto manufactures to the TMG complex to seek their cooperation in the early development / marketing of trucks with drastically reduced PM / NOx emission.

In February 2003, diesel vehicle manufacturers were again requested to promote the replacement of diesel vehicles and provide relevant information actively to users.

The user side also implemented pioneering initiatives, as seen in trucking businesses organizing shared operations in urban areas, and courier services actively switching to the use of low-pollution trucks.



Seeking the cooperation of auto manufacturers in the development of low-pollution diesel vehicles

These initiatives have led to a dramatic proliferation of LPG and CNG vehicles, whose demands had been stagnant.

Since the launch of the "Say No to Diesel Vehicles" campaign, the number of LPG vehicles registered in Tokyo has increased 2.3 times from 1,723 in 1999 to 3,888 four years later as at the end of March 2003.

Similarly, the number of CNG vehicles surged around 13 fold from 234 to 3,048. (The figures are the total of cargo vehicles and special-purpose vehicles.)



Source: LPG Vehicle Promotion Council, Tokyo Gas

[TMG's Achievement 6] Coordinating with local governments across the nation to implement the "Illicit Diesel fuel Eradication" campaign

- (1) In a bid to eliminate and eradicate illicit diesel fuel, TMG launched the "Illicit Diesel fuel Eradication" campaign in September 2000, and since has actively implemented various measures such as cracking down on manufacturers / distributors of such diesel fuel, and organizing roadside inspections in cooperation with local governments nationwide.
- (2) All-out efforts to eradicate illicit diesel fuel have successfully reduced the rate of finding illicit diesel fuel in roadside inspections from 14% in FY2000 to 1% in FY2002.

TMG's active campaign to eradicate illicit diesel fuel in adverse conditions

TMG launched the Illicit Diesel fuel Eradication campaign in September 2000 to eliminate and eradicate illicit diesel fuel, which facilitate tax evasion and air pollution, from Tokyo and its neighboring prefectures.

Since then, under the slogan of (1) No Manufacturing, (2) No Purchasing and (3) No Using, a variety of operations has been implemented, such as over 11,000 roadside / onsite inspections, coordinated nationwide inspections, crackdown on manufacturers / distributors of illicit diesel fuel and enforcement of the eradication campaign. These operations have uncovered manufacturing bases in Tokyo, and underground channels from identified manufacturing to distribution, while overcoming numerous dangers and difficulties. The grip on tax evasion has been tightened through the Regional Tax Law, leading to a number of achievements.



Diesel fuel sampling / soot inspection

Fourteen prefectures in eastern Japan have united

to establish a liaison council to wipe away manufacturing bases for illicit diesel fuel. In addition, diesel fuel distributors / users such as petroleum industry corporations, construction industry associations and trucking associations have been invited to set up the Illicit Diesel fuel Eradication Promotion Council to carry out PR / educational campaigns for eliminating such oil.

TMG has also successfully uncovered a case involving the use of A Heavy Oil for fueling trucks, and coordinated with neighboring prefectures / cities to conduct emergency on-site investigations / guidance on factories that abandoned a massive amount of sulfate pitch in drums in open fields under the Waste Processing Law.

Twelve prefectures and fifteen cities of the Greater Metropolitan Region banded together to establish the Regional Liaison Council for the Prevention of Improper Disposal of Industrial Waste (Industrial Waste Scram 27) to enhance wide-area coordination in preventing illegal dumping of sulfate pitch.

Diverse initiatives reducing the rate of finding illicit diesel fuel to 1%

As detailed above, TMG has undertaken numerous operations to eradicate illicit diesel fuel in coordination with other local governments across the nation, and making use of existing laws / regulations to win a fierce battle against malicious tax evaders.

As a result, the rate of finding illicit diesel fuel in roadside inspections has dramatically dropped from 14% in FY2000 to 1% in FY2002.



Transition in the rate of detecting illicit diesel fuel use

Source: TMG Environment Bureau

Outlines of Automotive Pollution Measures Stipulated in the Environmental Preservation Ordinance>

TMG adopted the Ordinance on Environmental Preservation to Secure the Health and Safety of Citizens of the Tokyo Metropolitan Area (commonly known as the Environmental Preservation Ordinance) in December 2000 to alleviate the city's serious air pollution, which showed no sign of improvement under conventional measures by the national government. Under the Ordinance, TMG has implemented its own automotive pollution measures, including the nation's first initiative to control diesel vehicles that do not comply with standards defined in the Ordinance [Ordinance enforcement date: April 1, 2001 (The diesel vehicle control will start on October 1, 2003)]

Submission of the Vehicle Environmental Management Plan (Article 28)

Obligation to introduce low-pollution vehicles (Article 35)

Operation ban on diesel vehicles (Article 37) A business that operates a fleet of 30 vehicles or above must submit a Vehicle Environmental Management Plan, detailing its efforts to streamline automotive use and introduce lowpollution vehicles. The business must also report the progress of its plan.

A large business that operates a fleet of 200 vehicles or above must introduce low-pollution vehicles, defined by the Governor, to at least 5% of its total business-use fleet by FY2005.

Diesel vehicles such as trucks and busses (excluding passenger vehicles) that do not comply with the PM emission standard are banned from use in Tokyo. This provision does not affect vehicles for the first seven years since the initial new-car registration. Vehicles that are over seven years old may be considered compliant vehicles if they are fitted with PM reduction devices certified by TMG.

<Vehicles subject to the regulation>

• Passenger vehicles are exempt. (Vehicles with the license plate classification number of 3, 5 or 7) Vehicles that are classified as "passenger use" in the usage section of their automobile inspection certificates are exempt from this regulation.



Regulated vehicles	Example	License plate classification number	Remarks
Cargo vehicles	Trucks, vans	1, 4, 6	Regardlessofwhetherthese
Commercial vehicles (with the passenger capacity of 11 or above)	Busses, micro-busses	2 (in some cases 5 or 7)	vehicles are for home or business use
Special-purpose vehicles	Refrigeration vehicles, cement mixer trucks	8	Models based on passenger vehicles are exempt.

Environmental information briefing by automotive dealerships (Article 47)

Ban on engine idling (Articles 52 to 54)

Ban on the use / distribution of fuel mixed with heavy oil (Articles 57 and 59)

Establishment of Automobile G-Men (Articles 61 and 152) New car dealerships must maintain documents detailing provisions of the Ordinance, emission volume, noise level, etc. of individual vehicles, and brief the content to purchasers.

Automotive drivers and users must stop the engine when parking or standing their vehicles. Parking lot operators, etc. must clearly inform their customers on the obligation to stop the engine while parking or standing.

Heavy oil and fuel blended with heavy oil discharge a greater amount of PM, etc., and are banned from use as fuel for automotives, construction machinery, etc. Their distribution as fuel for construction machinery, etc. is also prohibited.

Tokyo Metropolitan Automotive Pollution Inspectors (commonly known as Automobile G-Men) checks the implementation status of the Vehicle Environmental Management Plans, provide guidance for improvement, give instructions on the implementation of the No Idling operation, and controls fuel blended with heavy oil. Upon the introduction of diesel vehicle control, they will be given the mandate to control noncompliance vehicles from October this year, conducting on-site investigations at business premises and performing roadside inspections.

<"Say No to Diesel Vehicles" Campaign (Outlines)>

STEP 1 (August – End of November, 1999)

A group of measures that called on the citizens and business of Tokyo to initiate active debate on the direction of automotive pollution measures and action to transform the way diesel vehicles were used. TMG made "five proposals", while also pledging to provide the venues / materials for further debate and implement initiatives (ten actions).

Proposal 1: Don't ride on, purchase or sell diesel-powered passenger vehicles in Tokyo.

Proposal 2: Obligate a switch from business-use diesel vehicles to gasoline equivalents wherever such alternatives are available.

Proposal 3: Achieve early development of emission purification devices and obligate their installation to diesel vehicles.

Proposal 4: Rectify the preferential taxation system that impose lower excise on diesel fuel than gasoline.

Proposal 5: Achieve early development of vehicles that complies with the New Long-Term Regulation on diesel emission (to be enforced around 2007) to enable its accelerated implementation.

Action 1: Organize an online debate "Diesel Vehicle, Yes or No?"

Action 2: Hold an open debate session "Handling of Diesel Vehicles".

Action 3: Continuously issue "Green Paper on Diesel Vehicle Elimination".

Action 4: Make the air pollution mapping system available for public access on the Internet.

Action 5: Promote replacement of diesel vehicles used by TMG.

Action 6: Conduct joint development of diesel PM reduction devices.

Action 7: Conduct a survey on green goods distribution.

Action 8: Open a telephone hotline for reporting soot-emitting diesel vehicles.

Action 9: Conduct a walking tour along motorways.

Action 10: Coordinate low-interest loans to encourage the proliferation of low-pollution vehicles.

<u>STEP 2 (December 1999 – December 2000)</u>

Based on views and opinions gathered in STEP 1, TMG compiled a report "Countermeasures for Diesel Measures: Tokyo's Choices" to outline its basic stance on future measures on diesel vehicles, and launched the "Say No to Diesel Vehicles STEP 2" campaign that entails "Nine Measures to Challenge Diesel Emission" (development from the Five Proposals) and "Five Actions for Promoting Debate and Initiatives".

Choice 1: It is necessary to fundamentally review automobile use in Tokyo, particularly the way diesel vehicles are used, in order to protect the health of Tokyo citizens.

Choice 2: The number of diesel vehicles in Tokyo should not increase any further in view of global warming.

Choice 3: We must not deny the future of diesel vehicles.

Choice 4: We must not slow down countermeasures for diesel vehicles for reasons of economic efficiency.

Choice 5: We will promote comprehensive automotive pollution measures with the focus on countermeasures for diesel vehicles.

Choice 6: As a local government with mandate from the people of Tokyo, we will force the national government and industries into action.

(Obligations introduced under the Ordinance) Measure 1: Obligation to install DPF to large cargo vehicles and busses (Proposal 3) Measure 2: Restriction to the use of diesel vehicles that do not meet the equivalent emission standard for gasoline vehicles, etc., and obligation to replace them (Proposals 1 and 2) Measure 3: Promotion of the use of automobiles that generate lower pollution Measure 4: Obligation to disclose and explain environmental information regarding automobiles (Early achievement of system reforms) Measure 5: Rectification of the preferential excise system on diesel fuel (Proposal 4) Measure 6: Enhancement of the sulfur content regulation on diesel fuel, and accelerated implementation of the New Long-Term Regulation (Proposal 5) Measure 7: Rectification of the emission testing method, which does not reflect the actual driving conditions in Tokvo Measure 8: Enhancement of the vehicle registration system with an environmental perspective, and tighter control on soot discharge in automotive emission (Establishment of a long-term strategy) Measure 9: Establishment of a long-term strategy that encompasses the introduction of fuel-cell vehicles and a modal shift

Action 1: Organize "Online Debate Part II".

Action 2: Reinforce TMG initiatives, e.g. the "Clean Up Metropolitan Busses" campaign.

Action 3: Organize the Tokyo Aozora (=blue skies) Forum to reinforce countermeasures for diesel vehicles.

Action 4: Organize an international symposium on automotive emission control.

Action 5: Collect and analyze information on diesel emission's health impact.

Noncompliant Diesel Vehicle Elimination Campaign (outlines)

In September 2002, TMG conducted "seven operations" to ensure smooth and effective implementation of diesel vehicle control one year prior to its enforcement.

As an internal promotion system, the Diesel Countermeasures Promotion Council has been set up to coordinate TMG-wide efforts, e.g. seeking cooperation from industry groups / individual businesses and conducting PR of regulation details.

TMG reference

Noncompliant Diesel Vehicle Elimination Campaign

Toward the introduction of diesel vehicle control in October 2003



Chronology (Automotive pollution actions by TMG and the national government)

TMG's key measures TMG's requests / demands to the national government

Main actions by eight major prefectures and cities in Greater Tokyo Area on citizens and businesses of Tokyo

	TMG actions (main ones)	National government actions (main
		ones)
1998 December		 Central Environment Council's report (3rd) "Future Policy for Motor Vehicle Exhaust Emission Reduction Define the target standard for the New Long-Term Regulation by around 2007 (at least half the standard of the New Short-Term Regulation) Delay the decision on the target level / year for the distribution of low sulfur diesel fuel until the end of FY2002
1999	• Shintaro Ishihara assumes Tokyo	
April	Governorship	
	• IMG proposal / demand on national government measures and budget for FY2000	
	• Reinforce emission control, review the	
	emission testing method, revise the	
August	Automotive NOx Law, etc.	
Tugust	• Launch of the "Say No to Diesel Vehicles"	
	campaign	
	• Discussions session with the Governor	
September	Automotives in the society of convenience"	
	• First Green Paper	
	"Health under threat: Economy of diesel	
	 Online debate 	
October	"Diesel vehicles, Yes or No?" (September –	
	November 1999)	
	• Open debate session "Handling of Diesel	
	Vehicles"	
November	• 2 nd Green Paper "Truth about diesel vehicles:	
	 TMG proposal / demand on FY2000 national 	
	budget	
	 Request to seven major diesel vehicle manufacturers from the development 	
	production and marketing of diesel vehicles	
	with low PM discharge	
Daaambar	 Summit meeting of seven Metropolitan prefectures and aities: A groement to initiate a 	
December	ioint control on diesel vehicles across the	
	Greater Metropolitan Area	
	• Online debate session Part II	
	" Nine Measures to Challenge Diesel Emission" (December 1999 – July 2000)	
	Emission (December 1777 – Jury 2000)	
	• Launch of the "Say No to Diesel Vehicles	

		STEP 2" campaign	
		Request to PAJ for the reduction of sulfur	
		content in diesel fuel	
2000	•	JAMA and PAJ's joint statement, in response	
March		to TMG request, committing themselves to	
		active efforts to facilitate early	
		Regulation on automotive emission	
		Distribution of low sulfur diesel fuel by	
		2005	
		Request to the national government on the	
		promotion of measures against diesel vehicles	
		(summit meeting of seven Metropolitan	
		prefectures and cities)	
		• Request for the early implementation of	
April		the New Long-Term Regulation,	
Артп		fuel practical application of DPE etc	
	•	First Tokyo Aozora Forum "DPF	
June	_	Symposium"	
	•	Second Tokyo Aozora Forum "Alternative to	
		Diesel Vehicles"	
		Decreased to the Control Environment Council	
		on future diesel emission measures	
		 Accelerated implementation of the New 	
		Long-Term Regulation, obligation of	
		DPF installation to existing diesel	
		vehicles, distribution of low sulfur	
		diesel fuel, etc.	
	•	Third Tokyo Aozora Forum "What can we do	
		for future nearth?	
	•	TMG proposal / demand on FY2001 national	
	•	TMG proposal / demand on FY2001 national government measures and budget	
July	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on 	
July	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of 	
July	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DDE technology in the feature of the fe	
July	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low suffir diasel fuel countermeasures for 	
July	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel etc. 	
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July	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting 	
July	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting of environmental preservation directors from 	
July	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting of environmental preservation directors from major cities) 	
July	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting of environmental preservation directors from major cities) TMG and major Japanese cities across 	• Interim report by the government study
July	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting of environmental preservation directors from major cities) TMG and major Japanese cities across the nation request tighter control on diesel vehicles. 	 Interim report by the government study group on technologies for diesel vehicles
July	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting of environmental preservation directors from major cities) TMG and major Japanese cities across the nation request tighter control on diesel vehicles. 	 Interim report by the government study group on technologies for diesel vehicles
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July August	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting of environmental preservation directors from major cities) TMG and major Japanese cities across the nation request tighter control on diesel vehicles. Summit meeting of seven Metropolitan prefectures and cities: Submitting an "opinion statement" to the national 	 Interim report by the government study group on technologies for diesel vehicles
July August	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting of environmental preservation directors from major cities) TMG and major Japanese cities across the nation request tighter control on diesel vehicles. Summit meeting of seven Metropolitan prefectures and cities: Submitting an "opinion statement" to the national government 	• Interim report by the government study group on technologies for diesel vehicles
July August	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting of environmental preservation directors from major cities) TMG and major Japanese cities across the nation request tighter control on diesel vehicles. Summit meeting of seven Metropolitan prefectures and cities: Submitting an "opinion statement" to the national government council 	• Interim report by the government study group on technologies for diesel vehicles
July August	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting of environmental preservation directors from major cities) TMG and major Japanese cities across the nation request tighter control on diesel vehicles. Summit meeting of seven Metropolitan prefectures and cities: Submitting an "opinion statement" to the national government council Accelerated implementation of the New Long-Term Regulation reduction of the New Long-Term Regulation of the New Long-Term Regulation reduction of the New Long-Term Regulation reduction of the New Long-Term Regulation reduction of the New Long-Term Regulation of the New Long-Term Regulation reduction of the New Long-Term Regulation of the New Long-Term Regu	• Interim report by the government study group on technologies for diesel vehicles
July August	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting of environmental preservation directors from major cities) TMG and major Japanese cities across the nation request tighter control on diesel vehicles. Summit meeting of seven Metropolitan prefectures and cities: Submitting an "opinion statement" to the national government council Accelerated implementation of the New Long-Term Regulation, reduction of sulfur content in diesel fuel etc 	• Interim report by the government study group on technologies for diesel vehicles
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July August September	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting of environmental preservation directors from major cities) TMG and major Japanese cities across the nation request tighter control on diesel vehicles. Summit meeting of seven Metropolitan prefectures and cities: Submitting an "opinion statement" to the national government council Accelerated implementation of the New Long-Term Regulation, reduction of sulfur content in diesel fuel, etc. 	 Interim report by the government study group on technologies for diesel vehicles Report on general countermeasures for
July August September	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting of environmental preservation directors from major cities) TMG and major Japanese cities across the nation request tighter control on diesel vehicles. Summit meeting of seven Metropolitan prefectures and cities: Submitting an "opinion statement" to the national government and the Central Environment Council Accelerated implementation of the New Long-Term Regulation, reduction of sulfur content in diesel fuel, etc. 	 Interim report by the government study group on technologies for diesel vehicles Report on general countermeasures for automotive emission in the future (interim
July August September October	•	 TMG proposal / demand on FY2001 national government measures and budget Enhanced emission control, review on the emission testing method, revision of the Automotive NOx Law, development of DPF technology, introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. Emergency appeal to the national government for tighter control on diesel vehicles (Meeting of environmental preservation directors from major cities) TMG and major Japanese cities across the nation request tighter control on diesel vehicles. Summit meeting of seven Metropolitan prefectures and cities: Submitting an "opinion statement" to the national government Council Accelerated implementation of the New Long-Term Regulation, reduction of sulfur content in diesel fuel, etc. Announcement of TMG opinions on the interim report by the government study group on technologies for diesel vehicles 	 Interim report by the government study group on technologies for diesel vehicles Report on general countermeasures for automotive emission in the future (interim report)

•	 Regarding the measurement results of air pollution in FY1999 Concentration of NO2 and SPM has dropped, but remains high. Multiple monitoring stations in Tokyo registered among the worst ten results of the nation. 	
•	Launch of the Illicit Diesel fuel Eradication campaign	
•	 Submission of TMP opinions on the government's interim report on general countermeasures for automotive emission Enhanced emission control, shorter grace period in the revision of the Automotive NOx Law, etc. TMG proposal / demand on FY2001 national budget 	

	TMG actions (main ones)	National government actions (main ones)
2000 November December	 "Tokyo Declaration for New Market Creation" for promoting the proliferation of low-pollution vehicles Operation launch of vehicles (metropolitan busses) fitted with "continuous regeneration" DPF, and fueled with low sulfur diesel fuel Summit meeting of seven Metropolitan prefectures and cities: Adopting an "opinion statement" on automotive emission measures in the Greater Metropolitan Area 	 Central Environment Council's report (4th) "Future Policy for Motor Vehicle Exhaust Emission Reduction" Recommending that the implementation of the New Long- Term Regulation be accelerated by two years, i.e. achieving the targets / regulation reinforcement set out in the New Long-Term Regulation by 2005 Aiming for the introduction of low sulfur diesel fuel by the end of 2004
	 Enactment of the "Environmental Preservation Ordinance" First full revision of the Pollution Prevention Ordinance in 30 years, reinforcing automotive pollution measures, e.g. diesel vehicle control and the obligation to introduce low pollution vehicles "Tokyo Vision 2000" authorizing the subsidization program for the distribution of low sulfur diesel fuel 	 "Future Policy on General Measures for Motor Vehicle Exhaust Emission Reduction" (final report)
2001 February	• Announcement of the results of a sampling survey for the "Illicit Diesel fuel Eradication" campaign (Rate of finding	
March April	 Opening of TMG natural gas fueling station "Tokyo Declaration for the Eradication of Illicit Diesel fuel" Enforcement of the Environmental 	
May	 Environmental Preservation Ordinance Launch of operations by Tokyo Metropolitan Automotive Pollution Inspectors (Automobile G-Men) 	 Final report by the government study group on technologies for diesel vehicles Passive stance on DPF installation to diesel vehicles manufactured before the 1988 regulation
June July	 Compilation of TMG guidelines for certifying PM reduction devices (certification application to open in July) 	 Partial revision of the Automotive NOx Law (promulgation of the Automotive NOx & PM Law) Including PM, released by existing diesel vehicles, subject to the Law Development of an action plan for the development and proliferation of low- pollution vehicles (METI, MLIT, Environment Ministry)
August	 Enactment of Saitama Prefectural Ordinance for Environmental Preservation TMG proposal / demand on FY2002 national government measures and budget Enhanced emission control, review on the emission testing method, development of DPF technology, 	

Chronology (Automotive pollution actions by TMG and the national government)

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	introduction of low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc.	• Seeking public comments on the revision
	• Regarding the measurement results of air	content of the Automotive NOX & FM Law
G (1	pollution in FY2000	
September	• Concentration of NO2 is level, and that of SPM is on the decline although	
	both still being at a high level.	
	Multiple monitoring stations in Tokyo	
	of the nation.	
	• Emergency meeting between the Tokyo Governor and national MLIT Minister for	
	 First meeting of the investigation committee 	
	on the relationship between diesel emission and hav fever	
October	• Submission of a "proposal statement"	
	seeking partial revision of the Automotive	
November	 Introduction of business support measures 	
	creating a subsidization program for PM	
	reduction devices, and expanding the	
	for the introduction of low-pollution	
	vehicles	
	• TMG proposal / demand on the compilation of FY2002 national budget	
December	• PAJ decision to respond to TMG request, accelerating the initial timeframe and	
	diesel fuel across Tokyo and many other parts of the Greater Metropolitan Area in	• Environment Ministry: Announcing its stance on postponing the enforcement of
	April 2003	the Automotive NOx & PM Law and
	 Introduction of car stickers for vehicles fitted with TMG certified PM reduction devices 	postponement of up to two and a half years)
	• Summit meeting of seven Metropolitan	
	prefectures and cities: Resolution to	
	promote the proliferation of low-pollution vehicles	
	• Disclosure of the results of a joint roadside	
	diesel fuel sampling survey by 27 prefectures nationwide (Rate of finding	
	heavy-oil blend: 2.2%)	
	• Submitting a question letter to the	
	postponement in the application of the	
	Automotive NOx & PM Law	
2002	• Lodging a formal "opposition" to the	• Formal request for opinions, according to
January	national government policy to postpone the	law, trom Environment Minister to the Tokyo Governor regarding the enforcement
	Law (Tokyo Governor)	postponement.
February		
	 Requesting diesel vehicle manufacturers to achieve the early development / marketing 	
	of low-pollution trucks and affordable PM	

March April	 reduction devices with high performance Enactment of the Chiba Prefectural Ordinance regarding the containment of particulate matter emission from diesel vehicles Announcement of the results of an opinion survey on automotive use and the environment 90% of Tokyo citizens recognizing automobiles as the primary cause of air pollution Announcement of the results of a sampling survey for the "Illicit Diesel fuel Eradication" campaign (Rate of finding heavy-oil blend: 3%) 	 Partial revision of government directives, etc. based on the Automotive NOx & PM Law Forcibly adopting the Law's enforcement postponement and grace period Report by a study group on assessing the risk of diesel PM Recognizing diesel PM as carcinogenic
M ay June	 Opinion statement on the promotion of diesel vehicle measures (Metropolitan Assembly) Full-scale implementation of the "No Goods Distribution with Diesel Vehicles" campaign at TMG complex Requesting PM reduction device manufacturers for development promotion and supply expansion (Summit meeting of seven Metropolitan prefectures and cities) 	 Cabinet approval of the basic policy on diesel emission reduction based on the Automotive NOx & PM Law Adopting the policy of generally achieving the prescribed environmental quality standards by 2010 Central Environment Council's report the (5th) "Future Policy for Motor Vehicle Exhaust Emission Reduction" Recommending a review on the target figures in the New Long-Term Regulation on diesel vehicles, and the testing method of such vehicles Launch of a subsidization program for the introduction of DPF / low-pollution
	• Establishment of a joint certification program among seven Metropolitan prefectures / cities on PM reduction devices (effectuation on June 1)	vehicles (MLIT)
	 TMG proposal / demand on FY2003 national government measures and budget Withdrawal of the transitional measure for the Automotive NOx & PM Law, adoption of ultra-low sulfur diesel fuel, countermeasures for illicit diesel fuel, etc. 	

	TMG actions (main ones)	National government actions (main ones)
2002 July		• Establishment of a certification system for diesel vehicles with ultra-low PM emission (MLIT)
August	 Regarding the measurement results of air pollution in FY2001 Concentration of NO2 is level, and that of SPM is on the decline, although both still are at a high level. All monitoring stations failed to reach target. Multiple monitoring stations in Tokyo registered among the worst ten results of the nation. 	
September	 Enactment of Kanagawa Prefectural 	
	 Differentiation of Ranagawa Prefetchard Ordinance on Conservation of Living Environment Launch of the "Noncompliant Diesel Vehicle Elimination" campaign 	
	 Advance distribution launch of low sulfur diesel fuel at some gas stations in Tokyo PAJ decision to respond to the TMG request, commencing nationwide distribution of low sulfur diesel fuel in 	
October	April 2003, 21 months ahead of the national regulatory timeframe	 Enforcement of the Automotive NOx & PM Law (revised Automotive NOx Law)
	 First ruling in the Tokyo Air Pollution Lawsuit TMG announcing its decision to not appeal Requesting that the national 	 First ruling in the Tokyo Air Pollution Lawsuit The national government appealing the ruling, with no acknowledgement of its responsibility
November	 government acknowledge its regulatory responsibility and opt not to appeal Opinion statement on the introduction of effective diesel vehicle control (Metropolitan Assambly) 	
	 TMG proposal / demand on the compilation of FY2003 national budget (top priority items) Expansion of PM reduction devices subject to the subsidization program Summit meeting of seven Metropolitan program 	
December	 Adopting a declaration on diesel emission measures Establishing the Diesel Countermeasure Promotion Headquarters 	
	 Seeking cooperation from diesel vehicle manufacturers, PM reduction device manufacturers, auto service industry, etc. Approving stickers for vehicles fitted with TMG certified PM reduction devices 	
	• Request to the national government for enhanced auto emission control (Summit meeting of seven Metropolitan prefectures and cities)	
	• Disclosure of the results of a nationwide	

Chronology (Automotive pollution actions by TMG and the national government)

	 roadside diesel fuel sampling survey (Rate of finding heavy-oil blend: 2.5%) Opinion statement on the creation of a system extending assistance to persons with health damage caused by air pollution (Metropolitan Assembly) 	
2003 January February	 Requesting prefectural governors and mayors of designated major cities in Japan for cooperation in implementing diesel vehicle control (Summit meeting of seven Metropolitan prefectures and cities) Establishment of the "General Inquiry Office" regarding diesel vehicle control Tokyo Bus Association declaring early completion in installing PM reduction devices on to its fleet (June) Request to TSE-listed companies for cooperation in complying with diesel 	 In his policy speech at the Diet, the Prime Minister declares the intention to implement the world's toughest emission control on diesel vehicles".
	 Request to diesel vehicle manufactures for cooperation in promoting user replacement and enhancing the supply of PM reduction devices Request to the national government for a fundamental review of automotive 	
March	 pollution measures Active initiatives for controlling existing diesel vehicles and extending assistance to victims of automotive pollution Launch of a new loan system for users 	 Partial introduction of "allowable limits in automotive emission" based on the recommendation in the 5th report of the Central Environment Council Insisting that Japan's emission control on diesel / gasoline vehicles will be the
April	 replacing diesel vehicles Resolution on the social responsibility of automotive manufacturers in diesel vehicle measures (Metropolitan Assembly) 	toughest in the world from 2005 onwards.
Мау	 PAJ move to respond to TMG request, commencing the sales of low sulfur diesel fuel (with the sulfur content of 50ppm or lower) at gas stations across the nation PAJ announcement of partial introduction (2005) and full distribution (2007) of ultralow sulfur diesel fuel Submitting a question letter to the Prime 	 Response to the question submitted by Tokyo Governor (Environment Minister) Insufficient response, justifying postponed enforcement of the Automotive NOx & PM Law
June	Minister and Environment minister, demanding that the national government implement automotive pollution measures that lead the rest of the world (Tokyo Governor)	
	 Announcement of an investigation results in the effects of diesel emission on hay fever Announcement of the results of a sampling survey for the "Illicit Diesel fuel Eradication" campaign (Rate of finding a 0413heavy-oil blend: 1%) 	 Applications closed for the subsidization program for DPF installation, etc. MLIT Minister to consider extension of the subsidization program for DPF installation, etc.
	• Joint PR event with eight major prefectures and cities in Greater Tokyo Area marking the final 100 days before the	

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Glossary and Notes

Retrofit

To install a PM reduction device to an existing vehicle to reduce polluting components in its emission

(Originally, to combine a new product with an old product to enhance the original functions)

Kobe District Court ruling on the Amagasaki pollution care

A ruling handed down at the Kobe District Court on January 31, 2000 in the so-called Amagasaki pollution case lodged by residents of Amagasaki City, Hyogo Prefecture with officially recognized pollution-related illnesses, suffering from air pollution caused by automotive emission, etc., as well as bereaved families of victims of such diseases. They took legal action against the national government and Japan Highway Public Corporation, which manage highways and other national motorways, seeking damage compensation and a halt to the discharge of air polluting substances.

In the ruling, the court acknowledged a causal relationship between automotive emission and health damage, and ordered the national government, etc. to pay a total of 330 million yen in compensation and halt the discharge of suspended particulate matter (SPM) beyond a set level (1.5 times the environmental quality standard).

Question letter from Governor Ishihara to Prime Minister Koizumi

On May 9, 2003, Tokyo Governor Shintaro Ishihara submits a question letter to Prime Minister Junichiro Koizumi and the Environment Minister regarding enhancement to automotive emission measures.

- (1) PM regulation on new vehicles
 - In view of the Prime Minister's public pledge to "enforce the world's toughest emission control, the national government is urged to adopt regulations tighter than those of the United States, and lead the rest of the world in automotive pollution measures.
- (2) Countermeasures for existing diesel vehicles
 - Implementing countermeasures for existing diesel vehicles is an urgent task in order to protect the lives and health of the people of Tokyo / Japan.
 - The national government must change its conventional attitude, and implement fundamental measures swiftly and strongly, e.g. accelerating the enforcement of the Automotive NOx & PM Law, and creating a loan system with effective substance.
- (3) Early introduction of low sulfur diesel fuel
 - Necessary measures must be taken urgently to achieve the early distribution of ultra-low sulfur diesel fuel with the sulfur content of 10ppm or below.
 - Fundamental measures must be taken to stem the circulation of illicit diesel fuel.

Online debate

One of the ten actions defined in the "Say No to Diesel Vehicles" campaign, launched in August 1999. TMG organized online debate on the future usage and countermeasures for diesel vehicles in Tokyo. The debate was conducted from September 20 to November 30, 1999, attracting over 13,000 hits and approx. 830 posts.

In the "Say No to Diesel Vehicles STEP 2" campaign, online debate Part II was organized from December 1999 to July 2000, attracting 968 posts.

A Heavy Oil

Heavy oil products have various levels of viscosity, carbon residue, sulfur content and pour point, which are adjusted according to usage. In JIS standard, A Heavy Oil is defined as having the kinematic viscosity of 20mm2/s or below, sulfur content of 2.0% or below, etc.

A Heavy Oil is used as fuel for factory boilers, building heaters, diesel engines on small vessels and heating for green houses.

1988 regulation, Short-Term Regulation, Long-Term Regulation, New Short-Term Regulation, New Long-Term Regulation (cargo vehicles and busses)

Emission regulations on new vehicles based on the Air Pollution Control Law, covering the following substances. The table below shows regulatory standards for large diesel vehicles (3.5 tons or over).

	Year of introduction	CO (g/kWh)	HC (g/kWh)	NOx (g/kWh)	PM (g/kWh)
1989 regulation	1989	790	510	400	-
Short-Term Regulation	1994	7.4	2.9	6.0	0.7
Long-Term Regulation	1998	7.4	2.9	4.5	0.25
New Short-Term Regulation	2003	2.22	0.87	3.38	0.18
New Long-Term Regulation	2005	2.22	0.17	2.0	0.023

Note 1: These substances are regulated on average values.

Note 2: The 1988 regulation is according to the Six Mode test.

Green Paper

One of ten actions defined in the "Say No to Diesel Vehicles" campaign. An information booklet summarizing the concepts and data as the basis for discussions. TMG has issued the first Green Paper "Health under threat: Economy of diesel vehicles" and the second Green Paper "Truth about diesel vehicles: Resolving three misconceptions".

Photochemical smog

Nitrogen oxides (NOx) and hydrocarbon (HC), released from vehicles and factories, make a photochemical reaction when exposed to the strong UV rays of the sun, generating ozone and other photochemical oxidants.

Under certain weather conditions, these photochemical oxidants amass together to appear like white mist. This state is called "photochemical smog".

Photochemical smog tends to occur on a hot days that have strong sunbeams but little wind.

Latest regulation compliant vehicles

Automotives that comply with the latest of automotive emission regulations currently in place.

Oxidation catalysts

Device to be installed on the exhaust pipe of a diesel vehicle to reduce PM in diesel engine emission by way of the catalyst effect of platinum (oxidation effect).



Of particulate matters, substances prone to oxidation (SOF, etc.) are oxidized with the effect of a catalyst (platinum, etc.), and converted into harmless substances such as carbon dioxide. The device also oxidizes carbon monoxide and hydrocarbons, which have adverse effects on human health, and converts them into harmless / odorless substances, while also reducing offensive emission odor.

Automotive emission

Gas that consists of carbon monoxide (CO), hydrocarbon (HC), particulate matters (PM) and other substances, generated when automotive vehicles are in operation, which may have adverse effects on human health and the living environment, and are designated under the Air Pollution Control Law

Emission measurement methods

Due to the difficulty in measuring emission of automotive vehicles in actual operation, it is normally measured with a chassis dynamometer (testing device that allows vehicles to operate as if they are driving on the road), simulating automotive operations on general road conditions. Emission volume changes significantly according to the operation conditions, which are therefore fixed under specific testing modes during measurement. The United States uses the "transient mode", which covers the transient process of complex speed changes in real-life driving. EU employs a testing protocol with greater engine load than in Japan.

Japan uses the following modes as the official testing methods for emission control of new vehicles. These modes do not reflect actual driving conditions in urban areas. Upon TMG request, the 5^{th} report by the Central Environment Council in 2002 recommended a review of such testing methods, e.g. introduction of the transient mode, in the New Long-Term Regulation to be enforced in 2005.

	Gross vehicle weight		
	2.5 tons or under	Over 2.5 tons	
Gasoline / LPG vehicles	10 / 15 Mode, 11 Mode	13 Mode	
Diesel vehicles	10 / 15 Mode	Diesel 13 Mode	

Note: The gross weight brackets for gasoline and LPG vehicles were changed to "3.5 tons or under" and "over 3.5 tons" at the end of 2001.

Automotive NOx Law

(Promulgated in June 1992: The Law concerning Special Measures to Reduce the Total Amount of Nitrogen Oxides Emitted from Motor Vehicles in Specified Areas)

- Bans the ownership of older vehicles with large NOx emission, in order to encourage replacement with vehicles manufactured in stricter standards. The law stipulates the following in addition to conventional automotive emission control, so as to satisfy NO2 environmental quality standard for NO2 (nitrogen dioxide) in large cities.
 - Drawing up the basic emission reduction policy (national government) and emission reduction plan (Governors).
 - (2) Imposing regulations by vehicle type (restricting the ownership of specific types of vehicles in specified areas)
 - (3) Defining guidelines for rationalizing automotive use (indicating desirable automotive use for lower NOx emission)

Automotive NOx & PM Law

(Promulgated in June 2001: The Law concerning Special Measures to Reduce the Total Amount of Nitrogen Oxides and Particulate Matter Emitted from Motor Vehicles in Specified Areas)

- Bans the ownership of older vehicles with large NOx and PM emission, in order to encourage replacement with vehicles manufactured in stricter standards.
- Outlines
 - (1) Drawing up the basic emission reduction policy (national government) and emission reduction plan (Governors).
 - Achieve the environmental standard in air quality by FY2010
 - (2) Imposing regulations by vehicle type (restricting the ownership of specific types of vehicles in specified areas)

Prevent noncompliant vehicles in NOx & PM emission from registering. Do not allow registration of existing vehicles beyond the grace period, defined according to vehicle type and initial registration year.

- (3) Implementing measures to contain emission by business operators Develops a mechanism to contain NOx / PM emission through mandating businesses of a certain scale or larger to prepare an automotive use management plan
- Areas subject to the regulations Kanto: Tokyo, Saitama, Chiba and Kanagawa Chubu: Aichi and Mie

Kansai: Osaka and Hyogo

*There are some exempt areas within these prefectures.

• Vehicles subject to the regulations Cargo vehicles, commercial vehicles (large busses, microbuses), diesel passenger vehicles and special-purpose vehicles based on these types of vehicles, registered for primary use in the areas subject to the regulations

*The grace period for vehicles subject to the regulations is indicated in the Remarks column of their vehicle registration certificates.

• Despite TMG's opposition, the national government postponed the law's enforcement and extended its grace period, delaying control on existing vehicles by up to two and a half years.

Problems of Japan's vehicle registration system

In the Japanese vehicle registration system, the emission test only examines carbon monoxide and hydrocarbon in gasoline vehicles, and soot in diesel vehicles. In either case, NOx and PM, which pose a greater problem, are left unchecked. Existing vehicles are therefore not examined on whether their original emission standard has been maintained.

The soot test in registration checks uses the simplified "free acceleration" system, in which an examiner puts their foot on the accelerator with the gear in neutral, thereby applying no load to the engine. It does not even remotely reflect actual driving conditions. In contrast, the U.S. system demands a recall of a model, if randomly selected existing vehicles in the model do not meet the required emission standard.

Regulation by vehicle type

Regulation for encouraging the use of vehicles with NOx / PM emission volume lower than special emission standards defined for trucks, busses (diesel, gasoline or LPG-powered) and diesel passenger vehicles in areas designed under the Automotive NOx & PM Law. This regulation is applied to new vehicles and currently used vehicles (existing vehicles), registered for primary use in the areas specified in the Law.

Existing vehicles

Vehicles that have had initial registration applications accepted by district transport bureaus. Vehicles currently being used.

Initial registration

The month / year in which a new motor vehicle had initial registration application accepted by a district transport bureau. The information is shown in the "Initial Registration" column of a motor registration certificate.

Petroleum Association of Japan

Established in November 1955 as an association of Japanese petroleum refining / wholesale companies, i.e. companies undertaking crude oil importation / refining and nationwide distribution of petroleum products.

Its key tasks include grasping domestic / international situations surrounding petroleum to initiate appropriate measures, and attaining broad-based community understanding on petroleum and social importance of the petroleum industry.

Nitrogen Oxides (NOx)

A general term for describing nitrogen-oxygen compounds. NO (nitrogen monoxide) and NO2 (nitrogen dioxide) are the main air pollutants. These two compounds are collectively referred to as nitrogen oxides in general.

NOx is mainly generated in fuel combustion at factories, business premises and automotives, as nitrogen in fuel and air is oxidized in high heat.

High-concentration acute exposure to NO2 causes pulmonary edema, fibrous bronchitis and pulmonary emphysema. Low-concentration chronic exposure is known to cause chronic bronchitis and deterioration in pulmonary functions. No2 is readily soluble, and reacts with water to generate nitric acid and nitrous acid. It is also known to react with hydrocarbon to cause photochemical oxidants.

Ultra-low sulfur diesel fuel

Diesel fuel with the sulfur content at one-fifth that of low sulfur diesel fuel (under 50ppm -> under 10ppm). Also called sulfur-free diesel fuel. This fuel is necessary to maintain the efficiency of high-performance emission reduction devices (e.g. PM reduction devices), compatible with future reinforcement of emission control.

In July 2003, the Central Environment Council (7th report) recommended the introduction of ultralow sulfur diesel fuel from 2007 onwards.

Low sulfur diesel fuel

Diesel fuel with the sulfur content at one-tenth that of conventional diesel fuel (under 500ppm -> under 50ppm). In November 2000, the Central Environment Council (4^{th} report) recommended the introduction of low sulfur diesel fuel by the end of 2004. While the national government announced to reduce the allowable sulfur content to 50ppm by August 2003 according to the Air Pollution Control Law (to be enforced at the end of 2004), the industry's voluntary initiative has led to nationwide distribution of such oil since April 2003.

The lower sulfur content reduces the amount of sulfur oxides in emission, and has some PM reduction effect.

The biggest objective of proliferating low sulfur diesel fuel swiftly, is to draw out the maximum performance of PM reduction devices, which enable existing diesel vehicles to clear tighter emission control.

DPF

It stands for Diesel Particulate Filter. When fitted on the exhaust pipe of a diesel vehicle, it filters PM in diesel engine emission, and eliminates collected PM through incineration, etc. to regenerate itself, thereby maintaining the filtering performance.



DPF has types using either heat or catalyst to eliminate PM collected at the filter.

Emission gas is channeled through perforated ceramic filters, which entrap particulate matters. DPF with oxidant catalyst can effectively reduce SOF, and convert carbon monoxide and hydrocarbon into carbon dioxide and other harmless / odorless substances.

(1) Heat-incineration types

1) A type that has two filters, alternately collecting PM, and draws power from the driving vehicle to an electric heating wire to incinerate PM and regenerate the filter (alternate regeneration type)

2) A type that filters PM, and draws power externally while the vehicle is not in operation, to provide heat treatment to regenerate the filter (batch regeneration type)

3) A type with which the filter is removed and placed in a simplified furnace for heat treatment

(2) Catalyst types (continuous regeneration)

4) A type that uses No2, generated in a oxidant catalyst placed in front of the monitor, to continuously de-oxidize collected PM at a relatively low temperature

5) A type equipped with a catalyst that continuously de-oxidize collected PM at a relatively low temperature for filter regeneration

Tokyo Vision 2000

TMG's basic policy vision, drawn up in December 2000, forming the basis for political and fiscal administration.

(Objectives / characteristics)

With a view to turn Tokyo into an attractive and vibrant cosmopolis that draws a large number of visitors, the Vision sets out initiatives and individual measures to achieve the goal.

As the basic vision, it represents indicators of future metropolitan administration. At the same time, it shows TMG's intended future direction to Tokyo citizens, businesses, municipal councils and the national government, so as to solicit their participation and cooperation.

(Term of the Vision)

The Vision covers the period of roughly 15 years (FY2001 to FY2015), however with more long-term perspectives.

(TMG policy indicators)

In the first of such attempt, TMG adopted policy indicators that described the standards of intended targets in terms of the everyday living feel of Tokyo citizens.

(Three-year promotion plan)

TMG announced the three-year promotion plan, detailing TMG's focal projects in the three-year period from FY2001 to FY2003. As part of the plan, TMG initiated a subsidization program to petroleum manufacturers that distribute low sulfur diesel fuel (two years).

Tokyo Air Pollution Lawsuit

Residents of Tokyo's 23 Wards suffering from respiratory illnesses, etc. filed a suit against the national government, TMG, Metropolitan Expressway Public Corporation (MEX) and seven auto manufacturers, demanding a halt to the emission of air pollutants such as NOx and PM, and damage compensation for their sufferings. The case, involving over 500 plaintiffs from the first class action of 1996 to the fourth one in 2000, is characterized for its claim of a area-wide pollution, rather than concentrating on roadside pollution, and its demand that auto manufacturers acknowledge their liability.

On October 29, 2002, the Tokyo District Court ruled that there was a causal relationship between auto emission and health damage suffered by seven of the plaintiffs, including one person with no government recognition as a pollution-illness victim. The court then ordered the national government, TMG and MEX to pay damages.

However, the ruling fell short of recognizing the national government's emission regulation responsibility, and failed to find auto manufacturers liable, or order a halt to the discharge of air pollutants. TMG did not appeal, but the national government and MEX did.

TMG's subsidization program for the installation of PM reduction devices and introduction of low-pollution vehicles

TMG has a subsidization program for the installation of PM reduction devices and the introduction of low-pollution vehicles, as a support measure for business operators working toward compliance with the diesel vehicle control.

The program subsidizes the cost of installing PM reduction devices such as DPF. There is also a loan arrangement system, extending businesses with interest payment assistance and credit guarantee, required when replacing a current diesel fleet with low-pollution vehicles.

Sulfur dioxide (SO2)

SO2 is generated when the sulfur content of fuel like petroleum and coal is incinerated and oxidized. It stimulates the respiratory system, and could trigger chronic bronchitis and asthmatic bronchitis in people living in heavily contaminated areas. SO2 is also a contributing substance of acid rain.

Damage compensation system

A system based on the Pollution-Related Health Compensation Law (promulgated on October 5, 1973).

The system defines pollution-related health and welfare schemes, etc. for compensating persons with pollution-related illnesses and preventing such sufferings in the future, so as to ensure swift and fair protection of victims.

The Law was revised in 1987 to reflect changes in the status of air pollution, shifting its focus from ex post facto compensation on sufferers to prevention of health damage to local residents. The revision terminated extending any further recognition of health damage and entitlement to compensation. However, those who had already received official recognition continue to receive medical cost supplementation and various other compensation payments.

PM reduction devices

Devices to be fitted on the exhaust pipe, etc. of diesel vehicles for reducing PM discharge. PM reduction devices currently available include DPF (Diesel Particulate Filter) and oxidation catalyst. (See the sections on DPF and oxidation catalyst for further details.)

Relationship of technological trade-off between NOx and PM reduction

It is generally difficult to reduce NOx and PM in diesel emission at the same time, due to the difference in the mechanism of how these substances are generated.

PM tends to be generated in incomplete combustion, and increases when the combustion temperature is low or when there is insufficient oxygen during combustion.

NOx is released more in the state of complete combustion. It is generated when the combustion temperature is high, thereby causing a reaction between nitrogen and oxygen.

This mechanism means that complete combustion reduces PM but increases NOx, and that incomplete combustion reduces NOx but increases PM. This relationship is described as "trade-off".

Sulfate pitch

Sulfate pitch is a tar-like mixture of waste acid and waste oil, containing sulfate and asphalt components. It is normally disposed of by neutralization and incineration.

The sulfate pitch, currently emerging as a social problem, is the byproduct of illicit diesel fuel production (adding oil of vitriol to heavy oil, kerosene, etc. to break down and remove the oil marker, coumarin). There have been numerous illegal dumping of un-treated sulfate pitch.

It contains toxic chemicals such as benzene and toluene, could generate sulfur dioxide gas in high enough concentration to cause respiratory illnesses, and may contaminate air, soil and groundwater.

Particulate Matter (PM)

PM consists of solid or liquid particulates. The Air Pollution Control Law designates PM as one of the regulatory items in automotive emission, and defines its allowable limit in diesel emission.

PM, released from automotives, is broken down into soot, sulfate and SOF (Soluble Organic Fraction). Sulfate is a general time for sulfate compounds, generated when the sulfate content of fuel is oxidized. A large volume of sulfate is generated when high load is applied to the engine, or in the presence of catalyst with strong oxidization property. SOF represents organic components that can be separated through solvent extraction at a relatively low boiling point. More specifically, it includes an un-combusted part of diesel fuel and lubricant.

Reports of overseas research and findings of TMG studies have pointed to serious adverse health effects of PM, triggering lung cancer, chronic respiratory illnesses and hay fever. A report (March 2002) by the Environment Ministry's study group on the risk of diesel emission particulates, strongly indicates the carcinogenic effect of diesel emission particulates (DEP) on humans.

Euro 4

Europe's emission control on large diesel vehicles (with the gross vehicle weight of 3.5 tons or over), to be enforced in October 2005. The regulation demands the NOx content of no more than 3.5g/kWh, and PM content of no more than 0.03g/kWh.

Continuous regeneration DPF

A type of DPF to be fitted on the exhaust pipe, etc. of a diesel vehicle. It filters diesel emission to collect PM, and continuously burn gathered PM with the effect of oxidation catalyst at a relatively low temperature so as to regenerate the filter and maintain the filtering performance. (See the section of DPF for further details.)