E-Mobility in Sustainable Urban Development

GRIHA Summit
December 2018, New Delhi

Indradip Mitra
Importance of e-mobility for SDG11

Motorization, air quality, traffic noise

Energy dependency and trade deficits

Energy consumption and GHG emissions
E-mobility is one of several pieces towards decarbonization

TRANSPORT TRANSFORMATION
This large-scale transformation will ensure that transport is carbon neutral by 2050.

MOBILITY TRANSITION
The transition to sustainable mobility will reduce energy consumption without limiting mobility.

ENERGY TRANSITION IN TRANSPORT
The transition to clean energy in the transport sector will cover remaining demand with carbon-neutral energy.

Source: Agora Verkehrswende
It requires both mobility transition and energy transition in transport.

GHG reductions by more than 60% can only be reached with the energy transition in transport.

Source: Agora Verkehrswende
Cities are key for EV adoption!

**Challenges on urban level**
- Rapid motorization
- Traffic jams
- Air pollution
- Roadway noise
- Loss of street space for NMT, green places, etc.
- Safety issues

**Chances for e-mobility on urban level**
- Lower distances
- Efficiency benefits
- Economical benefits
- Available regulatory instruments
- Concentration of innovation driver
- New business models

12/11/2018
Areas of implementation

- rail/ tram
- private cars
- governmental/ company/ tourism fleets
- public transport
- two-wheelers
- three-wheelers
- x-sharing/ taxi/ ridehailing
- urban freight
Amount of renewable energy required for various powertrain and fuel combinations (per 100 km)

15 kWh
- Battery electric vehicle + direct charging

31 kWh
- Fuel-cell vehicle + hydrogen

93 kWh
- Combustion engine vehicle + power-to-gas

103 kWh
- Combustion engine vehicle + power-to-liquid

Source: Agora Verkehrswende, based on calculations by DLR, Ifeu, LBST, DFZ (2015)
Consequences for the transport sector, example public transport provider

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Opportunities</th>
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<tbody>
<tr>
<td>High upfront costs (vehicles and infrastructure)</td>
<td>Higher energy efficiency</td>
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<tr>
<td>Challenging operation</td>
<td>Less running and maintenance costs</td>
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<td>New ways to procure (requirements on vehicles, equipment, operation services)</td>
<td>Renewal of operation systems can lead to more efficiency (e.g. routes, frequency)</td>
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<tr>
<td>Standardization and interoperability</td>
<td>Attractive vehicles might attract more people to public transport</td>
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<tr>
<td>Reinforcing cooperation with energy provider</td>
<td>Less GHG emissions, air pollutants and noise</td>
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Consequences for the energy sector

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Opportunities</th>
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</thead>
<tbody>
<tr>
<td>• Development of charging infrastructure (location finding, technical, economical and legal requirements)</td>
<td>• Use of EVs for grid integration and storage of renewable energy (reducing load peaks, alternative to network expansion)</td>
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<tr>
<td>• Increasing electricity demand</td>
<td>• Decentralised production, control and storage is becoming cheaper and smarter</td>
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<td>• Uncontrolled charging can lead to problems in distribution grids</td>
<td>• Energy security/ reduction of oil import dependency (price stability)</td>
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<td>• Dependency on charging behaviour of the user (difference between desire and reality)</td>
<td>• Re-use of mobile batteries for stationary operations</td>
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<td>• Billing of charging current</td>
<td>• New business models</td>
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<td>• …</td>
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E-Mobility in Germany: Visions and actions

Vision 2020

Key areas

- Energy and climate goals
- Innovation and competitiveness
- New mobility concepts
- Market acceptance

Measures and Actions

- National E-Mobility Development Plan
- National Platform Electromobility
- Government Program Electromobility
- Showcase and Flagship Projects
- National Organization for Hydrogen & FC Technology
- E-Mobility Act
- Tax Incentive Mechanisms
- Road Traffic Measures
- R&D Program for Batteries, Design, Grid Integration etc.
- Charging Infrastructure Program
- Public Procurement Plan
- Etc.
E-Mobility in Germany: Road Map

Focus on:
• Research & development
• Education & qualification
• Norms & standards

2014

Focus on:
• Market development of EVs
• Suitable market incentives
• Appropriate charging infrastructure

2017

Focus on:
• Sustainable business models
• Integration of Renewables

2020

1. Market preparation
2. Market ramp-up
3. High-volume market

Lighthouse projects
Self-sustaining market
Germany founded National platform on e-mobility NPE

150 representatives from industry, science, politics, trade unions and trade associations are advising government for strategic dialogue

http://nationale-plattform-elektromobilitaet.de/en/the-npe/organisation/
GoI initiated electric mobility from a sustainability and an energy security point of view with an aim of saving $330 Bn in energy costs and 1 gigatonne of carbon emissions by 2030.

Alternative Fuels for Surface Transportation Programme by the Ministry of New and Renewable Energy
- Incentive package worth ₹ 95 crore ($13.6 Mn)
- Incentives of 20% on the ex-factory prices of electric vehicles

Faster Adoption and Manufacturing of Electric Vehicles
- Initial outlay of ₹ 75 crores ($10.7 Mn)
- Purchase incentives of ₹ 1.38 Lacs ($2000) for cars and ₹ 1.5 crores ($0.2 Mn) for Buses
- Subsidy for establishing R&D and testing centres

Govt. intends to go all electric by 2030
- Taxes on hybrid raised to 43%
- EESL tenders for 10k EVs for govt fleet
- ₹ 437 crores ($62.5 Mn) of subsidy allotted by DHI under remaining corpus of FAME scheme to 11 cities to procure 390 e-Buses, 370 e-cars and 720 e-three wheelers
- Karnataka becomes the first state launch an EV policy

National Electric Mobility Mission Plan 2020
- 6 million to 7 million EVs by year 2020
- ₹ 22,400 crore ($3200 Mn) of investments expected of which ₹ 14,000 crore ($2000 Mn) shall be from Govt.

Govt. ropes in Prof. Jhunjhunwala to lead the Programme Management Cell
- Implementing electric mobility for public transport
- Develop cost effective solution for India
- Standardization of charging infrastructure specifications
- Target to bring affordability without subsidy

Renewed interest in Electric mobility
- Draft National Auto Policy (2016-26) to promote Green Mobility
- NITI Aayog to anchor the EV roadmap for India
- Reduced GST and green number plates for EVs
- Ministry of Power clarified that no license will be required for setting up Charging Infrastructure

Impact assessment of large scale integration of Electric Vehicle Charging infrastructure in the electricity distribution system

BYPL study

- Technology review: Charging processes and impact on power quality
- Load flow simulation on feeders including PV rooftop
- Contributing to Indian regulations
NDC Transport Initiative for Asia

An upcoming regional programme under the International Climate Initiative

On behalf of:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany
# NDC Transport Initiative for Asia (2019-2023)

**Outcome: Asian countries put transport on a pathway towards decarbonisation.**

## Identification of pathways & targets

<table>
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<tr>
<th>India Component: Consolidating transport strategies and EV policies.</th>
<th>Implementation of actions</th>
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<tbody>
<tr>
<td>1.1: Identifying transport targets and mitigation pathways</td>
<td>1.2: Implementing electromobility powered by RE</td>
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<th>China Component: Integrating low-carbon and clean air strategies.</th>
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<tr>
<td>2.1: Long-term transport policy-package for a Chinese province</td>
<td>2.2: Vehicle-related GHG &amp; pollutant emissions regulations</td>
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<th>Vietnam Component: Increasing transport ambition in the NDC.</th>
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<td>3.1: Monitoring &amp; enhancing transport targets in climate strategies</td>
<td>3.2: Design &amp; implementation of clean transport policies</td>
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## Scaling and outreach

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<th>Global &amp; Asia Component:</th>
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<td>Further countries enhance ambition in transport</td>
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| 4.1: Studies and toolkits inform decision-maker |
| 4.2: Regional dialogue puts transport on the agenda |
| 4.3: Global awareness for high ambition in transport |
India component

**WP 1: Integrated decision-making for decarbonizing transport**

**Output:** Stakeholder engagement structure is established and informed by comprehensive quantitative analysis

**Activities:**
- Stakeholder dialogue
- Data & modelling
- Technical support to inform stakeholder dialogue

**WP 2: Electromobility powered by renewable energy**

**Output:** Policy and procurement frameworks for EVs & charging infrastructure have been improved

**Activities:**
- Charging infrastructure uptake
- EV supply and demand side policies
- EV business models
The consortium

- **GIZ (project coordinator):** Service provider on international cooperation for sustainable development. Track record on global and bi-lateral transport and climate change projects of BMU (e.g. TraCS and TRANSfer).
- **WRI:** Think tank with a track record on climate policy and urban mobility. Hosting the NDC-Partnership. Country offices in India and China with high expertise on urban mobility and electromobility.
- **ITF:** Forum of Ministries of Transport, organising the annual International Transport Forum in Leipzig. Strong modelling expertise. Implementing the decarbonising transport project with activities in India.
- **The ICCT:** Think tank focusing on fuel economy policies and energy efficiency of vehicles, incl. electromobility. Representatives based in China and India. Implementing the IKI-funded soot-free bus project.
- **Agora Verkehrswende:** German think tank organising stakeholder dialogue on transforming transport.
- **SLoCaT Partnership:** Partnership of more than 100 transport organisation. Transport focal point of the Marrakech Partnership for Global Climate Action, organising the Transport Day at COPs.
Futuristic themes: Nexus between power supply and e-mobility

- Power Distribution networks must change grid planning and operation: ICT, automation, smart grid, vRE integration
- Load management, DSM, DR
- Using e-vehicle fleet as virtual power plant integrated with vRE, V2G
- Participation in ancillary services for power sector
- .....
Thank you very much for your attention!

Indradip Mitra

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

E indradip.mitra@giz.de

I www.giz.de