Trend and Prospects of e-mobility towards smart and resilient cities in Asia and the Pacific

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WHO (2018) estimates that exposure to ambient air pollution causes 4.2 million premature deaths, and 103.1 million DALYs* every year, while exposure to smoke from dirty cookstoves and fuels causes 3.8 million deaths, and 85.6 million DALYs every year.**

More than 2/3 of the deaths occur in Western Pacific and South East Asian regions.

* DALYs are the sum of life years lost due to premature mortality and years lived with disability adjusted for severity.

Rising CO₂ emissions from transport especially in non-OECD countries

Climate change mitigation by sector

- **6 degree scenario**
- **2 degree scenario**

Transport needs to contribute ~20% to global carbon emission reductions to limit global warming

- Most of the vehicle fleet growth will take place in non-OECD countries
- IPCC (Oct 2018) “High growth rates are now appearing in electric vehicles, electric bikes and electric transit, which would need to displace fossil-fuel powered passenger vehicles by 2035-2050 to remain in line with 1.5°C consistent pathway”

Source: ETP 2016 (IEA 2016)

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Acknowledging the need to focus on improving movement of people and goods over vehicles
Asia is leading the global e-mobility transformation


Annual e-bike sales 2016-2023

UNEP eMob Programme

**Electric 2 & 3 wheelers**
- Economically viable
- Technically mature
- Charging at home outlets feasible
- High growth rates of two-wheeler market in Asia and Africa

**Electric light duty vehicles**
- Close to break-even with conventional cars
- Technically mature
- Highest mitigation potential of global transport energy use and emissions

**Electric buses**
- Economically viable on high-capacity lines
- High potential to improve local air quality
- Manageable recharging infrastructure requirement
UNEP E-Mobility Projects

E-mobility feasibility studies in Rwanda and Morocco
Sida, Mohammed VI, 2017-ongoing
USD 300,000

Global Fuel Economy Initiative
EU, FIA Foundation, GEF-5, Hewlett Foundation, 2009 - ongoing
Clean vehicles and fuels policy support including e-mobility policies
~ USD 9.2 million in about 60 countries world-wide

CCAC Soot-Free Bus projects
CCAC, 2015 – ongoing
Low-emissions buses including e-busses in 20 cities world-wide

GEF 7/EC Solutions Plus Global Electric Mobility Programme
GEF, European Commission, from 2021
Jointly implemented by UNEP, UNDP, UNIDO, ADB, EBRD, & IEA
USD 80 million for e-mobility projects involving demonstration, scale-up studies and regional platforms in 40+ countries worldwide

Integrating 2&3 wheelers into urban traffic
BMU-IKI, 2017 - ongoing
4.0 million for electric 2&3 wheeler projects in 6 countries in East Africa and South-East Asia
GEF 7 Electric Mobility Programme

countries and partners

Activities depend on country priorities, but includes supporting national and local policy development on e-mobility, public procurement, charging infrastructure, link to renewable energy.
Supporting policies to promote **light-duty e-vehicles** (1)

Integrated **EV specific policy measures** with the Global Fuel Economy Initiative (GFEI) national activities supporting the fuel economy policy development in 65+ countries

**Dedicated EV policies:**

- Tax breaks on registration, import & circulation tax as part of FE policy development
- Inclusion of EVs in regulatory measures i.e. in form of credits in FE standards, quotas, bans
- Information campaigns
- Dedicated soft measures: parking policies, exemption from access restrictions etc.
Supporting policies to promote light-duty e-vehicles (2) – Chile

- 2010: Development of fuel economy baseline
- 2012: Introduction of mandatory fuel economy label
- Drafting of CO₂ emission-based vehicle registration tax
- Originally, the registration tax was intended to become a feebate scheme: EVs would have been eligible for substantive rebates
- 2014: A vehicle registration tax based on fuel consumption and air pollution has been implemented
- 2015: EVs are exempt from paying an annual vehicle registration tax for a period of 4 years

Next steps:
- Introduce dedicated EV policies
- Develop recharging infrastructure projects
- Foster local manufacturing
Supporting policies to promote light-duty e-vehicles (3) – Sri Lanka

High vehicle excise taxes for conventional vehicles in Sri Lanka influenced the adoption of cleaner and more efficient vehicles.

Source: Sugithapala, 2019
Supporting policies to promote light-duty e-vehicles (4) – Thailand

<table>
<thead>
<tr>
<th>Categories Of Vehicle</th>
<th>Engine Capacity (Horse Power)</th>
<th>Tax Structure Before Jan’2016</th>
<th>Current Tax Structure</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Engine Capacity</td>
<td>Tax Rate (%)</td>
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<tr>
<td></td>
<td></td>
<td>(≤ 1,500 CC)</td>
<td>E10</td>
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<tr>
<td>Passenger Vehicles</td>
<td></td>
<td>≤ 2,000 CC</td>
<td>30</td>
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<tr>
<td></td>
<td></td>
<td>2,001-2,500 CC</td>
<td>35</td>
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<tr>
<td></td>
<td></td>
<td>2,501-3,000 CC</td>
<td>40</td>
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<tr>
<td></td>
<td></td>
<td>&gt; 3,000 CC</td>
<td>50</td>
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<tr>
<td>PPV/DC/Space Cab/Pick Up</td>
<td>≤ 2,250 CC</td>
<td>20/12/3,18</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 2,250 CC</td>
<td>50</td>
</tr>
<tr>
<td>Eco Car (Benzine/Diesel) / E85</td>
<td>1,300/1,400 CC</td>
<td>17</td>
<td>25</td>
</tr>
<tr>
<td>Electric Vehicle /Fuel Cell/ Hybrid</td>
<td>≤ 3,000 CC</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 3,000 CC</td>
<td>50</td>
</tr>
</tbody>
</table>

CO₂-based vehicle excise tax structure in Thailand

Source: GIZ, 2018
Supporting policies, regulations and pilots to promote electric 2&3 wheelers (1)

• 8 ongoing projects in East Africa and Southeast Asia
  • Morocco, Kenya, Uganda, Ethiopia and Rwanda
  • Philippines, Thailand and Vietnam; (Indonesia and Myanmar starting 2021)
• 3 main components
  • Planning and project baseline setting
    • Local manufacturing potential, electric demand modeling, financing gaps etc.
  • Piloting / policy design
  • Knowledge management & policy replication

Getting the policies right:

• Fiscal – Registration tax exemption, tax breaks on corporate income for industry etc.
• Regulatory – Industry standards (e.g. with respect to batteries)
• “Soft measures” – City centre access only for electric 2&3 wheelers
• Consumer information – Fuel economy labelling labels for 2&3 wheelers
Supporting policies, regulations and pilots to promote electric 2&3 wheelers (2) – Philippines

- The Philippines is one of the earliest to pilot electric 3-wheelers and jeepneys in Southeast Asia starting in 2008 – there are now 4,318 registered electric 3-wheelers.
- The Department of Energy has delivered 3,000 e-trike units to 33 local government units and 4 national government agencies with ADB support.
- Supporting development of regulations for electric 2&3 wheelers with the Land Transportation Office, and Bureau of Product Standards.
- UNEP/BMU-IKI pilot project supporting urban electric freight launched in Nov 2019 with PhilPost and Pasig City.
- Supporting more demonstration projects and setting up charging network in Pasig City with EC Solutions plus.
Supporting policies, regulations and pilots to promote electric 2&3 wheelers (3) – Thailand

- UNEP/BMU-IKI supporting the development of standards and regulations on electric 2&3 wheelers
- Demonstration project to support electric motorcycle taxi/ electric motorcycle deliveries
Supporting policies, regulations and pilots to promote electric 2&3 wheelers (4) – Vietnam

- 1.35 million registered electric 2-wheelers as of June 2020
- UNEP/BMU-IKI is supporting standards and regulations development and demonstration projects on electric 2-wheelers for personal use and for urban freight

Source: complied by Vietnam University of Transport Technology
Supporting development of policies, regulations and pilots to integrate e-buses (1)

- CCAC Soot-Free Bus Fleet Project
  - Urban buses account for approximately 25% of the black carbon emitted by the transportation sector
  - Urban bus activity is predicted to increase by nearly 50% by 2030
  - In 2030, this will translate into an estimated additional 26,000 tons of black carbon

- Electric buses are a logical step to curb pollutant emissions and can already be cost effective on high-capacity lines
- Many low and middle-income countries invest now in high-capacity public transport – lock-in with polluting technology for the next 15+ years needs to be prevented
Supporting development of policies, regulations and pilots to integrate e-buses (2)

- Integrating electric buses in the Transjakarta bus system supported by UNEP-CTCN and implemented by ITDP
- Many countries in the GEF 7 Global Electric Mobility Programme include a focus on electric buses – although financing is a main issue
- Interest to electrify and better integrate intermediate public transport modes, like angkots, seongtaws, jeepneys, in addition to three-wheeler

Figure 2.1 Total cost of ownership for various bus types in Shenzhen

Notes: Capex = capital expenditure; ICE = internal combustion engine; BEV = battery electric vehicle. Conversion rate: CNY 1 = USD 0.14. The figure shows the TCO for the operations over the vehicle lifetime, which typically is eight years in Shenzhen. While the capital costs for e-buses in Shenzhen appear to be high relative to their ICE counterparts, the cost of Euro VI 12 metre diesel bus is around USD 300 000 to 400 000, far exceeding these prices and also higher than the non-subsidised BEV costs in Shenzhen. Costs of battery replacement (if any) have not been explicitly considered as part of this comparison.
Source: Case study on Shenzhen by Berlin, Zhang and Chen (2020).
Key issues and recommendations

• Integrate e-mobility policies into national policies, e.g. National Environmentally Sustainable Transport, NDCs, energy efficiency and renewable energy policies

• Develop integrated framework to promote e-mobility – standards and technical regulations, road-use policies, local manufacturing, fiscal and non-fiscal incentives, renewable energy

• “Localize” policies, e.g. local transport planning and regulations, building regulations to include provisions of charging, etc.

• Prioritize inherently low carbon modes – walking, cycling (plus e-bicycles), and electrification of public transport (buses, intermediate public transport, light-rail, heavy-rail, etc.)

• Support electrification of urban freight and waste management (including use of electric 2&3 wheelers, e-cargo bikes)

But let's not forget!
Electric vehicles alone not the answer to solve our unsustainable and inequitable transport systems!
Thank you

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