KAORI HEAT TREATMENT CO., LTD.

Investor Conference

Allen Wu

June 13th, 2019

Outline

A、Company Profile

B、Operating Results

C、Future Prospects

D、Q & A

KAORI

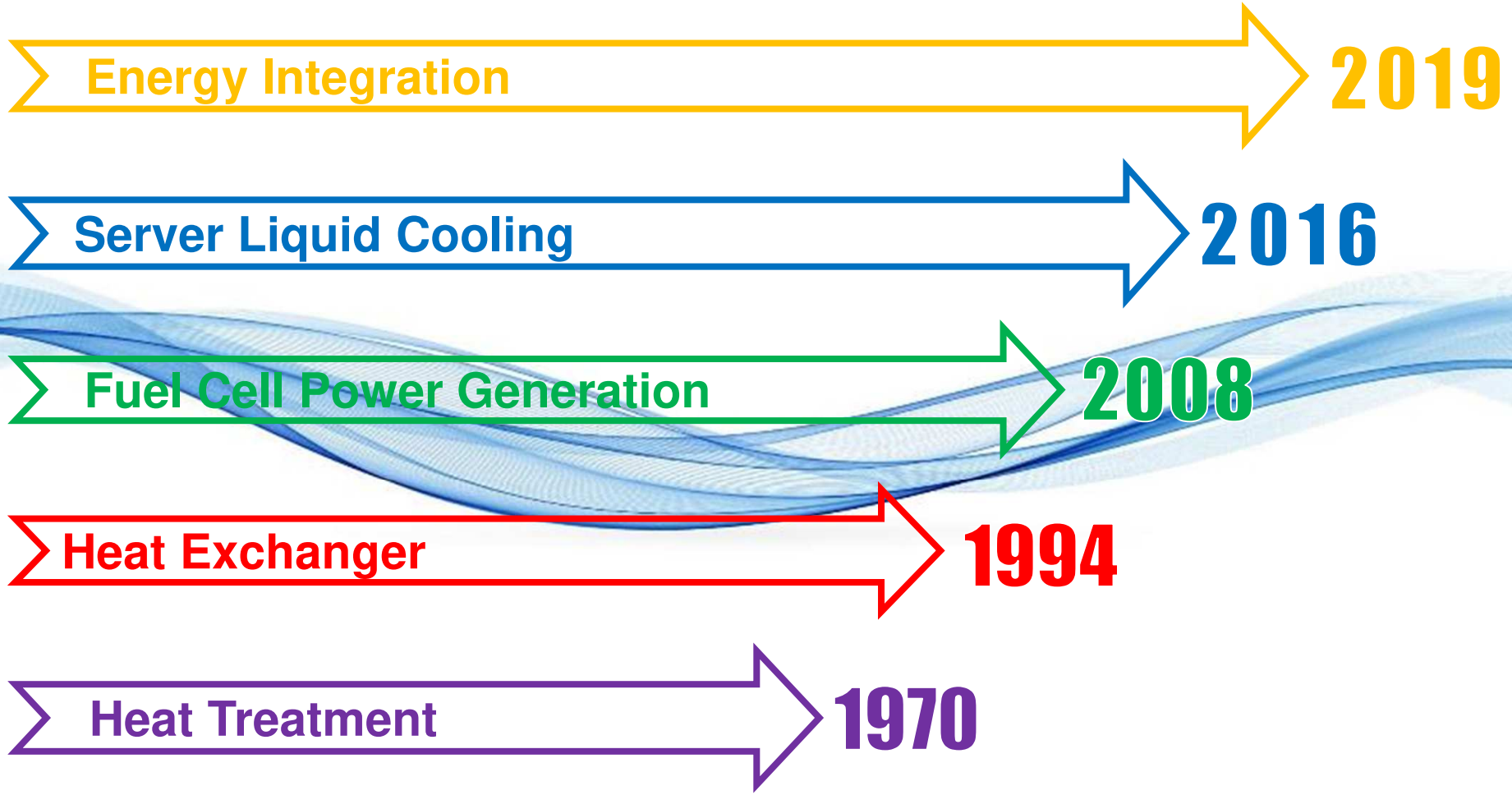
A、 Company Profile

Company Profile

- Founded：11 October, 1970
- Capital：US$ 30 million (NT$893,840,800)
- Employees：548 (July 2019)
- Main Products & %：Metal Ware (0.5%)、Plate Heat Exchanger (50%)、Fuel cell Key Parts (49.5%)
- Address：No.5-2 Jilin N. Rd., Zhongli District, Taoyuan City
- Base: Taiwan (Zhongli & Kaohsiung)

  China (Ningbo)

Major Milestone: Constant Innovations and Transformations



Core Technologies and Product Integrations

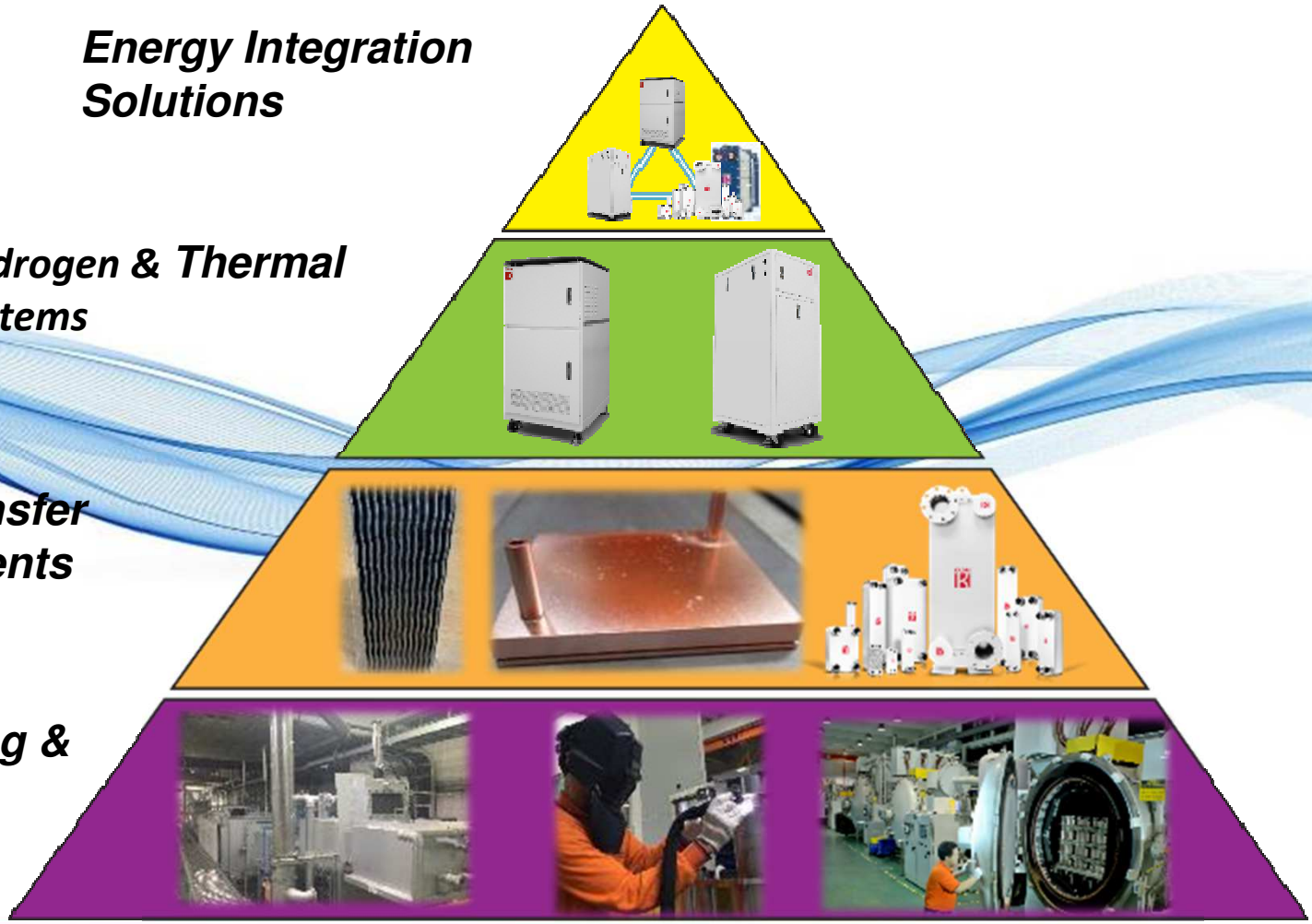
KAORI

Energy Integration Solutions

Hydrogen & Thermal Systems

Heat Transfer Components

Metal Processing & welding/brazing



B、 Operating Results

Performance

Unit：NT$ in thousands，EPS：NT$

Items	Y2014	Y2015	Y2016	Y2017	Y2018
Revenue	2,334,681	2,178,024	2,707,256	1,779,318	1,931,586
Gross Profit	575,903	539,514	744,344	492,039	566,945
Net Income before Tax	238,897	215,584	360,654	73,932	283,852
Net Income after Tax	198,870	185,371	311,430	56,138	229,734
EPS	2.45	2.07	3.48	0.63	2.57

Performance

Unit：NT$ in thousands，EPS：NT$

Items	Y2019Q1	Y2018Q4	QoQ	Y2018Q1	YoY
Revenue	531,703	474,218	12.1%	386,614	37.5%
Gross Profit	154,029	121,217	27.1%	112,346	37.1%
Net Income before Tax	63,950	24,941	156.4%	7,446	759%
Net Income after Tax	51,371	21,520	138.7%	4,216	1118%
EPS	0.57	0.24	137.5%	0.05	1040%

Performance(Financial Ratio)

Items	Y2015	Y2016	Y2017	Y2018	Y2019 Q1
Current Ratio (%)	207	270	148	224	231
Quick Ratio(%)	142	185	116	134	143
Average Collection Days	79	77	112	67	55
Average Inventory Turnover Days	150	122	162	152	143
Debt Ratio(%)	44.48	37.78	50.14	32.77	30.25
Return on Total Stockholders' Equity (%)	10.21	16.14	2.96	12.63	10.91
Net Income to sales(%)	8.51	11.5	3.16	11.89	9.66

KAORI

C、 Future Prospects

Main Products

KAORI

Gasket Plate Heat Exchanger

Brazed Plate Heat Exchanger

Data Center Cooling System

H2 Generator

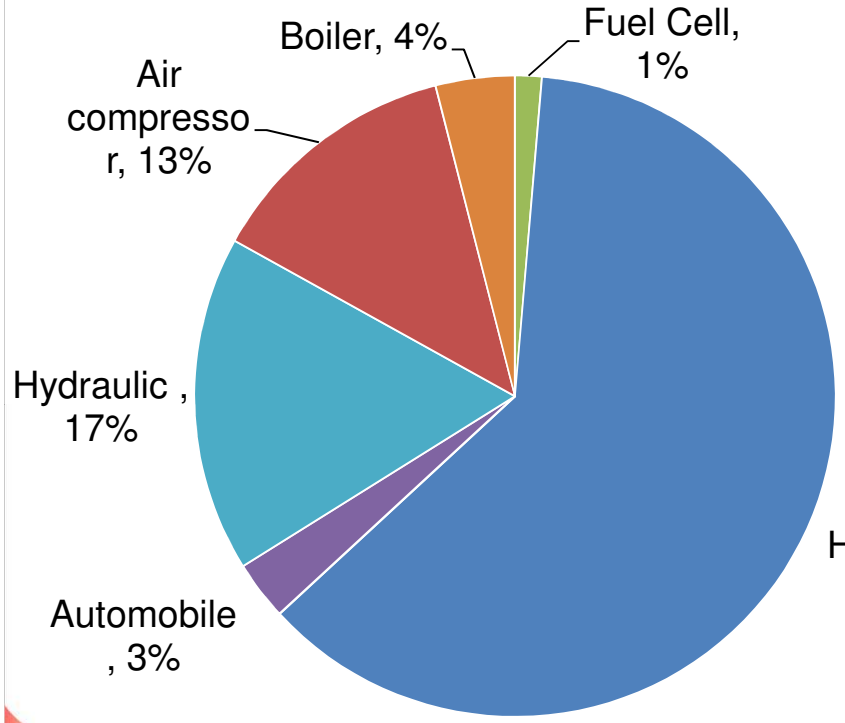
Methanol Fuel Cell Power System

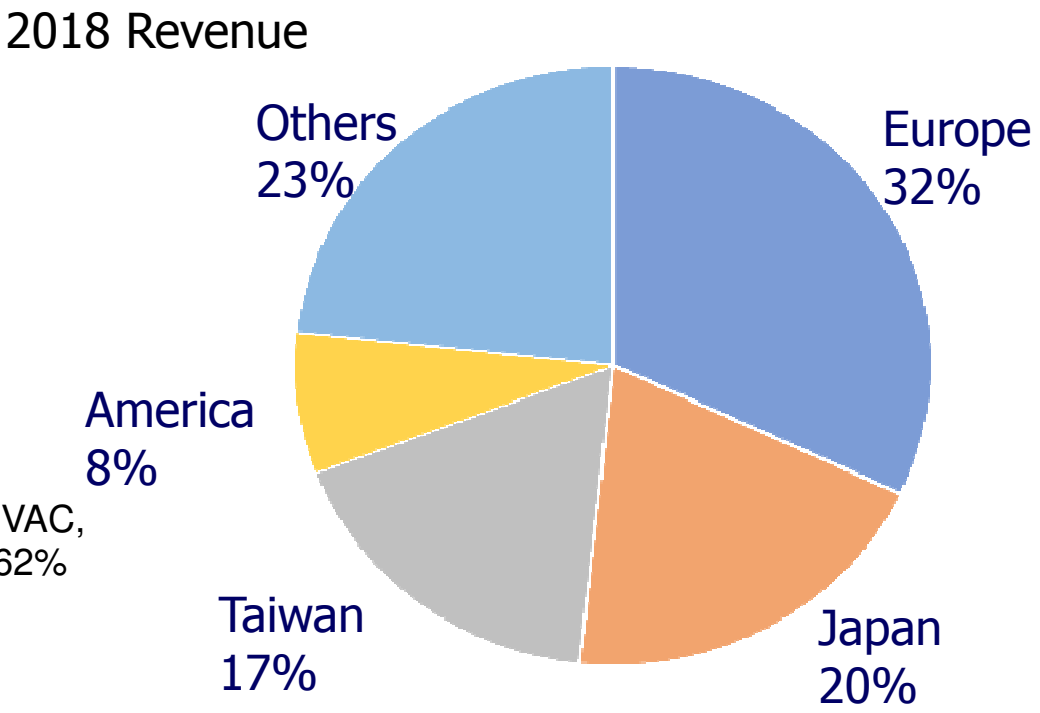
Brazed Plate Heat Exchanger

➢**Operational Overview**：

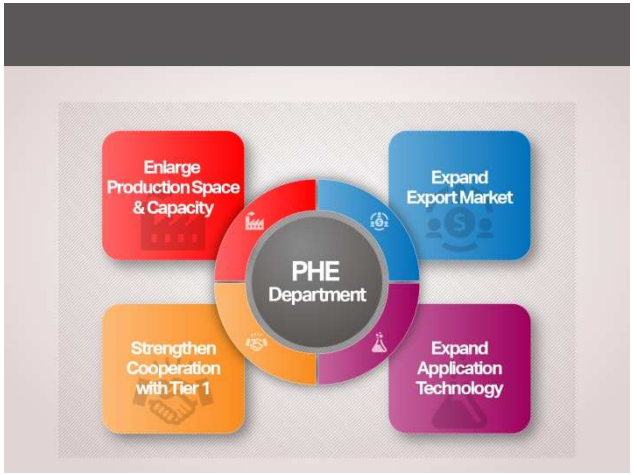
(1) 2018 The global market size 780 Million,
KAORI market share 3.3%.

(2) Export 83%, Major market; Europe & Japan





Brazed Plate Heat Exchanger



- **Continue to develop new products**

  Expand industrial applications：

  1) Renewable energy and hydrogen energy market dedicated High Temperature heat exchanger (fuel cell)

  2) Reduce channel volume design: Improve Refrigeration & Air conditioning System performance

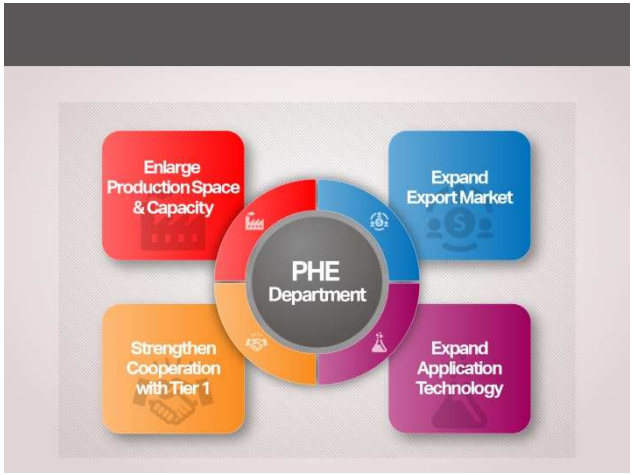
  3) All stainless steel plate: Meet semiconductor and drinking / pure water system requirements

  4) Natural Refrigerant (R290/CO2) heat exchanger: Expand new industrial refrigeration / heating system market

Brazed Plate Heat Exchanger

KAORI

- **Actively expand sales channels, increase market share：**
  1) Americas and Middle East
  2) Develop new sales partners
  3) Market share target increased to over 5%



- **Integrate supply chain partners to enhance production efficiency and expand capacity**
  1) Manufacturing automation and intelligent production management
  2) Production base: Taoyuan / Kaohsiung / Mainland China
  3) Two-digit growth target

PEM Fuel Cell Power Generation System and Advantage

KAORI

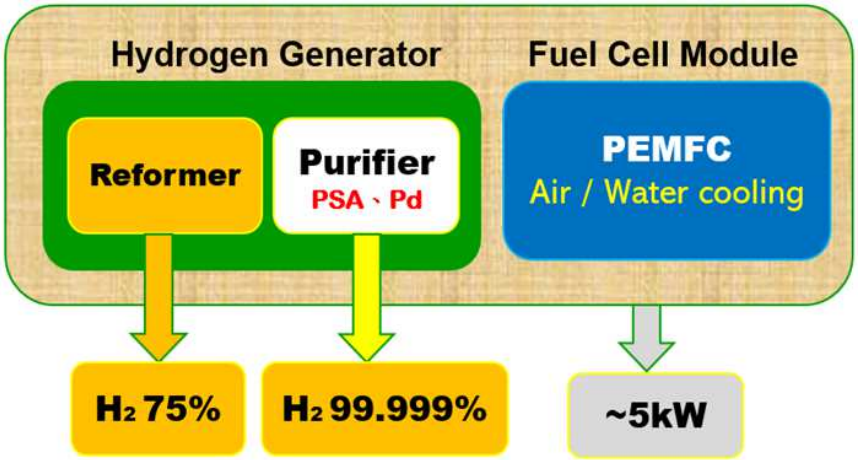
➢ Advantage

Size 30%~50% smaller than competitors

Stand-by Power ≦ 0.5kW (at 5kW output)

Noise ≦ 65dB (at 5kW output)

CO Emission ≦ 20ppm (no NOx及SOx)



➢ Safety/ Stability

- Immediate consumption of produced hydrogenation, no safety concern of high-pressure storage
- Efficiency of combined electricity & heat > 85%
- Continuous operation > 72hrs

➢ Applications

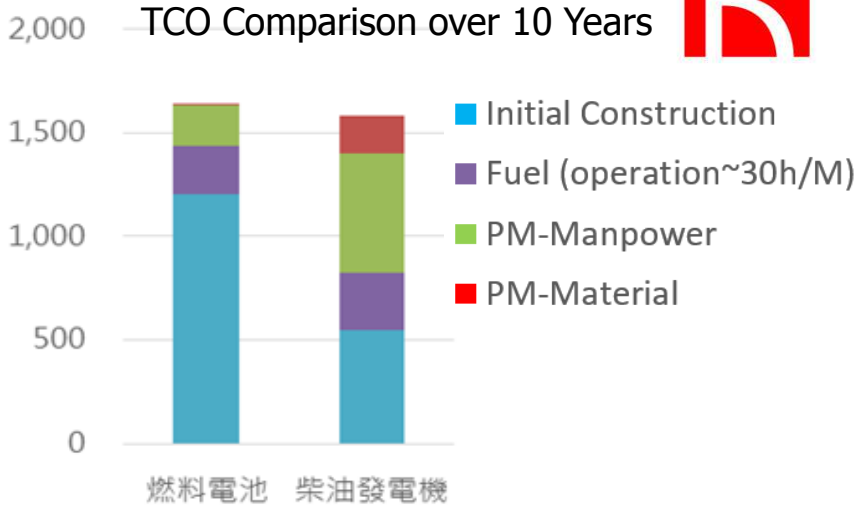
Backup power for remote or disaster area

Auxiliary power for critical facilities (e.g. data center)

Future Development of H2 Generation & FC Technology

KAORI

- **Product and Eff Improvement：**
  1）5kW FCS efficiency improvement
  2）30kW FCS(30Nm^3/h H2 generator)
  3) Purifier of special gas(H2, O2, N2)
  4) Power integration(storage system, other green power)
  5）CHP system



- **Extend Applications：**
  1) Distributed auxiliary & backup power(community, dormitory, small business like convenient stores…)
  2) Telecom (5G station, data center…) backup power
  3) CHP(designated area with warm water/heat supply, like hospital, swimming pool,
  bathroom, hotel …)
  4) Small-scale hydrogen stations for vehicles.
- **Integrate with suppliers for domestic/oversea sales channels：**
  1) Co-work with FCM suppliers for cost competitive systems.
  2) Co-work with micro-grid suppliers to provide more reliable local power.

New Product – Server Liquid Cooling Systems

KAORI

➢Immersion Cooling System

Cooling capacity: 30-150kW
Fan-less / Dust-less / vibration Isolated
Energy efficiency(PUE) ≦ 1.1

➢In-Rack Cooling System

Cooling capacity: 6-60k
Energy efficiency(PUE) ≦ 1.3
With various cabinets

➢Ideal for High Density and Mobile Data Centers

High Computing Data Center (Blockchain/AI/Geological exploration)
Small and medium-sized data center (container/combined)

Liquid cooling system market background

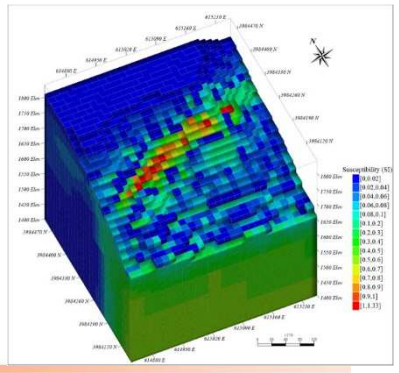
The rise of industry has created high computing and high heat density computers

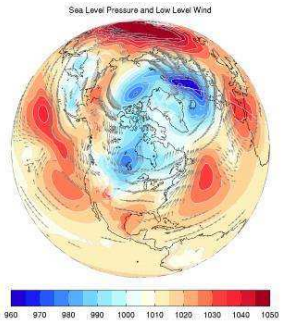
New Retail (O2O, IoT)

Self-driving
(5G Communication – EV)

Monitoring & Financial Business

Scientific Research





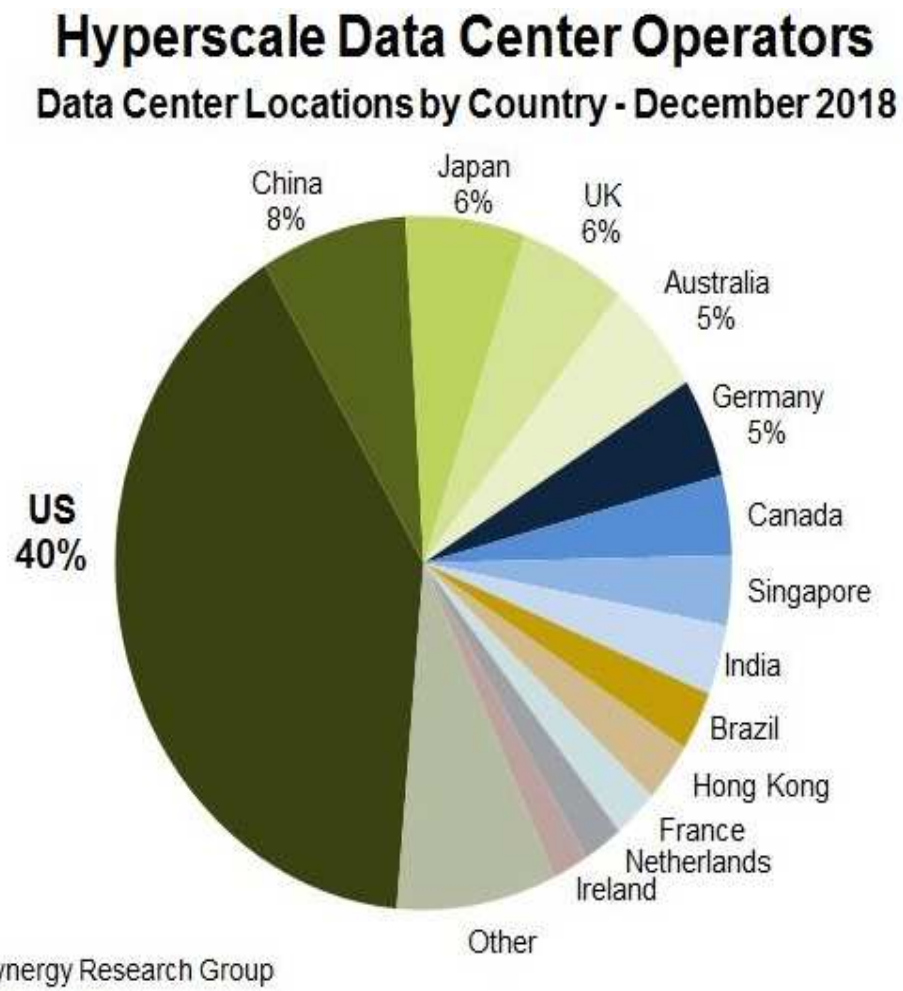
Distribution of large data centers in 2019

Total 430 large data centers

1. USA (172)
2. China (34)
3. Japan (26)
4. UK (26)
5. Australia (22)
6. Germany (22)

2019-2023

- Global estimates of 15-20 large data centers per year
- 20-30% need to use liquid cooling
- Kaori's involvement Liquid cooling data center construction capacity 3-6 / annual



Global Data Center Liquid Cooling Market Status

- The compound annual growth rate of the global data center liquid cooling market is expected to be 12.02% (2018-2023)

- Liquid cooling (type)
  - Indirect liquid cooling (cold plate)
  - Direct liquid cooling (immersion)

- End user (by industry)
  - Banking & Financial Services
  - Entertainment
  - Media IT & Telecom
  - Energy and Power / Healthcare Central
  - Local Government / Manufacturing

- Reduce the floor space with a liquid cooling system, which is conducive to the needs of the data center cooling market

Source: Market Reports World 2018

China official Regulation

2018: Summary and interpretation of relevant policies of the National Data Center.

- September 26, 2018: The Beijing Municipal Government announces the Catalogue of Prohibitions and Restrictions on New Industries in Beijing. Among them, there are new regulations for software and information technology services, which require the city to prohibit the construction and expansion of the Internet. Data Center in Data Services, Information Processing and Storage Support Services (Cloud Computing with PUE below 1.4). Except for the data center, the construction and expansion of the data center is completely banned in the central city.
- October 2018: Data Center White Paper (China Institute of Information and Communications Open Data Center Committee)

省市	时间	政策	主要内容
北京	2018.09	《北京市新增产业的禁止和限制目录(2018年版)》	明确规定全市禁止新建和扩建互联网数据服务、信息处理和存储支持服务中的数据中心，PUE值在1.4以下的云计算数据中心除外；中心城区全面禁止新建和扩建数据中心。
	2016.12	《北京市"十三五"时期信息化发展规划》	推进京津冀云计算数据中心统筹规划布局和共建共享，鼓励开展异地容灾备份。

Energy Policy Associated With Liquid Cooling Equipment

KAORI

$$\text{Power Usage Efficiency (PUE)} = 1 + \frac{\text{Non-IT Equipment Power Consumption}}{\text{IT equipment power consumption}}$$

Non-IT equipment power consumption: Air conditioning, power supply, lighting, other

Country	Average PUE	Demand PUE	Direct Cooling PUE	In-direct Cooling PUE	Regulation Authority
Taiwan	2.0	≦ 1.6	≦ 1.3	≦ 1.5	National Development Association
China	2.2	≦ 1.4			Central government
Others	1.9	= 1.0			Non

Project Involvement

Complete successfully PUE 1.13 (Minimum) power efficiency
China's first project achieved annual average PUE <1.2

Advantage of Kaori CDU

Items	Knowledge & Market information	Kaori	Others
01	Heat Exchanger	**Design & Manufacture**	**Outsourcing**
02	Magnetic Pump	**Outsourcing**	**Outsourcing**
03	Measuring component: Flow meter, pressure gauge, thermometer, etc.	**Outsourcing**	**Outsourcing**
04	Control Element: Level switch, temperature switch, etc.	**Outsourcing**	**Outsourcing**
05	Matching CDUs to HVAC Systems	**Self-owned production lines**	**Outsourcing**
06	Programming Digital Control	**Familiar & Self-owned**	**Outsourcing**
07	Machine performance test	**Self-owned Lab.**	**Non**
08	After service & maintenance	**Able to perform**	**Not available**

New Products -
Energy Integrations for Data Centers

- Energy Generation
  - Green backup power
  - Safe and stable long-lasting
- Energy Saving
  - PUE≦1.3 (In-Rack)
  - PUE≦1.1 (Immersion)
- Energy Recycle
  - Heat Recovery

Fuel Cell Power Generation System
Energy Generation

Server Liquid Cooling System
Energy Saving

Heat Recovery System
Energy Reuse

Metal products technical processing services

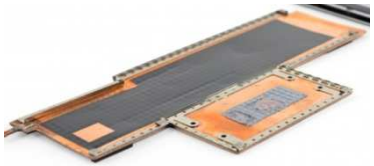
- Based on metal brazing and heat transfer technology to provide the best cooling solution for electric vehicles and 5G mobile communication 。
- Technology advantages

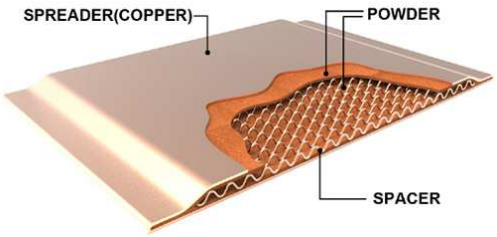
  Strength: up to 20 kg/mm^2

  Sealing: up to 10^{-5} Torr

  Different materials brazing: (Cu/SUS/Ti/Inconel/Ceramic)

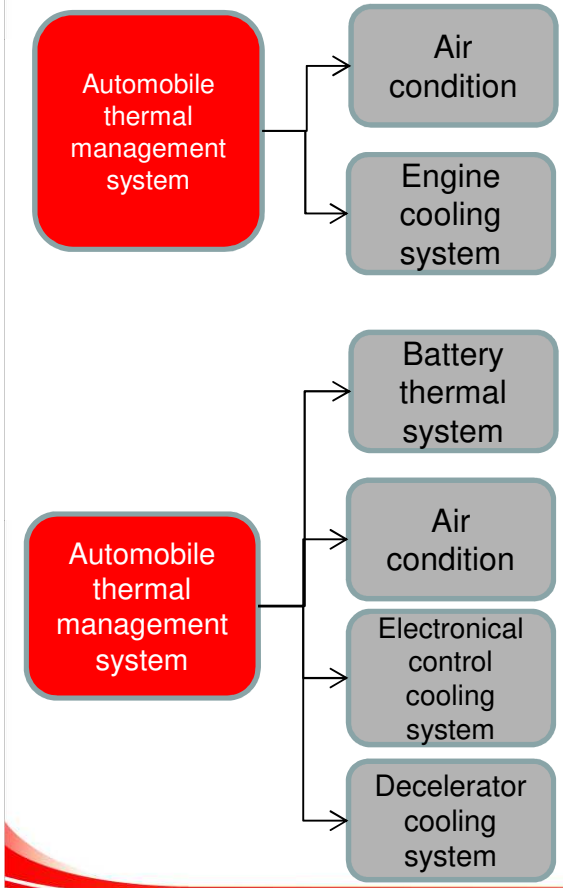
  Production capacity :3KK/month





Metal Products Division Strategic Objectives

- By using metal welding technology to provide heat exchanger, copper rotor, battery cooling plate, IGBT thermal module for three-electric core components of electric vehicle. Developing thermal management system to become the market leader in thermal management liquid cooling technology



Motor:
induction motor copper rotor

Electronical control:
IGBT thermal module

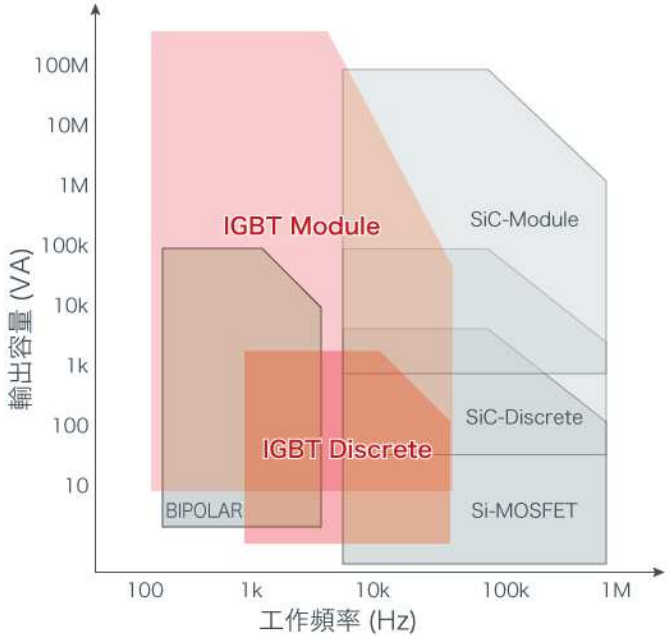
Battery:
Cooling plate and
heat exchanger

Three-electric core components of EV

Applications

➢ EV industry: IGBT liquid cooling module

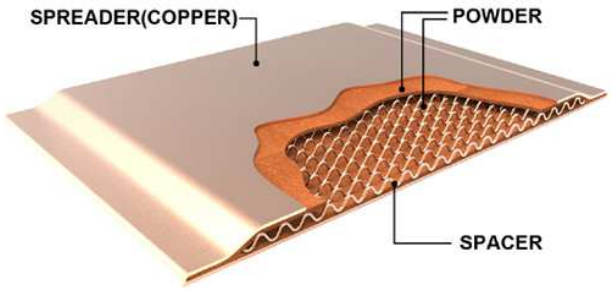
- IGBT is the core component of EV motor.
- IGBT accounts for 7~10% of the total EV cost, which is the second highest cost component and determines the energy efficiency of the EV.



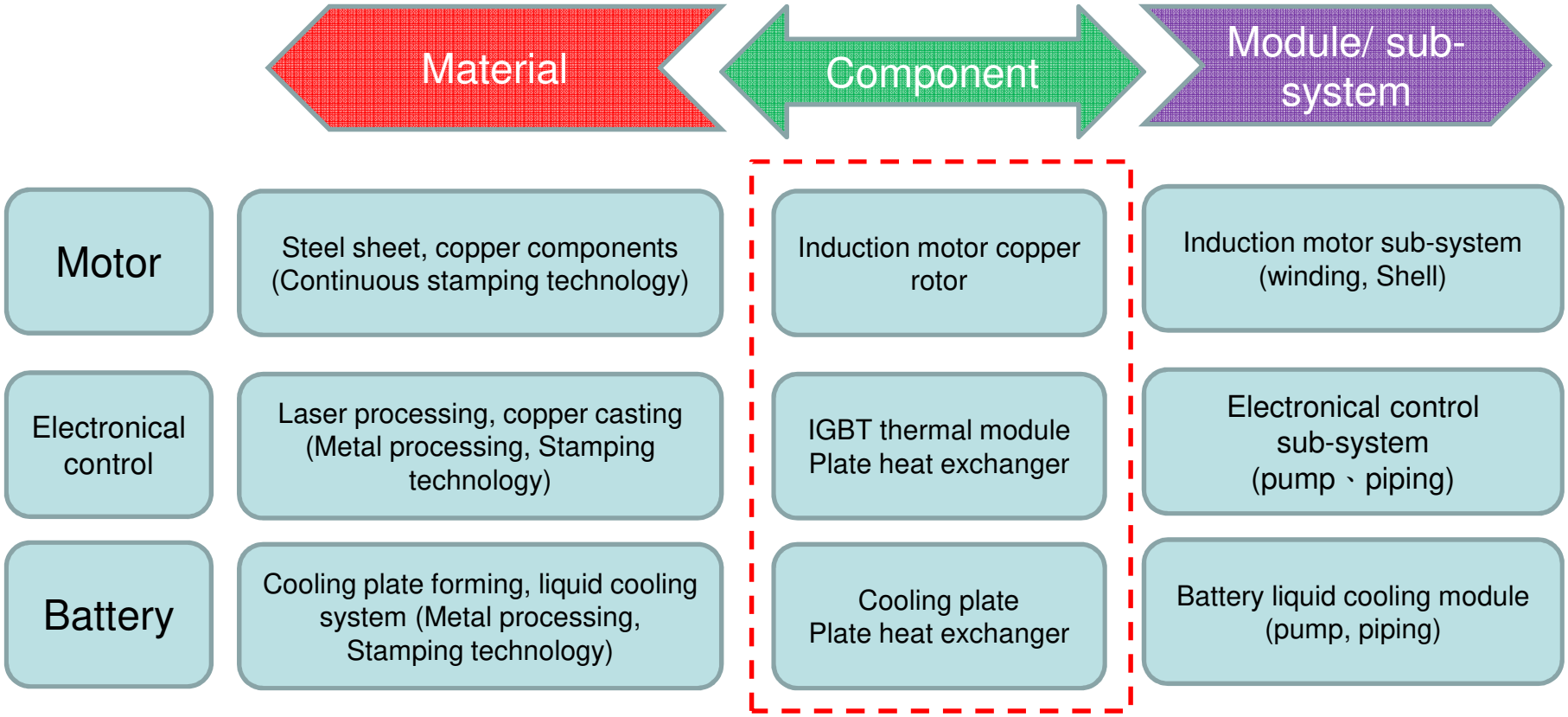
Ref.: https://www.rohm.com/electronics-basics/igbt/igbt-application-copeigbt

➢ Brazing of vapor chamber

- The challenge of ultra-thin VC: Brazing accurate without leakage.
- KAORI brazing technology is the key to mass production yield.
- The traditional cooling tool has not met the needs of 5G communication devices.
- Samsung, Huawei, VIVO, OPPO, and Xiaomi are all introduced into VC.
- Market Forecast In 2019, the VC is about 15 million, and it is expected to rise to 40 million in 2020.



Metal Products Division Strategic Direction



KAORI

Vision

The Leading Thermal & Hydrogen Technologies Integrated Company

KAORI

D、Q & A

THE END

Thank You!