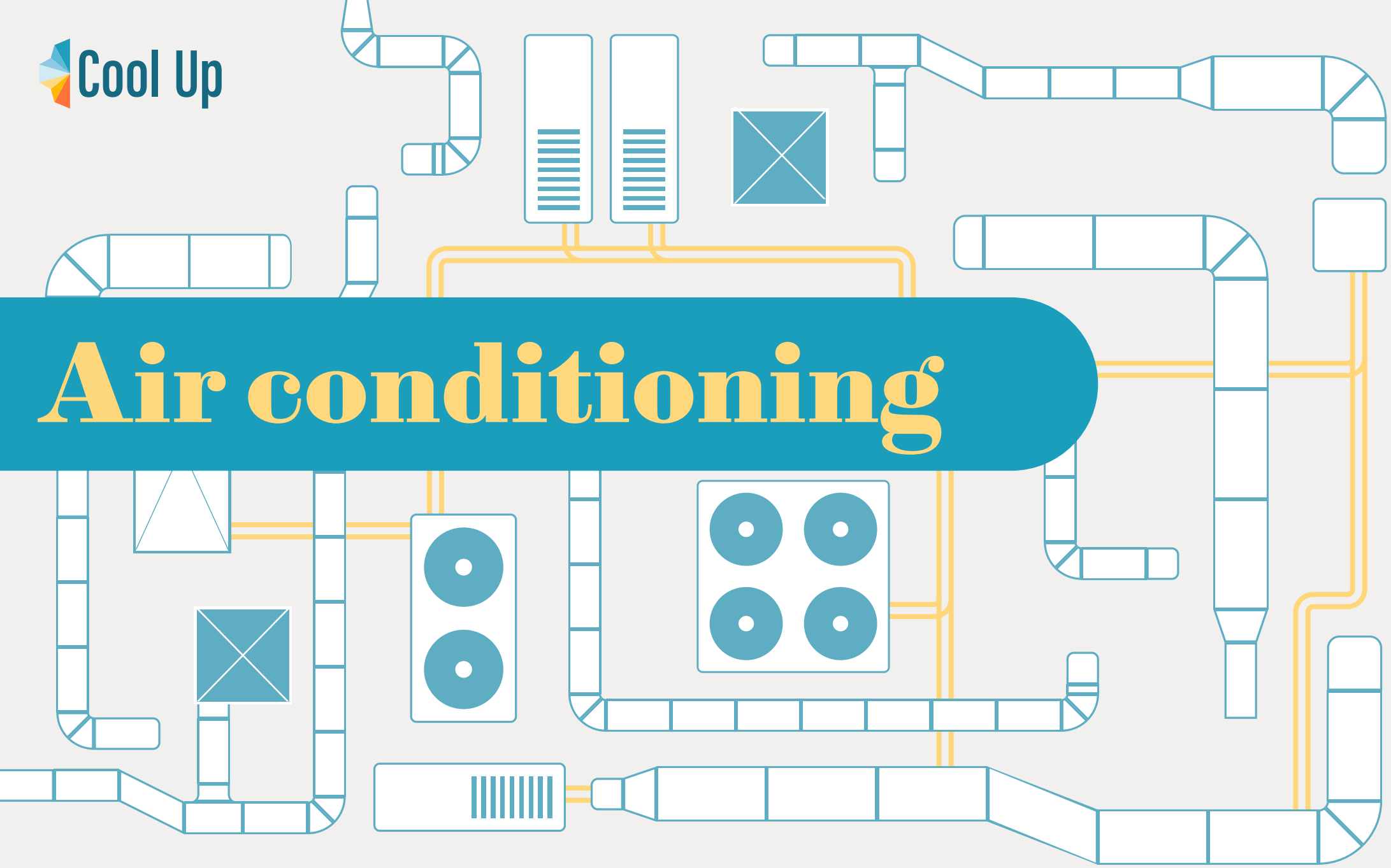
Cool Up

Air conditioning



Utilising natural refrigerants

Banned refrigerants

First generation refrigerants are usually CFC or HCFC chlorofluorocarbons that are highly environmentally harmful as they are synthetic, toxic, impact the ozone layer and have high global warming potentials. These ozone depleting substances (ODS) were targeted for phase-out under the 1987 Montreal Protocol.

		SC	ODP	GWP
R12	CFC - CF_2Cl	A1	1	10900
R22	HCFC - CHF_2Cl	A1	0.055	1810

Safety Class

Ozone Depletion Potential

Global Warming Potential (100 years)

Commonly used in air conditioning

Commonly used in refrigeration

(Full colour = used / partial colour = not used)

Commonly used refrigerants

Hydro-fluorocarbon based refrigerants entered the market as replacements for their ozone damaging HCFC cousins. However, these HFCs have high global warming potentials and have since been targeted for phase down under the 2016 Kigali Amendment to the Montreal Protocol.

		SC	GWP
R134a	HFC - CH_2FCF_3	A1	1430
R404A	HFC - Zeotropic blend	A1	3922
R407A	HFC - Zeotropic blend	A1	2107
R407C	HFC - Zeotropic blend	A1	1774
R407F	HFC - Zeotropic blend	A1	1825
R410A	HFC - Zeotropic blend	A1	2088

Natural refrigerants

Natural refrigerants are non-synthetic substances that occur in nature's biochemical process and thus do not lead to persistent and toxic emissions and decomposition products. In addition, natural refrigerants have only a negligible climate effect, if any.

		SC	GWP
R744	Carbon dioxide - CO_2	A1	1
R290	Hydrocarbon - Propane C_3H_8	A3	0
R600a	Hydrocarbon - Isobutane C_4H_{10}	A3	3
R717	Ammonia - NH_3	B2L	0
R718	Water - H_2O	A1	0

Newer alternatives

These refrigerants are considered modern alternatives for applications where they are replacing refrigerants with a higher global warming potential. However, they are largely HFOs or blends of synthetic HFCs and HFOs where the GWP is still sufficiently high. Nearly all of the new synthetic refrigerants are per- and polyfluoroalkyl substances (PFAS), which a suspected of being carcinogenic, that's why they may be banned in the EU due to a new PFAS regulation.

		SC	GWP
R32	HFC - CH_2F_2	A2L	675
R449A	HFC + HFO - Zeotropic blend	A1	1396
R450A	HFC + HFO - Zeotropic blend	A1	601
R454A	HFC + HFO - Zeotropic blend	A2L	237
R513A	HFC + HFO - Azetropic blend	A1	631
R1234ze	HFO - $C_3H_2F_4$	A2L	1
R1234yf	HFO - $C_3H_2F_4$	A2L	1

More information

Full reports

This snapshot is based on the 2022 series of reports entitled:

Catalogue of Technical Solutions for Sustainable Cooling in:

- **Egypt**
- **Jordan**
- **Lebanon**
- **Türkiye**

AC technologies

- **Domestic air conditioning:** cooltechnologies.org/sector/domestic-air-conditioning
- **Commercial / industrial air conditioning:** cooltechnologies.org/sector/commercial-industrial-air-conditioning
- **Hydrocarbon technologies database:** hydrocarbons21.com

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