



State of the art of thermally driven cooling

Workshop IEA-HPP Annex 34 - Thermally driven heat pumps

Dr. Uli Jakob



Source: SolarNext

- Electrically driven
- Maximum electrical consumption at peak-load period
- Refrigerant HCFCs and HFCs:
no Ozone Depletion Potential (ODP)
but Global Warming Potential (GWP)
- Leakages in a range of 5 – 15 % per year

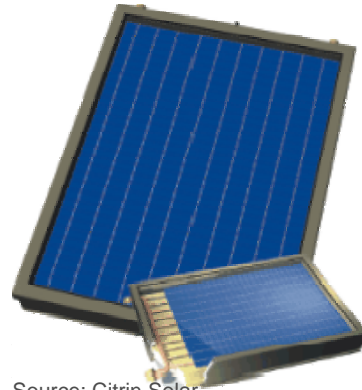
Conventional Air-Conditioning

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Solar



Source: Tsinghua



Source: Citrin Solar

District Heating



Source: wikipedia

CHP Unit



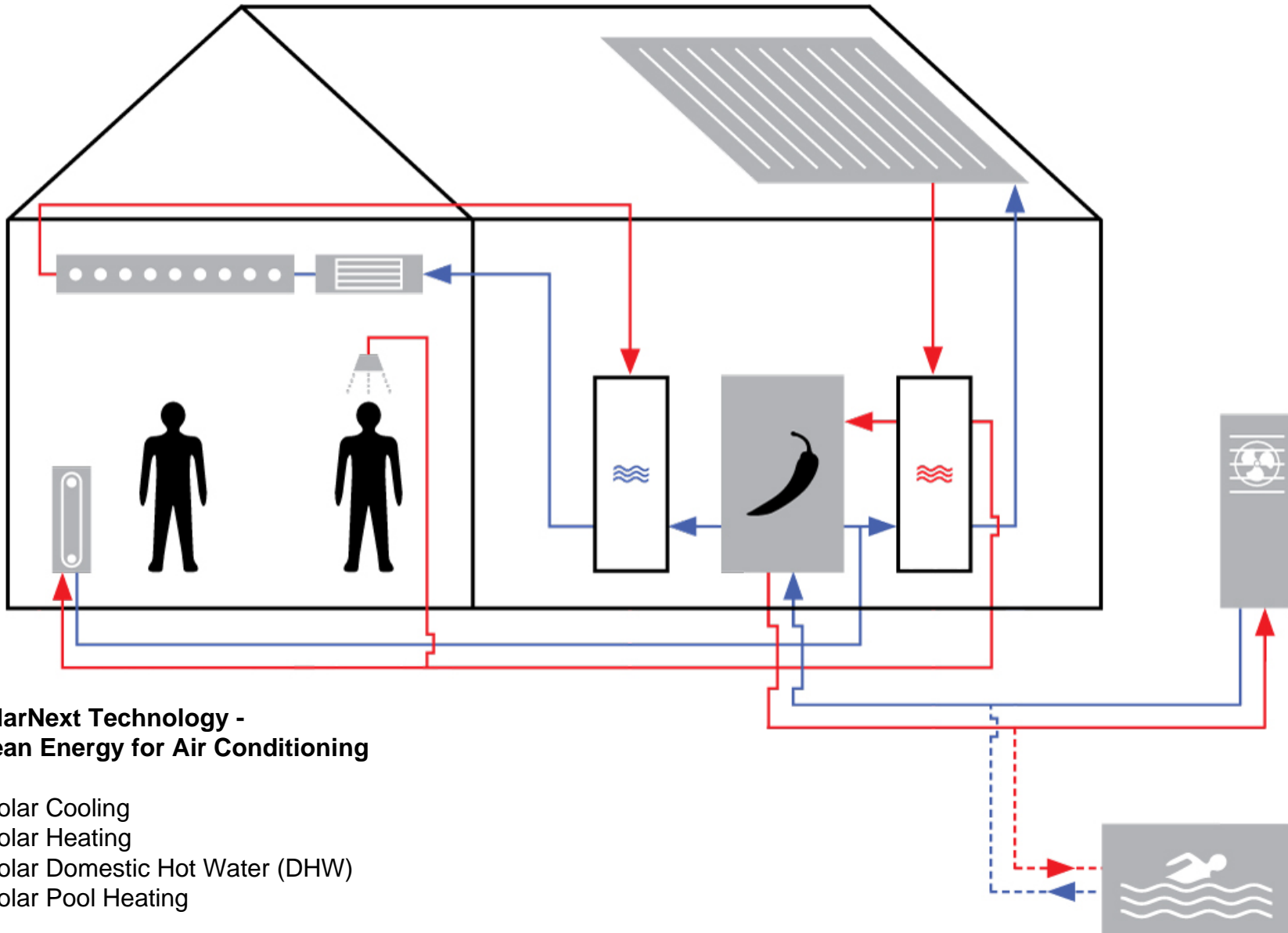
Source: EC-Power



Source: ecopower

Heat Sources for Thermally Driven Cooling and Heating Systems

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**SolarNext Technology -
Clean Energy for Air Conditioning**

- Solar Cooling
- Solar Heating
- Solar Domestic Hot Water (DHW)
- Solar Pool Heating

All in one System!

The Application of Solar Cooling in a Building (Installation Principle)

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Water / Lithium Bromide (H_2O / LiBr)



chillii® WFC 18

17.5 kW

Source: Yazaki

chillii® Technology by SolarNext: Small Scale Absorption Chillers (17.5 kW)

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Water / Lithium Bromide (H₂O / LiBr)

Yazaki WFC-SC (35 - 105 kW)



Source: Yazaki

EAW Wegracal SE (15 - 200 kW)



Source: EAW

Schüco LB 15 & LB 30 (15 - 30 kW, EAW)



Source: Schüco

Sonnenklima suninverse (10 kW)



Source: Sonnenklima

Rotartica (4.5 kW, air-cooled)



Source: rotartica

Abakus (4.5 kW) prototype



Source: Abakus

Recent Developments of Small Scale Water/Lithium Bromide Absorption Chillers

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Water / Lithium Chloride (H_2O / LiCl)



Source: Climatewell

Climatewell 10

10 kW

Small Scale Absorption Chiller from Sweden (10 kW)

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Ammonia / Water ($\text{NH}_3 / \text{H}_2\text{O}$)



chillii® PSC 10

10 kW

Source: Pink

chillii® Technology by SolarNext: Small Scale Absorption Chillers (5-20 kW)

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Ammonia / Water ($\text{NH}_3 / \text{H}_2\text{O}$) prototype

ABB (15 kW)



Source: ILK Dresden

Helioplus (5 kW)



Source: TU Graz

ITW Stuttgart (10 kW)



Source: ITW Stuttgart

HfT Stuttgart (3-5 kW)



Source: zafh.net

Ammonia / Water ($\text{NH}_3 / \text{H}_2\text{O}$) prototype, air-cooled

Robur (17 kW)



Source: Robur

AoSol (6 kW)

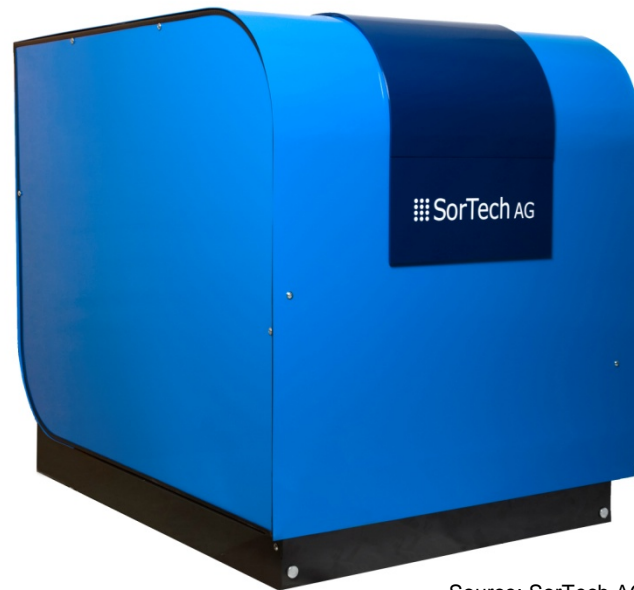


Source: AoSol

Recent Developments of Small Scale Ammonia/Water Absorption Chillers

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Water / Silica Gel (H_2O / SiO_2)



Source: SorTech AG



chillii® STC 8

7.5 kW

chillii® Technology by SolarNext: Small Scale Adsorption Chillers (5-10 kW)

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Water / Silica Gel (H_2O / SiO_2)



Source: Shanghai Jiao Tong University

SWAC-10

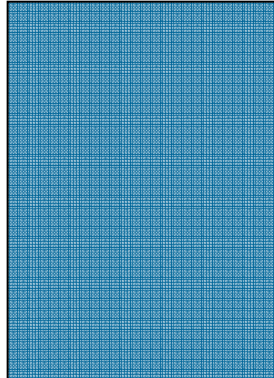
10 kW

Small Scale Adsorption Chiller from China (10-100 kW)

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Water / Silica Gel (H_2O / SiO_2) prototype

InvenSor (10 kW)



ECN (5 kW)



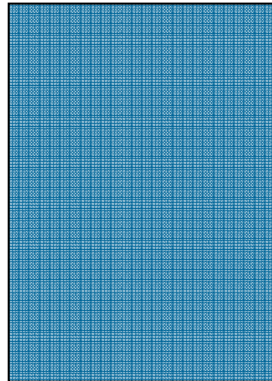
Water / Zeolith (H_2O / Zeolith) prototype

SorTech (7.5 kW)



Source: SorTech

InvenSor (10 kW)



Recent Developments of Small Scale Adsorption Chillers

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Sources: SolarNext

(2007)

H₂O/LiBr EAW Wegracal SE15

in Rimsting, Germany for Office Space Cooling and Heating

37 m² Flat Plate and 34 m² Vacuum Tube Collectors & Oil Burner Back-up
2,000 l Hot Water Storage and 1,000 l Cold Water Storage
15 kW Cooling Capacity, 35 kW Cooling Tower Capacity

Solar Cooling at the Hightex Office Building in Germany (Refit) - Cooling System

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Source: Citrin Solar



Sources: SolarNext



Source: Citrin Solar

(2007)

H₂O/Silica gel chillii® STC6

in Moosburg for Office Space Cooling

24 m² (total 90 m²) Flat Plate Collectors and Wood & Oil Burner Back-up
7.500 l Hot Water Storage and 1.000 l Cold Water Storage
5,5 kW Cooling Capacity, 16,5 kW Cooling Tower Capacity

chillii® Technology at the Office Building CitrinSolar GmbH, Moosburg, Germany

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Source: Bachler Austria



Source: SolarNext



Source: SolarNext

(2007)

NH₃/H₂O chillii® PSC10

in Gröbming, Austria for Office Space Cooling

40 m² Flat Plate Collectors and Biomass & District Heating Network Back-up
4,500 l Hot Water Storage
9 kW Cooling Capacity, 26 kW cooling tower capacity

chillii® Technology at the Training Centre and Office Building Bachler Austria GmbH, Gröbming, Austria

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Sources: Fraunhofer ISE

(2007)

H₂O/Silica Gel chillii® STC6

in Freiburg, Germany for Canteen Cooling

22 m² Flat Plate Collectors and District Heating Network Back-up
1,000 l Hot Water Storage
5.5 kW Cooling Capacity, 20 kW Borehole Heat Exchanger Cooling (3x 80 m)

Solar Cooling System at the Canteen of Fraunhofer ISE, Freiburg, Germany

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Sources: SolarNext

(2005)

H₂O/Silica Gel SWAC-10

in Shanghai, China for Space Cooling

25 kW CHP unit (NG or LPG fired), 16 kW Electricity Power
10 kW Cooling Capacity, 35 kW Cooling Tower Capacity

CHCP System at Shanghai Jiao Tong University, Shanghai, China

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Thank you.



Hightex Group

