CLEAN AIR ASIA

Electric 2- and 3-Wheeler Development in the Philippines

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Presentation Overview

- Introduction: Clean Air Asia and the Sustainable Transport Program
- Electric 2- and 3-wheelers in the Philippines: Baselines and Policies

Clean Air Asia...

leads the mission for better air quality and healthier, more livable cities in Asia.

INDONESIA

MALAYSIA

NEPAL

THE PHILIPPINES

SRI LANKA

VIETNAM

CLEAN AIR ASIA

Electric 2- and 3-wheeler Development in the Philippines

Our Programs

Air Quality and Climate Change

Sustainable Transport

REGIONAL NATIONAL SUB-NATIONAL

Training & Workshops
Hands-on Work

CAPACITY BUILDING

INFORMING FOR ACTION

Data gathering & analysis
Knowledge products
Awareness raising

POLICY GUIDANCE

Science-based

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Registration trends of 2- and 3-wheelers in the PH

- Data (as of 2016) show that 2 and 3-wheelers have consistently been above **77% of the total shares among first registrant motor vehicles** in the Philippines
- A significant portion of these registrations are classified as **motorcycles, motorcycles with sidecar, and tricycles**
- **118% - 265%** growth from 2005 – 2016

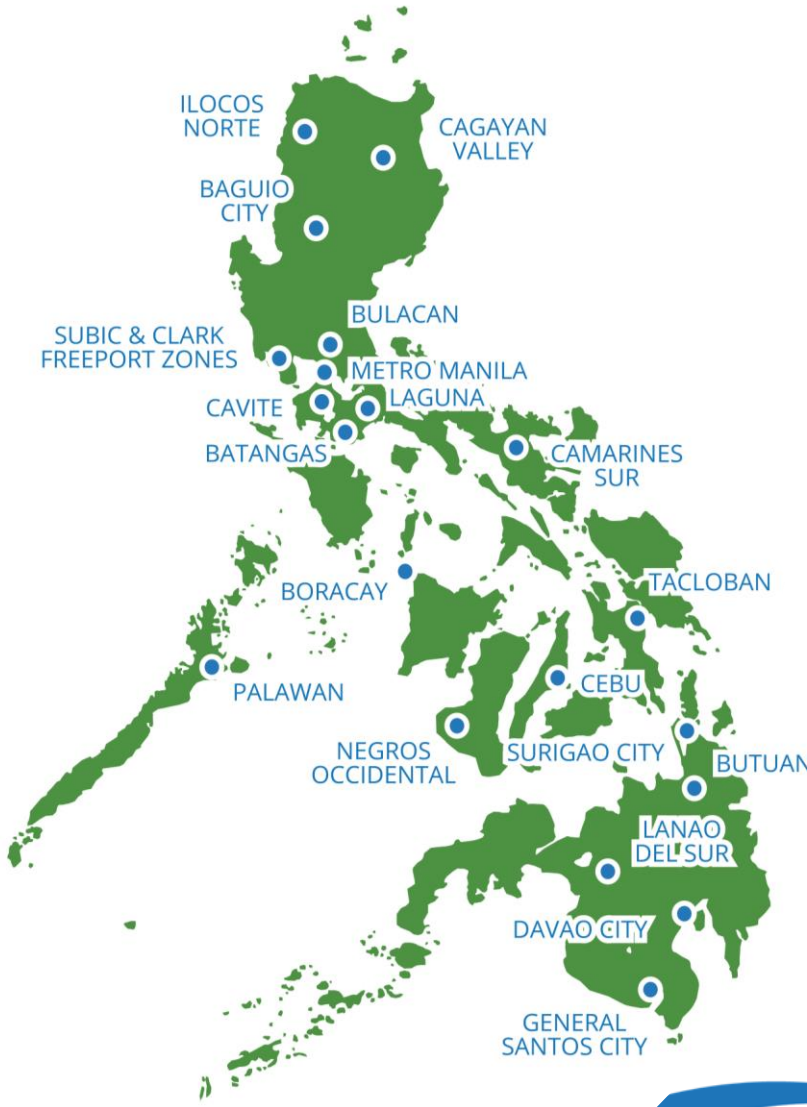
Fuel economy analysis

- Observed a downward trend in average fuel consumption and emissions from 2005 to 2016 due to the increase in use of **smaller engines.**

- But there is still room for improvement in these projected trends by adopting motorcycles with cleaner technologies

Electric Vehicles in the Philippines: Policies

- Republic Act No. 11697 – Electric Vehicle Industry Development Act **(EVIDA)**
- Implementing Rules and Regulations: Comprehensive Roadmap for Electric Vehicle Industry **(CREVI)**
  - EV and charging stations, manufacturing, research and development, human resources development



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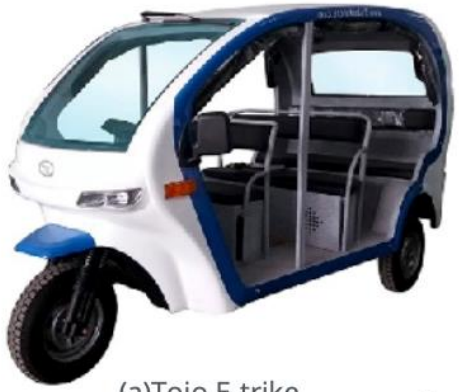
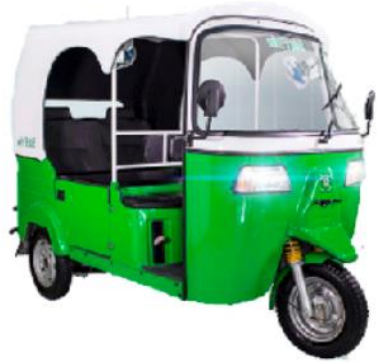
A steady growth...

of EVs registered annually has been observed. It has surpassed more than 1000 vehicles in 2017 and peaking in 2018 with a total of 4,632. Two- and three-wheelers dominate the segments by around **75% of the total registered EVs**.

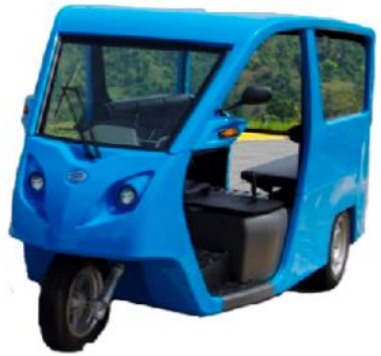
But not all EVs are registered (i.e., electric bicycles)



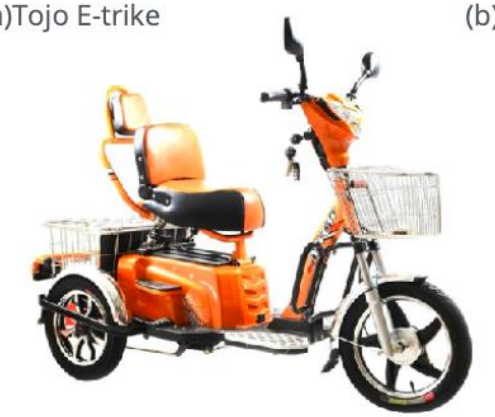
(a)Tojo E-trike

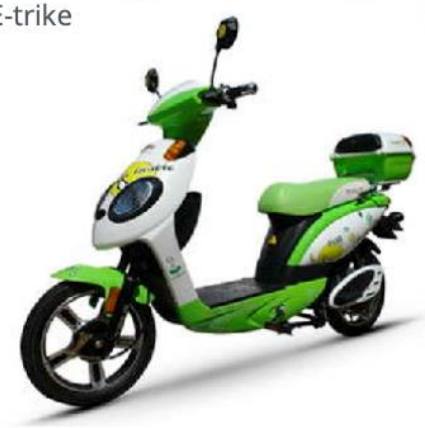


(b) Star-8 E-trike



(c) BEMAC E-trike





(d) E-mopeds and e-motorcycle

Surveys conducted with the suppliers in the Philippines reveal that there are over 200 models of EVs (e-bike, e-motorcycle, or e-trike categories) that are available in the market, the registration for which has not been fully implemented.

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Electric 2- and 3-wheelers for Personal Use

Number of Available Models: 101	
Declared Seating Capacity	Minimum of 1; Maximum of 4
Battery Bank Voltages Used	36V and below: 6% 48V: 63% 49V and above: 31%
Battery Energy Used	Ranges from 1.44kWh up to 2.88 kWh
Type of Battery	Lithium Ion: 2%
	Lead Acid: 95%
	Both: 3%
Selling Price	Between PhP 6,390.00 to PhP 58,000.00 Average: PhP 34,000.00

Source: Actual Surveys and Interviews from LEV distributors

- Some would make modifications on their bicycles by adding a brushless DC motor, motor controller, battery bank, and a battery management system which allowed the bicycles to function as a basic electric vehicle.This is placed under the category of a Do-It-Yourself (DIY) brand

Electric 2- and 3-wheelers

for Public Transport

Number of Available Models: 20	
Declared Seating Capacity	Minimum of 4; Maximum of 9 (including driver)
Battery Bank Voltages Used	48V, 55.2V, 60V, 72V, 82.8V (varied across models)
Battery Energy Used	Ranges from 1.44kWh up to 16.2kWh
Type of Battery	Lithium Ion: 62% (12 models) Lead Acid: 25% (6 models) Both: 10% (2 models)

Source: Actual surveys and interviews from different e-trike stakeholders

- Different payment arrangements
  - Continuance fund (PhP 150 for 6 days to be used for maintenance and battery replacement). Drivers must provide free rides to public school students
  - *Boundary-hulog* (PhP 150/day for five years)

Operating arrangements of pilot programs

- Battery swapping system to address range anxiety and battery maintenance (Mandaluyong, Boracay). Cost: PhP 150-250 (450-750 per day)

Figure 12. Actual swap happening at (a) Tojo Motors and (b) Kor-E swapping stations

Figure 13. (a) Tojo Motors (b) Prozza (c) Kor-E Battery Replacements

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Third-party operator leasing services

- Lease-to-own models (Navotas, and Parañaque) ~3 years

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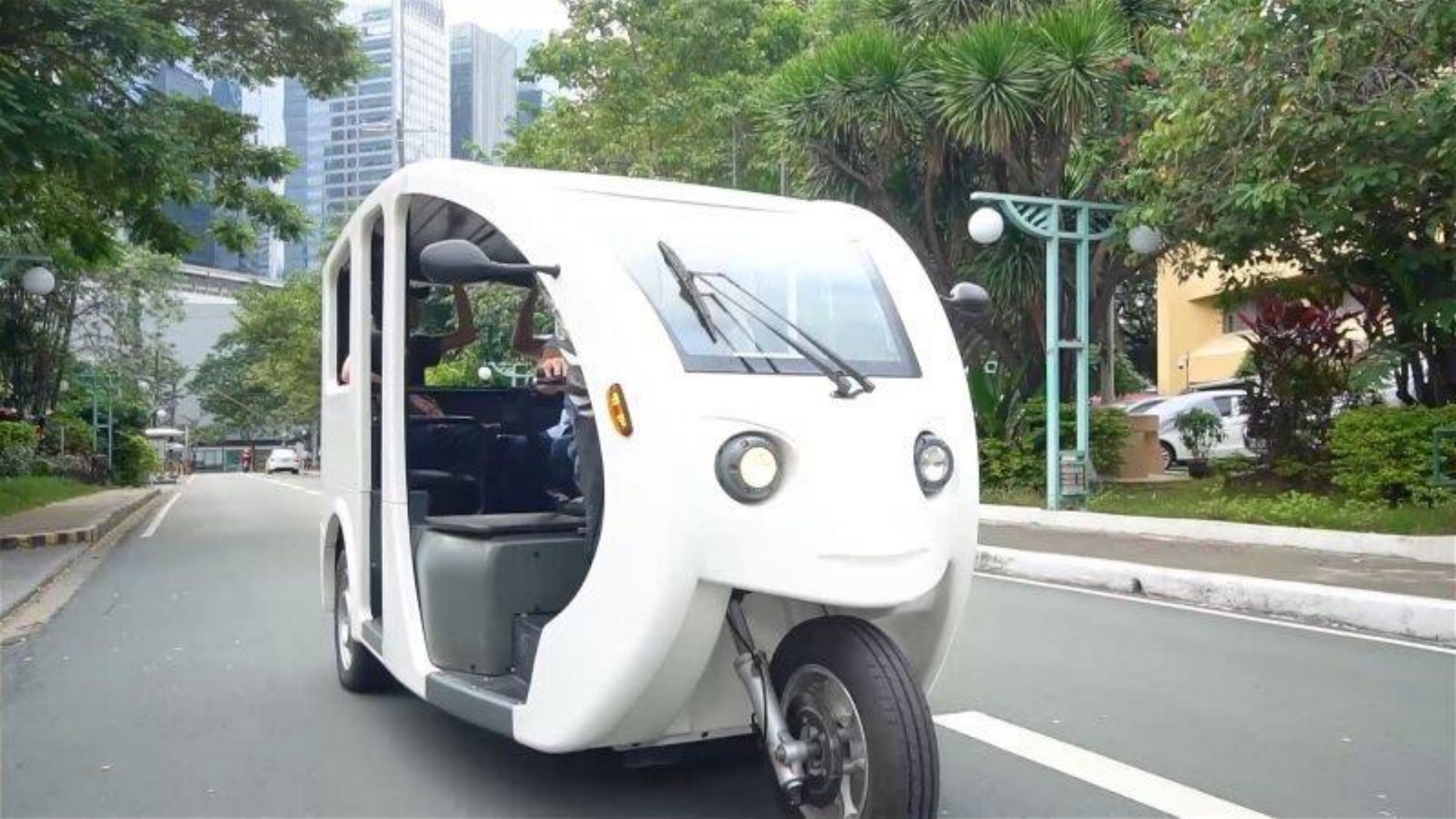
Identified challenges

- Lack of charging facilities and long charging time – limited number and reliability of charging stations despite the interest
- High cost of the units – some projects were halted because of the cost
- Lack of after-sales services for operation and maintenance – some brands/manufacturers did not provide aftersales and maintenance services
- Others – limitations in space (reduced orders), incompatible batteries, flood proof designs



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