



TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI
HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

STATUS OF ELECTRIC VEHICLE DEVELOPMENT IN VIETNAM

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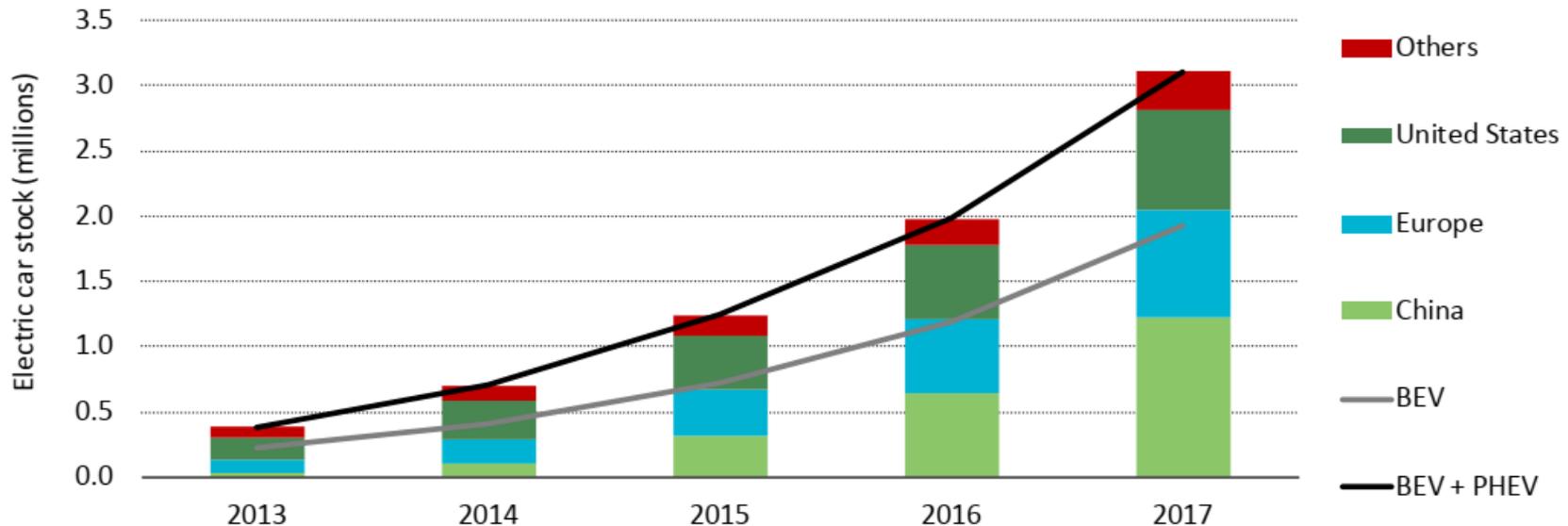
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Electric Vehicle Outlook

Global EV sales by region

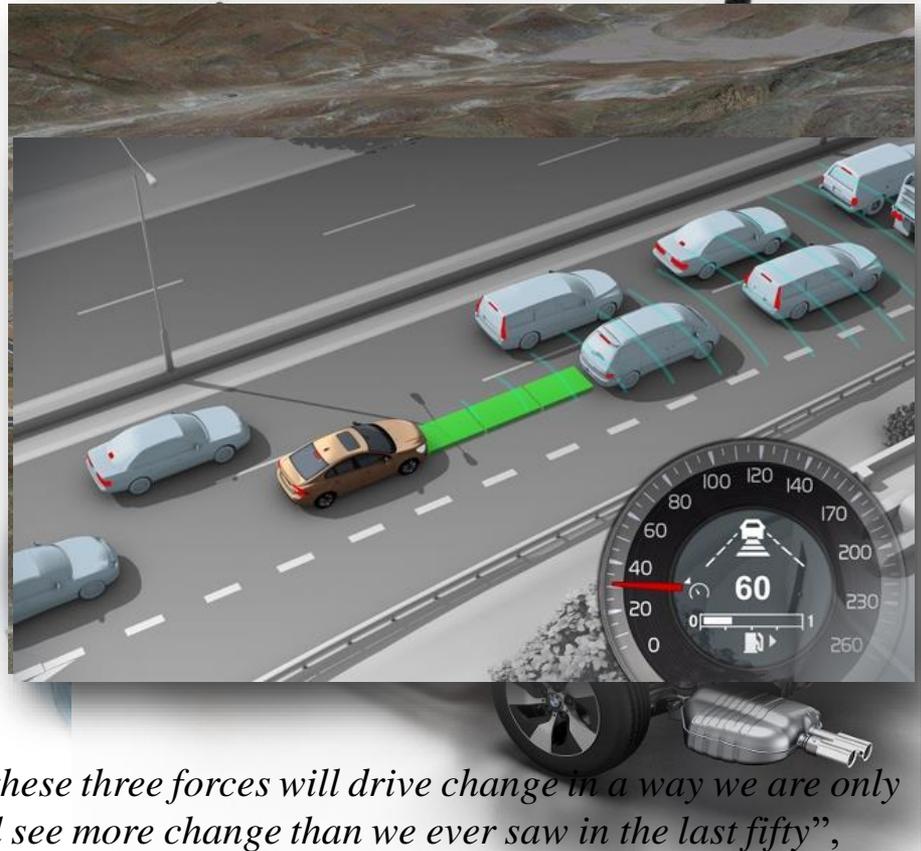


Notes: The electric car stock shown is primarily estimated on the basis of cumulative sales since 2005. Where available, stock numbers from official national statistics have been used (provided that the data can be shown to be consistent with sales evolutions).

Sources: IEA analysis based on country submissions, complemented by ACEA (2018); EAFO (2018a).

- In 2017, the global electric car (BEV + PHEV) stock surpassed 3 million vehicles
- The stock of electric buses increased to 370 k units, electric two-wheelers reached 250 million

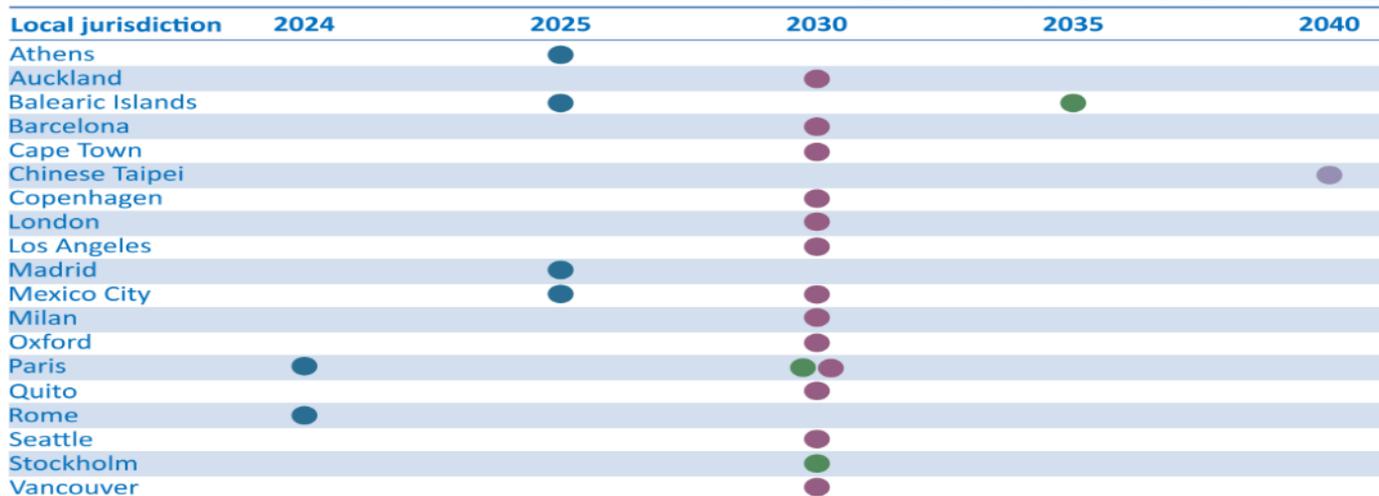
- COP21: Lowering of Emissions
- Electrification of drive-trains
- Falling costs in Li-ion battery & EV manufacturing
- Autonomous & Connected



“Electrification, driverless cars and connectivity : these three forces will drive change in a way we are only beginning to imagine. In the next fifty years we shall see more change than we ever saw in the last fifty”,
Carlos Ghosn, Chairman & CEO of the Alliance Renault-Nissan-Mitsubishi.

Electric Vehicle Outlook

- Increased resilience against oil price volatility
- Volkswagen emissions scandal (2015 in USA) → announcement of 2-3 millions EV by 2025
- Considering banning ICE cars in big cities



● Diesel access restrictions ● ICE access restrictions
● Fossil-Fuel-Free Streets Declaration ● ICE sales ban

Announced access restriction mandates in local jurisdictions

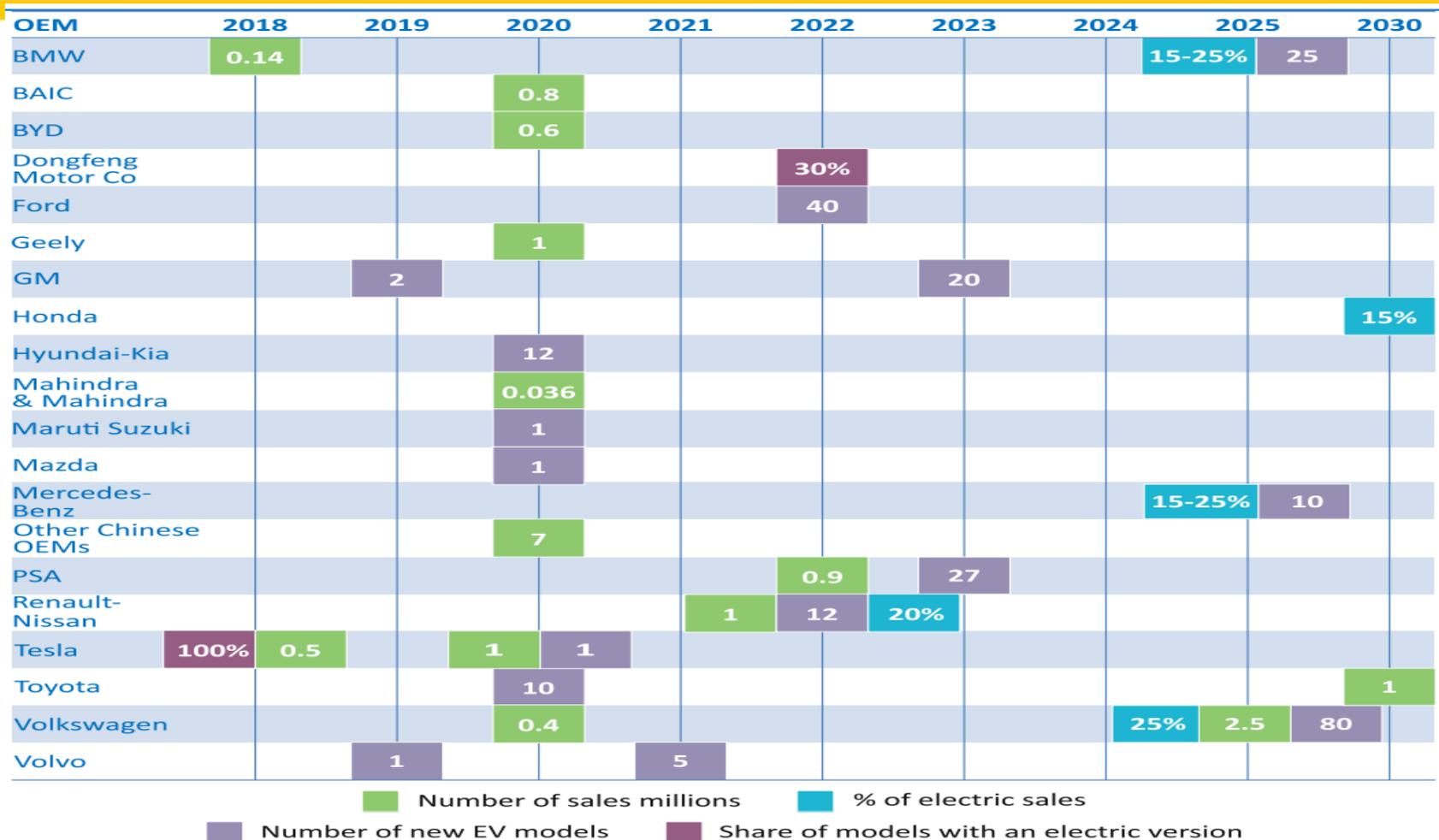
Source: IEA, *Global EV Outlook 2018: Towards cross-modal electrification*

Electric Vehicle Outlook



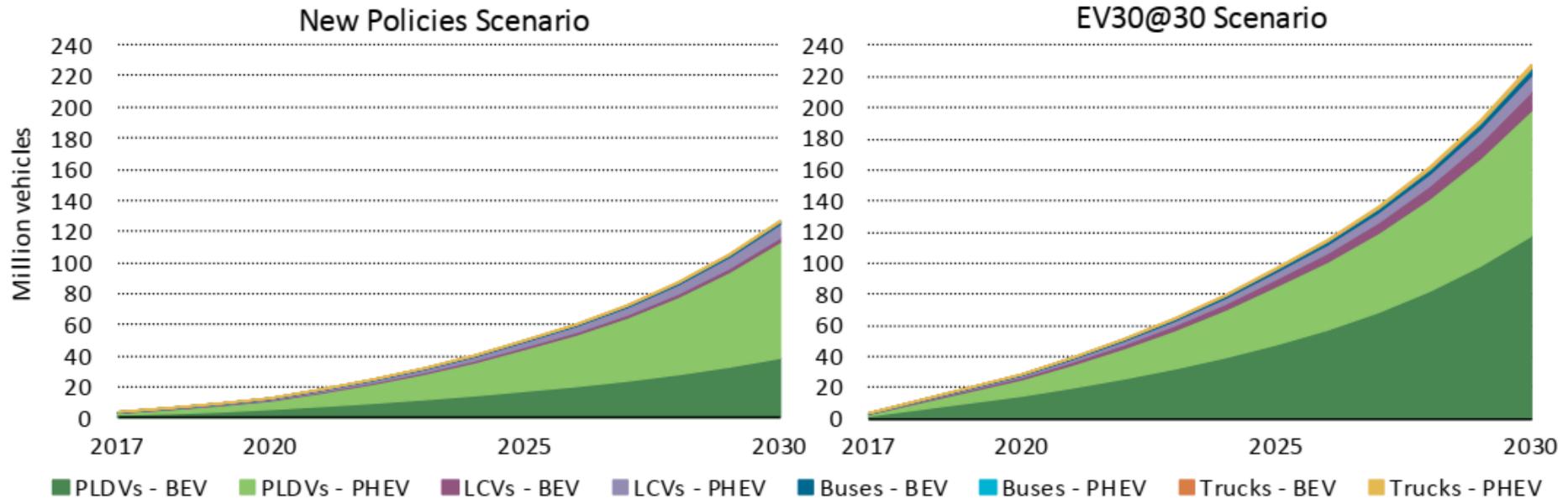
Electric Vehicle Outlook

OEM announcements related to electric cars



- Several OEMs have announced increased EV production and development of new EV models

Source: IEA, *Global EV Outlook 2018: Towards cross-modal electrification*



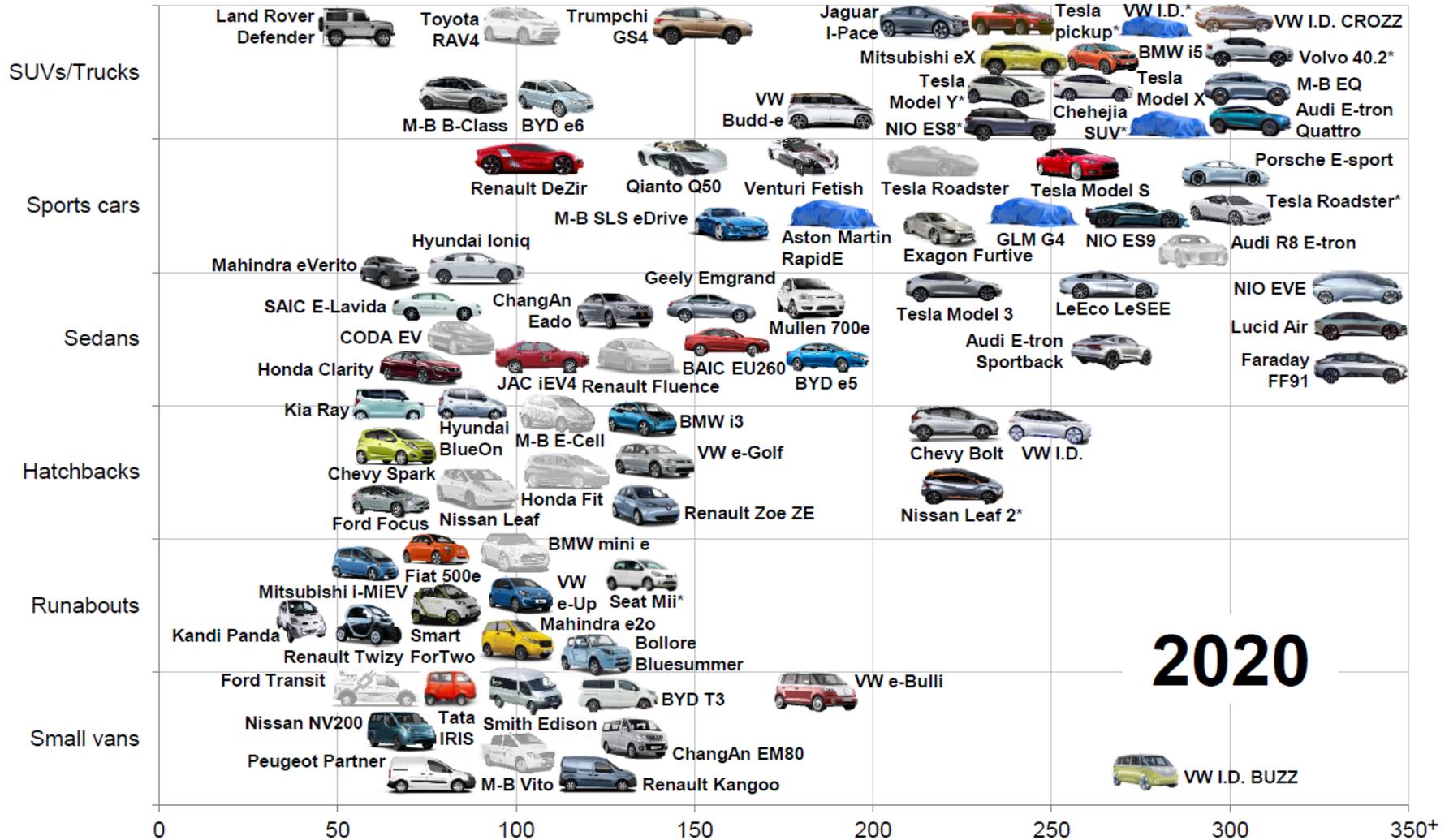
Notes: PLDVs = passenger light duty vehicles; LCVs = light commercial vehicles; BEVs = battery electric vehicles; PHEV = plug-in hybrid electric vehicles.

Source: IEA analysis developed with the IEA Mobility Model (IEA, 2018b).

- Estimation in 2030 : from 130M to 220M EVs

Electric Vehicle Outlook

BEV model availability, 2008-2020



2020

Source: Bloomberg New Energy Finance, Images various. Notes: Not exhaustive. (*) Range is speculated.

Electric Vehicle Outlook

Policies & promotion of EV

	EV purchase incentives				EV use and circulation incentives				Waivers on access restrictions			Tailpipe emissions standards		Market share of electric cars in 2015
	Rebates at registration/sale	Sales tax exemptions (excl. VAT)	VAT exemptions	Tax credits	Circulation tax exemptions	Waivers on fees (e.g. tolls, parking, ferries)	Electricity supply reductions/exemptions	Tax credits (company cars)	Access to bus lanes	Access to HOV lanes	Access to restricted traffic zones*	Fuel economy standards/regulations including elements	Road vehicles tailpipe pollutant emissions standards	
Canada													Tier 2	0.4%
China													China 5	1.0%
Denmark													Euro 6	2.2%
France													Euro 6	1.2%
Germany													Euro 6	0.7%
India													Bharat 3	0.1%
Italy													Euro 6	0.1%
Japan													JPN 2009	0.6%
Netherlands													Euro 6	9.7%
Norway													Euro 6	23.3%
Portugal													Euro 6	0.7%
South Korea													Kor 3	0.2%
Spain													Euro 6	0.2%
Sweden													Euro 6	2.4%
United Kingdom													Euro 6	1.0%
United States													Tier 2	0.7%

Legend:	No policy
	Targeted policy **
	Widespread policy***
	Nationwide policy
	General fuel economy standard, indirectly favouring EV deployment
	Euro 6
	Pollutant emissions standard in place in 2015

* Such as environmental/low emission zones.

** Policy implemented in certain geographical areas (e.g. specific states/regions/municipalities), affecting less than 50% of the country's inhabitants.

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Automotive industry in Vietnam

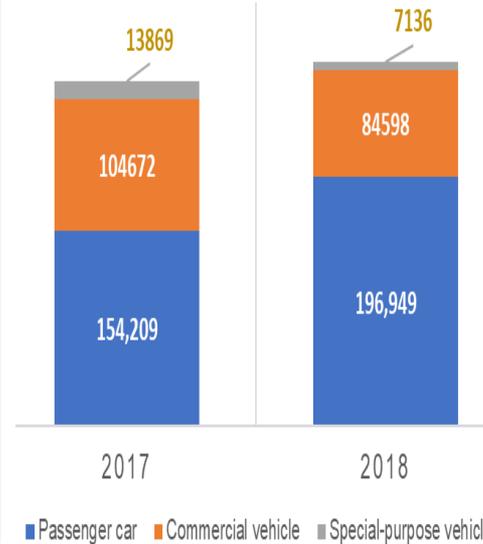
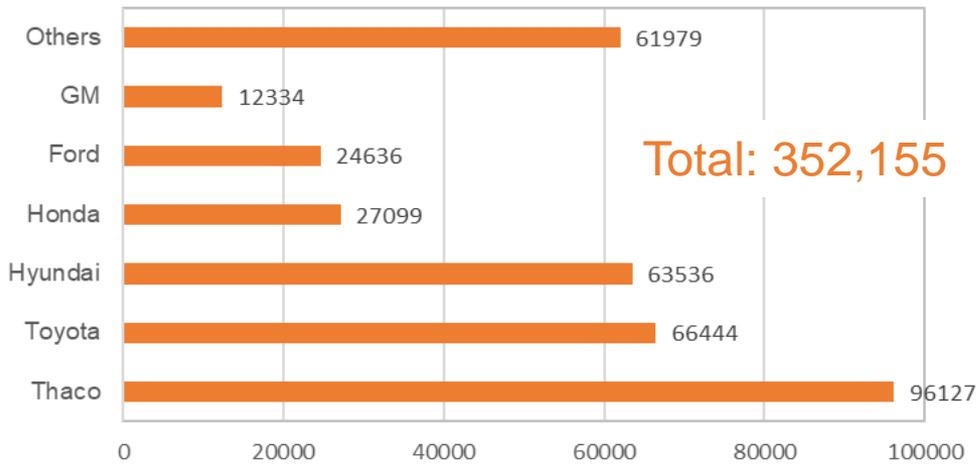
- Population: 95 million (14th)
Urban population: 33%
- Area: 321 230 km² (65th)
- Average temp. range: 18.7° to 27.9°C
- GDP (PPP) in 2017:
 - Total: \$705 billion
 - Per capita: \$7.463 (128th)
 - GDP growth: 6.5%
- Industries: Food processing, garments, shoes, machine-building; mining, coal, steel; cement, chemical fertilizer, glass, tires, oil, mobile phones
- Top 10 countries impacted by climate change
- Traffic behaviors:
 - Congestions
 - Air pollution from ICE. engines and constructions
 - Noise pollution
 - Traffic safety issues
 - Stress
- Registered vehicles (2018):
 - 46 M motorcycles and scooters (including 2 M E-bikes)
 - 3.5 M cars (incl. passenger and commercial vehicles)



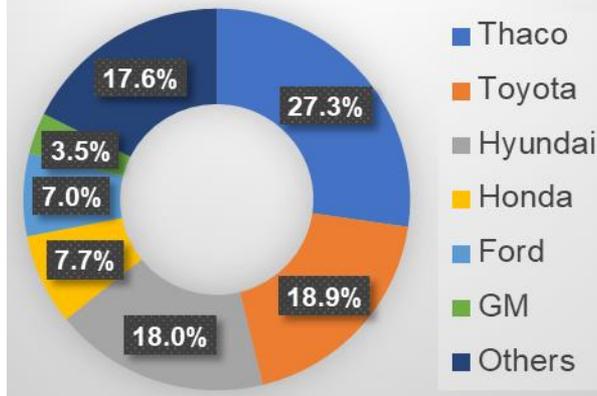
Mesh of national roads network
256 600 km in total

Automotive industry in Vietnam

2018: Vehicle sold by auto-makers

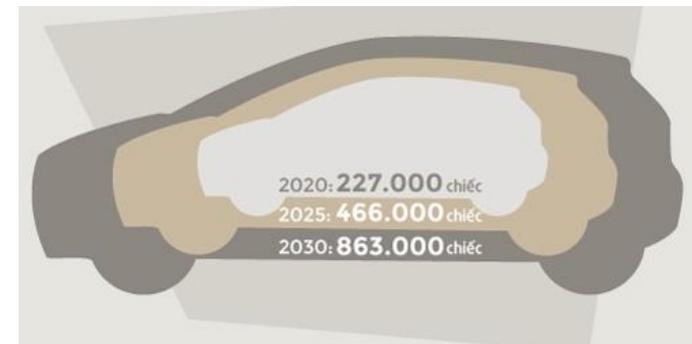


2018: Market share



Automotive industry in Vietnam

- Huge market and OEM for motorcycles and scooters (>2M/year)
- Mostly CKD assembly. Thaco Truong Hai (Kia, Mazda, Peugeot, Thaco bus and Thaco Truck): 1st range since 2015
- Korea manufacturers (Hyundai Thanh Cong): New Hyundai factory completed in 2018 (40.000 units/year)
- New local player : VinFast/Vingroup (09/2017):
Ambition: top car manufacturer in ASEAN



- Automotive industry planning: potential automotive market (> 800 kU passenger cars in 2030)

Low Carbon and Electric Vehicles

- Low carbon vehicle options and implementation
 - CNG, LPG vehicles: considering for buses and freight vehicles
 - ❖ Project on LPG taxi used to apply within Petrovietnam
 - ❖ LPG buses were also piloted by PVI
 - ❖ LPG motorcycles implemented in Danang city
 - stopped due to less of LPG suppliers
 - ❖ 428 buses is running in HCM city by the end of 2018; aiming 75% of the new buses running on clean fuel by the end of 2020 (1000 CNG buses of about 1680 new ones)
 - ❖ 50 CNG buses is running in Hanoi by Hai Yen Co. Ltd. (3 routes)
 - ❖ CNG freight vehicles are also piloted by PVGas south.



Low Carbon and Electric Vehicles

- Low carbon vehicle options and implementation

- Vehicles use biofuels

- ❖ E5 fuel has been mandated nation-wide since early 2018, E10 is considered to be mandated soon
 - ❖ Biodiesel is failed to be implemented due to lack of raw materials



GIÁ XĂNG DẦU NGÀY 02/05:

- Xăng E5RON92: **20.688 đồng/lít**
- Xăng RON95: **22.191 đồng/lít**
- Dầu diesel: **17.695 đồng/lít**
- Dầu hỏa: **16.625 đồng/lít**
- Dầu mazut: **16.002 đồng/kg**

Low Carbon and Electric Vehicles

- Electric vehicles

- 2012, a project of using Siemens's ELFA powertrain for hybrid bus of Vinamotor
→ huge cost, lack of support of cities
- 2016, MOU between Mai Linh's taxi group and Renault on the importing of electric cars (10-15 kU) for passenger transport services
→ incentive, regulation, infrastructure, failed!
- Uses electric vehicles low-speed (~2M units cumulative sales)
 - 2 wheels electric scooter for students (without driver's license)
 - 4 wheels electric vehicles for service, cargo, tourism, transport



(Law 106/2016/QH13)

No	Vehicle Category	Excise Tax rate (%)	
		2016	Since Jan. 2018
1	Passenger cars from 9 seats or fewer		
a	- Engine capacity <1.5L	40	35
b	- Engine capacity 1.5-2L	45	40
c	- Engine capacity 2-2.5L	50	50
d	- Engine capacity 2.5-3L	55	60
e	- Engine capacity 3-4L	90	90
2	Cars operated by gasoline and electricity or bio-fuel, with gasoline accounting for at most 70% of the fuel used	-	70% of the tax rate for cars of the same kind
3	Bio-fuel powered cars	-	50% of the tax rate for cars of the same kind
4	Electric cars		
a	- Passenger cars from 9 seats or fewer	-	15
b	- Passenger cars from 10 to less than 16 seats	-	10
c	- Passenger cars from 16 to less than 24 seats	-	5
d	- Cars for both passenger and goods	-	10

- Only excise tax for EV, quite low rate to help development EV!

Vehicle Technology Measures	Source/Documents	Implemented year
Electric 2-wheeler		
Nationwide: ~2 mil. Units low speed (2016)	Site: mt.gov.vn	
2 wheeler “high speed/spec”		
Small Electric bus		
HCM: 4 operating lines (01.2017)		2017
Intensify electric buses in big cities		
Electric car	N/A	
Next-generation Vehicle		
Hybrid vehicle	N/A	
Fuel cell vehicle	N/A	
Autonomous vehicle	N/A	

Electric Vehicle Policy and Regulation

- National standards, ONLY existed for low speed electric vehicles:
 - National Technical Standard on Electric Bicycles: QCVN68:2013/BGTVT/SĐ1:2015 (2015)
 - QCVN 75:2014/BGTVT: National Technical Standard of Motor used for Electric Bicycles
 - QCVN 76:2014/BGTVT: National Technical Standard of Battery used for Electric Bicycles
 - Circular on 4 wheeler vehicles for passenger purpose, operating in restricted areas: 86/2014/TT-BGTVT
- Technical standards for 4 wheeler vehicles are under developing: 10 standards are going to be adopted
- It is very hard to adopt regulations due to lack of testing facilities

- Electric vehicle market in Vietnam
 - Several auto-makers start to introduce EVs to the market: Toyota (Prius), Mitsubishi (Outlander PHEV), Hyundai (Kona electric)...
 - Vinfast: a new rising star
 - ✓ 1st year: 2 wheelers EVs (2018)
 - ✓ 2nd and 3rd years: passenger cars (gasolines, Sept. 2019)
 - ✓ From the 3rd year: 4 wheelers EV
 - ✓ VinBus Co.Ltd. was formed on 2nd May, 2019: manufacture, provide and operate about 3000 public E-buses in 5 biggest cities (March 2020): Hanoi, Hai Phong, Da Nang, HCM, Can Tho



May 2019



Potential Electric Vehicle Association of Vietnam (EVAV)

• Policies and Promotion

- Several small and single research programs
- No regulations for electric cars (passengers and commercial cars)
- No national incentive plans for EV purchases (only the excise tax since 2018)
- No national development plans of EV (infrastructures, fleets, concept, prototype,...)

• Charging Infrastructure

- Only some pilot charging stations!
- No regulations
- No national plan for network development



• Society & Environment

- Air quality is strongly affected by emissions from traditional vehicles
- Treatment of Lead-acid battery of existing 2M units of low speed 2-wheelers

• Car OEM' strategy

- CKD, investment of plan for new technology car
- Component OEM's strategy (battery, powertrain...)



Conclusion and Outlook



• Vietnam EV Forum March 29, 2019

- Ministries:
 - Industry Agency, Ministry of Industry and Trade
 - National Traffic Safety Committee
 - Dept. of Science & Technology, Dept. of Environment, Vietnam Register, Ministry of Transport
 - Dept. of Science & Technology for Economic Technical Branches, Ministry of Science and Technology
- Companies: Hyundai, Toyota, Honda, Vinfast, Vega Rex Hanoi, DK Technology Vina, LMS Vina, SG Investment Consultant, JIN Polymer, Vakaxa Technology JSC, Master Motor, Mordentec
- Researchers and experts from universities and institutes: HUST, UTC, UTT, LQDTU, VMU, HUI, TLU, VNUA, EPU, PHU, VAIEP, HCMUT, DNU, VNU-HCM, NLU
- Media: HUST, Journal of Mechanical Engineering of Vietnam, online journals, VTV



Conclusion and Outlook



Conclusion and Outlook

Future Electric Vehicle for Vietnam:

- ✓ Increasing the awareness of people: environmental friendly low emission vehicles, especially EVs; media, training courses or related curriculums in universities.
- ✓ Automotive strategy must include goals of sustainability, EVs and environmental friendly low emission vehicle development and production should be given priority.
- ✓ It is very important to develop standards, regulations, policies and investment regarding electric vehicles, together with batteries waste treatment and a master plan for charging stations infrastructure.
- ✓ Annual EV forum, as initiation, then coming up with electric vehicle association is needed.
- ✓ Strong support from industry is crucial.



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