Electric 2&3 Wheelers and Climate Change Mitigation: Role and Measurement

Global Conference on Electric 2&3 Wheelers
October 9, 2023

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Mobility Hub of the Urban Living Lab Center (ULLC) a UN-Habitat Collaborating Center

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- The Urban Living Lab Center provides a space for collaboration among implementation-oriented projects in the field of urban climate action.
- First collaboration center of UN-Habitat
- UEMI as the mobility hub of the Urban Living Lab Center

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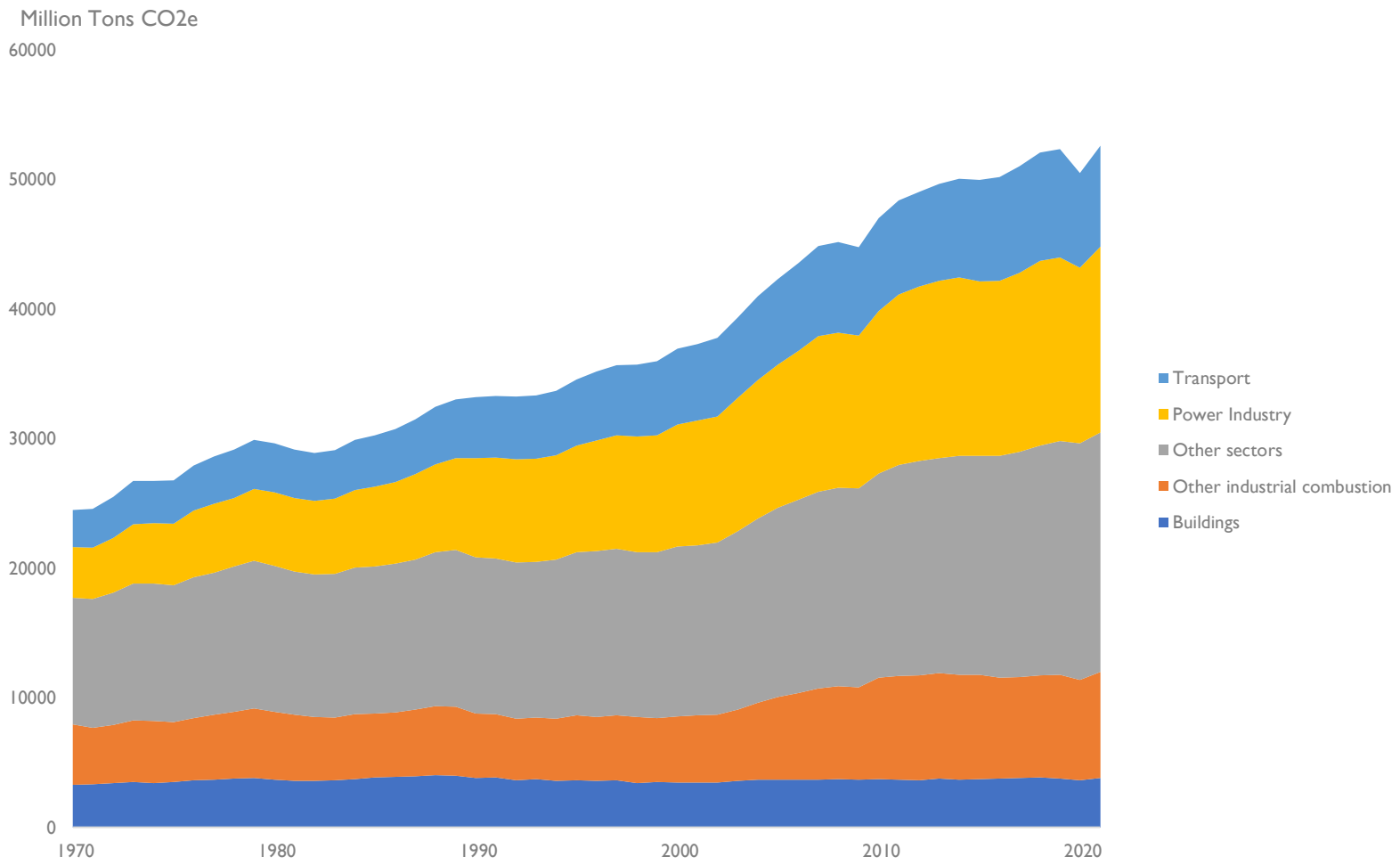
Urban Living Lab CENTER

SOLUTIONSplus: *(Integrating Urban Electric Mobility Solutions in the Context of the Paris Agreement, the Sustainable Development Goals and the New Urban Agenda)*

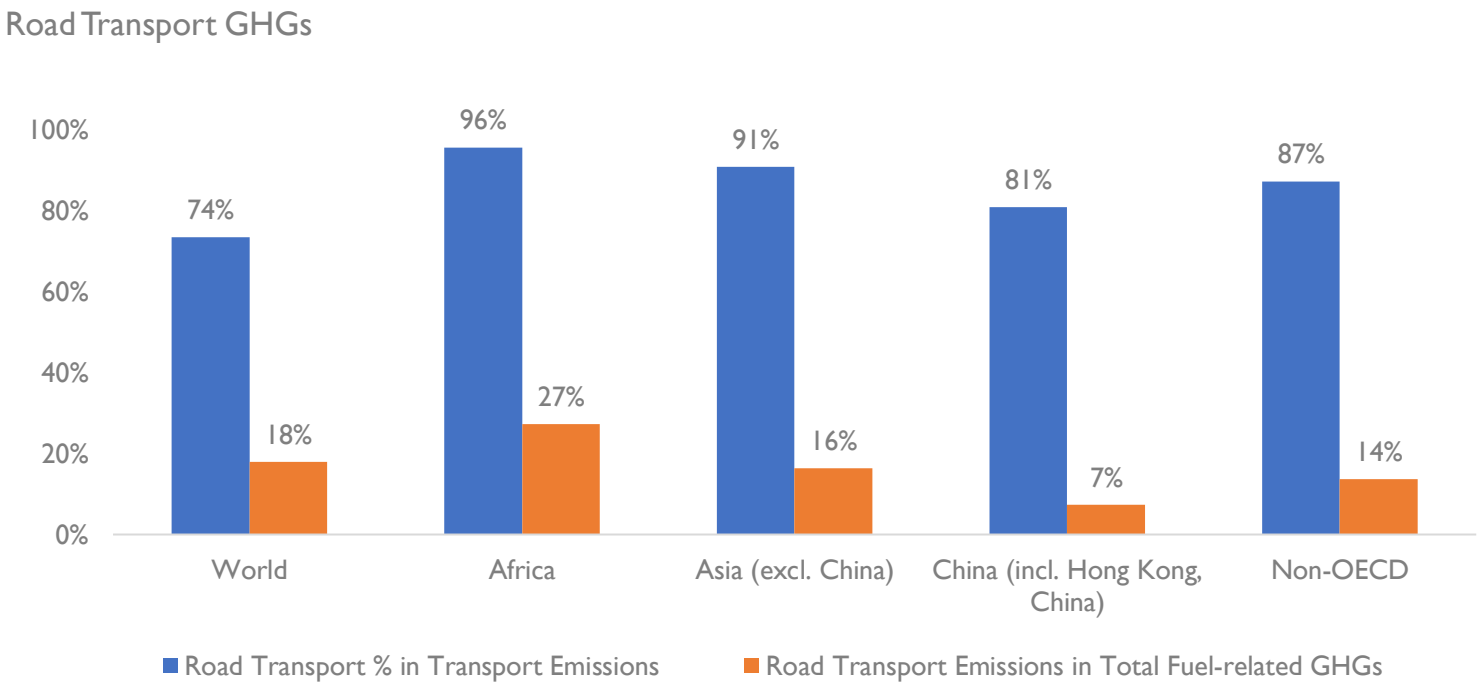
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 875041

http://www.solutionsplus.eu/
https://emobility.tools/

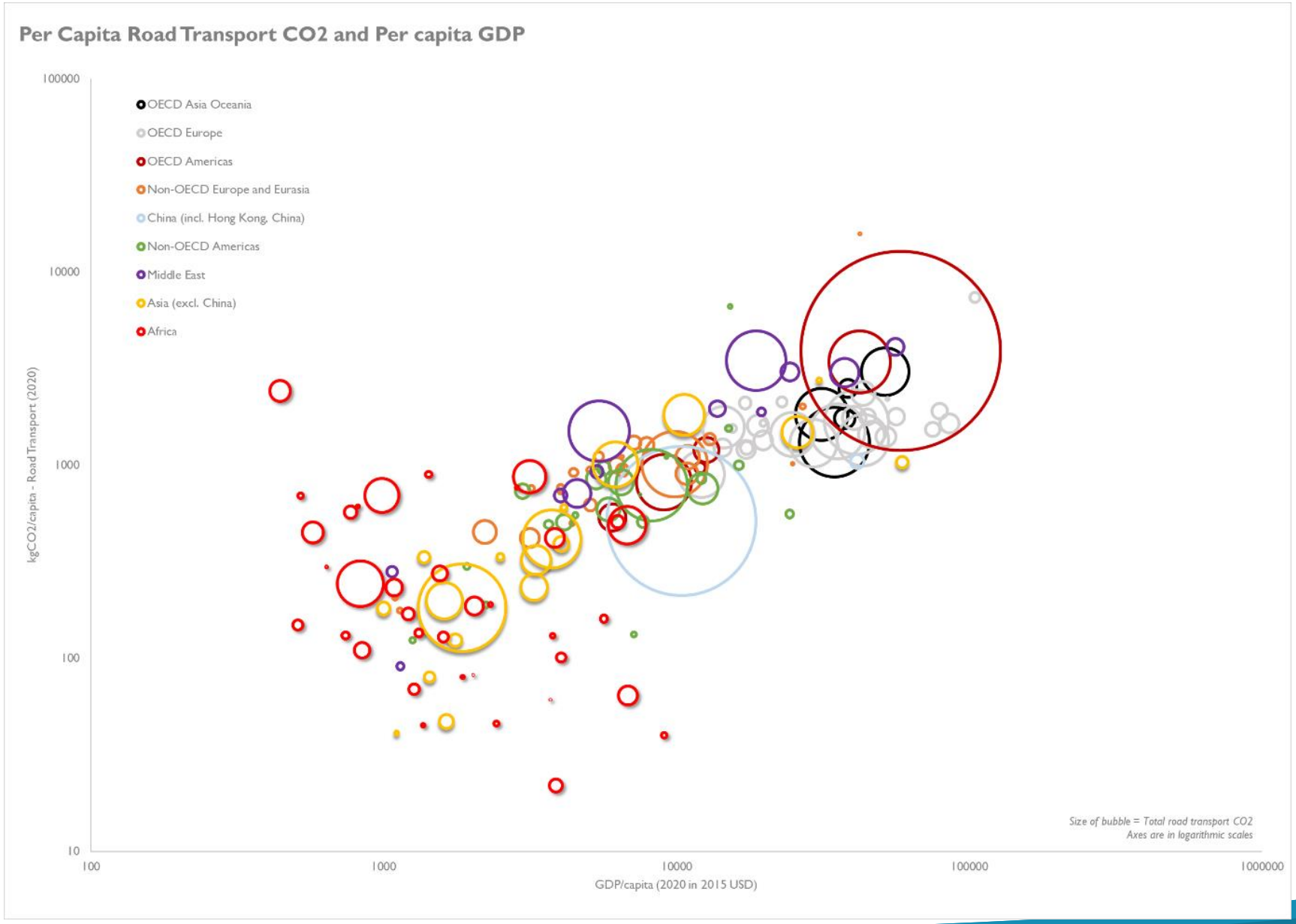
- Transportation-related greenhouse gas (GHG) emissions accounted for 23% of energy-related GHG emissions
- Transport GHG emissions growth has remained roughly constant (2% per year) from 2010-2020, in contrast to the decline in the emissions growth in power sector (from 2.3% to 1.0%) and industry (from 3.4% to 1.4%)



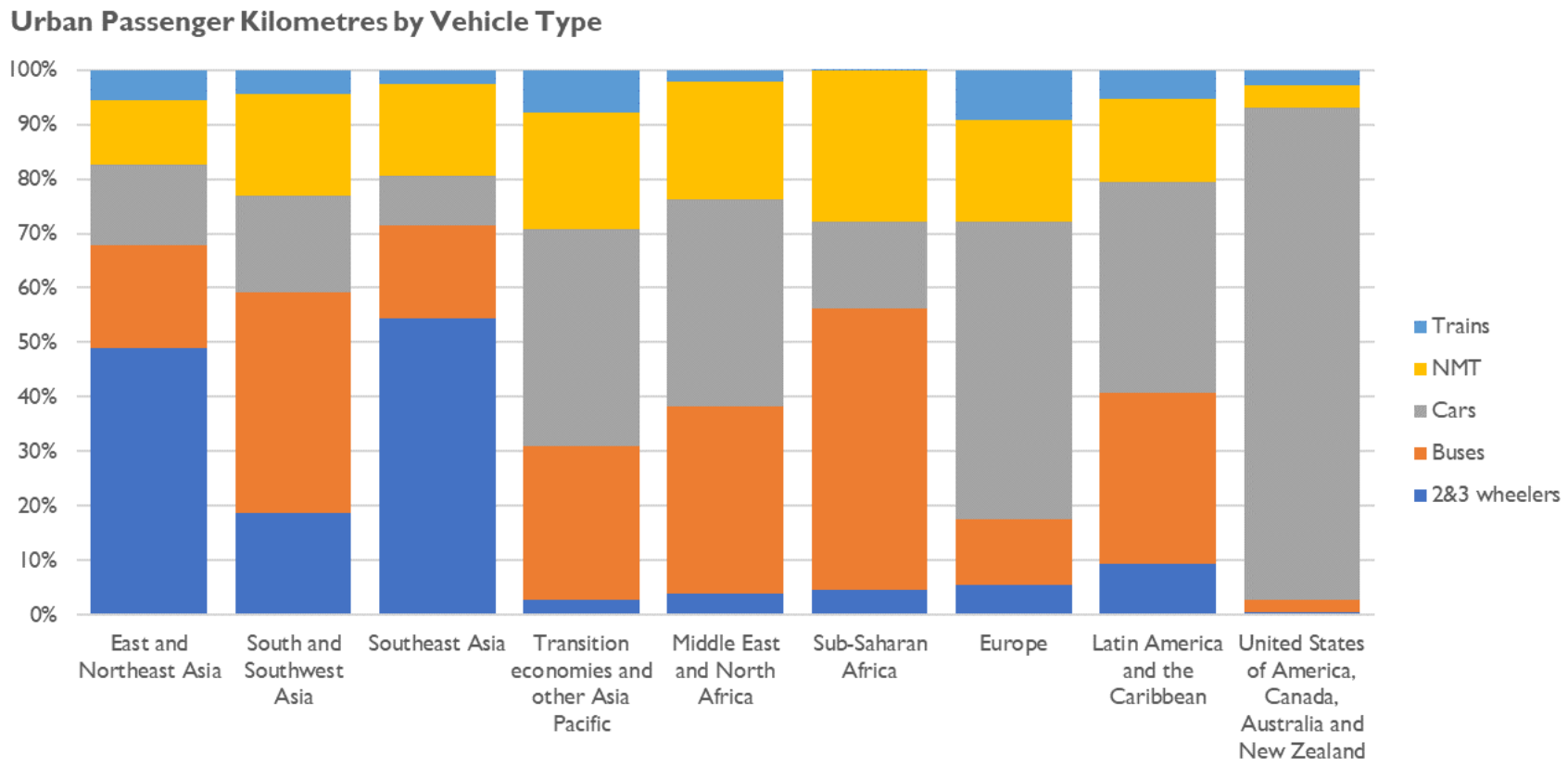
- The International Energy Agency (IEA) estimates that road transportation contributes ~75% of the total transport emissions, and up to 18% of the total fuel combustion-related emissions globally. It is interesting to note that these contributions are much higher when we look at the developing countries, particularly in Africa and in Asia (IEA, 2022).



- Economic growth → higher purchasing power → enables higher vehicle ownership and/or higher utilization of vehicles → increased transport GHG growth



- Significance of 2 and 3 wheelers in many developing countries, particularly in Asia; increasing relevance in African region
- Lower acquisition, operation costs; higher levels of service due to nimbleness ; various use cases and flexibility in terms of applications



electrive

Automobile Infrastructure Battery Commercial Vehicles Fleet

Politics

Taiwan to ban ICE car & scooter sales as of 2040

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ECONOMY

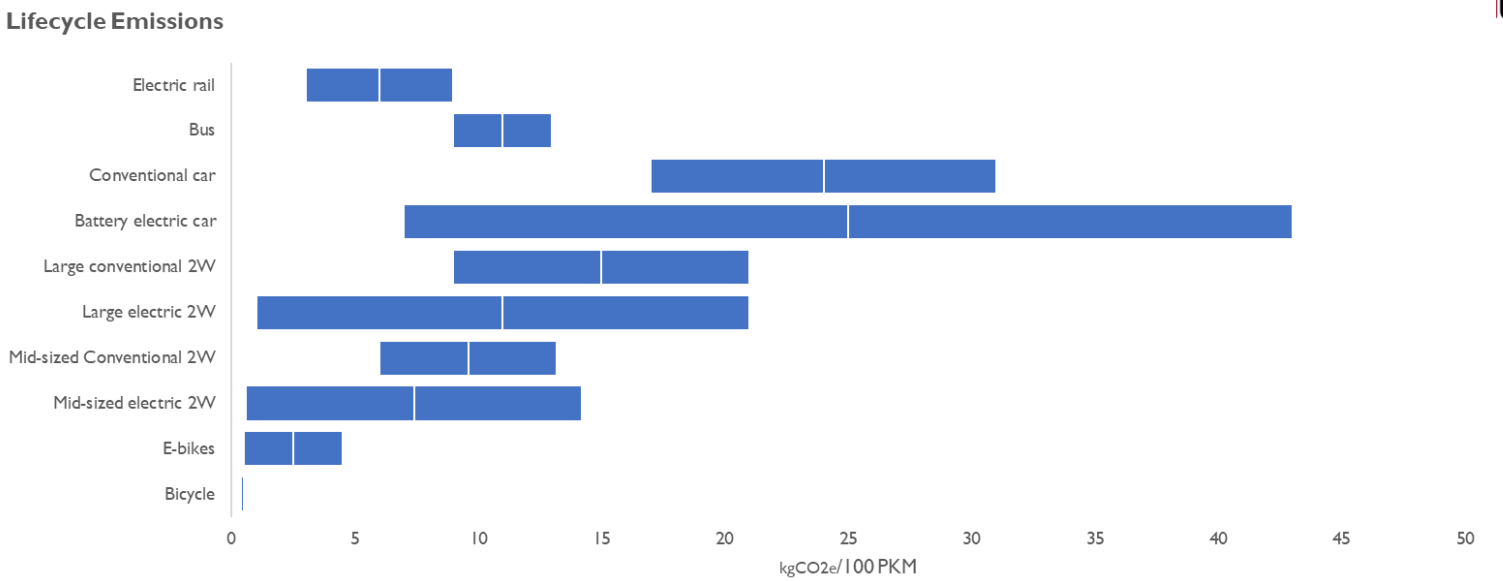
EVs in India: Electric two-wheelers adoption skyrockets

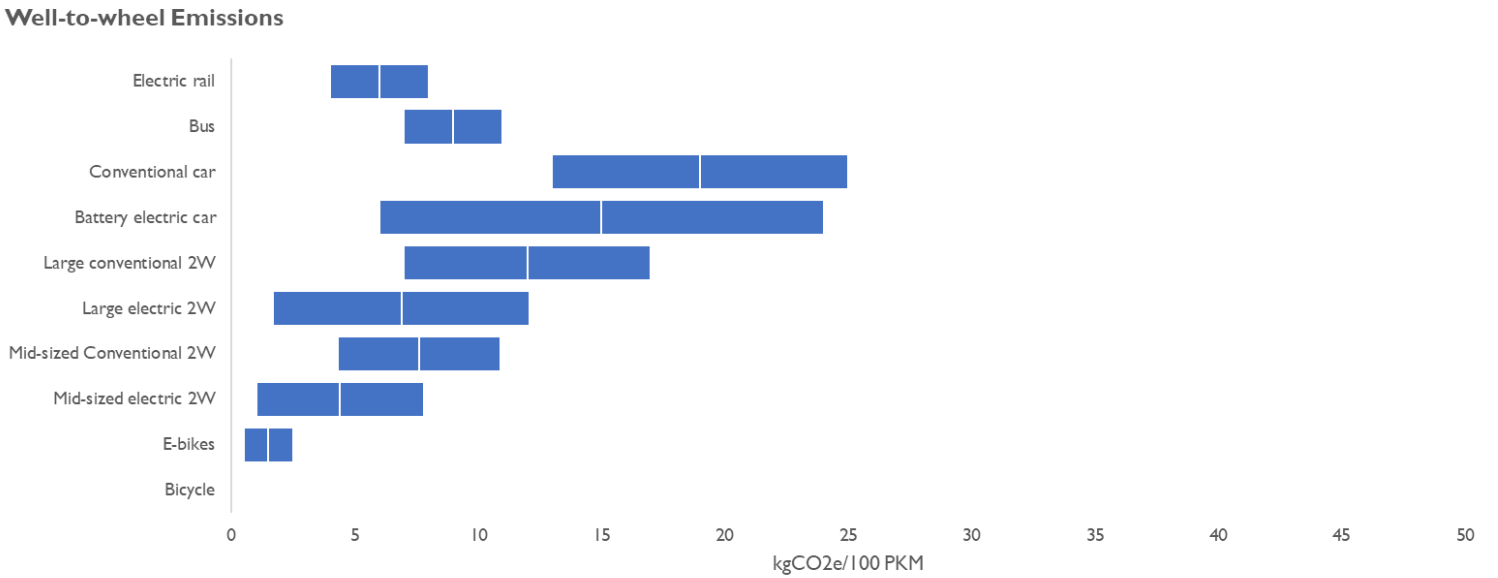
Policy Circle Bureau — June 13, 2023

Electric two-wheelers adoption is on the rise despite challenges such as dependence on component imports, subsidy cuts, and absence of vehicle recycling and scrappage policies.

India: The country is making giant strides in electric vehicles adoption as it looks to combat climate change and cut reliance on fossil fuels. Recent data from the Vahan Dashboard indicates that four Indian states

- Electric 2 and 3 wheelers can have varying emissions impacts depending on the actual situation
- It is important to understand and properly document how the electrification of 2 and 3 wheelers would impact the emissions of the system it will be introduced in



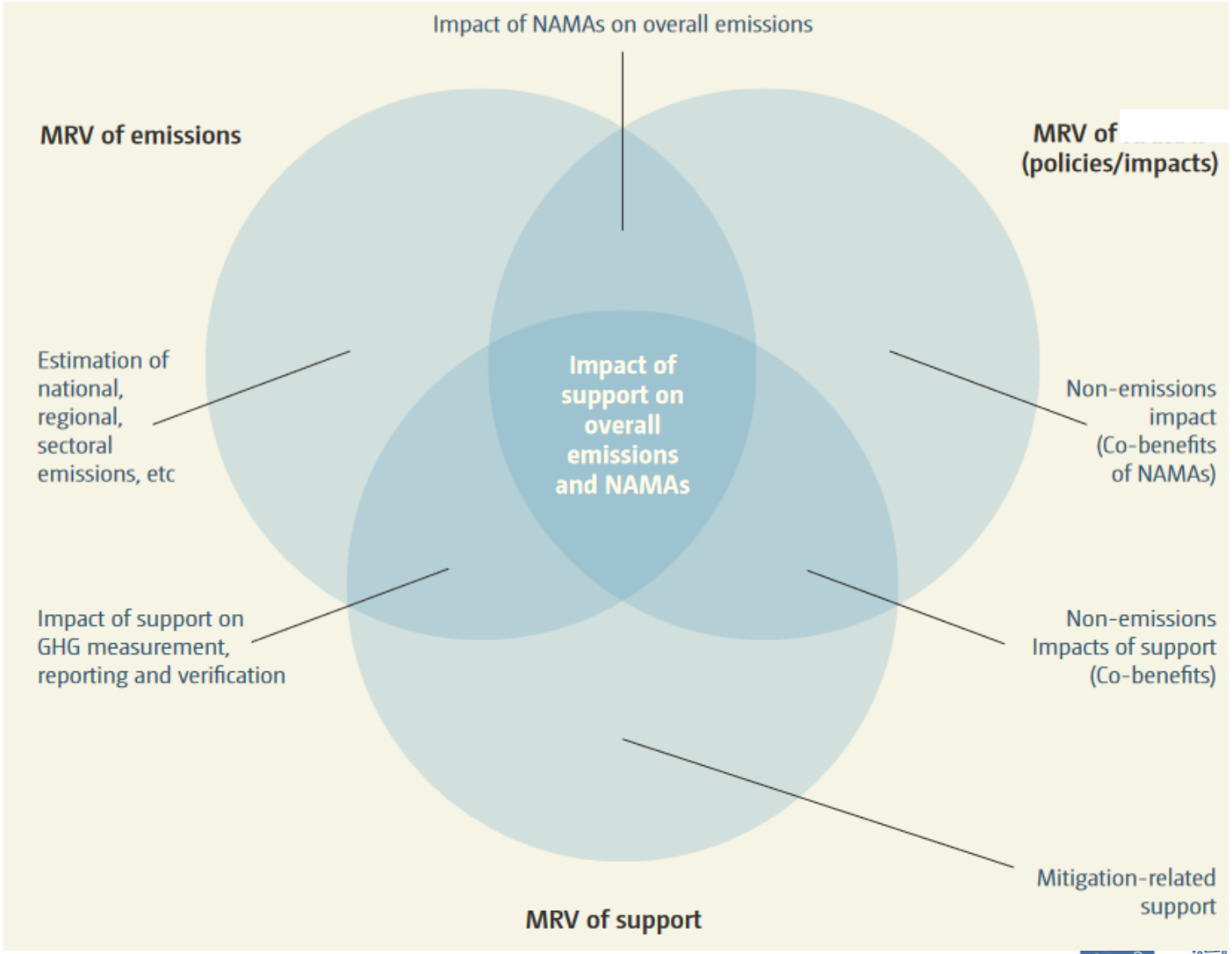


Source: (Jaramillo et al., 2022

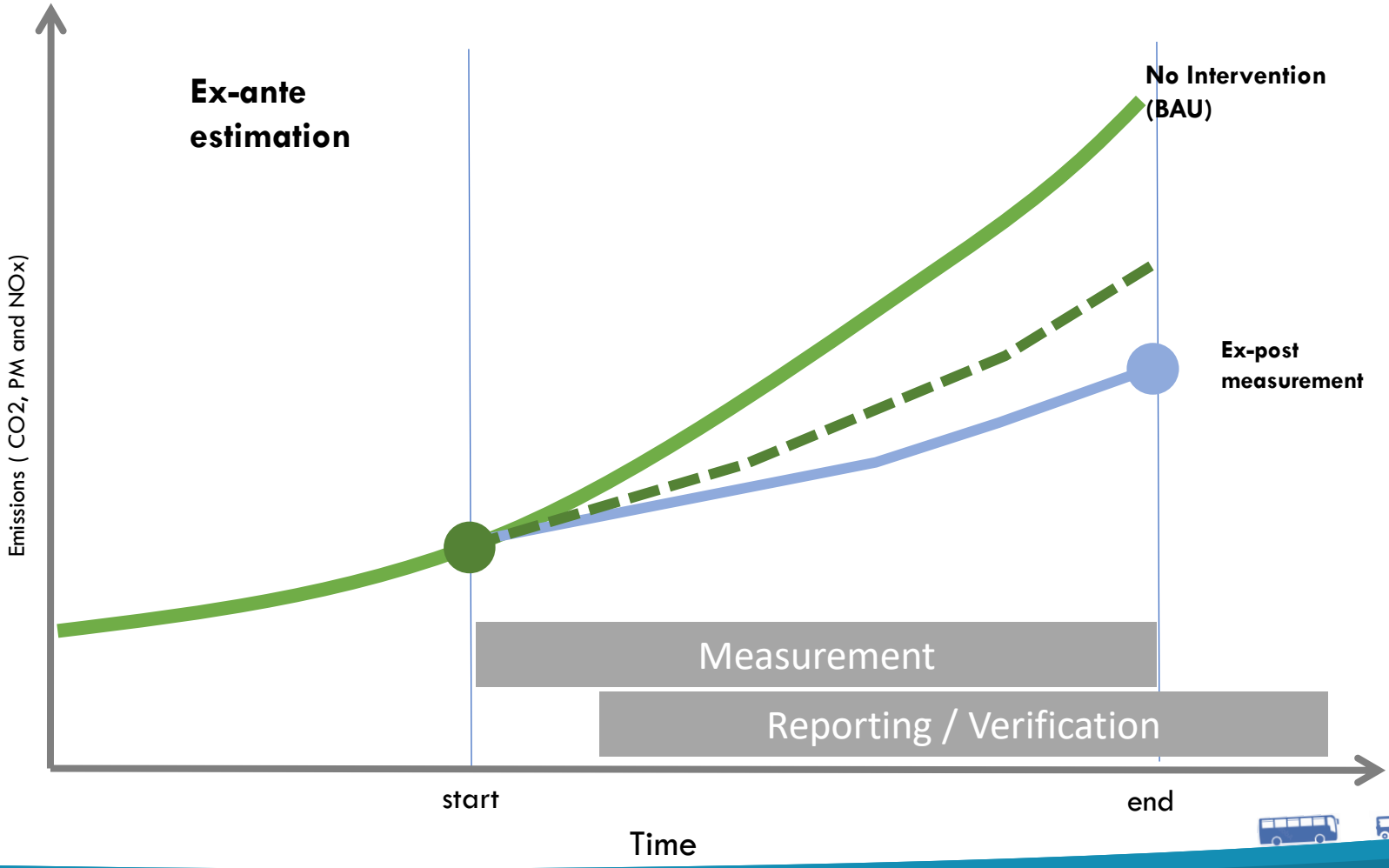
- "MRV" is one of the key tools in establishing transparency regarding climate change mitigation efforts

Why?

- Increases transparency / clarity of project effectiveness
- Opportunities for accessing finance
- Enhances planning, implementation, and future project/ policy formulation
- Promotion of effective measures



MRV: Before, During, After the Intervention



Project Scenario

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

		Project Scenario	Baseline Scenario
Activity and Structure	**Vehicle activity (VKM)** **Transport activity (PKM/ TKM)**	Ex-ante: estimated; Then Monitored	    Existing studies; dedicated surveys and interviews ; depending on the mechanism rules
Energy Intensity and Emission Factor	**Energy consumption (MJ)** **emission factors (kgCO2/MJ)**	Ex-ante: estimated; then Monitored	Other local data Other sources

Emissions Mitigation in Transport: Avoid, Shift, Improve

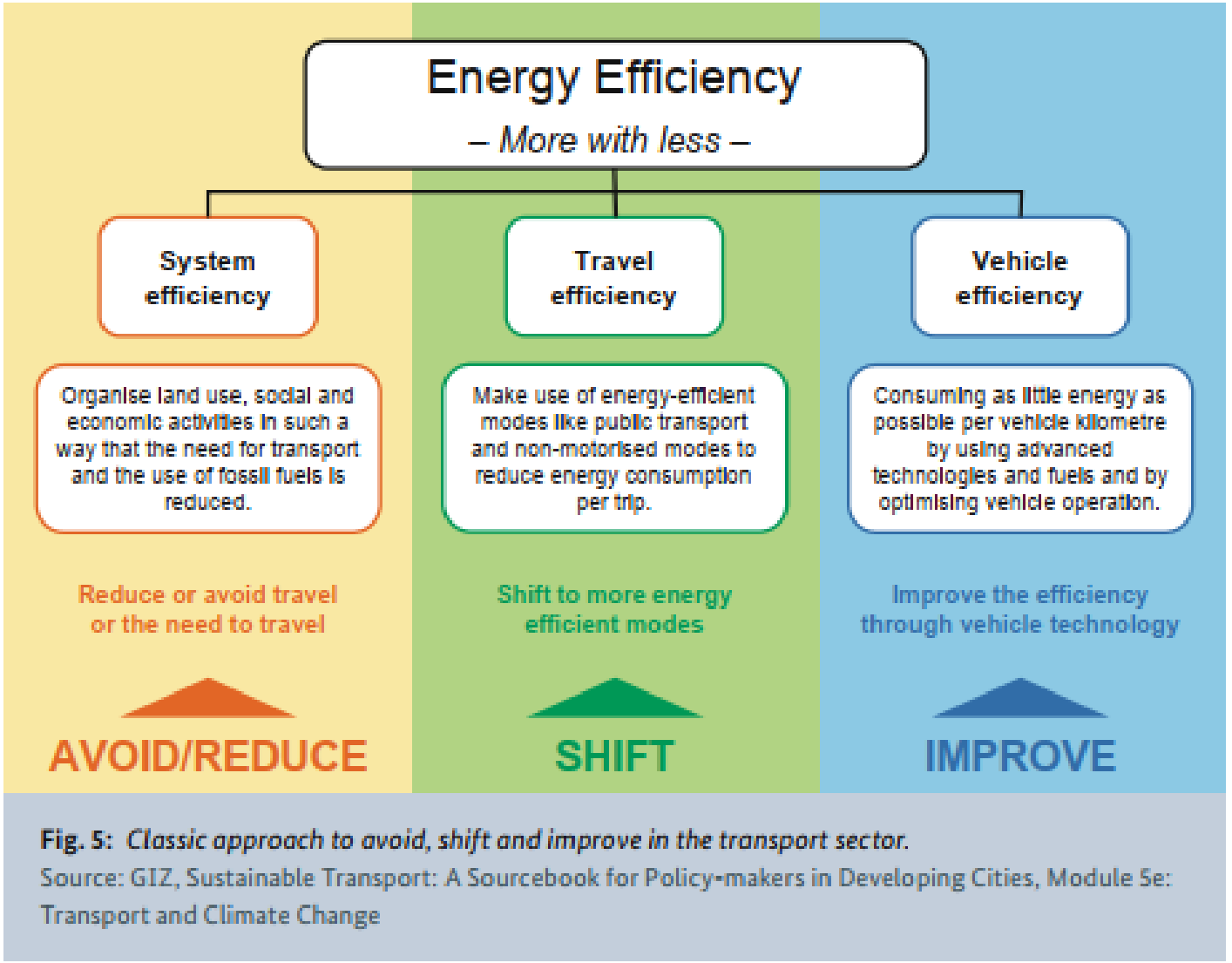
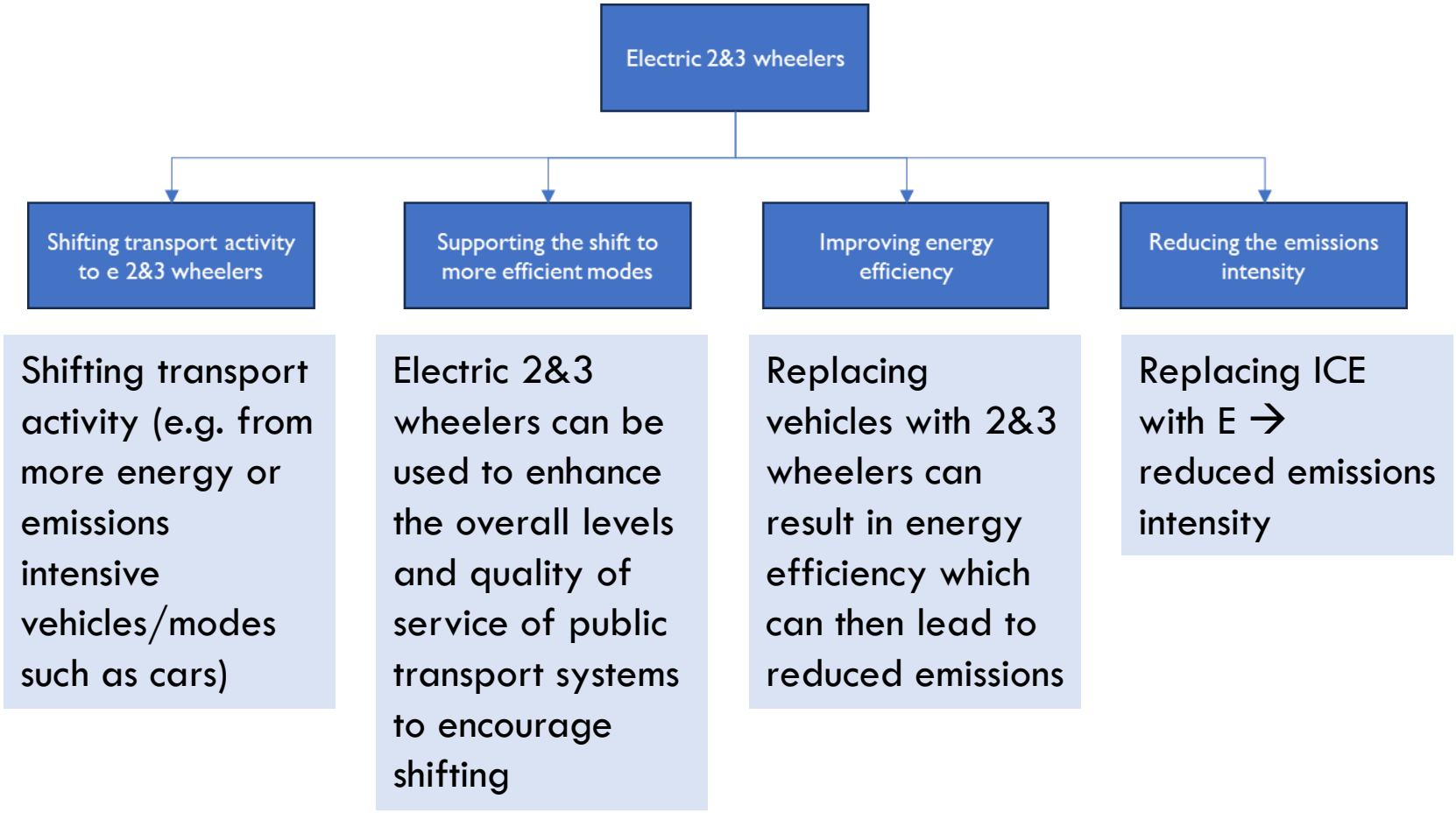
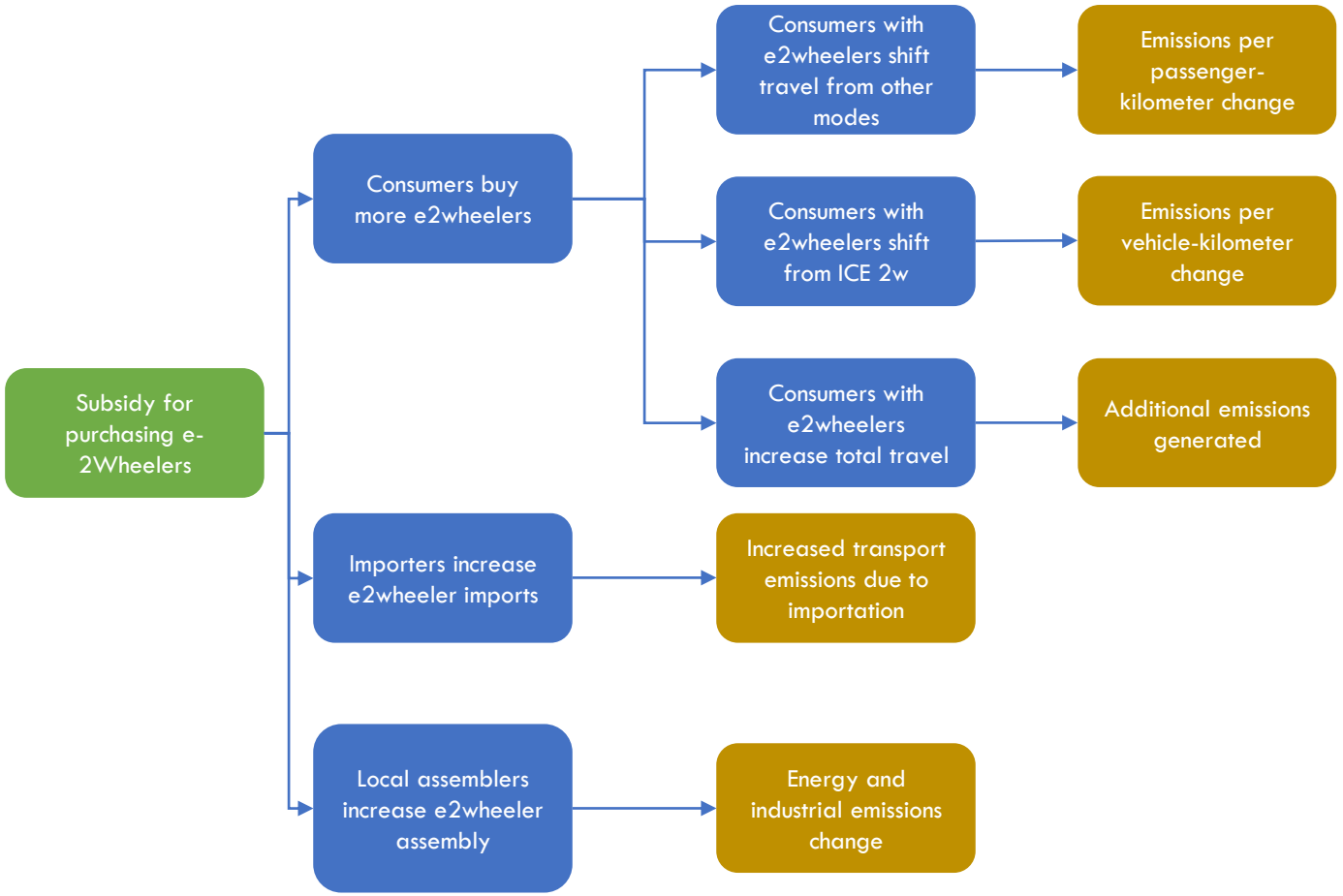


Fig. 5: *Classic approach to avoid, shift and improve in the transport sector.*
Source: GIZ, Sustainable Transport: A Sourcebook for Policy-makers in Developing Cities, Module 5e: Transport and Climate Change

- The impacts of the electrification of 2 & 3 wheelers need not be limited to the one-is-to-one replacement of a conventional 2 / 3 wheeler with an electric one.
  - towards reduced emissions



- Causal chain analysis refers to the systematic exploration of cause-and-effect relationships that link interventions (like policies or projects) to their expected or observed impacts (e.g. GHG impacts).
- Identifying the boundaries (temporal, geographic, thematic) is a crucial step
- The pathways by which higher level/macro programs impact emissions may be more difficult to map
- When in doubt:
  - Are they relevant?
  - Are the impacts significant?
  - Is it possible to measure?



- Also, ask yourself this – what's the purpose of the MRV exercise that you are embarking on?
- Different mechanisms have different requirements
- Avoid paralysis by analysis

Climate Mechanism	Reporting Requirements for Transport Mitigation Actions	Frequency of Reporting	Reported To	Verification Requirements for Transport Mitigation Actions	Frequency of Verification	Verified By
Clean Development Mechanism (CDM)	Project Design Document (PDD) with baseline emissions and estimated reductions	Every 1-2 years	Executive Board of the CDM	Verification by an independent designated operational entity (DOE) accredited by the CDM	Every 1-2 years	Independent DOE accredited by the CDM
Joint Implementation (JI)	Monitoring Report with emission reduction data	Every 1-2 years	Joint Implementation Supervisory Committee (JISC)	Verification by an independent designated operational entity (DOE) accredited by the JISC	Every 1-2 years	Independent DOE accredited by the JISC
Global Environment Facility (GEF)	Project Progress Report with transport mitigation actions	Varies by project	GEF Secretariat and project stakeholders	Monitoring and evaluation based on agreed indicators	Varies by project	GEF Independent Evaluation Office
Clean Technology Fund (CTF)	Project Progress Reports with transport mitigation actions	Varies by project	CTF Trust Fund Committee and project stakeholders	Monitoring and evaluation based on agreed indicators	Varies by project	Independent evaluation experts selected by the CTF Trust Fund Committee
Nationally Appropriate Mitigation Actions (NAMAs)	NAMA-specific reporting formats with transport mitigation actions	Varies by country and NAMA	Relevant government agencies and international stakeholders	Monitoring and evaluation based on NAMA-specific requirements	Varies by country and NAMA	Varies by country and NAMA
Mitigation Facility (MF)	Project-specific reporting formats with transport mitigation actions	Varies by project	Implementing entity and relevant stakeholders	Monitoring and evaluation based on project-specific requirements	Varies by project	Implementing entity or independent evaluators
International Climate Initiative (IKI)	Project-specific reporting formats with transport mitigation actions	Varies by project	IKI Secretariat and project stakeholders	Monitoring and evaluation based on project-specific requirements	Varies by project	Implementing entity or independent evaluators

MRV : Application to Different "Mechanisms"

- Carbon credits : Carbon Markets
  - Mandatory Carbon Markets
    - Clean Development Mechanism
    - Joint Implementation
  - Voluntary Carbon Markets
    - Gold Standard
    - Verified Carbon Standard
- Climate Finance Support Mechanisms
  - Mitigation Facility
  - GEF
  - IKI
  - Climate Investment Funds
  - Green Climate Funds
  - Climate bonds
- National reporting: National Communications to the UNFCCC ; Biennial Update Reports

Differences in…

- *Requirements in terms of*
  - *Accuracy of estimates*
  - *Monitoring, reporting, and verification requirements*
  - *Assessment periods*
  - *Scope*
  - *Defining boundaries*
  - *"Types" of emissions and emissions saved*
  - *Estimating BAU*
  - *Others*

Methodologies: Examples

Differences in :

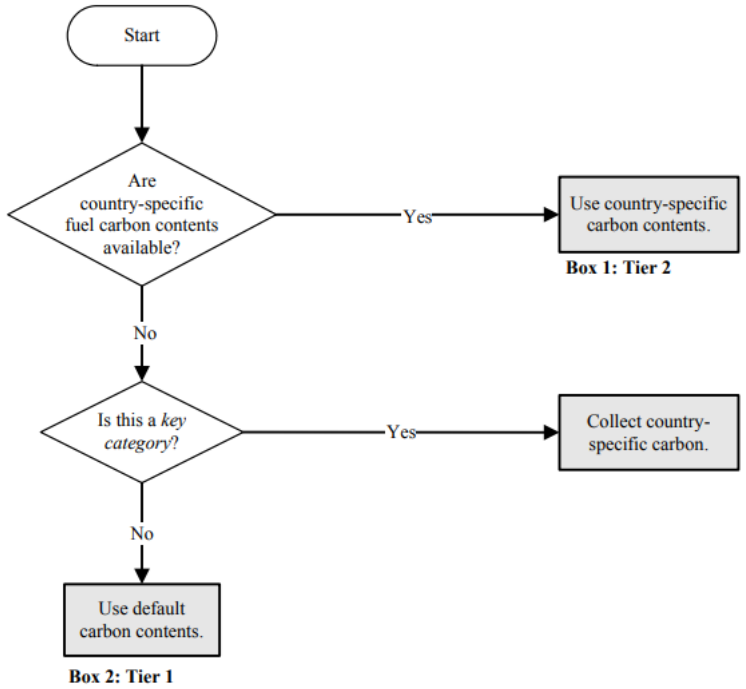
- Applicability
- Logic of emission reduction
- Formulae
- Monitoring methods

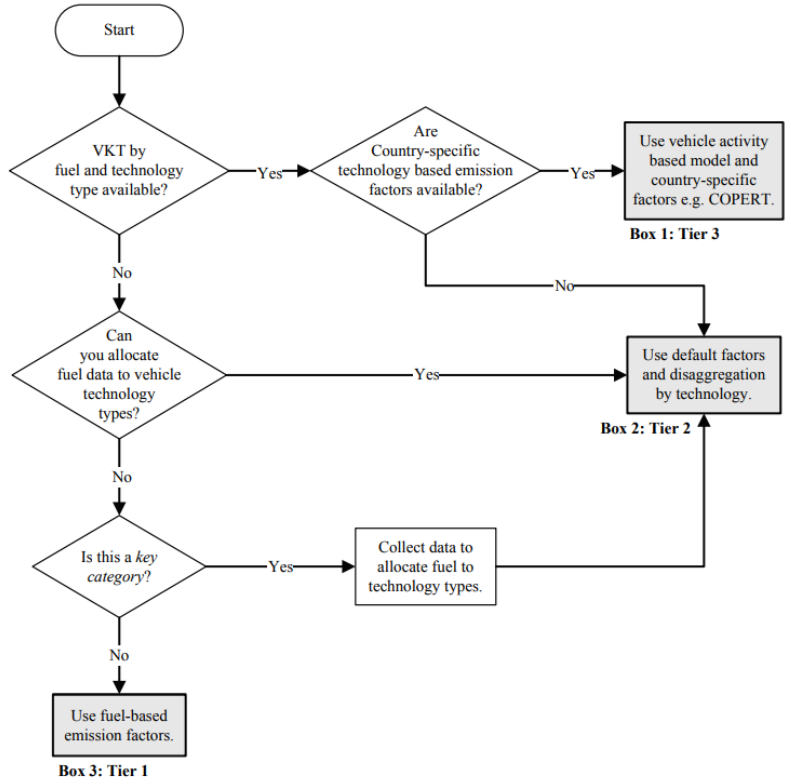
Selected Examples: CDM Methodologies

Category	Methodology	Purpose
Bus systems	AM0031, ACM0016	Shifting travel to more sustainable modes
Mass rapid transit systems	ACM0016, AMS-III.U	Shifting travel to more sustainable modes
Energy efficiency	AMS-III.AA, AMS-III.AP, AMS-III.C, AMS-III.AT	Improve the efficiency of modes
Fuel switch (bio-CNG)	AMS-III.AP	Improve the efficiency of modes
Fuel switch through retrofit	AMS-III.5	Improve the efficiency of modes
Transportation of cargo	AM0090	Shifting travel to more sustainable modes
Biofuel for transport	AM0047, ACM0017, AM0089, AMS-III.AK, AMS-III.T	Improve the efficiency of modes

Source: Romero. (2013).

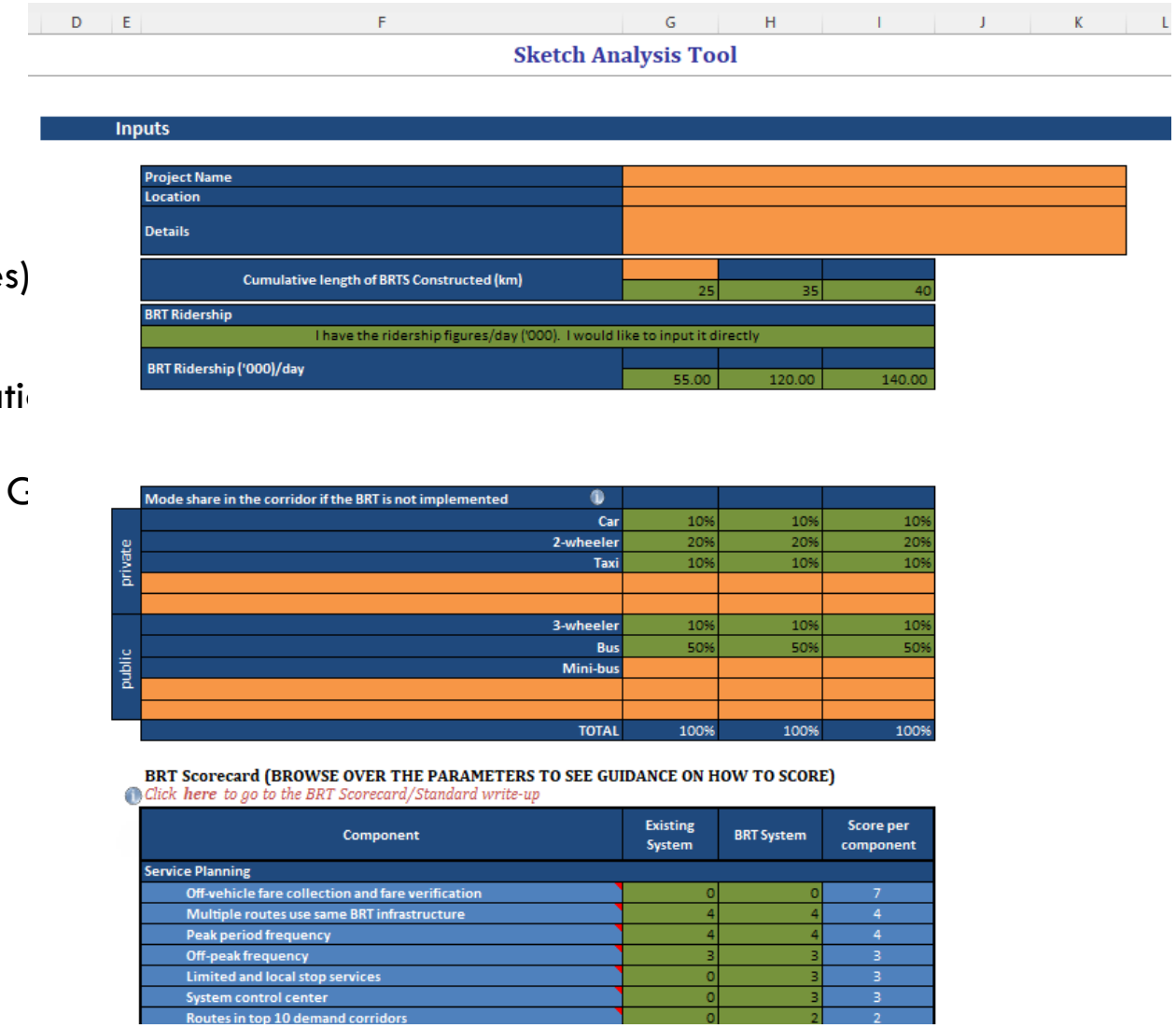
- Know the rules of the applicable mechanisms
- Flexibilities are normally embedded, which can be used depending on the circumstances





Methodologies and Tools

- IPCC Guidelines on National Greenhouse Gas Inventories
- GHG Protocol
- MOVES , COPERT (“intensity” and “fuel” types of measures)
- CDM tools
- GEF Guidelines for Estimating GHG Impacts of Transportati Projects
- Transport Emission Evaluation Model for Projects (TEEMP) : G
  - Sketch models for different types of projects
    - Avoid
    - Shift
    - Improve
- Micro/meso/macro transport simulation tools
- HDM-4 (road maintenance, improvements)
- MYC Calculator
- UNEP E-mobility Calculators
- Others…



Sketch Analysis Tool

Inputs

Project Name			
Location			
Details			
Cumulative length of BRTS Constructed (km)	25	35	40
BRT Ridership			
I have the ridership figures/day ('000). I would like to input it directly			
BRT Ridership ('000)/day	55.00	120.00	140.00

	Mode share in the corridor if the BRT is not implemented			
private	Car	10%	10%	10%
private	2-wheeler	20%	20%	20%
private	Taxi	10%	10%	10%
public	3-wheeler	10%	10%	10%
public	Bus	50%	50%	50%
public	Mini-bus			
	TOTAL	100%	100%	100%

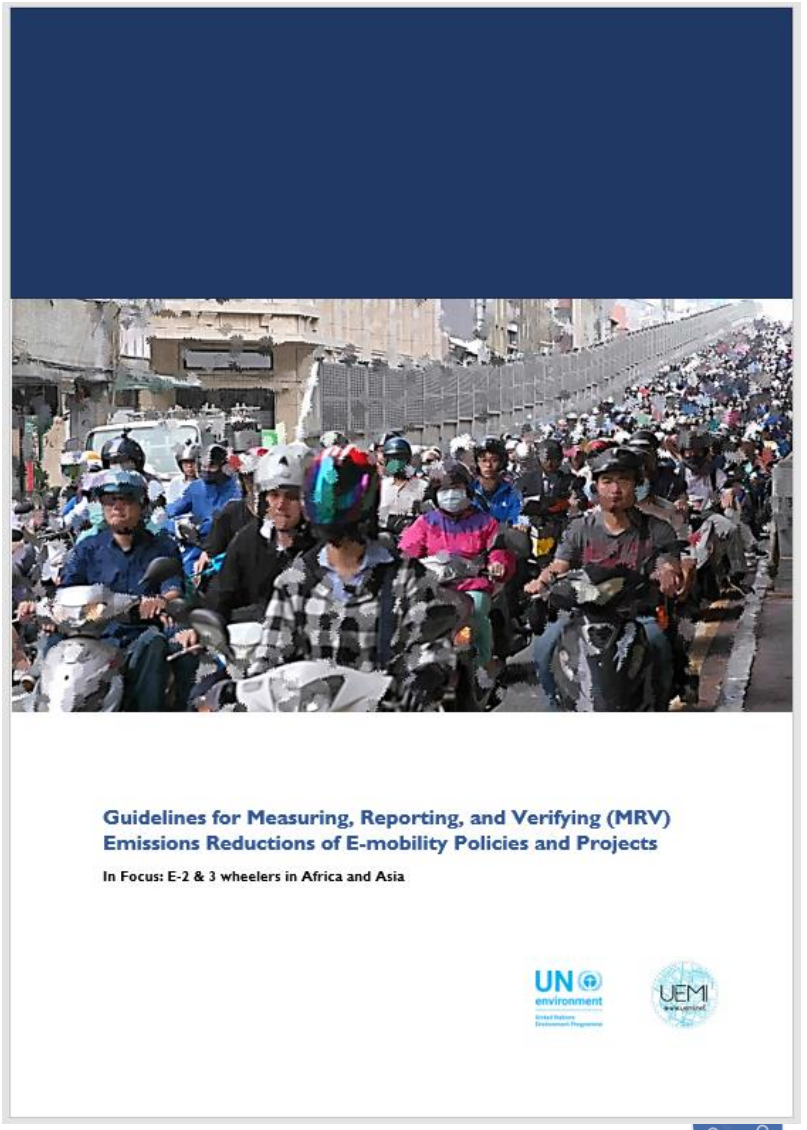
BRT Scorecard (BROWSE OVER THE PARAMETERS TO SEE GUIDANCE ON HOW TO SCORE)

Click here to go to the BRT Scorecard/Standard write-up

Component	Existing System	BRT System	Score per component
Service Planning			
Off-vehicle fare collection and fare verification	0	0	7
Multiple routes use same BRT infrastructure	4	4	4
Peak period frequency	4	4	4
Off-peak frequency	3	3	3
Limited and local stop services	0	3	3
System control center	0	3	3
Routes in top 10 demand corridors	0	2	2

https://www.thegef.org/sites/default/files/publications/TEMP-models-2014.zip

- Upcoming publication on Guidelines for MRV Emissions Reduction of E-mobility Policies and Projects (focus on E2&3 wheelers in Africa and Asia)



Reporting and Verification

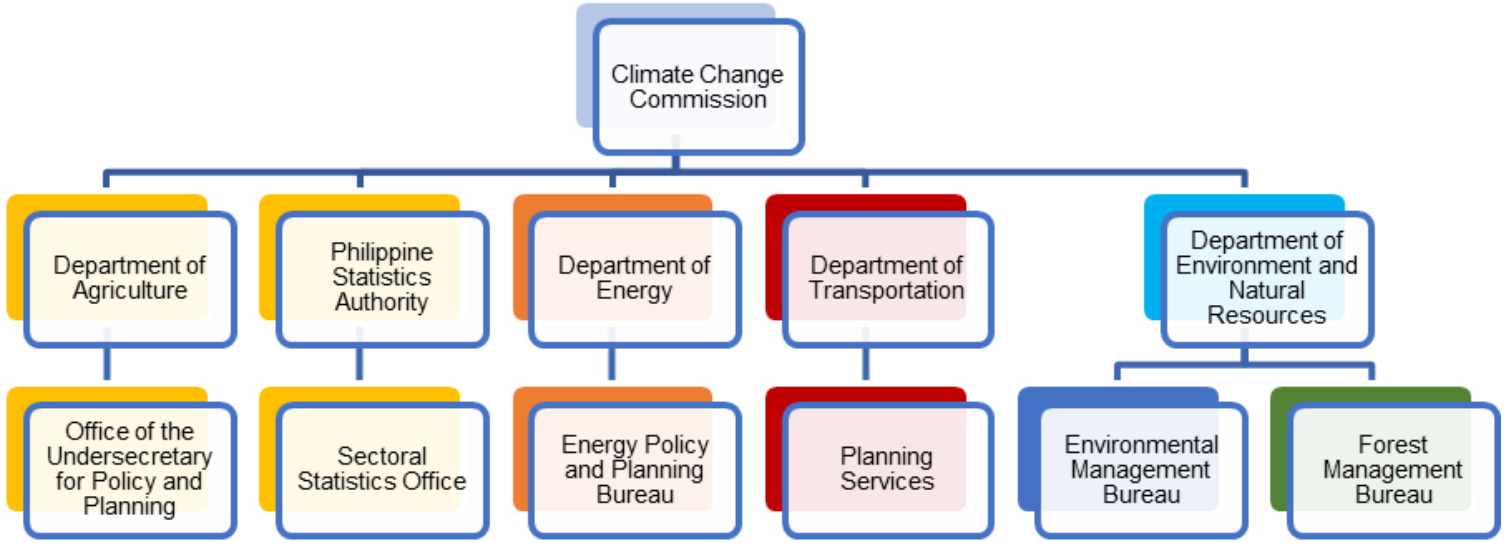
- Who to report to/ who verifies
  - Domestic / local stakeholders
  - International donors
  - Review committees / evaluation departments
- What to report/what is to be verified
  - Depends on the objectives/ who we are reporting to
  - High level/long-term estimates to detailed estimates and input/monitored parameters
  - Different metrics
    - Intervention metrics
    - Progress metrics
    - GHG metrics
    - Sustainable development metrics

MRVing Mitigation Interventions: in a Nutshell

Overall Steps	Detailed Step
Define policy/action	Define policy or action to be assessed
Identify effects	Identify potential GHG effects of the policy/action; include them in the map of the causal chain
	Define the GHG assessment boundary around significant effects; identify the sources/sinks in the boundary
Measure / Estimate Effects	Estimate baseline emissions for affected sources or sinks in the boundary
	Ex-ante assessment; Estimate policy scenario emissions for affected sources or sinks; subtract baseline to estimate GHG effect
	Identify key performance indicators Monitor over time
	Ex-post assessment; Estimate policy scenario emissions for affected sources or sinks; subtract baseline to estimate GHG effect
	Assess uncertainty
Verify	Verify results
Report	Report results and methodology used

Institutions

- MRV systems are dependent on institutional arrangements
- Institutional set-ups vary depending on the existing structures ; most of the time, coordination is the missing link
- In some cases, (e.g. at national level), existing structures (institutions and data systems) need to properly accommodate new data brought about by electrification



Source: Clean Air Asia

Summary

- Electric 2 and 3 wheelers an essential piece in mitigating climate change globally
- E2&3 wheelers can result in reducing GHG emissions through a variety of different pathways
- MRV is essential for ensuring transparency, enhancing implementation, informing future action, and accessing climate finance
- Knowing the MRV landscape, rules, and specific applications are important if you want to balance robustness with practicality and purpose.
- Institutions and institutional set-ups are important in sustaining MRV systems that provide the intended outcomes

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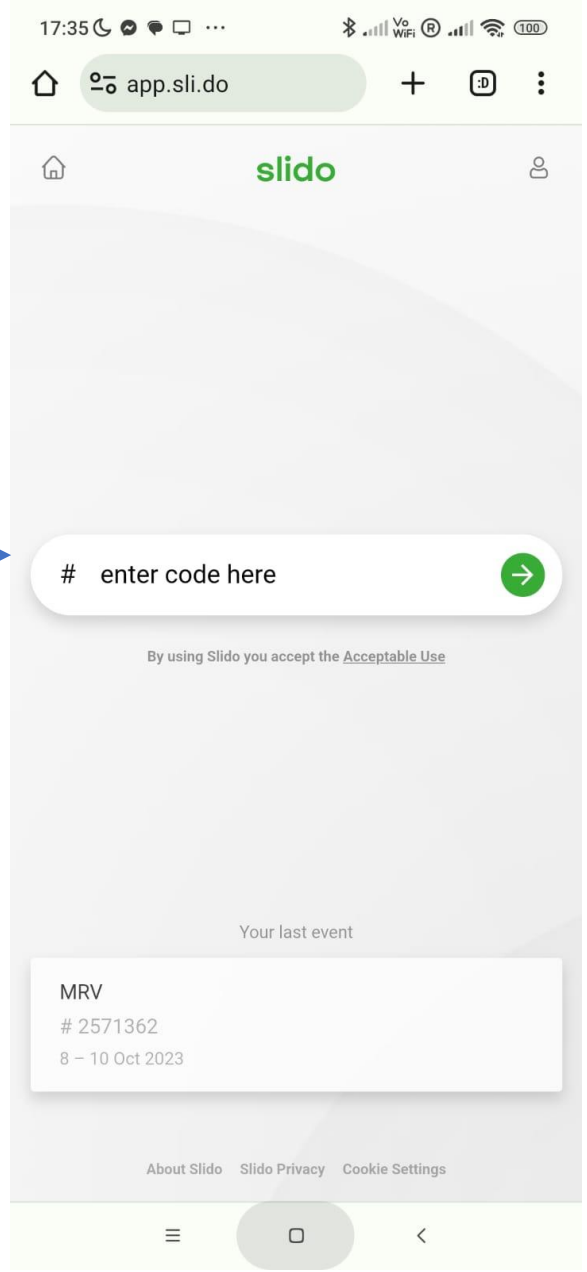

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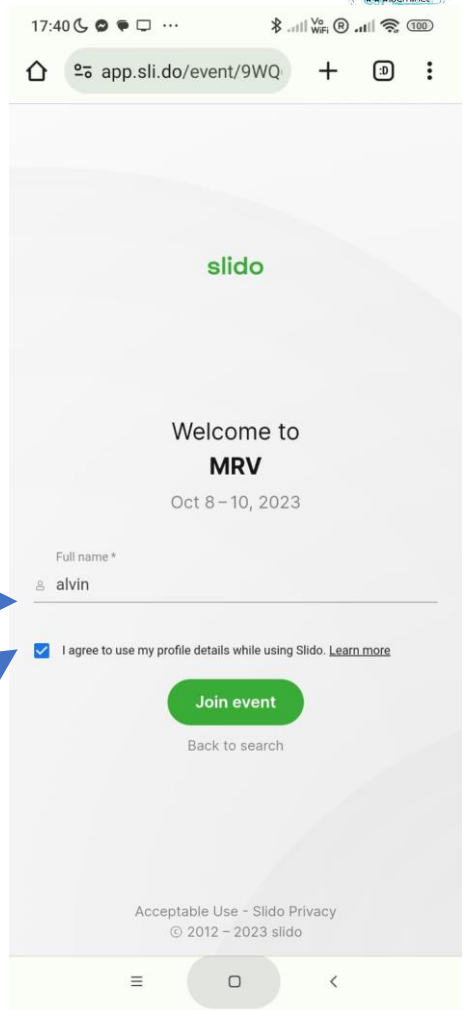

ROUNDTABLE DISCUSSION: INSTITUTIONAL SET-UP OF MRV SYSTEMS

Objectives

- To understand the unique institutional setups of MRV systems across different countries.
- To identify best practices, challenges, and opportunities in these setups in the context of electric two and three-wheelers.
- To foster collaboration and shared learning among participating countries pertaining to MRV systems, particularly from the lens of electrifying two and three wheelers.

Distinguished Representatives from

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Cameroon

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Mr. Peeraway Saisirirat
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University of Transport Technology
Vietnam

Quick presentation from the panelists:

1. Please give us a quick overview of the electric 2 and 3 wheeler landscape in your country?

2. Describe the institutional setup of the MRV system in your country (and kindly highlight specific institutions and elements that are critical in relation to MRVing mitigation efforts related to 2 and 3 wheelers).

Panel and Q&A