

# Transforming Public Transport in the Philippines

The Jeepney+ NAMA of the Philippine Government



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## List of acronyms and abbreviations

AADT	Average Annual Daily Traffic
ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
AusAID	Australian Agency for International Development
AUV	Asian Utility Vehicle
BMUB	German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
BPS	Bureau of Product Standards
BRT	Bus Rapid Transit
CAA	Clean Air Asia
CCC	Climate Change Commission
CDIA	Cities Development Initiative for Asia
CRUISE	Connecting Rural Urban Intermodal Systems Efficiency
DBP	Development Bank of the Philippines
DENR	Department of Environment and Natural Resources
DOE	Department of Energy
DOF	Department of Finance
DOLE	Department of Labor and Employment
DOTr	Department of Transportation
DOST	Department of Science and Technology
DPWH	Department of Public Works and Highways
DTI	Department of Trade and Industry
EEVE-I	Electric Vehicle Expansion Enterprises, Inc.
ESITU	Environmentally Sustainable Initiatives Transportation Unit
GDP	Gross Domestic Product
GET	Global Electric Technologies
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GHG	Greenhouse gas
IKI	International Climate Initiative
INDC	Intended Nationally Determined Contribution
ITP	Integrated Transport Planning Ltd.
ITPS	Institute for Transport Policy Studies
JICA	Japan International Cooperation Agency
LDV	Light Duty Vehicle
LGU	Local Government Unit
LRT	Light Rail Transit
LTFRB	Land Transport Franchise Regulatory Board
LTO	Land Transportation Office
LV	Light Vehicle
MFI	Microfinance Institutions
MMDA	Metro Manila Development Agency
MRT	Mass Rapid Transit
MRV	Measurement, Reporting and Verification
MVIS	Motor Vehicle Inspection System
NAMA	Nationally Appropriate Mitigation Action
NCCAP	National Climate Change Action Plan

NCR	National Capital Region
NEDA	National Economic and Development Agency
NFSCC	National Strategic Framework on Climate Change
NIP	National Implementation Plan
NREP	National Renewable Energy Programme
NTP	National Transport Policy
OTC	Office of Transportation Cooperatives
PDP	Philippine Development Plan
PETC	Private Emission Testing Center
PNP	Philippine National Police
PSA	Philippine Statistics Authority
PTA	Public Transport Agency
PUJ	Public Utility Jeepneys
PUV	Public Utility Vehicles
PTNSP	Public Transport Network and Service Plan
RMC	Route Measured Capacity
RTRS	Road Transit Rationalisation Study
SVPCF	Special Vehicle Pollution Control Fund
TESDA	Technical Education and Skills Development Authority
TSU	Technical Support Unit
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
UP NCTS	University of the Philippines National Center for Transportation Studies
UP VRTL	University of the Philippines Vehicle Research Testing Laboratory
VAT	Value Added Tax

### Exchange rates used in this report

Original Currency	EUR	USD	Date
1000 PHP	18.84 EUR	20.09 USD	01.12.2016



## Executive Summary

### Context

*“Traffic rules it all.”* There is no bigger topic in the urban daily life of the Philippines than *traffic*. Everyone who is living in or has visited Manila understands why. Long commuting times have reached unprecedented levels and the traffic jams on EDSA are world-known. Many factors played into this: The Philippines is one of the fastest growing economies in Southeast Asia, almost tripling its Gross Domestic Product (GDP) in the last 10 years and sustaining an annual average GDP growth of 5-7% in the last two years. More than 60% of the total 100 million inhabitants in 2015 live in urban areas. Metro Manila, as the dominating economic and political centre of the country, accounts for an estimated population of 12-13 million in 2015 and represents approximately one-third of the GDP. Metro Manila is comprised of 16 cities and a town. The metro capital is highly dense wherein 8 of the 16 highly urbanised cities surpassed the metro capital population density of 20,000 persons/km<sup>2</sup> in 2015.

But at the same time, Metro Manila has adopted a car-focused urban design approach with only four public railway lines. Where Manila has too few high-capacity railway lines it has too many old buses and jeepneys. While motorisation is still low relative to other low-middle income countries in ASEAN, annual growth of the vehicle fleet is approximated at 6-7% and the fastest growing market in ASEAN. The increasing private vehicle ownership challenges the status quo of the public transport system in the Philippines significantly.

**Table 1: General Overview – Philippine Context**

<b>Country's Capital</b>	Manila
<b>Total Inhabitants 2015</b>	100.98 Million
<b>Population Growth 2000 - 2015</b>	32%
<b>GDP Total in USD 2015</b>	292.45 Billion
<b>GDP per Capita in USD 2015</b>	2,899.38
<b>GDP per Capita Growth 2000 – 2015</b>	64%
<b>Motorization Rate 2014</b>	35 motor vehicles/1000 inhabitants
<b>Motor Vehicle Population Growth 2000-2014</b>	114% (= 4.2 Million vehicles added)

Metro Manila's public transport system that operates only four public railway lines relies heavily on road-based vehicles, i.e. jeepneys or buses.

The historically fragmented public transport system is dependent on road-based vehicles and is dominated by on-street competing **jeepneys**, a semi-formal, inefficient system of ancient, backyard-customized former army jeeps. According to official registrations there are 250,000 jeepneys in the Philippines, approx. 55,000 thereof in Metro Manila, although the true number including informal jeepneys may be much higher. Still today, jeepneys count for approx. 40% of all vehicle trips, which make them the biggest contributor of GHG emissions in the transport sector and a dominating force in the daily life in the Philippines. Jeepneys are

capable of accommodating 12 to 32 passengers, are manufactured and maintained locally in small facilities and are regarded as a cultural symbol of the country. Other road-based public transport vehicles include buses (approx. 5,000 in Metro Manila, 20,000 in the Philippines), taxis, Asian Utility Vehicles (AUV, express point-to-point service in mini-vans accommodating ca. 14 passengers), and motorized or pedal-powered tricycles.

The current situation of the public transport market is characterised by a large number of on-street competing operators (buses, Asian Utility Vehicles, jeepneys and tricycles). This has led to an inefficient supply of low quality public transport service and dangerous and congested traffic situations.

In Metro Manila alone, over 43,000 jeepney franchises and over 830 bus franchises have been issued on more than 900 routes, making the public transport market practically unmanageable for the government. Over 75% of jeepney operators own just a single vehicle, with just 2% of operators owning more than five vehicles which again highlights the extremely fragmented nature of the market.

In Metro Manila alone, the current traffic situation translates to societal costs of roughly 20 billion USD annually (around 7.4% of the country's GDP) or 51 million USD per day<sup>1</sup> due to lost working-hours, additional fuel consumption, health costs caused by air pollution, and loss of investment opportunities.

Accounting for 34% of energy-related GHG emissions, transport is also noted as the largest source of air pollution in the Philippines. In 2010, road transport emissions were estimated at 25.9 MtCO<sub>2</sub>e. Emissions from road transport under a business as usual scenario are projected to increase to 87 MtCO<sub>2</sub>e by 2030, resulting in a rapid enlargement of the country's carbon footprint and further worse air pollution in urban areas.<sup>2</sup>

## The NAMA Approach

Modernising the jeepney industry would lay the foundation for enabling the reform of the road-based public transport system and would potentially mitigate the current motorisation trend in light of an extraordinarily economic and vehicle population growth over the last decade (see Table 1). Complementary to the jeepney market reform, described in this document, the Philippine Government developed, in cooperation with the Japan International Cooperation Agency (JICA), the Mega Manila Dream Plan 2030, which focuses on the development of a comprehensive railway network through the metropolitan region. However, a transformation of the road-based public transport market is needed to a) realize short- and midterm mitigation effects, b) complement existing efforts in improving mass public transport, and c) to limit the current motorization trend of the country.

The **objective** of the Jeepney+ NAMA is to establish a modern, sustainable, and climate-friendly road-based public transport system in Philippine cities.

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<sup>1</sup> Japan International Cooperation Agency (JICA). 2014. *Roadmap for Transport Infrastructure Development for Metro Manila and Its Surrounding Areas* (Region III & Region IV-A). Tokyo, Japan International Cooperation Agency.

<sup>2</sup> National Framework Strategy on Climate Change 2010-2012.

The reform process envisaged by the Government involves key structural changes within an implementation period of approximately 10 years (2016-2026). The strategy is based on two main elements:

- Structural changes within the public transport market
  - Institutional re-organisation of public transport planning and regulation,
  - Introduction of service contracts and franchise consolidation and reform,
  - Introduction of joint fleet management,
  - Shift towards an Origin-Destination demand model planning approach, and
  - Use of technology to manage public transport operation.
- Fleet renewal incl. shift to higher capacity vehicles
  - Introduction of age limit and vehicle standards for jeepneys,
  - Introduction of a scrappage scheme, and
  - Introduction of financial incentives to modernise and consolidate the fleet.

The NAMA is a combination of shift and improve approaches to reduce emissions from the transport sector and tackles different arenas of the public transport market (see **Figure 1**).

Ultimately, the NAMA aims to consolidate public transport provision towards a manageable number of public transport service providers/companies. In Metro Manila, the existing jeepney fleet will be replaced with new, higher capacity and more efficient vehicles. The NAMA aims to reduce the fleet by about 22%. A 22% reduction represented by 11,000 jeepneys would leave room for a vehicle replacement of about 42,000 more jeepneys (78%) by 2026 (Biona, 2015, see Table 2). It is believed that there is potential for further consolidation of up to 36% reduction of the vehicle fleet in the long-term (Kaenzig, 2016). Through the introduction of new vehicles with higher passenger capacity the total capacity of the fleet will not be reduced but the total vehicle kilometres.

**Table 2: Overview of consolidated jeepney fleet for 22% reduction in Metro Manila**

<b>Existing Jeepney Fleet</b>	54,843
<b>Rationalised units / routes in 2026</b>	
<b>Electric Jeepneys</b>	2,239
<b>Euro 4 Diesel Jeepneys</b>	33,131
<b>Euro 4 Diesel Minibus</b>	7,966
<b>Euro 4 Buses</b>	885
<b>Total rationalised units</b>	43,336
<b>Jeepney Fleet Reduction</b>	11,507 less vehicles = 22% fleet reduction

Source: Own calculations based on Biona (2015)

The NAMA consists of four components, which are illustrated in **Figure 1**. Through the introduction of new vehicles with higher passenger capacity the total capacity of the fleet will not be reduced but the total vehicle kilometres.

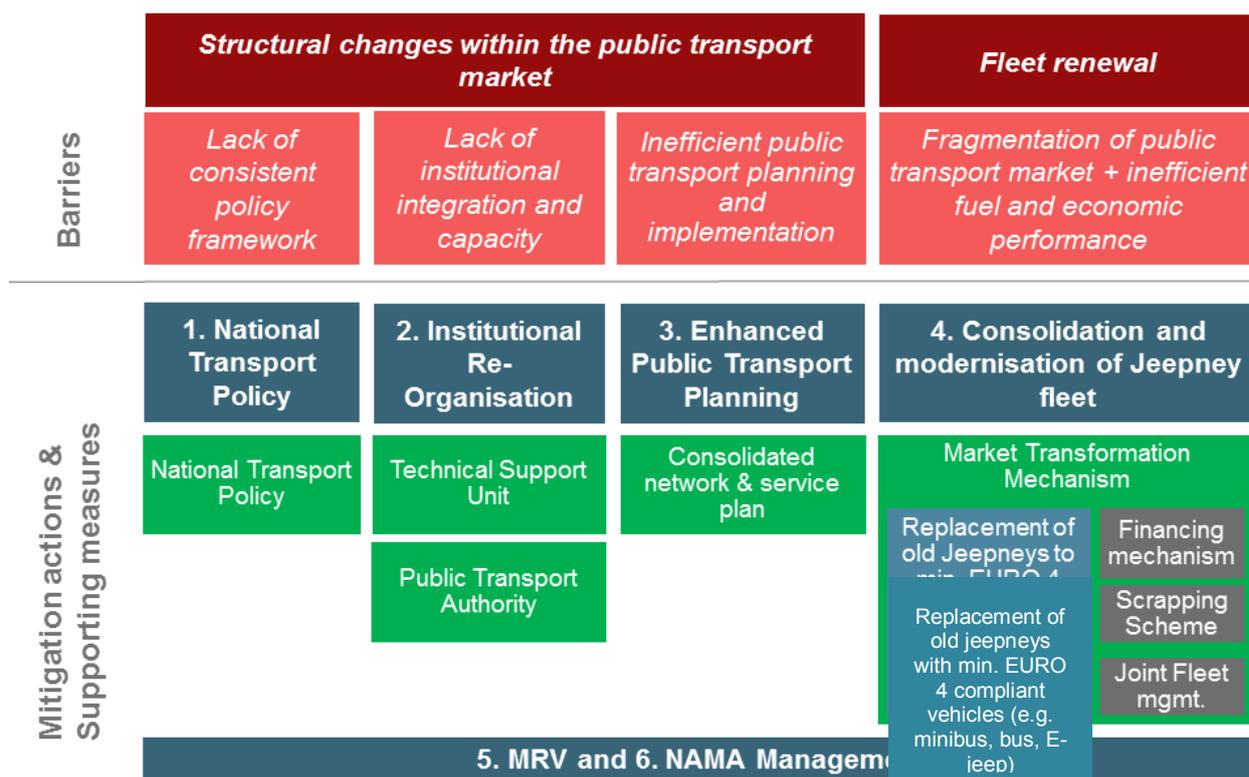


Figure 1: The Jeepney+ NAMA

The NAMA consists of four Components which are briefly described in the following:

The **National Transport Policy (Component 1)** will consolidate relevant aspects on climate change, clean air, land-use, and public services into a much-needed coherent national policy framework.

The objective of **Institutional Reorganisation (Component 2)** is to establish an improved institutional structure for public transport in the country. Merging competencies and mandates currently fulfilled by different divisions within and attached agencies of the DOTr could be an important step towards better aligning public transport policy in the Philippines – in and beyond Metro Manila. [An envisaged Public Transport Agency would merge the core public stakeholders for public transport planning and regulation]

Setting up a reorganized structure will not be a short-term endeavour. In order to strengthen the institutional and planning capacities of DOTr in the short-term, it is planned to establish a so-called Technical Support Unit (TSU) under the Office of the Undersecretary for Planning of the DOTr. The TSU would serve a double function:

1. To be a focal point for the NAMA implementation and oversee the planning, implementation as well as the scaling up of the NAMA nationwide;
2. To provide technical assistance and capacity development, including data collection and knowledge management within the Government.

As a preparatory step towards consolidation, the NAMA foresees the development of a **consolidated public transport network and service plan for Metro Manila (Component 3)**.

The core of the NAMA approach is the **consolidation and modernisation of the jeepney fleet (Component 4)**. It will focus on two main workstreams:

1. **Consolidation** through reduction of total number of vehicles, franchise and industry stakeholders (shift);
2. **Modernisation** of the jeepney fleet through the replacement of old jeepneys with new, higher-capacity, low-emission vehicles (improve).

**Consolidation** of public transport provision is understood as a phased approach towards lowering the number of public transport vehicles and franchises and consolidating currently dispersed jeepney and bus operations under a limited number of corporately managed fleets servicing consolidated transit routes. This **organisational consolidation** will facilitate improved fleet management, thereby supporting **vehicle consolidation** (shift to higher-capacity buses) and modernisation of public transport fleets, as well as service provision based on pre-determined service contracts. The objective is to shift all passengers' kilometres from the current jeepney fleet on major corridors to cleaner city buses by 2026. This phased consolidation approach is expected to start in key routes in Metro Manila, with an ultimate goal of having main routes serviced by corporate public transport operators using modern, high occupancy, environment-friendly city buses. In the mid-term, scaling up consolidation to other cities is planned.



*New bus fleet in "Bonifacio Global City", Metro Manila (unclear emission standard)*

**Modernisation** refers to the **replacement** of old polluting and inefficient jeepneys with cleaner and more efficient vehicles. Different technological options are considered as alternatives for the new vehicles, which all of them have to meet at least EURO IV standards. Moreover, the modernisation programme will not only address emissions but also safety, accessibility and other operational concerns through the introduction of new vehicle standards. Retrofitting existing units is not foreseen.

In order to incentivise the sustainable consolidation of the industry and push for an accelerated adoption of cleaner technologies, several **additional supportive measures** are recommended to be introduced by the Government:

- i) Introducing jeepney age limit and scrappage scheme
- ii) Introducing/Improving vehicle standards
- iii) Establishing acquisition incentives and scrapping scheme
- iv) Franchise reform and introducing joint fleet management
- v) Introduction of fixed jeepney stops
- vi) Use of technology for more efficient transport service

The NAMA is designed in **3 phases** over a 12-year time span. Phase 1 (2014-2016) is focused on the design and set up of the NAMA, including the envisaged funding mechanism and institutional structures for management and capacity development. Phase 2 (2017-2020) is focused on kick-starting the consolidation and fleet modernisation in selected areas, mostly in Metro Manila. Phase 3 (2020-2026) will roll out the activities nationwide.

## Financing

The current road-based public transport system is fully financed through fare box revenues. The government does not provide any subsidies to jeepney operators. Investments into the modernisation of the public transport market will result in significant reductions of the external costs to society. The biggest financial barrier for fleet modernisation is the difficulty of the operators to afford the downpayment for a new vehicle (10-20% of the investment cost). This is largely linked to the fragmented, individualized ownership structure of the jeepney industry.

Based on rationalised fleet numbers, and on estimated cost of vehicles meeting the new standards, the overall investment required for fleet modernisation is as follows:

**Table 3: Fleet investment requirements for Metro Manila (22% reduction of fleet)**

Technology	Cost per Unit	Number of rationalised fleet in Metro Manila	Initial Investment costs in Metro Manila (in Million)
<b>Electric Jeepneys</b>	PHP 950,000 (USD 19,088)	2,239	PHP 2,127.05 (USD 42.74)
<b>Euro 4 Diesel Jeepneys</b>	PHP 1,100,000 (USD 22,102)	33,131	PHP 36,444,100 (USD 732.25)
<b>Euro 4 Diesel Minibus</b>	PHP 1,800,000 (USD 36,166)	7,966	PHP 14,338,800 (USD 288.10)
<b>Euro 4 Buses</b>	4,500,000 (USD 90,416)	885	PHP 3,982,500 (USD 80.02)
<b>Total initial investment costs</b>		43,336	PHP 56,892,450 (USD 1.14)
<b>Total financing requirements (90%)</b>			PHP 51,203,205 (USD 1,028.80)

Source: Own calculations based on Biona (2015)

The modernization programme offers huge benefits to society, to travellers and to the jeepney industry supporting market transformation and long-term competitiveness vis-à-vis private transport. The financing mechanism suggests a burden-sharing scheme to **mitigate the financial impact** on the sector. The financial mechanism is built upon **three core elements**:

1. Preferential finance terms
2. Value Added Tax (VAT) exemption on the purchase of new compliant vehicles.
3. Revised fare structure for routes operating new vehicles.

Preferential finance rates (in particular a longer loan term and preferential interest rates) and VAT exemption **make investments more affordable**. The fare restructuring softens the impact on operators' income during the loan repayment period. This bundle of measures incentivizes the sector to make the investment required and to maintain the level of transport service supply that is essential to mobility in Metro-Manila.

### NAMA Schedule

The timeline of the NAMA is illustrated in Figure 2 below.

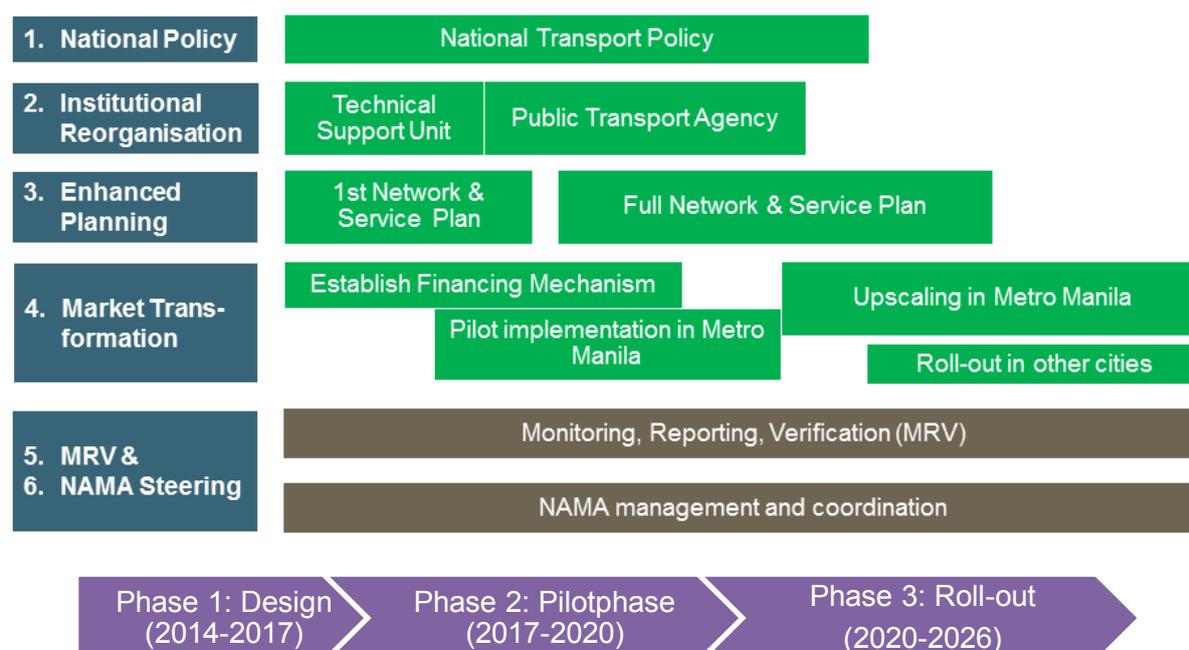


Figure 2: NAMA Schedule and Milestones

### Mitigation Potential and MRV

MRV (measurement, reporting, verification)-related components will be realized as part of the NAMA. The monitoring of the progress and impacts of the NAMA will be important in determining the effectiveness of the interventions, as well as potential future courses of action. Overall, the MRV approach will take on a “bottom-up” approach and will therefore involve the collection of vehicle activity data (particularly for those vehicles that have been introduced due to the NAMA), as well as the conduct of complementary data collection processes such as sample surveys.

It is envisioned that the MRV component will be a multi-agency initiative which will involve the operators, as well as the relevant government agencies (such as DOTr, LTO, MMDA, among others). The MRV component can also feed into larger related initiatives on assessing the emissions from the transport sector. The data collected, as well as the estimates of the impacts of the NAMA can be used in tracking the progress of the country in terms of its NDCs, for example. As the monitoring of the NAMA's impacts will be bottom-up in nature, the data to be collected can also be used in other relevant purposes, particularly in terms of transport project identification, planning and evaluation.

The NAMA is expected to achieve accumulated GHG emission reductions in the range of 6.5 to 9.2 MtCO<sub>2</sub>e between 2016 and 2026 in the Philippines (between 3.1 and 4.4 MtCO<sub>2</sub>e avoided for Metro Manila). This translates into an average annual emission reduction of 0.65 to 0.92 MtCO<sub>2</sub>e in the Philippines. Through these mitigations, the total yearly transport emissions in a) Metro Manila would be reduced by 3.6% and b) nationwide by 2.6%.

**Table 4: Ex-Ante GHG Impact Assessment 2016 – 2026**

		<b>Low Scenario (in MtCO<sub>2</sub>e) (70% shift)</b>	<b>High Scenario (in MtCO<sub>2</sub>e) (100% shift)</b>
<b>Workstream A: Fleet Consolidation</b>	<b>Metro Manila</b>	1.8	2.5
	<b>Philippines</b>	to be estimated	to be estimated
<b>Workstream B: Fleet Modernisation</b>	<b>Metro Manila</b>	1.3	1.86
	<b>Philippines</b>	4.68	6.69

Source: Own calculations based on Clean Air Asia (2015)

Capacities to conduct data collection, monitoring and reporting within DOTr will be strengthened by workshops and on-the-job training. The progress and achievements of the NAMA will be continuously monitored and annually reported.

### **Sustainable Development Benefits (co-benefits)**

In addition, the NAMA will generate various sustainability benefits besides GHG emission reductions. The improvement of public transport services is expected to result in reduced congestion and travel time, better quality of public transport service, and improved road safety. The shift towards more efficient low emission vehicles will improve air quality and contribute to fuel security by reducing fuel demand. Consolidation and joint fleet management is expected to realise better working conditions for providers of public transport services.

The modernization of the jeepney fleet in Metro Manila, combined with the rationalization of public transport services in major corridors would result in total on-road diesel savings

between 528 to 754 million litres (up to 2026) or 310 million to 443 million USD.<sup>3</sup> If the impacts of the scaled up jeepney modernization program (nationwide) are included, the total amount of diesel to be saved can be between 1.9 to 2.7 trillion litres (or 1.9 to 2.7 billion per year) or 1.1 to 1.5 trillion USD.

The NAMA can also improve air quality in Metro Manila, as well as in the other urban areas in the country. It is estimated that the NAMA will reduce harmful air pollutant emissions (aside from GHGs) such as Particulate Matter (up to 47%), Carbon Monoxide (up to 52%), NOx (up to 30%), SOx (up to 9%) and Hydrocarbons (up to 52%). The reduction in the emissions of these pollutants is estimated to positively impact the health of the citizens. The estimated human toxicity impacts are estimated to be reduced by 53%.<sup>4</sup> The monetized health value of the reduced air pollutants in Metro Manila are estimated to be between 83 to 119 million USD per year. If the scaled up program for the jeepney technology modernization is accounted for, the monetized value of air pollution reduction is estimated to be in the range of 220 to 316 million USD per year.<sup>5</sup>

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<sup>3</sup> Based on pump price of 28 pesos per liter and 0.21 Php/USD.

<sup>4</sup> Based on Biona (2015) that used human toxicity factors for different pollutants emitted by different vehicle types.

<sup>5</sup> The monetized values are estimated using monetized health impact factors based from Biona et al (2017) which represent aggregated costs associated with a ton of a certain type of pollutant (limited to PM, SOx and NOx).

**Table 5: The Jeepney+ NAMA at a glance**

<b>National Implementing Entity and involved stakeholders</b>	<p><b><u>Institution:</u></b> Department of Transportation (DOTr)</p> <p><b><u>Name of contact person:</u></b> Usec. Anneli Lontoc, Asec. Mark De Leon</p> <p><b><u>Involved national partners:</u></b> Climate Change Commission (CCC), Land Transportation and Franchising Regulatory Board (LTFRB), Land Transportation Office (LTO)</p> <p><b><u>Involved supporting organizations:</u></b> GIZ</p>
<b>Type of action</b>	Policy / Programme
<b>Type of policy instruments</b>	Regulations, Financial instruments, Public spending/investments
<b>Scope</b>	<p><b><u>Geographical:</u></b> Metro Manila, other cities TBD</p> <p><b><u>Type of approach:</u></b> Shift and Improve</p> <p><b><u>Subsector:</u></b> Urban road-based public transport (jeepneys + buses)</p>
<b>Main mitigation measures</b>	<p><b>Consolidation of public transport services (shift)</b></p> <ul style="list-style-type: none"> <li>• Consolidation of public transport routes and operators (merging franchises) in order to improve the current inefficient operation of services</li> <li>• Reducing total amount of public transport vehicles by approximately 22% by replacing old jeepneys with new, higher capacity and climate-friendly vehicles</li> </ul> <p><b>Jeepney fleet modernisation (shift and improve)</b></p> <ul style="list-style-type: none"> <li>• Shifting old jeepneys to modern, new “jeepney units” (e-jeep and new units which utilize cleaner fuels and engines (EURO IV) in minor routes)</li> <li>• Replacing old jeepneys with new vehicles clean and efficient combustion engines (meeting EURO 4 or stricter) or with zero-emission propulsion systems</li> </ul> <p><b>Additional supportive measures</b></p> <ul style="list-style-type: none"> <li>• Introducing jeepney age limit and scrappage scheme</li> <li>• Introducing/Improving vehicle standards</li> <li>• Establishing acquisition incentives and scrapping scheme</li> <li>• Franchise reform and introducing joint fleet management</li> <li>• Introduction of fixed jeepney stops</li> </ul>
<b>Timeframe</b>	<p><b><u>Phase 1:</u></b> “Design of Jeepney+ NAMA” (2014 – 2017)</p> <p><b><u>Phase 2:</u></b> “Pilot Phase in Metro Manila” (2017 – 2020)</p> <p><b><u>Phase 3:</u></b> Roll-out in additional Philippines cities (2020 – 2026)</p>
<b>Expected GHG mitigation</b>	<ul style="list-style-type: none"> <li>• Between 6.5 MtCO<sub>2</sub>e and 9.2 MtCO<sub>2</sub>e between 2016 – 2026 in the Philippines</li> </ul>
<b>Type of NAMA</b>	Supported with unilateral elements
<b>Type of support requested</b>	<p><b><u>Technical support:</u></b> institutional re-organisation, fleet consolidation and modernisation, MRV, vehicle inspection system</p> <p><b><u>Financial support:</u></b> loan to incentivize industry consolidation and bridge funding gap during payback period and support leap-frogging in regard to technology adoption</p>

# 1 Introduction

*“Traffic rules it all.”* There is no bigger topic in the daily urban life of the Philippines than *traffic*. Everyone who is living or who has visited Manila understands why. Commuting times have reached unprecedented levels and the traffic jams on EDSA are world-known. Many factors played into this: The Philippines is one of the fastest growing economies in East Asia, almost tripling its Gross Domestic Product (GDP) in the last 10 years. Of the 100 million inhabitants in the Philippines more than 60% of the population lives in urban areas. With an estimated population of 12-16 million, Metro Manila is the dominating economic and political centre of the country, accumulating roughly one third of the national GDP.

Metro Manila combines three aspects that can lead to congestion and traffic woes. The city is one of the densest populated areas in the world. In Metro Manila, which covers only 620 km<sup>2</sup> on average approx. 18,000 people/km, with pockets of density of 40,000 people/km (i.e. City of Manila) are putting the transport system under pressure.



*Traffic situation along EDSA and Ortigas Avenue (2016)*

But at the same time as its population grows by 1.8 % annually, Manila has adopted a car-focused urban design approach with only four public railway lines. Only 5 kilometres of the 73-km planned expansion (in 1998) got build in the last 15 years. Between 2007 and 2012, car ownership grew by 16% and motorcycle/tricycle ownership increased by 69%. The 2014 ASEAN Automotive Federation sales report noted the Philippines as the fastest growing automobile and motorcycle market in the region ahead of Vietnam, Singapore, Malaysia and Indonesia. In Metro Manila alone, average annual growth rate of the vehicle fleet is about 3.9%, exceeding average annual population growth, which is only at 2.2%. While the motorisation rate is low relative to other low-middle income countries in ASEAN, annual

growth of the vehicle fleet is approximated at 6-7%. Absolute motorisation is still low at a little over 12 passenger cars per 1,000 inhabitants<sup>6</sup> (compared to 564 in member states of the European Union and the European Free Trade Association or 73 in Asia, Oceania and the Middle East)<sup>7</sup>, which indicates a hidden future demand for private vehicles in the Philippines, if no countermeasures are taken.

**Table 6: General Overview - Philippine Context**

<b>Country's Capital</b>	Manila
<b>Total Inhabitants 2015</b>	100.98 Million
<b>Population Growth 2000 - 2015</b>	32%
<b>GDP Total in USD 2015</b>	292.45 Billion
<b>GDP per Capita in USD 2015</b>	2,899.38
<b>GDP per Capita Growth 2000 – 2015</b>	64%
<b>Motorization Rate 2014</b>	35 motor vehicles/1000 inhabitants
<b>Motor Vehicle Population Growth 2000-2014</b>	114% (= 4.2 Million vehicles added)

In addition, the road-based public transport system lacks state-of-the-art technologies and operational procedures. Where Manila has too few high-capacity railway lines it has too many smoke-belching buses and jeepneys. It is believed that there are much more jeepneys plying the streets of Metro Manila than the 54,800 officially registered vehicles. In a highly liberalized market, buses and jeepneys are competing on-street over customers, which has led to dangerous traffic situations and is significantly contributing to traffic.

Generally, urban transport in the Philippines has long been afflicted by highly fragmented spatial and infrastructure planning, poor urban governance, largely unregulated public transport services and underfunded public transport infrastructure. This has led to chaotic and congested traffic conditions, most notably in Metro Manila. This resulted in high transport-related GHG emissions, high levels of air and noise pollution, overwhelmingly slow travel times, poor public transport service and severe problems in traffic safety.

The government recognizes that modernising public transport is an overdue priority for economic and social prosperity and for the ecological footprint of the sector. This recognition is reflected in the National Environmentally Sustainable Transport Strategy (NESTS) and the National Implementation Plan (NIP) on Environment Improvement in the Transport Sector of the DOTr, the National Strategic Framework on Climate Change (NFSCC), the National Climate Change Action Plan (NCCAP) 2011-2028, and the Philippine Development Plan (PDP) 2011-2016. Jeepney modernisation is also included in the Intended National Determined Contribution (INDC) of the Philippines in the context of the Paris Agreement of 2015 under the United Nations Framework Convention on Climate Change (UNFCCC).

<sup>6</sup> Helgi Analytics

<sup>7</sup> Eurostat (2016). The EU in the world – Transport.

Modernising the jeepney industry will not solve all transport-related issues of the current development path in Philippine cities but it will allow the society to mitigate the high motorisation rate in the light of an extraordinarily economic and vehicle population growth over the last decade (see Table 6) and the government to provide better public transport service. In addition to the jeepney market reform, the Philippine Government developed, in cooperation with the JICA, the Mega Manila Dream Plan 2030, which focuses on the development of a comprehensive railway network through the city region.

But as of now, almost all public transport trips are made on road (90-95%) in the Philippines. A transformation of the road-based public transport market is needed to realize short- and midterm mitigation effects and to limit the current motorization trend of the country while improving public transport services.

The current situation is characterised by a large number of private, individual operators for buses, AUVs, and jeepneys. This has led to an inefficient supply of low quality public transport services and dangerous and congested traffic situations.

The cost of congestion in Metro Manila alone translates to an estimated loss of 20 billion USD annually, which is around 7.4% of the country's GDP or 51 million USD per day (Php 2.4 billion), due to lost working-hours, additional fuel consumption, health costs due to pollution, and loss of investment opportunities (JICA, 2014).

With 34%, transport is also noted as the largest source of air pollution and energy-related GHG emissions in the Philippines. In 2010, road transport emissions were estimated at 25.9 MtCO<sub>2e</sub>. Based on the current motorization rate and a projected increase in urban population, emissions from road transport under a business as usual scenario are projected to increase to 87 MtCO<sub>2e</sub> in 2030, as noted in the NFSCC. This would result in a rapid enlargement of the country's carbon footprint as well as in further worsening of air pollution in urban areas.

The Jeepney+ NAMA will introduce reform measures to modernise and consolidate public transport provision in the Philippines. This NAMA Concept Document will describe the context of the public transport sector (Chapter 2) in the Philippines before summarizing the main barriers (Chapter 3) towards a climate-friendly and modern public transport system. Chapter 4 will introduce the comprehensive and transformational approach of the Jeepney+ NAMA. Chapter 5 will shortly present the MRV-approach of the NAMA before the financial mechanism (Chapter 6) will be described.

## 2 Overview of the Philippine (road-based) public transport sector

### 2.1 Context of the jeepney sector

Today, **jeepneys are the most frequently used (public) transport mode in urban areas.** Of all motorized land transport modes, jeepneys are responsible for 40% of all trips, which makes it the dominant mode in the Philippines. There are 685 jeepney routes in Metro Manila alone, extensive enough for commuters anywhere to get a ride within 500 meters. About 235,000 units are operating in the Philippines, both registered and unregistered, wherein 54,800 units are officially registered in Metro Manila. Other public transport vehicles include buses, taxis, AUVs and motorized or pedal-powered tricycles.

The jeepney sector is highly fragmented and individualised with a low level of professionalization and coordination. A lack of consolidation and coordination has led to an astonishing amount of (quasi) single operators that are competing on street. In Metro Manila, this highly fragmented system includes about 43,000 jeepney franchises, which leads to an average vehicle/franchise ratio of only 1.25. Franchise data identifies 24,387 named operators (=owners of the franchise), the large majority of whom (78%) own just a single unit. Just 2% of operators own more than 5 units. These include some individual operators with larger fleets but also a number of operator co-operatives, which may own more than 100 units collectively. Even with the larger fleet sizes, the total vehicles owned by co-operates accounts for less than 15% of the total fleet.

**Table 7: Number of PUJ units owned by each operator**

No of Units	No of Operators	Percentage
1	19,098	78%
2	3,696	15%
3	669	3%
4	410	2%
5-9	368	2%
10+	146	1%
Total	24,387	

Source: Kaenzig 2016

Typical seating capacity of jeepneys ranges between 12 and 32 passengers<sup>8</sup> (the average jeepney provides rather 20 seats). Currently used city buses can accommodate 50 to 58 passengers, having a seating configuration with limited space for standing. In Metro Manila,

<sup>8</sup> Jeepneys are not designed to accommodate standing passengers. However, to increase capacity, passengers at times, hang onto the back of the vehicle, which imposes an additional safety risk.

light rail transit (LRT) and buses service the major radial thoroughfares, while jeepneys service almost all routes but also act as feeders to buses and the LRT system. The average trip length of jeepney passengers is rather short (about 3.0 km), while transfers between jeepneys are frequent. The average length of bus trips per passenger is about 10 km. Other public transport vehicles include taxis, AUVs, and motorized or pedal-powered tricycles. AUVs provide express point-to-point service, which is faster than buses or jeepneys. Roughly 6,000 AUVs are operating in Metro Manila on 137 routes with an even more fragmented market as indicated in the table below.

**Table 8: Buses, jeepneys, and AUVs operating in Metro Manila**

Mode	Buses	Jeepneys	AUVs (UV Express)
Units	9,669	54,843	5,953
Routes	98	685	137
Franchises	263	43,541	2,622
Operators	157	24,387	2,527
Operator – Franchise ratio	1.7	1.8	1.0
Operator – Unit Ratio	29.7	2.2	1.2
Franchise – Unit Ratio	17.7	1.25	1.2
Average speed (km/h)	17.5	14.0	25.2
Average length of route (km)	37.6	11.3	15.2

Source: LTO, LTFRB, DOTr

In the Philippines, there are four railway lines in operation, which include three LRT lines and one mass rapid transit (MRT) line in Metro Manila. The other railway line is the Philippine National Railways, which is comprised of a commuter service and a long-distance rail service to the southern regions of the main island of Luzon.<sup>9</sup>

**Figure 3** illustrates the different service routes of buses, jeepneys, AUVs, and rail in Metro Manila, showing significant overlap. Service provision has become quite complex bordering to chaos in the streets. The figure shows the **need for a more rationalized network** and service plan that takes note of the road-based public transport terminals and stops in particular for buses and jeepneys. It is interesting to note that all modes can be found in the main routes with jeepneys serving the inner routes. The map does not show a clear demarcation of the connection between modes and that there seems to be tight competition among modes but not all are serving the demand with the exception of the jeepneys.

<sup>9</sup> ITPS, 2014



Figure 3: Public transport service routes in Metro Manila

Source: Biona, 2015

Jeepney operation is a major source of jobs and income. It provides income to a large number of drivers, callers, and mechanics, and employment through its supporting businesses, including assembly plants, repair shops, filling stations, warehouses, and motor insurance companies. It is estimated that about 118,000 families (or about 590,000 individuals) in Metro Manila depend on income from the jeepney sector.<sup>10</sup>

<sup>10</sup> Biona (2015) assumes one operator and one driver per unit, one mechanic for every ten jeepneys and four terminal callers per route. Most of the drivers, operators and jeepney mechanics have not undergone formal auto-mechanic schooling

In 2013, total registered vehicles in the Philippines were 7.69 million units (see Table 9: Registered vehicles in the Philippines, 2013), which is 4.5 times that of vehicles registered in 1990. Of these registered vehicles, more than 50% were motorcycles/tricycles. About 27% of all vehicles were registered in the National Capital Region<sup>11</sup>, for private cars almost 50%. Jeepneys are summarised under “utility vehicles” among other types of vehicles.

**Table 9: Registered vehicles in the Philippines, 2013**

Vehicle Type	Registered Vehicles	% Share
Cars	868,148	11.28
Utility Vehicles	1,794,572	23.33
SUV	346,396	4.50
Trucks	358,445	4.66
Buses	31,665	0.41
Motorcycles / Tricycles	4,250,667	55.27
Trailer	40,145	0.52
<b>Total</b>	<b>7,690,038</b>	

Source: LTO Statistical Yearbook 2013

### Climate Impact

With 34%, transport is noted as the largest source of air pollution and energy-related GHG emissions in the Philippines. In 2010, road transport emissions were estimated at 25.9 MtCO<sub>2e</sub>. Bottom-up calculations that take vehicle activity data as the basis to estimate emissions, however, came to much higher numbers for transport-related emissions than the top-down approach of the Department of Energy (DOE). Clean Air Asia (2012) estimates that the 2010 emissions of road transport were 46 MtCO<sub>2e</sub> – over 1.7 times the DOE number.<sup>12</sup> Emissions from road transport under a business as usual scenario are projected to increase to 87 MtCO<sub>2e</sub> by 2030. This would result in a rapid enlargement of the country’s carbon footprint as well as in further worsening air pollution in urban areas.<sup>13</sup> Although jeepneys (PUJs) only make up a small proportion of the total vehicle fleet in Metro Manila (55,000) or the Philippines (250,000), the jeepney sector contributes significantly to GHG emissions from the road sector with 7% of all transport-related GHG emissions in 2015<sup>14</sup>.

<sup>11</sup> ITPS, 2014

<sup>12</sup> The large discrepancy between results illustrates the difference in top-down and bottom-up estimation. The official GHG inventories rely on the overall energy balance sheets of the DOE that contain sectoral energy consumption estimates based on the data submitted by fuel companies, for example. This top-down approach is useful when analysing trends; however, a bottom-up approach in emission calculation provides insights not only on fuel consumption but also on transport activity across all modes and thus sources of emissions and options for mitigation.

<sup>13</sup> NFSCC 2010-2012

<sup>14</sup> Own calculations according to CAA data (2016)

## 2.2 Road-based public transport: Governance and market players

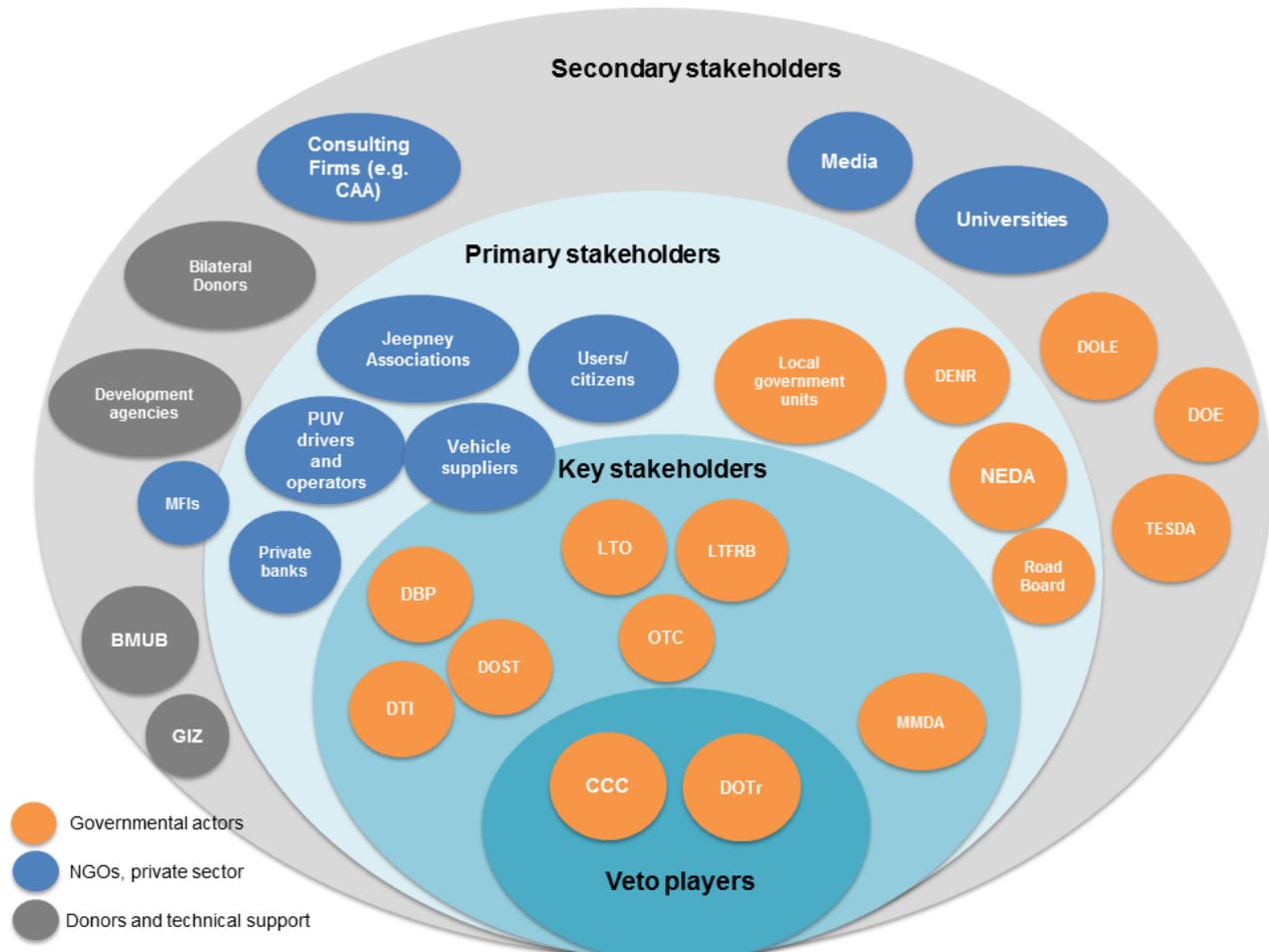
The main implementing partners of the Jeepney+ NAMA are the Department of Transportation (DOTr) and the Climate Change Commission (CCC).

The DOTr, the key player in the road-based public transport sector, is the lead executing government agency responsible for public transport planning and for the promotion and development of a reliable and coordinated transportation network. In contrast to many other countries worldwide, the national DOTr is also issuing out the franchises for public buses, AUVs, and jeepneys. In most countries, the management and regulation of the public transport industry is within the responsibility of the regional or local political level.

The CCC is the lead policy-making body of the government in the coordination, monitoring, and evaluation of climate change programs and action plans. Moreover, the CCC is responsible in strengthening the capacities of all sectors on the development of NAMAs and the design of MRV systems to support the implementation and evaluation of NAMAs and is the overall coordinator of the NAMA to the UNFCCC.

Further relevant stakeholders for the implementation of the Jeepney+ NAMA are outlined in **Figure 4**. Stakeholders are divided into four categories:

1. Veto players: actors whose support and participation are necessary in order to achieve the targeted results of the project or actors who may veto the project;
2. Key stakeholders: actors directly involved in the decision-making of the project and who are able to strongly influence the implementation of the project;
3. Primary stakeholders: actors directly affected by the implementation of the project; and
4. Secondary stakeholders: actors that are temporarily or indirectly involved in the implementation of the project.



**Figure 4: Stakeholder map**

Source: Own illustration, see Annex 5 for further explanation

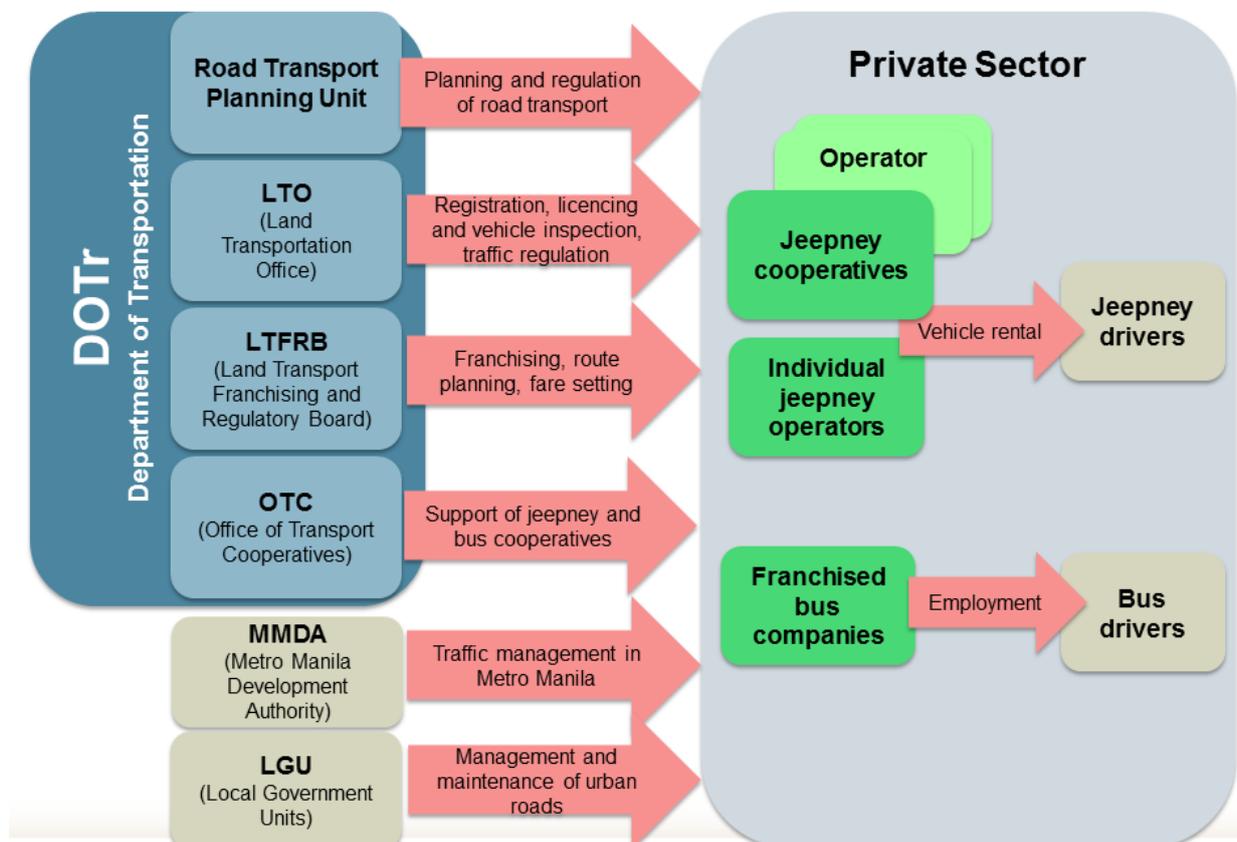
The DOTr is responsible for public transport planning. The *Road Transport Planning Division* of the DOTr identifies and rationalises major public transport (bus, jeepneys, AUVs, such as vans and shuttle services) routes and determine the routes to enable an efficient management of the public transport service. It furthermore is responsible for the development and planning of programs, projects, and policies on environmentally sustainable road transportation, especially geared towards mass public transport.

The *Metro Manila Development Authority* (MMDA), a subnational/regional special purpose government body, is in charge of traffic management and enforcement operations on national roads in Metro Manila. Cities or local government units (LGUs) within Metro Manila are in charge of traffic management and of the maintenance of secondary roads.

The *Land Transport Franchise Regulatory Board* (LTFRB) regulates entry and exit of bus operators into the market and regulates bus fares. The *Land Transportation Office* (LTO) is mostly responsible for vehicle registration and inspection. The market operates under a highly complicated enforcement regime wherein enforcement of traffic policy is shared by several agencies including the MMDA, the Philippine National Police (PNP) and the responsible LGU. Also indirectly involved through planning and development of road

infrastructure are the Department of Public Works and Highways (DPWH) and National Economic Development Authority (NEDA).

Given the discussed structure, road-based **public transport planning and regulation is highly fragmented**. Figure 5 illustrates the main market players in the road-based public transport sector including their functions.



**Figure 5: Market players in the road-based public transport sector in Metro Manila/Philippines**

Source: Own illustration

The **LGUs** are responsible for regulating the franchises of tricycles and pedicabs (bicycles with side-cabs) and for the maintenance of local urban roads. In most cities, there is no particular agency that develops local public transport plans. Some cities have a transport plan as a result of their cooperation with multilateral development agencies. However, in order to ensure the implementation of the public transport plans, it is essential that the local transport agencies have a leading role in developing the according plan.

The **typical operational arrangement** for jeepneys is a rental contract between the owner of a jeepney (often called: “operator”) and the driver. The driver rents the vehicle and serves on a certain route agreed with the owner. The owner or operator holds the franchise certificate and is responsible for ensuring that the service complies with all regulations.

In the late 2000s, the DOTr, through the Philippine Cooperative Code of 2008<sup>15</sup>, began to foster the introduction of **jeepney cooperatives**, in which several jeepney operators are loosely organized with the objective of improving the efficiency of operations and management. The cooperatives were intended to contribute to the integration and consolidation of public transport services and to improve the socio-economic conditions of its members. Through membership in a cooperative, jeepney drivers and operators (owners) would benefit from more accessible loans and statutory benefits like health insurance, social security system membership and specific housing loans. Jeepney operators are not yet legally demanded but encouraged to belong to a cooperative to renew their franchise. The *Office of Transportation Cooperatives* (OTC) is responsible for promoting cooperatives by regularly conducting trainings and by providing administrative advice. At the moment, however, in Metro Manila, less than 10% of jeepney operators are organised into cooperatives.<sup>16</sup>

**Bus services** are also regulated by a franchise system. The LTFRB regulates the entry of bus operators, issues bus franchises, and regulates bus fares<sup>17</sup>. Operators that apply for a franchise must undergo a financial and technical evaluation to prove capability of maintaining the service. According to data from the LTFRB, 5,057 buses, covered by 381 franchises, are registered in Metro Manila. Bus operators vary in their size. Small-scale operators owning 10 to 14 buses dominate the system. Some large-scale operators have a fleet of more than 100 buses. A franchise for bus operation on a specific route is not directly connected to a specific bus company. In contrast to the jeepney sector, there is usually a formal employer-employee relationship between the bus operator and the driver and bus conductor.

For buses (as well as for taxis and school buses), a 15-year age limit applies since 2013, which is supposed to lead to fleet renewal towards vehicles complying with Euro IV emission standards (introduced in 2016). To date, the implementation of the 15-year age limit for jeepneys is pending the approval and issuance of the Department Order (DO) on the age limit.

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<sup>15</sup> Republic Act No 9520, February 17, 2009 – “An Act amending the Cooperative Code of the Philippines to be known as the “Philippine Cooperative Code of 2008”

<sup>16</sup> Biona 2015

<sup>17</sup> The LTFRB is mandated to review and implement any fare adjustments under Department Order No. 92-587.

## 2.3 Finance for public transport in the Philippines

As outlined above, the DOTr is responsible for public transport planning and implementation across the Philippines. The DOTr has an annual budget of about USD 0.92 billion (PHP 46 billion) for administration, support and operations (see Table 10). In addition, the DOTr and its attached agencies receive special provisions such as, fines collected by the LTO from violations on seat belt use, and infrastructural budget for the extension of the LRT and the extension of airport and navigational facilities. All capital investment cost related to road, e.g. Motor Vehicle Inspection System (MVIS), computer systems for vehicle registration, that DOTr proposed to include in the budget, needs to undergo the approval of Congress. All related national road infrastructure is under the budget of DPWH.

All budget reflected on

Table 10: Annual Budget of the DOTr in 2014 are based on government appropriations approved by the Congress in 2014.

**Table 10: Annual Budget of the DOTr in 2014**

	<b>Purpose</b>	<b>USD (In Million)</b>	<b>PHP (In Million)</b>
<b>Programmes</b>	<b>General administration and support</b>	62.58	3,114,398
	<b>Transport policy services</b>	2.40	119,580
	<b>Motor vehicle registration and driver's licensing regulatory services</b>	21.83	1,086,638
	<b>Regulation of public transport services</b>	5.99	298,378
	<b>Rail transport passenger services</b>	38.62	1,922,190
<b>Projects</b>	<b>Locally funded projects</b>	580.42	28,887,484
	<b>Foreign assisted projects</b>	211.32	10,516,754
<b>Total</b>		<b>923.15</b>	<b>45,945,422</b>

Source: DOTr Official Gazette, 2014

### Jeepney/Bus operations

Road-based public transport services in the Philippines are fully financed through fare box revenues and advertisements. At present, the government does not provide any subsidies to jeepney or bus operators. For jeepney transport, a minimum fare of about USD 0.16 (PHP 8.00) applies to the first 4 kilometres. Every kilometre thereafter costs about USD 0.025 to 0.03 (PHP 1.25 to 1.50). The majority of vehicles are second-hand when acquired at an average price of USD 6,028 (PHP 300,000).<sup>18</sup>

The attractiveness of the franchised route has a strong bearing on the price of the vehicle as the franchise remains with the vehicle. Private equity is often not sufficient to cover the

<sup>18</sup> Biona, 2015

full purchasing price. Often, monthly payments are agreed with the previous vehicle owners, as loans from formal financial institutions are not accessible for most operators due to the small scale of operations (see Chapter 3). There is no employer–employee relationship between jeepney owner/operators and driver. Instead, the vehicle driver rents the jeepney from the owner for a fixed daily amount (called “boundary”). The fixed amount depends on the route and quality of the jeepney. Typical daily rents range between USD 16.48 (Php 820.00) and USD 17.68 (Php 880.00). Drivers receive a daily net revenue of USD 18.08 (Php 900.00) in < 5 km routes, USD 13.26 (PHP 660.00) in 5-10 km routes, and USD 18.74 (Php 933.00) in > 20 km routes (Table 11: Jeepney Daily Cost Structure). The daily net revenue is the take-home pay once fuel and vehicle rental fees are paid.

This system is referred to as the **boundary system** since drivers earn what remains after achieving the boundary of rental and fuel expenses. This in turn creates a strong incentive for drivers to literally fight for as many passengers as possible and therefore results in inefficient and unprofessional services from a network perspective. The frequent start and stop, lower cruising speed, longer idle time while waiting for passengers, excessive lane changing, and sudden acceleration of jeepneys contribute significantly to high fuel consumption and emissions. Similarly, lane blockage caused by jeepneys waiting for passengers reduces road capacity, which exacerbates traffic congestion. In combination with the historically highly fragmented industry structure, the boundary system has led to on-street-competition with many, not only ecological, negative impacts. The NAMA will introduce key structural changes (see Chapter 4) to overcome this highly inefficient operational set-up.

**Table 11: Jeepney Daily Cost Structure**

Average Amount	End to End Route Length		
	< 5 km	5 – 10 km	> 20 km
Vehicle Boundary (Rental)	878 PHP	820 PHP	840 PHP
	17.64 USD	16.48 USD	16.88 USD
Fuel Cost	634 PHP	900 PHP	915 PHP
	12.73 USD	18.08 USD	18.38 USD
Other Expenses	172 PHP	210 PHP	245 PHP
	3.45 USD	4.3 USD	4.92 USD
Driver Net Take-Home Pay	900 PHP	660 PHP	933 PHP
	18.08 USD	13.26 USD	18.75 USD

Source: Biona 2015, based on 2015 Survey Data

**Bus services** are also fully financed through fare box revenues. Bus fares are higher than jeepney fares. Travelling with ordinary buses costs about USD 0.20 (PHP 10.00) for the first 5 kilometres and about USD 0.04 (PHP 2.20) for every kilometre thereafter. Tickets for air-

conditioned buses are more expensive, costing about USD 0.24 (PHP 12.00) for the first 5 kilometres.<sup>19</sup> The driver and the bus conductor, employed by the bus operator, receive a fixed base income from the bus company and in addition, commission-based revenues from fare collection, which leads to competition for passengers among bus drivers and between bus and jeepney drivers. The fixed base income for bus drivers and conductors is obligatory since 2012.<sup>20</sup>



*Jeepneys competing with buses for passengers and loading space*

In contrast to bus and jeepney services, **rail-based services** are developed as public private partnerships and are subsidised by the government through tax revenues. In 2012, data from the Philippine Statistics Authority (PSA) indicated that railways received almost USD 160 million (PHP 8 billion) in subsidies (apart from DOTr budget), which was equivalent to 99.8% of the total subsidies to the transport sector.<sup>21</sup> Railways received the largest subsidies from the government with regards to infrastructure and service operation as the railway sector is not capable of generating its own revenues given the capacity of the general commuting public to pay. Consequently, DOTr requests an annual budget taken from taxpayers.

### **The Special Vehicle Pollution Control Fund (SVPCF)**

In recent years, the Government has taken significant steps to support sustainable, climate-friendly transport via the SVPCF. Projects, activities, and programs that reduce air pollution and/or GHG emissions from mobile sources are eligible to receive funding from the SVPCF, which is managed by the DOTr. The SVPCF was set up by the Government of the Philippines in 2001 and is fed by a 7.5% share of the registration charge levied on owners of

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<sup>19</sup> Biona, 2015

<sup>20</sup> Based on the Memorandum Circular No. 2012-001 issued by the LTFRB.

<sup>21</sup> PSA, 2012

motor vehicles. The fund accumulates to about USD 16 million (PHP 800 million) annually.<sup>22</sup> The SVPCF has hardly been utilised. In mid-2015, the fund comprised about USD 120 million (PHP 6 billion).<sup>23</sup> In order to better utilise this fund for public transport improvements, the Operating Guidelines for the Implementation and Monitoring of the SVPCF, has been issued by the DOTr in 2015.

### **The Development Bank of the Philippines**

The Development Bank of the Philippines (DBP) currently has two programmes that are relevant to support sustainable public transport: The *Green Financing Programme* and the *Connecting Rural Urban Intermodal System Efficiency (CRUISE) Programme*.

The *Green Financing Programme* is the umbrella programme for the environment sector and supports the objective of the PDP 2011-2016 of a cleaner and healthier environment. USD 379 million (PHP 18.9 billion) was allocated to the programme to support cleaner production, water conservation, proper waste management, energy efficiency, air quality improvement, pollution prevention and control, among others. In addition, the bank allocated USD 200 million (PHP 10 billion)<sup>24</sup> to the programme to support environment-friendly projects undertaken by private institutions, LGUs, and other groups. It provides loans with concessional rates and technical assistance to developmental and climate financing programs of the public and private sectors. Projects eligible for financing include, inter alia, pollution management and green transport projects. Eligible borrowers include private corporations, cooperatives or associations, government agencies, LGUs, and others.<sup>25</sup> The Green Financing Programme is the financing source for electric vehicle production and distribution, an expansion program of Tojo Motors Corporation, a local electric vehicle manufacturing company, which was just recently approved.<sup>26</sup>

The *CRUISE Programme* comprises USD 442 million (PHP 22 billion) to support developmental initiatives for the transport and logistics sector. It is aligned with the priorities of the PDP 2011-2016 on infrastructure investments, particularly for the creation of an integrated and multimodal national transport and logistics system. It also seeks to promote rural-urban integration and physical connectivity and the decentralization and reduction of urban congestion, to accelerate economic growth particularly in high potential growth sectors, and to leverage limited public resources for infrastructure through public-private partnerships. All kinds of transport projects, including road, water, air, and rail infrastructure and services, as well as urban and non-motorized transport, are eligible. Similar to the Green Financing Program eligible borrowers include private corporations, cooperatives or associations, government agencies, LGUs, and others.<sup>27</sup>

<sup>22</sup> According to information provided by former DOTr Assistant Secretary Sherielysse Bonifacio (Office of Planning and Finance)

<sup>23</sup> According to information provided by former DOTr Assistant Secretary Sherielysse Bonifacio (Office of Planning and Finance)

<sup>24</sup> The Standard (2016): <http://thestandard.com.ph/mobile/article/197776>

<sup>25</sup> DBP (undated): [https://www.devbnkphl.com/devbanking.php?cat=230\\$609e3b61087b76d94e106f2bb25b2d83](https://www.devbnkphl.com/devbanking.php?cat=230$609e3b61087b76d94e106f2bb25b2d83)

<sup>26</sup> The Standard (2016): <http://thestandard.com.ph/mobile/article/197776>

<sup>27</sup> DBP (undated): [https://www.devbnkphl.com/devbanking.php?cat=378\\$d0438bfb0cc34b08f485eb9774f281a9](https://www.devbnkphl.com/devbanking.php?cat=378$d0438bfb0cc34b08f485eb9774f281a9)

## 2.4 Philippine road-based public transport policy in the context of climate change

In October 2015, the Philippines submitted their official GHG mitigation target to the *United Nations Framework Convention on Climate Change* (UNFCCC) as *Intended Nationally Determined Contribution* (INDC). The Philippines conditionally committed to reduce national GHG emissions significantly by 70% relative to the business-as-usual scenario of 2000 until 2030. The mitigation contribution is conditional depending on the assistance of the international community through financial support, technology development and transfer, and capacity building. Transport is one of the key sectors identified in order to achieve this reduction goal.<sup>28</sup>

Before the INDC submission, the Philippine government had launched several programmes and regulations aimed at emission reduction and climate change adaptation. In 2009, the Philippine government enacted the Climate Change Act (Republic Act No. 9729) to provide a policy framework to systematically address climate change. The *Climate Change Commission* (CCC) was established under the Climate Change Act. The CCC is in charge of coordinating, monitoring and evaluating governmental programmes and action plans related to climate change, as well as implementing the Philippine Greenhouse Gas Inventory Management and Reporting System (Executive Order No. 174). Furthermore, the CCC developed the *National Strategic Framework on Climate Change* (NFSCC), which was adopted in 2010.

The NFSCC covers climate change adaptation and mitigation, with greater focus on climate change adaptation. The NFSCC considers environmentally sustainable transport as one of its key mitigation targets through its objectives of improving the efficiency of the transport sector by increasing the uptake of alternative fuels and expanding mass transport systems. Based on the guiding principles outlined in the NFSCC, the *National Climate Change Action Plan* (NCCAP) was formulated, which outlined the country's agenda for climate change adaptation and mitigation for 2011 to 2028.

The NCCAP offers a framework to implement mitigation and adaptation strategies, and involves institutional changes and capacity building to facilitate climate change policies. The NCCAP identifies seven priorities. One of the priorities is the promotion of sustainable energy, which includes the promotion and adoption of environmentally sustainable transport. Under transport, the following activities are foreseen: clean fleets program, adoption of integrated land-use and transport planning at the national and local levels, and energy efficiency labelling for new vehicles.

In 2011, the DOTr and the *Department for Environment and Natural Resources* (DENR) developed the *National Environmentally Sustainable Transport Strategy* (NESTS). The overall objective of this strategy is to a) reduce the annual growth rate of energy consumption and associated GHG and air pollutant emissions from the transport sector, especially in urban areas of the country and to b) enhance sustainable mobility through the development of a viable market for environmentally sustainable transport goods and services which involves,

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<sup>28</sup> Republic of the Philippines – Intended Nationally Determined Contributions. Communicated to the UNFCCC on October 2015

among others, the promotion of transportation systems of low carbon intensity and shift towards the use of more sustainable transport modes.<sup>29</sup>

Under the clean fleets programme, the *Electric, Hybrid and Other Clean Energy Vehicles Incentives Act* was developed in 2013. The Act is pending legislation approval. In relation to the envisaged jeepney modernisation, the incentives will only cover modernisation of the jeepney fleet by electric (and LPG) jeepneys. The Act seeks to exempt these vehicles from the payment of excise taxes and duties for nine years starting from the date at which it enters into force. The imposition of the VAT for the purchase and import of raw materials, spare parts, components, and capital equipment used in manufacturing or assembly of electric, hybrid and other clean energy vehicles shall also be suspended for nine years. It further provides the exemption from excise taxes for imported complete units. Moreover, *the National Renewable Energy Programme* (NREP) of the DOE is relevant in the promotion of electric vehicles. The NREP aims to triple the renewable energy capacity of 5,369 megawatts in 2010 to an estimated 15,304 megawatts by 2030. The *Philippine Energy Plan 2009-2030* provides a detailed plan to ensure secure, sustainable, affordable and environmental friendly energy for all sectors.

The *Clean Air Act* of 1999 (Republic Act No. 8749) is a key legislation that guides governmental regulations and programmes to reduce vehicle emissions. The main objective of the Clean Air Act in the context of road transport is the removal of lead in gasoline and the promotion of clean alternative fuels, such as LPG and biofuels. It also requires emissions tests prior to the renewal of registration for public transport vehicles and encourages private emissions testing centres (PETCs) in various parts of the country to provide testing services to public transport vehicles including privately owned vehicles. In 2006, the Biofuels Act (Republic Act No. 9367) was enacted and mandates the blending of biofuels to diesel and gasoline.

Under the Clean Air Act, the Philippines adopted the Euro II vehicle emission standards for new vehicles in 2008. Through the DENR, the use of cleaner fuels and an upgrade of emission standards to Euro IV have been imposed on all vehicles in July 2015. However, as the standard is limited to new vehicles, the standard does not cover used jeepneys, jeepneys fitted with surplus engines, and pre-registered jeepneys repowered with new or surplus engines. Jeepneys follow the emission standards imposed on rebuilt vehicles and imported second-hand vehicles, which are significantly weaker than the standards imposed on new vehicles, thus, greatly limiting the effect of the Euro IV emission standard.

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<sup>29</sup> DOTr and DENR (2011): Formulation of a National Environmentally Sustainable Transport Strategy the Philippines, Final Report, May 2011, [http://www.ncts.upd.edu.ph/est/docs/formulation/formulation\\_INSIDE\\_PAGES.pdf](http://www.ncts.upd.edu.ph/est/docs/formulation/formulation_INSIDE_PAGES.pdf)

## 2.5 International cooperation with the Philippines in the urban passenger transport sector

Limited international cooperation projects on urban passenger transport exist in the Philippines:

- In 2014, the Philippines adopted the Mega Manila Dream Plan or the Roadmap for Transport Infrastructure Development for Metro Manila and its surrounding areas. The study for the Plan was conducted by JICA. The study was closely developed with the DOTr, DPWH, MMDA, NEDA, and other relevant agencies. The roadmap highlights the need to establish better north-south connectivity and appropriate hierarchy of different transportation modes such as roads, railways, and other mass transits. The roadmap also proposes interventions to achieve a modern, affordable, and a well-coordinated and integrated transport system for Mega Manila by 2030.<sup>30</sup>

The NAMA will build on the Dream Plan and support the comprehensive integration of the different road-based public transport modes, as well as improve the capacities for integrated public transport planning.

- The World Bank is currently funding the first bus rapid transit (BRT) route/network, which will be built in Cebu. The project runs from September 2014 to June 2021. The total project costs amount to USD 228.5 million. The World Bank's committed amount is about half of the total costs (i.e. USD 116 million). Under the Cebu BRT Project, the goods, works and services for design, construction and supervision of the BRT infrastructure in Cebu are financed. In addition, funding is provided for traffic management and road and intersection upgrades. Also, operational support in terms of technical assistance, equipment and vehicles is provided. The project also covers outreach activities, capacity building and feasibility studies to support BRT application in the Philippines. This includes funding for a detailed design of the proposed BRT Line 1 in Metro Manila, which was approved in December 2015.<sup>31</sup>

The NAMA complements the work on the BRT project by addressing the needed modernisation and consolidation mechanism and the capacity to plan and consolidate public transport services beyond BRT.

- The Asian Development Bank (ADB) is supporting the DOTr in the development of the North–South Railway Project South Line to connect Metro Manila to the currently under-served areas in Southern Luzon. Although mainly a long-haul project (653km), the line also includes 56-kilometres of commuter rail from Manila to Calamba City in Laguna. The ADB is providing advisory services to the DOTr in developing the railway line as a public-private partnership project. Currently, no financial assistance has been provided by the ADB.<sup>32</sup>

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<sup>30</sup> JICA (2014): Roadmap for transport infrastructure development for metro Manila and ITS surrounding areas (region III & region IV-A) in the Republic of the Philippines final report

<sup>31</sup> GMA News (2015): Metro Manila's first bus rapid transit approved.  
<http://www.gmanetwork.com/news/story/548149/money/economy/metro-manila-s-first-bus-rapid-transit-line-approved>

<sup>32</sup> Business Mirror (2015): <http://www.businessmirror.com.ph/government-to-bid-out-p171-billion-south-line-rail-project/>

The NAMA will consider this activity as one potential opportunity for scaling up initiatives. Potential synergies could be explored in Luzon by addressing the feeder routes needed to connect to the major rail system.

- ADB also supported the Davao City Sustainable Urban Transport Project, which consists of four components: i) development of a comprehensive public transport strategy for Davao; ii) development and implementation of a transport reform program defined for service coverage, franchising arrangements, systems integration and enforcement; and iii) capacity development for government officials on public transport planning and franchising. It also conducted stakeholder consultation for public transport operators and community members. The Cities Development Initiative Institute for Asia (CDIA) is also currently supporting the pre-feasibility study of the Davao Urban Transport Project.<sup>33</sup>

The DOTr and GIZ are closely coordinating with the ADB regarding their on-going activities. It is planned to assess opportunities for cooperation and exploitation of synergies in regard to scaling up activities for public transport consolidation and modernisation beyond Metro Manila.

- GIZ also supports the DOTr through a regional project called “Transport and Climate Change in the ASEAN Region” (TCC). The project supports the transport ministries of its partner countries in the development and implementation of national action plans on sustainable transport and climate change mitigation in the land transport sector. In the Philippines, TCC supports the DOTr mainly in improving and updating its NIP on Environment Improvement in the Land Transport Sector. In addition, it supported DOTr in the institutionalization of the SVPCF, which involves the development of the Operating Policies and Guidelines for Implementation and Monitoring. In the second phase of the project, TCC continues to support the Philippines Government on green freight and fuel economy.

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<sup>33</sup> ADB (undated): Philippines: Davao Sustainable Urban Transport Project <http://www.adb.org/projects/45296-003/main>

### 3 Barriers to efficient and sustainable public transport in the Philippines

Currently, several barriers inhibit efficient public transport operation in the Philippines (shown in **Figure 6**). These barriers are especially related to the fragmented industry structure, weak institutional structures and the lack of capacity for planning, implementing and enforcing state-of-the-art public transport principles. Four main barriers have been identified:



**Figure 6: Barriers to sustainable public transport**

Source: Own illustration

#### **Lack of consistent policy framework and implementation**

The Philippines does not have a “national transport policy” that would provide the overarching framework for sustainable (public) transport in the Philippines. The current policy framework lacks a committed, coherent and progressive structure with clear indications for the market players.

The current framework and implementation of regulations and programs are not sufficient to induce clean technologies or efficient operational procedures in the jeepney sector. Vehicle emission standards have been adopted by the Philippine Clean Air Act. However, the reference vehicle emission standard only covers new vehicles, while jeepneys are used vehicles. Standards for rebuilt vehicles or imported second-hand vehicles are significantly weaker compared to emission standards imposed on new vehicles. Prominence of fake inspection certificates and non-inspection or fraud inspection reduce the effectiveness of existing standards and allows the fraudulent registration of poorly maintained and malfunctioning units. In addition, in-use emission standards apply to diesel-run vehicles. The stringency of emission standards imposed on in-use vehicles increases for vehicles registered at a later date thus encouraging the continued use of outdated technologies. Vehicle emission standards are not fully enforced. Fake inspection certificates or non-inspected vehicles have been considered an important issue by the LTO, but initiatives to address this issue have been of limited success.

To ensure that vehicles comply with in-use emission standards, roadside vehicle emission inspection was implemented. The effectiveness of this programme is limited by a lack of anti-smoke belching emission analysers and personnel. In addition, the reluctance of the jeepney sector in complying with the existing regulations such as emission standards or road safety regulations is coupled with weak enforcement mechanisms.

#### **Lack of institutional integration and capacity**

Several divisions within and attached agencies of the DOTr currently fulfils competencies and mandates related to public transport regulation. Additional competencies are within the jurisdiction of the LGUs or the MMDA (cf. 2.2).

The fragmentation of responsibilities leads to inefficiencies, time-consuming decision-making processes, and a lack of alignment in transport planning and management. There is no coherent sustainable mobility framework that guides the operation of the various units and agencies.

Overall, the current expertise and organisational structure of the DOTr are not sufficient to successfully plan, implement and enforce public transport consolidation and modernisation.

### **Inefficient public transport planning, implementation and low level of enforcement**

As outlined above, in most Philippine cities, no particular agency is in charge of transport planning. Consequently, and in most cities, no specific transport plan exists. There is no comprehensive national planning framework that could serve as the basis for sustainable transport planning at the local level. There is also a lack of data to enable efficient management of the public transport system. Data on passengers and jeepneys are not frequently updated, which leads to an excess of franchises granted for a particular route, while other routes remain unserved. Current services are not easily modified to respond to changes in demand.

The existing franchise regulation is not properly enforced. Despite a moratorium on bus franchises implemented in 2000, it was still possible to acquire new ones.<sup>34</sup> In addition to a system-inherent oversupply of franchises, illegal buses and jeepneys that operate without official franchise further adds to system inefficiencies and traffic congestion.

Poor enforcement of traffic rules and regulation contributes to the unrestricted pick-up and drop-off of passengers and excessive lane changes by jeepney drivers who compete for passengers.

### **Fragmentation of the public transport industry and persistence of inefficient vehicle technologies due to financial constraints and lack of regulation**

Many cities, like Hong Kong or Singapore, once faced problems with below-standard public transport due to a system run by individual operators. For example, Singapore's transport issues were overcome gradually through consistent consolidation measures. In the 1970s, Singapore began re-structuring the public transport system by bringing together individual operators into three large companies, each of which holds the rights to license routes within a particular area (franchise system). Unregulated services tend to provide poor quality services, so they should be reorganized in line with professional management principles. Service quality control systems should also be put in place to guarantee mobility that benefits all parties, from operators to staff, customers to government.

Due to deregulation efforts in the late 1980s and the lack of institutional capacity, the provision of public transport services in the Philippines today is characterised by a large number of private operators. The jeepney sector is fragmented, as it is largely based on individual vehicle ownership and loosely organised cooperatives (see Chapter 2.2). Cooperatives often only exist on paper to comply with the governmental requirement that

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<sup>34</sup> Domingo et al. 2015

asks franchise owners to belong to a cooperative in order to renew their franchise. Most cooperatives do not function as real enterprises and do not have the personnel and financial resources to operate as fleet managers. The pure number of franchise holders and cooperatives makes it difficult to manage the sector and/or to introduce service contracts with quality standards that need to be monitored.

The lack of financial resources of jeepney owners, mostly due to the hyper-fragmented industry structure, hinders investments in clean vehicle technology. Jeepneys are not subsidized and are fully dependent on the fares collected. Most jeepney owners have acquired their jeepney or components thereof as used units, so that the penetration of new and more efficient technologies is low. Profit margins of jeepney operation are usually small, so that owners do not have the financial resources for proper maintenance and vehicle replacement or retrofitting within the existing system. Operators that own only one or two vehicles cannot afford the outage of one of their vehicles. Furthermore, small-scale operators, which dominate the system, have only limited access to loans. Commercial banks require between 10 to 20 percent equity, which may not be affordable to most jeepney operators. In addition, required credit records and maximum amortization periods of about 6 years impede the accessibility of loans from commercial banks for vehicle replacement. Banks are usually reluctant to provide loans for jeepney acquisition, as there is a lack of planning security. There is a need for a financing scheme that takes into account equity assistance and amortization periods based on the costs savings that may be provided by new vehicles.

## 4 The NAMA: Objectives, measures and impacts

### 4.1 Objectives of the NAMA

The objective of the *Jeepney+ NAMA* is to establish a modern, sustainable and climate-friendly road-based public transport system in Philippine cities.

The reform process envisaged by the Government involves key structural changes during an implementation period of approximately 10 years (2016-2026). The strategy is based on two main elements:

- Structural changes within the public transport market
  - Institutional re-organisation of public transport planning and regulation,
  - Introduction of service contracts and franchise consolidation and reform,
  - Introduction of joint fleet management,
  - Shift towards an Origin-Destination demand model planning approach,
  - Use of technology to manage public transport operations.
- Fleet renewal incl. shift to higher capacity vehicles
  - Introduction of age limit and vehicle standards for jeepneys,
  - Introduction of a scrappage scheme,
  - Introduction of financial incentives to modernise and consolidate the fleet.

The NAMA is a combination of shift and improve approaches to reduce emissions from the transport sector and tackles different arenas of the public transport market (see **Figure 7**).

Ultimately, the NAMA aims to consolidate public transport provision towards a manageable number of public transport service providers/companies. In Metro Manila, the existing jeepney fleet will be replaced with new, higher capacity and more efficient vehicles. The NAMA aims to reduce the fleet about 22%, and potentially up to 36%, depending on the selection criteria such as demand per route, physical space, accepted head-way. A 22% reduction would keep room for a replacement of about 42,000 jeepneys (78%), while the jeepney fleet would be reduced by about 11,000 units (22%) by 2026 (Biona, 2015). It is believed that there is potential for further consolidation of up to 36% reduction of the vehicle fleet in the long-term (Kaenzig 2016).

**Table 12: Overview of consolidated jeepney fleet for 22% and 36% reduction in Metro Manila**

	Rationalised vehicle fleet (22% reduction)	Rationalised vehicle fleet (36% reduction)
<b>Modern “Jeepney” vehicle</b>	35,370	23,578
<b>Minibus</b>	7,966	6,966
<b>Bus</b>	885	4,334
<b>Total Units</b>	43,336	34,878
<b>Reduction</b>	11,507 less vehicles	19,965 less vehicles

Source: Own calculations based on Biona (2015) and Kaenzig (2016)

Through the introduction of new vehicles with higher passenger capacity, the total capacity of the fleet will not be reduced; however, would reduce the total vehicle kilometres. The vehicle replacement programme will have an immense positive effect on air quality and GHG emissions and will significantly improve the service quality of the public transport system.

The NAMA is expected to achieve accumulated GHG emission reductions in the range of 6.5 to 9.2 MtCO<sub>2</sub>e between 2016 and 2026 in the Philippines (between 3.1 and 4.4 MtCO<sub>2</sub>e avoided for Metro Manila). This translates into an average annual emission reduction of 0.65 to 0.92 MtCO<sub>2</sub>e in the Philippines. Through these mitigations, the total yearly transport emissions in a) Metro Manila would be reduced by 3.6% and b) nationwide by at least 2.6%.

The jeepney modernization program in Metro Manila can potentially save 754 million litres of diesel fuel up to 2026. The scaled-up estimates if the modernization will be implemented throughout the country translate to 2.7 billion litres of diesel fuel savings up to 2026. The route rationalization component in Metro Manila will further reduce 620 thousand litres of on-road diesel consumption up to 2026.

The NAMA can also improve air quality in Metro Manila and in other urban areas in the country due to the improvement of the vehicles within the road public transport sector in the country. It is estimated that the NAMA will reduce harmful air pollutant emissions (aside from GHGs) such as Particulate Matter (up to 47%), Carbon Monoxide (up to 52%), NO<sub>x</sub> (up to 30%), SO<sub>x</sub> (up to 9%) and Hydrocarbons (up to 52%). The reduction in the emissions of these pollutants is estimated to positively impact the health of the citizenry. Reduction in human toxicity impacts is estimated at 53%.<sup>35</sup>

## 4.2 Scope and schedule of the NAMA

The NAMA is targeting jeepneys in major cities in the Philippines, which are the dominating modes of transportation in the country. In the pilot phase of the NAMA geographically, the programme aims to cover the major urban areas in the Philippines, starting with Metro Manila in the pilot phase. Further cities will be selected after/during the pilot phase until 2020.

The NAMA includes a mix of direct mitigation measures and supporting activities to facilitate the realisation of the Philippine Government public transport reform (see following sections).

The implementation involves the introduction of a phased structural reform process by modernising and consolidating the jeepney fleet, rationalising public transport routes and improving road-based public transport planning. The NAMA is a combination of shift and improve approaches to reduce emissions from the transport sector and tackles different arenas of the public transport regime (**Figure 7**). Measures will be implemented in five areas:

1. Introducing a “National Transport Policy”,
2. Re-organizing the institutional set-up of public transport provision,
3. Enhancing the public transport capacities of the Government to ensure long-term rationalised network planning,
4. Consolidating and modernising the jeepney industry, and
5. Setting up a MRV system to monitor the impact of the interventions.

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<sup>35</sup> Based on Biona (2015), which used human toxicity factors for different pollutants emitted by different vehicle types.

The mitigation measures are then realised at the city level, starting with Metro Manila. To effectively coordinate this comprehensive intervention, a “NAMA steering mechanism” shall be adopted.

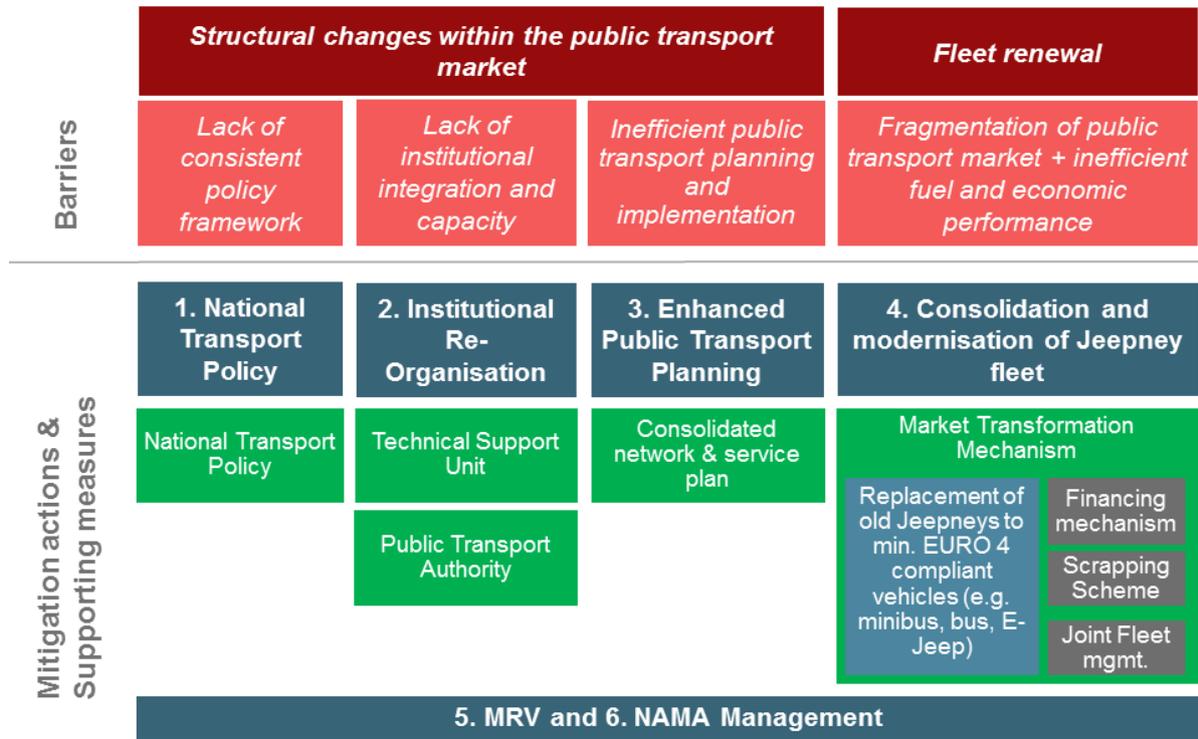


Figure 7: Overview of main components of the NAMA approach

The NAMA is designed in 3 phases over 12 years (see Figure 8). **Phase 1** (2014-2016) is the design phase to set up the NAMA, including the envisaged funding mechanism and institutional structures for management and capacity development; **Phase 2** (2016-2020) aims to test consolidation and fleet modernisation in select Metro Manila corridors; **Phase 3** (2020-2026) will roll-out activities to all Metro Manila routes and other major Philippine cities.

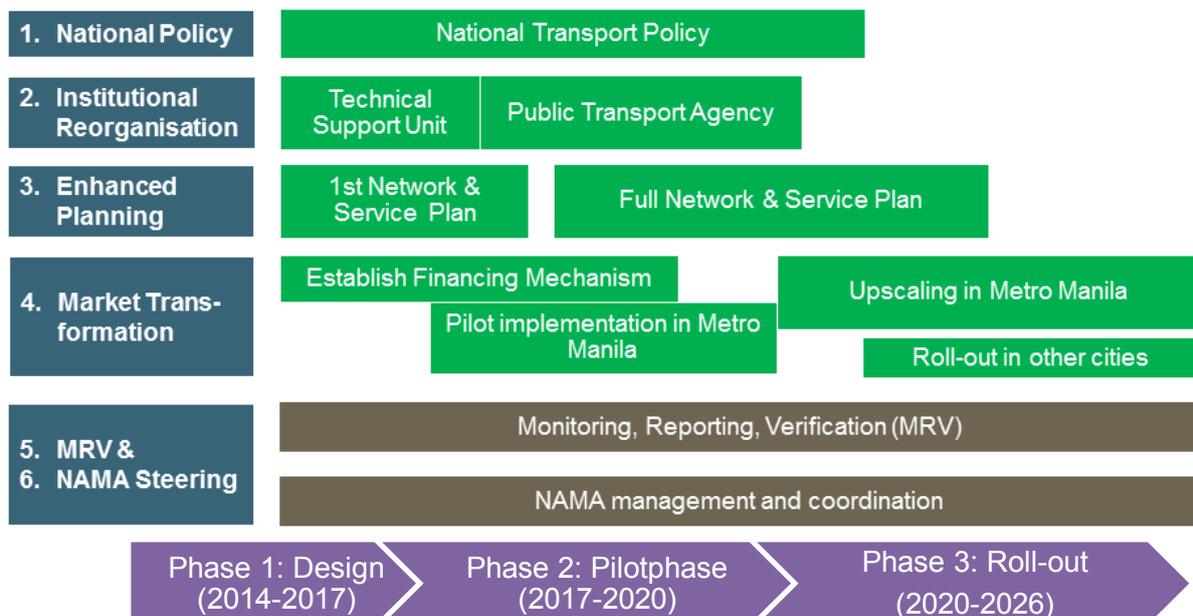


Figure 8: Schedule of the NAMA

### 4.3 Supportive measures at the national level

Transforming the public transport industry in the Philippines is a complex task that requires more than technology improvements or efficient management. The NAMA therefore includes a set of supportive measures to transform the framework conditions of public transport provision (components 1-3 in the logical framework). The positive impact of the direct mitigation measures for the market transformation of the jeepney sector is directly linked to the successful implementation of supportive measures. The NAMA therefore foresees three key supportive measures:

1. The introduction of a National Transport Policy to overcome the lack of a consistent policy framework.
2. The institutional reorganisation of public transport provision to overcome the lack of institution integration.
3. The enhancement of public transport planning by introducing a rationalised public transport service and network plan.

#### 4.3.1 National Transport Policy

The DOTr plans to address the lack of an overarching policy for all aspects of transport and climate change by launching the *National Transport Policy* (NTP). The NTP will consolidate the transport-related elements of existing overarching national policies regarding climate change, clean air, land-use and public services into a coherent national policy.

The initial step is to review all the existing policies (Public Service Act, Clean Air Act, Motor Vehicle User's Charge, Climate Change Act, Local Government Code, and others) that could be harmonised into one national policy in order to respond to the identified need of reforming national legal framework conditions in the context of the public transport system. Based on the findings of the reviews and consultations with stakeholders, a comprehensive NTP will be drafted until end of 2016. Public consultation processes will be conducted to discuss the draft and mainstream the NTP within the political system. With respect to land transport, the Philippine Government committed to improve the framework conditions to *“facilitate the modernization of the land transport industry through the promotion of utility services which are environment-friendly and shall provide assistance to the land transport sector through lease-to-own programs, technical assistance, subsidies, and the encouragement of the use of alternative fuels and/or renewable energy, among others.”* (E.O. 712, 2008).

The formulation of such policy will define the transport vision of the Government and establish criteria for selecting and formulating alternative policy areas. After this process, the stakeholders will have to evaluate the alternatives in order to prioritise the preferred policy framework. This is a highly political process that can be technically supported by (international) experts. AusAID prepared the National Transport Policy and Planning Study in 2009 to guide the Philippine Government in this regard. For successful implementation, it is essential to study and further develop the recommendations and findings in order to integrate the diverse interests of the various stakeholders. It is furthermore crucial that the capacity of the DOTr and attached agencies is further strengthened during the NAMA pilot phase to ensure the efficient and timely implementation of the NTP.

The NAMA aims to achieve political approval of the NTP until 2017 and support the formulation of accompanying Implementing Rules and Regulations which would include

guidelines for sustainable transport planning at the national, metropolitan and local levels. This would set a strong framework for transforming public transport provision in the Philippines.

### 4.3.2 Institutional reorganisation

The objective of institutional reorganisation is to establish an improved institutional structure for public transport provision in the Philippines. Merging competencies and mandates currently fulfilled by different divisions within and attached agencies of the DOTr into a PTA could be an important step to better align public transport policy in the Philippines – in and beyond Metro Manila. The envisaged reorganized structure would merge the core functions of public transport provision, such as planning, licencing, contracting, monitoring and consulting. At the moment multiple units or attached agencies of the DOTr fulfill those functions (see Chapter 2.2).

Institutional reorganisation will support the “Programme on Rationalising and Improving Public Service Delivery”<sup>36</sup> of the Philippine Government, which has not yet been implemented for the DOTr. A unification of the competencies for coordination, planning and implementing public transport provision would improve the efficiency of internal processes of the DOTr for timelier decision-making, better alignment of plans, and successful enforcement. Organisationally, there is a need to coordinate and/or integrate the role of data collection and planning with that of DOTr’s Road Transport Planning Unit with that of its attached agencies: LTO, LTFRB, and OTC. Currently, DOTr and OTC as the attached agency do not have regional offices like LTO and LTFRB nor any coordination role with LGUs or MMDA in Metro Manila. The NAMA will support this process through a feasibility study on the establishment of the reorganized structure.

In order to strengthen the institutional and planning capacities of the DoTr in the short-term, the Office of the Undersecretary for Planning will be strengthened. The TSU will serve a double function:

1. To be a focal point for NAMA implementation and oversee the planning, implementation as well as the scaling up of the NAMA nationwide (incl. the preparation of the establishment of the reorganized structure);
2. To provide technical assistance and capacity development, including data collection and knowledge management.

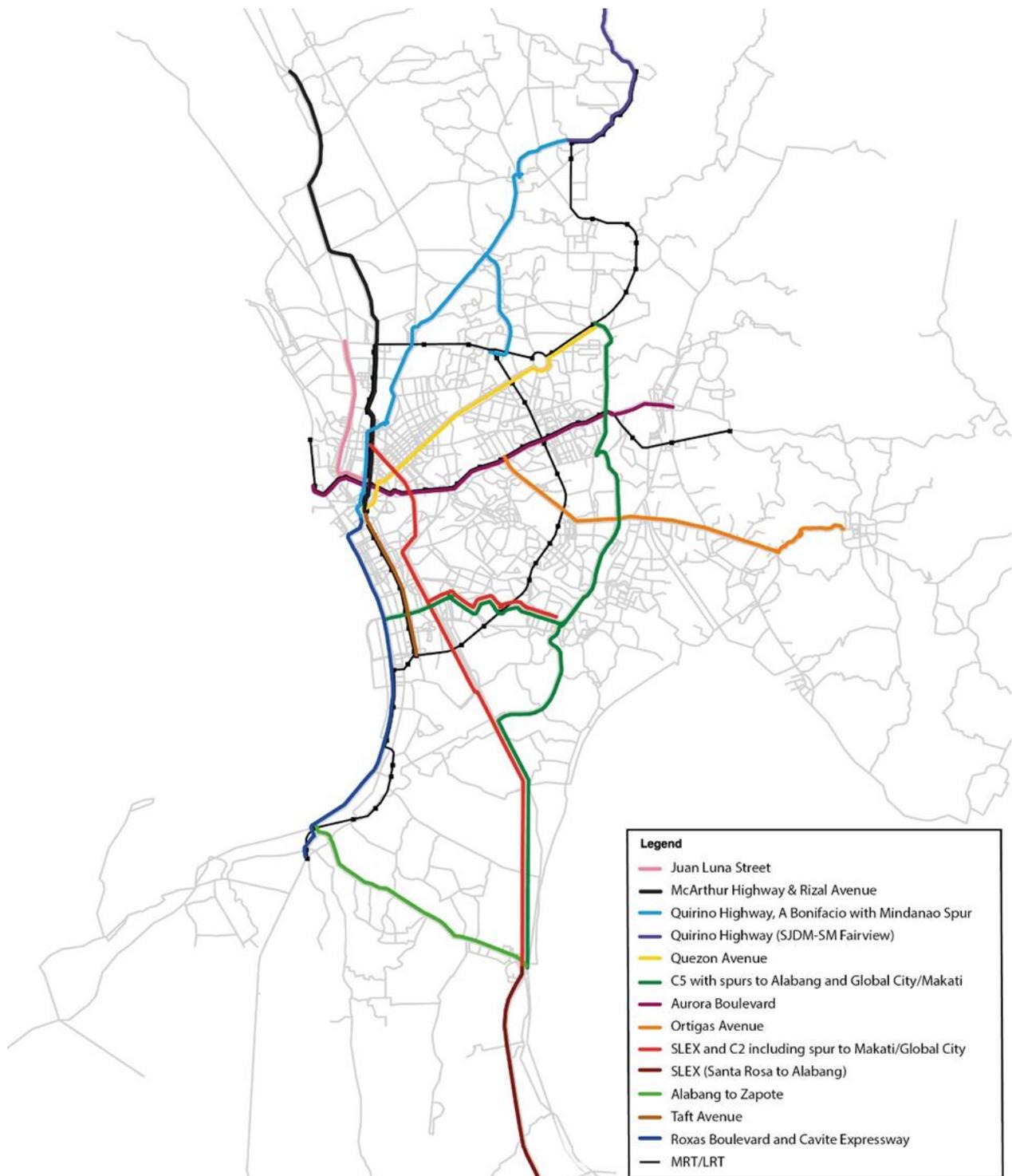
### 4.3.3 Enhanced public transport planning

As a preparatory step towards consolidation, the NAMA foresees the development of a rationalised public transport network and service plan for Metro Manila in order to improve the efficient provision of public transport services.

In 2013, the consulting firm *Integrated Transport Planning (ITP)* conducted a *Road Transit Rationalisation Study (RTRS)* on behalf of the DOTr. The study concluded that there is sufficient existing passenger demand to implement a network of at least 16 mass transit

<sup>36</sup> <http://www.ppa.com.ph/newtemp/docs/EO%20366/primer%20on%20EO%20366.htm>

routes across Metro Manila (see **Figure 9**). The current network is based on historical issuing of franchises and private sector initiatives to access the market. The issue of franchises is based on Route Measured Capacity (RMC), which can be translated as the optimum number of vehicles on any given route based on the projected/evaluated volume of passenger demand. The limitation of this approach is that it is route centric or that it does not consider road capacity constraints or linkages to the physical planning of the network. It also does not take into account any service level guarantees, such as scheduling, safety issues or cleanness. This highly liberalized regulation approach has led to a very competitive market and driving behaviour, as well as to further system inefficiencies.



**Figure 9: Proposed major public transport routes for Metro Manila**

Source: ITP, 2015

Therefore, the Jeepney+ NAMA will prepare the consolidation of public transport franchises. The Transport Planning Unit of the DOTr aims to develop a network and service plan, which entails reviewing the current route network and identifying redundancies and oversupply. The network and service plan will also take into account previous and on-going studies, such as the Metro Manila Urban Transportation Integration Study Update and Capacity Enhancement

Project, supported by JICA, and the feasibility study on a BRT line in Metro Manila by the World Bank.

On behalf of the DOTr, the ITP developed a demand model and investigated the public transport demand of all bus and jeepney routes in Metro Manila. Based on the results of the demand model and the basis of the first review, the pilot routes for consolidation in Metro Manila will be selected.

In order to develop a complete plan, the DOTr will introduce a computer model for transport analysis and planning in the context of the NAMA implementation. The model will be used to continuously optimise the public transport route network and to overcome the route-centric transport planning. As the current human resources for network planning are scattered in different agencies which limits the modelling capacity of DOTr, this measure also includes a sub-task to set up a special network planning and modelling team within DOTr (or within the proposed public transport authority) to maintain and apply the model.

An initial *Public Transport Network and Service Plan (PTNSP)* for Metro Manila is planned to be adopted by DoTr until 2017. The institutionalization of network-based, rationalised public transport planning will be the major outcome of this supportive measure and will require substantial resources and capacity development activities.

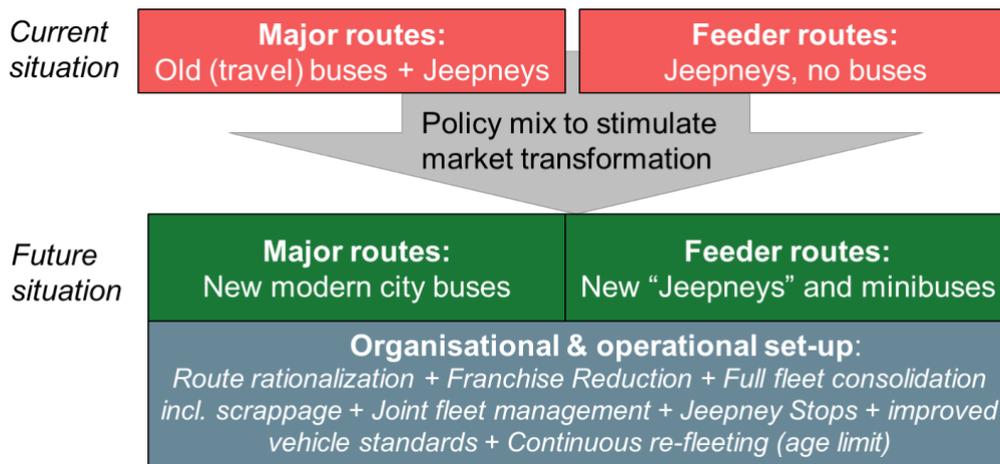
#### 4.4 Mitigation measures under the NAMA

The core of the NAMA approach is the **consolidation and modernisation of the jeepney fleet** (component 4). It will focus on two main workstreams:

1. **Consolidation** of currently insufficient regulated and inefficient road-based public transport services (shift);
2. **Modernisation** of the jeepney fleet through the replacement of old jeepneys with new, higher-capacity, low-emission vehicles (improve).

**Consolidation** of public transport provision is understood as a phased approach towards lowering the number of public transport franchises and consolidating currently dispersed jeepney and bus operations under a limited number of corporately managed fleets servicing consolidated transit routes. It is noteworthy that it is recommended to even further limit the total number of franchises/contracts towards a “multiple routes – one franchise” system in the future. However, this step will need further strengthening of the industry and governance framework (regulations and stakeholders) involved.

The NAMA targets the shifting of passenger travel from jeepneys towards higher occupancy and cleaner, more efficient city buses on **major routes**. These routes are characterised by a high number of passengers and road infrastructure, which is suitable for large city buses. According to Biona (2015) and Clean Air Asia (CAA) (2014), on major routes, Euro IV Diesel City Buses with a seating capacity of 50-60 could replace jeepneys on a 1:4 ratio. The objective is to shift all passenger kilometres from major corridors to Euro IV Diesel City Buses by 2026. **Feeder routes** are smaller, peripheral routes, which connect smaller or more remote areas/routes with major routes with high volume traffic. On feeder routes, it is envisaged to either introduce Euro IV Diesel Minibuses with a seating capacity of 40 seats, which could replace jeepneys on a 1:2 ratio or replace old jeepneys with “new jeepney-like” vehicle (called “new jeepneys”). The rationale of this strategy is based on the current street- and jeepney network, which sometimes does not allow for bigger vehicles, like Minibuses.

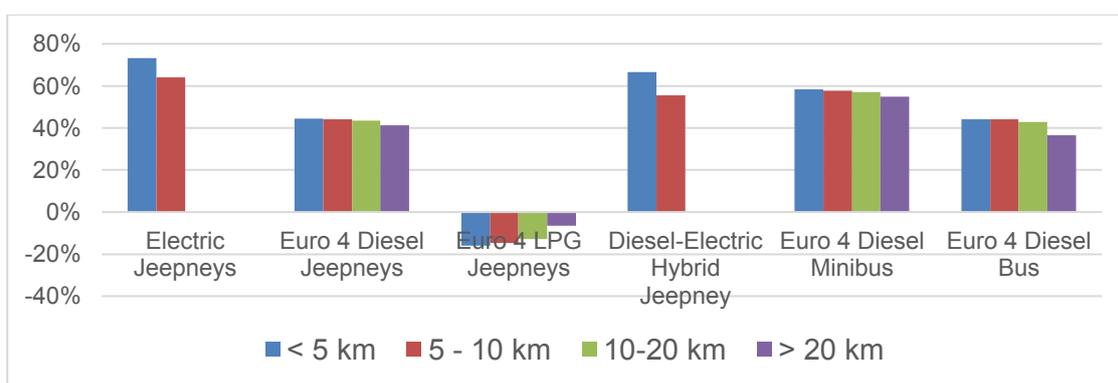


**Figure 10: Market Transformation Mechanism**

This phased consolidation approach is expected to start in key routes in Metro Manila, with an ultimate goal of having main routes serviced by corporate public transport operators using modern, high occupancy, environment-friendly city buses. Consolidation will build on the rationalised network plan (NAMA Component 3). Starting in 2020, scaling up the consolidation approach to other cities is envisaged.

The consolidation approach will lead to a reduction of the fleet of about 22% (up to potentially 36%). However, not all vehicles can or should be replaced by high-capacity vehicles (buses, mini-buses) due to various reasons, such as limitations through the built environment of Metro Manila or the implications of a rationalised service network plan in Metro Manila (socially accepted headway, feeder routes). The modernisation approach includes organizational consolidation (“one route – one franchise”), joint fleet management and introduction of minimum service standards. **Modernisation** in this context refers to the **replacement** of old polluting and inefficient jeepneys with cleaner and more efficient vehicles. Different technological options are considered as alternatives for the new vehicles. Moreover, the modernisation programme will not only address emissions but also safety, accessibility and other operational concerns of the public transport fleet through the introduction of new vehicle standards. Therefore, retrofitting existing units is not foreseen.

The **recommended technological options** by Biona (2015) for **1:1 jeepney replacement** include Euro IV Diesel jeepneys, Euro IV LPG jeepneys, electric jeepneys and Diesel-Electric Hybrid jeepneys. Electric jeepneys provide the highest mitigation potential based on the current Luzon grid mix, however, due to their technological specification, electric vehicles are only recommended on shorter routes. The recommendation for electric jeepneys is followed by Diesel-Electric hybrids, Euro IV diesel minibus, Euro IV diesel jeepneys and Euro IV buses. Euro IV LPG jeepneys is projected to produce more GHG emissions compared to the baseline jeepneys due to their poor fuel economy (see **Figure 11**) and are therefore not considered an option under the NAMA. Substantial human toxicity reductions are expected from all technology options.



**Figure 11: Greenhouse gas mitigation potential relative to baseline jeepneys**

Source: Biona, 2015

Details of the replacement options are provided in Annex 1, including vehicle specifications, which are used in the MRV methodology.

Similar to the consolidation activities, jeepney fleet modernisation is supposed to be tested in a pilot phase before full implementation.

The consolidation of the jeepney industry affects a large number of families, as it provides a major source of income. Consequently, uncertainties and resistance are expected. It is therefore a highly sensitive topic and needs to be handled with caution and close consultations and interactions with representatives of the jeepney industry. The interests of drivers, such as regular income and working hours, social security and consistent employment, need to be ensured and communicated throughout a dialogue. From the perspective of vehicle owners, there are financial and technical risks to invest in new technologies as the daily income of operators and drivers and the livelihood of their families depend on the limited number of vehicles they own. **The pilot phase would allow building trust and creating experiences within the jeepney industry** in regard to the new vehicles involved and the linked economic and performance impacts.

**Consolidation and fleet modernisation** are equally important in reducing emissions from public transport in the Philippines. Consolidating public transport routes and introducing fixed stops can result in **increased system efficiency and reliability in the mid- to long-term**, while reducing both traffic and emissions in selected corridors. **Improving vehicle technology further reduces emissions and energy consumption per kilometre travelled in the short-term**. Modernising public transport service is expected to make it more attractive, thereby leading to an additional pull effect to counter and limit the ongoing shift to private motorised transport in the longer term.

In order to structurally transform the jeepney sector, the NAMA focuses on further interventions to optimize public transport services. Listed below are the essential mechanisms or interventions by the Government envisaged to support the market transformation:

- Introducing jeepney age limit and scrappage scheme
- Introducing/Improving vehicle standards
- Establishing acquisition incentives and scrapping scheme
- Franchise reform and introducing joint fleet management
- Introduction of fixed jeepney stops

## Implementation of a jeepney age limit and scrappage scheme

The 15-year age limit, which already applies to buses, is planned to be extended to jeepneys to phase-out existing units. The vehicle age limit facilitates continuous updating of vehicle technology thereby reducing vehicle emissions, improving public safety and providing time to build-up enough equity funds for the procurement of new vehicles.

The country has not yet developed a vehicle scrappage industry where owners could bring their car for crushing and eventual scrappage. However, existing market practices demonstrate the viability of developing a scrappage program. Major industry players are engaged in big-scale scrappage and have the monetary resources and logistics capacity to handle the sudden influx of scrapped jeepneys. These same companies are also currently mostly engaged in the scrappage of sea vessels, industrial facilities and equipment. The scrappage program should consider reliability, political and social implications, financial viability and legality.

The DoTr estimates that with the implementation of the age limit for jeepneys, 80% of the current vehicles would fail and become subject to scrapping, rising to almost 90% by the proposed 2018 implementation timeframe. A scrappage scheme would accelerate the replacement of old and polluting jeepneys by providing jeepney operators with financial support and incentives to subject their old jeepneys to scrapping and acquire alternative units. To ensure that the old units are not registered elsewhere, decommissioning and scrapping of the old units needs to be institutionalised.

**A scrapping scheme is an integral part of the reform** to lock-in the aspired benefits, in particular in terms of better air quality and reduced CO<sub>2</sub> emissions. Transfer of old vehicles to other locations and use for different purposes than passenger transport (e.g. freight) needs to be avoided. All jeepneys that do not comply with emissions, construction, safety and comfort standards should be refused registration. In the process of franchise approval LTFRB should require scrappage certificate according to the amount of vehicles under the new franchise.

Additionally, scrappage should be promoted proactively to make sure that it actually happens. Since the vehicles are private property, mandatory scrapping faces legal constraints. The MVIS needs to be strengthened and compliance with the MVIS and other standards needs to be set as a requirement in the D.O. "Omnibus Guidelines".

The rationalization of routes, economic requirements and minimum numbers of units will reduce the number of operators and stimulate a transformation from many small operators to companies operating several units. In general, there the following cases need to be considered:

- Case 1: operators might leave the market;
- Case 2: operators might remain in the market as shareholders of a company;
- Case 3: operators might remain in the market under a cooperative (operators still own the vehicles but franchises are owned by the cooperatives);
- Case 4: additionally, new operator might enter the market.

The route rationalization network plan will need to determine the optimum number of old and new franchises and thus define how many scrappage certificates the operators that apply for the new franchises would need to present.

The scrapping certification prioritizes incumbents and compensates those opting out without the need of additional government support; however, entry for new companies would be more expensive (cost of the certificates).

### **Jeepney standards development and implementation**

According to the Bureau of Product Standards (BPS) of the Department of Trade and Industry (DTI), the local industry and the government have agreed to harmonize vehicle standards with the rest of the ASEAN region and adopt the vehicle regulations provided by the United Nations Economic Commission for Europe (UNECE). Despite the agreement in adopting the UNECE vehicle regulations, poor implementation on jeepney regulations continues due to lack of mechanisms. The Monitoring Vehicle Inspection System (MVIS), which is limited in nature, serves as the closest mechanism for vehicle standard regulation.

The proposed new vehicle standard proposes that new vehicles satisfy at least one of the following:

- Euro IV certified as attested by a certification from the source country containing a complete description and specification of the vehicles actually tested detailing the emissions control system present. The certification is applicable only to the vehicle completely resembling the unit indicated and will not be applicable to modified versions;
- Satisfy the Euro IV emission limits for M2 light duty vehicles as tested by a DENR designated test facility; or
- Fully powered by an electric drive train.

It further requires the minimum seating of 21 people and additional requirements in the context of vehicle safety.

A lot of efforts and existing documents are already in place but need to be reviewed, consolidated and agreed upon for application to the units that will be eligible to the jeepney modernization program. The major challenge lies more on the infrastructure and mechanisms to support its implementation. While it is not recommended that the standards be lowered, alternative testing methods or requirements could be introduced to address the infrastructure gaps or satisfy the standards.

### **Financial mechanism** *(please find more detailed information on this topic in chapter 6)*

A financial mechanism accepted by all stakeholders involved is required to enable the jeepney industry to switch to clean vehicles.

The current road-based public transport system is fully financed through fare box revenues. The government does not provide any subsidies to jeepney operators. Investments into the modernisation of the public transport market will result in significant reductions of the external costs to society. The biggest financial barrier for fleet modernisation is the difficulty of the operators to afford the downpayment for a new vehicle (10-20% of the investment cost). This is largely linked to the fragmented, individualized ownership structure of the jeepney industry.

Based on rationalised fleet numbers, and on estimated cost of vehicles meeting the new standards, the overall investment required for fleet modernisation is as follows:

**Table 13: Fleet investment requirements for Metro Manila (22% reduction of fleet)**

Technology	Cost per Unit	Number of rationalised fleet in Metro Manila	Initial Investment costs in Metro Manila (In Millions)
<b>Electric Jeepneys</b>	PHP 950,000 (USD 19,088)	2,239	PHP 2,127,050 (USD 42.74)
<b>Euro 4 Diesel Jeepneys</b>	PHP 1,100,000 (USD 22,102)	33,131	PHP 36,444,100 (USD 732.25)
<b>Euro 4 Diesel Minibus</b>	PHP 1,800,000 (USD 36,166)	7,966	PHP 14,338,800 (USD 288.10)
<b>Euro 4 Buses</b>	PHP 4,500,000 (USD 90,416)	885	PHP 3,982,500 (USD 80.02)
<b>Total initial investment costs</b>		43,336	PHP 56,892,450 (USD 1,143.12)
<b>Total financing requirements (90%)</b>			PHP 51,203,205 (USD 1,028.80)

Source: Own calculations based on Biona (2015)

The modernization programme offers huge benefits to society, to travellers and as well to the jeepney industry supporting market transformation and long-term competitiveness vis-à-vis private transport. The financing mechanism suggests a burden-sharing scheme to **mitigate the financial impact** on the sector. The financial mechanism is built upon **three core elements**:

1. Preferential financing terms
2. VAT exemption on the purchase of new compliant vehicles.
3. Revised fare structure for routes operating new vehicles.

Based on financial viability analyses and the preference of the present administration to facilitate a market led financing solution, it is expected that these measures would **incentivise private investments**. Preferential finance rates (in particular a longer loan term and preferential interest rates) and VAT exemption **make investments more affordable**. The fare restructuring softens the impact on operators' income during the loan repayment period. This bundle of measures incentivizes the sector to make the investment required and to maintain the level of transport service supply that is essential to mobility in Metro-Manila.

### **Franchise reform and joint fleet management**

In addition to the network and service plan, the DOTr is aiming at reducing the total amount of franchises in the public transport sector, especially in the jeepney industry. On the way towards consolidation, a **move from vehicle franchising to route franchising (“one route – one franchise”)** will be a key step in rationalisation. Offering a route franchise only to co-operatives or companies will allow consolidation to occur almost organically, as it enables the co-op to act like an operator rather than a group of individual vehicle owners that

compete on the street. They will then make investment decisions according to route demand rather than individual return on vehicle investment.

To facilitate and strengthen the whole program of consolidation and modernisation the introduction of a **joint fleet management** system is planned. The fleet management system is very important to the whole jeepney modernization program for the following reasons:

- It manages the financing risk.
- It facilitates sourcing of other revenue streams.
- It ensures the proper maintenance of the vehicles at a lower cost.
- It controls the deployment of vehicles for optimum operational and service efficiency.
- It facilitates conformance to jeepney stops.

The fleet management company lowers the financing risk by ensuring that the amortization payments are regularly collected and remitted, the vehicles are properly managed and secured, and possible co-funding or collateral in some cases are provided. Sourcing other revenue streams collectively for the whole fleet provides stronger bargaining power. The same would be true for supply and service agreements lowering down maintenance and operations cost. Optimizing and planning of the deployment of vehicles is another avenue for operational cost reduction and ensuring transport service quality. This is however only possible if all vehicles in the route are either managed by a single fleet company or that a joint deployment plan is developed and followed by all fleet management companies operating in the route. This also requires investments on back-end systems (GPS and CCTV, IT tools, Operations Command Post, automated payment systems), which the fleet company can invest on. Fleet companies will be given the task to ensure that their units follow the jeepney stops to be eventually prescribed in their routes. A **shift from the boundary system to an employer – employee relationship under a joint fleet management system** (and the introduction of “one-route one franchise principle”) would eliminate the competition of drivers, which is currently the cause for inefficiencies and traffic accidents in the jeepney sector.

**Table 14: Franchise options**

Franchises per route	Vehicle ownership	Fleet management
<b>“One route – one franchise” principle</b>	<ul style="list-style-type: none"> <li>• <b>One company with all the units required for one route</b></li> <li>• <b>One fleet management company per route</b></li> <li>• Introduction of <b>employer-employee relationship</b> (overcoming the “boundary system”)</li> </ul>	
<b>Several franchises per route:</b> vehicle ownership separate from fleet management	<b>Companies (or cooperatives) owning several units</b> (minimum number of unit could be required)	<ul style="list-style-type: none"> <li>• <b>One fleet management company per route</b> (managing operations of all vehicles on the route)</li> <li>• Introduction of <b>employer-employee relationship</b> (overcoming the “boundary system”)</li> </ul>

Source: GIZ

Based on the experiences of existing fleet management initiatives in Metro Manila, a fleet management system will be developed including operational guidelines and business planning. Different organisational or legal models of fleet management systems are possible based on the existing fleet managers. For instance, the vehicles could be owned by the operator, who has a service contract with the fleet manager for maintenance and management of the units. Another option is that the management company buys existing units and franchises and provides company shares.

Stringent pre-qualification requirements for fleet management companies needs to be formulated to ensure that the program is implemented properly and not mismanaged. The pilot phase of the NAMA will initially focus on existing fleet management companies or cooperatives to develop and fine-tune possible fleet management structures and business models before the program is fully implemented in Metro Manila.

The DOTr has already started preliminary talks, which are ongoing, to encourage individual jeepney operators and drivers to form and/or join cooperatives. Options are being considered to facilitate the jeepney consolidation and introduction of service contracts to corporate/cooperative operators. Longer timelines for contracts of consolidated fleets may be introduced as incentive to join cooperatives.

It is envisaged that by 2020, franchises in Metro Manila will only be issued to corporate bodies based on performance contracts. A phased approach is discussed as well for service contracts by starting with awarding only service contracts on viable routes that demonstrate the ability for cost-recovery and scale up to other routes as capability strengthens, moving towards service contract “bundles” or gross cost (‘pay by km’) contracts, which will be offered by competitive process.

### Introduction of fixed jeepney stops

The lack of or wrongly placed fixed jeepney stops currently lead to severe congestion and inefficiencies of the whole transport system when jeepneys would stop and converge anywhere along the route to pick up and drop off passengers. Establishing fixed jeepney stops improves traffic flow, reduces emissions from stop-and-go traffic, and has a positive influence on road safety.



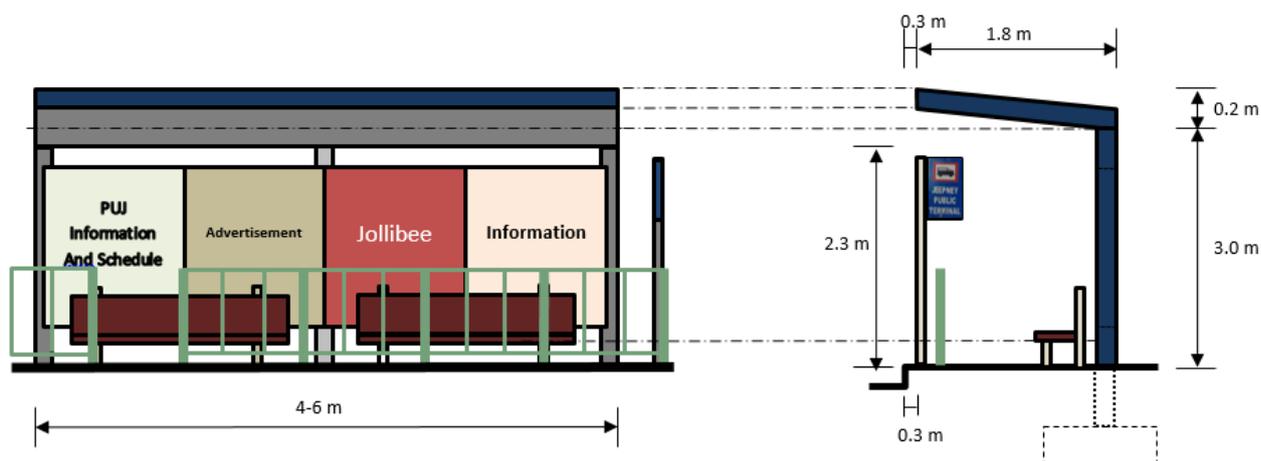
*Jeepney loading situation and stop signs in Metro Manila (own pictures)*

The establishment and compliance to jeepney stops involves three components:

1. Identifying the strategic locations;
2. Introduction of enforcement mechanisms to ensure that they are followed, and
3. Demonstration of the use and benefits of jeepney stops.

Strategically locating jeepney stops is a scientific process and requires comprehensive data gathering to know passenger origin and destination patterns. Proper guidelines would also have to be formulated to ensure safety and prevent choke points of traffic flow. Standard design of the jeepney stops also needs to be developed.

Linking an enforcement mechanism to fleet management companies could make its implementation more efficient through strict adherence to agreed service standards that follows a schedule when to drop-off and pick-up passengers at particular stops. Management companies could be liable to ensure that their units adhere to the stops; otherwise, both the driver and the company would be penalized. Biona (2015) proposes the introduction of a “badge system” for drivers, which is based on points, which are deducted for every violation, and excludes drivers from the system if they commit too many violations. This system could be part of performance-based service contracts as well.



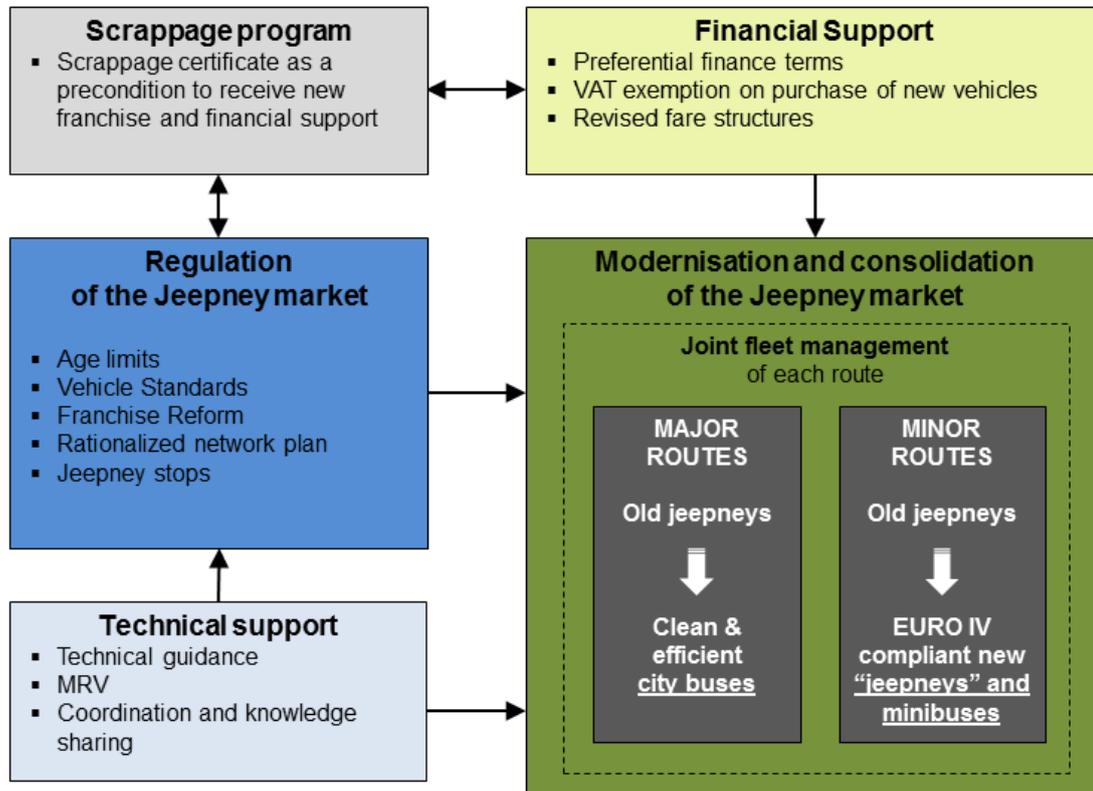
**Figure 12: Proposed design of jeepney stops**

Source: Own illustration

For the pilot phase, priority corridors will be chosen, based on a demand model currently developed by ITP and consultations with the DOTr. In this regard, in the latest discussion with the DOTr, route rationalization of jeepneys will focus on those affected by the following proposed BRT systems being considered according to the schedule of implementation, starting with Quezon Avenue BRT, then EDSA BRT and lastly, the C5 BRT.

## Summary of measures to facilitate consolidation and modernisation

**Figure 13** summarises the envisaged policies and measures to be introduced in the Jeepney+ NAMA to facilitate the consolidation and modernisation of road based public transport in the Philippines.



**Figure 13: Market Transformation Approach of the Jeepney+ NAMA**

Source: Own illustration

The introduction of the age limit and new vehicle standards and the combination of **organisational consolidation** (shift from vehicle franchising to route franchising) and joint fleet management approaches will promote **fleet consolidation** (shift to higher-capacity vehicles). The objective is to shift all passengers' kilometres from the current jeepneys on major corridors with highly frequented routes to cleaner city buses by 2026. This phased consolidation approach is expected to start in key routes in Metro Manila, with an ultimate goal of having main routes serviced by corporate public transport operators using modern, high occupancy, environment-friendly city buses. For the remaining minor routes (feeder routes), different technological options are considered as alternatives for the new vehicles. Moreover, the modernisation approach will not only address emissions but also safety, accessibility and other operational concerns of the public transport fleet through the introduction of new vehicle standards or jeepney stops.

## 4.5 NAMA coordination and management

To ensure efficient and effective management and steering of the NAMA, the following steering structure is planned (this relates to component 6 in the logical framework):

- An Executive Board composed of high-level representatives (Undersecretary level, LTFRB Chair) from DOTr, LTFRB and CCC to provide guidance to the project at political and strategic levels, as well as to mainstream the NAMA concept to all relevant political levels and the public. The Executive Board makes decisions and approves suggestions of the Technical Steering Committee (see **Figure 14**) and informs the Secretary of the DOTr and further relevant high-level decision makers on the progress of the NAMA to ensure mainstreaming and complete circulation of information. The Executive Board can thereby play a catalytic role in the sectoral policy reform and implementation of the NAMA mechanism.
- A Technical Steering Committee is responsible for the development and updating of the annual work plan and the implementation and coordination of corresponding activities and responsibilities to each concerned party, providing guidance to and deciding on suggestions and concerns from working groups, deciding on the integration of new members to the Committee and the appointment of a head for each working group and further members. It will be composed of representatives (Assistant Secretary and director/technical level) from DOTr and attached agencies, i.e. LTO, OTC and LTFRB, the CCC, and other national agencies related to NAMA implementation, such as the Department of Finance (DOF), DENR, NEDA, LGUs, as well as international development partners and other local research institutes, such as CAA, De La Salle University, and others. As Chair, DOTr is expected to convene and moderate the meetings of the Committee supported by the Technical Secretariat, monitor and actively follow-up the implementation of the annual work plan and other activities as well as facilitate the decision-making within the committee and coordinate the external communications related to the NAMA. Members of the Committee are asked to designate one main and one alternate representative.
- A Technical Secretariat staffed by the Environmentally Sustainable Initiatives Transportation Unit (ESITU) of the DOTr to support the Chair of the Technical Steering Committee in the performance of duties by preparing meeting agendas, documentations, and the organisation of annual planning workshops. The Technical Secretariat further continually assesses the progress of the annual work plan and submits progress reports to the Committee. Finally, the Secretariat is in charge of making all documents related to the NAMA available to all members through an online platform.
- The Working Groups on the thematic components of the NAMA support the decision-making within the Committee providing technical input and feedback. The Groups include further experts and stakeholders to integrate all necessary information into the preparation of the decision-making process. They further guide experts and consultants who are working on the preparation and implementation of the NAMA and review the progress of consultancies.

The overall steering structure is illustrated below.

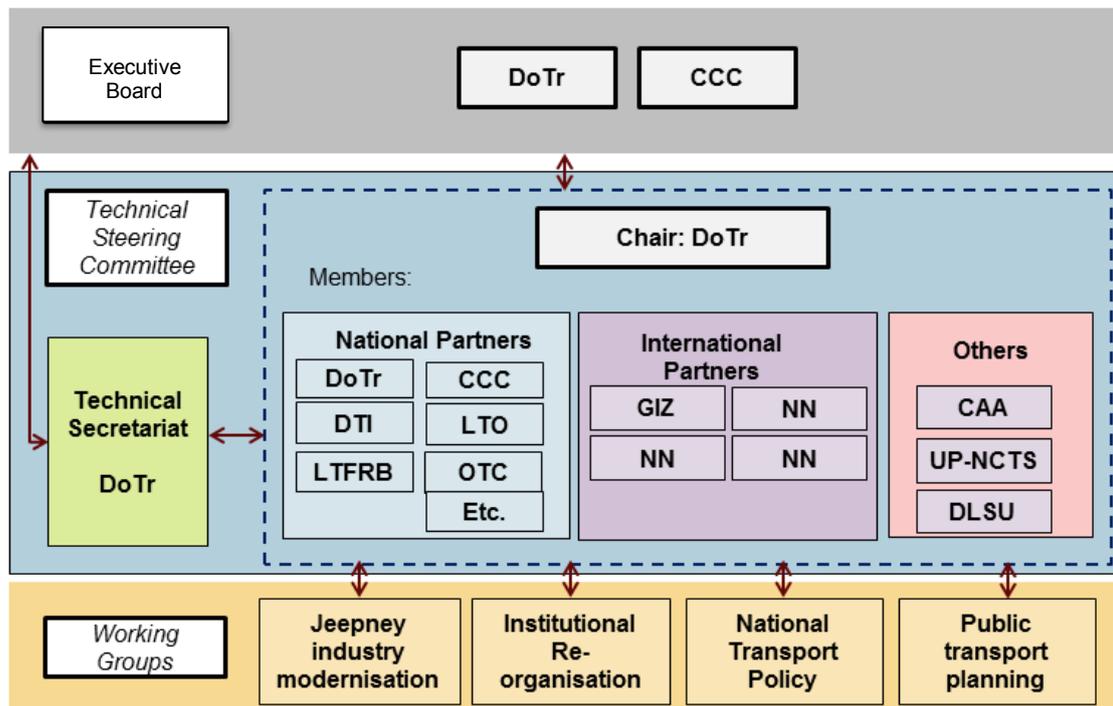


Figure 14: NAMA Steering Structure

Source: Own illustration

## 4.6 Expected sustainable development benefits

The NAMA is expected to generate various sustainability benefits besides GHG emission reductions. The improvement of public transport services is expected to result in reduced congestion and travel time and better quality of service to public transport users, improved air quality and road safety, better working conditions for providers of public transport services and contribute to fuel security by reducing fuel demand (see Chapter 5.2 for more details).

By reducing the total amount of jeepney by approximately 22% due to the consolidation of the market and the rationalisation of the service network, the benefits in terms of time savings and local air pollutants will be significant. The improvement of the overall economic situation for the industry as a consequence of a row of interventions, such as joint fleet management, usage of new, more efficient, vehicles, and introduction of jeepney stops or the discontinuation of the “boundary system” will lead to a most sustainable socio-economic environment of the industry stakeholders. Furthermore, the situation for the public transport users or customers will improve significantly due to reduced travel times, safer vehicles and less local pollution, which is beneficial for drivers. Due to the importance of the public transport market in the Philippine society and as a result of the market transformation, all envisaged interventions of the Jeepney+ NAMA will lead to sustainable development benefits if successfully implemented.

The modernization of the jeepney fleet in Metro Manila, combined with the rationalization of public transport services in the major corridors would result in total on-road diesel savings

between 528 to 754 million litres (up to 2026) or 310 million to 443 million USD.<sup>37</sup> If the impacts of the scaled up jeepney modernization program (nationwide) are included, the total amount of diesel to be saved can be between 1.9 to 2.7 trillion litres (or 1.9 to 2.7 billion per year) or 1.1 to 1.5 trillion USD.

In terms of local air pollutant reduction, the ex-ante estimated potential for Metro Manila was calculated. Table 15: Total pollutant emissions avoided in Metro Manila from 2016 to 2026 (tons/year) below provides the estimated average pollutant emissions avoided per year due to the NAMA. Pollutants affect health, destroy infrastructure and damage agriculture, and with the implementation of the Jeepney+ NAMA, significant amounts of air pollution can be avoided.

**Table 15: Total pollutant emissions avoided in Metro Manila from 2016 to 2026 (tons/year)**

		PM	CO	Nox	SOx	NMHC
<b>Route Rationalization</b>	<b>Low</b>	107.69	656.04	362.98	0.58	193.67
	<b>High</b>	153.85	937.20	518.54	8.43	279.56
<b>Jeepney Technology Modernization</b>	<b>Low</b>	276.71	1,858.79	558.80	0.16	570.60
	<b>High</b>	395.30	2,655.42	798.28	0.23	815.15

Source: GIZ

The monetized health value of the reduced air pollutants in the table above are estimated to be between 83 to 119 million USD per year. If the scaled up program for the jeepney technology modernization is accounted for, the monetized value of air pollution reduction is estimated to be in the range of 220 to 316 million USD per year.<sup>38</sup>

NAMA implementation yields a number of significant sustainable development benefits. While a quantitative assessment will only be carried out during the pilot phase, Table 16: Qualitative assessment of co-benefits (sustainable development benefits) of the NAMA shows a qualitative assessment of the major expected benefits associated with NAMA implementation.

<sup>37</sup> Based on pump price of 28 pesos per liter and 0.21 Php/USD.

<sup>38</sup> The monetized values are estimated using monetized health impact factors based from Biona et al (2017) which represent aggregated costs associated with a ton of a certain type of pollutant (limited to PM, SOx and NOx).

**Table 16: Qualitative assessment of co-benefits (sustainable development benefits) of the NAMA**

Main co-benefits	Relative importance	Justification
<b>Socio-economic</b>		
Decreased travel times and associated economic benefits	<i>High</i>	<i>Traffic congestion can be substantially decreased (rationalised service and network plan; consolidation of public transport fleet; introduction of joint fleet management; )</i>
Reduced stress levels and diseases (and consequent reduced societal health costs) associated with traffic noise/air pollution	<i>High</i>	<i>Long-term impact due to the reduced traffic noise/air pollution</i>
Reduced casualties and injuries by accidents	<i>High</i>	<i>Reduced traffic and modernised public transport vehicle fleet</i>
Increased income for public transport industry	<i>High</i>	<i>Rationalised and modernised public transport system will lead to higher revenues and income situations</i>
Increased competitiveness of cities as attractive places for business/families	<i>Low</i>	<i>A better mobility attracts families and businesses</i>
Social inclusion of people of vulnerable groups	<i>High</i>	<i>Implementation of vehicle standards will improve (physical) accessibility to public transport</i>
<b>Environmental</b>		
Reduced traffic related air pollution (NO <sub>x</sub> , SO <sub>x</sub> and particulate matter)	<i>High</i>	<i>Stringent vehicle standards, reduced fuel consumption and emissions due to optimized number of road public transport vehicles, as well as potential shifting of trips from private modes.</i>
Rational use of scarce resources, e.g. fossil fuels	<i>High</i>	<i>Stringent vehicle standards, reduced fuel consumption and emissions</i>

## 4.7 Expected ex-ante GHG mitigation

The MRV approach is described in more detail in Section 5. The NAMA is expected to achieve accumulated GHG emission reductions in the range of 6.5 to 9.2 MtCO<sub>2e</sub> between 2016 and 2026 in the Philippines (between 3.1 and 4.4 MtCO<sub>2e</sub> avoided for Metro Manila). This translates into an average annual emission reduction of 0.65 to 0.92 MtCO<sub>2e</sub> in the Philippines. Through these mitigations, the total yearly transport emissions in a) Metro Manila would be reduced by 3.6% and b) nationwide by 2.9%.

Table 17: Ex-Ante GHG Impact Assessment 2016 – 2026

		Low Scenario (in MtCO <sub>2e</sub> ) (70% shift)	High Scenario (in MtCO <sub>2e</sub> ) (100% shift)
<b>Workstream A: Fleet Consolidation</b>	<b>Metro Manila</b>	1.8	2.5
	<b>Philippines</b>	to be estimated	to be estimated
<b>Workstream B: Fleet Modernisation</b>	<b>Metro Manila</b>	1.3	1.86
	<b>Philippines</b>	4.68	6.69

Source: Own calculations based on Clean Air Asia (2015)

## 4.8 Transformational character of the NAMA

### Transformational Change

The NAMA has the potential to initiate a transformational change for the entire public transport market in the Philippines, not only in Manila but also in other metropolitan areas and beyond (*up-scaling*). This approach can also become a model for transforming other (semi-) informal public transport systems in the region (*replication*).

Implementing a market modernisation programme for the public transport sector in the Philippines is undoubtedly the approach with the highest potential for transformational change in the subsector and for the whole transportation system of the country.

Key structural changes targeted by the NAMA include:

- Creation of better policy framework conditions for public transport: e.g. NTP, vehicle standards for public transport vehicles, scrapping incentives for old jeepneys.
- Building institutional capacities: e.g. the implementation of the direct mitigation measures will be flanked by capacity building measures following a capacity needs assessment to be carried out at the beginning of NAMA implementation.
- Re-Organisation of institutional set-up: e.g. establishment of a PTA, strengthening of the capacity of the Government through the establishment of a TSU
- Facilitation of key sector interventions and investments: e.g. jeepney fleet consolidation and modernisation in Metro Manila and beyond, introduction of joint fleet management and service contracts (franchise reform).

By consolidating the public transport market and at the same time modernising the vehicle fleet, the NAMA aims to preserve the importance of public transport against the trend of growing car ownership in the Philippines. The NAMA will support the shift from a currently poorly regulated, weakly planned and enforced, largely scattered, inefficient, high-carbon public transport system of low quality and high external costs to an aligned, professionalized, efficient and low-carbon system of high quality, safety and comfort.

The NAMA furthermore will develop an incentive system to make reorganisation and consolidation attractive for jeepney and bus drivers and operators. In doing so, it will become a self-enforcing system by introducing orchestrated interventions and regulations, such as

introducing joint fleet management, vehicle standards or changing the salary system of the industry to improve traffic behaviour.

The NAMA works towards this transformation through a phased structural change of the jeepneys and bus industry, ultimately establishing a more formal public transport market with a manageable number of franchises, offering better working conditions and more reliable and safe services to the customers.

Public transport consolidation and modernisation is in line with existing transport and climate policies of the Philippines, ensuring the political will and ownership of the Government. To achieve and maintain the transformational potential of public transport reform, the NAMA will strengthen the planning and management capacities of the DOTr through organisational restructuring within the DOTr combined with a strong capacity development component. Installing a TSU within DOTr further strengthens the institutional innovation potential of the Government.

LGUs and other implementing agencies will be encouraged to partner with DOTr. Moreover, improved management capacities within DOTr centred in the TSU hold great potential to catalyse financial support from various development partners to scale up implementation in cities across the Philippines.

Consolidating currently scattered services under cooperatives and fleet managers will facilitate better regulation and enforcement, as well as modernisation of the existing fleets. This in turn will allow new low carbon technologies to be introduced. Building up these new capacities and transforming the planning and management structure both within DOTr and among bus and jeepney operators will ensure the sustainability of the impacts.

In addition, by establishing a funding mechanism to support the introduction of new vehicles, the NAMA helps to overcome the current financial constraints of jeepney and bus operators, triggering quicker up scaling of fleet modernisation.

## 5 The MRV approach: Monitoring, Reporting and Verification

Monitoring, reporting and verification (MRV) of the NAMA requires clearly defined processes, methodologies and responsibilities. Continuous data collection and processing also requires additional resources in terms of manpower for data collection and management, database development and maintenance and capacity development. The NAMA will support the set-up and quality control of MRV processes, including annual monitoring plans and the development of a reporting format. Capacities to conduct monitoring and reporting within DOTr will be strengthened in workshops and on-the-job training, as well as through guidance on data collection (see logical framework).

### 5.1 Scope and boundaries of the monitoring approach

The direct mitigation measures of the NAMA aim at increasing the modal split of high capacity city buses and at lowering the share of jeepneys and old buses on major roads (consolidation component), as well as the technological improvement of the remaining jeepney fleet in the city (NAMA modernisation component).

Shifting passenger kilometres travelled from jeepneys and old buses to new city buses has implications for fuel consumption and related GHG emissions of public transport activity in a city. Replacement of old jeepneys with more efficient technologies can further improve the emission intensity of road-based public transit. However, these measures can also have unintended effects, such as leakage of displaced jeepneys outside of Metro Manila (and other pilot cities) if scrapping of units is not ensured.

#### 5.1.1 Cause-effect analysis from transport intervention to GHG impacts

The direct GHG impacts and indirect impacts of the NAMA were identified by conducting a causal chain analysis of each NAMA component. A *direct GHG impact* is defined as the GHG emissions resulting from intended effects on the target emission sinks/sources, while an *indirect GHG impact* is defined as unintended effect on emissions resulting from the actions that are implemented.

The full causal chain analysis is shown in Annex 2. Each of the GHG impacts was assessed to determine which indicators were quantifiable using available data from official statistics and studies. The MRV framework is segregated into two workstreams according to the mitigation measures described in Chapter 4.

#### **Workstream A: Consolidation and rationalization of public transport routes in favour of cleaner and more efficient city buses**

For Workstream A, GHG emission reductions is a result of the shifting of passenger kilometres from jeepneys and old tourist buses to cleaner and more efficient city buses. Passenger trips are assumed to gradually shift to clean city buses, reducing vehicle trips by jeepneys and increasing vehicle trips by buses. At the same time, improving the current bus fleet to cleaner, more efficient buses will further improve fuel efficiency and reduce emissions.

There are several potential negative indirect impacts. A possible indirect impact of rationalization is the leakage of displaced jeepney units to areas outside Metro Manila. It is assumed that the scrapping programme would prevent the leakage and ensure that no phased out units would operate outside the urban areas. Also, the improved public transport service could theoretically attract more passengers, increasing ridership that leads to a system-wide modal shift to public transport, which would increase public transport vehicle kilometres travelled, however limits passenger car vehicle kilometres travelled (pull effect).

A positive indirect impact from rationalising routes is that the replacement of jeepneys and small buses with higher occupancy public transport will ease congestion, improving traffic speed and therefore further reducing fuel consumption, emissions and air pollutants all of which are much higher in stop-and-go traffic.

In the selected corridors, traffic activity is monitored regularly by the MMDA and DPWH, so that data from these corridors is available.

### **Workstream B: Jeepney fleet modernisation**

For Workstream B, alternative options for jeepneys have been identified and assessed for direct and indirect impacts based on the current technologies that exist as well as on the discussions between DOTr and GIZ. Three options are considered: replacing jeepneys with electric vehicles or electric jeepneys (new vehicles), replacing jeepneys with minibuses, and replacing current units with Euro IV units. These options are further described in Annex 1. All options would reduce fuel consumption and emissions compared to current jeepneys. Euro IV minibuses are more energy efficient than regular jeeps, thus the difference in fuel consumption would save emissions. Although minibuses have higher fuel consumption per vehicle, the reduction of vehicle travel would reduce fuel consumption per PKM, thus lower emissions from the fleet.

A negative indirect impact of fleet modernisation is the embedded carbon from the manufacturing of the alternative vehicles.

Table 18: Impact chain of direct mitigation measures summarises the direct and indirect impacts of the consolidation and modernisation.

Table 18: Impact chain of direct mitigation measures

MRV Component	Subcomponent / Options	GHG Impacts	Included in MRV?	Remarks on Measurement
<b>Workstream A</b> Consolidation and rationalization of public transport routes in favour of cleaner and more efficient city buses	Gradual phasing out of jeepneys in major routes/corridors	<b>Direct Impact:</b> Shift of PKM from jeepneys and buses to cleaner more efficient city buses in major routes. Reduction of jeepney VKT	Yes	VKT/PKM can be estimated using available data <sup>39</sup> . Ex-post monitoring will involve the collection of VKT data for the vehicles replacing the baseline vehicles.
		<b>Indirect Impact:</b> Potential leakage in GHG emissions due to the transfer of old jeepneys to other places outside urban areas	No	It is assumed that the scheme will entail a scrapping component – and as part of the financing scheme, a requirement that the old, polluting jeepneys will be handed over for scrapping - and thus the jeepneys up for replacement will be destroyed.
	Gradual phasing out of old long-distance buses in favour of for cleaner city buses	<b>Direct Impact:</b> With higher capacity, fewer buses would be needed to carry passengers equivalent to lower capacity jeepneys, thus lower vehicle kilometres	Yes	Existing city buses are already plying the roads of the Bonifacio Global City (BGC) which have the specifications assumed in the alternative scenario.
		<b>Direct Impact:</b> Larger vehicles in the fleet would increase fuel consumption per vehicle, but with fewer vehicles on the road, the fuel consumption and emission per PKM would be lower	Yes	
		<b>Indirect Impact:</b> Increased demand in public transport increases ridership that lead to system wide mode shifting towards public transport	No	System wide modelling was not possible so far but may be considered in the future, provided that complementary surveys are conducted that can be used for associating the shift towards the NAMA.
		<b>Indirect Impact:</b> Less vehicles on the road would ease congestion, thus improving the traffic speed and reducing emissions	No	The speed is not monitored by official data

<sup>39</sup>At the time of study, only the four corridors selected in the report had reliable data on Average Annual Daily Traffic. These corridors are Quezon Avenue, Commonwealth Avenue, Ortigas Avenue and Taft Avenue.

MRV Component	Subcomponent / Options	GHG Impacts	Included in MRV?	Remarks on Measurement
		<b>Indirect Impact:</b> Less private cars on the road due to shifting to public transport, reducing the PKM from private vehicles.	No	No assumptions on shifting from private to public modes are considered
<b>Workstream B</b> Jeepney fleet technology modernization	Replacing with electric jeepneys	<b>Direct Impact:</b> Reduction of CO <sub>2</sub> emissions from jeepneys as units are being replaced with electric units without tailpipe emissions	Yes	The number of units replaced, the vehicles kilometres performed by the replacement vehicles (as well as other operational characteristics such as ridership, average passenger trip lengths) are to be collected. Emission factors were estimated based on the energy scenario forecasted by the DOE towards 2030
		<b>Indirect Impact:</b> CO <sub>2</sub> emissions from electricity grid due to consumption of electricity generated from an energy mix with high shares of coal sources <sup>40</sup>	Yes	
	Replacing jeepneys with mini-buses	<b>Direct Impact:</b> Change from current low capacity jeepneys to higher capacity buses would result in lower vehicle kilometres; fleet consumption per vehicle would increase due to size of minibus, but consumption per passenger kilometre is lower since less vehicles would operate thus lower emissions	Yes	Minibuses are defined and the specifications can be integrated
	Replacing current pre-Euro jeepneys with Euro IV units	<b>Direct Impact:</b> Improved fuel efficiency leading to lower fuel consumption from jeepneys	Yes	There are studies regarding local fuel efficiencies of Euro IV engines

<sup>40</sup> DOE (2014): <http://www.upecon.org.ph/epdp/conference/wp-content/uploads/2016/01/Plenary-3-Monsada-Energy-Prospects-for-the-Philippines.pdf>

### 5.1.2 Sustainable development impacts

Consolidation and modernisation will translate into a reduction of old smoke belching jeepneys as well as old buses thereby reducing air pollution in addition to carbon emissions. The modernisation of fleets will further present an opportunity for the vehicle industry. While jeepney and bus operators can receive new vehicles at lower rate due to economies of scale, passengers will enjoy better level of service.

Consolidation of public transport services is expected to reduce congestion and road safety, due to the shift to high capacity vehicles and eliminating the competition between drivers inherent in the current system. Through the NAMA, the government will be able to effectively manage and regulate the industry. A well-functioning transport system in cities improves the quality of life and business conditions due to reduced costs of transportation (better reliability, reduced time-loss).

Under the consolidation scheme with operational fleet management, it is also envisioned that working hours will be streamlined because of better scheduling to match the passenger demand per route. Currently drivers work long hours, competing for passengers with each other. In addition, drivers would receive a fixed monthly income, instead of earning irregular amounts with the current “boundary system”.

As mentioned above, the impact of inefficiencies and congestion in urban transport has been estimated by JICA (2014) to amount to roughly 20 billion USD annually (around 7.4% of the country’s GDP) or 51 million USD per day (PHP 2.4 billion).<sup>41</sup> From January to April 2015, a total of 26,903 road accidents and 158 road accident fatalities were recorded by the MMDA.<sup>42</sup> While air quality in the first quarter of 2015 was worse than the air quality recorded in 2014 as air pollutant concentrations reached 130 micrograms per normal cubic meter ( $\mu\text{g}/\text{Ncm}$ ).<sup>43</sup> Consequently, the proposed NAMA holds great potential for sustainability benefits and contributes to the achievement of objectives of the Clean Air Act.

Specific indicators will be included in the monitoring plan to reflect the achievement of sustainability benefits.

### 5.1.3 Assessment Boundary

Based on the identification of impacts and data availability the following assessment boundaries are set for the monitoring approach (summarised in Table 19: Assessment boundary). The quantification of GHG emissions is limited to the direct effects of fleet consolidation and technological modernisation. The monitoring approach covers tank-to-wheel CO<sub>2</sub>e emissions from fuel combustion in jeepneys and buses within the geographical boundary, as well as key sustainable development benefits caused by the NAMA, including air pollution, accidents, formal employment and energy consumption.

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<sup>41</sup> JICA. 2014. *Roadmap for Transport Infrastructure Development for Metro Manila and Its Surrounding Areas* (Region III & Region IV-A). Tokyo, Japan International Cooperation Agency.

<sup>42</sup> <http://motioncars.inquirer.net/37554/did-you-know-road-accidents-and-fatalities-in-metro-manila>

<sup>43</sup> <http://www.gmanetwork.com/news/story/509142/lifestyle/healthandwellness/metro-manila-s-air-quality-even-worse-this-year-data>

**Table 19: Assessment boundary**

<b>Boundary elements</b>	<b>Description</b>
<b>Temporal boundary</b>	2016-2026
<b>Sectoral boundary</b>	The assessment covers road based public transport activities, in particular by jeepneys, buses, and mini-buses.
<b>Territorial boundary</b>	<p>Due to the nature of the mitigation activity, the territorial boundary distinguishes between two layers of analysis:</p> <p>At the national level the territorial boundary includes all pilot cities and their respective territorial assessment boundary.</p> <p>At the city level, for each city implementing consolidation and modernisation of their public transport services a suitable territorial boundary is determined, which can differ between component A and B.</p> <p>For Metro Manila the exact routes to be covered in the ex-post analysis will depend on the choice of pilot applications for component A and B.</p>
<b>GHG included</b>	<p>The focus is on direct, activity-based GHG emissions. The monitoring covers tank-to-wheel CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O and CO emissions, as well as emissions related to electricity generation, which are also included as direct emission source in the case of electric jeepneys.</p> <p>Indirect upstream emissions for fuel production or vehicle manufacturing are not covered.</p>
<b>Sustainability effects included</b>	<p>Estimates of pollutant emissions cover particulate matter (PM), nitrogen oxide (NO<sub>x</sub>), sulfur oxide (SO<sub>x</sub>), carbon monoxide (CO), and non-methane hydrogen compounds (NMHC) from road-based public transport activities within the territorial boundaries.</p> <p>In addition, road accidents and formal employment created vs. jobs lost / income developments of drivers and operators are also monitored.</p> <p>Energy security is assessed based on the net fuel savings of the mitigation activities, which are calculated anyhow for GHG emissions assessment.</p>

Source: Own overview

## 5.2 Calculation of GHG Impacts

Calculating GHG emissions for workstream A and B follows different rationales. Workstream A looks at corridor or route-based activity and emissions, whereas workstream B measures fleet-based vehicle emissions (total VKT of one vehicle). This means that the geographic boundary varies in the two components, as well as the data requirements.

### 5.2.1 Establishing the ex-ante baseline estimates

To provide a reference case in order to compare the NAMA scenarios, a baseline scenario needs to be calculated for the consolidation workstream and the modernisation workstream, respectively. The baseline GHG emissions in this report are defined as the business-as-usual scenario without the NAMA activities, i.e. no consolidation and rationalisation of

jeepneys and buses and no operation of higher occupancy clean city buses in major routes. Old jeepney units are assumed to continue to operate in competition with buses in major traffic corridors. Meanwhile, the public transport franchise moratorium is assumed to be extended such that there is no growth in jeepney numbers, although some growth in passenger trips is assumed due to land use changes and economic growth.

For workstream A, the Average Annual Daily Traffic (AADT) represents transport activity in identified routes or corridors. It is a measure of traffic flow typically derived through hourly traffic counting. The AADT is commonly used in emission inventories from road-based transport, and to measure emissions for workstream A, the AADT of all vehicle types are considered to represent traffic activity in the chosen corridors. The AADT is multiplied by the corridor distance as an approximate VKT:

$$VKT_{RV,y} = AADT_y * road\ length$$

$$PKM_{RV,y} = VKT_y * average\ occupancy\ per\ vehicle\ type$$

Where:

$VKT_{RV,y}$  = vehicle kilometers at measurement year y

$PKM_{RV,y}$  = passenger kilometres at measurement year y

For workstream B, calculations are based on the vehicle registration of jeepneys per route, which is available from the DOTr. The fleet population is then multiplied by an assumed annual VKT per vehicle.:

$$Total\ VKT_{RV,y} = Number\ of\ registered\ jeepneys_y * VKT$$

$$Total\ PKM_{RV,y} = VKT_{RV,y} * average\ occupancy\ per\ unit$$

Where:

VKT and PKM are the vehicle kilometres and passenger kilometres of jeepneys at measurement year y

In both cases, baseline emissions are those of old jeepneys (and old buses in case of workstream A), which would have been used in the absence of the new city buses or the new replacement jeepneys/mini-buses, respectively. Emissions are calculated based on the alternative PKM values (in order to account for different seating capacities).

## 5.2.2 Ex-Ante GHG Impact Assessment

The preliminary analysis of the jeepney fleet consolidation and modernisation analysed the following scenarios for Metro Manila (a low and a high scenario each for workstream A and B of direct mitigation measures):

- **Scenario A1: Low Shift Consolidation** assumes consolidation of routes and a 70% shift of passenger kilometres travelled from jeepneys and buses to new city buses on all major roads in Metro Manila (including circumferential roads, radial roads, Marcos

Highway, and McArthur Highway). This equals a 5% shift per year for the low shift scenario.

Expected cumulative emission reductions Metro Manila: 1.8 MtCO<sub>2e</sub>

- **Scenario A2: High Shift Consolidation** assumes consolidation of routes and a 100% shift of passenger kilometres travelled from jeepneys and buses to new city buses on all major roads in Metro Manila (Including circumferential roads, radial roads and the Marcos and McArthur Highway). This equals a 7% shift per year for the low shift scenario.

Expected cumulative emission reductions for Metro Manila: 2.5 MtCO<sub>2e</sub>

- **Scenario B1: Low Modernisation** assumes that technological modernisation and scrapping affects 70% of the 54,843 jeepneys registered in Metro Manila in 2015 by 2026. This equals an annual shift rate of jeepneys of approximately 3,840 vehicles from 2016 to 2026 or 38,390 units in total. The scenario assumes an optimal mix of technologies for different route types as based from the preliminary assessment done as part of the NAMA preparation.

Expected cumulative emission reductions for Metro Manila: 1.3 MtCO<sub>2e</sub>

Expected cumulative emission reductions nationwide: 4.68 MtCO<sub>2e</sub>

- **Scenario B2: High Modernisation** assumes that technological modernisation and scrapping affects 100% of the 54,843 jeepneys registered in Metro Manila in 2015 by 2026. This equals an annual shift rate of jeepneys of approximately 5,484 vehicles from 2016 to 2026. The scenario assumes an optimal mix of technologies for different route types as based from the preliminary assessment done as part of the NAMA preparation.

Expected cumulative emission reductions for Metro Manila: 1.86 MtCO<sub>2e</sub>

Expected cumulative emission reductions nationwide: 6.69 MtCO<sub>2e</sub>

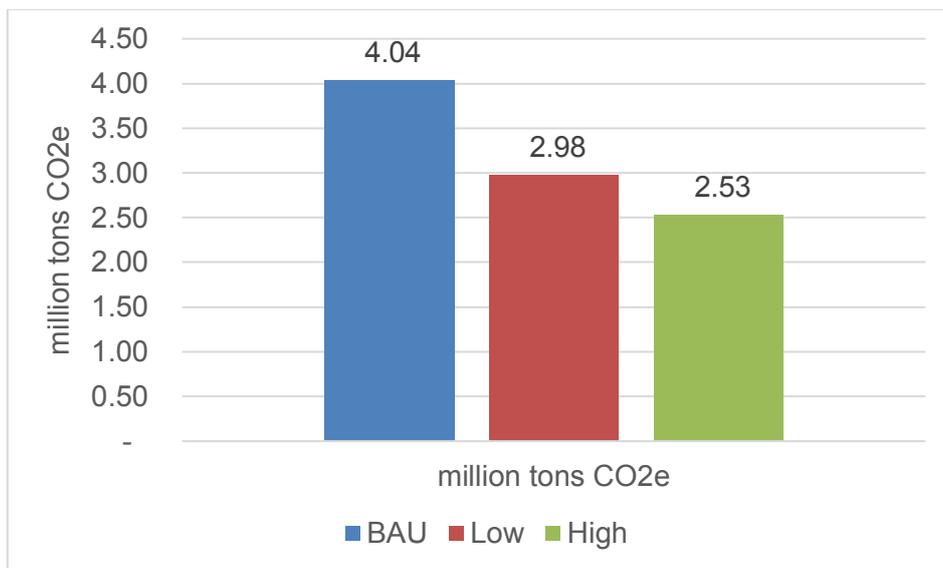
The baseline assumptions for the ex-ante estimation are as follows.

#### *Baseline Scenario for Consolidation on Major Routes*

- The traffic flow measured by the Annual Average Daily Traffic will continue to increase by 3% per year in major roads from 2015 to 2026. Despite the moratorium, historical data show that there is an increase in daily traffic flow possibly due to developments in various places in Metro Manila.<sup>44</sup>
- No change in fleet structure along major roads – This means that buses and jeepneys will continue to operate unexclusively along major corridors within the system boundary. Mode mixing and competition between the two modes will continue. In addition, due to lack of data, vehicle age and impact is not factored into the baselines.
- The current jeepneys and buses will retain their average occupancies towards 2026. Increase in public transport travel demand is not factored in but it is emphasized that

<sup>44</sup> In the forecasts, the Vehicle Capacity Ratio of each road was checked to ensure that each road would not exceed capacity with increasing vehicle traffic.

with limited road and vehicle capacity the system will reach a saturation point that would cause public transport service to dwindle.



**Figure 15: Baseline and scenario emissions from jeepneys and buses in major roads in Metro Manila from 2016 to 2026 (consolidation)**

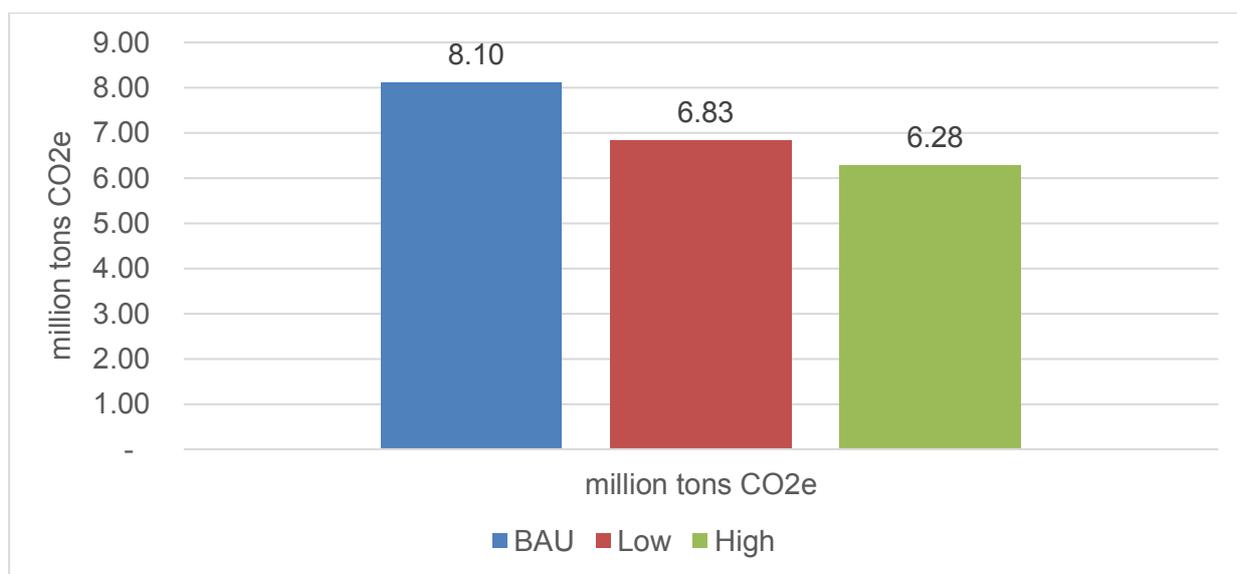
Source: Own illustration

The figure above illustrates the cumulative emissions (up to 2026) related to workstream A over the assessed corridors. The reduction potential is an effect of reduced vehicle kilometres due to the shift in passenger trips from low-capacity jeepneys to larger capacity buses. This reduction potential does not consider improved level of service in the corridors from reduced vehicle kilometres that would result in better fuel efficiency due to speed impacts. The estimation is therefore conservative.

*Baseline Scenario for the Jeepney Fleet Modernisation*

- The franchise moratorium on road-based public transport is assumed to prevent more jeepneys from entering Metro Manila, so that the 54,843 registered jeepneys in 2015 are assumed to continue to run.<sup>45</sup>
- It is assumed that the targets will be achieved by 2026, and the replacement of vehicles will start in 2016 (linear growth in replacement target growth up to 2026).
- A scaling up factor of 3.6 was used for estimating the potential impact of a nation-wide modernization program

<sup>45</sup> The LTFRB has granted route franchises in the recent past, but are limited to clean technologies such as electric jeepneys and such will not be impacted by the NAMA.



**Figure 16: Baseline and scenario emissions from jeepneys and buses in Metro Manila from 2016 to 2026 (fleet modernisation)**

Source: Own illustration

The figure above depicts the cumulative emissions for component B scenarios. The jeepney fleet in Metro Manila is estimated to emit around 8.1 MtCO<sub>2</sub>e per year. The low alternative scenario will result in a cumulative 1.3 MtCO<sub>2</sub>e saved (up to 2026), while the high alternative scenario will yield 1.86 cumulative MtCO<sub>2</sub>e savings (up to 2026). A nationwide jeepney modernization program will save 4.68 to 6.69 MtCO<sub>2</sub>e up to 2026.

### **Assessment of uncertainties in the ex-ante calculations**

The ex-ante calculations provide a good indication of the possible mitigation range of the Jeepney+ NAMA. Nonetheless, the ex-ante calculations necessarily require a set of assumptions and simplifications to be feasible. Uncertainties include:

- The calculation approach adopted considers the two components (route and service consolidation and fleet modernisation) separately, so that the interaction of the two components is not accounted for and cannot be added up. It is possible that the mitigation potential is significantly higher when considering the interactive effects with scrapping and replacement of vehicles on main roads.
- Effects of consolidation on major routes outside of Metro Manila have not yet been taken into account due to a lack of good enough data for decent estimations.
- Jeepneys operate differently in various cities in the Philippines. For scaling up of component B to the Philippines, however, it was assumed that all jeepneys operated at similar parameters. The variation between jeepney operations across the country has not been accounted for in the ex-ante estimates.

### **Consolidation and Rationalization**

- At the time of the study, the rationalization of public transport routes has not been finalized. There is a lack of information regarding current and future demands on

public transport and how the routes would be affected by phasing jeepney trips out of major roads. Moreover, the “pull effect” of better public transport is not accounted for.

- Congestion reduction effects are not considered.
- Jeepneys in the major roads travel at various distances. Assuming that the jeepneys would traverse the whole corridor can potentially overestimate short distance trips.
- Future land use and the impact on travel demand is not part of the ex-ante estimates. The travel demand in Metro Manila is highly variable due to current and future developments, and this is not accounted for in the ex-ante estimation.

### Jeepney Technology Modernisation

- The ex-ante estimates consider the individual impact of each technology option, no technology mix is assumed for Metro Manila. The technology mix poses uncertainty in the results since not all technologies can provide optimum mitigation in a single scenario.
- Modernization assumes that jeepneys will be scrapped, so that no jeepneys will be recycled outside Metro Manila.<sup>46</sup>

### 5.2.3 Ex-post calculation of GHG Impacts

Despite the different calculation rationales for baseline emissions of workstream A (based on routes) and B (based on VKT per unit), the key ex-post monitoring parameters for the emissions estimates of the NAMA of both workstreams A and B are VKT, occupancy and fuel consumption.

NAMA emissions are calculated as follows:

$$NE_y = \sum EF_{NV} * FC_{NV}$$

$$FC_{NV} = VKT_{NV,y} * FI_{NV}^{-1}$$

Where:

$NE_y$  = NAMA emission in year y (MtCO<sub>2e</sub>)

$EF_{NV,y}$  = Emission factor of the NAMA scenario vehicles (in gCO<sub>2e</sub>/km or gCO<sub>2e</sub>/MJ)

$FC_{NV}$  = Fuel consumption of the NAMA scenario vehicle (in litres or in MJ in the case of electric jeepneys)

$VKT_{NV,y}$  = Vehicle kilometres served by the NAMA scenario vehicles in year y (in km)

$FI_{NV}$  = fuel intensity of the NAMA scenario vehicle (km/litre)

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<sup>46</sup> CAA (2015) shows more details on ex-ante estimations.

Since the two works streams vary in scope, they require different monitoring data to be collected to arrive at the calculation (see Annex 3 and 4).

The emission reductions in both cases are calculated by subtracting the estimated emissions of the respective NAMA measures from the calculated baseline emissions:

$$ER_y = BE_y - NE_y$$

Where:

$ER_y$  = Emission reductions in year y

$BE_y$  = Baseline scenario emissions in year y

$NE_y$  = NAMA scenario emissions in year y

The baseline emissions are calculated using the same formula as for the NAMA emissions, only that the sum of the reference vehicles and their respective fuel consumptions are assessed:

$$BE_y = \sum EF_{RV} * FC_{RV}$$

$$FC = VKT_{RV,y} * FI_{RV}^{-1}$$

Where:

$BE_y$  = Baseline emissions in year y (MtCO<sub>2e</sub>)

$EF_{RV,PKM,y}$  = Emission factor of the reference vehicles (in gCO<sub>2e</sub>/km or gCO<sub>2e</sub>/MJ)

$FC_{RV}$  = Fuel consumption of reference vehicle (in litres or in MJ)

$VKT_{RV,y}$  = Vehicle kilometres served by the reference vehicles in year y (in km)

$FI_{RV}$  = fuel intensity of the reference vehicle (km/litre)

To derive the VKT of the reference vehicle ex-post the VKT of the NAMA scenario vehicles are multiplied with the difference in the occupancy between the NAMA scenario vehicles and the reference vehicles.

$$VKT_{RV,y} = VKT_{NV,y} * \frac{Occ_{NV,y}}{Occ_{RV,y}}$$

Where:

$VKT_{RV,y}$  = Vehicle kilometres served by the reference vehicles in year y (in km)

$VKT_{NV,y}$  = Vehicle kilometres served by the NAMA scenario vehicles in year y (in km)

$Occ_{NV,y}$  = Occupancy of the NAMA scenario vehicles in year y

$Occ_{RV,y}$  = Occupancy of the reference vehicles in year y

A summary of the ex-post calculations of underlying parameters to calculate the NAMA and baseline emissions is provided in Annex 4.

## **5.3 Monitoring Plan**

### **5.3.1 Data Monitoring for GHG impacts**

#### **Monitoring Options for Public Transport**

There are several options for regularly collecting data from public transport. A final decision on data collection methods will be made when the monitoring plan is developed in parallel to the decision on implementation pilots.

In the case of public transport vehicles, the following monitoring tools can be employed:

1. Self-monitoring reports for the bus and jeepney operators
2. Survey of public transport operators
3. Global Positioning System (GPS) installation for trip data measurement and capture
4. Odometer readings from regular inspection
5. Sample surveys for determining other important parameters such as average occupancies

The ex-post monitoring framework is summarised in the following table.

**Table 20: Ex-post monitoring framework for the Jeepney+ NAMA**

Data	Notation	Description	Unit	Data Collection Method	Collection Frequency	Collecting Agencies
Vehicle population	N	The number of registered jeepney units	No. of vehicles	Through vehicle registration	Annual	LTO
Ridership	R	Number of passengers in a given measurement year	Passengers/year	Self-monitoring report / Sample surveys for operators	Annual	Operators/ LTO OTC
Vehicle trips of jeepneys	$t_{RV}$	The trips made per vehicle in a specified route/corridor	No. of trips/ Vehicle/yr.	Self-monitoring report	Daily	Operators/ MMDA/ DPWH
Trip distance	$d_{RV}$	The distance travelled per vehicle per trip	km/trip	Odometer measurements/ GPS installations per unit / Sample surveys	Daily	Operators/ MMDA/ DOTr
Operating days	$D_{RV}$	Number of days in operation per vehicle	Days/ vehicle	Self-monitoring report of operator	Annual	Operators/ DOTr
Speed	S	The average speed per vehicle	Km/h	Odometer measurements	Daily	MMDA/ DOTr
Fuel split	%Fuel	The frequency distribution of the vehicle population per fuel type i.e. Diesel, Gasoline, Electric, etc.	% Fuel type	Vehicle registration forms	Annual	LTO
Technology Split	%Tech	The frequency distribution of the vehicle population per technology type i.e. Euro I, Euro II, Euro III, etc.	% Technology type	Vehicle registration forms	Annual	LTO
Fuel consumption	FC	The total fuel consumed per vehicle	Litres	Self-monitoring reports from operators	Ad hoc	Operators/ DOTr
Electricity consumption (e-jeepneys)	EC	The total electricity consumed over the distance travelled per electric vehicle	kWh/day	Self-monitoring reports from operators based on daily charging	Daily	Operators/ DOTr
Emission factors	EF	The amount of CO <sub>2</sub> per litre	gCO <sub>2</sub> /litre; gCO <sub>2</sub> /MJ	Lab measurement (Vehicle inspection / PETC)	Ad hoc	UP NCTS/ VRTL

### **Ex-Post Monitoring for Workstream A**

Workstream A focuses on monitoring major roads. Ex-post monitoring should still collect AADT data as basis, but with additional monitoring of the routes that pass through the major roads.

For future monitoring, it would be ideal to use data on the registered routes of buses and jeepneys. Routes that pass through major roads must be identified and these routes shall be the basis of the monitoring. Parallel to this, the new city buses must be monitored in addition to the AADT. The data for ex-post monitoring can be taken from LTFRB franchise data or self-monitoring reports by the fleet operators, while data such as the roundtrips per day, daily distance travelled and occupancy can be acquired through updated surveys.

### **Ex-Post Monitoring for Workstream B**

Workstream B would require an inventory of the jeepney fleet population and activity for the ex-post monitoring. Aside from registration data, the government can look into institutionalizing self-reporting from jeepney operators or fleet managers. The DOTr can serve as the lead agency to handle the monitoring of jeepneys, using a project management unit dedicated to the implementation of the NAMAs. The LTFRB can compile data from reports sent by the fleet managers and add them to a public transport database that they can manage.

It is important to monitor the number of units replaced and the number of replacements. This can be done by the operators through the LTFRB. Alternatively, if the vehicle replacement is done through a government program, then the program evaluation can already serve as the monitoring mechanism of the jeepney replacement.

### **5.3.2 Monitoring of sustainable development impacts**

Based on the assessment boundaries, the following sustainable development impacts are planned to be monitored for the Jeepney+ NAMA (see

Table 21: Monitoring parameters for sustainable development impacts).

**Table 21: Monitoring parameters for sustainable development impacts**

Sustainable development benefit	Indicator(s)	Source	Frequency
Air quality	Estimated amount (tons) PM, NO <sub>x</sub> , SO <sub>x</sub> , CO, NMHC;  Mg/m <sup>3</sup> levels for selected pollutants (as monitored by the available air quality stations in Metro Manila PM, SO <sub>2</sub> , NO <sub>2</sub> )	Calculated on the basis of average emission factors based on fuel savings calculated for the emission reductions  AQ monitoring stations	Annually  Aggregated annually
Road safety	Road accidents (ideally on the affected roads)	Based on city statistics by MMDA	Every five years
Formal employment	Number of new formal jobs created through consolidation	Public transport cooperatives	Annually from the start of pilot implementation
	Number of jobs lost	Own survey	Annually
Energy security	Net fuel savings	Taken from calculations for emissions reductions	Annually

Source: Own table

### 5.3.3 Monitoring of NAMA activity and progress

NAMA activity and progress will be continuously monitored by the Technical Secretariat based on annual work plans and indicators in the logical framework.

## 5.4 Reporting set-up and process

As part of the NAMA design phase a detailed monitoring plan, including responsibilities and processes will be developed with support of the Technical Support Unit. The monitoring plan will build on the MRV approach and monitoring parameters presented above, but responsibilities have yet to be assigned. Transport data collection and monitoring are among the mandates of the DOTr and its affiliate agencies. However, the agency currently does not have a platform for consolidated transport data that could support GHG monitoring of the NAMA. Instead, such a database will be built up as part of the MRV activities of the NAMA.

Reporting will take place annually and progress reports will serve as input to the annual planning meetings.

## **5.5 Verification**

In order to facilitate verification of the achieved emission reductions and other effects, the monitoring process will include a well-managed component of data management and maintenance to store all relevant data sources in a central data depository and maintain annual data in an easily accessible database. In addition, all assumption of emissions calculations and related material will also be managed and stored by the DOTr. The exact verification procedures are not yet known.

## 6 Financing the NAMA

The large number of 'small players' within the market represents a challenging situation when considering the financing required for fleet modernization. The smaller operators are typically poorly capitalized and having originally paid off the cost of their unit they have been unhabituated to significant ongoing investment requirements beyond essential maintenance. The jeepney is seen as an extension of family property rather than business capital, and the income stream generated will often support multiple dependents. The atomized nature of the industry would also place a high administrative burden on finance providers which can be expected to inevitably lead to higher cost of finance.

### 6.1 Existing Market Business Model

#### 6.1.1 Investment Costs

As highlighted above, the majority of the existing jeepney fleet is aged, and as such the investment in the vehicles dates back a long time.

New Jeepney vehicles are manufactured locally by a number of small manufacturers, producing small volumes of vehicles to meet the market demand for additional and replacement vehicles to the existing fleet. These manufacturers have however been impacted by the moratorium on new franchises (unless they are low emissions vehicles) with the consequent fall in the demand for new vehicles. The current market for jeepney vehicles is therefore driven mainly by the sale of second-hand vehicles which already have a franchise associated with the vehicle.

The second-hand cost of a jeepney is driven both by the residual value of the vehicle and the value of the franchise associated with it.

The cost purchasing a second hand jeepney with franchise can vary from PHP 270,000 (USD 5,425) to over PHP 500,000 (USD 10,046) depending on the characteristics and profitability of the franchised route, with a 'typical' franchise valued at around PHP 350,000 (USD 7,032). The jeepney unit is estimated to represent around PHP 200,000 (USD 4,018) of this overall value (although true market value of the unit is difficult to estimate given the lack of market for the unit without an associated franchise). By means of comparison, a newly built jeepney vehicle without franchise is estimated to cost in the region about PHP 650,000 (USD 13,060).

Reflecting the ageing vehicle fleet, many vehicles are owned without outstanding finance. Some of these will have been facilitated by past government or co-operative run schemes such as the 'Boundary Hulog' programme which facilitated the purchase of vehicles.

Despite the moratorium on new franchises, the trade in second hand vehicles with the franchise has provided an opportunity for those wishing to enter the market, or for jeepney drivers to become jeepney operators. With major financial institutions typically not lending to the sector based on historic loan performance, micro-finance institutions have found a niche in lending to those more broadly considered not creditworthy. With close management of the loans, and high rates of interest, a viable business model for both the MFI and the aspiring operator can be demonstrated. The micro-finance loan terms for second hand vehicles are typically as follows:

- Purchase of second-hand vehicle with existing franchise – PHP 350,000 (USD 7,032)
- 7% deposit paid by driver – PHP 24,500 (USD 492)
- Interest rate – 2% per month
- Loan duration – 4 years
- Repayment amount – PHP 16,200 (USD 325) per month

The MFI model, whilst expensive in terms of financing cost provides a means for market participants who would not have access to mainstream credit to have the opportunity to work towards jeepney vehicle ownership, putting the fare revenues which otherwise would be taken in boundary payment towards the financing of the vehicle.

### 6.1.2 Operating Costs

The operator is responsible for maintaining the vehicle. Maintenance tends to be carried out on a reactive rather than pro-active/preventative basis. The table below shows the estimated annual maintenance costs identified in the Jeepney Market Study. Industry feedback suggesting typical maintenance costs of PHP 50,000-65,000 (USD 1,005-1,306) per annum corroborate these figures.

**Table 22: Annual maintenance cost of baseline jeepneys by route**

Item	< 5 km	5 - 10 km	10 - 20 km	> 20 km
Engine Maintenance	PHP 8,344.5 (USD 167.6)	PHP 13,744.7 (USD 276.16)	PHP 26,037.6 (USD 523.2)	PHP 31,161.9 (USD 626.1)
Mechanical Maintenance	PHP 10,311.7 (USD 207.2)	PHP 16,985.0 (USD 341.3)	PHP 32,176.0 (USD 646.5)	PHP 38,508.4 (USD 773.7)
<b>Total</b>	<b>PHP 18,656.3</b> <b>(USD 374.9)</b>	<b>PHP 30,729.8</b> <b>(USD 617.4)</b>	<b>PHP 58,213.6</b> <b>(USD 1,169.6)</b>	<b>PHP 69,670.3</b> <b>(USD 1,399.8)</b>

Source: Biona, 2015

Under the boundary system, it is the driver who is responsible for covering operating costs including fuel and lubricants, taking whatever is left over after these and the boundary payment as an income. Based on typical route length, PHP 1,000 (USD 20.09) daily fuel/oil costs are to be expected.

### 6.1.3 Operating Revenues

Revenues for jeepney operation are generated by the carriage of fare paying passengers. Typical farebox revenues are in the region of PHP 3,000 to 4,000 (USD 60.28 to 80.37) per day depending on the route. This revenue does not all go to the operator however. The revenue received by the operator depends on the operating arrangements, and in particular whether the owner is an operator-driver or whether the unit is rented out.

Where the operator does not also drive (for example in the case of an owner of more than one unit) the income takes the form of a 'boundary payment. Under the boundary system, the revenue to the operator is the rental value of the unit. The typical boundary value ranges from PHP 500 up to PHP 1,200 (USD 10.05 to 24.11) per day, dependent on the route characteristics.

#### 6.1.4 Net Operating Income

The operator income is derived from the boundary payment, as outlined above, supplemented by a driver income stream in the case of an operator-driver. Net income for the driver is determined by the remainder of the farebox revenue once the boundary and fuel/lubricant costs have been covered. The table below provides a breakdown of how the operating revenue is disaggregated.

**Table 23: Jeepney daily cost structure<sup>47</sup>**

Average amount per day	End-to-End Route Length		
	< 5 km	5 - 10 km	> 20 km
Vehicle Boundary (Rental)	PHP 878 (USD 17.64)	PHP 820 (USD 16.48)	PHP 840 (USD 16.88)
Fuel Cost*	PHP 634 (USD 12.74)	PHP 900 (USD 18.08)	PHP 915 (USD 18.38)
Other Expenses	PHP 172 (USD 3.45)	PHP 210 (USD 4.22)	PHP 245 (USD 4.92)
Driver Net Take-Home Pay	PHP 900 (USD 18.08)	PHP 660 (USD 13.26)	PHP 933 (USD 18.75)

\*Note: Diesel Price = PHP 26.00 (USD 0.52) per liter

Source: Biona, 2015

Deducting the monthly maintenance and miscellaneous cost from the vehicle rental income provides the monthly net income of jeepney operators and also driver-operators.

**Table 24: Estimated monthly net income of jeepney operator and driver-operator**

Basis	< 5 km	5 – 10 km	10 – 20 km	> 20 km
Jeepney Operator	PHP 17,201.00 (USD 345.61)	PHP 14,935.00 (USD 300.08)	PHP 13,079.00 (USD 262.79)	PHP 14,705.00 (USD 295.46)
Driver Operator	PHP 35,201.00 (USD 707.27)	PHP 28,135.00 (USD 565.30)	PHP 31,739.00 (USD 637.71)	PHP 33,365.00 (USD 670.38)

Source: Biona, 2015

<sup>47</sup> Based on survey conducted in May 2015.

## 6.2 New Vehicle Investment Case

### 6.2.1 Financial Status of Existing Operators

It is recognised that the jeepney sector consists of a large number of participants for whom financial and socio-economic status will vary widely. Operators range from single owner-operator to co-operatives and larger fleet owners. However, understanding the characteristics 'typical' operators is important to the development of the financing mechanism.

A socio-economic profile of the jeepney operators provided insights on their ability to finance the adoption of the newer technologies. A survey involving 36 driver-operators during the Jeepney Modernisation Study provided a snapshot of the socio-economic profile of their sector.

Most of the respondents have household sizes between 3 to 7 members with 5.19 as the average. This indicates the number of persons depending on the total household income. This may be true only if the vehicles are already amortization payment free and may not apply if the operational savings provided by the acquisition of new vehicles will not be enough to pay up the loan dues. In such case, funds originally allotted for family expenditures would have to be diverted to finance the difference. While this may not be a problem for the 22% of the households that receive between PHP 10,000.00 to PHP 25,000.00 (USD 200.92 to USD 502.31) additional cash flow from other sources<sup>48</sup>, this will not be feasible for most of the sector. This would be especially difficult for those with standing loans. 39% of those surveyed have loans between PHP 3,000.00 to PHP 120,000.00 (USD 60.28 to USD 2,411.09) with the average at PHP 40,000.00 (USD 803.70).

Raising the equity required to match the loaned amount is another issue. Only 3 of those surveyed indicated to have some savings. A look at the assets owned indicates that 70% of those surveyed own their homes, 36% owns some land in the province and 22% own at least one motorcycle. It is unlikely that the operators will be willing to have their limited assets as loan collateral and risk losing them.

Based on the discussions provided, the acquisition of new units through the normal bank-financing scheme is not feasible. A financing scheme needs to be customized taking into account equity assistance and operational cost savings that may be provided by the new units.

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<sup>48</sup> Mostly from remittances from family members working abroad.

## 6.2.2 Investment costs

The anticipated purchase prices of new vehicles meeting the Euro IV requirement are shown in the table below.

**Table 25: Estimated purchase cost of new vehicle technology**

Vehicle Type	Cost
Used Jeepney	200,000 (USD 4,018)
Electric Jeepney	950,000 (USD 19,100)
Euro 4 Diesel Jeepney	1,100,000 (USD 22,100)
Minibus	1,800,000 (USD 36,189)
City bus	4,500,000 (USD 90,472)

Source: Biona, 2015

Based on market information obtained during the stakeholder engagement, the cost purchasing a second hand jeepney with franchise can vary from c. PHP 270,000 (USD 5,425) to over PHP 500,000 (USD 10,046), with a 'typical' franchise valued at around PHP 350,000 (USD 7,032). The jeepney unit is estimated to represent around PHP 200,000 (USD 4,018) of this overall value (although true market value of the unit is difficult to estimate given the lack of market for the unit without an associated franchise). By means of comparison, a 'new' jeepney vehicle without franchises is estimated to cost in the region of PHP 650,000 (USD 13,060).

Euro IV jeepney costs are anticipated to be higher than the existing new jeepney vehicles, and significantly higher than the second hand vehicles. The new technology does however bring about some advantages over the old vehicle technologies in terms of reduced operating and maintenance costs. The scale of these advantages is summarized in the table below.

## 6.2.3 Operating Cost Differences

The new Euro IV jeepney vehicle technology will deliver operating cost savings across all routes, whilst the electric jeepneys may show savings on the shortest routes. However, these savings do not take account of the higher vehicle cost and the associated cost of financing new vehicle investment.

**Table 26: Operating monthly cost differences of new vehicle technologies**

	<b>Current Fuel and Maintenance Cost</b>	<b>Euro 4 Jeepney</b>	<b>E-Jeepney</b>	<b>Euro 4 Minibus</b>
<b>&lt; 5 km</b>				
Monthly Fuel and Maintenance Cost	PHP 9,045 (USD 182)	PHP 5,802 (USD 117)	PHP 8,098 (USD 163)	PHP 8,345 (USD 168)
<b>Monthly Savings</b>		<b>PHP 3,244 (USD 65)</b>	<b>PHP 947 (USD 19)</b>	<b>PHP 9,746 (USD 196)</b>
<b>5 to 10 km</b>				
Monthly Fuel and Maintenance Cost	PHP 11,599 (USD 233)	PHP 7,761 (USD 156)	PHP 13,261 (USD 266)	PHP 11,079 (USD 223)
<b>Monthly Savings</b>		<b>PHP 3,838 (USD 77)</b>	<b>PHP -1,663 USD -33</b>	<b>PHP 12,118 (USD 243)</b>
<b>10 to 20 km</b>				
Monthly Fuel and Maintenance Cost	PHP 18,364 (USD 369)	PHP 12,763 (USD 256)	PHP 25,122 (USD 505)	PHP 18,124 (USD 364)
<b>Monthly Savings</b>		<b>PHP 5,601 (USD 113)</b>	<b>(PHP 6,758) (USD 136)</b>	<b>PHP 18,603 (USD 374)</b>

Source: Biona, 2015

## 6.2.4 Business Case Modelling

Using the information collected on the existing jeepney operational costs and revenues and financial status, detailed business case modelling has been undertaken to establish affordability of alternative financing options. This analysis has the following key outcomes:

- 5% operator downpayment is considered achievable for the majority of sector participants. A higher level of downpayment required would lead to the exclusion of many operators from finance options.
- The operating cost savings relating to the new vehicle technologies are not sufficient to offset the cost of vehicle repayments under the 5% deposit scenario even at preferential financing terms (6.5% AER, 7-year term). Operator income would fall by 66% (a reduction of PHP 11,040 (USD 222) per month during the 7-year loan term, although over the 15-year life of the investment, the NPV of the investment remains positive, with an internal rate of return on investment of 11%.
- Increasing the downpayment to 20% (typical finance terms) would still leave an income gap of PHP 8,590 (USD 173) per month.
- To fully retain operator income at current levels, deposit support would need to be as high as 70% of vehicle cost (with the remaining amortisation covered by operating cost savings).

- Extension of the loan term is not an effective means of eliminating the income gap. Even at an unrealistic 15-year loan term, the operator would experience a 25% fall in income due to loan repayments.
- Increasing revenue provides a means of reducing or eliminating the income gap. A fare increase of 26% would fully eliminate the income gap over the 7-year loan repayment period.

The conclusions of the business case modelling are that in the absence of some form of deposit support there is likely to be significant exclusion of existing operators from remaining in the sector, and that additionally fare increases will be required to soften the impact of income reduction for operators during the loan term.

### **6.3 Scale of Investment Requirement for Market Transformation**

The financing requirement will be driven by the need to replace the majority of the existing jeepney vehicle fleet due to become obsolete by the end of 2018. Without a viable and practical financing mechanism, there is a risk that operators are not able to invest in the required modernization of the vehicle fleet. Given the key role that the jeepney sector plays in meeting the day-to-day transport needs, the lack of an appropriate solution risks to leave a vacuum in the transport provision, which may be filled with undesirable paratransit solutions or impacting on transport supply to the detriment of the wider economy.

#### **6.3.1 Investment Requirement**

Based on rationalised fleet numbers, and on estimated cost of vehicles meeting the new standards, the overall investment required for fleet modernisation is found in Table 27.

With a cost of PHP 56.9 billion (USD 1.1 billion) investment to deliver a rationalized and modernized vehicle fleet for Metro Manila, the defining of an appropriate financing mechanism needs to identify the capacity of the jeepney sector to provide capital for new vehicle investment, and to identify financial institutions with the capacity to provide finance to cover the financing requirements of the sector.

### **6.4 Review of Financing Options**

A full review of the potential financing options was undertaken in the development of the financing mechanism. This included a review of international case studies in the financing of fleet modernisation and a full financial sector options review.

#### **6.4.1 International case study review**

The case study review identified a range of different fleet modernisation schemes with relevance to the Manila context, including the Dakar fleet renewal programme, the Bogota public transport project, India JnNURM urban renewal Programme and Sofia public transport project. The key findings in the international case study case study review were as follows:

- The scale of vehicle replacement and financing requirements were much lower than that required in Manila.
- Each example entailed high levels of financial support for operators, whether from donor agencies, climate financing and/or government investment.
- Sector reform and consolidation played an important role in most schemes.

Specific lessons were drawn from the Dakar scheme which entailed the co-operatisation of operators into Economic Interest Groups (EIGs) in order to gain access to finance, and the adoption of enhanced operating practices such as maintaining fixed schedules, use of formal ticketing systems and a preventative maintenance regime. Another lesson of this scheme was that expecting high upfront deposit from the operator (25%) was found to be unrealistic and unachievable.

#### **6.4.2 Financing Sector Review**

A review of potential financing sources was undertaken, covering commercial banks and other lending institutions, manufacturer arranged financing, international donor agencies, climate finance opportunities and government funding options. The outputs from the market review and stakeholder discussions were as follows:

- The national banks (DBP and Land Bank) have been active in the sector and involved in past government led jeepney financing schemes.
- Past experience in extending finance to the jeepney sector has been of mixed record, with a history of poor loan performance leading to some institutions (including Land Bank) no longer serving the sector.
- The credit requirements required by commercial banks restricted lending to only the more credit-worthy borrowers from the sector.
- Typical commercial lending terms for the auto-sector require a 20% downpayment, and a maximum term of 5 years (deemed to be the life of the asset).
- Transport sector exposure, even for the largest lending institutions will not extend to the full financing requirement for the jeepney sector in Metro-Manila, and even less so nationally. Hence, the financing solution will need to consider multiple financing partners.
- Past government schemes, whilst successful in terms of take-up, have seen higher than anticipated levels of default.
- Micro-finance institutions are able to lend to less creditworthy borrowers but close relationship with the borrower is required to mitigate against default.
- The scale of potential climate finance funding is small relative to the investment requirement, and is therefore seen to play an augmenting role in delivering necessary facilitating measures as part of the NAMA rather than contributing directly to the vehicle financing requirement.

#### **6.4.3 Government Financing Streams**

The Special Vehicle Pollution Control Fund (SVPCF) has been identified as a potential source of funding for the jeepney modernisation program. This fund is built from a 7.5%

allocation from the Motor Vehicle Users Charge, and is intended to establish the goal of the DOTr to contribute to sustainable improvement in air quality through abatement and mitigation of air pollution from mobile sources.

The fund has been building up over recent years since introduction and currently stands at around PHP 7 billion (USD 140.6 million), with additional funds in the region of PHP 700 million (USD 14.07 million) received each year and further compound interest enjoyed. The fund has strict guidelines for usage, but has been identified as a potential source of support for the sector, potentially in the form of loan guarantee or for financing of a scrappage program.

A key challenge to any use of government funds for investment in the modernisation of the vehicle fleet is the legislative constraints on use of government funds to support private enterprises. The nature of any support therefore would need to be carefully defined to ensure that the use is not unconstitutional in this regard. The path preferred by the present administration is to proceed with a commercial financed solution with no direct support.

## 6.5 Financing Mechanism for the Jeepney+ NAMA

Based on the business case modelling, a costed package of measures is proposed to meet the financing requirements.

### 6.5.1 Sector Financing Requirements

The sector investment requirements have been presented earlier in this section. The financing requirements are determined by the amount of capital which operators put down towards the new vehicle. Market analysis suggests that the majority of operators will not be in a position to put down more than 5% of the required investment. This is below the acceptable level of downpayment for most lenders, with even the micro-finance institutions demanding 7%. Discussions with the national bank DBP have resulted in a minimum 10% downpayment being considered acceptable. The potential scale of the sectoral financing requirements with a 10% downpayment are as follows:

**Table 27: Jeepney sector financing requirement**

	<b>Metro Manila</b>	<b>National<sup>49</sup></b>
<b>Number of Vehicles (rationalised)</b>	43,336	156,010
<b>Total Investment Cost</b>	PHP 56.9 billion (USD 1.14 billion)	PHP 204.8 billion (USD 4.11 billion)
<b>Finance Requirement at 90%</b>	PHP 51.2 billion (USD 1.03 billion)	PHP 184.3 billion (USD 3.7 billion)

<sup>49</sup> The numbers for the costs of a nationwide roll-out are based on a factor of 3,6 (ratio between fleets of Metro Manila and total Philippines) and need further analysis and adjustments.

At PHP 51.2 billion (USD 1.03 billion) for Metro Manila, the scale of financing required exceeds that of the sectoral exposure of the major banks. The financing solution is therefore anticipated to require support from multiple financing institutions. The past discussions with DBP have tabled the extension of just PHP 1.4 billion (USD 28.13 million), even with the support of SVPCF funds as a loan guarantee.

### 6.5.2 Finance Arrangements

The financing arrangements developed between DOTr and DBP proposed following terms:

- 7-year loan term
- 6-7% interest rate
- 10% downpayment

The above terms were however based on the provision by DOTr of a partial loan guarantee, taken from the SVPCF fund, covering 50% of the credit extended. Hence, based on the 2016 SVPCF fund allocation of PHP 700 million (USD 14 million), DBP would be willing to extend PHP 1.4 billion (USD 28 million) of finance. The scale of funding under this agreement is insufficient to meet the needs of the sector and the guarantee requirements onerous. The **scale of available funding needs to be increased**, and in order to achieve similar loan terms, risk to the lender must be minimised through the pursuit of risk reduction measures.

Those identified in the financing mechanism report include:

- Consolidation of the sector
- Taking collective franchises as collateral for finance agreement with cooperative
- Avoiding 'gifted deposit' which reduces repayment incentive
- Adoption of auditable ticketing systems and GPS

The provision of a loan guarantee by the government as a means of reducing risk may be an effective means of enabling preferential finance terms. However, the scale of the guarantee fund requirement should be commensurate to the scale of the potential delinquency rates and potential default risk. Write-down allowance on even higher risk auto-loans stands at no more than 15%. Hence, a guarantee fund intended to cover half of any default should not need to be significantly greater than 10% of the total finance extended.

### 6.5.3 Deposit Support

In order to achieve the 10% downpayment considered to represent the minimum required by mainstream finance institutions, a deposit contribution of 5% is required to supplement the 5% downpayment made by the operator. This contribution would amount to PHP 55,000 (USD 1,105) per vehicle.

The scrappage scheme mentioned earlier presents itself as an opportunity to provide existing operators with the capital to invest in new vehicles. The scrap value of a jeepney is estimated to be in the region of PHP 10,000 to PHP 30,000 (USD 201 to USD 603). However, the residual value of old vehicles is considered to be higher, given their potential in-use value beyond the field of passenger transport. For operator groups, the perceived

residual value of old vehicles is around PHP 50,000 (USD 1,005). A scrappage payment of this order therefore comes very close to providing required 5% deposit assistance.

#### 6.5.4 Fare Policy

As a result of the investment in new vehicles, operators will see a fall in income during the repayment period. In order to mitigate the social impact of this fall in income, the DOTr should consider increasing fare levels. A 19% fare increase in combination with VAT exemptions for the purchase of the new vehicle and preferential finance terms would reduce the income gap entirely.

#### 6.5.5 Options for a Financing Mechanism

In the absence of government support, operators will be required to finance new vehicles at commercial rates of financing, relying on the scale of capital available for downpayments. An absolute minimum 10% deposit requirement is anticipated from commercial lenders. With the 5% deposit capacity identified during the focus groups, plus the scrappage value (c. 1-2% of new vehicle value) it is likely that many operators will not be able to meet minimum deposit requirements of commercial lenders.

Assuming that 10% deposit is achievable, at a typical loan term of 5 years, the rate of return on investment would only be 10% over a 15-year vehicle life. The level of the amortization payments during the 5-year term would account for 90% of current typical monthly operator income even after allowing for operating cost savings. Existing operators who choose to invest in the new technology would face a total loss of income over the period of the repayment. At these levels of return, it would also be unlikely that more corporations would have interest in investing except in the case of the most profitable routes. This would lead to significant loss in transport sector capacity.

To mitigate the impact on the sector, and to travellers, three potential support measures have been identified, none of which requiring direct government support.

1. **Preferential Finance Terms.** Achieved through working with the finance sector as part of their Corporate Social Responsibility (CSR) programmes, and also putting in place risk-reduction measures to allow finance to be offered to the industry at preferential rates. A scenario based on a 7-year loan term and a concessionary 4% interest rate has been tested.
2. **VAT exemption on the purchase of new compliant vehicles.** The true net impact of this exemption is likely to be low, as without support, investment in new vehicles is demonstrated to be unlikely to occur.
3. **Revised Fare structure** for routes operating new vehicles, reflecting the new operating structure. This may see a modest overall fare increase, justified by improved level of service offer and industry cost base.

The results of the scenario tests are shown below, highlighting the impact on industry rates of return on investment, and the impact to the incomes of existing operators.

Table 28: Financing scenarios

Scenarios	Preferential Finance (7yrs., 4%)	VAT Exemption	Fare Structure	IRR <sup>50</sup>	Income Gap
Baseline				10.4%	-91% (-15,127 PHP) (-304 USD)
Option 1	Yes			11.9%	-55% (-9,056 PHP) (-182 USD)
Option 2		Yes		13.8%	-77% (-12,775 PHP) (-257 USD)
Option 3			Yes (+10%)	15.1%	-68% (-11,244 PHP) (-226 USD)
Option 4	Yes	Yes		15.9%	-45% (-7,432 PHP) (-149 USD)
Option 5		Yes	Yes (+10%)	19.3%	-54% (-8,892 PHP) (-179 USD)
Option 6	Yes		Yes (+10%)	17.3%	-31% (-5,173 PHP) (-104 USD)
Option 7	Yes	Yes	Yes (+10%)	22.3%	-21% (-3,550 PHP) (-71 USD)
Option 8	Yes	Yes	Yes (+19%)	28.5%	0% No income gap

Source: Kaenzig, 2016

No combination of these measures would avoid loss to operator income levels. However, preferential finance rates (in particular a longer loan term) make investment more affordable. Both VAT exemption and fare restructuring can have a positive impact on industry levels of return, ensuring that the sector will be incentivized to make the investment required to maintain the level of transport supply which is essential to mobility in Metro Manila.

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<sup>50</sup> IRR: Internal Rate of Return

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## 8 Annexes

### Annex 1: Description of Alternative Vehicles

In the NAMA scenarios, specifications of alternatives were identified from selected studies and existing information. The city buses assumed for Component A were based on models already running in Metro Manila. The alternatives for Component B, on the other hand, were based on derived values of the jeepney market transformation study by Biona (2015).

- **City Buses**

The assumed city bus in the NAMA scenario is based on the city buses plying the Bonifacio Global City (BGC). The BGC buses are Almazoa Tourist Star model buses with a seating capacity of 50 persons. These buses are fitted with Mercedes Benz Diesel OM906LA engines with a fuel economy of 14.4 litres per 100 km, or 6.94 kilometres per litre.

**Table 29: Assumptions for NAMA Buses**

Parameter	Baseline Bus	City Bus
Occupancy	35	35
Fuel Efficiency (km/l)	2.67	6.94
Fuel Type	Diesel	Diesel
Euro Standard	Euro I	Euro IV

- **Electric Jeepneys**

One of the options considered for jeepney modernization is the electric jeepneys or e-jeepneys. Currently, e-jeepneys are already operating in various areas in Metro Manila. The specifications for e-jeepneys assumed in this report are based on the COMET currently running C5 to SM North<sup>51</sup>, with a battery capacity of 18 kWh at a range of 100 kilometres daily. It is assumed that the electric jeepneys would run at the same mileage as the regular jeepneys.

- **Euro IV engine jeepneys**

The Euro IV Engine specifications used in the NAMA scenario are based on a study by Manuel Biona<sup>52</sup> on alternative energy efficient engines, with fuel economy at 8.8 km/L. It is assumed that the jeepneys will retain the same physical configurations and operating characteristics except for the fitted engine. In Biona's report (2015), the fuel economy of various engines was gathered, and the assumed value in this report is the overall average fuel economy.

<sup>51</sup> Global Electric Transport Philippines (<http://getevee.com/>)

<sup>52</sup> (Biona, 2011)

- **Mini-buses**

Euro IV Minibuses have better fuel efficiency and capacity compared to regular jeepneys, and has the potential to be more attractive to commuters (see Table 30: Fuel Efficiencies of the Technology Options).

Table 30: Fuel Efficiencies of the Technology Options shows the assumed fuel efficiencies while shows the occupancies of the vehicles covered in ex-ante estimation of GHG emissions. These values are taken from Biona (2015). The occupancies are based on the information provided by jeepney operators and drivers on their revenue over the routes. Occupancies are the average number of passengers per vehicle regardless of capacity.

**Table 30: Fuel Efficiencies of the Technology Options**

Route Category	Regular jeepneys (km/l)	Electric jeepneys (km/kWh)	Euro IV jeepneys (km/l)	Minibus (km/l)
< 5 km	4.2	3.4	7.6	5.0
5 – 10 km	5.7	3.4	10.2	6.8
10 – 20 km	7.2	3.4	12.7	8.4
20 – 30 km	7.3	3.6	12.4	8.0
30 – 40 km	8.0	3.6	13.6	8.8
> 40 km	8.5	3.6	14.5	9.4

**Table 31: Occupancies assumed per route category (average number of persons per vehicle)**

Route Category	Regular jeepneys	Electric jeepneys	Euro IV jeepneys	Minibus
< 5 km	12.5	12.5	12.5	12.5
5 – 10 km	17.3	17.3	17.3	17.3
10 – 20 km	18.2	18.2	18.2	18.2
20 – 30 km	17	17	17	17
30 – 40 km	20.8	20.8	20.8	20.8
> 40 km	20.8	20.8	20.8	20.8

## Annex 2: Causal chain analysis of consolidation and modernisation

### Legend:

Black text = taken from the original matrix (main outputs)

Blue text = intermediate relevant impacts related to the emissions analysis

Orange text = potential GHG impact

Brown text = thoughts on how the GHG impacts can be reflected in the calculations

TBD (to be decided)

Indentation reflects impact hierarchy

	Phase I	Phase II	Phase III
Industry structure	Scheme of incentives to attract investment in urban buses and amendments to regulations	Some main routes to be operated by larger buses under franchise contracts that contain service obligations.  Shift of travel (pkm) in the specified routes from jeepneys towards larger buses  Shifts in the travel activity from jeepneys to buses in some main routes will result in reduced emissions intensity for the affected pkm  Included, but current calculations are based on sample routes that data is available for	Move towards target industry structure of less than 50 corporate operators of large buses.  Jeepneys organised into co-ops remain on minor routes.  Jeepney activity limited to minor routes  Shifts in the travel activity from jeepneys to buses in main routes will result in reduced emissions intensity for the affected pkm  Inclusion is limited to major routes, as the whole set of targeted routes have not yet been defined
Regulatory regime	Draft franchise contract with performance obligations	Transition to large buses will parallel the transition to performance contracts  Shift of travel (pkm) in the specified routes from jeepneys towards larger buses  Reduced emissions intensity of the pkm affected due to higher occupancies of buses  Included, but current calculations are based on sample routes that data is available for	All main routes are operated by corporate operators under performance contracts  Shift of travel (pkm) activity in all main routes towards larger buses ran by corporate operators  Reduced emissions intensity of the pkm affected due to higher occupancies of buses  To be included, but more information on the targeted routes at this stage is needed (do we take the current main routes as they are)
Vehicle	A progressive set of minimum	A substantial proportion of the fleet will be larger modern	All main routes are operated by high specification large city

	Phase I	Phase II	Phase III
specification	<p>specifications for public transport vehicles (type approval standards)</p> <p>Stricter type approval standards will be formulated</p> <p>May not have direct impacts at this stage as these are still being formulated</p> <p>The impacts of type approval standards are not included in this analysis as the latest updates and conversations on the NAMA do not have type approval standards as a NAMA element, although the impacts of the utilization of newer buses are simulated (not necessarily due to type approval standards, but standards that are set for operational buses)</p>	<p>buses.</p> <p>Proportion of fleet will be modern buses (particularly in the target routes)</p> <p>Reduced emissions intensity of the pkm affected (in the mid-term targeted routes)<sup>53</sup> due to technological improvements + higher occupancies of the buses vs jeepneys<sup>54</sup></p> <p>Included and simulated in the tool developed</p>	<p>buses</p> <p>Public transport in the main routes will be done through modern buses</p> <p>Reduced emissions intensity of the pkm (all main routes) affected due to technological improvements + higher occupancies of the buses vs jeepneys</p> <p>Inclusion is limited to major routes, as the whole set of targeted routes have not yet been defined</p>
Vehicle fitness	<p>A progressive set of parameters to be subject to 6-monthly inspection (MVIS)</p> <p>Stricter vehicle in-use emission standards are formulated</p> <p>May not have direct impacts at this stage as these are still being formulated</p>	<p>A progressive set of parameters to be tested by regular 6-monthly inspections (MVIS).</p> <p>All PT vehicles to be tested.</p> <p>Stricter and enforced in-use standards leading to better vehicle maintenance</p> <p>Lesser fuel efficiency deterioration</p> <p>Not included due to the lack of information and data</p>	<p>All PT vehicles to be tested twice yearly to international standards</p> <p>Stricter enforcement and stricter standards relating to vehicle inspection and maintenance</p> <p>Lesser fuel efficiency deterioration can lead to more stable GHG emissions (vs the assumed values).</p> <p>Not included in the current form due to the lack of information on deterioration</p>

<sup>53</sup> Non-targeted here means non-main routes and will not be affected by the shift towards buses.

<sup>54</sup> Type approval standards should include fuel economy standards

	Phase I	Phase II	Phase III
	<p>Not included in the current form as in the discussions, specific components on MVIS are not attributable to the NAMA</p>	<p>Non-compliant jeepneys serving the non-targeted routes are de-licensed and replacement of the non-compliant jeepneys in the non-targeted routes by modern jeepneys</p> <p>Reduced emissions intensity of the jeepney fleet serving the non-targeted routes.</p> <p>Included, scrapping rates are based on targets given by DOTr</p> <p>Unless the jeepneys are scrapped, they might make their way into the other regions</p> <p>Leakage emissions due to additional travel performed by the “non-compliant” jeepneys</p> <p>Not included, it is assumed that these jeepneys are destroyed as part of the scheme</p> <p>Increase demand for alternative-powered units (e.g. electric jeepneys)</p> <p>Emissions from the alternative units (ie. If electric, there is a need to account for the emissions from the electricity use, same with other technologies)</p> <p>Included</p>	<p>rates and the impacts of improved compliance to testing. Also, no specific components on the inclusion of MVIS are related directly to the NAMA based on the recent discussions.</p>
Fares and revenues	<p>A basic technical standard for a common ticketing system</p>	<p>A basic technical standard, and a management agency is in place for a common ticketing system</p> <p>Can contribute towards making the public transport system more attractive to the public</p> <p>Shifts in system wide mode shares (higher public transport shares- clean and bigger buses) can reduce the emissions</p> <p>Not included as Inclusion would entail system wide assumptions</p>	<p>More flexible fares enable commercial operators to market services and recover costs, and minimize the need to subsidize services.</p> <p>Can contribute towards making the public transport system more attractive to the public</p> <p>Shifts in system wide mode shares (higher public transport shares- clean and bigger buses) can reduce the</p>

	Phase I	Phase II	Phase III
		in terms of long term – Metro Manila wide mode shares (unless targets are given, it will be difficult to include these impacts)	<b>emissions</b> Not included as Inclusion would entail system wide assumptions in terms of long term – Metro Manila wide mode shares (unless targets are given, it will be difficult to include these impacts)
Infrastructure	DOTr to identify sites for jeepney depots	<p>DOTr to identify sites for jeepney/bus depots.</p> <p>Need to construct depots</p> <p>Embedded carbon in construction materials may have to be accounted for?</p> <p>As per the advice of Infrac, this has not been included in the calculations</p> <p>Buses' capacity, productivity and reliability to be enhanced by priority use of road space.</p> <p>Can contribute towards making the public transport system more attractive to the public - better speeds, predictability</p> <p>Shifts in system wide mode shares (higher public transport shares- clean and bigger buses) can reduce the emissions</p> <p>Inclusion would entail system wide assumptions in terms of long term – Metro Manila wide mode shares (unless targets are given, it will be difficult to include these impacts)</p>	<p>Predictable running times make services reliable, cost-effective and attractive to users</p> <p>Can contribute towards making the public transport system more attractive to the public</p> <p>Shifts in system wide mode shares (higher public transport shares- clean and bigger buses) can reduce the emissions</p> <p>Inclusion would entail system wide assumptions in terms of long term – Metro Manila wide mode shares (unless targets are given, it will be difficult to include these impacts)</p>

### Annex 3: Ex-post Data Collection Framework for Workstream A

Data	Notation	Description	Unit	Data Collection Method	C Fr
Average Annual Daily Traffic	AADT	The average number of vehicles passing through the corridor per vehicle type	No. of vehicles	Traffic counting	
Vehicle Capacity Ratio	VCR	The measure of level of service per corridor	n/a	Computation	
City bus trips	t <sub>CB</sub>	Number of trips made by the city bus	No. of trips	Self-monitoring reports	
City bus trip distance	d <sub>CB</sub>	Distance travelled per trip by city bus	kilometres	Self-monitoring reports	
City bus ridership	R <sub>CB</sub>	Number of persons that rode city bus	No. of persons	Self-monitoring reports	
Fuel split	%Fuel	The frequency distribution of the vehicle population per fuel type i.e. Diesel, Gasoline, Electric, etc.	% Fuel type	Vehicle registration forms	
Technology Split	%Tech	The frequency distribution of the vehicle population per technology type i.e. Euro I, Euro II, Euro III, etc.	% Technology type	Vehicle registration forms	
Fuel economy		The average fuel economy per vehicle type	Km/litre	Ad hoc studies of fuel economy or regular collection through vehicle registration data	
Electricity consumption (e-jeepneys)		The total electricity consumed over the distance travelled per electric vehicle	kWh/day	Self-monitoring reports from operators based from daily charging	
Emission factors		The amount of CO <sub>2</sub> per litre	gCO <sub>2</sub> /litre; gCO <sub>2</sub> /MJ	Calibration of HBEFA	

## Annex 4: Ex-Post Data Collection Framework for Workstream B

Data	Notation	Description	Unit	Data Collection Method
Vehicle population	N	The number of registered jeepney units	No. of vehicles	Through vehicle registration
Ridership	R	Number of passengers in a given measurement year	Passengers/year	Self-monitoring report / Sample surveys for operators
Vehicle trips of jeepneys	$t_{RV}$	The trips made per vehicle in a specified route/corridor	No. of trips/ Vehicle/yr.	Self-monitoring report
Trip distance	$d_{RV}$	The distance travelled per vehicle per trip	kilometre/ trip	Odometer measurements / GPS installations per unit / Sample surveys
Operating days	$D_{RV}$	Number of days in operation per vehicle	Days/vehicle	Self-monitoring report of operator
Speed	S	The average speed per vehicle	kilometre/h	Odometer measurements
Fuel split	%Fuel	The frequency distribution of the vehicle population per fuel type i.e. Diesel, Gasoline, Electric, etc.	% Fuel type	Vehicle registration forms
Technology Split	%Tech	The frequency distribution of the vehicle population per technology type i.e. Euro I, Euro II, Euro III, etc.	% Technology type	Vehicle registration forms
Fuel consumption	FC	The total fuel consumed per vehicle	Litres	Self-monitoring reports from operators
Electricity consumption (e-jeepneys)	EC	The total electricity consumed over the distance travelled per electric vehicle	kWh/day	Self-monitoring reports from operators based on daily charging
Emission factors	EF	The amount of CO <sub>2</sub> per litre	gCO <sub>2</sub> /litre; gCO <sub>2</sub> /MJ	Lab measurement (Vehicle inspection/PETC)

## Annex 5: Stakeholders and their roles and responsibilities

Roles and responsibilities with regard to the NAMA	
<b>Veto players</b>	
Department of Transportation (DOTr)	The DOTr is the lead executing government agency responsible for public transport planning. In the context of the NAMA, the DOTr is the main implementing agency at the national level and is responsible for the overall design, planning, development and implementation of the NAMA. The DOTr forms part of the Political Board and is the Chair of the Technical Steering Committee of the envisaged NAMA Steering Structure. This signifies its key role in decision-making and its tasks of providing strategic guidance to the project and of mainstreaming the NAMA in all relevant political levels and the public. The DOTr is also expected to convene and moderate meetings of the Steering Committee, monitor and actively follow-up the implementation of the annual work plan for the NAMA.
Climate Change Commission (CCC)	The CCC is the lead policy-making body of the national government in the coordination, monitoring, and evaluation of climate change programs and action plans. The CCC is the overall lead in the implementation of the Philippine Greenhouse Gas Inventory Management and Reporting System, which signifies its role in providing direction and guidance to the DOTr in developing a GHG inventory system for the transport sector. This further enables the development of the MRV system to support the implementation and evaluation of the NAMA. Moreover, the CCC is the overall coordinator to the United Nations Framework Convention on Climate Change (UNFCCC) and is a part of the Political Board of the envisaged NAMA Steering Structure, which highlights its key role in decision-making and in mainstreaming the NAMA.
<b>Key stakeholders</b>	
Land Transportation Franchising and Regulatory Board (LTFRB)	The LTFRB is the attached agency of the DOTr responsible for issuing franchises that authorizes the operation of public transport services. Moreover, the LTFRB prescribes and regulates public land transport services for all routes in the country. In the context of the NAMA, this signifies its role in regulating the entry and operation of buses and jeepneys and in administering franchises to the modernised public transport vehicles for operation. The LTFRB also determines fare rates of public land transportation services. The LTFRB is also a part of the Technical Steering Committee, which highlights its role in providing inputs to the annual work plan for the NAMA.
Land Transportation Office (LTO)	The LTO is the attached agency of the DOTr responsible for the inspection, licensing, and registration of all private and public vehicles nationwide. In the context of the NAMA, the LTO plays a key role in defining the requirements and standards for the registration of public transport vehicles. The LTO is also part of the Technical Steering Committee, which enables it to provide inputs to the annual work plan for the NAMA.
Office of Transportation Cooperatives (OTC)	The OTC is the attached agency of the DOTr that governs the organisation, supervision, and development of transportation cooperatives. The OTC forms part of the Technical Steering Committee thus, providing inputs to the annual work plan of the NAMA. Moreover, the OTC plays an active role in realising the objective of institutional reorganisation (NAMA component), as it is the

	lead agency in consolidating and managing jeepney operators into cooperatives.
Department of Science and Technology (DOST)	The DOST provides direction and coordinates scientific and technological efforts in the national level. A key component of the DOST research agenda is on climate change adaptation and mitigation, while sustainable mass transport has been identified as a priority research area. In the context of the NAMA, the DOST is the executing agency of the development of Customised Local Road Vehicle (CLRv) standards, which entails the design and formulation of environment-friendly and roadworthy dimensional standards for mini buses and utility vehicles including jeepneys.
Department of Trade and Industry (DTI)	Through the Bureau of Product Standards (BPS), the DTI is the lead national agency in promoting the use of Philippine National Standards (PNS), standardisation, and conformity assessment activities in the country. The DTI-BPS also coordinates with industry organisations and other government agencies on the implementation of standards. In the context of the NAMA, the DTI-BPS is the approving entity of the CLRv standards. Moreover, the DTI-BPS is also responsible for the standardisation of key vehicle parts, which includes tires, windshields, and brake systems under the PNS. The DTI also forms part of the Technical Steering Committee thus, providing inputs to the annual work plan of the NAMA.
Metro Manila Development Authority (MMDA)	The MMDA is the government regulatory and supervisory authority that is responsible for the delivery of services, which includes transport and traffic management, within Metro Manila. Specifically on traffic management, the MMDA is responsible for the enforcement of traffic operations in metro-wide thoroughfares, traffic engineering services, and traffic education programs, including the institution of a single ticketing system in Metro Manila. The MMDA is thus recognised to play an active role in the implementation of the NAMA in routes located in Metro Manila.
Development Bank of the Philippines (DBP)	The DBP is a government-owned and controlled development bank. In the context of the NAMA, the DBP is identified by the DOTr as its potential financing partner in developing a financing scheme that will encourage jeepney owners to switch to modern and cleaner vehicles.
<b>Primary stakeholders</b>	
Department of Environment and Natural Resources (DENR)	The DENR is the lead agency in the overall implementation of the Philippine Clean Air Act, which provides the policy framework for air quality management of the country and which addresses air pollution from the transport sector. The DENR also issued the Department Administrative Order No. 2015-14, which provides the full implementation of Euro 4 standards on new cars in 2016. Moreover, the DENR is an approving entity in terms of emission standards of new vehicles that could replace the jeepneys, which highlights the role of the DENR in the context of the NAMA.
National Economic and Development Authority (NEDA)	The NEDA is the government agency that formulates and coordinates national development plans and priorities, which includes the modernisation of road-based public transport that the NAMA addresses. As the NAMA supports the development of the road-based public transport reform program, which is a major program of the sector, the NEDA takes on an active role in updating the PDP based on the developments of the NAMA.

Road Board	The Road Board is responsible in ensuring that the projects financed by the Special Vehicle Pollution Control Fund (SVPCF) are earmarked and utilised solely for the purpose of reducing air pollution in the road transport sector. Moreover, the Road Board mainly approves projects proposed for SVPCF funding and consistently monitors the utilisation of the SVPCF. The SVPCF is a special government fund which the NAMA will utilise as a seed fund to catalyse the implementation of the NAMA.
Local government units (LGUs)	LGUs are responsible for traffic management enforcement at the city level, which includes jeepneys plying its area of jurisdiction. The policy direction of the DOTr is geared towards empowering the LGUs to develop, implement and monitor its own city transport development plan, which involves determining the level and kind of public transport service needed. In the context of the NAMA, LGUs is an implementing partner of the DOTr in terms of traffic management in the city. Moreover, LGUs form part of the Technical Steering Committee thus, providing inputs to the annual work plan of the NAMA.
PUV drivers and operators	PUV operation is a main source of income for PUV drivers and operators, which requires the NAMA to develop a customised financing scheme that is able to provide adequate equity assistance and operational cost savings to enable the shift to clean and modern vehicle technologies. The planning and implementation of the NAMA is a consultative process that mainly considers the needs of and addresses the financial risks and technical concerns in adopting new technologies by PUV drivers and operators.
Jeepney associations	Jeepney associations or cooperatives are intended to contribute to the integration and consolidation of public transport services. The existing jeepney associations are to serve as models in order to promote further industry consolidation. Initial implementation phases of the NAMA will focus on developing and fine-tuning the structure and business models of the different jeepney associations in Metro Manila.
Vehicle suppliers	To undertake the modernisation of public transport services, initial stages of NAMA planning and implementation requires the identification of and coordination with vehicle suppliers mainly to discuss the possibility of supplying clean and modern vehicle technologies that also meet vehicle standards. Moreover, the NAMA also explores the possibility of suppliers providing financing and incentive schemes to jeepney operators and drivers in order to encourage industry consolidation and fleet modernisation.
Private banks	Private banks are identified beneficiaries as the NAMA project provides the opportunity for private banks to develop arrangements with cooperatives or fleet management companies in the financing of modern and clean units.
Microfinance institutions (MFIs)	MFIs, similar to private banks, are identified beneficiaries as the NAMA project provides the opportunity for MFIs to offer financing schemes to PUV drivers and operators who are unable to access loans from private banks.
Users/citizens	The support of public transport users and the general public is crucial in the planning and implementation of the NAMA as it encourages the needed political will. To garner support and prepare the general public for the NAMA, IEC campaigns and awareness raising on the reform program.

<b>Secondary stakeholders</b>	
Department of Energy (DOE)	The DOE is responsible for strengthening the implementation and monitoring of energy efficiency programs with government agencies and promotes fuel and energy efficient vehicles through fuel economy runs and labelling, and IEC. The direction of the DOE is to develop fuel economy standards for vehicles, which need to be considered by the new vehicle fleet replacement.
Department of Labor and Employment (DOLE)	The DOLE is the government agency responsible in assessing the working conditions and prospects of laborers in the country and ensures the protection of labor welfare and employment, which includes PUV drivers and operators. It is crucial that the NAMA justifies and ensures that the transformation allows PUV owners and drivers to gain more income compared to revenues generated from the boundary system in order to secure the one-time approval of DOLE.
Technical Education and Skills Development (TESDA)	The TESDA is the government agency that provides programs that provides technical education and skills training for the national workforce. An incentive offered to affected PUV drivers and operators by the NAMA is the provision of skills or entrepreneurship training and employment assistance through TESDA programs.
Universities and consulting firms	Universities and consulting firms are sources of technical expertise for studies and capacity development measures needed to support the implementation of the NAMA.
Media	The media enables awareness raising and the promotion of the NAMA to the general public.
Bilateral donors and Development agencies (e.g. GIZ)	Several development agencies have contributed to the planning and expressed interest in the implementation of the NAMA. The GIZ supports the NAMA through the TRANSfer project that conducts technical studies that defined the NAMA and provides capacity development training needed to support the NAMA.