IKI Brown Bag Lunch

End-of-Life Management in the Cooling Sector

The Climate and Ozone Protection Alliance – COPA
Cutting refrigerant emissions and protecting the climate & the ozone layer

IKI Office

Online, *19 February 2026, 13:00-14:00 CET*

The
Federal Government

IKI INTERNATIONAL CLIMATE INITIATIVE

Welcome

IKI BBL

Netiquette:

- Please log in with your full name and organization.
- Please switch off all microphones.
- Please, raise your hand for questions and comments.
- Use the chat for content-related questions and technical questions. Chat
- This event will be recorded.

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IKI INTERNATIONAL CLIMATE INITIATIVE

Your host today: Mark Nowakowski, IKI/ZUG

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Agenda

End-of-Life Management in the Cooling Sector

1. **Welcome & Moderation** (M. Nowakowski, IKI Office / ZUG)
2. **COPA Impact & Role** (R. Pekker, BMUKN)
3. **End-of-Life Management in the Cooling Sector** (E. Michel, GIZ)
4. **COPA: Project & Alliance**
   - The set-up (Y. Zhou, COPA Secretariat, UNIDO)
   - Support available for countries (E. Michel, GIZ)
   - Mitigation pilots (E. Michel, GIZ)
   - Sustainability beyond IKI (S. Jacobs, COPA Steering Committee, Energy Partners)
5. **Discussion, Q&A**
6. **Closure**

"WITH CHALLENGING TIMES ALL AROUND THE WORLD, IT IS GREAT TO SEE PEOPLE FROM SO MANY COUNTRIES WORKING TOGETHER TO PROVIDE SOLUTIONS FOR URGENT CLIMATE CHANGE AND OZONE PROTECTION CHALLENGES."

Rachel Pekker, German Federal Ministry for Economic Affairs and Energy (BMWE), COPA Plenary, 2nd July 2025

Cooling is a cross-cutting topic

End-of-Life Management in the Cooling Sector

Cutting refrigerant emissions and protecting the climate & the ozone layer

The Cooling challenge – Breaking a vicious circle

Climate change increase both the global temperature and the demand for cooling and air conditioning units.

Ozone depleting substances (ODS) and climate-damaging hydrofluorocarbons (HFCs) used in existing and old cooling equipment, insulation foam or cylinders, has led to the **accumulation of large "ODS and HFC banks" globally**.

If old cooling devices are not maintained and disposed of in an environmentally friendly way, the **ODS and HFC banks release their emissions freely into the atmosphere**.

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Cutting refrigerant emissions

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Cutting refrigerant emissions and protecting the climate & the ozone layer

Climate and environmental impacts from of common refrigerants

- **HFC-based Refrigerants** have a Global Warming Potential (GWP) ranging from GWP 270 and up to GWP 12,500.
- Released into the atmosphere, **the environmental impact on climate** from these cooling substances will be substantial.
- In comparison, **Natural Refrigerants**, such as CO2, Ammonia and Propane, have a GWP value below 1.5

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Cutting refrigerant emissions and protecting the climate & the ozone layer

Climate and environmental impacts from of common refrigerants

	Type	GWP (20y)	GWP (100y)	Lifetime (yr)	Ozone depleting?	PFAS?
R12	CFC	12,700	12,500	102	Yes	No
R410A	HFC blend	4,715	2,256	-	No	Yes
R32	HFC	2,690	771	5.4	No	No
R290 (Propane)	Natural	0,072	0,02	0,036	No	No
R744 (CO2)	Natural	1	1		No	No

High-GWP: red; Medium-GWP: yellow; Low-GWP: green

	Type	GWP (20-yr)	GWP (100-yr)	Lifetime (yr)	Ozone Depleting?	PFAS?
R11	CFC	8,320	6,230	52	Yes	
R12	CFC	12,700	12,500	102	Yes	
R22	HCFC	5,690	1,960	11.9	Yes	
R141b	HCFC	2,710	860	9.4	Yes	
R125	HFC	6,740	3,740	30	No	Yes
R134a	HFC	4,140	1,530	14	No	Yes
R143a	HFC	7,840	5,810	51	No	Yes
R404A	HFC blend	7,208	4,728		No	Yes
R407C	HFC blend	4,457	1,908		No	Yes
R410A	HFC blend	4,715	2,256		No	Yes
R452A	HFC/HFO blend	4,273	2,292		No	Yes
R32	HFC	2,690	771	5.4	No	No
R452B	HFC/HFO blend	2,275	779		No	Yes
R454A	HFC/HFO blend	943	270		No	Yes
R513A	HFC/HFO blend	1,823	673		No	Yes
R290 (Propane)	Natural	0.072	0.02	0.036	No	No
R600a (Isobutane)	Natural	<1	<1	0.019	No	No
R717 (Ammonia)	Natural	<1	<1	<1	No	No
R744 (CO_2)	Natural	1	1		No	No
R1234yf	HFO	1.81	0.501	0.033	No	Yes
R1234ze(E)	HFO	4.94	1.37	0.052	No	Yes

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Spotlight on F-Gas Banks Management

2022
7680 kt ODS &HFKW
13.4 Gt CO_2eq

~1 Mt CO2eq **Are emitted daily from global ODS & HFC banks**

Global ODS banks in kt of substance. HCFC consumption is interpolated between 2023 and 2030 (deadline for the phase out in Article 5 countries).; Source COPA publication, 2025

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Cooling Sector: F-Gas Banks Management has an enormous mitigation potential

~1 Mt CO2eq → **Are emitted daily from global ODS & HFC banks**

Emission equivalent

- **Driving:** About 4 billion kilometers (2.5 billion miles) in an average gasoline car - enough to circle the Earth 100,000 times.
- **Flying:** The CO_2 emissions from about 250,000 one-way flights from Berlin to New York.
- **Electricity:** The annual CO_2 emissions from powering roughly 125,000 European homes.
- **Coal:** Burning about 400,000 tons of coal.
- **Forest:** The amount of CO_2 absorbed by about 17 million tree seedlings grown for 10 years.

End-of-Life Management in the Cooling Sector

Licensed technicians

- trained and informed
- Monetary incentive for RRR
- limiting “free venting” practice

Refillable cylinders

not disposable single-use containers

Certified handlers

guarantees quality of content in cylinders through verification

➢ both for virgin and reclaimed substances

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COPA Cutting refrigerant emissions

The Climate and Ozone Protection Alliance – COPA

COPA Project & Alliance - The set-up

Setting up the Alliance – COPA was initiated in 2021 by the German Federal Ministry of Economic Affairs and Climate Action as phase II of an IKI project.

The main objective was establishing a **member-driven coalition** of organizations and countries, working together across all member groups, to:

- ✓ Promote a global shift to **sustainable refrigerant management**
- ✓ **Accelerate holistic solutions** for managing end-of-life of cooling systems, thereby avoiding emission of the refrigerants locked into the systems (ODS & HFC Banks)

GIZ Proklima was commissioned to set-up the Alliance in cooperation with **UNIDO and UNDP.**

Implemented by:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

In cooperation with:

UNIDO UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNDP

Supported by:

Federal Ministry for Economic Affairs and Climate Action

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on the basis of a decision by the German Bundestag

The Climate and Ozone Protection Alliance – COPA

COPA Project & Alliance – The set-up

COPA Secretariat

- 2021-2025 GIZ Proklima, support UNIDO & UNDP
  - ✓ Website, Mailbox, Newsletter
  - ✓ Member acquisition & management
  - ✓ Exchange formats, working groups, Annual Plenaries
  - ✓ Election & support of Steering Committees

- 2026 – UNIDO, support UNDP
  - ✓ Website, Mailbox, Newsletter
  - ✓ Member Management → **83 members, 26 countries (02/2026)**
  - ✓ Exchange formats, working groups
  - ✓ Supporting Steering Committee

UNIDO & GIZ, Vienna 10/2025

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COPA Cutting refrigerant emissions

The Climate and Ozone Protection Alliance – COPA

COPA Project & Alliance - The set-up

- **COPA has 4 thematic working groups**
- Aligned to the challenges of an efficient End-of-Life management in the cooling sector
- Infrastructure and technology for collecting, re-cycle, reclaim, analyze, treat or destroy substances are necessary
- Knowledge about financing mechanisms and policy frameworks are essential
- Implementation models - e.g. exchanging best practices and lessons learned

Policy Framework

Technology Solutions

Financing Mechanism

Implementation Models

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COPA Project & Alliance – Support available for countries

COPA resources purposefully support countries in the steps towards a sustainable life-cycle refrigerant management

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COPA Project & Alliance – Mitigation pilots

MAC

- China
- Mobile ACs (cars)
- Refrigerant recycling
- Cooperation with the private sector & research institute
- Methodology: Baseline & Scenario calculation
- Weblink

Business Case

- Grenada
- Recovery, Recycling, & Reclamation (RRR) Centre
- Techno-economic model developed
- Business Case Building

The Climate and Ozone Protection Alliance – COPA

COPA Project & Alliance – Mitigation Pilots

ODS-Destruction

- South Africa & Zimbabwe
- Transboundary movement
- Basel convention
- Certified destruction of 971 kg of gas (R12)
- Destruction of the cylinders too

A-THERMAL
for the environment

Certificate Number A-0026856

THERMAL DESTRUCTION CERTIFICATE

Description	Quantity	UOM
THERMAL TREATMENT R12 DESTRUCTION FROM DRUM	971	KG
R12 - E-003 - 301 KG		
R12 - E-024 - 1 KG		
R12 - E-033 - 2 KG		
R12 - E-249 - 199 KG		
R12 - E-268 - 315 KG		
R12 - E-293 - 153 KG		
DESTRUCTION OF CYLINDER - 3795 KG		
Total:	971	KG

DESTRUCTION DATE: 02/12/2025

CLIENT: GERMAN DEVELOPMENT COOPERATION GIZ
GIZ OFFICE PRETORIA, FINANCE UNIT, HATFIELD GARDENS
BLOCK C, 333 GROSVENOR STREET, HATFIELD 0083

WASTE GENERATOR: ZIMBABWE MINISTRY OF ENVIRONMENT, WATER AND CLIMATE, NOU

SIGNED: Sherwin Naicker
BSc. Chemical Engineering

DATE OF ISSUE: 02/12/2025

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COPA Project & Alliance – Sustainability beyond IKI

COPA Steering Committee (2025 – 2027)

PUBLIC SECTOR — PRIVATE SECTOR — COUNTRIES

Rachel Pekker
BMWE, Germany

Adrian Bukmanis
Veridien RM, Australia

Samuel Jacobs
Energy Partners Refrigeration, South Africa

Leslie Smith
Grenada

Igobe Gobsie Mbulawa
Botswana

Website: https://www.copalliance.org

COPA Secretariat (GIZ, UNDP & UNIDO): contact@copalliance.org

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COPA Project & Alliance – Sustainability beyond IKI

Value proposition for members joining COPA

- **Knowledge sharing**
- **Networking and exchange**
- **Going beyond current utilisation→ towards implementing mitigation.** Initiating new action and new financing.

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COPA 2026 – upcoming activities

- In March, first SC meeting for the year → planning and scheduling, align with Secretariat
- **Promote Active Membership:**
  Welcoming new members, Meet & Greet by members, Representation on Conferences and events
- **Exchange and Networking:**
  Quarterly Newsletter, SC representation, link to relevant conferences, Working Groups sessions, presenting new research, etc.
- **Support Project and Business Development:**
  with and for members, e.g. CaaS in South Africa, Destruction in Thailand, Reclamation in Indonesia

COPA Resources

COPA Compendium 2025:

provides an overview and links to all publications, activities and resources developed by COPA between July 2021 and 2025 in an interactive PDF file for download. (Weblink)

COPA-Website:

Results & resources can be found filtered by topic, type and language, e.g. guidelines, presentations, studies, etc. (Weblink)

Q&A SESSION

THANK YOU FOR YOUR ATTENTION

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