of

Solar Powered Air-Conditioning Systems

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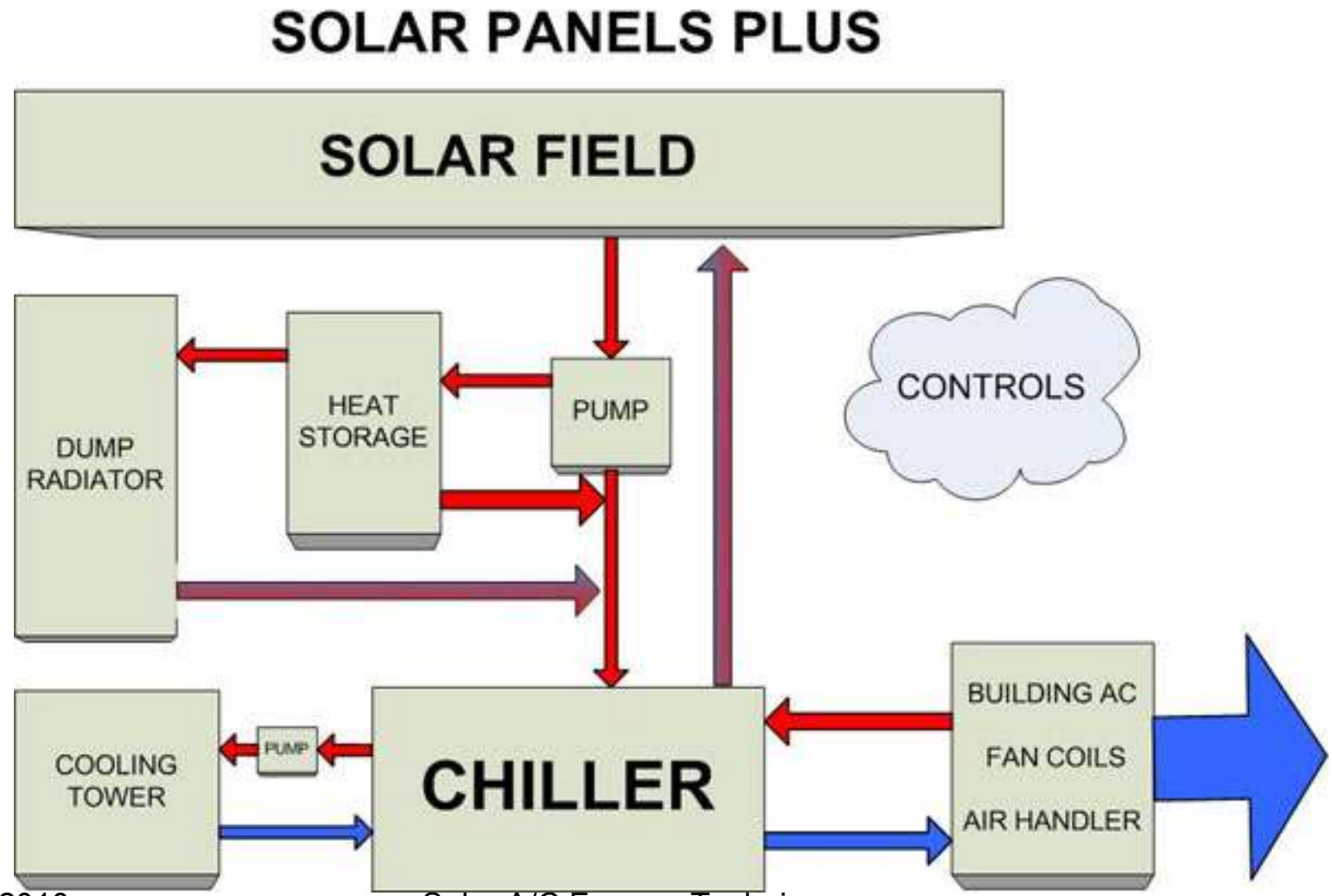
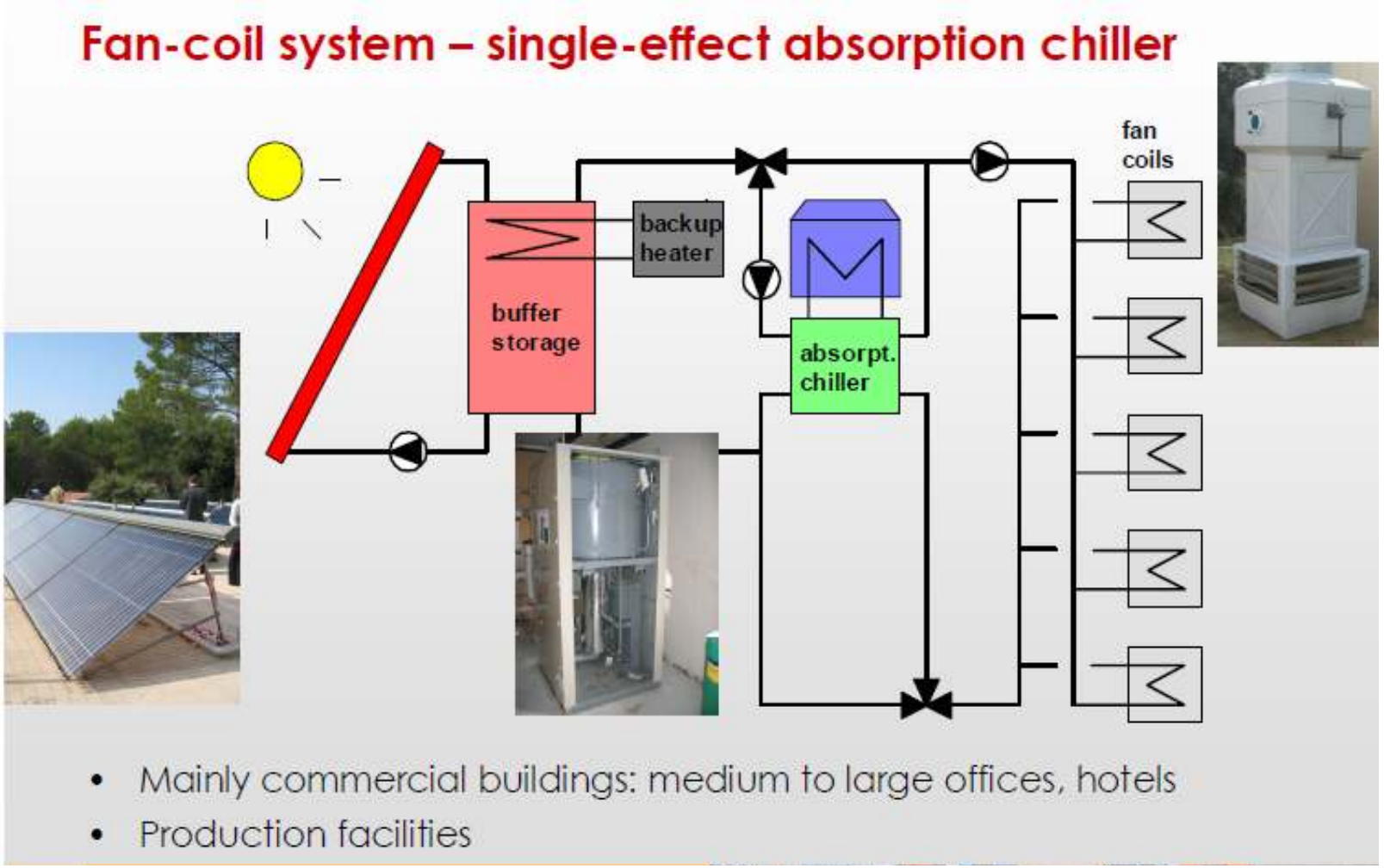
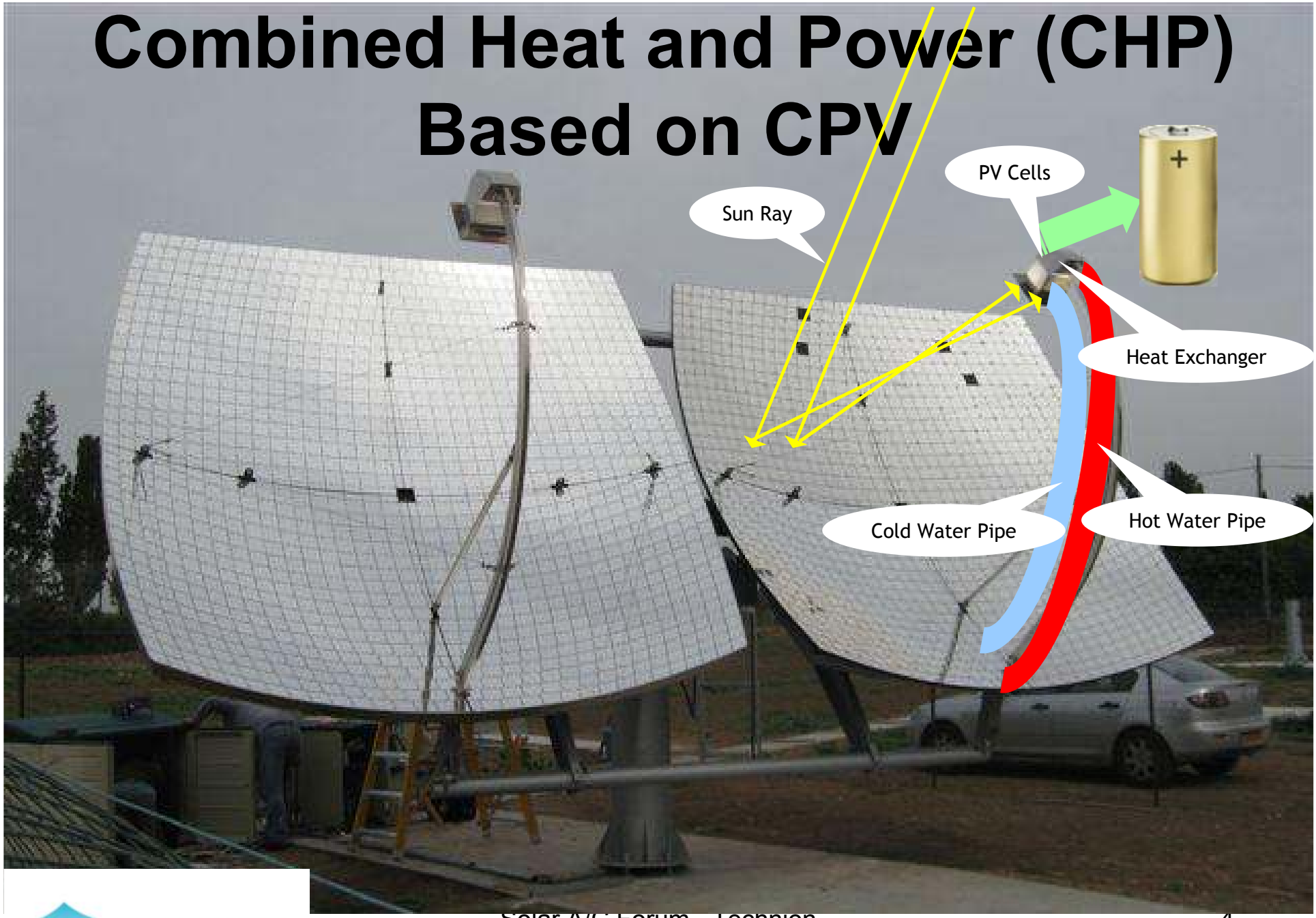
The Building Blocks…



Solar A/C System
Complex and Expansive…



Combined Heat and Power (CHP) Based on CPV



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Installed Solar CHP System

Zenithsolar System

- ~1,000 x concentration
- Efficiency >70%
- Lowest $/Wp
- Upgradable on site
- Z20, 4.5kWp (e) + 11kWp (t)
- 3J GaAs solar cells 35% (e)

21% Electric output

50% Thermal output

Combined Heat and Power

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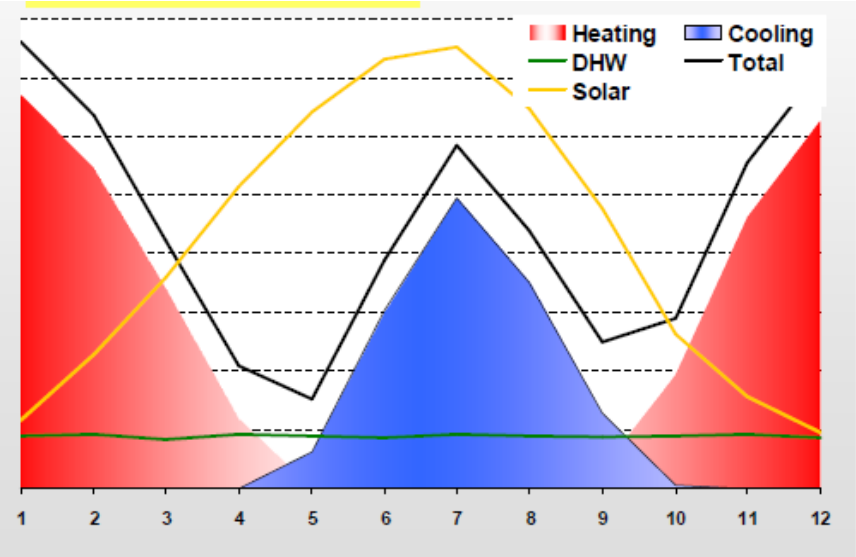
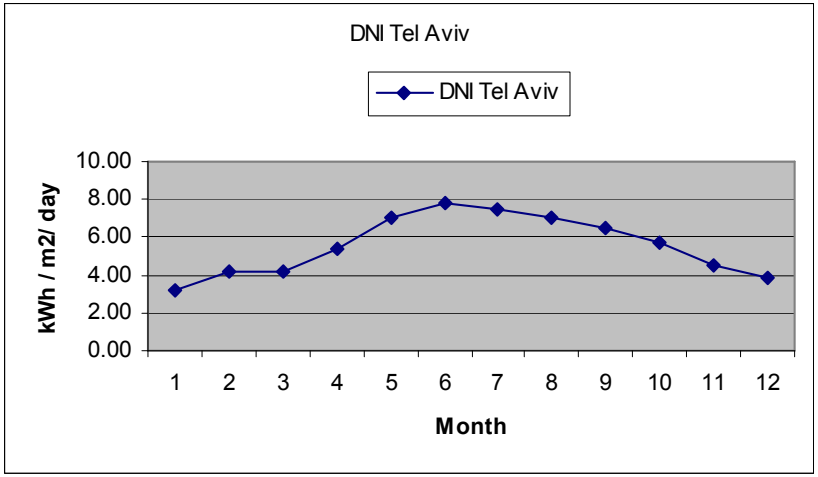
Annual Solar (DNI) Pattern





- Solar A/C system should be operational year round
- Lack of load can accrue in spring and fall
- Full yearly operation is essential for good economical performance

Major European Players

Europe is leading in development of small thermally driven chillers

aosol

rotartica

PINK

ClimateWell

EAW

SorTech AG

SK SonnenKlima GmbH

Economical Comparison of Solar Cooling Systems Powerd by ZS CHP

Assumptions:

- **No back-up**, air-conditioning operation follows DNI
- **ZS Z20 unit**: 4.5kWpe + 11kWpt
- **Absorption chiller COP**: 0.75, 100 deg C HW
- **Location:** Beer Sheva,
- **DNI:** 2,117 hrs/year @1kW/m2
- **Capacity:** 30TR (=35kW) cooling
- **A/C hours:** 10 per peak day
- **COP of avoided conventional chiller:** 2.5
- **Thermal Loses:** 10%
- **DC to AC conversion efficiency:** 92%
- **Z20 cost:** $18,000
- **BOS cost for thermal + electrical system:** 40%
- **Air-conditioning cost:** $3,000/TR

Economical Comparison of Solar Cooling Systems with ZS CHP

Case			1	2	3	4
ZS Output	Electricity		Fed In to IEC			
	Thermal		DHW	Absorption A/C		
Energy Price	Electricity Fed In	NIS/kWh	1.49	0.42	1.49	1.49
	Avoided Cost for A/C	NIS/kWh	NA	0.42	0.42	1.49
	Avoided Cost for DHW	NIS/liter	4.58	NA	NA	NA
Simple Pay Back		**Years**	**3.76**	**19.47**	**7.61**	**5.79**


Thank You
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