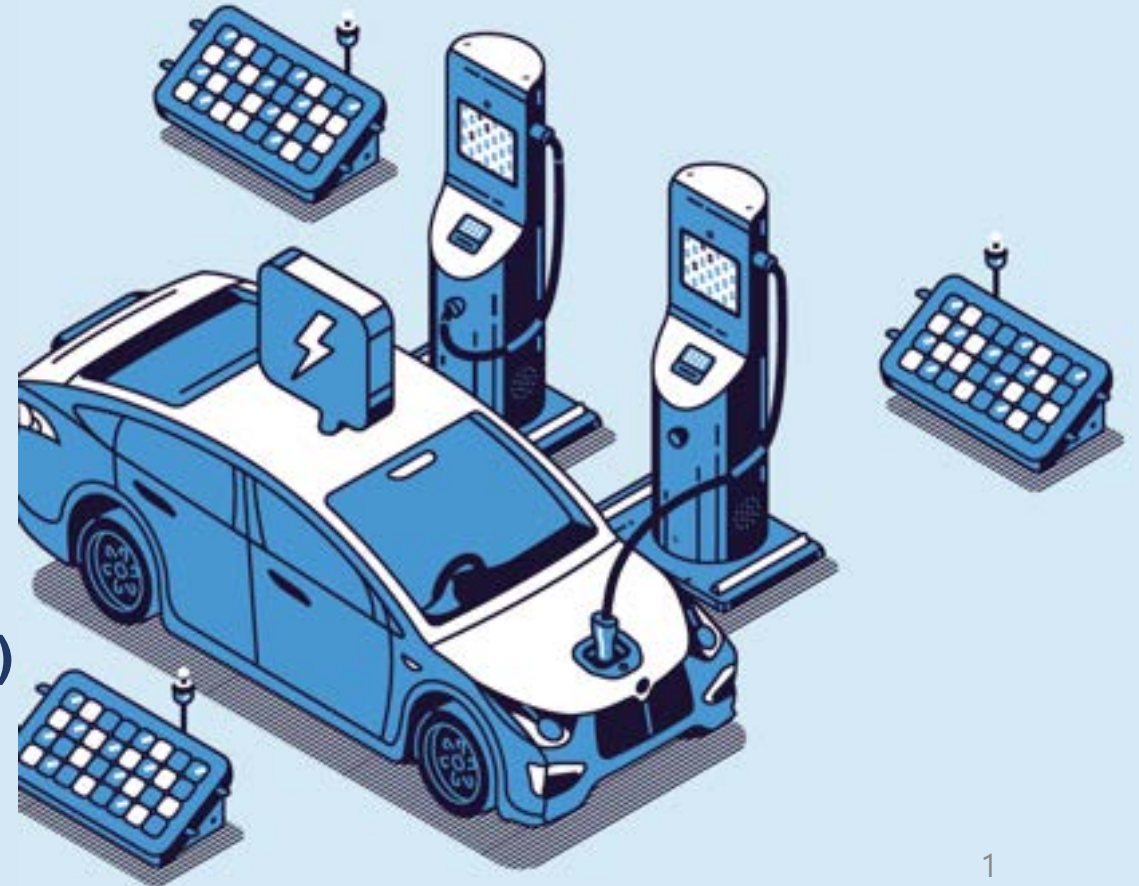


# Auto industry transition : How are Korean auto-parts makers adapting to the changes?

---

2024. 9. 13.

Dr. Hyunjin Lim  
KATECH (Korea Automotive Technology Institute)





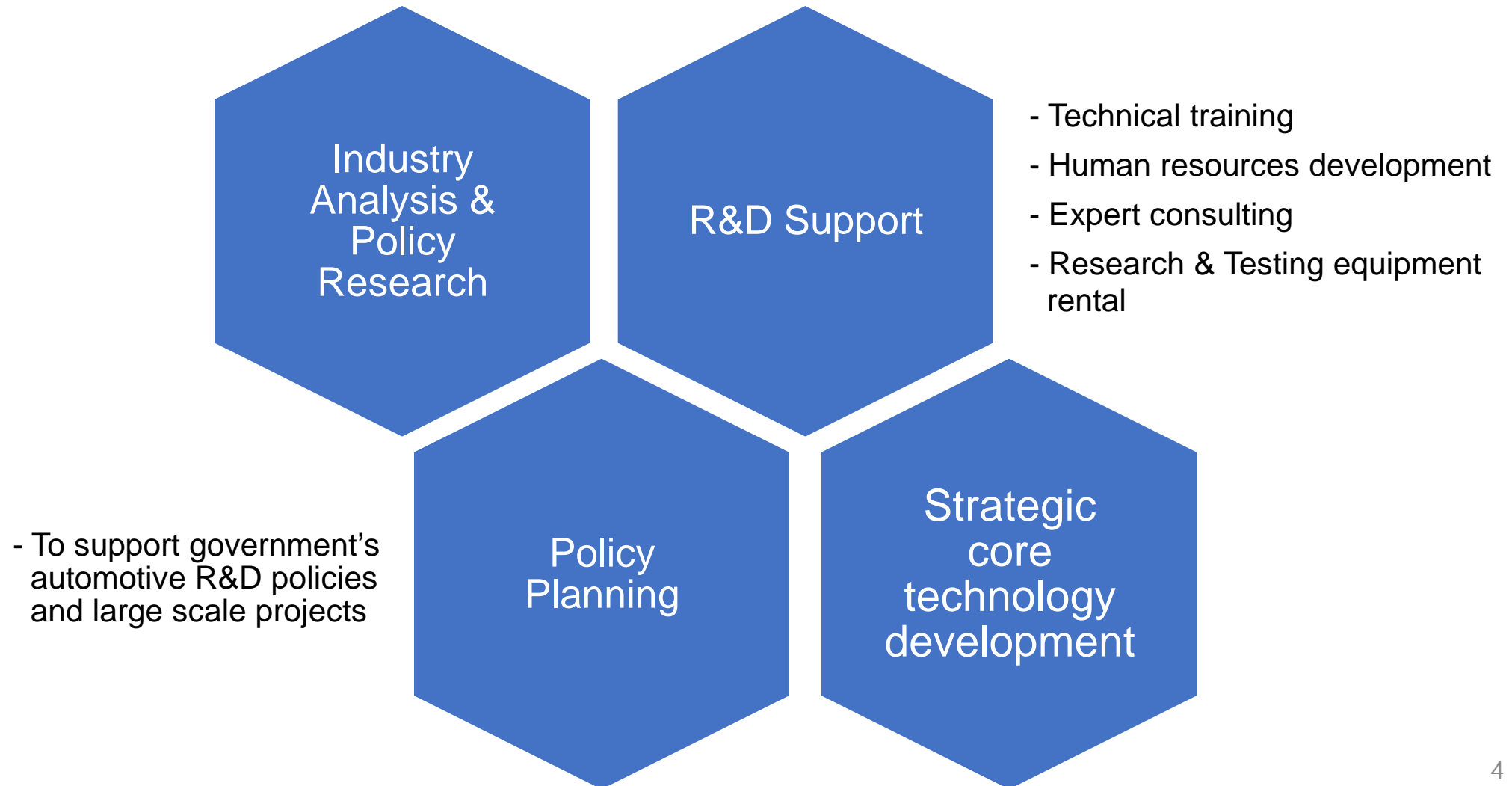
I

**KATECH**

## Purpose of Establishment

- **Korea Automotive Technology Institute(KATECH)** is established by Korean government and companies in 1990, based on ‘the law of Industrial Technology Innovation and Promotion’
- The mission of institute is to support the regional auto part industry, especially SMEs(Small and Medium Enterprises), to secure sustainable growth by **offering R&D support, reliability assessment test**, as well as **technical information** and **human resources development**.

## Main Roles

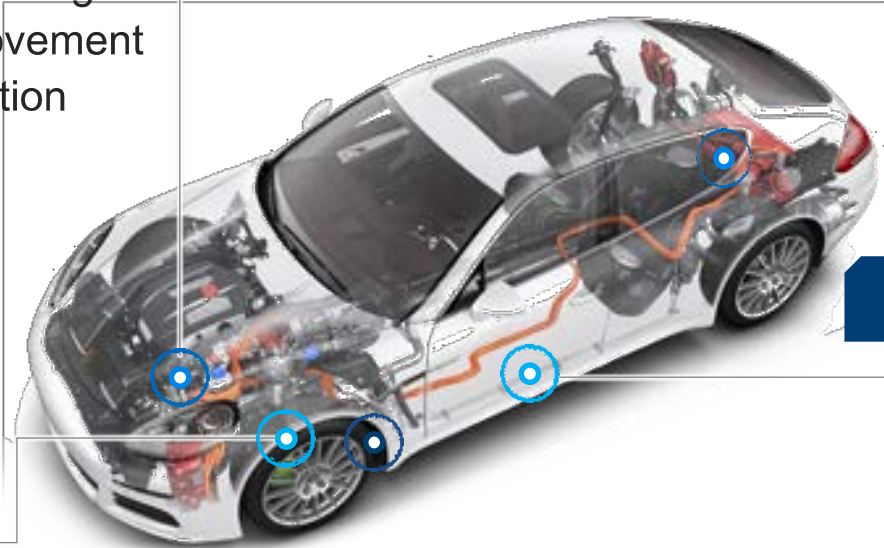


## Fields of R&D



### Green

- Energy Conversion & Storage
- Energy Efficiency Improvement
- Engine control optimization
- Exhaust gas treatment



### Smart

- Active safety driving
- Autonomous vehicle
- Driver convenience
- Interface

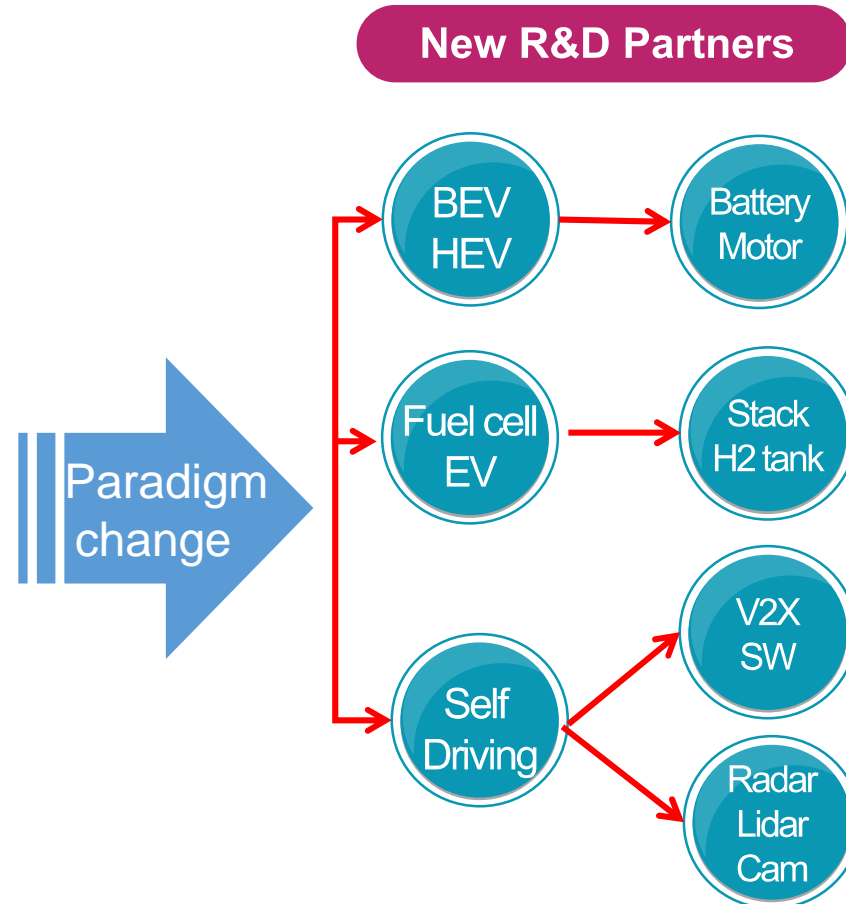
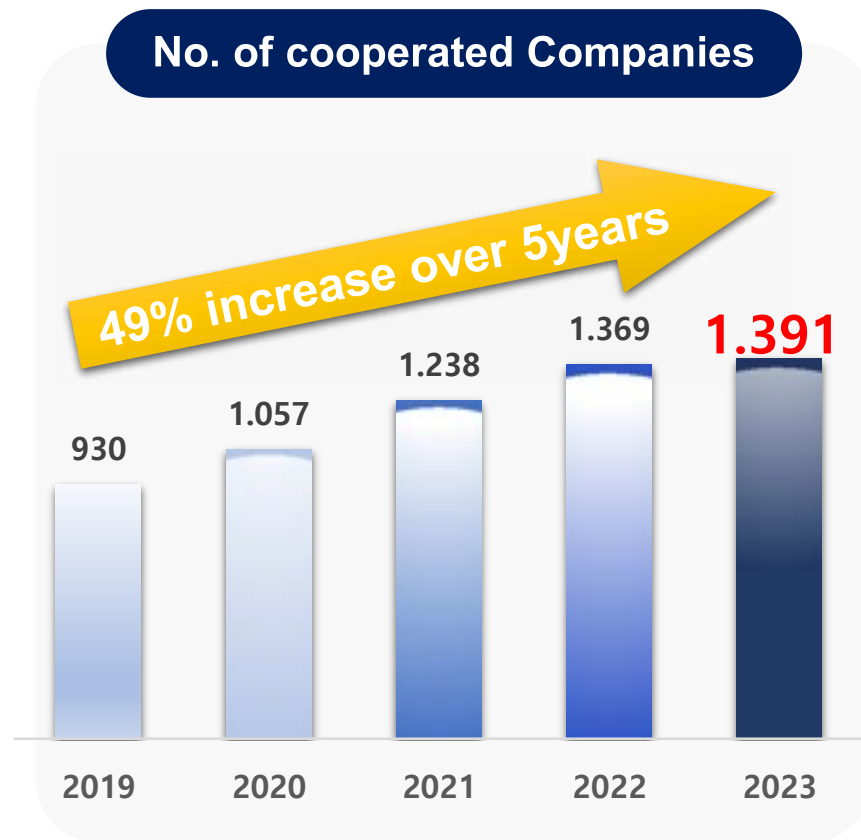
### Materials/Componentes



- Lightweight
- Environmental Friendly
- High cognitive
- Durability and Reliability

## 1,391 auto & auto-parts makers worked with KATECH in 2023

- Cooperation with Korean auto & auto-parts makers is rapidly increased due to **paradigm shift** in auto industry.



**II**

## **Auto Industry Transition**

## Electrification driver

- Regulatory pressures remain high, while industry and regions compete to transform value creation in the powertrain industry.

### Regulatory motivation

- Regulation continues to spur **zero-emission** electrification and is expected to **intensify further**.
- The regulation is **directed at both OEMs and consumers**.

### Economic motivation

- OEMs are increasingly focusing on ESG, encouraged by financial markets as it is also a key factor in raising capital for the transformation.
- A high proportion of EVs in the OEM portfolio **improves overall rating performance**.

### Geopolitical motivation

- Various programs launched by the major regions, such as the US **Inflation Reduction Act (IRA)**, are vying with each other to **galvanize a local electric powertrain value chain**.



## Development and Diffusion

- Technological development in the ePowertrain will enable OEMs to reach competitive cost levels of BEVs and satisfy different customer segments, enabling large-scale market diffusion.

### Cost parity

- BEV powertrains are expected to become available at **competitive costs** in comparison with ICE by the end of the decade.
- **Parity of total costs of ownership** is expected to be achieved by **2025**.
- **Powertrain costs parity** is forecasted to be reached **after 2030**, which is especially significant for price-sensitive entry class diffusion.

### Market diffusion

- **Improved TCO** due to scale effects and technological development are likely to lead to **BEV diffusion**, further consolidating the position of **BEVs as the standard choice**.
- By **2030**, around **40% of light vehicles** globally are forecasted to be based on a BEV platform and a **70% BEV share** expected by **2040**.
- Electrification is moving from **premium to entry segments**, driven by customer demand.

## Trends and Challenges

- **(Trend)** Automated & connected vehicles(CAVs) is slowly moving from trial to commercial stage.
  - Mercedes L3 drive pilot allows drivers to take their hands off the steering wheel, eyes off the road.
  - Robotaxis (Cruise, Waymo, Baidu, Pony.ai) are entering commercialization, expanding to more cities.
  - High AV adoption expected in China, with significant policy support and 5G coverage.
- **(Challenge)** Automated and connected vehicles need to overcome various technological and legal hurdles to get road ready. Moreover, consumers are still skeptical about the novel technology.
  - (Data Privacy) Handling of personal data should be dealt with care, due to user trust and cyber security risks.
  - (Technology) More powerful AV system also requires more electricity, affecting the car range in EVs especially. Also, AV technology, such as LiDAR, is still significantly expensive.
  - (Policy) AV regulation evolves very differently across regions.

## SDV (Software defined vehicle)

- **Software capabilities continually improve during the vehicle life cycle.**
  - The passenger and driving experiences are no longer determined by mechanical or electrical systems.
  - SDVs support a focus on customer-centricity by **facilitating personalization, autonomous driving, and security** to enhance the digital experience for consumers.

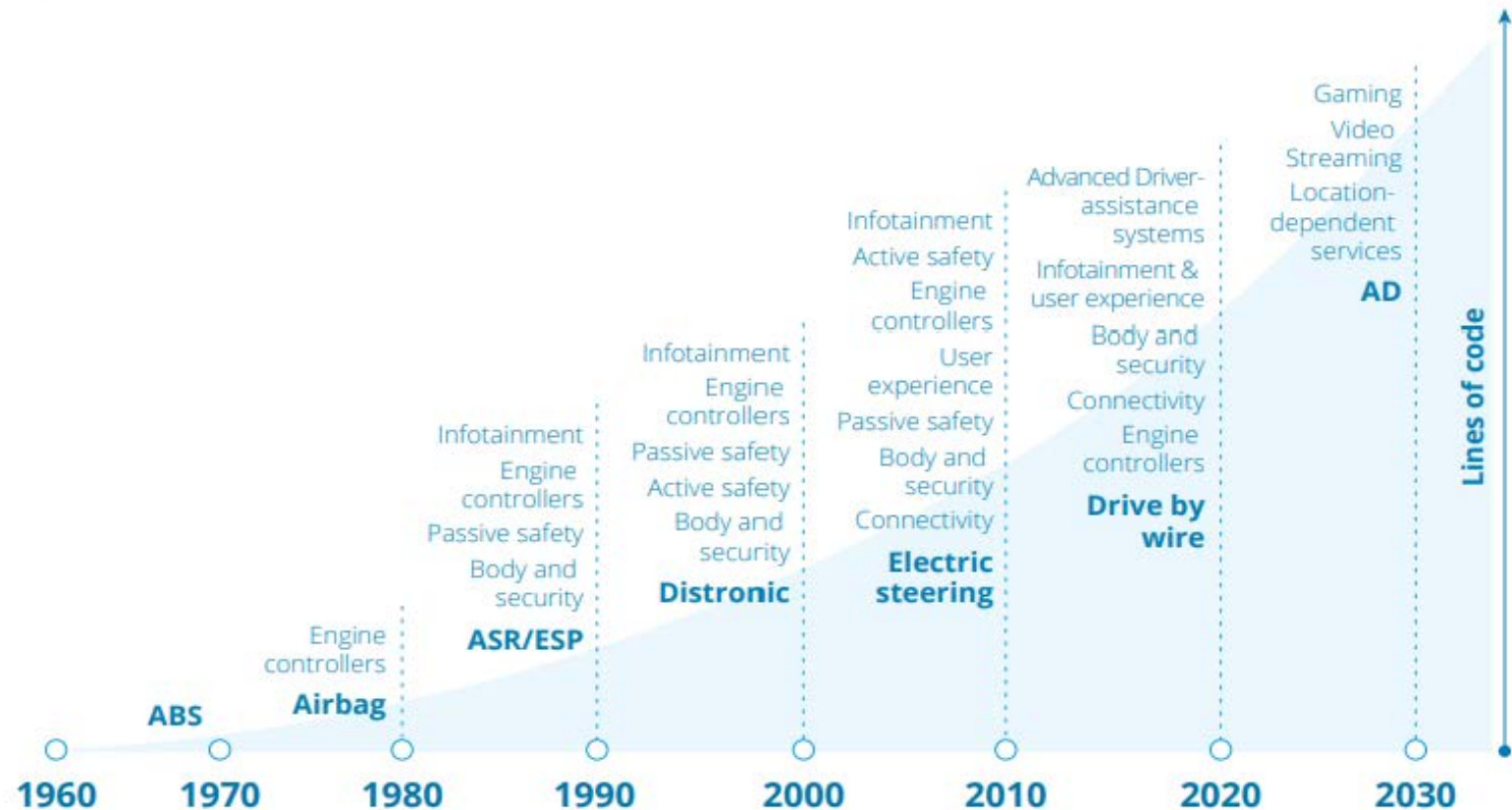
### <Increasing software share in automotive components>

#### Domain expansion

Leveraging compute platform knowledge to deliver incremental features and functions

#### Up-integration beginning

High-performance compute platforms serve as natural function consolidators



## Component difference between ICE & EV

- The transition from internal combustion engine vehicles (ICE) to EV is creating a list of winners and losers among auto components.

### Lost

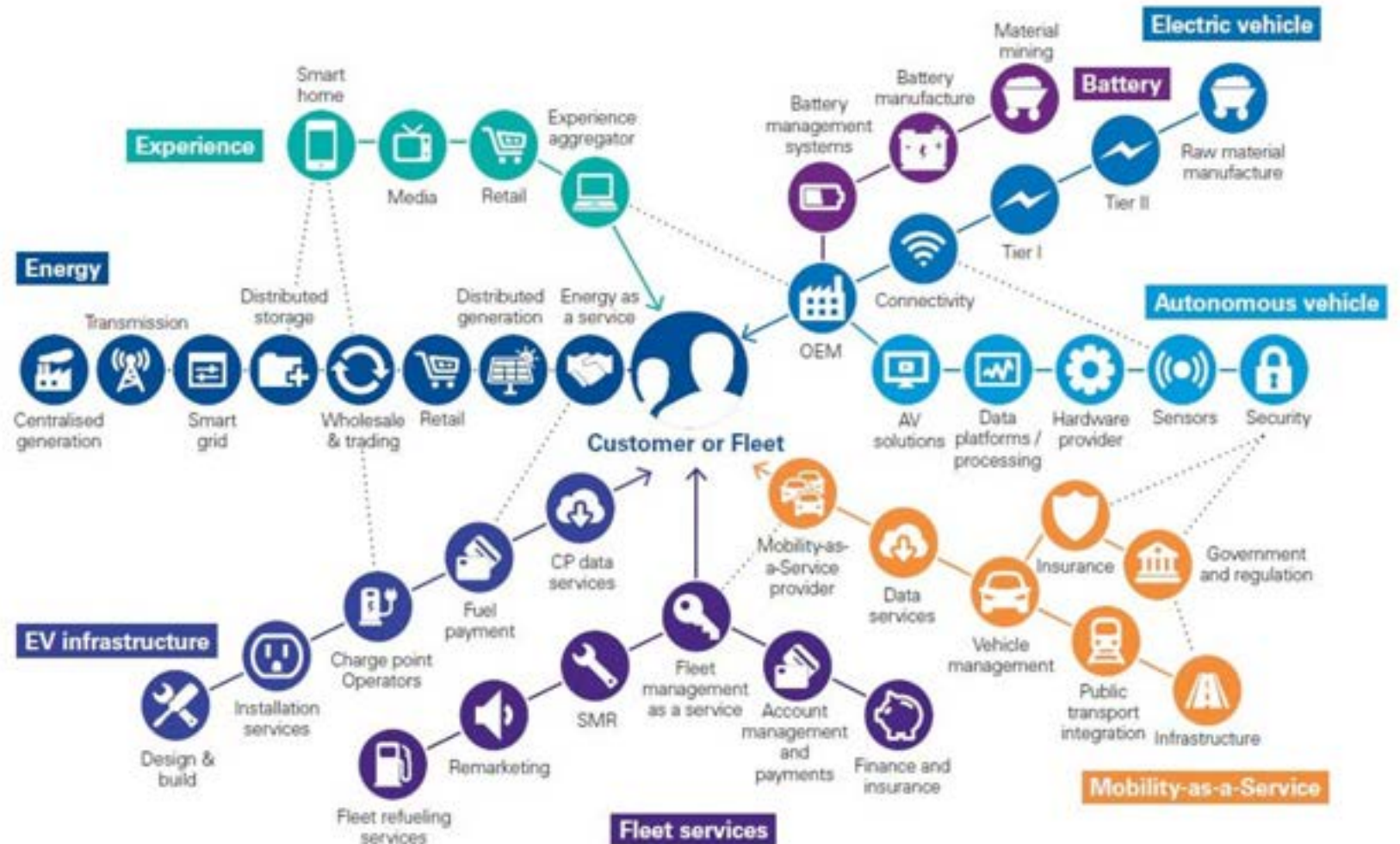
- Nearly **100 traditional ICE components will be eliminated** in the shift to EVs.
- **No ICE fuel system or exhaust system components** are needed in EVs.
- Transmission, awd unit and driveshafts
- Mufflers and exhaust components including catalytic converters)
- Engine cooling system (Radiator with fans, Coolant tank, Coolant pump)
- Engine components (Camshafts, Pistons and connecting rods, Cylinder heads, Crankshaft, Exhaust manifolds, Oil pan, Alternator)
- Fuel-system components (Fuel tank, Fuel pump, Fuel filter)

### Gain

- EVs will require **new components**, and most of them will be **electrical or electronic**.
- Most parts for vehicle **suspension and steering systems** will transition to EVs with **no big changes** required.
- Inverter and power control unit
- Powertrain thermal management
- E-motor
- Battery pack (Battery module/cells, Battery management system)
- High-voltage power cables
- Charging port

## From disconnected verticals to an interconnected ecosystem

- Historically, the automotive industry has operated along largely **linear value chains**.
- It is changing to a **complex web of interconnected value chain**.
- We expect a **multitude of new entrants** to take a share of this market, with unprecedented levels of **partnership** and **collaboration** in the search for new solutions.



Source: KPMG

**III**

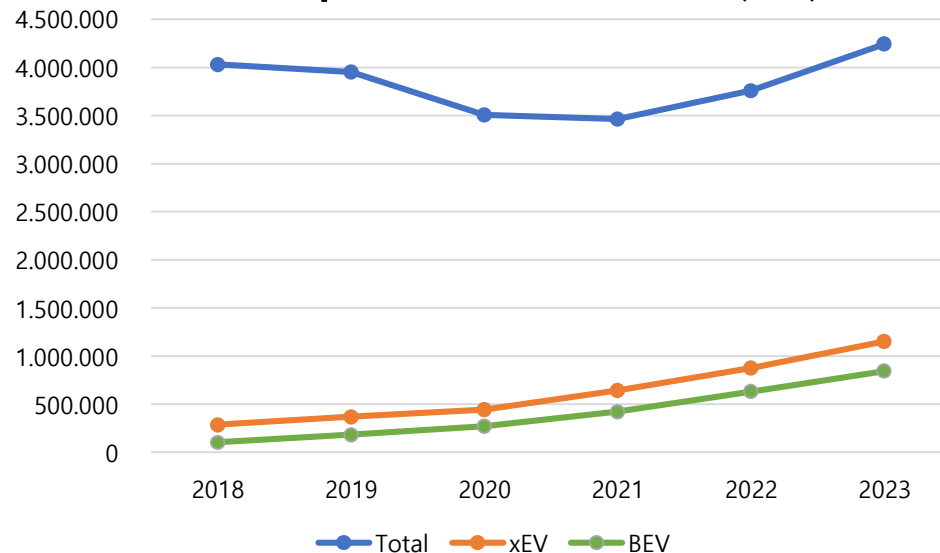
## **Korean automotive industry**



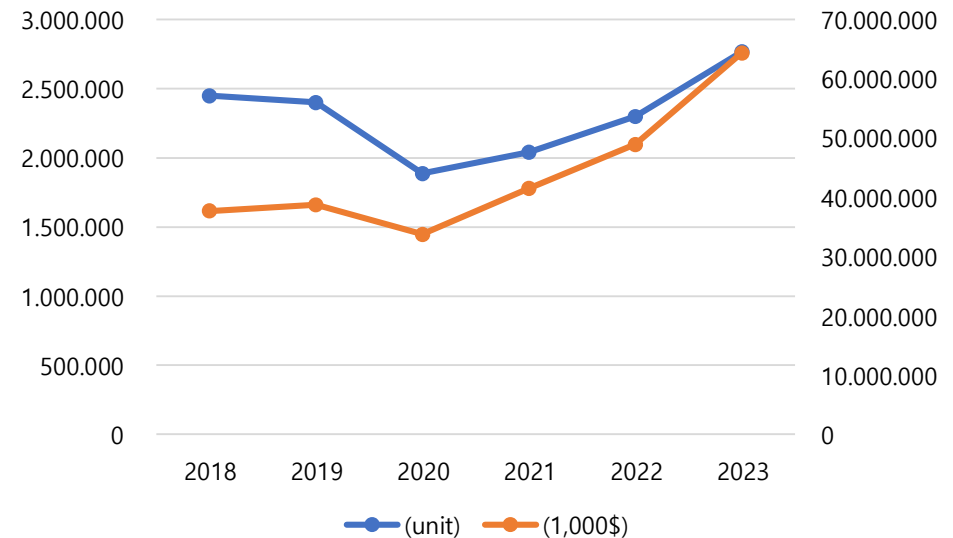
## OEMs in South Korea

- As automakers in South Korea has prepared proactively to transition, the amount of vehicle production and exports continue to grow.
  - growth rate of production: (`19) -1.9%, (`22) 8.5%, (`23) 13.0%
  - growth rate of export: (`19) 3.4%, (`22) 15.7%, (`23) 29.1%
- Proportion of xEV/BEV production is increasing.
  - BEV production: (`18) 2.6%, (`22) 16.8%, (`23) 19.9%

< Vehicle production in Korea (unit) >



< Vehicle exports from Korea >



## OEMs in South Korea

### < Vehicle production and exports >

		2018	2019	2020	2021	2022	2023
<b>Production (unit)</b>	<b>Total</b>	4,028,705	3,950,614	3,506,774	3,462,499	3,757,049	4,243,597
	<b>xEV</b>	286,632	369,987	444,016	644,687	876,741	1,152,144
	<b>BEV</b>	103,922	184,620	272,117	422,299	632,196	844,585
<b>Export</b>	<b>(unit)</b>	2,449,651	2,401,382	1,886,683	2,040,572	2,300,333	2,766,271
	<b>(1,000\$)</b>	38,077,358	39,388,297	33,772,635	40,263,384	46,590,109	60,132,954

1) xEV includes BEV, PHEV, HEV, FCEV.

2) All values are represented in real prices.

Source: KAMA



## Auto-parts makers in South Korea

- The companies, specialized in EV, autonomous vehicles, AI, and SW, still account for only about 4% of total numbers of automotive establishments in Korea.
- However, those auto-parts suppliers account for 8.5% and 4.6% of sales value and number of employees, respectively.

### < Korean auto-parts industry by specialized field (2022) >

Specialized field	No. of establishments		No. of employees		Value of sales	
<b>ICE</b>	3,956	(26.0%)	79,681	(28.3%)	281,569	(29.6%)
<b>ICE - EV/AV</b>	8,320	(54.6%)	164,505	(58.5%)	543,311	(57.1%)
<b>EV/AV</b>	600	(3.9%)	12,837	(4.6%)	80,682	(8.5%)
<b>Others</b>	2,363	(15.5%)	24,349	(8.7%)	46,292	(4.9%)
<b>Total</b>	15,239	(100%)	281,372	(100%)	951,854	(100%)

1) Proportion in parentheses.

2) Value of sales represented in 100 million won.

3) ICE: Engine and transmission components; ICE – EV/AV: Suspension, Steering, Exterior/Interior, and etc. components; EV/AV: EV and AV components and systems

## Auto-parts makers in South Korea

- Auto-parts suppliers in Korea are also adapting well to new environment driven by industry transition.
- Despite the Covid-19 and supply chain issues, the amount of deliveries to Korean OEMs and global markets is growing well.
- In 2023, the value of deliveries to Korean OEMs increased by 25.4% through active cooperation with them to develop advanced technologies and increase added values.

< Value of sales of Korean auto-parts makers (100 million won) >

	2020		2021		2022		2023	
<b>Total sales</b>	1,269,533	1,315,578	(3.6%)	1,375,568	(4.6%)	1,539,399	(11.9%)	
<b>To Korean OEM</b>	509,089	535,191	(5.1%)	570,560	(6.6%)	715,622	(25.4%)	
<b>Export</b>	184,808	209,881	(13.6%)	238,633	(13.7%)	243,050	(1.9%)	
<b>Others</b>	575,636	570,507	(-0.9%)	566,376	(-0.7%)	580,726	(2.5%)	

1) Growth rate in parentheses.

2) All values represented in real price.

3) It only includes sales value of 1<sup>st</sup> tier suppliers.

Source: KAICA

## Business diversification

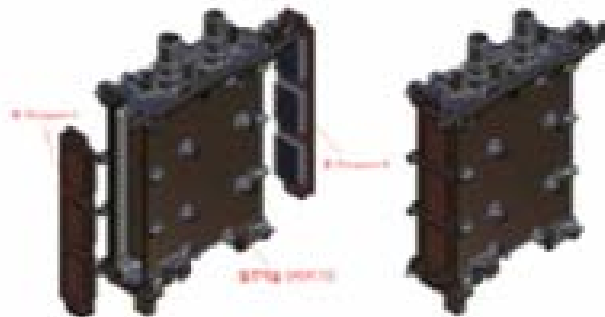
- The transition, from ICE to EV, not only means new form of propulsion, but also confronting a drivetrain with fewer parts that required even greater reliability and durability.
- Some Korean auto-parts suppliers trying for the adaptation place their critical importance on the pivot from their technologies of the past into those of the future.
- Also, Korean government has been operating various programs to support auto-parts makers' business diversification and reorganization by offering consulting, incentives for R&D and tax, and funding.
  - Based on the government's programs, KATECH has been providing various supports needed at the field of the industries, as well as R&D activities.

## Case study – Business diversification

### (1) Critical technology elements – ATE\*\*\*

- ATE\*\*'s main product is an air intake manifold for engines and electronic parking brake system.
- In order for preparing the possibility of sales decline, this company has developed high efficiency double-cooling inverter system for EV by utilizing their critical technology elements from the air intake system.
- ATE\*\* has received contracts worth \$ 14 million, with domestic and international corporates, and registered new patents.

### < High efficiency double-cooling inverter system >



## Case study – Business diversification

### (2) Cooperation between businesses – GUYO\*\*\* & ILS\*\*\*

- GUYO\*\*\*'s main products are oil pans mountable to engines, a variety of brackets, and seat frames.
- The consortium has developed ,in case of fire, a reliable and durable EV battery module case, which requires ultra precision mold technology of GUYO\*\*\* and technology of ILS\*\*\* who specialized in surface treatment.
- GUYO\*\*\*, with new products, expects an increase in their sales value by 100% in 5 years.

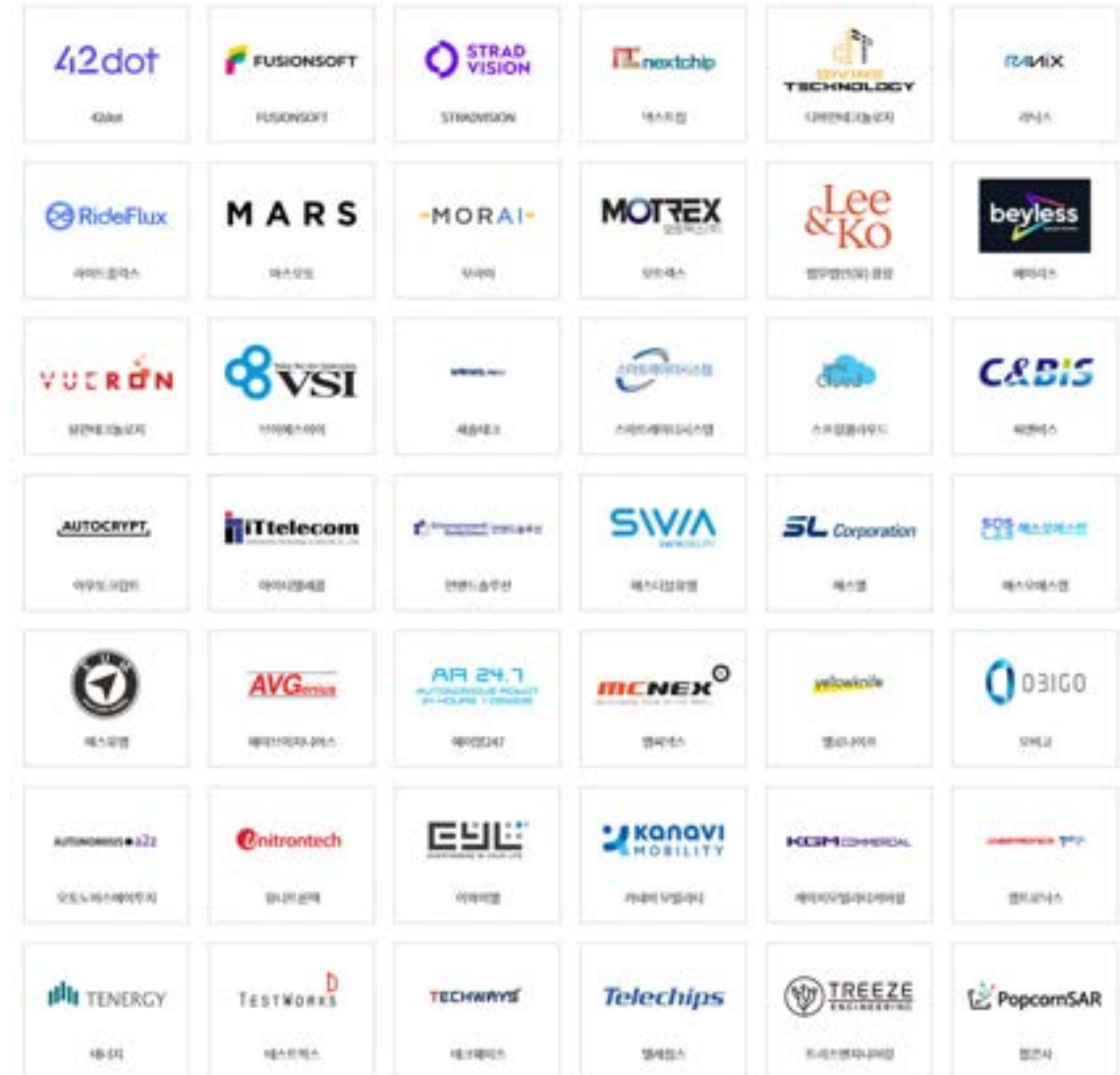
< Battery module case with a process of surface treatment for corrosion resistance >



## Emerging area – AV, SW & AI

- Many Korean corporates and startups are trying to lead AI-inspired AV and automotive SW industry.
  - Smart AI-based camera perception technology for safe self-driving
  - Open SW platform for autonomous driving era
  - Cybersecurity solutions for SDVs and smart roads
  - Full HMI (Human Machine Interface) for vehicle cockpit integrated with the cluster and AV system
  - In-vehicle monitoring system

### < Korean companies related to automotive AV, SW&AI >



# Thank you

**Dr. Hyunjin Lim (hylim2@katech.re.kr)**

**Industry Analysis Office**

**Korea Automotive Technology Institute**

