

JRAIA Side Event

“Look Forward: Practical Use of A2L Refrigerants For Air Conditioning Sector”

Time	Title
13:45--13:55	Opening
	JRAIA's policy on refrigerant for air conditioning sector
13:55-14:10	Risk assessment on mini split and application on equipment
14:10-14:20	Leak Detector for R32 and service tools for R32 and R1234yf
14:20-14:30	The Development of Refrigeration Oil for R32
14:30-14:40	Recovery machine for R32 and R1234yf
14:40-14:50	Service tools for R32 and R1234yf
14:50-15:00	Production line, transportation, storage and servicing of R32 air conditioner



JRAIA position on Climate Change

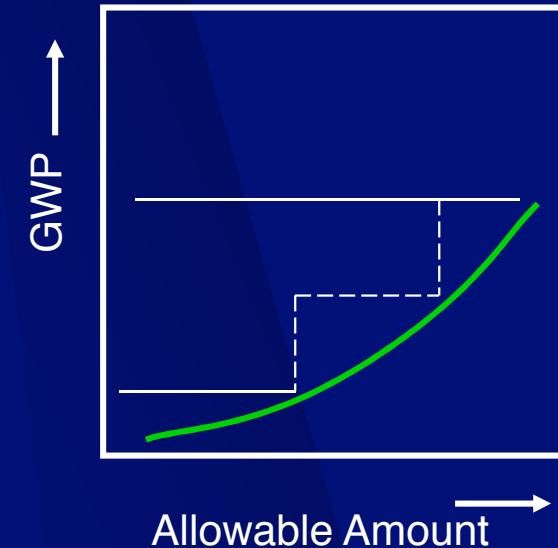
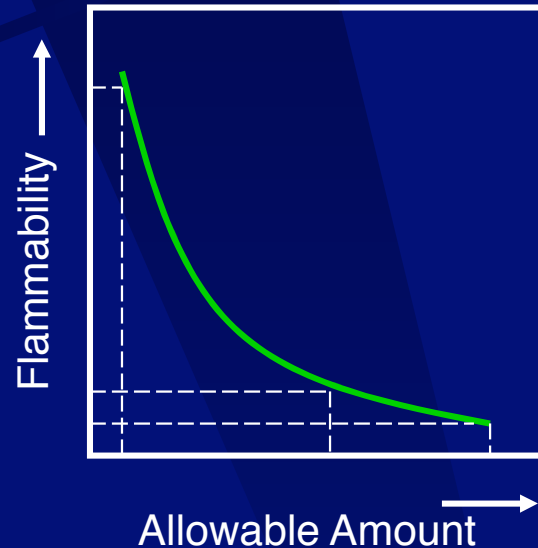
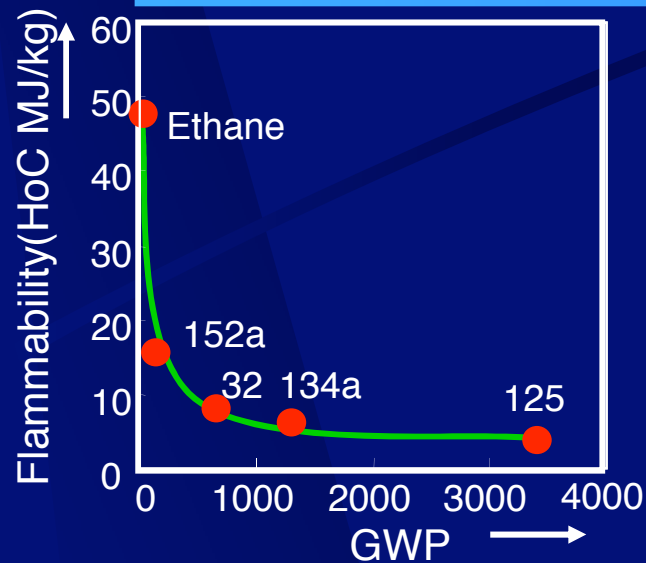
June 2013

JRAIA (The Japan Refrigeration and Air-
conditioning Industry Association)

1. Introduction

- JRAIA (Japanese Refrigeration Air conditioning Industry Association) is manufacturers association of HVAC&R industry in Japan.
- JRAIA companies have major share of many air conditioning products in the world, so we believe we are responsible for various issues of products in the world.

Low GWP Alternatives



Stable: High GWP

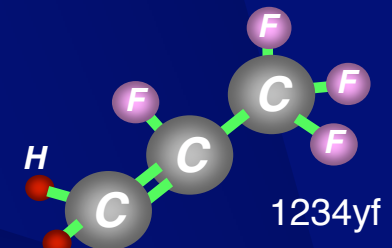
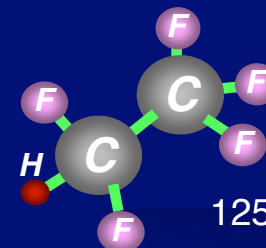
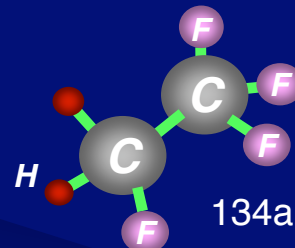
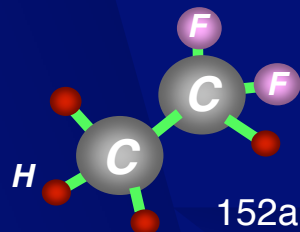
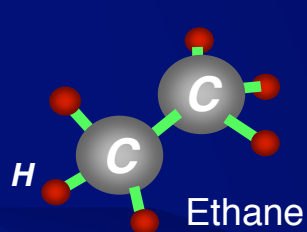
Low GWP=Less Stable → Flammable or Toxic

Risk increases as refrigerant amount increases.

Optimum refrigerant should be used, but how many kinds?

Natural refrigerants to be used where effective, but limited due to high risk.

Moderate flammability substance may reduce direct Global Warming Effect largely.



◆ Natural Refrigerant in the Market

**R600a
Refrigerator** 2002~

**NH₃
Commercial
Refrigeration** 2001~
(Special Use)

**HC, CO₂
Vending Machine** 2004~



Products with small refrigerant charge employs HC refrigerants.

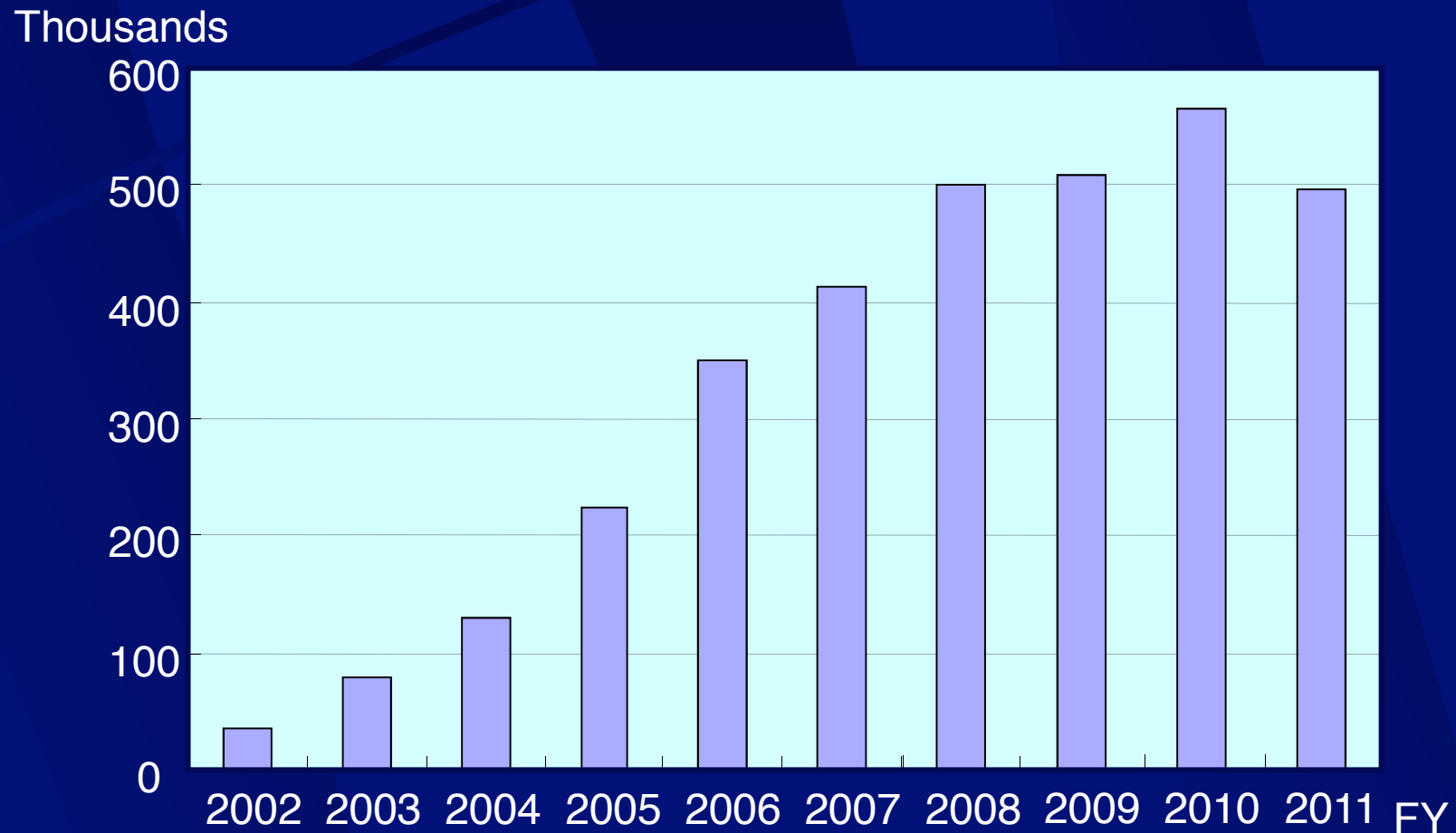
Air conditioner requires larger refrigerant amount and field refrigerant recovery, so HC refrigerant is not employed.

◆ CO₂ Heatpump Water Heater



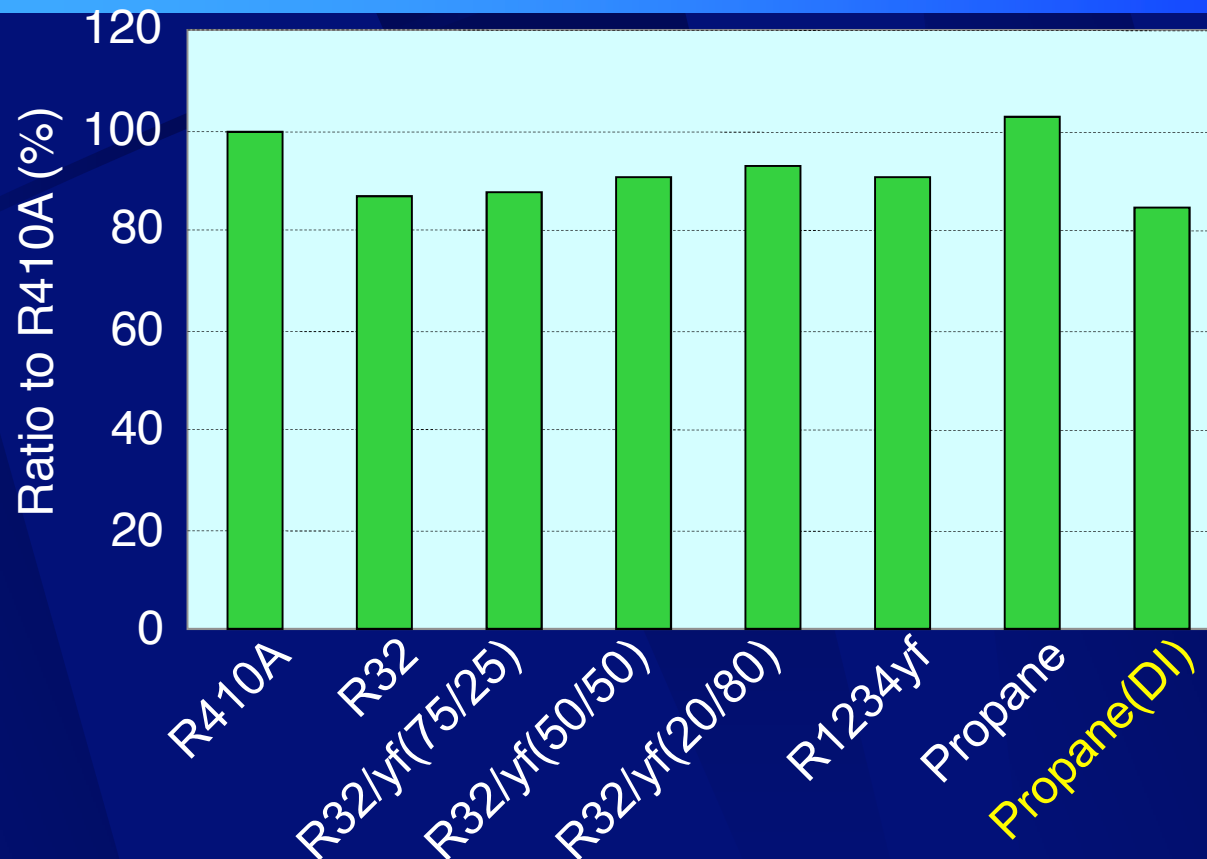
- CO₂ Heatpump Water heaters were commercialized and getting popular in Japan with government incentive.
- Heat storage system utilizes excessive mid-night electric power

Sales of CO₂ Heatpump Water Heater



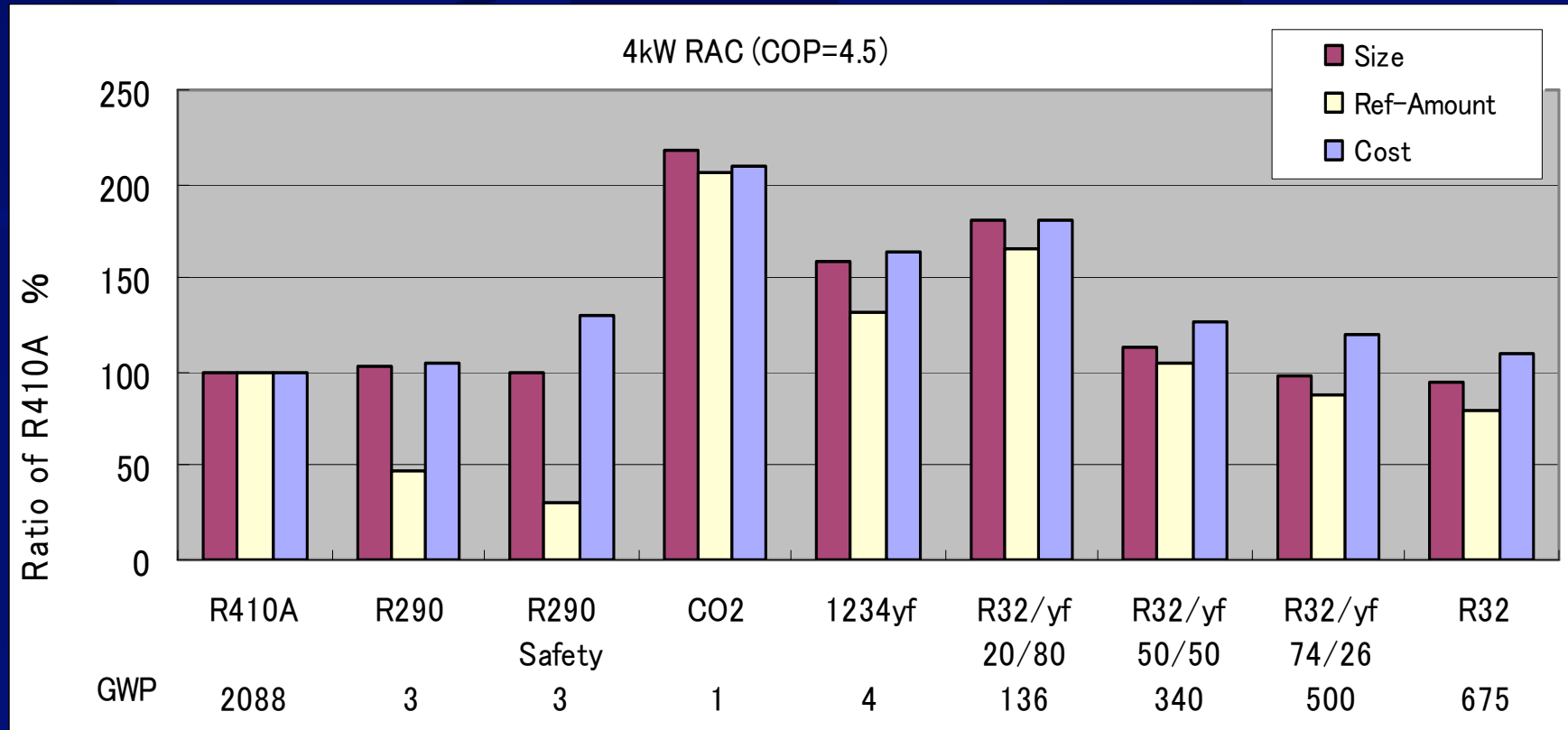
- Around half million units are sold annually.
- More than 3 million units are installed in total.

LCCP Analysis (4kW RAC EU average climate)



- Propane without safety measure is effective for climate change, but not with safety measures.
- Effect is not so different with moderate GWP refrigerants.
- Low GWP and equivalent LCCP means large energy cost.
(ca, 2000 kg-CO₂ eq≈5000 kWh ≈ \$1300 ETS=5€/t?) **JRAIA**

Comparison of alternatives



- Estimated cost of R290 with safety measures is much higher than R410A.
- Blends with GWP 500-700 do not make large cost increment.

Accident Statistics in Japan

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Fuel gas explosion	NA	38	51	77	57	48	57	64	53	45
fire	NA	NA	NA	NA	NA	NA	19	51	60	42
<hr/>										
Refrigeration Facility										
Ammonia Installation	210	257	239	NA	111	168	154	151	132	188
FC Unit sales (CU)	141,928		127,304		124,387		114,063		83,473	
		126,079		118,627		115,044		100,337		77,023
Refrigerant Fatality										
Ammonia	0	0	0	0	0	0	1	0	0	1
Fluorocarbon	0	0	0	0	0	0	0	0	0	0
Refrigerant Injury										
Ammonia	2	2	1	5	0	1	2	1	3	9
Fluorocarbon	0	3(11)	0	2(39)	0	0	3	0	0	0

- Sales of ammonia units are far less than ones with FC, but accidents with them are equivalent or higher.
- But no ignition of ammonia w/o anti-explosion system.

◆ Conclusion (JRAIA policy)

- Natural refrigerants should be used where suitable, but not effective in air cooled air conditioning application against climate change.
- Refrigerants with GWP 500-700 have the largest potential to reduce LCCP, if alternative is chosen now and cost is considered.
- (Flammability of 2L class appears acceptable. Details will be in next presentation)



End

Thank you for your attention!