



ONLINE

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Supporting the Use of Natural Refrigerants in Air Conditioning

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#GoNatRefs

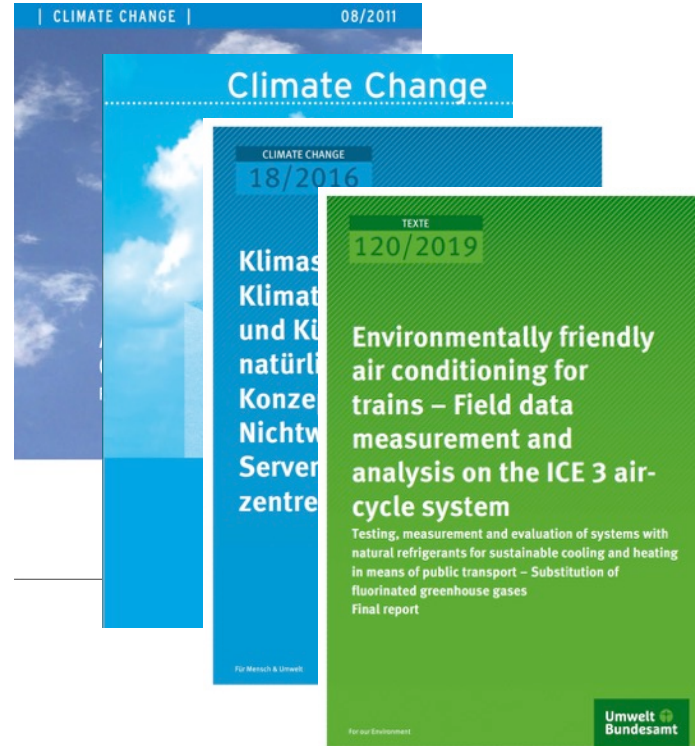
Who we are

- The German Environment Agency (UBA) is **Germany's central environmental authority** and an **independent research agency**.
- It was **established in 1974** in Berlin, headquarters in Dessau since May 2005.
- It employs about **1,600 people** at 13 locations, including 7 air monitoring stations across Germany.
- **Main tasks: conducting research, informing the general public, providing policy advice to federal ministries, enforcing environmental law**
- UBA has a **budget** of ~130 million EUR, including ca. 45 million EUR for external research



How we support the replacement of HFCs by NatRefs

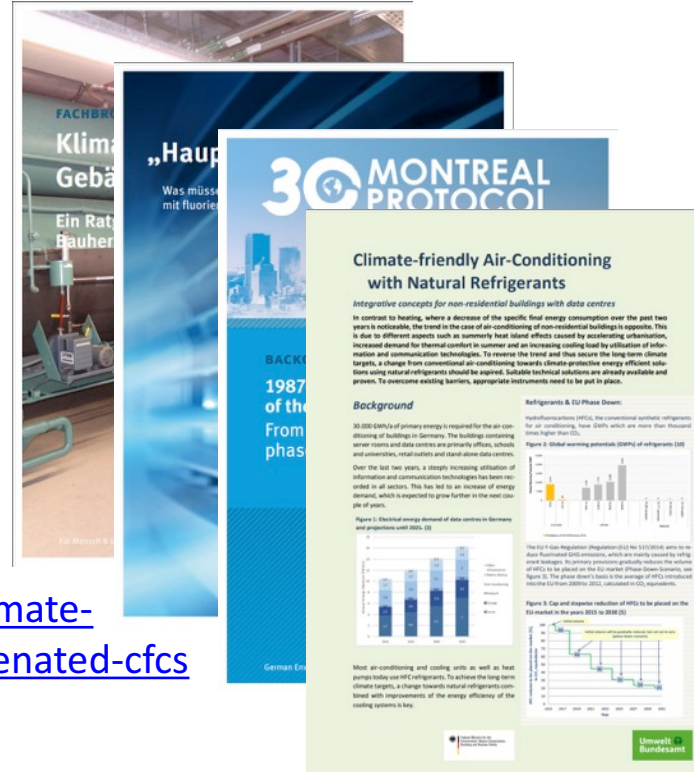
- Research projects
- Brochures, fact sheets, information on our website
- Online platform for natural refrigerants
- Blue Angel Ecolabel
- Etc.



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<https://www.umweltbundesamt.de/en/topics/climate-energy/fluorinated-greenhouse-gases-fully-halogenated-cfcs>



Climate-friendly Air-Conditioning with Natural Refrigerants

Integrative concepts for non-residential buildings with data centres

In contrast to heating, where a decrease of the specific final energy consumption over the past two years is noticeable, the trend in the case of air-conditioning of non-residential buildings is opposite. This is due to different aspects such as summer's heat island effects (caused by accelerating urbanisation, increased demand for thermal comfort in summer and an increasing cooling load by utilisation of information and communication technologies). To reverse the trend and thus secure the long-term climate targets, a change from conventional air-conditioning towards climate-protective energy-efficient solutions using natural refrigerants should be approved. Suitable technical solutions are already available and proven. To overcome existing barriers, appropriate instruments need to be put in place.

Background

30.000.000 t/a of primary energy is required for the air-conditioning of buildings in Germany. The buildings containing server rooms and data centres are primarily offices, schools and universities, retail outlets and stand-alone data centres.

Over the last two years, a steadily increasing utilisation of information and communication technologies has been recorded in all sectors. This has led to an increase of energy demand, which is expected to grow further in the next couple of years.

Figure 1: Electrical energy demand of data centres in Germany and projections until 2025. (2)

Year	Energy Demand (TWh/a)
2018	~10
2019	~12
2020	~15
2021	~18
2022	~22
2023	~28
2024	~35
2025	~45

Figure 2: Global warming potentials (GWP) of refrigerants (20)

Refrigerant	GWP
R410A	~2088
R32	~675
R134a	~1430
R125	~3500
R12	~1090
R22	~1810
R407C	~1975
R404A	~3940
R507	~3940
R502	~3940
R502A	~3940
R502B	~3940
R502C	~3940
R502D	~3940
R502E	~3940
R502F	~3940
R502G	~3940
R502H	~3940
R502I	~3940
R502J	~3940
R502K	~3940
R502L	~3940
R502M	~3940
R502N	~3940
R502O	~3940
R502P	~3940
R502Q	~3940
R502R	~3940
R502S	~3940
R502T	~3940
R502U	~3940
R502V	~3940
R502W	~3940
R502X	~3940
R502Y	~3940
R502Z	~3940

Figure 3: Cap and phase reduction of HFCs to be phased on the EU market in the years 2025 to 2030 (2)

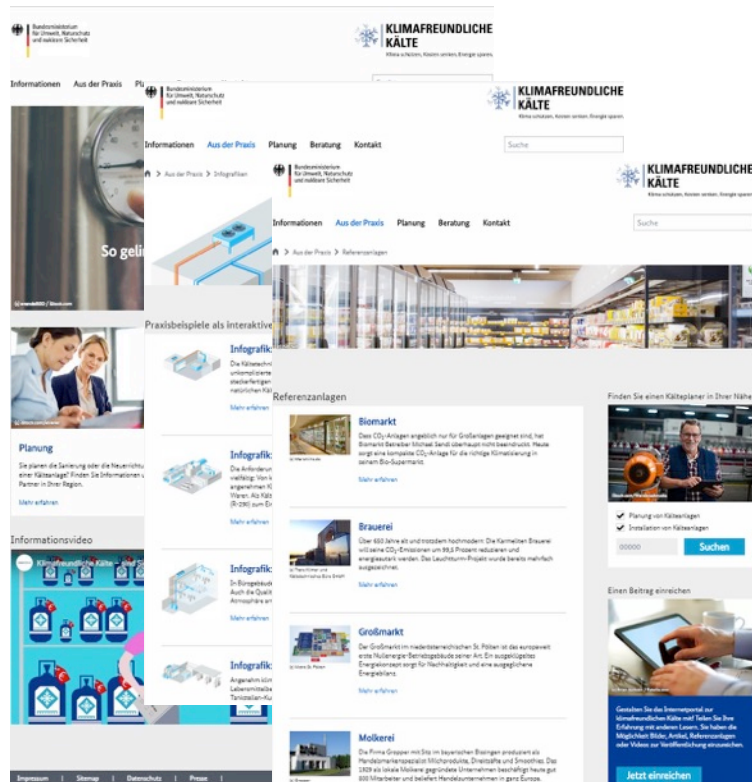
Year	Cap (Gt CO ₂ eq)
2025	~1.5
2026	~1.2
2027	~0.9
2028	~0.6
2029	~0.3
2030	~0.1

Most air-conditioning and cooling units as well as heat pumps today use HFC refrigerants. To achieve the long-term climate targets, a change towards natural refrigerants combined with improvements of the energy efficiency of the cooling systems is key.

Umweltbundesamt

How we support the replacement of HFCs by NatRefs

- Research projects
- Brochures, fact sheets, information on our website
- **Online platform for natural refrigerants**
- Blue Angel Ecolabel
- Etc.



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German Ecolabel ,Blue Angel‘

- ISO 14024 Type 1 Label:
 - Voluntary, market-based
 - Multi criteria set based on life cycle considerations of the product (or service)
 - third party verification required
- Established in 1978 (world's first ecolabel)
- 120 product groups
 - 1,500 companies
 - 12,000 products and services certified
- Aims at 20-30 % of the products (regarding environmental performance)
- Product group criteria undergo revision after 2-4 years



German Ecolabel ,Blue Angel‘



Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

Owner: Federal Ministry for the Environment

- determines the principles upon which the Blue Angel is awarded
- appoints the members of the Environmental Label Jury

Professional expertise: German Environment Agency (UBA)

- develops the technical criteria
- regularly reviews criteria to ensure that the Blue Angel always remains up to date with the latest technical developments
- functions as the offices of the voluntary Environmental Label Jury, and thus supports their work

Independent decision-makers: the Environmental Label Jury

- consists of 15 representatives, decisions on new product groups to be awarded
- discusses and approves the award criteria suggested by UBA
- not bound by any instructions, making them completely independent

Auditor: RAL gGmbH

- verifies the compliance with the criteria upon receiving a product-specific application
- concludes contracts with companies regarding their use of the Blue Angel



German Ecolabel for Room Air Conditioners

- DE-UZ 204: Stationary air conditioners
- Published in August 2016
- Scope: Single-split units (no packaged units (e.g. portable, through-the-window), no multi-splits), < 12 kW
- Criteria (I):
 - Halogen-free refrigerant; no ammonia
 - SEER ≥ 7 (corresponds to A⁺⁺ category);
 - SCOP ≥ 4.6 for heating mode
 - Sound power level at rated capacity (≤ 4.5 kW):

Indoor unit:	≤ 50 dB (A)
Outdoor unit:	≤ 58 dB (A)



Verification by test reports

German Ecolabel for Room Air Conditioners

- Criteria (II):
 - Installation by certified personnel (according to Chemicals Climate Protection Ordinance) must be offered (as well as maintenance and disposal)
 - ,easy' cleaning of indoor unit air filter
 - Exclusion of hazardous substances (mercury, chromium VI, etc.) according to ROHS Directive (2011/65/EU)
 - environmental-friendly product design (e.g. avoidance of composite materials)
 - Etc.



Verification by self declaration

Comparison of ecolabels for room AC worldwide



Country/Region	China	South Korea	Thailand	Scandinavia	Germany
Latest Version	2013	2013	2016	2018	2016
Energy Efficiency	SEER \geq 5.4 SCOP \geq 4.5 (units < 4.5 kW)	Fulfill first class Energy Efficiency Rating	EER > 2.82	SCOP \geq 3.4 (EU climatic zone C)	SEER \geq 7 SCOP \geq 4.6
Refrigerant	Ozone Depletion Potential (ODP) = 0; no GWP limit	ODP = 0 GWP \leq 2,500	ODP = 0 GWP \leq 2,500	ODP = 0 GWP \leq 2,000	Halogen-free GWP < 10

1st manufacturer with Blue Angel certificate for room AC



- Single-split AC with 2.6 and 3.5 kW (9.000 and 12.000 BTU/h) cooling capacity
- Product information and ecolabel criteria: <https://www.blauer-engel.de/en/products/electric-devices/stationary-air-conditioners>



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Thank you for listening!

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