

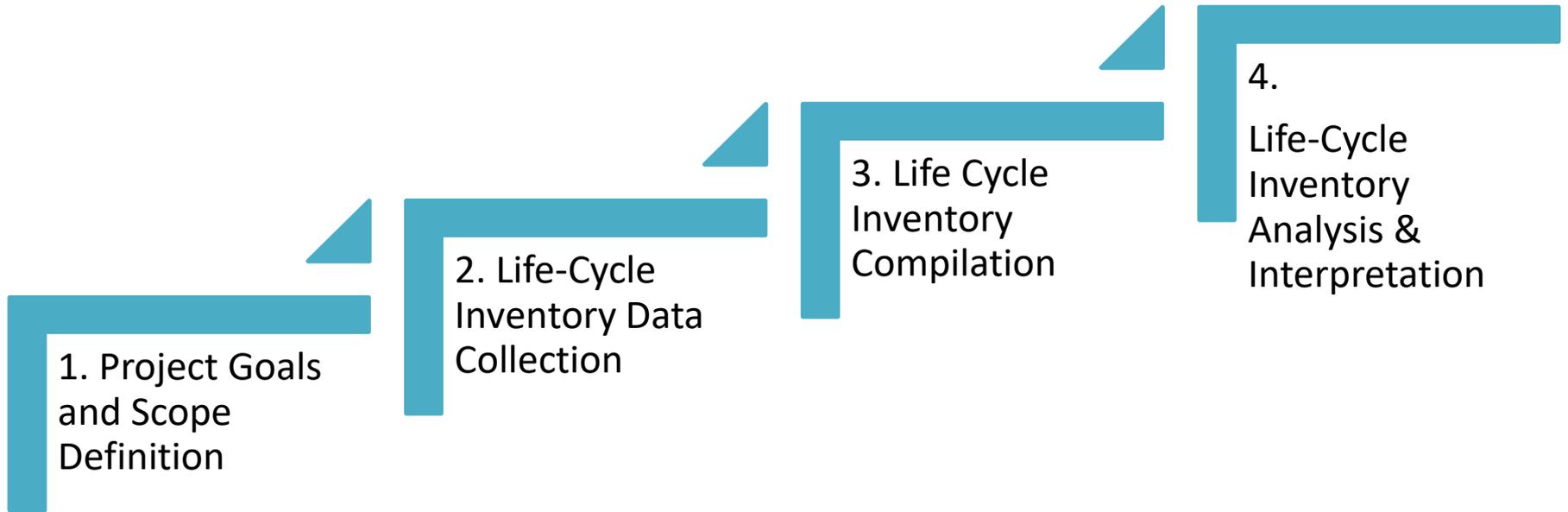
ESG Report – Phase 1

Ecological, Climate and Social Impact Assessment

Sun Mobility

February 2021

Process Flow



Assumptions

Assumptions

- In-Use and not 'rated' Fuel Efficiency of Electric Vehicles (EVs) and Internal Combustion Engine Vehicles (ICEs) used; based on data supplied by Fleet Operators.
- Renewable Energy contribution to electricity 'fuel-mix' accounted for in deriving Use-Phase GHG Emissions.
- Material Acquisition and Pre-processing (including mining of rare earth metals, Lithium etc.) were not considered in this Phase and will be integrated in Phase 2 of the assessment process.
- Emissions from mining, transporting, and distributions of fossil fuels (for ICEs and for non-renewable component of grid electricity) were estimated and included in this Phase.
- Emissions from Battery Production, End of Life processes for Vehicle Body (i.e. recycling, disposal etc. of metal, polymers, glass etc.), and Battery-Recycling were not considered in this Phase and will be integrated in Phase 2 of the assessment process.
- Emissions from Distribution and Storage stage were considered to be negligible compared to other LCA stages and hence not included.

Goal & Scope Definition

Goal

- Establishing baseline life cycle carbon and air pollutant footprints for conventional (ICE), Lead-Acid EVs.
- Conducting a comparative analysis, based on primary as well as secondary research, with the life cycle footprint of Sun Mobility's Swappable Lithium-Ion Battery solutions (Battery-as-a-Service, Baas) for Electric Vehicle.
- Provide high-caliber technical support for establishing a science-based voluntary self-disclosure centric financial and communications relationship with its customers and potential/current investors, through the results and insights derived from the comparative Life-Cycle-Analysis study of Sun Mobility's EV-mobility enabling products relative to Business-as-Usual mobility solutions prevalent in India in 2020.

Goal & Scope Definition

Scope

- Conduct comparative life cycle footprint analysis between EV and ICE Vehicles according to the life-cycle boundary defined below and analyze them through per vehicle-km travel scenario models.

| Life Cycle Stage | Sub-Stage | Included within Boundary |
|---|---|--------------------------|
| Material Acquisition and Pre-Processing | Ore and other raw material mining and extraction | No |
| | Metal and other material processing | No |
| Production | Fuel Supply Chain (Mining, Extraction, Transport, Power Generation) | Yes |
| | Metal and other material procurement | No |
| | Transformation of metals and other materials | No |
| | Assembling | No |
| Distribution and Storage | Domestic Transport for Export | No |
| | International Transport for Export | No |
| Use | Vehicle Use & Ride Scenarios | Yes |
| End-of-Life | Disposal of Batteries | No |

Goal & Scope Definition

Scope

1. PART 1: Primary Fuel Efficiency & Vehicle Research and Data Collection: Conducting primary and secondary research through literature reviews, interviews with stakeholders, web research catalogues to collate information on vehicle make, model, design and efficiency along with manufacturing and other details.
2. PART 2: Formulating Vehicle based Emission Factors: Thorough and comprehensive formulizing of vehicle-based emissions factors
3. PART 3: Conducting Life Cycle Assessments: Designing Spreadsheet models to calculate GHG and Non-Particulate Air Pollution mitigation assessments of Business-As-Usual and Intervention scenarios in accordance with the WRI GHG Protocol's Product Life Cycle Accounting and Reporting Standard and the Scope 3 Emissions Accounting and Reporting Standard.

Goal & Scope Definition

Scope

4. PART 4: Estimating Particulate Carbon (Black Carbon) Emissions and local air quality impacts in congruence with the Black Carbon Methodology for the Logistics Sector (2017) developed by the Global Green Freight Project's Smart Freight Centre.
5. PART 5: Estimating the economic wellbeing benefits for materially relevant subsets of stakeholders/end-users of products in accordance with specific indicators and methodologies articulated in the Global Reporting Initiative's 'G4 Sustainability Reporting Guidelines' relevant sections related to Economic Performance (G4 EC1 and EC4).

Protocols & Standards

International Protocols followed:

- 1996 & 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2 – Energy for developing Scope 2 & Scope 3 Emission Factors for Indian Grid Electricity Mix.
- EMEP/EEA Air Pollutant Emission Inventory Guidelines.
- Greenhouse Gas Protocol's Product Life Cycle Accounting and Reporting Standard (WRI, WBCSD).
- Global Reporting Initiative's 'G4 Sustainability Reporting Guidelines.
- Black Carbon Methodology for the Logistics Sector (2017), Global Green Freight Project.

Table 1 – GHG Mitigation

Table 1: Greenhouse Gas Mitigation – upto 2025 (BAU Renewables % in Grid)

| | | 2022 | 2023 | 2024 | 2025 |
|-------------------|-----------------------------------|---------------|----------------|------------------|------------------|
| Sr. No. | Vehicle Type | (tonnes CO2e) | (tonnes CO2e) | (tonnes CO2e) | (tonnes CO2e) |
| 1 | Bus (Heavy Duty) - India | - | - | - | - |
| 2 | Bus (Heavy Duty) - World | 2,872 | 29,519 | 105,649 | 248,656 |
| 3 | Scooter - India | 1,169 | 8,248 | 22,557 | 49,632 |
| 4 | Scooter - World | 24,380 | 98,418 | 225,039 | 455,147 |
| 5 | Three Wheeler (Freight) - India | 5,234 | 19,607 | 80,242 | 160,516 |
| 6 | Three Wheeler (Freight) - World | - | - | - | - |
| 7 | Three Wheeler (Passenger) - India | 2,595 | 23,694 | 102,720 | 158,658 |
| 8 | Three Wheeler (Passenger) - World | 17,853 | 58,292 | 121,937 | 225,773 |
| 9 | Truck (Light Duty) - India | - | 4,559 | 47,703 | 129,877 |
| 10 | Truck (Light Duty) - World | - | 37,774 | 114,055 | 230,072 |
| Total | | 54,104 | 280,112 | 819,902 | 1,658,329 |
| Cumulative | | 54,104 | 334,216 | 1,154,119 | 2,812,448 |

Table 2 – GHG Mitigation

Table 2: Greenhouse Gas Mitigation – upto 2025 (50% Renewables in Grid)

| | | 2022 | 2023 | 2024 | 2025 |
|-------------------|-----------------------------------|---------------|----------------|------------------|------------------|
| Sr. No. | Vehicle Type | (tonnes CO2e) | (tonnes CO2e) | (tonnes CO2e) | (tonnes CO2e) |
| 1 | Bus (Heavy Duty) - India | - | - | - | - |
| 2 | Bus (Heavy Duty) - World | 2,872 | 29,519 | 105,649 | 248,656 |
| 3 | Scooter - India | 1,239 | 9,208 | 26,327 | 60,235 |
| 4 | Scooter - World | 24,380 | 98,418 | 225,039 | 455,147 |
| 5 | Three Wheeler (Freight) - India | 5,735 | 23,270 | 101,689 | 215,121 |
| 6 | Three Wheeler (Freight) - World | - | - | - | - |
| 7 | Three Wheeler (Passenger) - India | 3,483 | 41,502 | 189,596 | 446,643 |
| 8 | Three Wheeler (Passenger) - World | 17,853 | 58,292 | 121,937 | 225,773 |
| 9 | Truck (Light Duty) - India | - | 5,258 | 58,177 | 166,245 |
| 10 | Truck (Light Duty) - World | - | 37,774 | 114,055 | 230,072 |
| Total | | 55,563 | 303,240 | 942,470 | 2,047,891 |
| Cumulative | | 55,563 | 358,803 | 1,301,273 | 3,349,164 |

Context 1 – GHG Mitigation

Context 1: Greenhouse Gas Mitigation – by 2025

50% Renewables ~ adds 0.54 Million Tonnes CO2e benefit

Sun Mobility's GHG Mitigation with BAU Grid ~ 2.8 Million Tonnes CO2e

Sun Mobility's GHG Mitigation with 50% Renewables ~ 3.4 Million Tonnes CO2e

Sun Mobility's GHG mitigation ~ 12 to 13 Million trees planted

Chart 1 – GHG Mitigation

Chart 1: % Contribution to Greenhouse Gas Mitigation – in 2025 (BAU Renewables)

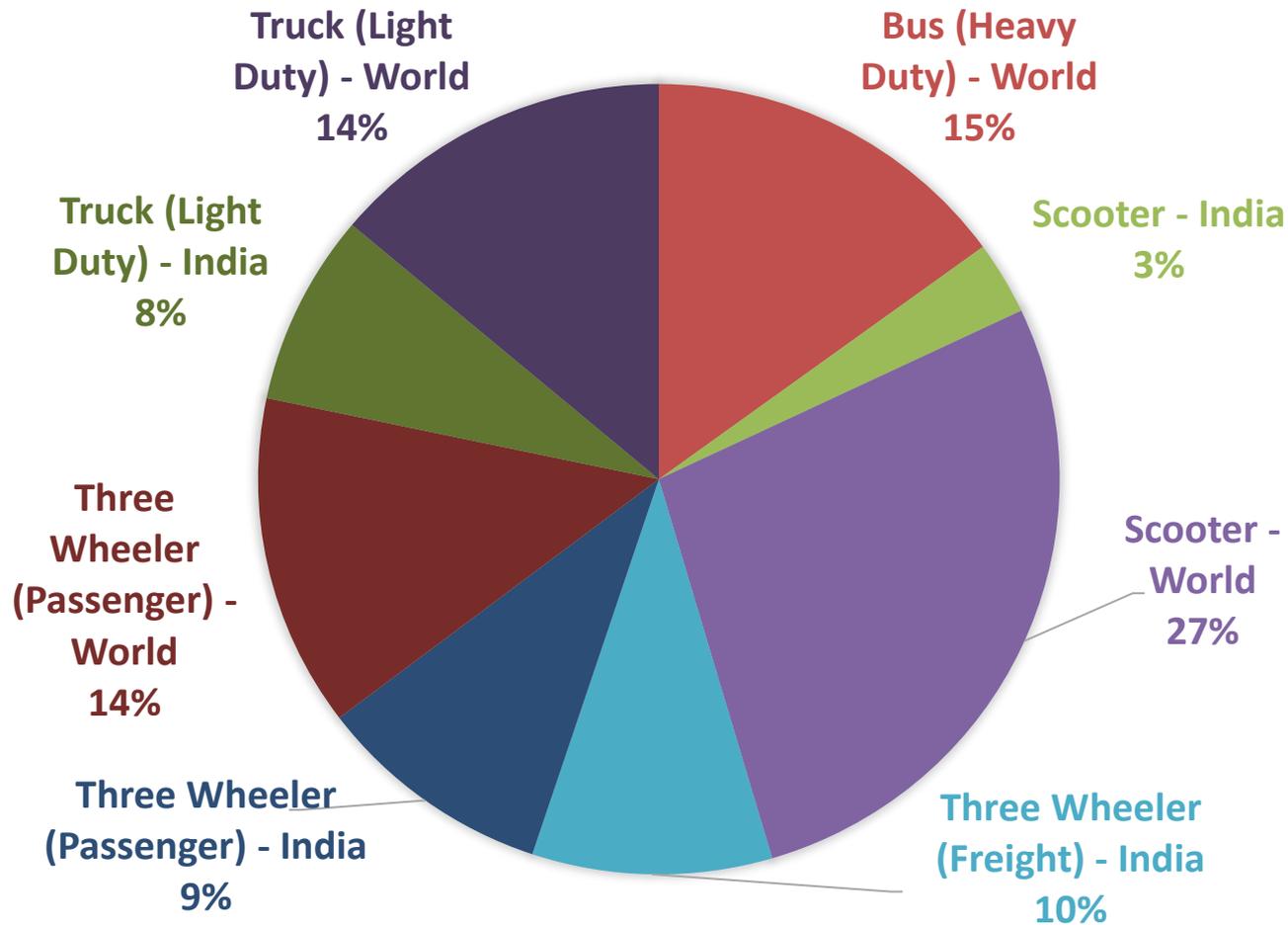


Chart 2 – GHG Mitigation

Chart 2: % Contribution to Greenhouse Gas Mitigation – in 2025 (50% Renewables)

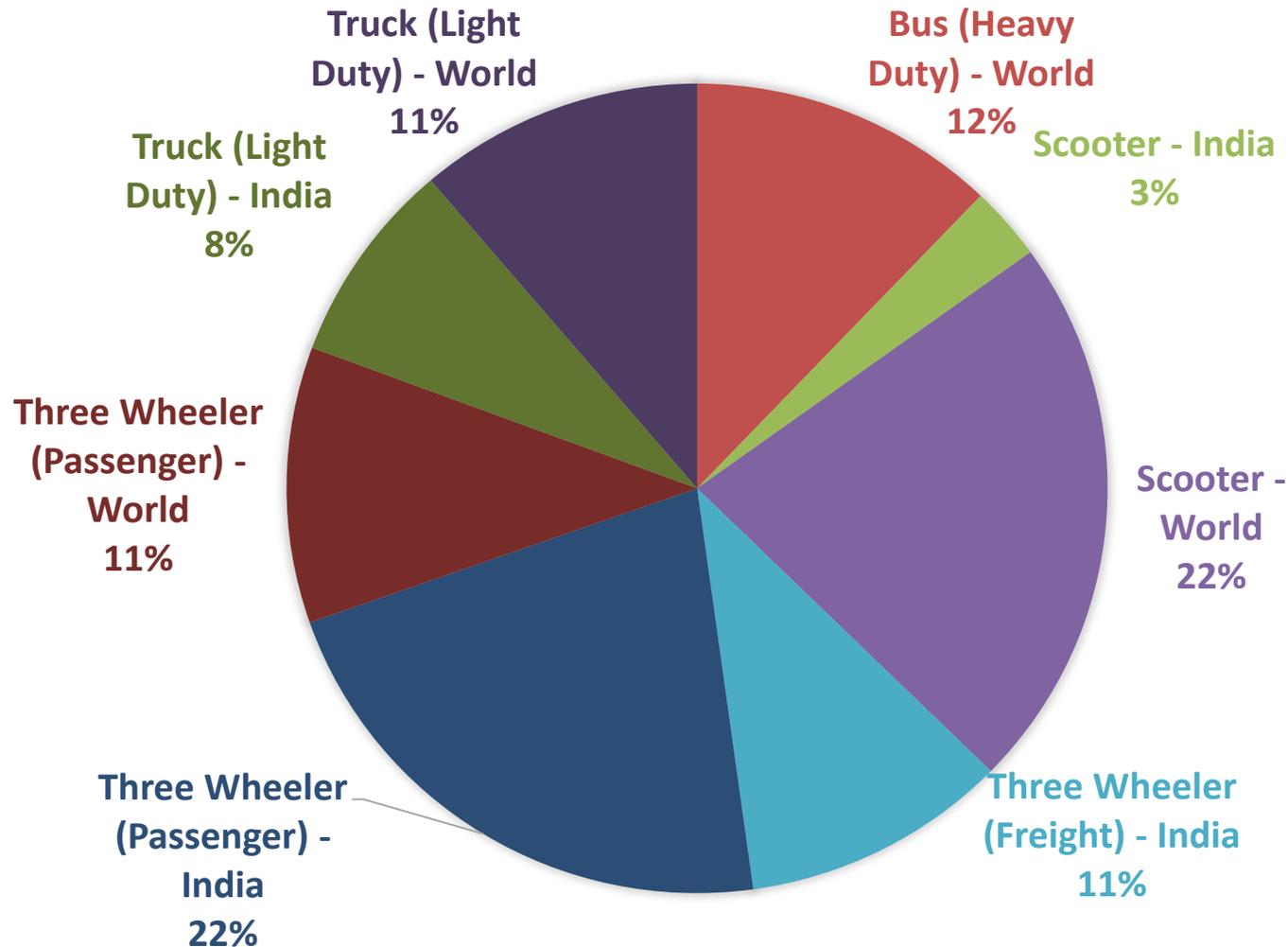


Table 3 – NOx Mitigation

Table 3: NOx Mitigation – upto 2025 (BAU Renewables % in Grid)

| | | 2022 | 2023 | 2024 | 2025 |
|-------------------|-----------------------------------|--------------|--------------|--------------|--------------|
| Sr. No. | Vehicle Type | (tonnes NOx) | (tonnes NOx) | (tonnes NOx) | (tonnes NOx) |
| 1 | Bus (Heavy Duty) - India | - | - | - | - |
| 2 | Bus (Heavy Duty) - World | 0 | 5 | 26 | 77 |
| 3 | Scooter - India | 2 | 13 | 36 | 79 |
| 4 | Scooter - World | 42 | 168 | 386 | 784 |
| 5 | Three Wheeler (Freight) - India | 6 | 23 | 93 | 186 |
| 6 | Three Wheeler (Freight) - World | - | - | - | - |
| 7 | Three Wheeler (Passenger) - India | -1 | -10 | -14 | -119 |
| 8 | Three Wheeler (Passenger) - World | 17 | 57 | 121 | 226 |
| 9 | Truck (Light Duty) - India | - | 6 | 60 | 164 |
| 10 | Truck (Light Duty) - World | - | 57 | 172 | 348 |
| Total | | 66 | 318 | 878 | 1,745 |
| Cumulative | | 66 | 384 | 1,263 | 3,008 |

Table 4 – NOx Mitigation

Table 4: NOx Mitigation – upto 2025 (50% Renewables in Grid)

| | | 2022 | 2023 | 2024 | 2025 |
|-------------------|-----------------------------------|--------------|--------------|--------------|--------------|
| Sr. No. | Vehicle Type | (tonnes NOx) | (tonnes NOx) | (tonnes NOx) | (tonnes NOx) |
| 1 | Bus (Heavy Duty) - India | - | - | - | - |
| 2 | Bus (Heavy Duty) - World | 0 | 5 | 26 | 77 |
| 3 | Scooter - India | 2 | 15 | 45 | 104 |
| 4 | Scooter - World | 42 | 168 | 386 | 784 |
| 5 | Three Wheeler (Freight) - India | 7 | 31 | 143 | 316 |
| 6 | Three Wheeler (Freight) - World | - | - | - | - |
| 7 | Three Wheeler (Passenger) - India | 1 | 32 | 191 | 566 |
| 8 | Three Wheeler (Passenger) - World | 17 | 57 | 121 | 226 |
| 9 | Truck (Light Duty) - India | - | 7 | 85 | 251 |
| 10 | Truck (Light Duty) - World | - | 57 | 172 | 348 |
| Total | | 69 | 373 | 1,169 | 2,672 |
| Cumulative | | 69 | 442 | 1,611 | 4,283 |

Context 2 – NOx Mitigation

Context 2: NOx Mitigation – by 2025

50% Renewables ~ adds 1,275 Tonnes NOx benefit

Sun Mobility's GHG Mitigation with BAU Grid ~
3,008 Tonnes NOx

Sun Mobility's GHG Mitigation with 50% Renewables ~
4,283 Tonnes NOx

Chart 3 – NOx Mitigation

Chart 3: % Contribution to NOx Mitigation – in 2025 (BAU Renewables)

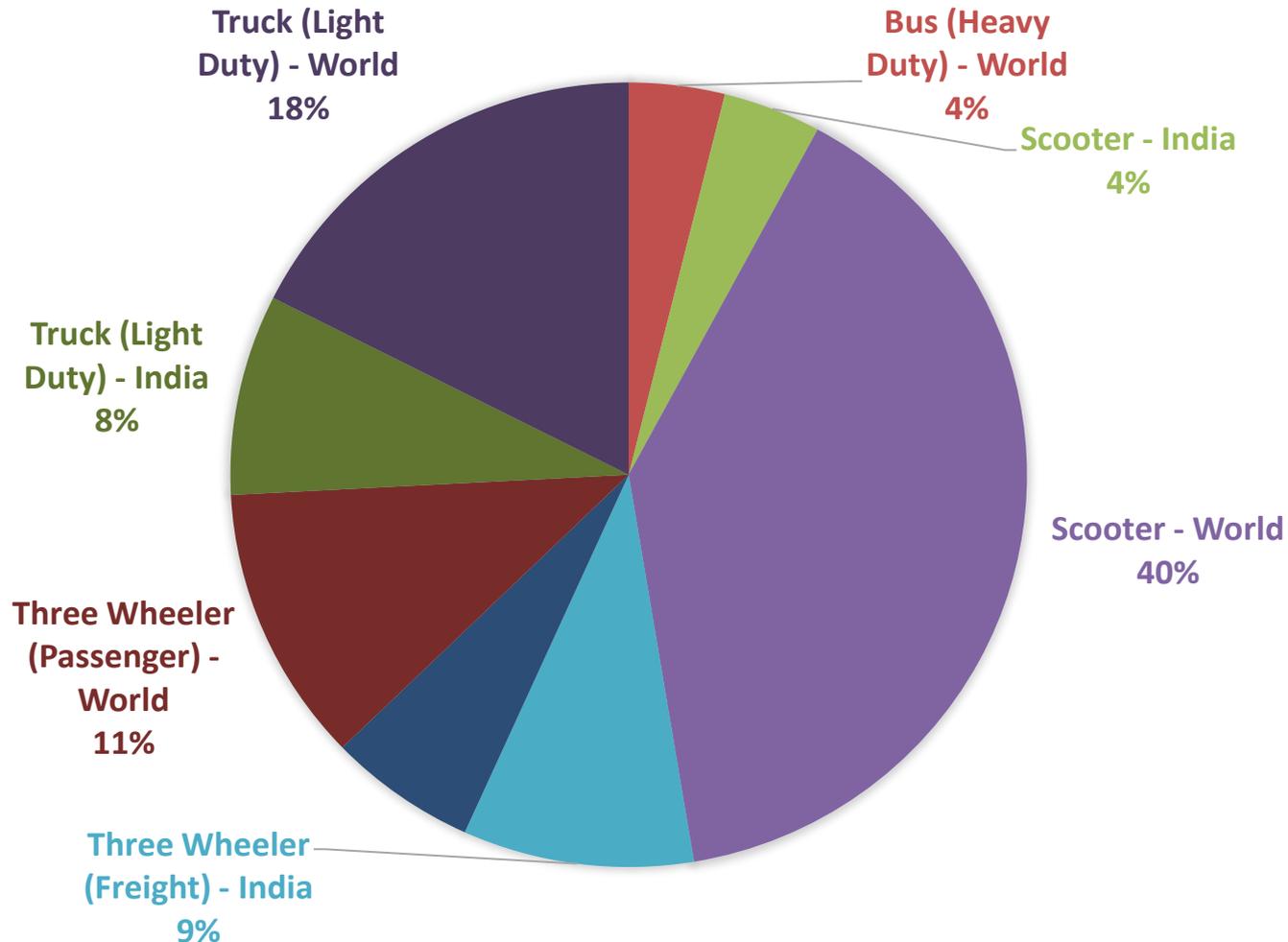


Chart 4 – NOx Mitigation

Chart 4: % Contribution to NOx Mitigation – in 2025 (50% Renewables)

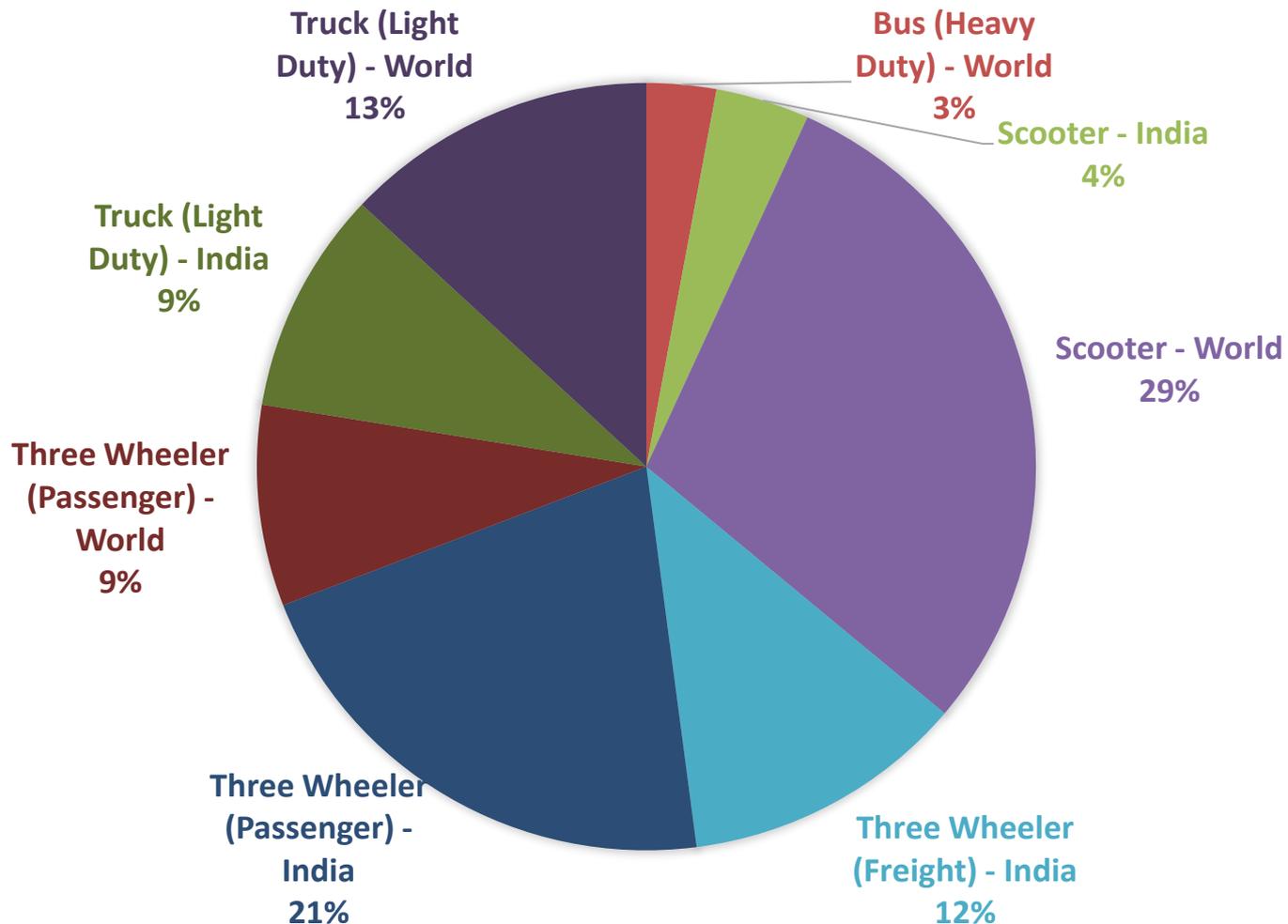


Table 5 – Black Carbon Mitigation

Table 5: Black Carbon Mitigation – upto 2025 (BAU Renewables % in Grid)

| | 2022 | 2023 | 2024 | 2025 |
|-------------------|-----------------------------------|-------------|-------------|--------------|
| Sr. No. | Vehicle Type | (tonnes BC) | (tonnes BC) | (tonnes BC) |
| 1 | Bus (Heavy Duty) - India | - | - | - |
| 2 | Bus (Heavy Duty) - World | 0.06 | 0.58 | 2.03 |
| 3 | Scooter - India | 0.00 | 0.00 | 0.01 |
| 4 | Scooter - World | 0.03 | 0.12 | 0.27 |
| 5 | Three Wheeler (Freight) - India | 0.14 | 0.51 | 2.06 |
| 6 | Three Wheeler (Freight) - World | - | - | - |
| 7 | Three Wheeler (Passenger) - India | 0.02 | 0.23 | 0.94 |
| 8 | Three Wheeler (Passenger) - World | 0.00 | 0.01 | 0.02 |
| 9 | Truck (Light Duty) - India | - | 0.11 | 1.14 |
| 10 | Truck (Light Duty) - World | - | 0.71 | 2.13 |
| Total | | 0.25 | 2.26 | 8.59 |
| Cumulative | | 0.25 | 2.51 | 11.10 |

Table 6 – Black Carbon Mitigation

Table 6: Black Carbon Mitigation – upto 2025 (50% Renewables in Grid)

| | | 2022 | 2023 | 2024 | 2025 |
|-------------------|-----------------------------------|-------------|-------------|--------------|--------------|
| Sr. No. | Vehicle Type | (tonnes BC) | (tonnes BC) | (tonnes BC) | (tonnes BC) |
| 1 | Bus (Heavy Duty) - India | - | - | - | - |
| 2 | Bus (Heavy Duty) - World | 0.06 | 0.58 | 2.03 | 4.68 |
| 3 | Scooter - India | 0.00 | 0.01 | 0.02 | 0.07 |
| 4 | Scooter - World | 0.03 | 0.12 | 0.27 | 0.57 |
| 5 | Three Wheeler (Freight) - India | 0.14 | 0.53 | 2.18 | 4.39 |
| 6 | Three Wheeler (Freight) - World | - | - | - | - |
| 7 | Three Wheeler (Passenger) - India | 0.03 | 0.33 | 1.42 | 3.17 |
| 8 | Three Wheeler (Passenger) - World | 0.00 | 0.01 | 0.02 | 0.05 |
| 9 | Truck (Light Duty) - India | - | 0.11 | 1.20 | 3.28 |
| 10 | Truck (Light Duty) - World | - | 0.71 | 2.13 | 4.27 |
| Total | | 0.26 | 2.38 | 9.27 | 20.48 |
| Cumulative | | 0.26 | 2.64 | 11.91 | 32.39 |

Context 2 – NOx Mitigation

Context 2: NOx Mitigation – by 2025

50% Renewables ~ adds 3 Tonnes Black Carbon benefit

Sun Mobility's GHG Mitigation with BAU Grid ~
29.4 Tonnes Black Carbon

Sun Mobility's GHG Mitigation with 50% Renewables ~
32.4 Black Carbon

Chart 5 – Black Carbon Mitigation

Chart 5: % Contribution to BC Mitigation – in 2025 (BAU Renewables)

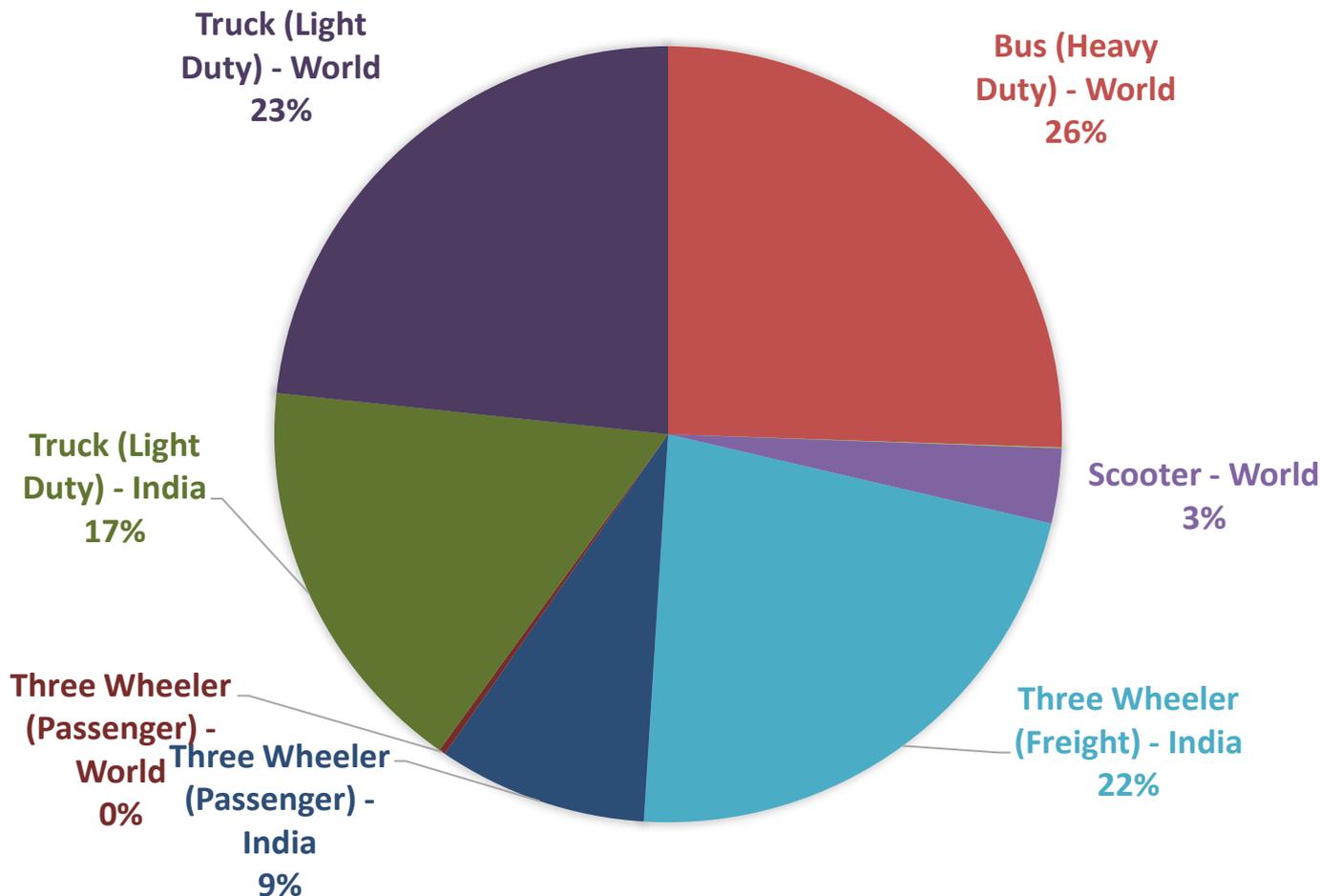
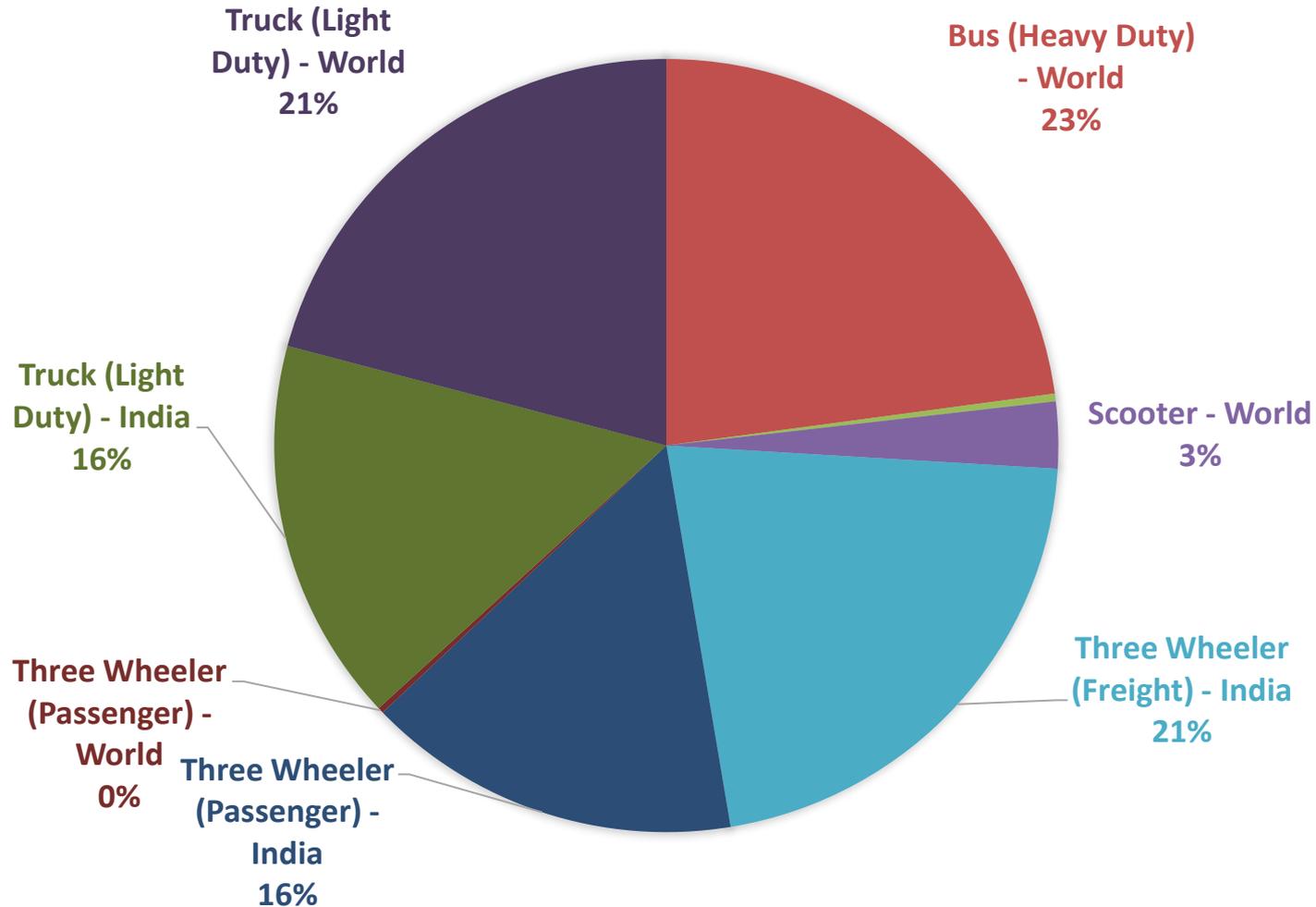


Chart 6 – Black Carbon Mitigation

Chart 6: % Contribution to BC Mitigation – in 2025 (BAU Renewables)



Context 4 – Economic Impact – EC1 (GRI)

Impact created (in million USD) – through E-Rickshaw/Auto Solution

| Vehicle | Region | 2022 | 2023 | 2024 | 2025 |
|--------------|--------------|-----------|------------|------------|--------------|
| E-Rick | India | 12 | 126 | 408 | 1,112 |
| E-Auto | India | 6 | 57 | 213 | 471 |
| Total | India | 18 | 183 | 621 | 1,584 |
| E-Rick | World | 2 | 42 | 217 | 532 |
| E-Auto | World | 3 | 51 | 265 | 650 |
| Total | World | 5 | 93 | 482 | 1,183 |