Derbi Conference, Perpignan 11.-12 June 2009

SONNENKLIMA
sun*inverse*

Solar Cooling
Product Information and Experience

Volker Clauß

www.sonnenklima.de

SK SonnenKlima GmbH - Am Treptower Park 28-30 - 12435 Berlin - D - Tel. +49 (0) 30 53 00 07 700 - Fax. +49 (0) 30 53 00 07 17 - www.sonnenklima.de - info@sonnenklima.de

SonnenKlima GmbH-Who are we?

- Manufacturer for small and medium absorption chillers focused on solar cooling applications.
- We started in 2001 as R&D Section of Phönix SonnenWärme AG (Phoenix Solaire in France).
- SK SonnenKlima has been founded in 2006 to realise serial production of the suninverse absorption chiller.
- 3 years experience with small production line.
- 5 years of experience in system and control development for Solar Cooling, district cooling and CHCP installations.

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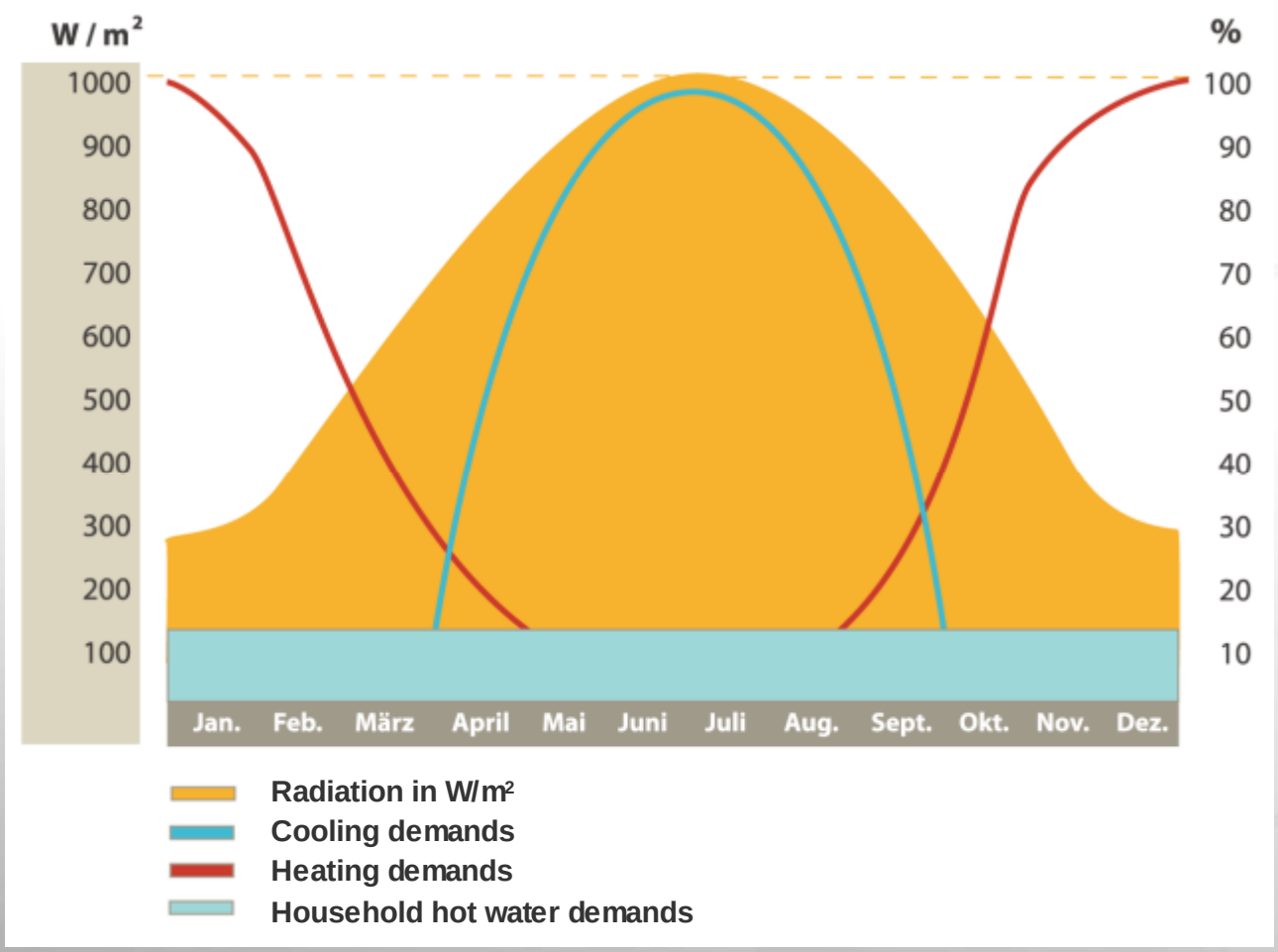
Where there is a lot of sunshine, there is also a high demand for cooling!



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Solar Cooling- why we are facing it?

- When sun is shining, rooms must be cooled – a rare situation for RE: availability and demand fit together.
- sun*inverse* reduces CO2 emissions and create a positive and high living standard for the user.
- Stops Cost-Inflation for energy supply: due to low operating costs you get financial benefits and planning reliability after investment is done.
- Innovative technology focusing on sustainability and technical leadership for energy saving cooling, heating and DHW supply.

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sun*inverse* - Indicators and Characteristics

- Designed for solar cooling applications.
- Nominal performance of 10 kW at 75℃, operation starts at 55℃.
- High coefficient of performance (~0.78) combined with excellent part load behaviour.
- Can be combined with various heat sinks: dry- or wet cooling towers, pools.
- Might be used for any water-based installation system (fan-coils, ceilings, walls…).
- Compact design (fits through doors).
- Weight: approx. 550 kg.

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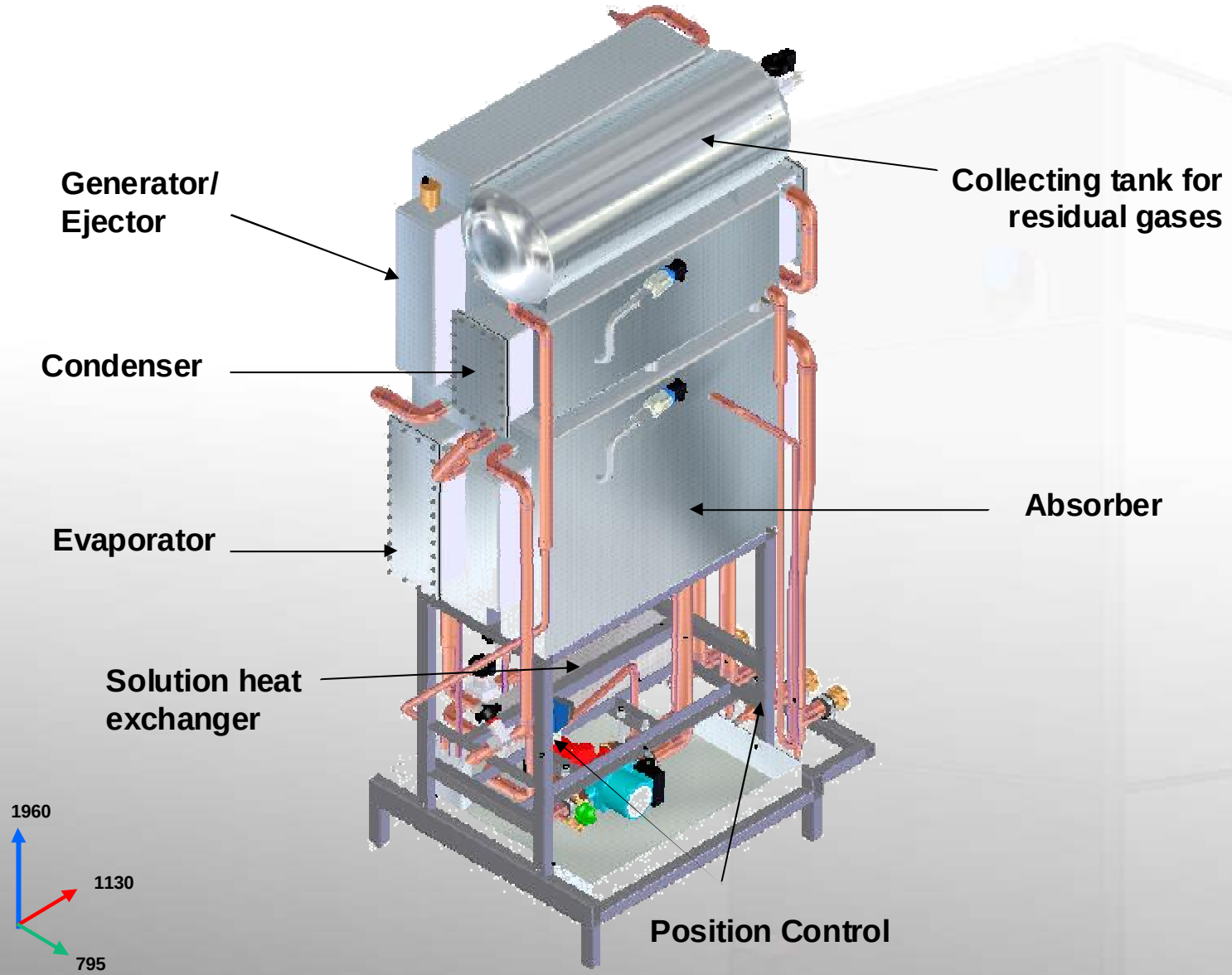
sun*inverse* Design



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sun*inverse* Data Sheet

specifications		unit	*suninverse*	
			operation with fan-coils	operation with ceiling
refrigerating capacity nominal/maximal		kW	8,8 / 11,7	10 / 15,8
		USRT	2,5 / 3,3	2,8 / 4,5
		BTU/h	30026 / 39932	34120 / 53925
chilled water circle	temperature nominal/maximal (out - in)	°C	6-12	15-18 / 15-20
	mass flow nominal/maximal	m³/h	1,3 / 1,7	2,9
	internal pressure drop	mbar	350	
	connection		1 ½" outside thread, flat sealing	
hot water-circle	temperature nominal/maximal (in)	°C	85 / 95	75 / 95
	mass flow nominal/maximal	m³/h	1,2	1,2
	internal pressure drop	mbar	200	
	connection		1 ¼" outside thread, flat sealing	
cold water-circle	temperature nominal/maximal (in - out)	°C	35-27 / 36-27	35-27 / 39-27
	mass flow nominal/maximal	m³/h	2,6	2,6
	internal pressure drop	mbar	320	
	connection		1 ½" outside thread, flat sealing	
electrical connection	voltage	V	230 V ~ 1 ph 50Hz	
	solution pump	W	70	
	refrigertion pump	W	50	
dimensions	height H	mm	1960	
	width B	mm	1130	
	depth T	mm	795	
weight	operation	kg	550	
	transport	kg	500	

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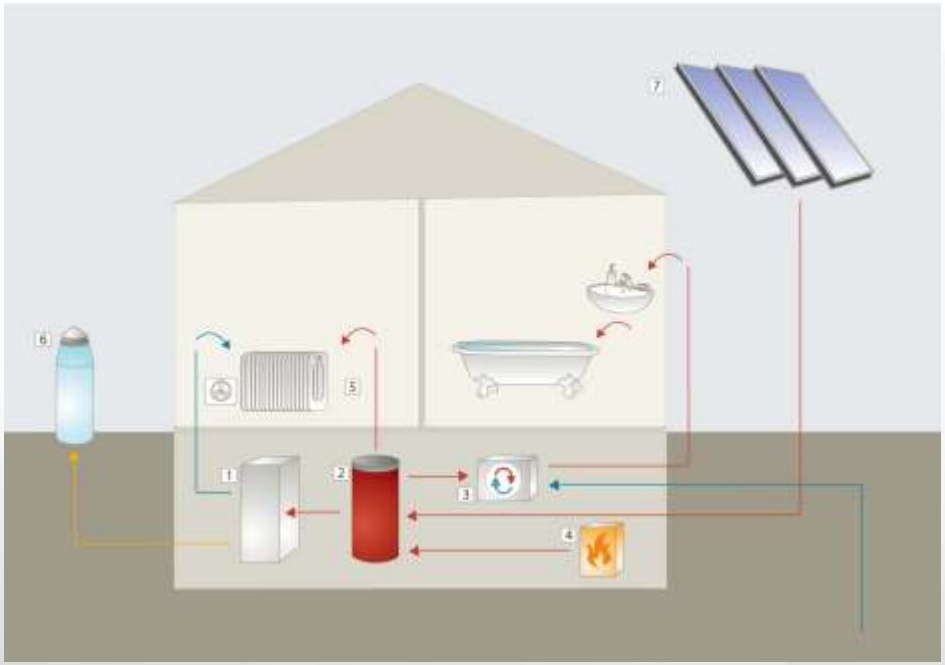
Solar Cooling with Solar Combi+ package



solarcombi+

- Heat, cold and DHW supply during the whole year.
- Only one heat/cold distribution system is needed.
- Free pool heating without drawing down other system outputs.

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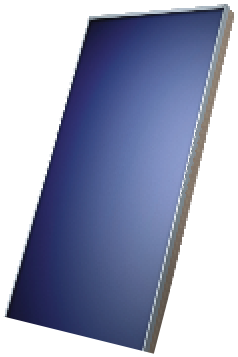
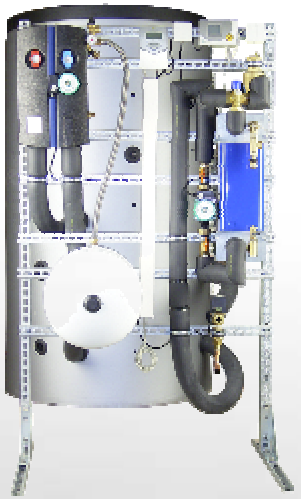
Package Solution SC+ components sun*inverse*



solarcombi+



- Solar compact station for solar cooling.
- System controller and optimized system components.

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Package Solution SC+ Systems sun*inverse*

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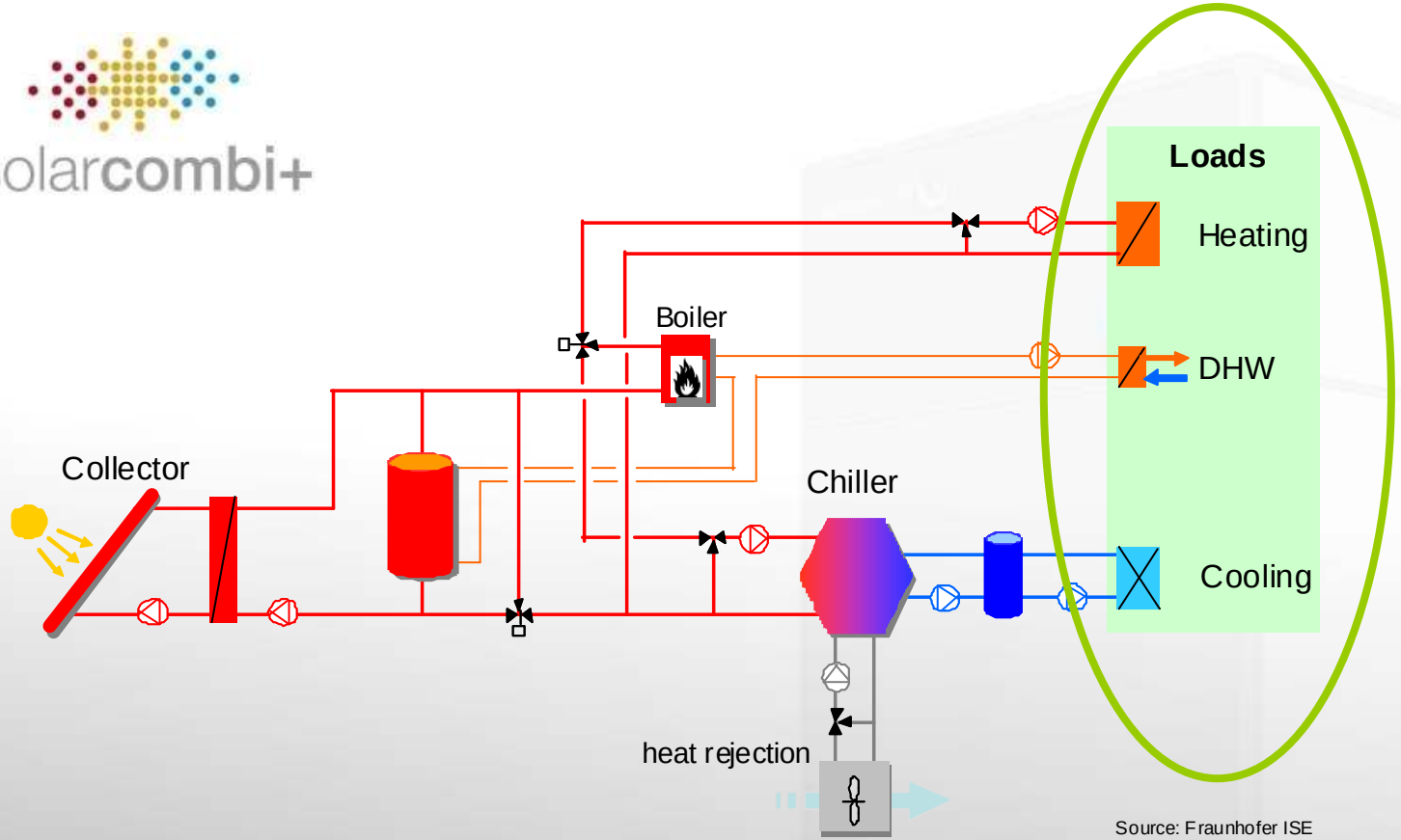

Source: Fraunhofer ISE

Simulations done for three typical climates in Europe:

- Collector area 30 to 45m².
- Storage tank up two 2m³.

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Applications Package Solution SC+

Residential

- Heating, Cooling and Domestic Hot Water.
- Building: 140m²-300m² cooled floor area, depending on climate and energy standard.Collector area 30 to 45m².

Office

- Heating and Cooling.
- Building: eg. 310 m² in Toulouse or Naples.

Further details on SC+ Website

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Example France, commercial building

Heat source	Cold distribution	Heat dump	City	Start-up
35m² flat collectors	Cooling floors	dwell	Uzés/France	2007

dena Deutsche Energie-Agentur

PHÖNIX SonnenWärme AG

Bundesministerium für Wirtschaft und Technologie

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Office building

Heat source	Cold/heat distribution	Heat dump	City	Start-up
34m² flat collectors	Radiators	Open wet cooling tower	Osnabrück/ Germany	2005

DBU
Deutsche Bundesstiftung Umwelt

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Example Solar Cooling as „Fuel Saver“

Bundesministerium
für Umwelt, Naturschutz
und Reaktorsicherheit

Application:

24h/365 Technical cooling load, for a medical building.

Heat source	Cold-distibution	Heat dump	City	Start up
40m² CPC Vacuum Tubes	FanCoils	drycooler	Berlin	2008

Förderkennzeichen:0325009.

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Alternative System configurations

Heat supply starting at 55°C

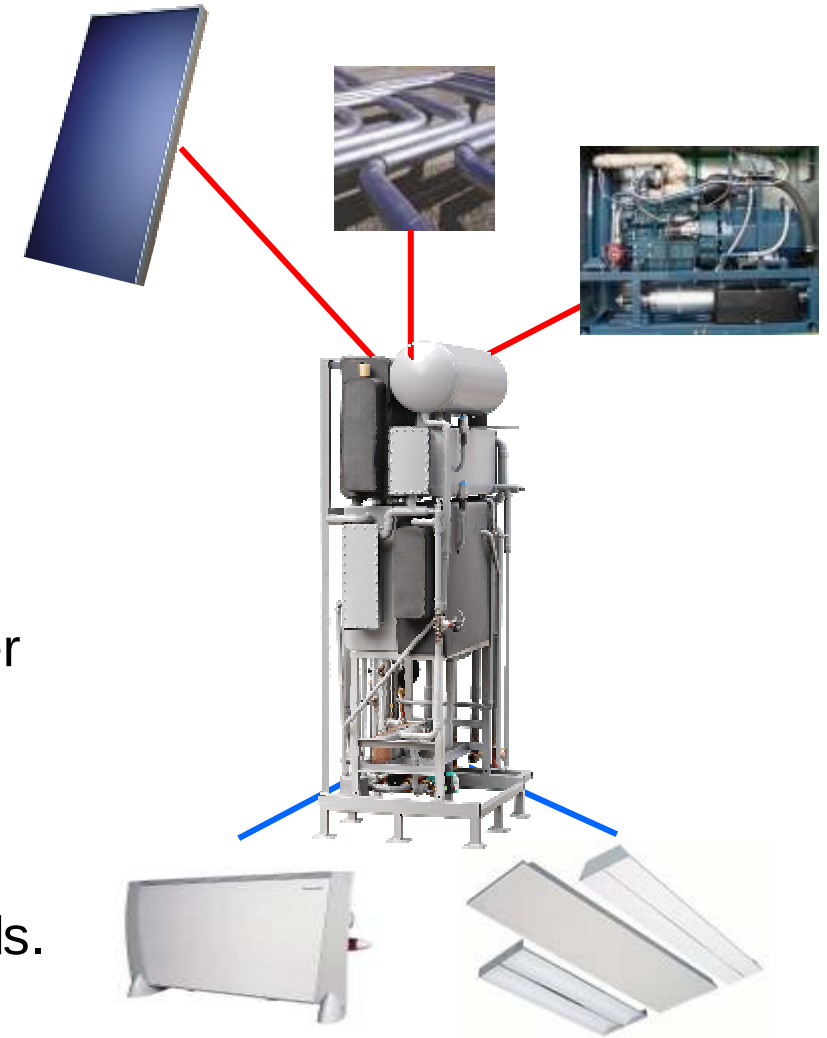
- Solar collectors
- CHP units
- District heat

Cold Production

- suninverse absorption chiller

Distribution systems

- every water-based standards.



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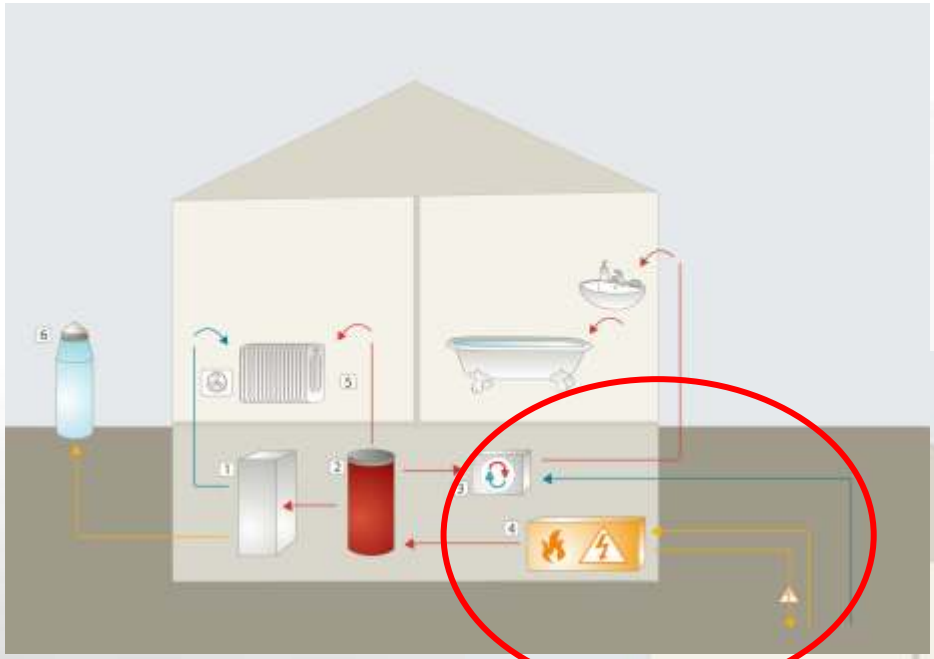
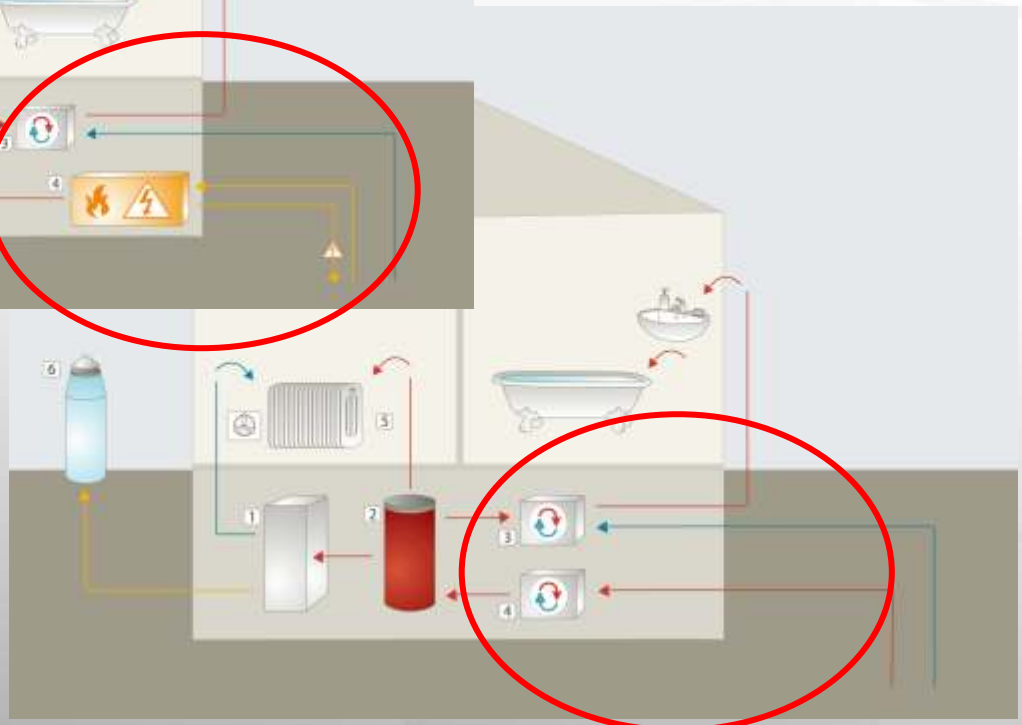
Alternative system configurations



Combined
Heat
Cold and
Power Production



District Cooling

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Thank You!

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Solar Cooling Solutions

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Contact

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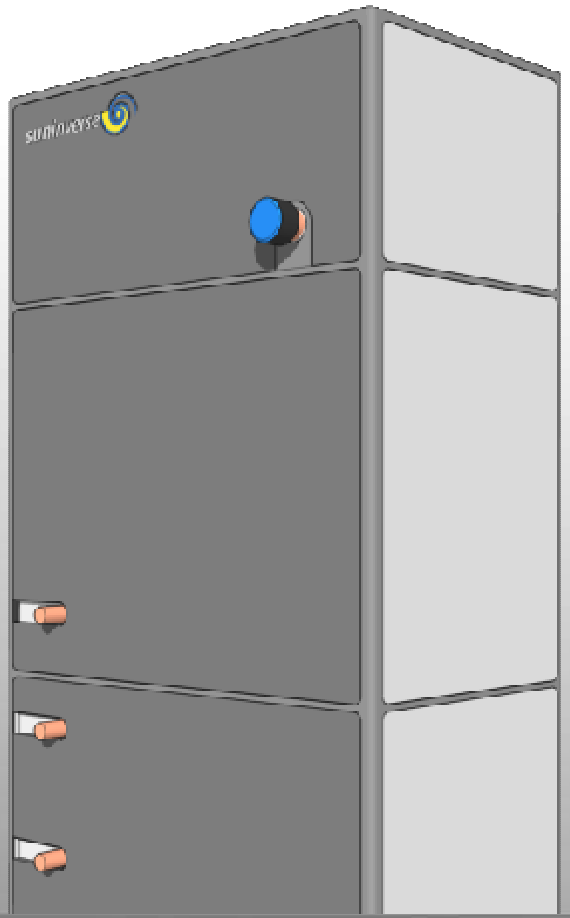

SK SonnenKlima GmbH, Germany

www.sonnenklima.de

info@sonnenklima.de

PHŒNIX Solaire, France

Philipp Spitzmüller

Tél +33 (0)9 62 55 14 64

Fax +33 (0)4 67 06 98 61

www.phoenix-solaire.fr

ps@phoenix-solaire.fr

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