Malaysia Low Carbon Cities Conference

Promoting Low Carbon Mobility in Malaysia through

Development of Electric Mobility

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Agenda

1) Electric mobility and Low carbon cities

1) International experience to initiate Electric Mobility

1) Current Electric Mobility initiatives in Malaysia

1) How should we start

1) Case study

Electric Mobility and Low Carbon

Global CO_2 emissions from transport will grow steeply; 40% from light vehicles

Fig 1: Global projected growth in annual CO_2 emissions from transportation

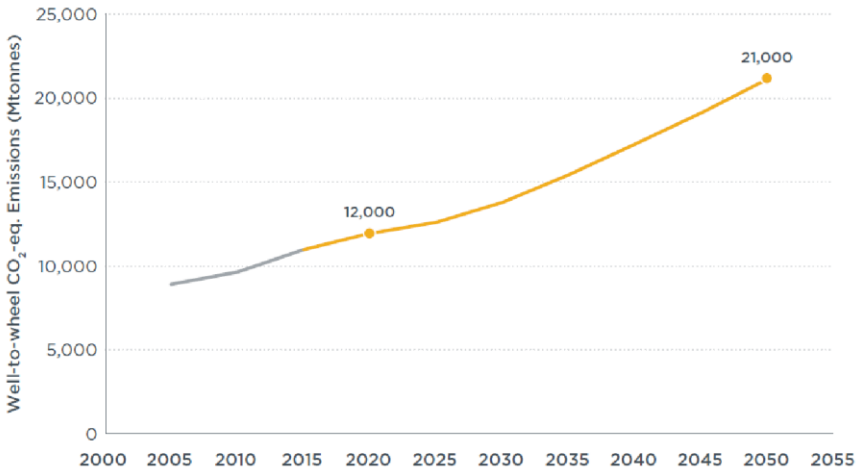
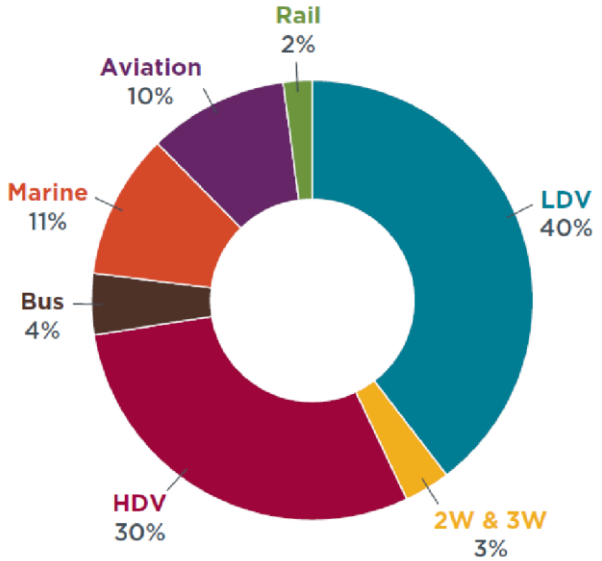
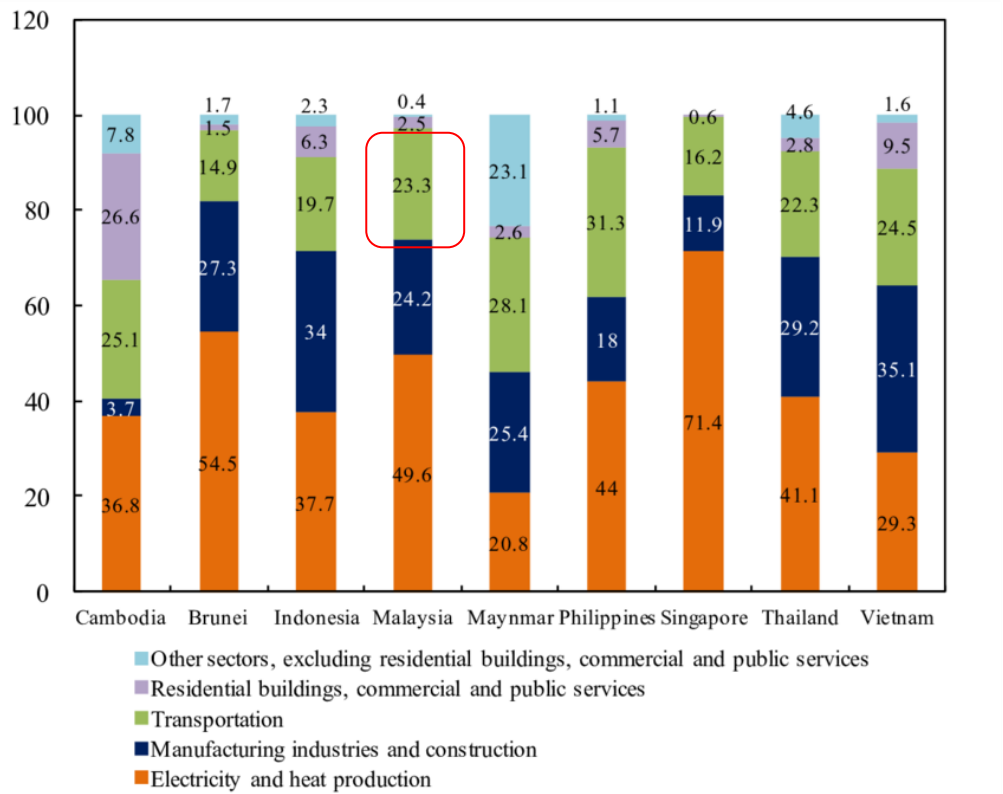


Fig 2: Global well-to-wheel CO_2 emissions from transportation (2020)



Source: https://theicct.org/publications/vision2050

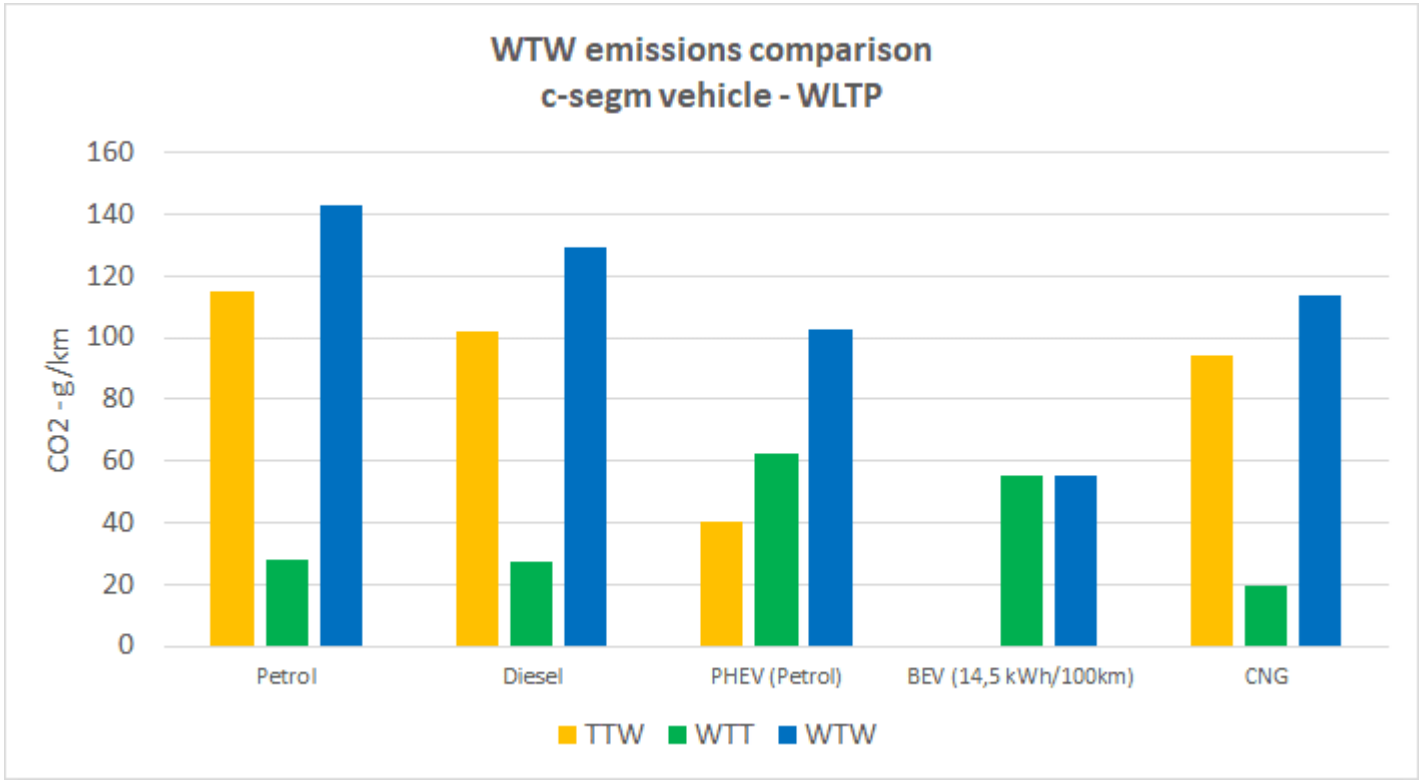
Transport is one of the largest GHG emitting sectors in Malaysia



- Malaysia pledges/ targets
  - reduce GHG emissions intensity of GDP by 45% by 2030 (relative to 2005)
  - 31% renewable energy by 2025
- Transport is the second fastest growing sector in energy consumption.
- Road transport = 90% of transport sector emission
- Malaysia has one of the highest vehicle ownership in South-East Asia. Car ownership and per capita emission is comparable with developed nations
- A holistic and integrated approach is needed for transport sectors
  - Increase adoption of energy efficient vehicles (EEVs) as a preferred mode of transport
  - Increase utilisation of public transport and non-motorised transport

Source: Carbon capture and storage in Southeast Asia (2016)

Electric cars, on average, emit 3 times less CO2 than equivalent petrol cars



Tank-to-Wheel (TTW) refers to the use of fuel in the vehicle and emissions during driving,

Well-to-Tank (WTT) from production of the energy source (petrol, diesel, electricity, natural gas) to fuel supply (transport to the charging point or fuel pump).

Well-to-Wheel (WTW) includes all emissions from WTT and TTW.

Source: https://www.gmobility.eu/

International experience to initiate Electric Mobility

International experience overview

Countries	Local Automotive industry	EV segment prioritised by Government	Clear Institutional structure exists	Maturity of e-Mobility development	Private sector participation
China	• largest automotive manufacturing country and automotive market • 10% of the country's GDP	• All passenger vehicle segments (2W, 3W, 4W and Buses) • Government Vehicles	• State Council of the PRC and the National Development and Reform Commission responsible for Industry policies and framework • The Ministry of Transport and The Ministry of Industry and Information Technology (MIIT) responsible for market access of manufacturers, quality and safety control of EVs	• Well ahead in terms of e-Mobility adoption and started the e-Mobility development plan in 2009. • Have carved the way in developing Infrastructure, mandating NEV to OEMs • Achieved a 100% e-Bus and taxi fleet in Shenzhen	• Private players have been working and showing interest across the EV value chain • Exports Li-ion battery worth $344.1 Mn, making China one of the largest exporters
India	• 6.4% of country's GDP	• All passenger vehicle segments • Total 7,090 e-Buses are to be supported under the FAME II scheme across India	• Does not have a single Ministry responsible for driving e-Mobility. • Different Ministries are involved in setting up policies, standards and regulations.	• The e-Mobility market is in early stage and gaining momentum in the last ~3-5 years	• Across EV value chain a number of players including Vehicle manufacturer, EVSE manufacturers, Energy Operators, etc.
South Korea	• 5th largest Automobile manufacturing countries in 2020. • 10% of country's GDP.	• 2W, 4W, Buses, Trucks, taxi	• Does not have a single Ministry responsible for driving e-Mobility • Different Ministries are involved in setting up policies, standards and regulations	• In 2019, ~134 thousand EVs (across vehicle segments) were registered in South Korea	• Hyundai Motor Kona and Kia Motors Niro are amongst the top EV producers in South Korea, owing a subsidy upto 19 Mn won for producing EVs
Thailand	• 10-12% of country's GDP	• 4W, Taxis and Buses	• Ministry of Energy is the National agency is responsible for EV related policy development	• The city started planning for electrification in the last 2-3 years and is early stage. In the year 2020, Thailand registered 2,854 only EVs.	• There is limited private sector participation, however, as the market matures it is expected to increase

Electric mobility policies comparison across countries

	USA	China	Norway	India	Malaysia*
Electric Vehicles					
EV Targets	✓	✓	✓	✓	✓
Financial Incentives					
Vehicle purchase subsidy	✓	✓		✓	✓
Road tax exemption/concession		✓	✓	✓	✓
Import tax exemption/concession			✓	✓	✓
VAT/GST exemption/concession	✓	✓	✓	✓	✓
Scrappage incentive/policy	✓	✓	✓	✓	✓
Non-Financial Incentives					
Parking fees exemption/concession	✓	✓	✓	✓	Local auth
Toll fees exemption		✓	✓	✓	
Access to special lanes	✓	✓	✓		
Free insurance					
Special registration plates (green, series no.)	✓	✓	✓	✓	
Special tariffs for charging	✓	✓	✓	✓	✓
Electric Vehicle Supply Equipment (EVSE)					
EVSE Targets	✓	✓	✓	✓	✓
Fiscal Incentives					
EVSE purchase subsidy	✓	✓	✓	✓	✓
EVSE tax credits					
Building Regulations	✓	✓	✓	✓	

*As proposed in Low Carbon Mobility Blueprint 2021-2030

Current Electric Mobility initiatives in Malaysia

Transport policy and automotive plan include measures to accelerate implementation of electric mobility initiatives

The National Transport Policy 2019-2030

- Review Road Transport Act 1987 to support growth and the use of EEV/ EV in Malaysia
- Encourage use of different models of EEV
- Formulate and implement fuel economy policy
- Develop green index and incentives to encourage transport operators to go green

The National Automotive Plan 2020

- Outline specific measures to support the growth of electric vehicles including
  - promoting manufacturing and application of local battery and battery pack,
  - develop standards to encourage battery swapping and wireless charging, recycling and disposal of battery,
  - develop EV smart grid interoperability centre and apply well-to-wheel concept in the calculation of emission from EV

Low carbon cities master plan and mobility blueprint to support the growth of energy efficient vehicles

The National Low Carbon Cities Masterplan (NLCCMP)

- A total of 33 local and regional government has been selected as Target Cities
- consolidate and streamline related national policies to provide clarity for cities to mainstream low carbon urban planning and development; promote awareness and institutional capacity development; provide funding and financing to facilitate low carbon development n cities.
- Develop sectoral strategies that cities need to act upon: Spatial Planning and Development, Energy, Transportation and Waste.

The National Low Carbon Mobility Blueprint 2021-2030

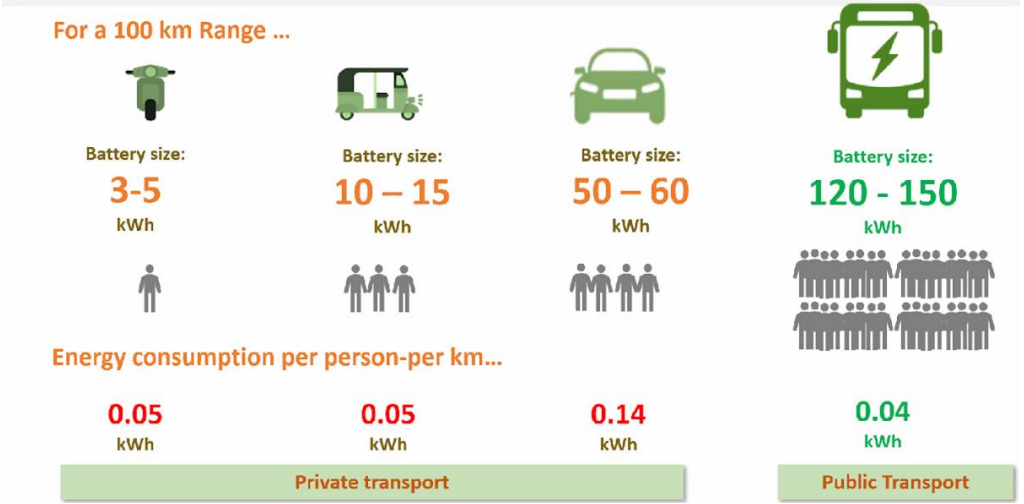
- Avoid-Shift-Improve strategy to decarbonise road transport sector in Malaysia
- Four focus areas
  - Vehicle Fuel Economy and Emission Improvement
  - Electric Mobility Adoption (car, bus and motorcycle)
  - Alternative Fuel Adoption
  - Mode Shift

How should we start

Why Electric Bus

Global

- Public transport reduces vehicle-km travelled
- 58% of municipal bus fleets will become electric by 2030* – the highest on-road EV adoption across any vehicle segments
- Energy consumption per person per km for bus is 3 times less than private vehicle



Source: pManifold

Development of electric bus in Malaysia

- Recent initiatives
  - Putra NEDO EV Bus Project (4 e-buses in Putrajaya)
  - BRT Sunway Line (15 e-buses by BYD),
  - Trials at University Tenaga Nasional, and planned trials with public transit operators,
- Next
  - Iskandar BRT system with a target start date in 2023

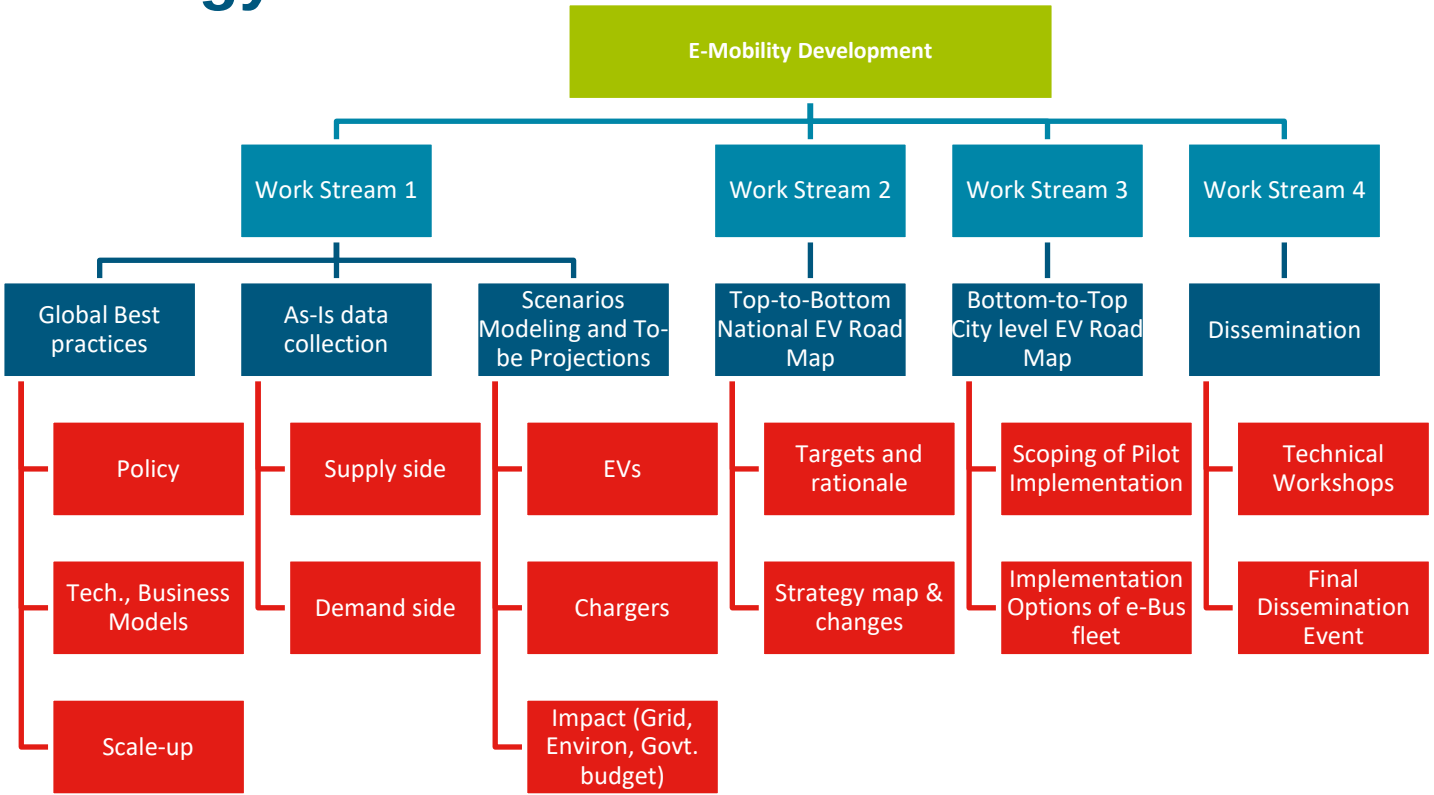
Low Carbon Mobility Blueprint

- Electric bus adoption
  - Government led procurement for EV bus fleet
  - Electric buses as stage buses, feeder buses, communal service by municipalities, shuttle services by company, shopping complex, hotels, etc.
  - Supporting manufacturers of local EV bus
- Mode shift
  - Shifting private to public transport
  - Promoting public transport through land use development

Development of National Electric Bus Roadmap

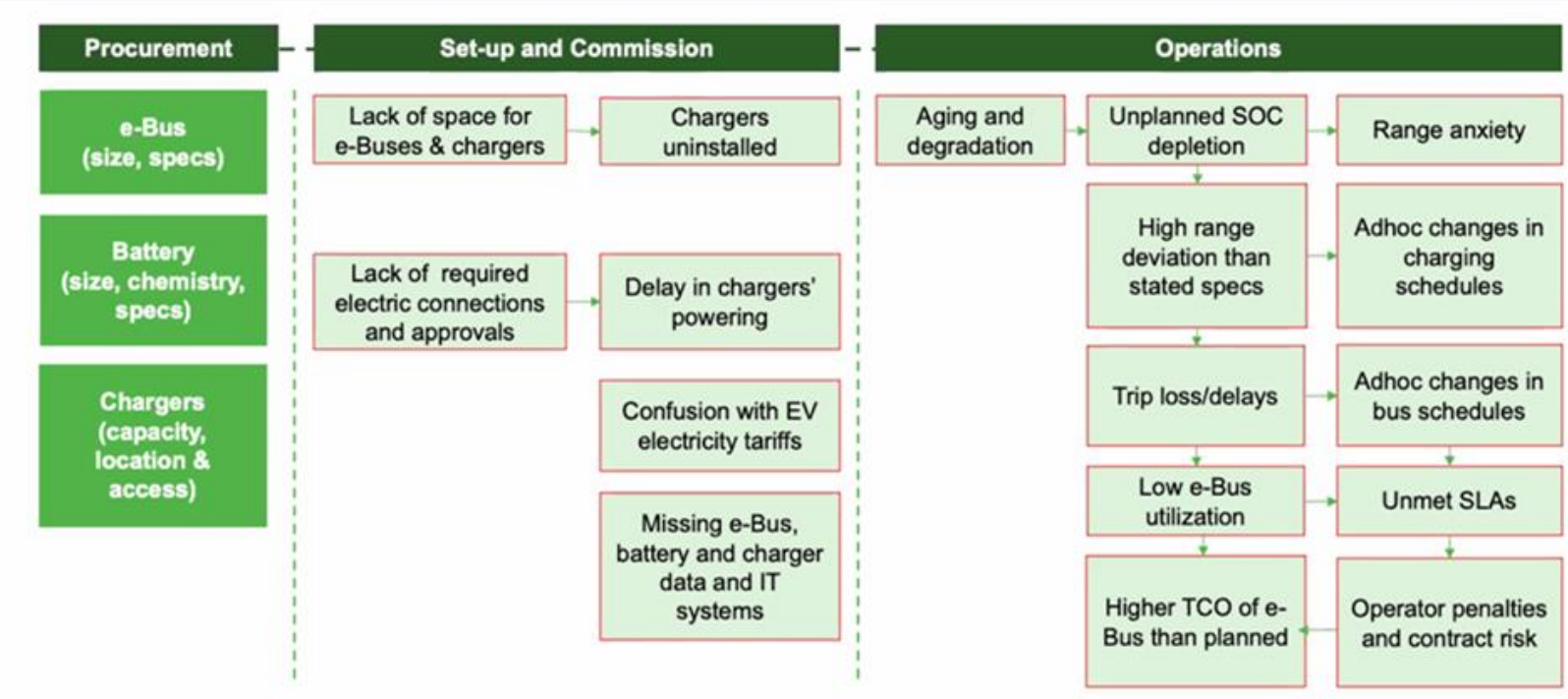
- Establish a roadmap for nationwide implementation of 6,000 e-buses by 2030
- In line with the National Transport Policy 2019-2030 and Low Carbon Mobility Blueprint
- Action plan for expansion of electric bus adoption
  - Propose institutional framework to facilitate the development and monitoring of business models and planning of electric bus adoption
  - Establish mechanism for implementation of strategies and enabling framework

How can we start - An example of approach and methodology



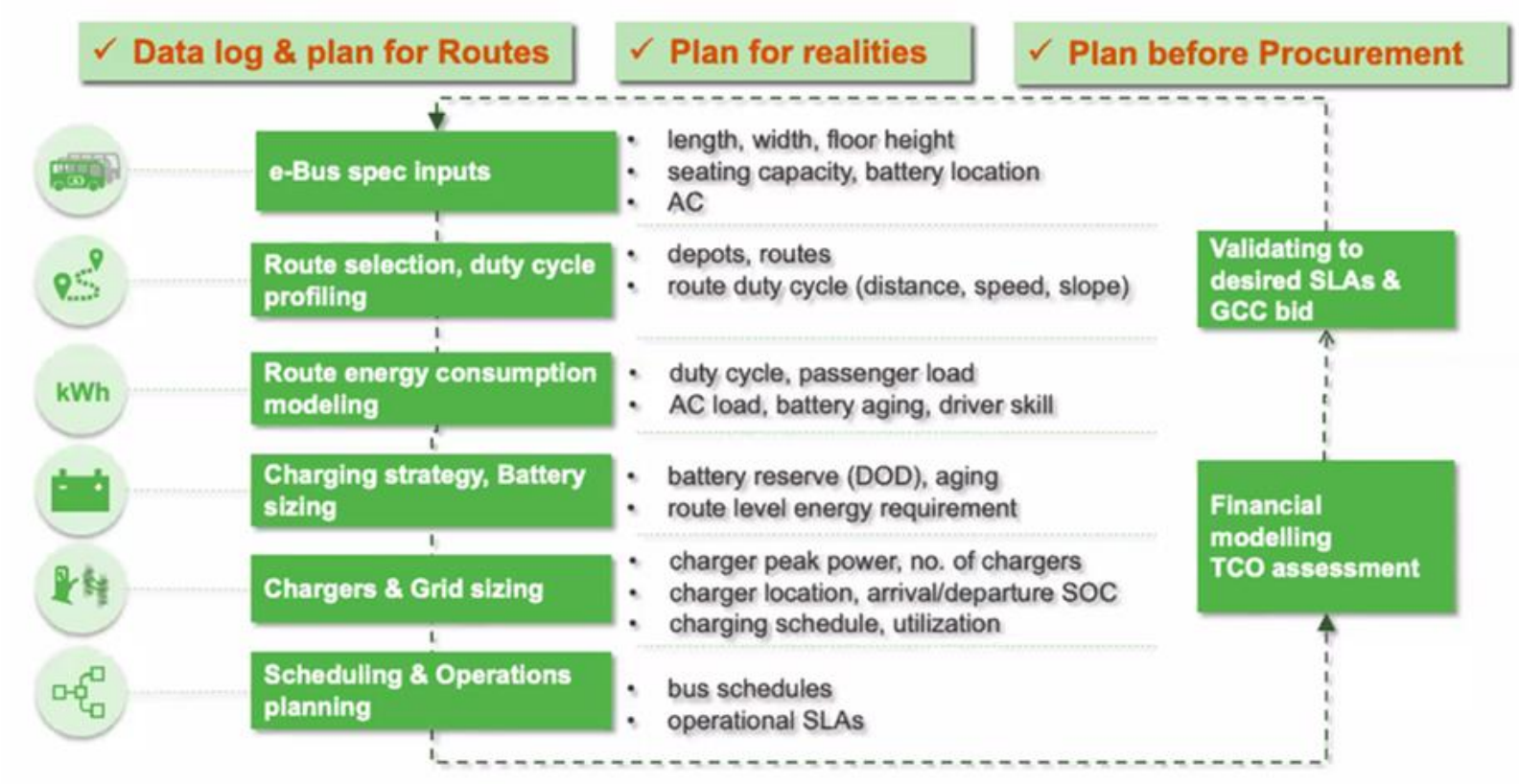
Challenges with E-buses

- Lack of systematic planning of e-bus fleet, infra, systems and operations



Source: pManifold

Systematic planning for e-buses



Case Study

Case study: Shenzhen E-bus development roadmap

2007

- City and National government started integration of several private bus operators into 3 large bus companies (namely Shenzhen Eastern Bus Company Ltd., Shenzhen Bus Group, Shenzhen Western Bus Company Ltd.)

2009

- Issued Shenzhen New Energy Vehicle Promotion Work Plan with a target of 4000 e-buses by 2012
- This policy announced 50% subsidy

2011

- With extensive planning, adopted first e-Bus fleet which included 101 large e-Buses and 26 medium e-Buses

2012

- Issued Shenzhen Urban Transport White Paper with a target of 7200 e-Buses stock by 2015
- Reduced target to 4500 due to technology immaturity

2015

- Total 4877 e-Buses were adopted.

2016

- Targeted 7700 e-Buses by end of 2016, and 100% e-Buses in three years

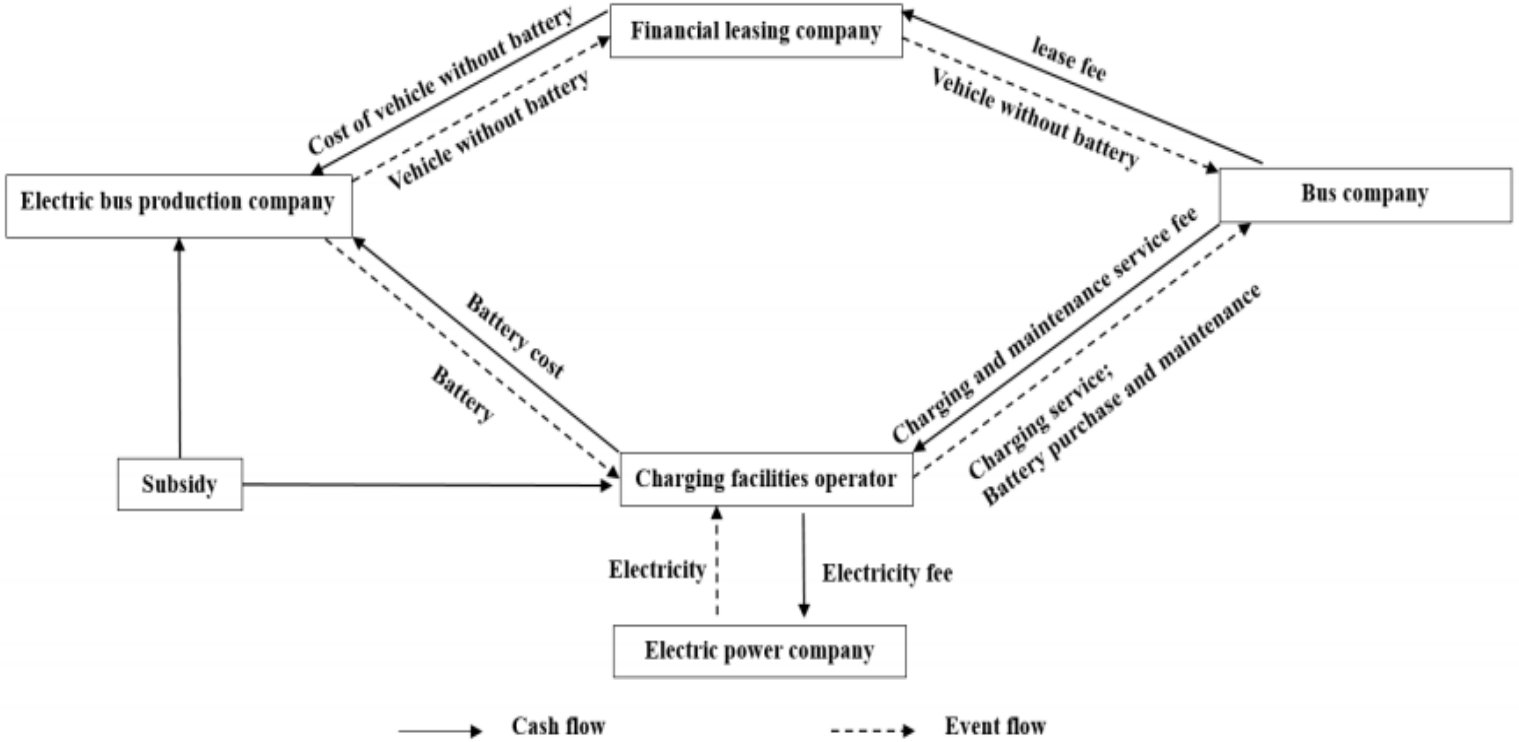
2017

- Targeted 100% e-Buses by end of 2017
- Acheived 100% bus electrification with total of 16,359 e-Buses

2018 / 2019

- Providing regular training to industry professionals sharing their e-Bus experience (4-5 training sessions completed of typical 3-4 days duration)

Business model for promoting e-bus adoption in Shenzhen



Happy to assist!

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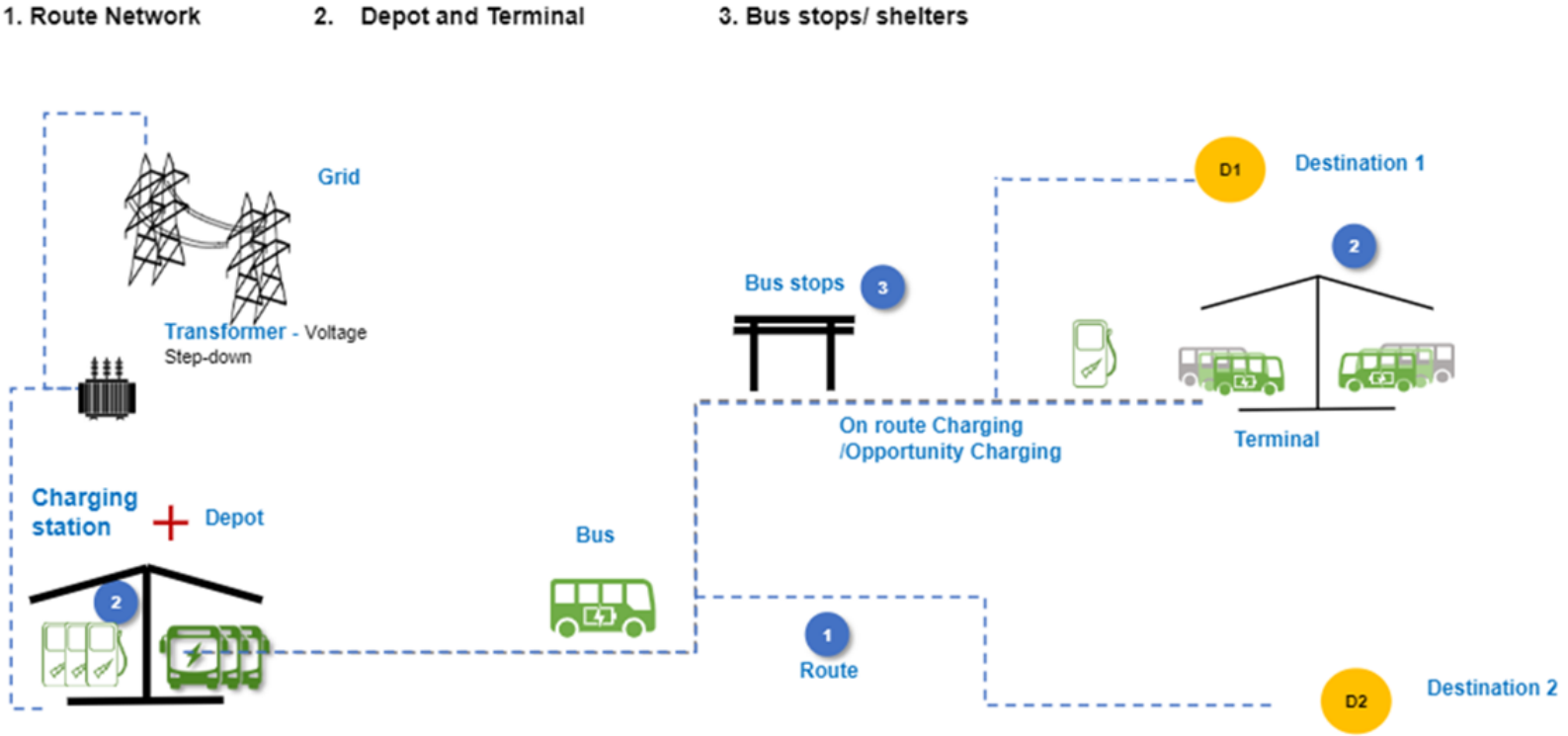
Elements of E-bus System



Source: pManifold

Charging strategy

Source: pManifold