Shifting to Efficient and Zero Emissions Vehicles in the Global South
Session on using the fuel economy baselines to strengthen MRV frameworks and quantification of transport emissions reduction

MRVing Emobility Initiatives in Developing Cities:
Insights from the SOLUTIONSplus Project

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Alvin Mejia
Senior Researcher
Mobility and International Cooperation Research Unit
Wuppertal Institute for Climate, Environment and Energy
InCo flagship project on “Urban mobility and sustainable electrification in large urban areas in developing and emerging economies” (SolutionsPLUS)

- Funded under the Horizon 2020 call GV-05-2019
- Duration: 1 January 2020 – 31 December 2023
- Total budget: €20,233,098.75 (EU Contribution: €17,970,258.75)
- Consortium of 46 partners, 116 associated and support partners
- 10 Living Labs: Kathmandu, Pasig, Hanoi, Montevideo, Quito, Kigali, Dar es Salam, Hamburg, Madrid and Nanjing (self-funded)
SOLUTIONSplus Demos

People

Culture

Goals

Technology

Infrastructure

Processes
Why “MRV”? 

- Understand the impacts of the demonstration
- Results to guide the exploration of scale-up options
- Provide insights into the potential impacts of such scale-up concepts (e.g. GHGs)
## Core Steps

<table>
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**Conceptualization, ex-ante evaluation of scale-up options**

**Scale up**
Situation Climate Impacts within the Wider Framework

Objective

Level 0 Boundaries

Level 1 Impacts

Level 2 KPI families

Level 3 Weighted KPIs

Level 4 Non-weighted KPIs

Operator

Society

Financial costs / revenues

Institutional / political

Financial Viability

Coherence with national plans and development goals

Ease of implementation

Impact on air pollutants

Impact on noise

Impact on environmental resources

Impact on accessibility

Impacts on affordability

Impacts on travel time

Impacts on road safety

Impacts on charging safety

Impacts on security

Impacts on well being (active transport)

Impacts on service quality

Impacts on national/local budget

Impacts on external trade

Impacts on employment

Technology transfer

Non-financial impacts & benefits

Climate

Alignment with national legislation

Impact on GHG emissions

Impact on air pollutants

Impact on noise

Impact on environmental resources

Impact on accessibility

Impacts on affordability

Impacts on travel time

Impacts on road safety

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- Define the baseline and map out the causal chain  
- Set up data collection | - Monitor  
- Iterate (if needed) | - Evaluate KPIs  
- Make decisions |

Conceptualization, ex-ante evaluation of scale-up options

Scale up
Multiple layers: “E-mobility” layers

• Depending on the nature of the demonstration, different impacts are to be accounted for
## Core Steps

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Conceptualization, ex-ante evaluation of scale-up options
Project vs Baseline Scenario

Demo/Project Scenario

Activity and Structure
Vehicle activity (VKM)
Transport activity (PKM/TKM)

Energy intensity and Emission Factor
Energy consumption (MJ)
Grid emission factor (kgCO2/MJ)

Baseline Scenario
What would happen if the project is not put into fruition

Existing studies; dedicated surveys and interviews
Other local data
Fuel Economy Baselines

Published
Monitored
Defining the “Baseline” and Mapping Causal Chains

Avoid

Shift

Improve

e-mobility interventions have primarily been treated as “improve” measures (i.e. vehicle replacement)
One-to-One Replacement

![Image of a traditional motorbike and a modern electric motorbike]

- Activity
- Structure
- Intensity
- Fuel

![Graph showing CO2 emissions comparison between reference and project]

- Electric
- CNG
- LPG
- Diesel
- Gasoline

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GFEI Fuel Economy Baselines

Scipper et al (2007)
Defining the “Baseline” and Mapping Causal Chains

“E-mobility’ becoming more integrated with new mobility services

- Avoid
- Shift
- Improve
New mobility services are disruptive innovations that can contribute towards the transition to sustainable mobility and arise from the unique combination of business models and digital platforms that enable the sharing of mobility resources.

Combined with “e”: e-NMS

<table>
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<tr>
<th>Mobility Resource</th>
<th>Business Models</th>
<th>Platform</th>
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<td>Vehicle trips</td>
<td>Sharing economy-based models</td>
<td>Enables crowdsourced data generation</td>
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<td>Person trips</td>
<td>“As-a-service” business models</td>
<td>Access to resources by users</td>
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<tr>
<td>Vehicles (bikes, scooters, others)</td>
<td>Novel operations features</td>
<td>Flexibility: routes/schedules/booking/payment</td>
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<tr>
<td>Human resource</td>
<td>New revenue models (i.e. digital advertising)</td>
<td>Monitoring by operators</td>
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<tr>
<td>Infra (e.g. charging, parking)</td>
<td>Accommodates different interactions: P2p, B2B, B2C</td>
<td></td>
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Influencing Modal Choice

Base Scenario

E-mobility + NMS

Activity
Structure
Intensity
Fuel
A diagram illustrating the relationship between carbon emissions from transport, total activity (passenger or freight travel), modal structure (travel by mode), modal energy intensity, carbon content of fuels, modal travel share, load factor (passengers or tons per veh-km), technological energy efficiency, and vehicle characteristics. The diagram uses symbols and equations to represent these relationships.

Scipper et al. (2007)
“E-mobility’ as an enabler of densification
• Smaller LEVs + shared economy + PT integration → can potentially lead towards enabling densification + reduction of total VKT
Conceptualizing Impacts to Choices: Emobility

Short-term:
- Activity choice
- Mode choice
- Destination choice
- Route choice

Long-term:
- Car ownership choice
- Type of vehicle choice
- Residential location choice
- Work location choice
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Conceptualization, ex-ante evaluation of scale-up options

Scale up
Setting up the Monitoring Mechanisms

- Using technological aids towards data generation (e.g. IoT sensors, GPS sensors, etc…)
- Engaging stakeholders: data collection planning and implementation
- Leveraging on existing tools and resources
- Finding links, and embedding into processes
### Core Steps

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Conceptualization, ex-ante evaluation of scale-up options

Scale up
Evaluating KPIs

- Existing calculation tools are explored and evaluated for suitability; tweaked if necessary; new ones created depending on the need.

https://emobility.tools/
• MRV: purpose-driven; details differ depending on the context/application
  • Evaluating pilots/demonstrations
  • Conceptualisation of wider scale up concepts
• Availability of fuel economy baselines highly beneficial for MRVing e-mobility initiatives
• Situating GHG MRV within a wider framework will maximize the utility of the effort to be exerted
• E-mobility + other transformative/disruptive concepts + different impact layers have underlined the importance of more holistic approaches towards mapping of the causal chain and the associated key performance indicators
• Multi-sectoral/multi-scalar collaboration is important in ensuring that the MRV exercises remain useful and relevant
Thank you for your attention

Alvin Mejia
alvin.mejia@wupperinst.org