

The logo consists of three concentric circles in shades of blue and green, centered at the top of the slide.

# Hanon

## SYSTEMS

Virtual Investor Day  
November 10, 2020



## Nurdal Kücükaya

President and  
Representative Executive Officer

**1 Growing in the Electric Vehicle Era**

**2 Accelerating Technology Leadership**

**3 Transforming Global Operations**

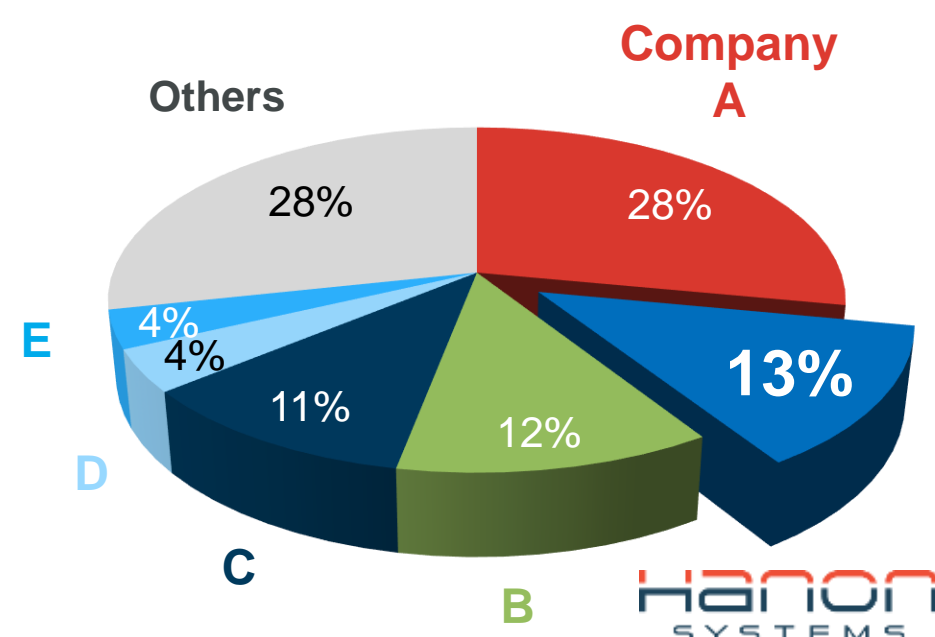
**4 Reporting 3Q20 Financials Results**

# Global Leader in Automotive Thermal Market



## Strong Market Presence

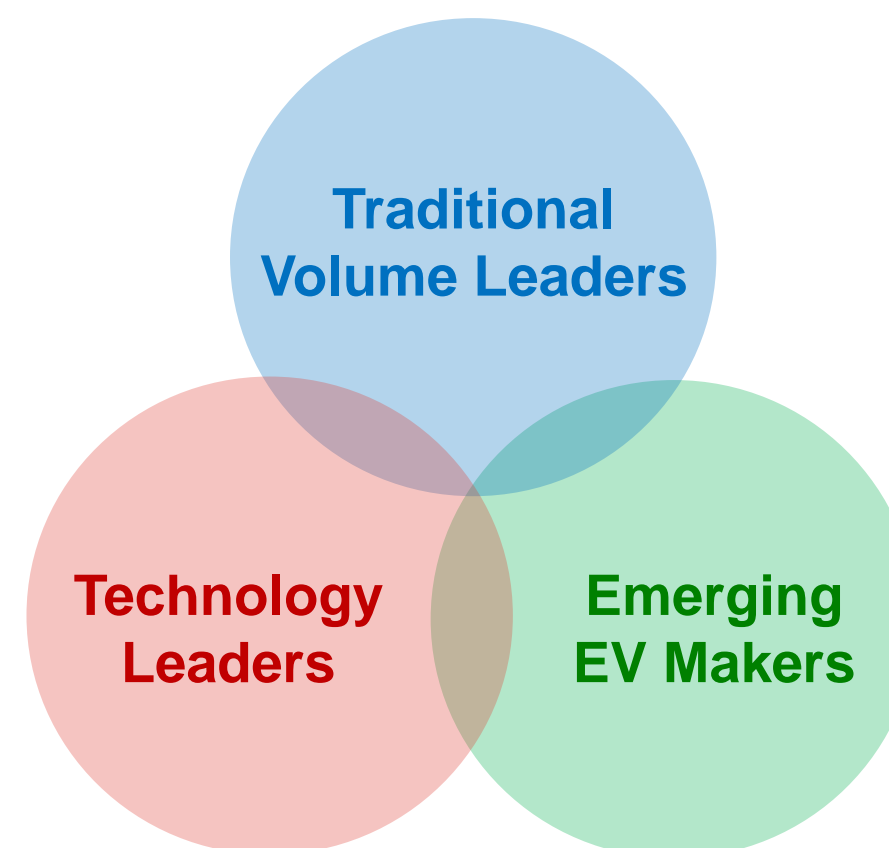
2019 Global Thermal Management Market Share



Source: IHS Markit, Hanon Systems

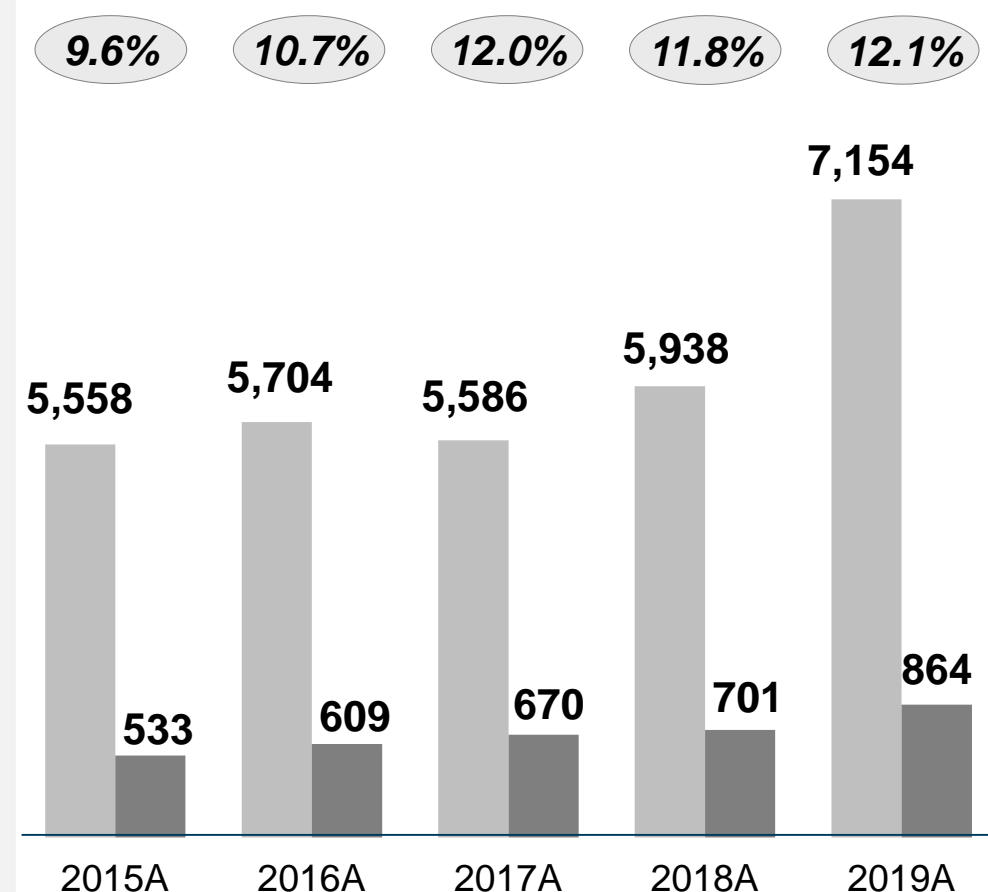
## Diversified Customer Base

Hanon Systems Customer Base

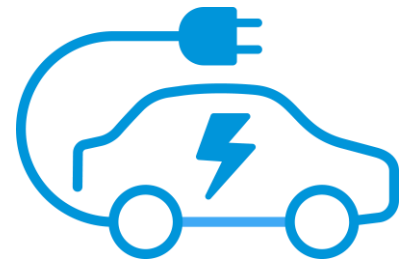


## Proven Financial Track Record

Revenue EBITDA EBITDA % of revenue  
(KRW in billions)



# Emerging Automotive Thermal Market Trends



## **EV driving range and cost competitiveness**

- Global propagation of battery electric vehicles



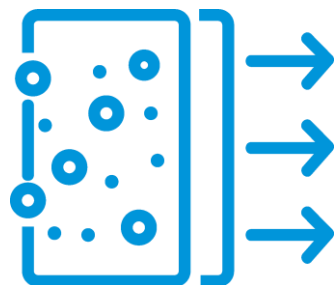
## **Introduction of alternative refrigerants (R744, R290)**

- Enhanced performance and lower global warming potential



## **Growing attentions on fuel cell electric vehicles**

- Accelerated by government support on infrastructure



## **Increasing passenger interests in cabin air quality**

- Disinfection beyond heating, ventilation and air conditioning



# History of Hanon Systems EV Thermal Business



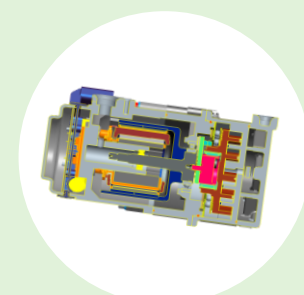
Early 2000s

Late 2000s

Early 2010s

Late 2010s and 2020s

## e-Compressor



**R134a e-Comp<sup>[1]</sup> Design ('07)**



**Gen 1 e-Comp Production for Early Stage xEVs of Multiple OEMs ('10)**



**Mass Production of Gen 3 e-Comp with New Scroll Design ('13)**

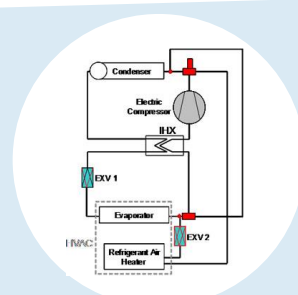


**Mass Production of Gen 4 e-Comp with New Inverter/Motor ('19)**

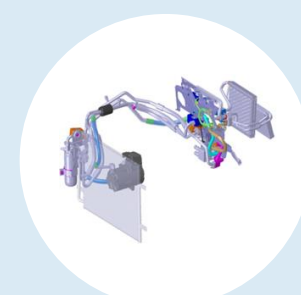


**Mass Production of First Ultra-High Voltage (UHV) and Large e-Comp ('21)**

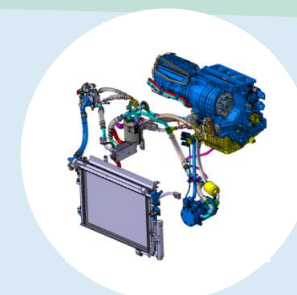
## Heat Pump System



**Heat Pump System Design Development ('02)**



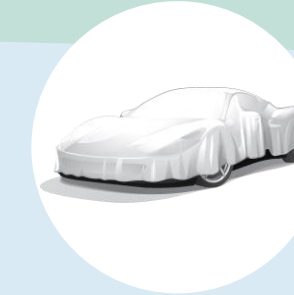
**Heat Pump Pre-Development Projects with German OEMs ('09-'11)**



**First Heat Pump System with PE Chiller ('14)**

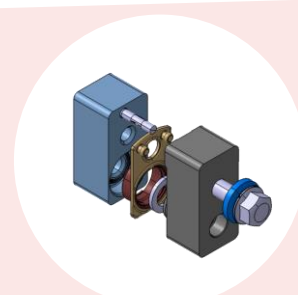


**First Heat Pump System with PE Chiller + Battery Cooling ('18)**



**First UHV Large e-Comp Based Heat Pump System ('21)**

## R744 Technology



**Leak Free A/C Line Fitting Technology Patent ('02)**



**First R744 e-Comp Design and Vehicle Testing with European OEMs ('05-'07)**



**PACE Award Winning Metal Seal Fitting for Leak Free A/C System ('13)**



**Mass Production of R744 Heat Pump Components for a German OEM ('20)**

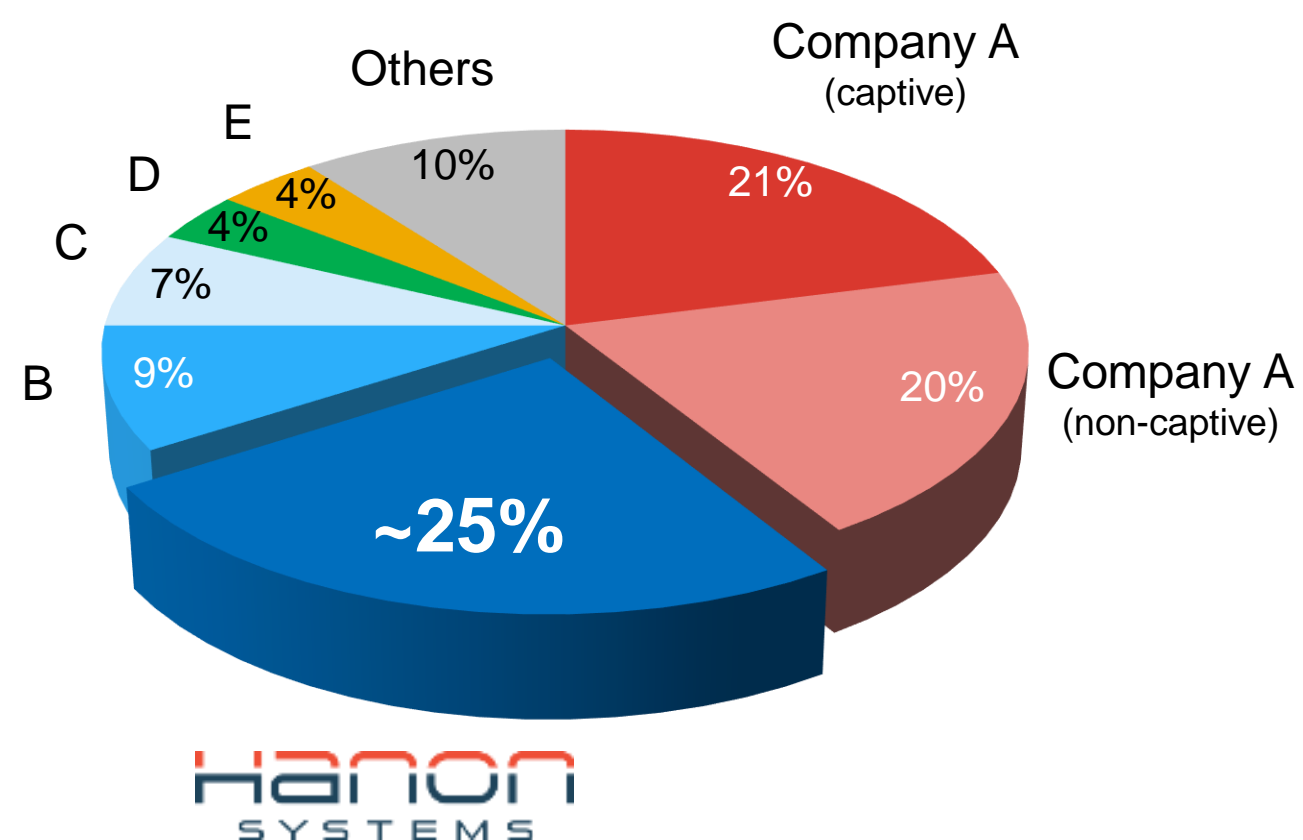
*Pioneer in EV Thermal Management Solutions with ~20 Years of Engineering and Manufacturing*

Note:  
[1] e-Comp or e-Compressor refers to electric compressors

# Strong Position in Electric Compressors



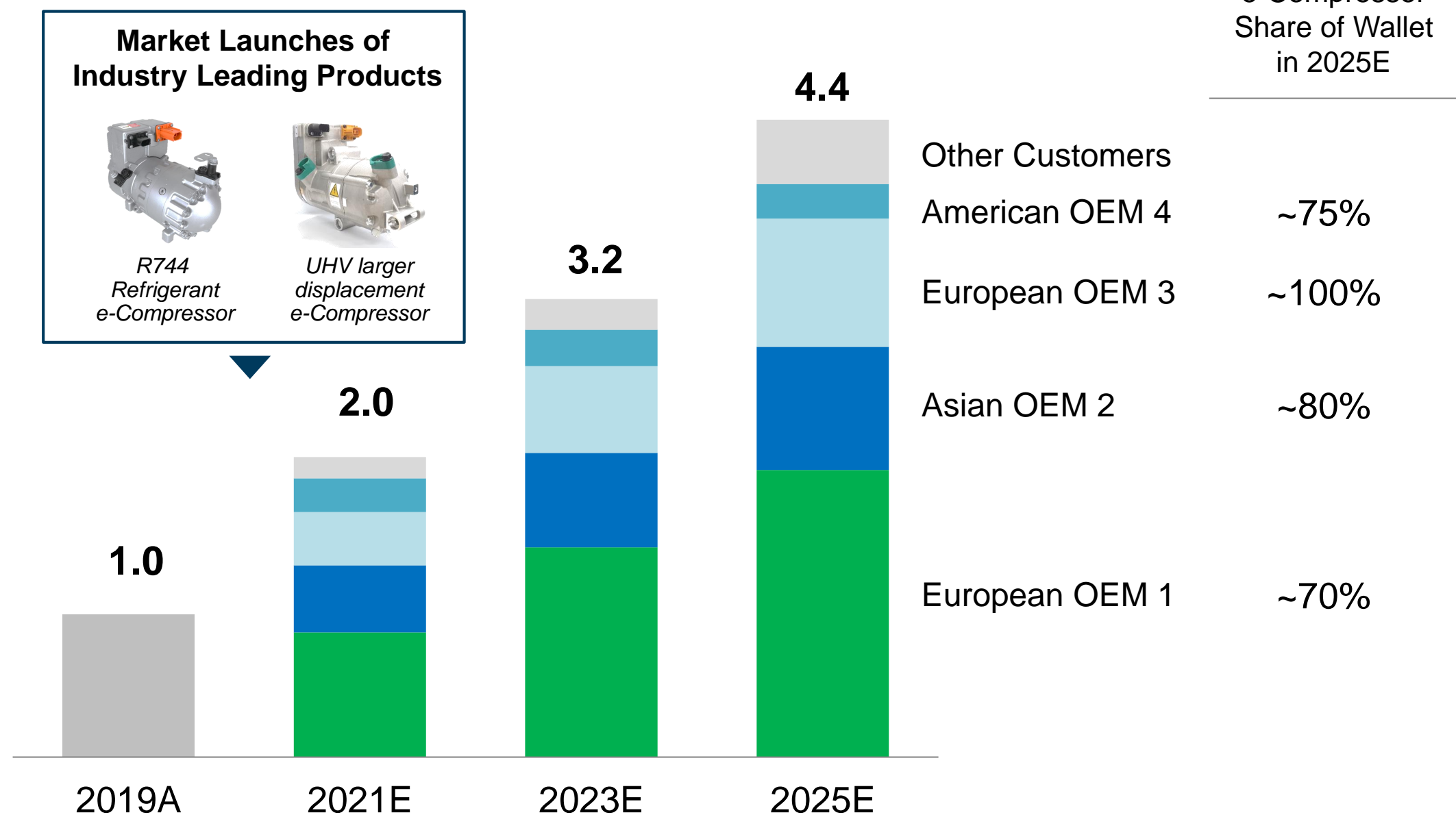
## 2025E e-Compressor Market Share



Source: IHS Markit, Hanon Systems

## Production Volume of Hanon Systems e-Compressors

(Million units)



*Established Market Leading Position and Technology Leadership*



# EV Models with Products from Hanon Systems

(1/2)



**Volkswagen – ID.3**



**Volkswagen – ID.4**



**Audi – Q4 e-tron**



**Skoda – Enyaq**



**Porsche – Taycan**



**Mercedes – EQC**





# EV Models with Products from Hanon Systems (2/2)



**Hyundai – IONIQ EV**



**Ford – All-Electric F-150**



**Fiat – All-Electric Fiat 500**



**Jeep – Compass PHEV**



**Lucid Motors – Lucid Air**



**NIO – ES6 and EC6**



**Xpeng – P7 and G3**



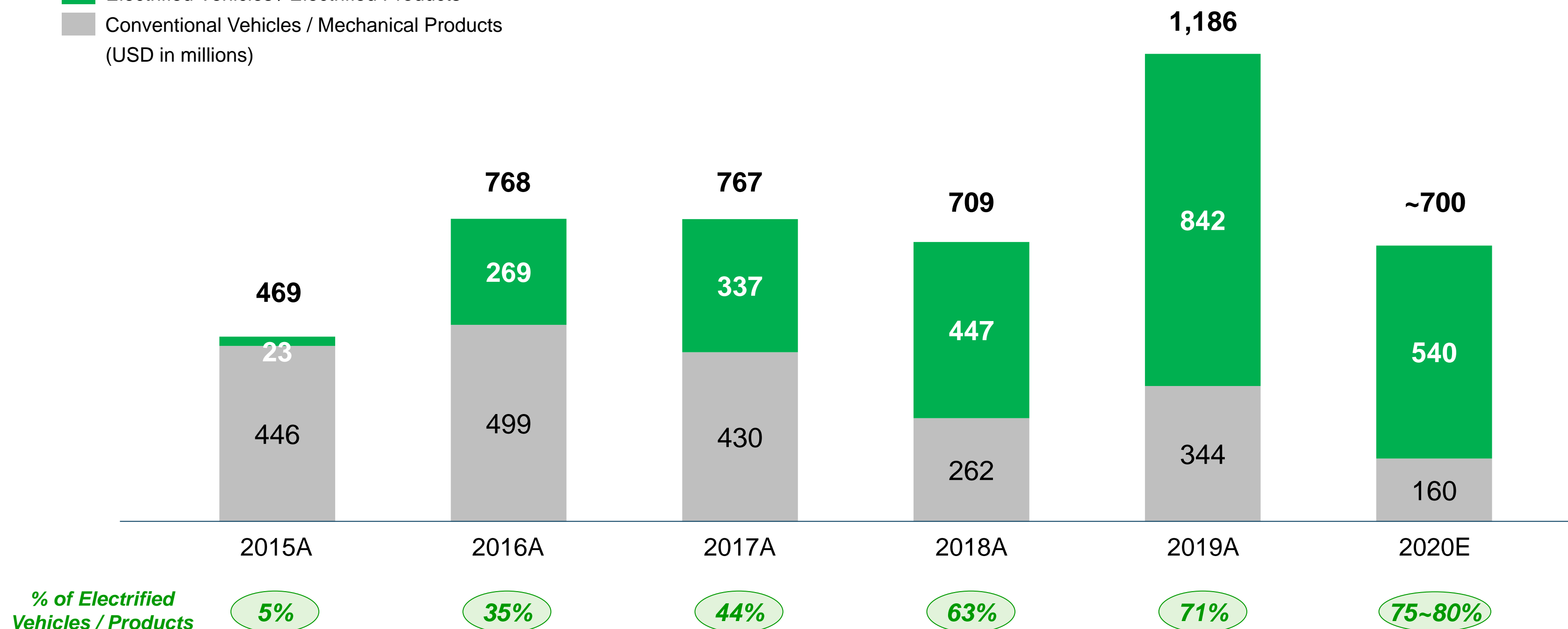


# Continued Growth Momentum



## New Business Win Track Record (New-Win Projects<sup>[1]</sup> Only)

■ Electrified Vehicles / Electrified Products  
■ Conventional Vehicles / Mechanical Products  
 (USD in millions)



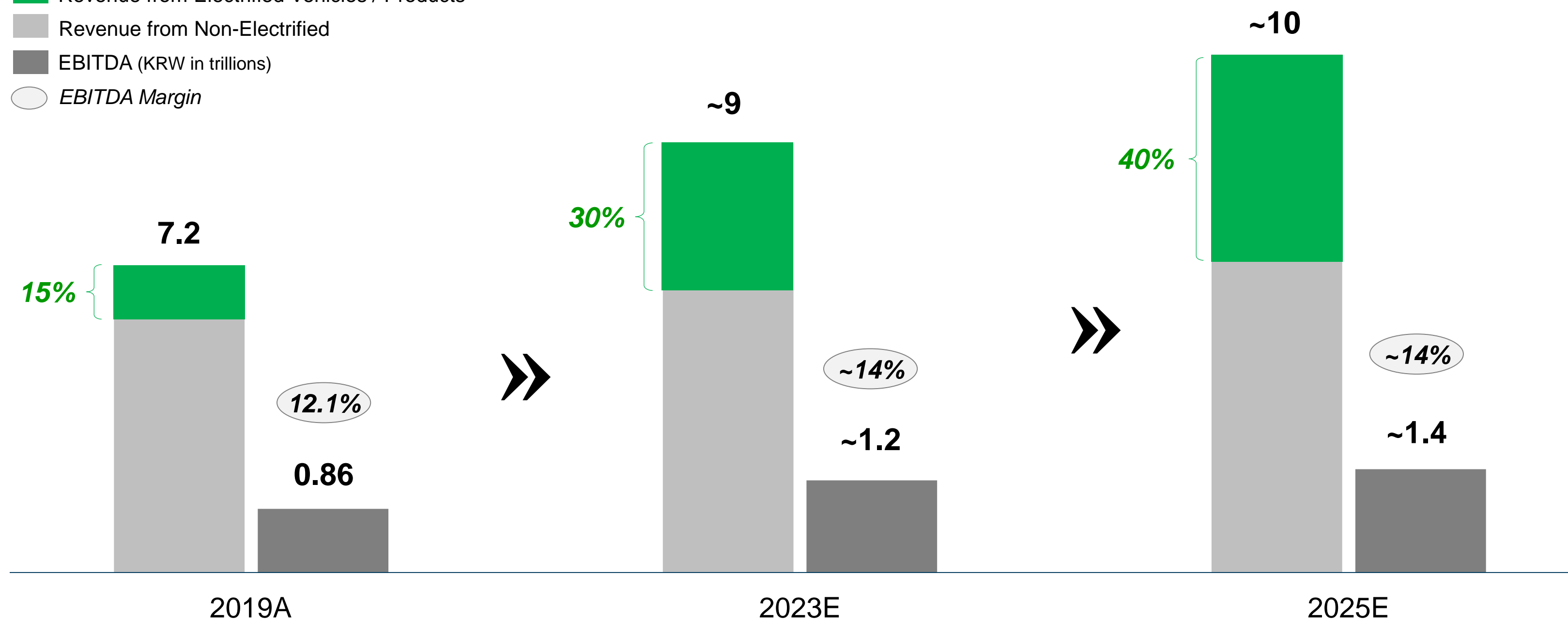
Note:  
 [1] Annual average incremental revenues from newly awarded projects, excluding replacement revenues from incumbent projects

# Accelerating Growth in Electric Vehicles



## Long-Term Financial Projection

- Revenue from Electrified Vehicles / Products
- Revenue from Non-Electrified
- EBITDA (KRW in trillions)
- EBITDA Margin



*Outperforming Market in Business Growth and Transformation to Electrified Vehicles*





**Steven Clarke**

Vice President and  
Chief Technology Officer

**1** Growing in the Electric Vehicle Era

**2 Accelerating Technology Leadership**

**3** Transforming Global Operations

**4** Reporting 3Q20 Financials Results

# Global Engineering Network

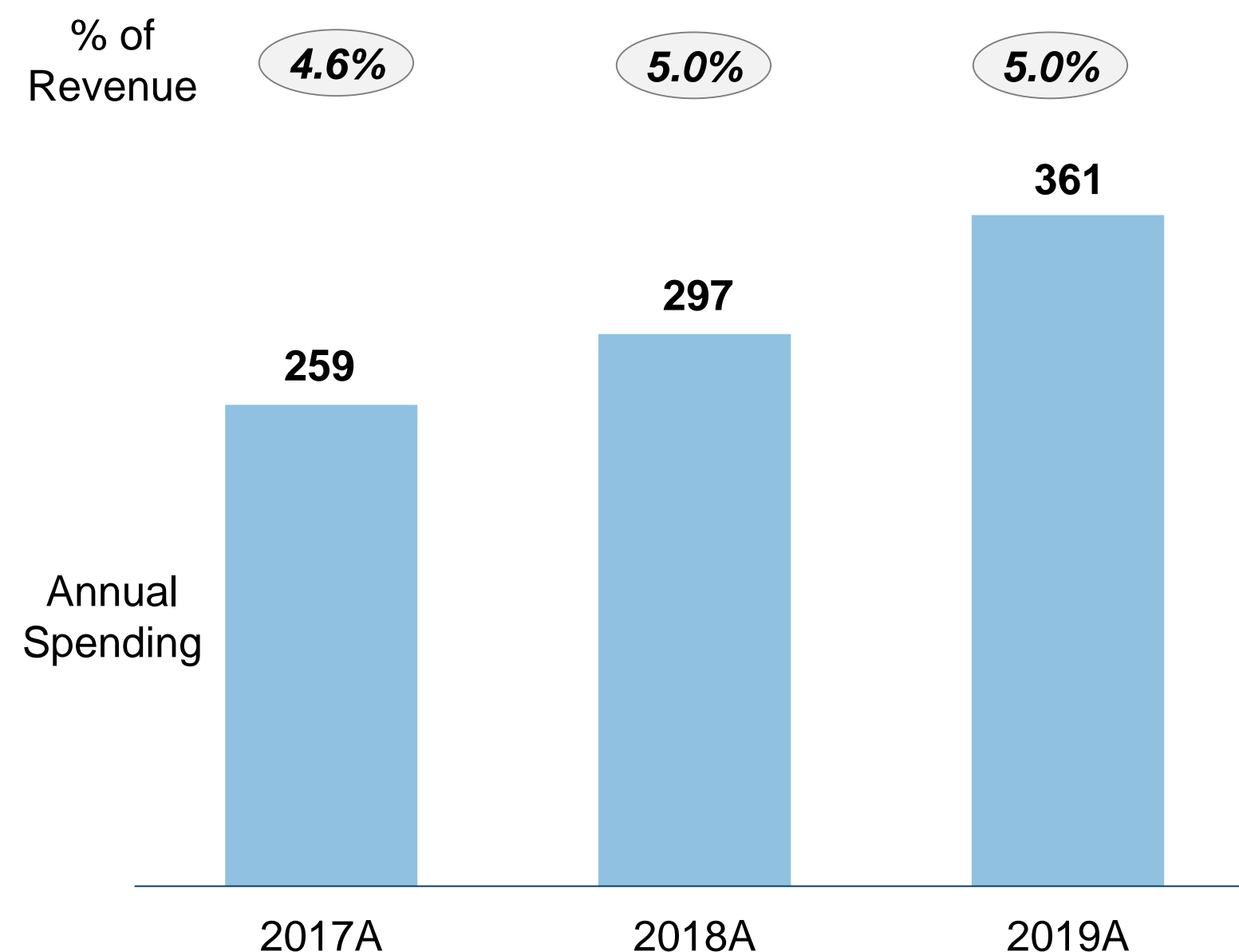


*Six New Engineering Sites Added in 2019; Accelerated xEV Thermal Technology Development*

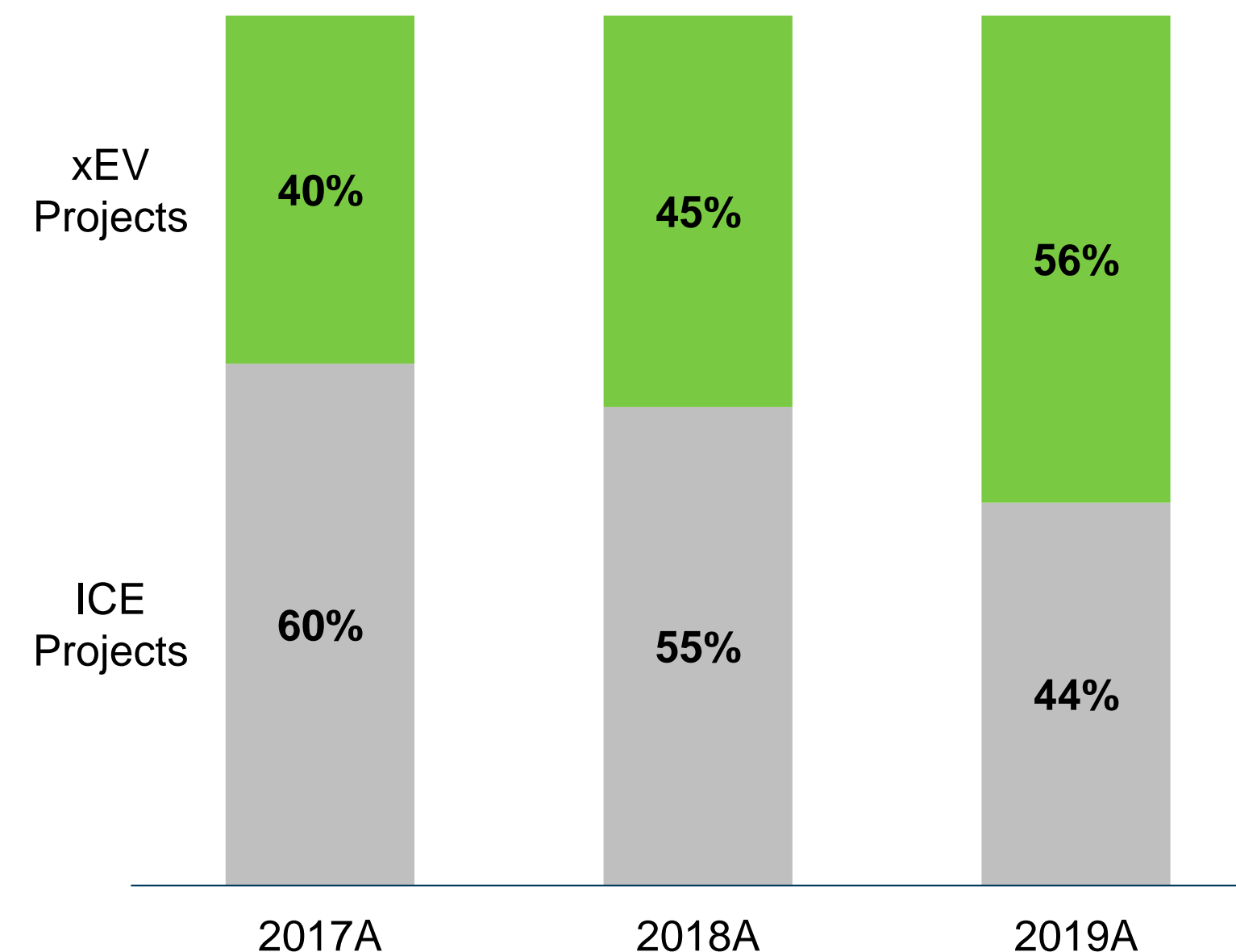


# Engineering Focus on EV Projects

## R&D Spending



## R&D Resource Allocation

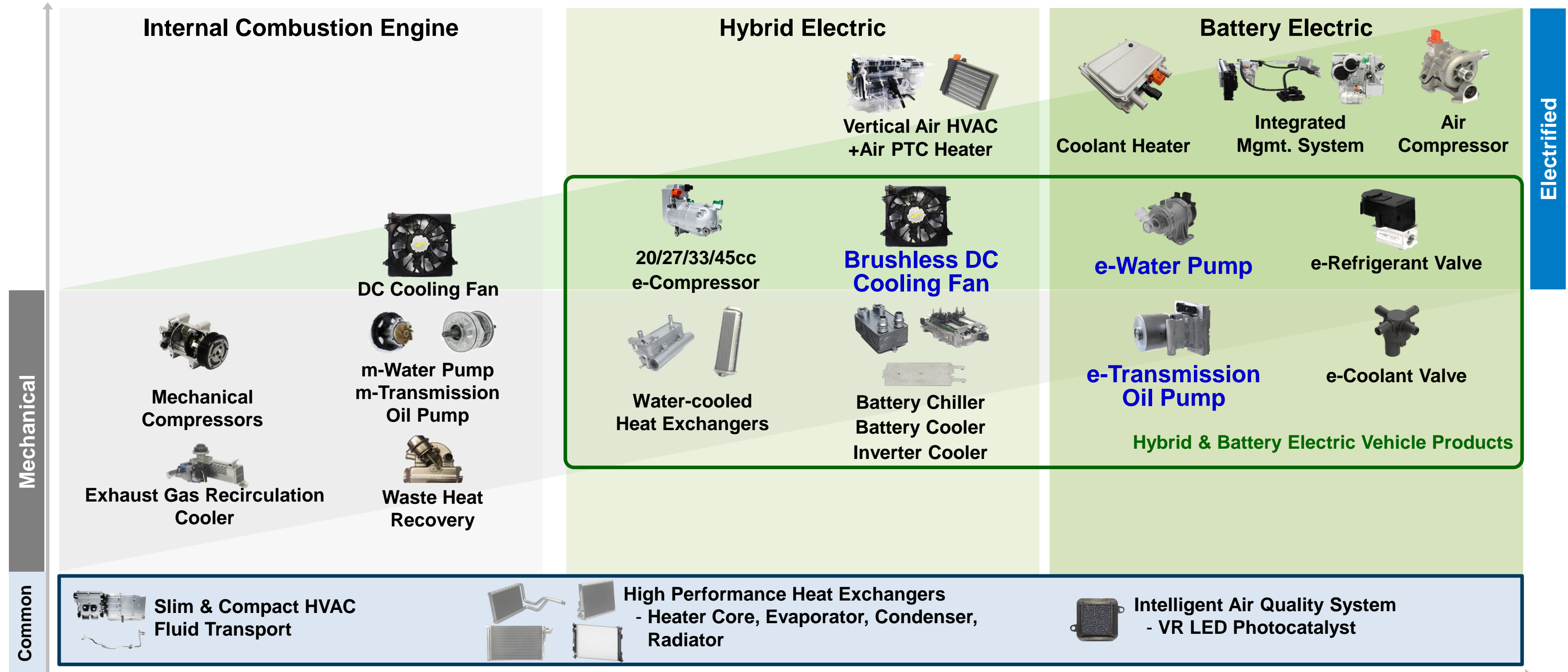


*Continued R&D Investment in 2020 Downturn; >60% Resources Allocated to xEV Projects*

# Hanon Systems Product Portfolio



New xEV Electronics and Fluid Pressure Products



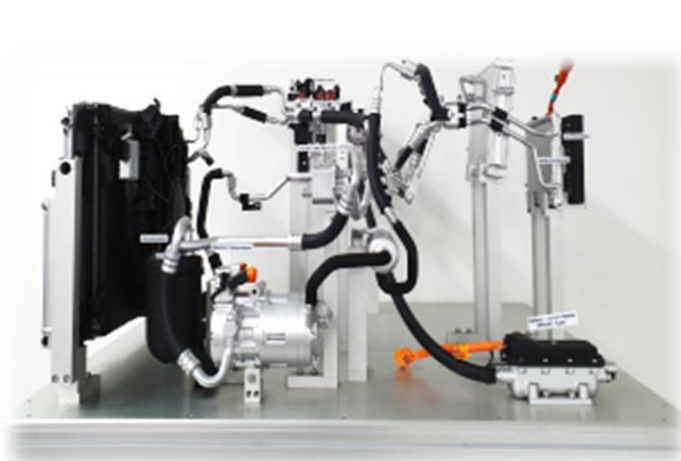
*Full Portfolio of Thermal and Energy Management Solutions for Electrified Vehicles*



# Comprehensive Heat Pump System Solutions

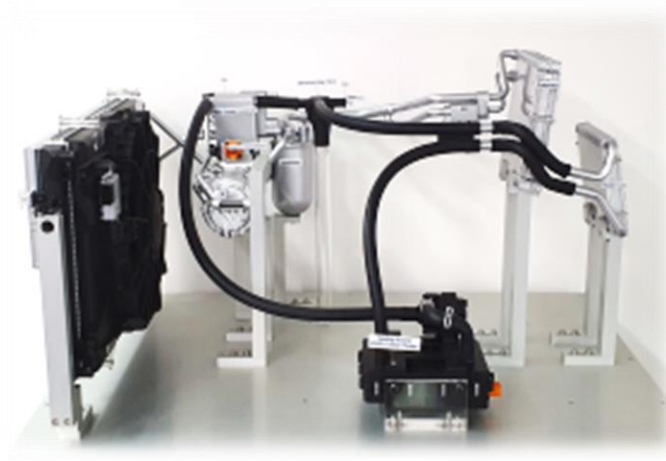


## First Generation



- Waste heat recovery from motor, inverter and battery
- Mass production for Hyundai/Kia electric vehicles

## iTEMST<sup>TM</sup> [1]



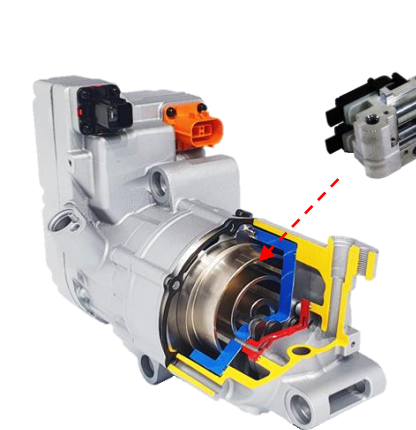
- Module system (refrigerant, coolant)
- Simple 1-way circuit heat pump system for fewer components

## R744 (CO<sub>2</sub>)



- Climate-neutral refrigerant (GWP<sup>[2]</sup>: 1)
- Superior driving range especially in heating mode

## Vapor Injection



- Additional performance boost to heat pump systems
- Increase cooling and heating capacity at same size

## R290 (Propane)



- Secondary loop heat pump system for safety
- Compact refrigerant and coolant modules system

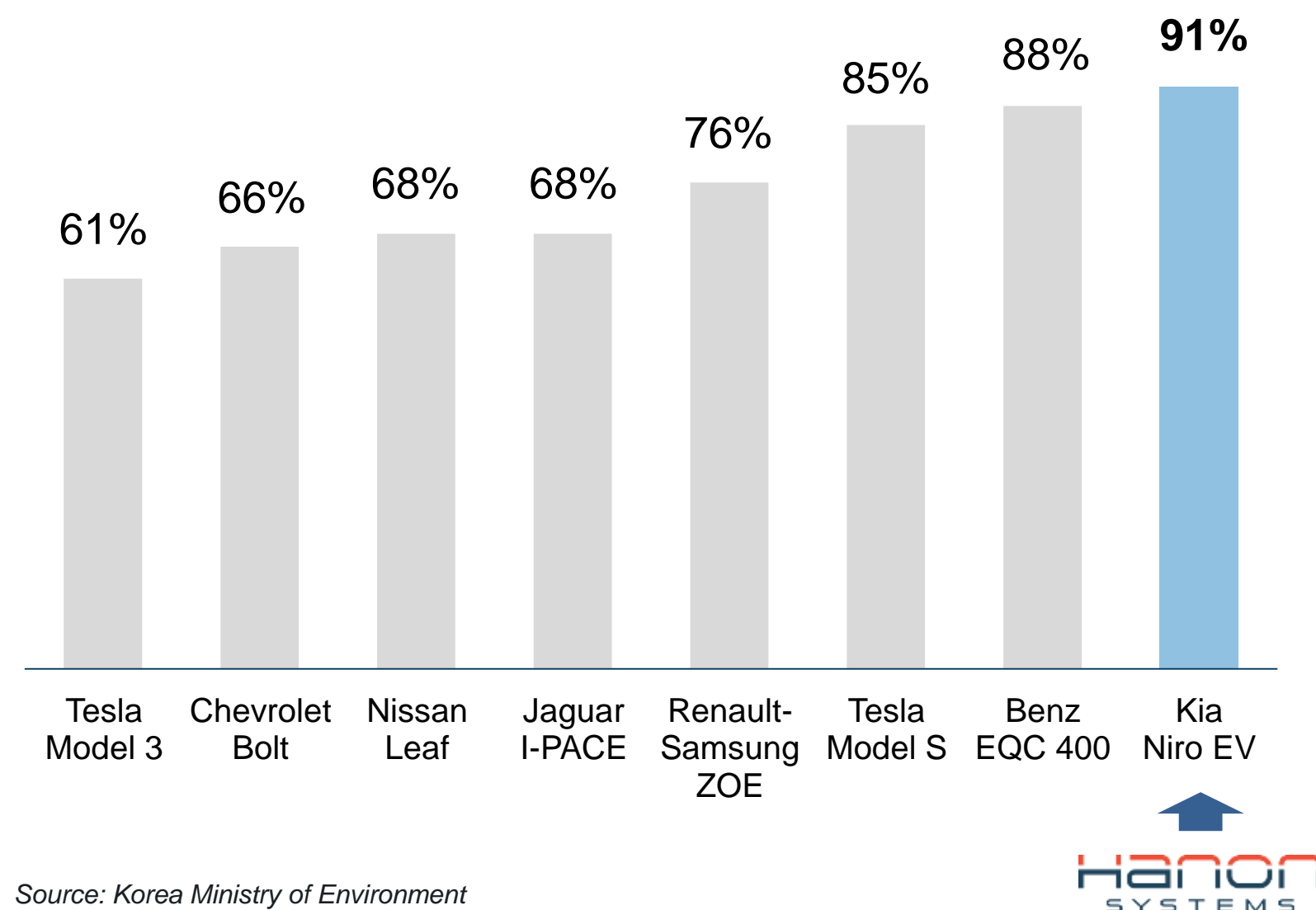
# Heat Pump System Technology



## Vehicle Range Performance Comparison

in heating model at -7°C

(%: Driving range at -7°C / driving range at 25°C x 100%)

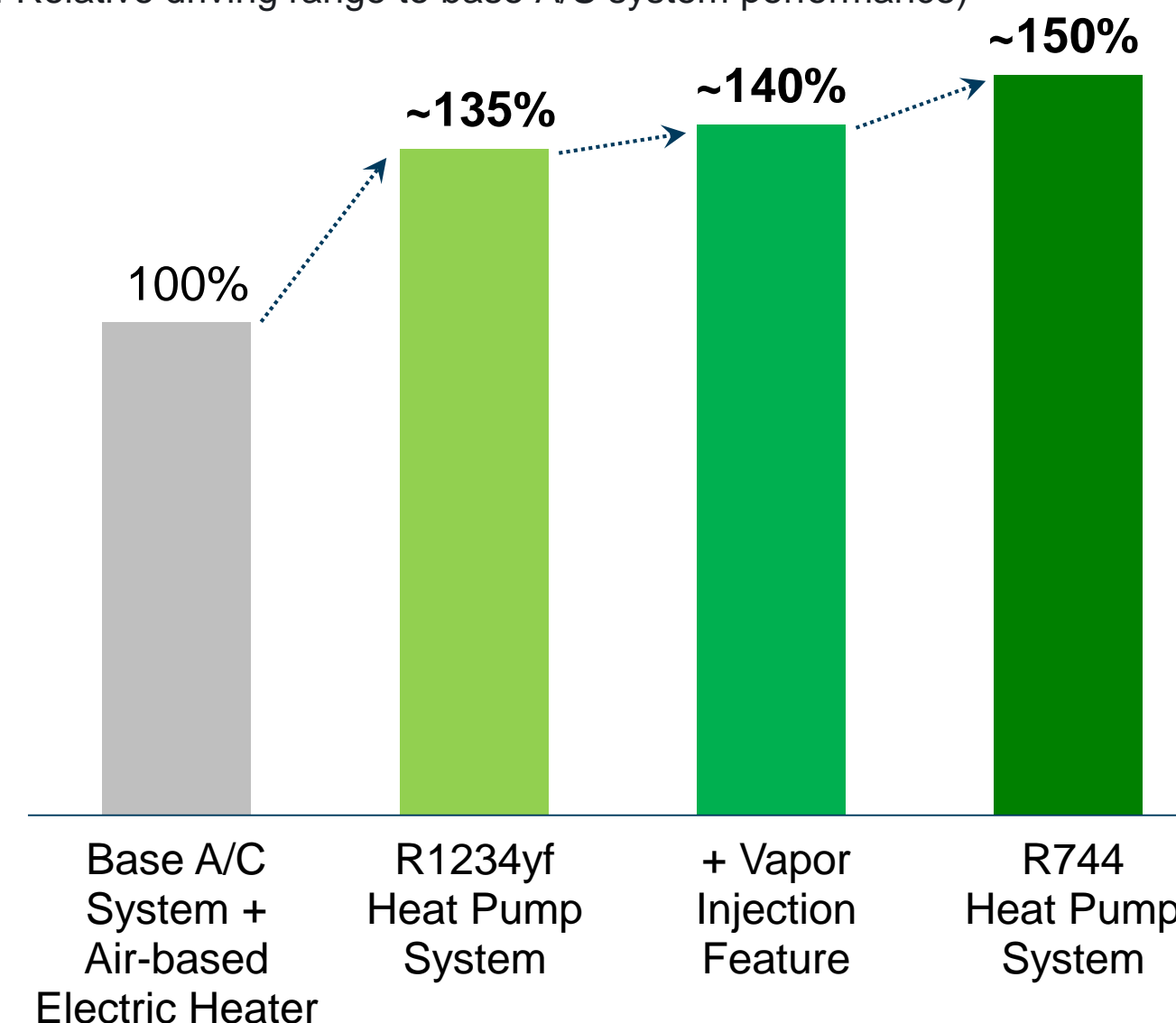


Source: Korea Ministry of Environment  
(Korea fuel economy test cycle base<sup>[1]</sup>)

## Driving Range Increase

in heating model at -7°C

(%: Relative driving range to base A/S system performance)



Source: Hanon Systems Europe Innovation Center test

*Heat Pump System is Essential to Improve Driving Range of Electric Vehicles*

Note:  
[1] Combination of FTP-75 (Federal Test Procedure) and HWFET (Highway Fuel Economy Test)



# R744 (CO<sub>2</sub>) Heat Pump System



CO<sub>2</sub> e-Compressor



Accumulator with  
Internal Heat Exchanger



Electronic  
Expansion Valve



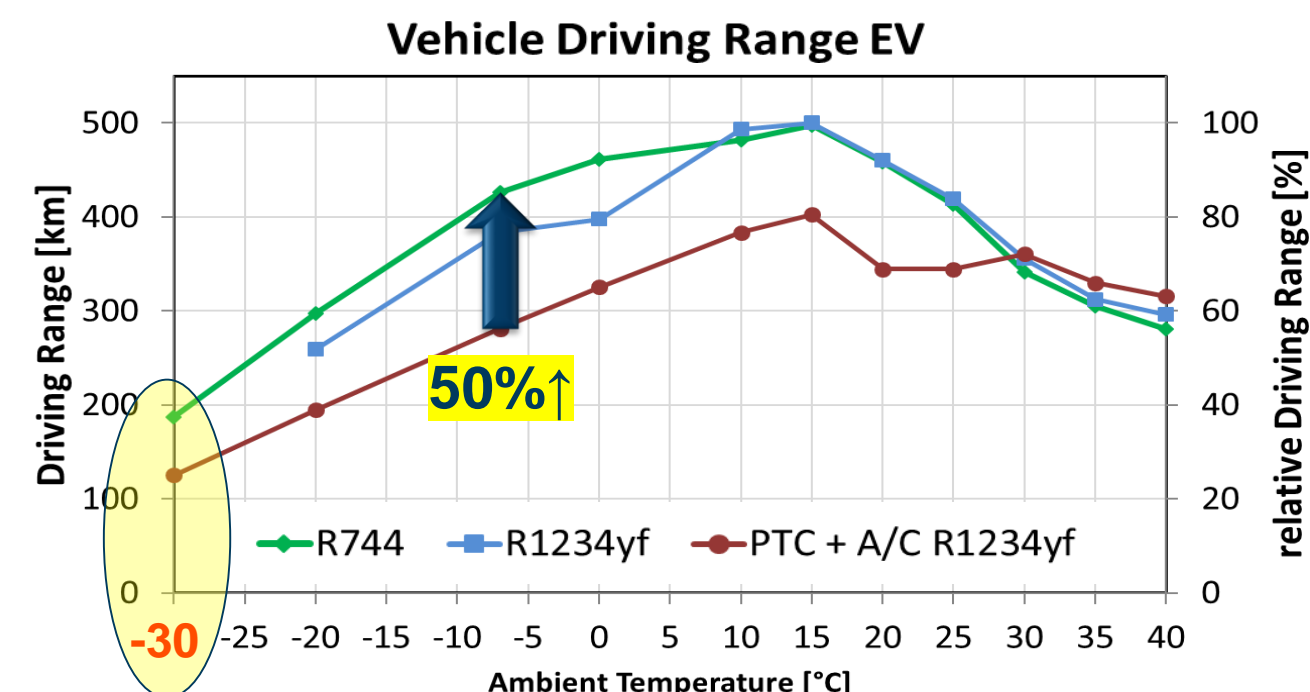
Connecting Technology  
(Metal Seal)

## New Technology Description

- Climate-neutral refrigerant (GWP: 1)
- All key R744 components in mass production

## Key Benefits

- Offers efficient and full operation to -30°C
- Enhances EV driving range especially in winter
- Improves noise and vibration performance



Source: Hanon Systems Europe Innovation Center test

# Full Suite of Electric Compressors



30+cc  
e-Compressor



Larger displacement  
e-Compressor

## New Technology Description

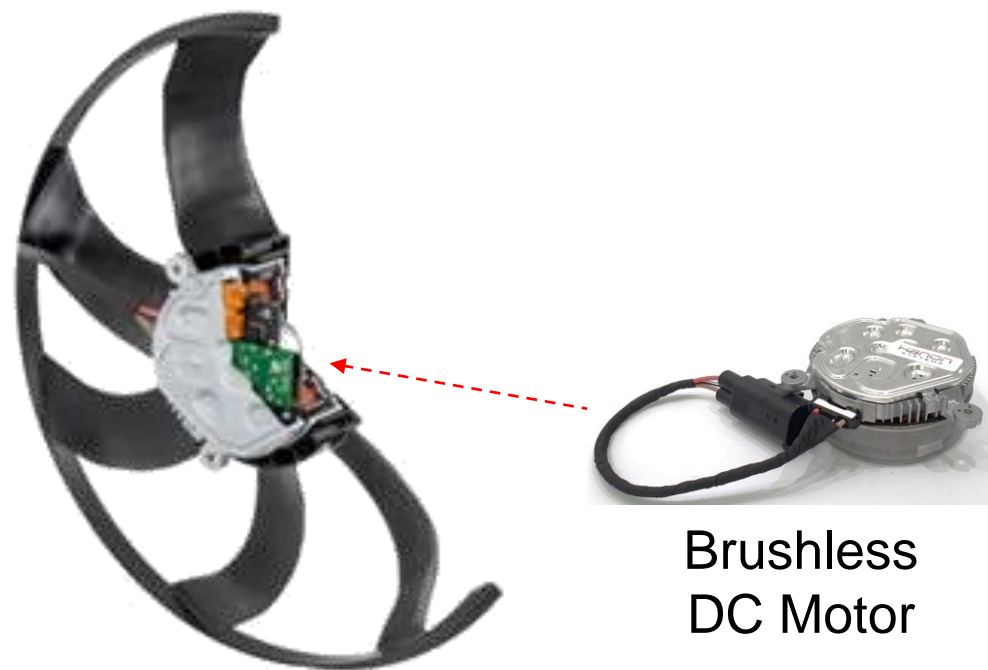
- Developed on a common global architecture
- Larger displacement compressor with new inverter for ultra-high voltage

## Key Benefits

- Reduces weight/cost with high efficiency
- Lowers noise, vibration and harshness (NVH)
- Applies to various voltage levels (48V, 400V, 800V)

# Electrified Components for xEV Thermal System

## BLDC Motor e-Cooling Fan



- Brushless direct current motor with integrated control electronics
- Reduction of fuel consumption, CO<sub>2</sub> emission and noise
- Highest aerodynamic efficiency

## Electronic Water Pump



- On-demand water pumps for optimal thermal management
- Improved fuel economy by variable coolant flow
- Compact and low weight

## Heat Pump Refrigerant Valve



- Incorporates shut-off and expansion functions
- A/C system architecture simplification
- Very low internal leak rate



# Intelligent Air Quality System

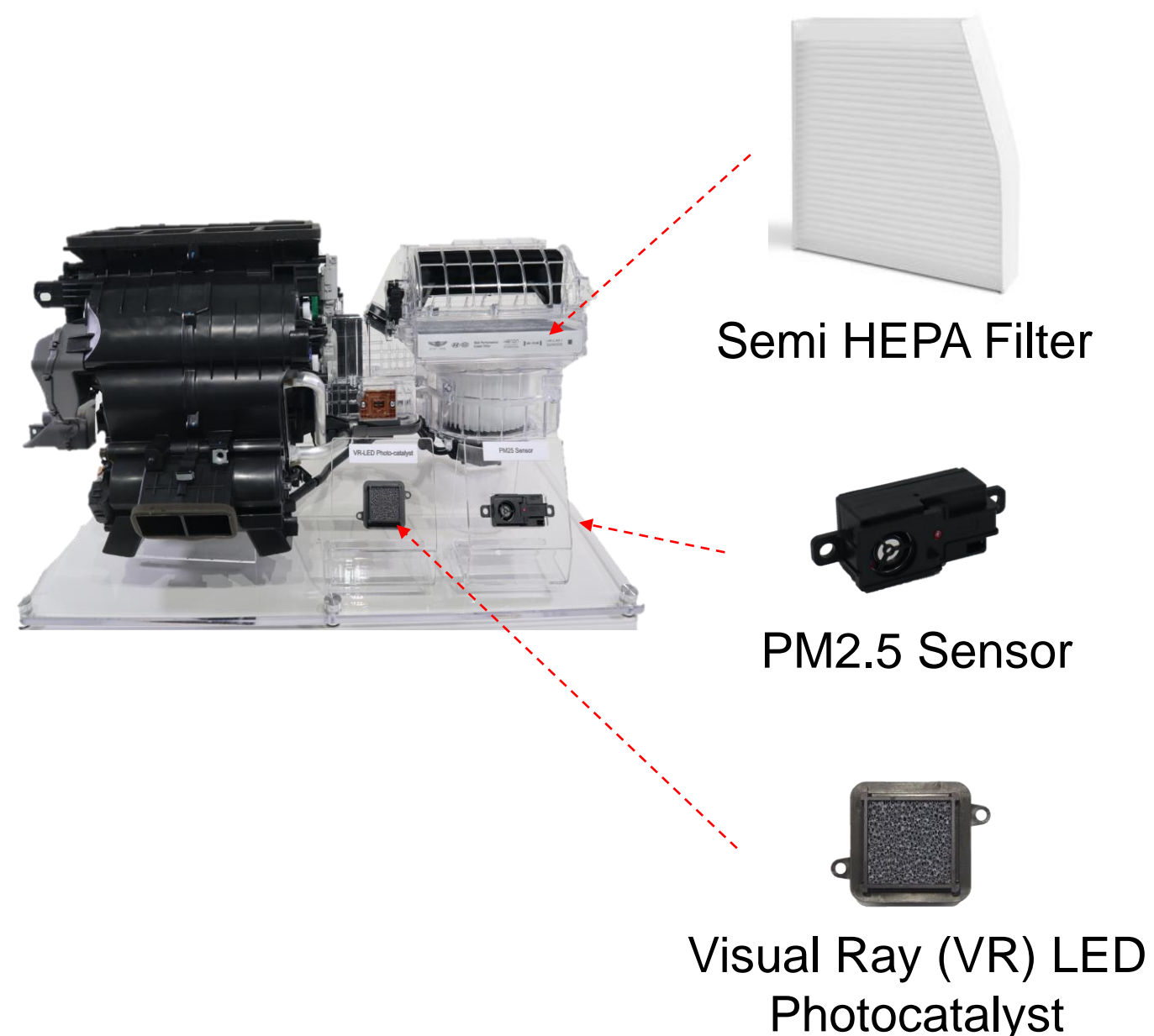


## New Technology Description

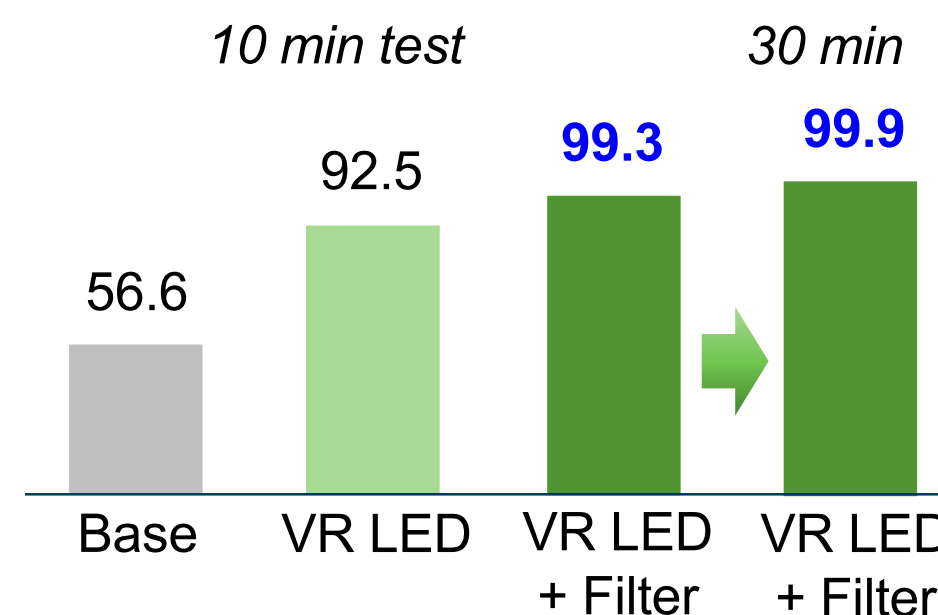
- VR LED photocatalyst for air quality improvement
- Fine dust: semi HEPA Filter & PM2.5 sensor controlling

## Key Benefits

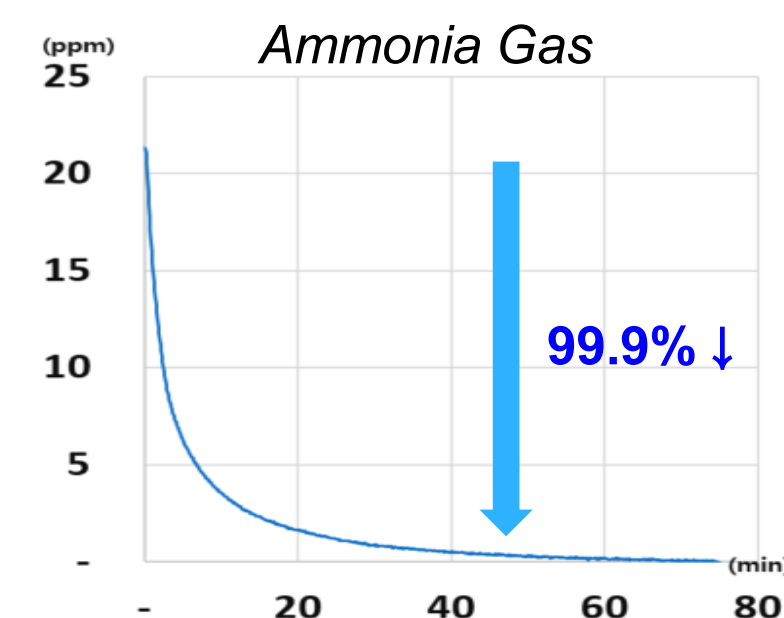
- Disinfects, deodorizes and reduces fine particles



### VR LED: Disinfection (%)



### Deodorization (ppm)



Source: Hanon Systems Asia Pacific Innovation Center test

# Air Compressor for Fuel Cell Electric Vehicles



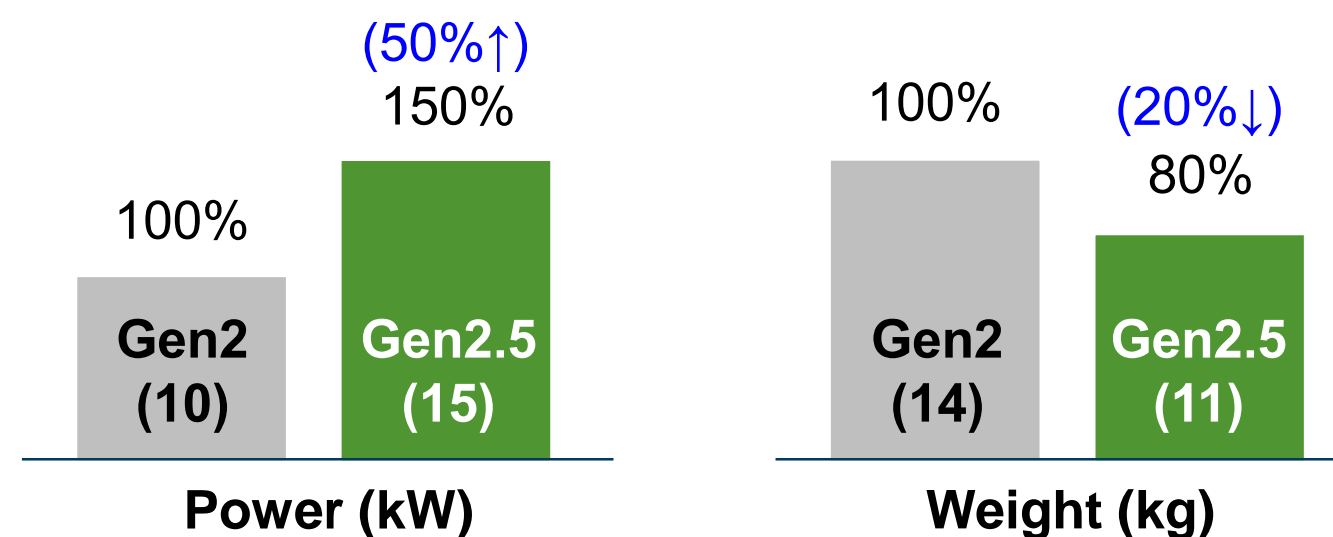
Gen 2 Air Compressor  
without Controller

## New Technology Description

- Gen 2.5 controller integrated air comp with air foil bearing

## Key Benefits

- Increases air compressor power: 10 → 15kW
- Enables compact and cost competitive product design



Source: Hanon Systems Asia Pacific Innovation Center test

# Technologies Leading Thermal Market Trends



EV Driving Range & Cost Competitiveness



Eco-friendly Alternative Refrigerant



Fuel Cell Electric Vehicle Application



Cabin Air Quality

2012

2013

2015

2017

2018

2020



**High Voltage BLDC  
Fuel Stack Cooling Fan**  
for fuel cell electric vehicles



**Metal Seal Fitting**  
for leak tight high-pressure  
refrigerant systems  
(help OEMs earn CO<sub>2</sub> credit)



**Centrifugal Air Compressor**  
for fuel cell electric vehicles



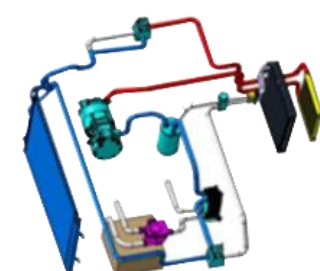
**Electrical Expansion /  
Shutoff Valve**  
for EV heat pump systems



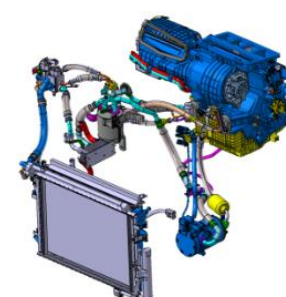
**Centrifugal Air Compressor  
Gen 2 Technology**  
with a patented oil-free air foil  
bearing design for higher RPM



**Simple One-way Circuit  
Heat Pump System**  
with improved cost efficiency



**High Efficiency  
Heat Pump System**  
with improved driving range  
on EV heating mode



**Heat Pump System  
Utilizing Waste Heat**  
to further improve energy  
efficiency and driving range



**Air Conditioner  
Deodorization**  
with UV photocatalyst  
technology



**Water-Cooled Condenser  
with Integrated Receiver Drier**  
for EV heat pump systems



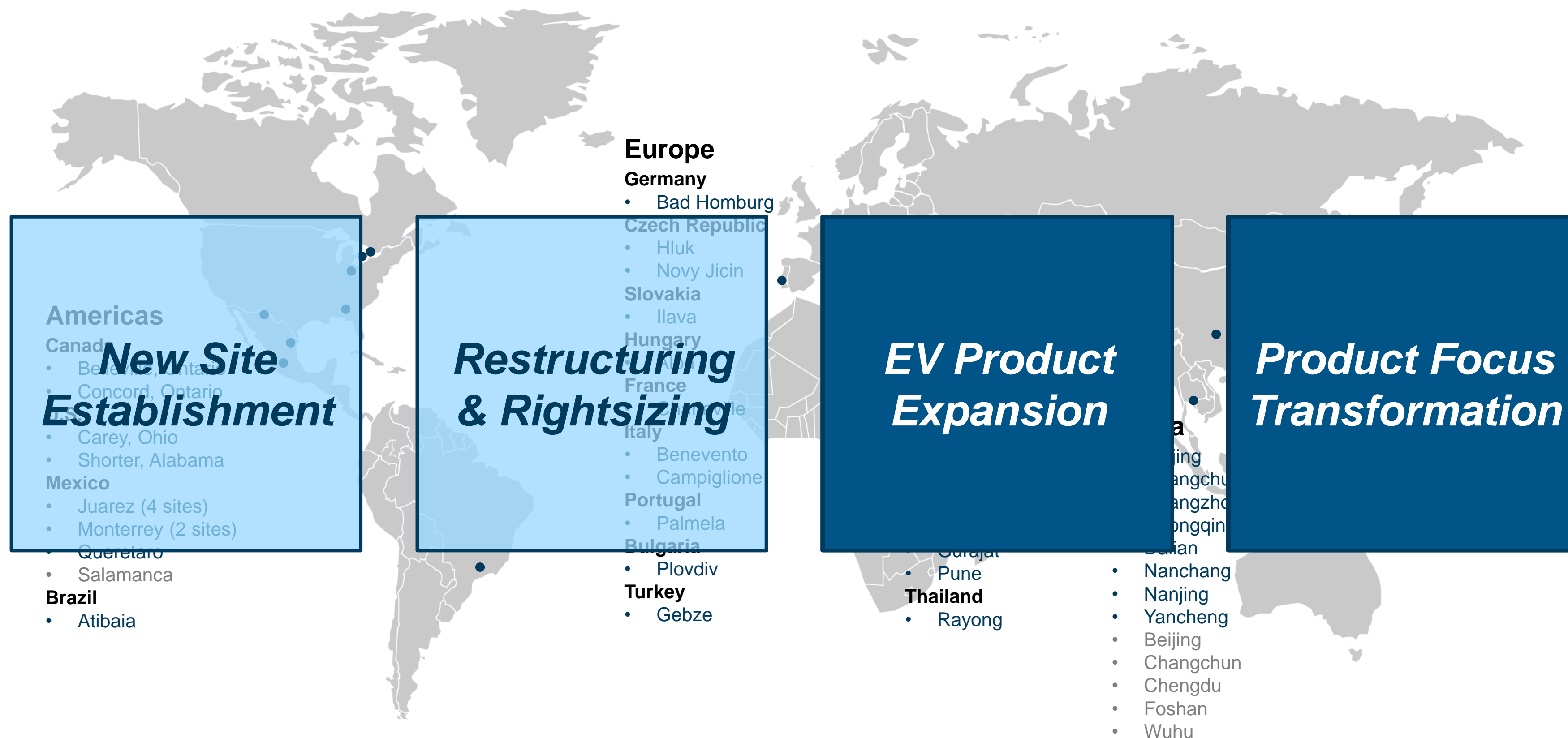


## Min Sung

Executive Vice President and  
Representative Executive Officer

- 1 Growing in the Electric Vehicle Era
- 2 Accelerating Technology Leadership
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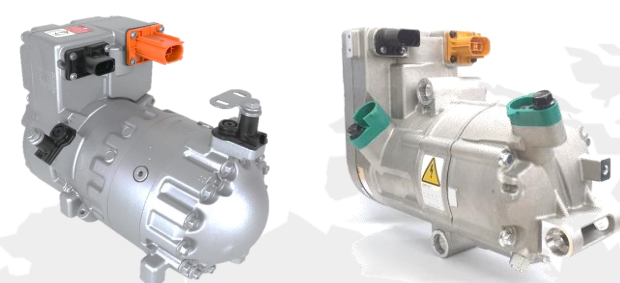
# Global Manufacturing Operation Strategy



Note:  
Grey-colored manufacturing locations of non-consolidated joint ventures which are not marked on the map



# Electric Compressors



## Product innovations and established global footprints widen gap against followers

- Recent expansions for Gen 4 e-Compressor production lines in both major EV markets
- Production facilities for R744 e-Compressors and larger-displacement e-Compressors
- World-class product testing and validation equipment

*Palmela, Portugal*



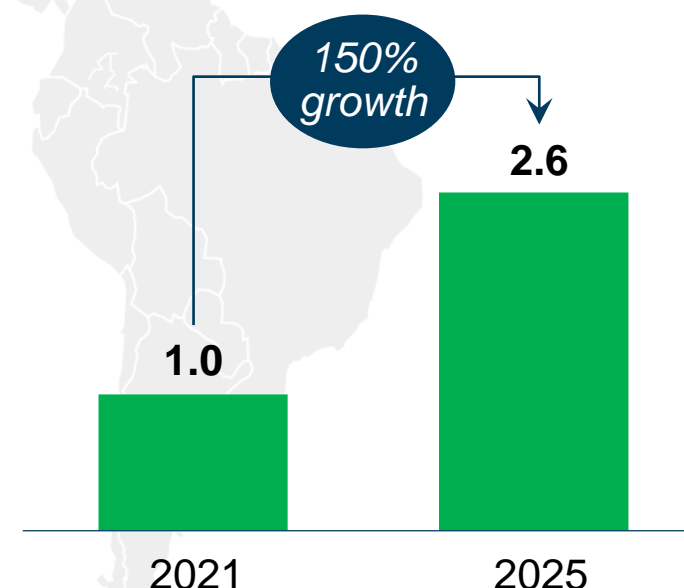
*Dalian, China*



## Manufacturing Hub of Industry Leading Solutions



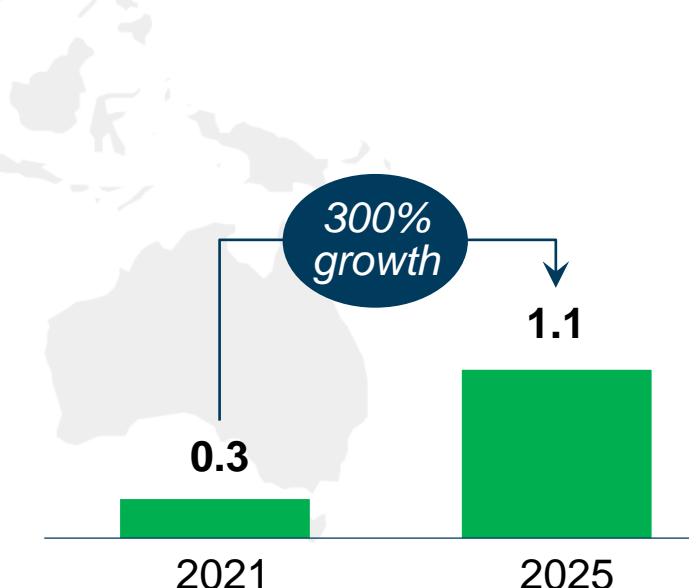
Production volume (million units)



## Low-cost Base for Fast Growing EV Market



Production volume (million units)





# Electronic Cooling Fan with Brushless DC Motor



## Growth opportunities maximize business synergies in manufacturing footprint

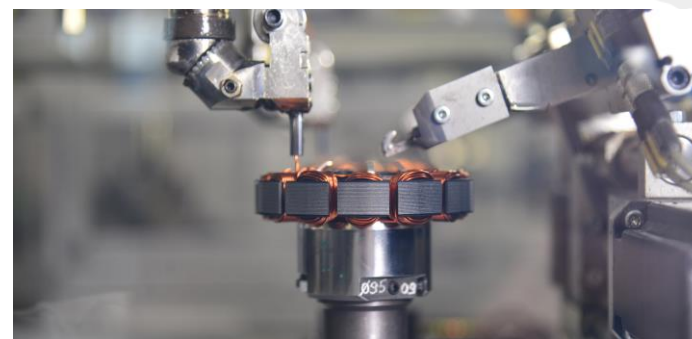
- Optimized investment by utilizing exiting production lines from acquisition
- Continuous new business awards supported by cost structure improvements
- In-house design and manufacturing capabilities on most of the sub-components

Campiglione, Italy

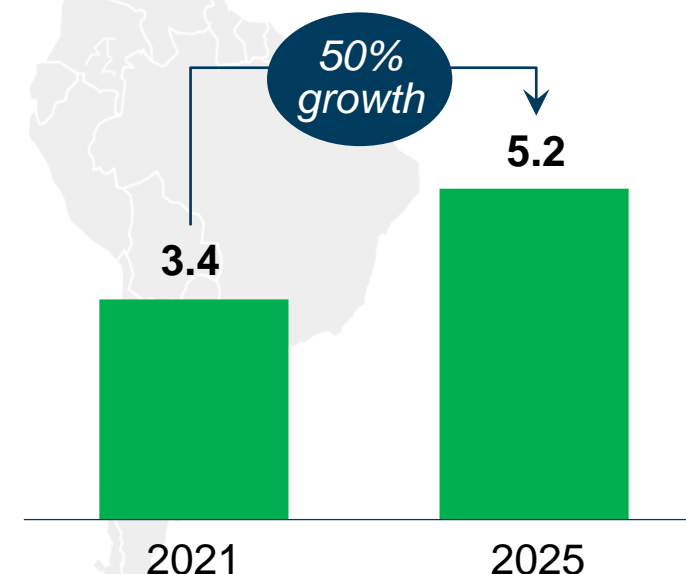


Changzhou, China

## Global Center of BLDC Motor Engineering & Manufacturing



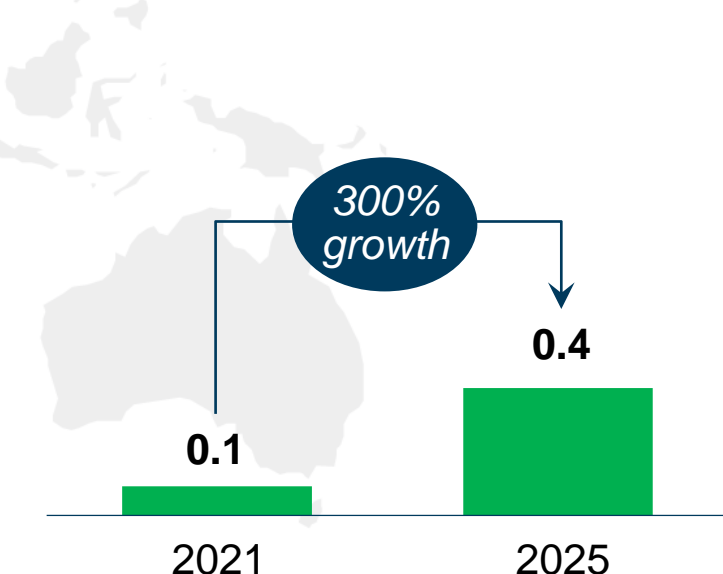
Production volume (million units)



## Low-cost Base for Fast Growing EV Market



Production volume (million units)





# Heat Pump Electronic Refrigerant Valve



## Regional footprint strategy addresses increasing demand from multiple OEMs

- End-to-end heat pump system solution with in-house valve capabilities
- Eastern European footprint re-arranged to best support growing demand of EV products
- Joint venture investment to penetrate local customers and optimize resources

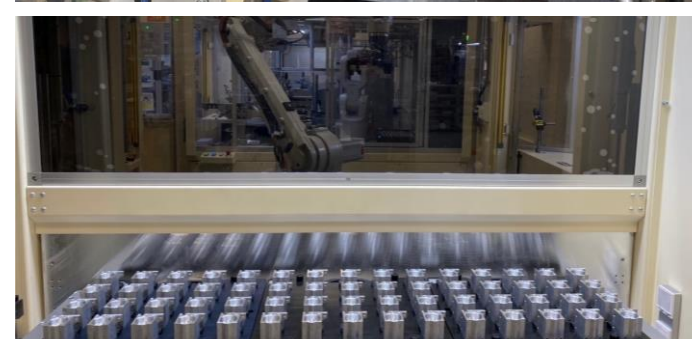
Alba, Hungary



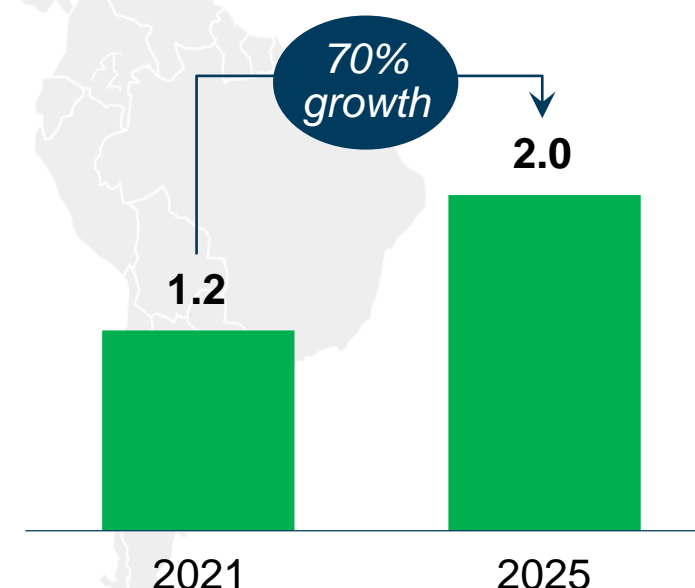
Changchun, China



## In-house Manufacturing Site for Innovative Solutions



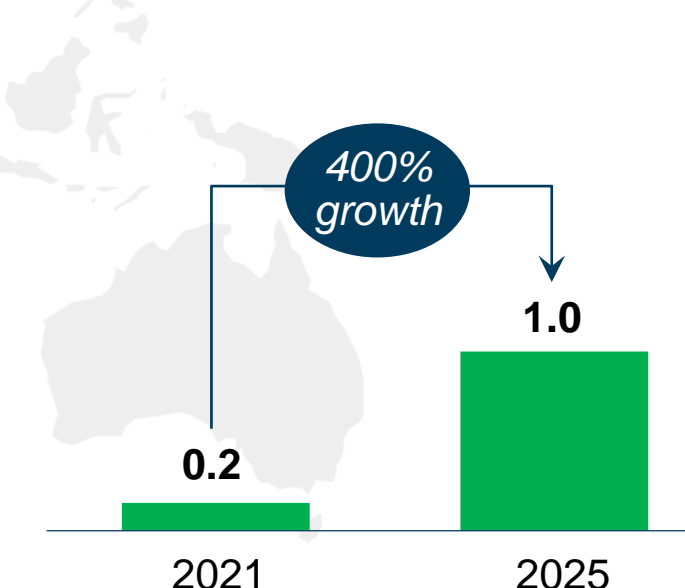
Production volume (million units)



## Joint Venture Production Site for China Market

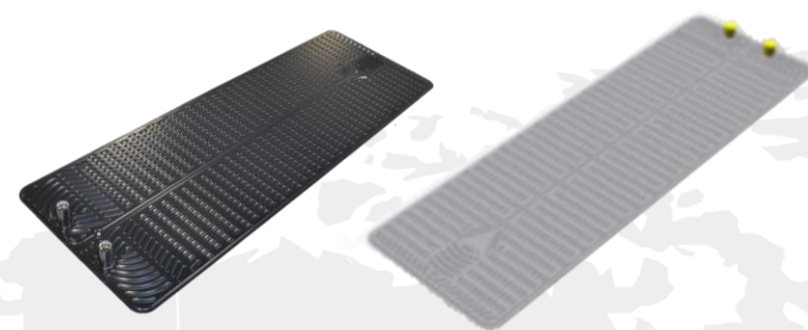


Production volume (million units)





# Electric Vehicle Battery Coolers



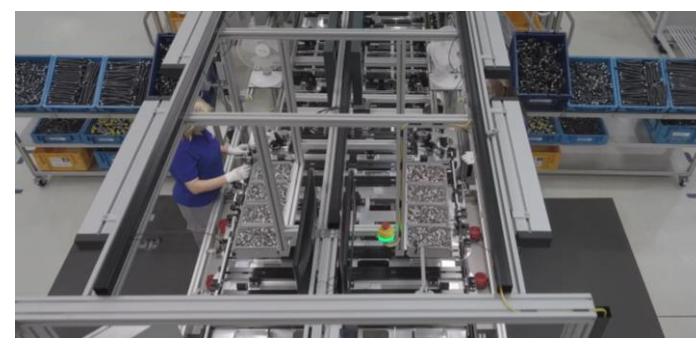
## Capacity increase serves growing needs of OEMs for EV battery cooling

- Product quality and solid cost structure ensured by highly-automated process
- Utilization of heat exchanger production expertise
- Continuous innovations of manufacturing engineering technologies

Ilava, Slovakia



## Automated Production Site with Less Manual Process





# Product Focus Transformation Cases



**Monterrey,  
Mexico**

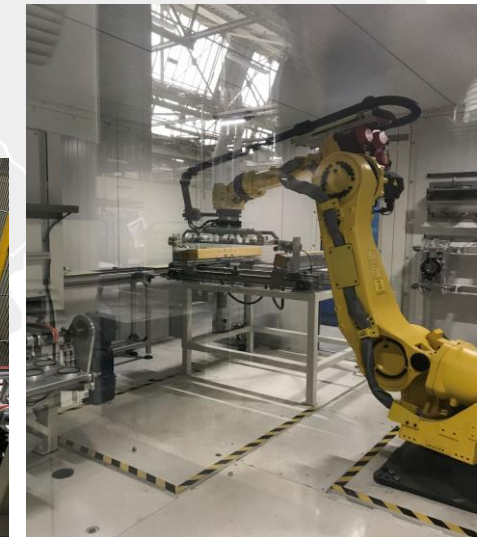
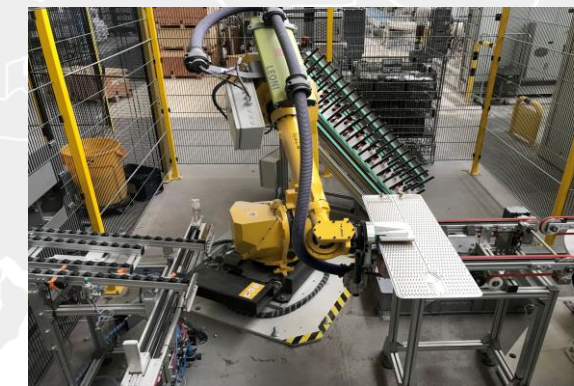
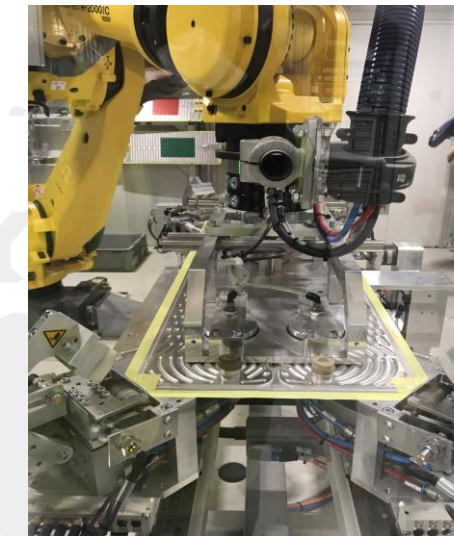
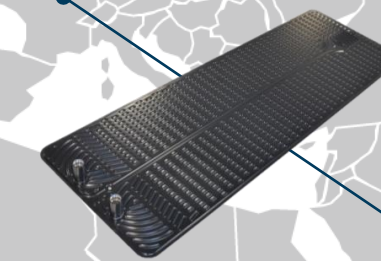


## Mechanical Pump → Electronic Pump

- Consolidated Mexico electronic water pump production sites
- Invested to scale-up facility into a regional manufacturing hub
- Electronic water pump production expected to increase 200% in 3 years



**Charleville,  
France**



## HVAC Module → EV Battery Cooler

- Transformed a labor-intensive product plant into a highly-automated EV product oriented plant
- Optimized resources to support new business for EVs
- To double battery cooler production volume in 3 years



## Subu Nagasubramony

Vice President and  
Chief Financial Officer

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# Top-line and Bottom-line Improvements



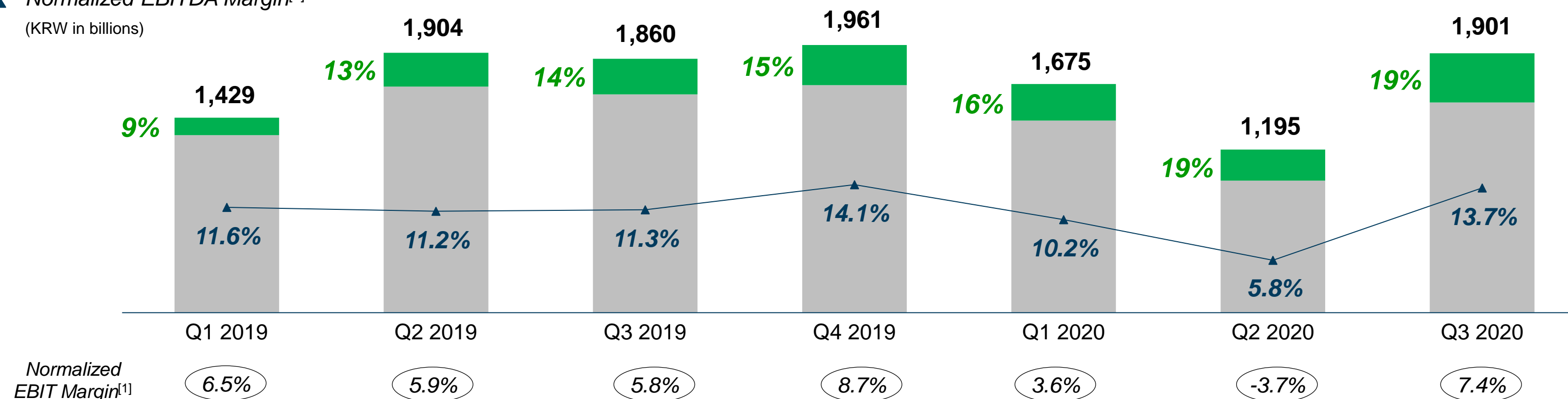
## Historical Quarterly Financials – Revenue and Profit Margin Trend

■ Electrified Vehicles / Products

■ Non-Electrified

▲ *Normalized EBITDA Margin*<sup>[1]</sup>

(KRW in billions)



- Business scaled up and synergy materialized with acquisition of Electronics & Fluid Pressure business
- Revenue from electrified business has increased with new business awards entering production
- Proactive cost structure improvement actions have improved profitability with volume rebound

Note:

[1] EBITDA and EBIT margin with normalization of one-time impact in Q2 2020 and Q3 2020



# 3Q 2020: Key Financial Metrics



(KRW in Billions)

	3Q20	3Q19	YoY %	2Q20	QoQ %
<b>Revenue</b>	<b>1,901</b>	<b>1,860</b>	<b>2.2%</b>	<b>1,195</b>	<b>59.1%</b>
<b>COGS</b>	<b>1,650</b>	<b>1,611</b>		<b>1,121</b>	
<i>% of Sales</i>	86.8%	86.6%		93.7%	
<b>SG&amp;A (Incl. R&amp;D)</b>	<b>132</b>	<b>141</b>		<b>133</b>	
<i>% of Sales</i>	6.9%	7.6%		11.1%	
<b>EBITDA</b>	<b>239</b>	<b>210</b>		<b>56</b>	
<i>Margin (%)</i>	12.6%	11.3%	<b>1.3%p</b>	4.7%	<b>7.9%p</b>
<b>Operating Profit</b>	<b>120</b>	<b>107</b>		<b>-58</b>	
<i>Margin (%)</i>	6.3%	5.8%	<b>0.5%p</b>	-4.8%	<b>11.1%p</b>
<b>Net Income</b>	<b>51</b>	<b>76</b>		<b>-60</b>	
<i>Margin (%)</i>	2.7%	4.1%	<b>1.4%p</b>	-5.1%	<b>7.7%p</b>

*3Q Volume Increased and EBITDA Margin Improved Accordingly with Proactive Cost Actions*

Note:  
EBITDA and Operating Profit has reflected one-time impact in Q2 2020 and Q3 2020

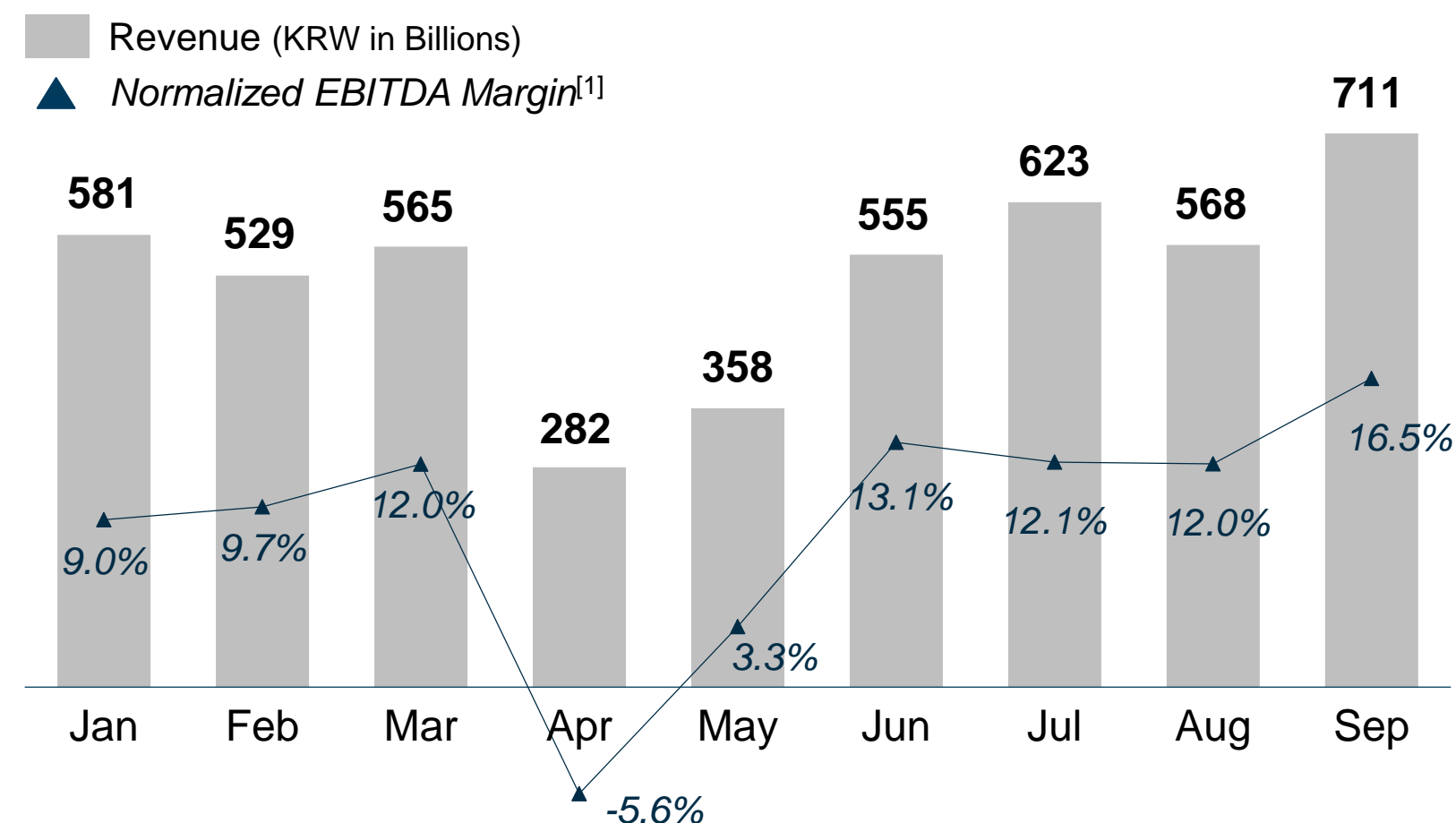
# 3Q 2020 Highlights



## 3Q20 Highlights

- EV revenue accounts for 19% of 3Q20 revenue, with VW and HMG as top 2 xEV customers
- Normalized OP margin recovered at 7.4% with volume recovery and proactive cost improvement actions
- Net debt has improved by more than 210 bW QoQ with normalized operation and working capital management

## Profitability Improvement Progress



### Personnel Cost Optimization

- Flexible rescheduling of production plans
- Rationalization of compensation schemes

### Organization Efficiency Improvement

- Restructuring of sub-scale sites
- Streamlining aligned to strategic focus

### Operational Saving

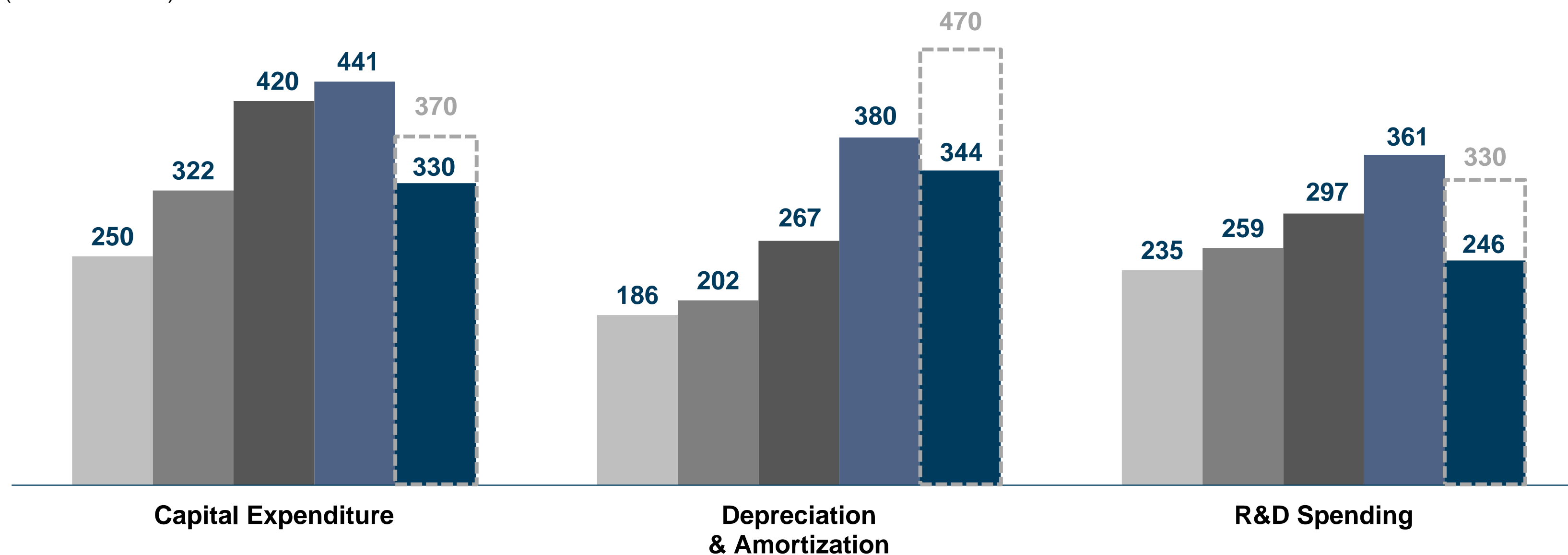
- Disciplined control of discretionary expenses
- Realign strategic focus of sales activities

Note:  
[1] EBITDA margin with normalization of one-time impact in Q2 2020 and Q3 2020

# Trend of CapEx, D&A and R&D Spending

■ FY2016 ■ FY2017 ■ FY2018 ■ FY2019 ■ FY2020

(KRW in Billions)



*Raised Guidance for 2020 CapEx by 20 bW Due to Accelerated EV Launches*



# 3Q 2020 Balance Sheet

(K-IFRS / KRW in Billions, x times)



## Balance Sheet

	Sep 2020	Dec 2019	Dec 2018
Cash and cash equivalent	991	687	1,018
Account receivable	1,225	1,254	1,021
Inventories	693	613	506
Property and equipment	2,208	2,130	1,551
Intangible assets	1,685	1,593	564
Lease assets	216	205	181
Other assets	670	601	515
<b>Total assets</b>	<b>7,688</b>	<b>7,082</b>	<b>5,356</b>
Account payable	1,358	1,459	1,215
Debt	3,474	2,734	1,672
Other liabilities	590	552	337
Shareholder's equity	2,143	2,217	2,037
Non-controlling	122	121	95
<b>Total liabilities &amp; shareholders' equity</b>	<b>7,688</b>	<b>7,082</b>	<b>5,356</b>

## Cash and Debt

Cash Balance	Sep 2020	Dec 2019	Dec 2018
Net Debt	2,484	2,047	654
Net Debt Ratio	1.1	0.9	0.3
Debt to Equity	1.5	1.2	0.8

- 'Debt' and 'Net Debt' includes Lease Debt since YE2018 due to the change of KIFRS 1116.

Leverage	2019	2018
EBITDA	864	701
Debt / EBITDA*	3.0	2.4
Net Debt / EBITDA*	2.2	0.9
EBITDA* / Net Interest Expenses	14.7	39.7

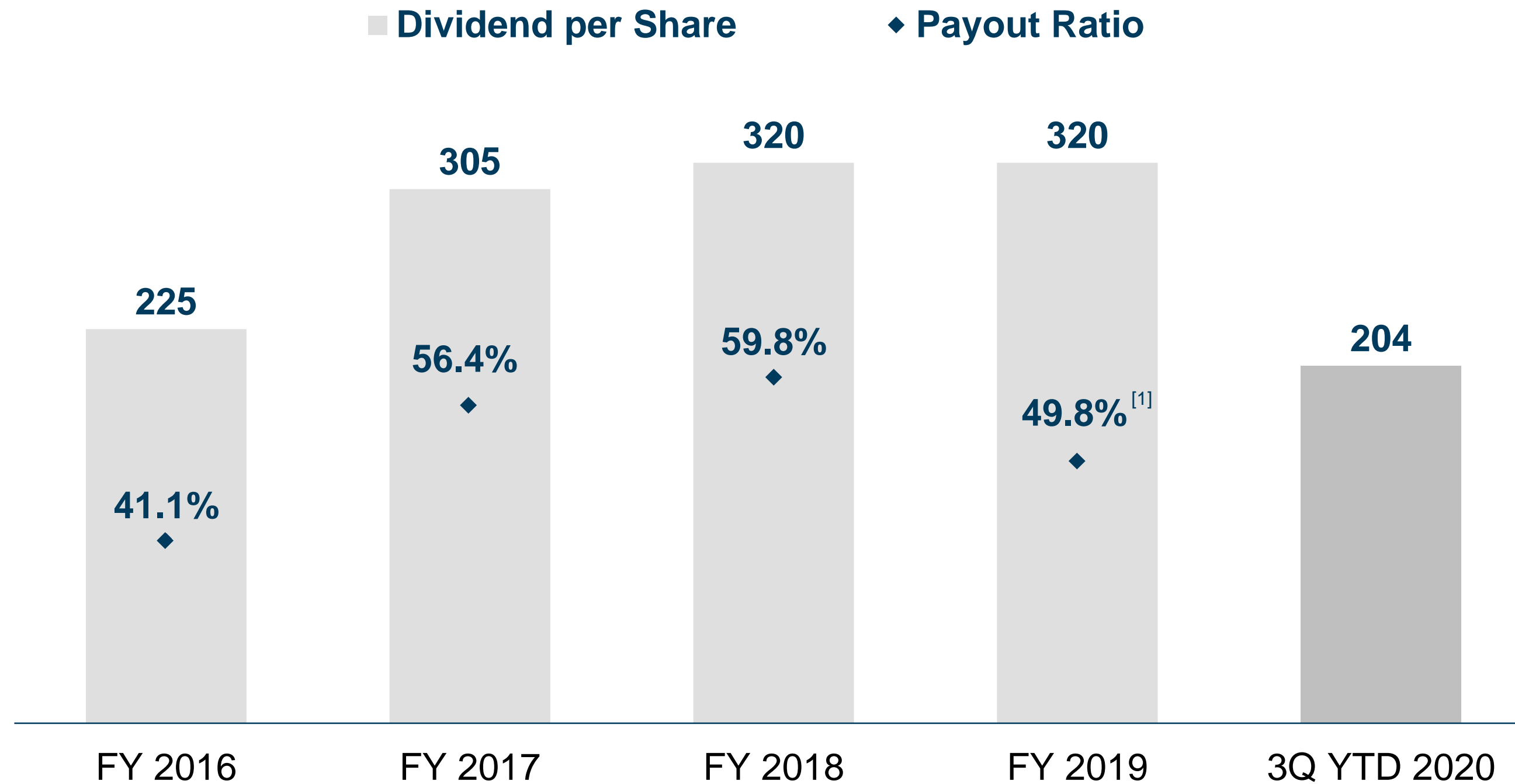
- Annualized EBITDA including Q1 performance of E&FP business

*Net Debt Significantly Improved by 210 bW QoQ and Back on Track to Reduce Down to Ordinary Level*

# Dividend



## 3Q20 Quarterly Dividend: 68 KRW per share

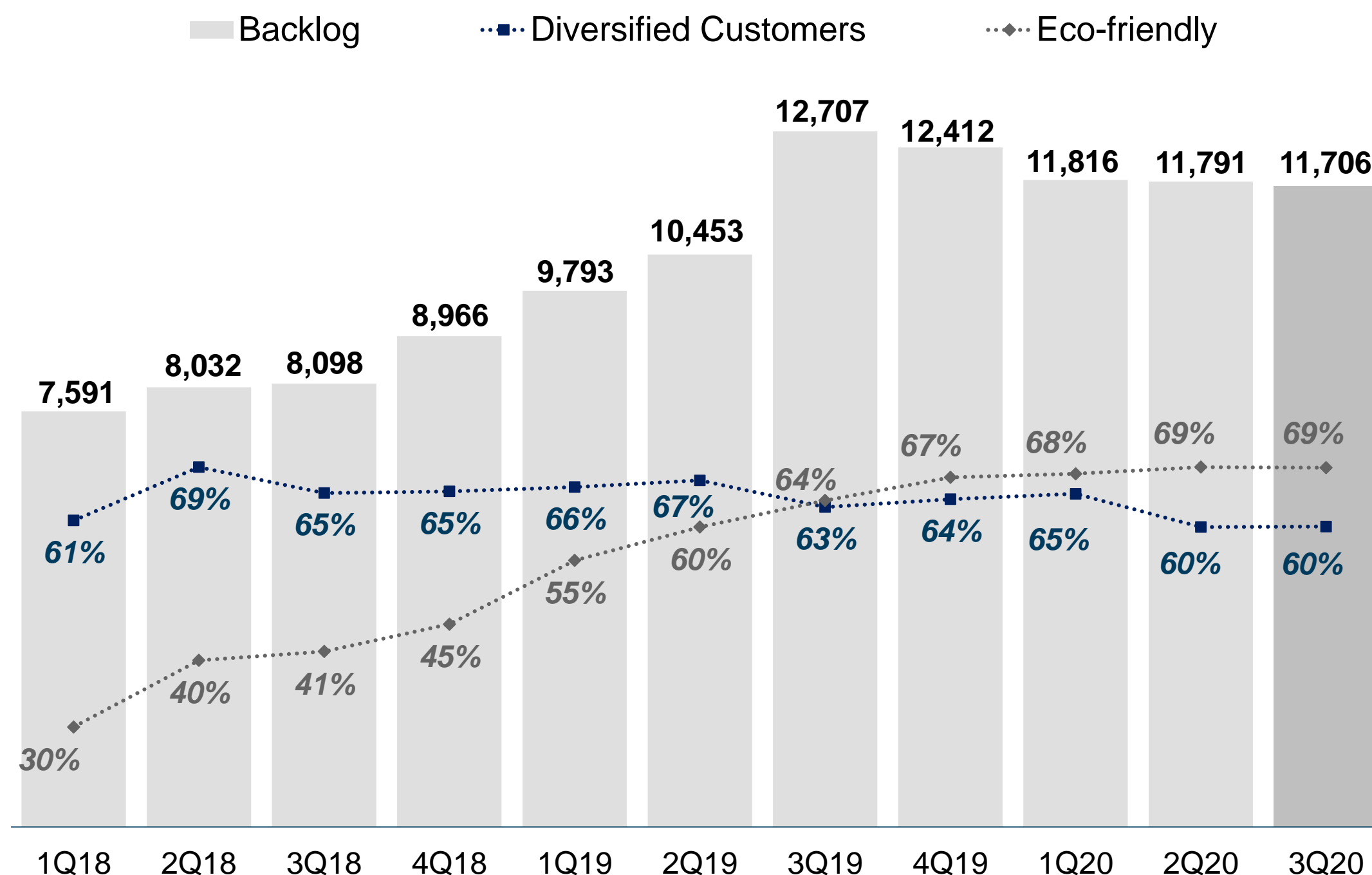


Note:  
[1] Based on adjusted net income per share of FY2019

# Backlog Status Update

## 3Q20 Backlog (New Wins Only)

(USD in Millions)



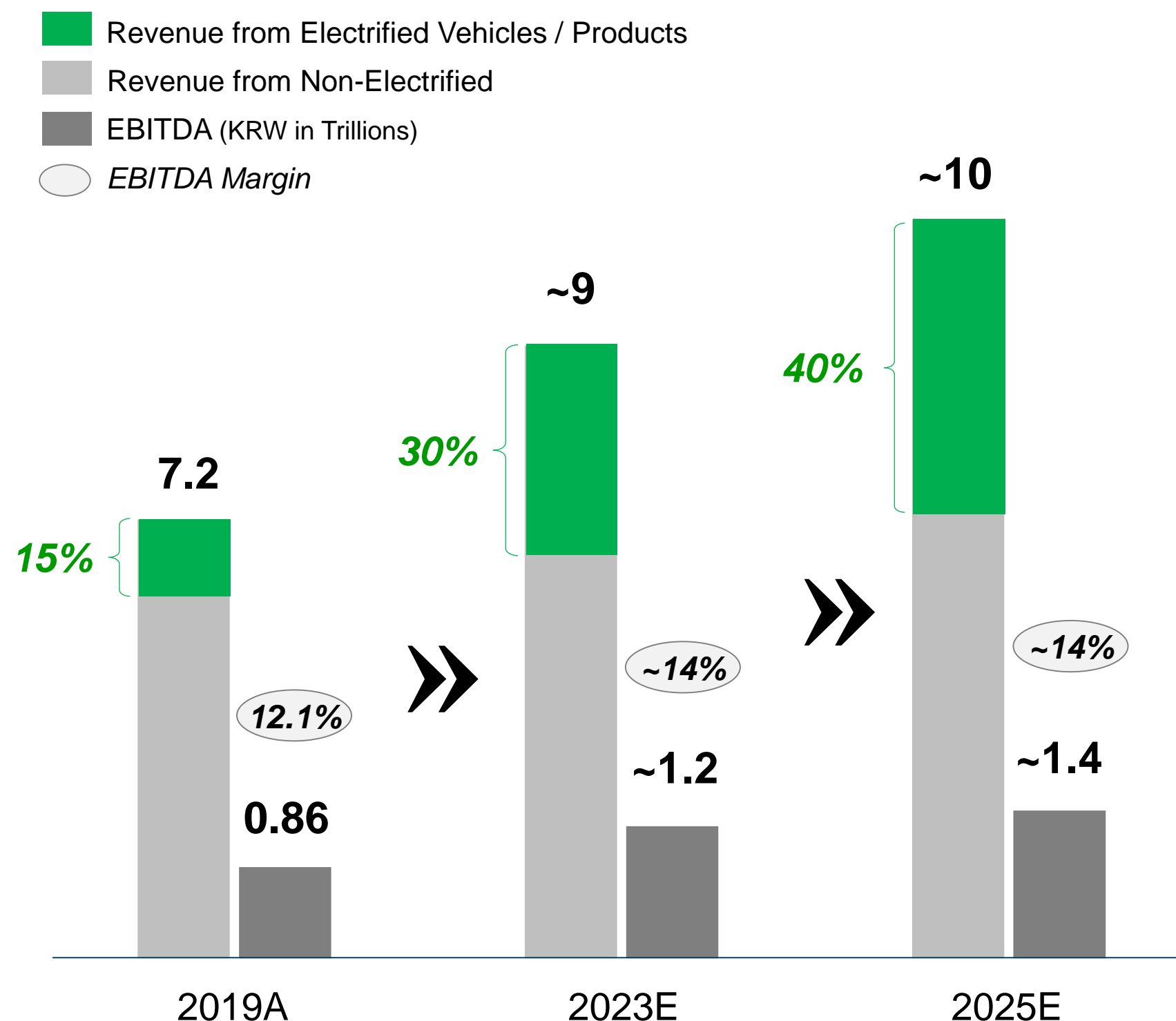
- Backlog: Defined as cumulative revenue for expected lifecycle of awards before start of production
- Orders from customers other than HMG and Ford account for 60% of current backlog
- Eco-friendly orders account for 69% of current backlog



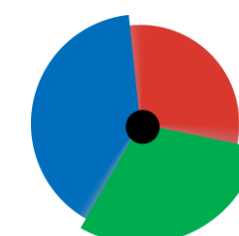
# Continuing Profitable Growth



## Long-Term Financial Projection



Economies of scale with EV volume increase to pass critical mass



Technology and market leadership in EV thermal business



Cost improvement roadmap in place and under execution

A cosmic scene featuring the curved horizon of the Earth at the bottom, with a bright, glowing light source (like a sun or star) rising behind it, creating a blue and white glow. The background is a deep blue space filled with numerous small white stars. A large, faint, circular lens flare or nebula-like structure is visible in the upper center.

**THANK YOU**