

# FCEV DEVELOPMENT TREND AND HYDROGEN VISION



**Soonil Jeon**

HEAD OF FUEL CELL DESIGN GROUP



## 4 POTENTIALS

WTW Efficiency

Energy Carrier

Creating Jobs

Air Purifier

## AIR CLEANING EFFECT

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



※ Purify 99.9% of particulate matter, fine dust and air pollutants

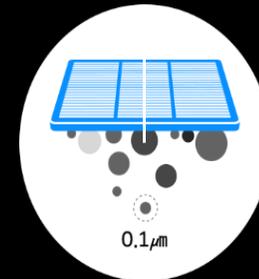
Air Filter



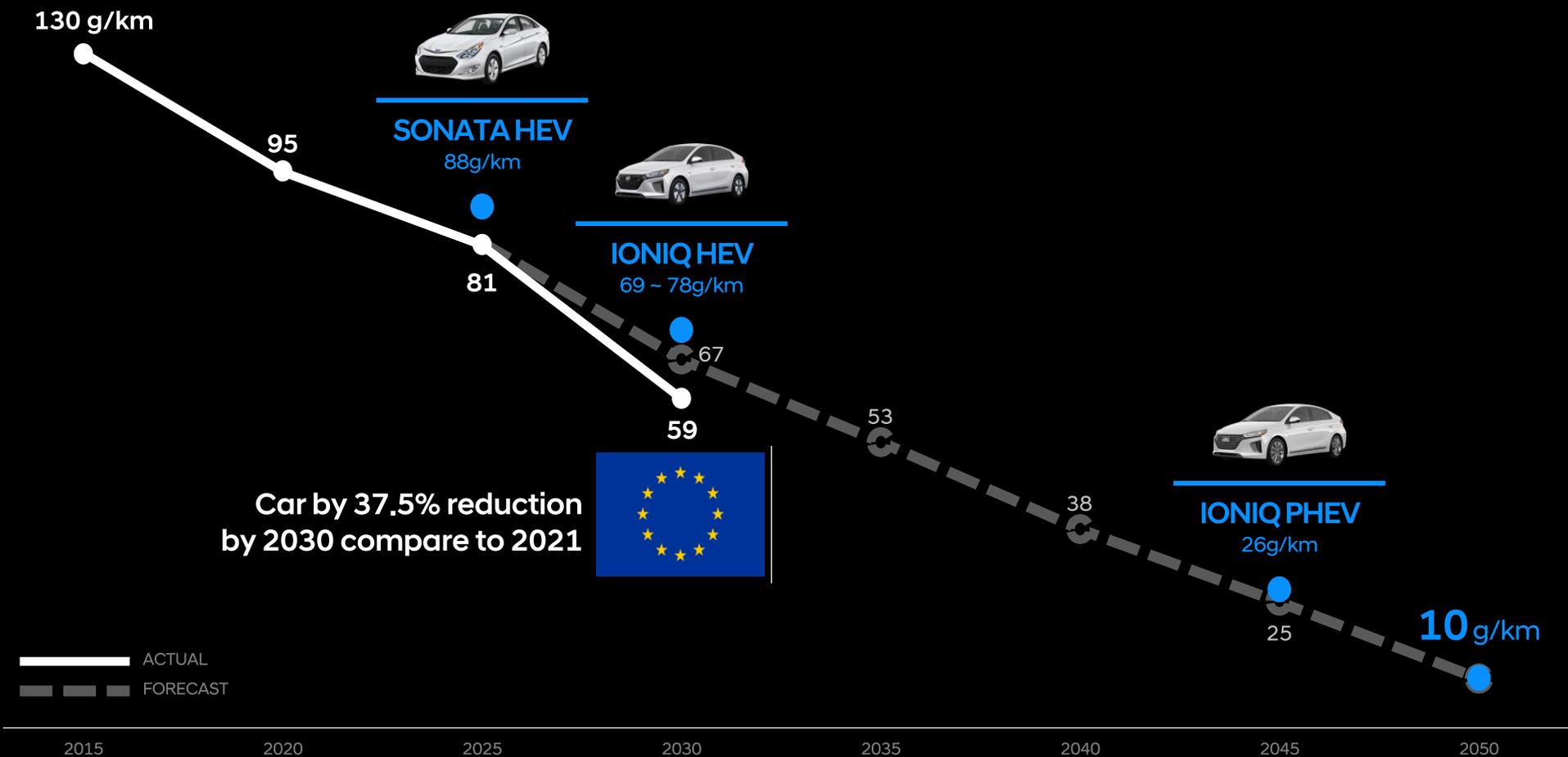
Humidifie



Gas Diffusion Layer



## Fuel Economy Regulation / EU



## VISION 2030

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

**As a first mover** in the forthcoming hydrogen economy, we will **lead a society that uses hydrogen** as its main source of energy

Euisun Chung, Executive Vice Chairman of Hyundai Motor Group



**" The hydrogen economic roadmap is a blueprint for Korea to emerge as a world leader based on this strength.**

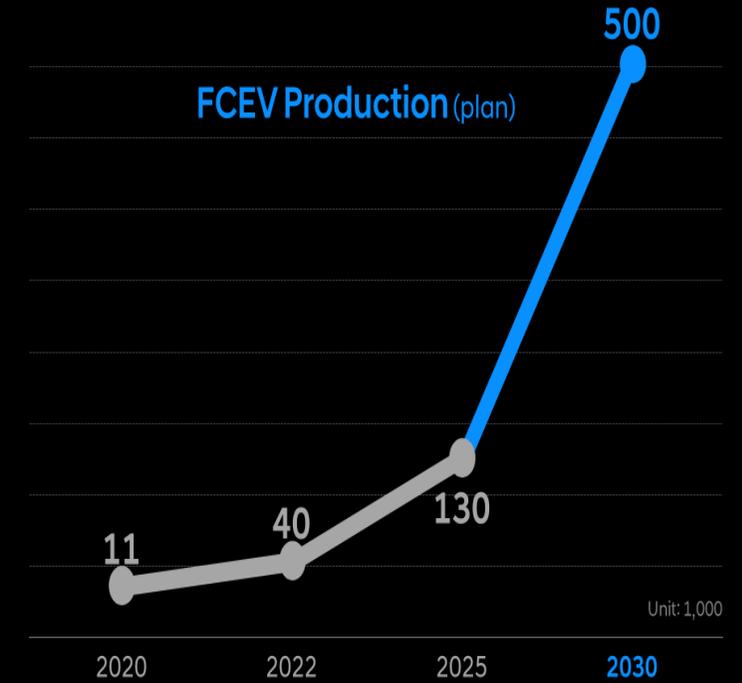
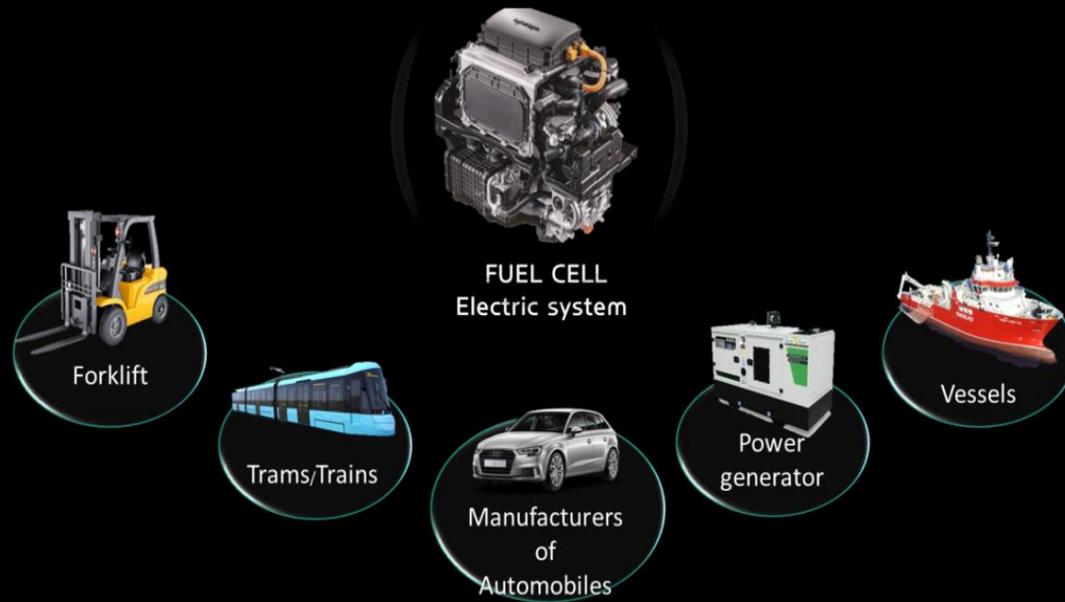
**Our goal is to rank first in the global market share in both hydrogen cars and fuel cells by 2030."** (Jan.2019)

- Moon Jae-in (South Korean President)



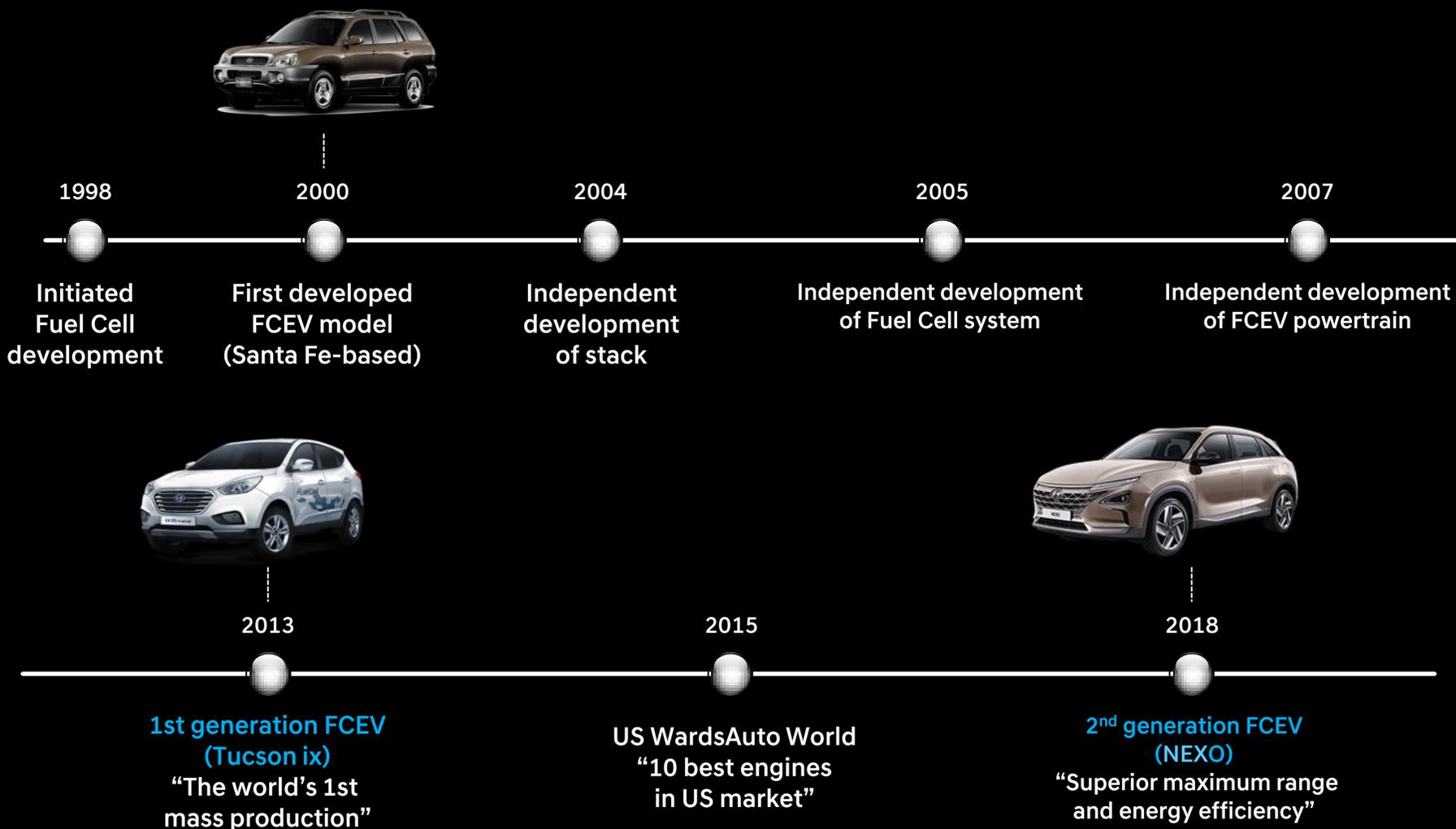
## VISION 2030

- 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**



## History of Hyundai FCEV

## ✓ Hyundai Motors has paid its devotion in developing FCEV



Hyundai FCEV / Tucson FCV

## WORLD 1<sup>ST</sup> MASS-PRODUCED TUCSON FCV ('13.2)

Deployed in 18 countries since 1st delivery to Copenhagen (2013)

Dedicated FCV assembly line in Ulsan Hyundai factory

France Eco - friendly Car of year from La Revue

Belgian 'Price FuturAuto'

Korea Silver Award

USA 2015 WARD's 10 Best Engine



FC stack	100 kW
Traction Motor	100 kW
Battery	24 kW
H2 Tank	700 bar
Driving Range*	415 km

\* Fuel Economy Label: 70% of EPA mode test results



CES2018 Editor's Choice (Automotive)

**NEXO** ('18)

Tucson ix FCEV ('13)

System efficiency	<b>60 %</b>	55 %
Power	<b>120 kW</b>	100 kW
Cold Start	<b>- 30 °C</b>	- 20 °C
Range	<b>609* km</b>	415 km

\*on Korean certificate basis

1. **Advanced Power Electric System**

2. **Durability & Storage**

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

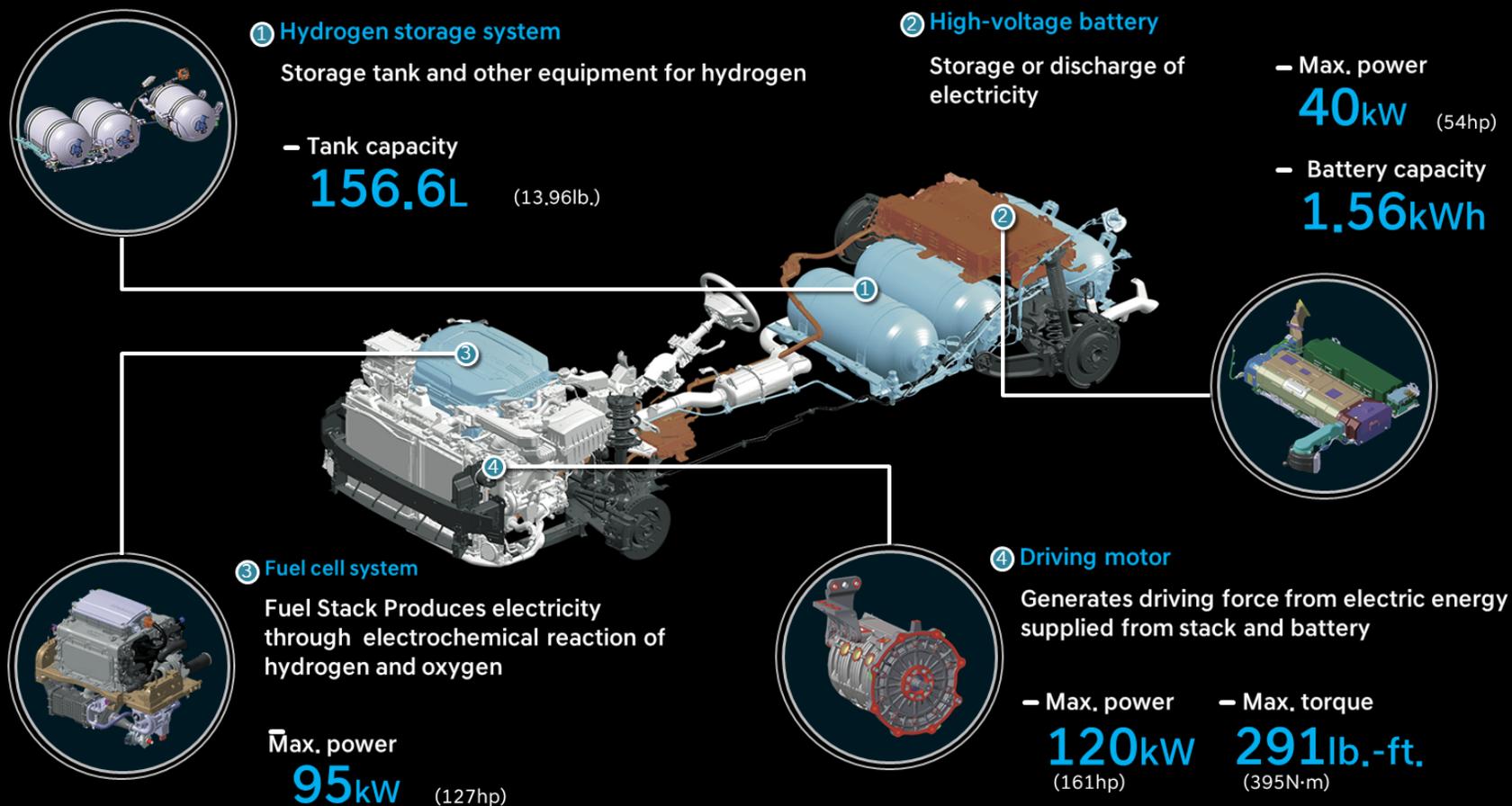


Integration System  
[Fuel Cell + Electric Motor]



Hydrogen  
storage system

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





## Top Safety rated Car, 'NEXO'



IIHS vehicle safety rating

**Top safety pick+**

Highest Rating

Euro NCAP Test



Highest Rating

Korean Government Safety regulation

**All Pass**

14 items

### Hydrogen Tank Extreme Test



Burst



Burn



Drop



Chemical



Gun shot

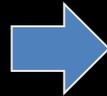


Cold Temperature

※ The hydrogen tank is completed through a number of verification tests



+



### FC BUS

2,000 buses in Korea by 2023



### FC Truck

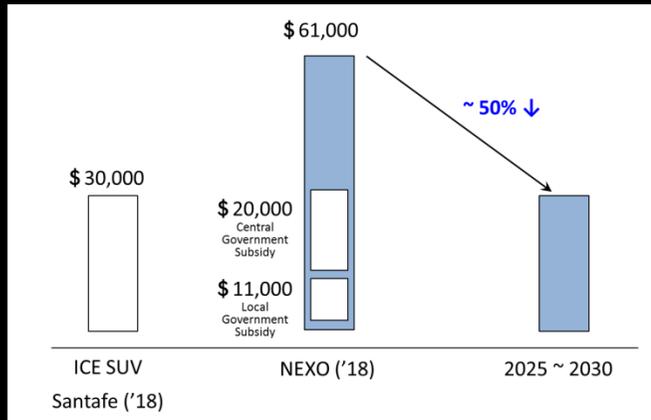
1,600 trucks to Switzerland by 2025



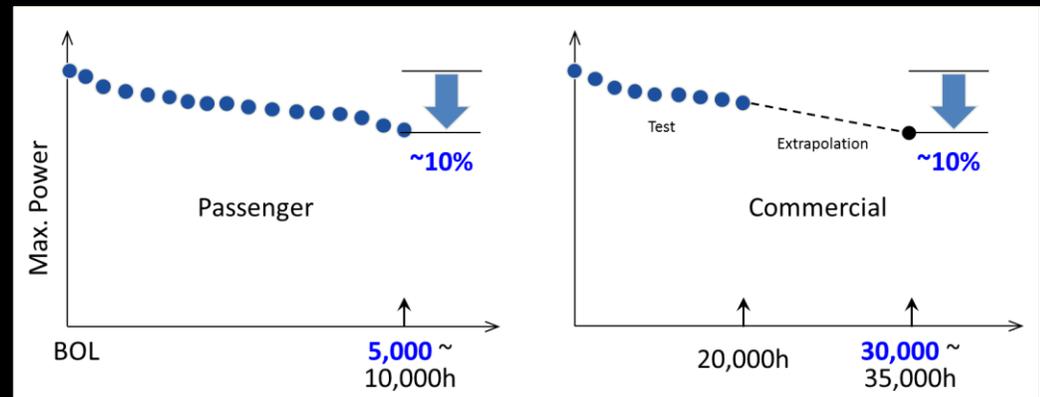
# ✓ World top-class Fuel Cell System, 'Hyundai FC System'

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

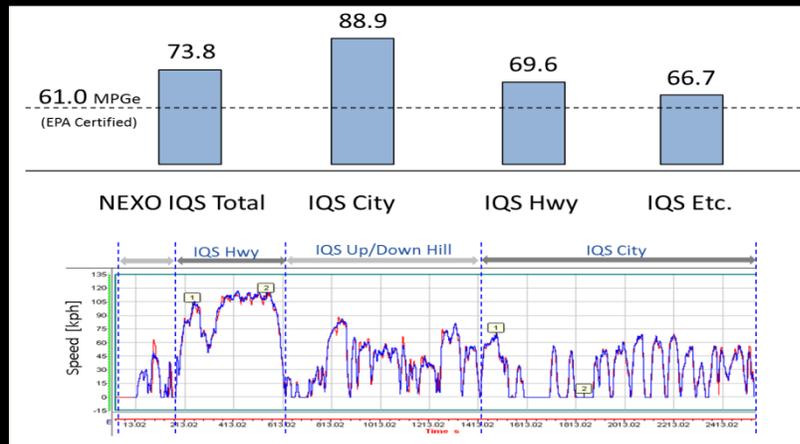
## 1. Low Cost



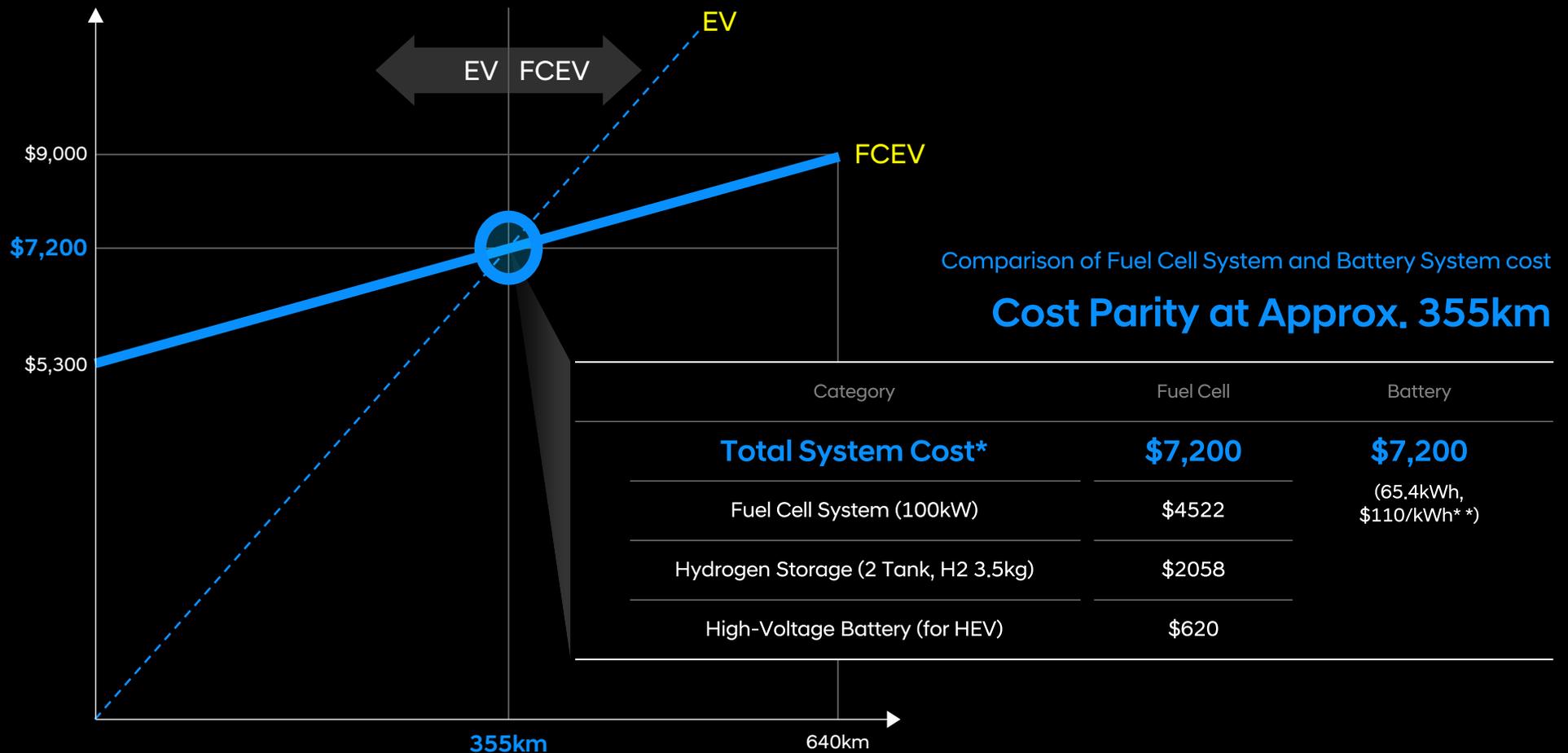
## 2. High Durability



## 3. High Fuel Economy

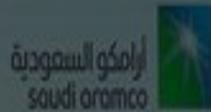


## Cost Parity / FCEV &amp; EV



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

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



# COLLABORATIONS WITH BUSINESS PARTNERS TO EXPAND & LEAD FCEV MARKET

Memorandum of Understanding Signing Ceremony  
Collaboration in Hydrogen and Nonmetallic area



Development cooperation of materials  
hydrogen charging station build up  
June 2019  
Seoul, Korea



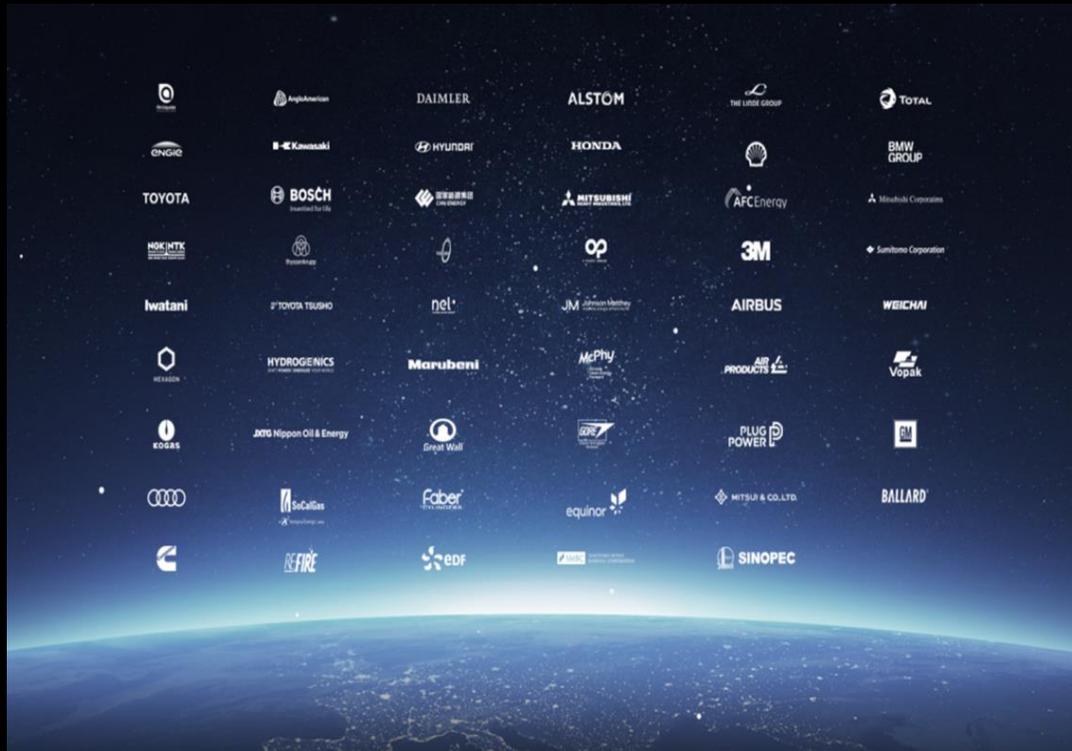
Collaborate on hydrogen commercial cars  
Development of fuel cell power generators



Cross-license agreement  
Share component



## 60 LEADING ENERGY, TRANSPORT AND INDUSTRY COMPANIES WITH A UNITED VISION AND LONG-TERM AMBITION FOR HYDROGEN TO FOSTER THE ENERGY TRANSITION



# Hydrogen Council

A global CEO-level initiative, launched at the World Economic Forum 2017, in Davos, January 2017

Co-chaired by Air Liquide & Hyundai since 2018

From 12 countries, covering three main regions : Europe, Asia and North America

As a responsible corporate citizen,  
Fuel Cell systems are our commitment to future generations

