Improving Fuel Efficiency in All Modes: E-bus and E-2/3W Initiatives in Indonesia

ITDP Indonesia
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The Compact City Scenario Electrified
The Only Way to 1.5°C

As we recover from COVID-19, we must choose how our cities will grow. Recent research studied four possible scenarios for the future. Only one scenario is consistent with limiting global warming to less than 1.5°C and avoiding the worst effects of climate change.

- Business As Usual: We keep building cities for cars instead of people, car use increases, and most cars and vehicles are powered by fossil fuels.
- Vehicle Electrification: All new motor vehicles are electric by 2040, worldwide. But cities are still built for cars instead of people.
- Compact Cities: We build dense, mixed-use cities focused on public transit, bicycling, and especially walking. But most motor vehicles are still powered by fossil fuels.
- Compact Cities - Electrified: We build dense, mixed-use cities focused on public transit, bicycling, and especially walking. All new motor vehicles are electric by 2040.

Read the report, The Compact City Scenario - Electrified, by ITDP and UC Davis, at: www.itdp.org/publication/the-compact-city-scenario-electrified/
ITDP Support for E-Mobility in Indonesia

E-mobility Adoption Roadmap for Indonesian Mass Transit System
- A World Bank project
- January - March 2022

TUMI E-bus Mission in Jakarta
- Under Transformative Urban Mobility Initiative (TUMI)
- June 2021 - November 2022

Supporting Jakarta’s Transition to E-mobility
- Supported by UNEP-CTCN
- March 2020 - May 2021

Action Plan to Scale-up Transjakarta E-buses
- Supported by UK PACT
- February 2021 - March 2022

Regulatory and Financial Basis for First Phase Transjakarta E-bus
- Supported by UK PACT
- March 2022 - March 2023

Timetable for Two-Wheeler Ride Hailing Fleet Electrification
- Supported by UK PACT
- February 2021 - February 2022

Scaling Up Clean Urban Mobility in Indonesia
- Supported by CWF
- March 2022 - February 2024

Mainstreaming Electric 2&3 Wheelers in Indonesia
- Supported by UNEP
- July 2021 - August 2022

Semarang

Jakarta

Greater Medan

Greater Bandung

National Context

Electric -bus

Electric 2/3 wheelers
## EV Transition in Indonesia: Targets vs Current Uptake

### EV adoption targets

<table>
<thead>
<tr>
<th>Year</th>
<th>E-2W</th>
<th>E-4W</th>
<th>E-bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>2025</td>
<td>2.1 million units (1.9% of current population)</td>
<td>2,200 units (0.01% of current population)</td>
<td>10% of urban bus fleets</td>
</tr>
<tr>
<td>2030</td>
<td>13 million units (11.5% of current population)</td>
<td>2 million units (12.8% of current population)</td>
<td>90% of urban bus fleets</td>
</tr>
<tr>
<td>2030 (moderate target)</td>
<td>16,936 units (0.13% from 2030 target)</td>
<td>2,309 units (0.12% from 2030 target)</td>
<td>43 units (0.27% from 2030 target)</td>
</tr>
</tbody>
</table>

### Notes:
- A Presidential Regulation no 55/2019 has been issued to accelerate the Battery Electric Vehicle (BEV) uptake in Indonesia.
- The Government of Indonesia targets to reduce the GHG emissions by 2,726 Mton CO2 eq in 2050 (58% from BAU baseline), and the use of BEV is one of the strategy to achieve this target.

Source: National General Energy Plan
E-2/3W Initiatives in Indonesia
2&3 Wheelers as Catalysts for EV Adoption in Indonesia

- 113 million units nationwide
- 4.5% annual growth rate
- 27% GHG emissions in Indonesia come from the transportation sector
2&3 Wheelers as Catalysts for EV Adoption in Indonesia

1. **Potential less range anxiety.**
   2&3W are generally used for shorter trips compared to cars, hence less range anxiety is expected even with the current low availability of public charging infrastructure.

2. **Easier to charge.**
   Smaller batteries and wattage to charge, no need to upgrade electricity in houses with low electrical power.

3. **Faster charging** and the availability of battery swap technology.

4. **Comparable total cost of ownership (TCO) and innovative business models.**

5. **Presence of large commercial and public motorcycle fleets** (ride-hailing services and government fleets).
   Easier to coordinate the adoption, bigger impacts due to higher VKT.

6. **Availability of multiple models.**
   Many domestic OEMs, various models for different needs.

*Source: Mainstreaming Electric 2&3W in Indonesia (Working document)*
Ride-hailing electrification can be a good starting point.

ITDP estimates* that ride-hailing fleet electrification in Greater Jakarta can lead to:

- **58%**
  Annual life-cycle emission compared to BAU

- **8.4%**
  Annual national gasoline import

- **-USD 173.8 million**
  Annual national gasoline incentive

Ride-hailing fleet electrification can have a bigger impact than private vehicles, since they have higher VKT (around 150 km/day)

* based on estimated number of ride-hailing motorcycles in Jakarta = 900,000 units

Source: UK PACT project “Action Plan and Timetable for Ride-hailing Electrification in Jakarta” (2022)
## 2&3 Wheelers Electrification Initiatives in Indonesia

<table>
<thead>
<tr>
<th>NATIONAL AND LOCAL-LEVEL INITIATIVES</th>
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<tbody>
<tr>
<td><strong>The National Government targets</strong> 13 millions E2W units in operation by 2030 and 100% E-2W sales in 2040</td>
</tr>
<tr>
<td><strong>Ride-hailing companies have time-bound electrification targets</strong> (GO-JEK: 100% electric fleets by 2030, Grab: 26,000 E2W units by 2025)</td>
</tr>
</tbody>
</table>

### National level incentives

- **Lower luxury goods tax** for lower emission vehicles
- **Bulk electricity tariff** for public charging infrastructure and home charging for registered EV users
- **Credit incentives**: Allow banks to offer lower interest rates for BEV purchase
- **Tax holidays and allowance** for industries complying to minimum % component requirement
- **Tax deduction** for BEV industry RnD
- **Limited import fee exemption** for machinery and materials

### Local level incentives

- **Vehicle ownership and transfer tax exemption/reduction** (Jakarta, West Java, Bali)
- **Parking fee** exemptions (Jakarta)
- **Limited road access** exemptions (Jakarta)
- **In pipeline**: Low emission zones
Stakeholders of Electrification

Source: Mainstreaming Electric 2&3W in Indonesia (Working document)
Challenges and Recommendations for the Uptake

Challenges

- **No clear roadmap to achieve national targets** and scarcity of local-level targets. Many stakeholders complicate the matter.

- **Under developed EV ecosystem**, such as lack of charging infrastructure and after sales market, leading to range anxiety and investment uncertainty.

- Lack of attractive financing schemes and no **significant economic benefit yet**, before TCO parity is achieved, due to the low cost of conventional vehicle and fuel. To date, there is no budget allocation plan for direct purchase subsidy.

- **Safety concerns due to lack of public awareness, knowledge and vague regulations.**

Key Policy Recommendations

- **Develop national EV and charging infrastructure roadmap** to achieve the targets, including fiscal and non-fiscal incentive roadmap and budgetary commitments, aligned with GHG reduction target and ICE phase-out policies.

- **Develop local-level incentives** (e.g. land provision for charging infrastructure) and **disincentives for polluting vehicles** (low/zero emission zones, parking fare, road pricing, etc.).

- Clearly regulate vehicle size, speed limit, road allocation.

- **Initiate battery standardization** to ensure safety and accelerate battery swap facilities, and quickly regulate battery waste management.

*Source: Mainstreaming Electric 2&3W in Indonesia (Working document)*
E2&3W, in particular e-micromobility (e.g. e-bikes) can support independent mobility of women, the elderly, and people with disabilities

- Lighter weight
- Suitable for short distance trips (first-last mile mobility, daily trips for errands around the neighbourhood)
- Comparably cheaper than e-motorcycles

Concerns

- Speeding on sidewalks and bike lanes
- Illegal parking on sidewalks
- Low noise causes lack of early notice for visually-impaired road-users

Source: Mainstreaming Electric 2&3W in Indonesia (Working document)
**E2&3W Uptake as a Momentum to Improve Mobility Inclusivity and Road Safety**

**Online Focused Discussion with Vulnerable Groups**

**Key Recommendations for Urban Traffic**

- **Road Design and Vehicle Operations**
  - Provide protected infrastructure and set lower speed limit on the lane (<25 km/h)
  - Lower motorized vehicle speed limits
  - Prioritize pedestrians and cyclists

- **Traffic Management**
  - Limit through traffic (e.g. through bottom-up neighborhood consensus, traffic calming measures, geo-fencing)
  - Enforce rules and sanctions on illegal parking

- **Vehicle Usage**
  - Promote E2&3W as first-last mile connectivity through infrastructure and facility integration at transit points (bike-sharing, parking, etc.)
  - Clearly define age limits and other user requirements

- **Vehicles**
  - Mandate speed limiters
  - Mandate Acoustic Vehicle Alerting System (AVAS)

**Source:** Mainstreaming Electric 2&3W in Indonesia (Working document)
E-bus Initiatives in Indonesia
MoT’s Public Transport Electrification Plan

**First Two Cities**
- 1 Corridor in Bandung, 2 Corridors in Surabaya

**BTS**
- 2021 - 2024
  - BTS Pilot Project with the intervention from the Government of Indonesia

**Two Cities**
- BRT Electrification in Bandung and Medan

**Full BRT Project**
- 2022 - 2025
  - Full E-Bus BRT project development

**6 Corridors**
- At the next 6 pilot cities

**Expansion**
- In 10 pilot cities

**10 Provinces**
- 1st implementation phase in 10 provinces’ capital (outside Jakarta)

**10 Provinces**
- 2nd implementation phase in 10 provinces’ capital

**Electrification**
- For fleets which are at their end of lifetime

**Developments**
- The development of electric public transport network

**Conversions**
- Conversions and developments of existing PT network

**90%**
- 90% of PT fleets are electrified in 34 provinces

**PROJECT START**
- 2021

**Interventions with Local Gov.**
- Ministry of Transportation provides assistance for Local Governments who want to conduct PT electrification.

**Source:** Ministry of Transportation
Key findings:

- Potential benefits of PT electrification:
  - **Transjakarta fleets**: Reduction of 224,432 tons CO2eq in 2030, compared to BAU (29.8% reduction). With cleaner grid, the impact will be more substantial.
  - **Bandung BRT**: Annual reduction of 780 tonness on NOx and 5.0 tonnes of PM
  - **Medan BRT**: Annual reduction of 2,430 tonnes on NOx and 15.6 tonnes of PM

- The total cost of ownership (TCO) of electric buses is still 40-59% higher than diesel buses. The gap is lower for electric microbuses (21%).

- Fiscal incentives both for fleet and charging infrastructure, innovative business models, regulatory support (e.g. longer contracts for e-buses) and disincentives for ICE fleets (e.g. Low Emission Zone implementation) can accelerate the transition

Key Findings: Public Transport Electrification

- **The National Government targets** 90% of public transport buses are electrified by 2030, including the upcoming bus rapid transit (BRT) systems in Greater Bandung and Greater Medan.

- **Transjakarta** (Jakarta’s PTA) plans to have 10,000 e-buses in operation by 2030
Around **10,000 electric bus fleets** are planned to be operated by 2030.

**Transjakarta Electrification**

**OPPORTUNITIES:**

- Current uptake: 30 pilot e-buses (Low Entry Bus)

The pilot deployment is conducted on 2 routes with high visibility (passing the Sudirman-Thamrin main corridor) and use overnight charging strategy.

**Transjakarta Electric Bus Share**

Source: Transjakarta, 2022

- 2021: 0%
- 2022: 2%
- 2023: 10%
- 2024: 35%
- 2025: 51%
- 2026: 53%
- 2027: 59%
- 2028: 61%
- 2029: 87%
- 2030: 100%

10,047 unit electric buses
4-stage analysis methodology

1. Defining the typology
   • Scope the e-bus types to be analyzed based on market availability
   • 8 typologies overall

1. Identifying charging systems
   To identify the suitable charging system for each route for each typology

1. Grouping the routes
   To group routes which are recommended to be implemented at the same time based on a spatial analysis (route and charging infrastructure overlap)

1. Phasing the implementation of the groups
   Based on technology maturity and charging infrastructure provision needs

ITDP recommends 5 implementation phases for Transjakarta e-bus deployment:

- **Phase 1 (2021 - 2024)**
  - Single bus
  - Single bus Medium bus Pilot Mikrotrans
  - Overnight + Staging Facilities + Terminal Charging

- **Phase 2 (2024 - 2027)**
  - Single bus Medium bus Articulated bus Mikrotrans
  - Overnight + Staging Facilities + Terminal Charging

- **Phase 3 (2027 - 2030)**
  - Single bus Medium bus Articulated bus Mikrotrans
  - Overnight + Staging Facilities + Terminal Charging

*Based on UNEP CTCN and UK PACT EUM 124 Projects

** Recommendations on Mikrotrans (microbus) electrification differs with single or medium buses. ITDP recommends implementation of only 50 pilot electric Mikrotrans units in 2022, followed by phase 1 in 2023, phase 2 in 2024 - 2025, phase 4 in 2026 - 2028, and phase 5 in 2028 - 2030."
Creating a Sustainable Ecosystem for Public Transport Improvement and Electrification

Electrification can be a momentum for overall Level of Service Improvement

**Issues on each electrification stage**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Lack of reliable operational data and transit infrastructure for potential charging location</td>
</tr>
</tbody>
</table>
| Fleet procurement      | - Weak financial capacity and poor bankability of the operators  
                         | - No financing/subsidy provision mechanism                           |
| Infrastructure provision | - Weak financial capacity and poor bankability of the operators  
                          | - No existing depot > need to procure land                           |
| Operations             | Irregular operations > issues on planning charging time and battery size |
| Maintenance            | No dedicated maintenance facility and lack of skills                  |

**Public transport reform are needed**

**Action plan:**

1. **Build the basics:** Develop PT plan, LoS, and Public Transport Authority (PTA), subsidy scheme

2. **Improve the operators**

3. **Set the PTA:** Develop operational plan (including electric fleets), contract documents, fare collection system, business models

4. **Contract and manage operators**

**Typical public transport services in cities other than Jakarta:**

- Informal, weakly regulated, and seldom subsidized
- Poor level of service (poor fleet quality, unreliable service, long waiting time, many transfers)
Thank you

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