



Outlook

Electrified Vehicle Outlook

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About LMC Automotive

- **Independent** industry-leading source of market intelligence for over 25 years
- **Focused** on global automotive forecasts: sales, production, powertrain, electrification, autonomy
- **Responsive & flexible** support for OEMs, suppliers, financial firms & government institutions
- The **smart** choice for automotive intelligence & insight into market dynamics, economic, regulatory & technological change



Hybrid & Electric Vehicle Reports

- We expect 40%+ electrification of new personal vehicle sales globally by 2030

The Essentials:

Global Edition (quarterly), US Edition (quarterly), China Edition (quarterly)

12-year forecast by model and unique electrification technology

National regulatory environments supporting development of electrification

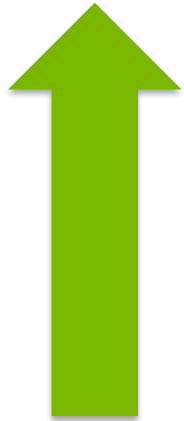
OEM strategies, investments and partnerships



Electrified Vehicle Types



Bigger Battery



■ BEV

Nissan Leaf BEV



■ PHEV

Mercedes-Benz C350e PHEV



■ HEV

Toyota C-HR FHEV






Engine

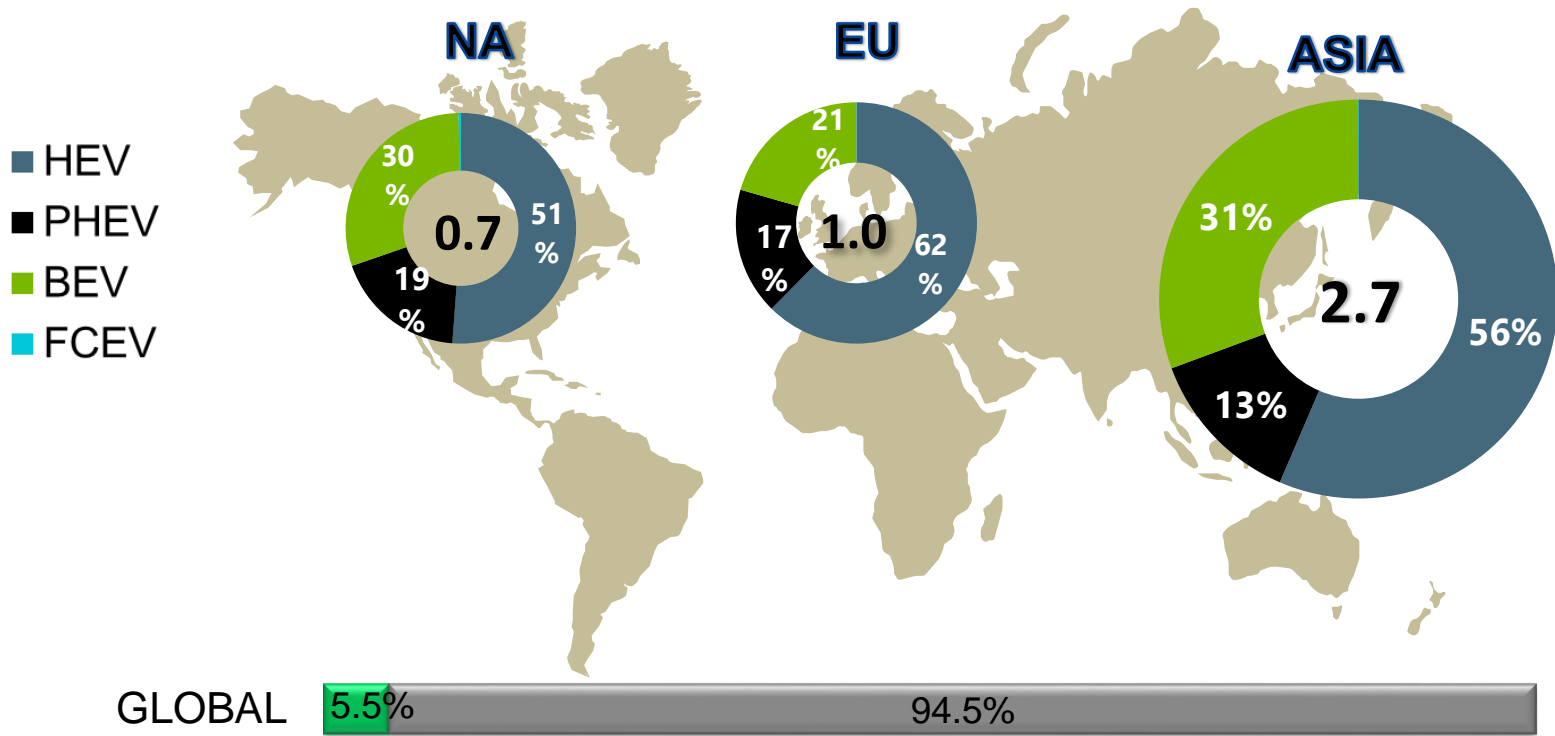
■ ICE

Honda Civic



-  Pure electric motors
-  ICE + electric motors
-  ICE (Internal Combustion Engine)

2018 Global EV sales (mil.)



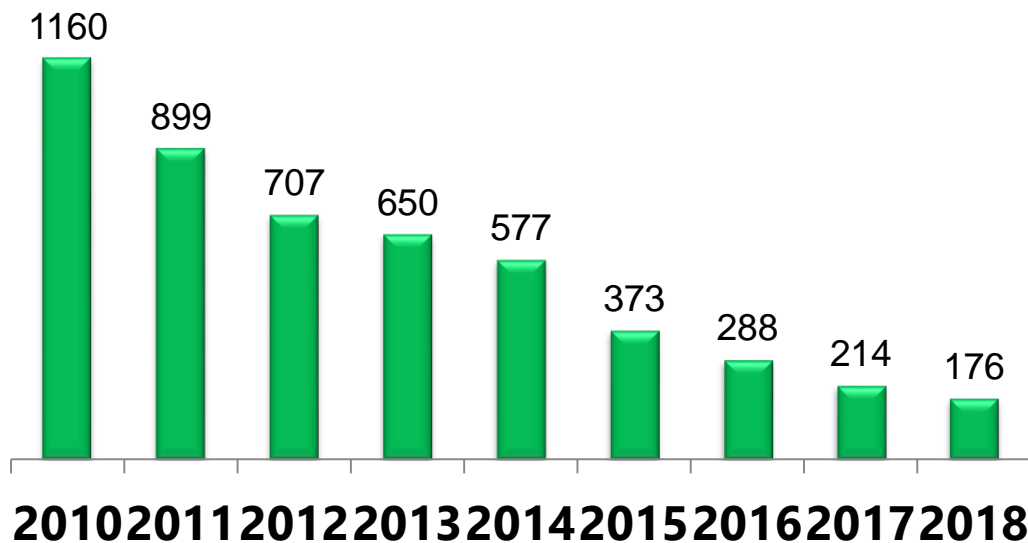
Key Factors For Vehicle Electrification



Factor	BEV & FCEV	HEV
Price	Very uncompetitive, will require high subsidy	Relatively high, but more competitive with policy support
Emission Regulation	Very lagged emission regulations	Lagged emission regulations
Buyer	Limited technology acceptance and low resale value	Low resale value
Infrastructure	Large investment in charging stations Grid stability and availability	-

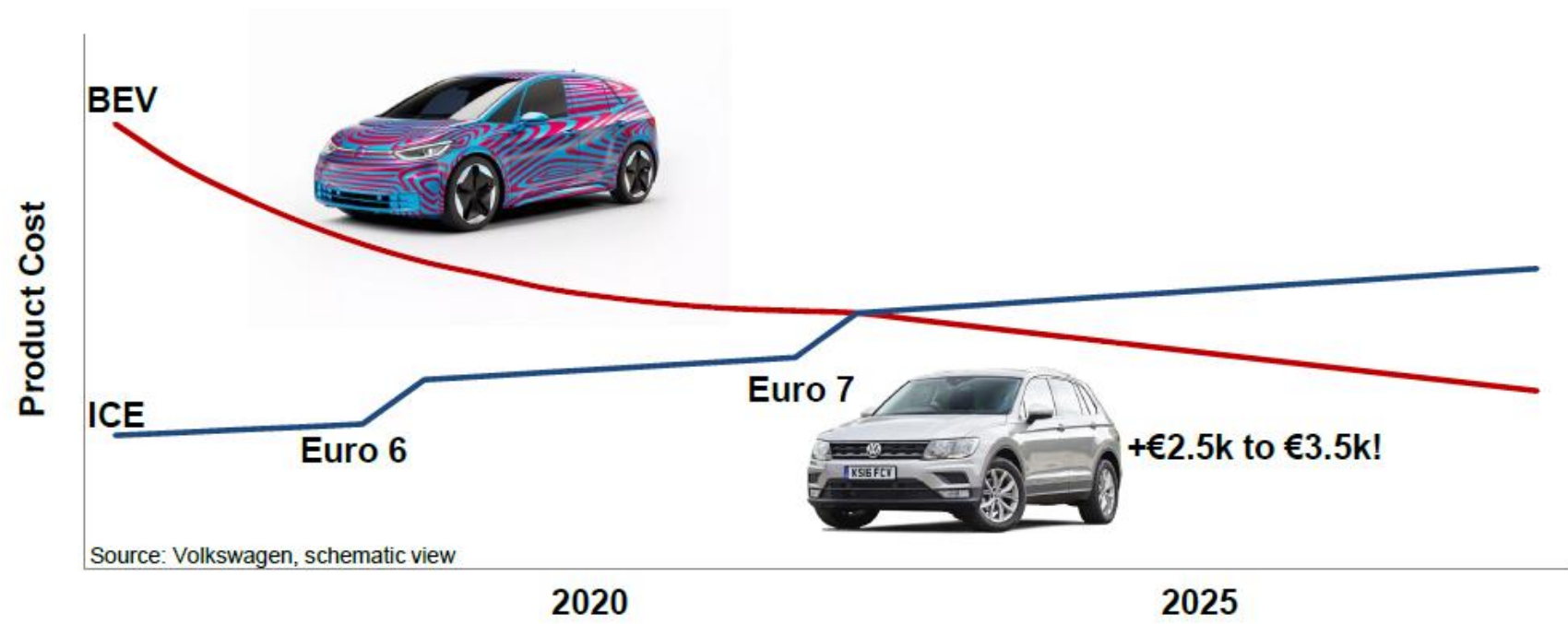
Battery Price History

Price (\$/kWh)



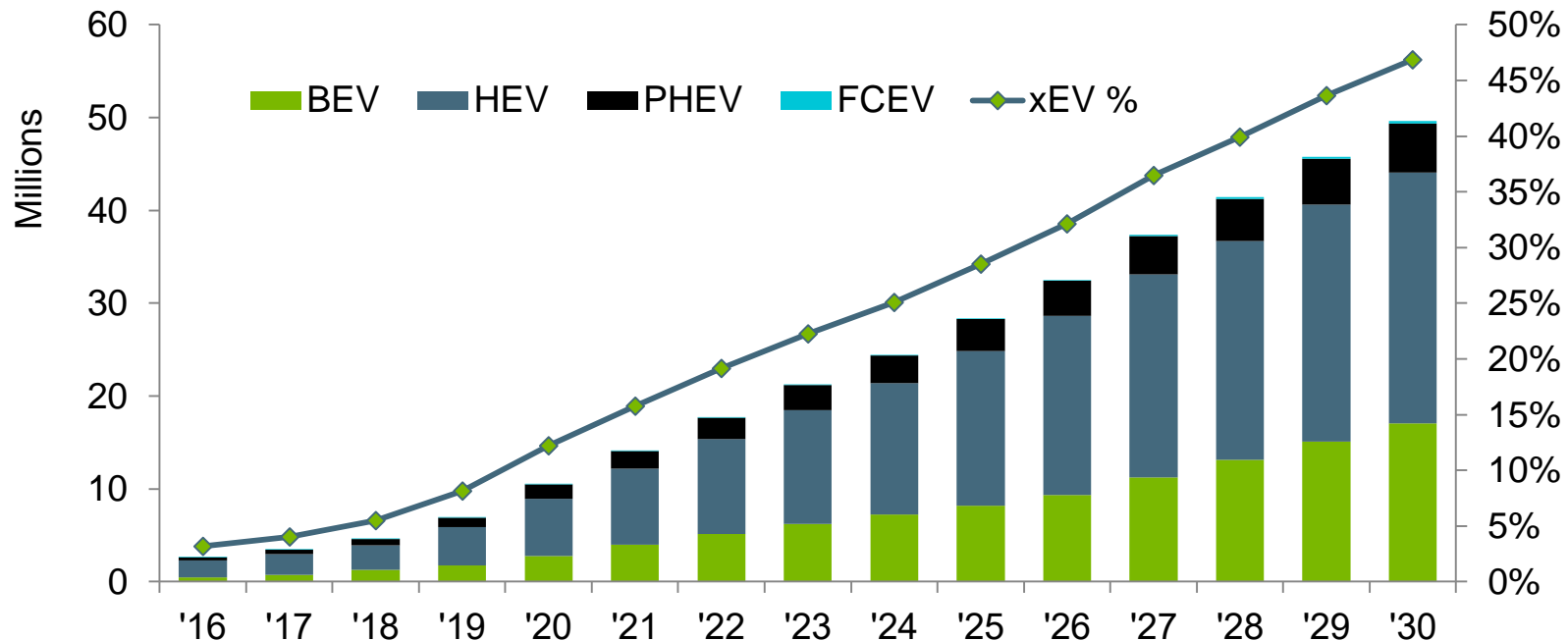
Model	MG EZS
Price (THB)	1.5M
Battery	46 kWh
Battery Price	263k

Tighten Emission Regulation



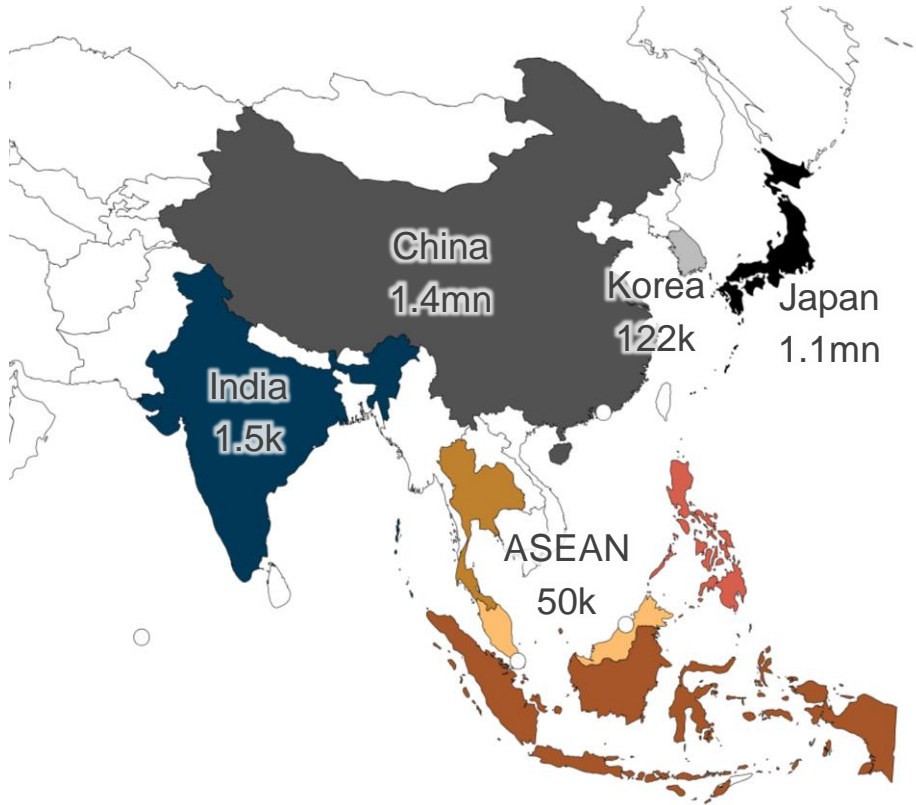
Source: Volkswagen, schematic view

Global EV PV Sales Outlook

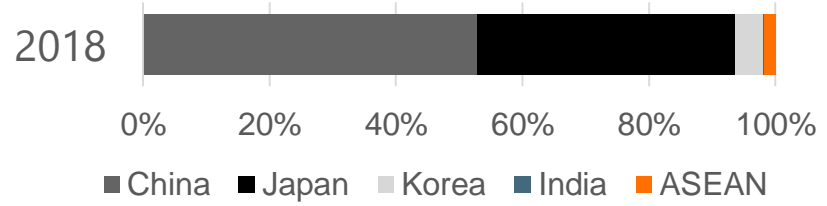


2018 EV sales in Asia

EV Incentives

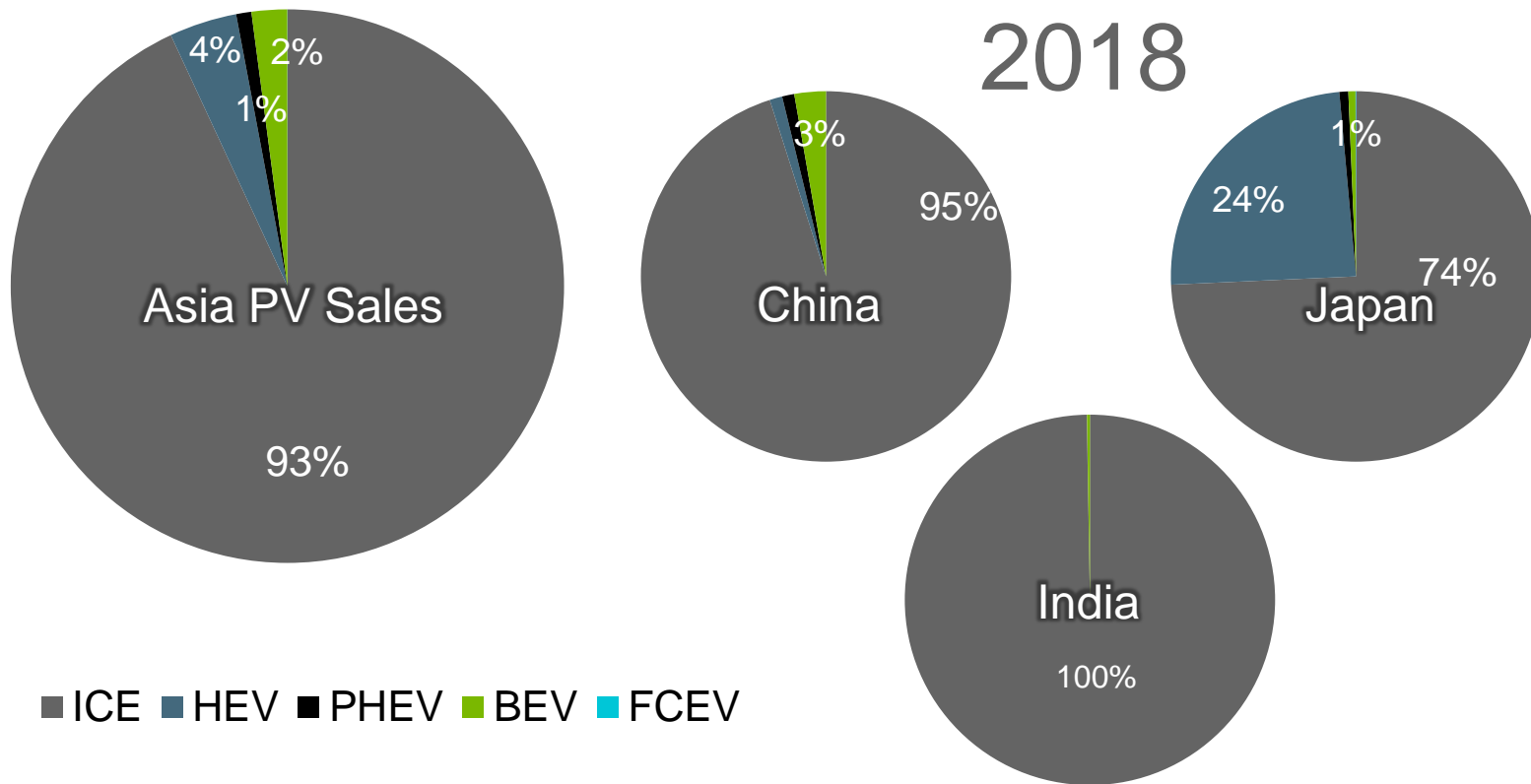


-  China: NEV credits
-  Japan: CEV subsidy
-  Korea: EV incentives
-  India: EV target 2030
-  Thailand: EV program
-  Malaysia: EEV program
-  Indonesia: LCEV program
-  Philippines: Low tax for EVs



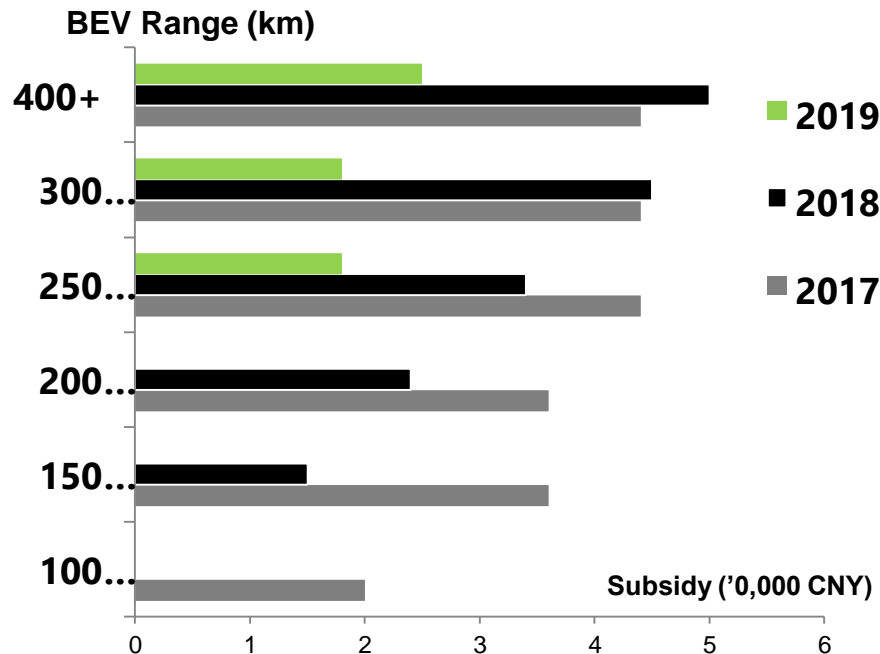


EV vs. ICE: How things are looking now



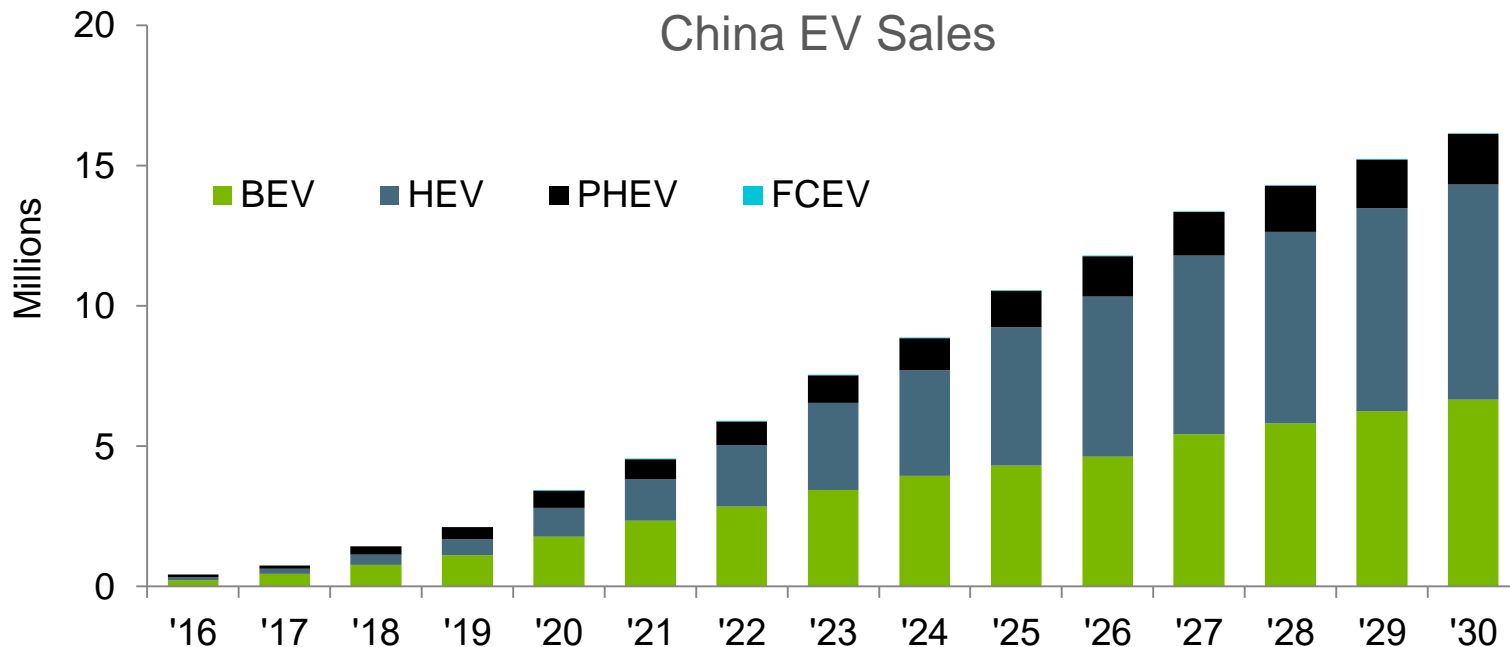
China Dual-Credit Policy

- **NEV credit** for BEV, PHEV, and FCEV
- Only applies to larger OEMs producing/importing $\geq 30,000$ units/year (small OEMs excluded)
- NEV credit equivalent to 10% in 2019, and 12% in 2020
- **CAFC credit**: currently CAFC target at 5L/100KM and will be 4L/100KM in 2025.
- Credit can be traded among OEMs. Demand and supply will determine credit price.



China and a big stick

- Dual-credit system (NEV and CAFC) imposes hefty penalties for non-compliance



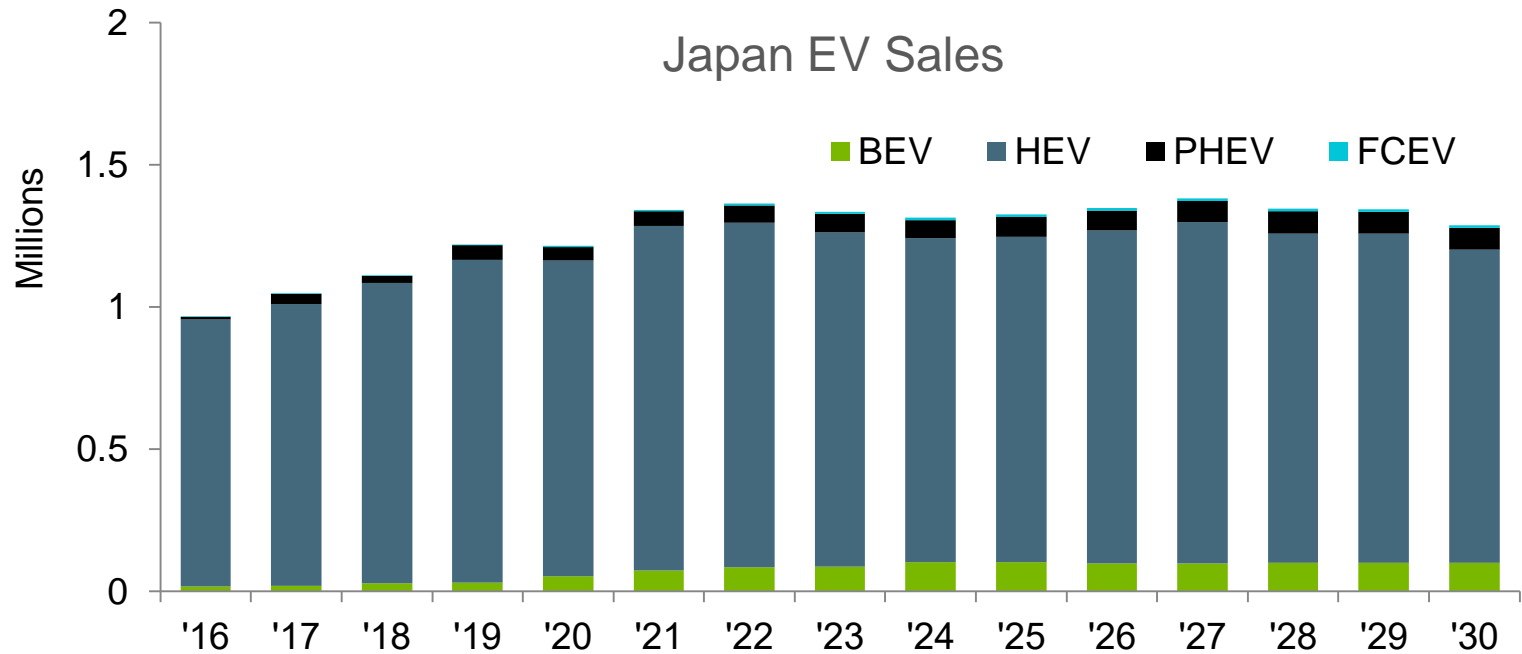
Japan EV Subsidy Policy



EV Type	Subsidy	2017-	2016
BEV	Subsidy	Range/charge (km) x 1000 Yen	Battery capacity (kWh) x 11,000 Yen
	Maximum	400,000 Yen	600,000 Yen
PHEV	Subsidy	200,000 Yen for PHEV with range >30 km	Battery capacity (kWh) x 11,000 Yen
	Maximum	200,000 Yen	600,000 Yen
FCEV	Subsidy	Vehicle base price x subsidy rate (2/3)	Vehicle base price x subsidy rate (2/3)
	Maximum	None	None

Steady Japan

- EV share to rise from 25% of PV sales now to 35% by 2030



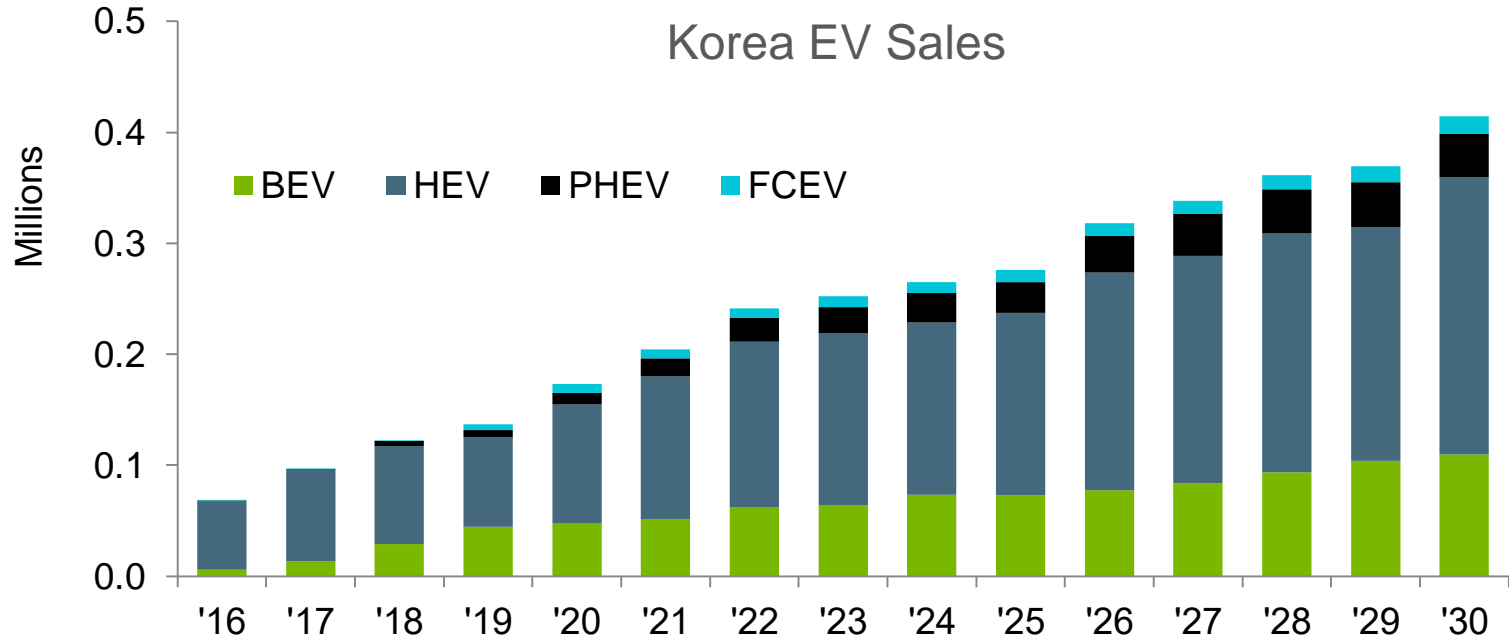
Korea EV Subsidy Policy



EV Type	Volume	Central Gov't Subsidy (mil. won)	Local Gov't Subsidy (mil. won)	Tax Incentive(mil. Won)
BEV	42,000	9	1	5.3
PHEV	300	5	0	2.7
FCEV	4,000	22.5	13.5	6.6

Rising Korea

- With government incentives, EV demand expected to grow significantly



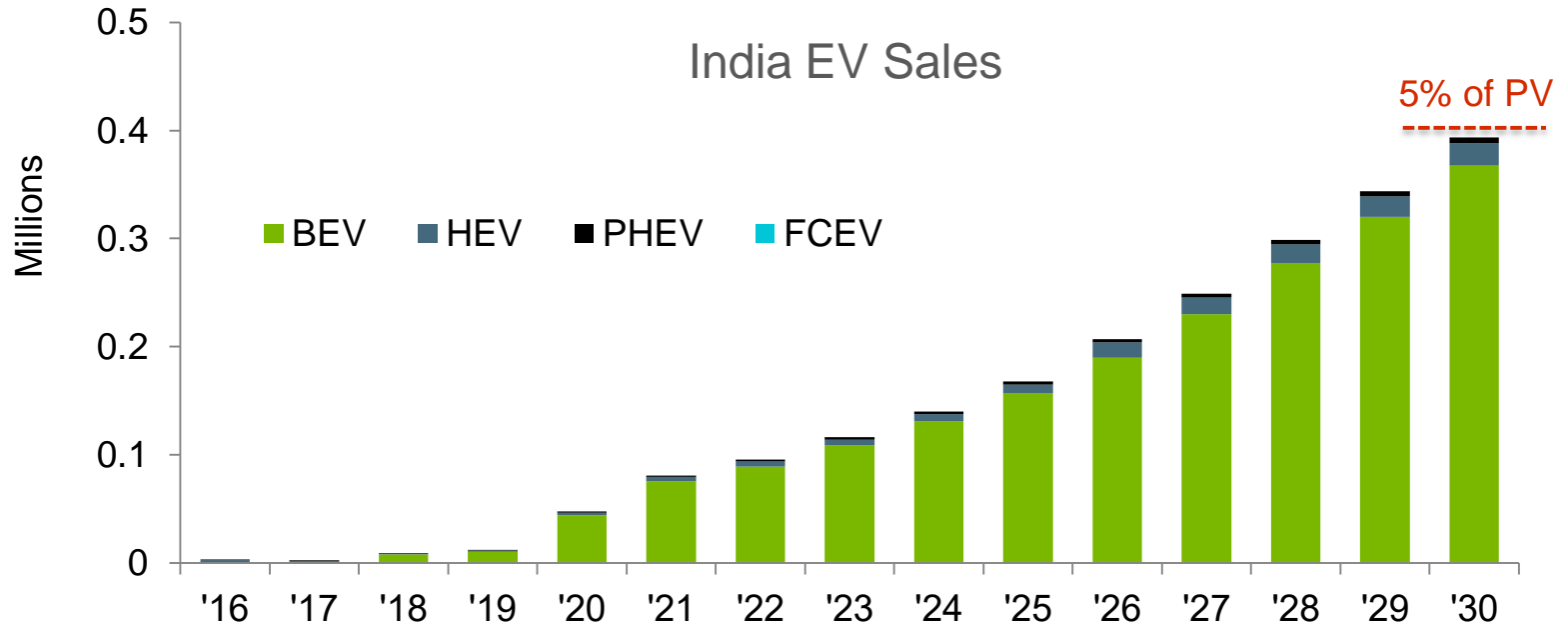
India EV Policy

Tax Type	Motor Type	Category	Fuel/Engine Displacement	Brand/Model	Previous GST Rate	New GST Rate	Change
GST	ICE Vehicle	Sub 4 Metres	Petrol < 1200cc	Suzuki's Alto, Baleno, Hyundai's Grand i10	31.5%	29% (28%+1% Cess)	- 2.5%
		Sub 4 Metres	Diesel < 1500cc	Tata's Brezza, Suzuki's Dzire, M&M's TUV300	33.2%	31% (28%+3% Cess)	- 2.25%
		Sub 4 Metres	Petrol =/< 1200cc Diesel =/< 1500cc	Ford's EcoSport Hyundai's i20	44.7%	43% (28%+15% Cess)	- 1.7%
		Over 4 Metres	Petrol > 1200cc Diesel > 1500cc	Honda's City, Suzuki's Ciaz, Merc's E-Class	51.6%	53% (28%+25% Cess)	+ 1.4%
		All SUVs	All	Merc's GL-Class, Audi's Q7, Hyundai's Creta	55.0%	53% (28%+25% Cess)	- 2.0%
	xEV	HEV	All	Toyota Camry, Volvo XC90 T8, BMW's 330e	30.3% (12.5% excise + 17.8% VAT)	43% (28%+15% Cess)	+ 12.7%
		BEV & FCEV	n/a	M&M's e ₂ oPlus, eVerito Tata's Tigor, Tiago	28.0% (13.5% excise + 14.5% VAT)	12%	- 16%
		Electric	Only battery	All Li-ion Battery (LiB)	28.0% (13.5% excise + 14.5% VAT)	18%	- 10%

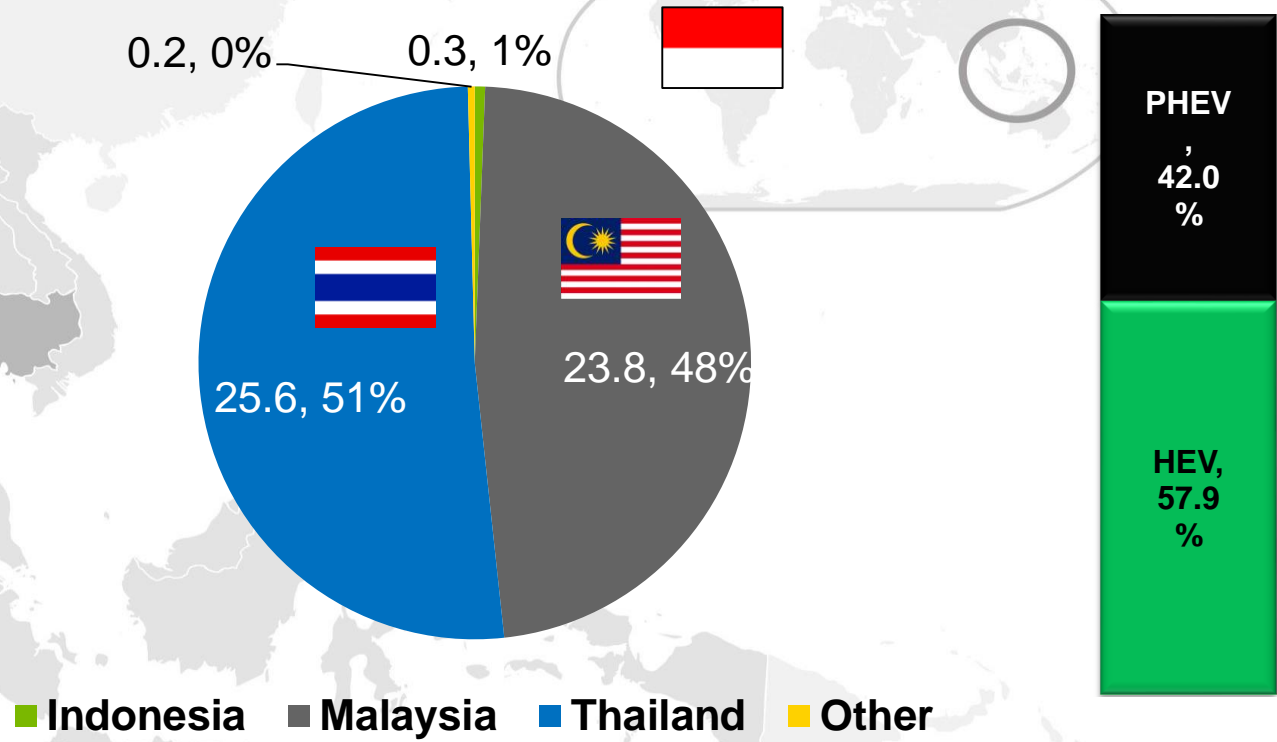
Tax Type	Type of Components	Previous Rate	New Rate	Change
Import duty	Import xEV's battery pack	Exemption (in order to promote xEV)	5%	+ 5%
	Other import xEV components (Undisclosed)	15-30%	10-15%	Lower by 5-15%

India's uncertain future

- Huh target (30% of PV by 2030), extremely challenging tasks ahead



2018 ASEAN EV sales (thousand)



Thailand EV Policy

- New programs supporting EV production focusing on HEVs for now

Type	Apply By	Key Components	Excise Tax	Import Tax	Corporate Tax	Qualified Vehicles
HEV	Dec-17	Batteries	5.0-12.5%	Exempt on Machinery	None	All Passenger Vehicles
PHEV	Dec-18	Traction motors Battery management systems		Depending on CO ₂	as above	
BEV		Drive control units (plus 9 other parts)	2%	as above	Exempt for 5-10 years	Crew-cab Pickup (10% from 12%) PPV (23% from 25%)



Malaysia EEV Program

- Customized incentives based on investment
- EEV specs do not require EV

Segment	Description	Curb weight (kg)	Fuel Efficiency (L/100km)
A	Micro Car	< 800	4.5
	City Car	801-1000	5
B	Super mini car	1001-1250	6
C	Small Family car	1251-1400	6.5
D	Large family car	1401-1550	7
	Compact executive car		
E	Executive car	1551-1800	9.5
F	Luxury Car	1801-2050	11
J	Large 4x4	2051-2350	11.5
Other	Other	2351-2500	12

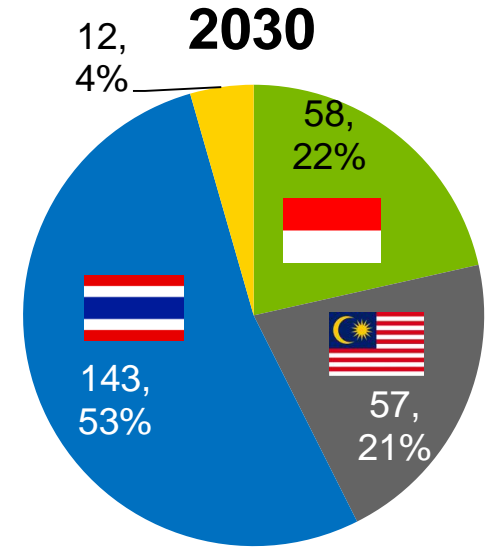
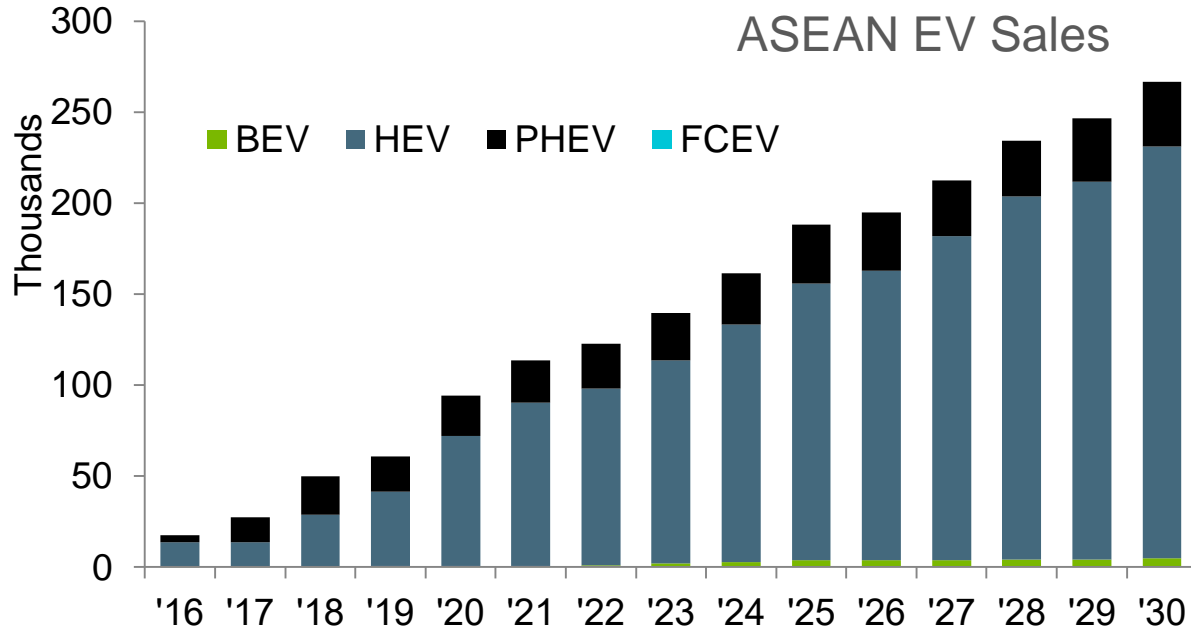
Indonesia Green Programs

- LCEV also covers ICE vehicles and does not necessarily require EVs.

Project	LCGC (Low Cost Green Car)	LCEV (Low Carbon Emission Vehicle)
Period	Start: September 2013	To Start Later in 2019
Requirement	<ul style="list-style-type: none">• Engine Size: Petrol \leq 1.2L, Diesel \leq 1,5L• Energy Efficiency: $>$ 20km/L• Price tag: $<$ 95 million rupiah (approx. US\$7,136)	<p><i>Details being proposed:</i></p> <ul style="list-style-type: none">• Locally produce vehicle with combination of ICE and electric motors, e.g., MHEV, FHEV & PHEV• Vehicle with a combination of flex-fuel under ICE, e.g., CNG, Ethanol or Biodiesel• BEV & FCEV (import tax cut from 50% to 5%)• Incentive rate linked to two levels of fuel economy at 20-28km/L and $>$28km/L as a minimum requirement
Incentive	Luxury Goods Sales Tax Exemption (from base price)	Details of the LCEV tax incentives currently under government consideration

ASEAN taking first step toward EV

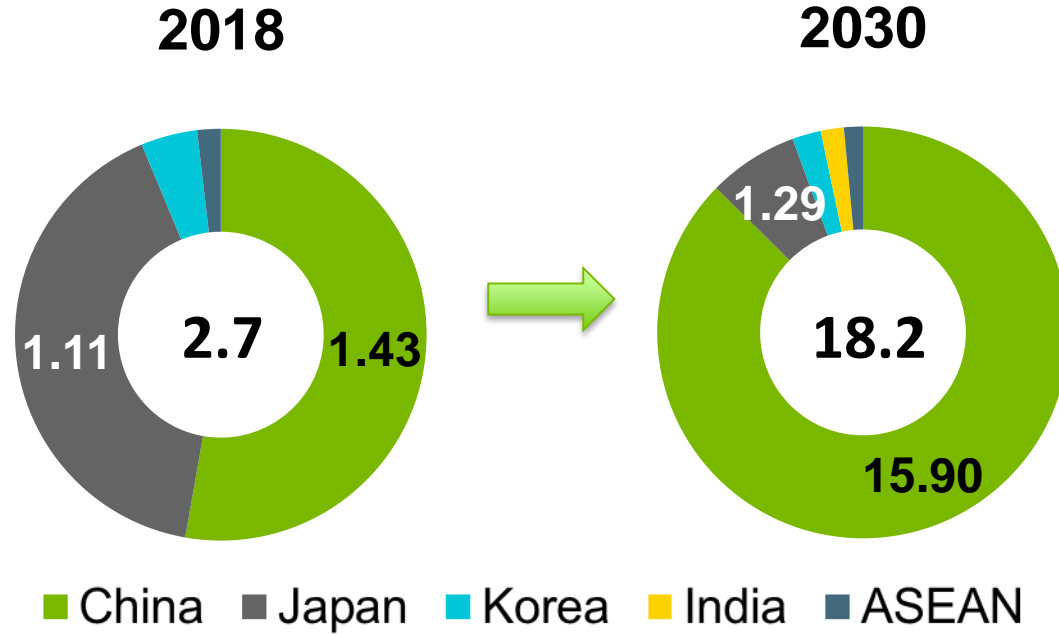
- HEV is expected to grow significantly due to incentive program



China to lead EV sales in Asia



Asia EV Sales (mil.)





Concluding remarks

- Vehicle electrification will be going rapidly mainly from China and Europe whereby strong mandatory regulation, such as emission regulation or fuel economy target, is applied.
- Asia EV market will grow strongly and remain to be the biggest EV market in the world, driven mainly from China. Korea and India are expected to become the new EV market in the next decade.
- ASEAN will also grow strongly especially on HEV. However BEV will trail behind other regions in due to many challenges including high technological and charging infrastructure costs, lack of supply chain for EV production, and, most of all, the absence of regulations mandating EV.



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Thank you