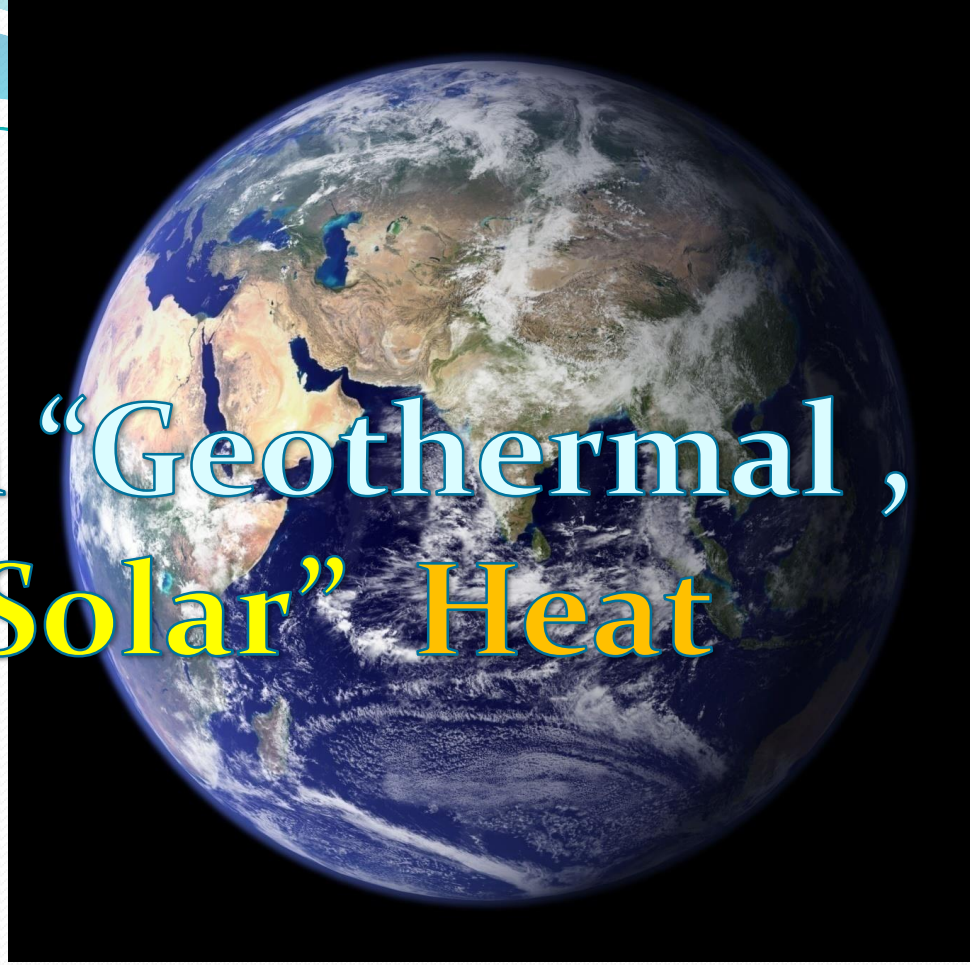
De Beijer RTB B.V

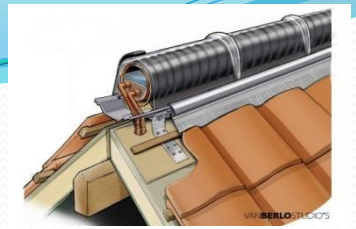
Cooling with "Geothermal , Waste or Solar" Heat



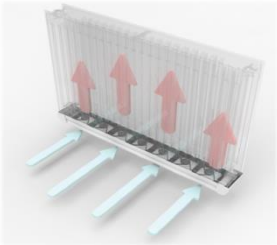
Henk de Beijer
Genève 30-10-2015

SolabCool
The best comfort with pure energy

Introduction De Beijer RTB:



SunRidge



CimateBooster

SolabCool

Thermo –chemical energy storage

Profile:

- Engineering company with 30 years of experience in renewable energy solutions and products.
- Many international cooperation's with institutes and universities.
- Various renewable energy products successfully launched to the market in the past.

Main activity:

De Beijer RTB is mainly active in the field of Solar, thermo-chemical-energy storage and thermo-chemical conversion technology.

Main projects:

Development, cost-effective pre-production method for SolabCool and ClimateBooster. Market introduction. Development and the pre-production SunRidge and thermo-chemical energy storage

De Beijer RTB B.V

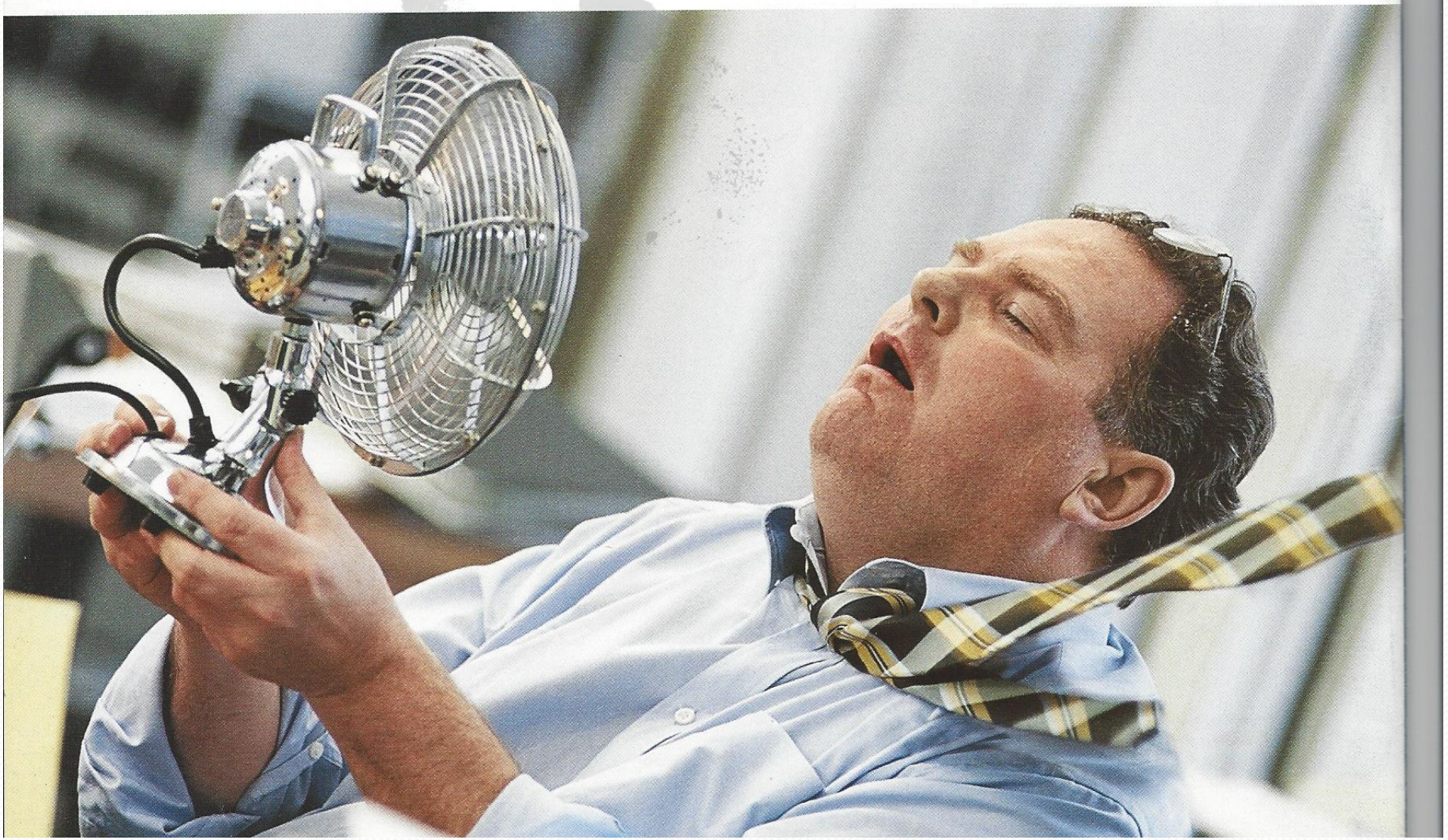
ClimateBooster

Sunridge

SolabCool

Sweat

Problems with building cooling?



Comfort spectrum

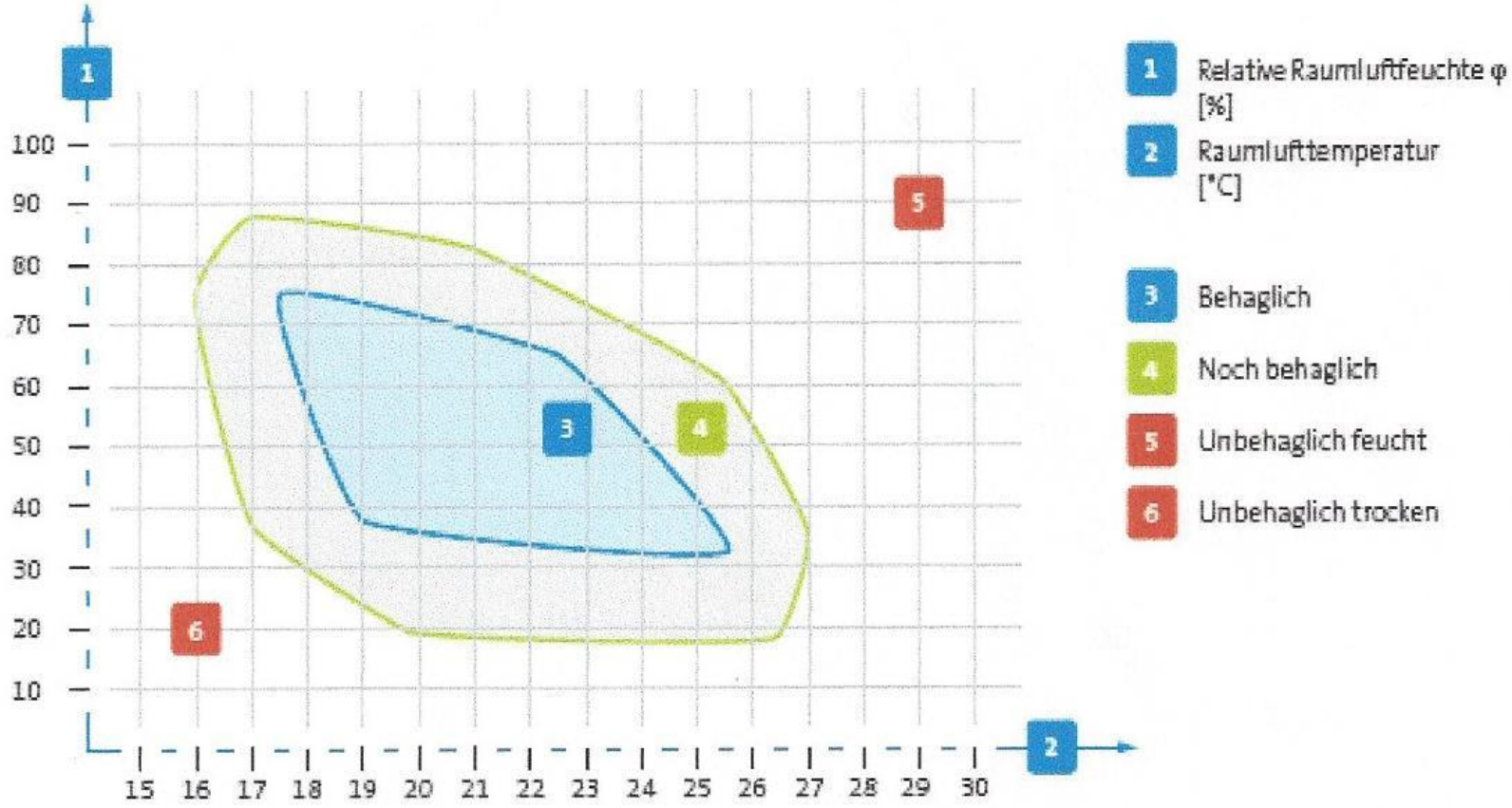
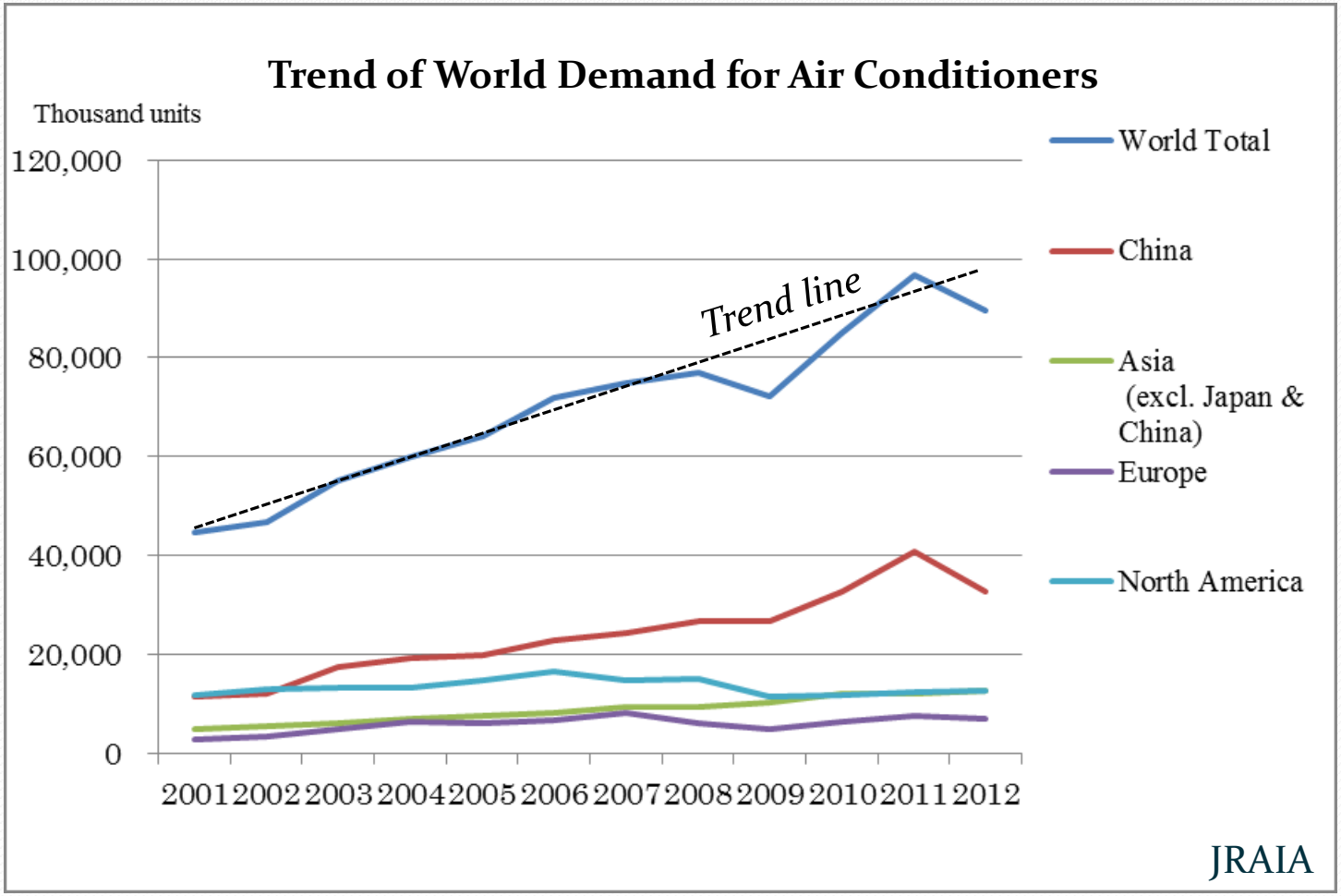
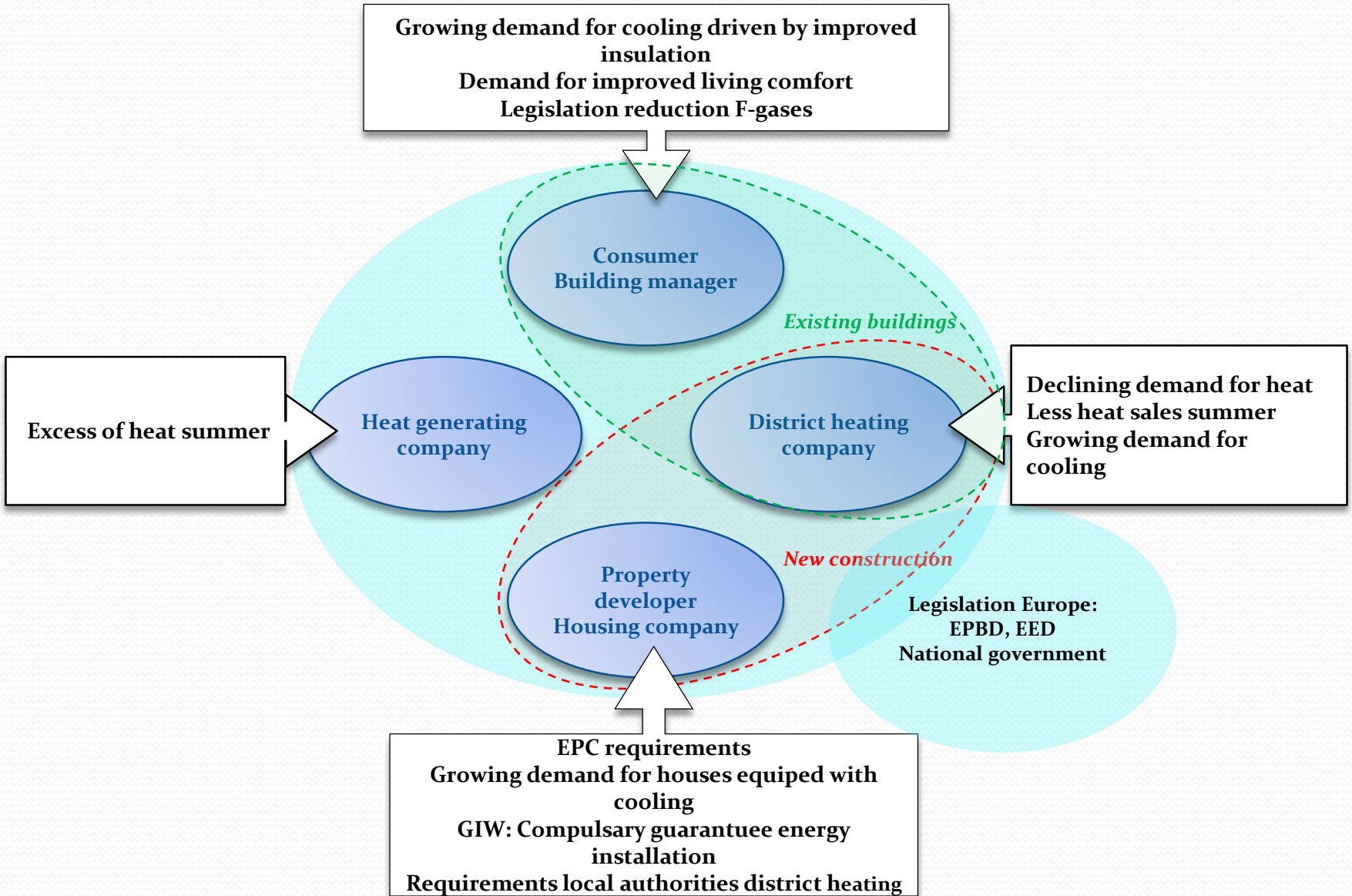


Abbildung 4:
Eine bestmögliche thermische Behaglichkeit ergibt sich im inneren blauen Feld (3), also bei einer Raumtemperatur von etwa 20 bis 25 °C (Winter/Sommer) und einer relativen Raumluftfeuchte von 30 bis zirka 60 % (Winter/Sommer).

Growing Demand for air conditioning



Key players and marketdrivers



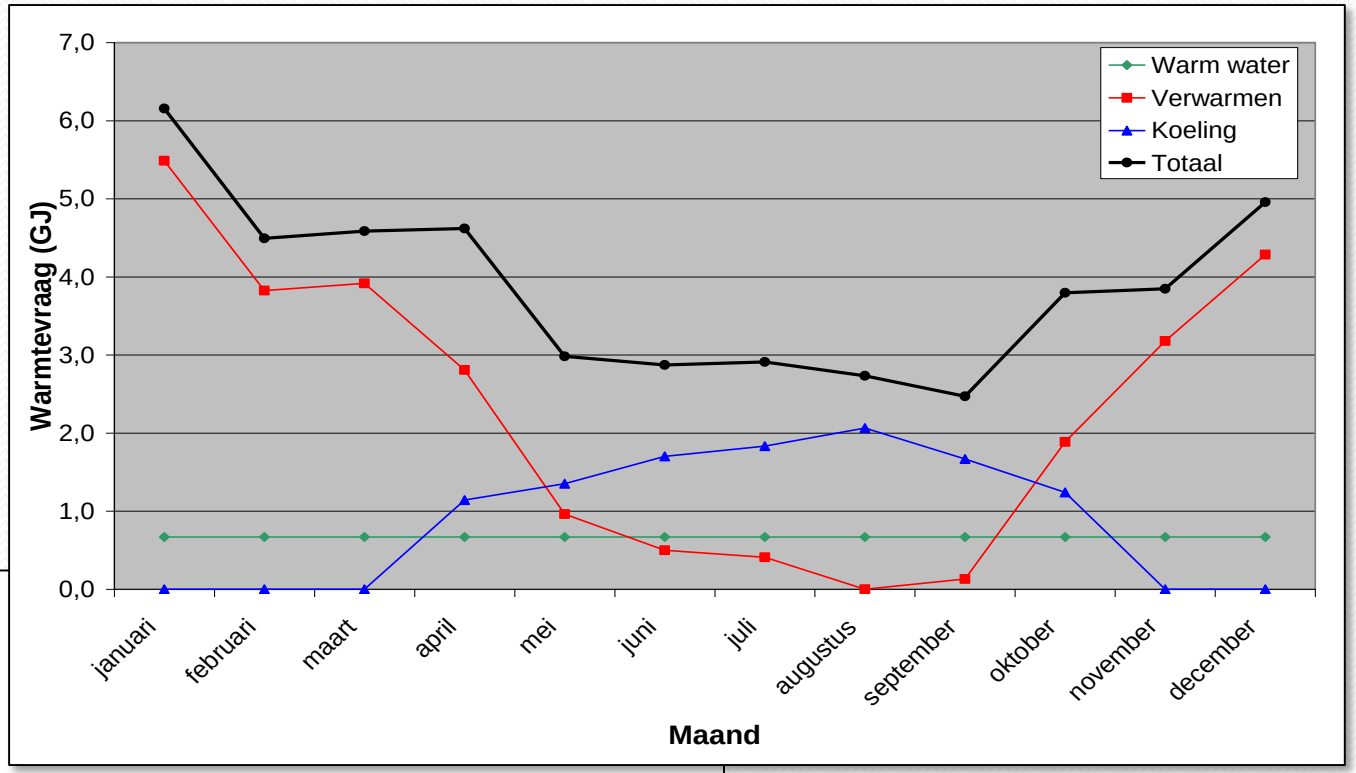
Cooling is a must

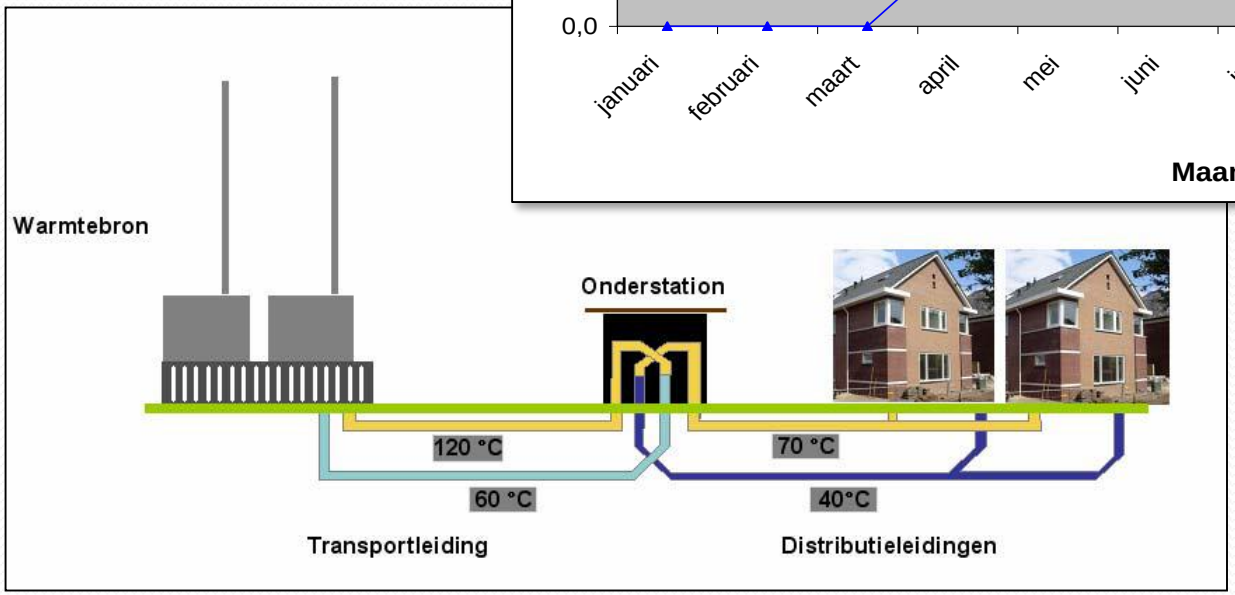
- Shifts in comfort culture, behavioural patterns, affordability and consumer expectation
- Perception that comfort cooling contributes to higher productivity
- Direct impact on rental value of commercial buildings
- Increase in internal loads (computers etc.)

Cooling is also business

- **10%** of electricity used for cooling (global) and 16% in US
- > **80%** of commercial and institutional buildings in USA and Japan has air conditioning
- < **40%** in EU, but expanding rapidly, **60%** is expected by 2020

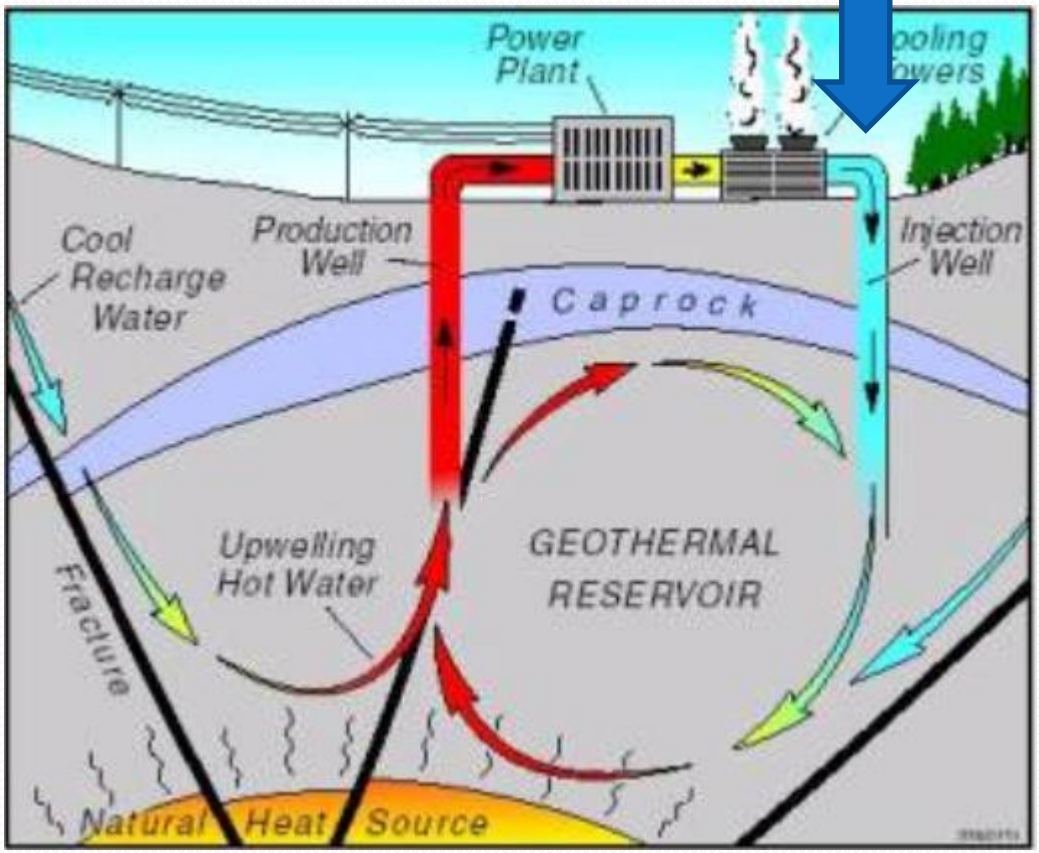
District heating: excess heat in summer

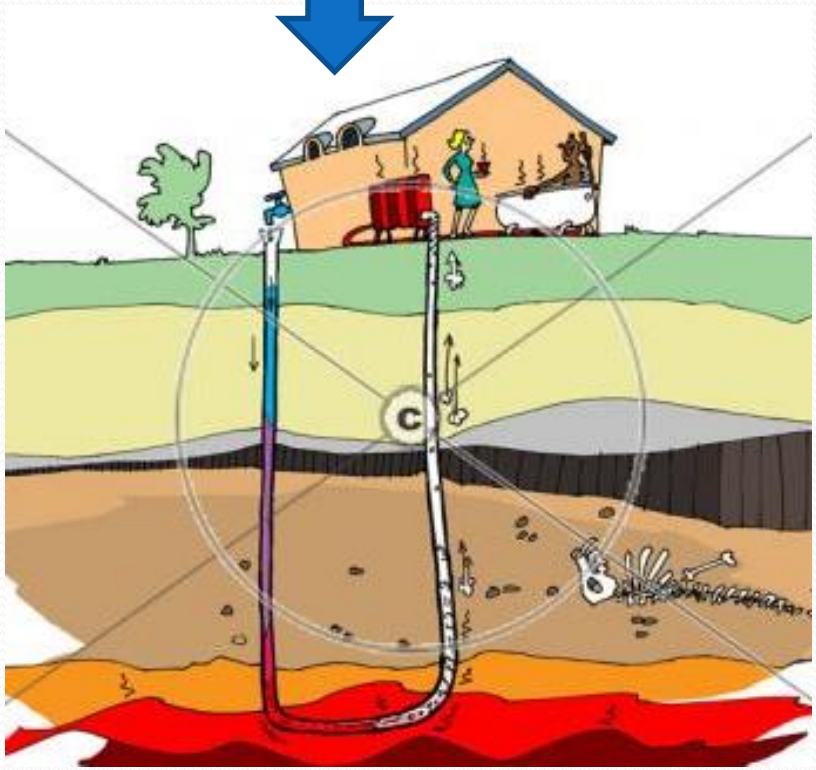




Geothermal & Cooling

SolabCool

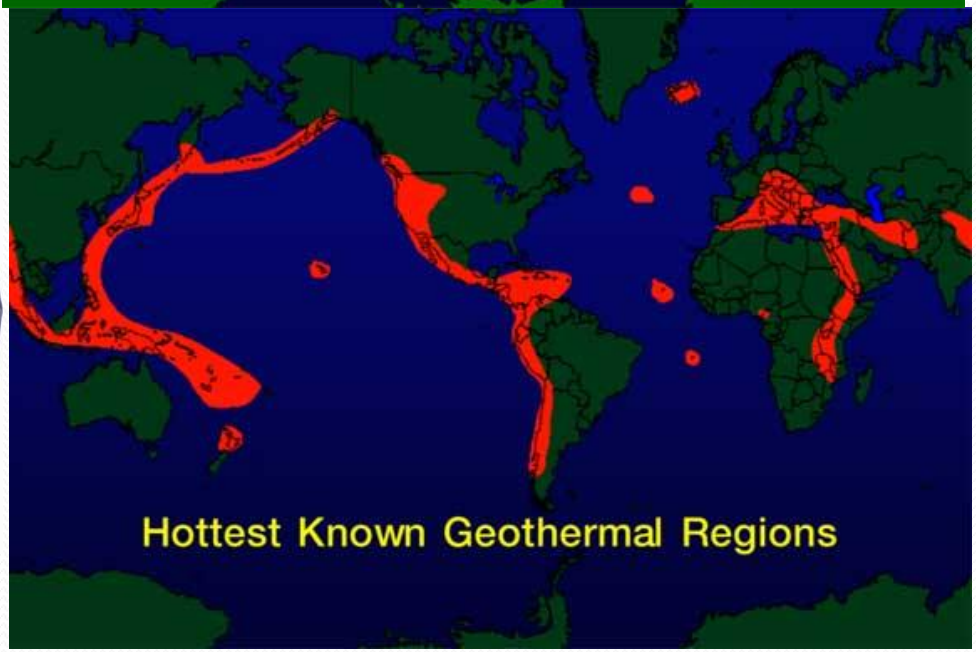




Soultz, Alsace, Fr.

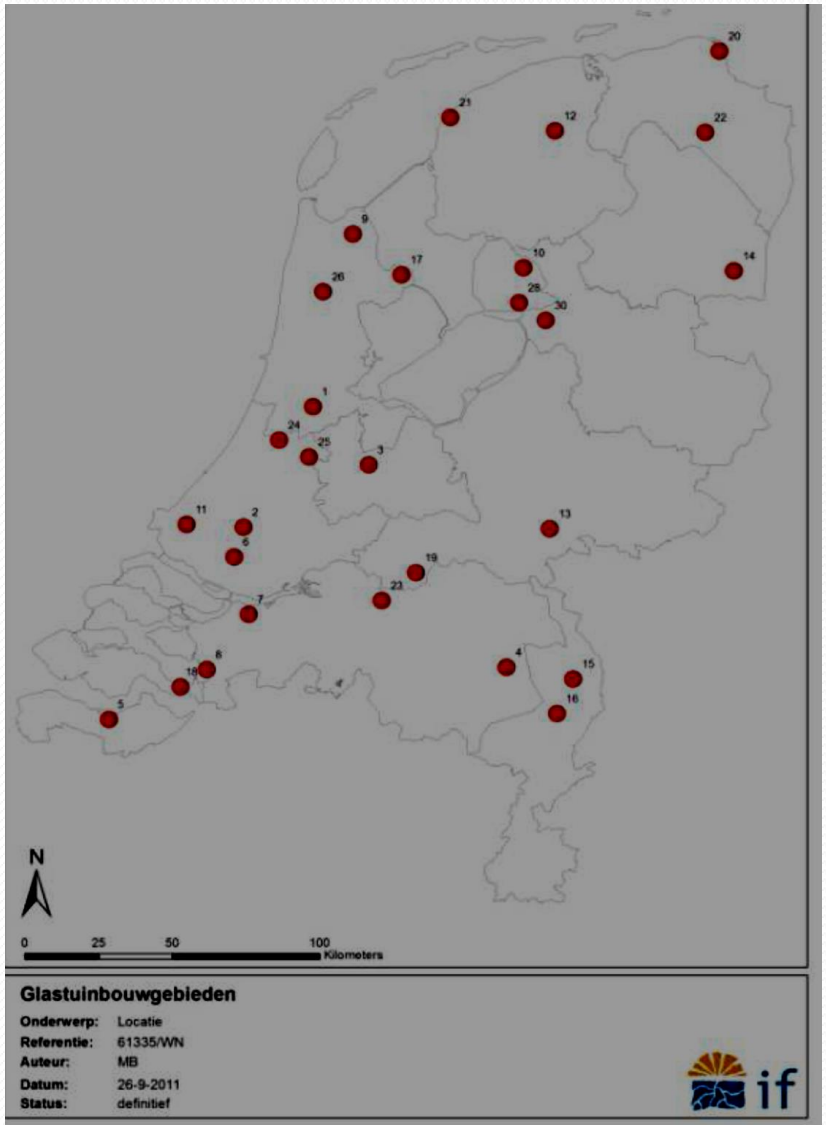
Production 5 km depth at 200°C & Organic Rankine Cycle (ORC) -> 2 MWe -> re-injected temp 70°C

Geothermal in the world



Geothermal in Nevis

Geothermal in the Netherlands



Nr	Locatie	Toevoeging
1	Aalsmeer e.o.	
2	Bleiswijk e.o.	"B-driehoek", Zuidplaspolder
3	Vleuten, Harmelen	
4	Deurne	
5	Terneuzen	
6	Zuidhollandse eilanden	Hoeksche Waard/Voorne Putten
7	Moerdijk	
7a	Dinteloord	nieuw te ontwikkelen
7b	Made	nabij Amer centrale
8	Bergen op Zoom	
9	Wieringermeer	"Agriport A7"
10	Luttelgeest	
11	Westland	
12	Berlikum	
13	Huissen/Bemmel	"Bergerden"
14	Klazienaveen	+ Erica
15	Horst a/d Maas	"Californie"
16	Maasbree	"Siberie"
17	Omgeving Enhuizen/Andijk	't Grootslag
18	Omgeving Rilland	
19	Zaltbommel e.o.	Bommelerwaard
20	Omgeving Eemshaven	
21	Sexbierum	
22	Hoogezand-Sappemeer	
23	Elshout	
24	Roelofarendsveen	
25	Nieuwkoop	
26	Heerhugowaard	
28	Ens	
30	Koekoekspolder	

IEA Task 28 Arnhem Netherlands energy storage & geothermal

Concentrating solar energy for electricity or heat

A power of tower near Seville

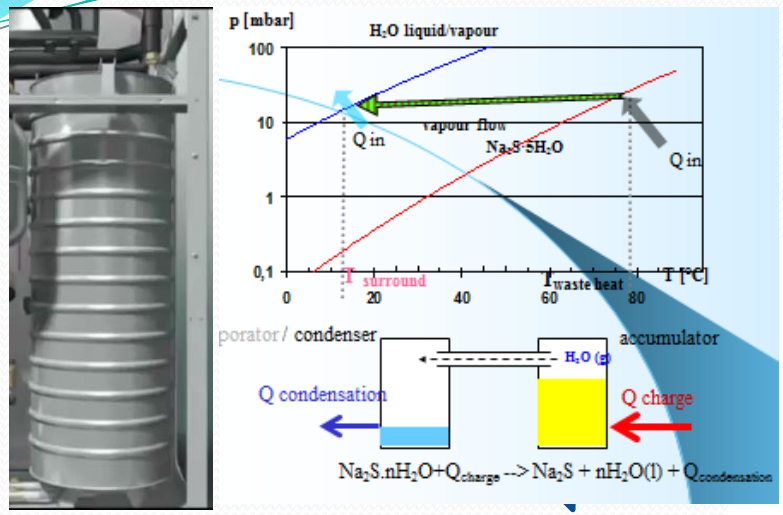
Bright Source EnergyCalifornia

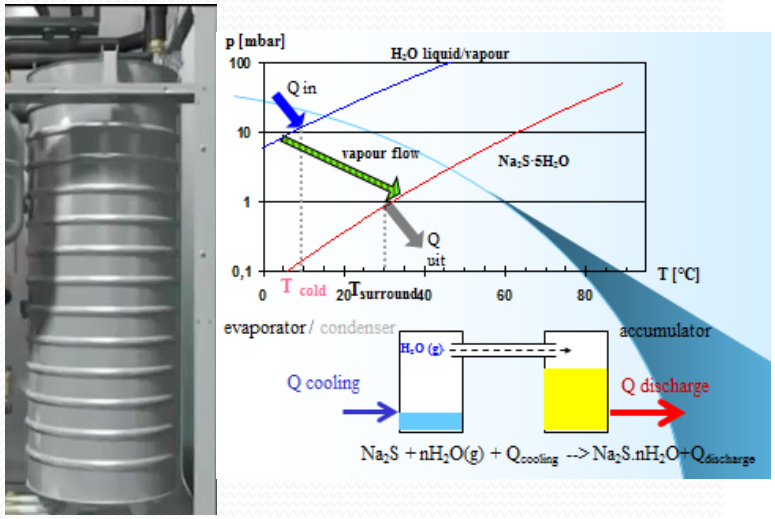
Electric Power Research based in Palo Alto

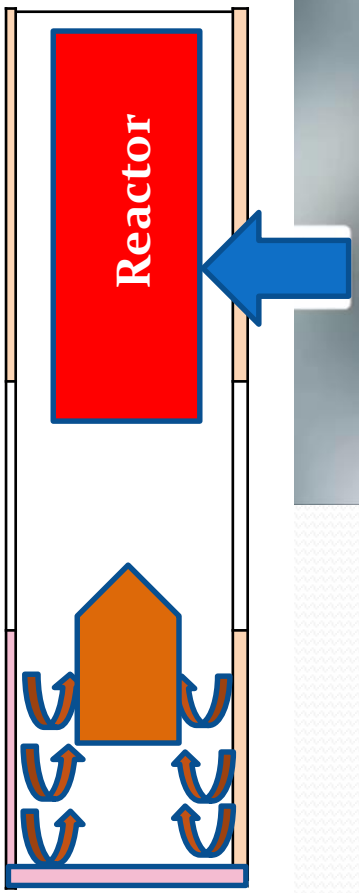
Solar island District heating 'Almere'

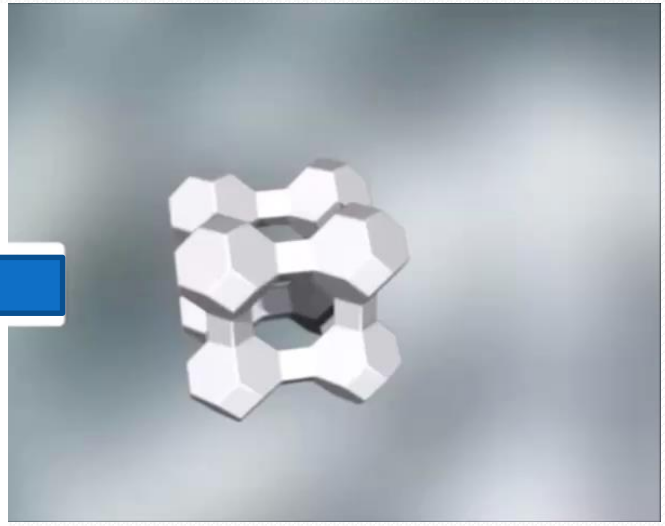
Flat Plate Collectors 7000 m² Production 10,000 GJ/y at 75 C

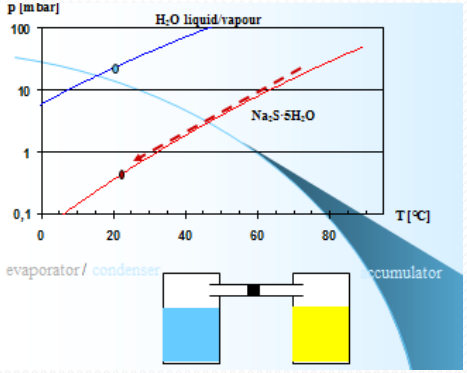
Energy storage and conversion









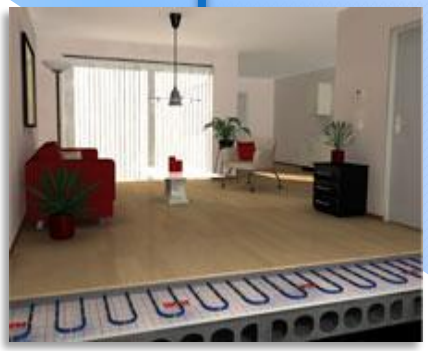


Heat- driven cooling

Zonne-energie

Warmtenet

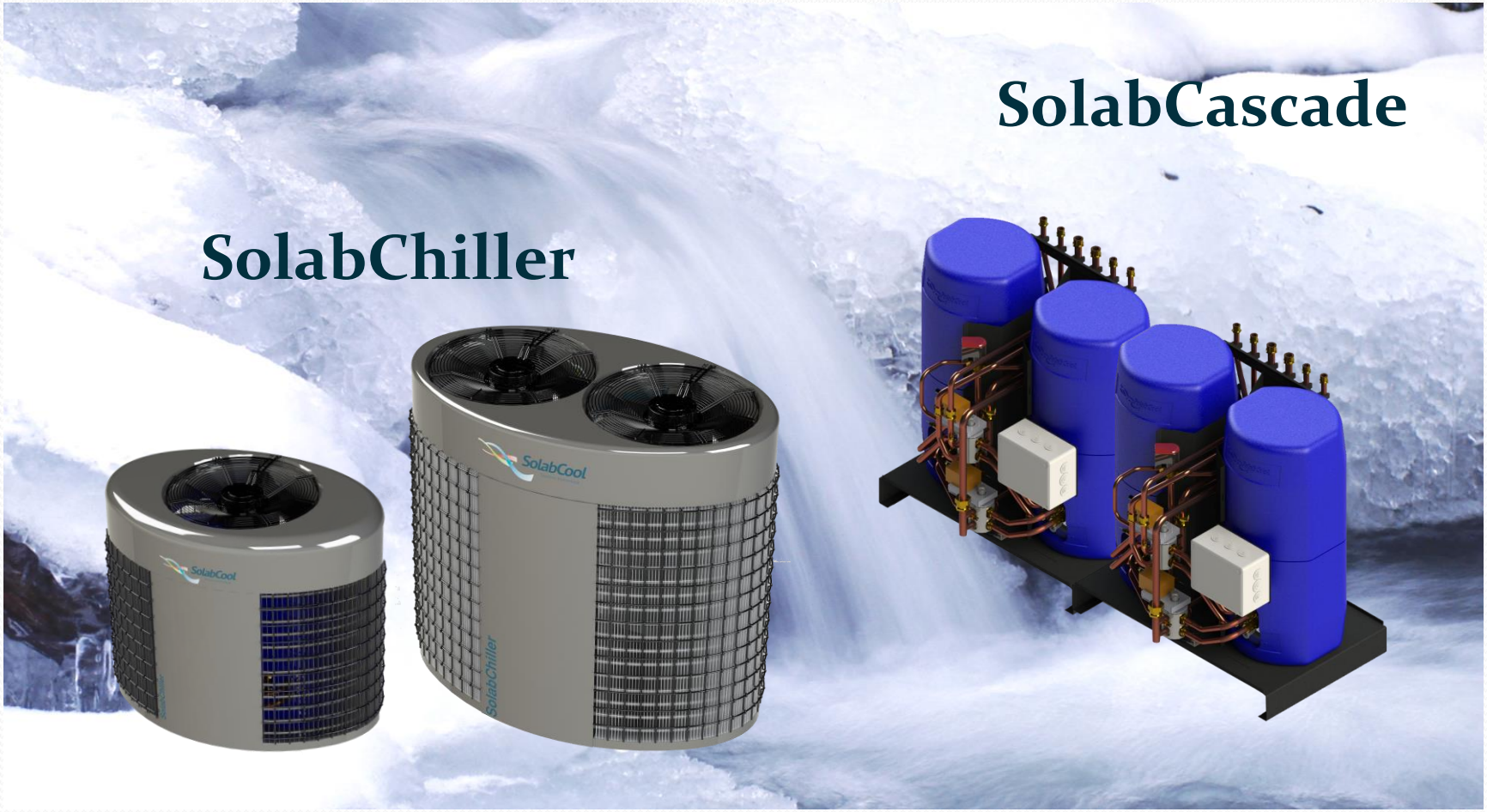
Warmtekracht-koppeling



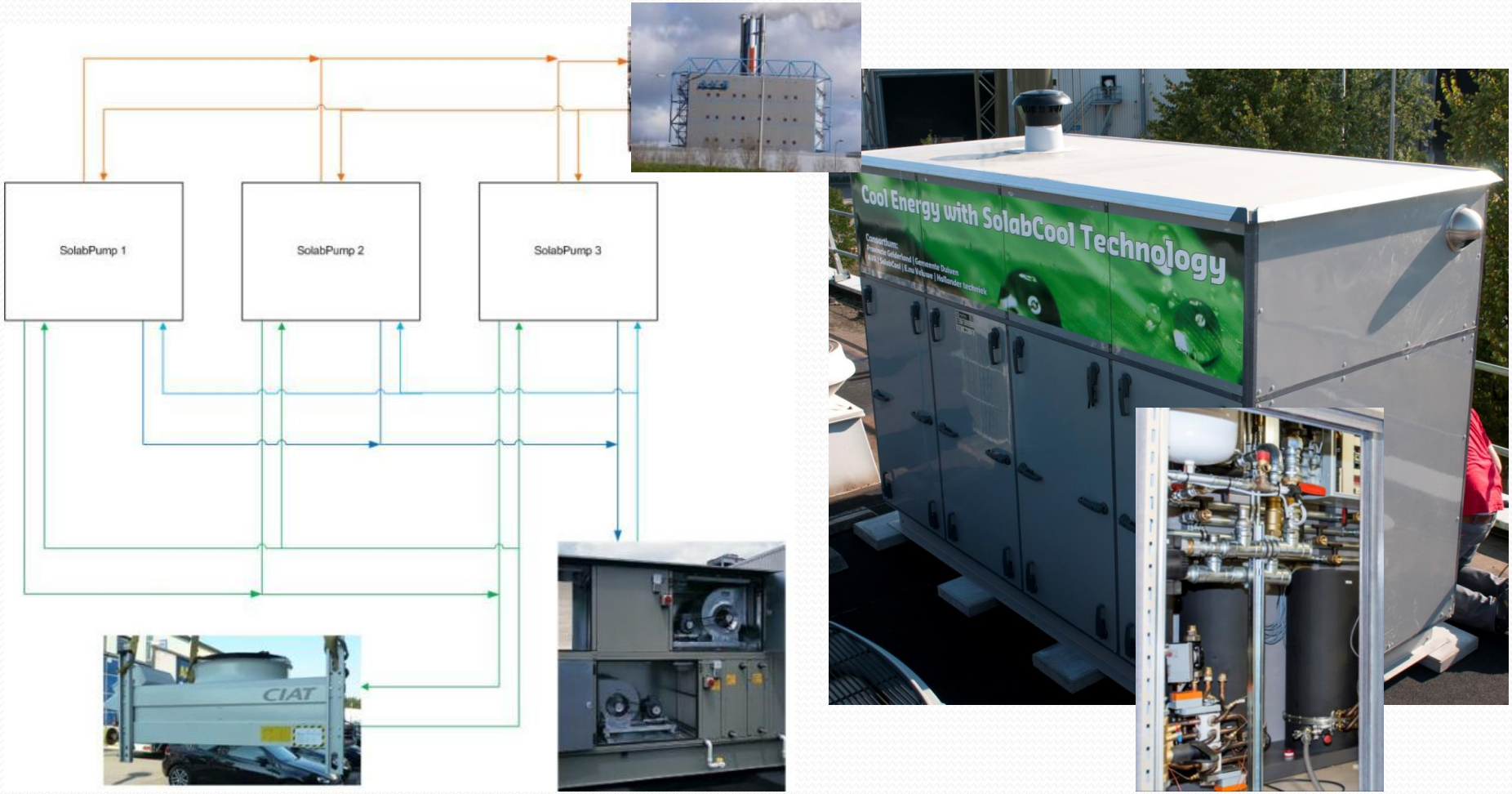
SolabCool

The best comfort with pure energy

SolabCool product range



Cooling office incineration plant AVR Duiven



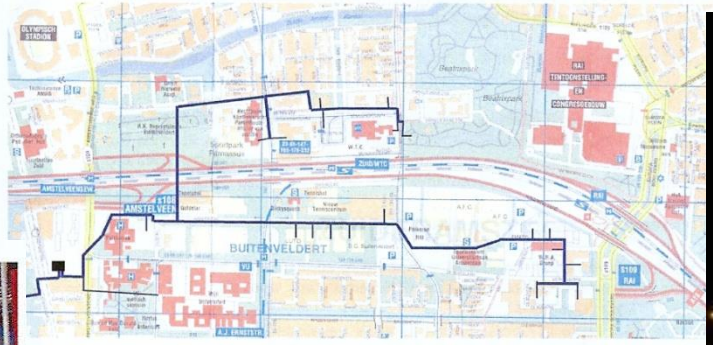
SolabCool
Sorption technology

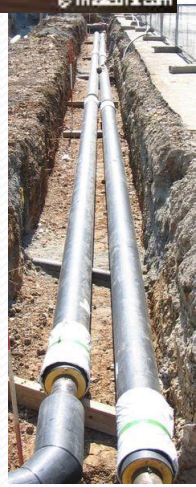
Residential

Absorption Chiller fed with heat from a district heating network

Two 3.5 MW absorption chillers for district cooling network making use of the heat delivered by the district heating system of the city of Helsinki.
These units are installed in a rock cavern under the ground.
Chilling Capacity : 2 x 3 500 kW
Driving Heat : 80°C / 69°C

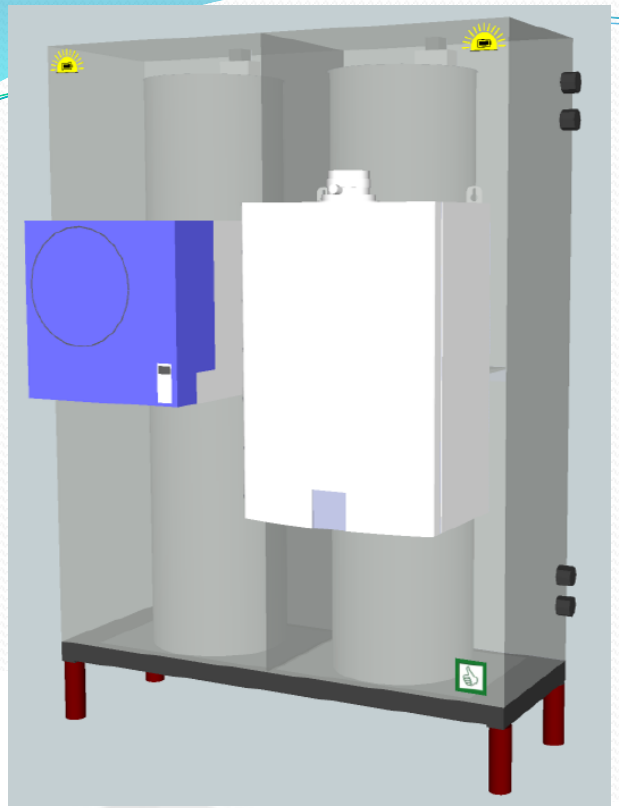
District Cooling in Europe cities

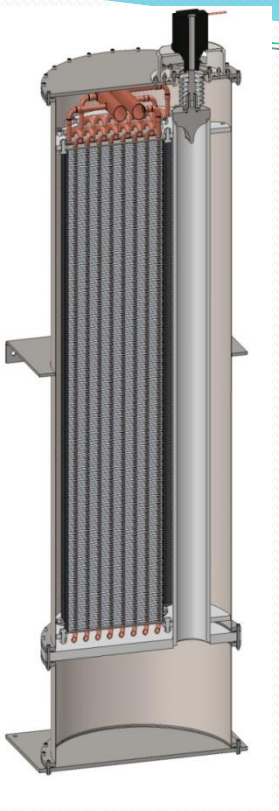


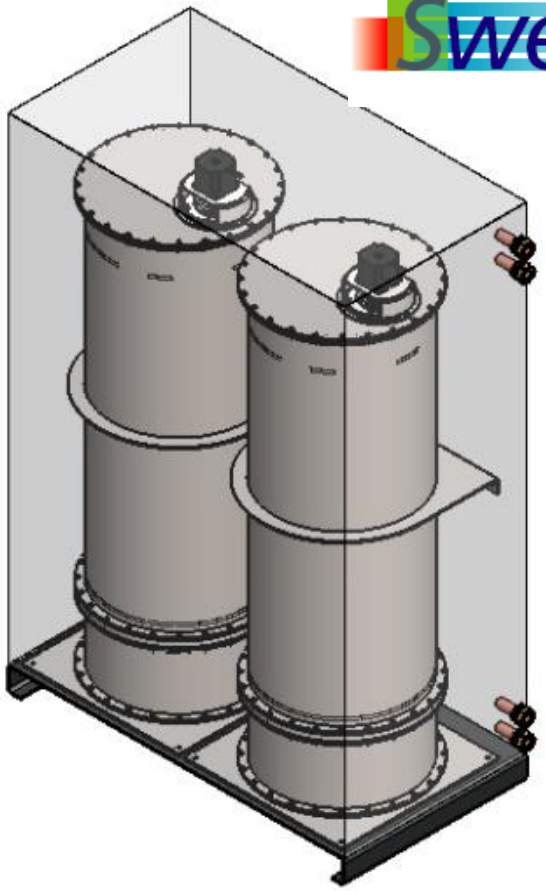


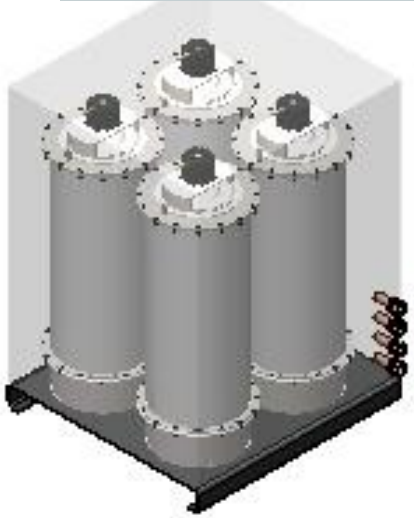
Amsterdam 76 MW Freecooling/Absorption chillers
Barcelona 66 MW
Helsinki 60 MW
Lisbon 40 MW
Stockholm 188 MW
Paris
Berlin

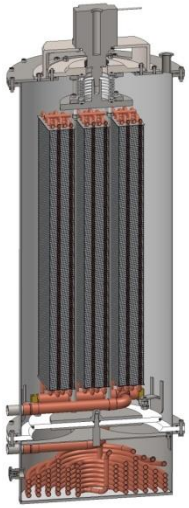
Cooling on District level







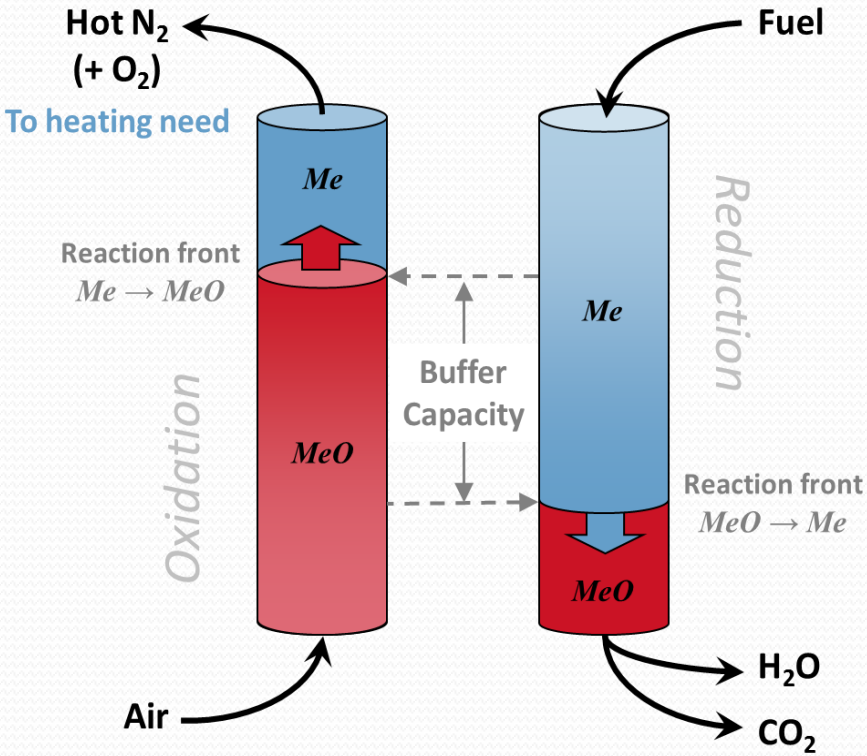


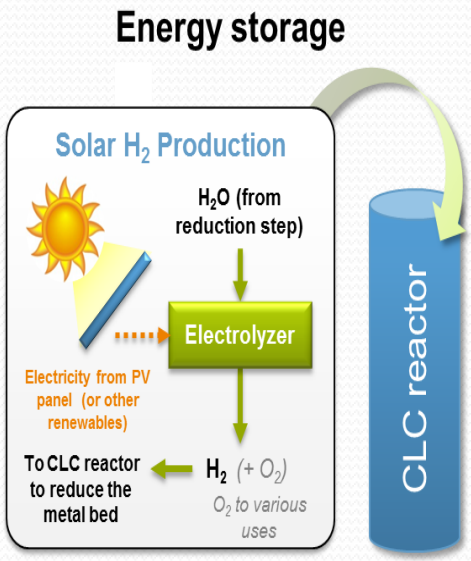


Energy density of the materials

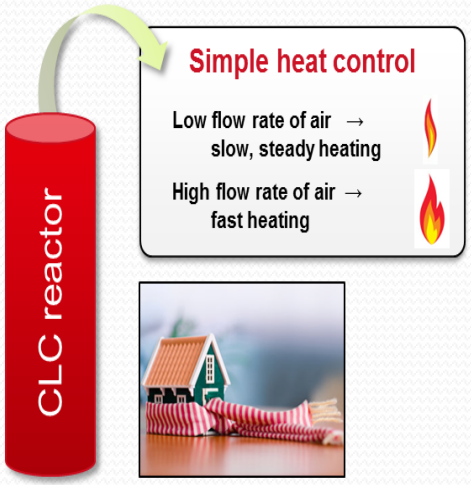
	Storage options				
	Hot water	Phase change materials	Thermochemical	Electical Batteries	Chemical Looping
Storage density	< 0.2 GJ/m³ (dT= 50°C)	< 0.3 GJ/m³	~ 1 GJ/m³	~ 1 GJ/m³	~ 3 GJ/m³
Storage duration	Day	day-year	day-year	minites-months	day-year
Storage	Thermal	Thermal	Thermal	Electrical	Electrical > thermal
Cycling efficiency	~ 70%	~ 90%	~ 90%	75%	70%

Chemical Looping Combustion for Energy Storage Applications



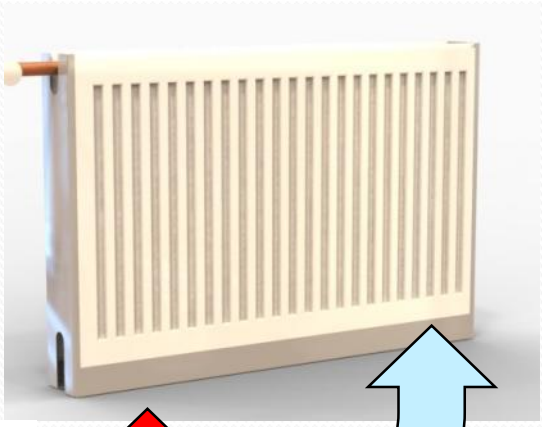


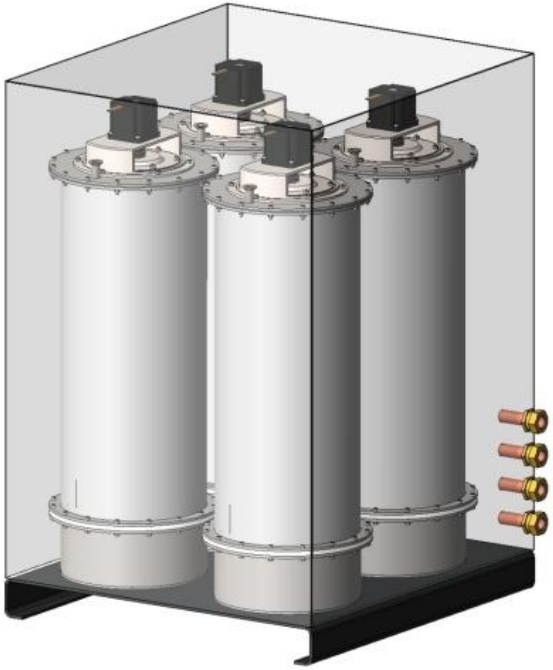
Bed reduction: Solar energy from summer is stored as chemical energy, without losses, until the heat is needed



Bed oxidation: Running air through the reactor oxidizes the bed and provides heat all winter long

Solar/Heat /Cold storage distribution system





De Beijer RTB B.V

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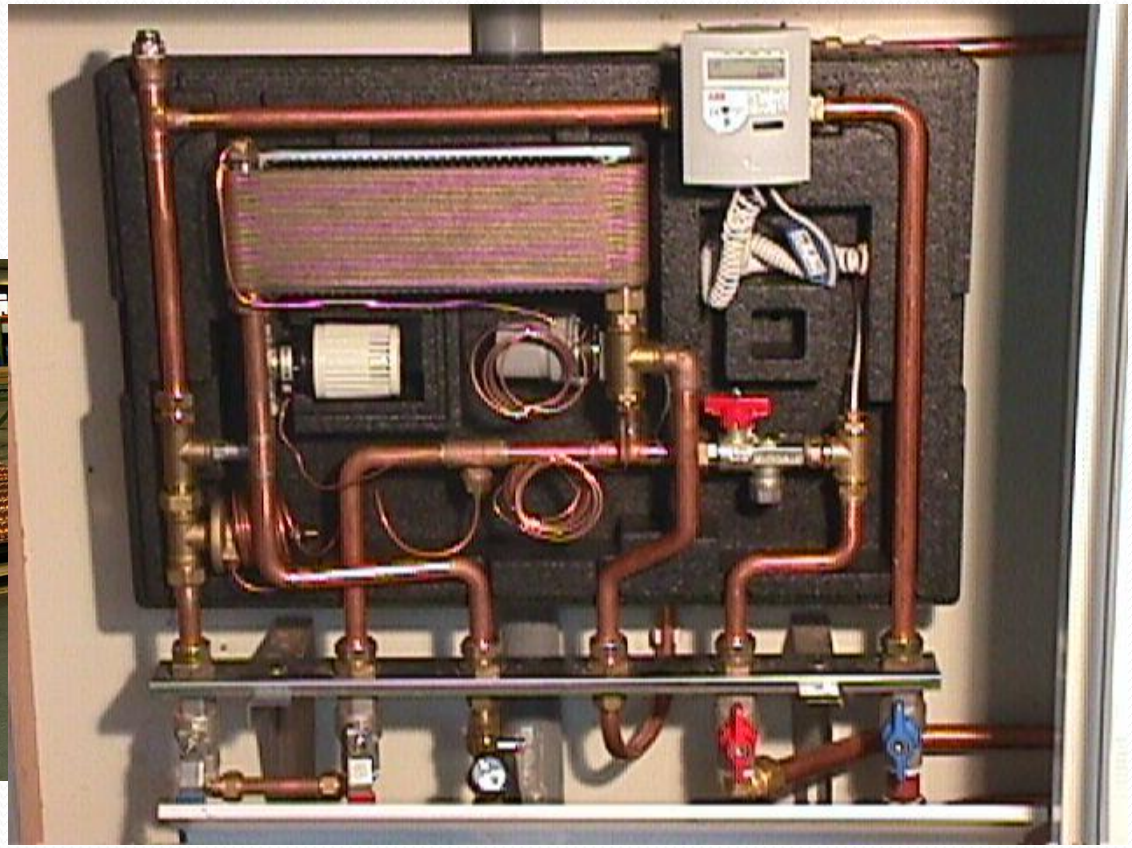
Company ‘Principles’

- Spirit
- Reliability
- Flexibility
- Innovation
- Fun

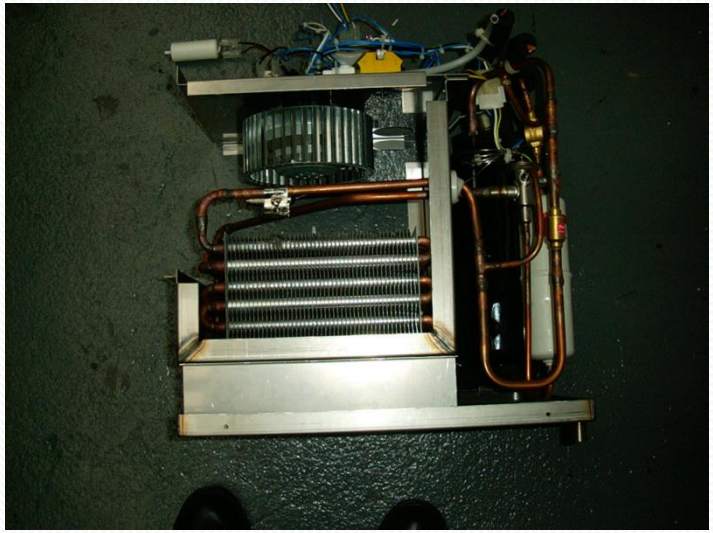
It's our Competence that makes the difference

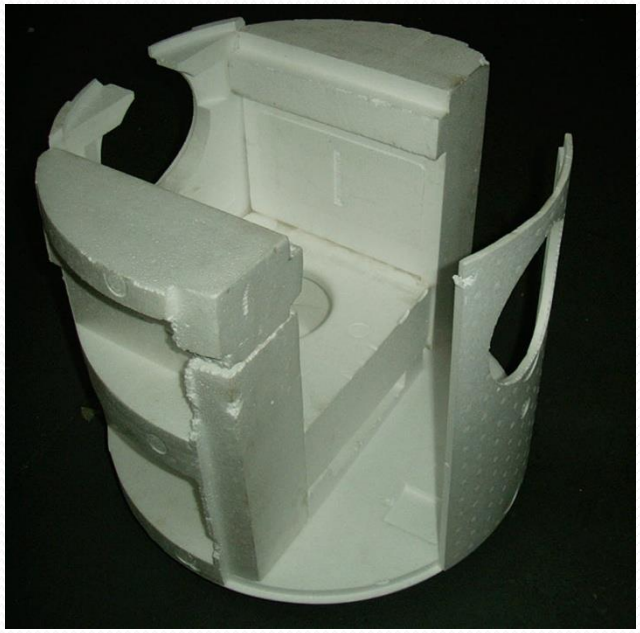
District Heating Units



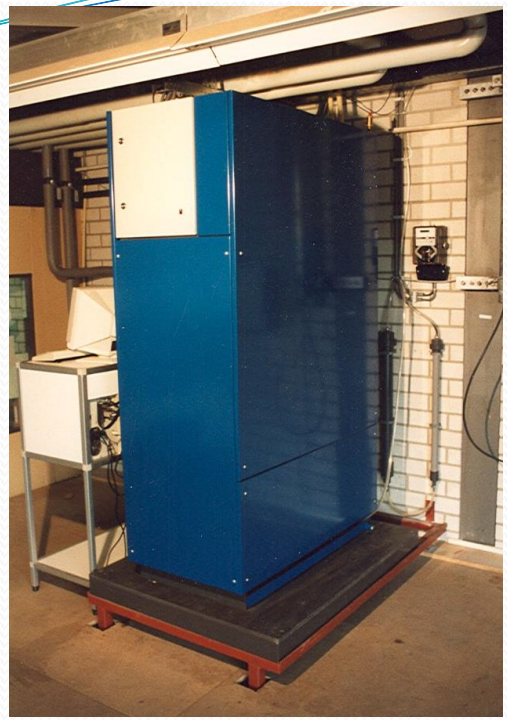
Electrical Heatpumpboiler

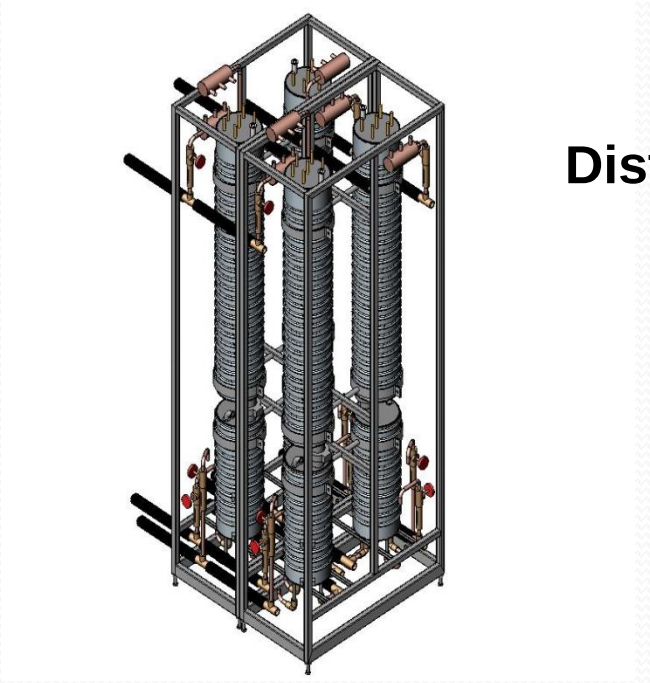
Inclusie mechanische ventilatie



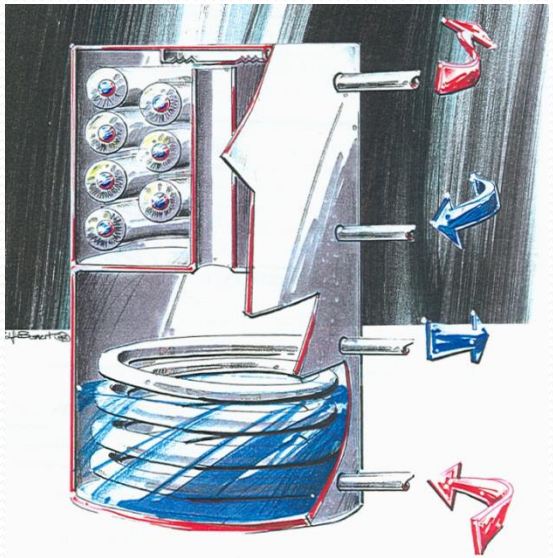


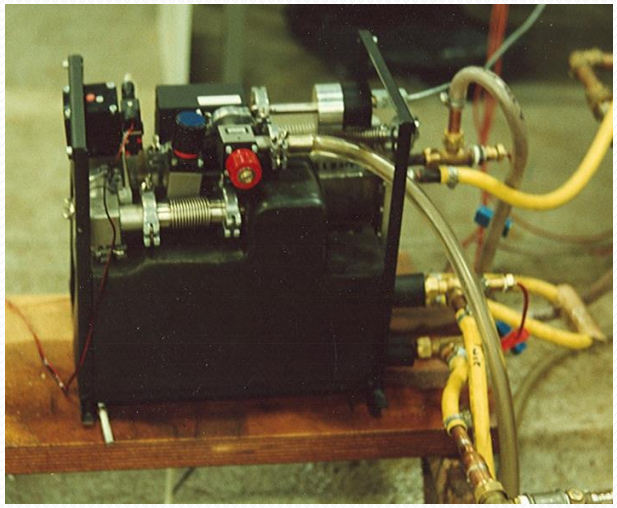
Storage and conversion 1e genaration





District heating

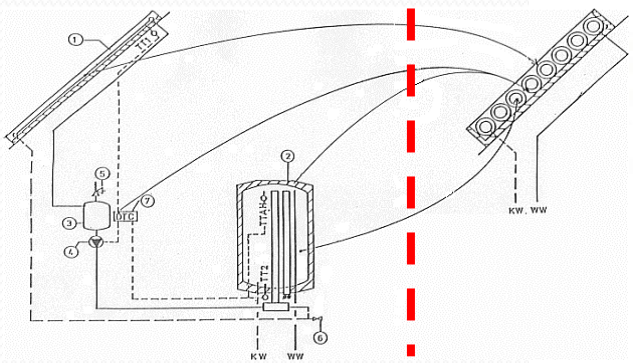




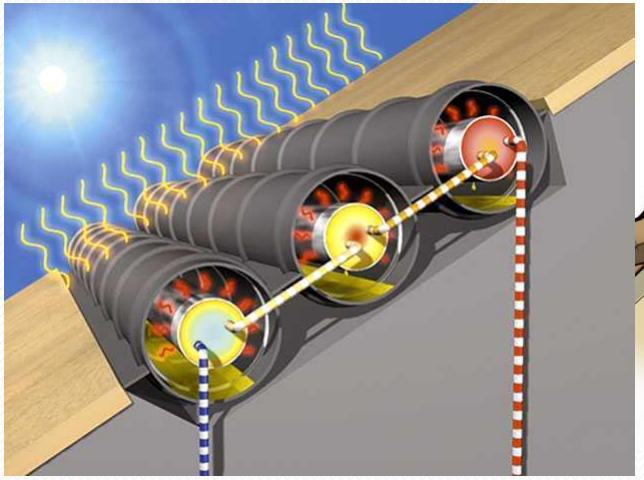
Automotive airco

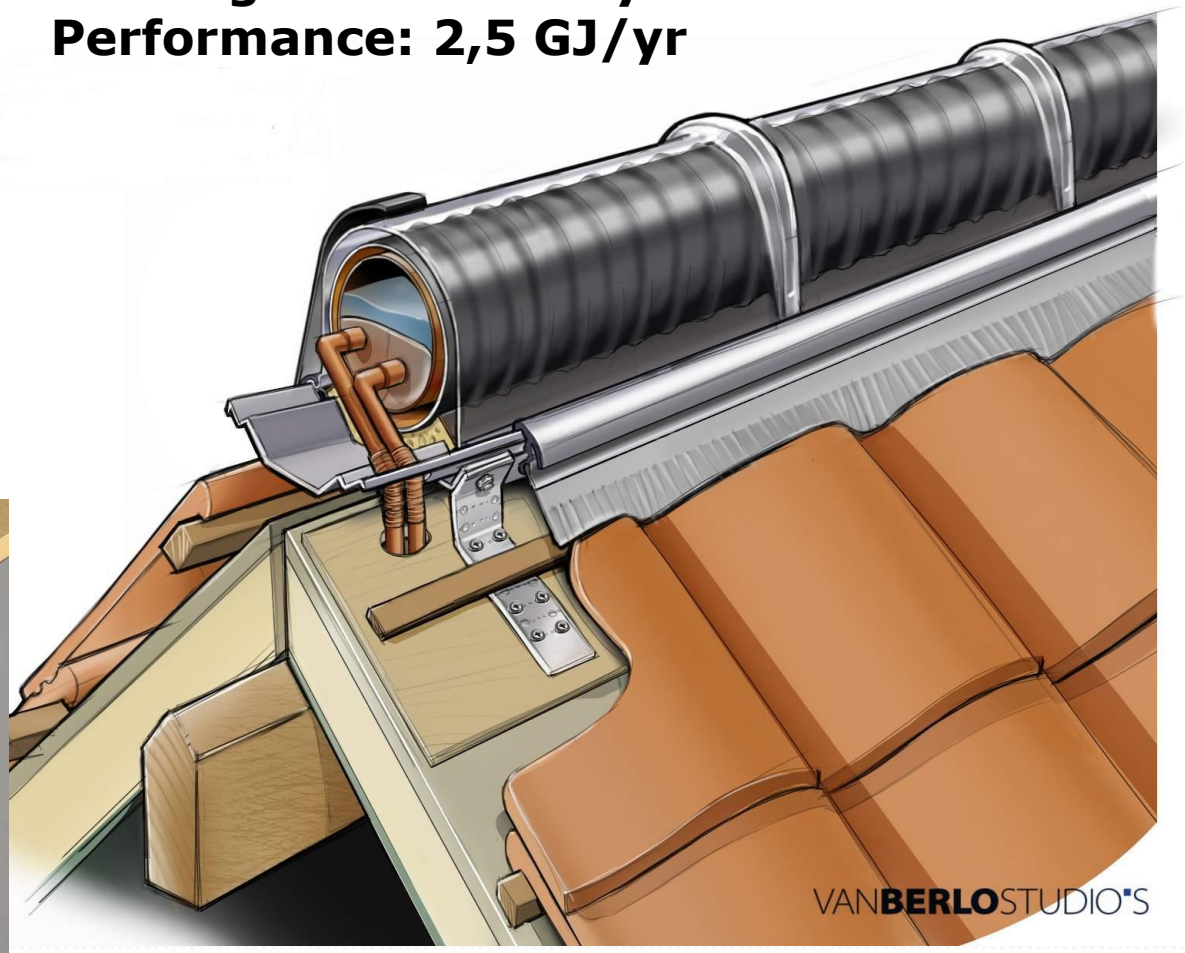
Product characteristics

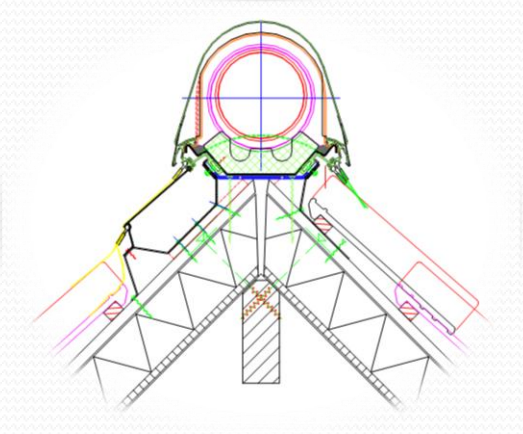
Sunridge > 3 tubes system:
Performance: 2,5 GJ/yr



Components Integration

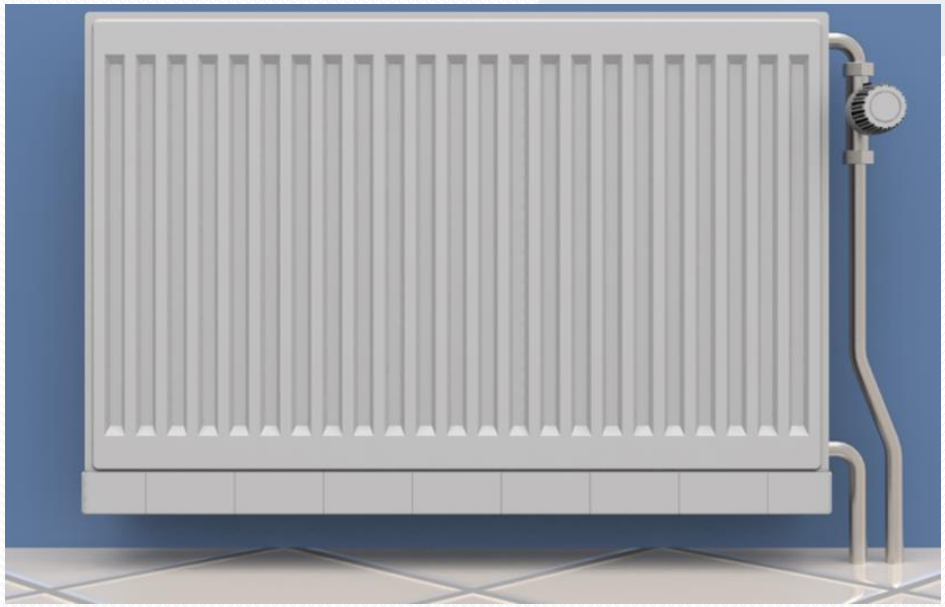






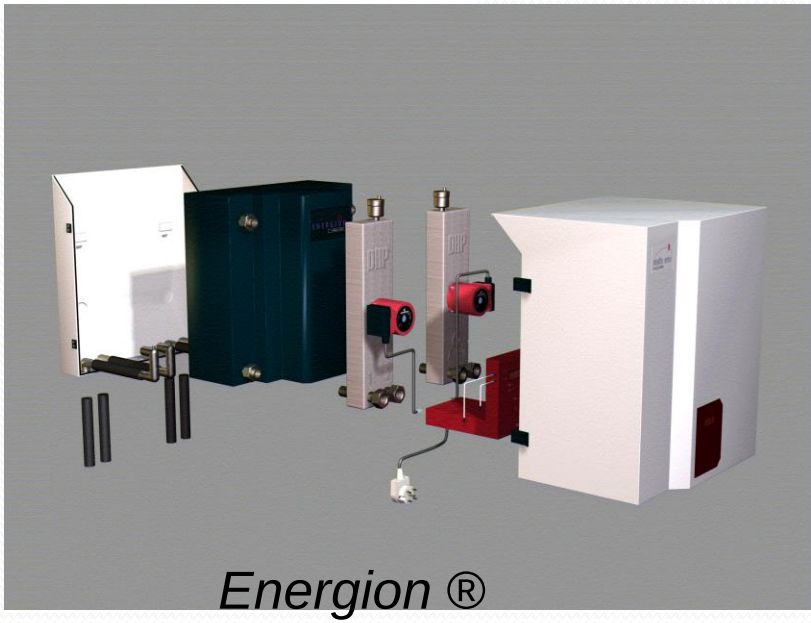
Ridge integrated solution
No use of space indoors
Optimal irridation
Independent of orientation

ClimateBooster



Electrical Heatpumps

Geotherm



Energion ®

Heatpipe for renovating electrical boilers to Solarboiler