EV Status in Korea

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Korea Automobile Testing and Research Institute

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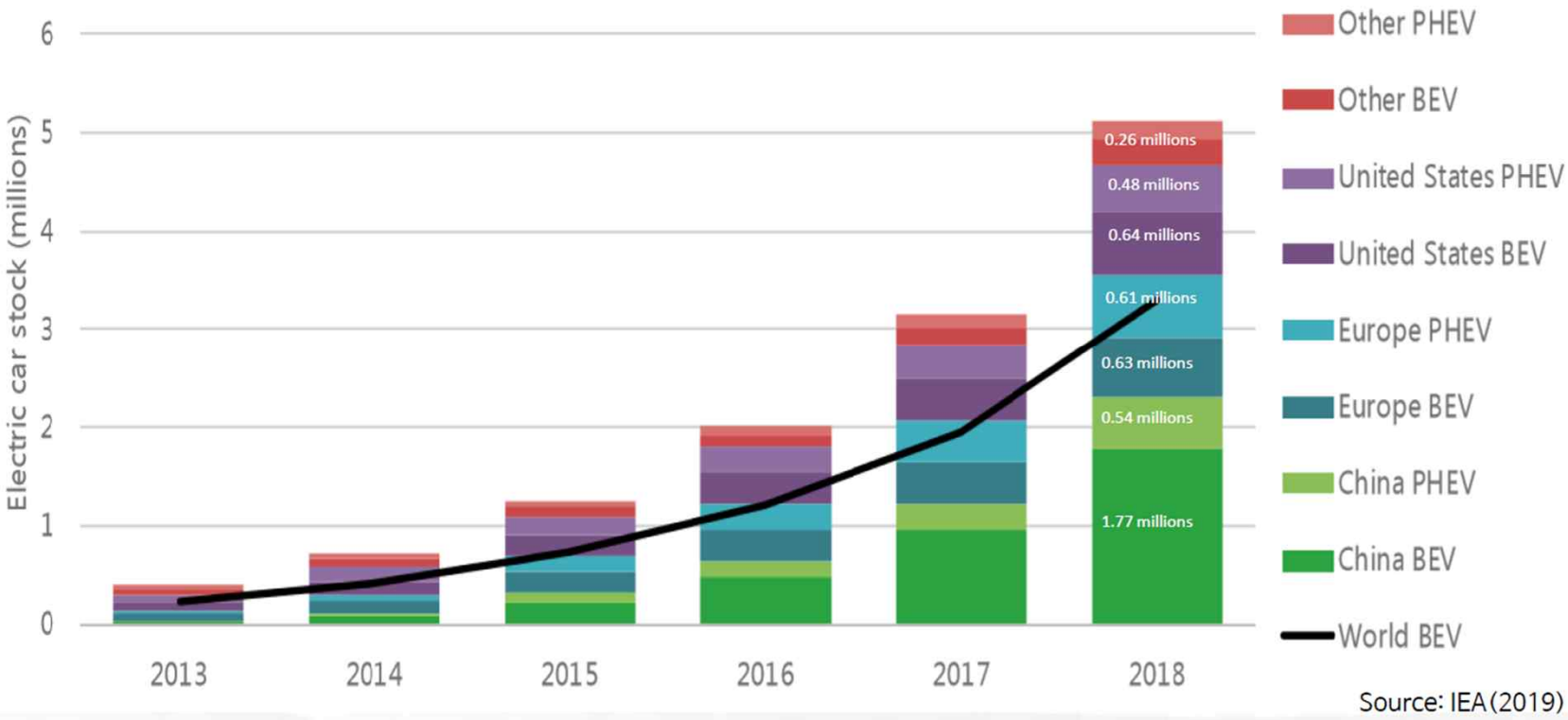
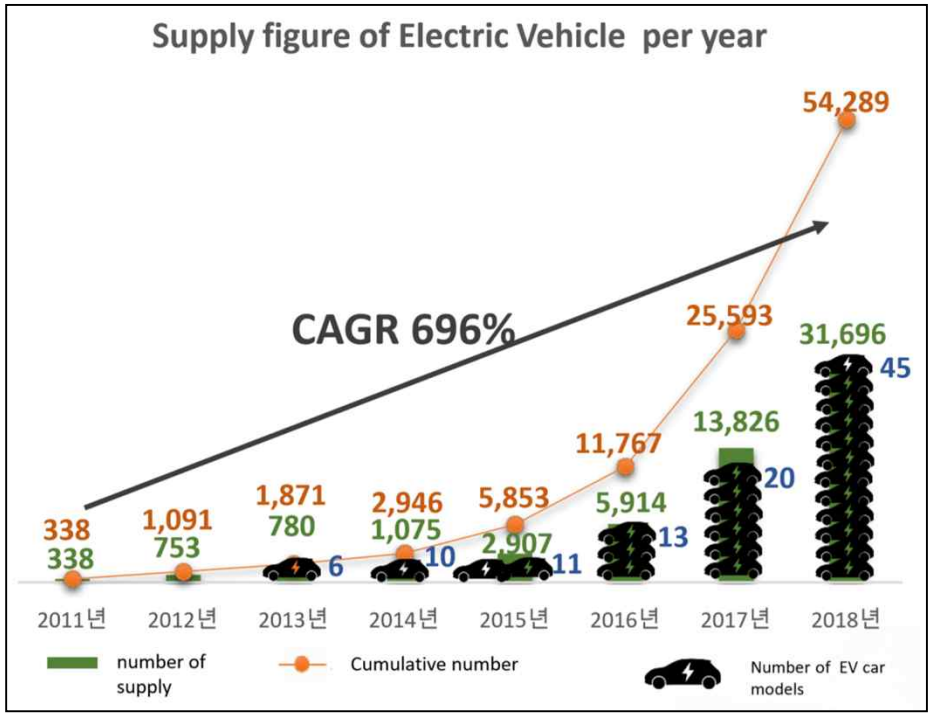
1. Introduction : EV market in Global

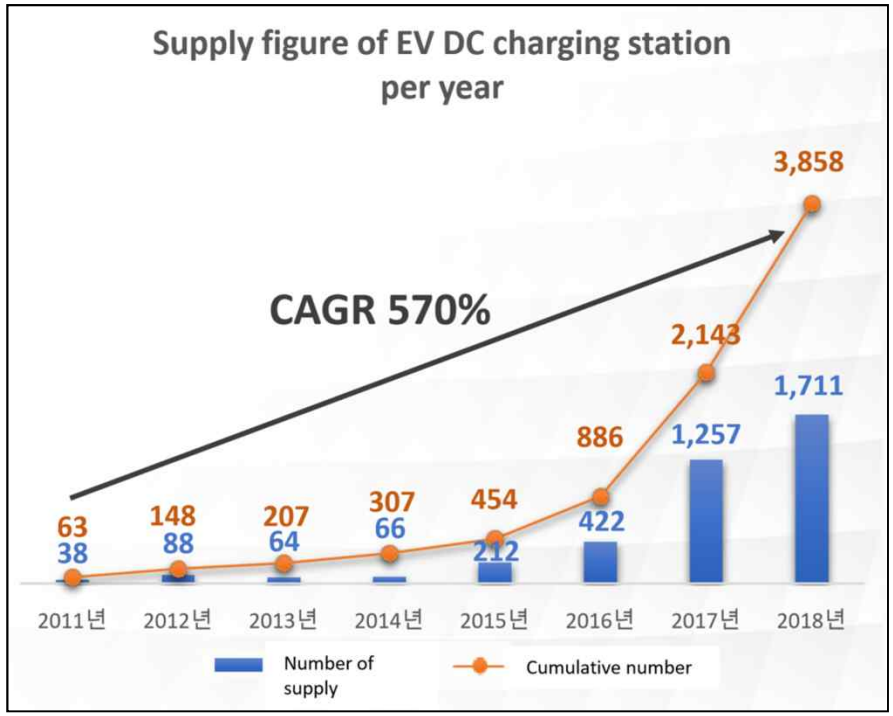
- **2017: 3.2millions → 2018: 5.1millions (63% ↑)**
- **EV Market Share: China(230mil, 45%), EU(120mil, 24%), US(110mil, 22%)**
- **EV stock of registered vehicle(1st): Norway(10%, 2018)**



1. Introduction : Overview of EV Status in Korean

- **Registered vehicle in Korea(2018) : 23,202,355 (Pure EV 54,289)**
- **Registered Pure EV in Korea (2018) : 54,289 (All EV(HEV, PHEV,…..) : 368,650)**
- **EV Sales and Registered Statistic in Korea**





- **Incentives on EV purchase**

Purchase subsidy (Max 16,160)	Individual consumption Tax Exemption (Max $2,551)	Education Tax Exemption (Max $765)	Purchase Tax Exemption (Max $1,190)	Parking Fee Discount (Over 50%)

2. Policy on Future Vehicles in Korean

- **Announcement on Vision and Plan to nurture the Country's Automobile Industry by 2030 ('19.10.15)**

[VISION]

The goal of becoming the world's No.1 Powerhouse in car technology by 2030

Realization of 5-Free Society in Korea

Accident, Barrier, Congestion, Delay, Emission

Target #1	E-car·Hydro car proliferation 1st Country Market share(%): ('19) 2.6 → ('20) 4.9 → ('22) 9.9 → ('25) 18.3 → ('30) 33.3
Target #2	Full(Lv4) Autonomous Vehicle in all road ('27) Launch Lv3 AV('21) → Lv4 AV in Highway('24) → Lv4 AV in all road('27)

[GOALS]

(Safety) Road Traffic Death : 3781('19) → Under 1000('30)

(Environment) Greenhouse Gas(30% ↓), Dust Particles(11% ↓)

3. R&D on EV in KATRI

- **Double Decker Electric Bus (Completed)**

  > Development of Body Structure and chassis on Double Decker Electric Bus

  > Development of Advanced Vehicle on Double Decker Electric Bus

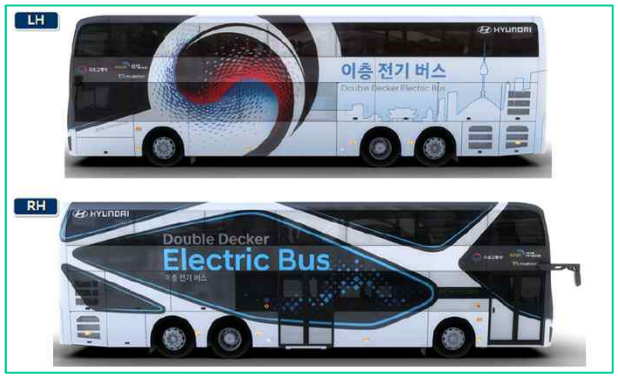
  * Specification: Length 13.0 m * Height 3.995m * Width 2.49m, 70(+1)seats

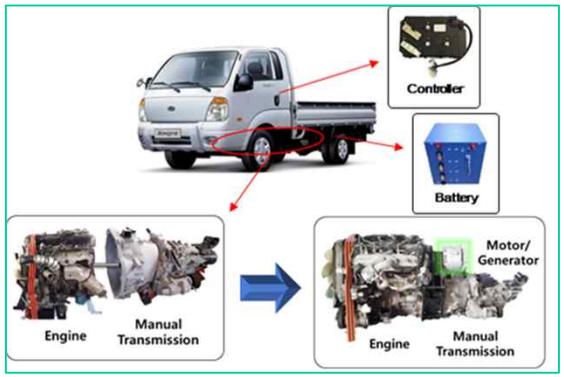
  * Driving distance / 1 charge : 420km, * Battery : 384kWh(6 packs) * Top Speed: 92.4km/h

- **Development of Modification Technology on eco-friendly hybrid diesel-electric truck for parcel delivery service**

  > Small Diesel Truck(In-use) → Eco-Friendly Hybrid Diesel Electric Truck

- **Technology development for e-LCV, with loading capacity 1ton and running distance 250km per charge**





4. Standards on EV

- **KMVSS (Korea Motor Vehicle Safety Standards)**

  > 'Automobile Management Act' Established as of Dec 31, 1986 from 'Road Traffic Act'

  > Total 165 articles(consist of 3 chapters) :

  Vehicle(Installation, Performance), Motorcycle(Installation, Performance), Parts Requirements

  > (Harmonization) 65 UN Regulations and 13 UN GTRs were introduced into KMVSS (~2019)

- **EV Safety Rules in KMVSS**

  > Motor Power (KMVSS Article 111)

  - Limitation Tolerance on Maximum power and Maximum average power for up to 30 minutes

  > REESS (Rechargeable Energy Storage System, KMVSS Article 18-3)

  - Physical Battery Test : Drop Test, Immersion Test, Over-Charge Test, Over Discharge Test, Thermal Exposure Test, Fire resistance Test, External Short Circuit Test

  > Electric Safety for High Voltage (KMVSS Article 18-2)

  - Check Protection against indirect contact and direct contact
  - Check Condition of Pre-Crash and Post Crash

  > Electromagnetic Compatibility for Motor and REESS (KMVSS Article 111-2)

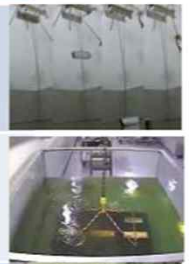
  > QRTV (Quiet Road Transport Vehicles, KMVSS Article 53-3)

4. Standards on EV

- **EV Safety Rules in KMVSS**

  > REESS (Rechargeable Energy Storage System, KMVSS Article 18-3)

Test Name	Description	Duration Test Time
Drop test	Free-fall battery test at 4.9m height * Criteria : Either explosion or ignition should not be occurred.	1 hour observation after free-fall battery
Immersion Test	Battery submerged simulation test with 0.6M salt water which is similar to sea water (1 hour) * Criteria : Either explosion or ignition should not be occurred.	1 hour observation after battery was submerged
Over-Charge Test	For verifying protection function of battery in case of over-charge condition Over charge until SOC(State of Charge) 150% * Criteria : Either explosion or ignition should not be occurred.	Depend on battery own capacity by battery supplier
Over-Discharge Test	For verifying protection function of battery in case of over-discharge condition Over charge until SOC(State of Charge) 150% * Criteria : Either explosion or ignition should not be occurred	Depend on battery own capacity by battery supplier
Thermal Exposure Test	For verifying battery safety with high temperature condition * Criteria : Either explosion or ignition should not be occurred.	Total 5 hours * Increase temperature up to 80℃ : within 1 hour * Staying temperature at 80℃ : 4 hours
Fire resistance Test	In order to secure escape timing when passengers are able to get out of vehicle * Using LPG to combust battery (Korea only) * Criteria : Explosion should not be occurred	Total 1 hours 2 minutes 30 seconds * Increase temperature up to 800℃ : within 30 seconds * Staying temperature from 800℃ to 1100℃ : 2 minutes * Keep battery after finishing combustion : 1 hour
External Short Circuit Test	For verifying external short circuit condition • Criteria : Either explosion or ignition should not be occurred. • Resistance : Under 50 mΩ	Within 5 minutes (* If short circuit protection was not equipped, duration test time will be about 1 hour.)



Thank you very much ! !

Korea Transportation Safety Authority
Korea Automobile Testing & Research Institute