NATIONAL ELECTRIC MOBILITY BLUEPRINT

Positioning Malaysia as the ‘Electric Mobility Marketplace’

Malaysian Green Technology Corporation

3 April 2015
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 (2,199 km).

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.
BACKGROUND:
NATIONAL DEFINITION OF ELECTRIC VEHICLE

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).

<table>
<thead>
<tr>
<th>TYPES OF GREEN VEHICLES</th>
<th>CO2 Emissions at tail-pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hybrid Electric Vehicle (HEV)</td>
<td>90 g/km</td>
</tr>
<tr>
<td>Plug-in Hybrid Electric Vehicle (PHEV)</td>
<td>&lt; 50 g/km</td>
</tr>
<tr>
<td>Battery Electric Vehicle (BEV)</td>
<td>0 g/km</td>
</tr>
<tr>
<td>Fuel Cell Vehicle (FCV)</td>
<td>0 g/km</td>
</tr>
</tbody>
</table>

Electric Vehicles

Includes:
- Battery electric vehicles (BEV);
- Plug-in hybrid electric vehicles (PHEV) with:
  - an electric range of at least 30 km,
  - \( \text{CO}_2 \) emission below 50 g/km.

Excludes:
- Mild hybrid vehicles
- Full hybrid vehicles
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;

By 2020:
- RM 7.5 bil GNI
- RM328 mil Investments
- 14K Jobs created

Opportunities:
- Key EV markets
- Right-hand drive (RHD) markets:
  Population 1.8 billion (47.9 million new cars registered annually; Malaysia: 600,000 per annum)

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 THRUSTS & ACTION PLANS

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

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

   **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.

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

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

   **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.

3. **Accelerate** EM technology localization opportunities

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

   **Key actions:** Technology localization
   - **Value chain:** identify players and enhance opportunities.
   - **New growth area:** existing E&E industry players.
   - **Global growth:** Attract key OEM/BOS players for FDIs.
BASIS FOR CONSIDERATION:
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.
  - **EV sharing programme:** COMOS was launched in 2014.

- **EVs:** 20 Nissan Leaf, 9 Mitsubishi iMiev, 1 Renault Zoe, 2 Renault Fluence, 2 Renault Twizzy, 1 BMW i3, 1 Tesla Roadster, 1 Mitsubishi PHEV available in Malaysia.

- **E-Scooters:** 500 Units for delivery fleet by KFC & Pizza Hut; 33 Units ordered 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
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.

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

- 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

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

- 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.

- 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.

- Conducive environment for market expansion

- Attracting key global EV players

- Program Skuter Elektrik Rakyat 1 Malaysia (SER1M)
- 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.

- EV Charging Eco-System
- 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**

**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, fuel subsidy RM0.27 per litre, 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, electricity subsidy RM0.09 per kWh, battery second life value RM326 per kWh, time in slow moving traffic 0.4hour/day, External Cost Savings EUR15/tCO2

<table>
<thead>
<tr>
<th>Based on 10 years useful life</th>
<th>Petrol car</th>
<th>Electric car</th>
<th>Difference</th>
<th>Savings</th>
<th>Beneficiary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel/Electricity cost</td>
<td>RM 30,742</td>
<td>RM 9,572</td>
<td>RM 21,170</td>
<td>69%</td>
<td>Rakyat</td>
</tr>
<tr>
<td>Maintenance cost</td>
<td>RM 23,338</td>
<td>RM 8,486</td>
<td>RM 14,852</td>
<td>64%</td>
<td>Rakyat</td>
</tr>
<tr>
<td>Stationary traffic fuel cost</td>
<td>RM 4,030</td>
<td>RM 0</td>
<td>RM 4,030</td>
<td>100%</td>
<td>Rakyat</td>
</tr>
<tr>
<td>Battery second life value</td>
<td>n/a</td>
<td>RM 7,824</td>
<td>RM 7,824</td>
<td>100%</td>
<td>Rakyat</td>
</tr>
<tr>
<td>Subsidy cost to Government (pre 1/12/2014)</td>
<td>RM 3,609</td>
<td>RM 2,721</td>
<td>RM 888</td>
<td>25%</td>
<td>Government</td>
</tr>
<tr>
<td>External cost savings</td>
<td>n/a</td>
<td>RM 2,044</td>
<td>RM 2,044</td>
<td>100%</td>
<td>Malaysia</td>
</tr>
<tr>
<td>CO2 tailpipe emission</td>
<td>32,248 kg-CO2</td>
<td>0 kg-CO2</td>
<td>32,248 kg-CO2</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

**Total benefits from Electric Mobility** RM 50,808

4 prong savings to Rakyat + 25% less subsidy burden on Government + improved air quality + reduced external cost
CONCLUSION:
IMPACT TO THE NATION, PEOPLE AND THE INDUSTRY

NATIONAL

- Reduction of emission by 1.7 mil tonnes CO₂
- Reduce dependency on oil
- Reduce fuel subsidy cost by 25%, estimated at RM0.1 bil by 2020
- 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

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

By 2020:
- 100,000 electric cars
- 100,000 electric motorcycles
- 2,000 electric buses
- 125,000 charging stations

Positioning Malaysia as the ‘Electric Mobility Marketplace’
IMMEDIATE & READY ACTION IN 2015:
ROLL-OUT OF PUBLIC EV CHARGING STATIONS NATIONWIDE

- 2015 ready actions:
  - **Government Leadership by Example**: use of electric vehicles (Tesla Model S) for official duties, whereby 120 units of Model S are to be procured by GreenTech Malaysia with private financing and leased to Government.
  - **300 public EV charging stations** in key cities by GreenTech Malaysia, with RM5 million funding from MESITA (via KeTTHA). Collaboration with First Energy Network and private building owners to enable public-private partnership and co-financing.
  - **RMK-11 (proposal): 25,000** public EV charging stations nationwide.
  - **2020 target**: 125,000 EV charging stations (public and private units).

### Yearly Public EV Charging Stations

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of EV Charging Stations (Public &amp; Private*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>3,750</td>
</tr>
<tr>
<td>2016</td>
<td>12,500</td>
</tr>
<tr>
<td>2017</td>
<td>18,750</td>
</tr>
<tr>
<td>2018</td>
<td>25,000</td>
</tr>
<tr>
<td>2019</td>
<td>30,000</td>
</tr>
<tr>
<td>2020</td>
<td>35,000</td>
</tr>
<tr>
<td>Total</td>
<td>125,000</td>
</tr>
</tbody>
</table>

* Subject to private EV ownership (1 EV = 1 private charging station)
“Catalysing green technology deployment as Malaysia’s strategic engine for socio-economic growth”