

# HYUNDAI MOTOR GROUP

## HYDROGEN VISION



**Sae Hoon Kim, Dr.-Ing**

HEAD OF FUEL CELL CENTER  
VICE PRESIDENT

# ✓ The automotive industry is facing challenges & opportunities

## GLOBAL ENVIRONMENTAL CHALLENGES

### CLIMATE CHANGE



- Reducing CO2 emissions

\* COP21, PARIS 2015

### AIR QUALITY



- Restriction on ICE vehicles

### ENERGY SECURITY



- Diversification of energy sources

## COUNTRIES

### NORWAY / NETHERLAND



ICE Vehicle sales to be prohibited from 2025

### FRANCE / UK



Diesel Vehicle sales to be prohibited from 2040

### CHINA



New conventional vehicle manufacturers (including HEV, PHEV) to be prohibited from entering the market from 2019

## OEMs



VW plan to stop developing gasoline & diesel cars from 2026

'18. 12



Daimler to make its vehicles Carbon Neutral by 2039

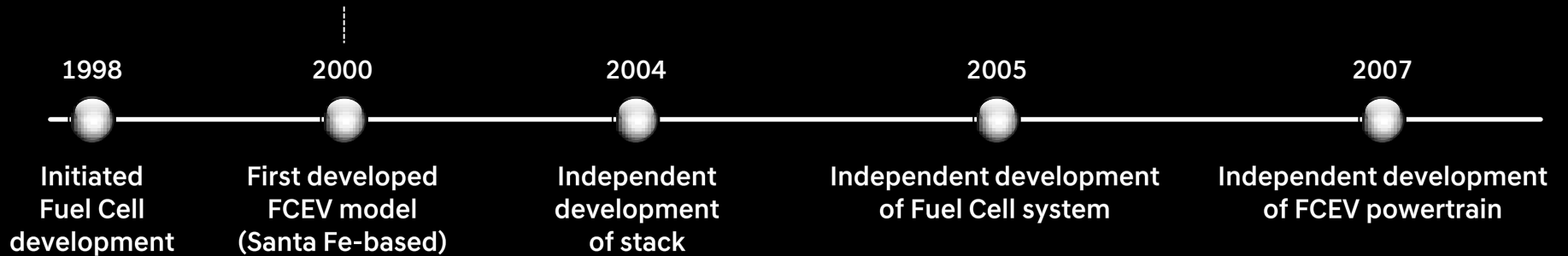
'19. 5



HMG to produce 44 eco-friendly vehicles by 2025

'19. 1.

# ✓ Hyundai Motors has paid its devotion in developing FCEV



## ✓ All-new dedicated FCEV, offering Hyundai's most advanced future technologies



### 1. Advanced Power Electric System

- The world-best driving range
- System efficiency 60%
- Refueled within 5 minutes
- In-house development for MEA, Metal Bipolar Plate

### 2. Durability & Storage

- Durability equivalent to conventional ICE : 160,000km /10 years
- The world-first 700 bar / Type4 3 tanks system : Cargo Volume Maximization

### 3. State-of-the-art ADAS Systems

[ Contribution to the environment ]

#### - AIR CLEANING EFFECT

The high-performance air filter can filter micro-particulates smaller than particulate matter (PM) 2.5

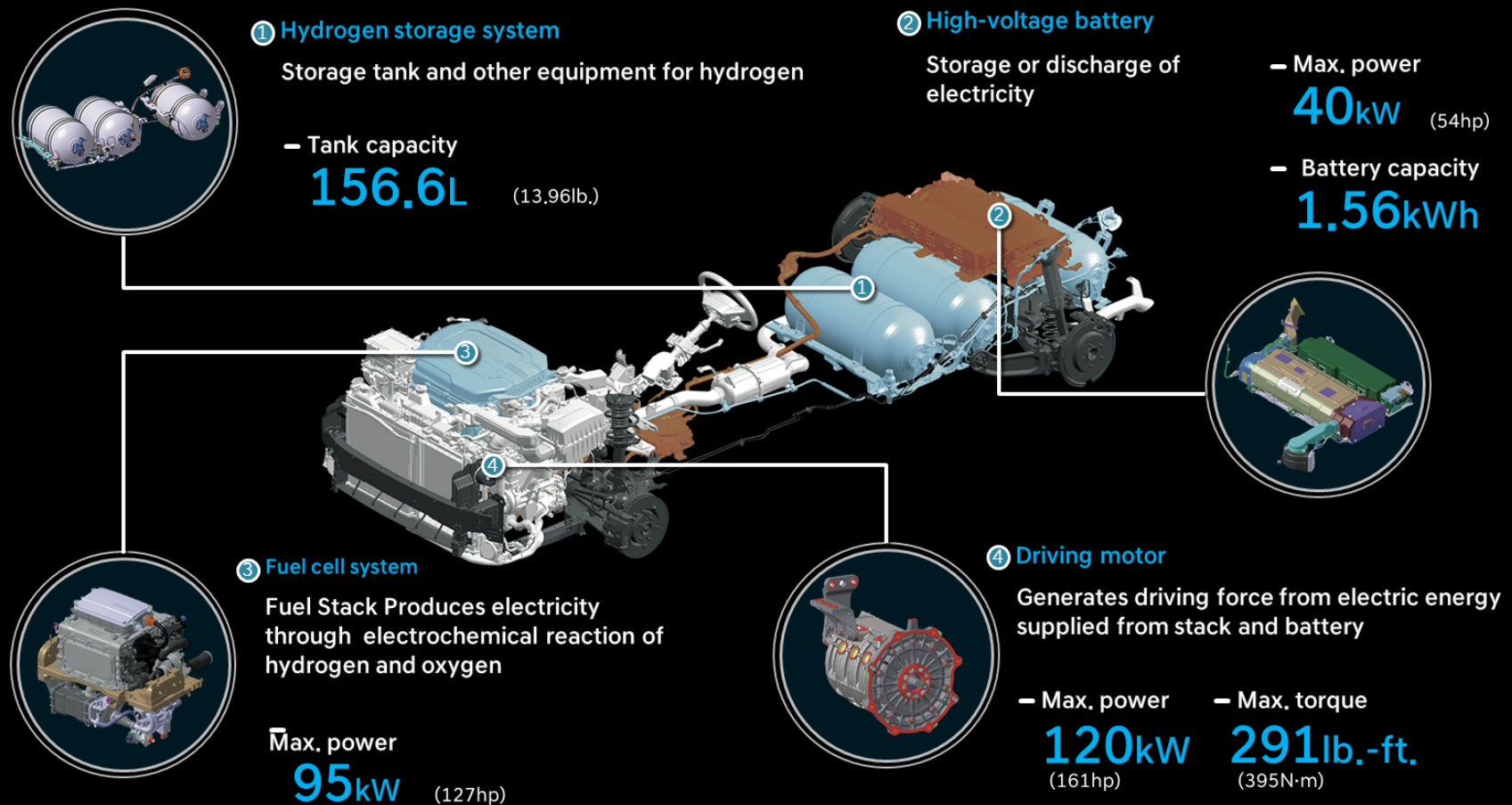


#### - FCV : SUPPLY ~ 10KW OF ELECTRIC POWER

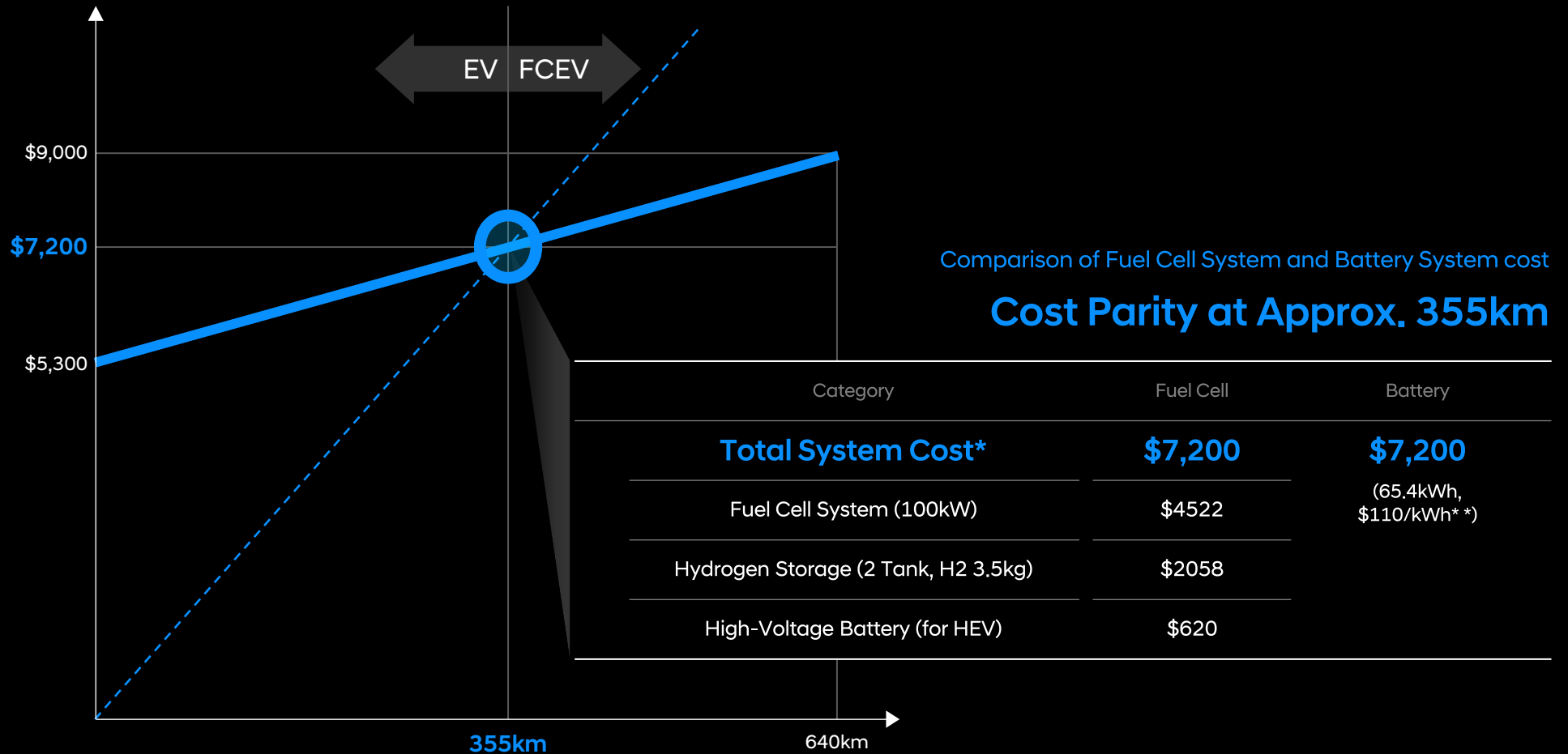
100,000 FCVs : Equivalent to a nuclear power plant (~ 1GW)



- ✓ **FCEV powertrain** developed with Hyundai's unique technology
- **Optimized system for FCEV to ensure high performance and efficiency**



Cost Parity / FCEV & EV



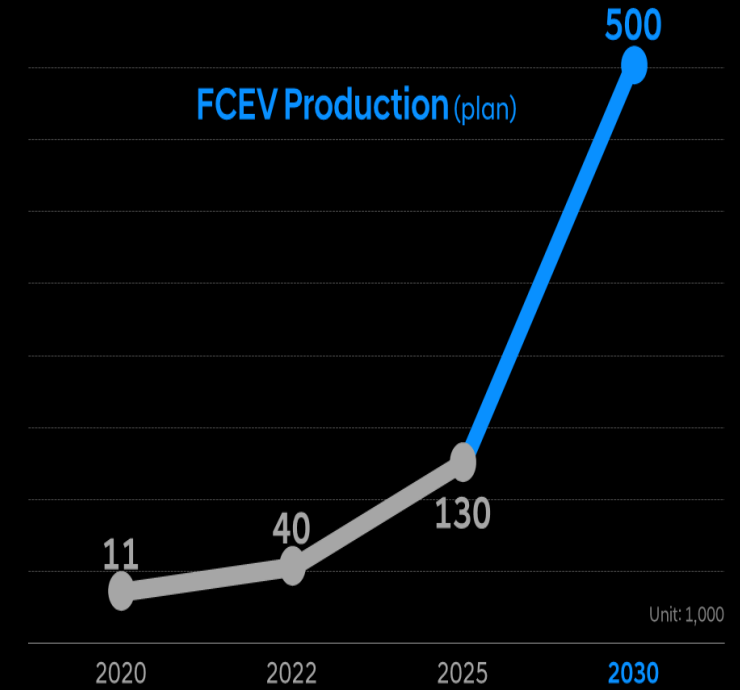
\* : NEDO\* & DOE\* Cost Road map for Fuel Cell System

\*\* : Bloomberg New Energy Finance forecast (2017, "Lithium-ion Battery Costs and Market")

# VISION 2030

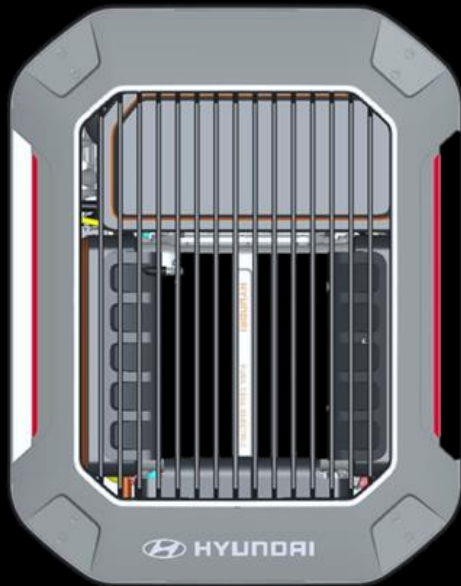
## ✓ Announcement of HMG's long-term roadmap 'Vision 2030' plan (11.DEC.2018)

- Plans to produce **700,000 fuel-cell systems annually by 2030** including 500,000 units for FCEVs
- **New Businesses Opportunities for Fuel Cell Systems beyond Automotive Industry**



## ✓ World top-class Fuel Cell System, 'Hyundai FC System'

- Role of clean solution provider for fuel cell applications with its advanced technology



Hyundai  
FUEL CELL System

### 1. Advanced Future Technology

- Eco-friendly system with zero CO2 emissions
- In-house development for core technologies (MEA, Metal Bipolar Plate etc.)
- Outstanding Efficiency (over 60%)
- Broad Applicability

### 2. Durability & Safety

- Proven durability for vehicle applications
- Improved low temperature control (-30 °C)
- Passed extreme safety test (gun shot, drop)

### 3. Mass Production Technology

- Stable Quality & Engineering support system
- On-time Delivery





Agreement  
only

### ✓ Collaborations with Business Partners to Expand & Lead FCEV Market

Memorandum of Understanding Signing Ceremony  
Collaboration in Hydrogen and Nonmetallic area

Saudi Aramco **أرامكو السعودية**  
Saudi Aramco

Agreement on development of raw materials and building of H2 charging station



Hyundai to supply 1,600 fuel cell electric heavy-duty trucks (from 2019 through 2025)



Cross-license agreement  
Share component





Thank You