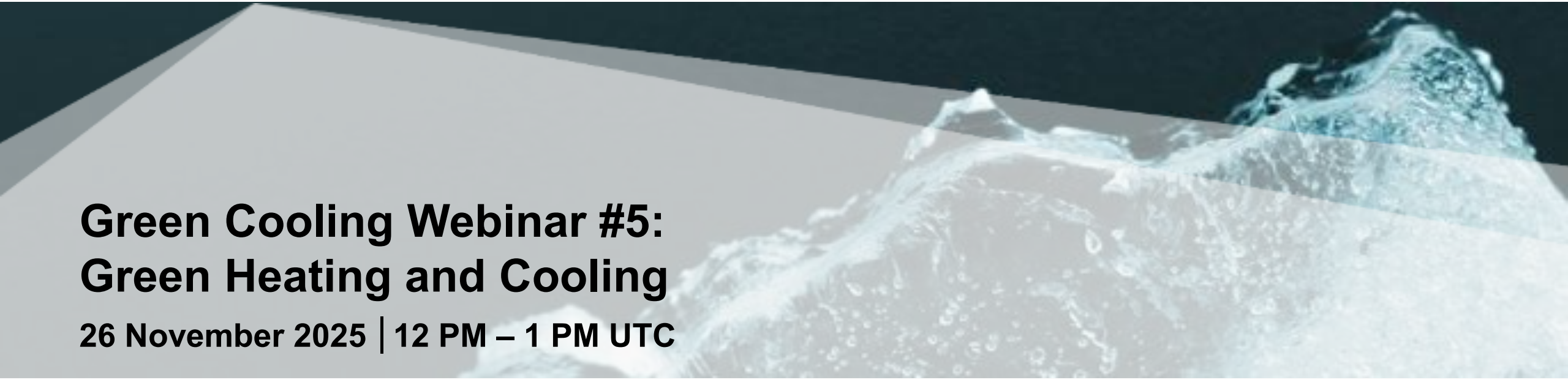
green cooling webinars



Green Cooling Webinar #5: Green Heating and Cooling

26 November 2025 | 12 PM – 1 PM UTC

green cooling initiative

Netiquette

Mute yourself to minimize background noise.

Use the "raise hand" feature or chat function to indicate when you have a question or want to contribute to the conversation.

Please feel free to write any questions in the chat.

Agenda

Time (UTC)	Topic	Speaker
12:00-12:05	Opening Remarks	Ellen Michel, GIZ Proklima
12:05-12:40	“From Proven Performance to Climate Action: Natural Refrigerants along the Value Chain”	Dietram Oppelt, eurammon
	Case Study: “Heating and Cooling of a Vienna office building relies on modern heat pump technology with ammonia as a natural refrigerant”	Tommy Angback, Alfa Laval Technologies AB
12:40-13:00	Q&A	All participants

Welcome Remarks

Ellen Michel
Project Manager GCI III, GIZ Proklima

From Proven Performance to Climate Action: Natural Refrigerants along the Value Chain

Dietram Oppelt

eurammon Board Member | HEAT GmbH

eurammon:
Refrigerants Delivered by Mother Nature

The European Initiative for Natural Refrigerants | Founded 1996

About eurammon

- 'Europe + Ammonia' - Frankfurt, Germany
- Joint initiative of companies, institutions & experts
- Focus: NH3, CO2, Hydrocarbons (R290, R600a), Air
- 50+ Member Entities
- 2024: Merger with Refrigerants, Naturally! e.V.
- 2025: Advocacy&policy, e.g. EN 378 safety standard revision

Key Member Companies

- Alfa Laval
- BITZER
- Danfoss
- EVAPCO
- Friterm
- FUCHS
- GEA
- Güntner
- Haas
- Johnson Controls
- KRAHN Specialty Fluids
- Kreuzträger
- KTI-Plersch
- Kältetechnik Dresen
- Mayekawa
- NDL Industries
- Next Lubricants
- NRS
- Refolution
- Refricomp
- Secon
- SSP Kälteplaner
- TH. WITT
- thermofin
- Vahterus
- Wettstein

Global Partner Network IIAR (USA) | AAR India | Green Cooling Initiative | Refrigerants, Naturally! e.V.

eurammon
Refrigerants, naturally!

eurammon in Action:

Global Network | Member Events | Industry Collaboration

eurammon Members: Complete Value Chain Coverage

From Components to Turnkey Solutions

COMPRESSORS

- BITZER
- Johnson Controls Sabroe
- GEA Grasso
- Mayekawa/MYCOM

Screw, reciprocating & scroll compressors optimized for NH3, CO2

HEAT EXCHANGERS

- Alfa Laval
- Güntner
- EVAPCO
- Vahterus

Plate, shell & tube, evaporative condensers for natural refrigerants

CONTROLS & COMPONENTS

- Danfoss
- NDL Industries
- TH. WITT
- Krahn
- FUCHS

Valves, sensors, controls, piping systems for NH3/CO2

SYSTEM INTEGRATORS

- GEA Refrigeration
- Johnson Controls
- Kreutzträger
- TH. WITT
- SECON

Turnkey industrial refrigeration & heat pump systems

eurammon members represent the complete ecosystem for natural refrigerant solutions

The Regulatory Imperative: EU F-Gas 2024/573

World's First HFC Phase-Out Mandate (In Force Since March 2024)

- 80% HFC reduction by 2030 | Complete phase-out by 2050
- January 2025: Commercial refrigerators/freezers with GWP ≥150 prohibited
- January 2025: Export ban for RACHP systems using GWP ≥1000 refrigerants
- 2025: Virgin HFCs prohibited for servicing high-GWP equipment
- 2027: Mandatory F-gas handling certification for all personnel
- EU-27 already 60% below Kigali Amendment target in 2024

The regulatory pathway is clear – natural refrigerants are the future

Natural Refrigerants: Proven Performance

130+ Years of Industrial Application | Zero ODP | Minimal GWP

AMMONIA (NH3 / R717)

- GWP = 0 | ODP = 0
- 15% more efficient than HFCs
- Most efficient thermodynamically
- Natural leak detection (odor)
- Not subject to phase-out
- Industrial, cold storage, district heating, heat pumps

CO2 (R744)

- GWP = 1 | ODP = 0
- 48 Gt emission reduction potential
- R404A = 3,922× more warming
- Non-flammable, non-toxic
- Transcritical systems mature
- Supermarkets, commercial, heat pumps

HYDROCARBONS

- GWP < 3 | ODP = 0
- R290 (Propane), R600a (Isobutane)
- Excellent thermodynamics
- Widespread in appliances
- Growing AC applications
- Refrigerators, small AC, commercial

The Value Chain Approach

Holistic Ecosystem for Natural Refrigerants Success

MANUFACTURING

Equipment design
Low-charge systems
Component optimization

INSTALLATION

Specialized skills
Safety protocols
System integration

SERVICE

Leak detection
Performance monitoring
Certification (2027)

END-OF-LIFE

Safe decommissioning
Recovery & recycling
Circular economy

TRAINING & QUALIFICATION FOUNDATION

Basic → Safe Handling → Advanced Design → Specialist Certification

Market Trends & Investment Case

Natural Refrigerants: A Growing Global Opportunity

Market Growth

Natural Refrigerants	USD 1.7B → 3.1B (2025-2035)	**~9% CAGR**
EU Heat Pump Market	USD 19B → 46B (2024-2033)	**~10% CAGR**
Share of European companies	40% of global market	**Leader**

Investment Logic

Factor	Synthetic	Natural
Regulatory Risk	HIGH	NONE
Energy Costs	Higher	15-30% lower
Future-Proofing	Poor	Excellent
Phase-out Risk	Yes	No

Key Market Drivers

F-gas phase-down acceleration | ESG & climate commitments | Energy price volatility | Building renovation wave | EU Heat Pump Accelerator Platform (Jan 2025) | EU Social Climate Fund (€86.7B from 2026)

Case Study: European Patent Office Vienna

Ammonia Heat Pumps Transform Building Renovation

Project Overview

- Timeline: Nov 2022 – End 2024
- Approach: Strip to shell + modernize
- Certification: BREEAM 'Outstanding'
- CO2 Saved: ~50% vs. demolition/rebuild
- Energy Result: Surplus generation
- Achievement: Lifecycle carbon neutrality
- Additional: PV system, wooden facade, rainwater harvesting, extensive greening

Ammonia Heat Pump System

- 2× Equans smartPACK-L7 (R717/NH3)
- 20 ground probes, 200m deep
- Condenser: 292 kW (38-47°C)
- Evaporator: 252 kW (cooling 16-7°C)
- Desuperheater: 38 kW (DHW 55-60°C)
- Heat Exchangers: Alfa Laval T10-EW + Alfa Nova fusion-bonded units
- eurammon member technology showcase

Next: Tommy Angback (Alfa Laval) – Technical deep dive

Key Takeaways

1. **Regulatory Clarity**

   EU F-gas phase-down – natural refrigerants are future-proof

2. **Proven Technology**

   130+ years industrial application – mature, reliable, efficient

3. **Complete Value Chain**

   eurammon members cover compressors to turnkey systems

4. **Strong Business Case**

   Lower operating costs, no phase-out risk, ESG alignment

Call to Action: Engage with eurammon | Invest in training | Specify natural refrigerants

Thank You

Refrigerants Delivered by Mother Nature

Dietram Oppelt
eurammon Board Member | UNFCCC TEC Chair

www.eurammon.com

eurammon | GIZ Proklima | Green Cooling Initiative

Questions? Join the Q&A session

Case Study: “Heating and Cooling of a Vienna office building relies on modern heat pump technology with ammonia as a natural refrigerant”

Tommy Angback
Alfa Laval Technologies AB

eurammon Refrigerants, naturally!

giz

Energy efficient buildings

02/12/2025

Making the world’s buildings more energy efficient

Energy efficient buildings

- Buildings use 40% of the world’s energy consumption
- Heating and cooling uses 60% of this energy
- By adopting to more energy-efficient heating and cooling systems we can reduce energy consumption and carbon emissions in the building sector by 50%

Trends in the industry

- Renovating buildings
- Strengthening existing building codes
- Connecting to updated heat networks
- Implementing digital solutions
- Installing heat pumps
- Cooling strategies

The European Patent Office in Vienna

Decarbonizing Heating and Cooling with Natural Refrigerant Ammonia

The European Patent Office in Vienna

Renovate or demolish?

- The office building originates from 1972.The building had reached the end of its operational life.
- Most such existing buildings have poor energy efficiency, which makes them uneconomical and harmful to the climate.
- Many properties are therefore demolished, although modernization would be possible in principle and in many cases even much more environmentally and climate-friendly.

Project overview

European Patent Office building in Vienna

Decision

- It was decided in 2021 to renovate the building and reduce emissions in line with European green deal ambition.

The goal

- To transform the office into a climate –neutral highly sustainable “Green Hub by 2024,” with a target of carbon neutrality by year 2030.

The solution

- The decision to preserve the original concrete structure of the four-storey building already saves about half of the carbon dioxide compared to a total demolition and complete reconstruction.
- On top of that, the building should be equipped with state-of-the-art technologies including a 360° view on sustainability

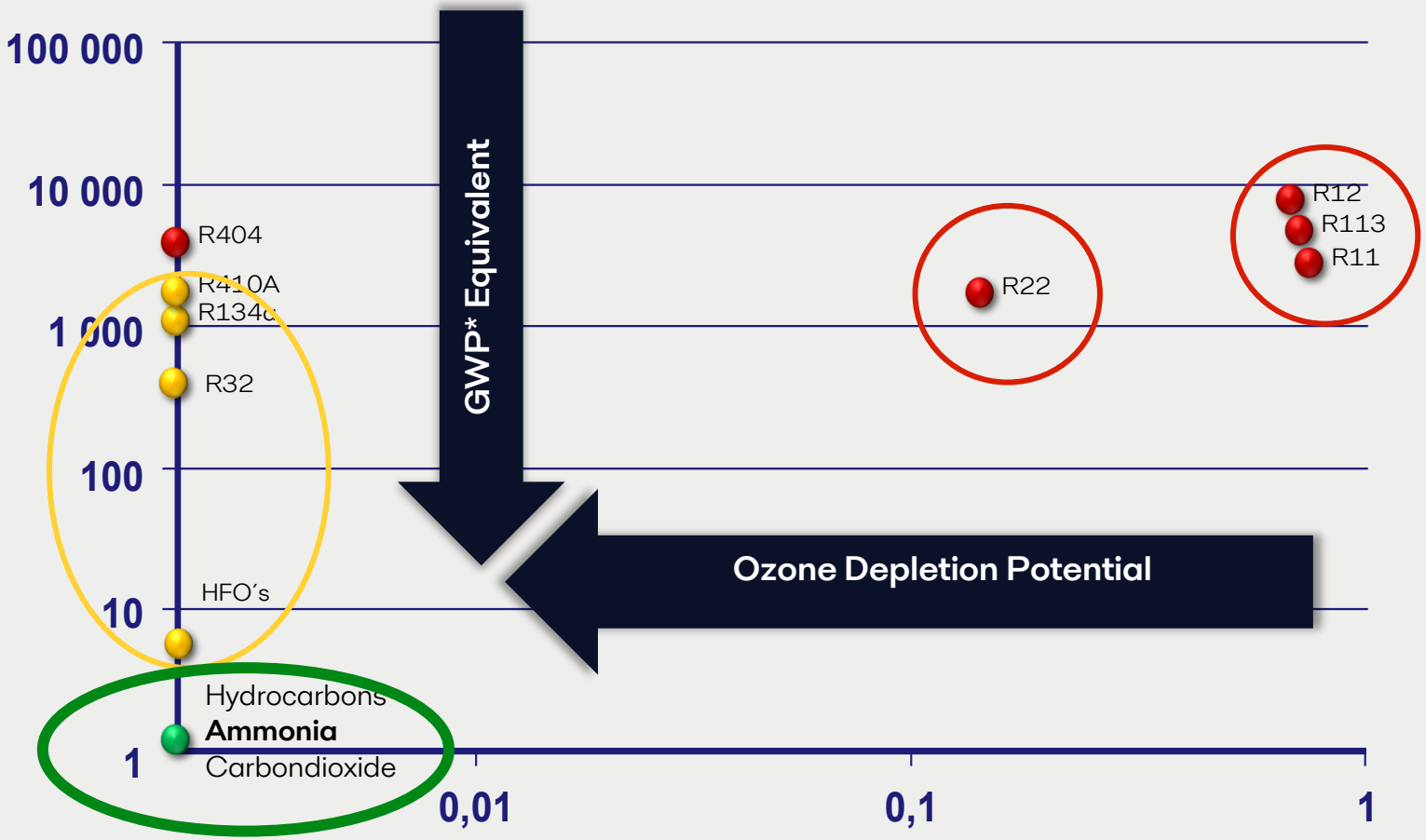
The Sustainability Building Certification

The Building Research Establishment Environmental Assessment Method

- 360° view on sustainability
- BREEAM is an assessment undertaken by independent licensed assessors using scientifically-based indices which cover a range of environmental issues. Its categories evaluate **energy** and water use, health and wellbeing, pollution, transport, materials, waste, ecology and management processes
- Buildings are rated and certified on a scale of "Pass", "Good", "Very Good", "Excellent" and the best "Outstanding".
- **The target was to achieve the highest grade ”Outstanding” rating of BREEM certification after renovation of the office building in Vienna.**

The power of Natural refrigerants

Ammonia selected



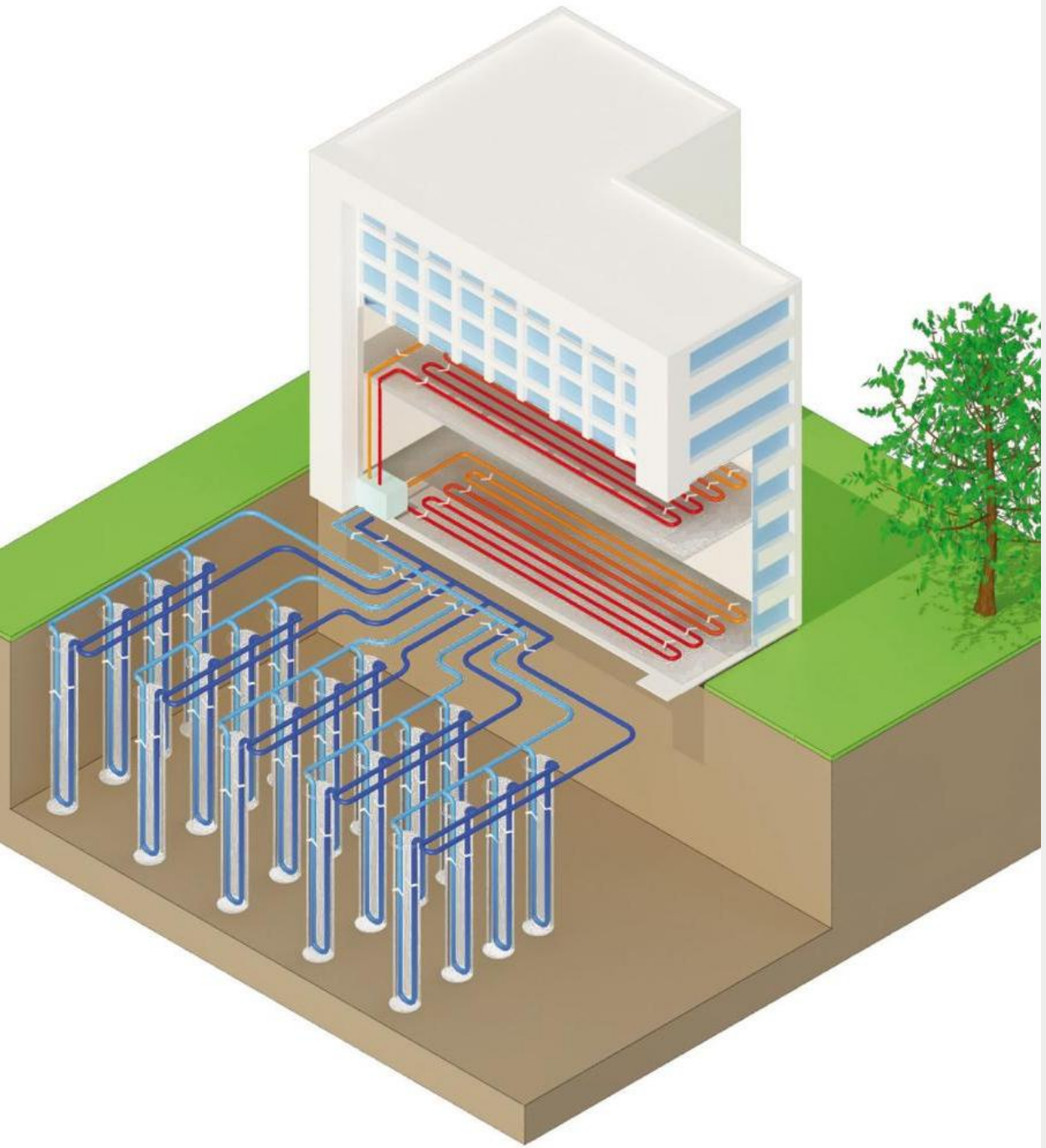
The heat pumps should work with a natural refrigerant. Due to its outstanding thermodynamic properties, ammonia was chosen, which has so far been known primarily as a classic industrial refrigerant and is almost never found in the lower output range.

The challenge with ammonia is the Refrigerant toxicity. That is why the system selected must be designed minimising quantity and the risk of releif.

Ammonia:

- Natural refrigerant
- GWP=0 (global warming potential)
- ODP=0 (ozone depleting potential)
- TFA content=0 (trifluoracetic acid)

- Highly efficient securing low energy consumption
- Lower cost than synthetic alternatives



Ground source energy.

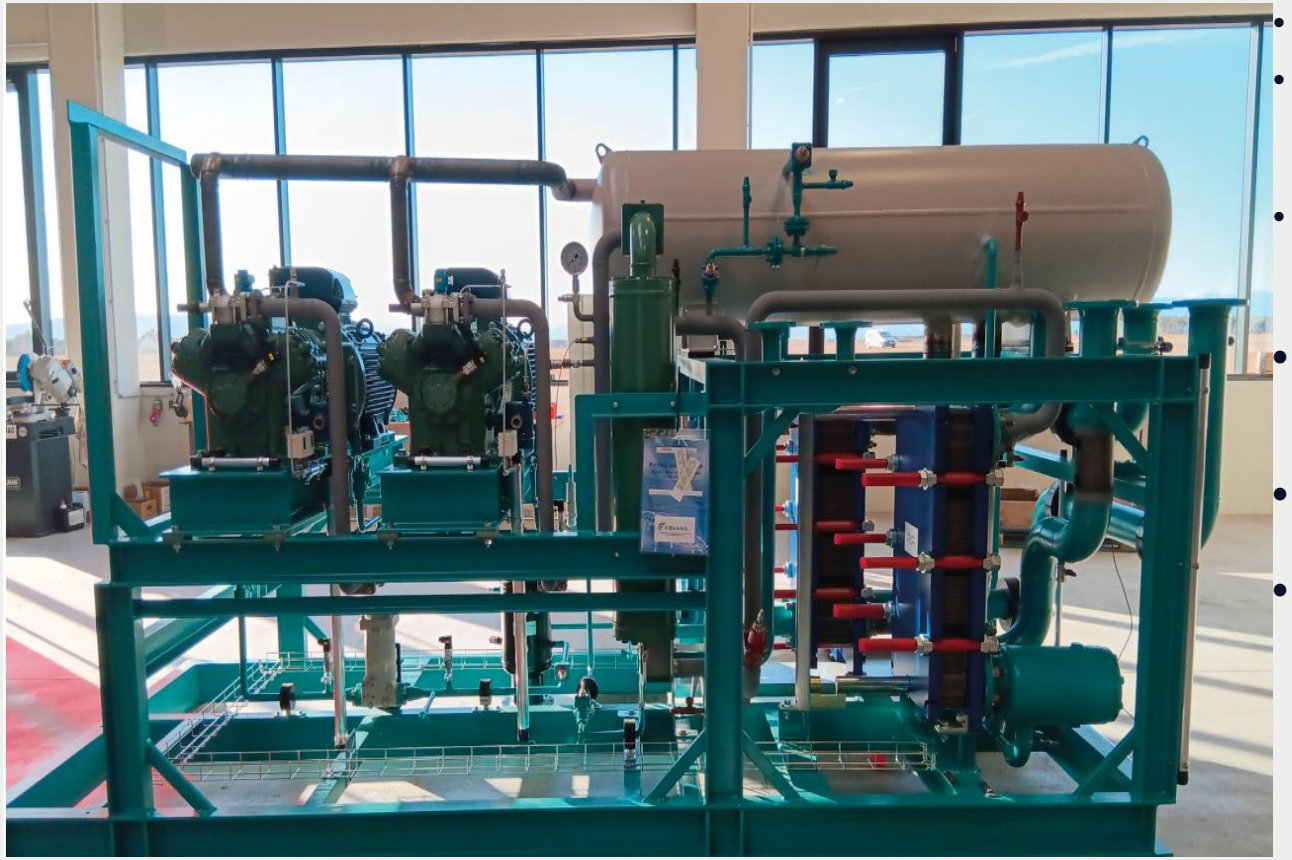
The integrated heating and cooling system

- A system with 20 probes drilled 200 metres deep into the ground below the existing 2nd basement level of the building is circulating a glycol brine as heat and cooling source.
- In winter, the glycol extracts heat from the ground as heat source to the heat pump that is heating the building
- In summer, the glycol brine is circulated to the probe being cooled as input to the heat pump which now is operating in reversed cooling/chiller mode.
- The driving force is two tailor-made heat pumps.
- The heat pump for such duties normally achieve a COP of 5, this mean 80 % of the heating or cooling energy comes from the ground and the rest is the electricity added.
- This is more energy efficient than any air source heat pump and with significantly lower* CO2 emissions than from a direct gas boiler.

*how low depends on how the electricity been produced

The ammonia heat pump chosen

Equans smartPACK-L7 compact heat pump /cooling system



Equans smartPACK-L7

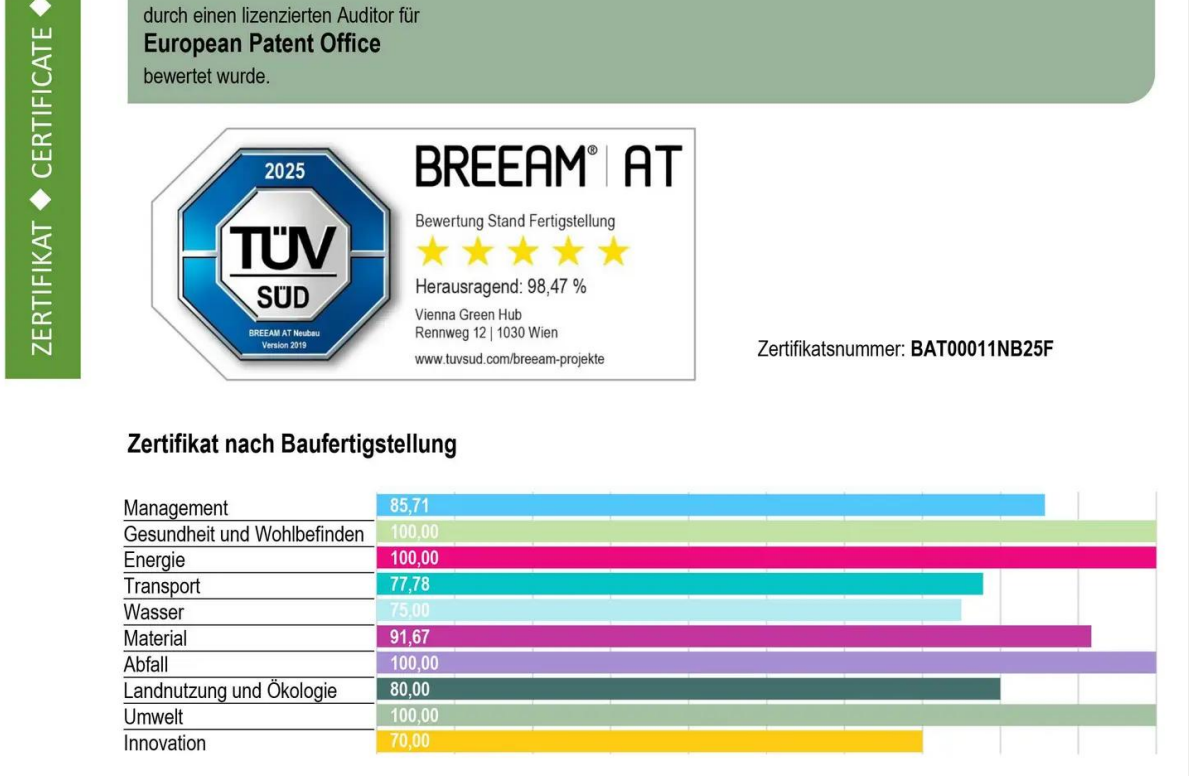
- Two tailor-made Equans smartPACK-L7 compact system.
- Containing each two Alfa Laval semi welded plate heat exchangers of type T10-EW integrated into the system as evaporators and condensers.
- These heat exchangers are particularly compact, reliable and energy-efficient and ideal for heat pump/chiller applications reducing the ammonia content to an absolute minimum.
- The evaporator has an output of about 252 kW and extracts ground heat by cooling the circulating frost-proof ethylene glycol brine from 16 to 7°C at an evaporation temperature of 4° C.
- The condenser delivers 292 kW of space heating to the building at a condensing temperature of 50° C.
- Further an Alfa Laval fusion-bonded plate heat exchanger delivers about 38 kW of power and uses the compressed 116°C ammonia gas to heat domestic hot water to 60°C.

Alfa Laval plate heat exchangers

Photo Voltaic Electricity supply

- In addition to the sophisticated heat pump system, the energy concept of the European Patent Office in Vienna also includes a photovoltaic system on the roof and on the facades.
- This is a complete own green electricity supply, which generates more energy than the building needs to operate its basic functions of heating, cooling, ventilation, lighting and hot water
- Additional eco-friendly measures such as the use of a wooden façade, rainwater tanks and lots of plants make the building even more sustainable and help save water and energy.

The result



BREEAM top rating achieved

- The revitalized headquarters of the European Patent Office in Vienna is one of the most sustainable buildings of its kind.
- With a BREEAM certification of "Outstanding," it has achieved the highest rating currently awarded in the German speaking region of Europe.
- The efficient heating/cooling installation with a sustainable natural refrigerant heat pump technology contributed very well to the 100% rating in Energy, Health, Waste and Environmental parameters

Thanks for your attention

Sources

- European Patent Office Vienna – End user
- ATP architects - Integrated overall design
- IC group - Construction
- Equans - Heat pump supplier
- Alfa Laval - Compact Heat exchanger supplier

Questions & Answers

Mark you calendars!

Webinar 12 February 2026
with Magnotherm and Pervormance on
„Cooling without refrigerant gases“

More information coming soon!

Contact

Thank you for your participation!
Please do not hesitate to contact us with any concerns, questions or requests.

Green Cooling Initiative III
proklima@giz.de

www.giz.de
www.green-cooling-initiative.org

Green Cooling by Proklima

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Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Sitz der Gesellschaft, Bonn und Eschborn

Friedrich-Ebert-Allee 32 + 36
53113 Bonn, Deutschland
T +49 228 44 60 - 0
F +49 228 44 60 - 17 66

Dag-Hammarskjöld-Weg 1 - 5
65760 Eschborn, Deutschland
T +49 61 96 79 - 0
F +49 61 96 79 - 11 15

E info@giz.de
I www.giz.de

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH