



*This document contains the executive summary from the “Timetable and Roadmap for Ride Hailing Fleet Electrification” document.*

# Road Map and Timetable of Two-Wheeler Electrification in Greater Jakarta

## Executive Summary of Timetable and Roadmap for Ride Hailing Fleet Electrification

22/02/2022

## Introduction

This document contains the executive summary from the initial “*Timetable and Roadmap for Ride Hailing Fleet Electrification*” document that have been submitted to UK PACT on 14<sup>th</sup> January 2022. **It should be noted that this is not the final document yet and further changes might be made, along with the main report, prior to project closure.** The main objective of this report is to explain what needs to be done, in particular from ride hailing operator, to electrify all of their two wheelers (2W) fleet in Greater Jakarta. The main report is structured into 4 following sections:

1. Current Business Model Snapshot
2. Policy Scenario Matrix
3. Business Model: 2030 Fleet Electrification
4. Financial Model

## Current Business Model Snapshot

This section contains the summary of current condition regarding 2W ride hailing business and 2W electrification program in Greater Jakarta, which was seen from the perspectives of three main stakeholders involved: the government, industry players, and ride hailing drivers.

In 2019, the national government has formed a coordination team to accelerate battery-based electric vehicle (BEV) utilisation for transportation, which consists of several related ministries, such as Ministry of Transport (MoT), Ministry of Energy and Mineral Resources (MEMR), and Ministry of Finance (MoF). Some of the measures being implemented to boost BEV adoption include the implementation of incentives for end users, incentives for corporations, and budget allocations for research and development of BEV. Moreover, Jakarta Provincial Government has also issued regulations to increase BEV adoption by exempting BEV from vehicle title fee and exempting them from transport demand management measures, such as odd-even policy.

On the other hand, ride hailing operators have also started their electrification program. Grab has used around 6,000 electric vehicles on their fleet as of the end of 2021, while Gojek were also planning to deploy 5,000 electric vehicles, started with 500 electric motorcycles deployed in South Jakarta at the end of 2021. This electrification efforts would need to be continued as there are currently only 41.3% of ride hailing drivers in Greater Jakarta who are interested to shift into electric 2W despite almost 75% of the drivers know the availability of electric 2W for ride-hailing service.

## Policy Scenario Matrix

In this part of the report, it was discussed briefly on what should the government do to achieve the goal of electrifying 2W ride hailing fleet in Greater Jakarta by 2030. Although this will be elaborated further on the policy recommendation document, here are some of the policies, but not limited to, that were proposed to enable 100% 2W ride hailing electrification in Greater Jakarta by 2030:

1. Solid fiscal incentives for electric 2W usage and charging infrastructure provision
2. Strong non-fiscal disincentives for ICE usage on 2W ride hailing fleets, e.g. mandates electric 2W usage for ride hailing purposes
3. Set standards on battery pack/size

## Business Model: 2030 Fleet Electrification

This part of the report contains the detailed action plan of ride hailing operators to fully electrify their 2W fleet in Greater Jakarta by 2030. It was started with choosing the suitable vehicles, continued with formulating the suitable vehicle ownership scheme, followed by charging infrastructure deployment strategy, before being summarised into a timeline diagram for 2W ride hailing electrification strategy in Greater Jakarta. This section was also complemented with marketing strategy to encourage ride hailing drivers and users to choose electric 2W instead of conventional 2W.

### Vehicle Selection

There were several variables used to determine the suitable vehicles to be used as ride hailing, such as vehicle dimension, range, charging mode, and power output. Data from the most basic 2W model that are currently being used by ride hailing drivers were used to set the minimum requirement for vehicle to be used as ride hailing. As there are three different types of service being offered by ride hailing operator, each type of service would require different specifications. Here is the example of selected electric 2W model that were deemed suitable to carry passenger on ride hailing service:

*Table 1 Model Selection for Combination and Passenger Transport Service*

E2W Models	Selis Mandalika	Viar New Q1	Gesits	Niu Gova 03	United T1800	Smoot Tempur	Volta 401
Daily Distance (km)	84.2	84.2	84.2	84.2	84.2	84.2	84.2
Max Allowed Distance Per Trip (km)	30	30	30	30	30	30	30
Battery Capacity (kWh)	0.43	1.38	1.44	2.4	1.68	1.44	1.2
Estimated Practical Range - Single Battery (km)	16.67	33.35	27.79	38.91	36.13	33.35	30.57
Battery Slots	1	2	2	1	2	1	2
Number of Charging - Single Battery	5.05	2.52	3.03	2.16	2.33	2.52	2.75

E2W Models	Selis Mandalika	Viar New Q1	Gesits	Niu Gova 03	United T1800	Smoot Tempur	Volta 401
Number of Charging - Multi Batteries *if available	5.05	1.26	1.51	2.16	1.17	2.52	1.38
Longest Charging Duration	6	5	3	7	5	4	6
Battery Detachability	-	✓	✓	-	✓	✓	✓
Battery Swap Availability	-	?	?	?	?	✓	✓
Output Power (watt)	350	800	2000	2000	1800	1500	1500
Top Speed (km/h)	30	60	70	60	70	60	55
Estimated Payload - Drivers and Cargo (kg)	130	130	130	130	130	130	130
Maximum Loads	150	?	150	160	150	150	200
Dimension Needs - Reference (mm)	1,877 x 669 x 1,074	1,877 x 669 x 1,074	1,877 x 669 x 1,074	1,877 x 669 x 1,074	1,877 x 669 x 1,074	1,877 x 669 x 1074	1,877 x 669 x 1,074
Dimension (mm)	1,600 x 600 x 1,080	1,680 x 690 x 1,220	1,947 x 674 x 1,135	1,740 x 705 x 1,065	1,886 x 715 x 1,170	1,860 x 690 x 1,050	1,920 x 680 x 1,100
Length Adequacy	X	X		X		X*	

## Vehicle Financing

Total Cost of Ownership (TCO) analysis was used to determine the suitable vehicle ownership scheme. In general, it was found that currently the TCO for those suitable electric 2W models are already below the TCO for conventional 2W models being used as ride hailing vehicles due to cheaper operational and maintenance cost. However, their currently higher capital cost would deter ride hailing drivers to shift into electric 2W yet. Therefore, there are three different ownership scheme that were elaborated in the report as could be seen below:

Table 2 Vehicle Ownership Schemes with Possible Ride-hailing Operators Interventions

	Driver owned	Third-party owned	Company owned
<b>Financial incentives to drivers</b>	<p>Providing a grant to support drivers to purchase EVs</p> <p>Offer per-ride bonus</p>	<p>Negotiate accessible rental fees for drivers</p> <p>Offer per-ride bonus</p>	<p>Offer favourable rental terms for drivers</p>
<b>Outreach and education</b>	Regardless of ownership scheme, ride-hailing companies should invest in outreach and education to familiarize drivers with the benefits of EVs. Companies can develop informational websites, and organize in-person training events to connect drivers with information and resources.		
<b>Support access to gov't incentives</b>	Offer support to drivers to navigate and access government incentives	n/a	n/a



	Driver owned	Third-party owned	Company owned
<b>Negotiate fleet discounts</b>	Partner with vehicle manufacturers to guarantee large quantity purchase, and streamline purchasing process	Support third party to negotiate fleet discounts	Purchase large fleet to reduce the per-unit cost and pass savings on to drivers
<b>Support charging infrastructure</b>	Provide financial incentive to support purchase of at-home charging equipment (if required)  Connect drivers to existing charging facilities	Support third party to expand charging infrastructure or battery swapping capabilities, possible through TK	Invest in charging infrastructure or battery swapping across the city
<b>Advocate for additional government incentives</b>	Lobby federal, state, and city government to advance policies that reduce purchase costs and expand charging infrastructure		

## Charging Infrastructure Development

To develop the charging infrastructure deployment plan, daily electricity needs for ride hailing usage was assessed. The daily electricity need was then divided between those could be obtained through charging at home and those that would need to be obtained through charging or swapping batteries at public charging infrastructures. This demand would then be compared to the daily electricity output that could be given by a single battery swap station. By dividing the demand with the output, the required number of public battery swap stations to serve all ride hailing fleets in Greater Jakarta. Traffic counting survey was then conducted to see the distribution of ride hailing fleets in each city in Greater Jakarta, so that the number of required battery swap station in each city could be determined as below:

*Table 3 Number of Required Battery Swap Stations in Greater Jakarta Based on Traffic Counting Data*

City/Regency	Number of Survey Point	18 hrs	14 hrs	Daily kWh	Battery Swapping Station Needed
Central Jakarta City	35	14.16%	14.13%	459,066.26	4008
South Jakarta City	44	13.16%	13.11%	426,468.00	3723
East Jakarta City	22	14.15%	14.09%	458,600.57	4004
West Jakarta City	18	15.41%	15.44%	499,581.24	4362

City/Regency	Number of Survey Point	18 hrs	14 hrs	Daily kWh	Battery Swapping Station Needed
North Jakarta City	16	7.13%	7.16%	231,137.17	2018
Bekasi City	4	5.90%	5.88%	191,087.88	1669
Bekasi Regency	5	4.06%	4.04%	131,634.87	1150
Depok City	7	5.92%	5.95%	192,019.26	1677
Bogor City	9	4.05%	4.07%	131,376.15	1147
Bogor Regency	5	2.61%	2.63%	84,600.24	739
Tangerang City	13	4.70%	4.72%	152,383.92	1331
South Tangerang City	11	4.66%	4.68%	151,142.08	1320
Tangerang Regency	4	4.07%	4.09%	131,997.07	1153
Total	193			3,241,095	28295

## Timeline Diagram

The timeline diagram would follow the commonly used technology adoption curve to estimate the penetration rate of electric 2W among ride hailing drivers. Considering a growth of 5.6% of ride hailing drivers annually, here is the electrification timeline diagram for 2W ride hailing in Greater Jakarta:

Table 4 2W Ride Hailing Electrification Roadmap

	2022		2023		2024		2025		2026		2027		2028		2029		2030	
Support Policies	Ride-hailing Roadmap				Fiscal Incentives - Charging Infrastructure & EVs				Interoperability standards - Battery size for swapping and connectors for charging				Non-Fiscal Incentives - LEZs, Building laws, parking zones					
Marketing Strategy	Economic incentives to drivers, and partnerships				Strengthen partnerships, Driver facing campaigns and outreach to encourage EV adoption				Customer campaigns to help choose EVs, carbon offset incentives, educate on impact of EV based trips etc				Subscription plan to customers for choosing EVs					
% EV Distribution	0.50%		1.25%		7.25%		7.00%		17.00%		17.00%		17.00%		17.00%		16.00%	
# Of electric vehicles	7,348		18,371		106,551		102,876		249,843		249,843		249,843		249,843		235,146	
% Passenger services	5%	367	5%	919	10%	10,655	15%	15,431	20%	49,969	20%	49,969	20%	49,969	30%	74,953	30%	70,544
% Combination	5%	367	5%	919	10%	10,655	15%	15,431	20%	49,969	20%	49,969	20%	49,969	20%	49,969	30%	70,544
% Food	45%	3307	45%	8,267	40%	42,620	35%	36,007	30%	74,953	30%	74,953	30%	74,953	25%	62,461	20%	47,029

	2022		2023		2024		2025		2026		2027		2028		2029		2030	
% Goods	45%	330 7	45%	8,26 7	40%	42,62 0	35%	36,00 7	30%	74,95 3	30%	74,95 3	30%	74,95 3	25%	62,46 1	20%	47,02 9
# Home chargers required in each phase	7,348		18,371		106,551		102,876		249,843		249,843		249,843		249,843		235,146	
# Battery swap stations required in each phase	186		465		2,700		2,607		6,330		6,330		6,330		6,330		5,958	
Areas and charger density # chargers/km	zone 1	0.18	zone 1	0.2	zone 1	0.9	zone 1	1.7	zone 1	3.4	zone 1	5.2	zone 1	7.0	zone 1	8.8	zone 1	10.4
			zone 2	0.2	zone 2	0.9	zone 2	1.7	zone 2	3.4	zone 2	5.2	zone 2	7.0	zone 2	8.8	zone 2	10.4
				0.2	zone 3	0.9	zone 3	1.7	zone 3	3.4	zone 3	5.2	zone 3	7.0	zone 3	8.8	zone 3	10.4
Phasing	Pilot Phase		Evaluation Phase		Partnership Phase		Technology Phase		Wider Adoption Phase		Wider Adoption Phase		Wider Adoption Phase		Scale-up Phase		Scale-up Phase	

## Financial Model

This section would elaborate how much resources was required to implement the action plan created in the document. However, as there are huge degrees of pricing variance on activities such as outreach strategy, this financial model would only cover the deployment plan of battery swap

stations and the vehicles themselves as the two most major things needed to electrify 2W ride hailing fleets. The financial model is as following:

Table 5 Financial Model for 2W Ride Hailing Electrification in Greater Jakarta

Combined Cost (IDR)		Column Labels									
Row Labels		2022	2023	2024	2025	2026	2027	2028	2029	2030	Grand Total
Charging infrastructure		IDR 36,810,440,856	IDR 103,441,220,592	IDR 573,467,756,196	IDR 718,030,642,968	IDR 1,612,055,079,648	IDR 1,994,000,067,924	IDR 2,375,609,552,604	IDR 2,757,356,635,284	IDR 3,065,482,836,252	IDR 13,236,254,232,324
Battery-swap stations, hardware		IDR 25,091,400,000	IDR 62,863,400,000	IDR 364,095,100,000	IDR 351,684,300,000	IDR 853,917,000,000	IDR 854,051,900,000	IDR 853,917,000,000	IDR 853,917,000,000	IDR 803,734,200,000	IDR 5,023,271,300,000
Battery-swap stations, installation		IDR 501,828,000	IDR 1,257,268,000	IDR 7,281,902,000	IDR 7,033,686,000	IDR 17,078,340,000	IDR 17,081,038,000	IDR 17,078,340,000	IDR 17,078,340,000	IDR 16,074,684,000	IDR 100,465,426,000
Battery-swap stations, insurance		IDR 376,371,000	IDR 1,319,322,000	IDR 6,780,748,500	IDR 12,056,013,000	IDR 24,864,768,000	IDR 37,675,546,500	IDR 50,484,301,500	IDR 63,293,056,500	IDR 75,349,069,500	IDR 272,199,196,500
Battery-swap stations, power		IDR 9,724,841,856	IDR 34,089,230,592	IDR 175,204,005,696	IDR 311,508,643,968	IDR 642,466,971,648	IDR 973,477,583,424	IDR 1,304,435,911,104	IDR 1,635,394,238,784	IDR 1,946,902,882,752	IDR 7,033,204,309,824
Battery-swap stations, real estate		IDR 1,116,000,000	IDR 3,912,000,000	IDR 20,106,000,000	IDR 35,748,000,000	IDR 73,728,000,000	IDR 111,714,000,000	IDR 149,694,000,000	IDR 187,674,000,000	IDR 223,422,000,000	IDR 807,114,000,000
Driver E2W incentive		IDR 51,426,144,000	IDR 128,633,750,784	IDR 745,803,447,460	IDR 720,186,361,777	IDR 1,748,836,032,538	IDR 1,748,919,117,976	IDR 1,748,904,483,467	IDR 1,748,909,353,391	IDR 1,646,022,607,884	IDR 10,287,641,299,278
Initial vehicle purchase incentive (grant or loan)		IDR 51,426,144,000	IDR 128,633,750,784	IDR 745,803,447,460	IDR 720,186,361,777	IDR 1,748,836,032,538	IDR 1,748,919,117,976	IDR 1,748,904,483,467	IDR 1,748,909,353,391	IDR 1,646,022,607,884	IDR 10,287,641,299,278
Grand Total		IDR 88,236,584,856	IDR 232,074,971,376	IDR 1,319,271,203,656	IDR 1,438,217,004,745	IDR 3,360,891,112,186	IDR 3,742,919,185,900	IDR 4,124,514,036,071	IDR 4,506,265,988,675	IDR 4,711,505,444,136	IDR 23,523,895,531,602



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