

Riding the Electrification Wave

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Auto Industry Trend and Thermal Systems Business

Four Key Transformative Forces in the Auto Industry



Electrification



Shared mobility



New entrants

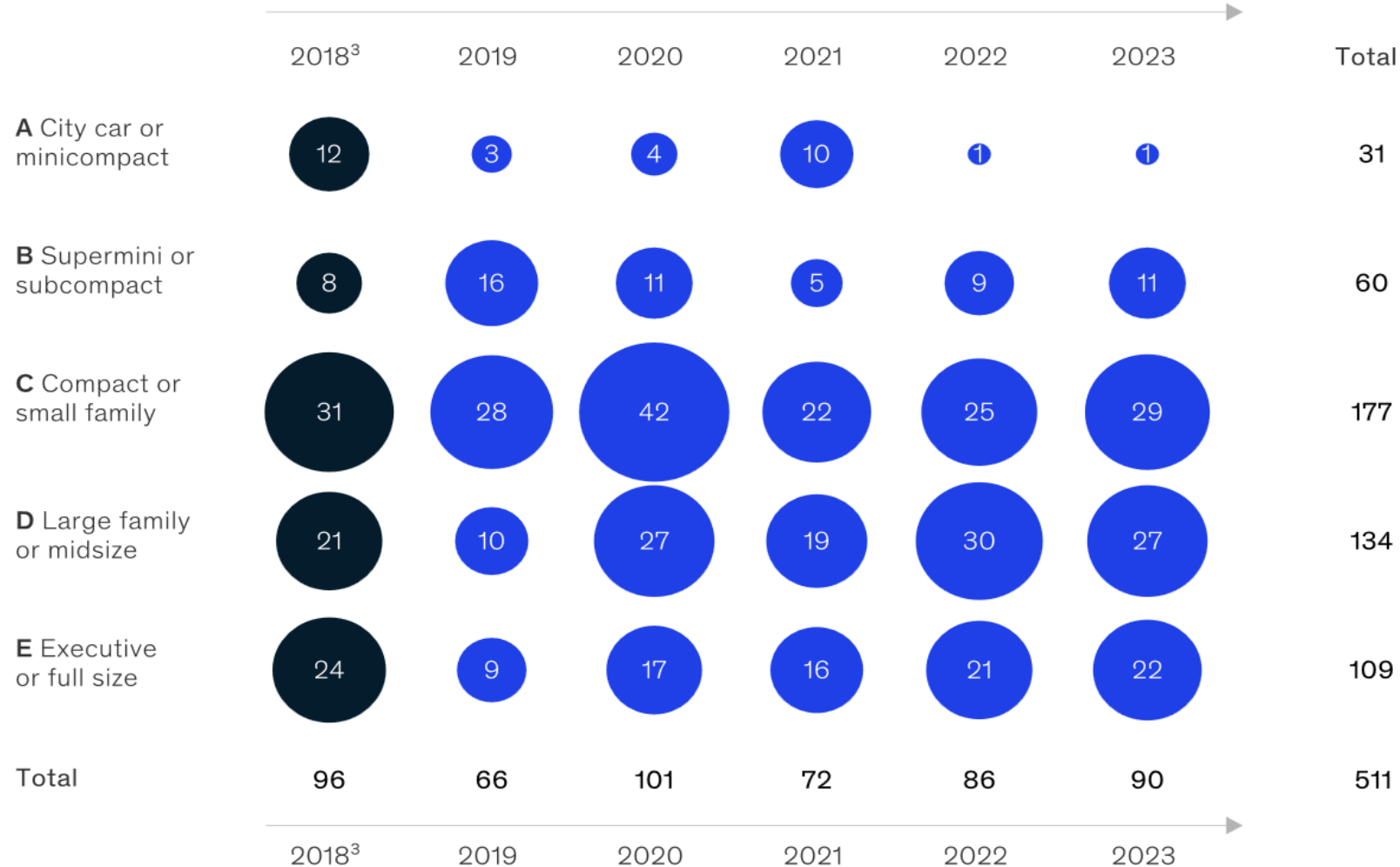


Technology convergence



Electrification by Segments

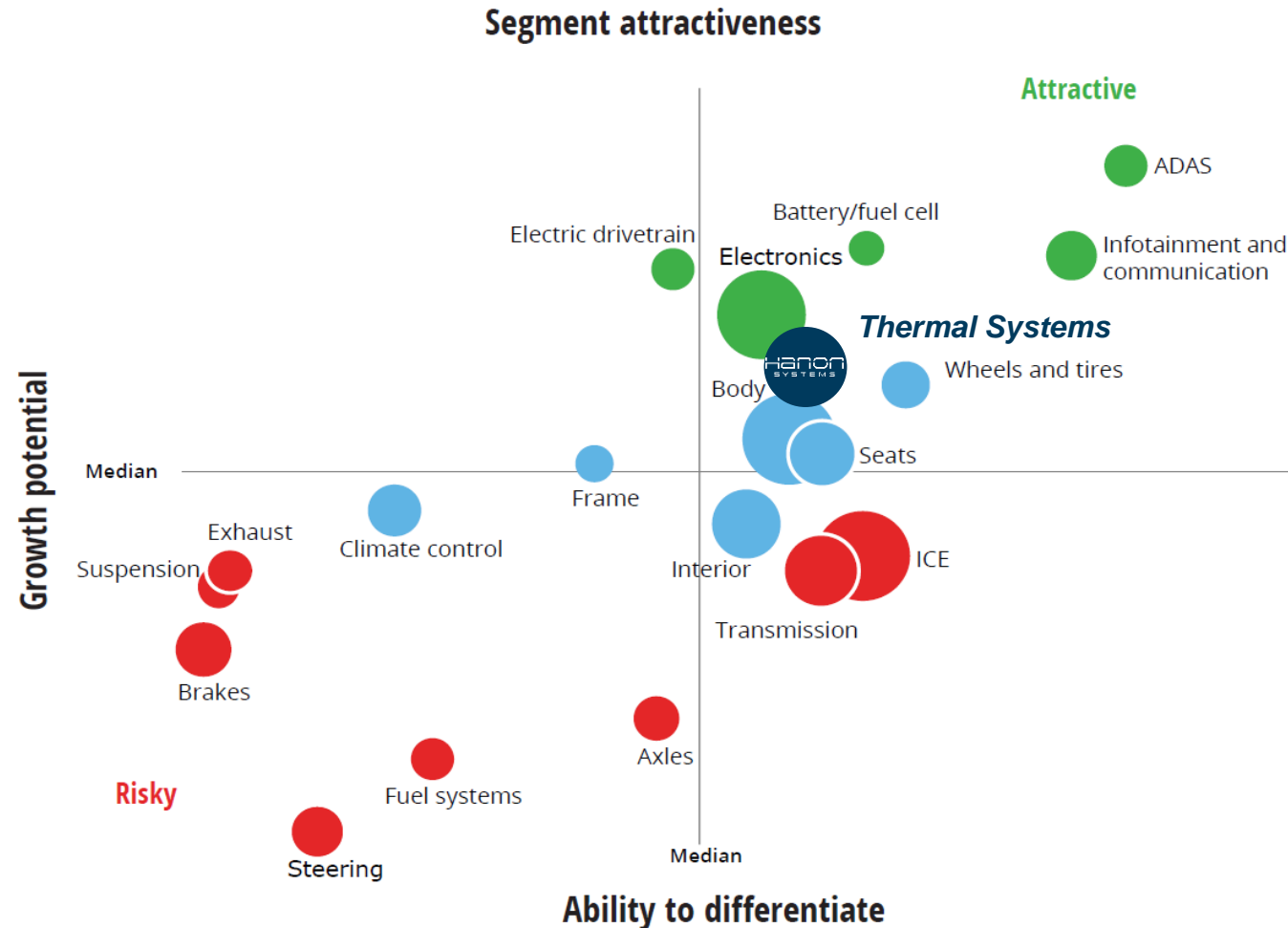
- Number of BEV and PHEV model launches by vehicle segment



Source: IHS, McKinsey & Co.

Transformative Impact on Automotive Supply base

○ Automotive revenue ■ Growth ■ Stagnant ■ Declining



Source: Deloitte, Hanon Systems

Characteristics of xEV Thermal Systems

	ICE	Hybrid	EV	FCEV
Power source	Engine	Engine / Battery	Battery	Battery / Stack
Climate Control	⊙	⊙	⊙	⊙
Powertrain Cooling	⊙	⊙	⊙	⊙
Driving Range	X	X	⊙	⊙
Heating Efficiency	X	○	⊙	⊙
Noise	X	○	⊙	⊙
Recharging Cooling	X	○	⊙	X

X – Does not exist/ insignificant

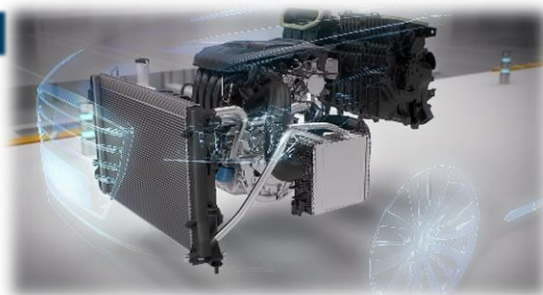
○ – important

⊙ – critical

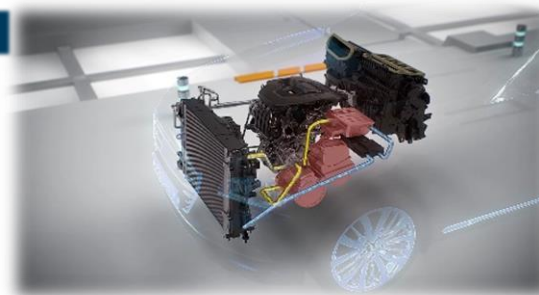
- Climate control and powertrain cooling systems are critical in all vehicle types
- Vehicle heating and cooling is a big contributor to energy consumption
- NVH(Noise/Vibration/Harshness) is a critical factor in electric vehicles
- Battery thermal management in the driving or recharging condition and managing optimal temperatures for electronics are future challenges

Solutions by Hanon Systems

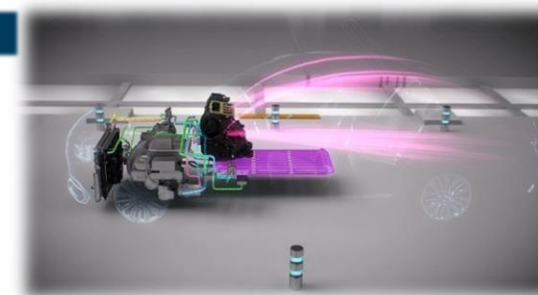
ICE



HEV





















BEV



Electrified Vehicles Drives Technology Innovation in Thermal Systems

CPV Upside with Vehicle Electrification

- Thermal Systems CPV will grow in both HEV and BEV due to increased complexity and electrification

	CPV in ICE	CPV in HEV	CPV in BEV
Total	 \$450 ~550	 \$1,100 ~1,300	 \$1,500 ~1,700
HVAC		 Addition of high voltage heater	 Addition of inner condenser, high voltage heater, and enhanced blower motor
Powertrain cooling		 Adoption of BLDC motor and addition of battery cooler	 Installation of sophisticated battery thermal management system
Fluid Transport		 Minimal CPV increase with similar A/C line set-up	 Increased fluid mechanics complexity and length extension
Compressor		 Evolution from mechanical to electric compressor	 Evolution from mechanical to electric compressor
Pumps & Valves		 Addition of electronic pumps	 Addition of high-power electronic pumps

Market Size of Hanon Systems' Products

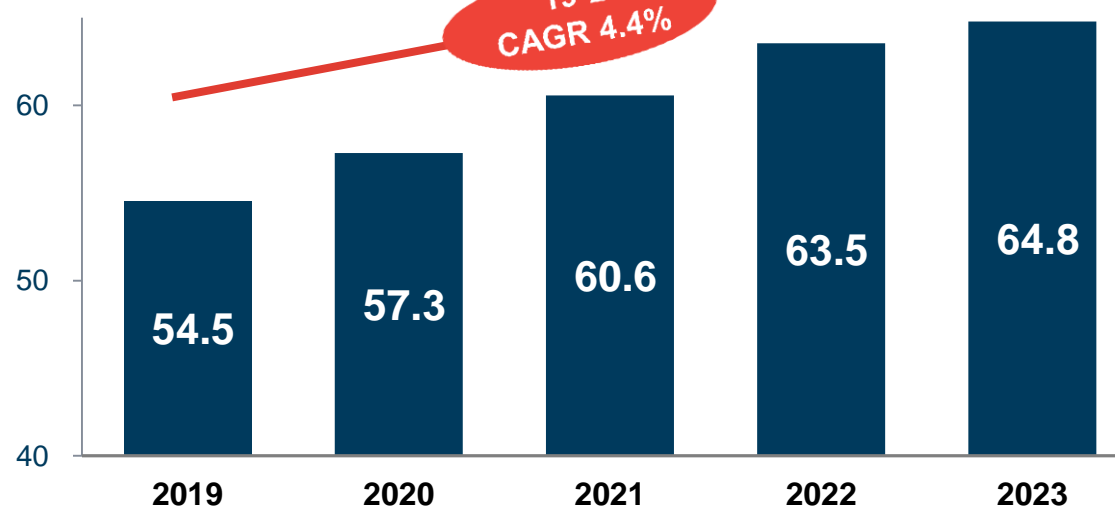


Global Vehicle Production Volume
(2019-23 CAGR 2.4%)



Market Size

(Trillion KRW)



Expanded products^[2]
(CAGR 10%)

- BLDC Fan
- TMOP
- Water Pump

^[2] E&FP product from the acquisition

Electrification^[1]
(6% → 16%)

- eComp
- Battery Thermal
- Heat Pump

^[1] 2019-23, Share of FHEV/PHEV/EV

Fuel Economy / Lower Emission



Source: IHS, McKinsey & Co.



Hanon Systems

Global Top 2 in Automotive Thermal Systems

Company at a Glance



One of only two global
full line automotive thermal
solution suppliers in the world



Headquartered
in Korea; listed
on the Korea Exchange



Global 2018
sales of ₩5.9T



51 Manufacturing Sites
23 Engineering Sites

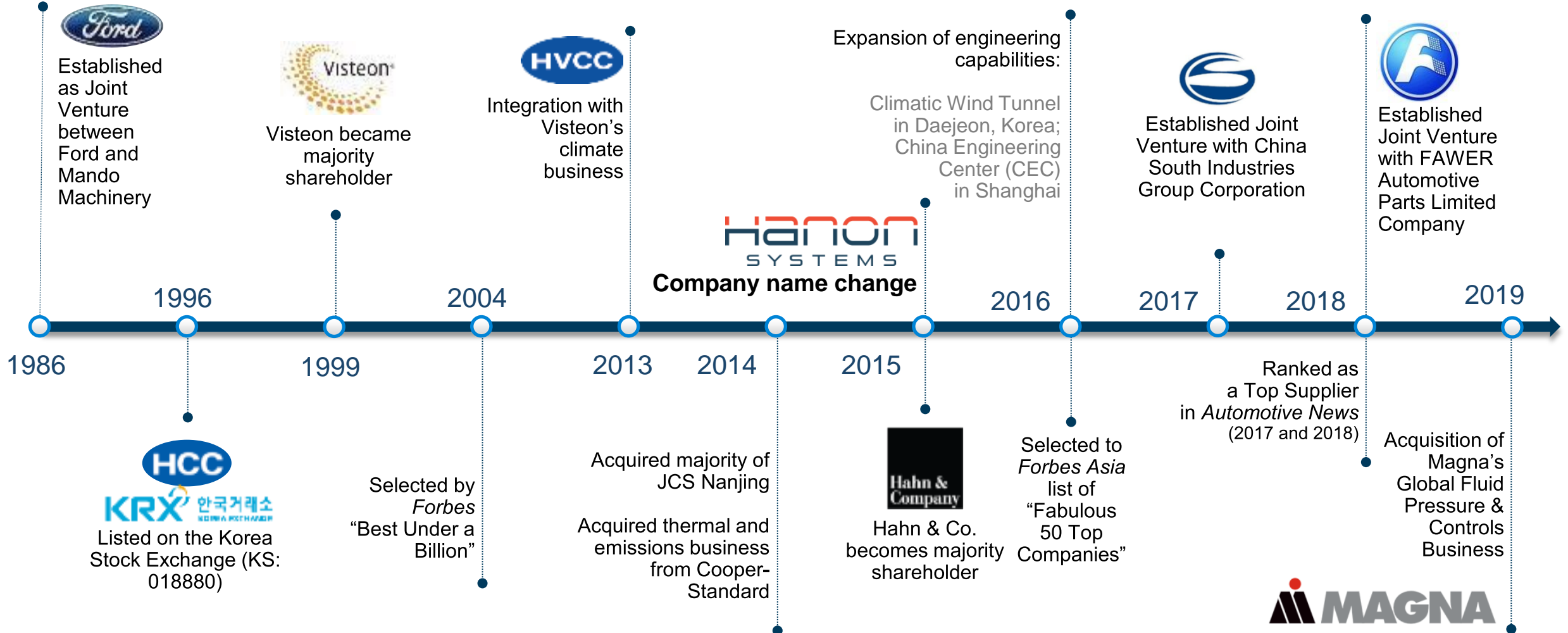


Presence in 21 countries
across Asia, Europe,
North America and
South America



More than 22,000
employees

History



* Source: Logos from misc. websites without permission. For illustrative purposes only

E&FP(Electronics & Fluid Pressure) Acquisition



- Acquired s a separate business unit of Fluid Pressure & Controls under Magna Powertrain group of Magna International
- A leading provider of various automotive pump products, enabling cooling and pump technology to support OEM fuel economy, emission reduction and thermal management needs
 - #2 in global PeWP market, #1 in North America eTMOP market,
 - #1 in Europe mTMOP market, #2 in Europe ECF market^[1]
- Operates a global business with approximately 4,100 employees (including 340 engineers), 9 manufacturing and engineering facilities

Electrified Products of E&FP



Electronic Cooling Fan

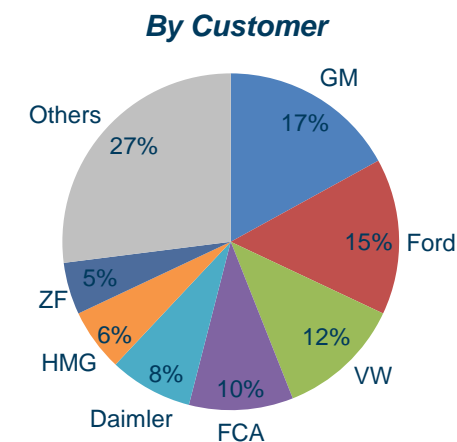
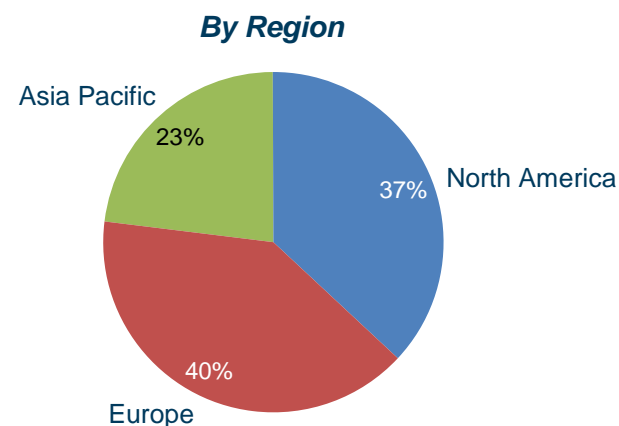
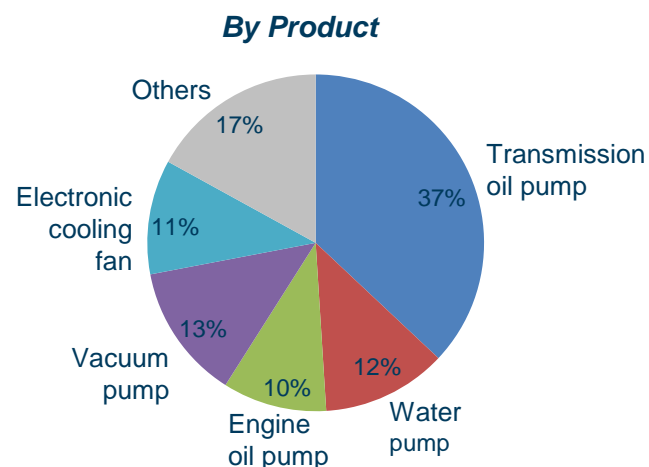


Electronic Water Pump



Electronic Transmission Oil Pump

Revenue Breakdown (2018A)



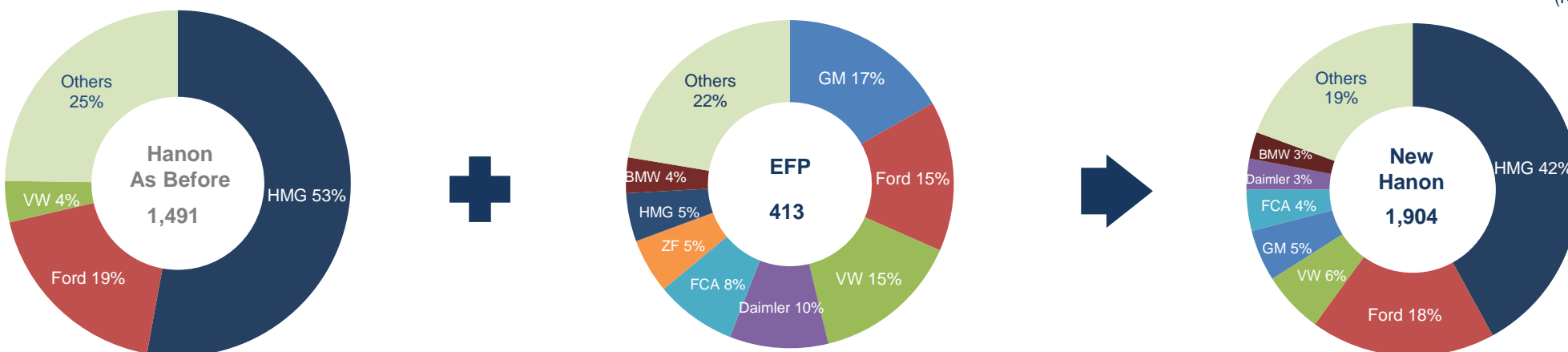
[1] PeWP (Primary electronic water pump), eTMOP (electronic transmission oil pump), mTMOP (mechanical transmission oil pump), ECF (electronic cooling fan)

Began to Consolidate EFP since 2Q19

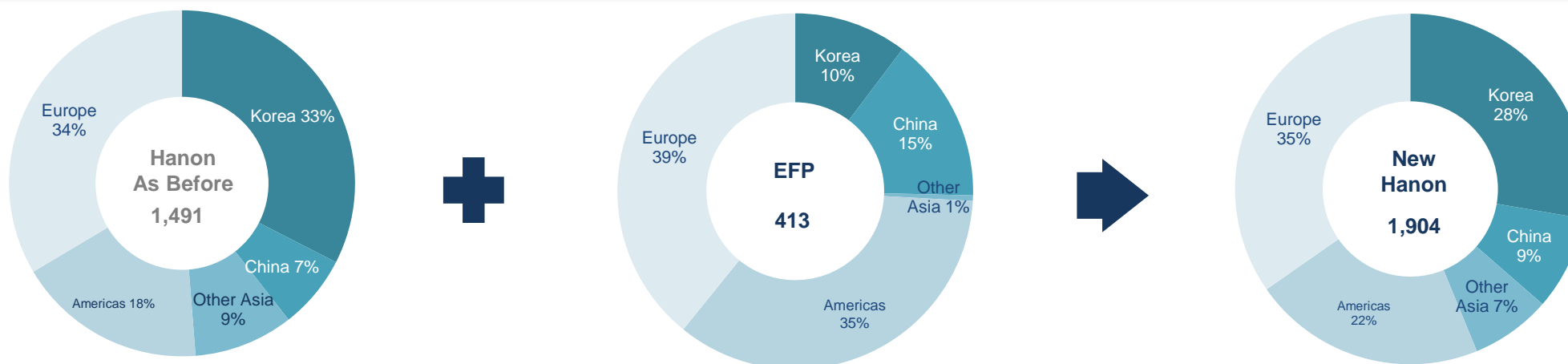
Customer / Region Mix

2Q19 Sales by Customer with E&FP

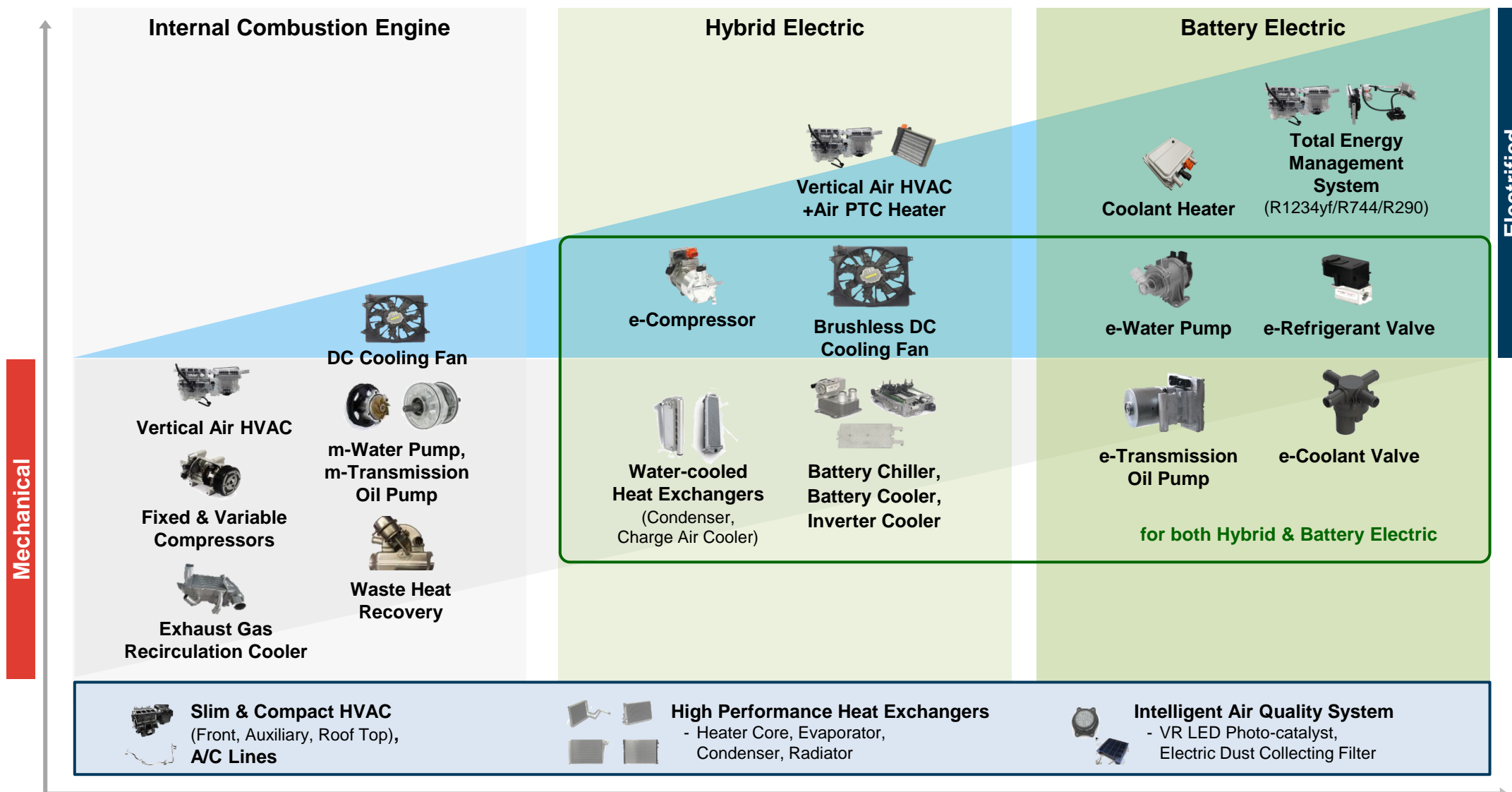
(KRW in Billions)



2Q19 Sales by Region with E&FP



Thermal Systems Product Portfolio



Leading Supplier of e-Compressors for xEVs

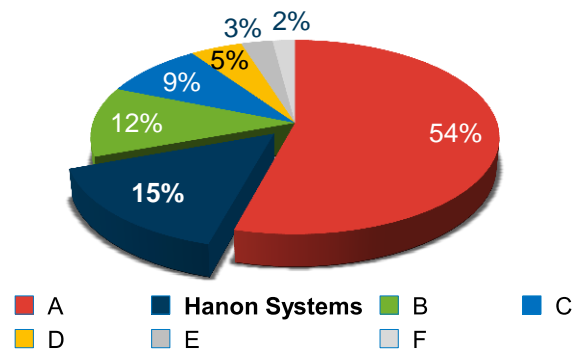


- Hanon Systems has successfully grown its e-compressor business with a diverse customer base
 - Awarded a series of global flagship xEV platforms from various OEMs and secured significant share of wallet

e-Compressor Market Share

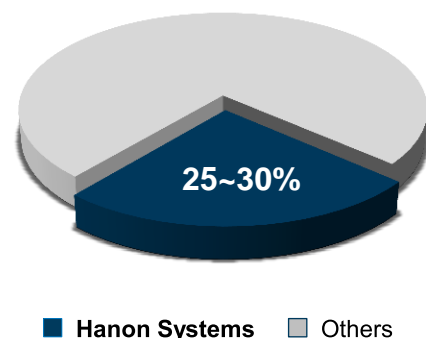
2017 Market Share

(%)



2023E Market Share

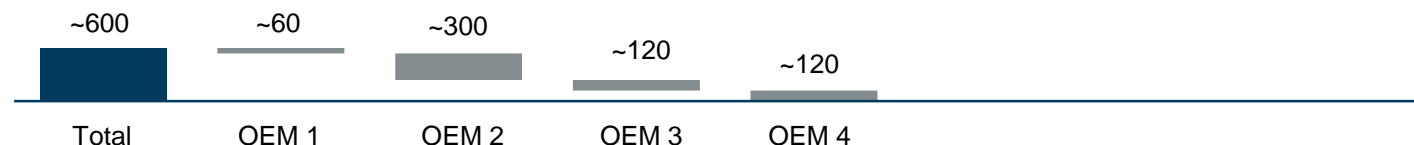
(%)



Hanon Systems e-Compressor Volume by Customer

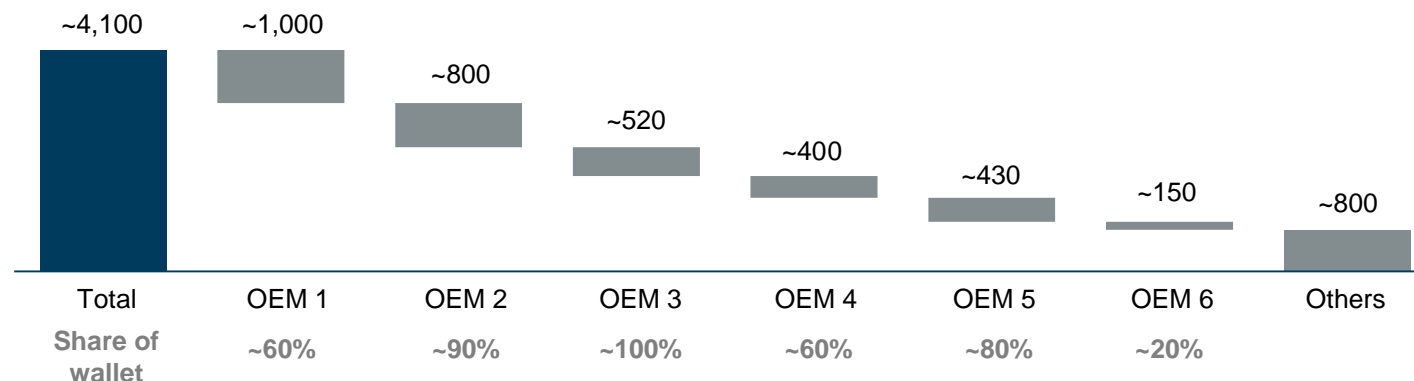
2017 Hanon Systems Production Volume

(Units in thousands)



2023E Hanon Systems Production Volume

(Units in thousands)

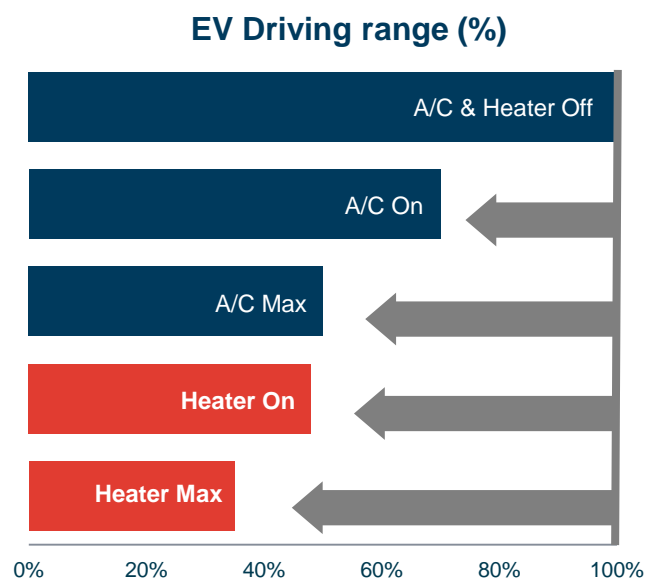


Heat Pump System

- Differentiation Points of the Hanon Systems Solution

Electrical heating can decrease
EV driving range significantly

Need high efficient heating system to minimize the impact



Driving range down to ~ 50%~

Consumer concern about driving
range breeds hesitation to buy EVs

	Electrical Heater	Heat Pump
COP (Efficiency)	0.9	1.5 ~ 3.0
Driving Range		~35% ~ Up
Energy Source	Electricity	+ Ambient Air (via heat exchange)

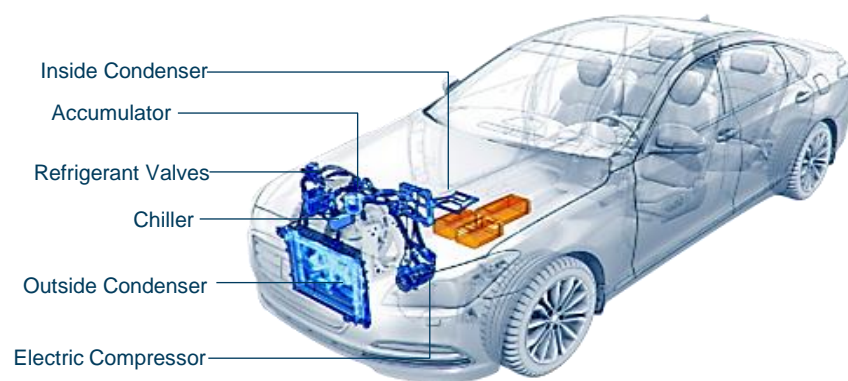
Heat Pump can minimize loss in
driving range with higher efficiency



Heat Pump System

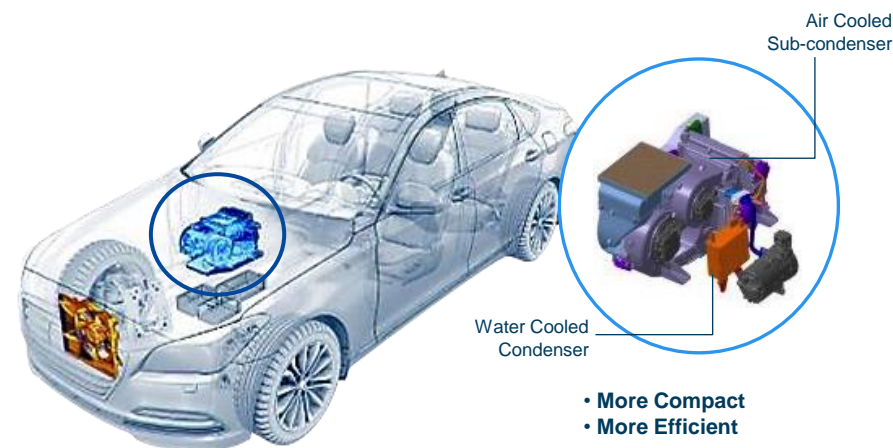
Product Evolution Roadmap

Heat Pump System



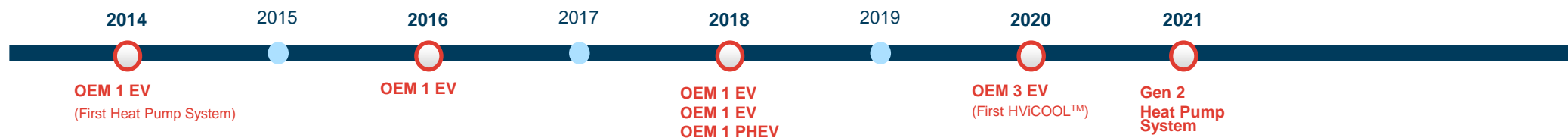
- Conventional heat pump system
- Cooling and heating via redirection of refrigerant

HViCOOL™ (“Climate in a box”)



- New concept heat pump system (Industry First)
- Increased cabin space (HVAC-free cockpit) ultimate design flexibility

Hanon Systems Heat Pump System Business



Global Footprint

● Manufacturing and Engineering Locations

■ Innovation Centers (Asia Pacific, Europe, Americas)

■ Technical Centers (Czech, Germany)

* Includes non-consolidated joint ventures

Europe

Slovakia Ilava
Turkey Gebze
Portugal Palmela
Czech Republic
Nový Jičín
Hluk
France Charleville
Hungary Székesfehérvár
United Kingdom Chelmsford
Germany
Kerpen
Waghäusel
Bad Homburg
Bulgaria Plovdiv
Italy
Campiglione
Benevento

India

Chennai
Pune
Gujarat
Bhiwadi
Bangalore

Thailand

Rayong

South Africa

Port Elizabeth

Korea

Daejeon
Pyeongtaek
Ulsan
Asan
Seoul

Japan

Hiroshima
Yokohama
Higashi, Hiroshima*
Hofu, Yamaguchi*

China

Beijing
Changchun
Dalian
Chongqing (3)
Nanchang
Changzhou
Yancheng
Nanjing
Shanghai

Beijing*
Changchun*
Chengdu*
Foshan*
Wuhu*

Americas

United States
Shorter, Alabama
Novi, Michigan
Carey, Ohio
Canada
Belleville, Ontario
Concord, Ontario
Brazil
Atibaia, São Paulo
Mexico
Juarez (San Lorenzo)
Juarez (Santa Fe)
Juarez (Paso del Norte)
Juarez (Rivereño)
Querétaro
Monterrey (2)
Salamanca*

51 Manufacturing Facilities, 23 Engineering Sites Globally and 22,000+ Employees



Mid-Term Business & Shareholder Return Plan

Business Plan

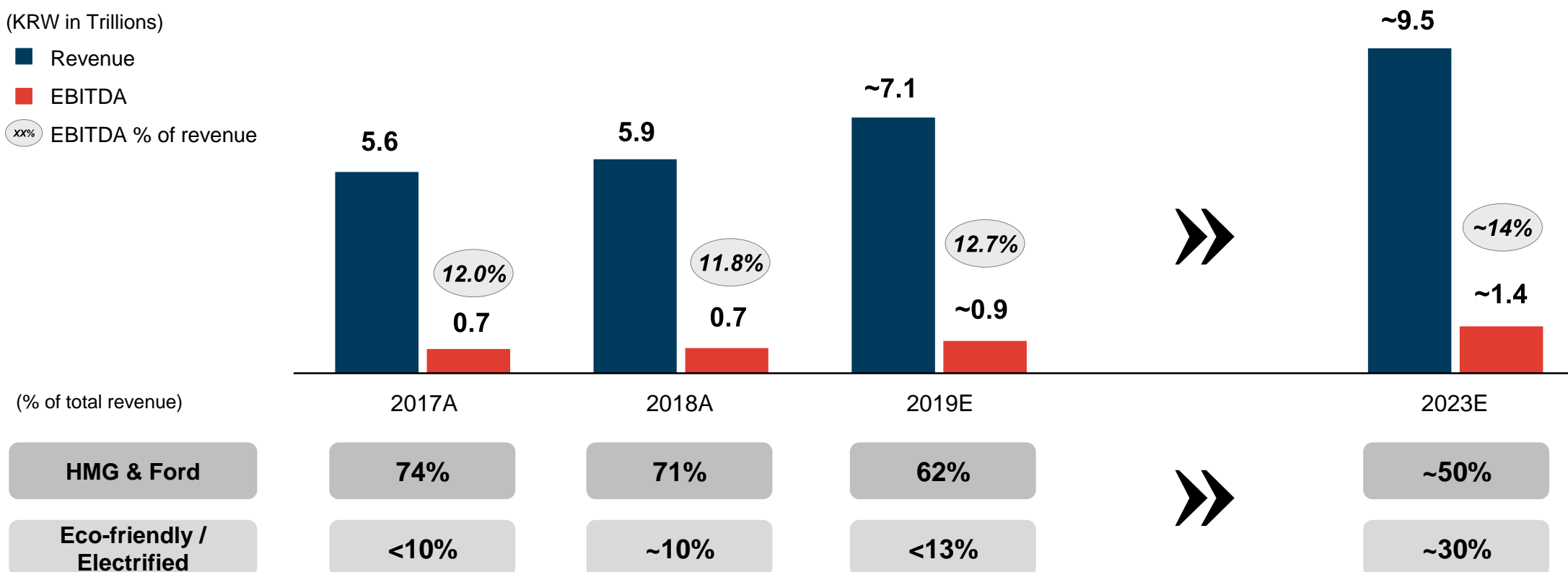
- Initial forecast for 2020 stands at a revenue of KRW 7.5~7.8 T and an EBITDA of more than KRW 1.0 T
- Revenue will continue to grow to KRW 9.5 trillion by 2023 with further customer diversification and increasing businesses of eco-friendly and electrified solutions

(KRW in Trillions)

■ Revenue

■ EBITDA

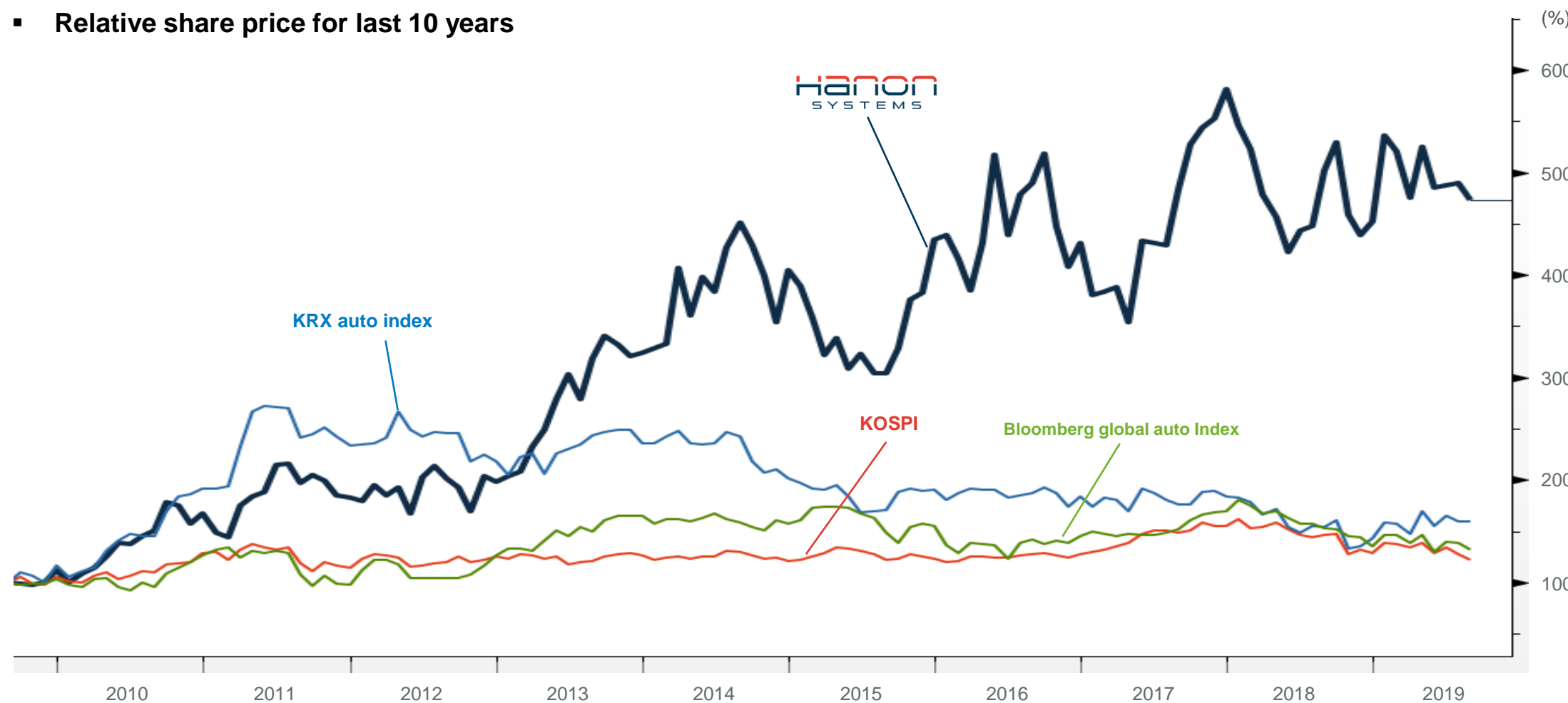
○ XX% EBITDA % of revenue



Hanon Systems to Grow Faster than Industry's Vehicle Volume Growth

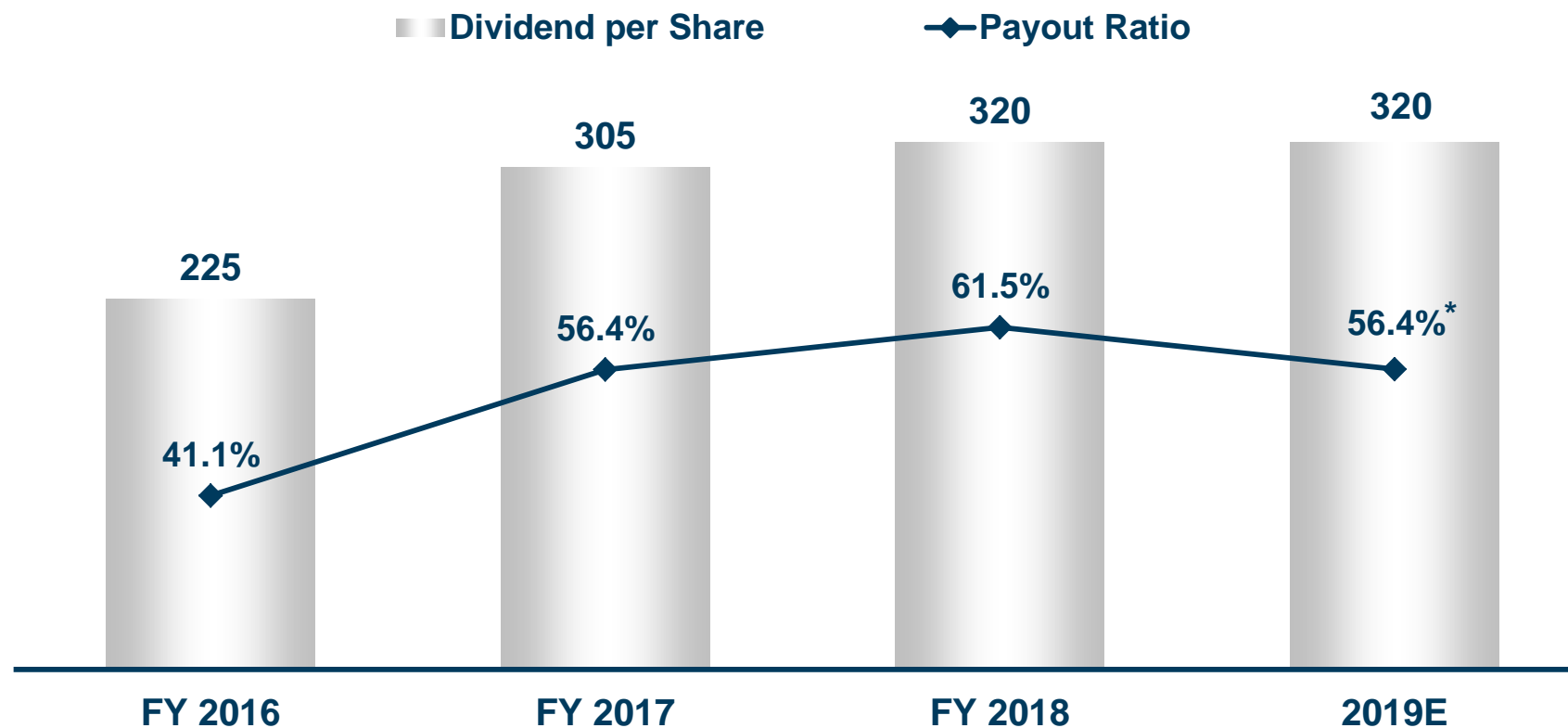
Historical Share Price Performance

- Relative share price for last 10 years



Outperformed Most Relevant Indices

2019 Dividend Guidance: 320 KRW per share



** Based on adjusted net income per share of 1H19*

Maximizing Shareholder Value is Top Priority for Hanon Systems

Thank you

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