

OPPORTUNITIES FOR E-SCOOTER IN INDONESIA

EIBD 2016

AED-ES | We are eScooter

EIBD 2016

eScooter Business in a Glance

Bosch Activities

260 Employees

Suzhou Plant - R&D center
- production plant for ECU



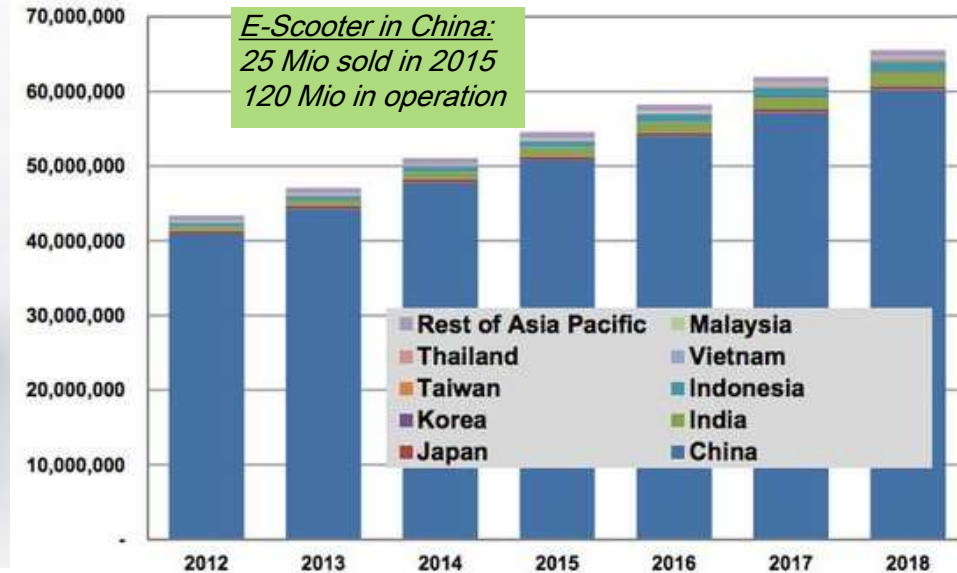
Ningbo Plant - production plant
for motor



1,800,000 Motors in past 2 years
700,000 ECU in past 2 years

Market Overview Asia E- Scooter & E-Bike

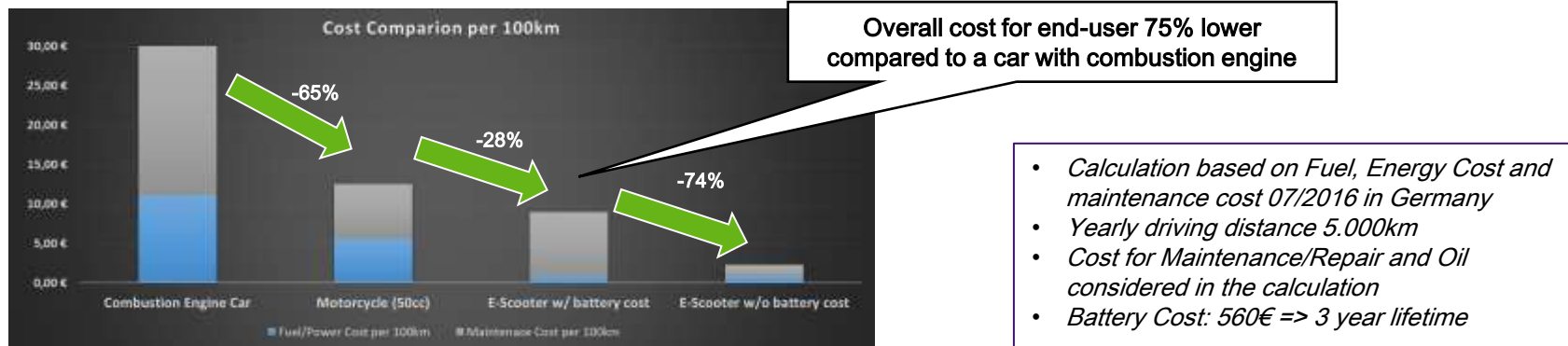
Electric Two-Wheel Vehicle Sales by Country, Asia Pacific: 2012-2018



(Source: Pike Research)

Advantages for E-Scooter Drivers & Urban Communities

- ▶ **Minimal parking space** necessary in densely populated cities
- ▶ **Low noise & exhaust emission** compared to 2-Stroke Engine Scooters
- ▶ **High efficiency (>84%)** compared to conventional combustion engine applications
- ▶ **Low operation and maintenance costs** compared to combustion engine solutions



>> E-Scooters are the most suitable individual vehicles for urban mobility

>> President Jokowi has asked Dewan Energi Nasional RI to support the introduction

Emission and efficiency benefits of E-Scooter

2W with combustion motor (125cc
& 50cc)



E-Scooter
(1.2kW)



Fuel consumption	125cc: 5.6l/100km* 50cc: 4.0l/100km*	5kWh _{el} /100km* (0.8l _{fuel-eq})
CO2 Emission Lifetime	125cc: 208g/km 50cc: 167g/km	18g/km
CO2 Emission for Production	1.000kg-1300kg	400kg
Efficiency	20%-30%	84%-94%

- 1km driving with 125cc combustion motorcycle is causing same CO2 emission like driving 12km with an E-Scooter
- 1km driving with 125cc combustion motorcycle car has the same energy consumption like driving 7km with an E-Scooter
- CO2 emissions from the production of an E-scooter are compensated completely by driving 2,000km instead of a motorcycle

EIBD 2016

Example on Fuel Saving for 1 Mio E-Scooter

(around 10% of the Jakarta Motorcycle population)

► Scenario for fuel consumption with **Combustion Engines**:

- » 1 Mio. Motorcycle driver (100 cc)
- » Distance home to work: 11 km, Daily travel distance: 22 km
- » Overall distance: 22mio kilometer per day
- » Fuel consumption higher for driving in city than on average level (11l car, 4l motorcycle)
- » **Total fuel consumption per day: 880.000l (around 35 truck loads)**

► Scenario for energy consumption with **E-Scooter**:

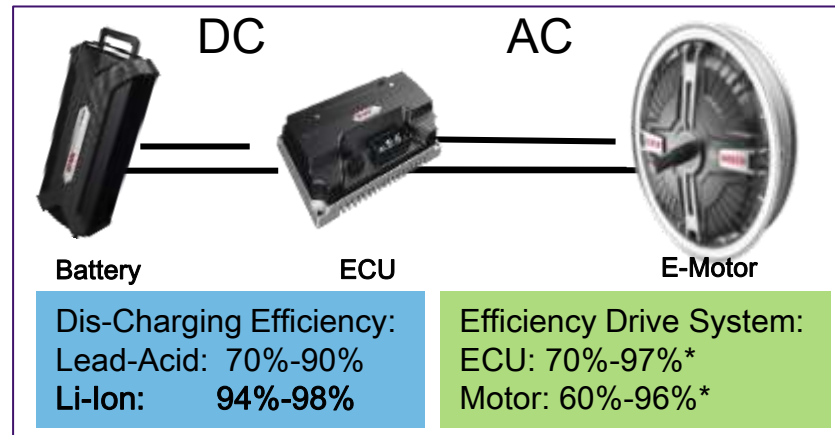
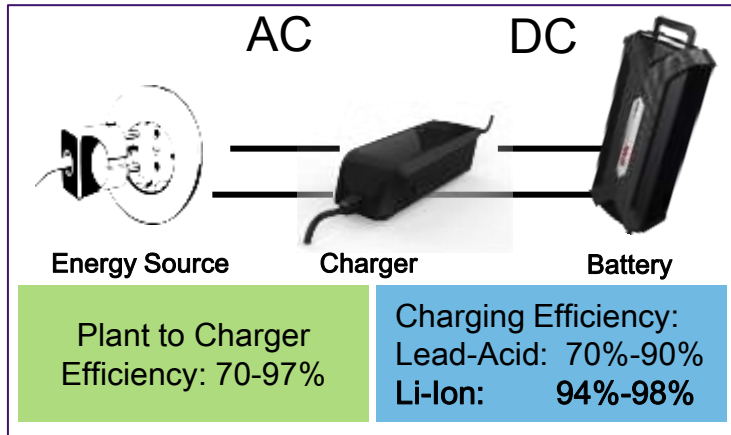
- » All commuter will **change from motorcycle to an E-Scooter**
- » Energy consumption based on urban driving mode: 7.0kWh/100km
- » Overall **energy required for E-Scooter** 22mio km/day: 1540 MWh (**64MW**x24h)
- » Darajat Geothermal Power Plant II alone provides sufficient energy of 80 MW to charge the scooters and cover transmission losses.



• Fuel saving per day if renewable energy is used for electricity production: **880.000l**

Battery as key component for E-Scooter

- ▶ Energy transfer and management from the power socket to the motor determines the eScooter efficiency
- ▶ E-Scooter in China (>95%) are for the time being still mainly equipped with Lead-Acid batteries with low lifetime (only 20% of the Li-Ion Battery) as well as low efficiency on charging and discharging.
- ▶ Li-Ion Battery are over lifetime cheaper and produce 3 to 6 times less waste despite initial higher cost



Standard & Lead-Acid
Power: 6.25kWh
Distance: 64km
State of the Art & Li-Ion
Power: 3.51kWh
Distance: 83km

- Li-Ion Battery Technology with the highest efficiency level => long driving distance, long battery lifetime, lower total cost
- Synchronized & Integrated System necessary to reach the overall best efficiency
- State-Of-The-Art Battery Technology & Integrated E-Scooter System > 30% longer driving distance with half of energy

Possible Support from Government

► Li-Ion batteries with initially high cost

Special programs could support this technology

- Battery leasing or renting concept
- Subsidies on E-Scooters with Li-Ion Battery Technology

► Privileges for E-Scooters

- CO2 based tax policy, subsidized leasing rates, Free parking, free charging
- Usage of Toll Roads, Busways and other non-motorcycle roads, special E lanes
- Restrict roads for scooter with combustion engine and/or introduce extra Tax

► Charging infrastructure for E-Scooters

Acceptance of technology depends on capability to charge E-Scooter as easy as fill up an combustion engine Scooter.

- Installation of Charging Stations for Li-Ion Batteries
- Definition of Battery Standards and Charger Standards
- Swapping Stations for Li-Ion batteries to exchange batteries in short time and make commercial vehicles running non stop



Opportunities in Charging : Electric 2W Battery Sharing Pool

Petrol Station

- Battery exchange & charging station



required
partners

Electricity Provider

- Setup the grid & provides the energy



User

- **Standardized battery** placed in pool
- Personal battery value account
- Account deducted per charge



Solution providers

- Suppliers provide standardized components, battery exchange station and IT system for deducting value from the user's battery account



EIBD 2016 eScooter Smart Functionality



THANK

YOU

