



Advancing Net Zero Markets



Energy



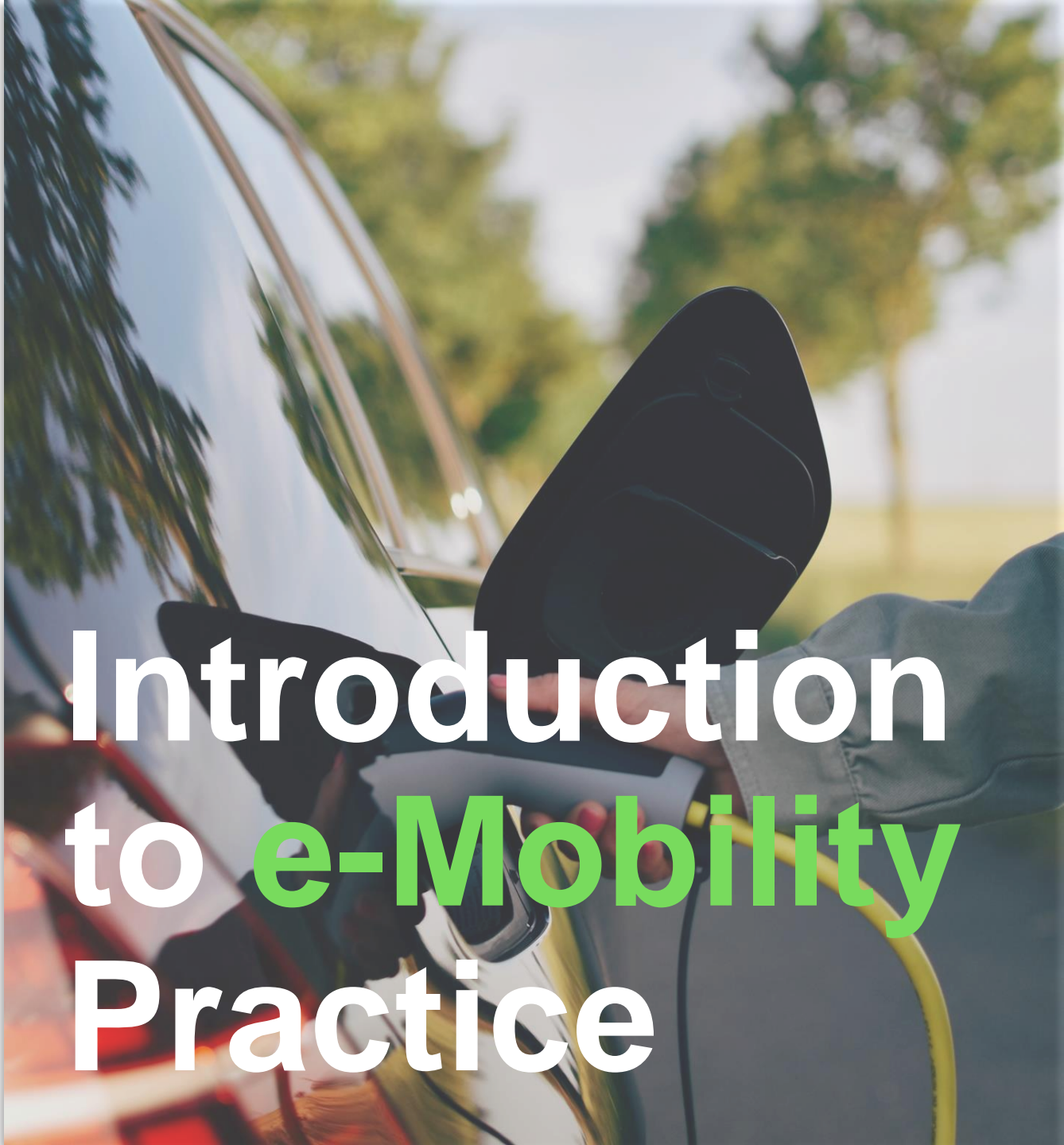
Transport



e-Mobility



Hydrogen



# Introduction to e-Mobility Practice

# Who we are **and what we do?**

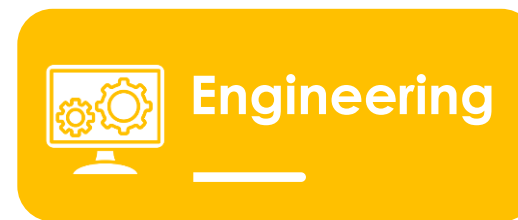
A **Strategic Consulting & Advisory** company focused on **e-Mobility, New Energy & Utilities** helping **countries, cities, industries and institutions** define, innovate and transform their solutions, services, business models, and policies for **faster climate & sustainability reforms**, higher customer experience and profitable market growth



- Energy & Transport, De-carbonisation Roadmaps
- Climate Transition Plans, Policies & Standards
- Techno-commercial feasibility studies
- Climate Financing



- Specialised and targeted research – Technologies, Markets, Customers
- GTM strategy
- Customer Experience Strategy



- Technical Due Diligence
- Model-based EV Design & Product Development support
- EVs Validation, Testing & Integration support



- Training Needs Assessment
- Training Program & Content Development
- EV Lab/CoE Setup
- ToTs, Training Execution
- Impact Assessment

# Growing Impact



**300+** Consulting Projects completed  
(**90+** in e-Mobility)

➔ **42+** Countries

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**Our experience across countries**



## Coverage

### Vehicle Segments

- 2Ws
- 3Ws
- 4Ws
- Buses
- Trucks (L-M-H)
- Ships

### Applications

- Personal
- Public Transport (PT)
- Commercial passenger
- Freight

### Value Chain

- Batteries
- PEMD
- Charging Infra
- Utilities, RE
- Recycling

### Areas

- Technologies
- Markets
- Demand (adoption)
- Supply (localisation)
- Policies
- Biz Models, PPPs
- Climate Financing
- EV Product Design
- Manufacturing
- Technical Standards
- Skills

# National/ Regional/ City e-Mobility & Decarbonisation Roadmap studies

## SAARC

Policy support, standards development for EV Infrastructure for 8 SAARC countries

## Nigeria

National, City & Rural e-Mobility Policy Framework & Roadmap

## Zimbabwe

National e-Mobility Policy Framework & Roadmap

## Sierra Leone

National e-Mobility Strategy, Policies, Business Models, & Investment Plans

## Cambodia

National Policy Framework on EVs & liaison with relevant stakeholders

## India

- Impact assessment of large-scale integration of **EV Charging Infra**
- Electric Vehicle and Charging Infrastructure (National & City level)
- Scaling up Electric Vehicle Adoption for **Last-Mile Logistics** and Preparing for **First-Mile and Mid-Mile Transition**
- Development of **Zero Emission Bus Market** Investor's Guide
- Electric Vehicles Program Management Cell under GoI
- Development of Internationally Compatible **Green Hydrogen Standards** in India

## Mongolia

- Preparation of a regulatory framework for EV battery recycling and second use

## Maldives

- National e-Mobility Plan development and Localisation to Male region

## Bhutan

Development of Surface Transport LEDS 2021-2050 and EV Roadmap

## Laos

Policy & technical standards development for EVs; Readiness Assessment to transition into Low Carbon Pathway

## Philippines

National e-Mobility Development & Deployment for **PT electrification**

## Tonga

Tonga Energy Road Map 2021-2035

## Solomon Islands

National policy on EV for land transport

## Samoa

Development of Energy Sector Plan



# EV Fleet Techno-Commercial Feasibility studies

## Pan Africa

Scaling up of 3 technologies (e-Buses, e-2/3 wheelers, cable cars) in 7 countries

## Nigeria

Techno-commercial feasibility for introduction to e-Buses and charging infra in Lagos city

## Ghana & Zimbabwe

Market feasibility study for 150+ inter-city & intra-city e-Buses in Harare, Accra, Kumasi

## South Africa

Preparation of GEF CEO Endorsement Document and Annexures for funding of 50 electric buses across 3 cities

## Kazakhstan

Scoping study to understand existing Bus ecosystem on the deployment of e-buses in the city of Almaty

## Lebanon

Technical Feasibility Assessment and Tender Preparation for e-Bus and Solar PV Charging System Procurement

## India

- Training Needs Assessment (TNA) for Electric Buses in India;
- Development of the India Zero Emission Bus Market Investor's Guide
- Design of India's Zero Emission Vehicle Mandate
- Due Diligence and Feasibility assessment for Electric Vehicles (2Ws, 3Ws)
- Industry Assessment and Roadmap for Zero-Emission Medium- and Heavy-Duty Trucks

## Philippines

Technical Feasibility Assessment for 3 corridors electrification with e-Buses & e-Jeepneys in Bataan; Metro Manila corridor e-Bus electrification detailed planning

## Solomon Islands

e-Mobility roadmap development and pilot design for e-Buses

## Fiji

Techno-economic feasibility study on electrification of shuttle bus transport in Valelevu; decarbonisation study of Govt. Fleet

## Tonga

High impact e-Bus Fleet Planning & Funding Proposal



# e-Mobility Climate Funding/ Financing proposals

## Jordan

Development of **PPF Concept Notes** for the GCF Readiness Program

## Ghana

Market feasibility & **GCF financing proposal** for 100 e-Buses in Accra and Kumasi

## Zimbabwe

Market feasibility & **GCF financing proposal** for 50 e-Buses in Harare

## South Africa

Preparation of **GEF CEO Endorsement** document for 50 e-Buses in 3 cities

## Pan-Africa

Preparation of **GCF Funding Proposal** by developing economic & financial models to support scale up of e-Buses, e-2Ws & e-3Ws



## India

- Preparation of Techno-Economic feasibility report on the establishment of EV Tech Park
- **GEF-7 e-Mobility CEO endorsement** document preparation for India

## Philippines

**2 Project Information Notes (PINs)** development for Climate Accelerator Funding for RE Integrated 500 e-Jeepneys & 400 e-Trikes for e-Commerce Freight

## Tonga

EV Pilot project planning & Investment Proposal

## Solomon Islands

e-Buses Pilot planning & Funding proposal

## Maldives

Preparation of **GEF CEO Endorsement** document and related annexures





# EVs Technical Standards & Circularity Policy Development studies

## UK

Scoping study in **PEMD** for UK & India collaborations



## India

- **EV Charging Infra Technical Standards** recommendations for India
- EVs **Smart Charging Architecture design** for India (Residential, Office, Kerb side charging)
- **Battery Reuse and Recycling technologies** benchmarking and feasibility

## Sub-Saharan Africa & South Asia

**PM/BLDC Motors Market** Assessment, Characterisation & Standardisation

## Laos

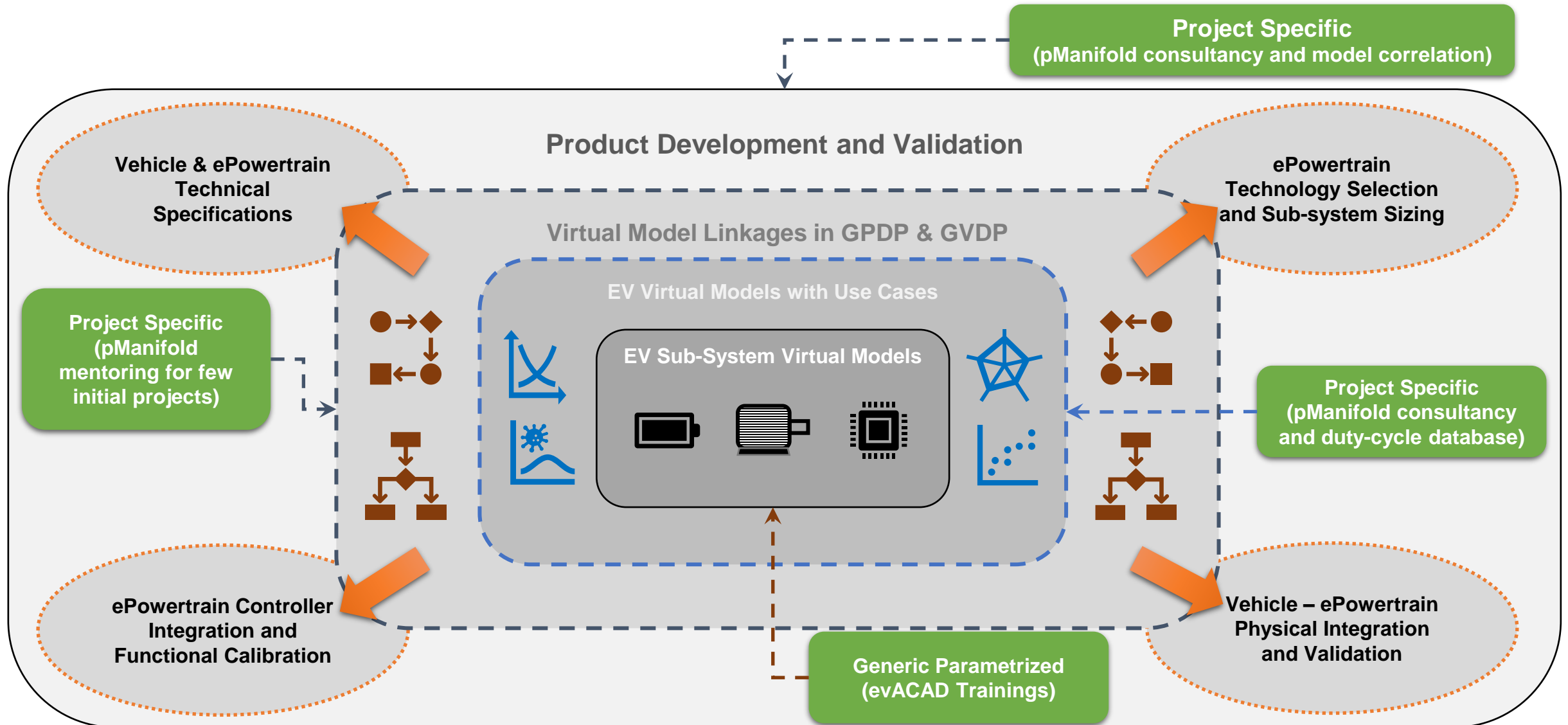
EVs & Chargers **Homologation & Testing Standards**

## Fiji

**Vehicle Emission Standards** development & Policy brief preparation



# EVs Model-based Product Development Services



GPDP – Global Powertrain Development Process, GVDP – Global Vehicle Development Process



# EVs Technical Due-Diligence Services

## Product Assessment

- **Product Capabilities**
  - Product Specifications
  - Regulatory Requirements
  - Maturity of Technology
  - Applicable Standards
- **Product Performance**
  - Specifications v/s Actual
  - Product Robustness
  - Durability & Maintainability
  - Standardization Potential
- **Competitive Benchmarking**
- **Recycling & Disposal Liabilities**

## Process Capability & Capacity Assessment

- **Engineering Processes**
  - Design & Development
  - Integration & Validation
  - FMEA & Risk Mitigation
- **Manufacturing & Sourcing**
  - Capacity & Scalability
  - Workforce Skills
  - Storage & Inventory
  - Sourcing Strategy
- **Quality**
  - Overall Framework
  - Performance Spread
  - Issue Resolution Process

## Suitability Assessment

- **Techno-commercial Viability**
- **Comparison with Competing Technologies**
  - IC Engines Products
  - Other Competing Technology
- **Adoption**
  - Current Partnerships
  - Deployment Status
  - Levers for Adoption
- **Safety & RoHS Compliance**

# EVs Technical Due-Diligence & Model-based Product Development studies



## India

### Technical Due Diligence studies

- **Duty Cycle development** for LCVs in e-Commerce delivery
- Due Diligence and Feasibility assessment in relation to setting up Business to market **Battery Swapping** solution for Electric Vehicles (2Ws, 3Ws) for an oil major in India
- Technical evaluation of 25+ motor models (Hub & Mid) of 4 EV **motor manufacturing start-ups** for an Indian wheel major company
- Technical Due Diligence of **Swap Battery Manufacturer**
- Technical Due Diligence of **Motor** and **SRM controller** supplier

### Model-based Product Development studies

- Setting up a model based product development process for a **e-2W** start-up
- Motor & Battery Sizing, Packaging, garage mechanics for electrification of a **1960 VW Beetle**
- Motor selection and Commonisation for **LCV Retrofit** using model based design
- **e-3W Retrofit kit** design and development

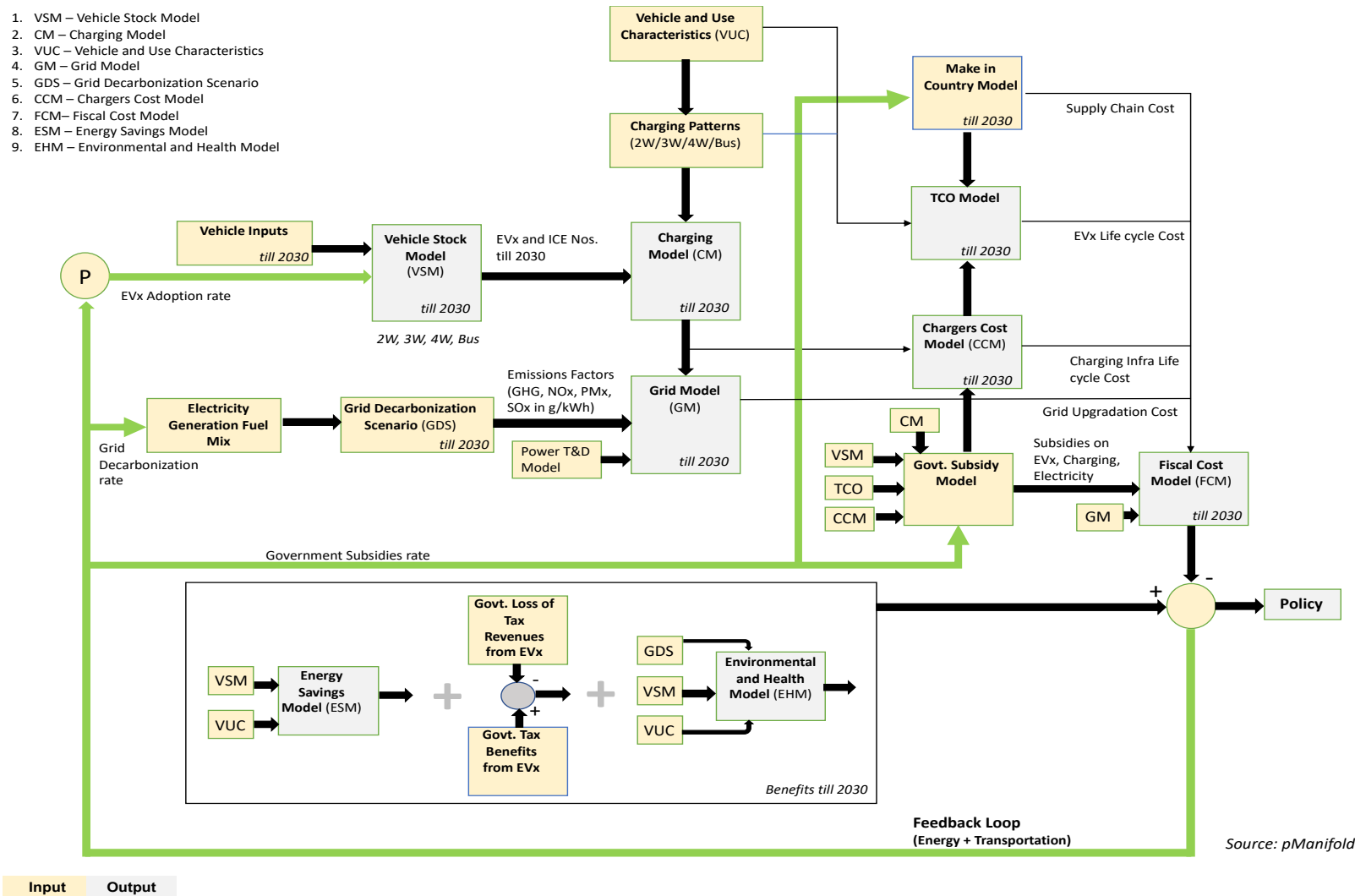
## Nigeria

- Study on **Techno-commercial Feasibility and Market Assessment** of EV Products

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# pManifold e-Mobility Tools - IETEM© Model

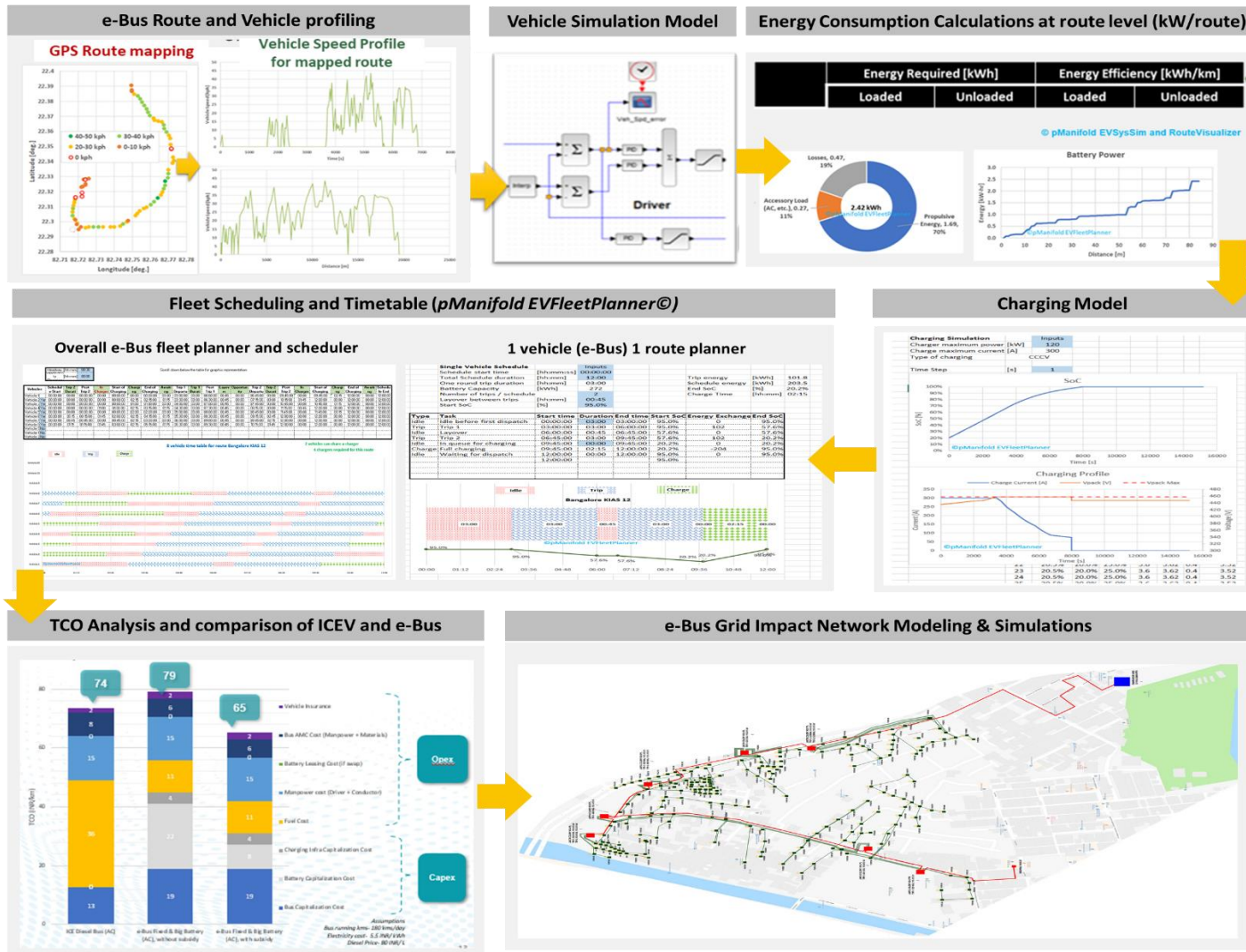
1. VSM – Vehicle Stock Model
2. CM – Charging Model
3. VUC – Vehicle and Use Characteristics
4. GM – Grid Model
5. GDS – Grid Decarbonization Scenario
6. CCM – Chargers Cost Model
7. FCM – Fiscal Cost Model
8. ESM – Energy Savings Model
9. EHM – Environmental and Health Model



## pManifold IETEM© - Integrated Energy & Transport e-Mobility Model

- EVs growth projections (different segments)
- Charging infra requirements
- Grid Impact
- Grid upgradation requirements
- Grid energy mix planning
- GHG estimation
- Health impact estimation
- TCO analysis
- Govt. budget & fiscal incentives planning
- ...

# pManifold e-Mobility Tools – EV Fleet Planner©



## pManifold EV Fleet Planner©

- Route duty cycle development
- EV Energy consumption analysis
- Battery types & size design
- Charger types & size design
- Charging strategy design
- Grid ancillaries design
- Grid impact analysis
- EV operations and scheduling
- TCO analysis
- GHG emissions saving
- ...

# Our select Clients

<b>DFIs, Institutions</b>	
<b>Utilities</b>	
<b>Consultants</b>	
<b>Government &amp; Academia</b>	

**270+**  
 projects in e-Mobility, New Energy & Utilities spanning sectors, value chain, geography, size, countries

+ many more..



# Our Management Team



**Rahul Bagdia**

Co-founder & CMD



**Vikrant Vaidya**

Senior Partner  
EV Systems Engg.



**Uma Bagdia**

Senior Partner  
Investments



**Raghavendra P**

VP - evACAD  
Marketing & Growth



**Hemant Saxena**

VP - evACAD  
Strategy & Co-creation



**Kunjan Bagdia**

AVP - e-Mobility,  
New Energy & Utilities



**Yamini Keche**

Lead - Strategic  
Communications



**Dipankar Das**

Lead -  
Strategy & Growth



**Waqar Siddiqui**

Sr. Manager  
F&A, HR

# Our Consulting Leads



**Kunjan Bagdia**

AVP - e-Mobility,  
New Energy & Utilities



**Ankit Agarwal**

Principal Consultant -  
e-Mobility, New Energy, Utilities



**Yamini Keche**

Lead-  
Energy Efficiency & Emerging Markets



**Abhansha Somvanshi**

Lead-  
e-Mobility & Transportation



**Saudamini Telang**

Lead -  
e-Mobility, Sustainable Cities



**Darshan Rathi**

RE, Utilities & EVs Specialist



**Sayali Agade**

Lead  
e-Mobility, Hydrogen, Climate



**Barsha Paul**

e-Mobility, Hydrogen &  
ZET Specialist



**Chola Priya  
Potupureddy**

e-Mobility, Transportation &  
Climate Specialist



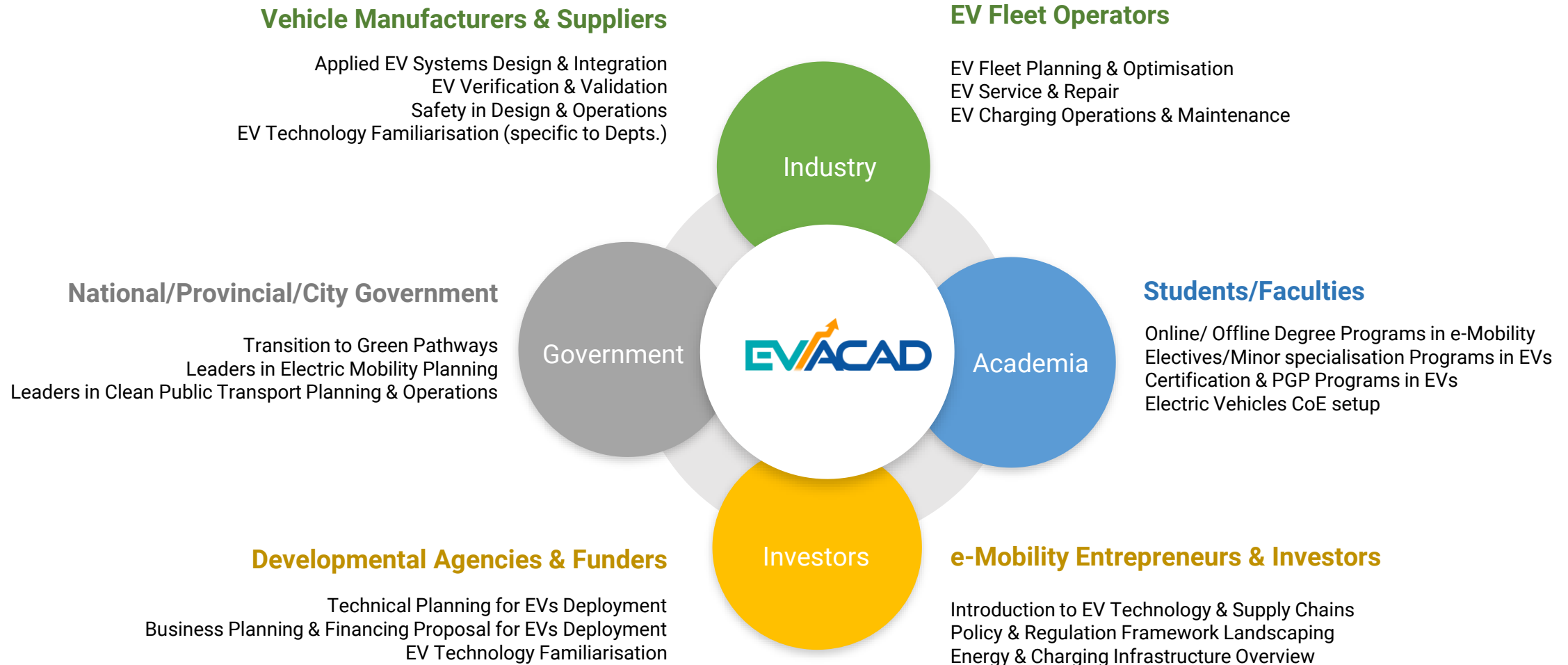




Building e-Mobility Talent

A  **MANIFOLD** Venture Company

# Our EV Training Services



# Growing Impact



20+

Training Programs



42+

Countries



5K+

Learners upskilled



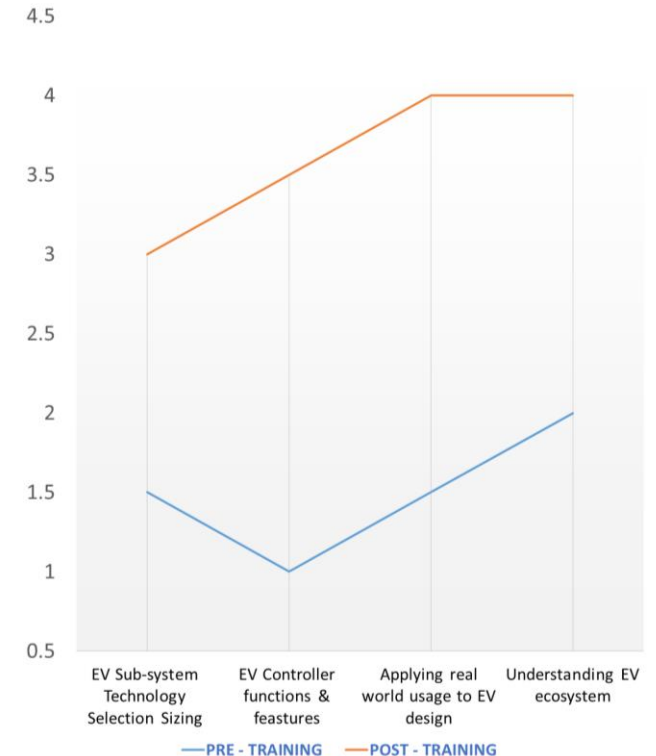
500+

Orgs. engaged

## Trainee Countries







## Pre & Post Training Trainee skills



# Our Training Portfolio

	B2C	B2B	B2I
Programs	<ul style="list-style-type: none"> <li>Applied EV Design and Integration</li> <li>e-Mobility for Leaders</li> <li>e-Bus Planning and Optimization</li> <li>Battery Modelling and Simulation</li> </ul>	<ul style="list-style-type: none"> <li>EV Systems Engineering (customized for Motor/ LCV/ Truck/ Retrofit cos.)</li> <li>EVs Design, Validation &amp; Testing</li> <li>Other custom programs based on TNA for OEMs, Suppliers, Consulting cos., Fleet Operators and others</li> </ul>	<ul style="list-style-type: none"> <li>Certification programs: PGC, PGD, others</li> <li>EV Degree programs: BTech, MTech, Minor/ Open Electives/ Specialisation</li> <li>EV Lab/ CoE setup</li> <li>EV Curriculum Development, Faculty Development</li> </ul>
Proposition	<ul style="list-style-type: none"> <li>Global EV expert Trainers</li> <li>Applied learning with model-based-design and hands-on Lab</li> <li>Industry relevant projects</li> <li>Online Hybrid learning platform</li> <li>EV Career support</li> </ul>	<ul style="list-style-type: none"> <li>One stop solution for all EV training needs</li> <li>Custom trainings based on identified needs</li> <li>Flexible training hours &amp; channels to integrate easily with work schedule</li> <li>Projects aligned with work responsibility</li> </ul>	<ul style="list-style-type: none"> <li>Integrated services: EV Degree program + FDP + EV Lab + Industry Projects/ Internship + Career support</li> <li>Applied Industry-ready curriculum + best Industry expert Trainers + industry projects + internship/ placement support</li> </ul>
Credentials	<ul style="list-style-type: none"> <li>20+ Courses (most are industry first ones globally)</li> <li>40+ Countries</li> <li>5,000+ Learners</li> </ul>	<ul style="list-style-type: none"> <li>20+ organizations worldwide</li> <li><b>OEMs:</b> Hella, Tata Motors, Daimler, Precision Camshaft, others</li> <li><b>Govt.:</b> Vanuatu, Bhutan, Rwanda, Zimbabwe, Ghana, Philippines, others</li> <li><b>DFAs:</b> UNDP, GGGI, CTCN, others</li> </ul>	<ul style="list-style-type: none"> <li>EV BTech program for ATRIA University + FDP</li> <li>EV Minor Program for VNIT + EV CoE setup</li> <li>FDP for Manipal University Jaipur</li> </ul>

# Global Participation in Trainings

<p>OEM (ICE/EV)</p>		<p>Supplier</p> 	
<p>EV Solutions and Service Providers</p>			
<p>Development Agencies</p>			
<p>Government / Policy Makers</p>			



# Global Participation in Trainings

<p>Fleet Operators</p>	
<p>Consultants &amp; Planners</p>	
<p>Businesses</p>	
<p>Academia</p>	





# Thank You

## Contacts:

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