The status of the Air Conditioning and Refrigeration market in JAPAN

July 11, 2019

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President of JSRAE
Vice president of JRAIA
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1. Market Trend

1) Market Volume and Refrigerant conversion status in each product sector

Product Category	Number of Units in 2017FY (x 1,000)	Y/Y Ratio (%)	Refrigerant
Residential A/Cs	9,054.6	106.2	R410A ⇒ R32 (almost 100%)
Commercial A/Cs	827.1	105.3	R410A ⇒ R32 (only Small-size; 41%)
Residential H/P water heaters	446.7	104.2	CO_2, (R32) (almost 100%)
Gas engine-driven A/Cs	28.7	94.3	R410A
Water chilling units	13.8	106.8	R410A, R134A
Air to air heat exchangers	111.3	102.0	NA
Commercial ref. cabinets	302.1	96.7	R404A ⇒ R410A, CO_2
Condensing units	93.5	102.4	R404A⇒R410A, CO_2
Refrigeration units	28.8	97.2	R404A ⇒ NH_3, ($+CO_2$) R410A

2. Market Trend

1) Market Volume 2018 Update

Product Category	Number of Units in 2018FY (x 1,000)	Y/Y Ratio (%)	Refrigerant
Residential A/Cs	9,814.6	108.4	R410A ⇒ R32 (almost 100%)
Commercial A/Cs	879.7	106.4	R410A ⇒ R32 (only Small-size; 41%)
Residential H/P water heaters	480.6	107.6	CO_2, (R32) (almost 100%)
Gas engine-driven A/Cs	28.7	100.0	R410A
Water chilling units	14.5	107.5	R410A, R134A
Air to air heat exchangers	111.2	99.9	NA
Commercial ref. cabinets	283.6	93.9	R404A ⇒ R410A, CO_2
Condensing units	87.2	93.3	R404A⇒R410A, CO_2
Refrigeration units	28.7	99.5	R404A ⇒ NH_3, ($+CO_2$) R410A

1. Market Trend

1) Type of Compressors in each product sector

Product Category	Number of Units in 2017FY (x 1,000)	Y/Y Ratio (%)	Compressor
Residential A/Cs	9,054.6	106.2	Rotaly Scroll
Commercial A/Cs	827.1	105.3	Scroll Rotaly
Residential H/P water heaters	446.7	104.2	Scroll (Rotaly)
Gas engine-driven A/Cs	28.7	94.3	Scroll
Water chilling units	13.8	106.8	Scroll Rotaly Screw
Air to air heat exchangers	111.3	102.0	NA
Commercial ref. cabinets	302.1	96.7	Resipro Rotaly Scroll
Condensing units	93.5	102.4	Scroll Rotaly Screw
Refrigeration units	28.8	97.2	Scroll Rotaly Screw

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Turbo Chiller:
➢ R245fa⇒R1233zd

VRF:
No Alternative yet
➢ R32

➢ R404A⇒R410A ⇒ R448A, 449A
➢ CO2(Cascade)

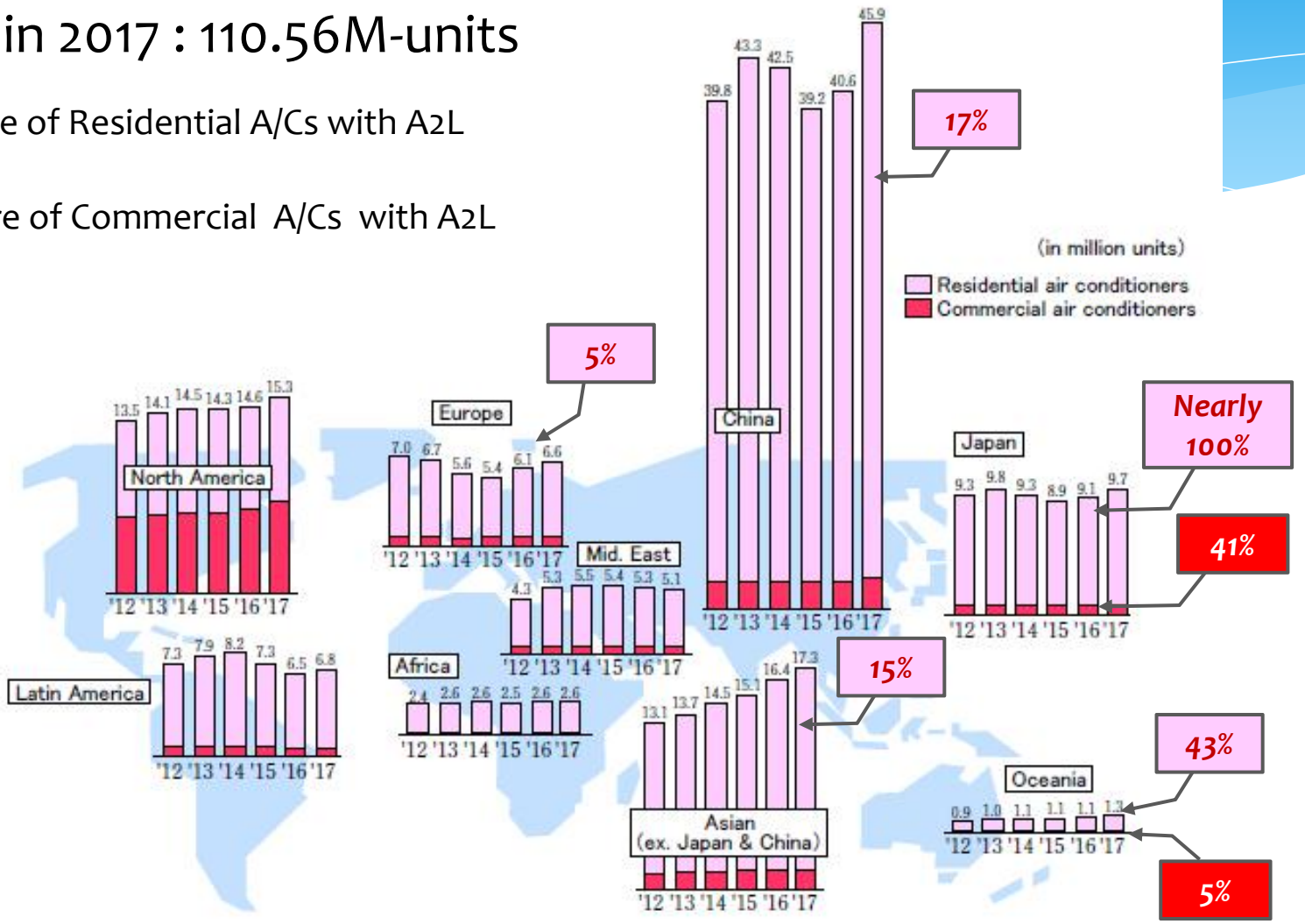
2. Market Trend

2) World market trend of Residential & Commercial A/Cs

Global sales in 2017 : 110.56M-units

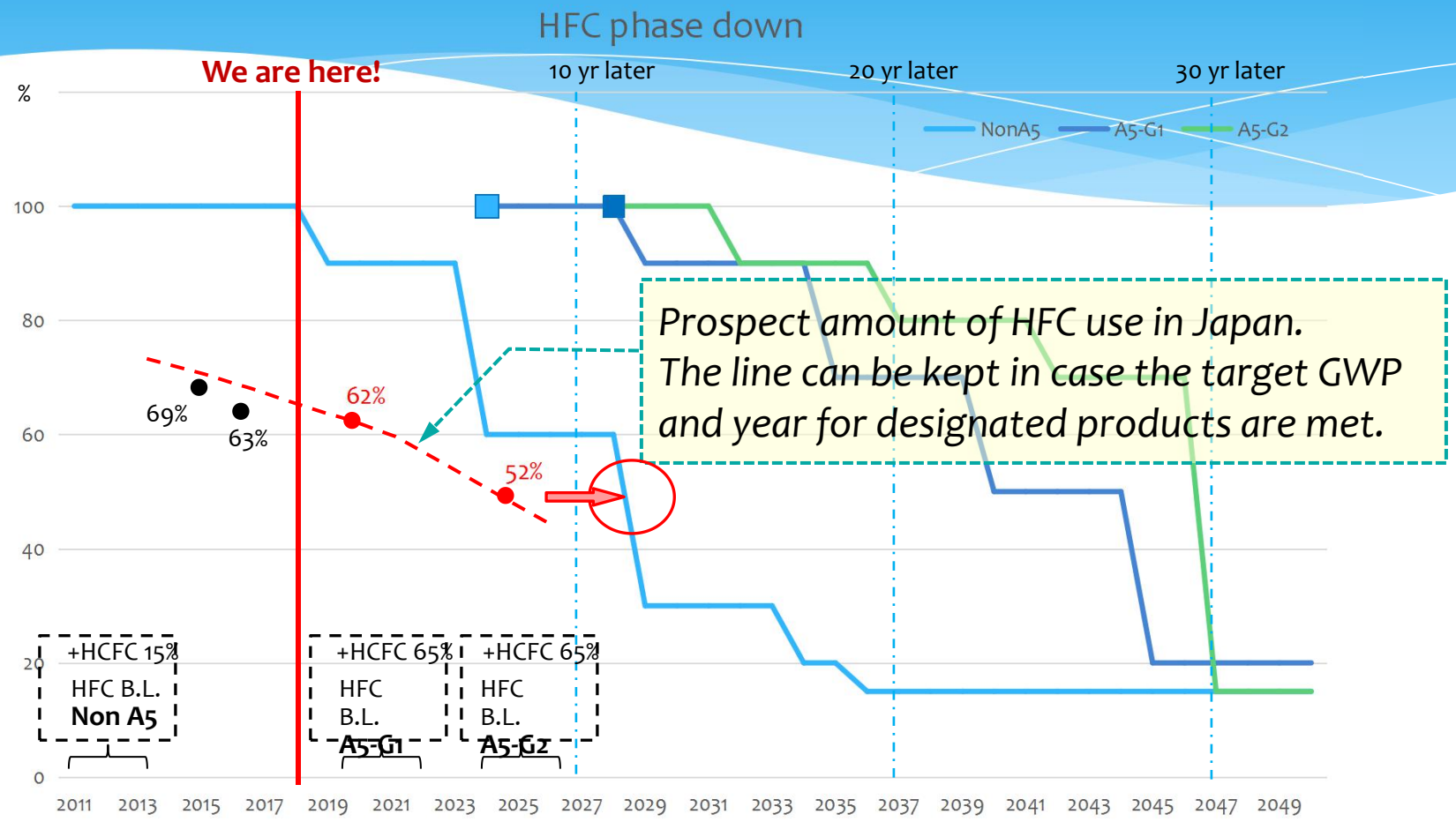
xx% : Share of Residential A/Cs with A2L

yy% : Share of Commercial A/Cs with A2L



3. Global environmental protection policy

1-2) Agreement at MOP 28



3. Global environmental protection policy

3) GHG emissions(CO2) by country / region

M CO2t

	2,013	2,016	dif.	%
China	10,250	10,151	-99	-1.0%
USA	5,520	5,311	-209	-3.8%
EU28	3,651	3,495	-156	-4.3%
Germany	833	802	-31	-3.7%
UK	477	398	-79	-16.6%
Italy	363	350	-13	-3.6%
France	370	347	-23	-6.2%
India	2,033	2,431	398	19.6%
Russia	1,668	1,635	-33	-2.0%
Japan	1,314	1,209	-105	-8.0%
S. Korea	592	595	3	0.5%
Canada	569	558	-11	-1.9%
Brazil	503	487	-16	-3.2%
Mexico	490	465	-25	-5.1%
Australia	398	413	15	3.8%

UNFCCC data

Who is JSRAE

The Japan Society of Refrigerating and Air Conditioning Engineers, **JSRAE**, was founded in **1925** in order to develop and disseminate **refrigerating and freezing technology** nationwide and also internationally.

Since then, it has served over **90** years as a non-profit academic organization in the field of **refrigeration, air conditioning, food refrigeration** and related science and technology.

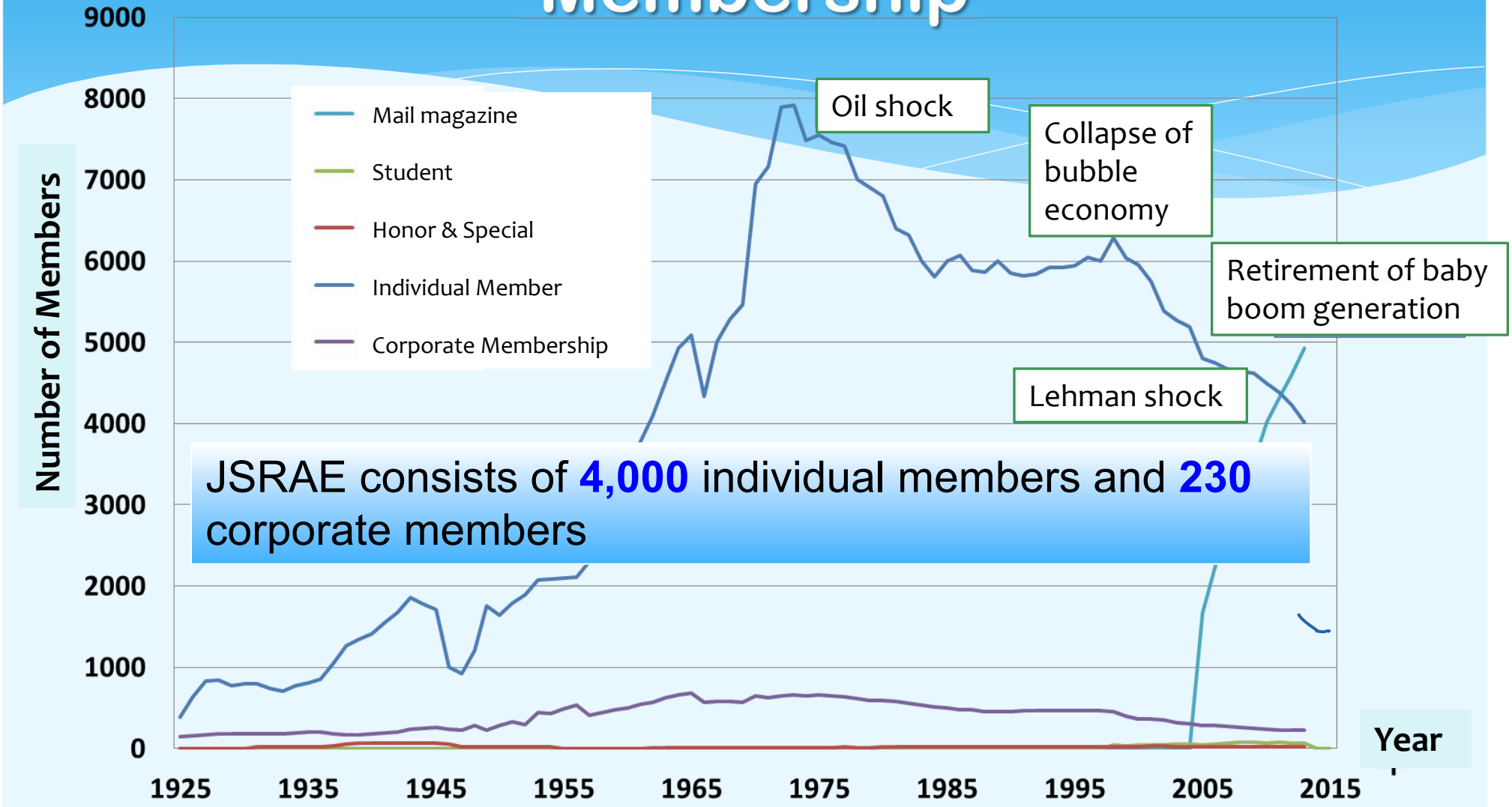
Historical Development and Activities (1)

Year	Event
1925	Establishment of the Japanese Association of Refrigeration, JAR, was approved.
1930	Approved as an incorporated association by the Ministry of Agriculture, Forestry and Fisheries.
1937	Japanese Research Committee for the International Institute of Refrigeration, IIR.
1956	Certified Refrigeration Engineer System started.
1962	Monthly Journal "Reitou Kuchou Gijutsu" (Refrigeration and Air Conditioning Technology) launched （merged with "Reito" in 1984).
1966	Certified Food Refrigeration Engineer System started.
1972	Holding the 1st Academic Lecture Meeting.
1973	JAR Award System started. The 1st Academic Award presented.

Historical Development and Activities (2)

Year	Event
1978	Participation to ASHRAE as an International Associate.
1980	The 1st JAR Technology Award presented.
1984	Transactions of JAR launched.
1990	Correspondence education system "Beginners' Course on Refrigeration and Air Conditioning“ started.
1997	Institutional name was changed to the Japan Society of Refrigerating and Air Conditioning Engineers, JSRAE.
2005	Conclusion of MOU with SAREK.
2006	Asia Academic Award was started.
2011	Approved as a public interest incorporated association.
2015	Hosted the 24th IIR International Congress of Refrigeration (ICR2015).

Membership



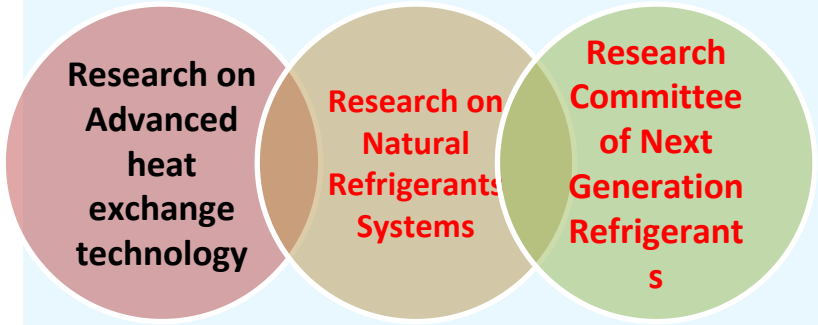
JSRAE consists of **4,000** individual members and **230** corporate members

Main Activities

((1))Education and training of engineers
((2))Survey and research on technology development
((3))Certificate recognition and commendation of award
((4))Promote international exchange with the overseas associations
((5))Other project to achieve the purpose

Research Project & T. C.

Research Project



Technology Committee, TC

Survey Research

- Food Technology Committee
- Refrigerant Technology Committee
- Compressor Technology Committee
- Heat Exchanger Technology Committee
- Technology of Next- Generation Refrigerating Systems Committee
- Desiccant, Adsorption, Absorbing and Chemical Systems Technology Committee
- Technology of Ammonia Refrigeration Equipment Committee
- Frost and Defrosting Systems Committee
- Technology of Thermal Storage by Solid-liquid

JSRAE

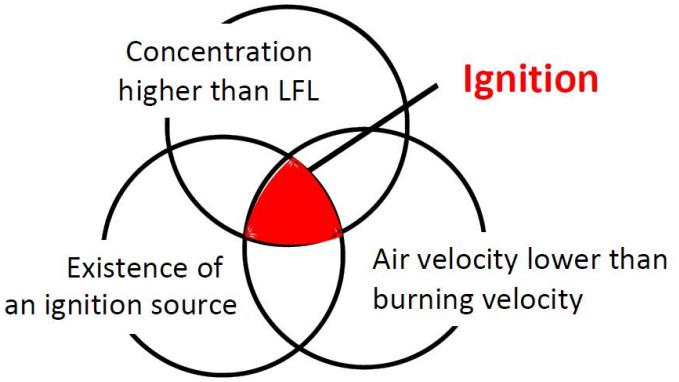
Survey Research

Risk Assessment of mildly Flammable Refrigerants

With the objective of gathering essential data for the risk assessment of mildly flammable refrigerants (Class A2L) for air conditioners, safety studies has been conducted by the national project since 2011.

1st stage of Project has completed and ignition risk of mildly flammable refrigerants (R32, R1234yf) was considered to be socially acceptable.

Japanese industry has provided Air Conditioner with R32 to the market since 2013.



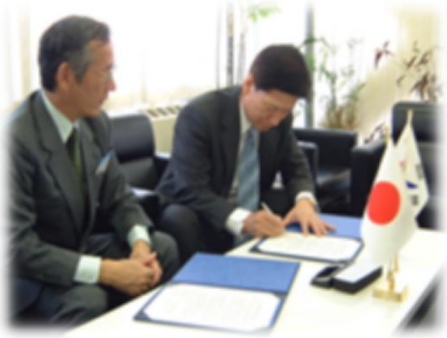
Ignition mechanism

International Exchange and Conferences

International activities

Associate Societies

- International Institute of Refrigeration (IIR)
- Asian Societies : CAR, SAREK, TSHRAE
- North America : ASHRAE



ASHRAE / JSRAE / SHASE Joint Meeting

1) Overview

70th Anniversary

The Japan Refrigeration and [illegible]y Association (JRAIA)

- Established in 1949.
- 165 member companies including the associate members.
  (as of 1st of November 2018)
- The business fields of the member companies are :

  - Air conditioning (residential, commercial, automotive)
  - Refrigeration (commercial, industrial, transport)
  - Ventilation
  - Heat pump system (HP water heaters)
  - Refrigerants
  - Parts

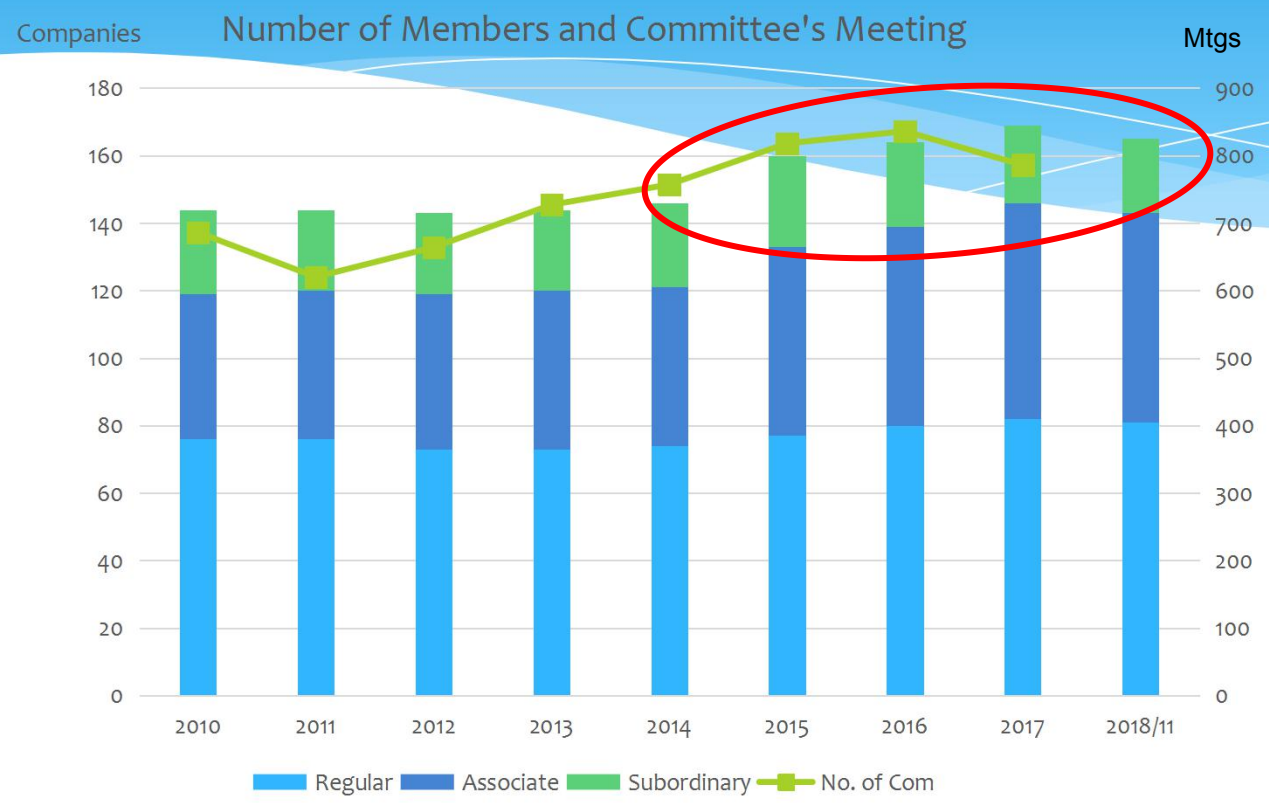
Who is JRAIA?

2) History

year	event
1949	Established on 18th February as "Japan Association of Refrigerator Production"
1955	First exhibition "Domestic freezer exhibition" held (hereinafter annually)
1959	"Frozen and Cooled" launched as a monthly magazine
1969	Renamed “the Japan Refrigeration and Air Conditioning Industry Association"
1978	Establishment of “Instrument performance inspection office” in Atsugi
1980,83	Room air conditioners, packaged air conditioners certification system started
1992	ICARHMA was established: Japan (JRAIA), USA (ARI), Canada (HARI), Europe (EUROVENT)
1994	Refrigerant Freon Regeneration Centre established
	"R22, R502 alternative refrigerant international symposium" started (biennially held)
2003	ICARHMA Tokyo meeting held
2004	Joined EPEE
	EPA :”Ozone layer protection award”, Nikkan Kogyo Shinbun "Ozone layer protection / global warming prevention award"
2007	Established Europe Office (Belgium)
2011	Inspection office separated as JATL
2016	Win Award of the Minister of ETI for "Ozone Layer Protection / Global Warming Prevention"

Who is JRAIA?

3) Number of members and activities



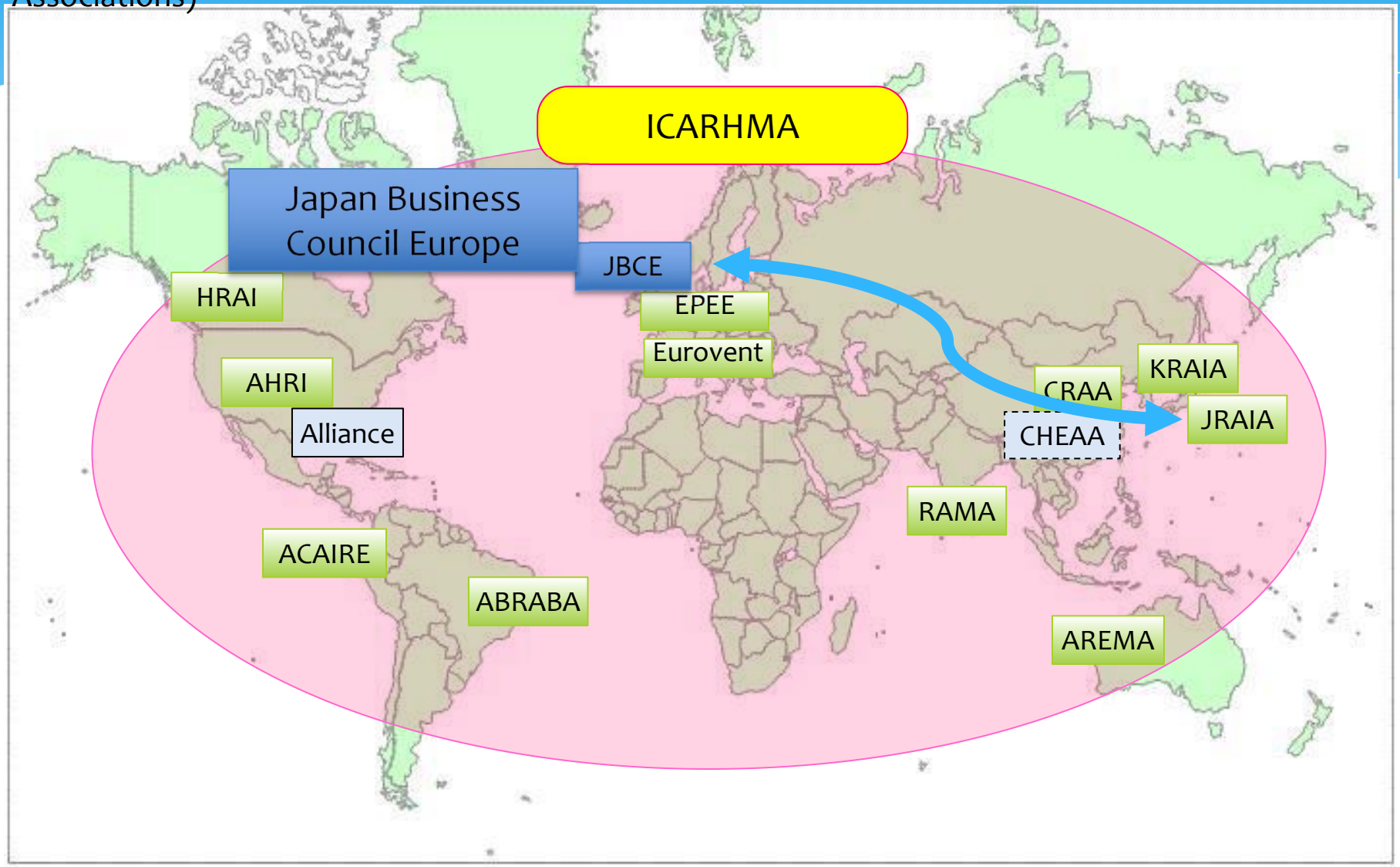
As of 1st of November 2018

regular member	81 companies
subsidiary member	22 companies
Associate member	62 companies
Total	165 companies

Global efforts

4) Global industry association system <ICARHMA>

（The International Council of Air conditioning, Refrigeration and Heating Manufacturers Associations）



JSRAE

Education Training

Internatio nal activities

2019 Annual Conference, Sept. 11~13

Tokyo University of Marine Science and Technology (Tokyo)

2018 Annual Conference, Sept. 4~7

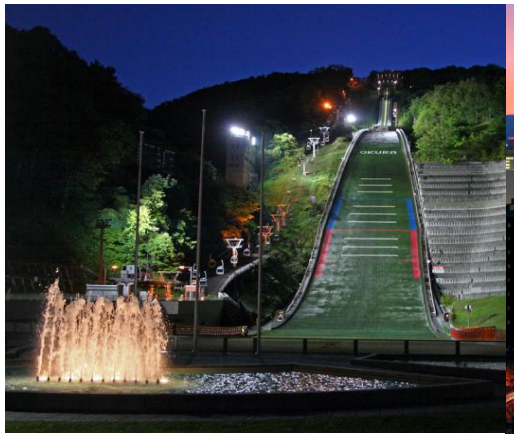
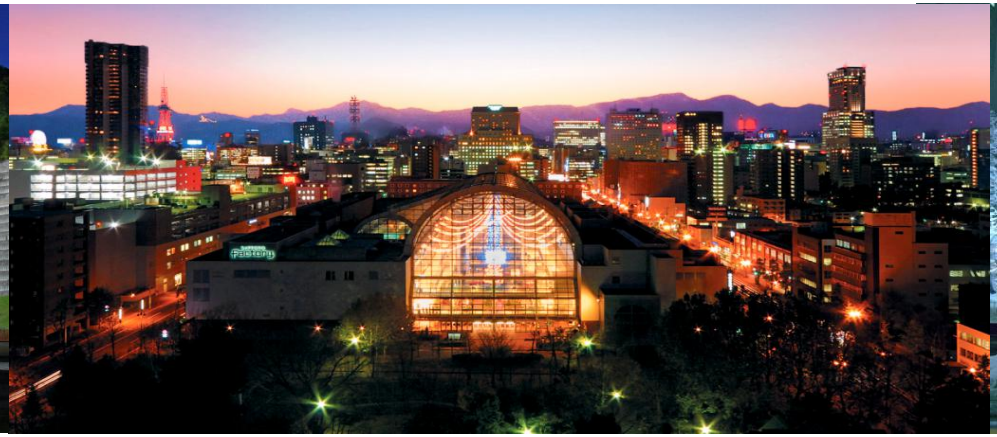
September, Nippon University (Fukushima)

JSRAE

ACRA2018

International activities

9th Asian Conference on Refrigeration and Air Conditioning (ACRA)


Date : August 21-24, **2018**
City, Country : Sapporo, Japan
Address : Conference Center

A forum for experts, scholars and engineers in the HVAC&R fields to discuss and exchange scientific and industrial knowledge.
The ACRA opened in **2002 in Kobe** and is held in **every two years**.

2004 Beijing(China), 2006 Gyongju(Korea)
2009 Taipei(Taiwan), 2010 Tokyo(Japan)
2014 Jeju(Korea), 2016 Taipei(Taiwan)

JSRAE

GL2020

14th IIR-Gustav Lorentzen Natural Working Fluids Conference

Date : **6 – 9 December, 2020** (Abstract due : **September, 2019**)
Venue: **Kyoto International Conference Center, Kyoto, Japan**
Web: **https://biz.knt.co.jp/tour/2020/12/gl2020/index.html**
(or, Please search by "GL2020")

History of "Kobe Symposium"

1) Major topics of each symposium

#	year	Major(New) Topics
1st	1994	Symposium starts. Focus on alternatives for R22(AC) and R502(REF).
2nd	1996	Focus on alternatives for HCFCs. Not only equipment but also refrigerants and oil.
3rd	1998	Energy efficiency with non ODP refrigerants was discussed. ICARHMA members joined the symposium.
4th	2000	"Environment issue Session" starts. Higher energy efficiency, resource efficiency and waste reduction discussed for Kyoto protocol.
5th	2002	Low GWP refrigerants, emission and products recycle discussed.
6th	2004	Automotive AC session starts.
7th	2006	Vending Machines and Refrigerating Appliances session starts. "Poster Session" started.
8th	2008	Future Buildings and HVAC Session starts. Presentation from EPEE.
9th	2010	Heat Pump Session starts.
10th	2012	Risk assessment for A2L refrigerants starts.
11th	2014	Environment issues(Activities of China, Asia and Europe) introduced.
12th	2016	Compilation of Risk Assessment in Japan
13th	2018	New Step(A3) of Risk Assessment in Japan

History of “Kobe Symposium”

2) Number of registered persons

HFO2021

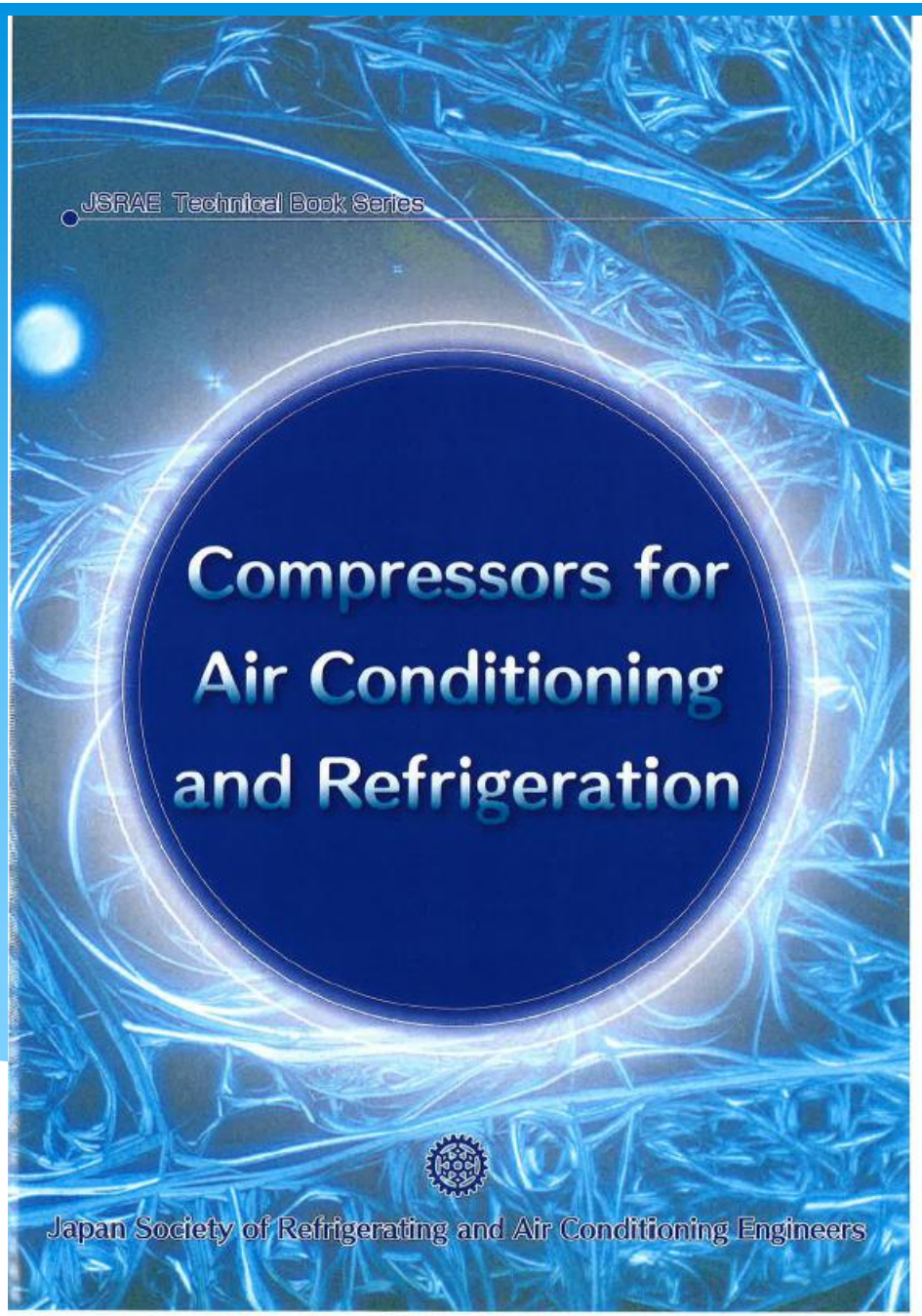
2nd IIR International Conference on the Application of HFO Refrigerants

Date : **16 – 18 June, 2021** (Abstract due : **January, 2020**)
Venue: **XXXXX, Japan**
Web: **under construction**

ACCC202X

(2nd / 3rd) Asian Conference on Cold Chain, XX, Japan

Note: 1st ACCC, 23-24 September, 2019, Wuhan, China



Japan Society of Refrigerating and Air Conditioning Engineers

Compressors for Air Conditioning and Refrigeration

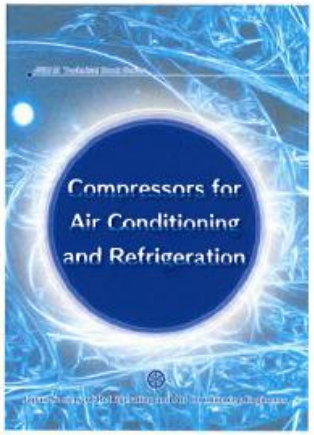
Covers a wide range of needs both for beginners and experts
Full of academic and technical knowledge, inspiring future breakthroughs!

NEW BOOK FROM JSRAE

With vast information on
Refrigeration compressors

Including:

1. Introduction
2. Basic Theory
3. Reciprocating Compressors
4. Rotary compressors
5. Scroll Compressors
6. Twin Screw Compressors
7. Single Screw Compressors
8. Car Air-conditioner Compressors
9. Refrigeration Oil
10. Motors and Inverters
11. Testing
12. Measurement Technologies



¥10000
+ shipping fee

Compressors, considered the heart of refrigeration and air conditioning system, have significant effects on the system performance and reliability. In spite of their importance, there are few publications which include systematical information on compressor technologies.

JSRAE launched a special project to publish a comprehensive reference manual to share knowledge on this important topic. This manual is intended to be used by beginners, aspiring engineers, seasoned academics and engineers professionals.

Focusing on common and universal technologies required, this book provides important knowledge, data, trends and developments of compressor technologies.

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