# Transport, Society & Environment :
# Future of Mobility


Dr. Yos Sunitiyoso

Vice President, Research, Development & Training, ITS Indonesia

Associate Professor, School of Business & Management, Institut Teknologi Bandung

# Yos Sunitiyoso, PhD

VP of Research, Development & Training, ITS Indonesia
Associate professor at School of Business & Management, ITB, Indonesia.

Yos received his PhD from the University of the West of England (UWE) Bristol at the Centre for Transport & Society (CTS) in 2007. He completed his Master of Engineering degree from the Nagaoka University of Technology, Japan in 2004 at the Infrastructure Planning laboratory. His bachelor's degree is in industrial engineering from ITB, graduated in 2000. he was working for the University of Southampton, UK as a research fellow at the Transportation Research Group (TRG) in Feb 2008 – Dec 2009. He is a faculty at SBM ITB in 2010 until now and serves at Intelligent Transport Systems (ITS) Indonesia since 2021 until now.

**E-mail:**
**yos.sunitiyoso@sbm-itb.ac.id**

He conducted research and consultancies in the area of mobility-as-a-services (MaaS), electric mobility, shared mobility, transportation business & management, future of mobility, road pricing and other transport topics. He received awards from ITB for Teaching (2016, 2021) and Institutional Development (2017) and become Fulbright-RISTEKDIKTI Visiting Scholar at University of Washington, Seattle (2018).

# ITS Indonesia 2020-2023

ITS Indonesia is a member of ITS Asia Pacific Forum and ITS World Community, a non- profit organization set up jointly between industry, academia, government agencies and communities in order to encourage development initiatives and the use of intelligent transport systems in order provide safe and convenient transportation ecosystem

- Digital Transformation for Transport Development
- *Integrated Urban Transport System*
- *Electric Transport*
- *Smart Driving & Logistics*
- *Safety & Healthy Mobility*

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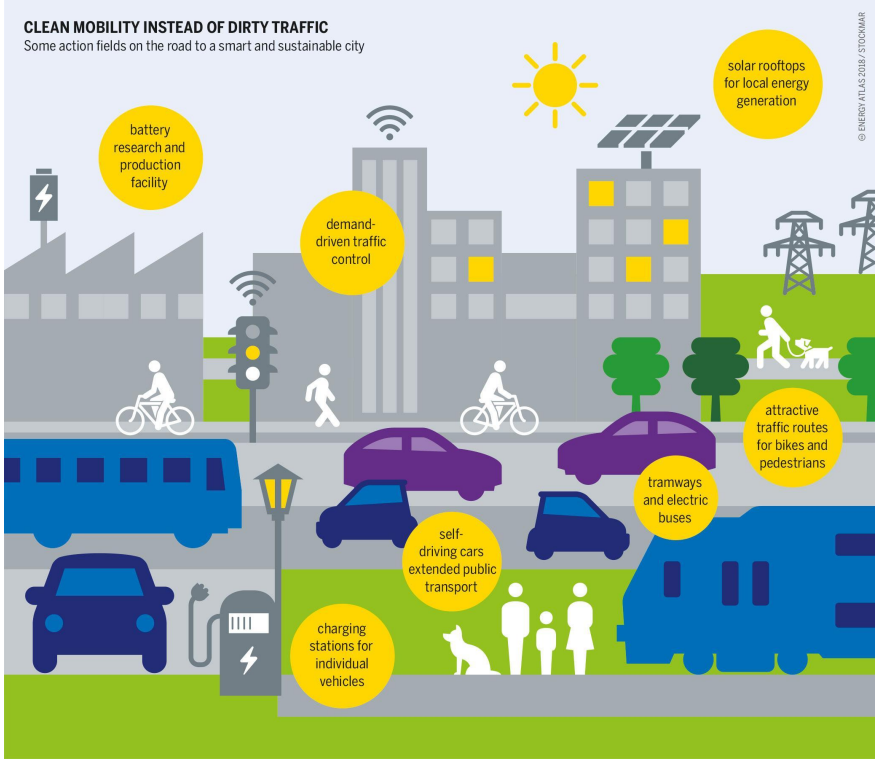
# Transport, Society & Environment

*Our transport systems must be developed and operated in such a way as to support a **vibrant economy** and an **equitable society** with enhanced opportunities for individuals to fulfil their potential and to enjoy a **satisfactory quality of life**. This must be achieved **without undue adverse impact on the built and natural environment** in which society exists and must be sustained to support **the needs of future generations***

*(Prof Glenn Lyons, 2004, Founder of Center for Transport & Society, UWE Bristol)*



# Transportation Challenges

Need to tackle inequitable and poor **infrastructure** in some areas



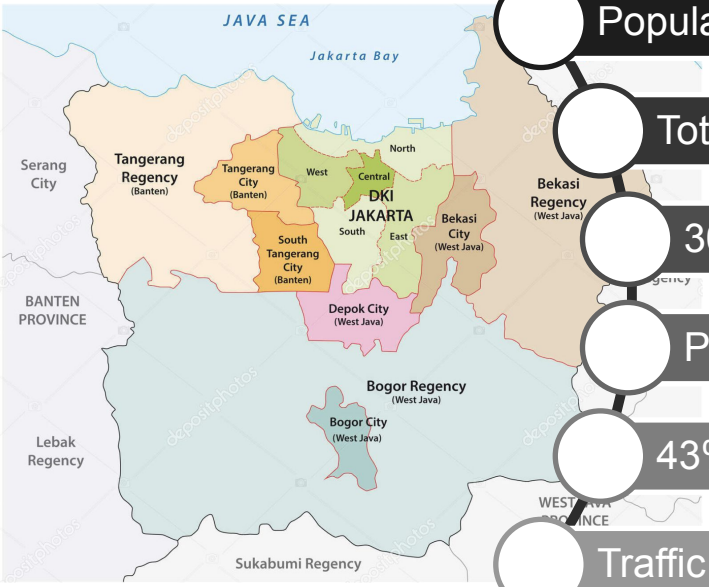
Need for **Regulation** or **policy** that push public transport usage and limit private vehicle


Needs to change commuters' **behavior**


Need for better intermodal **integration** and stakeholders synergy

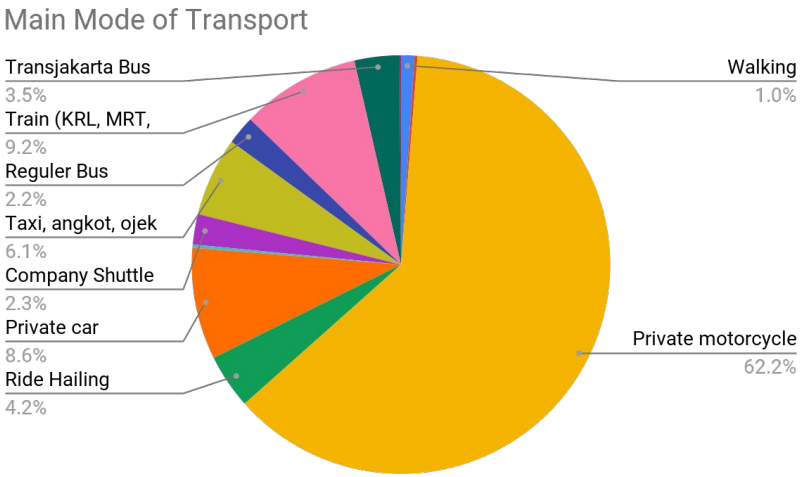
# Understanding Users Behaviours

# The Challenges of Jakarta Metropolitan Area (Jabodetabek)



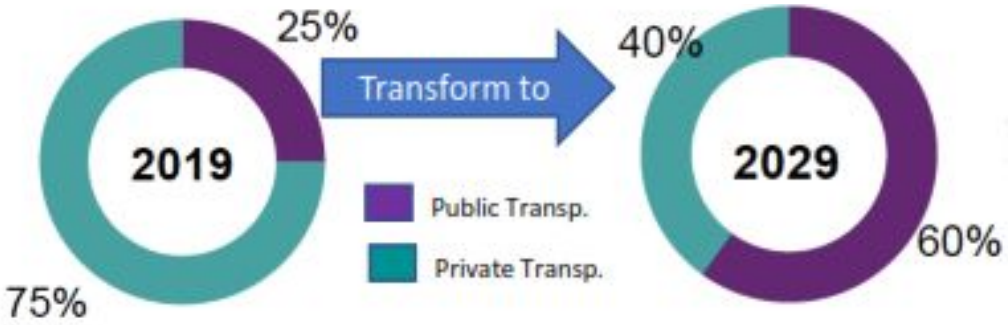

- Population of 31 million people
- Total trips of 88.2 million daily
- 30% of public transport mode share
- People commute around 4 hours daily
- 43% emissions originates from transport sector (25.000 tons/year)
- Traffic congestions costs USD 6 billion per year in lost of productivity

# Mode Share in Jakarta Metropolitan Area




Source: BPS (2019)

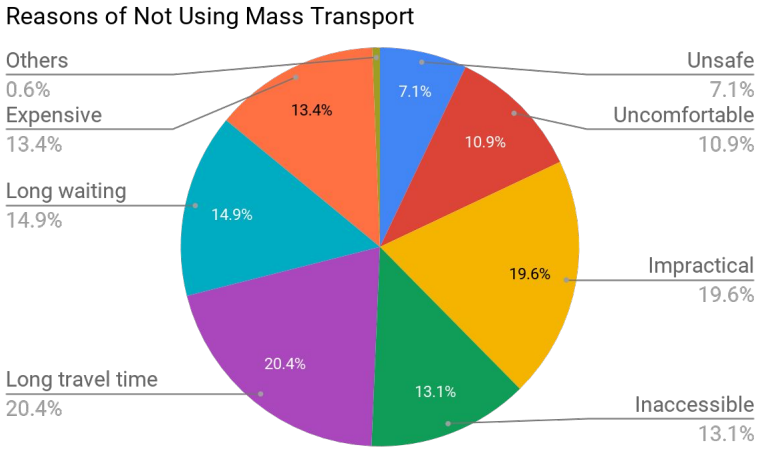
**Expected Public Transport Share in 2029**



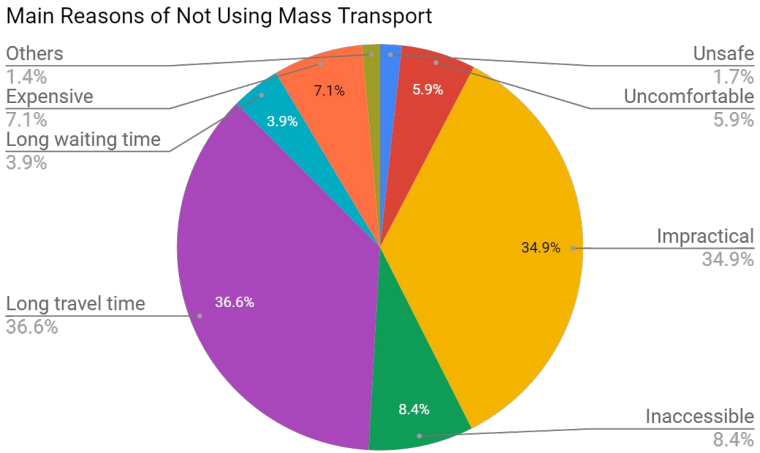

Source: Jabodetabek Transport Master Plan (BPTJ, 2019)

# Reasons of Not Using Mass Transport

From the commuter survey conducted by Badan Pusat Statistics (2019), there are five reasons for commuters who do not use mass public transport: **long travel time, impractical, long waiting time, expensive** and **inaccessible**. However if we look at their main reasons, the top two main reasons are **long travel time** and **impractical**.



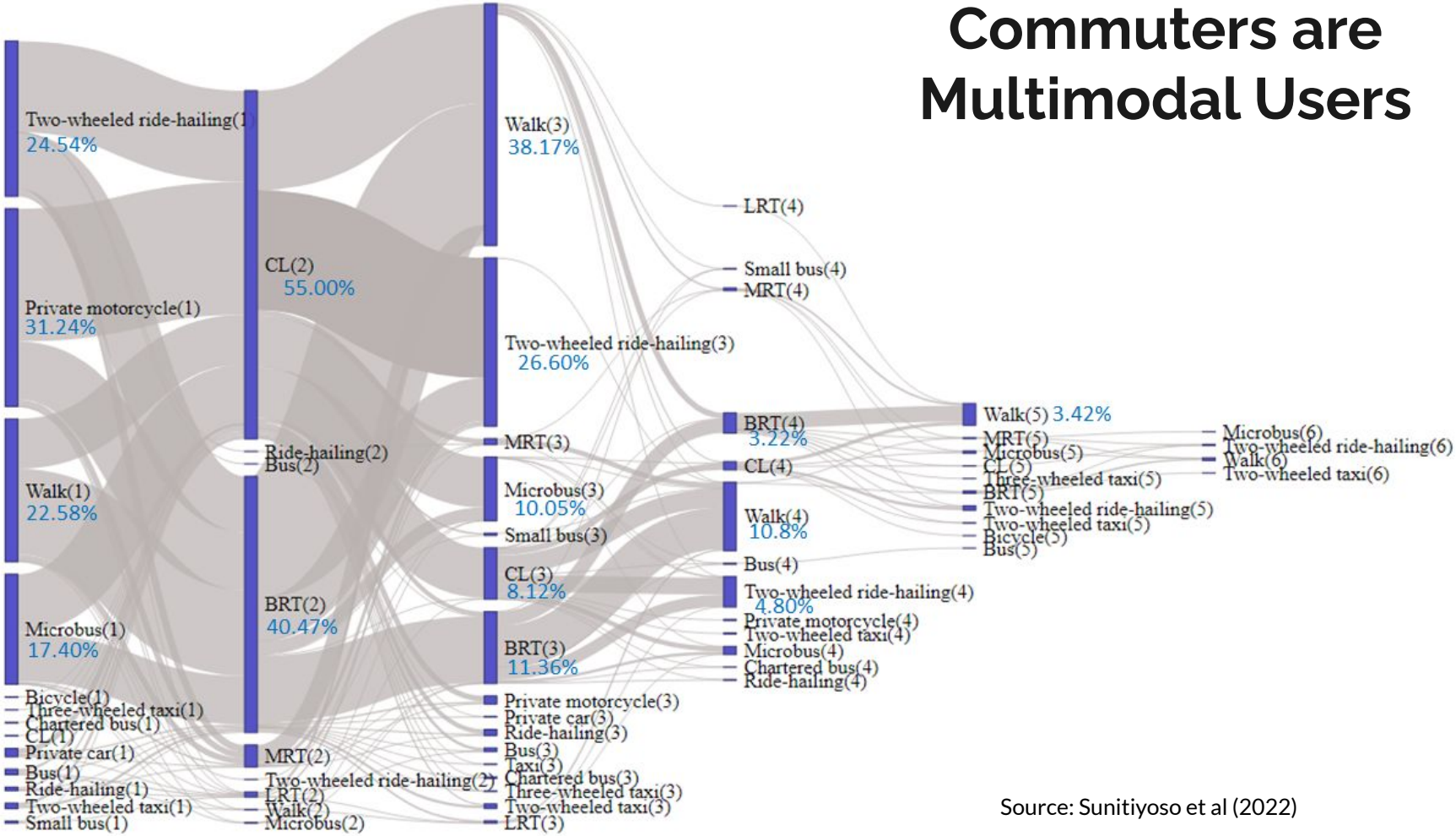

**Note**: respondents may choose more than one reason




**Note**: respondents' main reason only

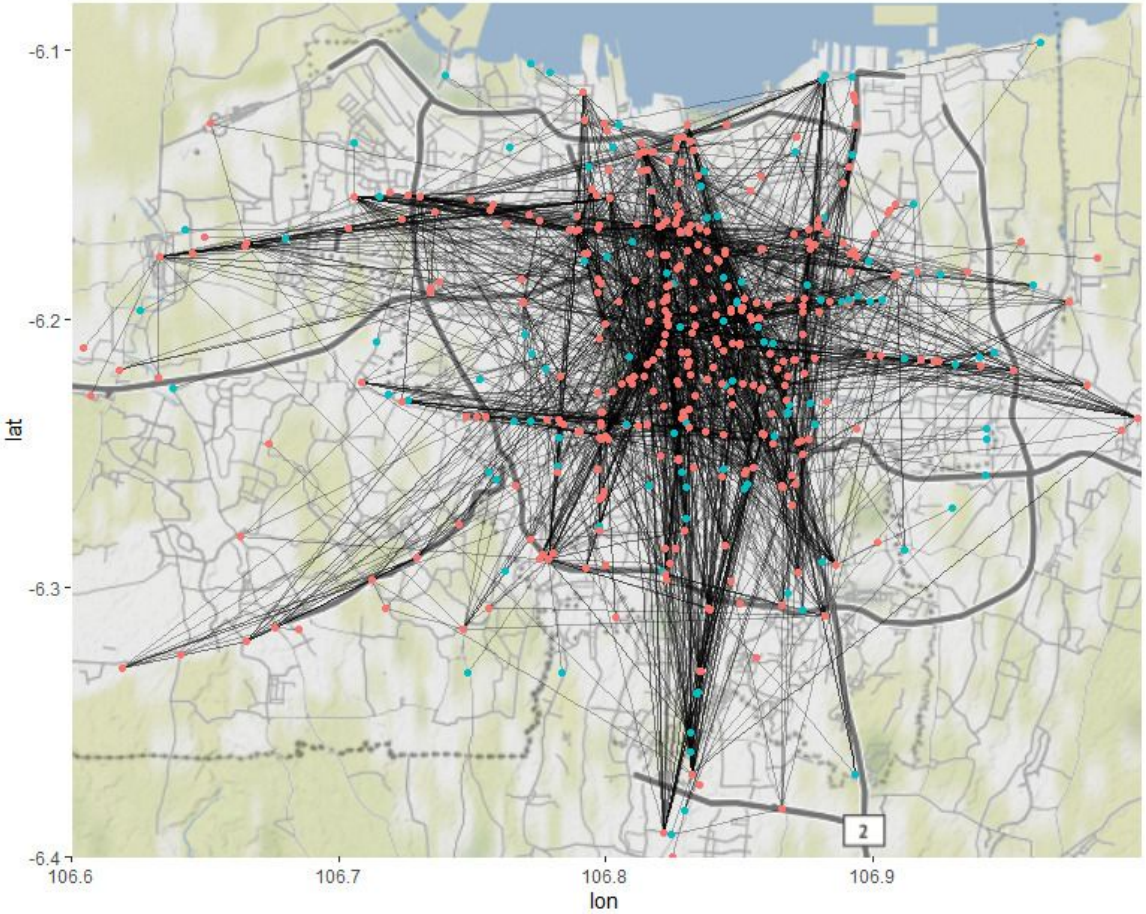
Source: BPS (2019)

# Commuters are Multimodal Users




Source: Sunitiyoso et al (2022)

# Commuters are Explorers




Commuters travel in 3-6 segments using

- Multiple modes of transport
- Multiple routes or corridors

type
- Destination
- Origin

**Note**: each line is a trip segment connected with a straight line

Source: Sunitiyoso et al (2022)

# Commuter is An Explorer

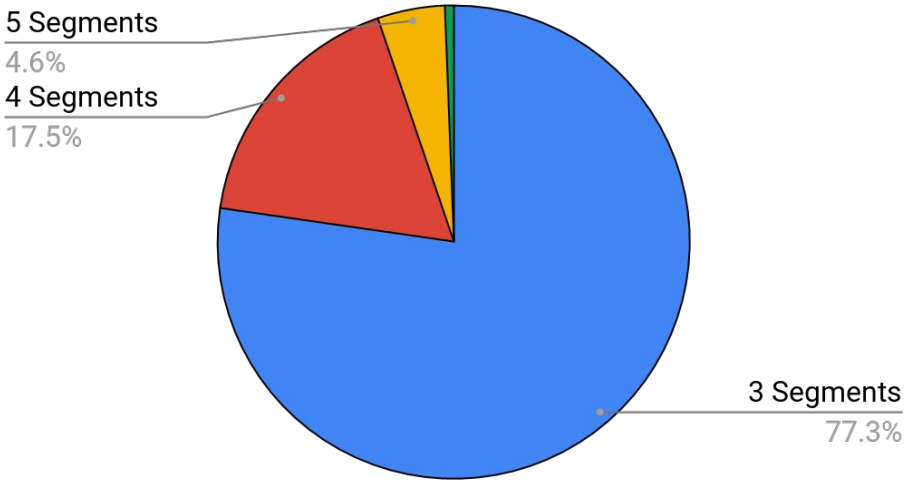
Average Distance (one-way)

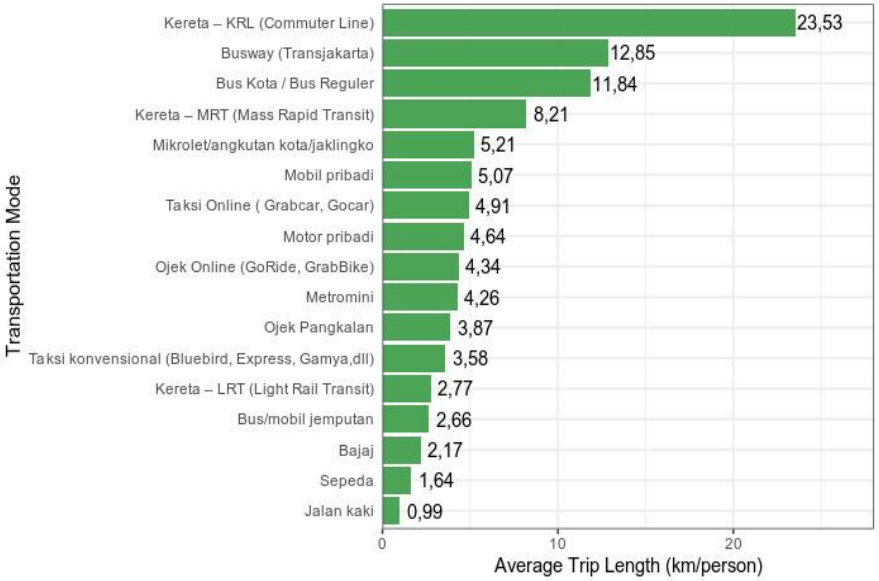
**25.15 KM**

Average Duration (one-way)

**1.12 Hours**

Number of Segments in a Multi-modal Trip




Source: Sunitiyoso et al (2021)

# What futures we will have?

# To where Indonesia is heading in 2030 ?

## Connected?

## Electric?

## Nowhere ?

## Automated ?

## Shared?

# Methodology:
# Scenario Planning

- Sensing the future
- Detecting weak signals
- Identify driving forces
- Work with uncertainty

NOW

FUTURE

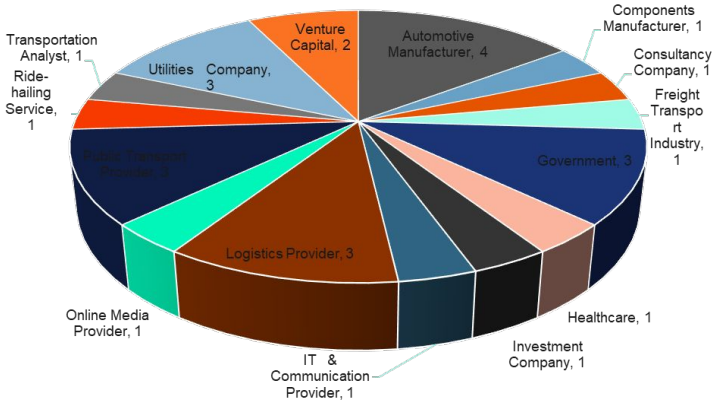
Legacy, history, past experience

Scenario planning

Strategies

# Scenario Planning Processes

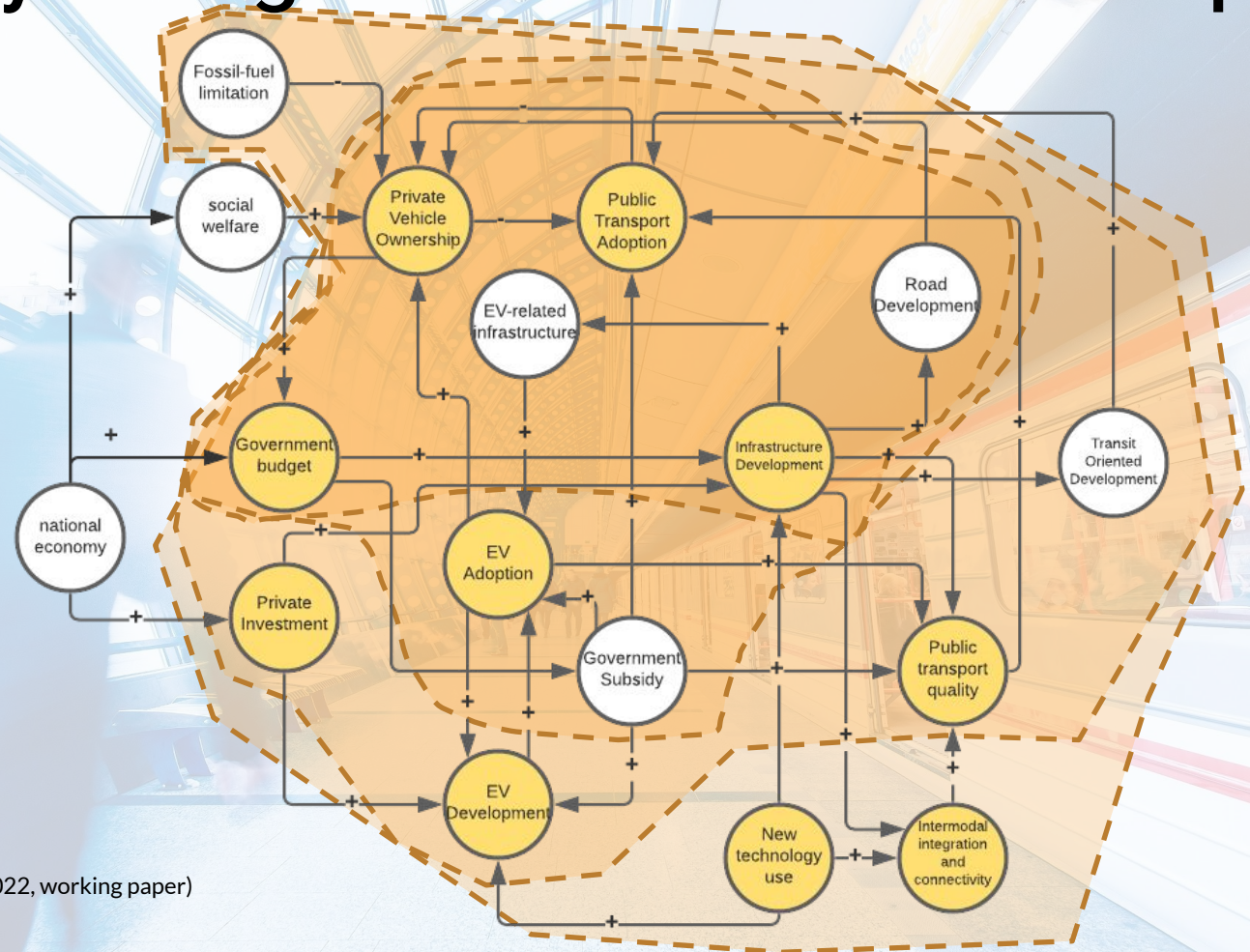
| STAGE 1<br>3 WEEKS | STAGE 2<br>2 WEEKS | STAGE 3<br>1 WEEK | STAGE 4<br>2 WEEKS | STAGE 5<br>2 WEEKS | STAGE 6<br>2 WEEK |
|---|---|---|---|---|---|
| **Collection of perceptions (current & futures)** | **Identification of driving forces & ke uncertainties** | **Visioning of Future Headlines** | **Identification of Scenario Elements & Implications** | **Formulation of Strategic Options for Each Scenario** | **Development of Potential Business Opportunities** |
| • Literature review<br>• Online interview<br>• Online survey for mobility users | • Interview analysis<br>• Discussion by team | • Discussion by team | • Discussion by team | • Discussion by team & experts<br>• Developing mobility users' personas | • Discussion by team |



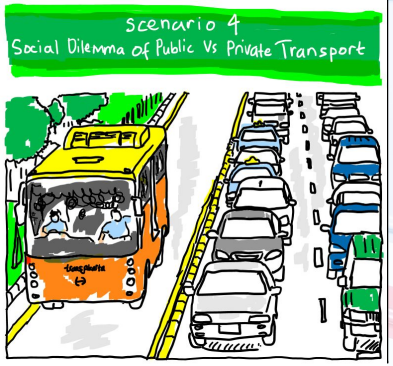

27 Stakeholders involved, coming from middle to senior level management: Senior Managers, Directors, CEOs, Head of Government Agencies, Commissioners

Source: Sunitiyoso et al (2022, working paper)

# Key Driving Forces & Their Relationships



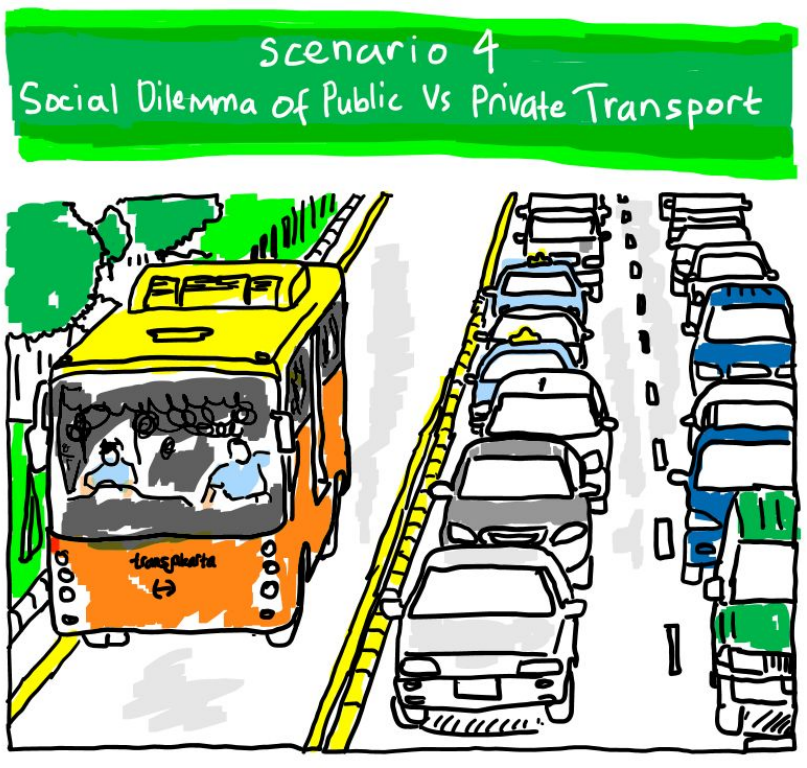

Source: Sunitiyoso et al (2022, working paper)

| | Scenario 1 | Scenario 2 | Scenario 3 | Scenario 4 |
|---|---|---|---|---|
| | **One Seamless Ecosystem** | **Culture of Public Transport** | **Exclusive Green Community** | **Social Dilemma of Public vs Private Transport** |
| **Headlines** | *"Mobility user have seamless experience supported by integrated and well connected infrastructure"* | *"In big cities the middle and upper class want to use public transportation, however in small cities traffic congestion increase"* | *"The technology adoption of EVs is increasing, however it creates the convenience of using private vehicles"* | *"Private vehicles are increasingly diverse, the choice of public transportation is not expanding"* |
| **Illustration** |   |   |   |   |

# Social Dilemma of Public vs Private Transport

*"Private vehicles are increasingly diverse, the choice of public transportation is not expanding"*

- Limited access to public transport
- Private vehicles dominates
- No emission standard policy in the cities
- Slow public transport development
- Development of roads and motorways
- High traffic congestion




Source: Sunitiyoso et al (2022, working paper)

# Exclusive Green Community

*"The technology adoption of EVs is increasing, but it creates the convenience of using private vehicles"*

- Limited access to public transport
- Limited incentives for EVs
- Emission standard policy in the cities
- EVs are adopted by middle & high economic class
- Development of roads and motorways
- High traffic congestion, but less polluted


Source: Sunitiyoso et al (2022, working paper)

# Culture of Public Transport

*"In big cities the middle and upper class want to use public transportation, however in small cities the congestion conditions increase"*

- High accessibility to public transport
- Digitalization & electrification of public transport
- Limitation of fossil fuel & private vehicles
- EVs are only for middle and high economic class
- Electronic Road Pricing is applied in main roads
- Transit Oriented Development


Source: Sunitiyoso et al (2022, working paper)

# One Seamless Ecosystem

*"Mobility user have seamless experience supported by integrated and well-connected infrastructure"*

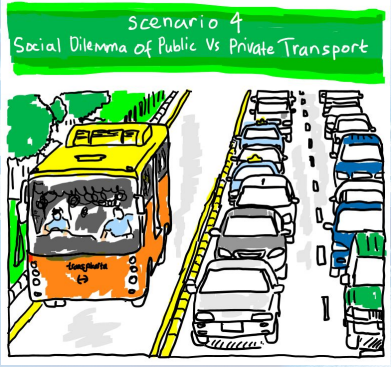
- Mobility-as-a-Service (MaaS) is the norm
- Integrated transport systems & infrastructure
- Limitation of fossil fuel & private vehicles
- Incentives for EV make it affordable
- Flexible in changing mode (incl. shared mobility)
- People use public transport & cycling


Source: Sunitiyoso et al (2022, working paper)


Scenario 3
Exclusive Green Community


Scenario 1
One Seamless Ecosystem
METRO


Scenario 2
Culture of Public Transport


Scenario 4
Social Dilemma of Public Vs Private Transport

?

?

?

?

?

now

2030

# What has been done so far?

- Digital Transformation for Transport Development
- *Integrated Urban Transport System*
- *Electric Transport*

# Digital Transformation & Integrated Urban Transport System

# Government Regulations / Decrees Mandating the Intermodal Integration

| | Regulations | Policy Summary |
|---|---|---|
| PRESIDEN REPUBLIK INDONESIA | **Presidential Decree No. 55 Year 2018**<br>Greater Jakarta Transport Masterplan | ▪ Mandate to implement **integrated intermodal payment system** for Greater Jakarta Public Transport Services (including Jakarta, Bogor, Depok, Tangerang and Bekasi) |
| DPRD | **Jakarta Provincial Law No 1 Year 2018**<br>Long Term Development Plan for Year 2017 to 2022 | ▪ **Integrating Transportation System to become interoperable and interconnected**<br>▪ Integrating Mass Rapid Transit, Light Rail Transit, Bus Rapid Transit into greater development of mass public transport by Provincial Government, Central Government, Central SOE and Private Operators including all road-based and rail-based transport operators |
| JAYA RAYA | **Jakarta Governor Decree No 63 Year 2020**<br>Governor Instruction to Jakarta Owner Transport Companies to Implement Integration | ▪ Assignment to **PT MRT Jakarta, PT Transportasi Jakarta dan PT Jakarta Propertindo** to **implement integrated multimodal transportation payment system**, in which they can establish a new company based on applicable laws |
| JAYA RAYA | **Jakarta Governor Decree No 68 Year 2021**<br>Regulation on Operating the Integrated Transportation Systems JakLingko | ▪ **Operation of JakLingko System**<br>▪ JakLingko Operating Company can perform commercial activities<br>▪ Initiatives to Improve the Use of Public Transports by citizens<br>i. Infrastructure and fleet integration<br>ii. Operating system integration<br>**iii. Bundled Fare Implementation** |



Source: ITS Indonesia (2022)

# Public Transport Integration Dimensions

| | Physical | Management | Ticketing | Services | Information | Brand |
|---|---|---|---|---|---|---|
| CHALLENGES | Not all stations are connected and have good transfer facilities | Unharmonized policies. Complex bureaucracy. No integrator entity. | Variety of pricing structure. E-ticketing is still in silos. | Unsynchronized scheduling. Customer orientation but not integrated. | No integrated database among operators. Some operators provide real-time info but not yet optimal. | Individual branding among operators; uncoordinated campaigns |
| SOLUTIONS | • Integrated Network Design<br>• Multimodal Station Design | • Integrated Policies<br>• Integrated Planning | • Integrated Pricing Structure<br>• On-the-shop Ticketing | • Schedule Synchronization<br>• Customer-oriented Services<br>• End-to-end Multimodal Journey Planner | • Integrated Real-time Data Warehousing<br>• Data Analytics Capability | • Joint Marketing<br>• Unified Marketing<br>• Integrated Stakeholders Management |

Source: Modified from MITJ (2022)


# From **single systems** to **an integrated system**


Source: ITS Indonesia (2022)

# JakLingko Implementation Phases


Deployment of standard transport card and mobile app to use four mass transport modes: MRT Jakarta, LRT Jakarta, Rail Commuter Line, and Transjakarta Buses.

**(August 2021).**

Distance-based fare integration across public transport modes, expand to more public transport operators and include first-mile/last-mile services.

**(expected in April 2022)**

Account-based ticketing to enable various ticketing models, such as period passes (daily, weekly, monthly) and targeted concession tickets (student, elderly, disable persons)

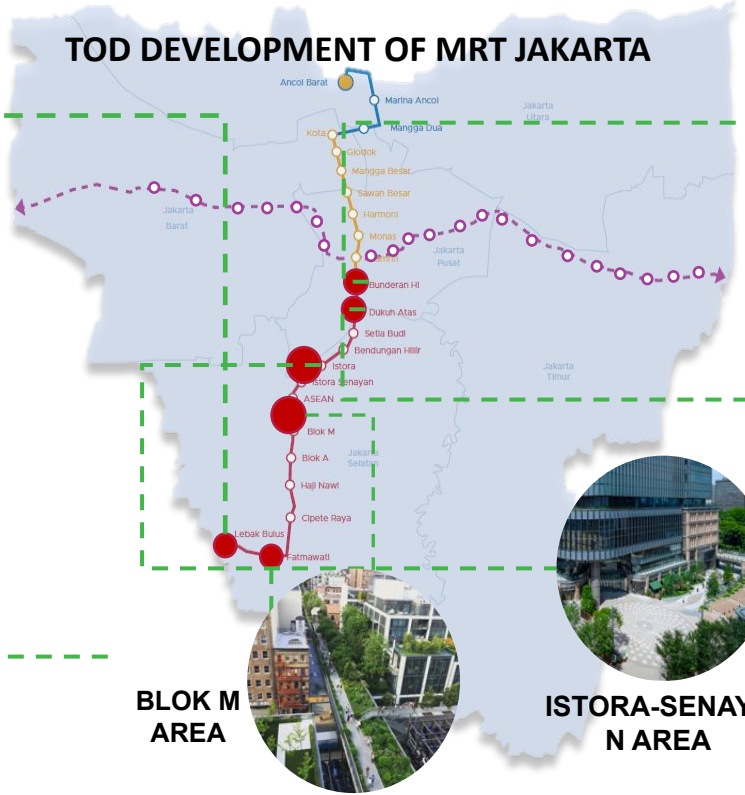
**(expected in Sept 2022).**

Source: JakLingko (2022)

# TRANSIT-ORIENTED DEVELOPMENT (TOD)


LEBAK BULUS AREA

FATMAWATI AREA




BUNDARAN HI AREA

DUKUH ATAS AREA

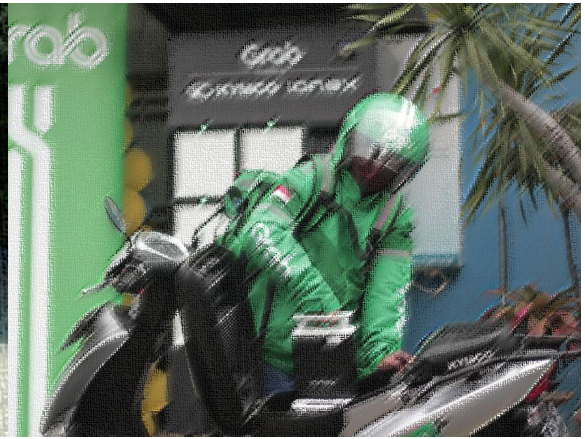
ISTORA-SENAYAN AREA



BLOK M AREA

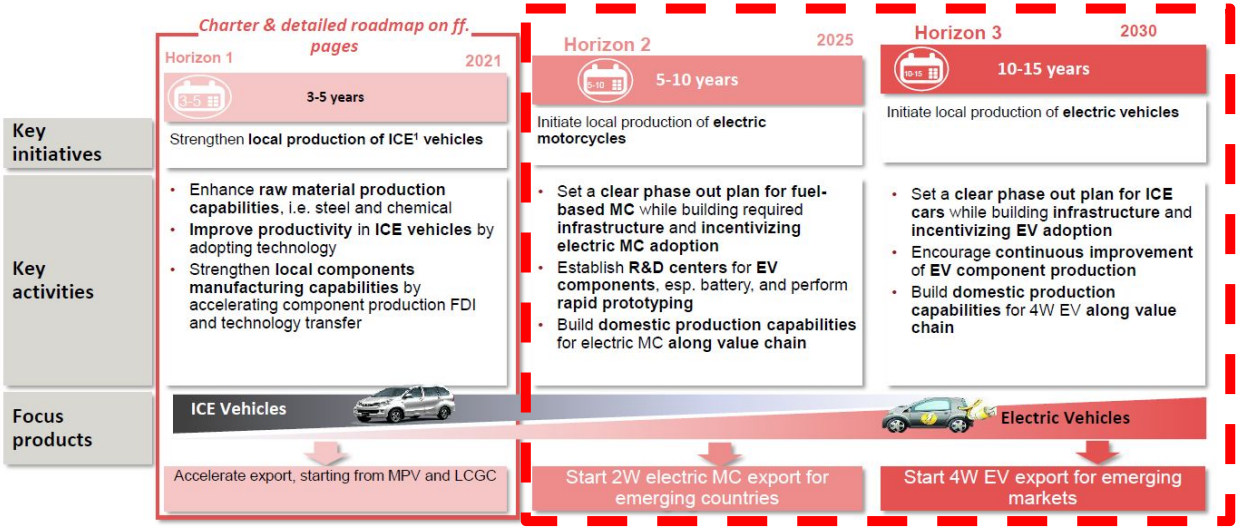
Source: MRT Jakarta (2022)

# ElectricTransport

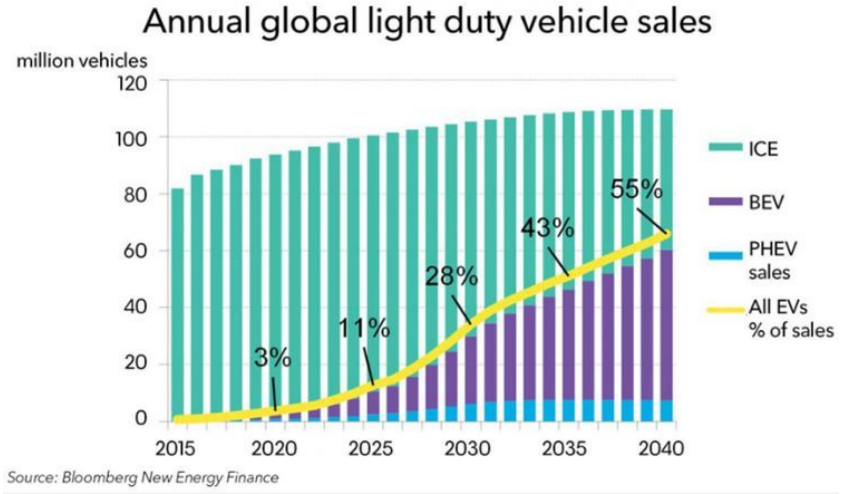


# Electric Vehicles


Indonesia continues to be committed to achieving net zero emissions by **2060**. In order to do that, the government and other stakeholders need to collaborate to control climate change. ***Electric Vehicles Become Indonesia's National Program to Support Zero Emissions***



# Electric Vehicles




INDONESIA

## 4-Wheel (2030)

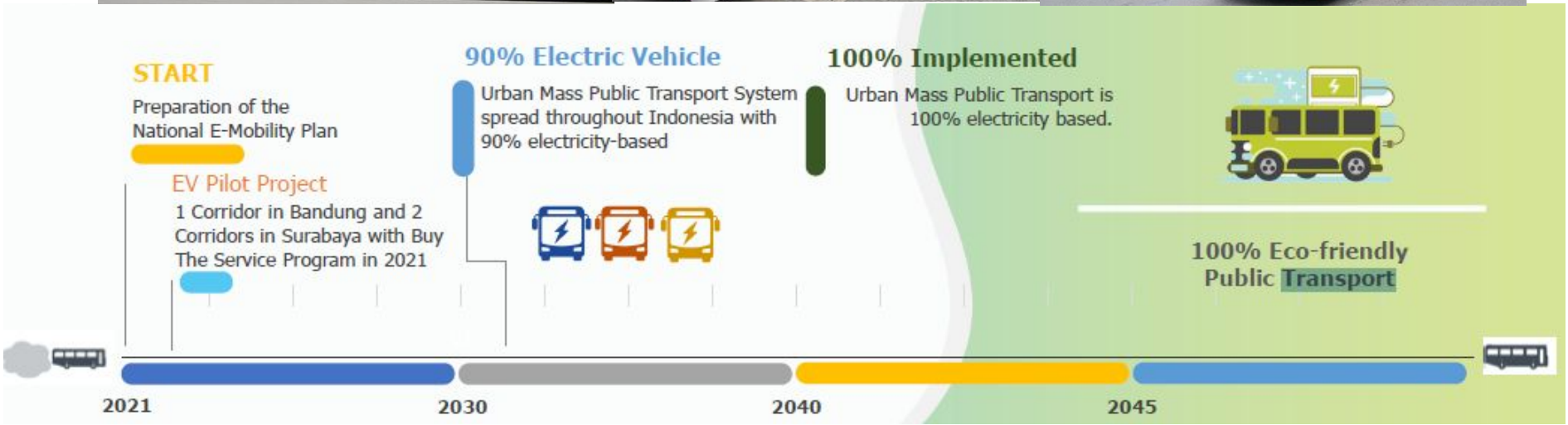
- Production target: 600.00 unit.
- CO2 emission reduction: 2.7 million ton.
- Production facility: 1.680 unit/year by 3 local companies.

## 2-Wheel (2030)

- Production target: 2.450.000 unit.
- CO2 emission reduction: 1.1 million ton.
- Production facility: 1.04 million unit/year by 21 local companies.

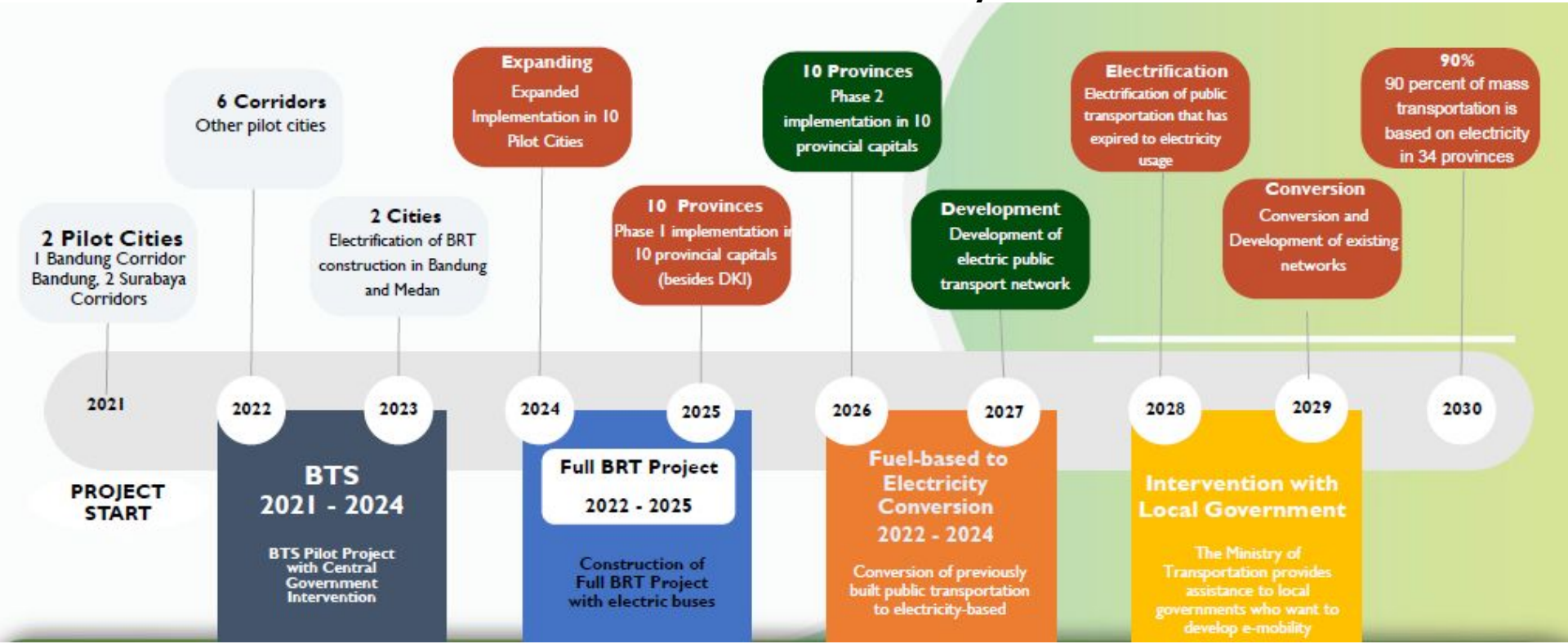

**Source:** Deputy of Strengthening for Research and Development MORT/NRIA, 2020

# Electric Buses: National E-Mobility Plan

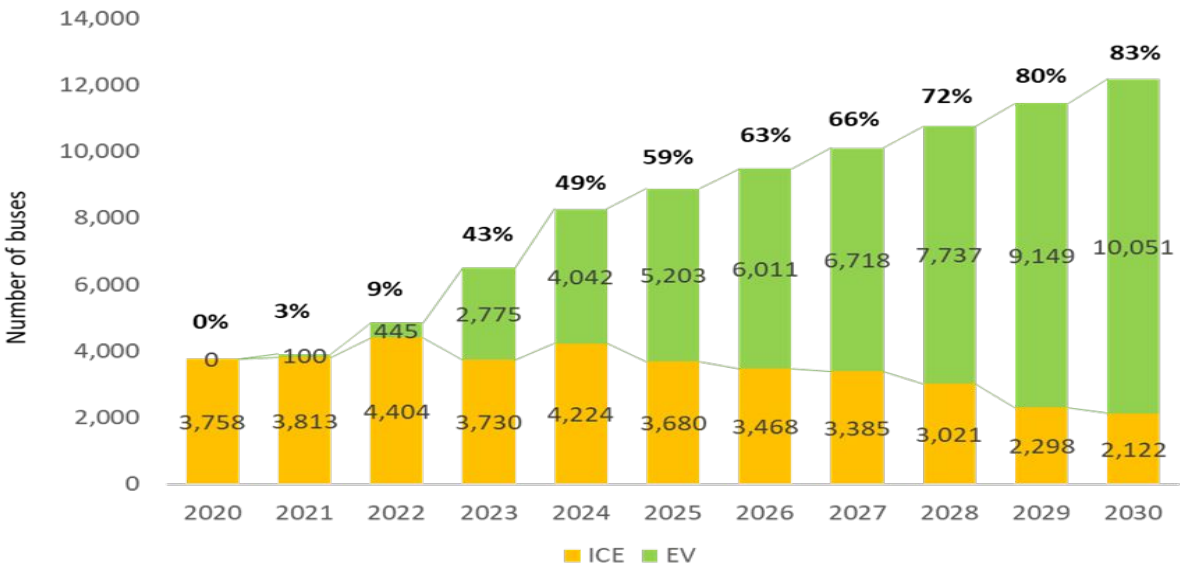

Source: Ministry of Transportation (2022)

# Electric Buses: National E-Mobility Plan




Source: Ministry of Transportation (2022)

# Electric Buses: TransJakarta






**CHALLENGES**

The **price** of an Electric Bus and its charger is currently in the range of 2.5 - 3 times the price of an ICE Bus, where the largest component is the price of the battery.

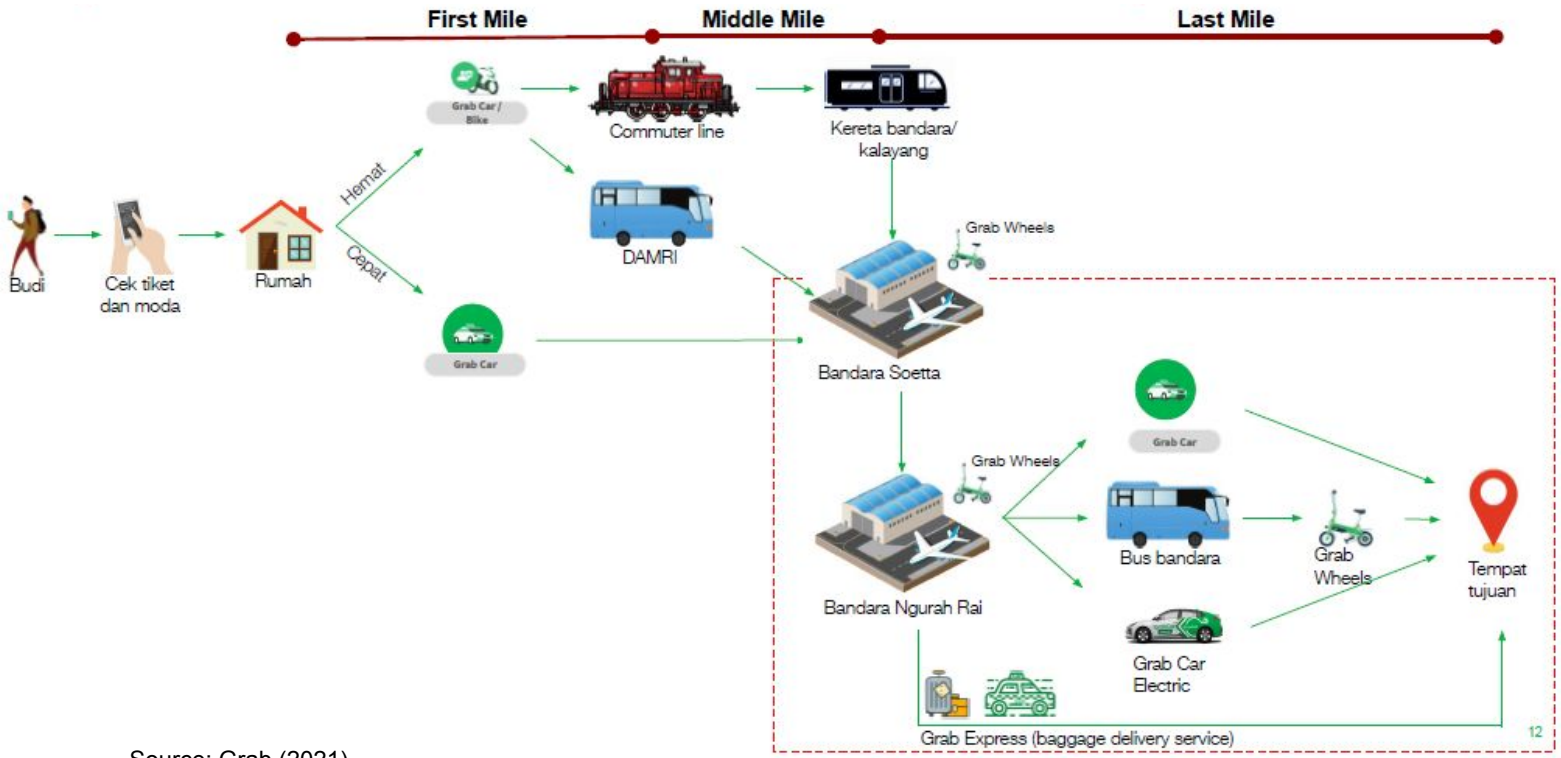
Large investments are required to prepare **electrical power**, including electrical network equipment and permits for connecting to electricity network.

Provision of (a) **facilities** for the fleet along with chargers & electricity grid; (b) advanced **information systems** including battery charging scheduling

Training and certification of **human resources** related to (a) work related to strong electric current, and (b) the operation, maintenance and repair of electric buses.

Source: Transjakarta (2022)

# First-Mile/Last-Mile on Electric Ride-Hailing Services



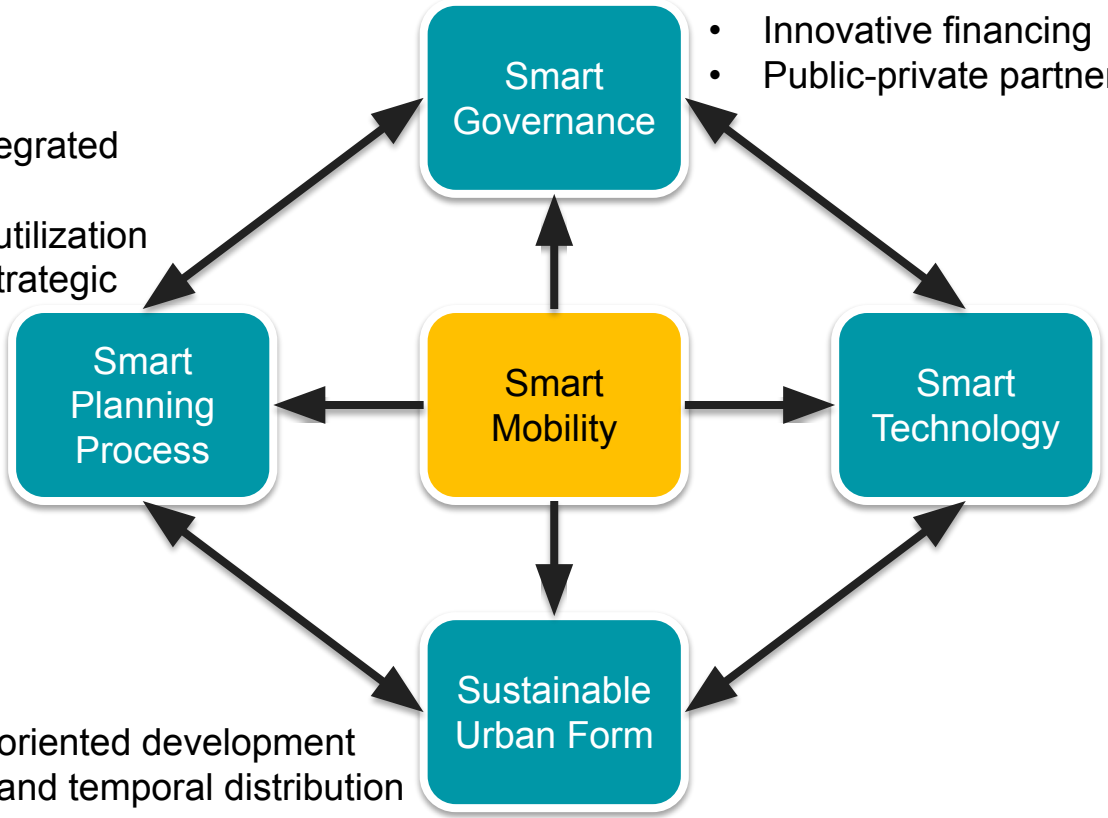

Source: Grab (2021)

# Key Remarks

# Enabling Smart Mobility

- Policy/regulation
- Incentive/disincentive
- Innovative financing
- Public-private partnerships

- Real-time & integrated information
- Data analytics utilization
- Collaborative strategic planning




- Intelligent transport system
- Mobility-as-a-service (MaaS) platform.
- Autonomous vehicles
- Electrification, renewable energy

- Transit-oriented development
- Spatial and temporal distribution (e.g., road pricing, parking management, teleworking)

Source: Modified from Dirgahayani (2021)

# Enabling Smart Mobility

| | |
|---|---|
| **Infrastructure, facilities, ecosystem** | Physical integration between public transport modes |
| | Supporting infrastructure, industry and ecosystem |
| **User Behavior** | Moving from an “ownership-based paradigm” to an “access-based perspective” of mobility. Buy mobility services, not the transport modes. |
| | Shifting from private vehicles to public transport. |
| **Policies & Regulations** | Push and pull policies to shift from private to public transport |
| | Tax holiday/allowance and incentives to support vehicle electrification |
| **Intermodal Integration** | Integration of all the available forms of transport, public and private, into one easy-to-use “travel package” (or “bundle of services”). |
| | Integration of end-to-end trip planning, booking, electronic ticketing, and payment services, also real-time travel information (before, during, and after the trip). |
| **Environmental Impact** | Public and private transport electrification to reduce environmental impact. |
| | Shifting from private vehicles to public transport to reduce emissions. |
| **Economics & Financing** | Alternative financing to reduce public transport subsidies through public-private partnership and increase non-farebox income. |
| | Appropriate level of market demand for the mass production (economic of scale) of electric vehicles. |

# Thank you !