"ARE WE READY TO TIGHTEN UP ON EMISSIONS OF JEEPNEYS AND BUSES"

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Abstract: Certain provisions of the Clean Air Act are supposed to be implemented starting in 2002, including the requirement for all motor vehicles to undergo emission testing before they can be registered. This paper examines the impacts of such implementation on Metro Manila's public transport – jeepneys and buses currently serving more than 70% of all commuting trips – and the readiness of the government's institutions.

If the implementation of the emission standards starts in 2003, up to 14,000 jeepneys and 1,000 buses, may stop operating unless replaced by complying units, affecting nearly 35% of Metro Manila commuters by 2005 before the public transport industry recovers using internally generated funds. We ask: Are the government's facilities, and its programs to alleviate the impact of reduction in the transport fleet, ready?

1. INTRODUCTION

Certain provisions of the Clean Air Act of 1999 are supposed to be implemented starting in 2002. All motor vehicles have to undergo emission testing before they can be registered. In order to facilitate the smooth implementation of the emission test, the accreditation and authorization of private testing centers are supposed to be under a joint effort of the Department of Trade and Industry (DTI) and the Department of Transportation and Communications (DOTC). To encourage the private sector to establish testing centers and to upgrade public utility vehicles for compliance with the Clean Air Act, the Philippine Government has also arranged for a financing program through the Development Bank of the Philippines (DBP) and the Land Bank of the Philippines (LBP). As far as can be gathered, however, there appears to be less consideration of, and preparation for, the impacts of the implementation of the Act on the public transportation industry and its clients – the riding public.

The additional cost for adopting rigid, quality maintenance practices, or upgrading the engines and entire vehicles, do not necessarily lead to any revenue increase to the industry as the current practice of fare regulation does not yet consider expenditures for mandated emission controls that may not necessarily improve service levels. In case operators cannot assume the cost burden, they have to pull vehicles off the roads. The government will eventually have to deal with the subsequent political and social impacts.

What may compound the problem, however, is the apparent lack of information adequately disseminated to concerned sectors. Note that there are around 10,000 buses and about 60,000 jeepneys operating in Metro Manila, carrying over 18 million passengers per day or over 70% of all trips.

2. THE METRO MANILA PUBLIC TRANSPORT INDUSTRY

2.1 Overall Situation

The latest recorded survey shows that road-based public transport meets 98% of the total travel demand in Metro Manila, 78% of which are accounted for by public transportation. Buses, jeepneys, tricycles, and taxis have been the modes of public transportation since the 1960s, among which, jeepneys and buses are the most popular with modal shares of 39% and 15% respectively.

2.1.1 Supply Characteristics

Table 2-1 shows the official tally of registered buses and utility vehicles for the past 5 years. These figures, however, do not reflect the actual number of units operating on the road. There are buses and jeepneys operating in Metro Manila with expired registrations but many more are without franchises, the so-called "colorum" units.

Table 2-1
Number of Registered Buses and Jeepneys

Year	1996	1997	1998	1999	2000
Bus	7,867	9,368	9,154	10,794	11,287
UV/Jeepney	50,582	51,775	52,219	56,585	56,484

Source: Land Transportation Office

Based on the available public transportation data from LTFRB and validated against those of DOTC, estimates were made on figures that would characterize the present public transport supply in Metro Manila. Table 2-2 and 2-3 shows these data in comparison with the 1996 Metro Manila Urban Transportation Integration Study (MMUTIS) estimates.

Table 2-2
Supply Characteristics of Bus and Jeepney Transport

Mode	Item	1996	2000
Bus	No. of Routes	89	45
	No. of Operators	437	400
	Estimated No. of Operating Units	9,600	10,000
Jeepney	No. of Routes	399	400
	No. of Operators		40,541
	Estimated No. of Operating Units	57,400	60,000

Source: 1999 MMUTIS Report, Study Team

Table 2-3
Number of Passenger and Average Occupancy of Buses and Jeepneys

Mode	Item	1996	2000
Bus	Estimated no. of Passengers (000/day)	2,584	3,000
	Average Occupancy (pass./veh.)	50	55
Jeepney	Estimated no. of Passengers (000/day)	12,078	13,000
	Average Occupancy (pass./veh.)	15	15

Source: 1999 MMUTIS Report, Study Team

2.1.2 Operational Characteristics

Based on our estimates and the 1996 MMUTIS survey, the characteristics of the road-based public transportation operation in Metro Manila are as follows:

a) the average travel speed of bus and jeepney is 12.2 km/h and 9.4 km/h, respectively;
b) the average load factor for jeepney is 64.6% while bus has 62.7%.
c) the estimated number of passengers for bus and jeepney is 3,000,000 and 13,000,000 daily, respectively;
d) about 10,000 bus units are in operation, while jeepneys are estimated to number about 60,000 units;
e) average travel time is 79 minutes for bus and 43 minutes for jeepney;
f) the average trip length for bus is 10 km as compared with 3 km for jeepney; and
g) the rail transit lines maintain commercial operating train speeds of about 30 kph.

Congestion greatly impacts on the operation of public transport. Another factor that influences the operation of public transport is the operating arrangement between the drivers and operators, the "rental" system for the vehicles by the drivers (or drivers and conductors) that encourages "bunching" at stops and corners, and generally unruly behavior by drivers to maximize total ridership. Needless to say, road-based public transport generates significant environmental pollution to the metropolis.

2.1.3 Public Transport Compliance With Emission Standards

The results of the regular emission testing of public transportation vehicles by the MMDA Smoke Belching Unit are alarming, as only 3% of total public transportation vehicles tested passed the test. Not unexpected, of course, as those vehicles stopped for testing already have evident violations in terms of smoke emissions. It also has to be noted that MMDA coverage is limited to certain main thoroughfares; thus, the small number of jeepneys tested. The table below shows the summary of testing results between April to October of this year.

Table 2-4
MMDA Smoke Belching Campaign Results (April-October 2001)

Type of Vehicle	Passed	Failed	% Passed
Bus	185	3,232	6%
Jeepney	12	876	1%
Taxi	3	349	1%
UV	150	6,424	2%
Truck	27	705	4%
Cumulative Total	377	11,586	3%
Total	11,963		

2.2 The Bus Sector

Majority of operators are small and medium companies, but large companies have a bigger share of total operating bus units, unlike the jeepney sector.

2.2.1 Bus Fleet

It is estimated that that there are now about 10,000 bus units operating in Metro Manila. Large companies provide 61% of total bus units while the remaining 39% belong to small and medium operators. With the largest bus fleet having a total of 433 authorized units, the hierarchy of bus fleets may be described are as follows:

- Small operators – 20 or less bus units; average fleet size – 9 buses;
- Medium-sized operators –20 to 50 bus units; average size – 32 buses;
- Large operators – more than 50 bus units; average fleet size – 115.

2.2.2 Bus Operators

a. By Type of Ownership Structure

Type	*% to Total*	*No. of Operators*
Corporation	- 40.34%	- 174
Sole Proprietorship	- 57.93%	- 169
Cooperative	- 1.21%	- 5
Partnership	- 0.52%	- 1

b. By Fleet Size

Size		*% to Total*	*No. of Operators*
Small	(1 to 20 units)	- 74%	- 242
Medium	(21 to 50 units)	- 12%	- 53
Large	(51 and above)	- 14%	- 54

The LTFRB database also shows that 44% of total bus operators in Metro Manila or 174 bus operators have 10 or less bus units. Twelve percent (12%) have only one (1) unit each.

2.2.3 Age of Bus Fleet

Section 22 of the Act stipulates that DTI shall promulgate the necessary regulations prescribing the useful life of vehicles and engines including devices in order to ensure that they will conform to the standrad they were certified to meet. The age of vehicle, therefore, could be a basis for estimating a proportion of public transport vehicles that will be displaced. However, due to limited data regarding the age of bus units operating in Metro Manila, the bus units' franchise control number or case number obtained from LTFRB will be used to estimate the age of buses. The first two digits of the case number signify the year of franchise application, which would be indicative of how long buses have been operating. The information below was extracted from the LTFRB database.

Year of Franchise Application	*% of bus units*
1995-2000	43%
1990-1994	41%
1985-1989	8%
1980-1984	7%
1979 below	1%

2.2.4 Bus Operating and Maintenance Practices

Operating Practices. The following characteristics of the operating practices among bus operators were surveyed in Metro Manila:

a. The driver to bus ratio is generally higher in bus fleets of smaller size operators, which averages about 2.2:1, as compared to about 1.1:1 for the larger size operators. The bus conductor to bus unit ratio is estimated at 1.4:1 for the smaller size operators and 1.1:1 for the larger fleet sizes.

b. The remuneration of drivers and conductors are based on a daily rate of percentage or commission and are computed based on the gross revenues that they have generated for the day. Extra compensations in addition to the agreed daily commissions are also automatically granted to both drivers and conductors in cases where the total revenues made for the day exceeds a pre-defined amount. This amount is normally referred to in the bus industry as the daily "quota". The setting of the remuneration of drivers and conductors in terms of a percentage rate of the daily revenues collected is a prevailing Metro Manila bus industry-wide practice.

c. The salary of drivers for the smaller size operators is computed at 9% to 10% of the gross daily revenue earned. Conductors are paid their salaries in the amount ranging from 7% to 8% of the gross revenues. The amount of additional compensation that may be granted to both drivers and conductors in cases where the earnings for the day exceed the daily revenue quota is computed at 1% each of the amount in excess of the required daily revenue quota.

d. Larger size operators pay their drivers and conductors salaries in amounts equal to 7% and 5% of the total revenues earned for the day, respectively. Additional compensation due for exceeding the daily revenue quota is determined on the basis of a fixed value per excess in the actual daily earnings over the quota. This fixed amount normally averages about P3.00 for every P100 revenue excess made over the quota, the total of which is shared by the driver and the conductor.

   In addition to the above, drivers and conductors of the larger fleet size operators, unlike their counterparts working for the smaller size operators, enjoy the benefits accorded to regular employees, such as social security, insurance, medical plans, bonuses and so on. The aggregate amount of these benefits is estimated to be about 3% of the daily revenues generated.

e. The amount of the daily revenue quota that drivers and conductors must meet in order to be entitled to additional compensations varies according to fleet size. In accordance with prevailing practices, smaller fleet operators impose daily revenue quotas on drivers and conductors in the amount ranging from P 5,000.00 - 6,000.00 per day while larger size operators only require a daily quota of P 1,500.00.

f. Except for a few smaller fleet operators, the cost of oil and fuel are borne by the operator regardless of the fleet size. However, very few of the smaller operators require their drivers and conductors to shoulder the cost of fuel consumed in cases when the concerned driver and his conductor fail to meet the daily revenue quota.

Maintenance Practices

In terms of the present maintenance practices obtaining in the bus industry within Metro Manila, the following general observations are made:

a. Only the large to medium size operators appear to be conducting periodic and regular repair and maintenance works on their fleets.

b. Only the larger size operators have complete and appropriate facilities and corresponding staff for almost all types of maintenance and repair services, and which they all undertake by themselves through their in-house maintenance crew.

c. A number of medium fleet size operators also have their own maintenance and repair facilities, but are sometimes found inadequate for conducting major repair and maintenance works. Major maintenance or repair works are normally contracted out.

d. Most small operators have no maintenance program in place whatsoever, and no periodic or regular maintenance nor repair works are done on the fleet. Maintenance and repair works, which are mostly contracted out, are initiated only when the units are already experiencing mechanical and/or engine troubles. Moreover, these small operators do not harbor any future plans for either establishing their own maintenance and repair facilities or in setting up a program for periodic and regular maintenance.

e. Replacement of old engines that are no longer economically repairable are made with surplus engines only. This is noted to be true even for the larger operators. The acquisition of brand new engines is undertaken only for the purpose of increasing the present inventory of units and not for replacement of an existing unit.

Conclusions

From the foregoing discussions, the more salient variances in the operating and maintenance practices among the different fleet size operators are as follows:

- Higher driver and conductor to bus ratio among smaller size operators as compared to the larger size operators
- More attractive financial compensation package among drivers and conductors of larger size operators as against those of the smaller operators
- Higher daily revenue quotas for bus units of smaller fleet size operators vis-à-vis the larger operators
- Lack of any maintenance and repair programs among units of smaller size operators as compared to the programs of larger size operators
- Lack of operator-owned maintenance and repair facilities among the smaller size operators vis-à-vis the larger operators

The variances in the practices above indicate that smaller size operators tend to maximize their profits at the expense of their drivers and conductors and even to the extent of risking a complete and total breakdown of units. The operating and maintenance systems practiced by smaller size operators indicate that they are intended only for purposes of minimizing cost and maximizing revenues without any regard to any other future consequences of such practices. The conclusion that can be drawn is that such small fleet

size operators: (a) are in the bus industry only for a short term and a quick profit; and (b) do not have the intention and the commitment for a long term involvement in the industry.

The prevailing practices of the larger fleet size operators on the other hand indicate a more rational profit-setting system that strikes a balance between the cost requirements of operation and maintenance and the revenues that are expected to be generated, leading to a conclusion that they are committed to long-term involvement in the bus industry.

2.3 The Jeepney Sector

The small operators dominate the jeepney sector. About 98% of total jeepney operators have 5 or less jeepney units, and they account for 70% of total jeepneys in Metro Manila.

2.3.1 Jeepney Fleet

LTFRB records show that there are about 57,100 jeepneys registered with franchises. However, taking into consideration the number of unauthorized jeepneys operating in Metro Manila, we estimate that there are about 60,000 units operating.

The average fleet size distribution is as follows:

- Small operators – 5 or less bus units; estimated average fleet size – one (1) jeepney.
- Medium sized operators – 6 to 20 units; average fleet size – 9 jeepneys.
- Large operators – more than 20 jeepney units; average fleet size – 80 units.

Single proprietors (including colorum) make up 99% of total jeepney operators and provide about 92% of total units. Cooperatives account for 7% of jeepneys. Sole proprietors have an average of 2 units while cooperatives have an average of 52 units.

2.3.2 Jeepney Operators

There are about 40,500 authorized jeepney operators in Metro Manila. Eighty percent (80%) of the small operators them have only 1 jeepney unit. Operators may be classified as follows:

a. By Type of Ownership:

Sole Proprietor	-	99.42%
Partnership	-	00.10%
Corporation	-	00.25%
Cooperative	-	00.23%

b. By Fleet Size:

Small	(1 to 5 units)	-	97.53%
Medium	(6 to 20 units)	-	02.05%
Large	(21 and above)	-	00.43%

2.3.3 Jeepney Operational Characteristics

Estimated Ave. Daily Passengers	13,000,000
Ave. Capacity per unit	18 passengers
Ave. Load Factor	64.6%
Ave. Speed	9.4 kms/hr.
Ave. Travel Time	43 mins.
Ave. Trip Length	3 kms.
Ave. Round Trips	6
Working Hours	13
Working Days/week	5.5
No. Drivers	2
Operating Days	6

2.3.4 Age of Jeepney Fleet

Due to limited data, the jeepney units' franchise control number or case number obtained from LTFRB was used to estimate the age of jeepneys. The first two digits of the case number signify the year of franchise application, which would more or less describe how long jeepneys have been operating. The LTFRB database indicates:

Year of Franchise Application	*% of Jeepney units*
1995-2001	22%
1990-1995	34%
1985-1990	20%
1980-1985	4%
1979 below	19%

2.3.5 Jeepney Operators Practices

Operating Practices

The systems and procedures that define the general nature of the operating practices of jeepneys are similar to those of a typical vehicle rental or lease agreement. The operator allows the use of his vehicle for a day for a specific fee, which is referred to as the "boundary". All expenses attendant to the operation of the vehicle is borne by the driver. At the end of the day, the vehicle is returned to the jeepney operator and is paid by the driver the agreed boundary rate. When the vehicle requires maintenance or repair works, the costs are borne by the operator. Details on the operating practices are as follows:

a. Boundary rates for jeepneys depend on the total passenger capacity of the vehicle and, to some extent, the age and condition of the unit:
   - 14 to 16 passenger capacity : P400/day
   - 18 passenger capacity : P500 to P600/day
   - 22 passenger capacity : P600 to P700/day
b. Route location and length is normally not considered in setting the boundary rates.
c. The cost of fuel is borne by the driver, estimated at about P250.00 to P300.00/day.
d. Net daily income of drivers ranges from P250 to P700, averaging P500/day.

e. Some operators allow for two (2) drivers alternating on a daily basis per unit, others require only one. Still, some operators have only one regular driver per unit but allows an alternate, when the regular driver is not available.
f. Some operators, particularly those with only a single unit, also act as the driver.

Maintenance Practices – In general:

a. All costs relating to maintenance and repair works are shouldered by the operator, but are only performed when the unit is already experiencing visible engine or mechanical troubles and, in some cases, when the unit already broke down and can no longer run. Engine oil change is, however, performed regularly every three (3) months.
b. All works are contracted out, although some large operators have their own in-house mechanics.
c. Some operators require that the driver have a working knowledge and be able to troubleshoot and undertake minor mechanical and engine troubles.
d. Surplus materials are commonly used in maintenance and repair works for the replacement of worn-out and damaged spare parts and components.
e. Most small operators, particularly those with only one or two units, often resort to non-traditional sources of credit to finance the cost required for maintenance and repair works, e.g. a 30-days supplier's credit on parts and components that carries a monthly interest of 20%, or "lending" which is usually resorted to in cases of major repair and maintenance works that carries a 5% interest and payable within three (3) months.

Conclusions

As compared to the bus industry, the operating and maintenance practices prevailing among jeepney operators with different fleet sizes are relatively uniform. Except for the large fleet size operators, which are very few, most units do not undergo periodic maintenance and repair works. From the foregoing:

a. The socio-economic profile of large operators indicates that they rely on jeepney operations as their main source of income and livelihood. With no other alternative source of income, these operators are bound to ensure the operational sustainability of their respective fleets. Hence, the practice of such operators to perform and undertake periodic and regular maintenance and repair works on their fleets.
b. Most of the smaller size operators are noted to have sources of income other than the business of jeepney operations, leading to a conclusion that neglect of maintenance and repair works may simply be lack of management know-how or even concern for sustaining operations.
c. On the other hand, some small operators have no other sources of income, which makes the conduct of maintenance on their units imperative to sustain operations. A possible explanation for their failure to do so is that the level of income they derive from operations is only sufficient to meet their daily family requirements.

The foregoing indicates that unlike the bus industry, the dominant practice among the jeepney operators relative to the repair and maintenance is not meant to cut costs to maximize profit, but is more a consequence of overall economic conditions.

2.4 Urban Rail System

It is the policy of the Government to implement as many viable urban rail lines as it can afford in order to install urban rail as the backbone of mass transportation in Metro Manila. It is therefore assumed that projects under the DOTC Railway Masterplan will be implemented and, for purposes of this study, implemented in accordance with the schedule and providing the foreseen capacity to the public transport system. Parallel efforts in implementing policy measures to manage demand and encourage the use of mass rail transit are likewise assumed to succeed.

3. THE CLEAN AIR ACT OF 1999

3.1 Introduction

Article IV entitled "Pollution from Motor Vehicles" of the Clean Air Act contains provisions that involve: (i) the issuance of Certificate of Conformity (COC) for new motor vehicles manufactured, locally assembled or imported into the country; (ii) enforcement of permissible emission levels of vehicles to be manufactured, marketed and/or operated in the country; (iii) implementation of the National Motor Vehicle Inspection and Maintenance Program including accreditation and authorization of private emission testing centers and certification of inspectors and mechanics, and; (iv) roadside inspection of motor vehicles.

3.2 Scope for Transportation

3.2.1 National Motor Vehicle Inspection and Maintenance Program[1]

Section 21, paragraph (d) calls for the formulation and implementation of a National Motor Vehicle Inspection and Maintenance Program that will promote efficient and safe operation of all motor vehicles. DTI and DOTC shall develop and implement standards and procedures for the certification of training institutions, instructors and facilities and licensing of qualified private service centers and their technicians as prerequisites for performing the testing, servicing, repair and the required adjustment to the vehicle emissions system. Furthermore, DTI shall prescribe regulations requiring the disclosure of odometer readings and the use of tamper-resistant fuel management systems.

3.2.2 Regulation of All Motor Vehicles and Engines

Article 4, Section 22 stipulates that no imported vehicle or assembled new motor vehicle shall be registered unless it complies with emissions standards as evidenced by the Certificate of Conformity issued by DOTC. The same shall also apply to imported motor vehicle engine, used motor vehicles and re-manufactured vehicles. The importer or consignee may be allowed to modify or rebuild the vehicle or engine to comply with the applicable emission standards. Likewise, no motor vehicle registration (MVR) shall be issued unless such motor vehicle passes the emission testing requirement.

[1] The DOTC/DTO proposal for a BOT-type project to privatize inspection stations has only recently been approved by NEDA.

3.3 Implementation of Emission Standards

3.3.1 Certificate of Conformity Under Type Approval

Under Rule 16, Section 1 of the Act's Implementing Rules and Regulations (IRR) issued on November 7, 2000, DENR through its Bureau shall issue a COC to a vehicle manufacturer, assembler, or importer certifying that a vehicle type complies with the emission standards. New motor vehicle shall not be allowed initial registration unless a valid COC issued by the Department is granted. New motor vehicles include the following:

a. Vehicles designed and manufactured in the Philippines using brand new engines and spare parts;
b. Vehicles assembled in the Philippines using original and brand new parts and components imported into the country either semi knocked down (SKD) or completely knocked down (CKD); and
c. New vehicles completely built up (CBU) imported into the country.

The emission test for type approval shall be carried out by the DOTC/LTO under the policy, regulation and guidelines supervision of the DENR. The DENR shall also have visitorial powers over the LTO Motor Vehicle Inspection Center and Vehicle Type Approval System Testing Center where these tests are carried out.

3.3.2 Provisions for In-Use Vehicles

Rule 17, Section 1 of the IRR provides that all in-use motor vehicles, and vehicles with updated/enhanced engine whose chassis are pre-registered with DOTC/LTO will only be allowed renewal of registration upon proof of compliance with the emission standards described in **Tables 3-1** and **3-2**. The DOTC/LTO shall conduct the vehicle test utilizing the Motor Vehicle Inspection Station (MVIS) or its duly authorized and accredited inspection centers within sixty (60) days prior to date of registration.

Table 3-1
Emission Standards for Vehicles with Compression-Ignition (Diesel) Engines (light absorption coefficient, m^{-1})*

Naturally Aspirated	Turbo charged	1,000 m increase in elevation
2.5	3.5	4.5

Table 3-2
Emission Standards for Vehicles with Spark-Ignition Engines (Gasoline) Except Motorcycles

Vehicle Category	CO(% by volume)	HC(ppm as hexane)
Registered prior to January 1, 1997: At Idle	4.5	800
Registered on or after Jan. 1, 1997 but before Jan. 1, 2003: At Idle	3.5	600
Registered on or after January 1, 2003: At Low Idle At High Idle (rpm > 2,500)	0.5 0.3 (l = 1+/-0.03)*	100

* or in accordance with manufacturer's specification

3.3.3 Provisions for Rebuilt Vehicles and Imported Second Hand Vehicles

Under Rule 17, Section 2 of the IRR, no rebuilt or second-hand CBU imported into the country or pre-registered vehicles retrofitted with second-hand engines shall be allowed registration or renewal of registration without valid Certificate of Compliance to Emission Standard (CCES) issued by the DOTC. However, Section 2 also states that as a requirement for the issuance of a CCES by DOTC for imported second hand vehicles, a Certificate of Emission Compliance duly authenticated by the Philippine Embassy/ Consulate from the country of origin shall be valid and sufficient. In the case of locally rebuilt vehicles, a CCES issued per inspection by the DOTC Vehicle Type Approval System, if available, or initially by LTO MVIS, is required.

The DTI through the Bureau of Import Services (BIS) shall formulate regulations and guidelines that will ensure that rebuilt and imported second- hand motor vehicles and engines will satisfy the emission standards for rebuilt and imported second-hand motor vehicles as described in **Table 3-3** below.

Table 3-3
Emission Standards for Rebuilt Vehicles and Imported Second Hand Vehicles*

Vehicle Category	CO[a]	HC[a]	Smoke[b][turbocharged]
Registered for the first time prior to December 31, 2002 At Idle	3.5%	500 ppm	2.5 [3.5] m^{-1}
Registered for the first time on or after January 1, 2003 At Idle	0.5%	100 ppm	2.5 [3.5] m^{-1}

a — For spark-ignition (gasoline-fueled) motor vehicles
b — For compression-ignition (diesel-fueled) motor vehicles; figure in brackets relate to turbocharged vehicles.
* If the in-use emission standard of the country of origin is more stringent than these maximum limits, it will supersede them.

3.3.4 National Motor Vehicle Inspection and Maintenance Program

As provided for by Article 4, Section 21, paragraph (d) of the Clean Air Act, the following are the key provisions of the IRR of the National Motor Vehicle Inspection and Maintenance Program. Under Rule 19 Section 1:

First, all private in-use motor vehicles and vehicles with updated/enhanced engine whose chassis are pre-registered with Land Transportation Office (LTO) will only be allowed renewal of annual registration when, upon inspection by the LTO or other authorized private Motor Vehicle Inspection Station (MVIS), such vehicles meet the in-use emission standards set forth in Section 1 of Rule 17. The LTO or other authorized MVIS shall conduct the vehicle tests for emissions.

Second, Public Utility Vehicles submitted to DOTC/LTO for renewal of registration shall only be allowed upon presentation of a valid Vehicle Inspection Report issued on the basis of the inspection from the MVIS or its authorized testing center. The Vehicle Inspection Report shall be valid for a maximum of 6 months.

Finally, emission tests may be conducted within 60 days prior to the renewal of registration. The results of such test shall be presented within 60 days from the date of the

test and may be presented to the LTO motor vehicle registration offices as a prerequisite to renewal of registration.

Motor Vehicle Inspection System shall be fully operational in Metro Manila by January 2003. Nationwide implementation shall follow 12 to 18 months thereafter. Meanwhile, vehicle inspection will be initially conducted in the LTO-operated MVIS or LTO Motor Vehicle Registration Centers. Priority shall be given to the immediate testing of diesel-powered vehicles.

3.3.5 Useful Life for For-Hire Vehicles

Section 22 of the Act, stipulates that DTI shall promulgate the necessary regulations prescribing the useful life of vehicles and engines including devices in order to ensure that such vehicles will conform to the emission they were certified to meet. It also includes provisions for ensuring the durability of emission devices.

3.3.6 Need to Reconcile Interpretation of Emission Standards

The interpretation of "in-use" standards mentioned earlier, as gathered from the DOTC Road Transport Planning Division, is that provided the existing standards are met upon testing, in-use public transport vehicles may continue to operate. The Air Quality Management Section of EMB-DENR, however, asserts that Euro I standards shall apply even to these "in-use" public transport vehicles starting January 1, 2003 but it will be up to DOTC-LTO to implement the standards. There is clearly a need to reconcile the interpretation of the provisions of the Law and the IRR.

3.4 Impact on Public Transport Fleet

Those who prepared the IRR of the Clean Air Act has been kind to the public transport industry or they have properly concluded that it is not prepared to deal with a massive overhaul of the entire public transport industry within the time frame of the law. Thus, we note that the provisions for "in-use" vehicles, i.e. those currently registered and operating will allow these vehicles to merely comply with existing standards at every registration, i.e. standards being applied now, until they actually stop operating.

Thus, it is evident from the above that the "in-use" public transport vehicles that can comply with mere rigid maintenance practices, overhauling or, at most, a change of engines, can continue to provide service. Only those units that are, in fact, too old to be serviceable or economically maintainable may fall out of the fleet in service. Vehicle age, as a proxy for maintainability or operability, is the controlling parameter in establishing the magnitude of the impact of the Act's implementation.

There is, in fact, a difference in interpretation of the provision of the IRR on "in-use" public transport vehicles between DOTC and the DENR-EMB Air Quality Management Section. There is clearly a need to reconcile the differing interpretation of the IRR provisions between DOTC and DENR, not only to prepare the government for the correspondingly different impact on the fleet to be affected, but also to properly examine the real spirit of the Law on the matter.

4. IMPACT OF EMISSION CONTROL IMPLEMENTATION

3.3 Estimation of Affected Vehicle Fleet

4.1.1 Methodology

Without a mandate for any new major data collection, heavy reliance was placed on MMUTIS data including demand projections – trip demand and patterns for the target years 2015 and 2025. Based on current available data on the public transport fleet, the future demand patterns and modal trip shares established by MMUTIS were adopted to determine the vehicles affected by the implementation of the Act, as well as derive estimated required bus and jeepney fleets to cope with the demand at the same level of service provided by the public transport system, with the same load factors, capacities, etc. This is on the condition that the LRT-MRT system is in place in accordance with the latest program available from DOTC, i.e. the planned urban rail lines will be completed and will take up capacity from road-based trips.

4.1.2 Year 2000 Base Fleet

While there are varied opinions about the quality of data at DOTC, LTO and LTFRB, the public transport fleet data has been gathered from official sources. LTO figures are still not classified in accordance with public transport vehicle types but are readily available. On the other hand, LTFRB data are in a database of yet unprocessed quality. The number of "colorum" vehicles is what is supposed to make the big difference but this is really unknown. Thus, the total number of jeepneys in Metro Manila have been reported or merely stated to be anywhere between 60,000 and 200,000! The latter number is considered an exaggeration and we have arrived at the following numbers for the year 2000. It may be considered that whatever number of "colorum" jeepneys is not reflected in the LTFRB data, this is made up for the fact that this data may be largely cumulative, i.e. inoperative vehicles are not immediately removed from the list.

Table 4-1 Public Transport Vehicle Fleet, 2000

Data Source	*Bus*	*Jeepney*
MMUTIS, 1996	9,600	57,400
LTO, 2000	11,287	56,484
LTFRB, 2000	10,193	57,100
Study Team, 2001	10,000	60,000

4.1.3 Industry Profile

Based on available information, the table below shows our best estimate of the profile.

Table 4-2 Public Transport Industry Profile

Operator Size	*Bus Units*	*Jeepney Units*
Small	2,200	42,600
Medium	1,700	6,000
Large	6,100	11,400
Total	10,000	60,000

Source: Study Team estimates from LTFRB data

Table 4-3 Public Transport Vehicle Age Profile

Age Group (Years)	*Bus Units*	*Jeepney Units*
1-6	4,383	12,036
7-11	4,179	18,773
12-16	815	11,234
17-21	714	2,436
22 and above	102	12,621
Total	10,193	57,100

Source: LTFRB

4.1.4 Expected Actions by Industry

Buses. Interviews with even the medium-sized operators reveal that they have a fairly good idea of how to maintain the service of their fleet and continue in operation, at least until they can keep their existing fleet running. It is considered very likely that the age group of vehicles above 22 years old will drop out of service; the same is true for the next age group of 17-21 years old. With the available LTFRB data, however, it is difficult to assume that it is the smaller operators who will drop out because of the large number of newer units in operation, and the significant number of small operators.

Maintenance costs will rise but operators appear to be confident that they can still survive provided the spare parts for the bus engines, including those required for overhauling and replacing or merely re-calibrating fuel injection pumps, will be available in the market.

Jeepneys. For the jeepney sector, it is likewise considered logical that the vehicles older than 22 years will drop out of the fleet readily[2] and this is a very significant number, i.e. 22%. It is perhaps easier to assume that the small operators (who make up over 70% of the operators and, in fact, are mostly owning 1-2 vehicles only) will bear the brunt of the impact of the Act's implementation.

Even at the present time when enforcement agencies are concentrating on buses and trucks on smoke-belching violations, jeepney operators and drivers are already unable to maintain their units properly and also complain of the high cost of spare parts. Many will have difficulty following a more rigid maintenance schedule for their units in order to keep them operating and, at the same time, comply with the standards.

4.1.5 Estimating Fleet Drawdown

The basic rules applied, for simplification of calculations, are:

i) the age of 15 years is the cut-off date for economic maintainability, i.e. in terms of registration date;
ii) overhauling may allow newer units to operate in compliance for three years but older ones will probably require re-overhaul every two years or even shorter;
iii) jeepney operators cannot afford new units but can probably replace with new engines after some time;
iv) bus operators, on the other hand, may be able to react faster in terms of new engines and even new units to replace dropped units; and
v) New engines are considered good for 6 years in compliance.

[2] New engines may be installed in older units but these engines must comply with new standards.

4.1.6 Base Case Scenario

Table 4-4 below provides the base case analysis on the impact of the emission control implementation on the bus and jeepney fleet, considering the entry into service of various urban rail lines in Metro Manila. The table indicates how many units of buses and jeepneys will fall out of service. Note that the base case scenario is actually a "do-something" scenario inasmuch as it is believed that segments of the pubic transport industry are committed to staying in it and will make appropriate moves to do so to comply with standards. The financial capabilities of these segments of the public transport industry to meet such commitment were, however, taken into consideration in establishing the base case scenario based on the results of the financial impact analysis undertaken (See Section 4.2.3). No direct government intervention has as yet been incorporated in the analysis. Allowing the WTO/ASEAN tariff reduction schemes (for vehicles, engines and spare parts) to prosper starting in 2004 would be indirectly assisting the industry.

Table 4-4 Base Case: Bus & Jeepney Units Falling Out of Service (Thousands)

Mode	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Bus	0	0	1.11	0.94	0.33	1.05	0.85	0.60	0.50	0.50
Jeepney	0	0	14.4	11.9	8.30	3.50	1.00	0.50	0.50	0.50

4.2 Economic, Financial and Social Impacts

4.2.1 Number of Commuters Affected

Based on the age profile of public transport vehicles operating in Metro Manila (Table 4-3), a total of 816 bus units and 15,057 jeepney units are aged 17 years and above. These units are assumed to readily drop out of the existing fleets in operation upon the stricter implementation of emission standards. For the remaining units in the present fleet, the operators have the option of either overhauling or retrofitting, or replacing with a new engine the existing engine of their units. Any one of the options cited would, however, involve additional costs. In addition, the present levels of maintenance and repair expenses are also expected to increase, including those for vehicles that have been able to meet and pass the required emission standards as a consequence of ensuring that compliance to said standards is maintained. Without any corresponding increase in the existing fare levels, the additional costs that will have to be absorbed could adversely affect the financial viability and the sustainability of public transport.

The reduction in the existing public vehicle fleet will adversely affect the riding public in Metro Manila. In turn, this is expected to entail certain costs and losses to the country's economy as a whole. Table 4-5 provides an estimation of the number of Metro Manila commuters who stand to be adversely affected. The estimates are based on the number of bus and jeepney units that are expected to fall out of service and the average service levels of 225 passenger-trips per day per bus unit and 186 passenger-trips per day per jeepney unit.

Table 4-5 Estimated Number of Affected Commuters (000s)

Mode	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Bus	250	212	74	236	191	135	113	112
Jeepney	2,678	2,213	1,544	651	186	93	93	93
Total	2,928	2,425	1,618	887	377	228	206	205

By 2005, nearly 35% of Metro Manila commuters will stand to be adversely affected before the industry recovers using internally generated funds.

4.2.2 Economic Impacts

For the parties involved in the public transport industry, the possible economic impacts of the implementation of emission standards can be defined in terms of the potential losses in livelihoods and income, as well as opportunities. The specific types of persons and business concerns that are expected, among others, to be affected are as follows:

a. the public vehicle operators and their personnel, workers and staff
b. spare parts dealers, suppliers and distributors
c. automotive shops
d. auto-mechanical and repair shops
e. machine shops
f. auto-electrical shops

On the other hand, the expected economic impacts on the general public are as follows:

a. longer waiting time for transport
b. reduced productivity
c. potential losses in income opportunities

4.2.3 Financial Impacts

For the road-based public transport industry, compliance to the set emission standards would necessarily entail additional costs to operators in terms of the infusion of new capital investments, whether for general overhauling, retrofitting or replacement of existing vehicle engines, and the consequent increase in maintenance expenses that will be necessary to maintain compliance to the prescribed standards. Without any corresponding increase expected in the levels of income, the effects and financial implications of these additional costs may render the continued operation of some fleet operators no longer financially attractive, or worse, no longer financially viable altogether.

The following options may be availed by the affected operators in order to comply with the required emission standards:

- For affected buses units

a. Engine retrofitting
b. Replacement with new engine

- For affected jeepney units

a. General engine overhaul
b. Engine retrofitting
c. Replacement with new engine

In view of the limitations in available data, the following assumptions and procedures will be adopted for purposes of establishing the required present levels of expenses:

a. The levels of expenses relating to bus operations will be determined on the basis of the cost structure developed by Ms. Josephine Bayan in her thesis entitled "*Cost Characteristics of Bus and Jeepney Transport Systems in Metro Manila*"[3];

b. The levels of expenses for jeepney operations shall be based on the value established for jeepney units that are being regularly maintained by their operators, which is estimated at P35,000 per year on the average; and

c. The levels of expenses defined above shall apply for all corresponding similar units regardless of the location of route, route length, etc. and whether or not the units are being regularly maintained.

4.2.3.1 Estimation of the Present Levels of Expenses and Operating Revenues

Bus Operations

- P4,500 average daily gross revenue for buses
- Cost structure: (i) Operating Cost – 62.3%; (b) Maintenance Cost – 23.4%; (c) Fixed Cost – 10.7%; and (d) Administration Cost – 3.6%. In turn, the operating cost is broken down as follows: (a) Wages for Bus Crews (Driver and Conductor) – 51.9%; (b) Fuel Cost – 44.8%; and (c) Staff Wages – 3.3%.
- The total level of expenses using the above cost structure is computed at P2,505.

Jeepney Operations

- P550 average daily operating revenue for jeepney operations
- P35,000 per year is the average level of expenses for all jeepney units

4.2.3.2 Estimation of Investment Requirements and Projection of Levels of Expenditures

a. Initial Investment Costs

For Buses

- Engine retrofitting[4] : P 200,000
- Replacement with new engine: P1,000,000

[3] Thesis submitted for completion of Master's Degree in Urban and Regional Planning Major in Transportation Planning, School of Urban and Regional Planning, UP Diliman, Quezon City, 1999.

[4] For purposes of this Study, retrofitting means replacement by a "surplus" or used engine that complies with standards.

For Jeepneys

- General Engine Overhaul : P 65,000
- Engine retrofitting : P 95,000
- Replacement with new engine: P200,000

b. Projected Levels of Expenses

For purposes of this Study, however, it is assumed that the expected increase in expense levels shall be uniform regardless of the option adopted, and is taken to be equal to 10% of the present levels of expenses previously established. In absolute terms, the levels of expenses required to maintain compliance with the law are as follows:

- For Buses : P 2,760 per day per unit
- For Jeepneys : P38,500 per year per unit

4.2.3.3 Assessment and Analysis of Financial Sustainability and Viability

While credit is available to some operators, for purposes of the computational analysis on the financial viability and sustainability of fleet operations, the initial investment requirement for each of the options identified are assumed to be financed through loans under the following terms and conditions:

a. Rate of Interest : 18% per annum (based on declining balance of principal)
b. Repayment Period : 3 years
c. Equity Requirement : 30% of the total cost

Based on the estimated investment requirements (equity plus loan and interest payments) and the level of expenses previously established, the following losses in net income representing the additional cost required to comply with the law are determined for each of the option identified:

For Buses:

a. Retrofitted Engine – P 481/unit/day
b. New Engine Replacement – P1,402/unit/day

For Jeepneys

a. Overhauled Engine – P 75/unit/day
b. Retrofitted Engine – P110/unit/day
c. New Engine Replacement – P231/unit/day

Based on the trial financial evaluation runs and subsequent analysis, the following conclusions are drawn:

For Bus Fleet Operators

a. Large and medium size operators will be able to meet the additional cost requirements for an option mix consisting of both engine retrofitting and new

engine replacement. However, for fleet operators at the lower size range of the scale, the overall financial attractiveness of their respective operations will be materially affected.

b. Small size operators can only afford engine retrofitting as an option and will not be able to meet the additional cost requirements that a new engine replacement will entail.

For Jeepney Fleet Operators

a. Large size operators will be able to meet the additional cost requirements for an option mix consisting of engine overhauling, retrofitting and new engine replacement.

b. Medium size operators will be able to meet the additional cost requirements for a mixture of both engine overhauling and retrofitting. They are also expected to meet the additional cost requirements of an option mix that will include new engine replacement for a few of their affected vehicle units. This will, however, already materially affect the overall financial attractiveness of their operations.

c. Small size operators will be able to meet only the additional cost requirements corresponding to engine overhauling and/or retrofitting.

4.2.4 Summary of Social Impacts

In line with the foregoing analysis, the following social impacts on the public transport industry in Metro Manila are estimated to result from the implementation of the vehicle emission standards prescribed under the Clean Air Act:

a. A total of 81,426 people consisting of drivers, conductors, bus company personnel and fleet operators will stand to lose their livelihood and main source of income within the eight-year period from 2003 to 2010;

b. A total of 20,470 families will experience a reduction in their levels of income and purchasing power within the same period from 2003 to 2010; and

c. A total of about P665.7 million in revenues is expected to be lost to other key players in the industry starting in 2003, and which will gradually increase over the years. Revenue losses to other key players will reach about P2.54 billion per year in 2010.

5. MEETING TRANSPORT DEMAND UNDER EMISSION CONTROLLED TRANSPORT SITUATION

5.1 Vehicles Required to be Replaced to Maintain Service to Passengers

5.1.1 Methodology

Based on the drawdown evaluation carried out, i.e. the number of jeepney and bus units to fall out of the industry or stop operations due to the implementation of the emission controls, the table of remaining vehicles has been applied to the mode share matrix. This procedure provides the capacity that can be provided by the industry as a base case, i.e. without direct government intervention segments of the industry who aim to stay in public transport service take actions to meet the emission regulations. The larger segment cannot do so, of course, specially from the jeepney sector.

Adopted Service Levels. In order to translate the affected vehicles into passengers deprived of transport, we use factors based on the existing service levels, i.e. simply the number of trips or passengers served by a unit vehicle in the fleet. However simplified it may appear, we have considered taxis and FXs to maintain their share in serving trips and passengers. Thus, only bus and jeepney shares in the provision of road-based public transport service have been projected. Table 5-1 below indicates the direct projection factors used to establish the future vehicle fleet necessary to provide service – at the same level as the present – to the projected demand.

Table 5-1 Direct Projection Factors For Future Fleet

Mode	Trips Served, 1996	Factor, Trips/unit
Bus	3,000,000/day	225
Jeepney	13,000,000/day	186

Ref: MMUTIS

Urban Rail System. As for the urban rail lines that enter service, these are assumed to be able to capture the anticipated ridership in their first year of operation for simplicity. The rail lines are assumed to have first preference among commuters for the projected trips, again for simplicity, although this may be considered Government strategy and to be promoted by policy measures. At the rate of their introduction, however, they still will not be able to dislodge road-based public transport from dominance in Metro Manila even up to 2015. For the study, only the operation of MRT 3 Phase 2 to Monumento, MRT 4 Phase 1 Recto to Batasan, and LRT 1 Extension to Bacoor, Cavite could be included. Table 5-2 below shows the build-up of rail capacity considered.

Table 5-2 DOTC Railway Masterplan for Operation by 2010

Line	Year of Operation	Capacity (1000/day)
LRT 1 Extension	2004	400
MRT 2	2004	350
MRT 3 Phase 2	2006	300
MRT 4 Phase 1	2007	530
Southrail	2010	370

Projecting Mode Shares. MMUTIS projected the level of demand for 2015 in terms of total trips in Metro Manila by general type, i.e. public transport and private transport. However, no detailed breakdown is made available in the Report. The projected bus, jeepney and rail mode shares have, therefore, been interpolated within the 2000 to 2015 period by straight-line method. These would represent the required capacity for the bus and jeepney fleet.

Future Public Transport Fleet Required. Table 5-3 below provides the base case analysis on the impact of the emission control implementation on the bus and jeepney fleet, considering that the service level of the industry will remain as it is today[5] and assuming further the entry into service of various urban rail lines in Metro Manila. Note that the base case scenario is actually a "do-something" scenario inasmuch as it is believed that segments of the pubic transport industry are committed to staying in it and will make appropriate moves to do so to comply with standards. No direct government intervention has as yet been incorporated in the analysis. Allowing the WTO/ASEAN tariff reduction schemes (for vehicles, engines and spare parts) to prosper starting in 2004 would be indirectly assisting the industry.

Table 5-3 Base Case *Scenario* for Public Transport

A. Demand (Million trips/day)

Mode	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
LRT	1.0	1.0	2.0	2.2	2.5	3.0	3.2	3.3	4.5
Bus	3.7	3.9	4.0	4.8	5.3	5.5	6.1	6.8	6.4
Jeepney	13.3	13.8	13.4	13.0	13.0	13.0	13.0	13.0	13.0
TOTAL	18.0	18.7	19.4	20.0	20.8	21.5	22.3	23.1	23.9

B. Available Bus & Jeepney Units After Drop-Outs (Thousands)

Mode	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Bus	10.0	8.9	8.1	8.3	7.9	8.0	8.8	10.0	11.6
Jeepney	57.1	42.7	30.8	22.5	19.0	18.0	18.0	17.5	17.5

C. Required Bus[6] & Jeepney Units (Additional Per Year)

Mode	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Bus	670	2,030	1,150	3.440	2,620	790	1,820	1,860	0
Jeepney	1,075	17,055	9,790	6,100	3,500	1,000	0	500	0

5.1.2 Observations on Estimated Requirements

It has to be reiterated here that the estimation procedure had assumed that the same level of service is aimed for, i.e. same load factors for vehicles. However, the behavior of private vehicles that may increase and, therefore, worsen congestion, has not been factored in. Moreover, the coming into service of the various rail lines have been assumed at full capacity upon introduction for simplification and this may not be true in practice.

[5] This may be difficult to achieve realistically as private vehicles will likely increase in number, increase congestion and reduce the overall level of service of urban transportation in Metro Manila..
[6] The numbers indicate the total of replacements and new units to be fielded by the industry.

What may be observed from the above table is that the impact on the fleet and, therefore, the riding public is hardest at the start of implementation because little preparation is being undertaken. The level of information being disseminated and received or accepted by the public transport industry, particularly the jeepney sector, reflects indifference. Note that the impacts are already tempered by the assumption that the LRT/MRT lines will be put into service in accordance with schedule, and it is only when Line 2, Line 3 Extension, and Line 4 have been completed (assumed to be 2009) will demand be fully served.

For the period 2003-2010, the following public transport vehicle types need to be added:

Bus - type - 14,380 units
Jeepney -type - 37,950 units

Translated into other terms, the required public transport fleet needs about 695,000 seats from large vehicles and about 683,100 seats from small-to-medium vehicles for the eight-year period. This magnitude of requirements, particularly from the jeepney sector, cannot be met without government intervention of some kind.

5.2 Government Intervention Options to Meet Required Public Transport Fleet

5.2.1 Rationale

The Implementation of the full provisions of the Clean Air Act will, no doubt, bring about enormous economic benefits in terms of the improvement and preservation of the country's human and natural resources. One of the major economic benefits that is expected to accrue is the improvement in the health of the populace through the reduction of air pollution. This is particularly true for Metro Manila, considering that the metropolis registers the highest levels of air pollution in the country.

The above notwithstanding, the effect of the implementation of such standards on the public transport sector could not altogether be ignored. This is again especially true for Metro Manila. The mobility of workers and employees, who are highly dependent on public transport, is of primary concern. Any adverse impact on public transport in Metro Manila will have adverse effects the economy of the region and the country as a whole.

The implementation of emission standards will cause a total of about 5,880 bus units and 40,564 jeepney units to drop out of operation within a period of eight (8) years, from 2003 to 2010 if no government intervention is forthcoming. This is seen to adversely affect a total of nearly 35% of Metro Manila commuters within the period 2003 to 2005, a condition that is deemed untenable. Added to this is the possible loss of revenues, as well as livelihood for people directly involved in the public transport industry.

5.2.2 Complete the Backbone Rail Network for Metro Manila

The study has assumed that the primary government policy for urban transport is to install urban rail transit as the backbone mode of public transport. It is mentioned as a principal option just to emphasize the importance of the implementation of the urban rail plan.

5.2.3 Alleviate the Operating Cost Implications to Existing Transport Units

The following other possible interventions by the government are meant primarily to impact positively on the operating and maintenance costs of operators:

a. Lower taxes and duties on spare parts and engines
b. Raise fares
c. Provide financing for the acquisition by private sector of new engines and/or vehicles
d. Provide fuel subsidies
e. Procure new vehicles directly

The first three options are considered the immediately doable options for the government as they have been undertaken regularly in the past or even presently as the financing support through GFIs. The latter two options are found to require further analysis.

Provision of fuel subsidies: The provision of fuel subsidies to public transport operators have been tried before in the 1970s (with unfavorable results) and can be operationalized through the issuance of "fuel coupons". However, the mechanism by which fuel operators/dealers, with the present deregulated environment, to claim reimbursement (the equivalent of the subsidy) from the government may be difficult to design and implement.

Procurement of new vehicles directly by the government: The acquisition of new vehicles is an option to replace units that will drop out of operation. It is likely that the government will avail itself of ODA for the purpose and will devise a way to offer the units to the private sector operators (consistent with the privatization policy) for lease or similar arrangement. However, such a scheme may not altogether be an attractive option for public transport operators considering the relatively high investment cost that the scheme is expected to entail. Normally, public vehicle fleet operators resort to the acquisition of new, locally-assembled units to expand their existing fleet but not to replace units that are to be dropped from operation.

From the financial analysis, only the following intervention options, taken together, are the more likely that government can package to alleviate the adverse impacts of the stricter implementation of standards monitoring on public transport:

a. Reduction in tariff for the importation of new engines from 30% to 5%[7] at the start of the implementation of the emission standards in 2003;
b. Increase in fare rates by 20% for buses and 15% for jeepneys; and
c. Provision of a credit/loan facility to finance the cost of acquiring new engines at an interest rate of 18% per annum payable in five (5) years.

Based on the above proposed interventions and level of requirements, affected public vehicle fleet operators will be able to meet the additional cost requirements attendant to complying with the provisions of the Clean Air Act such that the number of units in their respective fleets and their incomes and revenues will generally be maintained at their present levels.

[7] It has been gathered that, while tariffs for importation of vehicles are to be lowered, engines and spare parts are not necessarily covered or, if they are, they may only be obtained by operators from local manufacturing program participants.

On the other hand, the identified package of interventions has its cost. The reduction in tariff rates for the importation of new engines from 30% to 5% will cost the government reduction in revenues amounting to about P3.0 billion over the eight -year period from 2003 to 2010. Likewise, the government will need to make available a total of about P15.0 billion as credit/loan facility in order to meet the requirements of the public transport industry to maintain the present levels of units in the fleet. Thus, the net cost of the package of interventions would be of the order of P18.0 billion over the period 2003-2010.

Tariff reductions are regular measures undertaken by the government to pursue various objectives related to economic activities. On the other hand, fares are regularly increased depending on the circumstances of fuel and oil prices, spare parts, etc. The need for overhauling, retrofitting, etc. entails higher maintenance costs and this could be sufficient justification for the LTFRB to grant fare increases, particularly when endorsed by other agencies citing cleaner air and reduction in related diseases and other health problems.

It is the required magnitude of the funding for financing support that may be difficult for the government to sufficiently meet. Presently, GFIs such as the Development Bank of the Philippines (DBP), to the order of about P 1.0 billion per year (total for environment-related projects) and Land Bank of the Philippines (LBP) do implement certain financing programs for the transport sector but these are not nearly as much as the requirement. However, considering that other agencies, such as DENR, may be willing to provide some assistance, it is considered reasonable to estimate that the government can readily provide up to P 1.0 billion pesos per year solely to the public transport industry in Metro Manila. This magnitude of a program, together with the policy-type measures earlier cited, may be able to meet half the requirements for financing the re-fleeting of public transport in Metro Manila, with private operators as hesitant but probably willing, participants.

It has been estimated that over the period 2003-2010, the total number of vehicles required to be re-fielded into the public transport system are 14,380 bus-type vehicles and nearly 38,000 jeepney-size vehicles. Thus, with the available funding from government covering a little more than half the requirements, the above package of government interventions may be able to replace about 8,000 buses and 20,000 jeepneys. Thus, still about 6,000 bus-type and 18,000 jeepney-type vehicles are required and to be covered by some type of additional financing.

5.2.4 Modernize the Public Transport System with New Vehicles

The previous section provides a basis for concluding that government efforts through traditional routes consistent with present policies may only be sufficient to provide a little more than half the requirements for continued mobility in Metro Manila.

While direct procurement by government of new vehicles would be expensive and difficult to pass on directly to private operators, the opportunity presents itself for modernizing the urban transport fleet. The government has the best opportunity to move to a higher-level transport system with rail transit as backbone and modern, environmentally sound road vehicles as feeders and parallel arterial carriers.

5.2.5 Summary of Proposed Actions

Following the previous estimate of requirements, we still need about 6,000 buses and 18,000 jeepney-type vehicles to meet travel demand in Metro Manila. We propose three programs:

a. A DEMONSTRATION PROJECT to be implemented by DOTC and DOE on the use of CNG buses with DOE providing the distribution network and filling stations and DOTC procuring about 1,000 buses to be leased to existing bus operators.

   Bilateral donors may be approached particularly those promoting the use of CNG and who also manufacture CNG vehicles like Germany. Meanwhile, the DOE has recently revealed its own programs and projects to promote the use of natural gas including utilization of CNG vehicles in public transport which, in turn, will require a network of filling stations.

   The proposed project has objectives of:

   i. Direct government intervention in pursuing clean air and meeting travel demand in Metro Manila;
   ii. Promoting the use of CNG as alternative fuel; and
   iii. Demonstrating CNG replacement as a viable alternative and, at the same time, demonstrating the government's desire to upgrade the jeepney as mode of public transport and not to eliminate it altogether.

b. A DOTC Project to Procure About 6,000 New Diesel Buses, also to be leased to existing operators through any government corporation under DOTC.

   Project cost may be of the order of P24 billion (US$470 million) with each bus assumed to cost about P4.0 million each. A CNG bus is assumed to cost only about 10% higher. An option would be to mix buses with engines suitable for alternative fuels, such as CNG. Japan, through JBIC, may be ideal for the project's funding source.

c. A DOTC Project involving the MRT/LRT operators who will procure Mini-Buses to Provide Feeder Services to the Rail Stations.

   About 1,000 mini-buses (equivalent to about 1,400 jeepneys) may be introduced by the MRT/LRT operators to serve as their own feeder fleet. The minibuses may be specified for use with CNG engines to further promote the coming abundant supply of natural gas. The rail operators may seek their own financing provided they will also be given freedom to charge the appropriate fares. Japan and other bilaterals may be appropriate fund sources. With each minibus costing around P2.4 million each, the program may cost about P2.4 billion (US$47 million).

Note that even with the above recommended programs, there will still be required smaller jeepney-sized vehicles to be fielded into service to meet the future demand.

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REFERENCES

Republic Act No. 8749 : "The Clean Air Act of 1999".

(1998) Manila Urban Transportation Integration Study (MMUTIS), Japan International Cooperation Agency – Department of Transportation and Communications. Manila

Bayan, Josephine (1999) Cost Characteristics of Bus and Jeepney Transport Systems in Metro Manila, Thesis submitted for completion of Master's Degree in Urban and Regional Planning Major in Transportation Planning, School of Urban and Regional Planning, UP Diliman, Quezon City.