



Geothermal Cold Storage: a solution for UK low enthalpy



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Thermal Partners LLP

Geothermal Cold Storage

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Iceland-based geothermal expert GEG pioneered an innovative new project type for geothermal cold storage under the moniker “GeoCool”.

Nobody thought geothermal could be this cool.

GeoCool Project Design

NEWLY STANDARDISED FACILITY DESIGN INTEGRATING OFF-THE-SHELF EQUIPMENT

- Based on well-proven equipment, straightforward engineering and the basic physics of thermodynamics.
- Technical design includes a full lifecycle approach to optimize efficiency and zero footprint construction.
- Three powerful foundations: energy storage, energy transformation and the raw power of the Earth.



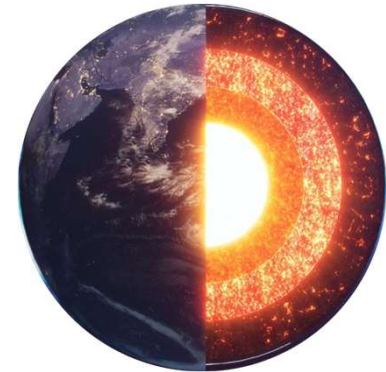
**INSULATED
COLD STORAGE**

+



**CHILLING
EQUIPMENT**

+



**CLEAN RENEWABLE
THERMAL ENERGY**

Project Proponents Companies



Newly incorporated UK Limited Partnership as Project Lead for a series of geothermal projects in Europe and ASEAN. Geothermal cold storage projects managed under the “GeoCool” brand in Poland, Croatia, US and Malaysia.



GEG predecessor companies and intellectual property origin includes an EPC contractor that built 16 power plants for national utilities in Iceland and Kenya.



- World leader in modular wellhead power plants with smallest footprint and lowest cost per MW.
- Innovations supported by research grants for cold storage to support climate adaptation and food security.
- Past awards by Miliken-Motsepe Prize in Green Energy, European Geothermal Energy Council, Bloomberg New Energy Pioneer and the Top 100 Global Cleantech.



Bjarnarflag: 5 MW back pressure power plant, ICELAND



GEG and KenGen officials, 84 MW wellhead power plants, Olkaria, KENYA

Geothermal
cold storage

Project Proponents

Principals



Jordan Oxley
Economist / Financier

THERMAL PARTNERS, Managing Partner
GEG GEOCOOL, Founder

Closed one of the largest contracts for geothermal drilling in Iceland (35 Wells), 2025
Led team to Finals of Miliken-Motsepe Prize in Green Energy, 2024
First field test of thermoelectric cold storage from low enthalpy geothermal, 2023
First drilling low enthalpy geothermal in Himalayas for cold storage field test (GEG), 2022
Completed first repowering of power plant in Iceland (Bjarnarflag, 5MW), 2019



Eirikur Bragason
Engineer / Developer

THERMAL PARTNERS, Managing Partner

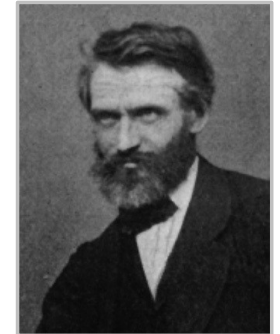
Chief Project Manager for World's Largest Geothermal Power Plant (Hellisheidi, 303MW)
Chief Project Manager for Second Largest Power Plant in Asia (Sorik Marapi, 200MW)
Chief Operating Officer for six years at largest geothermal heat company (Arctic Green)
Developed and built first geothermal power plant in Hungary (Tura, 10MW)

Timeline & Status

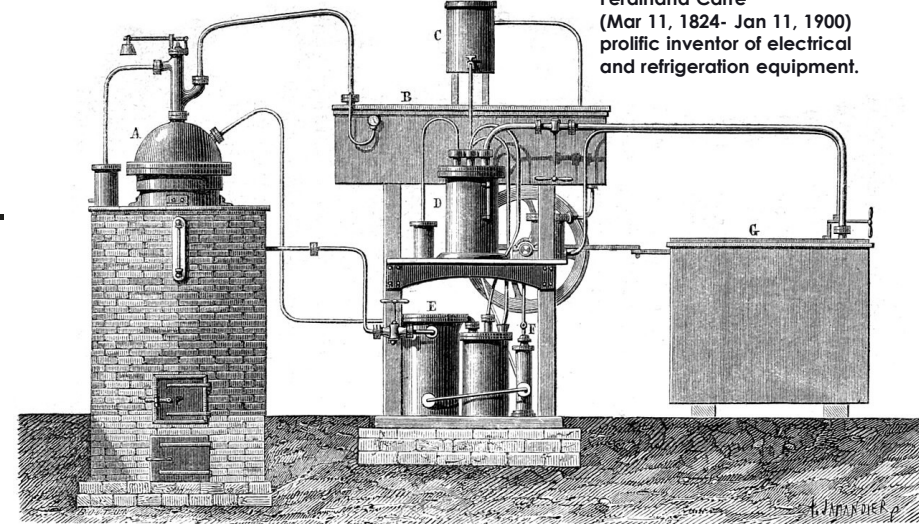
Technical Origins

- 1860** Ferdinand Carré developed the first absorption chiller.
- 1945** Carrier introduced the first large-scale LiBr absorption chiller.
- 1960s** Double-effect chillers increased efficiency and use expanded.
- Present** **Thousands installed globally.**

Major Global Brands: Carrier, Daikin, Trane, Johnson Controls (YORK), Trane, Yazaki, Thermax.



Ferdinand Carré
(Mar 11, 1824- Jan 11, 1900)
prolific inventor of electrical
and refrigeration equipment.



First Absorption Chiller patented as an Ice-Maker, 1860

Timeline & Status

Geothermal Project Origins

160 years later . . .

- 2021** Government of Iceland provides research grant to GEG via the Business Partnership Fund for UN Global Goals for research/engineering and field tests in Himalayas.
- 2023** Spinoff to Geotropy for Indian projects and GeoCool for Europe and ROW.
- 2025** Project InnerSpace finances Geotropy under GeoFund.
- 2026** Thermal Partners funds GeoCool for EU, ASEAN, US.
First UK Projects evaluated for feasibility.



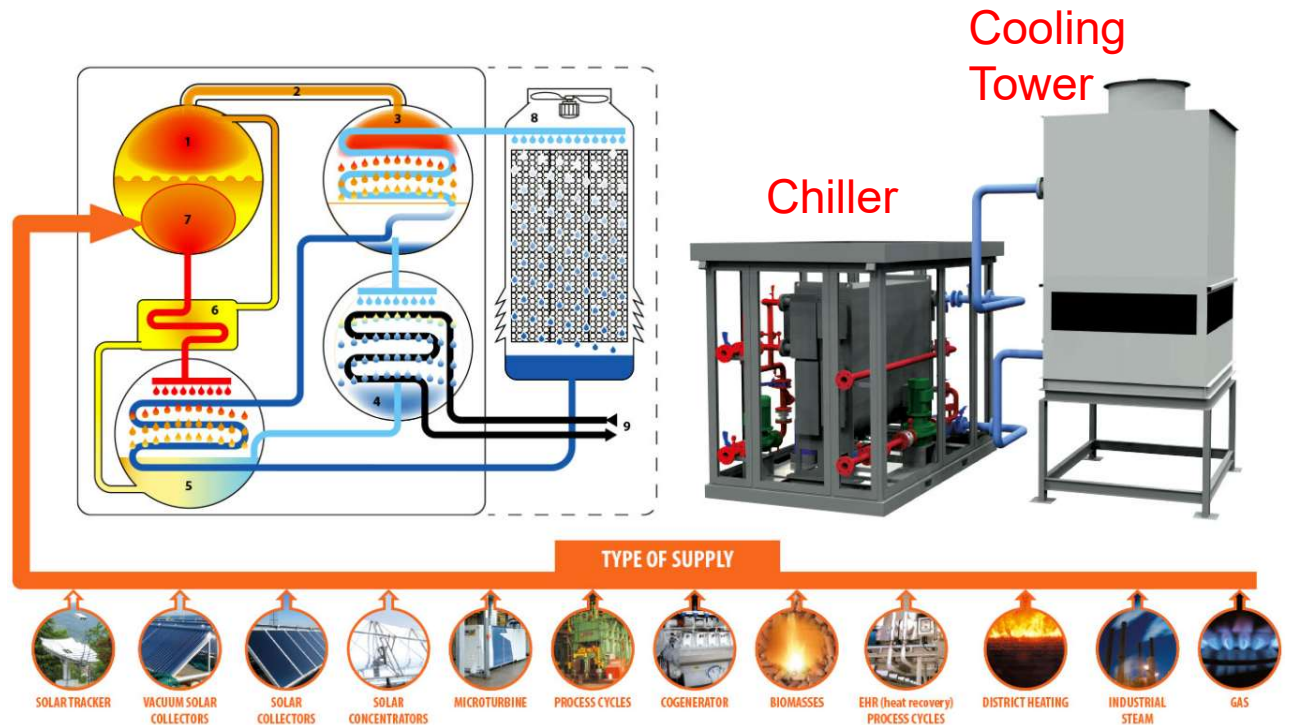
GEG Team, Feasibility Studies, Himachal Pradesh 2021

Technical System

When a liquid evaporates, it absorbs heat. Alcohol on your hand, you feel cold sensation.

In this system, water acts as a coolant and LiBr as absorbent.

LiBr is highly absorbent and absorbs heat in low pressure. LiBr and water solution are heated (1), causing separation of water and conversion in steam of high temperature (2).

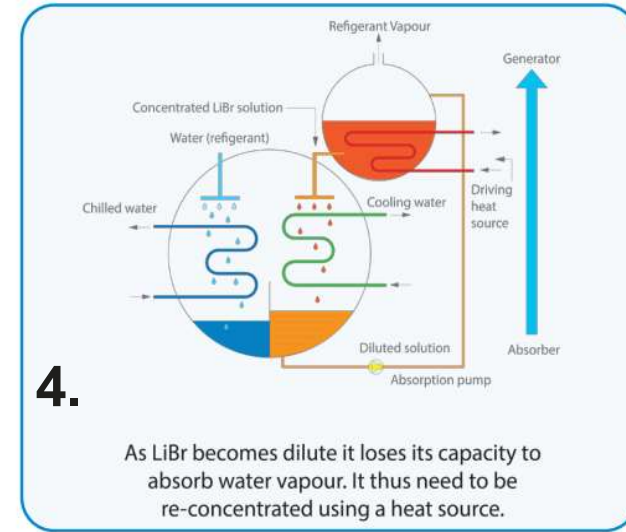
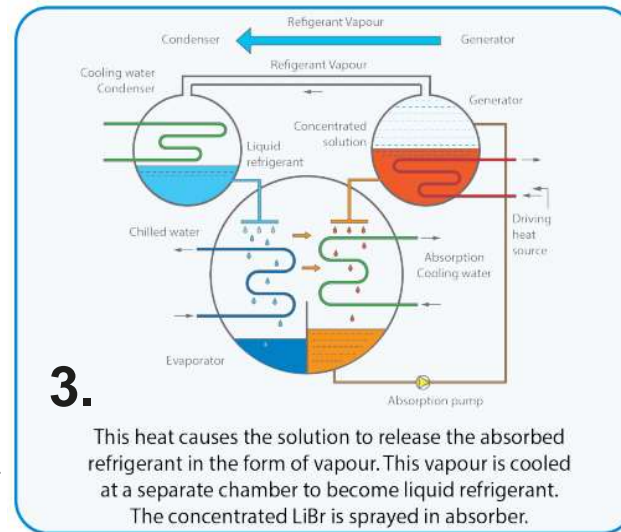
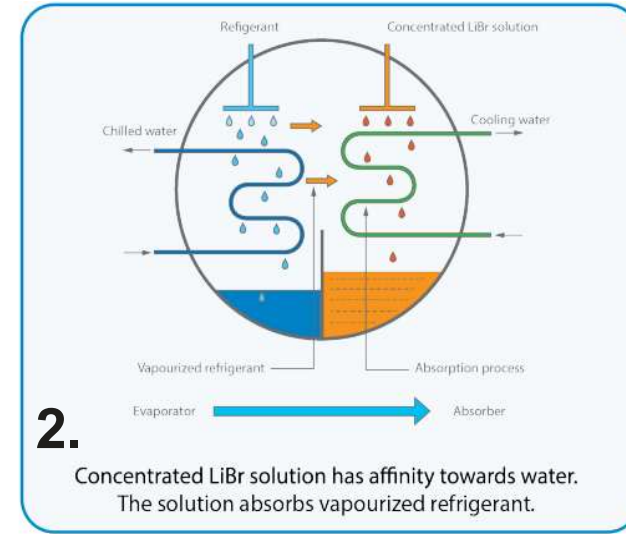
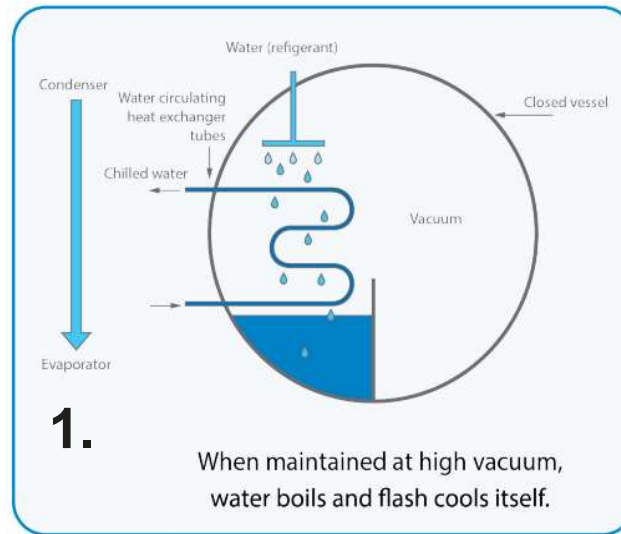


Absorption Chiller Diagram, Systema S.p.A., Padua, Italy

Novel approach is using geothermal as the heat source.
Target resource is low enthalpy in a range of 75C to 95.
It is possible to operate lower temp (50C) with “adsorption”.

Technical System

Underlying Thermodynamics



Vapour Absorption Chiller Stages, Thermax Ltd.



Geothermal
cold storage

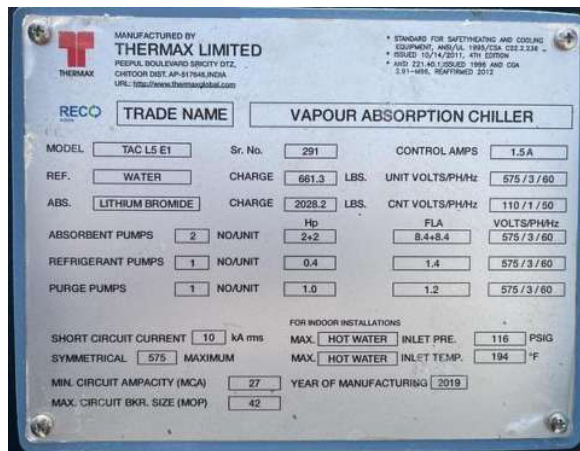
Technical System

Thermax LT5 (“Low Temperature”)



Technical System Thermax LT5

Hot Water Circuit Flow Rates
17 to 64 m³ / hour (5 to 18 l/s)



- Notes:
- 1) Model Nos. : LT X - Low Temperature Hot water fired Single effect Chillers
 - 2) Chilled water inlet/outlet temperature- 12.2/6.7°C
 - 3) Cooling water inlet temperature = 29.4°C
 - 4) Hot water inlet / outlet temperature = 90.6 / 85°C
 - 5) Minimum Chilled water outlet temperature is 3.5°C
 - 6) Minimum Cooling water inlet temperature is 20°C
 - 7) Ambient condition shall be between 5 to 45°C
 - 8) Maximum Allowable pressure in chilled / cooling / hot water system = 4.9 bar (g)
 - 9) Control panel Electric Input = 1 kVA
 - 10) All Water Nozzle connections to suit ASME B16.5 Class 150
 - 11) Technical specification is based on JIS B 8622 : 2002

Model Number	UNIT	LT2	LT3	LT5	LT6	LT8	
Cooling Capacity	kW	70	106	176	229	281	
Chilled Water Circuit	Flow Rate	m ³ /hr	11.0	16.5	27.4	35.7	43.9
	No. of passes (Evaporator)	#	6	4			
	Friction Loss	kPa	18.6	16.7	19.6	17.7	24.5
	Connection Diameter	mmNB	50	65	80	100	
Cooling Water Circuit	Flow Rate	m ³ /hr	20	30	50	65	80
	Outlet temperature	°C	37.1	36.8	36.8	36.8	36.8
	No. of passes (Absorber)	#	6	4			
	No. of passes (Condenser)	#	2				
Hot Water Circuit	Friction Loss	kPa	39.2	45.1	77.5	46.1	54.9
	Connection Diameter	mmNB	65	80	125		
	Flow Rate	m ³ /hr	17	24	40	52	64
	No. of passes (Generator)	#	8	4			
Overall Dimensions	Friction Loss	kPa	76.5	17.7	17.7	15.7	17.7
	Connection Diameter	mmNB	50	65	80	100	
	Length (L)	mm	2150	2350	2350	2550	
	Width (W)	mm	1105	1275	1350	1540	
Operating Weight	Height (H)	mm	2350	2100	2350	2490	
	x10 ³ kg		2.5	3.0	4.0	5.5	5.8
Maximum Shipping Weight	x10 ³ kg		2.2	2.5	3.5	4.2	4.5
Clearance for Tube Removal	mm		1500	2200			
	Absorbent Pump	kW (A)	1.1(3.4)				
Electrical data	Refrigerant Pump	KW (A)	0.1(0.55)		0.3(1.4)		
	Purge Pump	kW (A)	0.75(1.8)				
	Total power consumption	kVA	5.1				5.7
	Power Supply		415V(±10%), 50 Hz (±5%), 3 Phase+N				

Vapour Absorption Chiller Specifications, Thermax Ltd.

Technical

Use of geothermal brine directly into system

Possible in unique geothermal aquifers but unlikely due to brine composition and process water requirements.

More realistic to use heat exchanger to transfer heat from geothermal brine to closed loop process water.

Sr. No.	Items	Units	Allowable Range		
			Chilled Water	Cooling Water	
			(Circulating)	(Circulating)	(Make-up)
1	pH (25°C)		6.5 - 8.0	6.5 - 8.0	6.5 - 8.0
2	Electric Conductivity (25°C)	μs/cm	500 max	800 max	200 max
3	M Alkalinity	ppm	100 max	100 max	50 max
4	Chloride Ion Cl -	mg/l	100 max	200 max	50 max
5	Sulphuric Acid Ion SO4 --	mg/l	100 max	200 max	50 max
6	Total Hardness as CaCO3	mg/l	100 max	200 max	50 max
7	Total Iron Fe	mg/l	1.0 max	1.0 max	0.3 max
8	Sulphur Ion S --	mg/l	Not detected		
9	Ammonium Ion NH4 +	mg/l	0.5 max	1.0 max	0.2 max
10	Silica	mg/l	50 max	50 max	30 max
11	Turbidity	NTU	10 max	20 max	5 max
12	Suspended solids	mg/l	10 max	20 max	5 max
13	Free Carbonic acid	mg/l	10	-	-
14	Biological Oxygen Demand (BOD)	ppm	Below 160	-	Below 160
15	Chemical Oxygen Demand (COD)	ppm	Below 160	-	Below 160

Process Water Specifications, Thermax Ltd.

Technical Stacked / Racked Reefers

Absorption chiller connects directly to embedded equipment.

Scalable and Reducible allowing relocation.



**Accelerates permitting as
a semi-permanent facility.**



Reefer Racks

Metal structures with integrated electrical outlets and catwalks



Stacked Reefers

Reefers arranged into cubes for storage in open yards—limited accessibility

RTE

**Geothermal
cold storage**

Technical Potential UK Sites

Sample Indicative Temperatures from Project InnerSpace Report:

Manchester and Crewe targeting
temperatures +90°C

Northern Ireland, Larne Basin
recorded temperatures up to 91°C

Stoke Deep Geothermal Project
anticipated temperature of 95°C

Marchwood Wessex, bottom hole
temp. 88°C, main aquifer 74°C

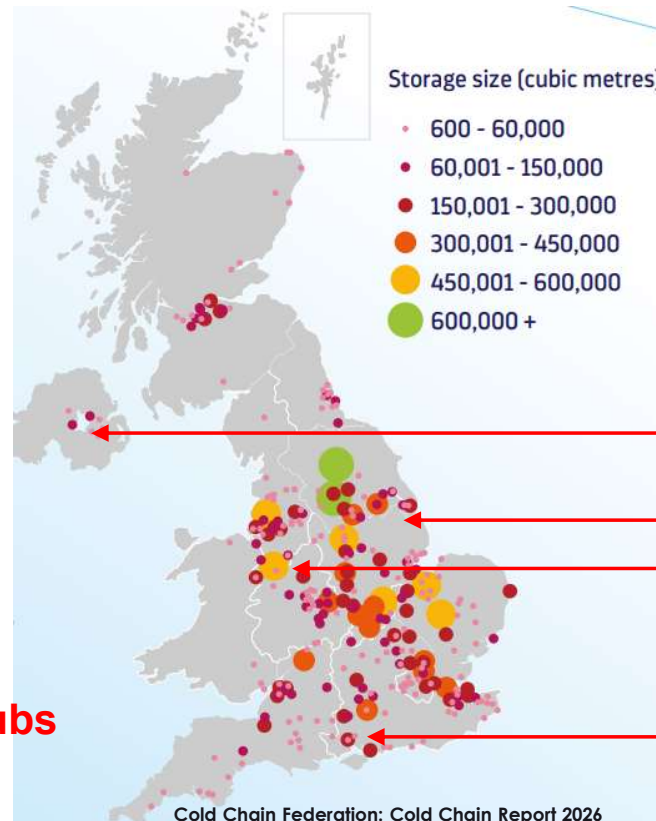
East Yorkshire & Lincolnshire
Basins borehole, temperature 69°C

**Good overlap of cold storage hubs
and low enthalpy geothermal.**

34 million m³ cold storage

East Midlands 20%

Yorkshire/Humber 15%

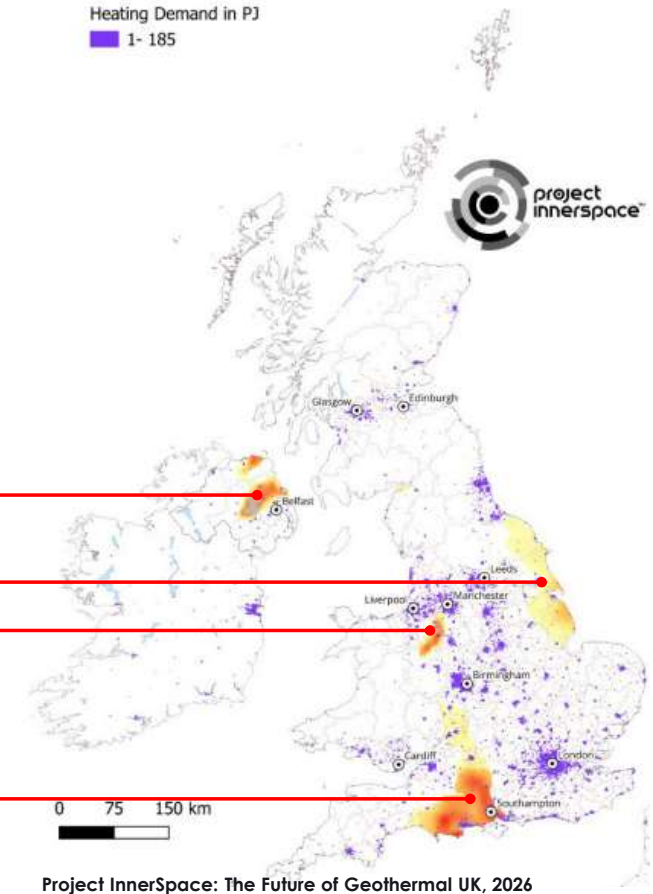


HIIP: Triassic 60 °C Cut-off Max Thermal Model (PJ per km²)



Heating Demand in PJ

1- 185



Geothermal
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Technical

Critical Insights from Cold Chain Report 2026:

Oxford Economics was commissioned by the Cold Chain Federation to quantify the economic impact of the cold chain in terms of its contributions to UK GDP, jobs, and tax revenues. The study also explores how the sector supports other key industries and international trade.

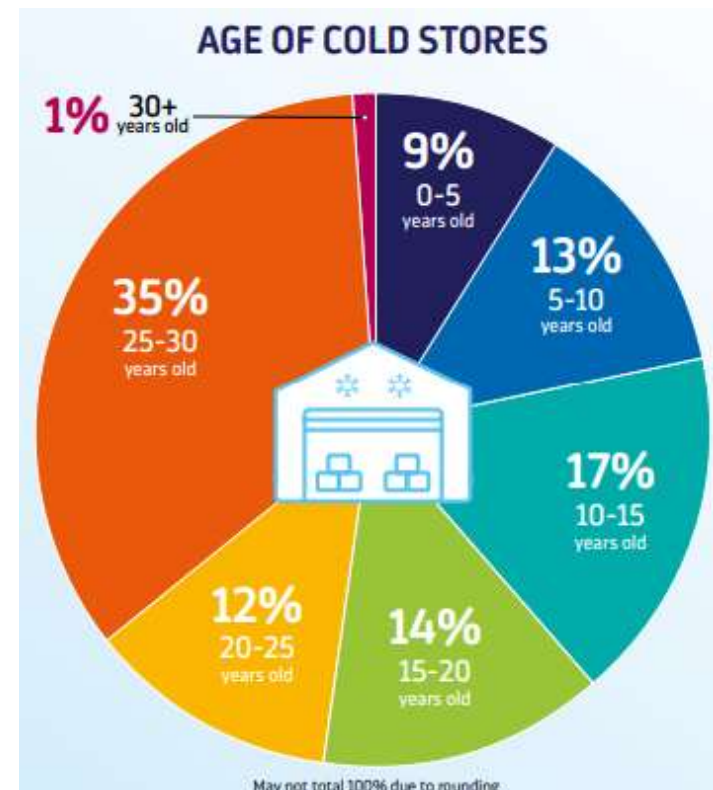
In 2023, there were approximately **34 million cubic meters** of cold chain storage and **104,000 refrigerated vehicles** operating across the UK.¹

Through these operations, the cold chain is estimated to have supported **£14 billion in gross value added**, **184,000 jobs**, and **£3.7 billion** in government tax revenues.

EMISSIONS FROM COLD CHAIN STORAGE AND DISTRIBUTION



4% of total energy consumption is generated by on-site renewables



Technical

Does the UK need more cold storage?

Yes! the UK requires more cold storage due to a chronic supply shortage, driven by increasing consumer demand for both fresh produce and frozen/chilled foods, Brexit-related trade issues (border checks) and critical pharmaceutical storage.

Almost 50% of all food and beverages produced in the UK, (£50 billion pa) require cold storage and efficient local cold chains.

Future-oriented supply chain resilience and food security issues are also working their way into policies and projects.

Reducing Farm Waste: new initiatives, such as the £15 million **Farm Gate Food Waste Fund**, aim to help farmers use cold storage to prevent surplus crops from being discarded.

The Number 1 Issue:
Aging Infrastructure
and New Standards.

Around 50% of the UK's current cold storage is over 20 yrs old and one-third is over 30 yrs. Older sites are becoming "unfit for purpose" due to new energy efficiency targets and regulations phasing out F-gases.
Where possible, let's build with geothermal.