

# EV Development status of HMG

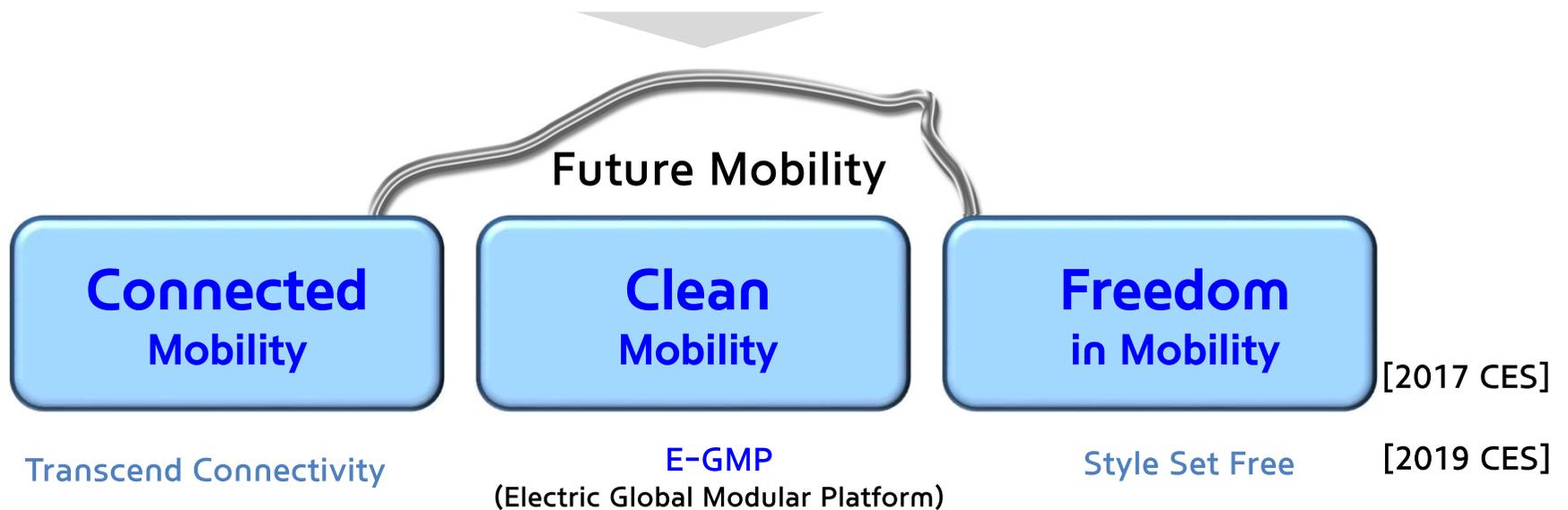
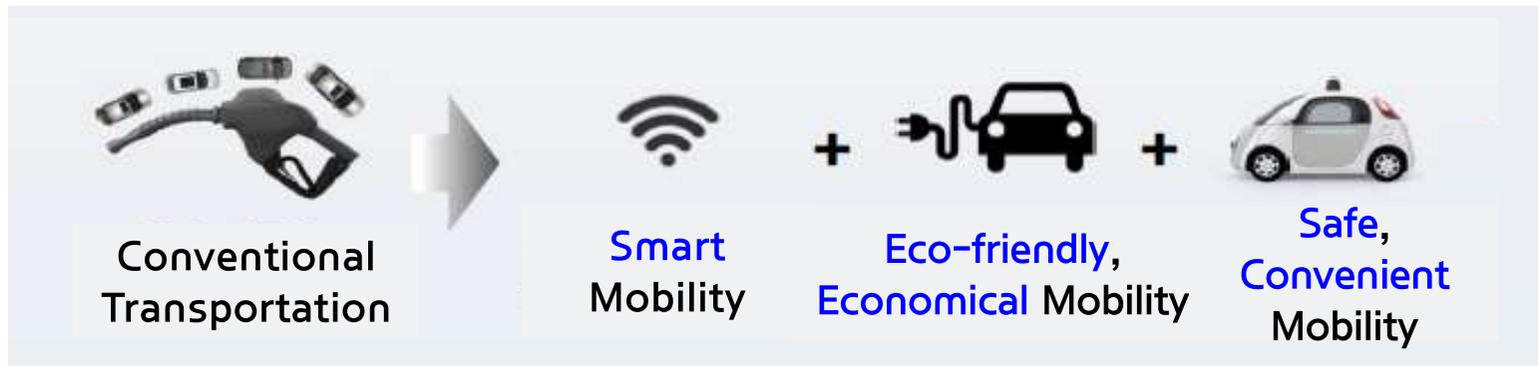
Powertrain Performance Development Center, R&D Division  
Hyundai Motor Group

- I. Global Green car(EV) Market Trend**
- II. HMG's Green car(EV) Status and Strategy**
- III. Concluding Remarks**

# I . Global Green car(EV) Market Trend

# HMG's way to future mobility

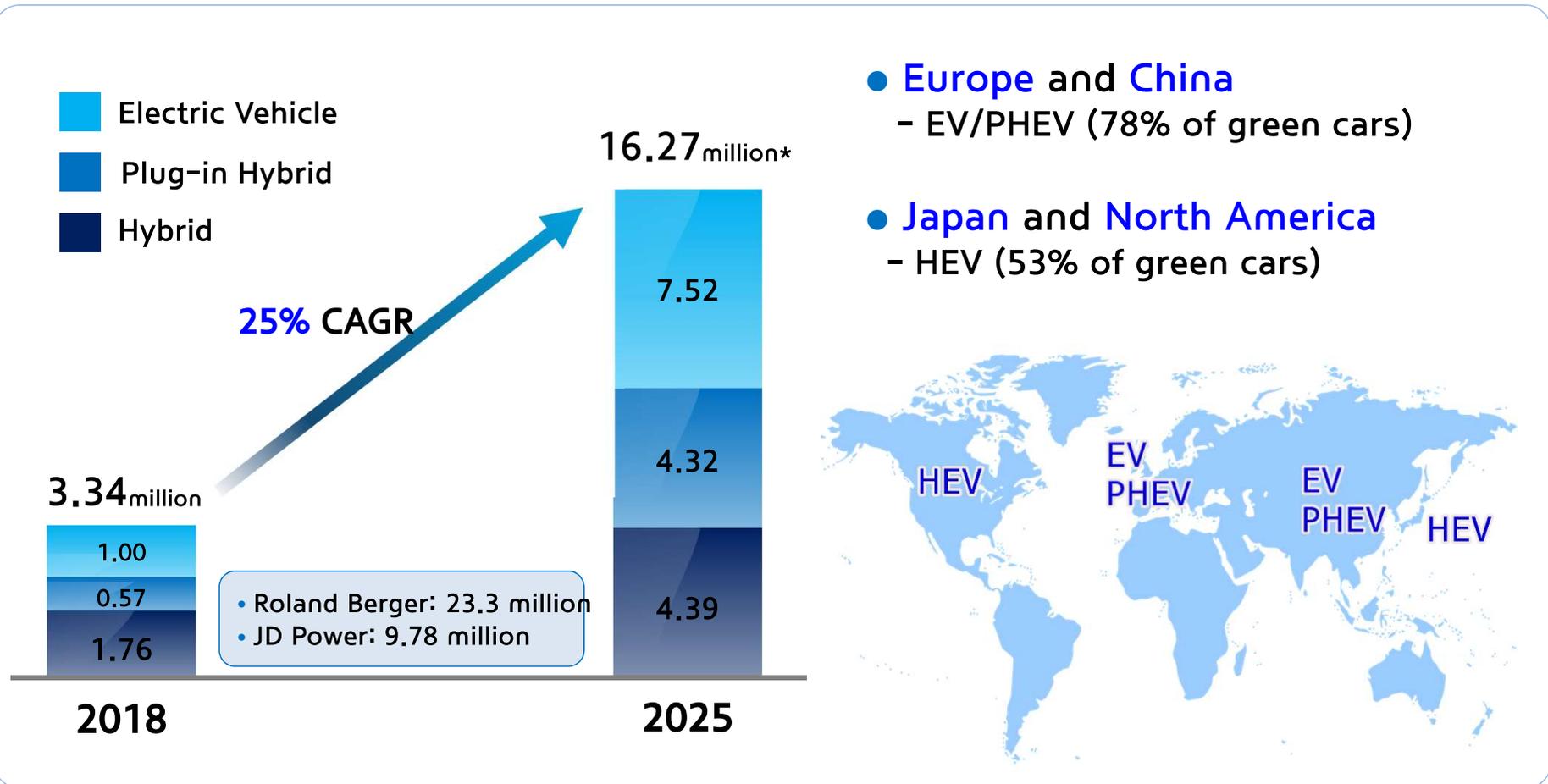
**Paradigm Shift** in automotive industry has brought a “New Concept of Mobility”



# Green Car Market Forecast

By **2025**, global green car market will expand to **16M. Units**

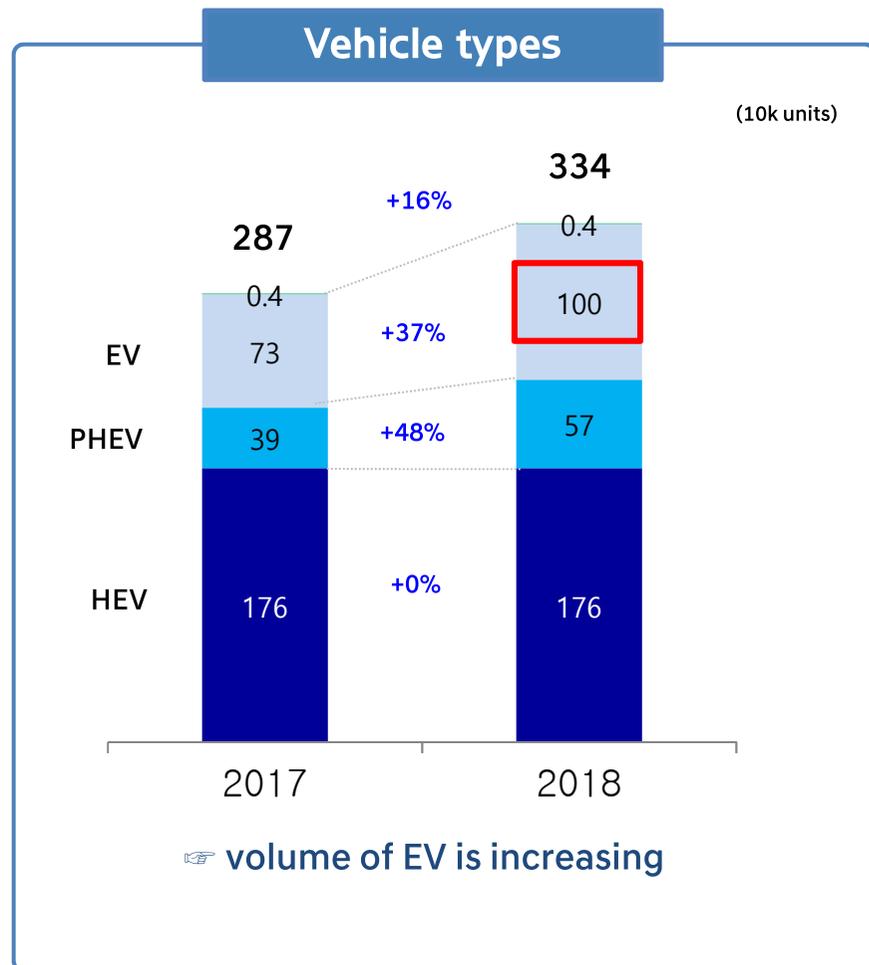
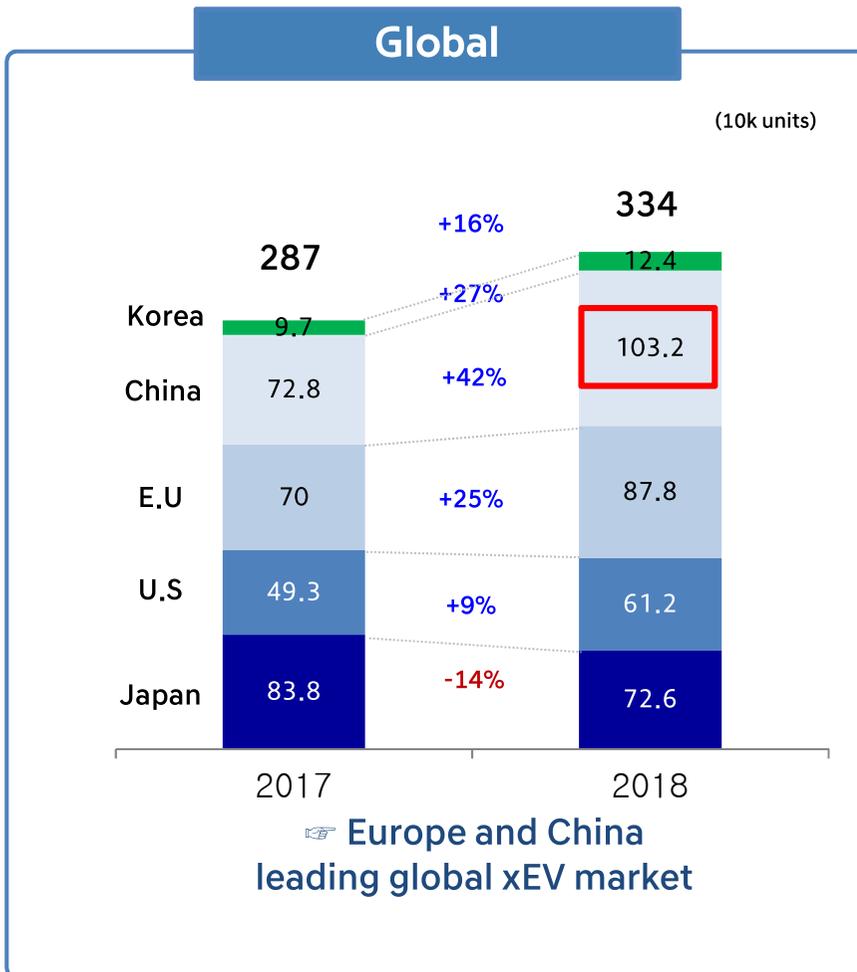
\* about 15% of global vehicle market (110M.)



\* Estimation based on external research institutes and HMC internal data

- CAGR : Compound Annual Growth Rate

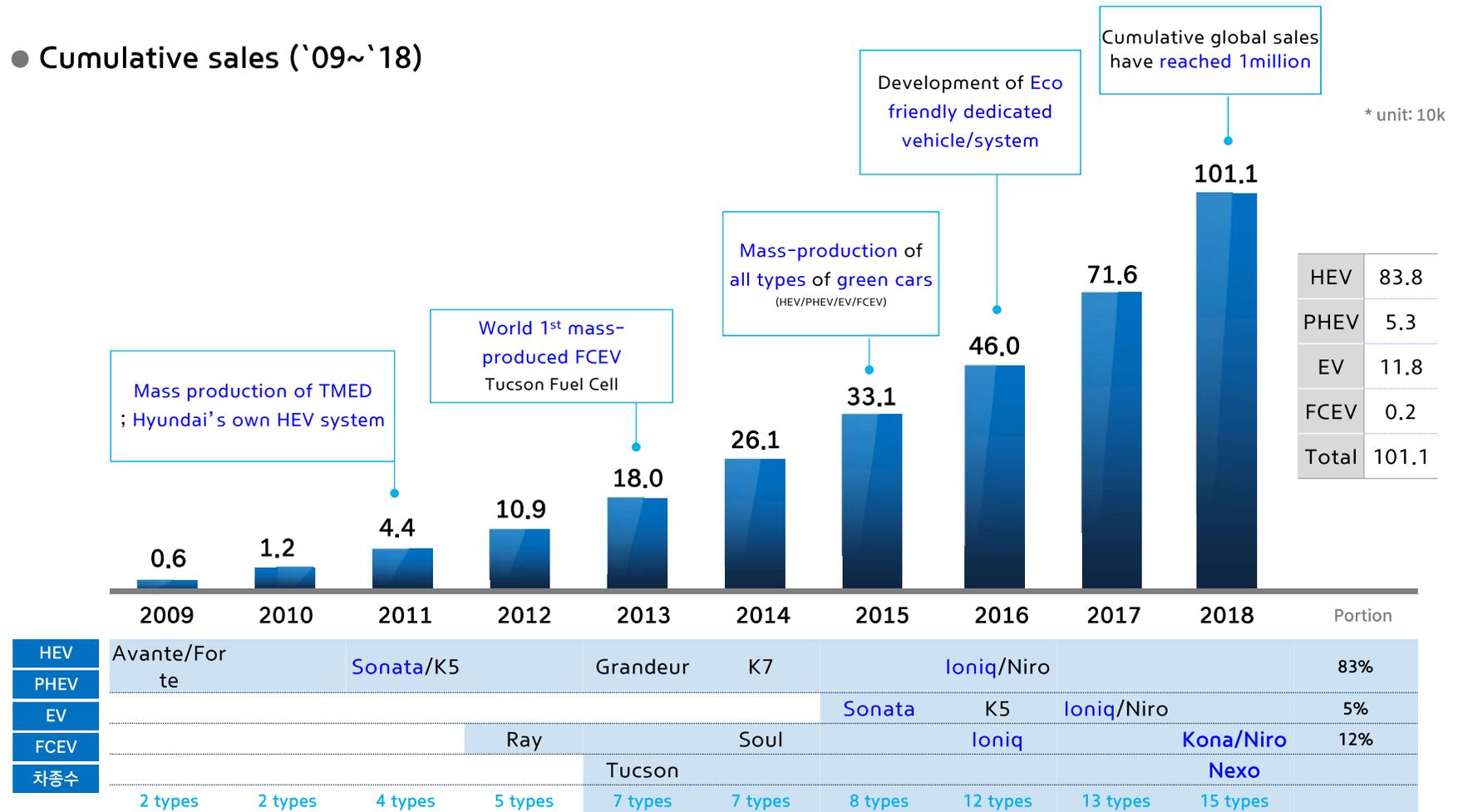
Global sales of 2018 have reached **3.34 Million units**



## **II . HMG's Green car(EV) Status and Strategy**

## Cumulative HMG Global Sales Hit 1 Million (July '09 ~ Dec '18)

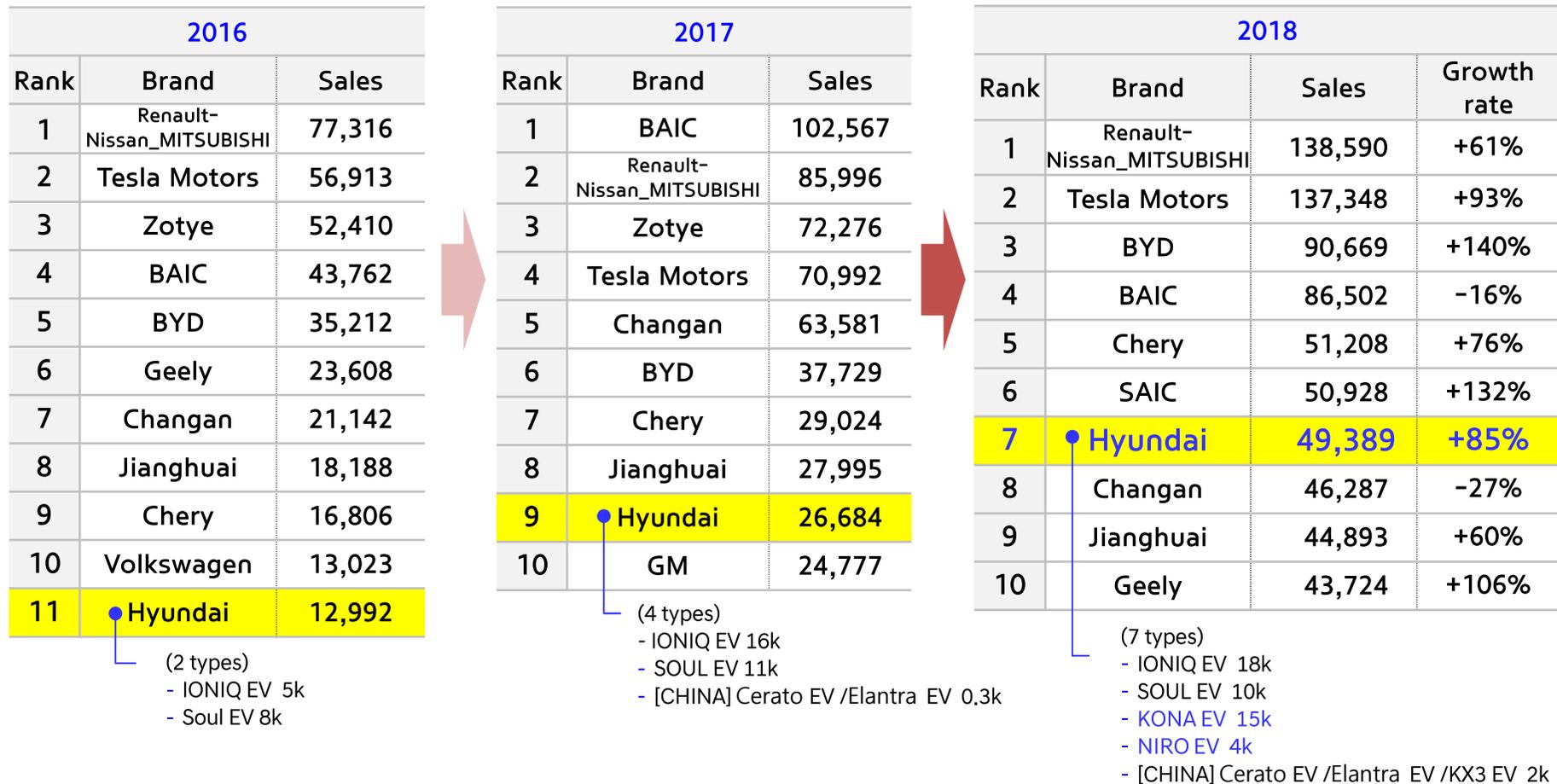
● Cumulative sales ('09~'18)



## HMG EV global sales jump to rank 7 in 2018 (4 folds increase since 2016)

### ■ HMG Green Car Sales continuously growing

Source: IHS Markit



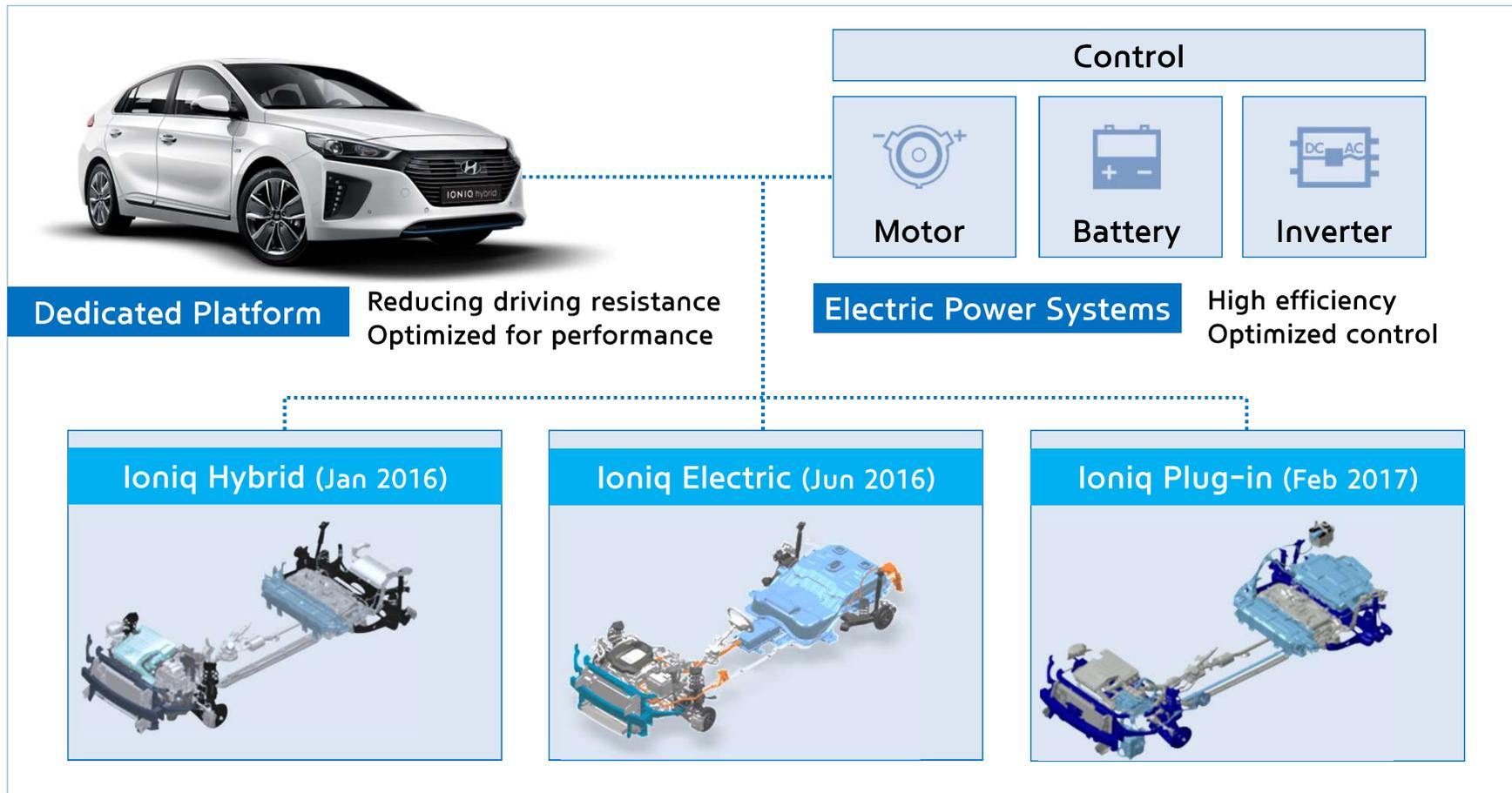
# HMG's Green Cars : Past, Present, and Future

Expanding to **44 models by 2025** (15 models in 2018)



**World's the first vehicle to offer 3 electrified powertrains in a single platform**

- Based on a **dedicated platform**, **highly efficient** electric power system provides **the best performance**.



## The Most Fuel-Efficient Car (among IC engine and HEV) by EPA

\* EPA : Environmental Protection Agency in USA

### IONIQ hybrid

2016, released in global market



### DCT - TMED (TMED: Transmission Mounted Electric Device)



(EPA Ratings, 2018 MY, Unit : mpg)



© Hyundai's TMED system + DCT for HEV

→ World's best fuel efficiency and powerful performance

© Dedicated high efficient P/T system

→ Dedicated hybrid engine (40% efficiency)

→ Highly efficient motor drive system

→ Dedicated hybrid DCT 1

## The most energy-efficient vehicle in the world

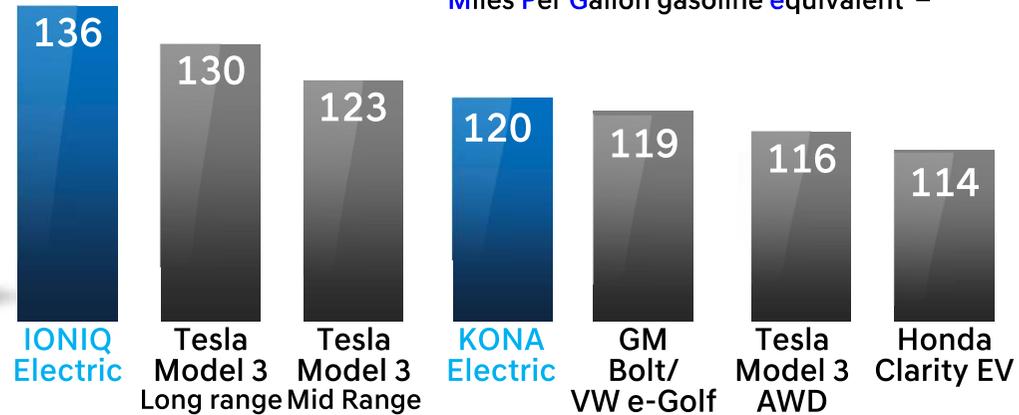
# IONIQ electric



DOE : Department of Energy

(EPA Ratings, 2018 MY)  
Unit : MPGe

Miles Per Gallon gasoline equivalent



Selected as “the Greenest Vehicle” by ACEEE\*

\* ACEEE : the American Council for an Energy-Efficient Economy

SUV<sub>type</sub> Long-Range EV :  
**KONA Electric** ( `18.4), **NIRO EV** ( `18.7), **Soul Booster EV** ( `19.2)



**KONA** Electric



**NIRO** EV



**SOUL** EV BOOSTER

- ★ the Next Green Car Awards in U.K.
- ★ Car of the Year 2019 in North America

- Electric driving range (Korea)

Type (Range)	KONA Electric	NIRO EV	Soul Booster EV
Long	<b>406 km</b>	<b>385 km</b>	<b>386 km</b>
Standard	254 km	246 km	250 km

\* NIRO: Cd better, ETW worse

- Specifications

Type (Range)	Motor	Battery
Long	150 kW	64 kWh
Standard	100 kW	39.2 kWh

- Advanced Power Electric devices

- Liquid-cooled 64kWh Li-ion Battery
- Integrated type motor and inverter
- PE components : 160,000km or 10 years warranty

- Segment-leading Driving Range

- Cutting-edge ADAS Systems



Forward Collision-Avoidance Assist



Lane keeping assist

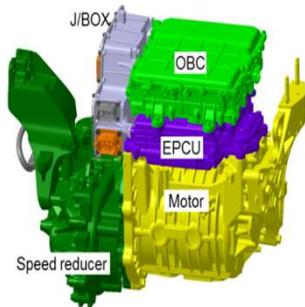


Highway driving assist

## Integrated Motor Systems with High efficient EPCU High energy density battery system

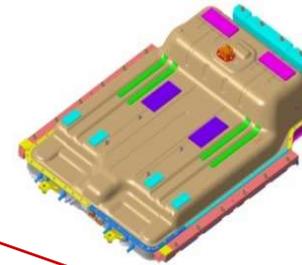
### Integrated Motor with Electric Power Control Unit

- EPCU (Inverter+LDC+VCU) Integrated & high power density
- On Board Charger with higher power output
- High powered Motor & dynamic performance



### High-Volt. Battery Pack

- High energy density Lithium-Ion Polymer Battery (LiPB)
- HV shut off device under the hood in addition to a safety plug
- Liquid Cooled System/ Battery Heater



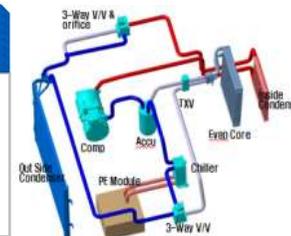
### Integrated Electric Booster

- Integrated motor-driven Booster Pressure build-up (motor) + Controller (ECU/Valve)
- Decrease of the operating noise/ cost and weight
- Maximizing Regen Braking



### Heat Pump (optional)

- High efficient heating
- Utilizing waste heat from drivetrain



**KONA Electric, Winner in EV Real Range Test by 『WHATCAR?』 ('18.10)**  
**NIRO EV, 『Car of the Year 2019 : Overall Winner』 by 『WHATCAR?』 ('19.1)**

\*WHATCAR? : authoritative automobile magazine of UK.

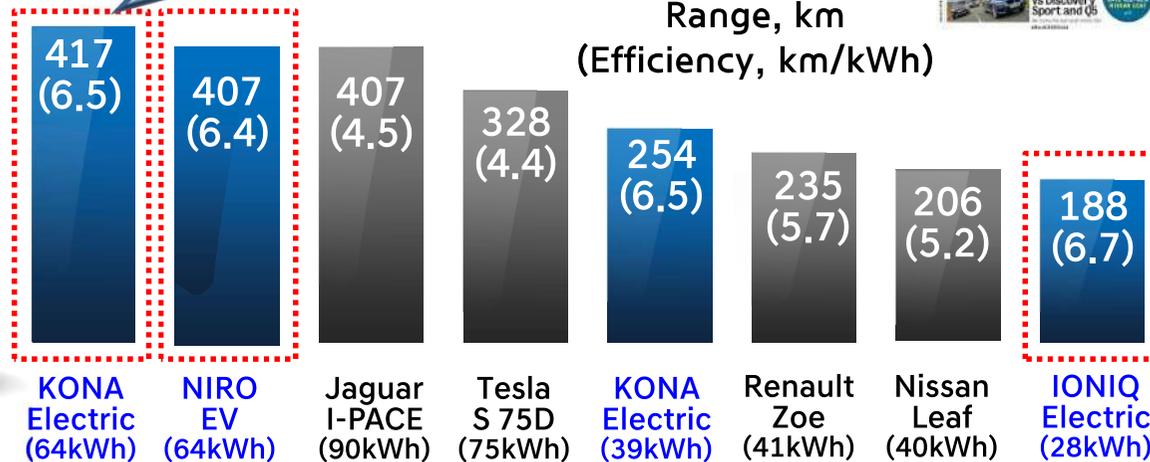
## 『True MPG Test』 by WHATCAR!



Winner in Range



Range, km  
(Efficiency, km/kWh)



449  
(WLTP)

470  
(WLTP)

Winner in Efficiency

# HMG's EV- Development strategy

**Goal : Economic + Long Range + High Performance EV**  
(Fun-to-Drive)

'14 ~

Standard Range EV (~300 km)

2016  
IONIQ Electric



'18 ~

Long Range EV (500 km~)

2018  
KONA Electric



'20 ~

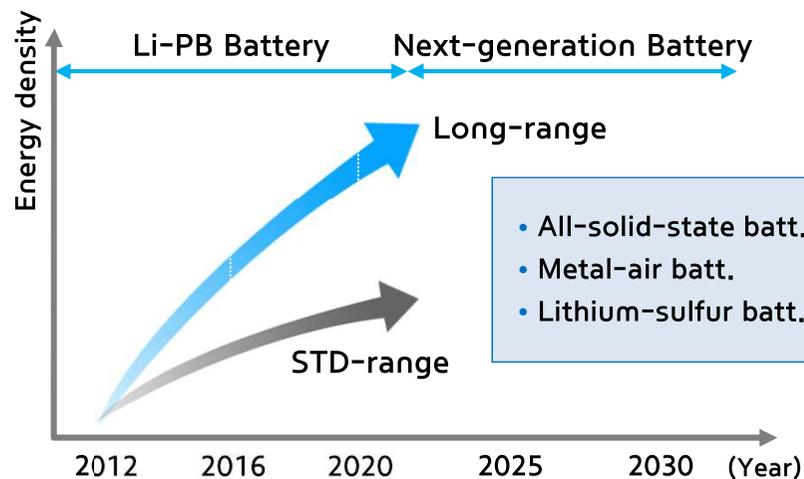
High-performance Long Range (500 km~)

2021  
GENESIS Electric  
(EV dedicated Platform)



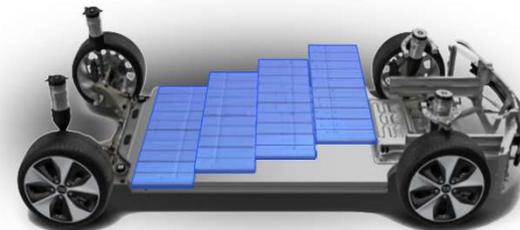
※ range : EU,  
NEDC

## < Next-Gen. Battery for Long Range EVs >



## < Dedicated EV Platform ; E-GMP\*\* >

- Flexible battery capacity for all segments
- High voltage system to reduce charging time
- High power charger : 400kW global standard



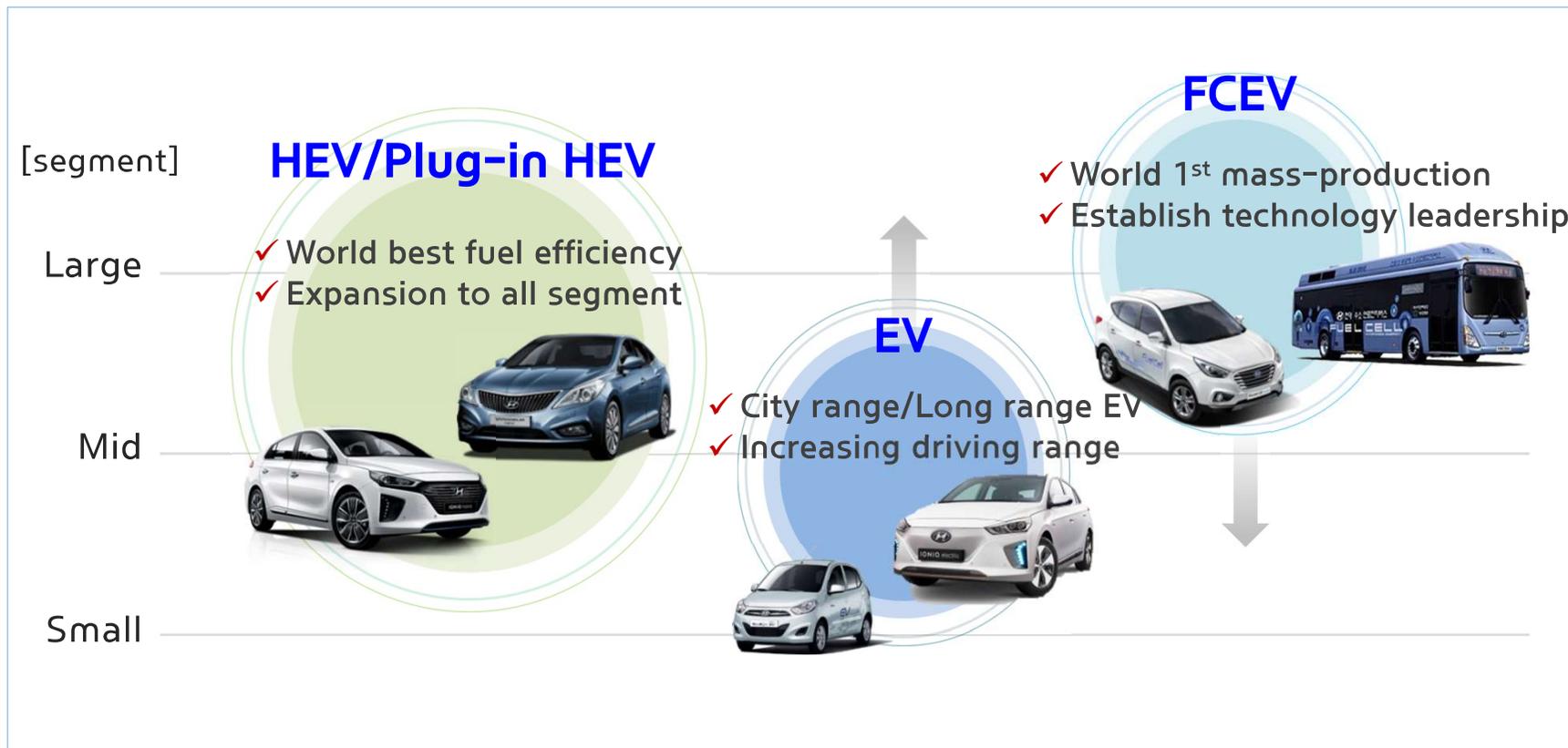
\* concept image

\*\*Electric-Global Modular Platform (released in CES 2019)

## **III. Concluding Remarks**

# HMG's Green Car – R&D Direction

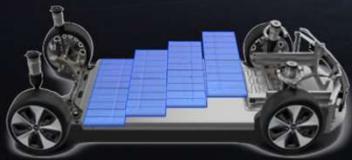
Development of **all three types of xEVs** to respond **global market needs** and to lead **future mobility market**



*“Lifetime partner in  
automobiles and beyond”*



*Thank You*



**HYUNDAI**  
MOTOR GROUP

NEW THINKING.  
NEW POSSIBILITIES.