NATIONAL ELECTRIC MOBILITY BLUEPRINT

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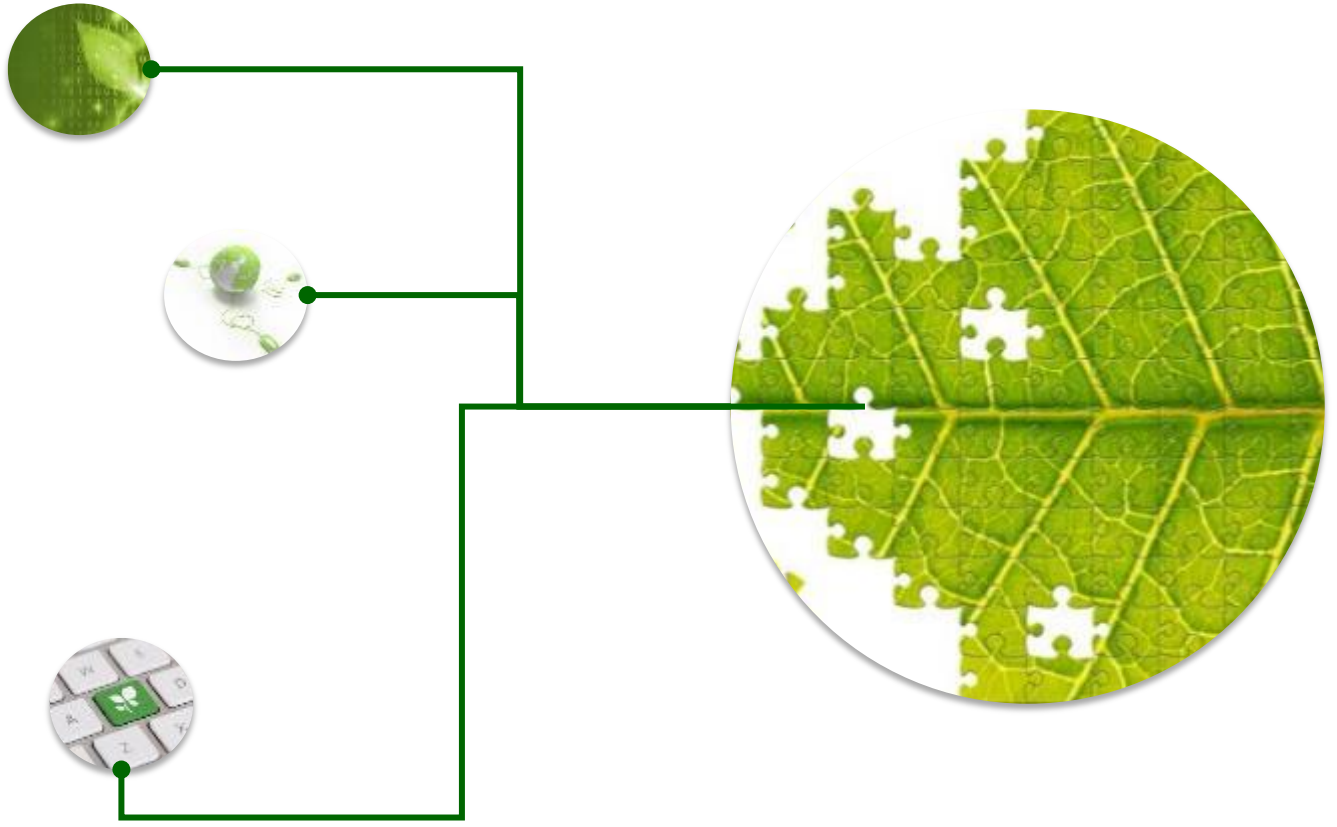
MALAYSIAN GREEN TECHNOLOGY CORPORATION

5 May 2015

OUTLINE OF PRESENTATION

- Background
- Strategic Thrust & Action Plan
- Impact
- Conclusion
- Recommendation



BACKGROUND

NAMA Owner, Focus, Status, Further Information

- GreenTech Malaysia
- Focus on implementation of the National Electric Mobility Blueprint
- Proposal stage (third time submission)

Motivation & Objective

The implementation of key financial and policy instruments promotes the transformation of the Malaysian motorcycle transport sector towards achieving the National Electric Mobility Blueprint of 100,000 electric motorcycles by the year 2020.

Mitigation Measures

- x tons of CO2 via Electric motorcycles
- the average EE (MJ/vkt) of motorcycle fleet improved by X%
- x tons CO2 reduced via inspection and maintenance measures for gasoline powered motorcycles

Mitigation Potential

OBJECTIVE

- **The key objective of the National Electric Mobility Blueprint** is positioning Malaysia as a progressive nation in low carbon mobility and environmental sustainability, encompassing the following: -

  i. Promote and encourage use of electric vehicles (EV) for public transportation and private ownership;

  ii. Strengthen electric mobility eco-system and charging infrastructure nationwide;

  iii. Accelerate electric mobility technology localisation towards national economic growth.

Positioning Malaysia as the 'Electric Mobility Marketplace'

BACKGROUND:
NATIONAL DEFINITION OF ELECTRIC VEHICLE

TYPES OF GREEN VEHICLES				
	Hybrid Electric Vehicle (HEV)	Plug-in Hybrid Electric Vehicle (PHEV)	Battery Electric Vehicle (BEV)	Fuel Cell Vehicle (FCV)
CO2 Emissions at tail-pipe	90 g/km	< 50 g/km	0 g/km	0 g/km

Electric vehicle definition:

- Vehicles with two or more wheels which main powertrain comprises of one or more **electric traction motors** powered using **energy stored in batteries**. Requires charging of the batteries from external electric power supply through a vehicle inlet socket.
- Conforms to:
  - UNECE R100 (safety requirements),
  - UNECE R101 (energy consumption),
  - UNECE R85 (measurement of electric drive power).

Electric Vehicles

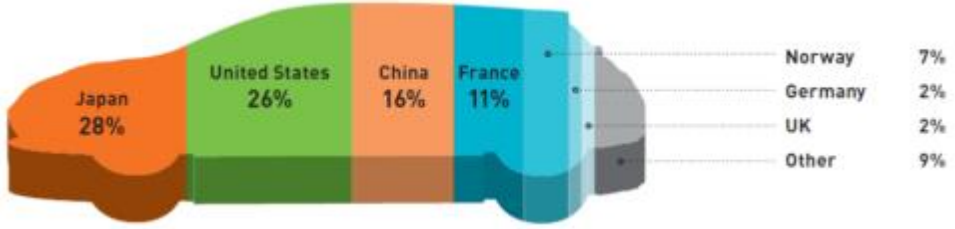
Includes:

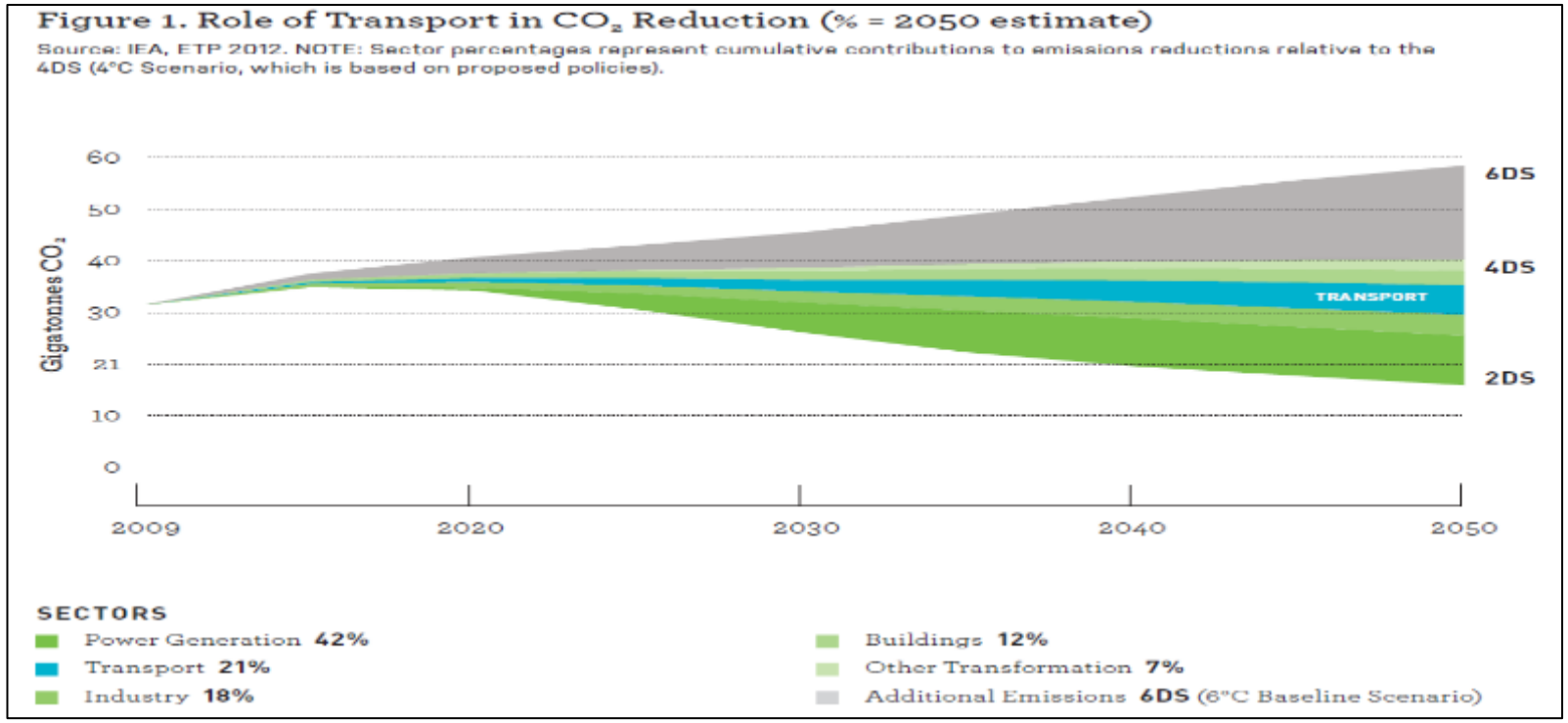
- **Battery electric vehicles (BEV);**
- **Plug-in hybrid electric vehicles (PHEV) with:**
  - **an electric range of at least 30 km,**
  - **CO_2 emission below 50 g/km.**

Excludes:

- Mild hybrid vehicles
- Full hybrid vehicles

BACKGROUND:
DRIVERS FOR GLOBAL GROWTH OF ELECTRIC VEHICLES



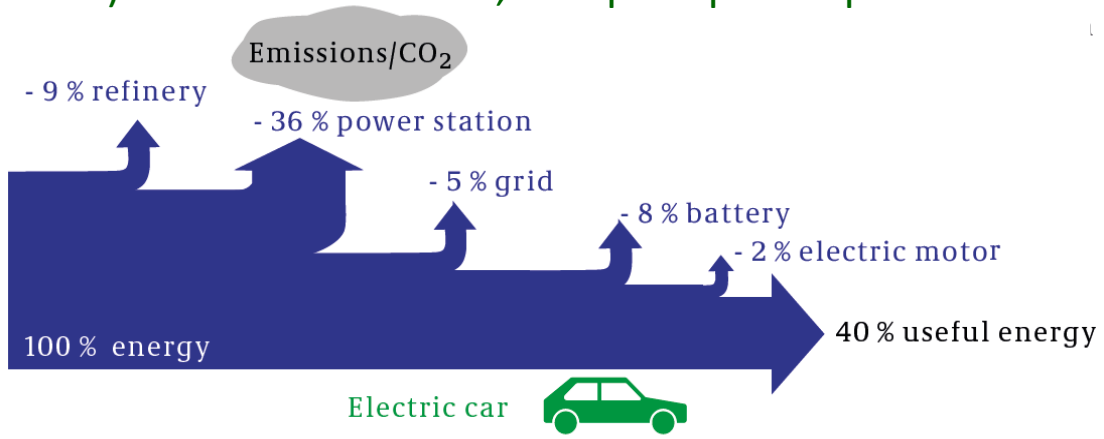


Why EV is important to the global community: -

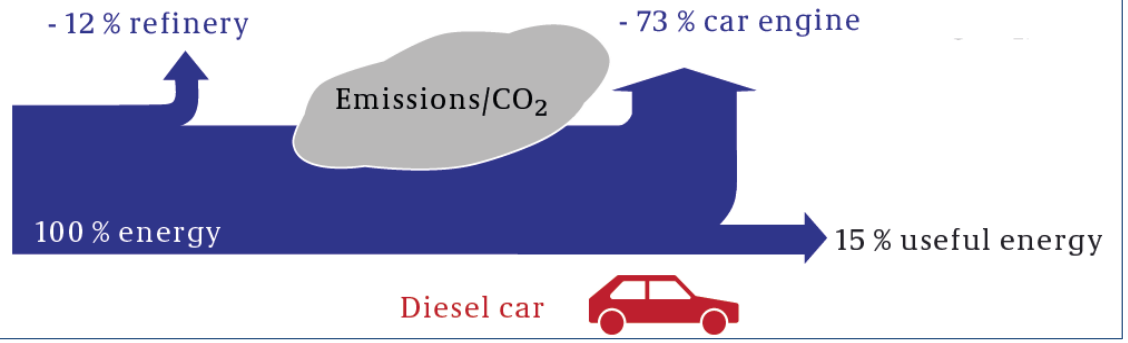
- Improving urban air quality: Transportation accounts for 20% of global energy use, and passenger vehicles cause 10% of energy-related CO2 emissions.
- Increasing energy security through reducing oil dependency.
- Efficient use of energy: reducing consumption amid depleting resources

BACKGROUND:
ELECTRIC VEHICLE IS MORE EFFICIENT AND BENIGN

An **electric car converts 40% of energy** into useful use (travel) with zero emission, except at power plants.



A **diesel car converts only 15% of energy** into useful use (travel) with carbon emissions throughout the travel and during fuel transportation.



With a barrel of oil equivalent:

- **An electric vehicle can travel further distance, from Kuala Lumpur up to Dhaka (4,021 km).**
- A petrol car can travel from Kuala Lumpur to Yangon (2,199km).

Based on findings published by the German Federal Ministry of Transport, Building, and Urban Development : Electric mobility – Germany as a lead market and lead provider

MALAYSIA'S EV JOURNEY

1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2009 2010 2011 2012 2013 2014

Ministry of International Trade and Industry

- Competitive and sustainable domestic automotive industry including the national automotive companies
- Malaysia as the regional automotive hub in energy efficient vehicles (EVV)
- Value-added activities in a sustainable manner
- Exports of vehicles and automotive components

Ministry of Energy, Green Technology and Water

- Impact to fuel cost and subsidy
- Impact to Electric Supply Industry
- Impact to environment and Green Technology agenda
- Impact to CO_2 Emissions and air quality within cities

ECONOMIC TRANSFORMATION PROGRAMME

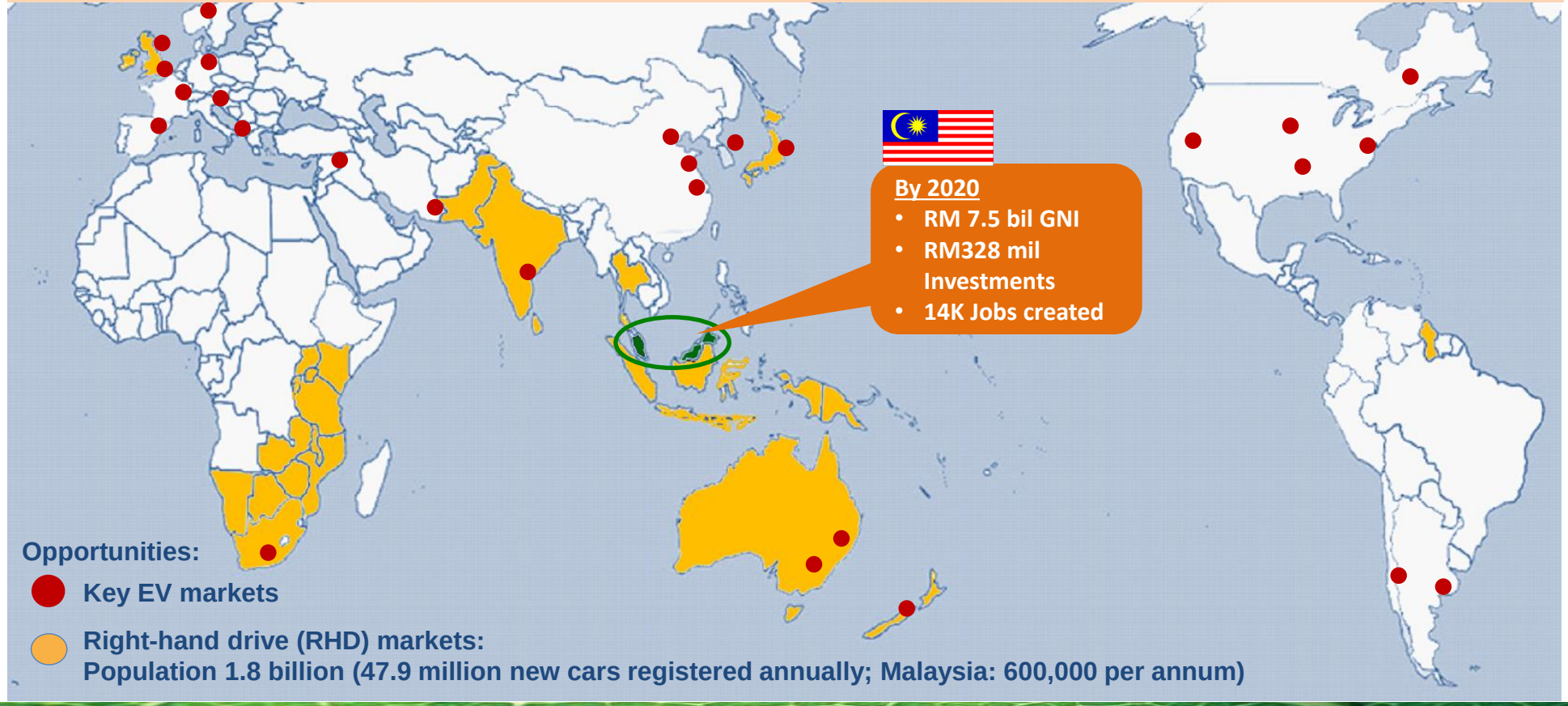
EPP18 (Enable Electric Vehicle Component Manufacturing)

STRATEGIC THRUST & ACTION PLAN:
MALAYSIA'S STRATEGIC DIRECTION & OPPORTUNITIES (BLUE OCEAN)

Positioning Malaysia as the 'Electric Mobility Marketplace' in the region

Accelerating deployment of:

- **National Automotive Policy (NAP 2014): energy-efficient vehicles (EEV) and components localisation;**
- **NKEA Electrical & Electronics (EPP 18): Enabling Electric Vehicle Component Manufacturing.**



Strategic Thrusts:

1. **Promote** use of electric public transportation, **& encourage** EV private ownerships;
2. **Strengthen** EM eco-system and charging infrastructure;
3. **Accelerate** EM technology localisation opportunities.

By 2020:

100,000 electric cars

100,000 electric motorcycles

2,000 electric buses

125,000 charging stations

STRATEGIC THRUST & ACTION PLAN:
ACCELERATING NAP & EPP18

1 **Promote** electric public transportation & **Encourage** EV private ownerships

Key actions: Mobilise EM marketplace

- **Electric buses:** city busses; BRT; last-mile connection for LRT/MRT.
- **COMOS:** car sharing scheme.
- **Private ownerships:** EVs (Tesla, BMW, Nissan, Renault, Mitsubishi, BYD); Scooters (Eclimo).
- **Delivery & dispatch:** Eclimo.
- **Official cars:** Government, corporate, national events.

Outcomes:

- **Malaysia becomes EM marketplace.**
- **Key EV manufacturers pay attention to Malaysia as a key market, provide product choices and availability.**

2 **Strengthen** EM eco-system and charging infrastructure

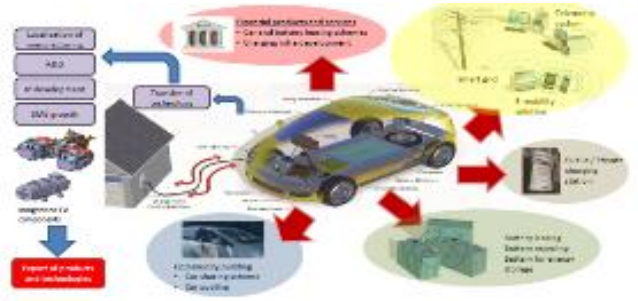
Key actions: Mobilise EM eco-system

- **Public EV charger:** national programme to install EV chargers at public places in city centres.
- **Private chargers:** change of lifestyle (for daily commuting with convenience).
- **Service providers:** upscale local service providers.

Outcomes:

- **Malaysia becomes EM marketplace.**
- **EV chargers available at public places, provide convenience and new lifestyle.**
- **Industry strengthens after-sales services.**

3 **Accelerate** EM technology localization opportunities.



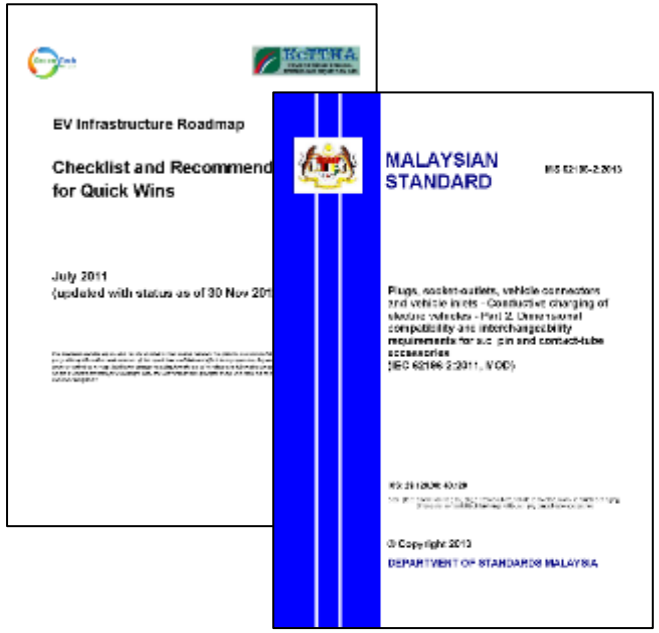
Key actions: Technology localisation

- **Value chain:** identify players and enhance opportunities.
- **New growth area:** existing E&E industry players.
- **Global growth:** Attract key OEM/BOS players for FDIs.

Outcomes:

- **Malaysia becomes strategic location for OEMs expansion.**
- **Malaysia plays a strategic role in global EM supply chains.**
- **Accelerating NAP & ETP-EPP18.**

STRATEGIC THRUST & ACTION PLAN:
MALAYSIA'S STRENGTHS & CAPABILITIES



- **Public transport:**

  Electric bus: orders for 55 units in 2014 (by Prasarana, Panorama Melaka) via BYD-AMDAC-MGTC collaboration; Sustainable Mobility Fund (RM70 mil) approved by MTHPI; Sunway BRT 15 Electric buses to be launched in June.

  EV sharing programme: COMOS was launched in 2014.

- **E-Scooters:** 400 Units for delivery fleet by KFC & Pizza Hut; 30 Units currently in-use by PDRM.

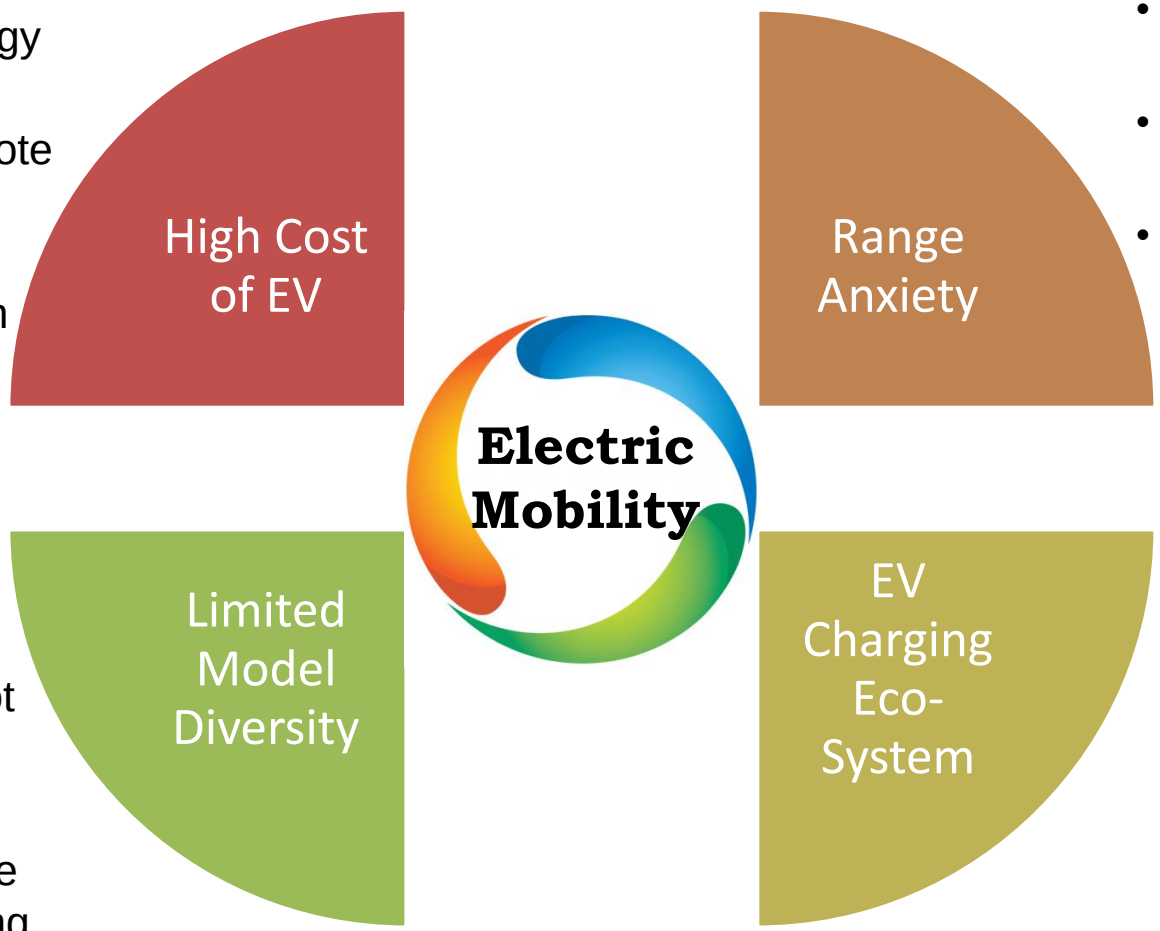
- **EM eco-system:** EV Infrastructure Roadmap published; 5 MS-IEC standards published; 3 Local EM service providers established.

- **EV chargers:** 20 Units EV chargers installed in public places, 10 Units EV chargers in government offices.

- **EM industry:** BYD-AMDAC, Eclimo, FEN, Proton, CMS Consortium

STRATEGIC THRUST & ACTION PLAN:
CHALLENGES TO OVERCOME

- EV is more expensive due to limited production & technology is still nascent.
- No specific incentive to promote EV ownership and use.
- No emission regulation for vehicles or mandatory carbon emission targets.



- Mindset still associated with petrol vehicle
- EV charger is not available at public places
- Building owners are not interested to install EV chargers due to limited vehicles

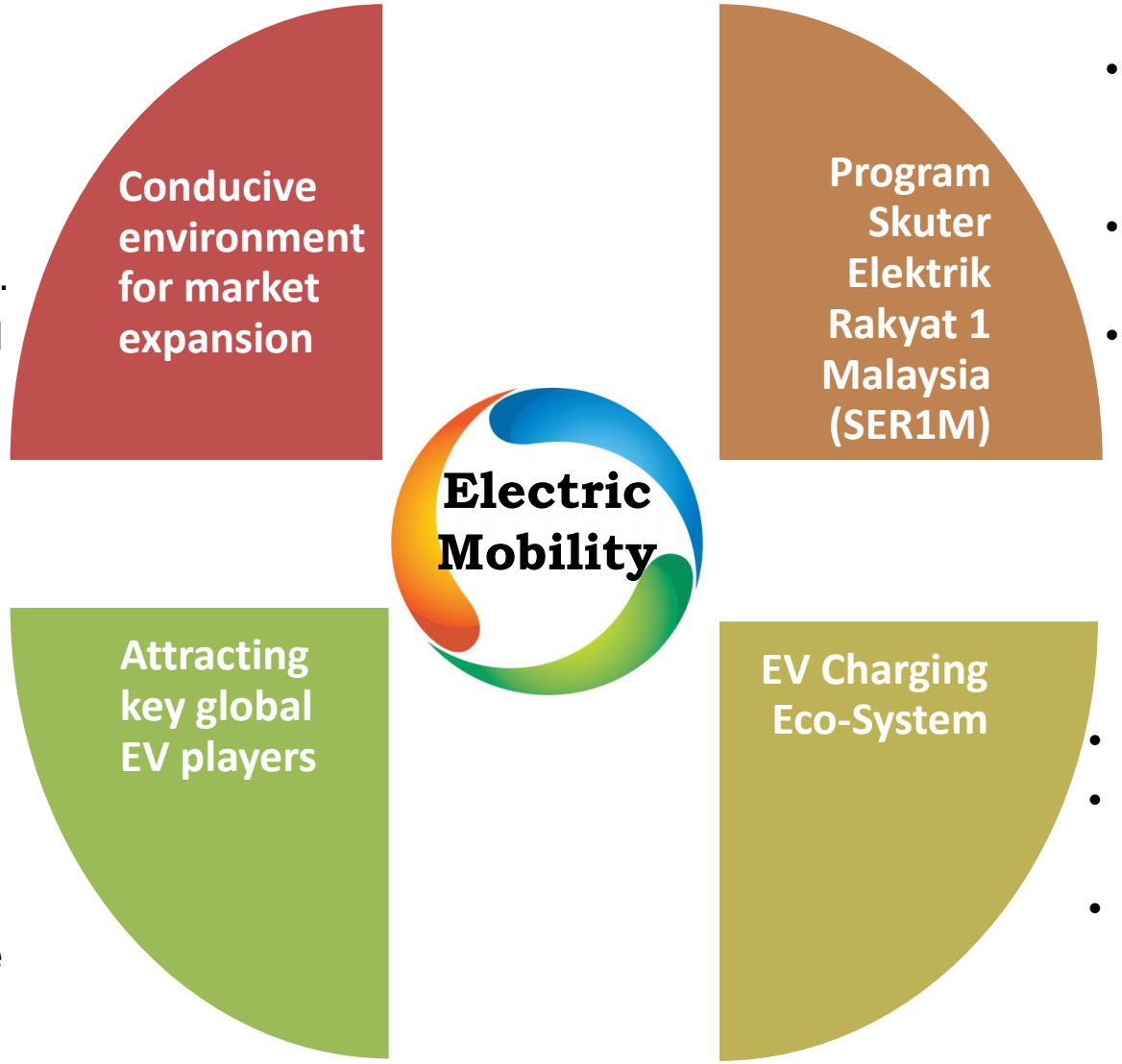
- Market limitation: EV is not introduced into Malaysia
- EV is limited to CBU.
- Other regional markets are more attractive: Hong Kong, Singapore, Australia, Japan.

- EV charger is new locally.
- Competency is limited.
- Standards are still being developed with many options for applications.
- Local players are limited.

STRATEGIC THRUST & ACTION PLAN:
CATALYSING THE MARKETPLACE

- Accelerate electric busses deployment and revisit Sustainable Mobility Fund.
- Provide import and excise duties exemption for CBU EVs.
- **Impact: vibrant domestic EM market, creating an Electric Mobility Marketplace.**

- Assist rural, warga emas to have access to electric scooter.
- Scooter sharing program at university campuses.
- **Impact: Widespread adoption of EM by rakyat of all ages, creating an Electric Mobility Marketplace.**

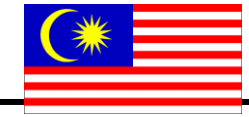


- Positioning Malaysia as the global Electric Mobility Marketplace.
- Incentives in place, high public awareness on EV.
- **Impact: Key global OEM prefer establishing presence in Malaysia compared to other countries.**

- National charging eco-system.
- Lifestyle centric, strategically located.
- **Impact: National comprehensive charging infrastructure assimilates into EV users lifestyle.**

IMPACT: EXPECTED BENEFITS TO THE PEOPLE & THE NATION – MITIGATION POTENTIAL

Assumptions: *Based on car useful life 10 years, annual mileage 21,216 km, petrol car fuel consumption 6.3 litres/100km, fuel price RM2.30 per liter, petrol car maintenance cost RM0.11 per km, stationary fuel consumption 1.2 litre/hour, CO2 emissions 152 g/km, electric car battery pack 24 kWh, maximum range 200 km, maintenance cost RM0.04 per km, zero tailpipe emission, energy consumption 14.25kWh/100km, electricity tariff average domestic RM0.3166 per kWh, battery second life value RM326 per kWh, time in slow moving traffic 0.4hour/day, External Cost Savings EUR15/tCO2*

Based on 10 years useful life	Petrol car	Electric car	Difference	Savings	Beneficiary
Fuel/Electricity cost	RM 30,742	RM 9,572	RM 21,170	69%	Rakyat
Maintenance cost	RM 23,338	RM 8,486	RM 14,852	64%	
Stationary traffic fuel cost	RM 4,030	RM 0	RM 4,030	100%	
Battery second life value	n/a	RM 7,824	RM 7,824	100%	
External cost savings	n/a	RM 2,044	RM 2,044	100%	Government
CO2 tailpipe emission	32,248 kg-CO2	0 kg-CO2	32,248 kg-CO2	100%	
Total benefits from Electric Mobility			**RM 49,920**		

4 prong savings to Rakyat + improved air quality + reduced external cost

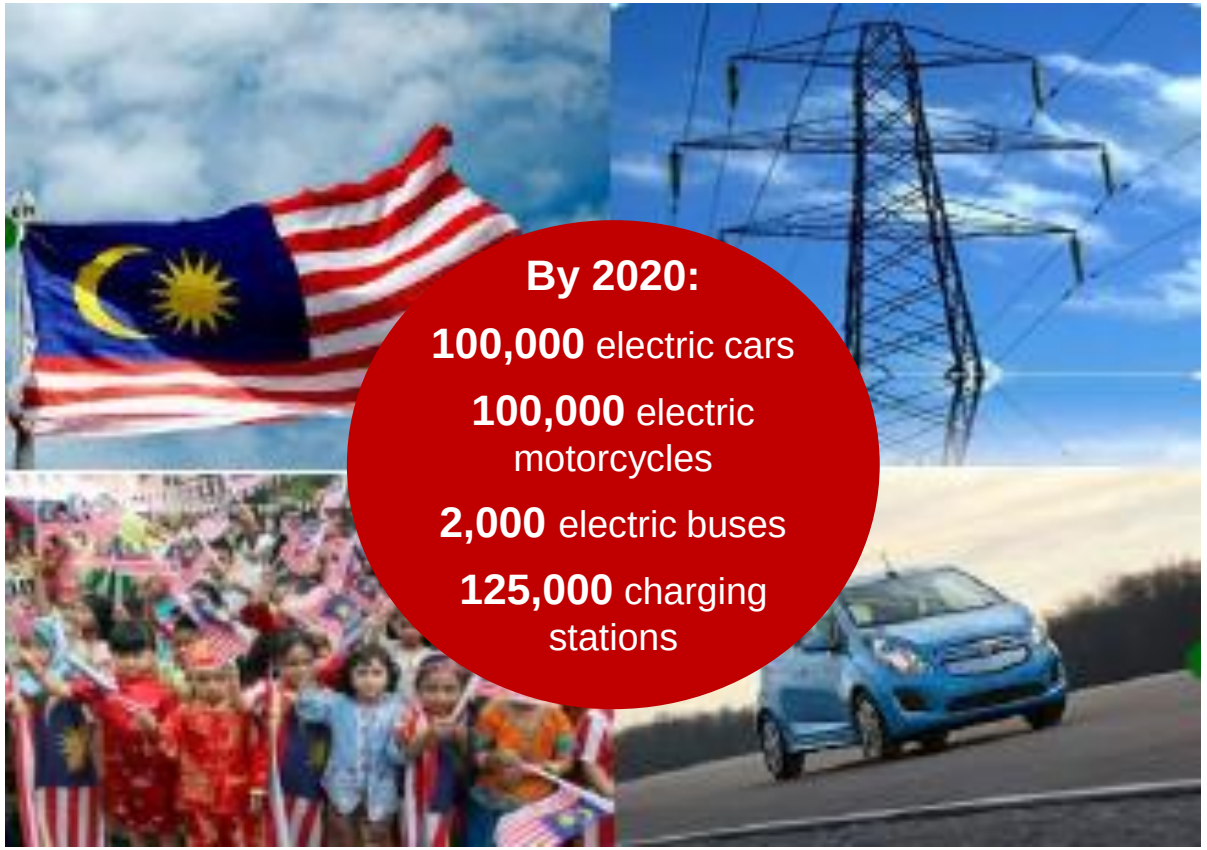
IMPACT: IMPACT TO THE NATION, PEOPLE AND THE INDUSTRY – CO-BENEFITS

NATIONAL

- Reduction of emission by **1.7 mil tonnes CO_2**
- Reduce dependency on oil
- Enhance economic growth: expected **RM328 mil** investment by 2020
- Reduce healthcare cost from better environmental condition

RAKYAT

- Reduce vehicle fuel cost by **69%** and maintenance cost by **64%**
- Improve air quality within cities
- Minimise building façade discolouration
- Increase the quality of life by offering convenience and joy of using EVs



Positioning Malaysia as the 'Electric Mobility Marketplace'

ENERGY SUPPLY INDUSTRY

- Increasing efficient use of energy sources by **100%** by shifting from fuel to electricity for transport
- Improve electricity load factor through off-peak electricity usage
- Pioneering large scale use of EV batteries for energy storage (second life)

ELECTRIC MOBILITY INDUSTRY

- Enhance local market demand of electric cars
- Promote new market and sustain growth of global electric cars
- Support NAP 2014: accelerate the growth of EEV

Providing financial incentives – tax rebates and subsidies are a common means of encouraging private EV purchases. With Malaysia's high rate of import tax on vehicles, a financial incentive of 100% import tax exemption on EVs would provide a sweeping and attractive incentive for vehicle purchasers to choose EVs

Encouraging and supporting municipal and corporate fleets

Initiating electric scooter sharing programmes – this would be highly effective in the Malaysian transportation landscape, where motorcycles account for 46.6% of vehicles on the road

Instituting other regulatory measures or incentives, such as a requirement or advantage for property developers building EV-ready properties or property owners installing and offering charging infrastructure to the public

Encouraging the use of EV fleets for commercial transportation and deliveries

Bringing EVs into public transportation, through electric buses, car-sharing programmes and electric taxi trials

Instituting emissions regulation

Free public-access EV charging

Ensuring the supply of an integrated charging infrastructure network, with Government taking the first step in the rollout of infrastructure

4.1.4 ELECTRIC SCOOTERS AND MOTORCYCLES

In Malaysia, motorcycles still form 46.6 per cent of land transport vehicles. After cars and buses, this is the preferred form of transportation in the country. Currently, there are 11,118,326 motorcycles on the road, and this number is expected to grow by 5 per cent yearly. The Electric Mobility Blueprint targets a total of 100,000 electric scooters and motorcycles to hit Malaysian roads by 2020.

In an effort to increase public awareness on the advantages of electric scooters in Malaysia, the following initiatives will be introduced to serve as incubators for the mass adoption of electric scooters by Malaysians.

4.1.4.1 PLANNED INITIATIVE 1: SKUTER ELEKTRIK RAKYAT 1MALAYSIA (SER1M)

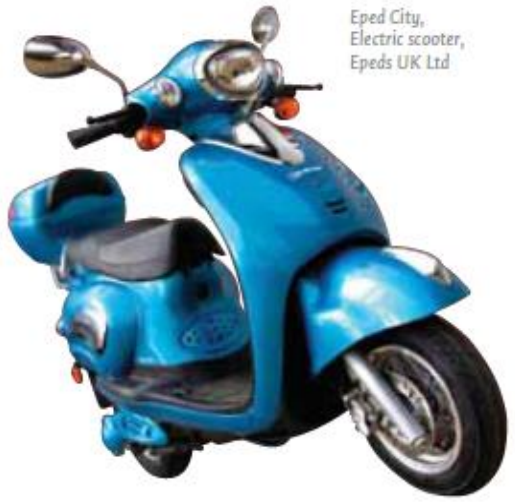
This programme proposes the use of electric scooters by older riders (pension age 55 and above) who live in rural areas. This initiative aims to alleviate the burden of fuel and maintenance costs in transportation for older Malaysians living in rural areas, as well as to promote better air quality in these areas. Under SER1M, it is proposed that 10,000 electric scooters be provided to the pensioners either in exchange for their existing motorcycles or through a leasing programme.

4.1.4.2 PLANNED INITIATIVE 2: ELECTRIC SCOOTERS SHARING PROGRAMMES IN UNIVERSITIES

Public universities in Malaysia register an average of 400,000 new students every year. Most of the university students' preferred mode of transportation is motorcycles followed by buses, bicycles and cars. The thousands of motorcycles on Malaysia's university campuses create noise and air pollution, cause parking problems, and may indirectly cause negative social issues such as illegal racing and theft.

An electric scooter sharing scheme on campuses can directly eliminate such issues and enable students to embrace green technology while assisting them to move around their campuses without the burden of the cost of a motorcycle.

A programme for electric scooter sharing on campus is at the planning stage, which will encourage collaboration between corporate sponsors, infrastructure and systems providers and universities. A pilot phase will target 100 scooters on a single campus, rolling out to an eventual 10,000 electric scooters in sharing systems across different universities in Malaysia over the next five years.



Eped City, Electric scooter, Epeds UK Ltd

4.2.6 EVS FOR COMMERCIAL FLEETS

The use of EVs in commercial fleets (for transportation and delivery) can offer a cost-effective alternative to ICE vehicles, saving on expenditure on fuel and maintenance in operations.

Companies should be provided technical and commercial support to facilitate the transition to deploying EV fleets in this area. This can be in the form of an advisory agency to assist companies in transitioning to EVs, as well as tax incentives such as Green Investment Tax Allowance (GITA), and other financial incentives deemed appropriate.

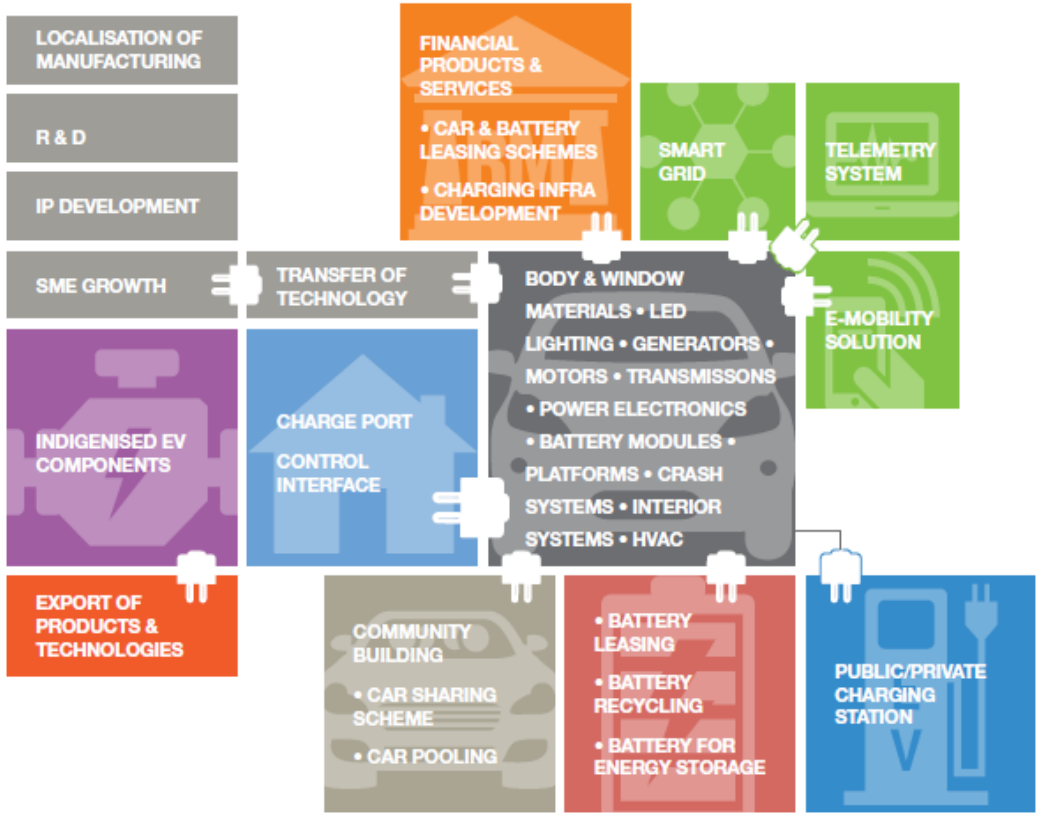
4.2.6.1 KFC FLEET

KFC, one of Malaysia's leading fast-food franchises, currently utilises a fleet of about 400 units of Eclimo ES11 scooters for food delivery purposes, making the switch to EVs to lower the maintenance costs of their delivery fleet.



6.3 CAPITALISING ON THE EV ECOSYSTEM VALUE CHAIN

As the EV lifecycle advances along the curve, the rise of the industry is anticipated to pave the way for a myriad of growth opportunities for the local economy as EVs themselves are dependent on an EV Ecosystem – components, systems or technologies that go hand-in-hand with shaping the EV market.



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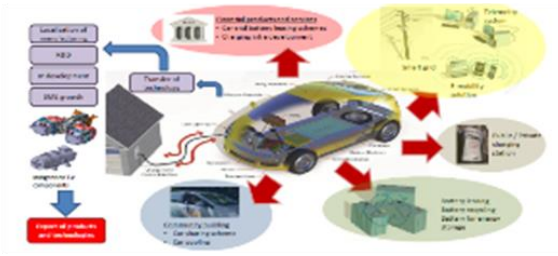

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11MP BUS PROGRAM*

SUSTAINABLE MOBILITY FUND FOR BUS

11MP SCOOTER PROGRAM*

11MP CHARGING STATION PROGRAM*

AAIBE Funded Project

GEF-UNIDO LOW CARBON TRANSPORT

** Pending approval Q3 2015*

“Catalysing green technology deployment as Malaysia’s strategic engine for socio-economic growth”

Malaysian Green Technology Corporation

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