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COOLING
FORUM

# Session 1

## Promotion of Natural Refrigerants in the Cooling Industry

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# Opening Remarks

## Speakers

### Mr. Ciyong Zou

**Deputy to the Director General and Managing Director**

UNIDO

### Ms. Wang Feng

**Director in the Department of Atmospheric Environment**

Ministry of Ecology and Environment, China

### Mr. Paul Krajnik

**Deputy Director in the Directorate General of the Environment and Circular Economy**

Ministry of Agriculture and Forestry, Austria

### Mr. Alessandro Giuliano Peru

**Directorate-General for European and International Affairs and Sustainable Finance**

Ministry of Environment and Energy Security, Italy

## Moderator

### Mr. Alois Mhlanga

**Director of the Climate Innovation and Montreal Protocol Division**

UNIDO

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# Technical Presentations

## Speakers

### Mr. Chen Jianming

**Senior Manager**

China Household Electrical Appliances Association

### Mr. Andreas Klaudus

**CEO and Co-Founder**

Austrian Academy of Refrigeration Technology

## Moderator

### Mr. Yunrui Zhou

**Industrial Development Officer**

UNIDO

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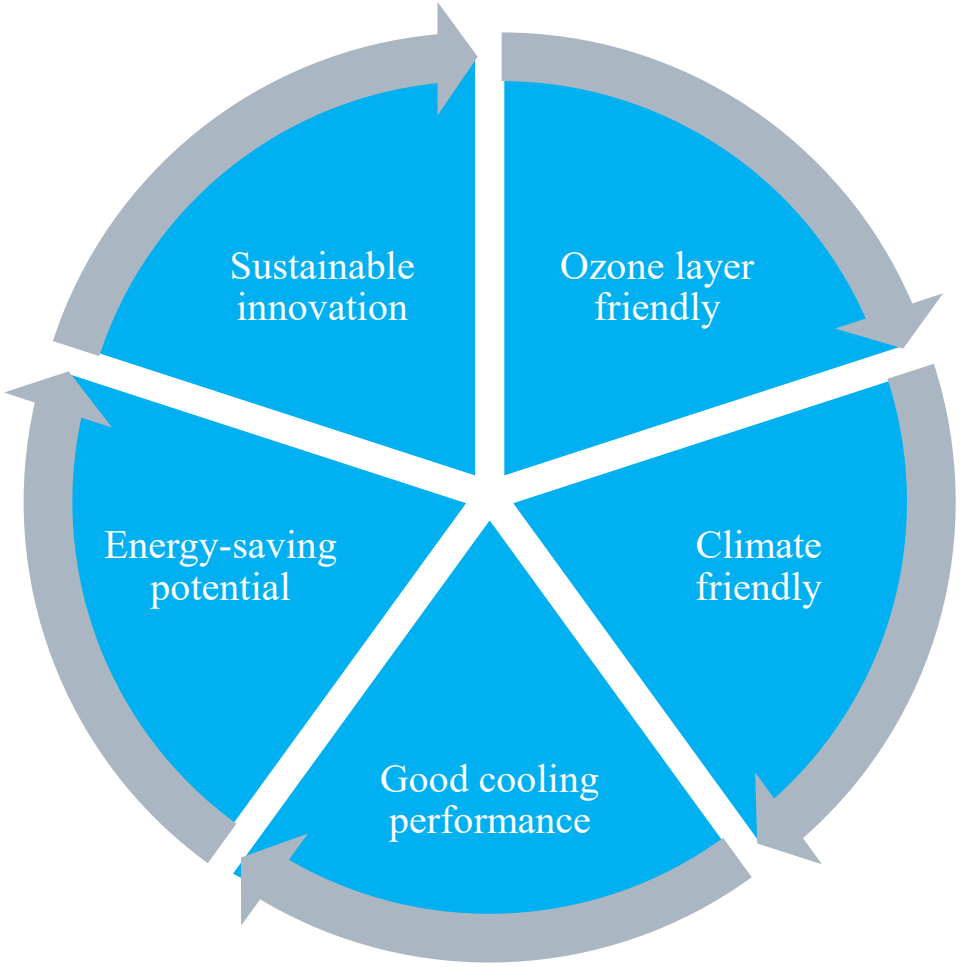
# Standards and Industrial Transformation for the Adoption of Natural Refrigerants in Chinese RAC Sector

中国家用电器协会
China Household Electrical Appliances Association

# SESSION 1: R290 - Green sustainable cooling solution recommended by Chinese RAC sector

- Chinese RAC sector, for the compliance with the Montreal Protocol and the sustainable development of the industry, has chosen R290 as alternative to HCFC-22 and HFCs. With ultra-low GWP and good energy-saving potential, R290 turns out a green and sustainable cooling solution, which will contribute to continuous GHG emission reduction of RAC sector and collaborative innovation of the industrial chain.

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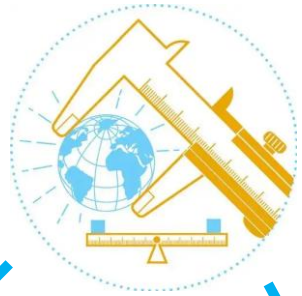
# SESSION 2: Standards-Provide specifications and guidance to R290 adoption



Development and revision of industrial standards covering manufacturing, installation and servicing as well as short-distance and long-distance transportation of R290 RACs.

Revision of EE standard GB 21455-2019 (under revision).


ICS 27.010
F 01

GB

中华人民共和国国家标准

GB 21455—2019

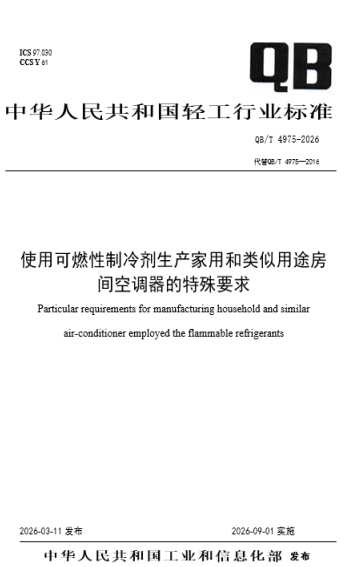
代替 GB 12021.3—2010,GB 21455—2013

房间空气调节器能效限定值及能效等级

Minimum allowable values of the energy efficiency and energy efficiency grades for room air conditioners

2019-12-31 发布　　2020-07-01 实施

国家市场监督管理总局
国家标准化管理委员会　发布


ICS 97.030
CCS Y 61

QB

中华人民共和国轻工行业标准

QB/T 4975—2026

代替QB/T 4975—2016

使用可燃性制冷剂生产家用和类似用途房间空调器的特殊要求

Particular requirements for manufacturing household and similar air-conditioner employed the flammable refrigerants

2026-03-11 发布　　2026-09-01 实施

中华人民共和国工业和信息化部　发布


ICS 97.030
CCS Y 61

QB

中华人民共和国轻工行业标准

QB/T 4835—2026

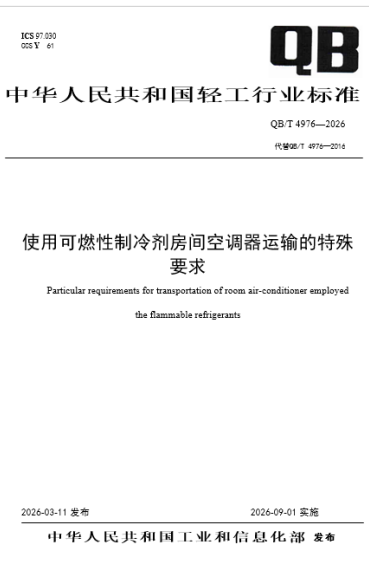
代替QB/T 4835—2016

使用可燃性制冷剂房间空调器安装、维修和运输的特殊要求

Particular requirements for installation, repair and transportation of room air-conditioner employed the flammable refrigerants

2026-03-11 发布　　2026-09-01 实施

中华人民共和国工业和信息化部　发布


ICS 97.030
CCS Y 61

QB

中华人民共和国轻工行业标准

QB/T 4976—2026

代替QB/T 4976—2016

使用可燃性制冷剂房间空调器运输的特殊要求

Particular requirements for transportation of room air-conditioner employed the flammable refrigerants

2026-03-11 发布　　2026-09-01 实施

中华人民共和国工业和信息化部　发布


ICS 13.120
CCS K 09

GB

中华人民共和国国家标准

GB/T 4706.32—2024/IEC 60335-2-40:2022

代替 GB 4706.32—2012

家用和类似用途电器的安全　第32部分：热泵、空调器和除湿机的特殊要求

Safety of household and similar electrical appliances—Part 32: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers

(IEC 60335-2-40:2022, Household and similar electrical appliances—Safety—Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers, IDT)

2024-07-24 发布　　2026-08-01 实施

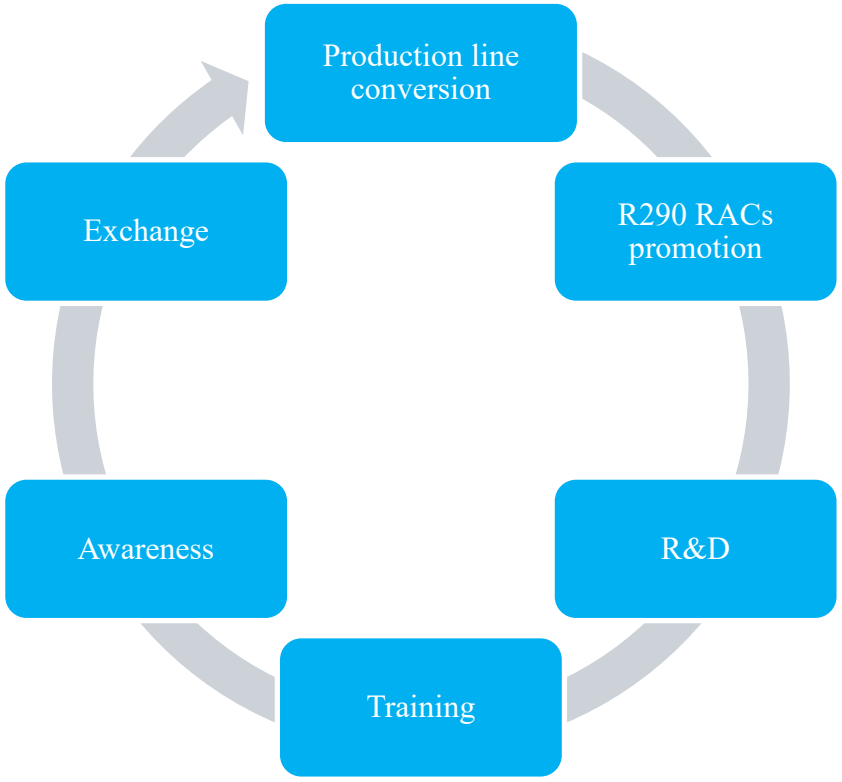
国家市场监督管理总局
国家标准化管理委员会　发布

Revision of safety standard GB/T 4706.32-2024 for RAC products, which adopts the 7.0th edition of IEC 60335-2-40 by equivalent.

# SESSION 3: Industrial transformation – Actions taken by Chinese RAC sector to promote R290

30 RAC and 7 compressor production lines converted

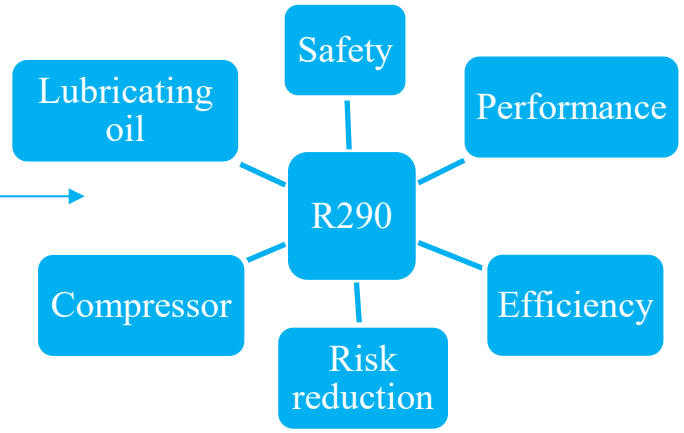
Midea Haier Hisense AUX 奥克斯 TCL GREE 格力 CHANGHONG 长虹 YAIR 扬子空调
GMCC & Welling HIGHLY 海立 中航机电三洋 AVIC EM SANYO 庆安制冷 QINGAN REFRIGERATION LAMDA




More than 10 million R290 RACs produced and sold

800,000+split R290 RACs installed in Chinese domestic market

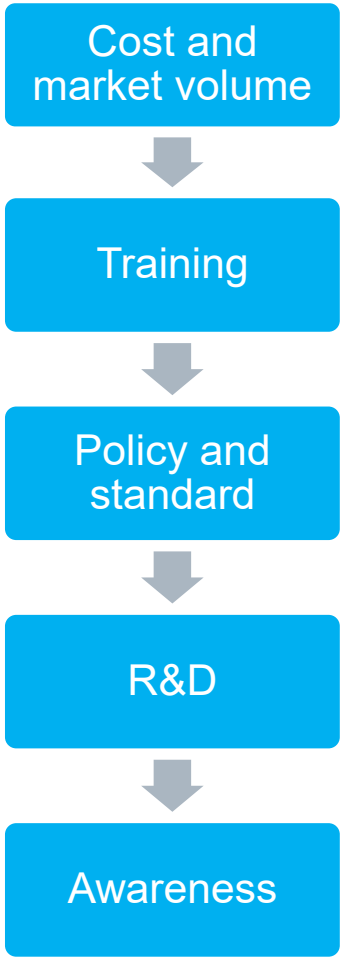
450,000+ split units of Grade 1 EE





# **SESSION 4:** Challenges and tasks

- The No.1 challenge is the higher cost of R290 RACs caused by safety enhancing measures applied and small production volume. It is the key task of the industry to scale up the market volume to average down the cost of R290 RACs.
- More training for servicing technicians is needed, which plays an essential role in the promotion of split R290 RACs, as main risk points of R290 RACs lie in installation and servicing processes .
- Coordination between policies and standards of different countries is necessary to clear the way for the adoption of R290 RACs worldwide and expand the environmental benefits of R290.
- More investment in R&D is indispensable to decrease the cost and improve energy efficiency to accelerate the adoption of R290 RACs.
- Joint efforts to increase stakeholders and consumer awareness will be helpful for the promotion of R290 RACs.



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# Thank you

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Österreichische
Akademie der
KÄLTETECHNIK

# UNIDO's approach

Shaping markets through policies

## European Best Practices in Scaling the Adoption of Nature Refrigerants

Andreas Klaudus
*Austrian Refrigeration Academy*

# A brief introduction to the Austrian Assoziation of Refrigeration (ÖGKT) and Austrian Academy of Refrigeration Technology

"We are the independent network of everyone interested in refrigeration, air conditioning and heat pump technology"

Österreichische Gesellschaft der KÄLTETECHNIK

2021

Österreichische Akademie der KÄLTETECHNIK

AREA

CEN/TC 182
"Refrigerating systems, safety and environmental requirements"

CEN/TC 182/WG 6 "Revision of EN 378"

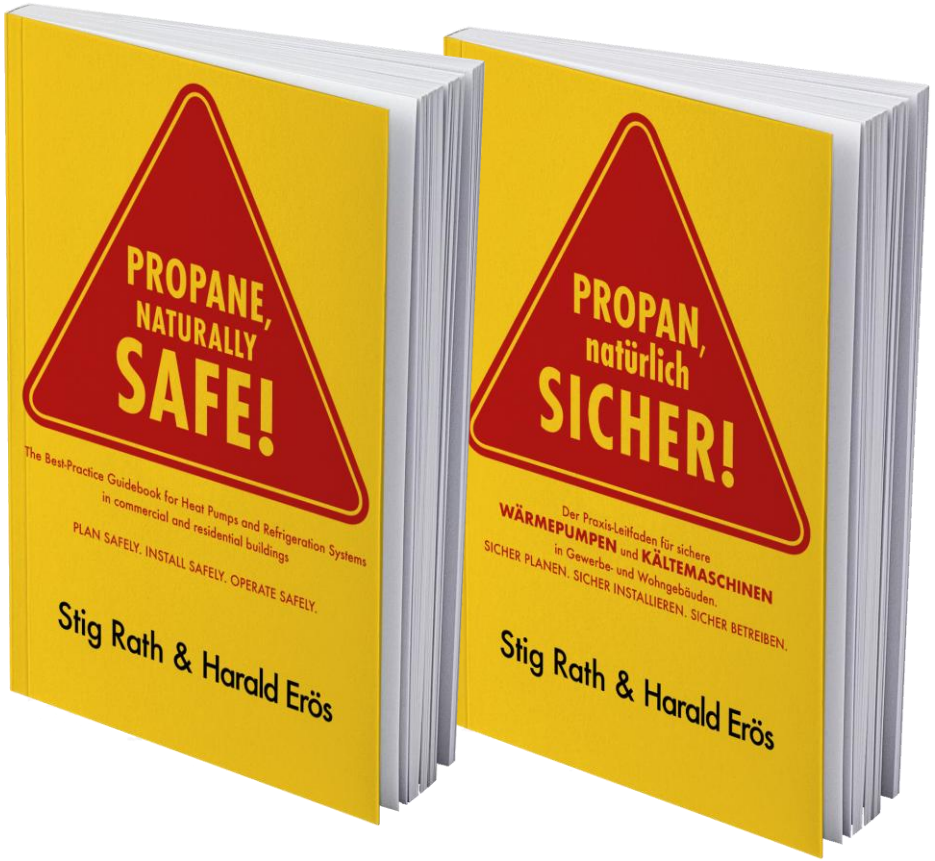
AUSTRIAN STANDARDS

IEA HPT Annex 64

Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie

IEA Forschungskooperation

FFG


New since January 2026 also in English

# Apprenticeship training

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# Specialization Training for R-290

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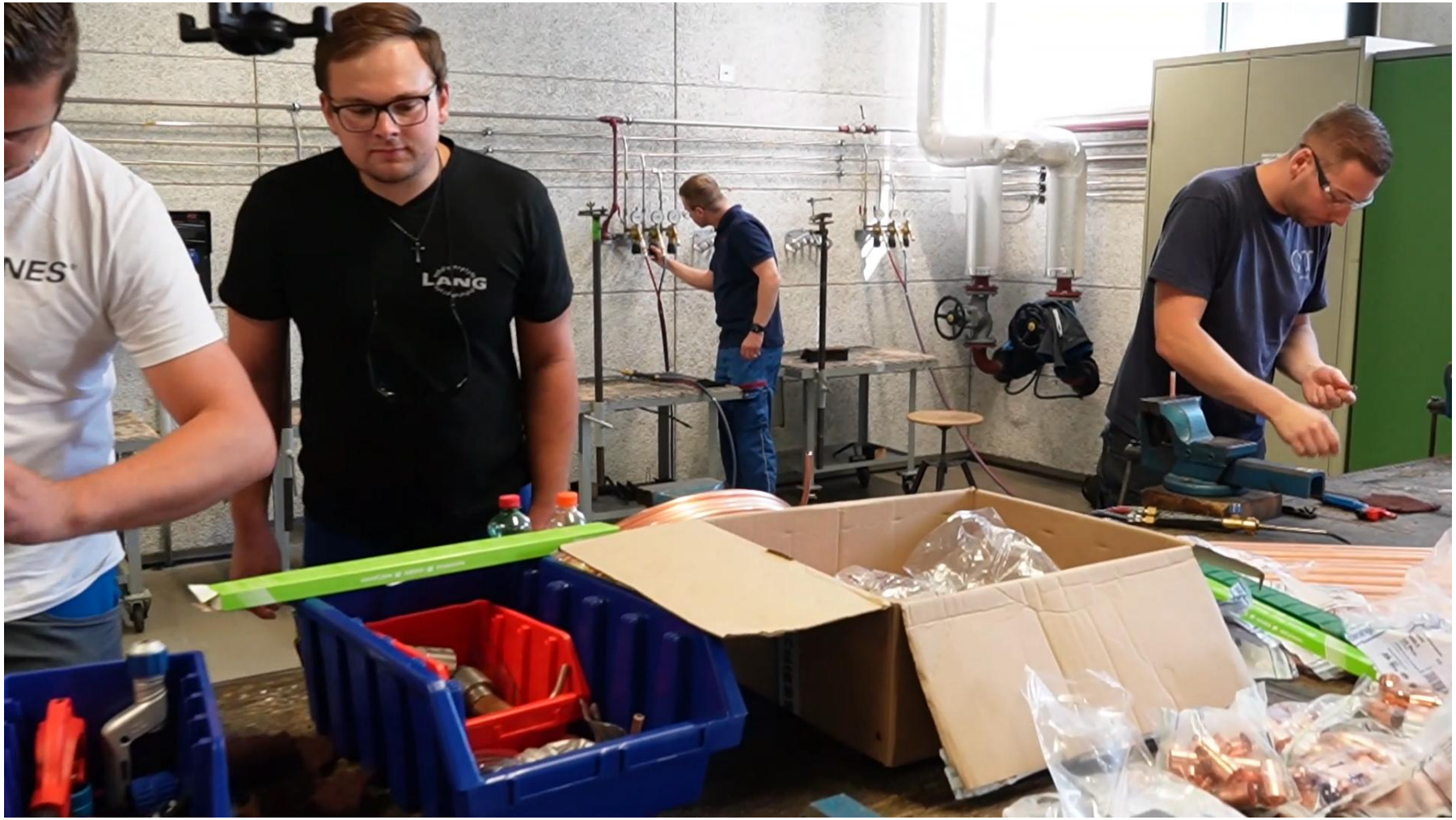
# Specialization Training for R-744

# Brazing training and certification



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# Refrigeration Masterclass

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# Thank you

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CEO and Cofounder
Austrian Refrigeration Academy
office@kaelte-akademie.at

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# Panel Discussion

Scaling up Natural Refrigerants: Challenges, Opportunities and Enabling Conditions

## Speakers

### Mr. Xiaoyan Li

**Senior Program Manager**

Ministry of Ecology and Environment, China

### Mr. Harald Eroes

**CEO and Co-Founder**

Austrian Academy of Refrigeration Technology

### Mr. Alfonso William Mauro

**Refrigeration and Heat Pumps Professor**

Federico II University of Naples

### Mr. Baolong Wang

**Professor at the Department of Architecture**

Tsinghua University

## Moderator

### Mr. Yunrui Zhou

**Industrial Development Officer**

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# Industry Case Studies

## Speakers

### Mr. Gao Hao

**R290 RAC Development Manager**

Midea

### Ms. Ju Chengcheng

**Deputy Director**

Moon-Tech

### Mr. Ren Tao

**Director**

Haier

## Moderator

### Mr. Yunrui Zhou

**Industrial Development Officer**

UNIDO

# Innovation and Commercialization of Midea R290 RAC for the Implementation of the Kigali Amendment

Hao Gao | MIDEA

2026-04-09

# 1 Properties of R290 and Technological Challenges

## ☐ Properties of R290

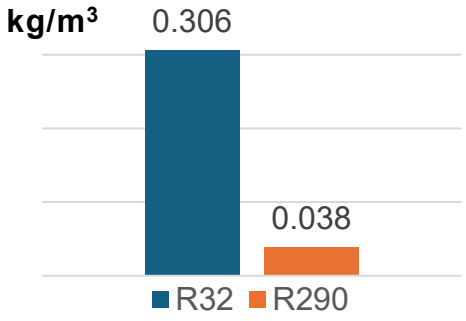
- Environmentally Friendly, High Energy Efficiency, Flammability

## ☐ Technological Challenges

### Safety

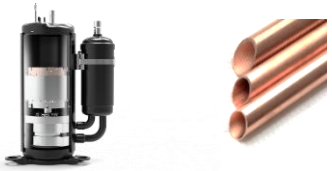
- The LFL of R290 approximately one-eighth of R32


**LFL**

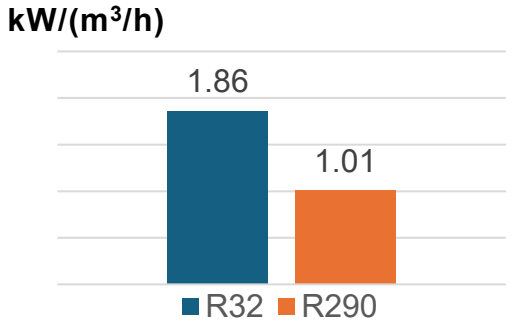



### Cost

- The specific volumetric cooling capacity of R290 is 48% of R32



**Volumetric cooling capacity**




### Reliability

- Stricter safety requirements and Verification


### Industry Chain

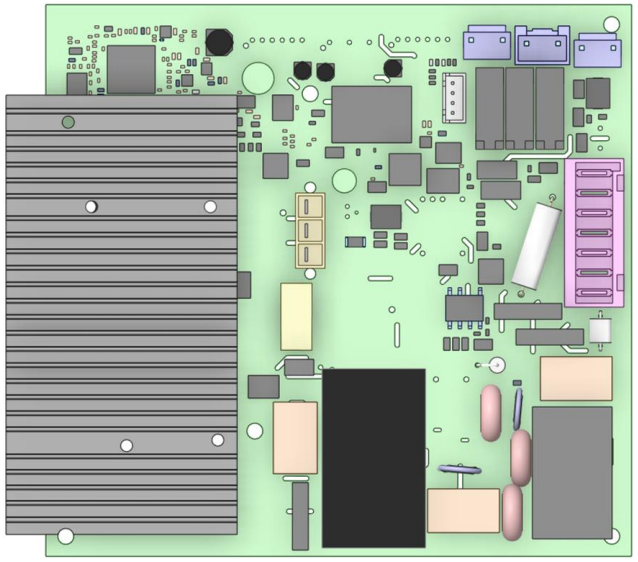
- The whole chain needs upgrading accordingly

# 2 R&D of R290 RAC

## ☐ Breakthrough of Electrical Controller

### Ignition-Source-Free

- Explosion-proof certification for some key components
- Control of the highest operating surface temperature

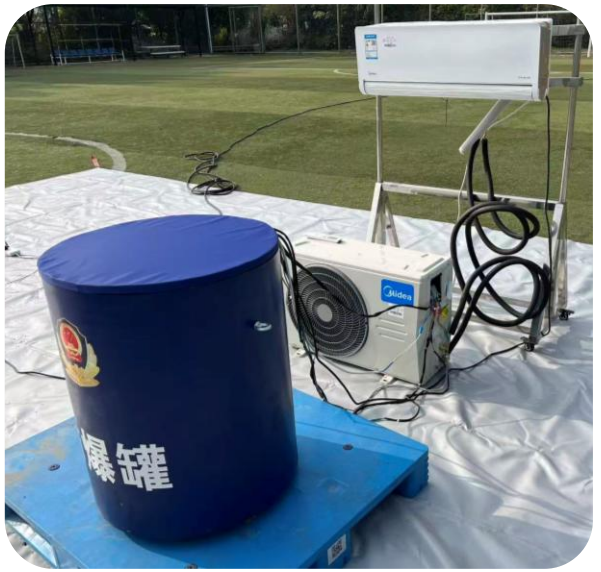


### Validation Under Extreme Environment

- An environment with 85°C and 85% RH
- Accelerated life test with 1000 hours of continuous operation


### Validation Under Flammable Conditions

- Flammable environment
- Operate safely with heavy load



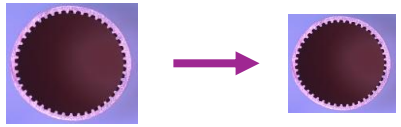
# 2 R&D of R290 RAC

## ☐ Breakthrough of Heat Exchanger

### • Smaller Diameter Tubes

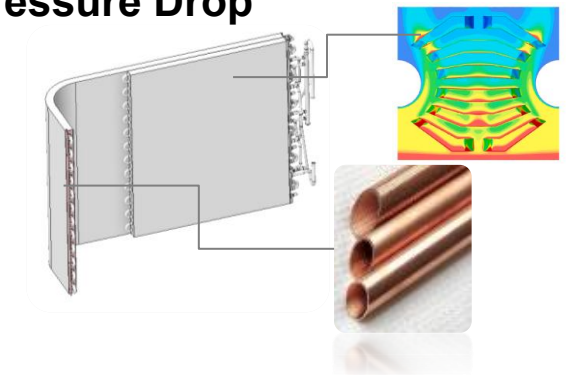
- Refrigerant charge amount reduce 49%
- Cost and Efficiency Optimization

Optimized diameter from 7 to 5 mm



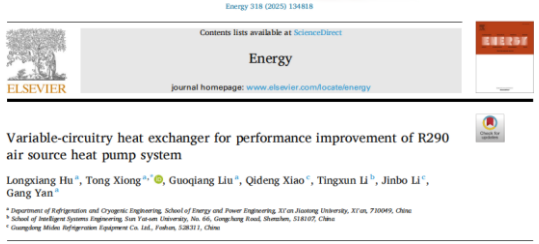
### • High Heat Transfer & Low Pressure Drop

- Efficient slit fin with quasi-radial strips
- New copper pipe with lower flow resistance and higher heat flux



### • Research Findings

- Published over 20 research papers in top-tier international journals, including *Energy* and *Applied Energy*



Energy 318 (2025) 134818

Contents lists available at ScienceDirect

Energy

journal homepage: www.elsevier.com/locate/energy

Variable-circuitry heat exchanger for performance improvement of R290 air source heat pump system

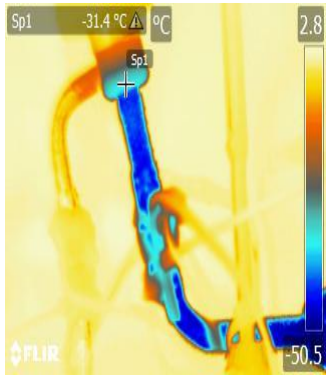
Longxiang Hu [a], Tong Xiong [a,*], Guoqiang Liu [a], Qideng Xiao [c], Tingxun Li [b], Jinbo Li [c], Gang Yan [b]

[a] Department of Refrigeration and Cryogenic Engineering, School of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an, 710049, China
[b] School of Intelligent Systems Engineering, Sun Yat-sen University, No. 66, Gongchang Road, Shenzhen, 518107, China
[c] Guangdong Midea Refrigeration Equipment Co. Ltd., Foshan, 528311, China

## ☐ Breakthrough of System Reliability

### • Oil Blockage

- Large compressor displacement
- Low refrigerant charge
- Low operating pressure

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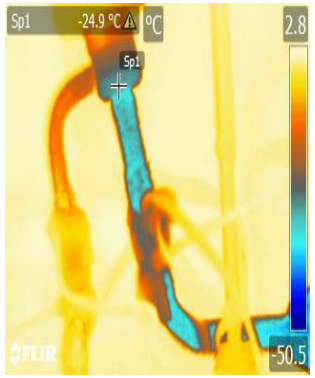


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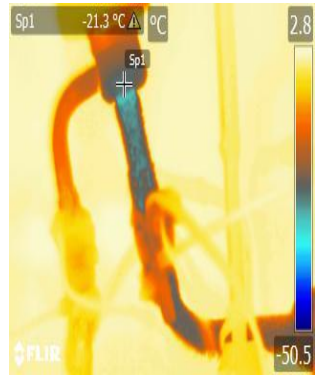
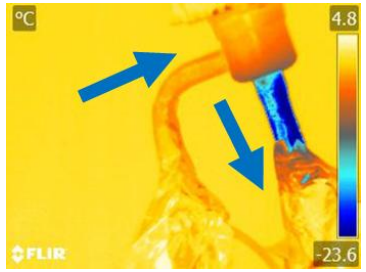



t=360s

**Temperature change of expired EEV**

### • Design Optimization

- Lower oil discharge compressor
- Higher flux EEV
- New control logic



# 3 Commercialization of R290 RAC

## ☐ Product Breakthroughs

Split Air Conditioners

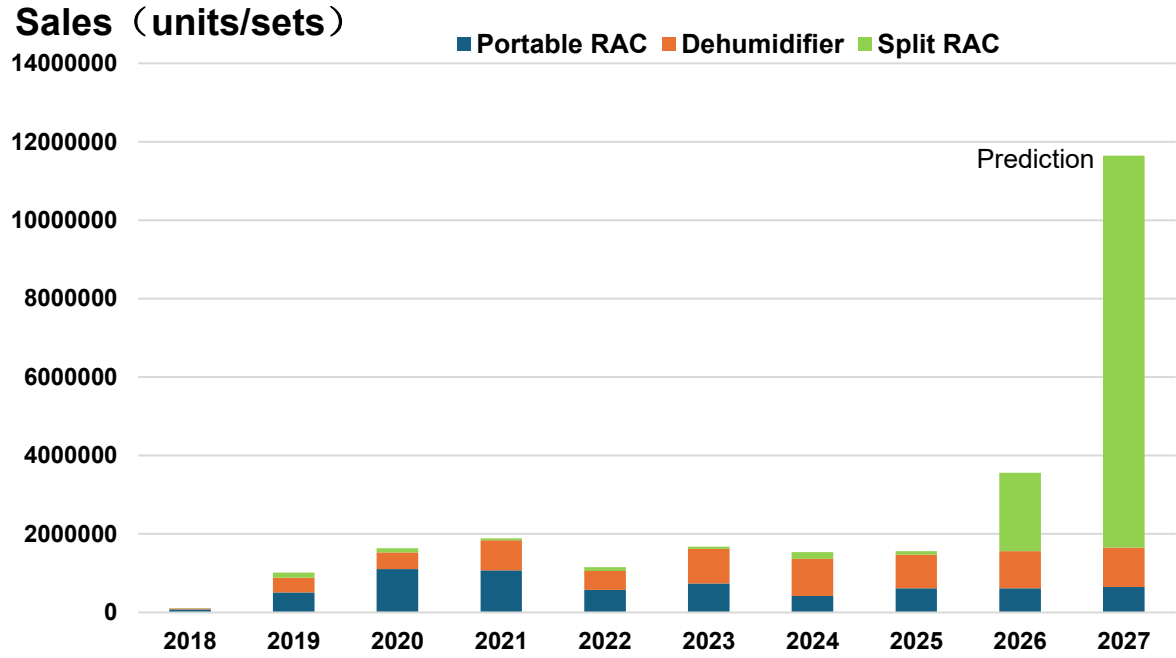
Dehumidifiers

Portable Air Conditioners

Heat Pump Water Heaters

## ☐ Market Performance

- Launched in 73 countries and regions , sales had exceeded 10 million units
- Refrigerant replacement has reduced greenhouse gas emissions by approximately 5.11 million $tCO_2e$, equivalent to the annual carbon sequestration of 6.06 million hectares of Amazon rainforest



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# 3 Commercialization of R290 RAC

## ☐ Production Line Upgrade

- A total of 13 production lines have been upgraded, capable of an annual production capacity of 7 million units



## ☐ After-sales Capability Building

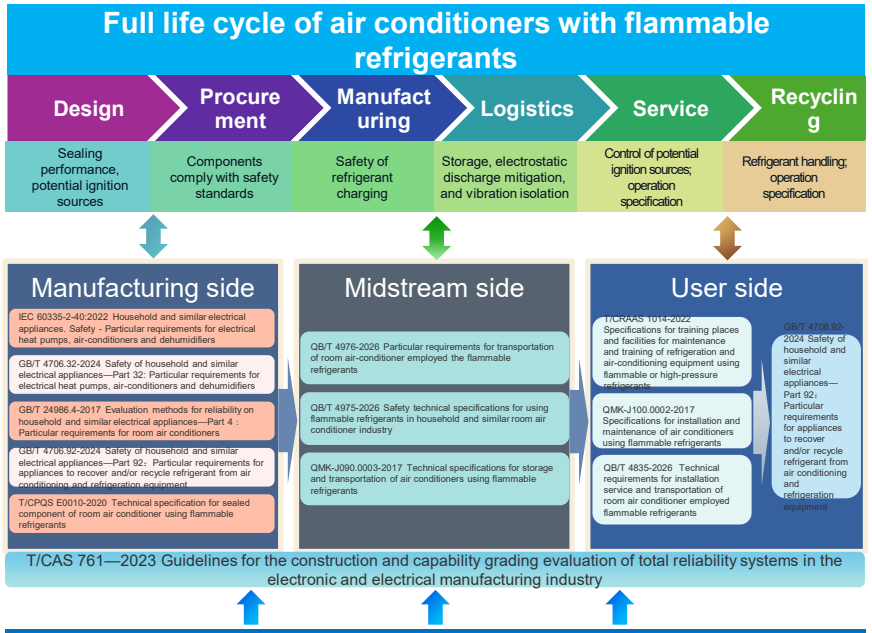
- Midea have carried out a special training program for R290 installation and maintenance, with over 100,000 personnel trained nationwide





## ☐ Standards System Construction

- Midea have built core reliability standards covering the entire life cycle and whole industrial chain of flammable refrigerant air conditioners, forming a complete industrialization standard system



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**2011**
Launched R290 Compressor Line

**2013**
3C Certificate

**2015**
Midea R290 Portable Air Conditioner launched EU

**2016**
R290 application demonstration base

**2017**
Montreal Protocol 30-year Outstanding Contributor

**2018**

Blue Angel certification(AB series)

**2019**
UNEP Low-carbon & Eco-friendly Technology Leadership Award

**2020**
UNIDO Certificate of Outstanding Contribution Award

**2021**
Blue Angel Certificate(AG series)

**2022**
Launched 1st Class Eff R290 RAC

**2023**
Blue Angel Certificate(AF series)

**2024**
EUROMONITOR INTERNATIONAL
Awarded by Euromonitor International, **Midea is the World's No.1 R290 Air Conditioner Company**

**2025**
Sales exceeding 10 million units

**Challenge** **Responsibility** **Collaboration** **Green Tomorrow**

# Thank you

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R290 RAC Manager
Midea Residential Air Conditioner(RAC) Division
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Haier

# Technology and application of Alternative Eco-friendly Refrigerant and Energy efficiency improvement in room and commercial Air conditioners

Tao Ren, Ph.D, Haier Smart Home Co. Ltd

The author is RTOC Member, *this presentation is given in my personal capacity*

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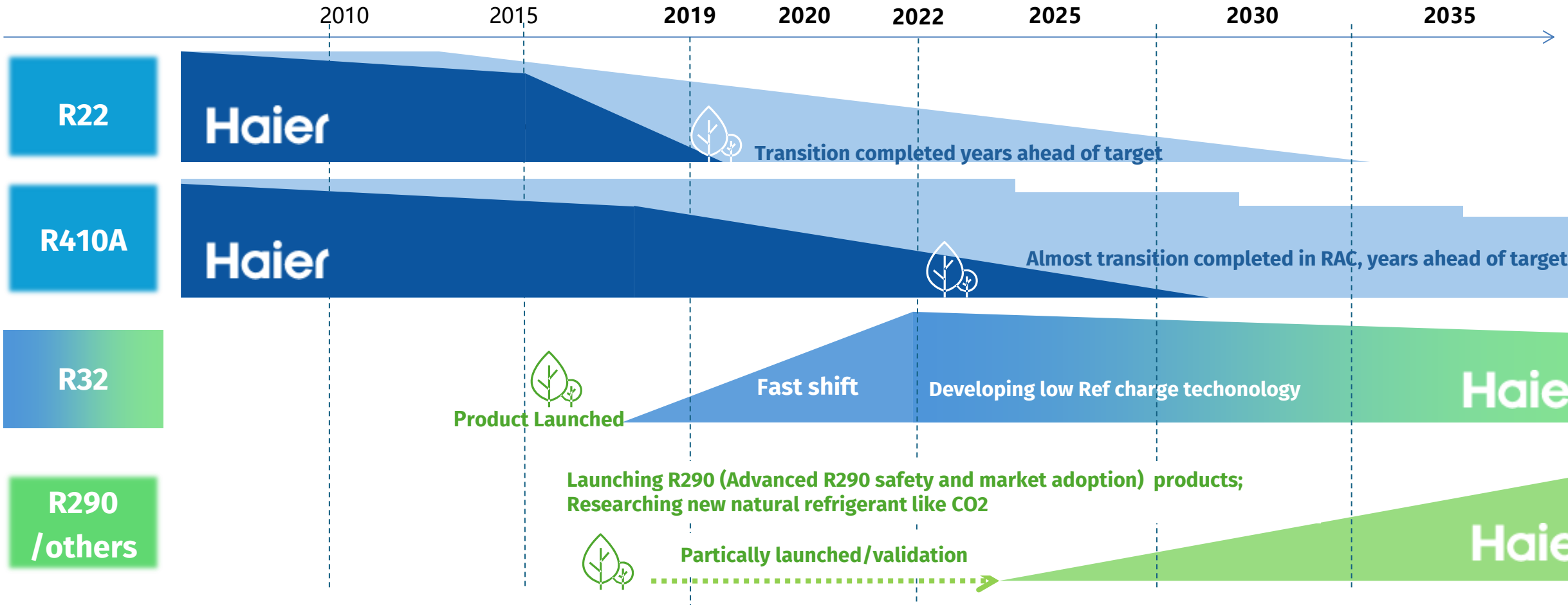
# Haier's Journey in Refrigerant Transformation

Achieved significant GWP emission reductions since 2019
Drove charge reduction techinics: small diameter cooper tubes HX, and microchannel HX
R290 promotion& developing CO2 Air conditioning technologies



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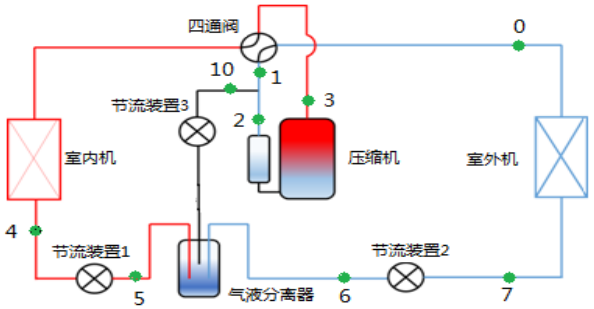
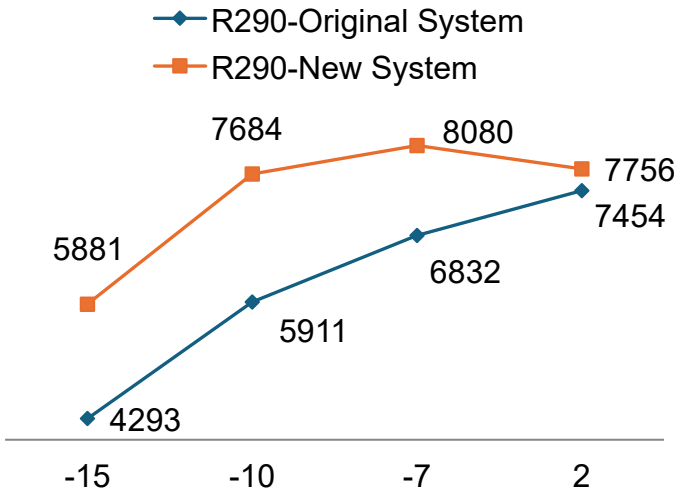
# R290 Residential AC: Technology Development and Deployment

## New type of dynamic air replenishment and enthalpy increasing cycle

- low insulationc index
- low-temperature heating capacity




External ambient temperature℃

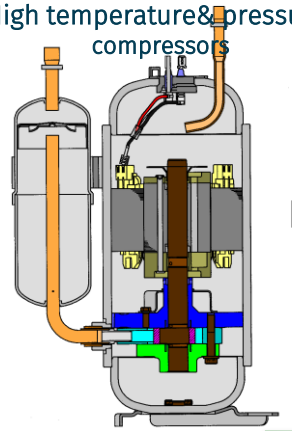


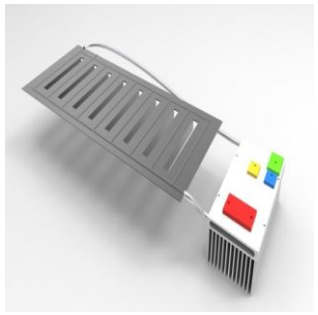

## Chip cooling scheme using heat pipe heat exchange

- High critical temperature &high-temperature performance

High temperature&pressure compressors

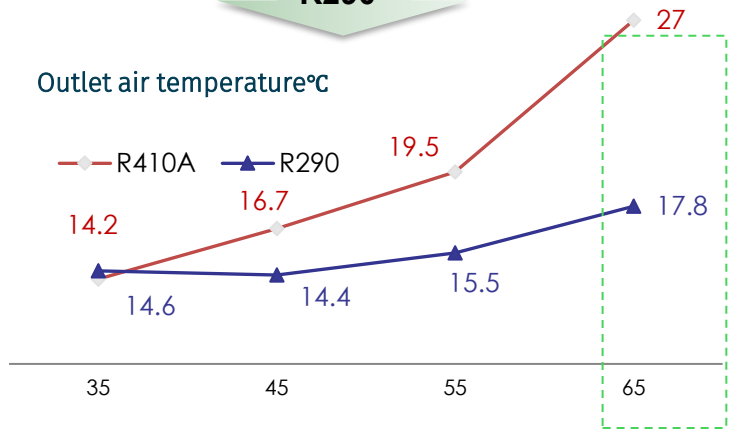
Heat pipes for heat dissipation of chips and IGBTs





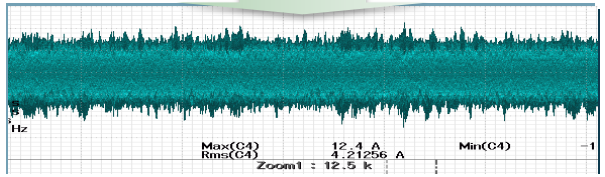
R290

Outlet air temperature℃

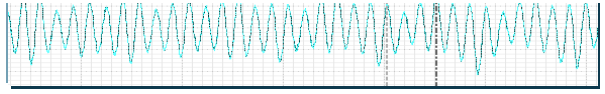


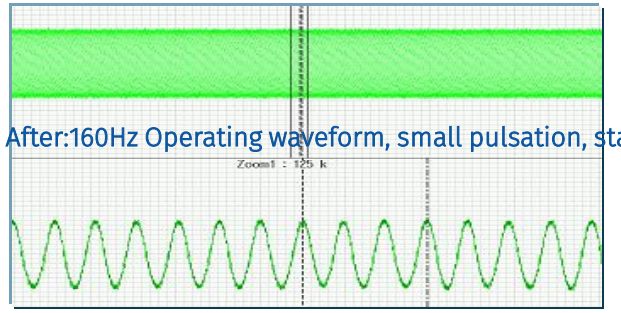

## Deep weak magnetic suppression of voltage pulsation technology

- low cooling capacity per unit volume

Before:High speed pulsation : large and unstable





After:160Hz Operating waveform, small pulsation, stable

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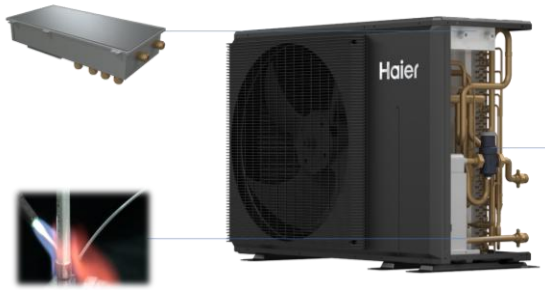
# R290: Safety Advocacy and Market Growth:

R290 Power Series New

**+Safety Control**
Fully sealed control cabinet
**+Explosion-proof electric control design**

**+Safety:**Silver brazing welding

**-Leak:**Reduce welding joints and advanced welding technology

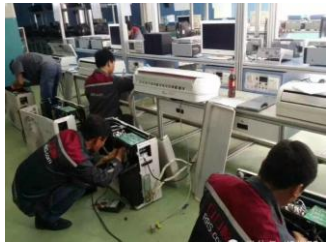



**+Safety :Refrigerant sensor**
Refrigerant leak detection for enhanced safety

## 8+Refrigerant Leak Prevention and Safety Design

## Professional Safety Training:

Refrigerant Handling/InstallationAccumulated Training of 3,000 R290 Service Personnel



## Market Growth: 60+ R290 Products Launched, 186,000 Units Sold In China

Fixed Frequency:KF serials

Variable Frequency:KFR serials

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# Refrigerant Transition in Commercial AC: R32 to R290 In Heat Pump

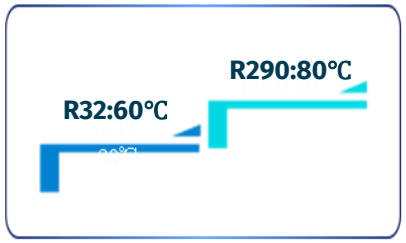
## Energy efficiency
increases around 10%, compared to R32

| R290 Heat pump (6 kW) | R32 Heat pump (6 kW) |
|---|---|
| COP 3.5 (55℃) | COP 3.02 (55℃) |
| SCOP 3.85 (55℃) | SCOP 3.52 (55℃) |

With the help of
high efficiency compressor, main HX, and heat recovery HX,

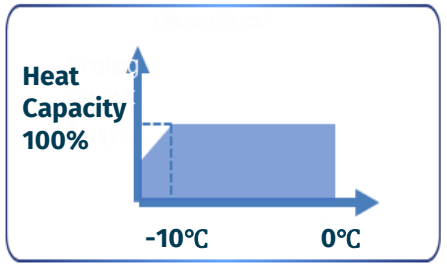

## Confort:

### High temp water
Max.Leaving water temp 80℃

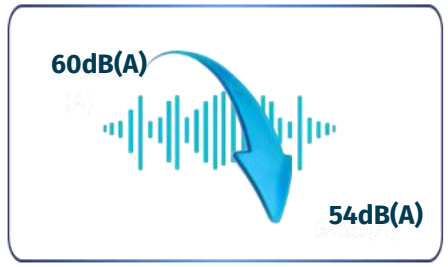



### Wide operating range
Heating at -28℃


### Low temp heating
-10℃ nominal capacity output




### Lowsound level
Sound power level down to 54dB(A)



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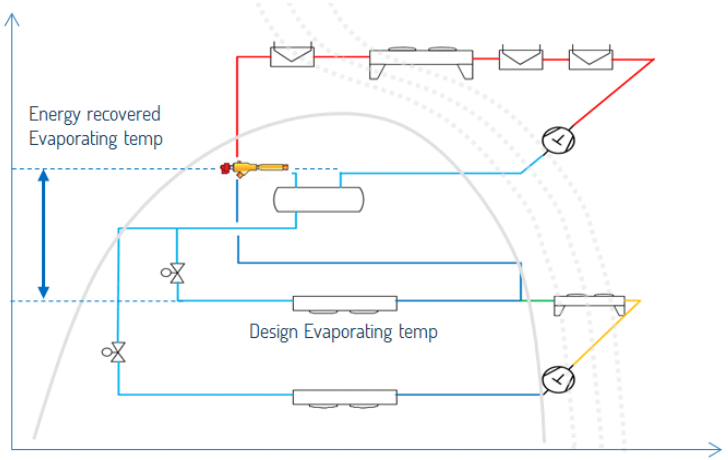
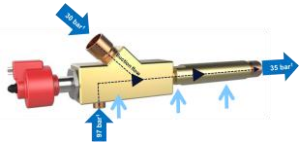
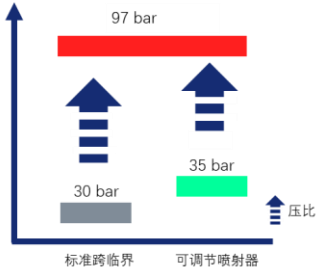
# Refrigerant Transition in Commercial Application: CO2 Technologies and Applications

## CO2 Cooling Technologies



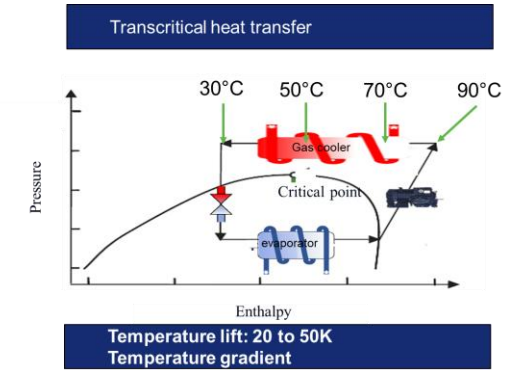






## Commercial Heating and Cooling


Heating： Air-terminal:20℃ILiving Area:18℃
Cooling：Air-terminal:25℃I Living Area:25℃
Hot water system：77℃/44℃I75℃/50℃
Chilled water system: 5℃/13℃


**CO2 system annual energy saving ~ 28% compared to HFC ***
**CO2 energy saving around 2 million kWh of electricity per yea**

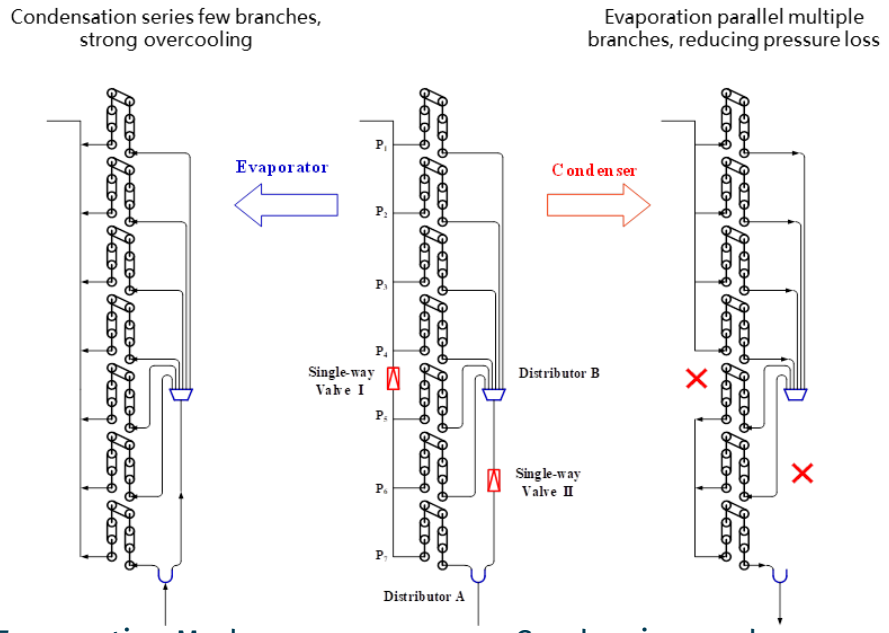

**Annual Combined heating and cooling energy saving: 5Million kWh >50%**

**Multi-Temperature Heat Recovery up to 85°C**
Gradient heat recovery (35-85°C)/ gas cooler pressure modulation.
40% + heat recovery capacity VS HFC/HFO and NH3 systems

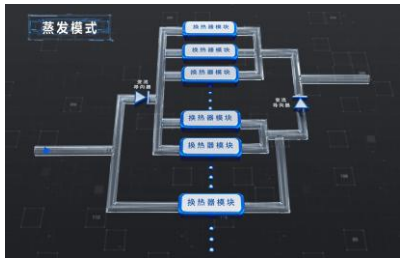
**Annual reduction of carbon emissions 5,500t**
**>90%** Near-zero carbon'emissions.

# Energy Efficiency Enhancement Technology:Variable flow path

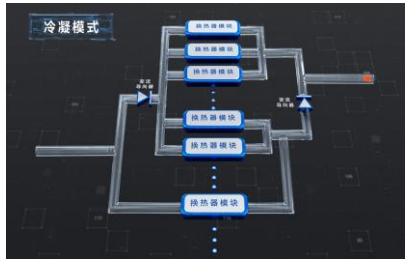

Solve the contradiction of reverse demand for condensation and evaporation convection paths, and achieve synchronous efficiency enhancement of condensation and evaporation



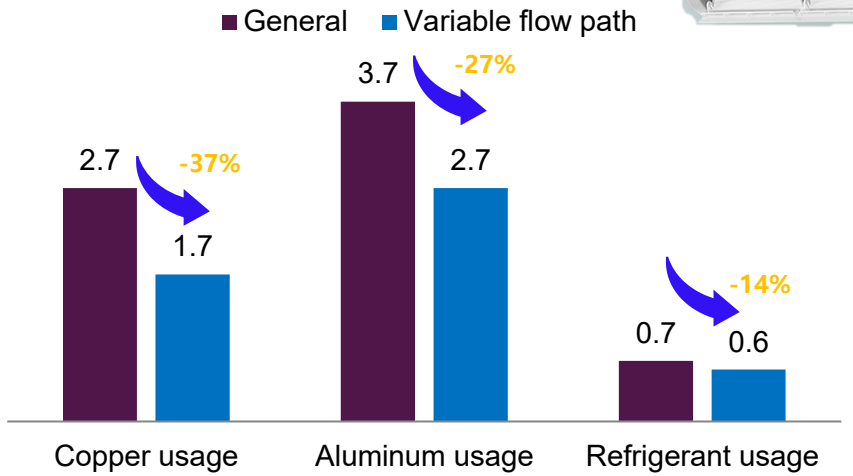

Evaporating Mode



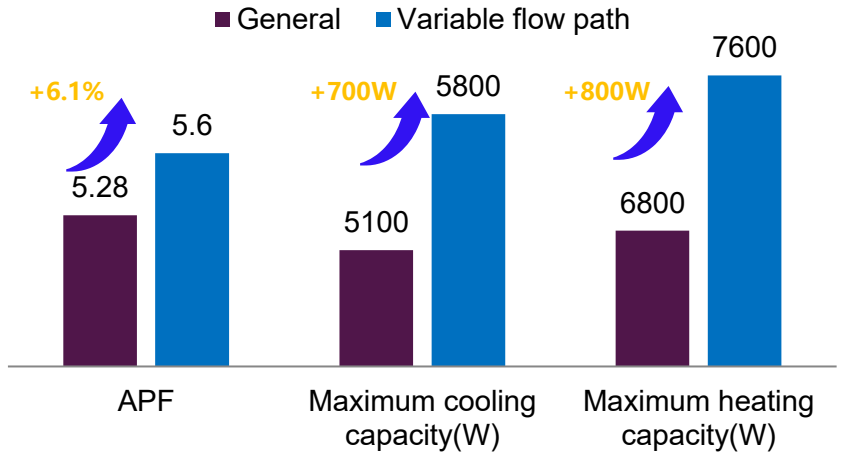

Condensing mode



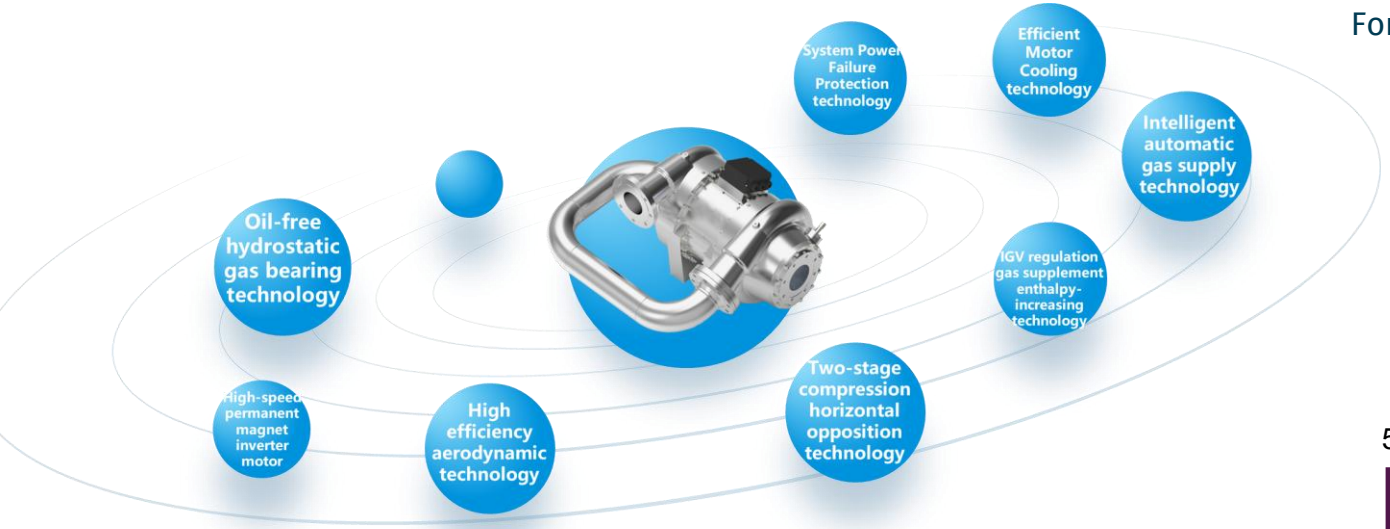

With the same energy efficiency

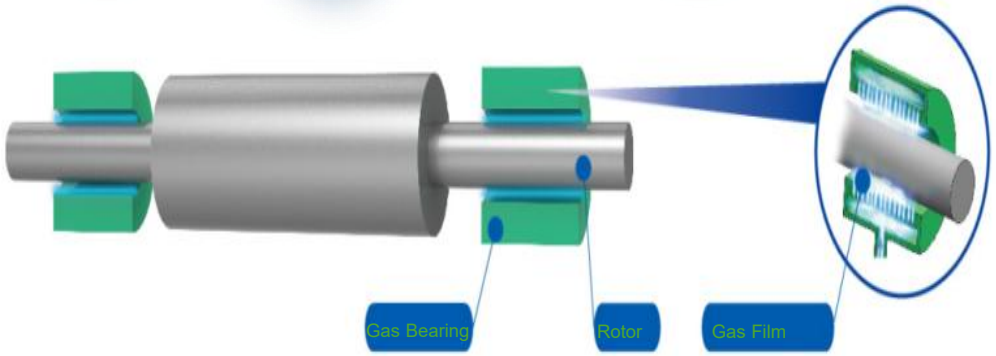



With the same cost



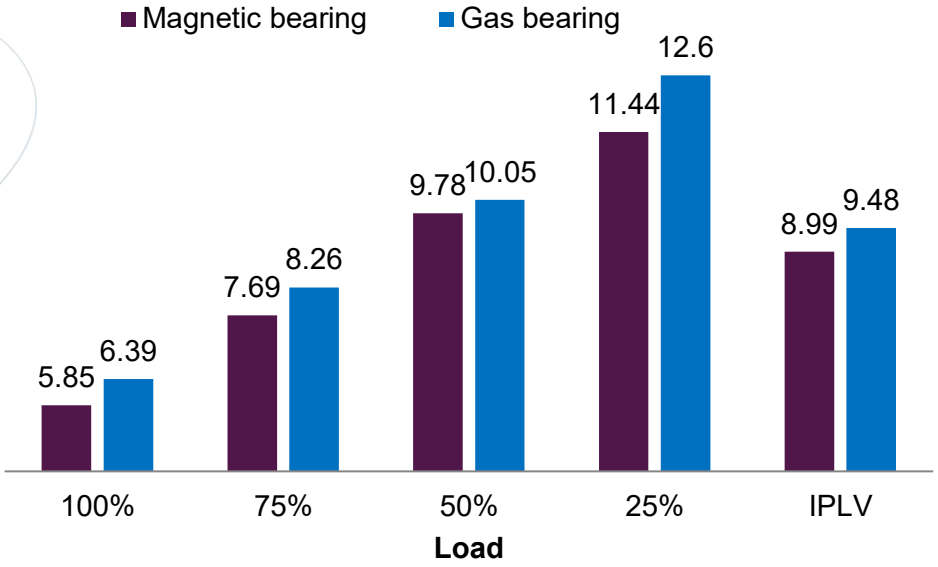
# Energy-Efficient Technologies: Gas Bearing Solutions




The compressor utilizes gas to generate buoyancy force to realize rotor suspension and self-adjustment, which greatly simplifies the suspension mechanism and control algorithms compared to magnetic bearing compressors.

For the 700RT unit, energy efficiency improves by 9.23% in COP and 5.45% in IPLV.

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# The Promotion of Natural Refrigerants in China's Industrial and Commercial Refrigeration

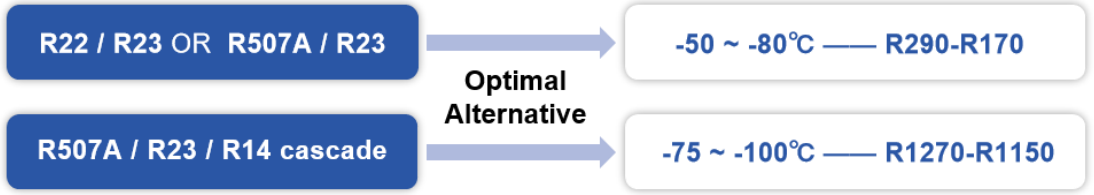
JU Chengcheng
MOON-TECH

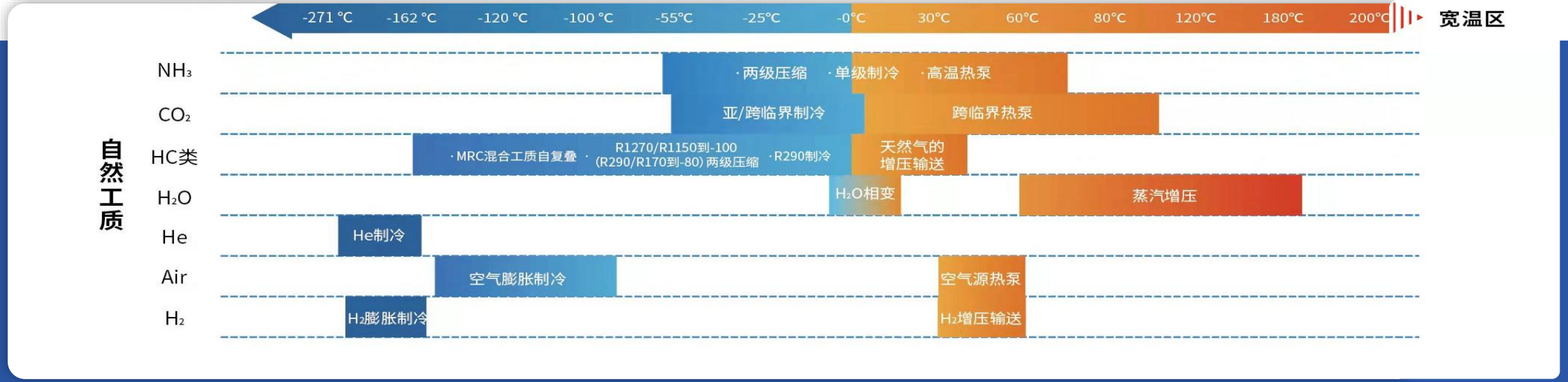
冰轮环境
MOON-TECH

# SESSION 1: Progress on the Natural Refrigerant Technology Roadmap

- $NH_3/CO_2$ Cascade Refrigeration Technologies
  - Cold Chain and Commercial Freezing Applications
  - Freon Replacement Above -50℃
  - Low Charge & Safe, High Efficiency, Eco-Friendly, Smart O&M


- HCs Refrigeration Technologies
  - Petrochemical Industrial Refrigeration Applications
  - Freon Replacement Above -100℃
  - Readily Available Materials, Reliable Explosion-Proof Design, Eco-Friendly, Stable & Economy



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# SESSION 2: Expansion of the $NH_3/CO_2$ refrigeration system application market

Cold Chain Logistics

Guangzhou Nansha International Logistics
National Modern Grain Logistics (Wuhan) Base

Muyuan Meat Food
Fujian Sunner Holding Group

Meat Processing

Seasoned Foods Process

Rugao Agricultural
Shandong Processed Food Manufacturing

Rushan Food Group
Zhoushan Seafood

Seafood Processing

Ice Cream and Cold Drinks

Lanxi Cold Food
Hefei dairy

- ## Cold Chain Logistics

  Guangzhou Port—China's largest cold chain hub port & A benchmark engineering project for $CO_2$ refrigeration systems

  - Capacity: nearly 300,000 tons.
  - Including 3 eight-story cold storage facilities, 1 refrigerated container yard, and 1 supporting exhibition building.

- ## Meat Processing

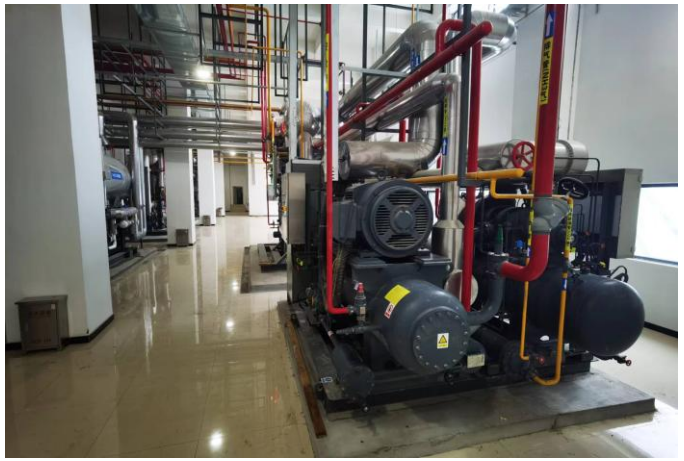
  A Project from One of the largest broiler processing companies in China

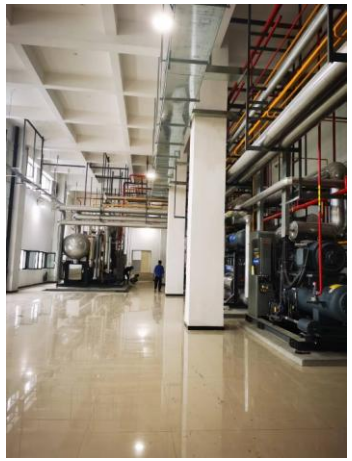
  - $NH_3/CO_2$ cascade system is adopted for the quick-freezing device, freezing room, and low-temperature cold storage.
  - Application of Frequency Conversion Technology & Intelligent System Control

# SESSION 2: Expansion of the $NH_3/CO_2$ refrigeration system application market

- Seasoned Foods Process

  A central kitchen project from a leading enterprise in the prepared meal industry
  - Committed to creating a series of "tens of millions of new products" including steamed dumplings and boiled dumplings
  - Design of low refrigerant charge system with high-efficiency plate-and-shell heat exchanger





- Seafood Processing

  HAIDU Project—China's largest single-unit $NH_3/CO_2$ refrigeration system for freezing
  - This system meets the demands of 12 single-unit seafood freezing devices and 120,000 tons of low-temperature logistics.
  - The amount of $NH_3$ refrigerant required can be reduced by 90% compared to the $NH_3$ refrigeration system. Compared to the R22 refrigeration system, it can reduce the annual amount of R22 refrigerant required by 114 tons.

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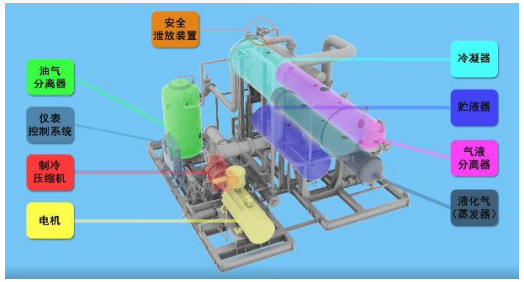
# SESSION 2: Expansion of the $NH_3/CO_2$ refrigeration system application market

- AIST Outdoor Portable Unit
  - Ultra-low refrigerant charge design with a plate-and-shell heat exchanger that incorporates a separate space, while the oil cooler and economizer utilize plate heat exchangers.
  - Outdoor portable unit with a design that does not require a separate machine room.

- Global Market — Achieves an overall energy saving of over 10%
  - A company in Thailand — $CO_2$ Cascade and Secondary Refrigerant System.
  - A cold chain project in Indonesia — Cold storage capacity: 50,000 tons, with $CO_2$ cascade and secondary refrigerant system.
  - A cold chain project in Indonesia — Cold storage capacity: 50,000 tons, with $CO_2$ cascade and secondary refrigerant system.


- CCUS — A 2,000 tons/year lithium battery new material project in Shandong Province
  - Operating Condition: -50 ℃ /+36 ℃





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# SESSION 3: Expansion of the HCs refrigeration system application market

Natural Gas Liquefaction

A Liaoning-based oil field
A Natural Gas Processing Complex in Yulin

VOCs Recovery

Vapor Recovery System for Ship Loading / Unloading Operations at the Terminal

Polysilicon

A Silane Production Facility in Henan
A Silane Production Facility in Xuzhou

- MOON-TECH has hundreds of operational cases in HCs natural refrigerant compression, HCs/$CO_2$ cascade, and HCs cascade refrigeration systems, achieving broad commercial adoption.

- VOCs Recovery
  - VOCs, referring to **Volatile Organic Compounds**, cause environmental pollution and pose hazards to human health.
  - Moon-tech's hydrocarbons refrigeration systems can be **custom-designed** for different types of VOCs, supported by integrated engineering services, which ensures stable system operation and achieves **excellent VOCs recovery efficiency**.

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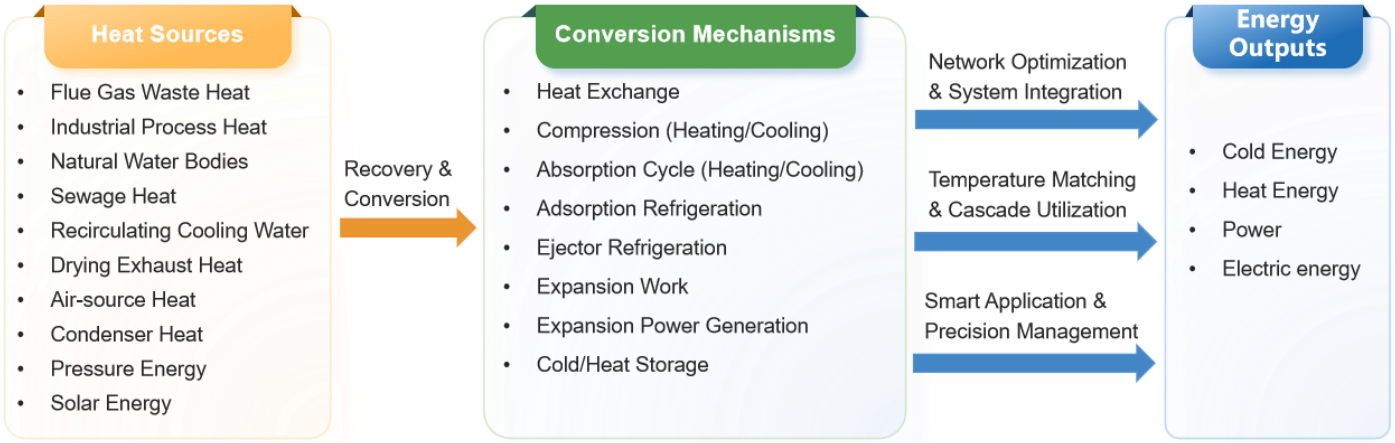
# SESSION 4: Heat Pump Based on Natural Working Fluids

- ## Roadmap for Integrated Energy Solutions




- ## Heat Pump Applied to Distillation Column

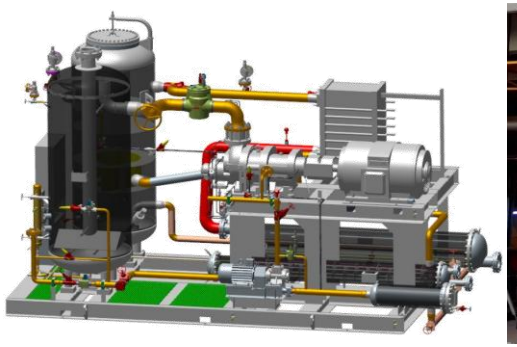
<u>Isobutane(R600A) Distillation Column Revamping Project</u>

- Using R600A as working fluid
- Recovery overhead waste heat of R600A distillation column
- Generating high-temperature R600A for bottom heating of the distillation column
- Saving 14 tons of steam per hour, achieving annual cost savings of 16 million RMB, reducing $CO_2$ emissions by 27,000 tons

- ## Heat Pump for Generating Hot Water

<u>A Project of</u> Charoen Pokphand Group in Fujian :A pig slaughtering project in Fujian Province with a capacity of 650 pigs per hour and an annual slaughtering volume of 2 million pigs.

- Using $NH_3$ as heatpump working fluid
- Recovery full condensation waste heat from refrigeraion system
- Generating hot water up to 85°C for process water
- Running for 4 years, saving 10 million RMB ,reducing 12,000 tons of $CO_2$ emissions
- Using $NH_3/CO_2$ as the refrigerant



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# Thank you

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# Questions and Answers

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# Closing Remarks


## Ms. Liazzat Rabbiosi

**Chief, Montreal Protocol Unit**

UNIDO

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Vienna Convention
MONTREAL PROTOCOL

Multilateral Fund for the Implementation of the Montreal Protocol

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## Rising to the Global Challenge

8-10 April 2026 | Vienna, Austria

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ISEC 2026

# GN SEC

# Global Network Regional Sustainable Energy Centres

Think globally. Act regionally. Implement nationally.

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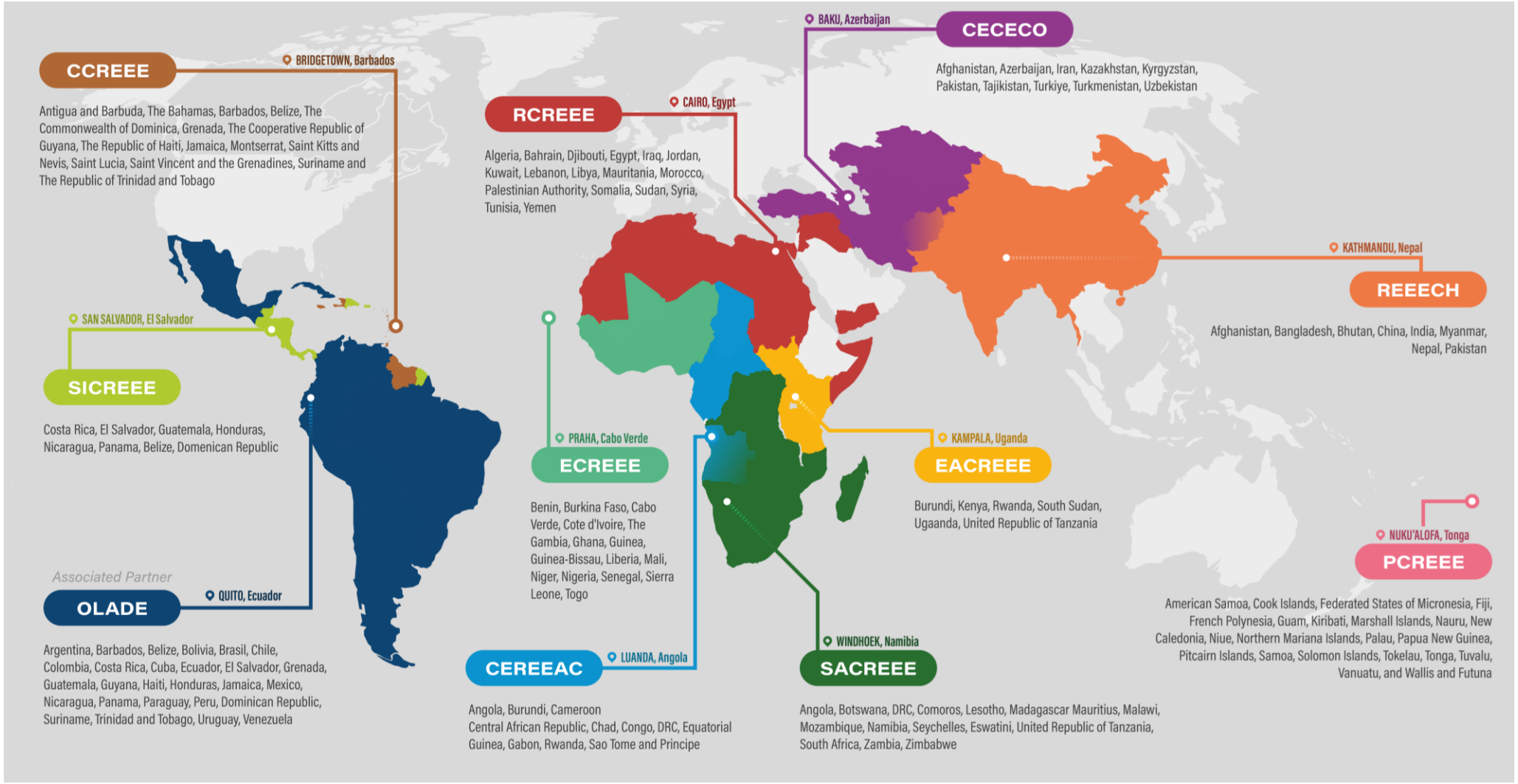
GN SEC

# The GN-SEC Platform facilitates South-South and Triangular Cooperation

## *Makerspace for joint:*

- Coordination
- Learning
- Projects
- Replication
- Upscaling
- Advocacy
- Campaigns
- Tools
- Knowledge
- Fundraising



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# Theory of Change

GNSEC

## Vision

To accelerate the energy transition from the regions for the regions, leveraging South-South and triangular cooperation to drive locally owned and sustainable change.

## Mission

To reduce institutional, technical, and financial barriers that hinder the development and uptake of integrated and inclusive regional sustainable energy markets.

**By addressing market barriers through regional cooperation, policies, regulations, incentives, standards, tools and methodologies**


**CREATE LOCAL DEMAND**
*Energy consumers*

**CREATE LOCAL QUALITY SUPPLY**
*Energy Businesses*

Contribute to national policy objectives and priorities

Contribute to global policy objectives and priorities

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GN SEC

# Activities and services of the regional centers

## CREATE SPILL-OVER EFFECTS AND ADDRESS BARRIERS REGIONALLY

- Policy, regulation and guidelines
- Knowledge, analytics & awareness
- Quality infrastructure & skills development
- Investment, business & innovation

## PROMOTE THE REGIONAL DIFFUSION AND INDUSTRIALL ROLL-OUT OF INNOVATIONS

- Transferring and developing new technologies, business models and policies
- Testing and demonstration of innovations
- Commercializing, replicating and industrial roll-out of innovations

## SCOPE OF SUPPORTED TECHNOLOGIES

- Renewable Energy Solutions (e.g. solar, wind, bioenergy, small hydro)
- Energy Efficiency Solutions (e.g. appliances, cooking, transport)
- Cross-cutting and integrated solutions (e.g. storage, hydrogen, gender and youth)

Broad range of direct beneficiaries and end-use sectors