Report on Procurement of E-Buses (Non-BRT Routes) by TransJakarta

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C40 CITIES FINANCE FACILITY

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ABOUT THE C40 CITIES FINANCE FACILITY

The C40 Cities Finance Facility (CFF) is a collaboration of the C40 Cities Climate Leadership Group and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. The CFF supports cities in developing and emerging economies to develop finance-ready projects to reduce emissions to limit global temperature rise to 1.5°C and strengthen resilience against the impacts of a warming climate. The CFF is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ), the Children's Investment Fund Foundation (CIFF), the Government of the United Kingdom and the United States Agency for International Development (USAID).

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Registered offices
Bonn and Eschborn, Germany

Potsdamer Platz 10
10785 Berlin, Germany

E contact@c40cff.org
W c40cff.org

DISCLAIMER: The report does not take into consideration the legal implications on E-bus contracting mechanism due to Governor regulation no. 74/2021

EXECUTIVE SUMMARY

The Provincial Government of DKI Jakarta has prepared a project entitled “Zero Emission Buses in Jakarta”. The project is being implemented with TransJakarta (TJ) aiming to induct a fleet of 240 Electric buses (E-buses) including 100 E-buses for non-BRT routes and 140 E-buses for BRT routes during calendar year 2021/2022 as part of a pilot project with the support of the C40 Cities Finance Facility (CFF).

The impact per vehicle unit in terms of avoided emissions is much larger for E-buses than for privately used vehicles. More than 110 e-motorcycles or 40 e-cars are required to achieve the same GHG mitigation impact as 1 E-bus. Therefore, Jakarta would like to electrify their buses first as the city embarks on the adoption of electric vehicles (EV).

E-bus as technology as well as the procurement and operations are new to Jakarta and are being introduced for commercial route operation. The “buy the service” or BTS model is in operation for diesel bus-based city operations. Routes with a replacement ratio close to 1.0 are more suited for electrification.

Procurement practices play a key role in determining the successful deployment of E-buses. A good business model for procuring public E-buses distributes responsibilities and business risks between stakeholders providing services. Public transport projects have two stages of procurement i.e. (1) capital investment and (2) service operations. However, in BTS its only one phase-procurement of service operations.

Economies of scale can be achieved when multiple stakeholders come together reducing overhead costs and subsequently reducing the total cost of ownership (TCO).

Each E-bus tender materially varies from the other not only on local conditions (viz. kilometers per day, bus type, high floor/low floor, road and traffic conditions opportunity charging etc.) but also on contractual conditions. Contract period do have significant impact on the BTS rate i.e., Rp/Km. The technical parameters (such as operating range, battery degradation/replacement) also have financial and legal aspects and these must be taken into consideration in an integrated and interactive manner while procuring E-buses and their procurement process should be treated differently than diesel buses.

Procurement practices play a key role in determining the successful deployment of E-buses. For successful deployment of E-buses the project team makes the following recommendations:

- Routes must be finalized upfront to determine the operational plan. Route selection helps in determining the right battery size and the charging requirements. For the Non-BRT buses, it is recommended to use battery sizes greater than 300 kWh along routes with daily utilization kms between 180-200 kms. This will ensure that the E-buses will need only overnight charging at depots in the early years without the need for opportunity charging during daytime thus reducing the complexity in the operations of the E-buses.

- Routes with a replacement ration less than 1.0 are more suited for electrification. While no threshold exists for the replacement ratio, it should not result in deployment of additional buses for the operator in the later part of the contract period as this would result in higher cost/km. TJ should negotiate for lower Rp/km taking daily kms travelled into consideration while considering different routes for E-buses implementation. Higher daily utilization kms will result in lower Rp/km.

- E-bus Contracts are being signed for 12-15 years by various cities internationally to reduce the impact of high up-front costs. This is because the effective cost per km reduces with increase in useful life of bus. Therefore, it is recommended that TJ should go for longer duration of contracts. The 10-year calculated Rp/km (as per new regulation) comes to about 22,794 with an average daily use of 196 kilometers and residual life of 10%. The change in contract period from 7-years to 10-years results in reduction in Rp/km by about 11.8%.

- There is a possibility that since E-buses are zero-emission buses, the restriction on use of the E-bus for up to 10 years should be removed. In which case the Operator will end up owning the bus after 10 years with much of the useful life still left. On the other hand, TJ could consider buying the bus for only 10% residual value and run it as long as it is road-worthy or extend contract for 3-4 years beyond the 10-year contract period. A longer contract period of 14 years will result in reduction in Rp/km by about 20% when compared to a 7-year contract and by about 10% when compared to a 10-year contract period.

- The present contract provides only adjustment of contract period (subject to regulations) in case agreed volume of work is not achieved. During the contract period, the operators cashflow will be strained if buses are not adequately used as the Operator has to meet the high fixed costs. If the contract period is extended, the Operator would incur additional costs (driver, insurance, overheads etc.) and hence bare extension of the contract does not ensure coverage of the costs. The case is the same when the contract period is maximum of 10 years, since there is possibilities that volume of work is not achieved, but of course with more relaxed terms as it is possible to repay the buses for 10 years rather than in 7 years. Since the E-bus fixed costs (depreciation, interest, driver, insurance) is almost 80-85% of the total cost, the minimum km assurance needs to be adjusted upwards as compared to the diesel bus which is 100 km/day. In view of the above, it is recommended that:
    a. The minimum km/day is adjusted to the agreed volume of work/day/bus (e.g. 196 kms) and availability.
    b. The Fixed cost portion (depreciation, interest, insurance, manpower, overheads etc.) is estimated
    c. In case the actual usage is lower than Min Km adjusted for availability, the actual km will be paid as per normal rate and the difference would be paid at 80% of the Normal Rate

d. In case the actual usage is higher than Min Km adjusted for availability, the Adj. Min Km will be paid at normal rate and excess is paid at, say 25% of Normal rate

The report highlights these considerations as well as some of the legal changes that must be instituted to facilitate rolling out of E-buses.

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LIST OF ABBREVIATIONS

AC	Air Conditioning
BAU	Business as Usual
BEB	Battery Electric Bus
BMS	Battery Management Service
BTS	Buy the Service Model
BPPBJ	Badan Pelayanan Pengadaan Barang/Jasa
BRT	Bus Rapid Transit
CapEx	Capital Expenditure
C40	C40 Cities Climate Leadership Group
CFF	C40 Cities Finance Facility
C40 KAPM	C40 Knowledge and Partnership Manager
CO2	Carbon dioxide
DC	Direct Current
DO	Driver Order
DKI Jakarta	Daerah Khusus Ibukota or Special Capital Region of Jakarta
E-bus	Electric bus
E-mobility	Electric mobility
EV	Electric Vehicles
FUSE	Discussion Forum for Electric Vehicles and Buses, Indonesia
GCF	Green Climate Fund
GEFF	Green Economy Financing Facility
GGGI	Global Green Growth Institute
GGF	Green for Growth Fund
GHG	Greenhouse Gas
GIZ	German Development Agency
ICE	Internal Combustion Engine
IDR	Indonesian Rupiah
IEA	International Energy Agency
IPCC	Inter-Governmental Panel on Climate Change
KWH	Kilowatt Hour
LKPP	The Government Goods/Services Procurement Policy Agency
MAB	Mobil Anak Bangsa (Indonesian e-bus manufacturer)
MEMR	Ministry of Energy and Mineral Resources, Indonesia
MYS	PT Mayasari Bakti bus company
NAMA	Nationally Appropriate Mitigation Action
NOx	Nitrous Oxide pollutants
OEM	Original Equipment Manufacture
OpEx	Operational Expenditure
PIU	Project Implementation Unit
PLN	Perusahaan Listrik Negara (Indonesia's state-owned electricity company)
PM	Particulate Matter
PM2.5	Particulate Matter less than 2.5 micrometers in width
PPF	Project Preparation Facility
PPP	Public-Private Partnership
Presidential decree	The Presidential Decree on Acceleration of Battery-Based Electric Vehicles

SGO	Gross Fleet
SOC	State of Charge
SP	Service Provider
SOP	Standard Operating Procedure
TCO	Total Cost of Operations
TJ	TransJakarta
ToR	Terms of Reference
TTW	Tank-to-Wheel
VCU	Vehicle Control Unit

1. INTRODUCTION

1.1 Background

The CFF has been supporting Jakarta since December 2019 in its transition to electric buses (E-buses) – a first step towards a system change to sustainable public transport and lower emissions in the capital and beyond. The 100 E-Bus Trial is seen as a pilot phase prior to the full deployment of E-bus fleet in Jakarta. TransJakarta (TJ) is operating its fleet both on the owner-operator model as well as the Gross Cost Contracting model, also known as the “Buy The Service (BTS)” model.

The CFF supported the city in the timeframe December 2019 to March 2021 in preparing a finance ready *100 E-Bus Trial* project on its award-winning bus transit system. The planning phase has been completed with the support from the CFF. Based on the CFF support, TJ identified BRT and Non-BRT routes for implementation.

1.2 Project Scope

The provision of 100 E-buses is following a procurement process within DKI, managed by BPPBJ (through their own SOP’s under LKPP guidelines). DKI’s Transportation Agency (Dinas Perhubungan) and TJ provide necessary technical support for the procurement process. The CFF recommendations have been used for first steps in the procurement planning. In the timeframe April to December 2021, the CFF is providing further support for completion of the procurement of the 100 E-Buses for the trial.

E-bus as technology as well as the procurement and operations are new to Jakarta and are being introduced for commercial route operation. BTS model is in operation for diesel bus-based city operations. The objective of the assignment is to:

- Provide hands-on support for the development of a proper tendering and procurement according to the Local Government procurement regulation.
- Ensure that tender requirements meet legal, technical and financial requirements to serve the purpose of the procurement.
- Facilitate broader participation by suitable local and international parties.

1.3 Data Collection

The data collection focuses on the following aspects:

- Final routes selected for the implementation of E-buses obtained from TJ;
- Review of contract document obtained from TJ;
- Review of existing studies carried out for implementation and procurement of E-buses globally;

1.4 Purpose of this Report

The purpose of the Report is as follows:

i. Gather relevant information from all available sources; and

ii. On the basis of the study findings, prepare the technical, financial and legal aspects of the project to a degree that allows the city for the development of a proper tendering and procurement according to the Local Government procurement regulation.

1.5 Structure of the Report

This report introduces the characteristics of E-buses that have been shortlisted for the implementation of the *100 E-Bus Trial* in Chapter 2. This is followed by the impact of concession period on the tariff under different scenarios due to current regulations in Chapter 3. Chapter 4 provides the legal requirements pertaining to procurement requirements and legal consequences based on several possible scenarios.

Annex 1 Translation in English of the various articles

2. E-BUS CHARACTERISTICS IN RELATION TO OPERATION OF NON-BRT ROUTES

2.1 Routes

TJ has shortlisted routes 1N and 1P for the deployment of E-buses in addition to routes 6D and 9D. Table 1 below provides the summary of daily kms utilized with and without the dead kms.

Table 1: Summary of Non-BRT buses (Daily utilization kms)

Route Numbers	Daily kms without dead kms[1]	Daily kms with dead kms of 20kms
1N	166	186
1P	181	201
6D	160	180
9D	185	205

Source: TJ

The kms mentioned in the table above are average kms per bus per day. The actual operating kms on a weekday will be higher considering the reserve fleet and that on weekends/holidays, buses run about 70% kms as compared to weekdays. Further, all buses may not do equal number of trips in a day e.g., if a route has 55 trips using 9 buses, one bus must do 7 trips while others will do 6 trips. Hence each bus must be capable of running 7 trips plus the dead kms.

2.2 Charging Requirements

To deploy the first 30 E-buses, the immediate option available for TJ is to opt for overnight charging at depots with bigger batteries. This will eliminate the need for fast charging at the terminals. As TJ gets more hands-on experience of deploying E-buses and is ready to scale-up the deployment it will need fast chargers.

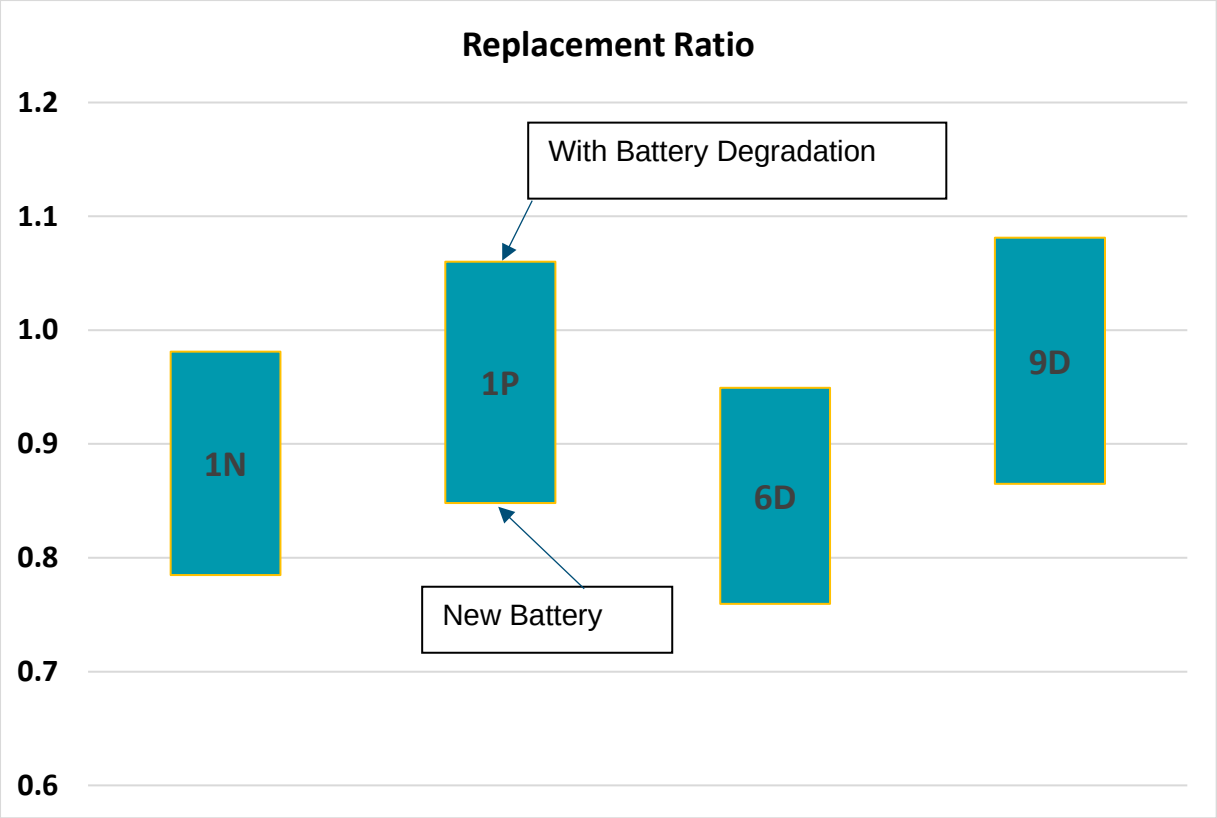
For only single charge at depot, E-buses will need to have battery size greater than 300 kWh. Taking into consideration factors that will affect battery capacity – Minimum SoC reserve, passenger loading and air-conditioning the available usable kms on a single charge for a new E-bus is about 237 kms for a bus with battery size of 324 kWh.

Based on the daily kms for the different routes the battery size will be sufficient for daily operations with single charge at depots. In the initial years, the bus may be underutilized by about 40-50 kms.

2.2 Replacement Ratio

Replacement Ratio- This ratio is calculated as the ratio of the daily total kms travelled by a bus along specific route to the available or calculated range taking into consideration the depth of discharge, use of AC, passenger loading and battery degradation over time.

Figure 1: Replacement Ratio of Non-BRT Routes



Source: Consultant Team

Due to battery degradation the daily usable kms will come down and the buses can probably still serve the routes without the need for additional charging (or with minimal charging) during the day. Currently, the battery warranty being offered by most of the OEMs is for 8 years. Therefore, it is assumed that battery will reach 80% of its capacity by 8th year when it will not be usable for automobile applications.
Routes with a replacement ration less than 1.0 are more suited for electrification. While no threshold exists for the replacement ratio, it should not result in deployment of additional buses for the operator in the later part of the contract period as this would result in higher cost/km. The replacement ratio has been estimated for each route based on the daily running kms and the estimated range of the battery (237 kms). As seen from the graph above, all four routes have a replacement ratio of less than 1 and with battery degradation over time, routes 1N and 6D have replacement ratios close to 1.0. While routes 1P and 9D having higher replacement ratio greater than 1,

indicating the need for fast charging facility near the route or deployment of additional buses.

In addition, while selecting routes, TJ needs to take into consideration other parameters such as TCO and ridership while selecting routes. Otherwise, the operator may find E-buses to be more expensive than diesel buses and may load this cost in the Rupiah/km quoted by them to TJ.

2.4 Maintenance

Best practices for operation and maintenance of E-bus technology are still evolving since the E-bus market is maturing. Therefore, monitoring bus deployment data, and evaluating performance will help inform any adjustments that should be made to the management's operational plan. E-buses may require less preventative maintenance than diesel counterparts since they have fewer moving parts, best practices included for the operation and maintenance of E-buses and charging infrastructure include:

- Promoting energy efficient driving behaviours
- Understanding and preparing for bus and charging
- Infrastructure maintenance activities, including spare part
- Monitoring battery state of health
- Inventories and lead times

Some of the maintenance practices include electrical checks at key points in the e-powertrain. This is to ensure health of all electrical connections in the vehicle and avoid any critical leakages. In addition, signal checks at key check points like from motor, BMS and with the VCU will also be important. TJ will need to ensure that their staff is trained to understand the powertrain error history and any associated faults.

3. PROCUREMENT OF E-BUSES

3.1 Introduction

Procurement practices play a key role in determining the successful deployment of E-buses. A business model of procuring bus public transport distributes responsibilities and business risks between stakeholders providing services. Public transport projects have two stages of procurement i.e. capital investment and service operations.

From the various best practices in E-bus deployment across the world, the key to effective transition seems to be innovative partnerships. For example, more than 80% of E-buses operations in India are by private operators. While the transit authorities have been providing depot space, the operators are taking care of installation of charging infrastructure and electrical supply inside the depot. Such operators will have to rely on partnerships with other players to leverage their expertise and reduce overall risks. Economies of scale can be achieved when multiple stakeholders come together reducing overhead costs and subsequently reducing the total cost of ownership (TCO).

Private sector participation can be encouraged by

• Assessing scope for introducing performance based operational incentives.

• Assessing scope to cross-incentivize positive externalities. Identification and adoption of viable operation contract models.

• Developing implementable strategies for a favorable business environment reducing business risks.

3.2 Risk Assessment and Understanding Barriers

The risks in implementation of bus electrification projects arise mainly from four sources: product risk, financing risk, operational risk and revenue risk. The above risks are explained below:

1. Product Risk: This risk arises from the differences between Diesel and E-buses and are as follows:

• Technology Risk: Electric mobility technology is quite mature now, however, there is lack of experience of application. High day time temperatures, undulating terrain, occasional flooding of streets, thefts, vandalism, passenger over loading, etc. pose threat to the high capital investment in the E-buses. Some of these risks can be mitigated by contracting out the operation/maintenance to third parties/manufacturers. Frequent technological changes also require to be captured under business model to provide interoperability and adaptability over the investment life cycle.

• Price Risk: The operator may rely on the specific energy consumption, battery life, reducing battery prices, availability of batteries, stable and reduced electricity prices etc. Any adverse changes in these parameters during the implementation phases poses a huge risk to the operator as it gets paid based on kilometers run by the buses. A well-defined roll out program may alleviate some of these risks as the operator can

implement mitigation strategies over a longer period learning from early mistakes/setbacks.

• Useful life: The total cost of operation and financial indicators are dependent on longer life of E-buses as compared to diesel buses. A long-term maintenance contract with OEMs may mitigate this risk. The OEMs would also train/advise the bus drivers/maintenance staff on proper usage/routine check-up/maintenance of the assets.

• Energy Consumption: The main advantage of E-buses arises from lower energy consumption. However, the energy consumption in reality may be higher due to traffic conditions, over loading, climatic conditions and deterioration of battery capacities over time. Such risk can be wholly/partly contracted out to OEM/concessionaire.

2. Operating Risk

Bus operators are subject to external operating risks such as:

• Reduced vehicle productivity: Congestion reduces daily operating kilometer/bus and thus earnings.

• Cancellation of trips: Due to delays, the authority may cancel trips.

• Energy Security: Southeast Asian Nations are not energy surplus and witness power cuts and fluctuations. An occasional blackout may totally disrupt transport operations dependent on E-buses and reduce revenue of the operators.

3. Financing Risk

The biggest hurdle to implementing the electrification project is the financing risk, especially considering fragile financial health of public transport bus operators. Further, the legal framework in Indonesia currently does not allow /facilitate separation of ownership and operation of the E-buses which is evolving as a standard business model for the E-buses. Innovative financing tools, incentive programs, dedicated funding resource and investments through public-private-partnership (PPP) will be explored to mitigate the financial risks.

Ownership of risks associated with components of service delivery also impact financial liability. Balancing between performance incentives and disincentive can normalize financial risks.

4. Revenue Risk

The revenue levels in post Covid-19 are showing a downward trend and going electric may not directly change that trend. Maintaining a sustainable revenue stream to support cost of operations, will remain constant challenge for the city transport organization. Accordingly expected ridership and fare levels alongside the extent of fare evasion/pilferage would pose the traffic revenue risks, while ability to tap on non-traffic revenue potentials can pose another dimension to the revenue related risks.

As mentioned, some of the above risks may be reduced by outsourcing. However, excessive transfer of risks to concessionaire may result in failed tenders/contracts or poor implementation outcomes.

A fair risk-reward mechanism is essential for PPP involvement in city bus operations. Similarly, improved customer satisfaction, enhanced infrastructure support and skill development can potentially support risk factors within control of Government.

3.3 Market Analysis of Tenders

As part of the market study, over 20 contracts that have been awarded in India were studied. The overall situation is that the transit agencies have received per kilometer rates are that much higher than their estimates despite considerable financial subsidy from the Government, favourable EV policy including concessional electricity tariff etc. On the other hand, the successful bidders have found it difficult to arrange the requisite financing and are wary of discretionary powers vested with the Authorities as per the contract with no mediating mechanism except for the arbitration process which could be long and cumbersome. The initial tenders have seen participation mostly by OEMs who need the opportunity to demonstrate operation of their products.

Each tender materially varied from the other not only on local conditions (viz. kilometers per day, bus type, high floor/low floor, opportunity charging etc.) but also on contractual conditions. Changes to some of the clauses particularly increased the risk perception of the tenders e.g., terminal payments, definition of force majeure events, right to depute transit agencies staff at operator's cost, additional penalty clauses, etc.

Table below shows a qualitative assessment of the factors that have an impact on the per km rate. This qualitative assessment is based on review of the tender documents and discussions with transit agencies and operators/OEMs.

Table 2: Factors impacting the per km rate

Criteria	Favorable	Unfavorable	Impact on Per km rate
Assured Kilometres	>200 km/day	<150 km/day	+ + + +
Empty kilometres	Included for fee payment	Not included for fee payments	++
Increase in input costs	Pass-through to authority	Included in prices by operator	++
Subsidy Bank Guarantee	Not required	Required for 5 years	++
Concession Period	12 years	<10 years	++
Ownership of assets at the end of concession	With operator	Transferred to authority	+

Source: Consultant Team

3.4 Effect of Contract Period

Previous regulation in under the governor regulation of Jakarta limits the contract period for procurement of buses to only 7 years. However, several cities around the world have gone ahead for concession periods greater than 10 years and in some cases up to 15 years. This is because of low maintenance due to fewer moving parts in the E-buses. Just recently, on 8 September 2021, the Governor of DKI Jakarta enacted Governor Regulation Number 74 Year 2021 ("Governor Regulation 74/2021") that provides the contract for E-buses can be for the maximum period of 10 years.

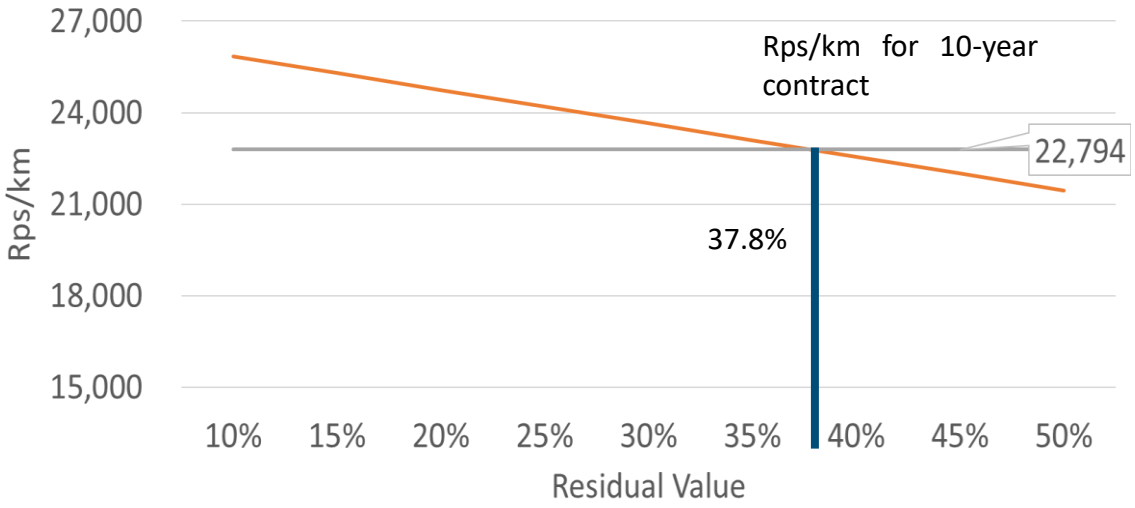
Table 3: Concession period for global cities

City	Concession Period
Mumbai, India	10 years
Bogota, Colombia	15 years
Pune, India	12 years
Lima, Peru	14 years
Santiago, Chile	14 years

Source: Consultant Team

The 10-year calculated Rp/km (as per new regulation) comes to about 22,794 with an average daily use of 196 kilometers and residual life of 10%. With a 7 year contract the change in Rp/km was calculated for different residual value of the E-bus. This will be helpful for TJ in negotiating the Rp/km with the operators for a particular value of residual life. The graph below shows the variation in the Rps/km for different residual values. If TJ would like to maintain the same Rp/km for both the 7-year and 10-year contracts, then the residual value calculated comes to about 37.8%.

Figure 2: Change in Rp/km with residual value for 10-year contract period



Source: Consultant Team

With a 7-year contract period, the loan period will reduce, and the debt service will increase. Without a buyback option of E-buses for the operator it is very likely that the operator will charge a higher Rp/km and a residual value of about 15-20%. The operator is very likely to load the upfront cost into the Rp/km. TJ should consider a BOT model i.e. Buy-Operate-Transfer in case of the E-buses in order to make productive use of the E-buses for full economic life or as long as the regulation permit.

Another scenario to consider in case regulation changes to allow contract period of 10 years:

- Contract period will be amended to 10 years
- Residual Value amended to 10%
- The Rp/km will be reworked so that it averages the Rp/km in a contract with 10 years to begin with (ignoring any revision in prices due to inflation)

E-bus contracts are being signed for 12-15 years by various cities internationally to reduce the impact of high up-front costs. This is because the effective cost per km reduces with increase in useful life of bus. So, if TJ owns the bus, it could give 2 contracts, one for 10 years and the second one for 3 years. The current restriction on usable life of bus is based on rationale of reduction in pollution – older diesel buses are more polluting (since they are based on old standards). Hence the regulation may undergo a change for allowing zero-emission e-buses for longer than 10 years.

A hybrid approach is that TJ enters primary contract for 10 years on BDMI basis. At the end of the contract period TJ is able to buy-back the bus (and chargers) at pre-agreed cost subject to E-buses being maintained in good condition. An objective independent technical assessment can be caried out based on pre-agreed parameters. TJ can appoint another operator (or the same) to continue operating the buses after the end of the first contract for 3-4 years as regulation permits at that time in future. The payment of Investment charges for depot and power infrastructure will be paid to the new operator only as needed.

The effective cost for different scenarios comes to the values shown in the table below. Higher the daily kms of utilization of E-buses over a longer period of time, better the Rp/km.

Table 4: Analysis of scenarios with different contract periods

	10-year Contract	7-year Contract	10-year Contract with buy back		
			Years 1-10	Years 11-14	Total
Bus Useful life	10	7	10	4	14
Total Investment Payment	7,565	6,712	7,565	936*	8,500
Total Investment Payment/year/ km	11419	14474	11419.00	3530.75	9165.21
Total O&M Cost + Profit/km	11,375	11,375	11,375	11,375	11,375
Total Rp/km	**22,794**	**25,849**	**22,794**	**14,906**	**20,540**

Includes:

- *Purchase price paid to Operator @ 10 % of the original Capex value*
- *Battery replacement cost*
- *Insurance cost for years 11-14*
- *Less residual value at the end of 14 years (5%)*

Source: Consultant Team

The present contract provides only adjustment of contract period (subject to regulations) in case agreed volume of work is not achieved. During the contract period, the operators cashflow will be strained if buses are not adequately used as the Operator has to meet the high fixed costs from its pocket. If the contract period is extended, the Operator would incur additional costs (driver, insurance, overheads etc.) and hence bare extension of the contract does not ensure coverage of the costs. The case is the same when the contract period is maximum of 10 years, since there are

possibilities that volume of work is not achieved, but with more relaxed terms it is possible to repay the buses for 10 years.

Since the E-bus fixed costs (depreciation, interest, driver, insurance) is almost 80-85% of the total cost, the minimum km assurance needs to be adjusted upwards as compared to the diesel bus which is 100 km/day. In view of the above, it is recommended that:

1. The minimum km/day is adjusted to the agreed volume of work/day/bus (e.g. 196 kms) and availability.
2. The Fixed cost portion (depreciation, interest, insurance, manpower, overheads etc.) is estimated (80% considered as an example here)
3. Underutilized/Overutilized km = Difference between [Min Km adjusted for availability] and [Actual Kms]
4. In case the actual usage is lower than Min Km adjusted for availability, the actual km will be paid as per normal rate and the difference would be paid at 80% of the Normal Rate:

IDR/km x Actual kms + [80%] x IDR/km x (Underutilized kms)

In case the SGO availability is less than 100%, the Operator will get paid less.

5. In case the actual usage is higher than Min Km adjusted for availability, the Adj. Min Km will be paid at normal rate and excess is paid at, say 25% (100%-80%+5%) of Normal rate:

IDR/km x Min Km adjusted for availability + [100%-x%+5%] x agreed IDR/km x (Overutilized Km)

Beyond the agreed kms per day, the cost of operation of E-buses will be low as compared to diesel buses (in the range of IDR 5000/km). Hence TJ could make arrangements for daytime charging to make maximum use of E-buses. The above structure gives a lot of flexibility to TJ to operate the buses as per actual requirement without pressure from the Operator to meet the minimum kms.

Table 5: Analysis of underutilization / overutilization kms in E-bus operation

Scenario		**1**	**2**	**3**	**4**	**5**	**6**
Description		Target Kms achieved	Short-fall due to TJ	Shortfall due to Availability < 100%	Shortfall due to TJ & Availability	Overutilization with 100% Availability	Overutilization with Availability < 100%

SGO Availability	A	100%	100%	95%	98%	100%	99%
Min Annual kms	B	66248					
Min Kms adj. for availability	C=A x B	66248	66248	62936	64923	66248	65586
Actual Kms run (annual)	D	66248	62936	62936	62936	69560	69560
Kms payable at normal rate	E=min(B,C,D)	66248	62936	62936	62936	66248	65586
Kms payable for underutilisation	F=(C-D) if D<C	0	3312	0	1987	0	0
Kms payable for overutilisation	G=(D-C) if D>C	0	0	0	0	3312	3975
Normal Rate/km	H	20,000					
Rate for underutilised kms	I=H*80%	16,000					
Rate for overutilized kms	J=H*(1-80%+5%)	5000					
Payment for normal kms	K=E X H	1325	1259	1259	1259	1325	1312
Payment for underutilization	L=F X I	0	53	0	32	0	0
Payment for overutilisation	M=G X J	0	0	0	0	17	20
Total Payment	**N=K+L+M**	**1325**	**1312**	**1259**	**1291**	**1342**	**1332**

4. LEGAL ASPECTS

This section limits the discussion on the legal requirement pertaining to:

1. Procurement requirements;
2. Legal consequences based on several possible scenarios.

The section does not cover any legal report on the legal aspects on technical specifications of E-bus. It is assumed that the technical specifications of E-bus have been prepared by TJ in accordance with the prevailing regulations.

4.1 Procurement Process for E-Bus Operator Services

1. Procurement Regulations applied to TransJakarta E-bus Operator Services

As a regional-owned enterprise, procurement of TransJakarta E-bus Operator Services shall follow the following regulations:

a. Government Regulation Number 54 Year 2017 concerning Regional-Owned Enterprises (BUMD) ("**GR 54/2017**").
b. DKI Jakarta Governor Regulation Number 62 Year 2016 concerning Public Service Obligation and the Subsidy Provisions from the Regional Budget to PT Transportasi Jakarta as lastly amended by DKI Jakarta Governor Regulation Number 43 Year 2030 concerning Amendment to DKI Jakarta Governor Regulation Number 62 Year 2016 concerning Public Service Obligation and the Subsidy Provisions from the Regional Budget to PT Transportasi Jakarta ("**Governor Regulation 62/2016**").
c. DKI Jakarta Governor Regulation Number 96 Year 2018 concerning Feeder Bus Integration into Bus Rapid Transit as amended lastly by DKI Jakarta Governor Regulation Number 74 Year 2021 concerning Second Amendment to DKI Jakarta Governor Regulation Number 96 Year 2018 concerning Feeder Bus Integration into Bus Rapid Transit ("**Governor Regulation 96/2018**").
d. DKI Jakarta Governor Regulation Number 98 Year 2018 concerning Delegation of Authority on the Electronic Catalogue Management for *OK-OTrip* Program Bus Operator Services ("**Governor Regulation 98/2018**").
e. DKI Jakarta Governor Regulation Number 50 Year 2019 concerning the Manual for Procurement of Regional Enterprises' Goods/Services ("**Governor Regulation 50/2019**").

In addition to the above regulation, based on our discussion with legal division and procurement division of TransJakarta, internally, TransJakarta has arranged its own procurement regulation pursuant to Board of Directors Decision Number: 203/SKP-PT.TJ/VI/2021 concerning the Manual for Procurement of Goods/Services and the Procurement of Public Transportation Operator Services in PT Transportasi Jakarta.

Note: As per the date of this Report, we have not received/seen/reviewed the said Board of Director Decision Number 203/2021.

4.2 The application of Presidential Regulation Number 16 Year 2018

Governor Regulation 96/2018 made a reference to Presidential Regulation Number 16 Year 2018 concerning the Procurement of Government's Goods/Services as amended by Presidential Regulation Number 12 Year 2021 concerning Amendment to Presidential Regulation Number 16 Year 2018 concerning the Procurement of Government's Goods/Services ("**Presidential Regulation 16/2018**"). Presidential Regulation 16/2018 applies to the following[2]:

a. Procurement of Goods/Services within Ministries/Agency/Regional Apparatus utilizing budget from State Budget (*APBN*)/Regional Budget (*APBD*);

b. Procurement of Goods/Services utilizing budget from State Budget (*APBN*)/Regional Budget (*APBD*), as mentioned in letter a, termasuk Procurement of Goods/Services where it is funded partially or its entirety from domestic loan or grant received by Government/Regional Government;

c. Procurement of Goods/Services utilizing budget from State Budget (*APBN*)/Regional Budget (*APBD*), as mentioned in letter a, termasuk Procurement of Goods/Services where it is funded partially or its entirety from foreign loan or grant;

Further, the following terms in the Presidential Regulation 16/2018 mean[3]:

a. Ministry: certain government apparatus managing a certain government affair. Example: Ministry of Transportation, Ministry of Finance.

b. Agency: non state ministry and other institutions as the user of budget established to carry out certain tasks in accordance with the 1945 Constitutions and other laws and regulations;

c. Regional Apparatus: element of assistances to the head of regional and the Regional Representatives organizing the government functions as the regional authority.

From Article 1 and 2 of Presidential Regulation 16/2018, it is clear that Regional-owned enterprises (SoE) is not considered as an agency (*Lembaga*), thus it is such regulation does not apply to SoE. Moreover, SoE, though receiving subsidies from APBN/APBD, is not considered as Budget user with Budget line in APBN/APBD (DIPA), thus, the regulation does not apply. As such, the procurement of goods and services by SoE shall follow the guidance as mentioned Article 93 Government Regulation 54/2017, which is in higher rank of regulation than a presidential regulation.

This is important to mention because it seems that TJ still refers to Presidential Regulation 16/2018, if applied then TJ must follow it completely.

[2] Presidential Regulation 16/2018, Article 2;
[3] Presidential Regulation 16/2018, Article 1, number 1, 2 & 3;

4.3 Regulatory Framework of Non-BRT E-Bus Operator Procurement

Some provisions of the regulations mentioned above in relation to the procurement of public transportation operator services in and by TJ which must be referred to in the procurement are:

(1) Article 93 paragraph (2) of GR 54/2017 states that *the provisions concerning the procurement of goods and services for BUMD shall be determined by* ***Head of Regional Regulation***.

DKI Jakarta has followed up this Article 93 by issuing Governor Regulation 50/2019, thus all SoEs owned by DKI Jakarta must adhere to the provisions of Governor Regulation 50/2019.

(2) Article 51 Regional Regulation 5/2014 which sets limitation to the lifetime of public transportation of 10 (ten) years.

(3) Governor Regulation 96/2018 as amended by Governor Regulation 74/2021:
Article 5:
Paragraph (7): the period of cooperation between TJ and TJ Transport Partner Operator with electric buses can be conducted for maximum of 10 (seven) years in 1 period.

(4) Governor Regulation 98/2018 sets out the delegation of authority for local (Jakarta) electronic catalogue by *Badan Pelayanan Pengadaan Barang/Jasa DKI Jakarta* (BPPBJ – Provincial Office for Goods/Services Procurement Services), including the procurement for Bus Operators for TJ.

To the best of the Consultant knowledge, since the issuance of Governor Regulation 98/2018, procurement of TJ bus operators in fiscal year of 2018 to date have been conducted in E-Catalogue of BPPBJ, which are accessible at https://e-katalog.lkpp.go.id/productsearchcontroller/listproduk?authenticityToken=c9a68a532e71da8d03e9c7e0db04c75748409145&cat=&commodityId=181&q=&jenis_produk=&pid=&mid=&tkdn_produk=-99&gt=&lt=. The link also includes procurement for E-Bus Operator with this link https://e-katalog.lkpp.go.id/productsearchcontroller/listproduk?authenticityToken=d85faba401a2002fa15544299cb152e855db273e&cat=7433&commodityId=181&q=&jenis_produk=&pid=&mid=&tkdn_produk= (accessible as per 20:25, August 25, 2021).
In practice, TJ has adopted E-Catalogue of BPPBJ for its bus operators procurement.

(5) Governor Regulation 50/2020
According to Governor Regulation 50/2020, Procurement of Goods/Services shall mean activities of Procurement of Goods/Services conducted by Regional-owned Enterprises with indirect funding from APBN/APBD where such process commences from need identification up to the deliveries of the works. Article 6 set outs the vendors selection methods which consist:

(a) Direct purchase;
(b) Direct procurement;
(c) Direct appointment;
(d) Tender;
(e) Selection (for consultation service);
(f) E-purchasing.

The above method shall be further regulated in the Board of Directors decision.

Further in Article 8, it states that Regional-owned enterprise may apply joint procurement by using the e-catalogue as developed by the regional government.

Pursuant to the above regulations, the procurement procedures of E-Bus Operator Services by TJ shall observe the following:

(1) Procurement can be conducted by TJ as per Governor Regulation 50/2019 or by joint procurement by BPPJB in accordance with Governor Regulation Governor Regulation 50/2019 jo. Governor Regulation 98/2018. However, to avoid ambiguity between Governor Regulation Number 50/2020 and Governor Regulation Number 98/2018, Governor Regulation Number 98/2018 should be revoked so that there is one consistent regulation for TJ Operator procurement procedures. Governor Regulation Number 98/2018 is also redundant as it is already covered in Article 8 of Governor Regulation 50/2020 where it explicitly states that the joint procurement is an option or alternative for regional-owned enterprise.

    However, with the issuance of Governor Regulation 74/2021, it seems that the procurement of operator services by existing operator must be done through electronic catalogue. Though it is not clear whether this can be done by TJ, or the e-catalogue as provided by BPPBJ.
(2) In the event TJ opts to conduct the procurement themselves, the Board of Directors of TJ shall set out in detail the procurement procedures for Bus Operator in its BOD decision (BOD Decision on Procurement Manual);
(3) Similarly, TJ, at its own discretion, may use BPPBJ e-catalogue in the procurement procedures as set out in the said BOD Decision on Procurement Manual.
(4) BOD Decision on Procurement Manual may adopt 1 of the procurement methods as mentioned in Article 6 of Governor Regulation 50/2019. If direct appointment is applied to the procurement of E-bus Operator, then the Board Decision on Procurement Manual, shall detail out:
    (a) The specific conditions requirements or the speciality of the E-buses; and
    (b) Argumentation or justification that it can only be conducted by direct appointment and no other methods.
(5) the operator contract duration for one period is limited to a maximum of 10 years, with no room for extension.

4.4 Terms of References in the Procurement of TJ E-Bus Operator Services

The study team has received Terms of Reference of the Procurement of TJ Low-Entry E-bus Operator Services (*Kerangka Acuan Kerja Jasa Layanan Angkutan Umum Transjakarta dengan Bus Listrik Lantai Rendah Berbasis Baterai)* from TJ dated 25 June 2021 ("**Non-BRT TOR**"), in which we have provided our reviews with the following general remarks:

a. The Non-BRT TOR adopts Bus-Driver-Maintenance-Insurance (BDMI) scheme similar to what is applied to diesel buses operator services contract;
b. The Non-BRT TOR is for the procurement of operator services for 100 E-bus units specifically for the existing TJ operators.
c. The specific requirements for existing TJ operators as part of the administrative requirements to be further regulated in the BOD Decision on Procurement Manual are:
   (1) The operator shall meet the requirements as existing operator pursuant to prevailing regulations, including the number of bus quota they are entitled to operate under contract with TJ as determined by the Head of Transportation Office of DKI Jakarta;
   (2) The operator obtains Purchase Order and Confirm Order from official manufacturer; and
   (3) The operator obtains letter of trial test from TJ.
d. Operational plans:
   Some operational plans which need to be considered are:
   (1) Charging station location and the non-productive (empty kilometer);
   (2) Unlike the diesel buses, the E-buses with overnight charging arrangement have a limitation of daily operating range which is expected to further decrease as the battery ages. Hence, the contract needs to acknowledge this limitation on a year to year basis. e.g. to meet the volumes, TJ may issue DO for 250 kms/day but the E-bus can't deliver and this should not be held as Operator default or deficiency. Hence maximum DO per day including empty kms should be specified in the contract separately for years 1 to 10 so that parties know their rights and obligations in this respect. The SGO of 100% and 90% needs to be understood in the contract accordingly.
   (3) Recharging time as part of SGO requirement shall be carefully calculated, alternatively, the daily operating hours per bus should be limited to certain hours (depot to depot) for charging purposes.

e. Electricity supply outage shall be considered as a Force Majeure condition in the contract;
f. Trial Period and price adjustment at the end of trial period shall only be limited to certain conditions and pursuant to the evaluation of independent appraisal.

4.4 Legal Consequences of Payment Structure on E-Bus Operator Services

1. Effect of Contract Period on Rp/km Payment and Feasible Scenarios

As mentioned above, contract period will have significant impact on the Rp/km tariff. The following implementing scenarios may be considered:

Pasal 5
VOLUME PEKERJAAN

1. *OPERATOR BUS menyetujui bahwa total kilometer yang dialokasikan untuk ditempuh oleh Armada Bus SG adalah sebesar **jumlah Armada Bus SG x Kilometer Tempuh Bus x 7 tahun** atau **{…} unit Bus SG x {…} km x 7 tahun = {…} km (terbilang kilometer**), dengan ketentuan total volume pekerjaan secara serta merta berubah menjadi **jumlah Armada Bus SG x Kilometer Tempuh Bus x 10 tahun** atau **{…} unit Bus SG x {…} km x 10 tahun = {…} km (terbilang kilometer**), sesuai ketentuan terkait Jangka Waktu Perjanjian sebagaimana yang diatur Pasal 7 Perjanjian ini (disebut "**Volume Pekerjaan**");*

Pasal 7
JANGKA WAKTU PERJANJIAN

1. *Perjanjian ini berlaku sejak ditandatangani oleh Para Pihak untuk jangka waktu sebagaimana diatur dalam ayat 2 Pasal ini.*
2. *Jangka waktu Perjanjian ini ditetapkan dengan ketentuan sebagai berikut:*
   a. *Perjanjian ini berlangsung untuk jangka waktu **7 (tujuh) tahun** sejak tanggal Berita Acara Pengoperasian Armada Bus SG, dengan ketentuan dalam hal terdapat peraturan yang mengatur bahwa jangka waktu Perjanjian dapat berlangsung lebih dari 7 (tujuh) tahun) maka jangka waktu Perjanjian berlangsung untuk jangka waktu sesuai peraturan dimaksud namun tidak lebih dari 10 tahun ("**Jangka Waktu Perjanjian**");*
   b. *Perubahan jangka waktu Perjanjian akibat perubahan peraturan sebagaimana dimaksud dalam Pasal 7 ayat (2) huruf a berlaku serta merta pada saat peraturan dimaksud diundangkan dan cukup dituangkan dalam suatu berita acara yang ditandatangani Para Pihak.*
   c. *Perubahan waktu perjanjian harus dibaca bersamaan dengan ketentuan Pasal 5 dan Pasal 8 Perjanjian ini.*
3. *OPERATOR BUS harus menyediakan Armada Siap Guna Operasi kepada PERSEROAN sejumlah 100% sebagaimana dimaksud di dalam Perjanjian Kerja Sama;*
4. *Volume Pekerjaan sebagaimana dimaksud dalam Pasal 5 ayat (1) wajib dicapai dalam Jangka Waktu Perjanjian, dengan ketentuan bahwa dalam hal masih terdapat kekurangan Volume Pekerjaan ketika Jangka Waktu Perjanjian berakhir dan menurut peraturan yang berlaku pada saat itu perpanjangan Perjanjian dapat diberikan serta disepakati oleh PARA PIHAK, maka Perjanjian ini berakhir sesuai jangka waktu yang dinyatakan dalam adendum perpanjangan untuk memenuhi kekurangan Volume Pekerjaan*
1. *Perjanjian ini berakhir ("**Tanggal Berakhir**"):*
   b. *pada saat berakhirnya Jangka Waktu Perjanjian sebagaimana dimaksud dalam ayat 2 Pasal ini; **atau***
   c. *dalam hal masih terdapat kekurangan Volume Pekerjaan ketika Jangka Waktu Perjanjian dimaksud dalam huruf a ayat ini berakhir, maka Perjanjian ini dapat diperpanjang yang*

akan dinyatakan dalam adendum perpanjangan untuk memenuhi kekurangan Volume Pekerjaan dimaksud, dengan tetap memperhatikan ketentuan peraturan perundangan yang berlaku pada saat adendum ditandatangani dan memperhatikan kondisi Armada OPERATOR BUS.

Pasal 8
HARGA RUPIAH PER KILOMETER
(HARGA RP/KM)

1. *Pendapatan OPERATOR BUS berasal dari pembayaran Jasa Operator dari PERSEROAN yang dihitung berdasarkan Harga Rp/Km, dengan memperhatikan pencapaian Tingkat Layanan dalam pelaksanaan Jasa Operator dimaksud.*
2. *Para Pihak sepakat bahwa Harga Rp/Km dihitung dengan menggunakan Format Perhitungan Harga Rp/Km, Berita Acara Negosiasi dan Berita Acara Perubahan Harga Rupiah Per Kilometer adalah senilai* ***Rp.{…},- ({…} Rupiah),*** *sudah termasuk pajak yang berlaku, terdiri dalam 2 pengelompokan perhitungan biaya Rp/Km yaitu Biaya Rp/Km Operasional yang bersifat tetap setiap tahun dan Biaya Rp/Km Perawatan yang besarannya disesuaikan dengan kebutuhan perawatan dalam tahun berjalan.*
3. *Dari penggabungan perhitungan Biaya Rp/Km Operasional dan Biaya Rp/Km Perawatan berdasarkan ayat 2 Pasal ini, diperoleh Harga Rp/Km per tahun berdasarkan tabel sebagai berikut ("****Harga Rp/Km****"):*

Periode	*Biaya investasi per bus per kilometer (Rp/km)*	*Biaya Rp/Km Operasional*	*Biaya Rp/Km Perawatan*	*Biaya Rp/Km Tahun ke Tahun*
Tahun 1	*Rp {…}*	*Rp {…}*	*Rp {…}*	*Rp {…}*
Tahun 2	*Rp {…}*	*Rp {…}*	*Rp {…}*	*Rp {…}*
Tahun 3	*Rp {…}*	*Rp {…}*	*Rp {…}*	*Rp {…}*
Tahun 4	*Rp {…}*	*Rp {…}*	*Rp {…}*	*Rp {…}*
Tahun 5	*Rp {…}*	*Rp {…}*	*Rp {…}*	*Rp {…}*
Tahun 6	*Rp {…}*	*Rp {…}*	*Rp {…}*	*Rp {…}*
Tahun 7	*Rp {…}*	*Rp {…}*	*Rp {…}*	*Rp {…}*
Rata-rata	***Rp {…}***	***Rp {…}***	***Rp {…}***	***Rp {…}***

Dalam hal Pasal 7 ayat 2 huruf b berlaku, *maka Harga Rp/Km yang berlaku secara serta merta adalah sebagaimana Lampiran [.] Perjanjian dan dituangkan dalam Adendum dengan format yang termuat dalam Lampiran [.] Perjanjian*

(English version is placed at annexure)

Some risks which need to be mitigated for in the scenario with contract period of 10 years are:

(1) Banks can only provide less than 7 years loan period.
(2) Further, even with the contract period for 10 years, the structure does not address the cost of battery replacement. Additionally, what if, at the time of change of the duration, the volume of work is more or less than the agreed volume? That would require further change in the formula. Even if we do the computation based on “kms used” and “kms remaining”, there is a risk that the remaining kms may be unachievable given the limitations of operating range of E-buses especially in later years.
(3) There is a possibility that since E-buses are zero-emission buses, the restriction on use of the E-bus for up to 10 years only may be removed. In which case the Operator will end up owning the bus after 10 years with much of the life left. On the other hand, TJ could consider buying the bus for only 10% residual value and run it as long as it is road-worthy.

Accordingly, options (a) and (b) below are explored.

a. 10 years and possible extension with new contract using the used buses for another 3-4 years;

This scenario is applied where after the end of the first contract period, TJ reuses the E-buses through a new procurement process. The purpose of this scenario is to try maximizing the bus life according to its lifetime usage. Enabling conditions for this scenario are:

(1) BOD Decision on Procurement Manual include this mechanism;
(2) Buses are appraised to be of worthy conditions for a certain period of time;
(3) New procurement with preference to the owner of the buses, for example with right to match.

Some risks to this scenario are:

(1) Changes to the BOD policy;
(2) Buses are not well-maintained.
(3) The Operator may not extend the contract and explore other more profitable use of the E-bus.

b. 10 years with buy-back mechanism.

This scenario is another alternative to secure the optimalization of buses lifetime, where at the end of the contract, TransJakarta procures the buses and operate the buses until the end its lifetime. TransJakarta can operate the buses themselves which has no minimum period (using self-operation mechanism/swakelola) except period of 10 years as per Regional Regulation Number 5 Year 2014. Enabling conditions for this scenario are:

(1) BOD Decision on Procurement Manual include this mechanism;

(2) Buses are appraised to be of worthy conditions for certain period of times to determine the values of the buses;
(3) Sale price determination mechanism including agreeing on the appointment of the independent appraisal;
(4) Contract shall be inserted with the following clause:

Clause [.]

Buy Back Clause

(1) TransJakarta has the right, but not obligated to, purchase the E-Buses at the end of the Contract.
(2) The Parties agree that in the event TransJakarta, at its own discretion, decides to exercise its right to purchase the E-Buses, then the following procedures shall be followed:
(a) TransJakarta conducts technical evaluation on the maintenance and conditions of the E-Buses;
(b) TransJakarta appoints an independent appraisal to appraise the price and lifetime of the E-Buses at the cost of TransJakarta;
(c) The E-Buses price and lifetime as so appraised in letter (a) shall be final and binding;
(d) The purchase mechanism shall be initiated at the latest 6 months before the Contract ends and shall be concluded 1 month before the Contract ends.

Some risks to this scenario are:

(1) Changes to the company policy;
(2) budget allocation for the purchase, whether from subsidy or company budget;
(4) Buses are not well-maintained.

2. Optimus asset utilization through differentiated pricing for under and over utilization

As an effort to utilize E-buses to its optimum value, another approach of applying fixed cost and variable cost in Rp/km Structure can be considered. The payment of fixed cost fee per month is pre-agreed based on the following components:

a. Investment;
b. Fixed cost such as for insurance, driver, fixed or routine maintenance cost;
c. Paid if bus meets the SGO as per operational plan; and
d. Pro-rate reduced if availability is less than per SGO requirements.

While the variable fee shall include the following components:

a. Electricity and charging costs;
b. Maintenance for variable components;
c. Profit margin

Enabling conditions for this approach are:

a. Subsidy regulation where it allows payment of fixed cost as opposed to actual payment of km runs;
b. Business case/studies by independent consultant for Rp/km formulation as the new basis for the contract and procurement procedures;
c. Changes to the BDMI Contract specifically on Rp/km payment.

Risks to be mitigated for this approach are:

a. Operational plan must ensure that the minimum agreed kms are achieved and it should not fall far apart from the minimum target;
b. As compared to diesel buses, much of the cost of the E-buses are fixed in nature (80-85%). Being untested in local conditions, there may be many issues and challenges during implementation of the pilot project which may prevent realization of the agreed volume of work or may enable higher usage (with availability of fast charging infrastructure at a later date). Since the E-buses are environment friendly, their usage needs to be prioritized as compared to diesel buses.

5. RECOMMENDATIONS

Procurement practices play a key role in determining the successful deployment of E-buses. For successful deployment of E-buses the project team makes the following recommendations:

- Routes must be finalized upfront to determine the operational plan. Route selection helps in determining the right battery size and the charging requirements. For the Non-BRT buses, it is recommended to use battery sizes greater than 300 kWh along routes with daily utilization kms between 180-200 kms. This will ensure that the E-buses will need only overnight charging at depots in the early years without the need for opportunity charging during daytime thus reducing the complexity in the operations of the E-buses.

- Routes with a replacement ration less than 1.0 are more suited for electrification. While no threshold exists for the replacement ratio, it should not result in deployment of additional buses for the operator in the later part of the contract period as this would result in higher cost/km. TJ should negotiate for lower Rp/km taking daily kms travelled into consideration while considering different routes for E-buses implementation. Higher daily utilization kms will result in lower Rp/km.

- E-bus Contracts are being signed for 12-15 years by various cities internationally to reduce the impact of high up-front costs. This is because the effective cost per km reduces with increase in useful life of bus. Therefore, it is recommended that TJ should go for longer duration of contracts. The 10-year calculated Rp/km (as per new regulation) comes to about 22,794 with an average daily use of 196 kilometers and residual life of 10%. The change in contract period from 7-years to 10-years results in reduction in Rp/km by about 11.8%.

- There is a possibility that since E-buses are zero-emission buses, the restriction on use of the E-bus for up to 10 years should be removed. In which case the Operator will end up owning the bus after 10 years with much of the useful life still left. On the other hand, TJ could consider buying the bus for only 10% residual value and run it as long as it is road-worthy or extend contract for 3-4 years beyond the 10-year contract period. A longer contract period of 14 years will result in reduction in Rp/km by about 20% when compared to a 7-year contract and by about 10% when compared to a 10-year contract period.

- The present contract provides only adjustment of contract period (subject to regulations) in case agreed volume of work is not achieved. During the contract period, the operators cashflow will be strained if buses are not adequately used as the Operator has to meet the high fixed costs. If the contract period is extended, the Operator would incur additional costs (driver, insurance, overheads etc.) and hence bare extension of the contract does not ensure coverage of the costs. The case is the same when the contract period is maximum of 10 years, since there is possibilities that volume of work is not

achieved, but with more relaxed terms it is possible to repay the buses in 10 years rather than in 7 years. Since the E-bus fixed costs (depreciation, interest, driver, insurance) is almost 80-85% of the total cost, the minimum km assurance needs to be adjusted upwards as compared to the diesel bus which is 100 km/day. In view of the above, it is recommended that:

a. The minimum km/day is adjusted to the agreed volume of work/day/bus (e.g. 196 kms) and availability.
b. The Fixed cost portion (depreciation, interest, insurance, manpower, overheads etc.) is estimated
c. In case the actual usage is lower than Min Km adjusted for availability, the actual km will be paid as per normal rate and the difference would be paid at 80% of the Normal Rate
d. In case the actual usage is higher than Min Km adjusted for availability, the Adj. Min Km will be paid at normal rate and excess is paid at, say 25% of Normal rate

1. ANNEX-ENGLISH VERSION

ARTICLE 5: Work VOLUME

1. The BUS OPERATOR agrees that the total kilometers allocated to be traveled by the SG Bus Fleet is the number of SG Bus Fleet x Bus Mileage x 7 years or {…} SG Bus units x {…} km x 7 years = {…} km (in kilometers), provided that the total volume of work immediately changes to the number of SG Bus Fleet x Kilometers of Bus Travel x 10 years or {…} SG Bus units x {…} km x 10 years = {…} km (counted kilometers), in accordance with the provisions related to the Term of the Agreement as regulated in Article 7 of this Agreement (referred to as “Work Volume”);

ARTICLE 7

DURATION OF THE AGREEMENT

1. This agreement is effective from the time it is signed by the Parties for the period as stipulated in paragraph 2 of this Article.

2. The term of this Agreement is determined with the following conditions:

a. This agreement lasts for a period of 7 (seven) years from the date of the Minutes of Operation of the SG Bus Fleet, provided that in the event of a regulation that stipulates that the term of the Agreement may last more than 7 (seven) years, the term of the Agreement will last for a period of according to the said regulation but not more than 10 years (“Term of Agreement”);

b. Changes in the term of the Agreement due to changes in the regulations as referred to in Article 7 paragraph (2) letter a shall take effect immediately at the time the said regulations are promulgated and simply be stated in an official report signed by the Parties.

c. Changes in the time of the agreement must be read in conjunction with the provisions of Article 5 and Article 8 of this Agreement.

3. BUS OPERATOR must provide Fleet Ready for Operation to the COMPANY in the amount of 100% as referred to in the Cooperation Agreement;

4. The Volume of Work as referred to in Article 5 paragraph (1) must be achieved within the Term of the Agreement, provided that in the event that there is still a shortage of Work Volume when the Term of the Agreement ends and according to the regulations in force at that time, an extension of the Agreement may be granted and agreed upon by the Contractor. THE PARTIES, then this Agreement ends according to the period stated in the extension addendum to fulfill the shortage of Work Volume

1. This Agreement terminates (“Termination Date”):

b. at the expiration of the Term of Agreement as referred to in paragraph 2 of this Article; or

c. in the event that there is still a shortage of Work Volume when the Term of the Agreement as referred to in letter a of this paragraph ends, this Agreement may be extended which will be stated in an extension addendum to fulfill the said shortage of Work Volume, with due observance of the provisions of the laws and regulations in force at the time the addendum was signed and pay attention to the condition of the BUS OPERATOR Fleet.

ARTICLE 8

PRICE RUPIAH PER KILOMETER

(PRICE RP/KM)

1. The income of the BUS OPERATOR comes from the payment of Operator Services from the COMPANY which is calculated based on the Price of Rp./Km, taking into account the achievement of the Service Level in the implementation of the said Operator Services.

2. The Parties agree that the Rp/Km Price is calculated using the Rp/Km Price Calculation Format, Minutes of Negotiations and Minutes of Changes in Rupiah Prices Per Kilometer is worth Rp.{…},- ({…} Rupiah), including tax The applicable regulations consist of 2 groupings for calculating the Rp/Km cost, namely the Rp/Km Operational Cost which is fixed every year and the Rp/Km Maintenance Cost, the amount of which is adjusted to the maintenance needs in the current year.

3. From the combination of the calculation of Rp/Km Operational Cost and Rp/Km Maintenance Cost based on paragraph 2 of this Article, the price of Rp/Km per year is obtained based on the following table (“Rp/Km Price”):

Period	Investment Cost Rp/km	Cost Rp/Km Operation	Maintenance Cost Rp/Km	Cost Rp/Km Year to Year
Year 1	Rp {…}	Rp {…}	Rp {…}	Rp {…}
Year 2	Rp {…}	Rp {…}	Rp {…}	Rp {…}
Year 3	Rp {…}	Rp {…}	Rp {…}	Rp {…}
Year 4	Rp {…}	Rp {…}	Rp {…}	Rp {…}

Year 5	Rp {…}	Rp {…}	Rp {…}	Rp {…}
Year 6	Rp {…}	Rp {…}	Rp {…}	Rp {…}
Year 7	Rp {…}	Rp {…}	Rp {…}	Rp {…}
Average	IDR {…}	IDR {…}	IDR {…}	IDR {…}

In the event that Article 7 paragraph 2 letter b applies, the price of IDR/Km that applies immediately is as attached to Attachment [.] Agreement and set forth in an Addendum with the format contained in the Attachment [.] Agreement

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C40 Cities Climate Leadership Group
3 Queen Victoria Street, City
London EC4N 4TQ
United Kingdom

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Potsdamer Platz 10
10785 Berlin
Germany

E contact@c40cff.org
W c40cff.org

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