FY2013 Financial Results

- Calsonic Kansei's technology development for the future -

May 15th, 2014

Calsonic Kansei Corporation
Representative Director and CTO
Shigeo Shingyoji

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1. Enhancement of profitability and strengthening of the foundation for Monozukuri capabilities

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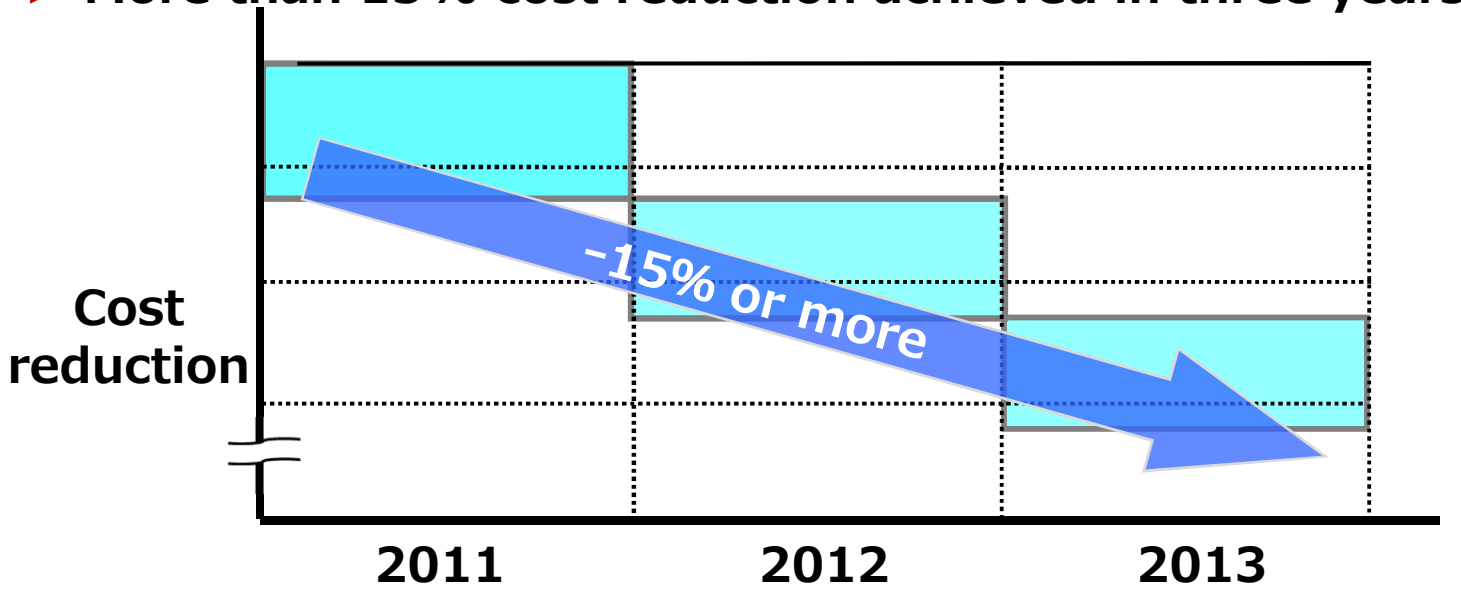
The corporate-wide MTCR activity launched in 2009 aiming at No.1 Monozukuri company in the world

- MTCR: Mono Tsukuri Challenge Runner
- Expansion of activities to overseas bases, standardization of Monozukuri know-how, human resource development
- More than 15% cost reduction achieved in three years



While enhancing profitability and strengthening Monozukuri foundation, Calsonic Kansei continues to promote significant enhancement of technological development capabilities in order to achieve the growth in the future.

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2. Expansion of technology development investment for the future

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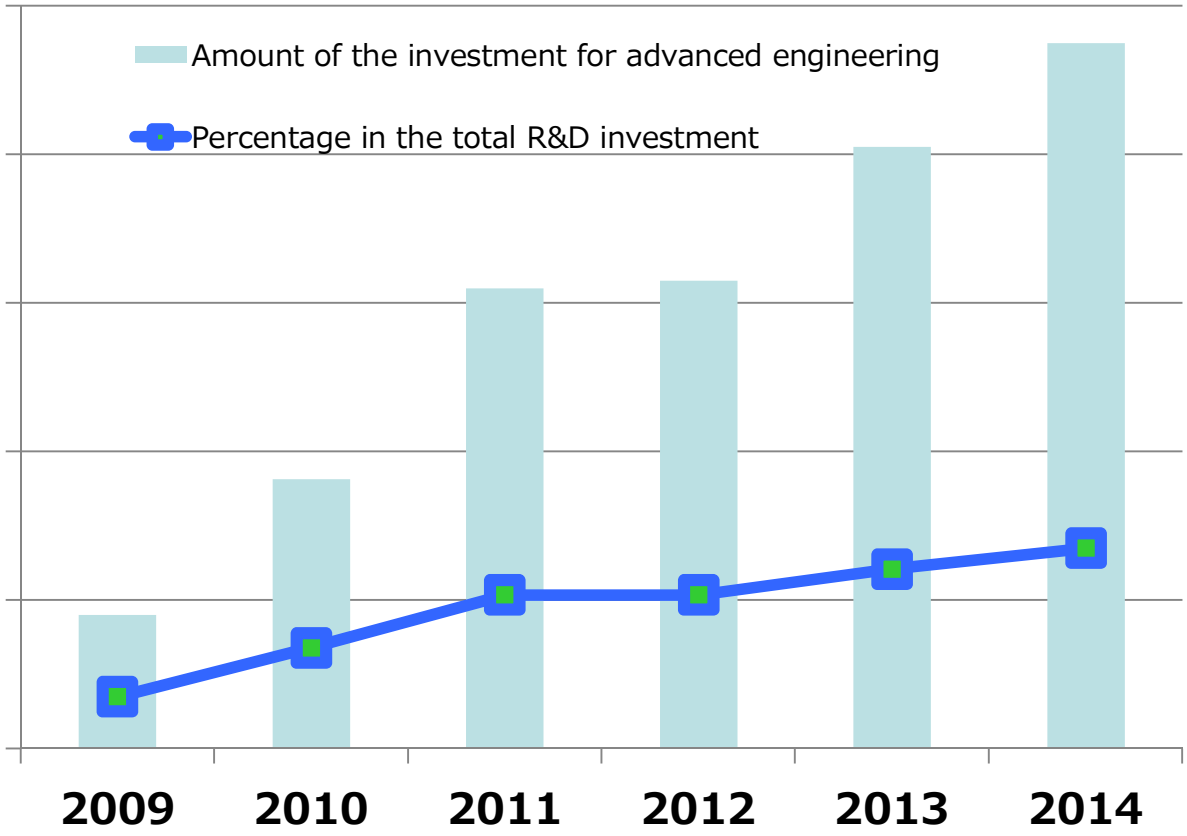
Resource allocation expanded for advanced engineering technologies

From 2009 to 2014:

- **5x in terms of the investment level for advanced engineering**
- **4x in terms of the percentage in the total R&D investment**



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2. Expansion of technology development investment for the future

Investment management for global technology development

■ Promotion of Global Formation Shift (GFS)

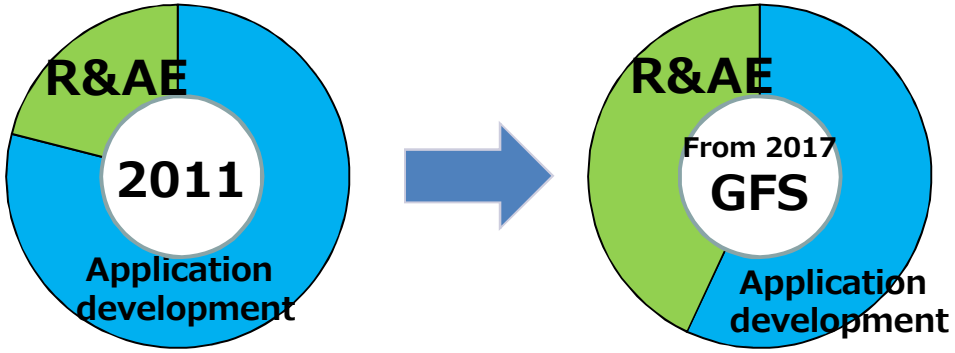
▶ Enhancement of global development functions

- R&D work transfer from Japan by nurturing the existing development centers in the US, Mexico, Europe and China
- Offshore development center utilization, global information platform development

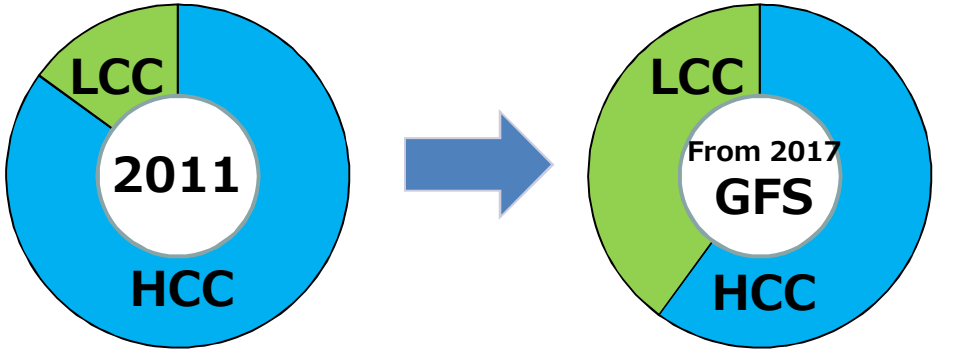
▶ Focus on the additional value of the development functions in Japan

✓ Significant increase in high-value-added business such as R&AE

- Expected to expand to 1.7 times



✓ Promote GFS to prevent the increase of excess development costs by facilitating the use of LCC engineering resources



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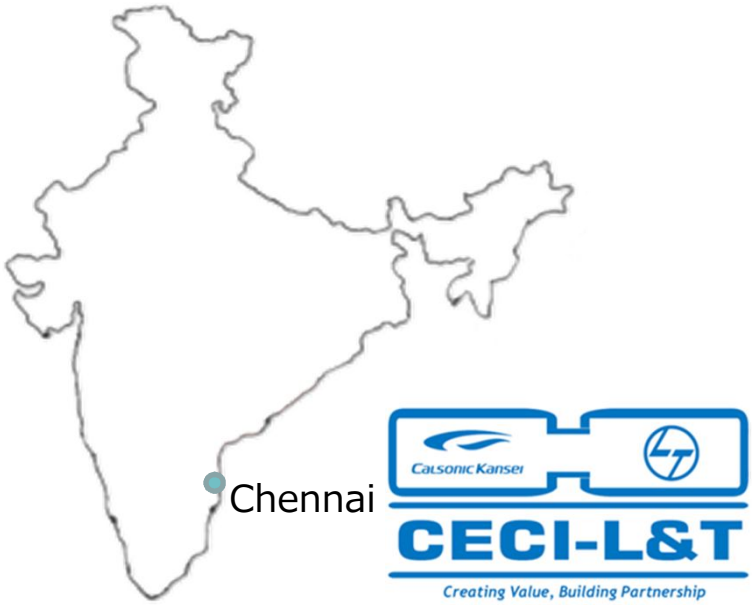
2. Expansion of technology development investment for the future

Establishment and expansion of Offshore Development Center

- **Calsonic Kansei Engineering Center India with L&T (CECI-L&T)**
  - In collaboration with Larsen & Toubro Technology Services (L&T TS), established the center with the development engineering function in Chennai, India (started FY12)
  - The early nurture plan for the CECI-L&T engineers in progress in order to expand and optimize as a global engineering center
  - Developed a seamless collaborative formation with the development centers in Japan, the US and Europe taking the geographical advantage of India



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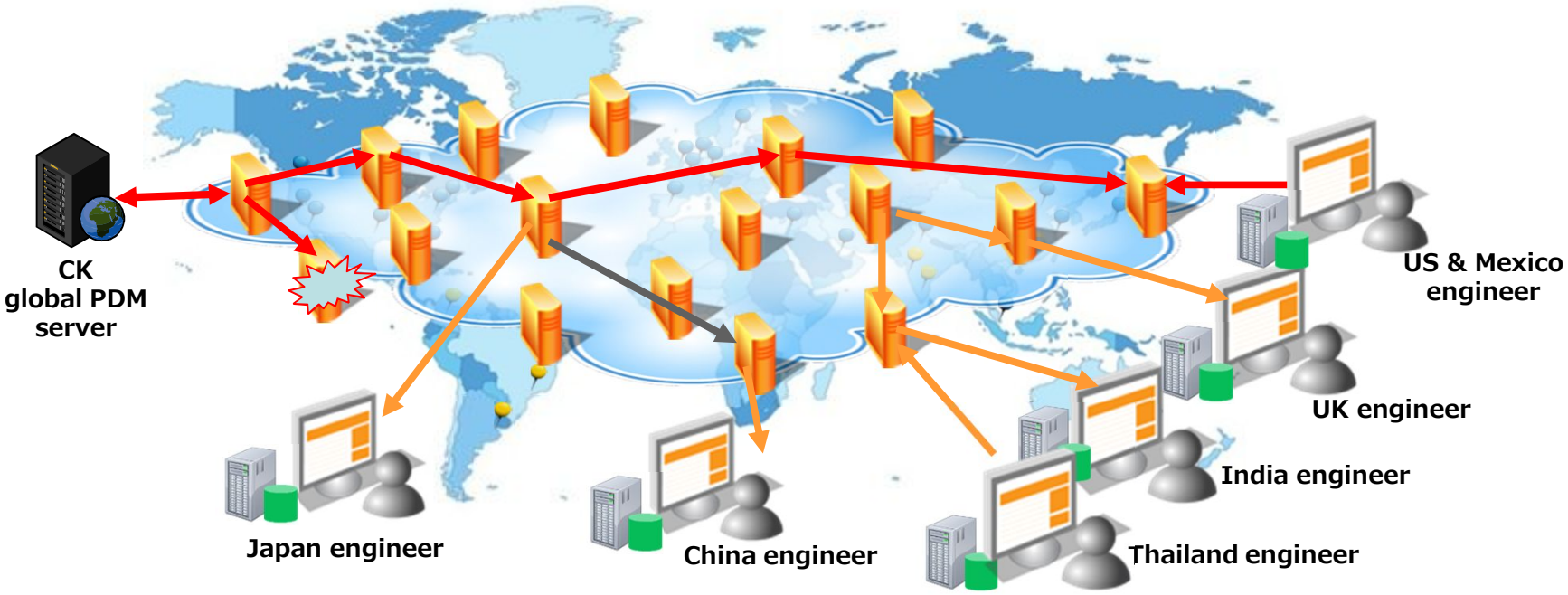
2. Expansion of technology development investment for the future

Establishment of a technological information platform supporting the global operation of technology development

- Established a global PDM (*) system that enables to share large volume data through the internet at high speed, with high reliability and at low cost (world's first)
- Will be started at overseas bases within FY2014

PDM(*) : Product Data Management



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3. Calsonic Kansei product portfolio

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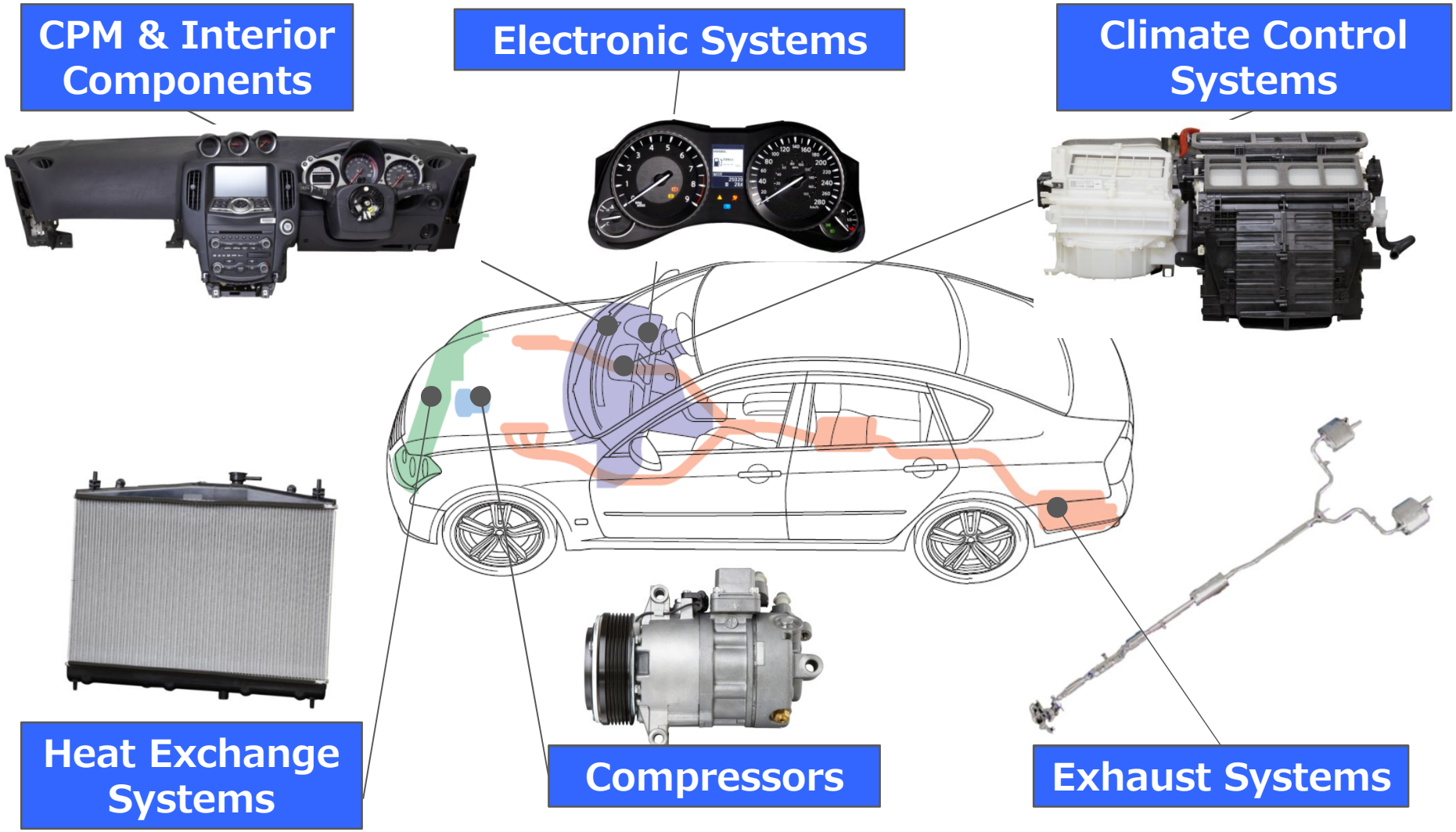
■ **Provide Calsonic Kansei's values to the customers around the world with 6 automotive product groups**



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4. The 4 value domains and the 11 strategic technology areas

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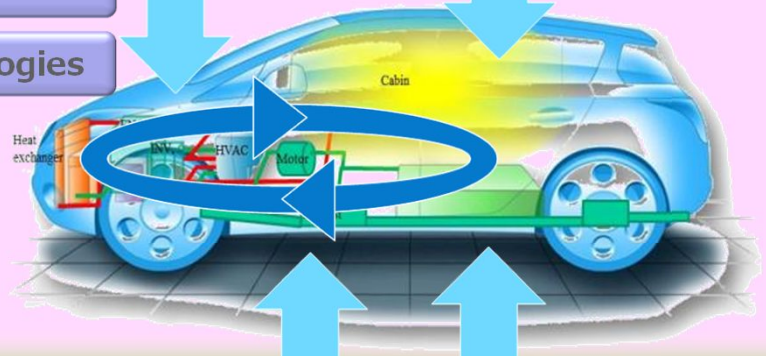
New Value

Innovation for Frontend

- Packaging Technologies
- Module Structure Technologies

Innovation for Cabin

- HMI Technologies
- Thermal Env. Technologies
- Air Quality Technologies
- Design Quality Technologies
- Module Structure Technologies



Innovation for Thermal Energy Management

- Highly Efficient Climate Control Technologies
- Thermal Recovery/Reuse Technologies
- Highly Efficient Radiation Technologies

Innovation for Electric Energy Management

- Total Energy Management Architecture & Control Technologies

Green

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4. The 4 value domains and the 11 strategic technology areas

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Green

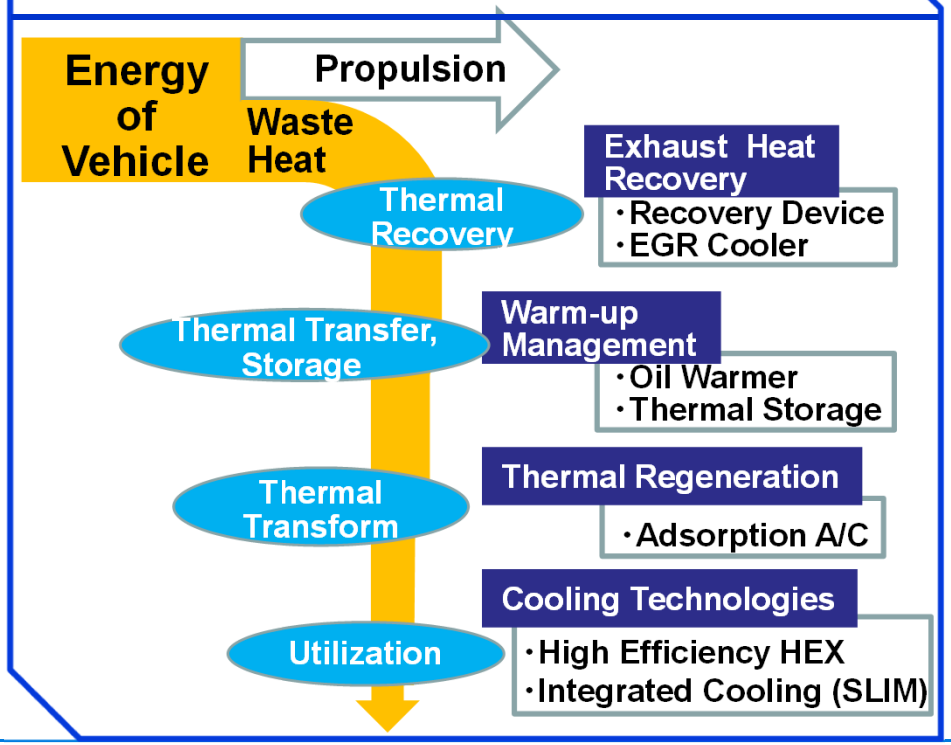
Innovation for Thermal Energy Management

◆ Covers all technology areas required to manage waste energy

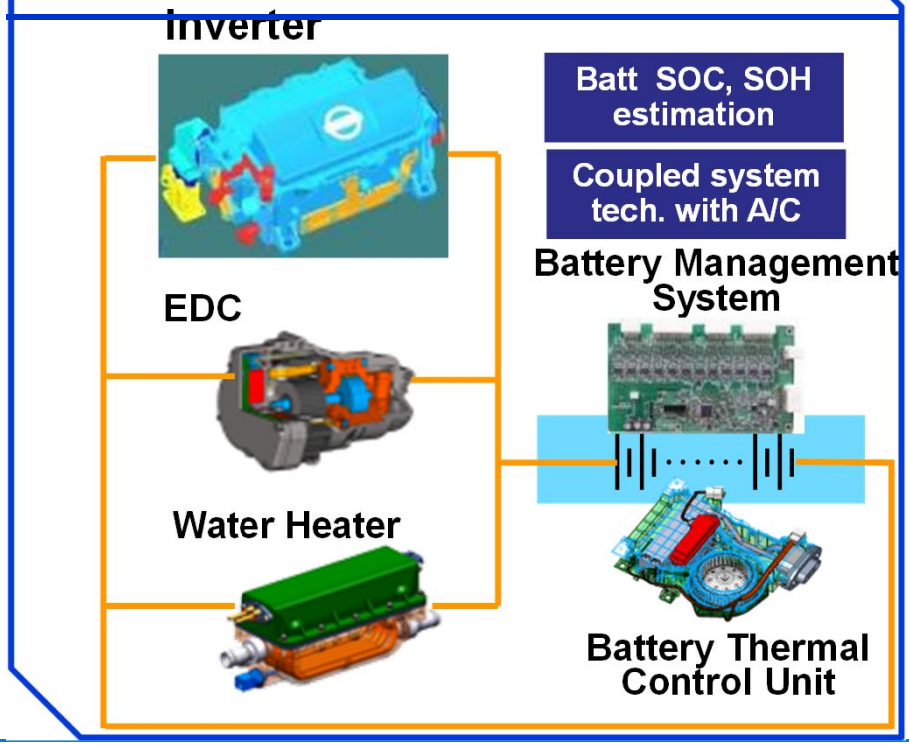
Innovation for Electric Energy Management

◆ Strong focus on power device and control technology for electrification (inverter, battery controller)

Example of Thermal Management



Example of Electric Power Management



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4. The 4 value domains and the 11 strategic technology areas

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New Value

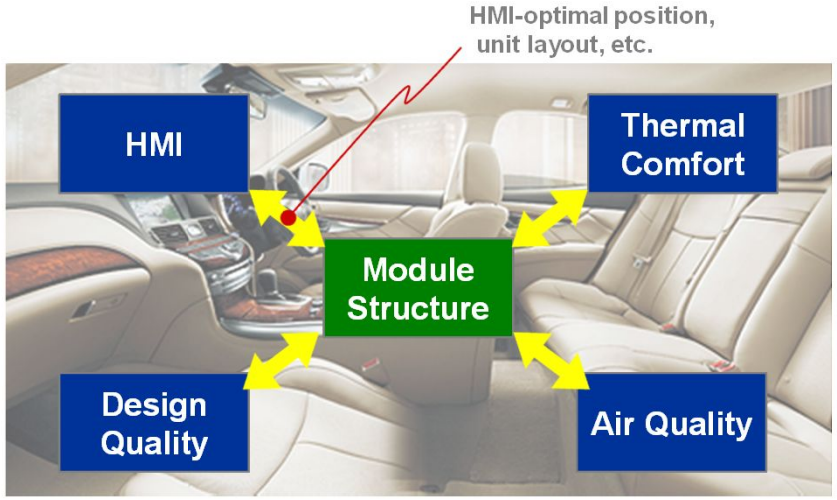
Innovation for Cabin

- Key technologies for innovative cabin value (HMI, thermal comfort, design and air quality) with CPM design and production engineering

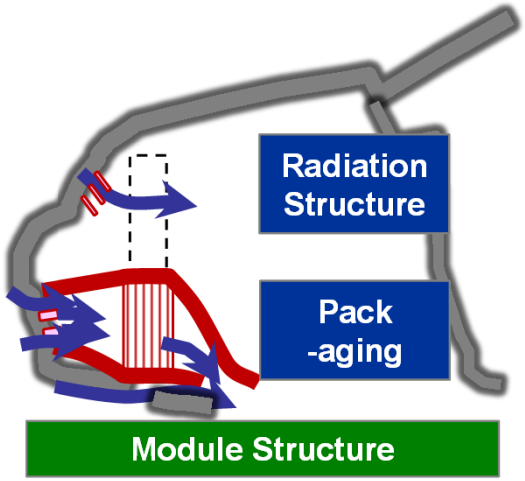
Innovation for Frontend

- Technologically capable to tackle frontend packaging innovations with heat radiation management solution

Easy-to-drive cockpit, comfort cabin, attractive design



Attractive design, downsizing-enabling technology



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5. GX4 T10 mid-term plan status

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GX4 T10 Goals

Develop 10 new eco-friendly products that lead the world by FY16

FY11~12	FY13~14	FY15~16	FY17~
2	5	3	

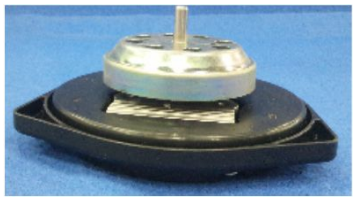
In production
Order received
Under sourcing

Smallest in the world

EGR cooler
Injection skin IP
Soft-feel Hard IP

B/M for bat. cooling

World's first



Most efficient & quietest

- ✓ **Four items introduced to the market, six items order already received**
- ✓ **Development in progress aiming at beyond the 10 items on the GX4 T10**

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5. GX4 T10 mid-term plan status

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Examples of GX4 T10 environmental technology development

■ VG-FIN ® (Vortex Generator Fin)

✓ The world's first trapezoid-shaped vortex generator fin (VG-FIN®) that generates "vertical vortices" to realize the best heat exchange efficiency

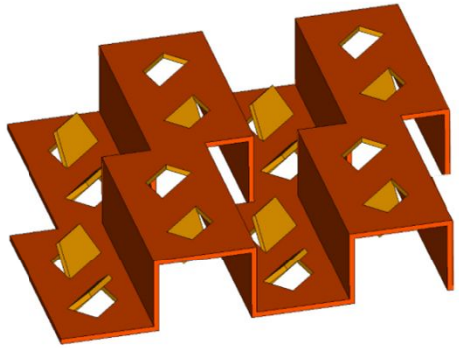

Figure 1. World's first trapezoidal VG-FIN®

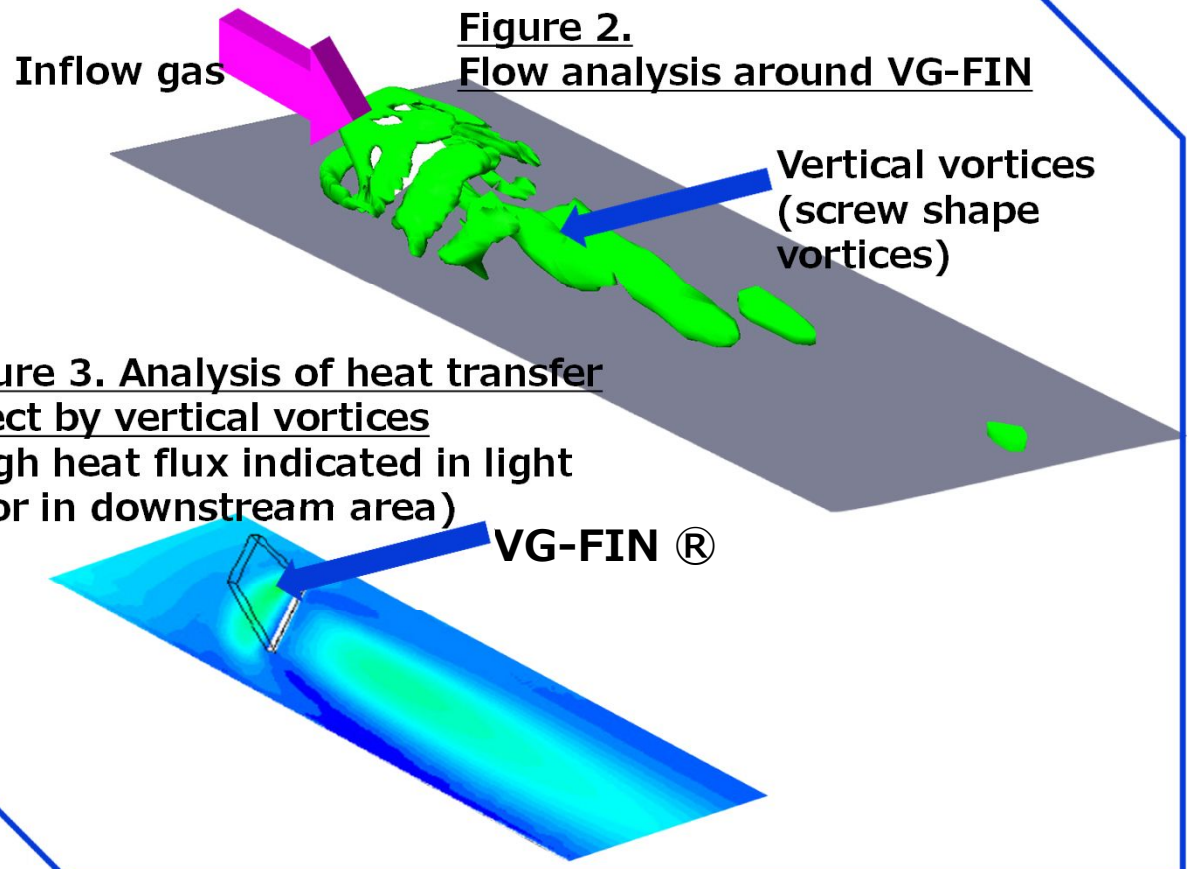

Figure 2. Flow analysis around VG-FIN

Figure 3. Analysis of heat transfer effect by vertical vortices (High heat flux indicated in light color in downstream area)

VG-FIN ® commercialized product: EGR cooler that simultaneously performs high-rate heat exchange and minimized airflow resistance

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5. GX4 T10 mid-term plan status

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Examples of GX4 T10 environmental technology development

■ World's smallest and lightest EGR Cooler

- Under mass production for Japanese market (started FY13)
- Increasing order receipts rapidly thanks to high competitiveness
- Expecting the market to expand rapidly due to gasoline engine's shift to downsizing turbo

■ Product commercialization with synergy effect of the technologies for heat exchanger and exhaust products

✓World's smallest and lightest (21-29 % weight saving from current product)

✓Performance improvement (12-36 % up from current product (at the same gas flow resistance))

✓New technology "VG-FIN®" introduction

✓NOx suppression and fuel efficiency improvement

EGR (Exhaust Gas Recirculation) Cooler:
Heat exchanging unit to cool the returning exhaust gas to combustion chamber

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5. GX4 T10 mid-term plan status

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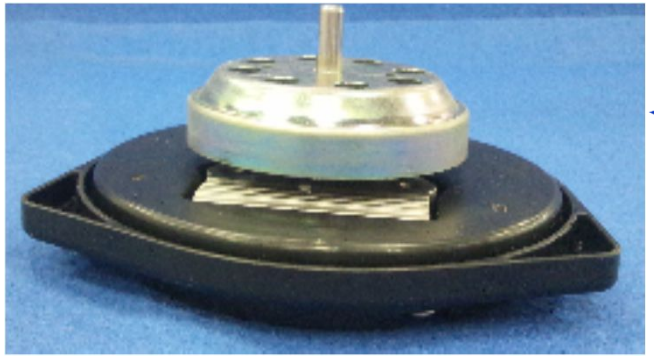
Examples of GX4 T10 environmental technology development

■ New light-weight brush-less motor series with long-life, low-noise and micro-size for blower fan



- Commercialization started with brush-less motor for battery cooling
- Applied to the new Skyline HEV (launched in Nov. 2013)
- Received order increasing for FY14-15 vehicle model applications
- Planning to increase the product line up and expand applicable products

■ New light-weight, small size brush-less motor suitable for the requirements of the vehicles with electric power train

✓Enhance further longevity of battery life in consideration of battery cooling during charging and parking

✓Ultra-light△ 45%, Ultra-slim△50%, Ultra-low noise(△4dB)

✓Top benchmark level achieved for reliability and packaging

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6. Examples of the recent technology development results

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Received various awards with the reinforcement of the technical development capability

1. Original battery control technology

- **SICE Technology Award of the SICE-Control Division "State Estimation of HEV/EV Batteries with Kalman Filter" <March, 2012>**

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6. Examples of the recent technology development results

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Received various awards with the reinforcement of the technical development capability

2. SLIM COOL (Single Layer Integrated cooling Module)

- JSAE Outstanding Technical Paper Award
  "Development of Thin Integrated Cooling System for Improving System Efficiency of Heat Exchanger"
  <May, 2013>

3. Instrument panel skin molding technology with injection molding machine

- SPE Automotive Innovation Award
  "Instrument Panel with Injection-Molded Skin"
  <November, 2013>

4. Technical contribution to American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

- ASHRAE George B. Hightower Award
  <January, 2014>

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6. Examples of the recent technology development results

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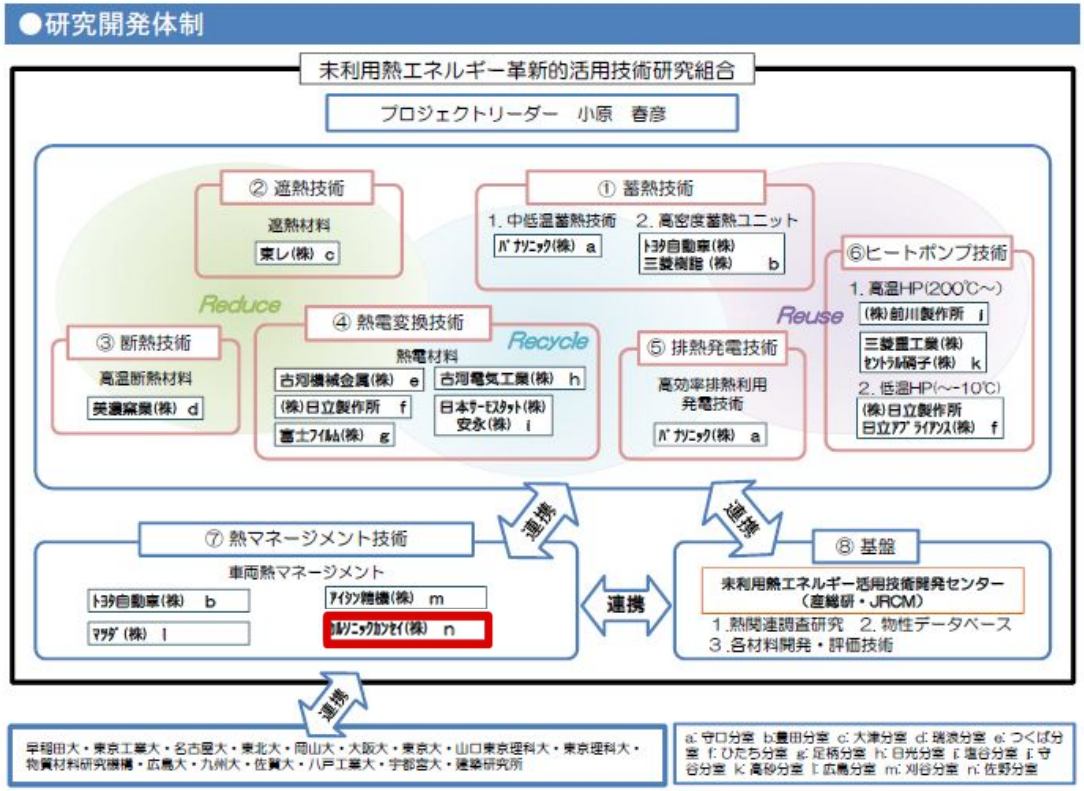
■ **Being Entrusted with a national project from Ministry of Economy, Trade and Industry**

- ► **Theme:** Research on innovative technology for utilizing thermal waste energy
- ► **Outline :** Innovative air conditioning system for fuel consumption improvement by utilizing thermal waste energy for automobile



Reference : Ministry of Economy , Trade and Industry HP
http://www.meti.go.jp/policy/tech_promotion/kenkyuu/140124saishin/52.pdf

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Calsonic Kansei is committed to:

- **Promote new technological development promised in the mid-term business plan GX4 T10**

- **Further strengthen its effort to contribute to our customers and society with the technology and products**

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