MINISTRY OF ENERGY,
GREEN TECHNOLOGY AND WATER

LOW CARBON MOBILITY BLUEPRINT & ACTION PLAN:
A POLICY DIRECTION FOR GREENER TRANSPORTATION

BY

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(ENERGY AND GREEN TECHNOLOGY)
MINISTRY OF ENERGY, GREEN TECHNOLOGY AND WATER

PRESENTATION OUTLINES

1. **Malaysia Transport Sector Scenario**
    i. Issue & challenges
    ii. CO2 emission on transport sector based on DSM Study

2. **EV & EEV Scenario In Malaysia**

3. **Green Technology Master Plan (GTMP) on Transport Sector**

4. **Future Global Low Carbon Mobility Future Trend**

5. **LCMB Expected Outcome**

MALAYSIA TRANSPORT SECTOR SCENARIO

MOTOR VEHICLE REGISTRATION

Table 1.17 Motor-Vehicle Registration

Year \ Type of Vehicle	Motorcars	Motorcycles	Taxi and Hired Cars	Buses	Goods vehicles	Others*	Total
2000	4,145,982	5,356,604	66,585	48,662	665,284	315,687	**10,598,804**
2005	6,473,261	7,008,051	79,130	57,370	805,157	393,438	**14,816,407**
2010	9,114,920	9,441,907	102,961	69,149	966,177	493,451	**20,188,565**
2011	9,721,447	9,985,308	109,214	71,784	997,649	515,867	**21,401,269**
2012	10,354,678	10,589.818	112,336	73,536	1,032,004	539,849	**22,702,221**
2013	10,535,575	11,087,878	153,875	62,784	1,116,167	862,977	**23,819,256**
2014	11,028,296	11,629,263	164,625	65,044	1,159,517	882,441	**25,101,192**
2015	11,871,696	12,094,790	172,034	66,999	1,197,987	898,446	**26,301,952**

Note: * Including Government motorcars, trailers, and driving school vehicles
Source: Ministry of Transport and Department of Statistics Malaysia

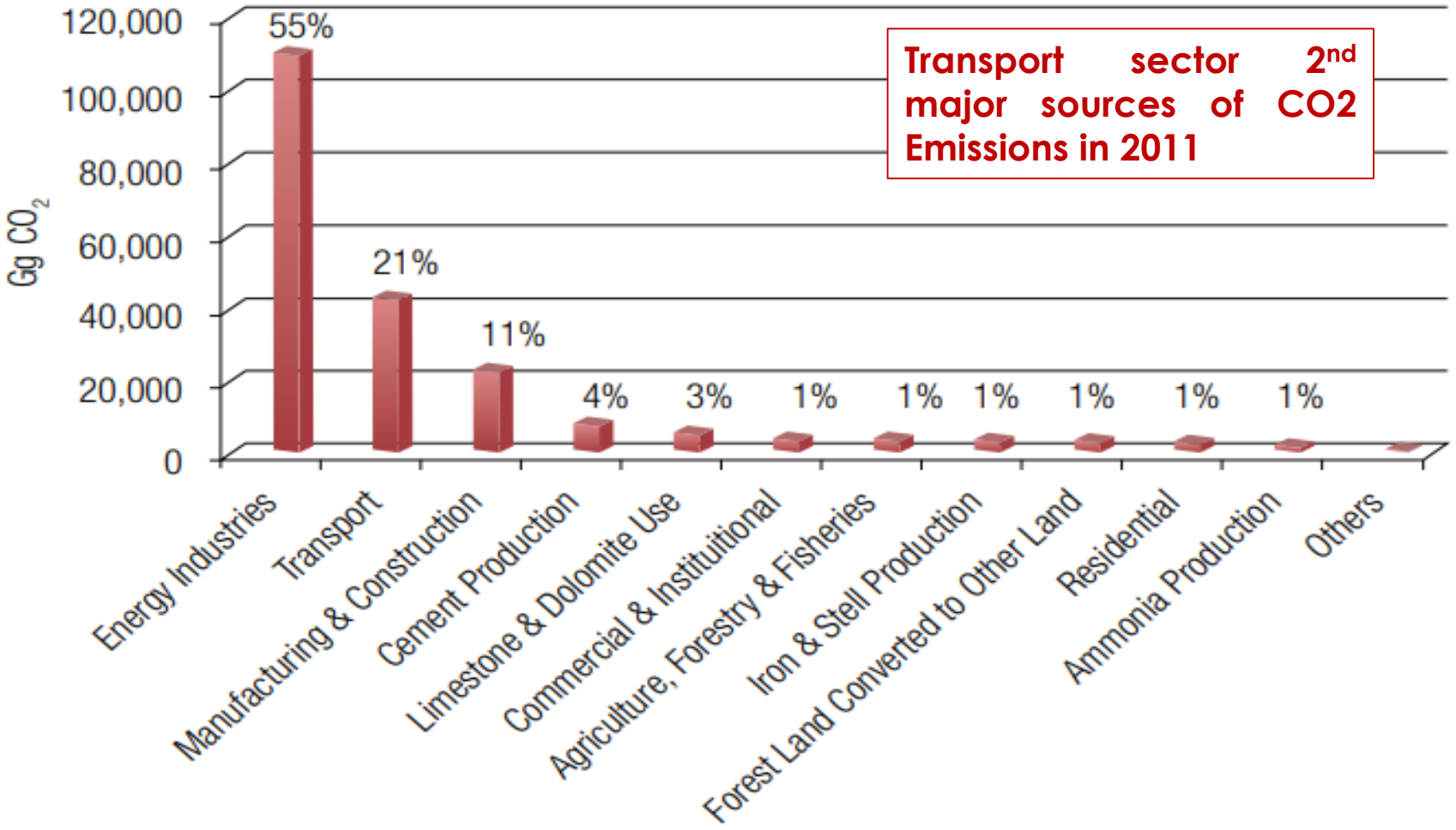
- **Increasing trend** in **motor-vehicle registration** for all categories
- **26.3 million registered vehicles in 2015**
- **Majorities - motorcars and motorcycles representing 45.1% and 46.0%**

Source: *Biennial Update Reports (BURs) 2016 (from MOT & Department of Statistics Malaysia)*

MALAYSIA TRANSPORT SECTOR SCENARIO

MALAYSIA'S TRANSPORT SECTOR

Figure 2.5: Major Sources of Carbon Dioxide Emissions in 2011



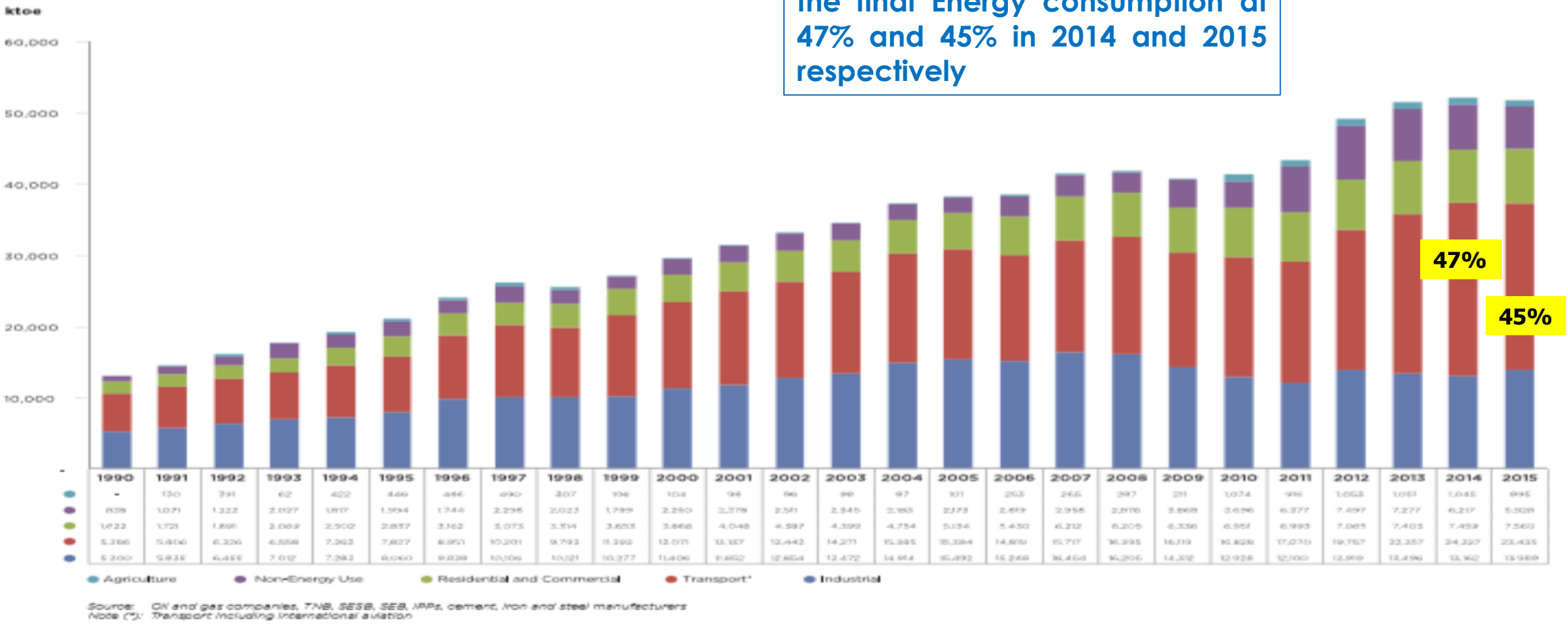
Transport sector 2nd major sources of CO2 Emissions in 2011

Source: NEB 2015, Biennial Update Reports (BURs) 2016

MALAYSIA TRANSPORT SECTOR SCENARIO

MALAYSIA'S TRANSPORT SECTOR

Figure 9: Final Energy Consumption by Sectors



Source: Oil and gas companies, TNB, SESB, SEB, IPPs, cement, iron and steel manufacturers
Note (*): Transport including international aviation

Transport sector – largest share of the final Energy consumption at 47% and 45% in 2014 and 2015 respectively

Source: NEB 2015, Biennial Update Reports (BURs) 2016

MALAYSIA TRANSPORT SECTOR SCENARIO

ISSUE: AIR POLLUTION

MALAYSIA's ROAD TRANSPORT SECTOR

- 2nd largest sector emitting carbon : **43 Mil tonnes carbon** annually.
- **No. 1 air polluter** in urban areas.

Organisation for Economic Co-operation and Development (OECD) study:

- Cost of air pollution = **$1.7 trillion** (50% from road transport).
- **>3.5 million people died** worldwide due to air pollution.

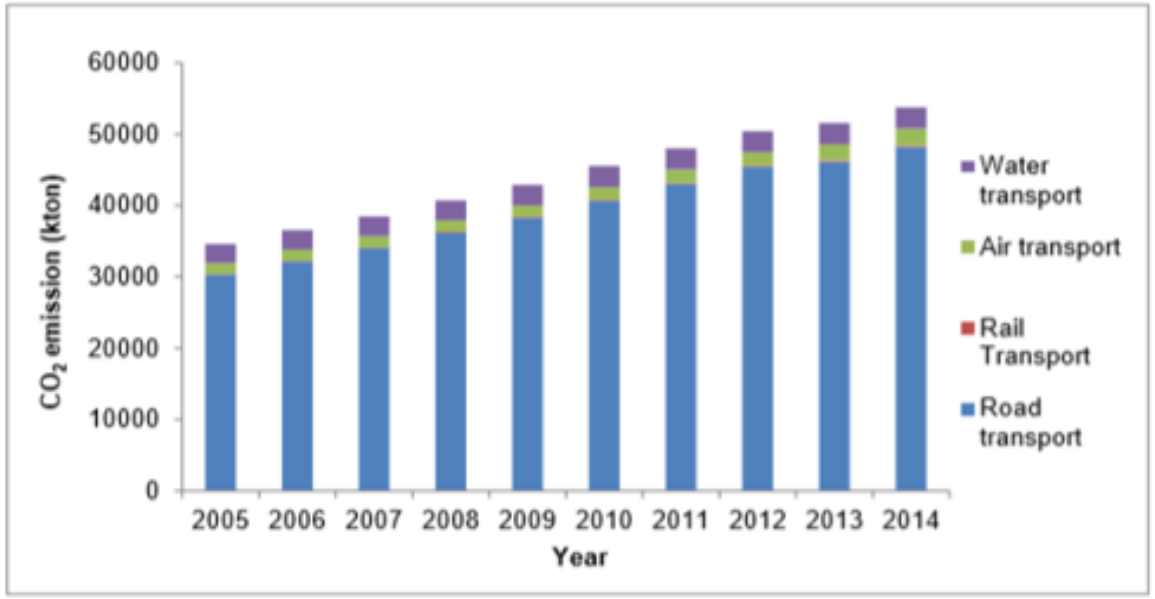
UK's Department of Health study:

- Air pollution cost British Government **up to £17 billion/year**.

Source: NEB 2015, Biennial Update Reports (BURs) 2016

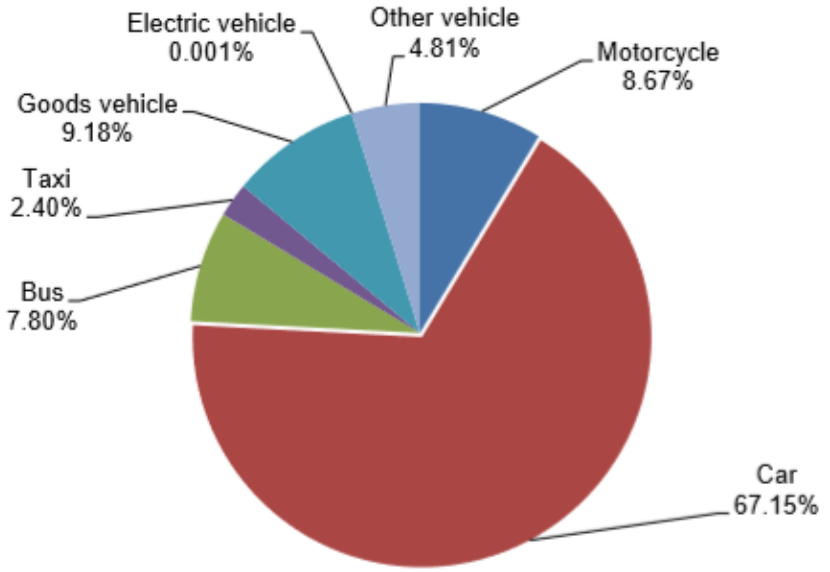
MALAYSIA TRANSPORT SECTOR SCENARIO

CO2 emission growth trend by all transportation system in Malaysia, 2005 - 2014



- 5% annual increase average
- At 2014, CO2 emission had increased 37% compare to 2005 level.
- Emission expected to increase unless drastic measure on CO2 emission control is in place

CO2 emission on land transport % in 2014



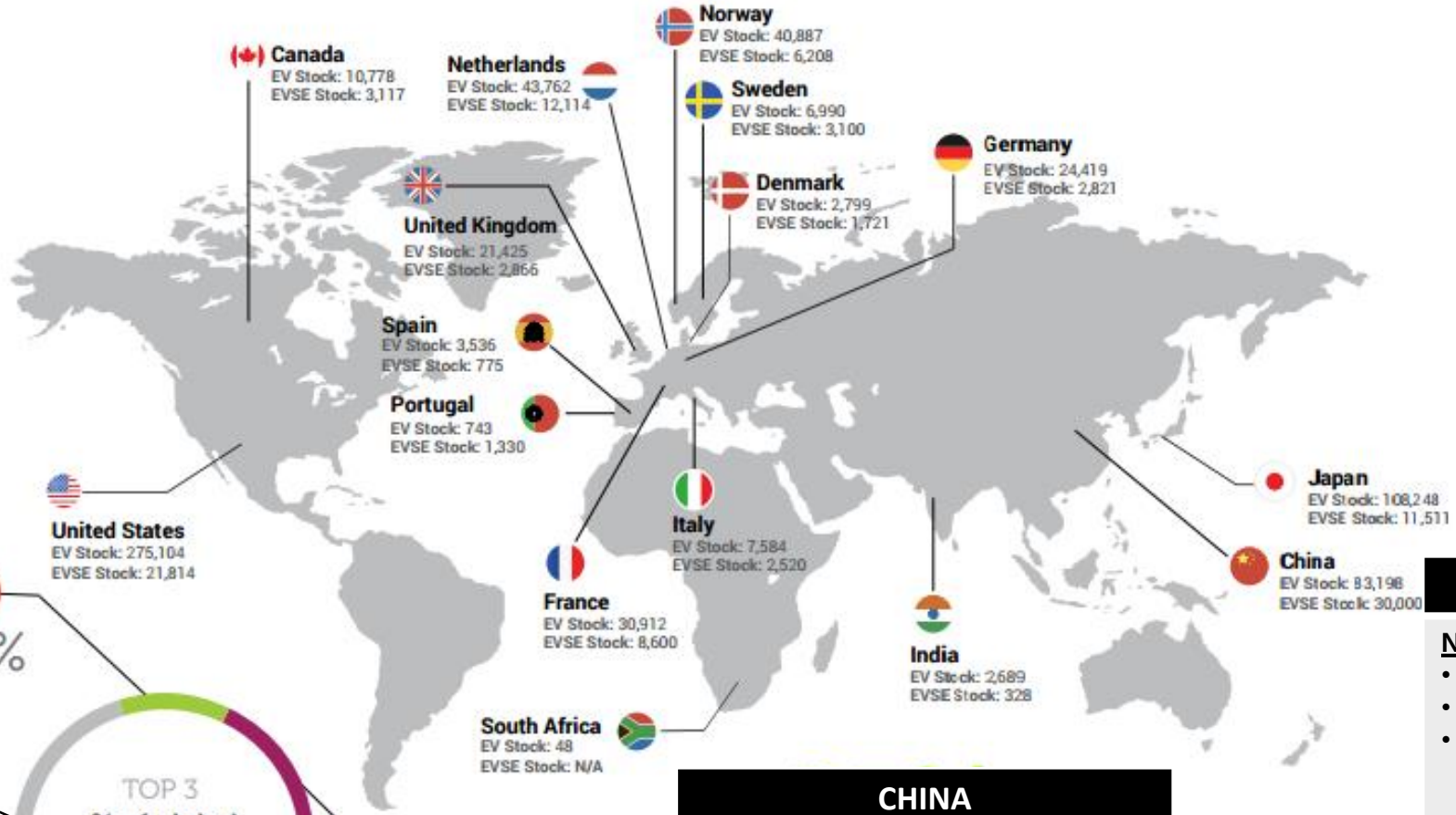
- Bus, taxis and good vehicles accumulating to 19% next to car at 67%

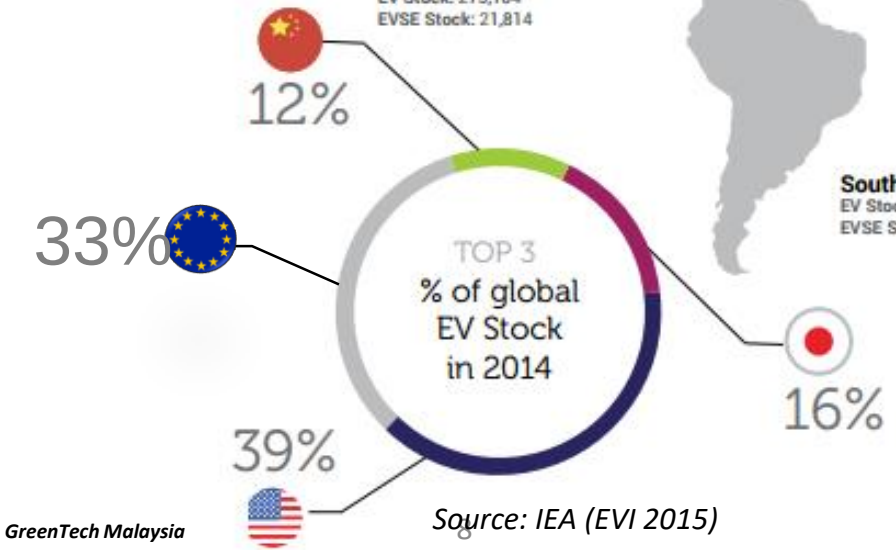
Source: Demand Side Management (DSM) Study

FUTURE GLOBAL ELECTRIC VEHICLES TRENDS

CALIFORNIA, USA

- **EV status: 220,000 EVs** as at 2014
- **EV target: 1.5 Mil ZEV** by 2025
- **Incentives:** Rebates of up to **$2,500** for EVs





Source: IEA (EVI 2015)

CHINA

- **EV status: 83,198 EVs** as at 2014 (**>250% growth**)
- **EV target: 5 Mil EVs** by 2020
- **Incentives:**
  - 10% purchase tax exemption
  - Free license plates

EUROPE

Netherlands:

- **EV status: 43,762 EVs** as at 2014
- **EV target: 1 Mil EVs** by 2020
- **Incentives:**
  - Financial incentives for E-taxis and E-vans
  - Tax exemption & registration

Germany

- **EV status: 24,419 EVs** as at 2014
- **EV target: 1 Mil EVs** by 2020
- **Incentives:**
  - Exemption from road taxes

EUROPE

Norway:

- **EV status: 40,887 EVs** as at 2014
- **EV target: 100,000 EVs** by 2020
- **Incentives:**
  - Tax & road tax incentives
  - Non-financial benefits

UK:

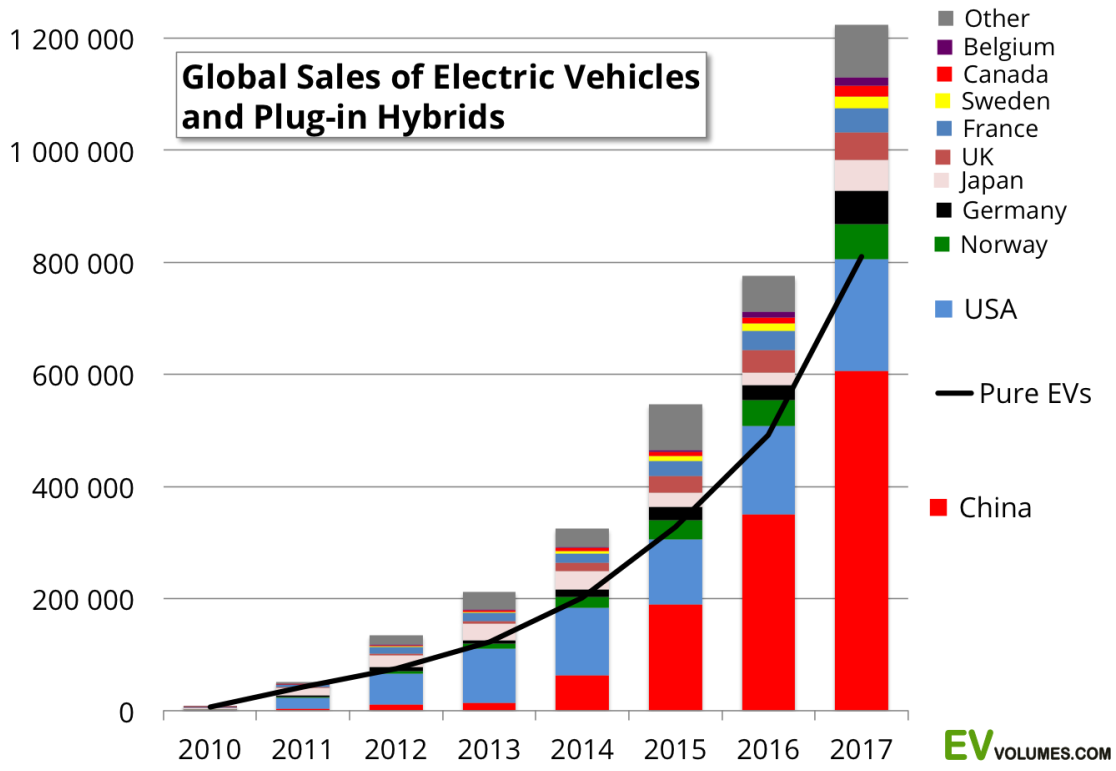
- **EV status: 21,425 EVs** as at 2014
- **EV target: 1.7 Mil EVs** by 2020
- **Incentives:**
  - **£500 Mil** Plug in Car Grant
  - ULEVs (consumer incentives, infrastructure, R&D)

FUTURE GLOBAL ELECTRIC VEHICLES TRENDS

- At least **10 other countries have set sales targets for electric cars**.
  - ✓ Currently, electric and hybrid vehicles accounting for just 3% of global auto sales.

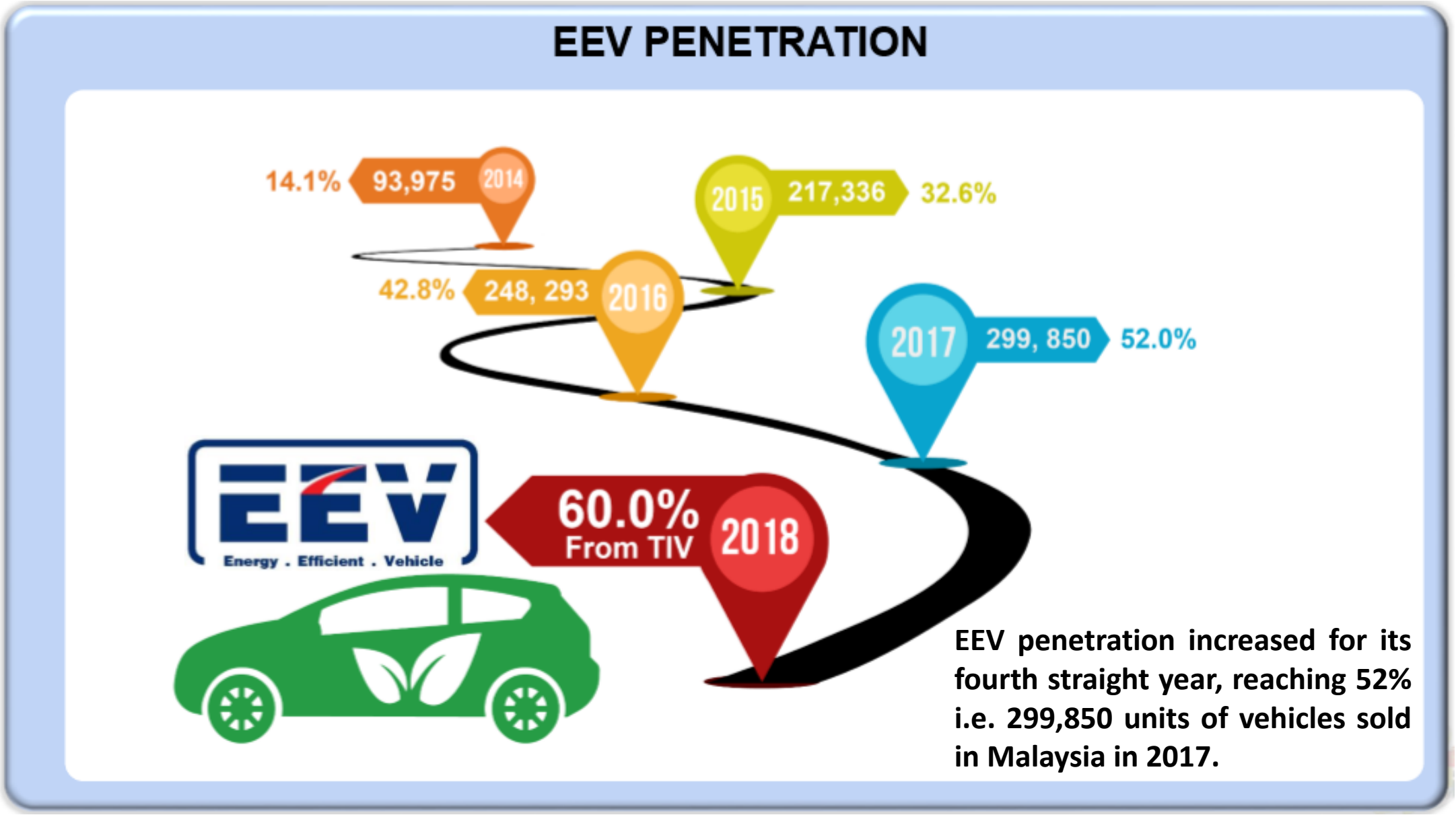
- Globally, **95% of electric cars are sold** in only 10 countries:
  - ✓ **China, US, Japan, Canada, Norway, UK France, Germany, Netherlands and Sweden.**

- Malaysia needs to start embracing the global move in promoting Low Carbon Mobility.



Source: EV Volumes

EEV SCENARIO IN MALAYSIA



Source: MAI NAP2018 presentation on 28th February 2018

EEV SCENARIO IN MALAYSIA

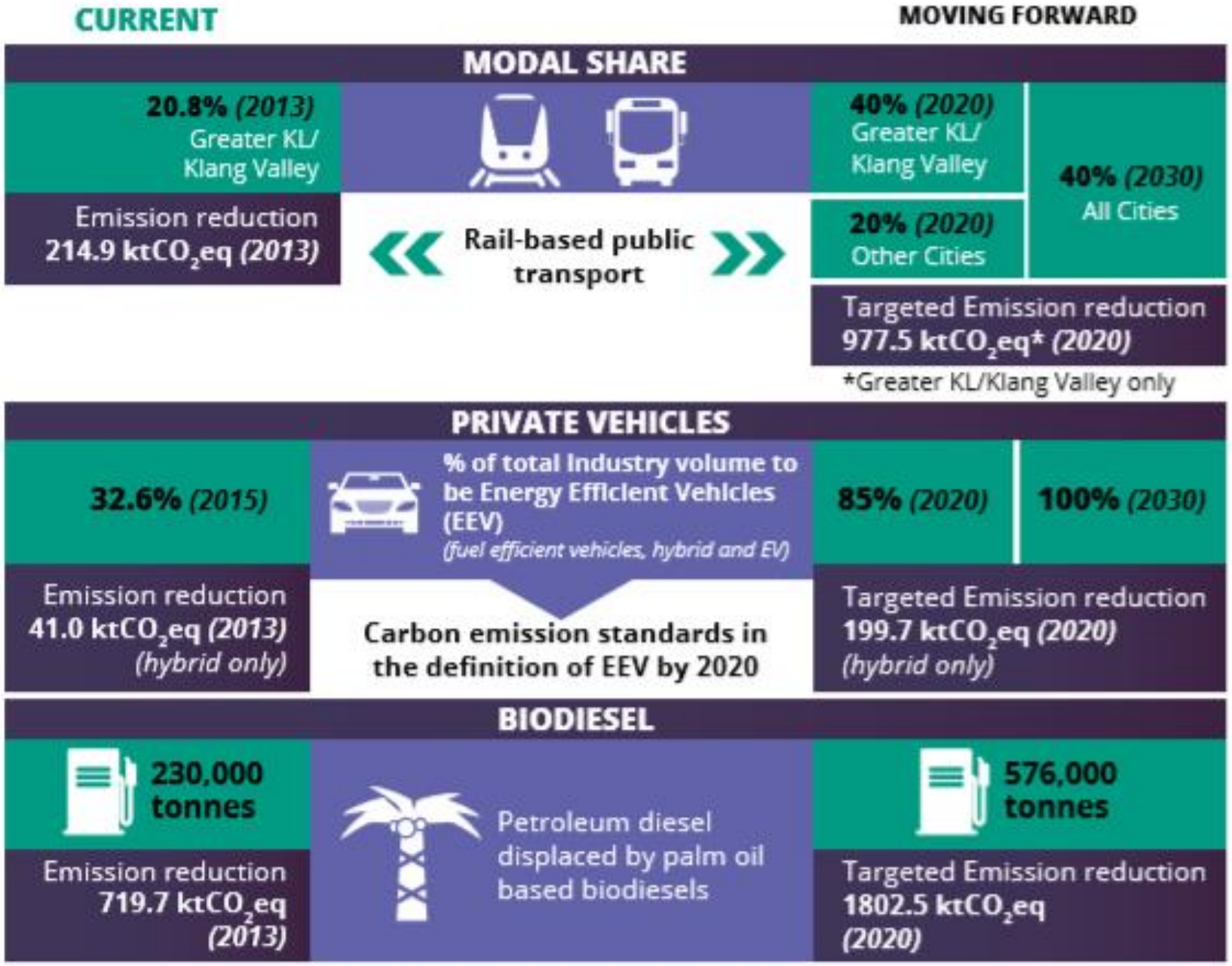
NO. OF REGISTERED HYBRID AND EV (2017)

CATEGORY	TOTAL VEHICLE REGISTERED BY YEAR								GRAND TOTAL
	2010	2011	2012	2013	2014	2015	2016	2017	
HYBRID	138	4,702	8,772	13,506	7,691	9,624	5,926	9,110	**59,469**
EV	-	275	183	157	291	130	50	348	**1,434**
TOTAL	**138**	**4,977**	**8,955**	**13,663**	**7,982**	**9,754**	**5,976**	**9,458**	**60,903**

Level for ultra-low and zero emission vehicle.

- **Hybrid = Ultra-low : Plug-in Hybrid (<50g CO_2 per km)**
- **EV = 0 g CO_2/km**

GREEN TECHNOLOGY MASTER PLAN (GTMP) ON TRANSPORT SECTOR



GREEN TECHNOLOGY MASTER PLAN (GTMP) ON TRANSPORT SECTOR

LCMB to rationalize the target and action plan. To include all transport spectrum and holistic approach.

WAY FORWARD

Transport Policies

- Implementation of the National Land Public Transport Master Plan (NLPTMP)
- Strengthening the Governance Structure in Green Transportation
- Carbon Emission Standards in the Definition of Energy Efficient Vehicle (EEV)
- Public-Private Partnership in Mega Public Transport Projects
- Partnership with Overseas Entities
- Economic Instruments
- Labelling and Carbon Emission Tax Structure
- Continuation of the National Biofuel Policy (NBP)
- Ride Sharing & E-hailing
- First Mile & Last Mile Connectivity

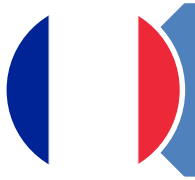
Transport Technology

- Energy Efficient Vehicle (EEV) Technology
- Electric Vehicle (EV) Technology
- Cycling Lane Infrastructure
- Internet of Vehicle
- Revolutionary Transportation System
- Human Capital Development

Future outlook of Low Carbon Mobility

Pledge by Countries

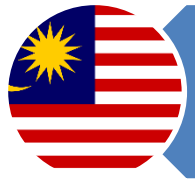
Britain - Ban sales of new gasoline and diesel cars starting in 2040. By 2050, all cars on the road will need to have zero emission.



France - End sales of gas and diesel-powered vehicles by 2040. Sales of electric, hybrid and alternative fuel vehicles were up 25% in first quarter of 2017.

Norway – All new passenger cars and vans sold in 2025 should be zero-emission vehicles.

Scotland – Phase out gas and diesel cars by 2032



Malaysia – ???

Pledge by Original Equipment Manufacturer (OEM)

Volvo – Announced that all its models introduced in 2019 and after would be hybrid or electric.

Mercedes-Benz – Accelerating its EV program and would have 10 new EVs to market by 2022.

BMW – By 2025, 12 new BEVs and 13 new hybrids will be on the road.

Volkswagen – Introduce 30 or more BEV models to the market by 2025

Proton/Perodua/Others–???

EU's emission restriction from all new vehicles: **<95 g-Carbon/km by 2021**, thus drives growth of hybrid, PHEV, EV

LCMB EXPECTED OUTCOME

- As a policy direction for low carbon mobility implementation in Malaysia
- To provide an action plan for low carbon mobility which include EV and EEV
- To include mass transit as a form of low carbon transportation mode
- To minimise the dependency of fossil fuel in the transportation sector
- The spill over of low carbon mobility on economy and GHG reduction

THANK YOU

MINISTRY OF TRANSPORT MALAYSIA

OVERVIEW OF THE TRANSPORT SECTOR

13 March 2018

Transport is a key enabler and backbone in facilitating trade

Government is committed in enhancing accessibility and connectivity

Big challenges remain in enhancing competitiveness of the sector, alleviating congestion and embracing green initiatives.

Overview of the Transport Sector

Malaysia's transport infrastructure & facilities has continue to be developed over the years

Length of Road (km)

1995	2016
61,294	238,823

3.9 increase in road network,

only **8.3%** of total road network is federal road

Ports

	1995	2016
Federal ports	8	10
State ports	5	10

Length of rail (km)

	1995	2016
Rail	699	1,989
Double track	145	774

2.8x increase in rail network of which

39% is double tracked

Airports

	1995	2016
Domestic	16	16
International	5	6
STOL	21	20

Source: Department of Statistics
Ministry of Transport

4 key mobility trends that need to be managed…

4 key mobility trends

1

The mobility of Malaysians to increase more than 3x,

40 mil daily trips in 2010 to
131 mil daily trips in 2030

2

Increase in number of vehicles by **1.4x,**

25 mil in 2015 to
31 mil in 2030
50% are motorcycles

3

Emerging disruptive technology

Autonomous vehicles
Electric vehicles
Vehicle sharing

4

Demand for sustainable transport

Improve **safety**, **reduce fatality & reduce GHG emission**

Mind set and **behavioural change** urgently required

High Energy Consumption and Pollution from Transport Sector

In 2014, the transport sector accounts for approximately 46.6% of total energy demand consumed nationally with road transport accounting for 90% or 16,002ktoe out of 17,778 ktoe

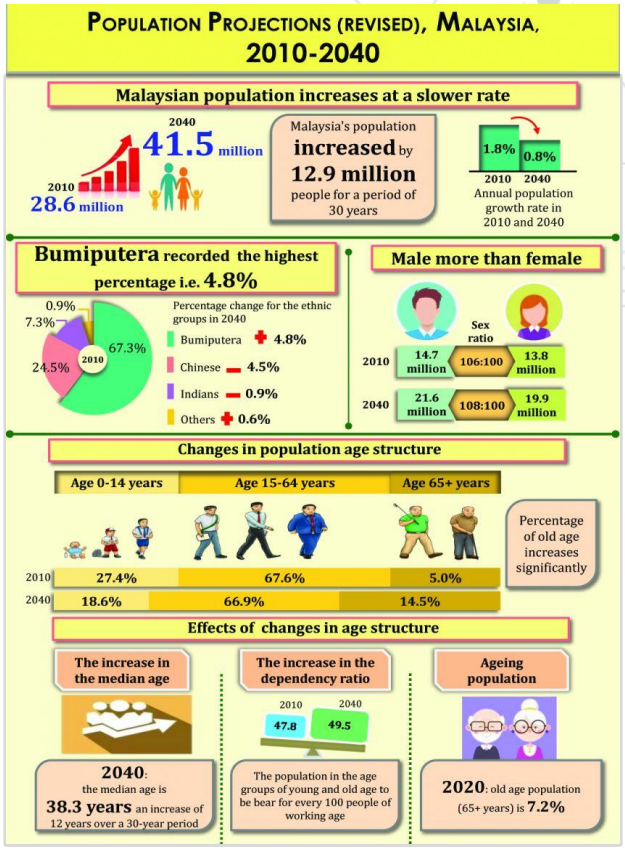
Correspondingly, CO2 emission from road transport recorded 48,242 ktonne or 89.73% of all transport related CO2 emission

In road transport, car consumes highest share of fuel/energy and emits the highest amount of CO2 with 67.7%.

- Urgent need to implement effective measures to improve the energy usage pattern via adoption of new policies and development of new technologies
- The National Green Technology Policy (2009) calls for incorporation of Green Technology in the transportation infrastructure and vehicles

AGEING POPULATION

- In 2016, total population of Malaysia is estimated at 31.7 million person. By 2040, total population is projected at 41.5 million
- The older population aged 65 years and above is expected to be 7% in 2020 and this value will double to 14% by 2043
- This means that in another 34 years, half of the total population will be aged 40 years or over

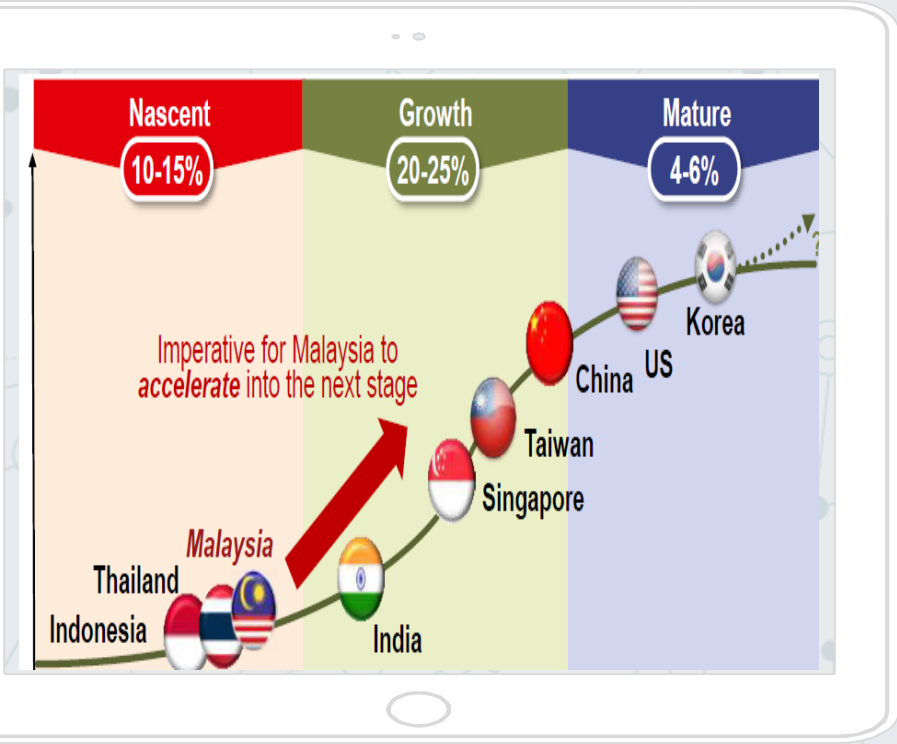


- The demographic change requires rethinking of current transport strategies to ensure that growing numbers of older people are able to remain active and mobile

EXPANSION OF E-COMMERCE MARKET

E-commerce may soon substitute for a significant portion of household shopping trips

The e-commerce contribution to GDP recorded RM68 billion in 2015 and Malaysia is now at an inflection point of e-commerce growth, with an annual growth rate of 11%, with plenty of potential to accelerate



- As e-commerce continue to growth, it will increase truck traffic in urban areas will increase as goods are delivered to residences, requiring efficient urban logistics with flexible transport connections, choices, affordable and seamless transfers

The Drafting Process

The NTP 2018-2030 will provide the strategic direction for a sustainable transport sector

NATIONAL TRANSPORT POLICY

A National Transport Policy is important for the following:

- To provide strategic direction to ministries/agencies to plan & develop the transport sector
- To streamline initiatives and programs towards common objectives and goals
- To ensure efficient and effective use of resources
- To ensure that sectoral plans complement each other

*The studies shown here are examples of sectoral policies

Interviews and discussions were held with over 168 stakeholders from 50 ministries/agencies & private sector

- SCOPE
- Land transport
- Maritime
- Air transport
- Logistics

Policy Content

The vision of the NTP 2018-2030 is anchored on the principles of sustainable transport

To develop a sustainable transport sector that accelerates economic growth and supports the well- being of the *rakyat* in line with an advanced nation status

Economic competitiveness | **Social element** | **Environmental protection**

OBJECTIVES

1 Create a conducive transport ecosystem	2 Facilitate seamless movement	3 Provide mobility that meet people's needs	4 Increase modal share for public transport	5 Deliver an Intelligent, safe and secure system	6 Ensure sustainable use of resources

POLICY THRUSTS

1. **Strengthen the governance** to create a conducive environment for the transport sector
2. **Optimise, build & maintain** transport infrastructure, services and networks for efficiency
3. **Enhance safety, integration, connectivity & accessibility** for seamless journey
4. Advance towards **green transport ecosystem**
5. **Expand global footprint** and promote internationalisation of transport services

5 policy thrusts and 24 strategies have been developed

5 policy thrusts is proposed to achieve the vision and objectives

5 policy thrusts

1. **Strengthen the governance** to create a conducive environment for the transport sector
2. **Optimise, build & maintain** transport infrastructure, services and networks to maximise efficiency and enhance economic competitiveness
3. **Enhance safety, integration, connectivity & accessibility** for seamless journey for passenger and goods
4. Advance towards **green transport ecosystem**
5. **Expand global footprint** and promote internationalisation of transport services

Policy thrust 4 have been developed to address 4 key challenges

Current mobility pattern is **carbon intensive**, with high dependence on fossil fuel

Pollution from the transport sector – air, water, noise and waste

Lack of/poor compliance to energy efficiency/environmental standards and regulations

Low awareness and poor adoption of sustainable transport practices

Policy thrust 4: Advance towards green transport ecosystem

5 strategies and 35 action items have been identified

S1 **Enforce compliance to** acts/regulations & shift towards international environmental standards

Key Action Items

- **Introduce green certification** for transport operators
- Establish **green standard** for road and rail construction

S2 **Prioritise public transport network** as fundamental structure for sustainable spatial growth

Key Action Items

- Ensure TOD guidelines are **harmonized/ in line** with local plans
- Encourage **Work-Play-Shop-Stay** development concept

S3 **Accelerate** implementation **of low carbon mobility** initiatives

gogreen

Key Action Items

- Institutionalise **green transport terminals**
- Promote non-motorized initiatives
- Encourage use of different models of **EEV**
- Formulate & implement **fuel economy policy**
- **Energy efficiency rating** for vehicles & introduce **carbon tax**

S4 Institute measures to **control pollution (air, solid waste, water)**

Key Action Items

- Develop procedure for **vehicles' end of life**
- Establish guidelines for **scrap waste, refurbishment, recycling**

S5 **Develop effective CEPA** to create behavioural change

Key Action Items

- Understand **travel behaviour** to identify right interventions
- Greater awareness among transport operators to **go green** & improve **service quality**

Thank you

"Integrated Green Transportation Iskandar Malaysia"

Sustainable Iskandar Malaysia: Low Carbon Society Implementation

By Boyd Dionysius JOUMAN (boyd@irda.com.my)
Head, Environment

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

GEF5-UNIDO PROJECT: ENERGY EFFICIENT LOW CARBON TRANSPORT IN MALAYSIA /13 Mar 2018, Putrajaya

45%

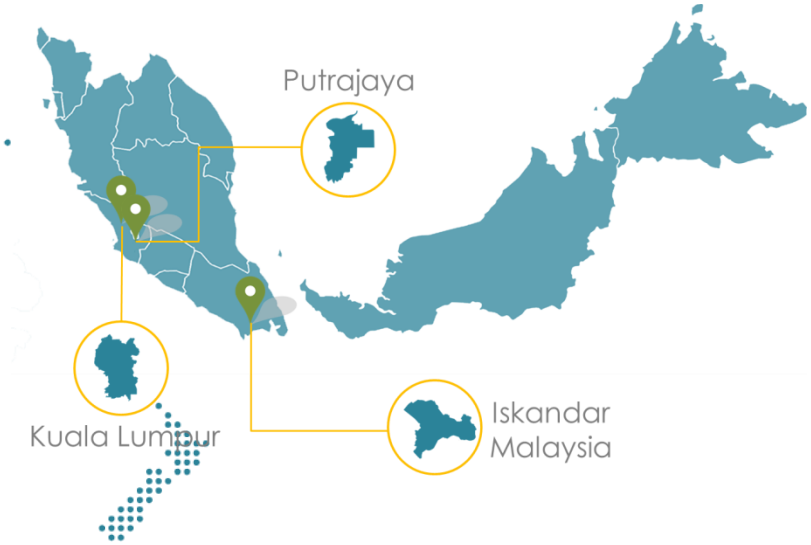
Reduction in GHG Emissions Intensity of GDP by 2030

Malaysia

Land Area: 332,000 km²

Population: 28.28 million (2010)

GDP: 247.5 billion USD (2010)



Iskandar Malaysia: Vision

ISKANDAR MALAYSIA 10 YEARS 2006 – 2016

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

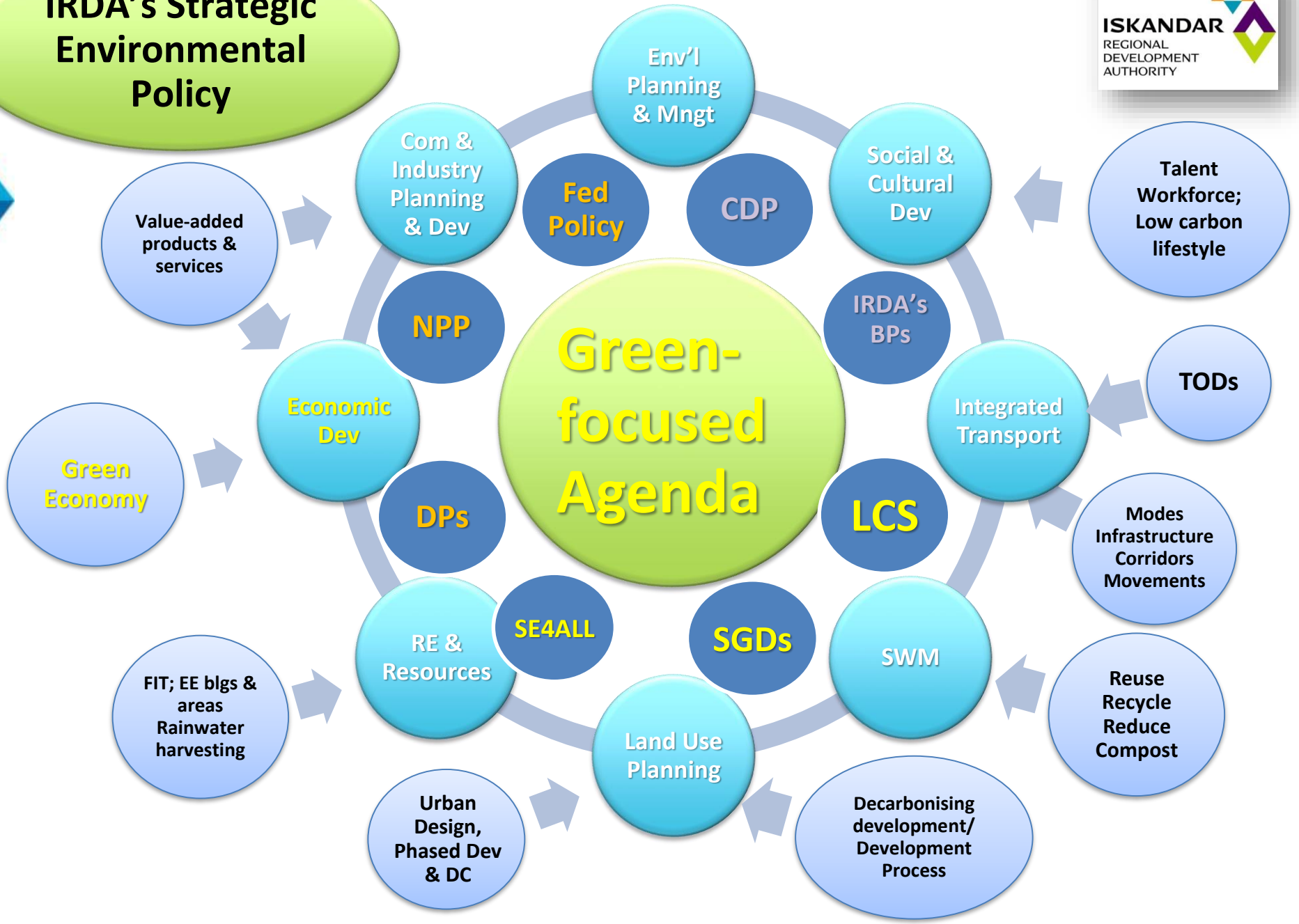
"Strong and Sustainable Metropolis of International Standing"

HOLISTIC ECOSYSTEM

Iskandar Malaysia Holistic Eco-system

A resilient ecosystem, anchored by wealth generators, creating regional wealth that is to be shared equally among communities. Wealth generation and wealth sharing, balanced by optimal use of ecological assets, would enhance the Quality of Life in Iskandar Malaysia, turning it into a leading global region. Together with this, spatial management and good governance would enable the realisation of its vision and goals by 2025.

IRDA's Strategic Environmental Policy



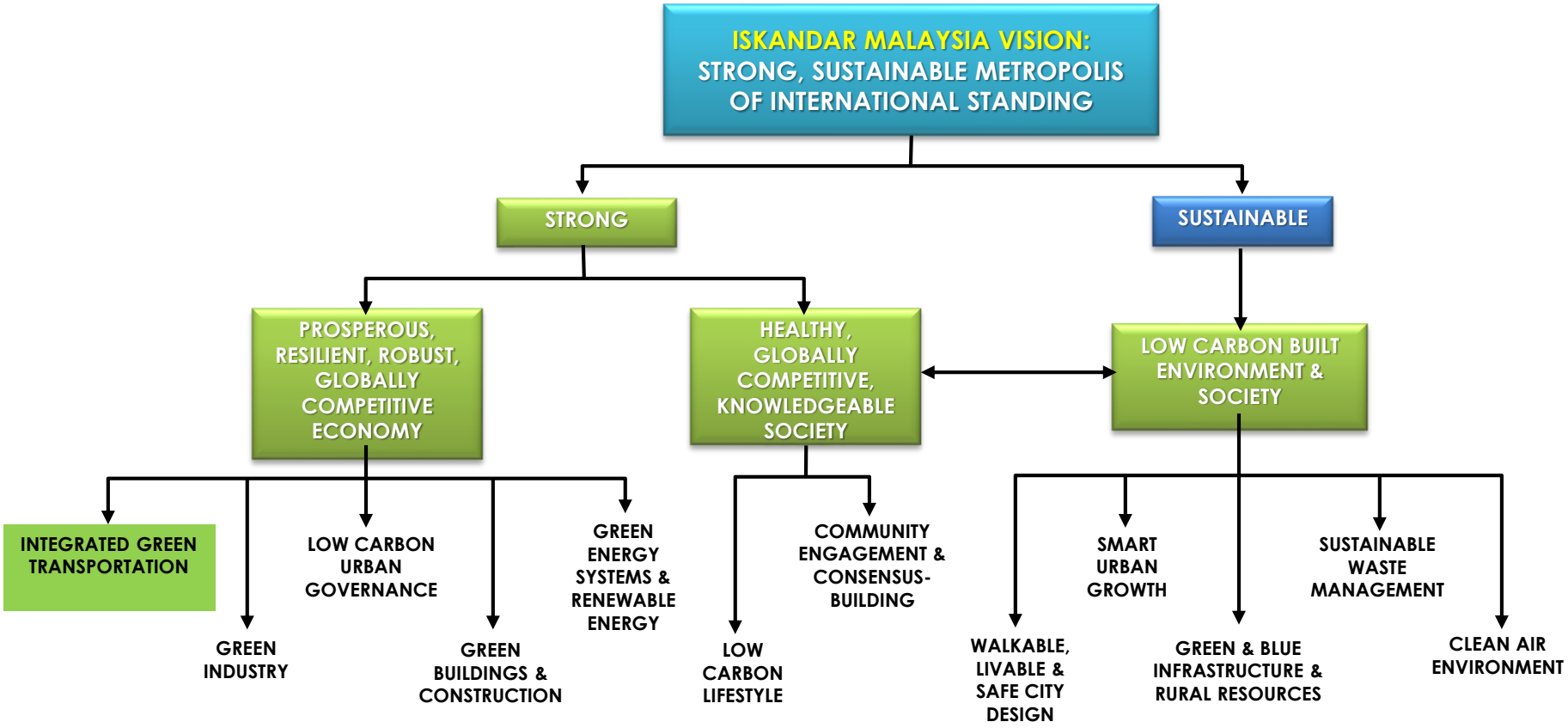
Green-focused Agenda: Rationale

SUSTAINABLE DEVELOPMENT GOALS
17 GOALS TO TRANSFORM OUR WORLD

ISKANDAR MALAYSIA 2006 – 2016

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

Aligning the Vision with Low Carbon Society Development



BASELINE/ POLICY DOCUMENTATION : LCSBPIM2025 : TBL/ ACTION THEMES

MEASUREMENT / MODELLING/ BASELINE

LCS ACTIONS : Potential CO_2 Reduction

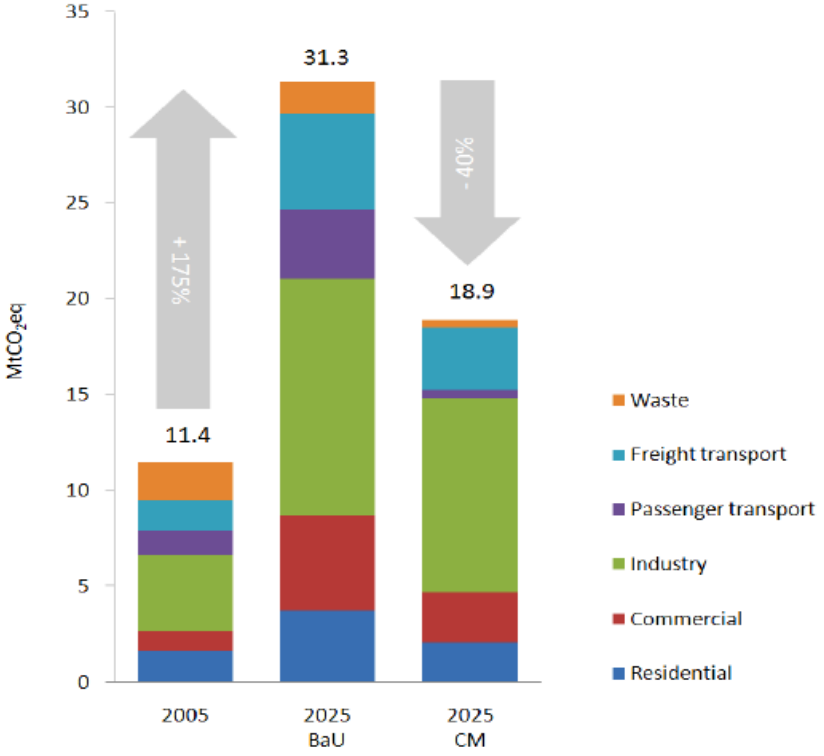


Figure 1: GHG emissions by sectors

	Action Names	Themes
1	Integrated Green Transportation	GREEN ECONOMY
2	Green Industry	
3	Low Carbon Urban Governance	
4	Green Buildings & Construction	
5	Green Energy System & Renewable Energy	
6	Low Carbon Lifestyle	GREEN COMMUNITY
7	Community Engagement & Consensus Building	
8	Walkable, Safe, Livable City Design	GREEN ENVIRONMENT
9	Smart Urban Growth	
10	Green and Blue Infrastructure & Rural Resources	
11	Sustainable Waste Management	
12	Clean Air Environment	

2,216 km²
1.64 million people (2010)
3 million people (2025)

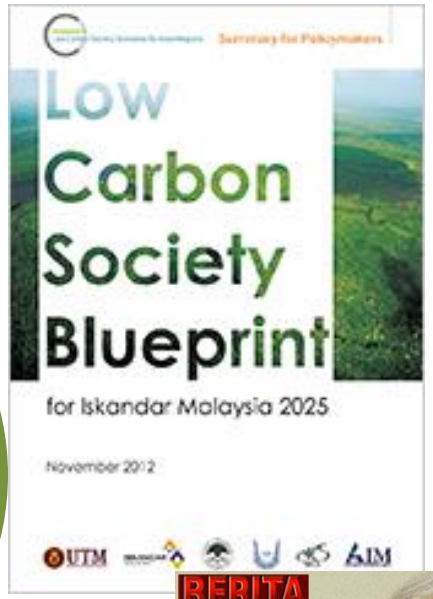
Iskandar Malaysia

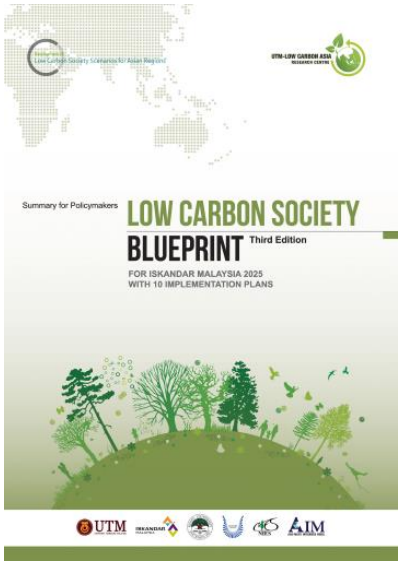
Malaysia's 1st economic development corridor (in Johor)

58%
Reduction in GHG Emissions Intensity of GDP by 2025

12 Actions

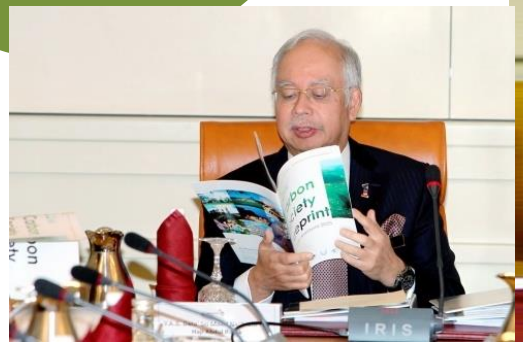
281 Programs

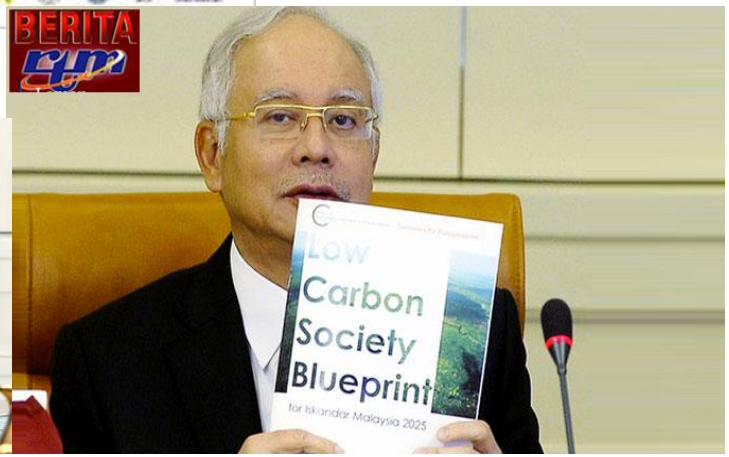




DOHA 2012
UN CLIMATE CHANGE CONFERENCE
COP18|CMP8

United Nations Climate Change Conference





IMPLEMENTATION AT LOCAL LEVEL

LCS Blueprint for Iskandar Malaysia 2025 (LCSBPIM)

Iskandar Malaysia

(5 Local Authorities)

Iskandar Malaysia

The first economic development corridor created in Malaysia

PM and MB Johor launched the Low Carbon Society Action Plans on 15 Dec 2015 during the Members of Authority (MoA) at Putrajaya

The 5 local authorities in Iskandar region - Low Carbon Society in the Making

Low Carbon Action Plans for 5 local authorities in Iskandar Malaysia @ Kota Iskandar Officially Handed Over to Datuk Bandar and YDPs of 5LAs/PBTs

By MB Johor – 25 Feb 2016

12 ACTIONS of the LCSBPIM 2025:
45 Programmes implemented

1.INTEGRATED GREEN TRANSPORTATION

2.GREEN INDUSTRY

3.LOW CARBON URBAN GOVERNANCE

4.GREEN BUILDINGS & CONSTRUCTION

5.GREEN ENERGY SYSTEMS & RENEWABLE ENERGY

6.LOW CARBON LIFESTYLE

7.COMMUNITY ENGAGEMENT & CONSENSUS

8.WALKABLE, LIVABLE, SAFE CITY DESIGN

9.SMART URBAN

10.GREEN & BLUE INFRASTRUCTURE & RURAL RESOURCES

11.SUSTAINABLE WASTE MANAGEMENT

12.CLEAN AIR ENVIRONMENT

Action 1: Integrated Green Transportation

Targeted high economic growth >> increased pop >> rapid growth in intra- and inter-regional freight and passenger transportation demand is inevitable. Growth in the transportation sector is expected to add to IM's GHG emission by 8,584 ktCO2 (27% of total BaU emission) by 2025.

To mitigate the projected increased transportation demand, development of an integrated green transportation system is highly essential. A **four-prong strategy**:

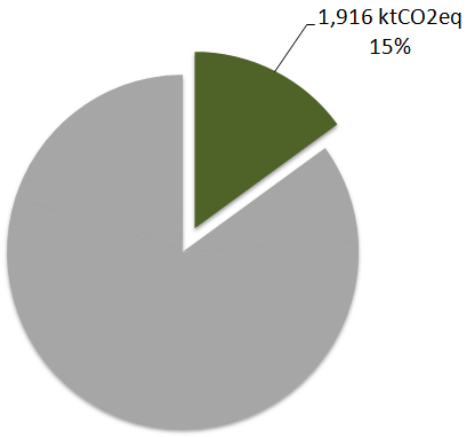
(1) promoting a shift to more energy-efficient passenger and freight transportation modes;
(2) enhancing intercity connectivity through energy-efficient high-speed rail;
(3) promoting energy efficiency improvement (EEI) in motorised vehicles; and
(4) improving flow and performance conditions in both the passenger and freight transport sectors.

Implementation is projected to reduce GHG emission by 1,916 ktCO2 equivalent (15% of total emission reduction) in 2025.

Low Carbon Society Blueprint Iskandar Malaysia (LCSBPIM)
Action 1 Green Integrated Transportation

No	Key Projects	Programmes
1.	Integrated Public Transport	1. Route network expansion planning (improve network coverage and connectivity) 2. Increase bus frequency, improve punctuality and reliability. **(e.g. BAS Iskandar etc)** 3. Real time arrival information 4. Public transport reimaging 5. Flat rate tickets and central area free shuttle Services 6. Web-based journey planner www.jomlah.com.my 7. Route network planning 8. Connectivity & integration with existing public transport modes 9. Integrated ticketing system (across all platforms) 10. Public transport interchanges as destinations & urban activity nodes 11. `Park and Ride´ facilities in suburban transit nodes
2.	Improvement of Singapore and JB-KL Connectivity **(HSR & RTS)**	12. Integrate Singapore MRT (SMRT) system with Iskandar Malaysia light Rail Transit (IMLRT) & bus systems 13. JB Sentral as HSRT-SMRT-IMLRT hub
3.	Enhancing Traffic Flow Conditions and Performance	14. Intelligent Transportation System (ITS) **(through LCSAP Local Authorities)** 15. Enhancing traffic signal performance **(through LCSAP Local Authorities)** 16. Enhance the use of Variable Message Signs (VMS) 17. Tidal flow and contra-flow along primary radial routes 18. Increase parking charges
4.	Green Transportation in Rural Areas	19. Provide hybrid bus services from rural areas to urban areas 20. Provide school bus services for students in rural areas 21. Subsidise rural area hybrid bus services
5.	Diffusion of Low Carbon Vehicles	22. Government agencies to use hybrid vehicles/ electric vehicles **(started at IRDA)** 23. Tax reduction for hybrid vehicle purchase 24. Gradual phasing out for diesel engine buses 25. Subsidy for the purchase of hybrid buses
6.	Green Freight Transportation	26. Modal shift from road-based to rail-based freight transport 27. Modal shift to ship-freight transport 28. Tax incentives for freight operators in acquisition of hybrid freight vehicles

GHG Emissions Reduction

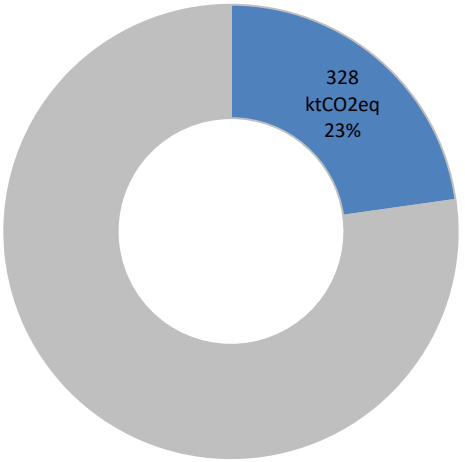


Low Carbon Society Action Plan (Pasir Gudang district)

Action 1 Green Integrated Transportation

Key Projects	2015	2020	2025	Potential Actors
Integrated Public Transportation				
1. Route network expansion planning (improve network coverage and connectivity)				SPAD, PPAJ, MPPG, Enterprises
2. Increase bus frequency, improve punctuality and reliability				PPAJ, MPPG, Enterprises
3. Real time arrival information				PPAJ, MPPG, Enterprises
4. Public transport reimaging				PPAJ, MPPG
5. Web-based journey planner				PPAJ, MPPG
6. Route network planning				SPAD, PPAJ, MPPG
7. Connectivity & integration with existing public transport modes				SPAD, PPAJ, MPPG
8. Integrated ticketing system (across all platforms)				SPAD, PPAJ, MPPG
9. Public transport interchanges as destinations & urban activity nodes				SPAD, PPAJ, MPPG
Diffusion of Low Carbon Vehicles				
1. Government agencies to use hybrid vehicles/ electric vehicles				SPAD, MPPG
2. Tax reduction for hybrid vehicle purchase				SPAD, MPPG
3. Gradual phasing out for diesel engine buses				SPAD, PPAJ, MPPG
4. Subsidy for purchase of hybrid buses				SPAD, PPAJ, MPPG
Enhancing Traffic Flow Conditions and Performance				
1. Intelligent Transportation System (ITS)				SPAD, PPAJ, MPPG
2. Enhancing traffic signal performance				SPAD, PPAJ, MPPG
3. Enhance the use of Variable Message Sign (VMS)				SPAD, PPAJ, MPPG
4. Tidal flow and contra-flow along primary radial routes				SPAD, PPAJ
Green Freight Transportation				
1. Modal shift from road-based to rail-based freight transport				SPAD,PPAJ, MPPG
2. Modal shift to ship-freight transport				SPAD, PPAJ
3. Tax incentives for freight operators in acquisition of hybrid freight vehicles				SPAD, PPAJ, MPPG

GHG Emissions Reduction



Importance level

High Medium Low

Low Carbon Society Blueprint: Implemented Programmes (45 of 281)

ISKANDAR MALAYSIA 10 YEARS 2006 – 2016

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

CASBEE ISKANDAR

CASBEE Iskandar

Status: Completed CASBEE pilot project and 3 CASBEE Manual (Building, Municipal and City) and developing CASBEE Iskandar Centre

Green Economy Guidelines

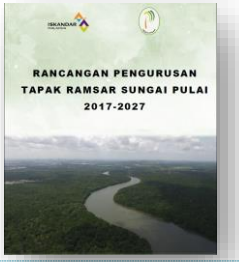
Status: Yearly programme since 2016. GAIA 2017: 3 categories Township Commercial Building and Individual Property.

Building Energy Monitoring & Reporting System (BEMRS)

Status: On-going programme since 2016. Collaboration with Tokyo Metropolitan Government, IRDA and 5 LAs.

MyCarbon Programme in Iskandar Malaysia

Status: Conducted Workshop for MyCarbon Programme in Iskandar Malaysia, 2015; IRDA is involved in MyCarbon reporting



Pulai River Management Plan

Status:

Completed 2017 (how to manage a Ramsar site and forest reserve for carbon sink etc)

PESISIR ISKANDAR MALAYSIA

PESISIR

Status:

Established in 2016 – Partnerships between stakeholders relating to Iskandar Malaysia coastal areas.

Iskandar Malaysia Green Portal

Status:

Completed

http://iskandarmalaysia.com.my/green/

Iskandar Malaysia Greenhouse Gas Inventory

Status: Completed IM GHG Inventory 2015 and for 2016: both shared at COP22 (Marrakech) and COP23 Fiji (Bonn).

Implementation of LCS Action Plan for 5 Local Authorities

Status: Completed 5 LCS Action Plan for 5 Local Authorities in Iskandar Malaysia in 2015, launched at COP21 Paris. In 2017, more than 20 LCS programmes have been implemented/ongoing by local authorities.

Johor EXCO Environment KPI.

Latest LCSBP Progress Report

International Recognition
Iskandar Malaysia as City Champion in Sustainable Development

9th ISAP, on 25-26 July 2017 at Pacific Yokohama, Japan. MB Johor delivered a keynote presentation and IRDA took part in the panel discussion.

COP 22, Marrakech. Launched 3 documents: IM GHG Inventory 2015, the CASBEE Manuals and PESISIR project.

Iskandar Malaysia selected as one of the project cities for GTALCC

On-going project

Iskandar Malaysia GHG Inventory 2015

7% reduction of GHG intensity in 2015 compared to 2010 level

Iskandar Malaysia GHG Inventory 2016

10.8% reduction of GHG intensity in 2016 compared to 2010 level

2016 showing significant reduction

Iskandar Malaysia Green Portal
http://iskandarmalaysia.com.my/green/

On-going project

Green Accord Initiative Award (GAIA) 2017: 3 categories Township Commercial Building and Individual Property.

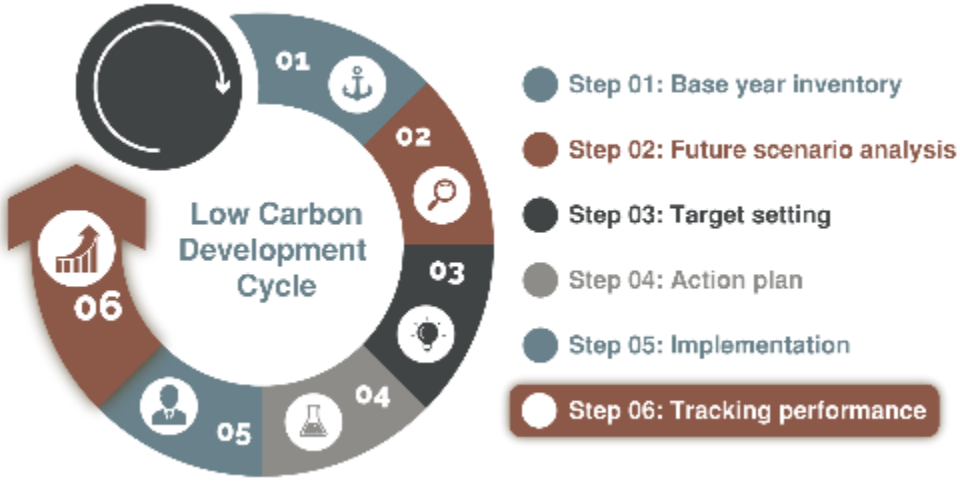
Iskandar Malaysia Eco Life Challenge (IMELC) 2017: increase to 346 Schools; 33,000 Students (Nov 2017.

2017: LCS programme Implementation by local authorities: More than 20 LCS programmes

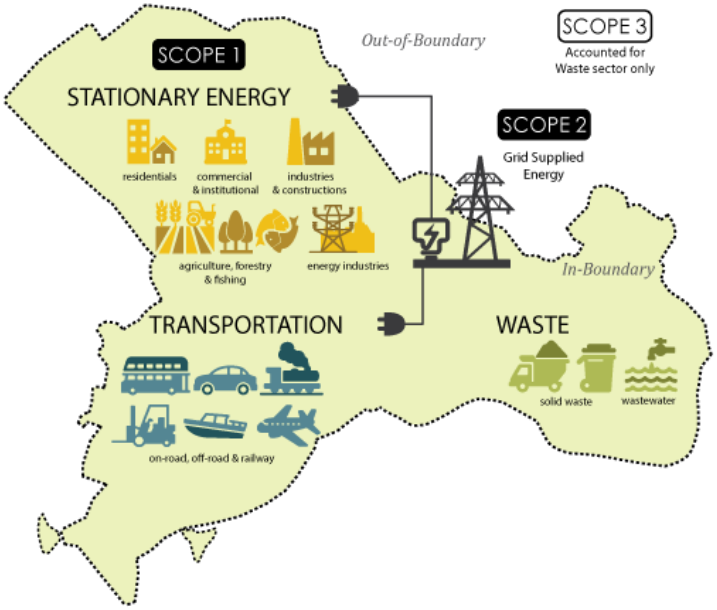
Facilitation: Hydro Mini Hydro Project at between Pontian District Council and Toyama City, Japan (launched Feb 2018)

Iskandar Malaysia Greenhouse Gas (GHG) Inventory 2016 (GPC)

- Iskandar Malaysia has completed **5 out of 6 stages** of the **Low Carbon Development Cycle** (2011-2016: Research/Science to 58% targeted reduction by 2025 to programme implementation). **Stage 6** of the cycle – **Tracking Performance of Implemented Low Carbon Society programmes** -→ Iskandar Malaysia Greenhouse Gas Inventory 2016.
- Iskandar Malaysia used the Global Protocol for Community Scale Greenhouse Gas Emission Inventories (GPC) - an internationally-recognised carbon monitoring and reporting framework (by World Resources Institute), recognised by the UNFCCC.

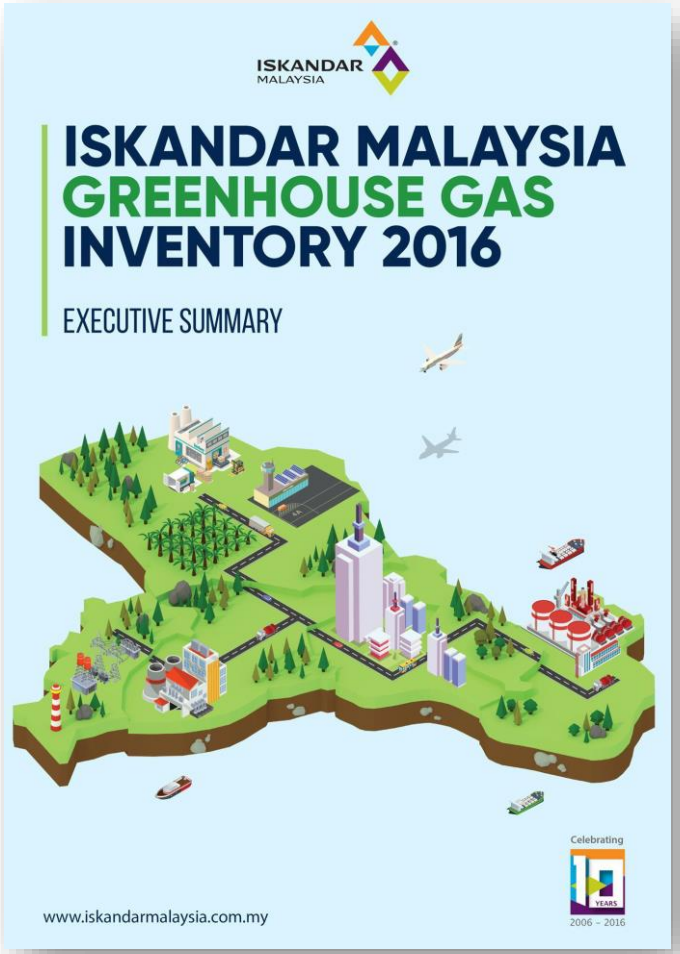


Low Carbon Development Cycle



Coverage of Iskandar Malaysia's BASIC level GHG reporting

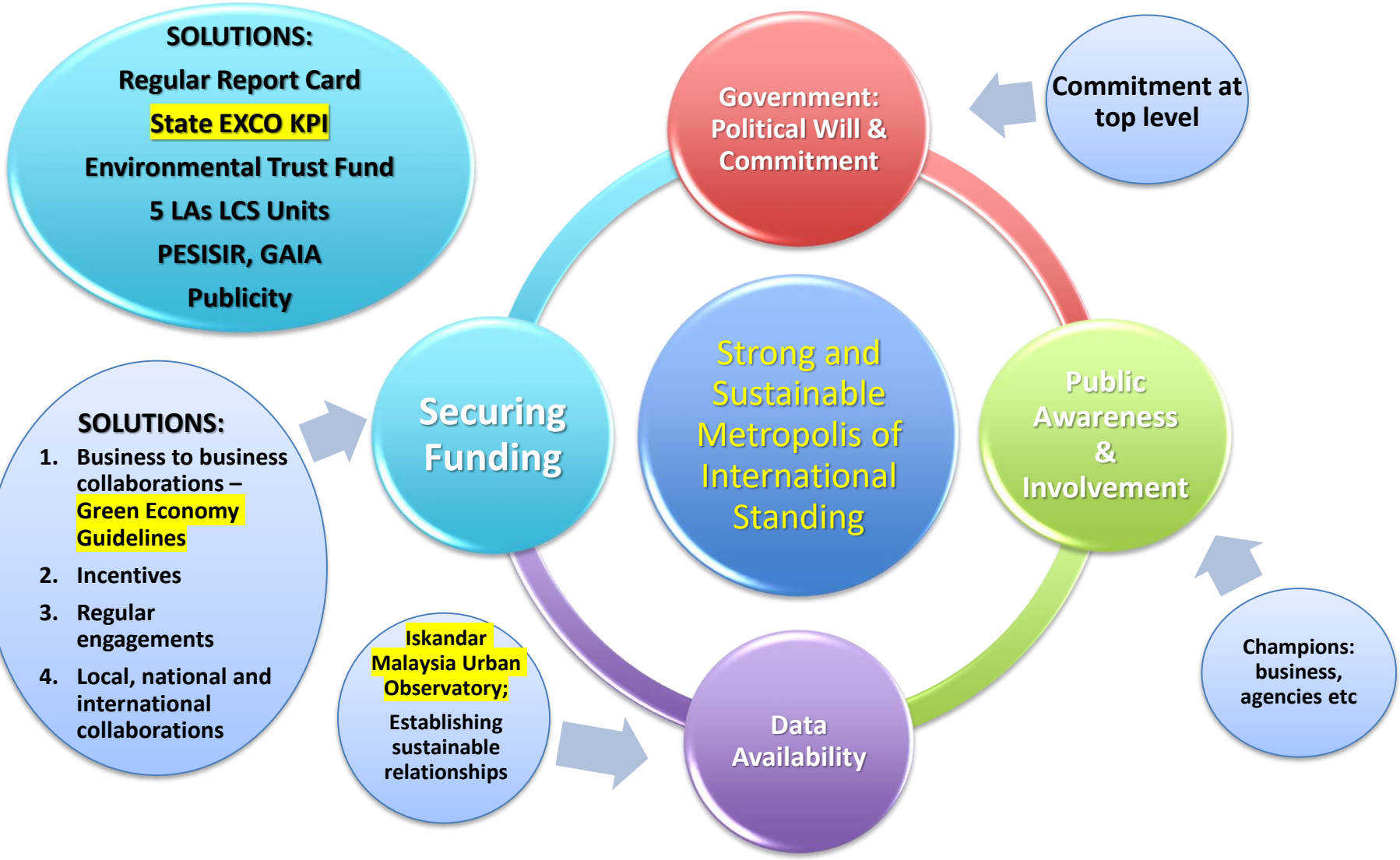
Iskandar Malaysia Greenhouse Gas (GHG) Inventory 2016



- This inventory had accounted 15.54 million tonnes of carbon dioxide equivalent for Iskandar Malaysia region in 2016.
- **64.5% of the total emissions is contributed by the stationary energy sector; 29.8% by the transportation sector and 5.7% by the waste sector.**
- Emission intensity per GDP in the year 2016 is 0.221 kilo tonnes of carbon dioxide per million ringgit Malaysia (ktCO2/RM Million), which marks a **10.8 % reduction compared with 2010 emission intensity** of 0.248 ktCO2/RM Million.
- To meet the targeted emission intensity reduction of 58% of base year (2010) emissions by 2025, 8.0% is the average yearly reduction rate required from 2017 onwards.

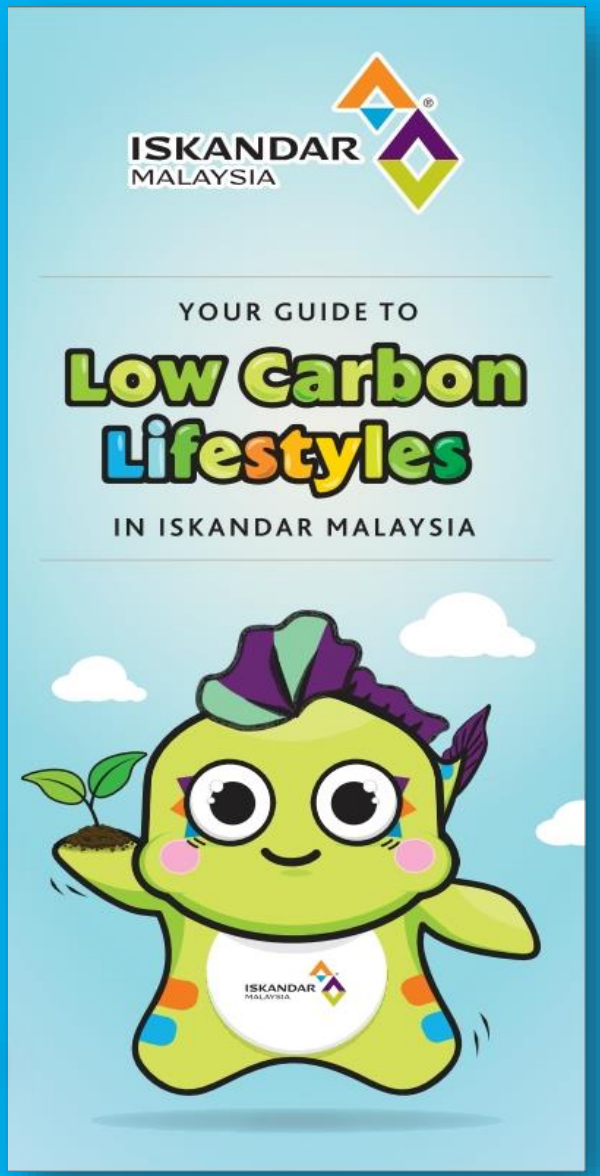
Helping Local Authorities to track GHG emission

Challenges & Solutions



THANK YOU!

RCE ESD (Regional Centre of Expertise on Education for Sustainable Development) –
RCE Iskandar
SE4ALL
Member of the Global Covenant of Mayors & Carbon Disclosure Project (CDP.net)



UTM-LOW CARBON ASIA RESEARCH CENTRE

REGIONAL CENTRE OF EXPERTISE ON EDUCATION FOR SUSTAINABLE DEVELOPMENT

ACKNOWLEDGED BY

UNITED NATIONS UNIVERSITY

GTMP and the Power Industry

Low Carbon Mobility Workshop
13th March 2018
Shangrila, Putrajaya

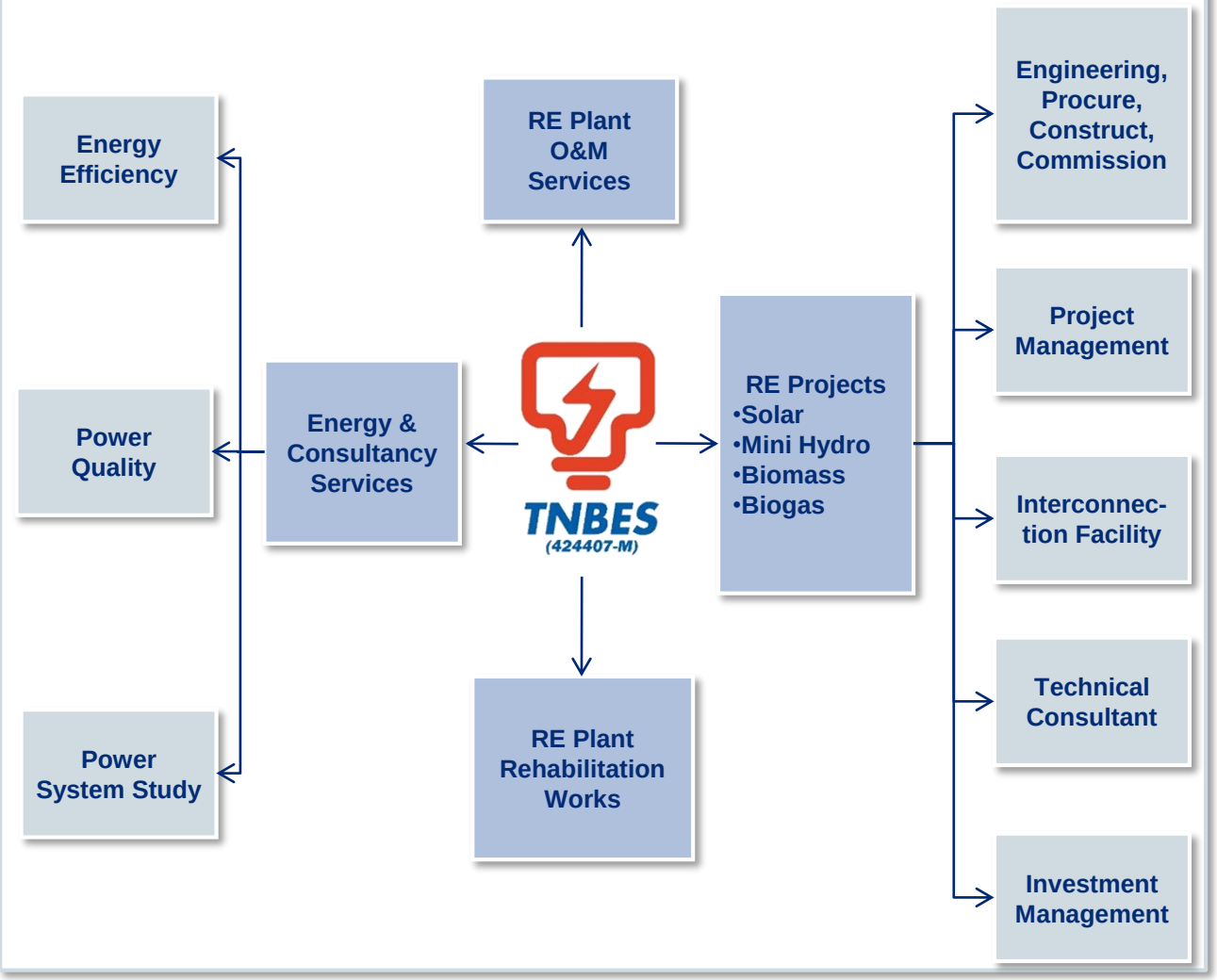
TNB ENERGY SERVICES SDN BHD (424407-M)

About TNB Energy Services

TNBES
(424407-M)

1. A wholly owned subsidiary of TNB
2. Established in 1997 with a staff of more than 200 people
3. Focus on Renewable Energy (RE) & Energy Efficiency (EE)
4. Providing services to LPCs & building owners on PQ, EE and RE since 2001

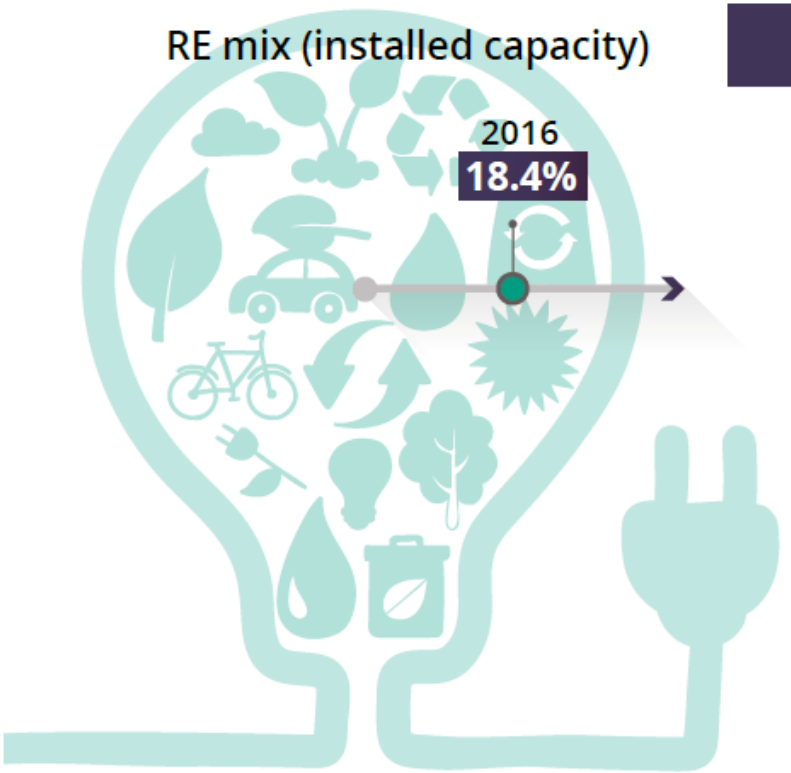
TNBES's current areas of expertise:



GTMP – Energy Perspective

CURRENT

RE mix (installed capacity)



2016
18.4%

MOVING FORWARD

Electricity generation

2020 **20%** → 2025 **23%** → 2030 **30%**

Electricity generation diversity:
Maintaining Herfindahl-Hirschman Index (HHI) **below 0.5**

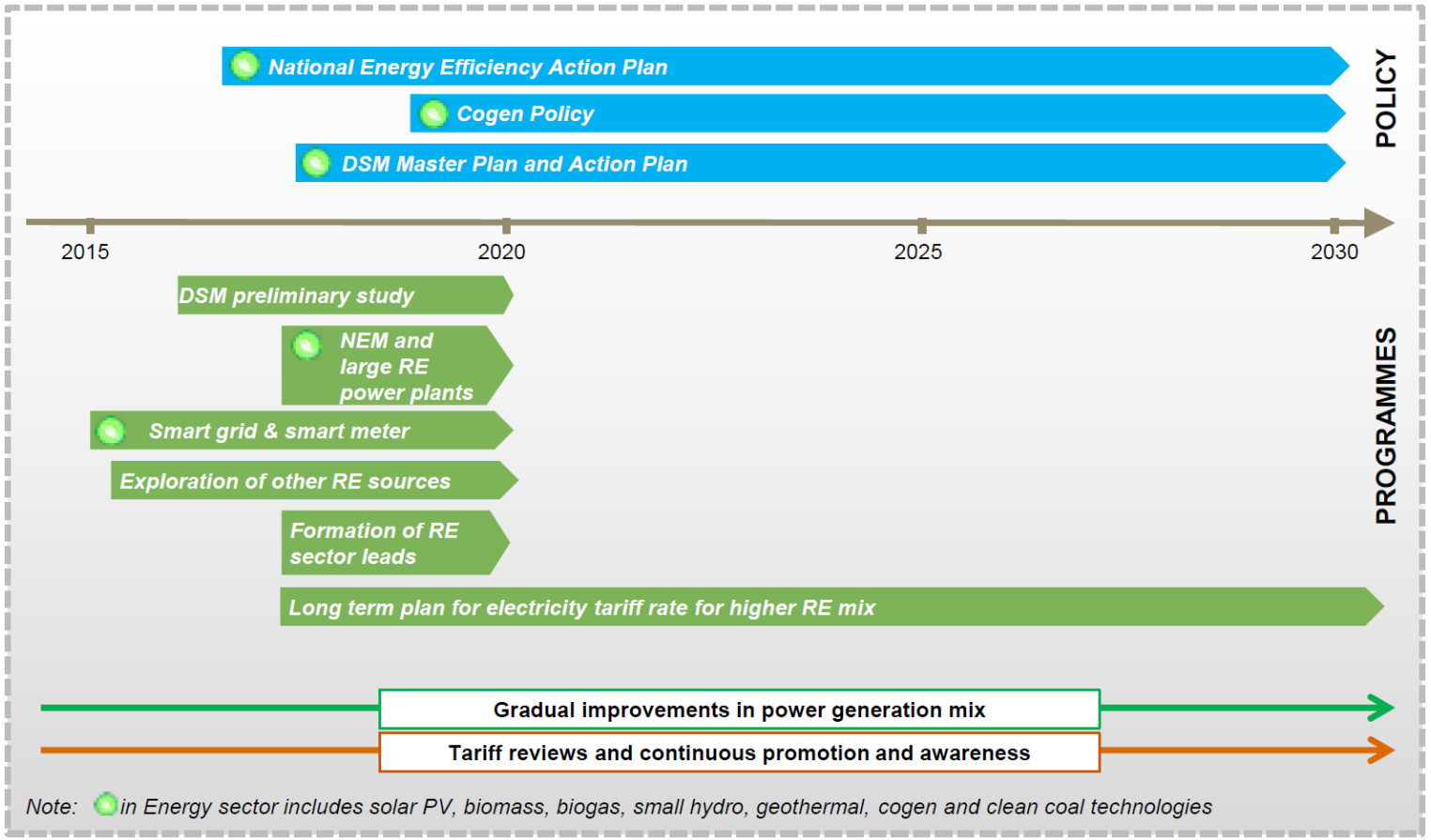
Carbon emission from power plants:
Imposition of **clean coal technology requirement** for new coal-fired plants

Reinvigorating **co-generation** policy

Energy efficiency

Reduction in electricity intensity

2014 **1.5%** → 2025 **10%** → 2030 **15%**



As- is

- Supply driven electricity management and fast growing energy demand
- Low electricity tariff rate
- Low awareness of GT

Expected end game

- Efficient use of electricity and optimised load factor to slow down the growth rate of power plants
- Gradual increase in the number of cogen power plants
- Increased public willingness to pay for quality life
- Reduced reliance on fossil fuel in power generation
- High awareness on GT as a way of life

LEGEND
Policy
Programmes
GT Application

Reimagining TNB

Future Generation Sources

We aspire to be the ASEAN leader in renewables by working with the Malaysian Government to deliver a major portion of the country's RE portfolio through investments in solar, wind, biomass, biogas and mini hydro projects. This will be fortified by our existing capabilities and experience in the renewables space in Malaysia.

Another component of this pillar is our global expansion drive, focusing on key growth markets in Southeast Asia, South Asia and the Middle East, as well as other markets in which we see opportunities to add value to our portfolio.

Grid of the Future

While the grid will continue to play a key role in the delivery of electricity, we foresee that its operations will evolve in line with advancements in technology. This will enable greater digitisation and automation of the grid, improving the performance and reliability of grid operations and delivering greater value to our customers.

In response to this, we have already introduced our smart meter/AMI facilities and will embark on providing more digitised and automated services not only to offer more value to our customers, but also unlock opportunities beyond the sale of electricity.

Winning the Customer

We recognise that our customers are the keystone of our business. As the industry landscape shifts, it will be crucial for us to adopt a value-centric understanding of our customers' needs. This will require us to appreciate their needs beyond electricity consumption to enable us to provide more complex products and services which surpass the mere sale of electricity.

To achieve this, we will pursue new avenues for business and strengthen the capabilities of our workforce to equip the Company with the right talent who can achieve our identified business targets.

Future Generation

“Green and Sustainable solution”

- Solar Power Purchase
- Solar Hybrid
- Mini Hydro
- Biomass & Biogas

Grid of the Future

“Optimal and Dedicated solution for utilities”

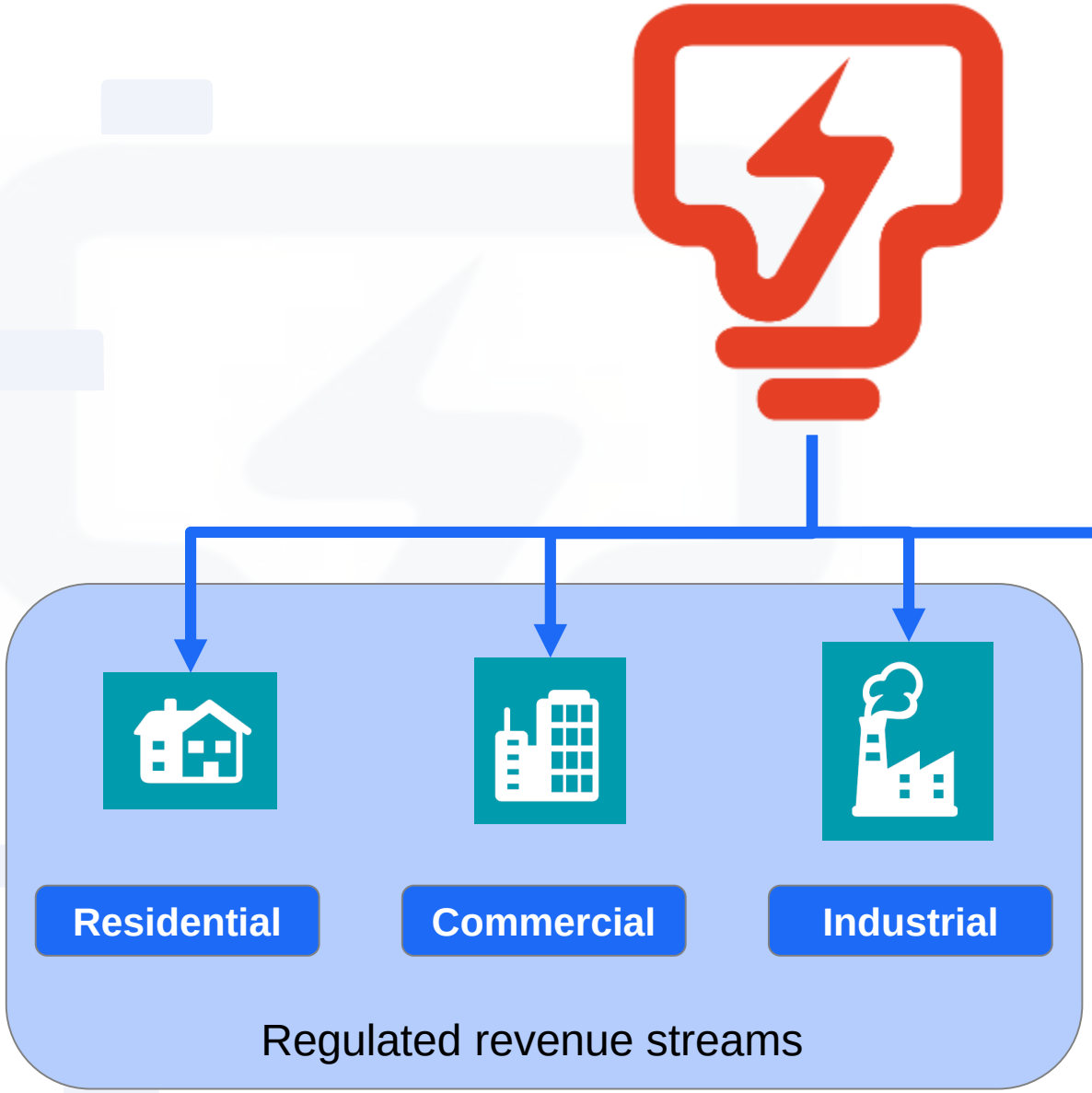
- Smart Meter
- BELB
- Street Lighting
- Street Furniture

Winning the Customer

“Smart and Green Solutions for customer”

- MaEVi
- EV Charging Infra
- Energy Efficiency
- PF Improvement

TNB's Perspective on Mobility



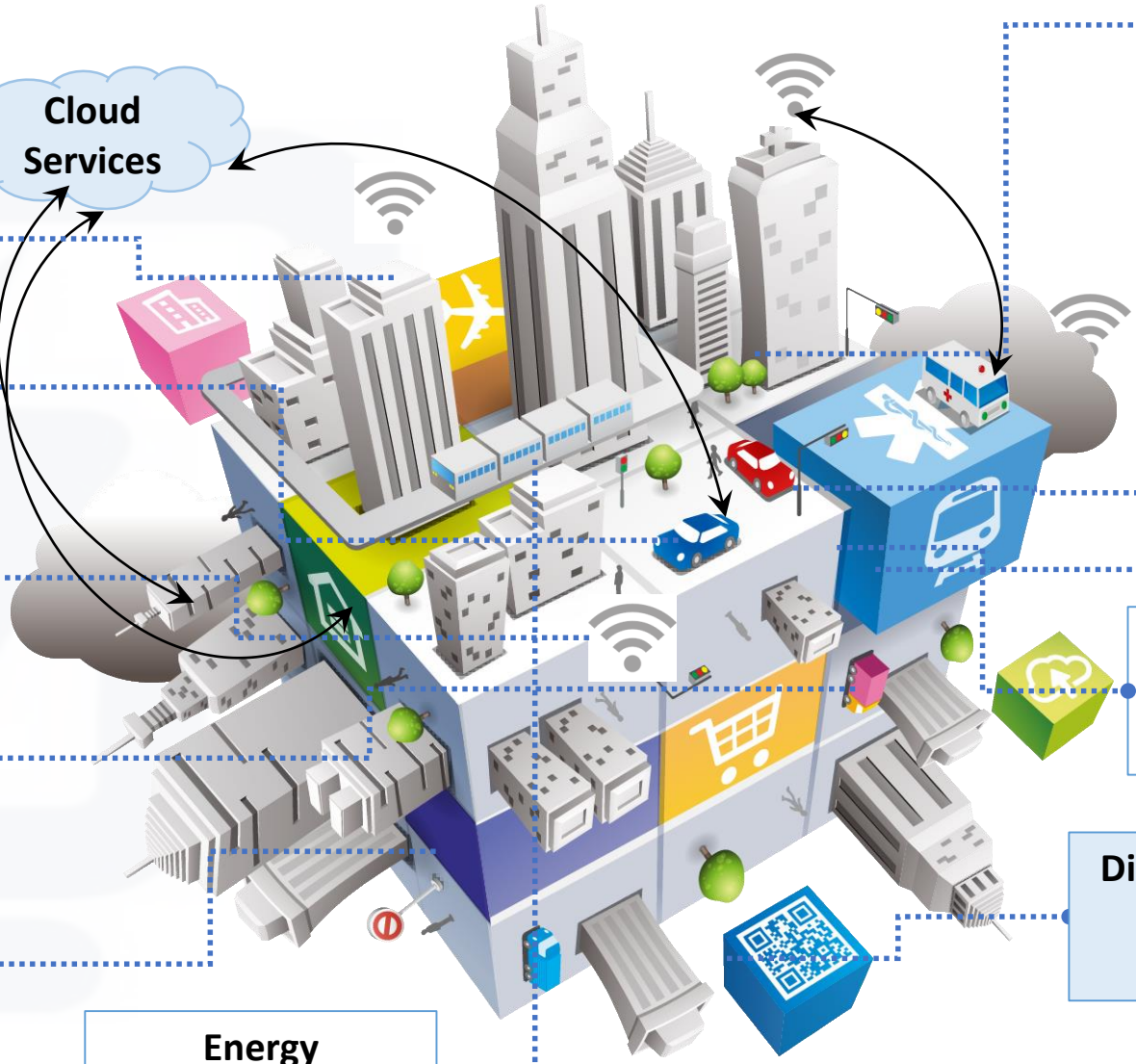
Mobility

Non regulated, cross sector, market driven, TNB as first mover, expand customer base, towards regional growth.

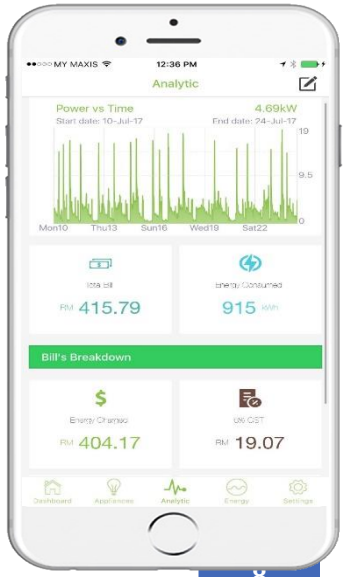
Charging infrastructure, backend ecosystem, green energy source.

EV fleets as "mobile gensets", energy efficiency through shift from fuel to electrons.

Low Carbon Mobility and The Sustainable City



- Rooftop Solar
- Battery Storage
- City Mobile App
- EV buses & car sharing
- Energy Centric Intelligence Surveillance
- Energy Management & Automation Apps
- High Speed Fiber Optic Network (FTTH/FTTB) & Bandwidth, City-wide WiFi
- Smart Street Light integrated with Solar, Battery, and Digital Advertising
- EV Charging Station & Vehicle-to-Grid
- Automated Traffic Management & Smart Parking
- Digital Billboards & Energy Dashboard

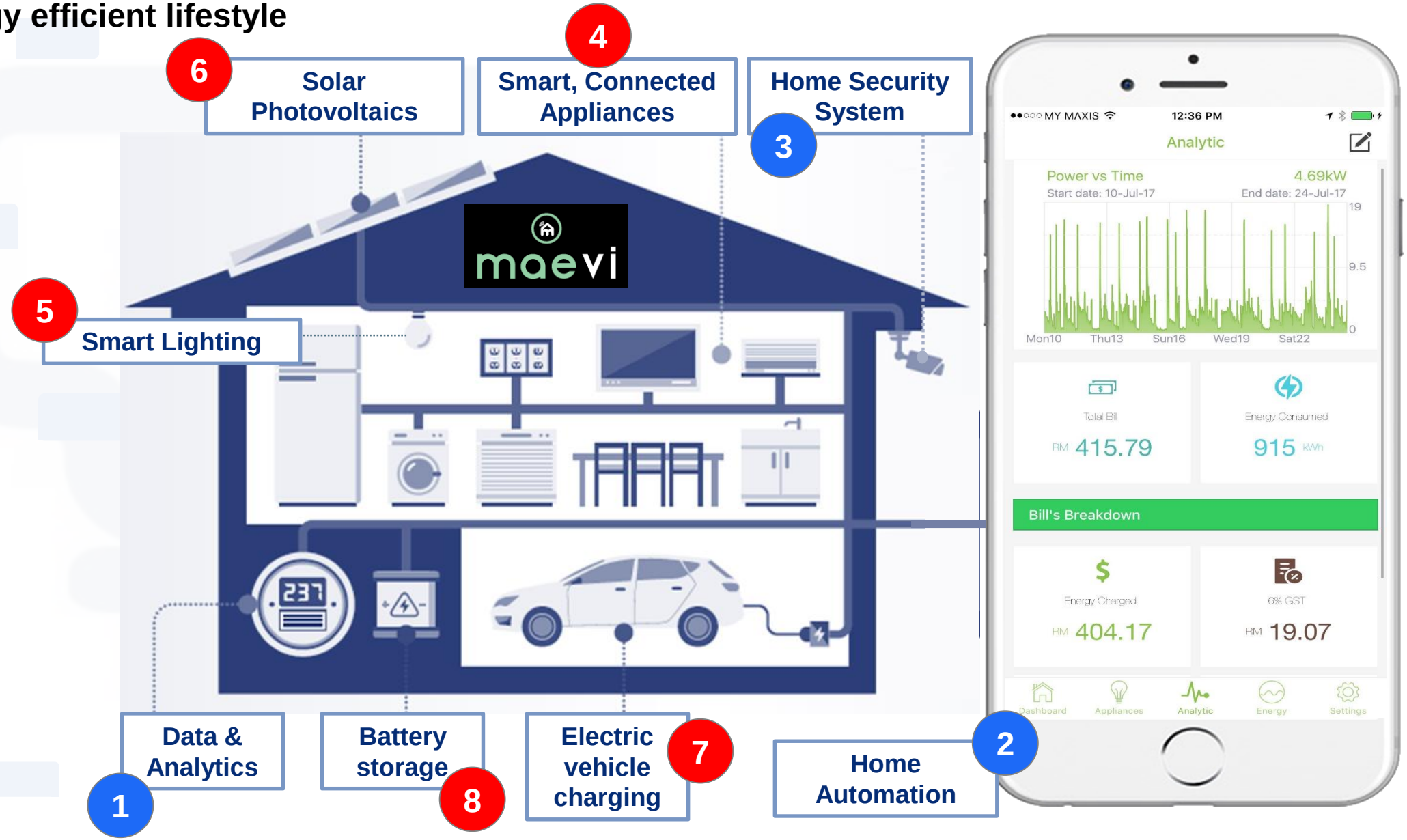


SOURCE: http://www.smartcitiesoftomorrow.com/

Low Carbon Mobility and The Smart Home

TNB ENERGY SERVICES SDN BHD (424407-M)

Beyond the meter solutions for the tech savvy, green advocate, affluent customer – **an energy efficient lifestyle**



GTMP and the Smart Home

TNB ENERGY SERVICES SDN BHD (424407-M)


TNBES
(424407-W)
THANK YOU
TNB Energy Services Sdn. Bhd. (TNBES)
Level 3, Menara PKNS,
Jalan Yong Shook Lin,
Petaling Jaya,
Selangor Darul Ehsan.
Tel: 03-76625111
Fax: 03-76625113
www.tnbes.com.my
Sustainability REinvented

USAGE OF LNG IN HAULAGE SECTOR

Workshop on Terms of Reference Harmonization for the Development of a Low Carbon Mobility Blueprint

13 March 2018

MALAYSIAN Gas ASSOCIATION

ABOUT MGA

ABOUT MGA

Founded 21 July 1986

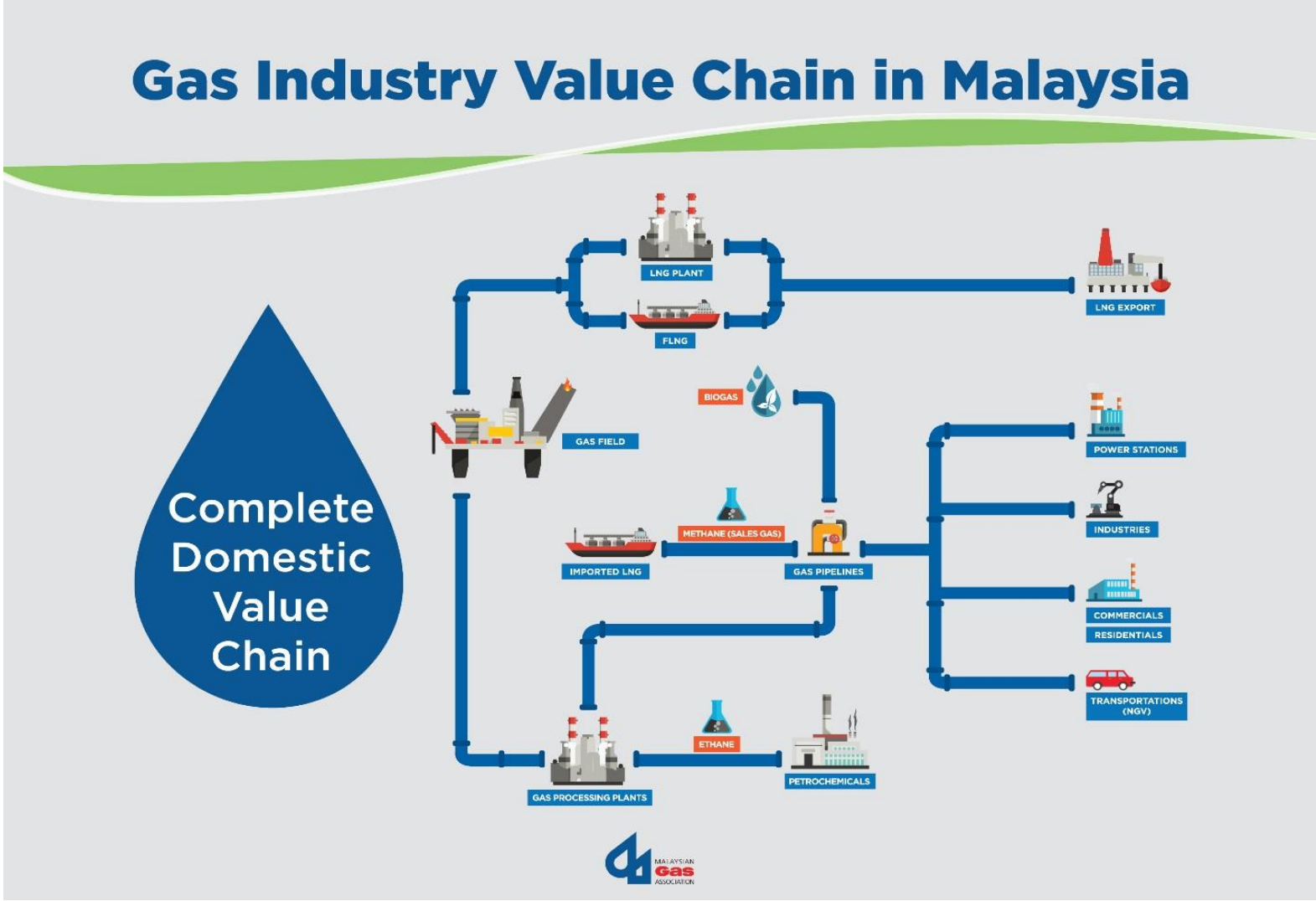
A nonprofit organization with 150 members.

Serving as an effective platform to bring together the key industry players to work towards a common vision of promoting a vibrant and sustainable gas industry in Malaysia.

A charter member of International Gas Union (IGU), a global organisation with members from more than 90 countries, representing 97% of the global gas market.

Malaysia held the IGU Presidency for triennium 2010-2012 and organized the prestigious World Gas Conference (WGC2012) in Kuala Lumpur

MALAYSIAN GAS INDUSTRY



Source: MGA's Gas Industry Annual Review 2017

OUR MEMBERS

FULL CORPORATE

PETRONAS · Shell · HESS · ExxonMobil · MURPHY OIL CORPORATION · REPSOL · ConocoPhillips · GAS MALAYSIA · MALAYSIA LNG SDN. BHD · SABAH ENERGY CORPORATION SDN BHD

ORDINARY CORPORATE

OUR MISSION

MISSION

To promote the advancement of a sustainable Malaysian gas industry through advocacy, communication and education on behalf of its members and the nation

MALAYSIAN Gas ASSOCIATION

LNG TRUCKING AS A LOW CARBON MOBILITY SOLUTION FOR OVERLAND HAULAGE

THE DIFFERENCES BETWEEN LNG, CNG AND LPG

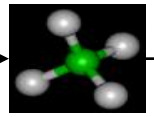
MALAYSIAN Gas ASSOCIATION

Liquefied Natural Gas (LNG)

LNG Plant

Gas fields

Compressed Natural Gas (CNG)

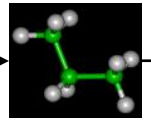


Methane

Gas Pipeline

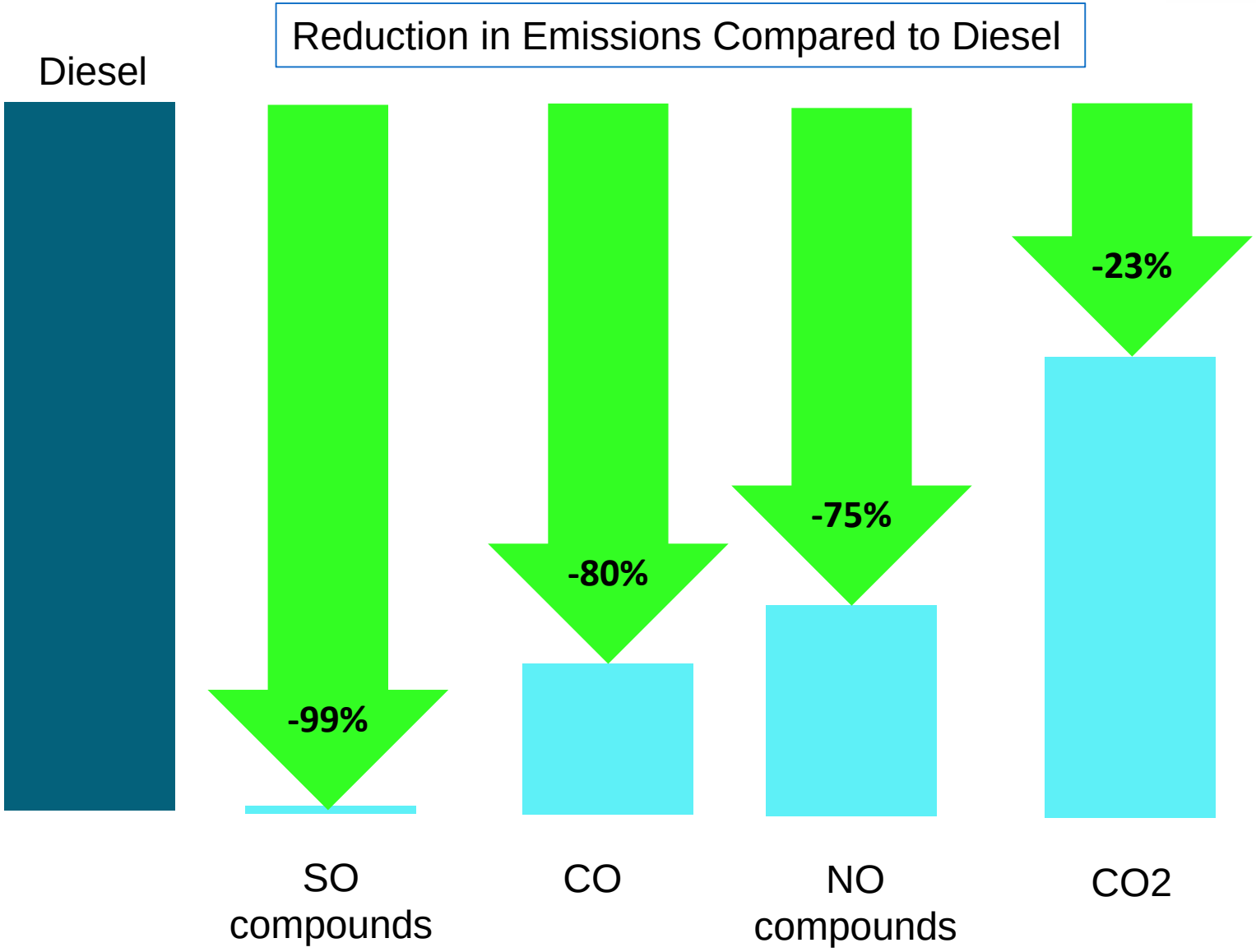
Gas Processing Plant

Liquefied Petroleum Gas (LPG)



Propane & Butane

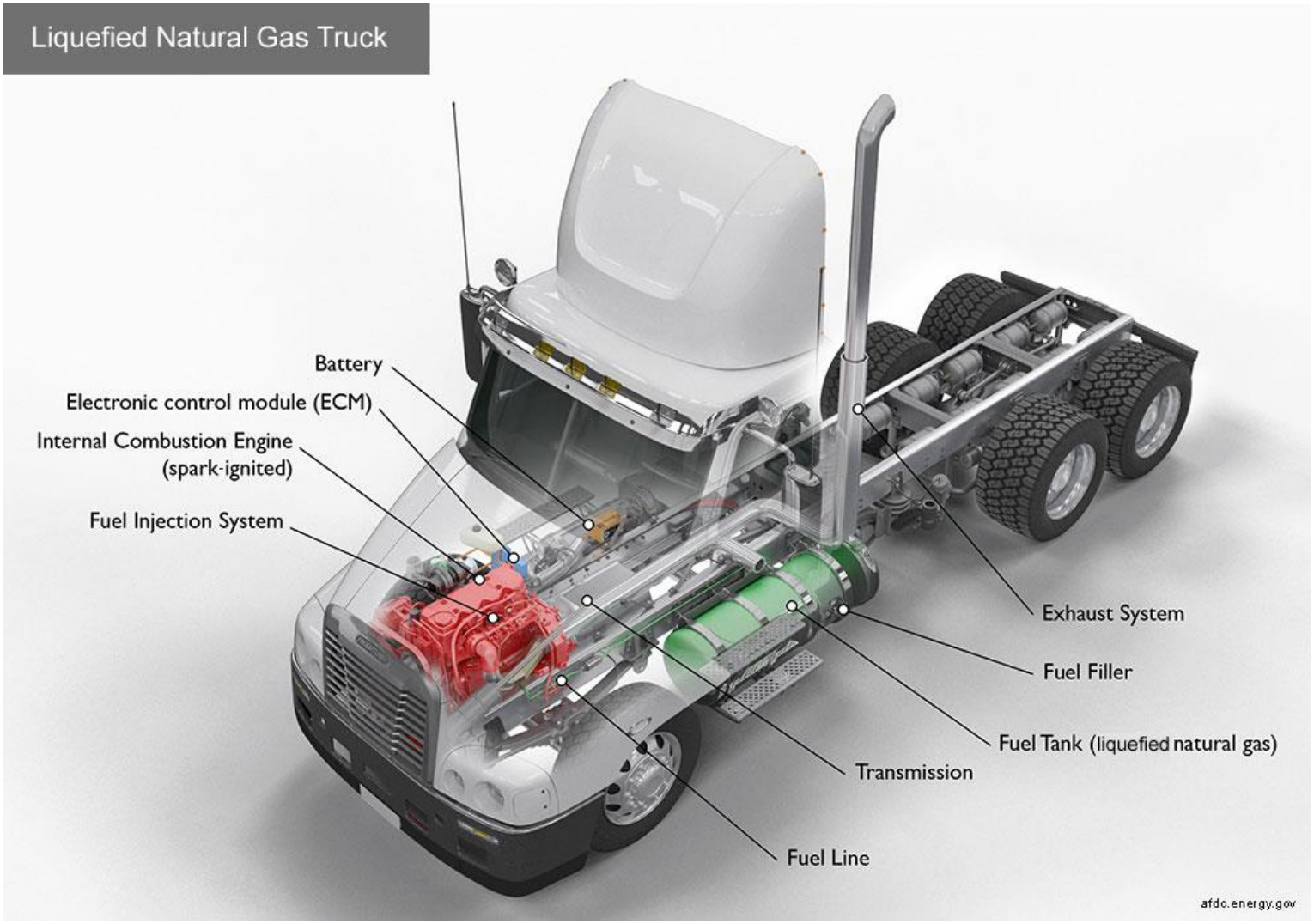
THE CREDENTIALS OF LNG AS A CLEAN FUEL ARE INDISPUTABLE



Source : America's Natural Gas Alliance

LNG Trucks Making Sustainable and Eco-friendly Haulage a Reality Today

Better than EURO 6 technology is available today

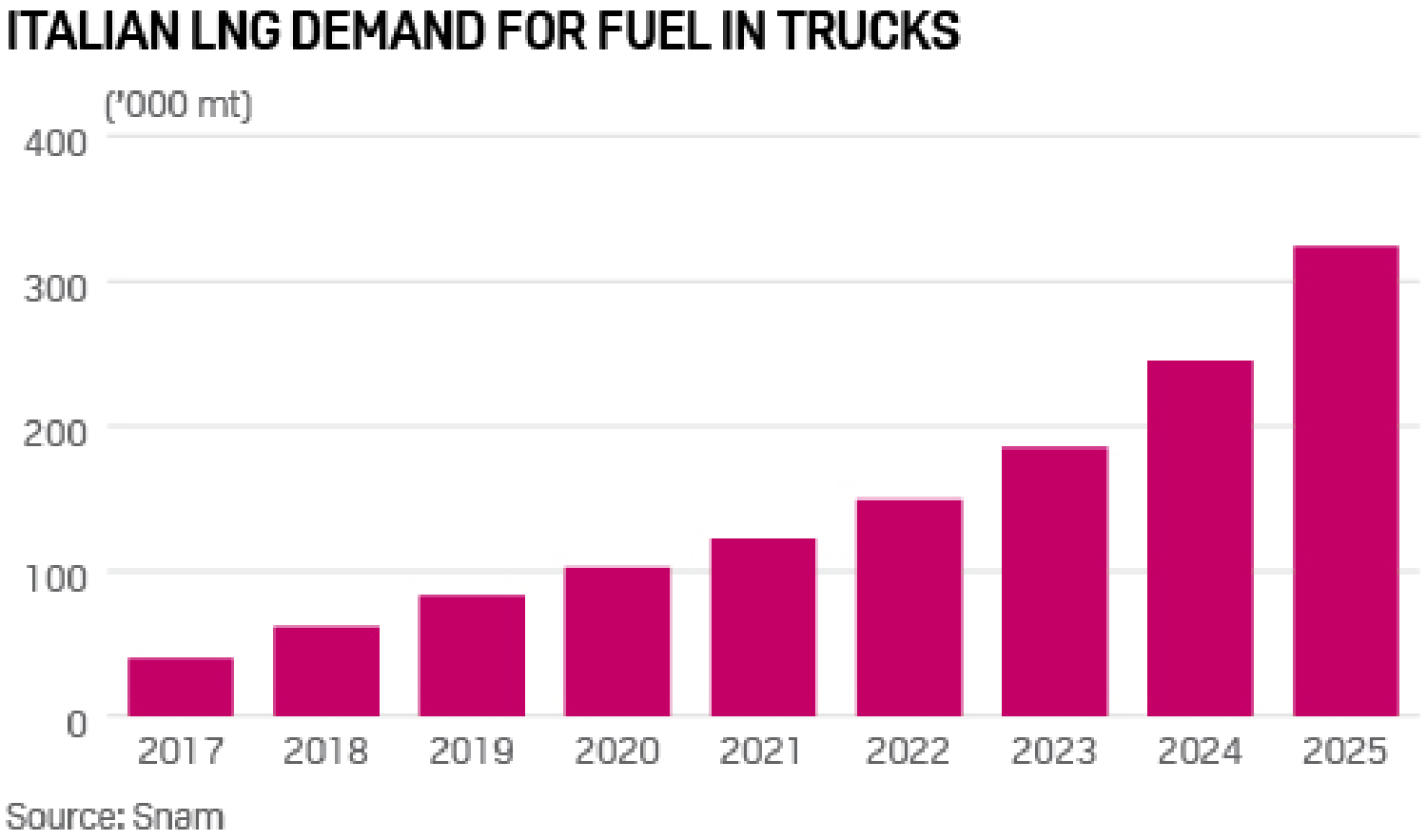


THE CASE FOR LNG TRUCKS

Description	LNG	Diesel
Range	Can exceed 1,000 km using 450 liter tank	Comparable
CO2 Emissions	16,275 g/100km	21,000 g/100km
Refueling Speed	45-50 Liters per minute	Comparable
Max Torque	2,000 - 2,300 Nm	Comparable
Engine Noise	71 dB(A)	82 dB(A)
Maintenance Costs	1-2 US cents per mile	Comparable
Flexibility	Dual fuel capability	Dual fuel capability but usually purchased as single fuel system
Safety	• Fuel at atmospheric pressure • Gas Detectors • Tank Impact Tests	Fuel at atmospheric pressure

Sources: PIEK, Reuters, Iveco, Volvo, Scania, America Truck Driving School

THE DEMAND FOR LNG FOR LAND TRANSPORTATION IS PICKING UP



400,000 trucks in Europe could be fueled by LNG by 2030

DRIVERS FOR ADOPTION

North America

50,000 LNG trucks

- Abundance of gas
- Clean transportation incentives
- Bio-LNG initiatives
- CO2 emissions limits
- Air quality regulations
- Price differential with diesel

Europe

2,000 LNG trucks

- Air quality regulations
- Noise regulations
- Price differential with diesel

China

300,000 LNG trucks

- Air quality regulations
- Wide availability of LNG
- CO2 emissions limits

North America, Europe and China are the centres of gravity

There is Widely-Distributed Infrastructure to Ensure Accessibility to Gas Supply

Connection to Thailand (MTJDA)

Gas Sourced from Domestic Offshore Gas Fields, MTJDA, Malaysia-Vietnam CAA and West Natuna, Indonesia

Peninsular Gas Utilisation of 2,655 km

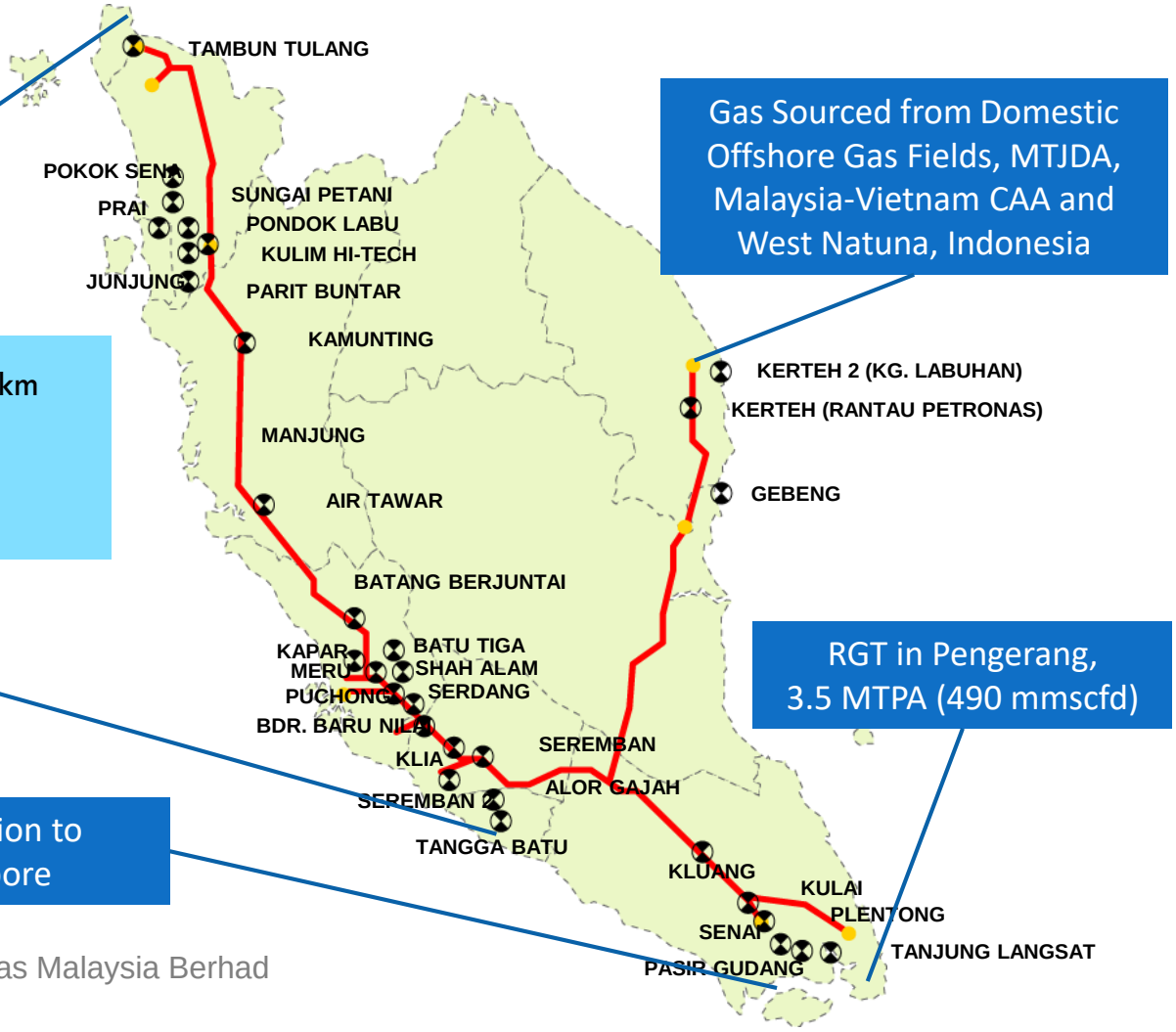
City Gate Stations

Distribution pipelines of 2,243 km

RGT in Sungai Udang, 3.8MTPA (530 mmscfd)

RGT in Pengerang, 3.5 MTPA (490 mmscfd)

Connection to Singapore



Source: Petronas Gas Berhad, Gas Malaysia Berhad

Extensive Pipelines, Multiple Sources

MALAYSIA IS UNDERTAKING GAS MARKET REFORMS

GAS SUPPLY (Amendment) ACT 2016

Gazette 9 Sep 2016

Eff. 16 Jan 2017

Suruhanjaya Tenaga
Energy Commission

THIRD PARTY ACCESS

NATION
Sustainability Of Supply
Attracts investments
Creates jobs
Direct impact to economy

INDUSTRY
Level Playing Field
Healthy Competition

CONSUMERS
More Option
Quality Services
Competitive Prices

AN ECO-SYSTEM IS FORMING AROUND LNG HAULAGE

MALAYSIAN Gas ASSOCIATION

Manufacturers

VOLVO · SCANIA · Peterbilt · Mack TRUCKS · CNHTC 中国重汽 SINOTRUK · IVECO

Conversion Kit Suppliers

CATERPILLAR · Westport™ The global leader in natural gas engines.

Logistics Operators / Users

BMW · UPS · IKEA · PENSKE · C.R.England · i-FAST Automotive Logistics

Fuel Suppliers

Shell · GAZPROM · Blu. good. clean. fuel. · GazMétro

Financiers

BNP PARIBAS

LNG REFUELLING STATIONS

LNG Truck Refuelling

THE LNG SADDLE LNG TANK AND GAS DETECTOR

BIO-LNG REFUELLING STATION

KEY TAKEAWAYS

- Widely-distributed gas infrastructure coupled with open market access with multiple competing suppliers ensure the sustainability and security of gas supply
- The technology and the eco-system for usage of LNG in the haulage sector is available today
- LNG trucks have a lower carbon footprint and are low emissions yet retains the same performance, drivability and fuel consumption as its diesel counterparts

MALAYSIAN Gas ASSOCIATION

THANK YOU