

# History of “Kobe Symposium “ And Global Issues of the HVAC Industry

JRAIA  
Tetsuji Okada  
Dec. 6. 2018



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1. Who is JRAIA ?
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# 1. Who is JRAIA?

## 1) Overview

### The Japan Refrigeration and Air conditioning Industry Association (**JRAIA**)

- Established in 1949.
- 165 member companies including the associate members.  
(as of 1<sup>st</sup> 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

# 1. Who is JRAIA?

## 1) Overview

70<sup>th</sup>  
Anniversary

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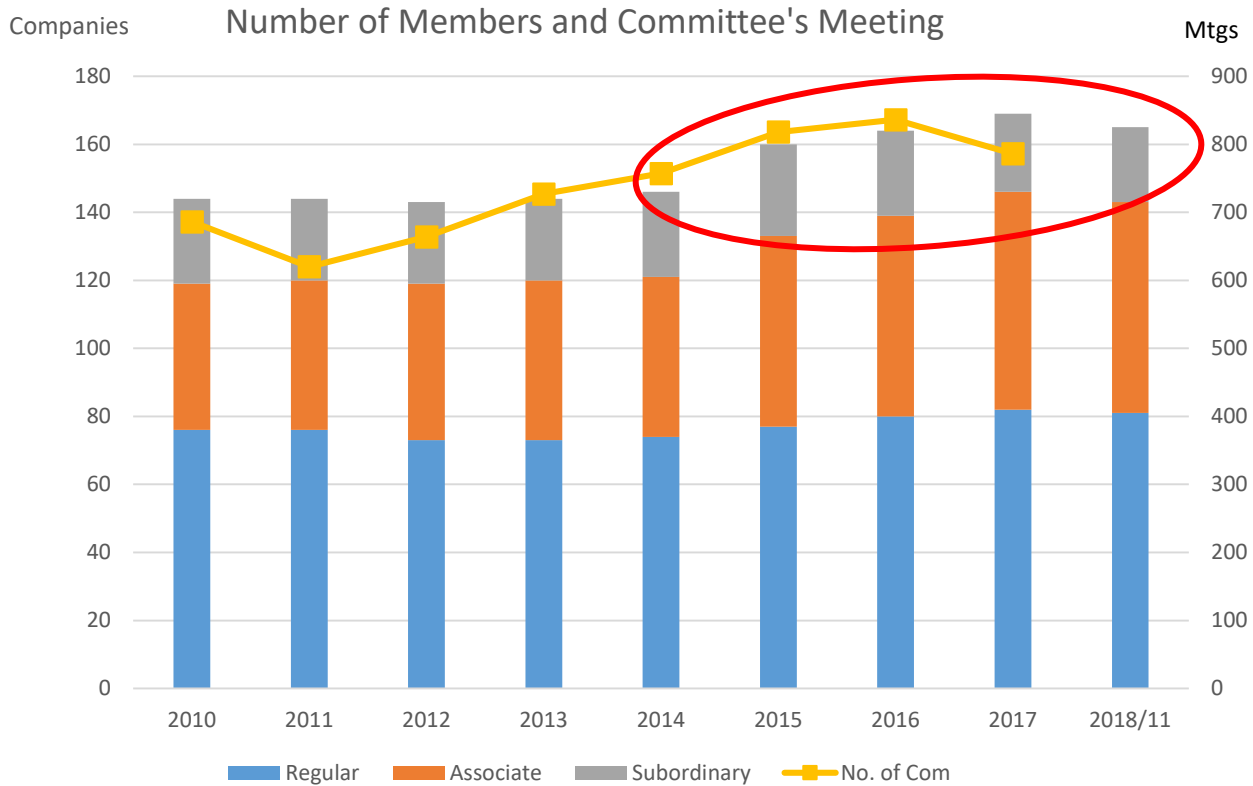
# 1. Who is JRAIA?

## 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"

# 1. Who is JRAIA?

## 3) Number of members and activities



As of 1<sup>st</sup> of November 2018

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

## 2. Market Trend

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

Product Category	Number of Units in <u>2017FY</u> (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 <sub>2</sub> , (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 <sub>2</sub>
Condensing units	93.5	102.4	R404A ⇒ R410A, CO <sub>2</sub>
Refrigeration units	28.8	97.2	R404A ⇒ NH <sub>3</sub> , (+CO <sub>2</sub> ) R410A

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VRF:  
No Alternative yet



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Turbo Chiller:  
 ➤ R245fa ⇒ R1233zd  
 ➤ R134a  
 ⇒ R1234ze(E)

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Air cooling Type:  
 ➤ R32

## 2. Market Trend

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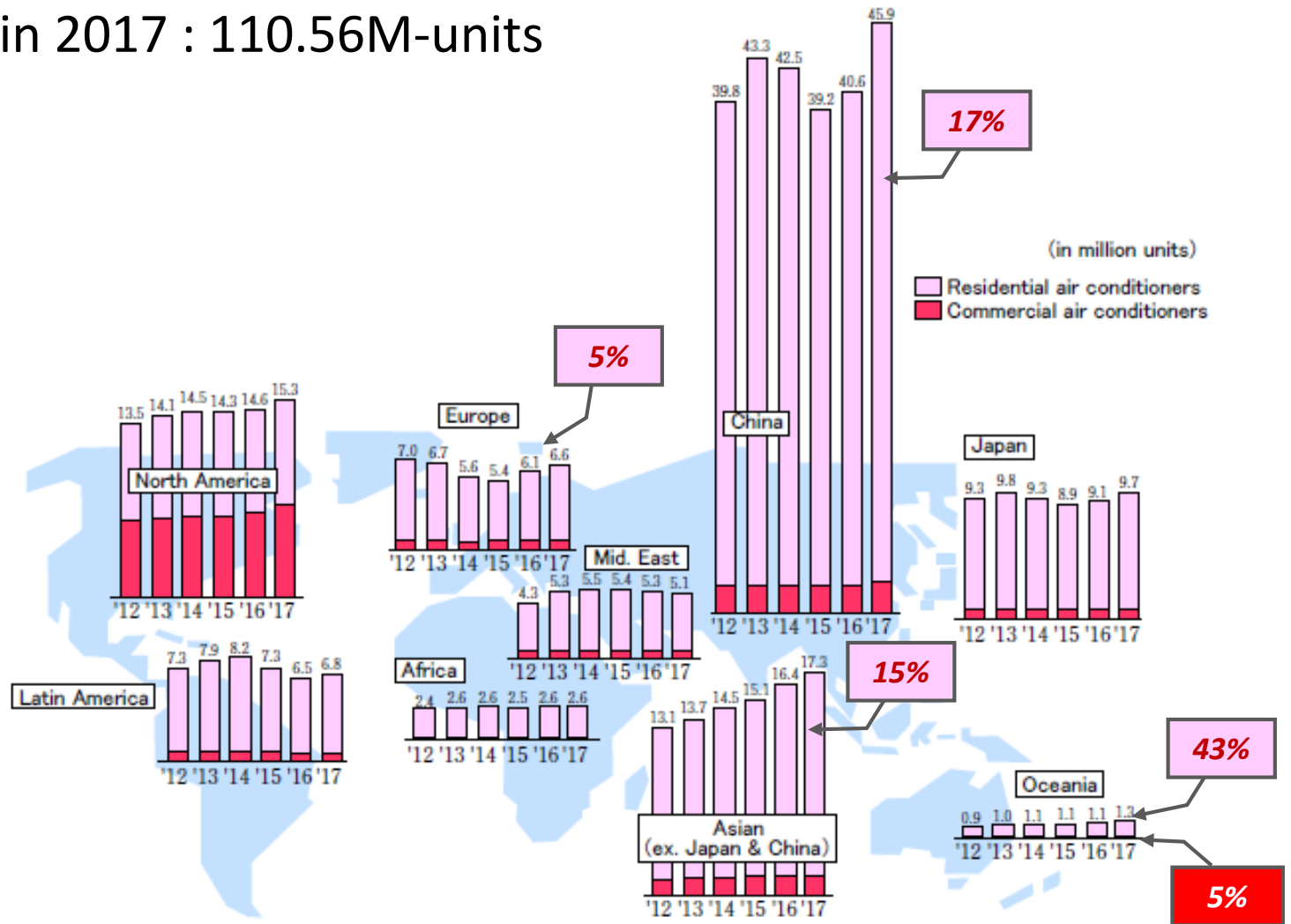
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- R404A ⇒ R410A  
⇒ R448A, 449A
- CO<sub>2</sub>(Cascade)

## 2. Market Trend

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

Global sales in 2017 : 110.56M-units



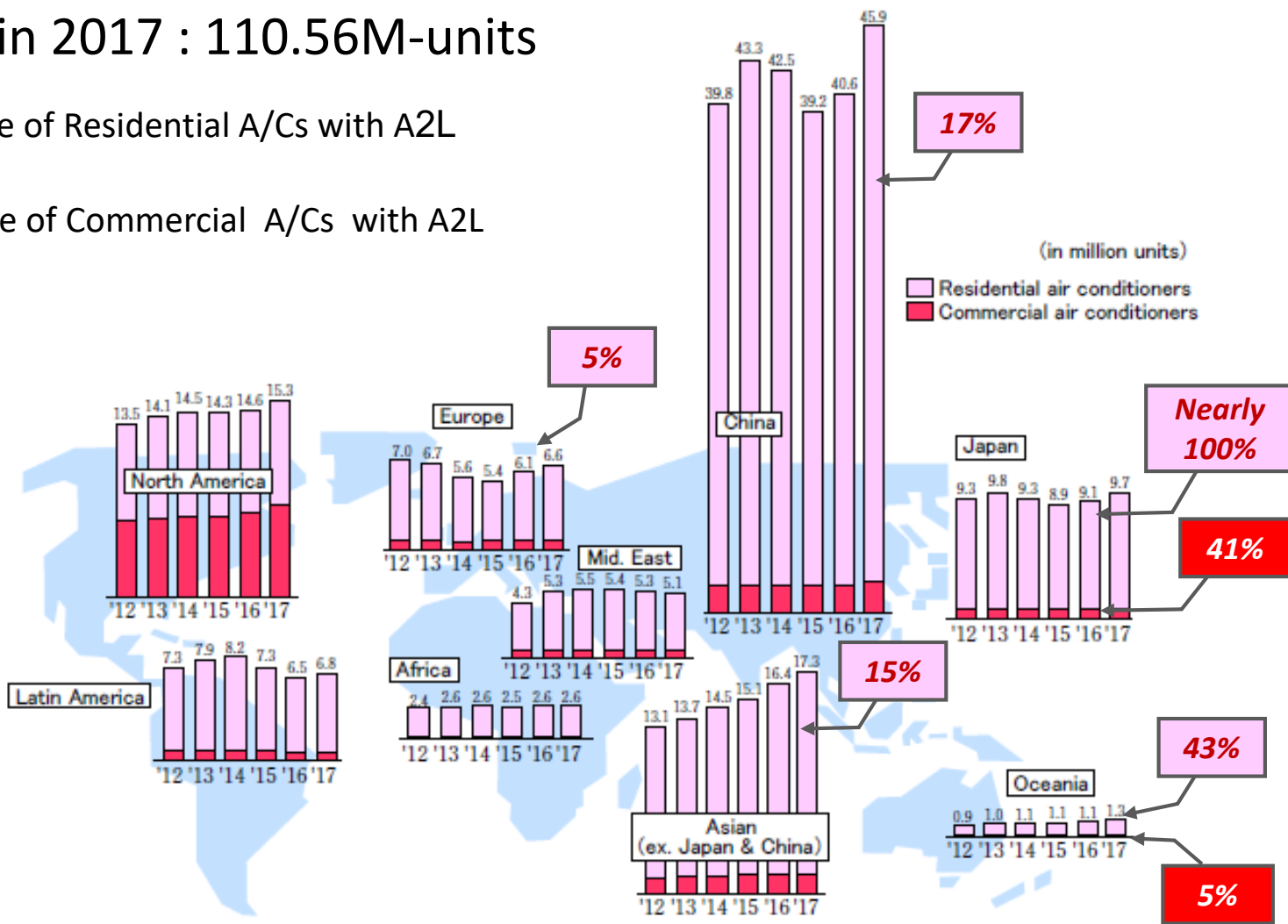
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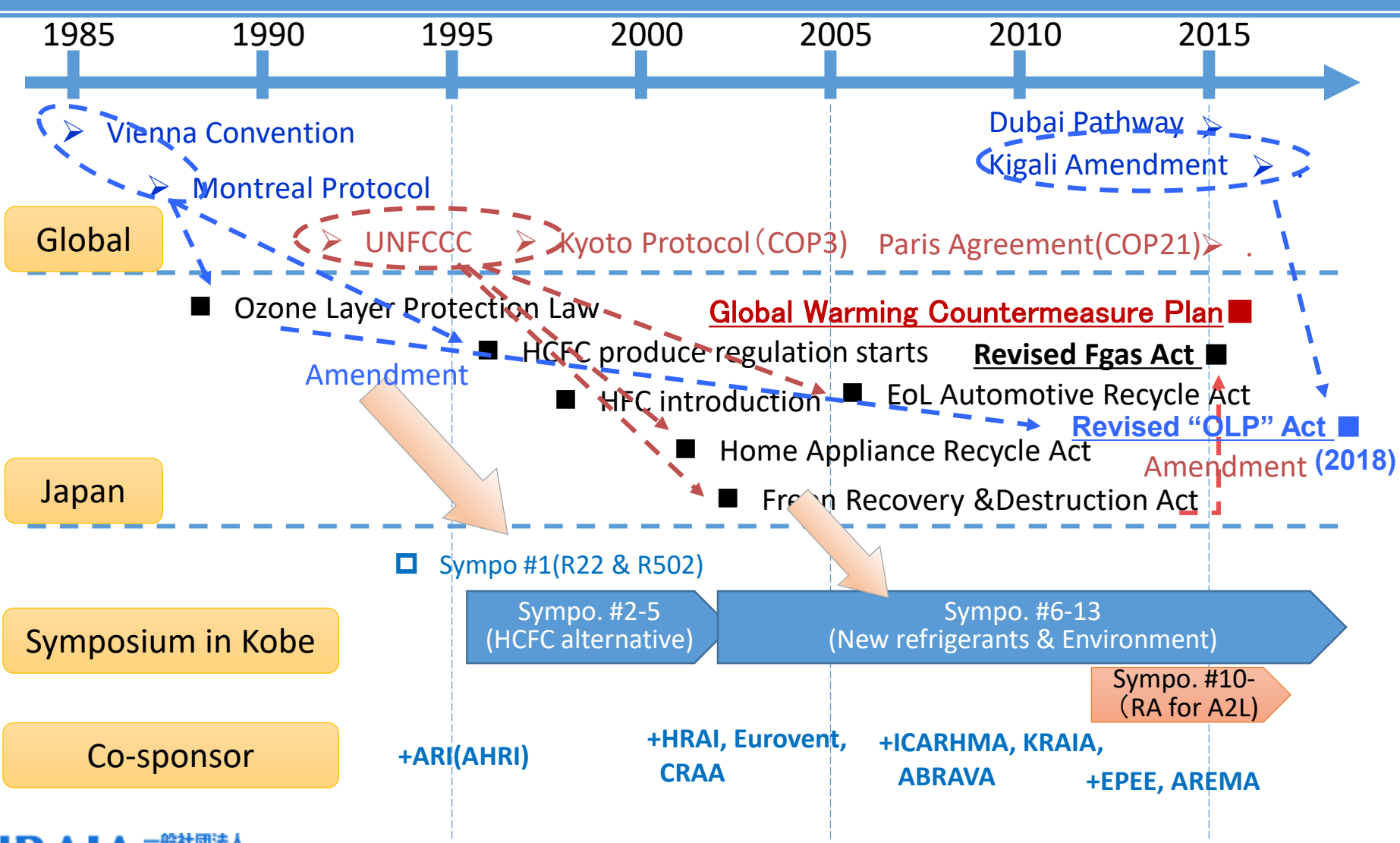
**xx%** : Share of Residential A/Cs with A2L

**yy%** : Share of Commercial A/Cs with A2L



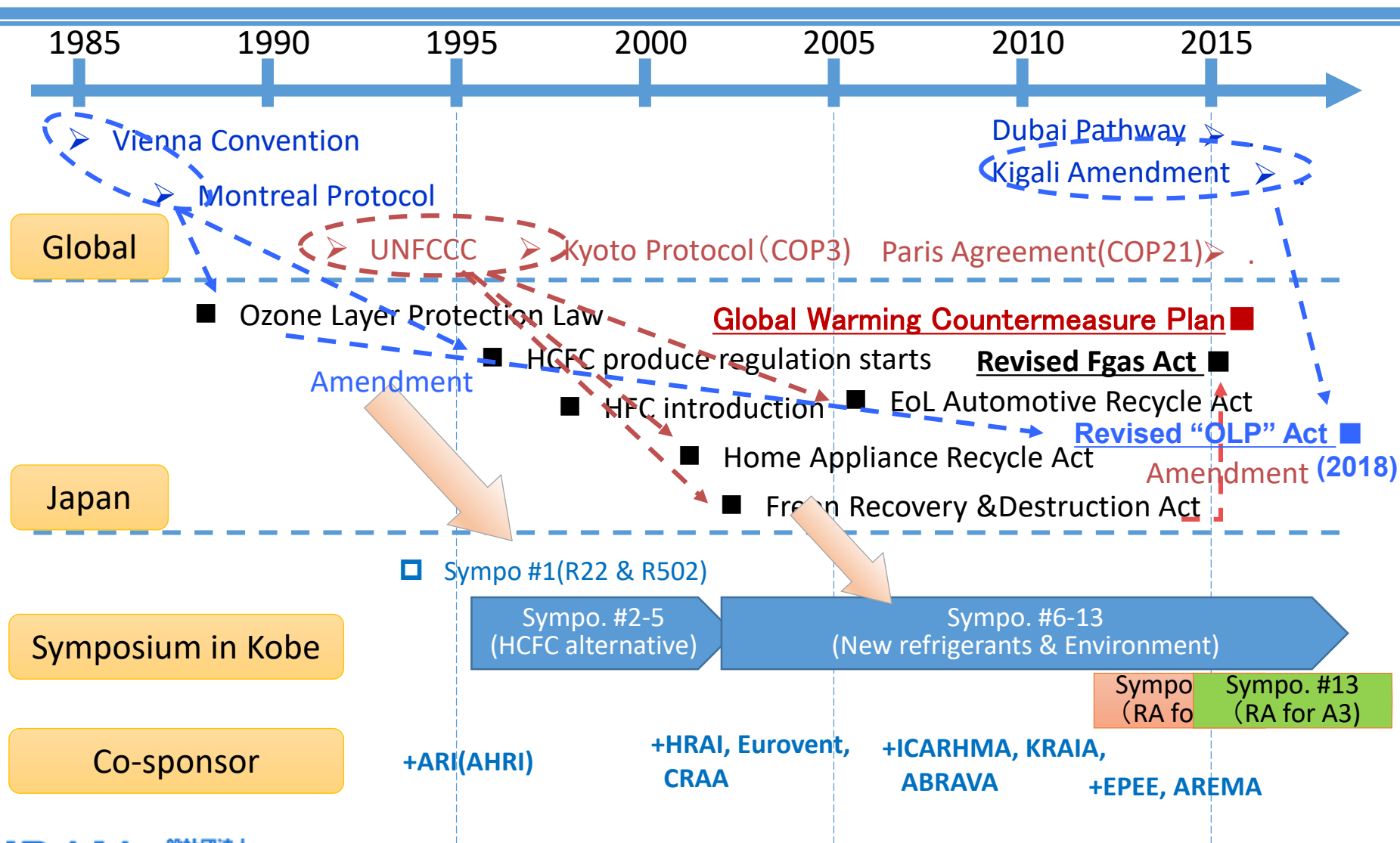
# 3. Trend of Regulations and Protocols

## ➤ Timeline



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# 4. History of “Kobe Symposium”

## 1) Major topics of each symposium

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



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13 <sup>th</sup>	2018	New Step( A3) of Risk Assessment in Japan

# 4. History of “Kobe Symposium”

## 2) Number of registered persons



# 5. Global environmental protection policy

## 1-1) Montreal protocol

### "Kigali Amendment" at MOP28

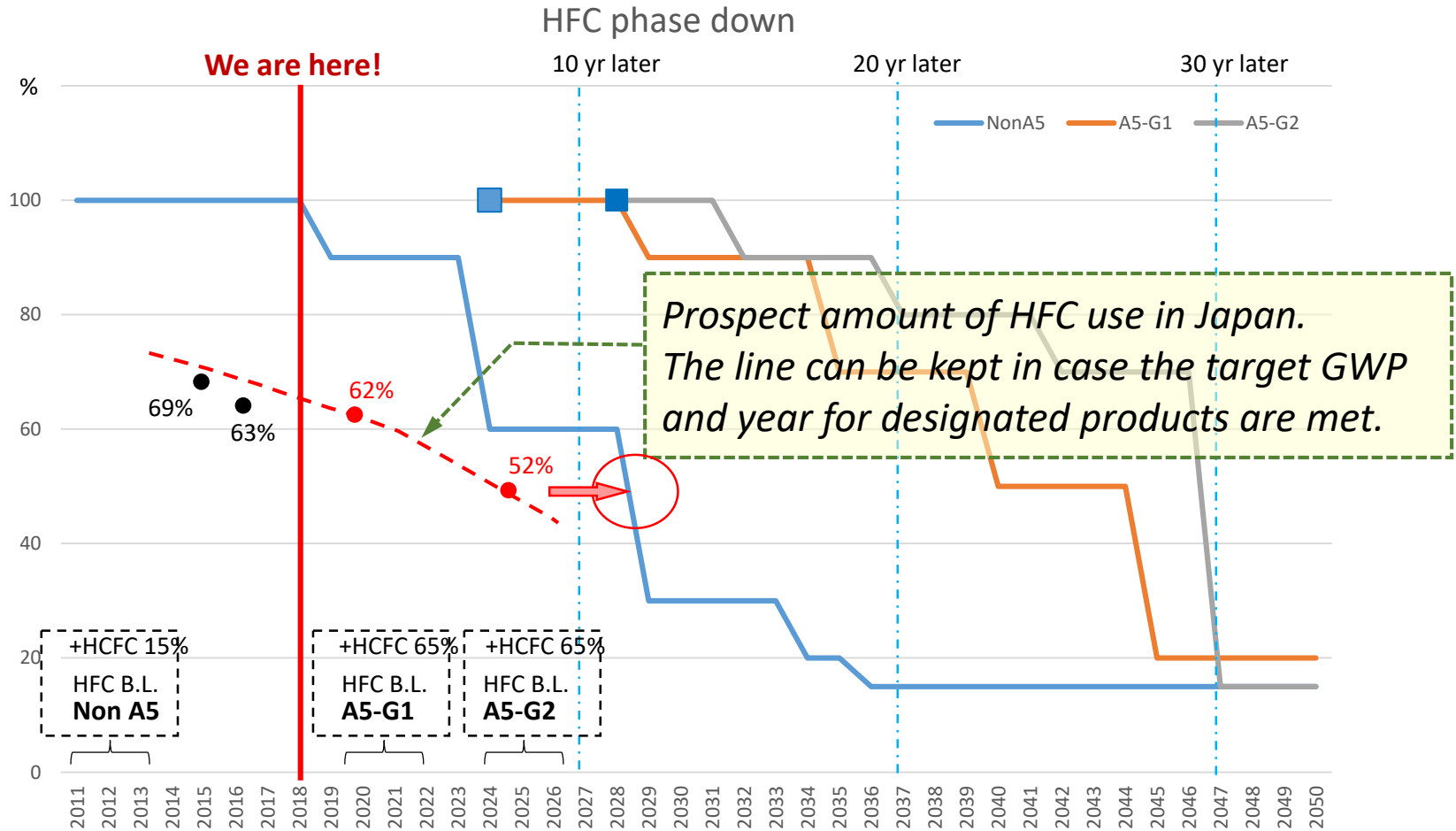
#### >>MOP 30 in Quito, Ecuador(11/2018)

(Ratified parties ; 60 at 9 Nov. 2018)

- Decided the reduction step by step of HFC (CO 2 equivalent ton)
  - Developing countries are divided into two groups.
- In order to promote review of standards concerning the safety of flammable refrigerants,
  - Establishment of TF(Task Force) in TEAP and decision to hold WS(Work Shop)
- 21 Decisions in MOP 30.
  - - Access of parties operating ....to energy-efficiency technologies in the RACH sec. (Decision XXX/5)
  - Unexpected emissions of CFC-11. (Decision XXX/3)
  - Financial Issues.(Decision XXX/4, 20)

# 5. Global environmental protection policy

## 1-2) Agreement at MOP 28



# 5. Global environmental protection policy

## 1-3) Montreal protocol

“TEAP **TASK FORCE** REPORT ON ISSUES RELATED TO **ENERGY EFFICIENCY** WHILE PHASING DOWN HFCs”

### Outline

Ch. 1 Introduction

Ch. 2 Technology options and requirements for EE in the RACHP sectors

Ch. 3 Funding institutions related to EE in the RACHP sector while phasing down HFCs

Ch. 4 References

Ch. 5 Glossary

ANNEX A: Sector-specific challenges to the uptake of technologies

ANNEX B: Examples of projects

**ANNEX C: Outcome of the workshop**

**ANNEX D: Additional guidance to TEAP as addressed in updated final report**



# 5. Global environmental protection policy

## 1-3) Montreal protocol

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**ANNEX C: Outcon**  
**ANNEX D: Additio**  
**updated final repc**

### Lessons learned: Room AC

- Non-A5 markets initially adapted to the phase-out of HCFC-22 with R-407C, and then R-410A with better energy performance
- Currently, global markets are adapting to medium- and low-GWP options to replace HCFCs and high-GWP HFCs in air conditioners including HFC-32, HC-290, and others under development
- Room ACs performance can be optimised with improved compressor, refrigerant charge, and size of the heat exchanger
- In the absence of enabling EE policy, EE values for AC are generally lower in A5 compared to non-A5 countries



# 5. Global environmental protection policy

## 2) COP 21 (Dec. 2015)>>COP 24

"Paris Agreement" (bottom up mechanism)

- Setting 2 degC target as a long-term goal (pursue efforts to keep it at 1.5 degC)
- All countries submit their own goals every five years
  - Construct a legally binding framework to participate
- However, there is no legally binding force (obligation) to achieve the target
- Mechanism to confirm implementation status of the entire world every 5 years
- All countries report and review the implementation situation in a common and flexible way
- The importance of innovation is positioned
- Utilization of market mechanism is positioned (including bilateral credit system)

COP24 2<sup>nd</sup>-14<sup>th</sup> Dec. in Katowice, Poland

The main objective is to adopt a decision ensuring full implementation of the Paris Agreement (the so-called implementation package - the Katowice Rules).

>> to adopt "Paris Agreement Work Programme"(PAWP)

# 5. Global environmental protection policy

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### COP24 2<sup>nd</sup>-14<sup>th</sup> Dec

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Agreement (the so-c

>> to adopt "Paris A

### Differences from the Kyoto Protocol:

- Top down type only developed countries have obligation to reduce with numerical target
- With penalties (No plan to formulate an accumulated plan, can not participate in emissions trading)
- Cover ratio is 13.5%
- Constraint period is the first commitment period: 2008-2012  
Second commitment period: 2012-2020



# 5. 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

# 5. Global environmental protection policy

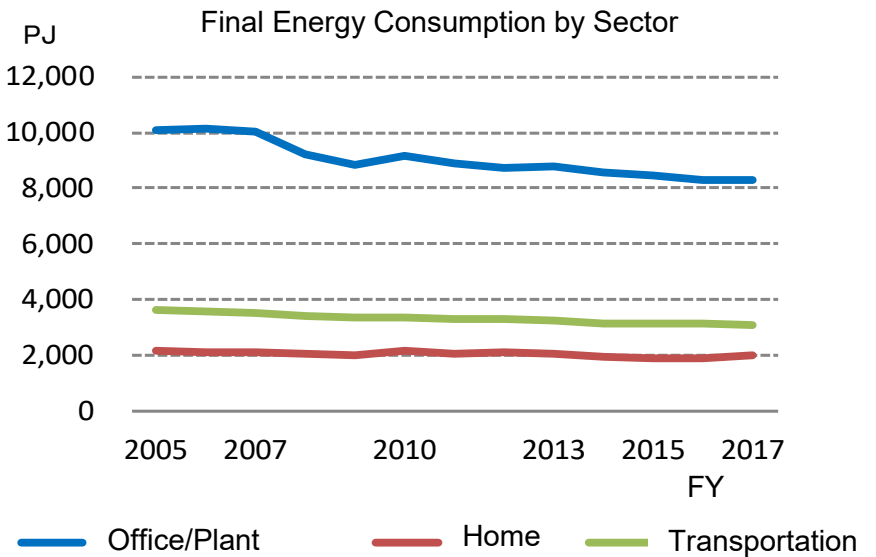
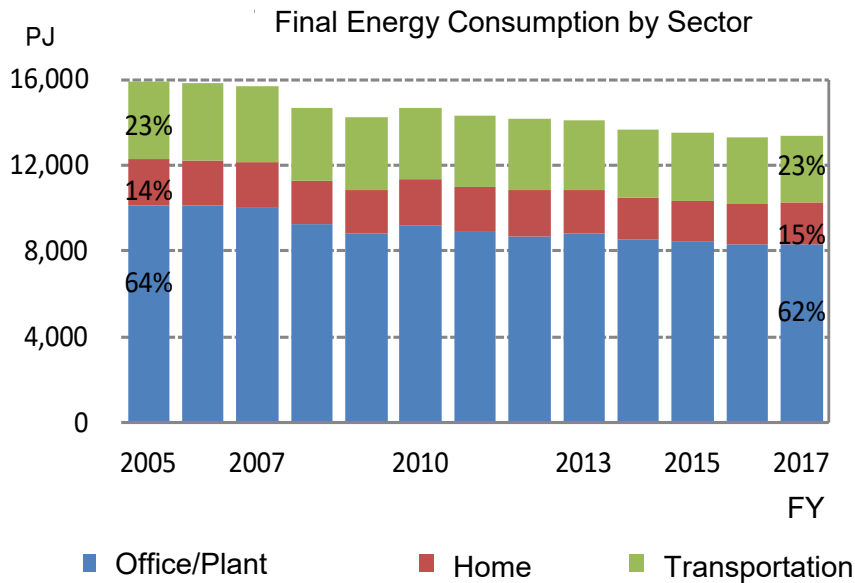
## 4) Reduction plan of CO2 emissions in draft commitments

	Vs.2013	Vs.2005	Vs.1990
Japan	▲26.0% (2030)	▲25.4% (2030)	▲18.0% (2030)
USA	▲18~21% (2025)	▲26~28% (2025)	▲14~16% (2025)
EU	▲24% (2030)	▲35% (2030)	▲40% (2030)
Canada	▲28% (2030)	▲30% (2030)	▲14% (2030)
China CO <sub>2</sub> emission ▲60-65%/GDP (2030 vs. 2005)	+13~29% (2030)	+67~91% (2030)	+307~365% (2030)
Korea ▲37% vs. BAU(2030)	▲22% (2030)	▲4% (2030)	+81% (2030)

Based on METI documents

# 5. Global environmental protection policy

## 5) Energy Supply and Demand Plan in Japan(Nov. 2018)



# 6. Global efforts

## 1) Global direction (discussion in MOP etc.)

1. From alternative refrigerant performance evaluation **to safety and refrigerant management.**

Example: GRMI or RDL

PRAHA II and ASEAN-SHINE

AHRI Flammable refrigerant subcommittee

**W/S on risk assessment with ASEAN countries**

2. Coexistence with energy saving (**energy efficiency**) is a challenge
3. Measures for considering **developing countries** are required (including High Ambient Temperature Countries)


# 6. Global efforts

## 2) Regulatory overview of each region



# 6. Global efforts

## 2) Regulatory overview of each region

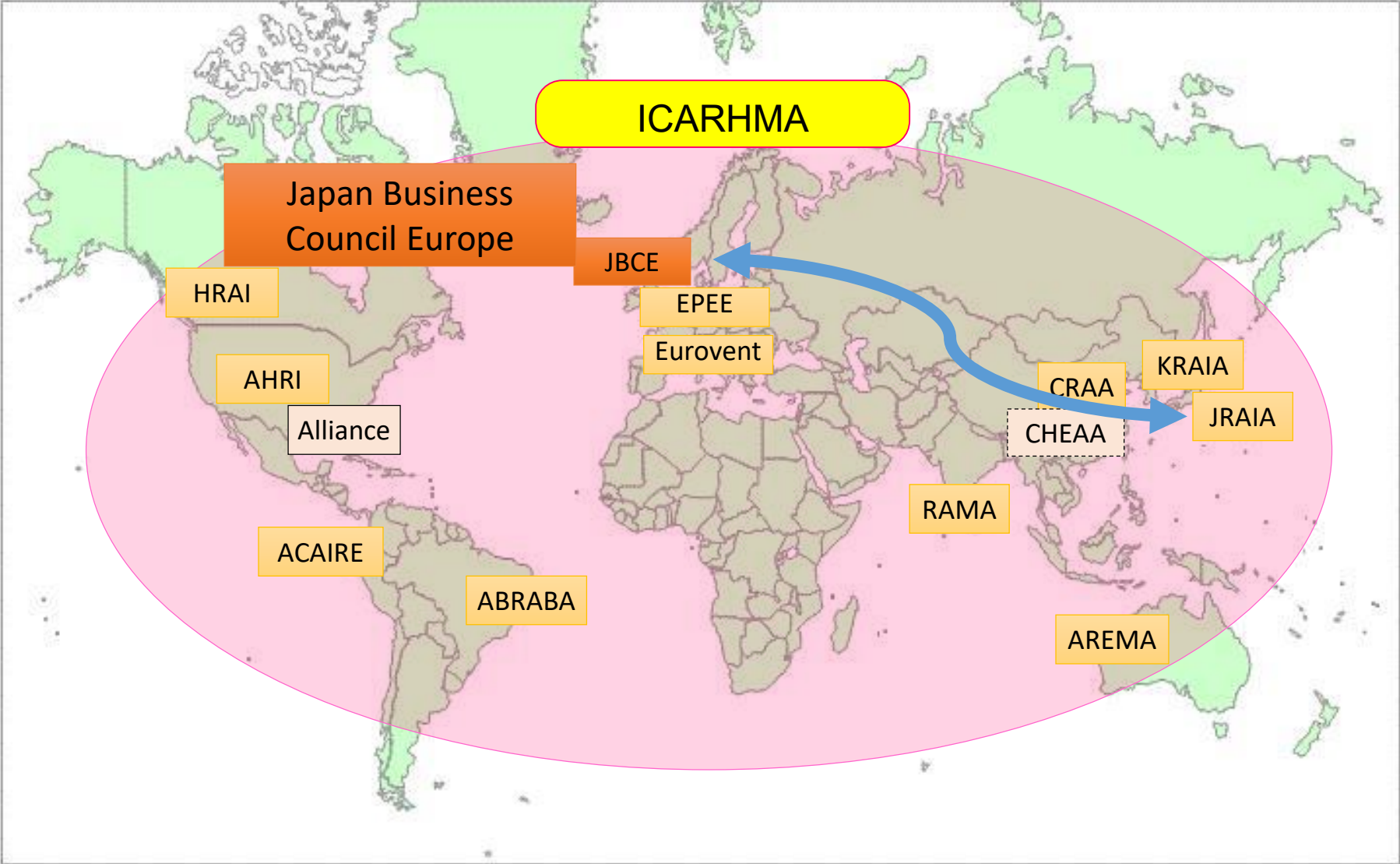


	U.S.	Europe	Japan
Legislation/ Act	Clean Air Act SNAP	F-Gas Regulation, Act	Act on Rational Use and Proper Management of Fluorocarbons <b>High pressure gas safety act</b> <b>Revised Ozone layer Protection Act</b>
National legislation	<b>Building Code</b> IMC, UMC, etc.	<b>Building Code</b>	<b>High pressure gas safety act</b>
International standards	ISO817 (refrigerant classification)		ISO5149 (safety)
Standard / regulations (define ref types)	ASHRAE34	Relevant standards based on ISO	<b>High pressure gas safety act</b>
Standard / regulations (safety)	ASHRAE15 UL60335-2-40 UL484, etc.	EN378 EN60335-2-40	<b>High pressure gas safety act</b> JIS C9335-2-40 JRA standards, etc.

# 6. Global efforts

## 4) Global industry association system <ICARHMA>

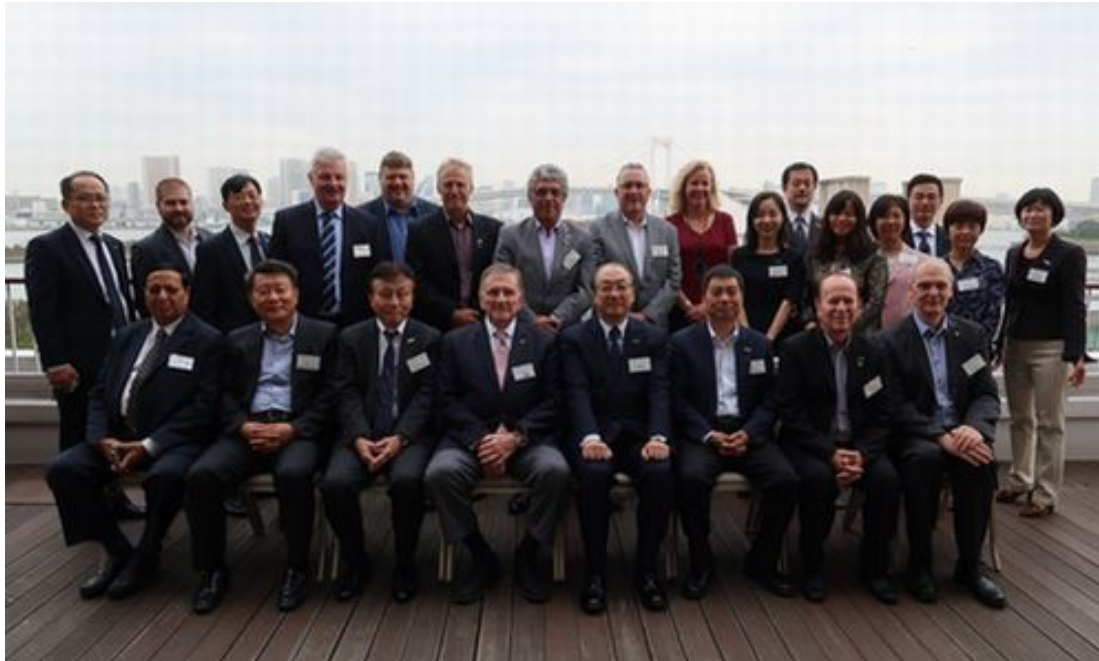
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# 6. Global efforts

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ICARHMA Mtg in Japan.

26. OCT. 2018

At Odaiba, Tokyo



# 6. Global efforts

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At Odaiba, Tokyo



# 6. Global efforts

## 5) Activities from a global perspective

### 1. GRMI (Global Refrigerant Management Initiative)

- AHRI and ABRAVA led (ICARHMA member participation)
- Extract and respond to global issues from the viewpoint of "refrigerant management" → Installation, service, qualification, etc.

### 2. RDL (Refrigerant Drivers License)

- Led by UNEP and AHRI
- Establishment of global standards for training of installation workers and qualification

### 3. AHRTI (Air Conditioning Heating and Refrigeration Technology Institute)

- AHRI, ASHRAE + US government led
- Implemented risk assessment of A2L, A3 refrigerant.

## 6. Global efforts

### 6) High ambient temperature area (Middle East etc.) and other support activities

#### 1. IEP for HAT (International Expert Panel for HAT)

- US DOE and ORNL led
- Alternative refrigerant drop-in test at room air conditioners and rooftop units  
→ Performance evaluation (capacity and COP)

#### 2. PRAHA (Promoting low-GWP Refrigerants for Air-Conditioning Sectors In High Ambient Countries)

- Led by UNEP and UNIDO
- Alternative refrigerant drop-in test in 4 types of room air conditioners, business air conditioners, etc.
- JRAIA is participating in “R32 Risk Assessment” as **the 2nd step (underway)**  
(First step is completed)

#### 3. ASEAN Risk Assessment Workshop in Kobe( 5<sup>th</sup> of December)

- Indonesia, Malaysia, Singapore, Thailand, Vietnam and Japan
- Regulation, Policy, Future Direction in each country are discussed

# 7. Strategies to be taken as Japan

## 1) Industry position (SWOT analysis)

<b>S(Strengths):</b>	<b>W(Weaknesses):</b>
<ul style="list-style-type: none"><li>·Technology (saving energy&lt;inverter&gt;, risk assessment)</li><li>·High quality</li><li>·Global production system</li></ul>	<ul style="list-style-type: none"><li>·Price competitiveness (especially against local manufacturers)</li><li>·Transmission ability is weak (how to tell)</li></ul>
<b>O(Opportunities):</b>	<b>T(Threats):</b>
<ul style="list-style-type: none"><li>· Risk assessment for A3 ongoing.</li><li>· Initiative an alternative refrigerant safety review, deregulation etc.</li><li>· Increasing needs of developing countries (environment-oriented)</li></ul>	<ul style="list-style-type: none"><li>· Establishment of risk assessment team in the United States → A3 Start risk investigation of refrigerant</li><li>· China and Europe aim to introduce A3 refrigerant active movement</li></ul>

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Opportunities

# 7. Strategies to be taken as Japan

## 2) What is expected in the industry and issues

### 1. Accelerate development of “innovative” technology

- Development of Innovative technology is mentioned in the COP
- As a concrete task, considerable hurdles are very high and mid or long-term perspective is indispensable
  - We will also make use of countermeasures such as collaboration among industry, government and academia, incentives etc.
- NEDO(New Energy and Industrial Technology Development Organization) supports Industries and Academia.(5 year project with 250 m¥(2.2mUS\$) /1<sup>st</sup> yr budget)

### 2. Acceleration of dissemination of environmental-friendly products such as high-performance equipment

- Increased incentive needs for accelerating dissemination
- The cooperation of public and private efforts
- ANRE has prepared preliminary figures on the FY2017 Comprehensive Energy Statistics based on the results of studies including a variety of energy-related statistics, and generated a preliminary report of the FY2017 Energy Supply and Demand Report.

# 7. Strategies to be taken as Japan

## 2) What is expected in the industry and issues

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### 3. Enhancement of support for developing countries

- Active support for technologies possessed in Japan is required.
- It is necessary to utilize bilateral offset credit system (JCM) etc. and make recommendations etc.
  - On the other hand, the expected effect on support is a challenge from the view point of business.
- More aggressive proposals for the policies are also necessary.

# 7. Strategies to be taken as Japan

## 3) Activity policy of JRAIA (About global countermeasures)

### 1. Strengthen activities at the global level (international conferences etc.)

- Example: for UNEP activities for OEWG, MOP  
→ Strategy as Japan, Proposal dissemination.
  - Cooperation with ICARHMA conference
  - Cooperation with the Japan-China-Korea Liaison Committee.
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- \* Building a strategy with “Global strategy WG” internally of JRAIA
  - \* Consistent proposal, continuation of transmission
  - \* Strengthen collaboration with the government (continuous appeal of industry intention) and Academia( JSRAE etc.)



# 7. Strategies to be taken as Japan

## 3) Activity policy of JRAIA (About global countermeasures)

➤ **OEWG40** in Vienna, 7 July 2018



OEWG40



JRAIA side-event @OEWG40

# 7. Strategies to be taken as Japan

## 3) Activity policy of JRAIA (About global countermeasures)

### ➤ **3 Association Meeting** in Kunming, China 16 May 2018

- JRAIA, CRAA, KRAIA.
- Annual Meeting, to share the information and the issues in each country.



# 7. Strategies to be taken as Japan

## 3) Activity policy of JRAIA (About global countermeasures)

### 2. Construction of regional strategies

- ◆ Individual activities in each region (participation in symposium in the Middle East and Australia etc.)
  - Europe: Collection, dissemination of information centered on the European Representative Office (cooperation with EPEE, JBCE etc.)
  - USA, Australia: Information on development of technology from Japan (collaboration with AHRI, AREMA)
  - Asia: Strengthening technical support from an international standardization perspective (distinction between themes, structure of organization)
  - Middle East, emerging areas (India, Brazil etc.)  
Issue extraction and response (support)

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Thank you for your kind attention!!  
Enjoy “Kobe Symposium”!