Electric two-wheelers in the urban mobility system: sustainability and policy options

Lucknow, 16 November 2019

Stefan Bakker
GFA Consulting Group
Integrated Sustainable Urban Transport Systems for Smart Cities (SMART-SUT)

**Commissioned by** - German Federal Ministry for Economic Cooperation and Development (BMZ)

**Lead Partner Ministry** - Ministry of Housing and Urban Affairs (MoHUA), Government of India

**Lead Executing Agency** - Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

The 3-year long project is jointly implemented by GIZ and the consortium comprising GFA, WRI India and Wuppertal Institute.
Two-wheelers: large and growing market

- Around 50 million powered two-wheeler sales per annum and rising
- >70% of vehicle fleet in India, Indonesia and Vietnam
- Popular due to economics, flexibility, reliability, ease of parking

https://www.unenvironment.org/pt-br/node/562
Cycling: varying trends

- Zero emissions and noise, active/healthy mode
- Attention increasing in policy and media
- Rising in some cities and countries due to comprehensive policy approach
- Significant potential
- Range of barriers: limited potential for high modal share in many cities, especially for trips >5 km
Can electric two-wheelers (E2W) be the bridge?
Variety of E2W

Speed up to about 25-30 kph
• Pedelec (no throttle)

Speed appr. 25 – 45/50 kph
• E-bike (throttle)

Speed 45+ kph
• E-scooter

• Electric motorcycle

https://www.bankbazaar.com/top-10-electric-bikes-india.html
For a global below 2 degree scenario, emissions of two-wheelers need to be reduced by 95% in 2050.

Well-to-wheel emissions (fuel production + combustion)

Source: TEEMP model, applied to Indian vehicles and driving conditions

Grid emission factor: 820 gCO₂/kWh + 10% losses

Global Fuel Economy Initiative

In addition to: zero street-level air pollution
Sustainability of travel modes

Figure 4. Indicative qualitative assessment of sustainability impacts and accessibility benefits of urban transport modes for trips 2–10 km, on a person-km basis. Accessibility covers travel time including parking and reliability. Sustainability aspects here include equity, road and parking space efficiency, air pollution, CO₂ emissions and fuel consumption, noise and physical activity (see Table 1). Larger ovals indicate larger spread in accessibility/sustainability benefits depending on local conditions. All vehicles except E2W are powered by internal combustion engines.

Source: Bakker (2018) Electric two-wheelers, Sustainable Mobility, and the City
But a large-scale shift won’t happen without policy

- Bans
- Behaviour change
- Phasing out PTW
- Support fleets
- Incentives
- Road infrastructure

Policy options
Banning petrol PTW

- Since 1996, Chinese cities have been banning motorcycles, city-wide or in certain areas
- (unintended) result: 200 million+ ebikes, mode share 15-25% in some cities
- Amsterdam air quality policy: only E2W from 2025
Phasing out petrol PTW

- Netherlands climate change agreement:
  - Only zero-emission moped sales by 2025
  - Aiming for only zero-emission scooter sales by 2030
- Taiwan action plan on air pollution: ban sales of non-electric motorcycles by 2035
- Sri Lanka: phase out by 2040
- Proposal in India
- Many countries have announced plans to phase out diesel and petrol vehicles (but unclear if includes two-wheelers)
Incentives

• Many governments providing subsidies, e.g.:
  – Taiwan: 25% subsidy for e-scooter
  – Paris: subsidy up to EUR 500 for e-bike
  – Austria: subsidy up to EUR 500 for e-cargobike
  – Oslo: 25% subsidy for e-cargobikes
  – Scotland: interest-free loan
  – India: FAME II subsidy of INR 10,000 per kWh

• Nepal: reduced vehicle tax, road improvement tax, waived annual tax
Safe + convenient road infrastructure

- Speed reduction, separation of modes in Netherlands
- Japan: with little bicycle infra but safe streets, a shift to ebikes from motorcycles and bicycles is taking place
- Advanced stop boxes in Taiwan
- Micromobility network for small vehicles 10-30 kph
Behaviour change programme

• Adoption barriers: range anxiety, new technology, unfamiliar with two-wheelers

• Behaviour change campaigns, potentially in combination with incentives and trial option to experience the new mobility option

• Potential higher during important event in life

• Scotland e-bike Grant Fund includes options for free test rides
Support fleets

Enable and support E2W for logistics and scooter sharing
- Delivery vehicles
- Two-wheeler taxis
- E-bike sharing systems at transit stations
Conclusions

• Local and global rationale to promote electric two-wheelers
  – Accessibility and liveability
  – Climate change
• Different types of E2W can cater to different user groups and may vary by region
• A combination of policies will be required, including limiting alternatives