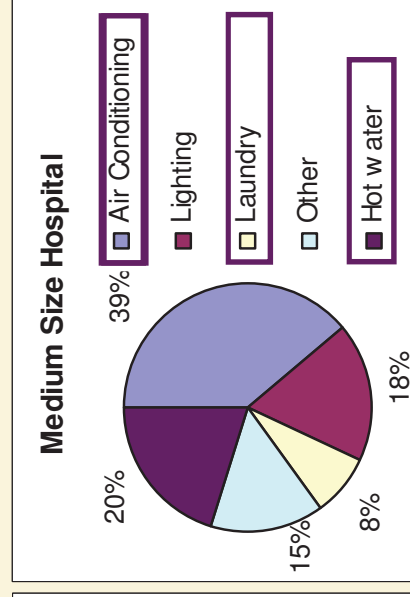
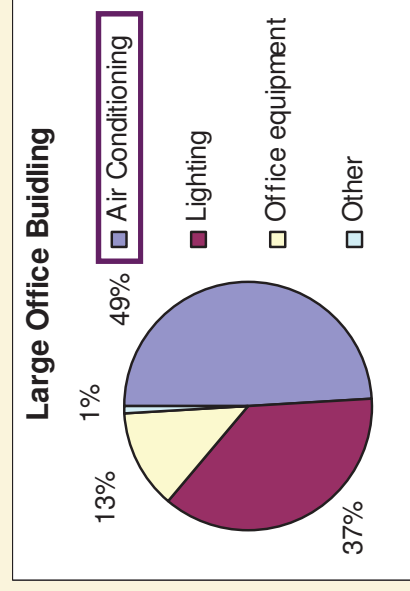
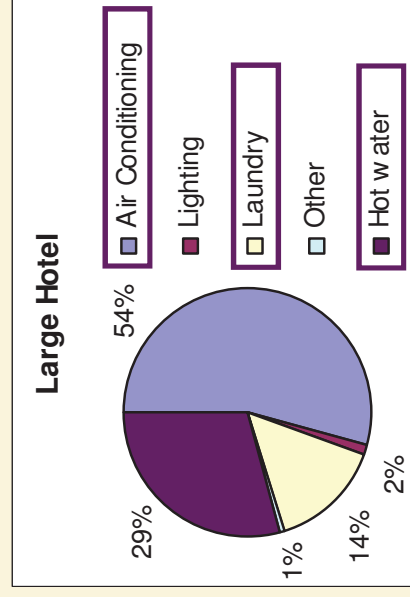


Why solar air conditioning ?

- The buildings sector accounts for 42% of global electricity consumption (IEA 2007)
- Steadily increasing electricity price
- Air-Conditioning (AC) represents the biggest single energy/power consumer in public and commercial sectors
- AC key driver of electric peak power demand growth → negative impact on grid load factor, electricity price and environment



Solar-Cooling Examples

International projects - Exampels



100,000 m² Offices

5,000 people
working in the
building

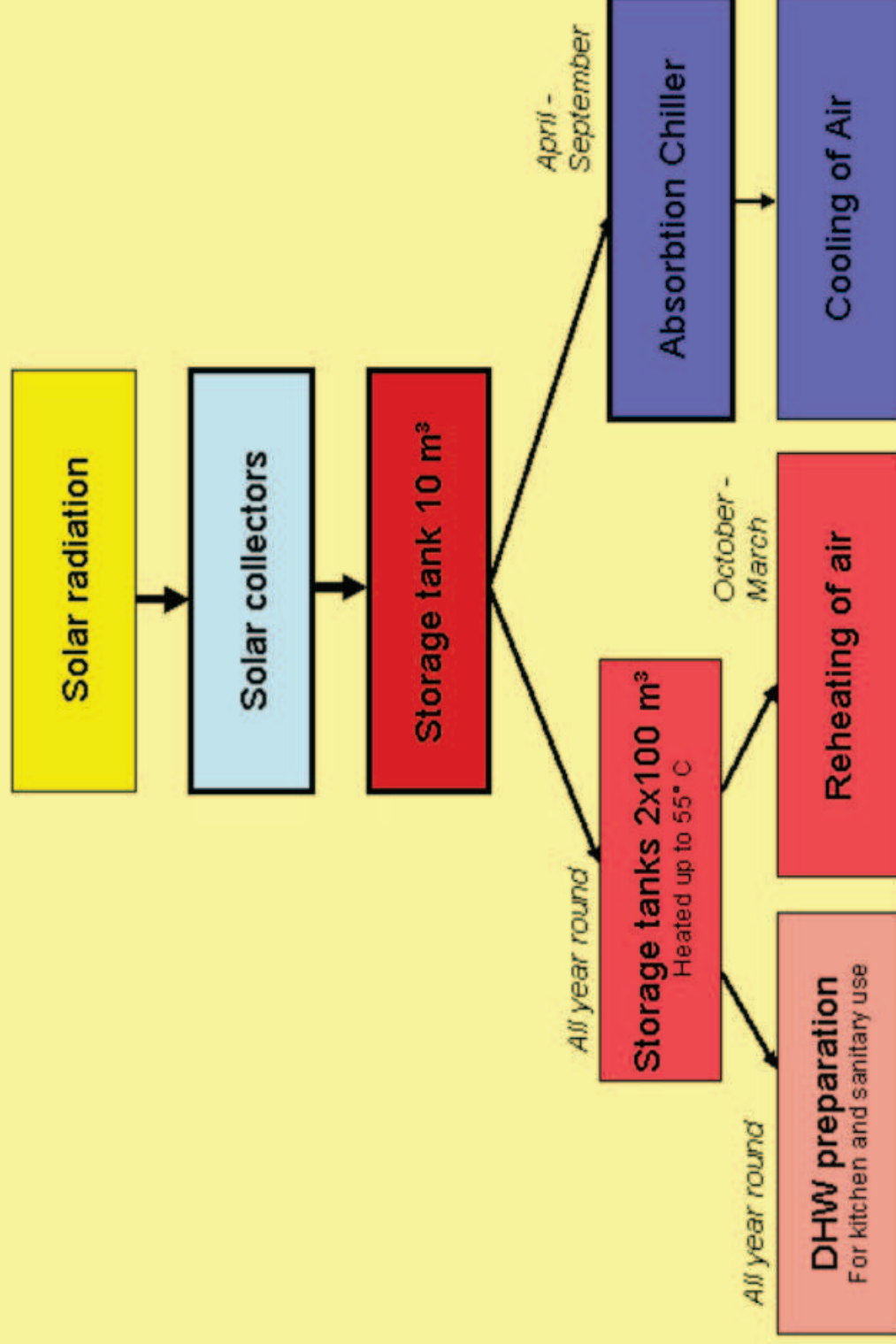
11 floors above
ground, 6 floors
under ground

Bank building
including employees
hospital, theater,
restaurants

Lisbon, PT, Caixa Geral de Depositos

Solar Panels: 1579 m² Cooling Power: 545 kW

Energy-flow



CGD Bank Headquarter, Lisboa

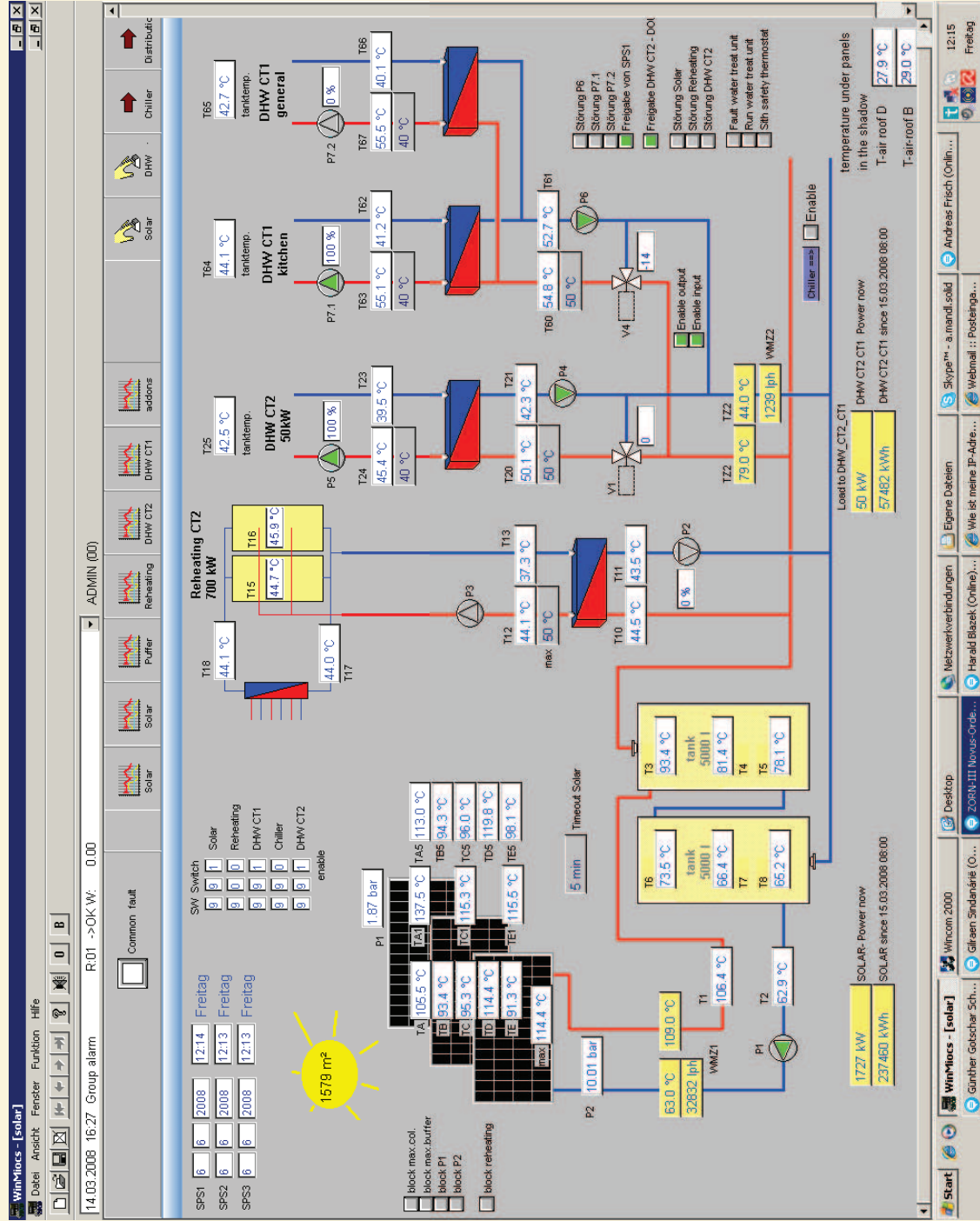


Variable speed control pumps added to:

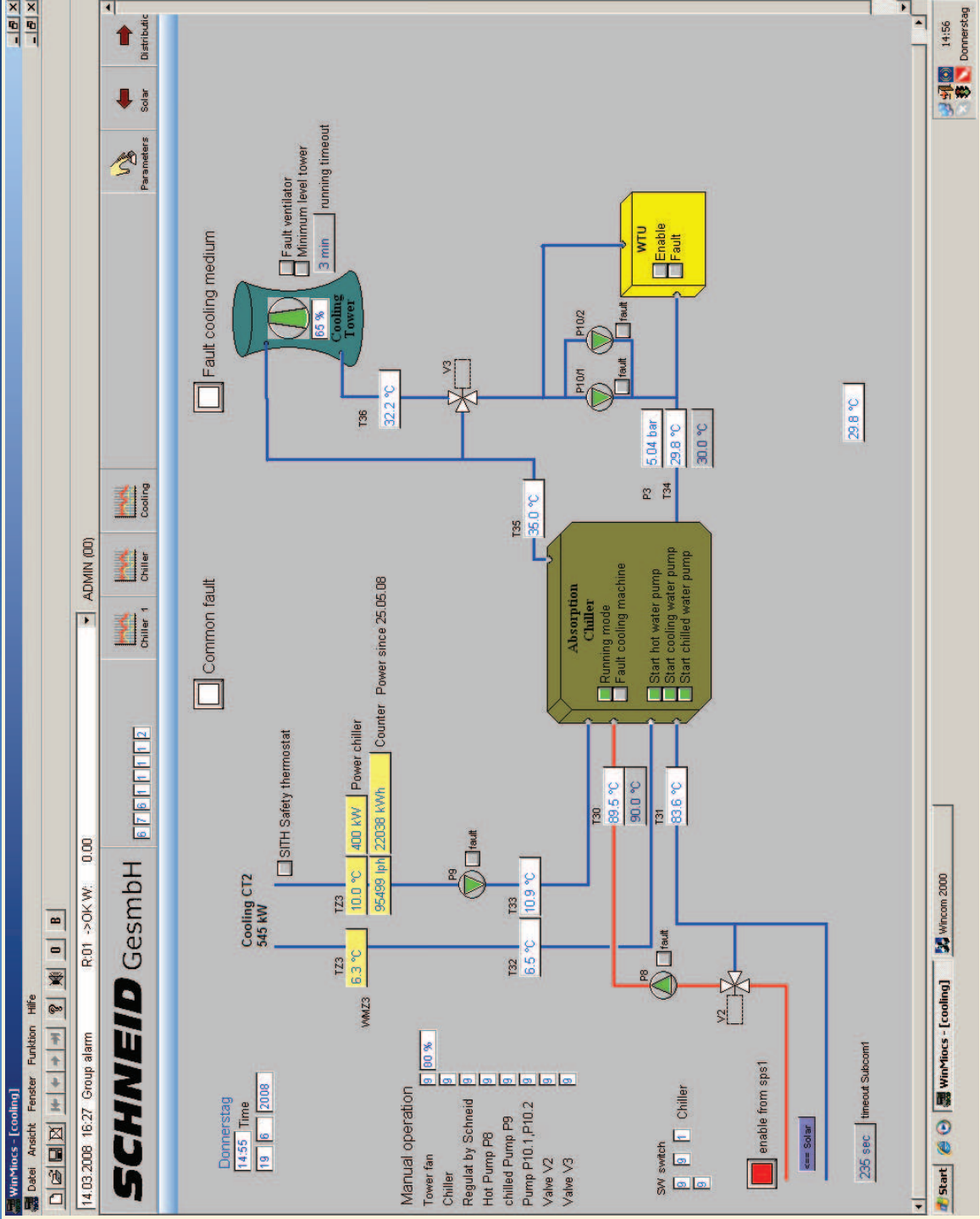
- save electricity
- create a delta T for the chiller



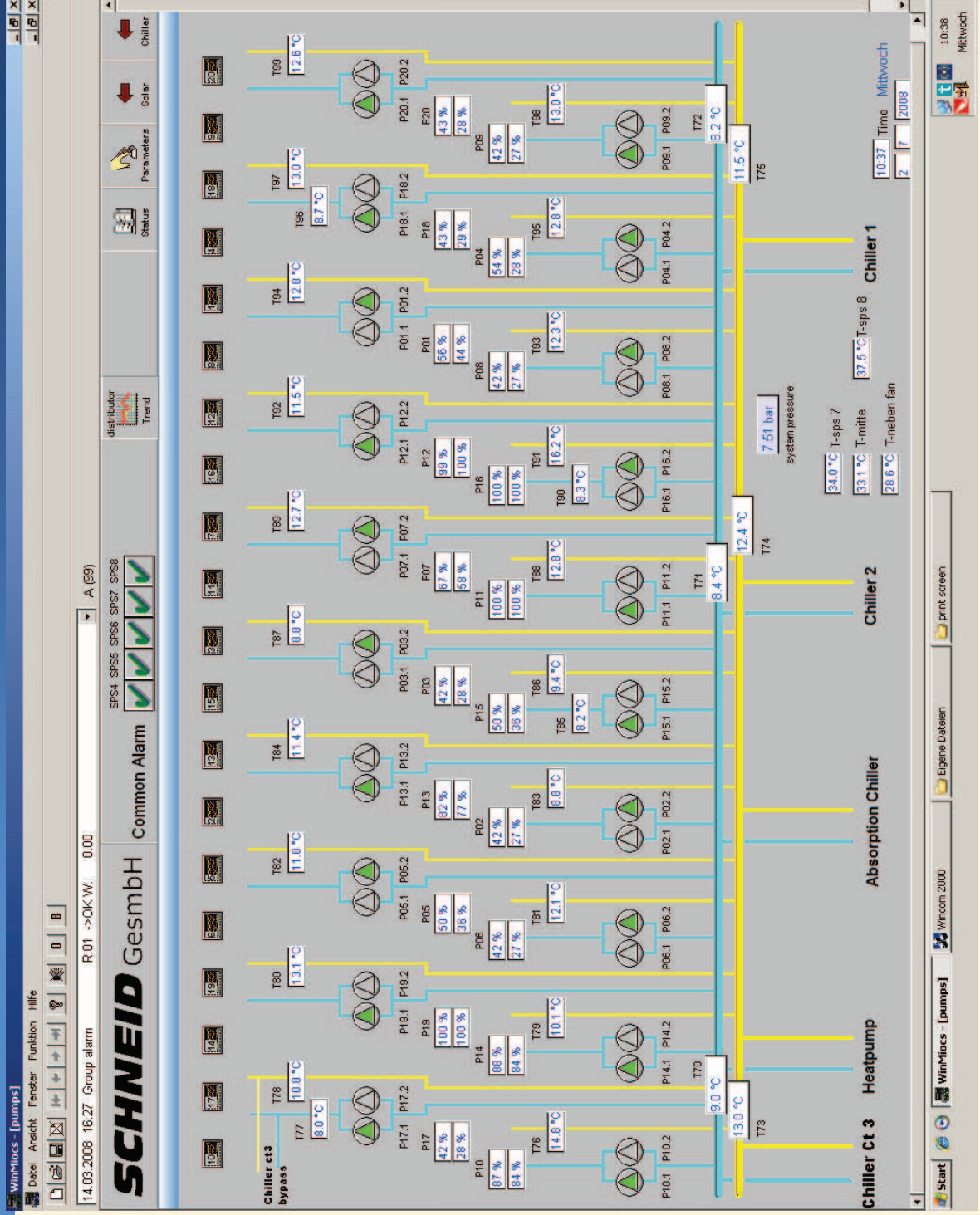
Sample energy flow



Sample energy flow



Sample energy flow



International projects - Examples



Qingdao, China, Olympic Sailing Village

Solar Panels: 1279 m² Cooling Power: 512 kW

UWC, Singapore

SOLID
solar installation + design



United World College (UWC),

Construction ongoing-
Start up April 2011

4000m² Solar Panels
500 ton cooling 20m³
DHW/day

Operated as ESCo by
SOLID Asia Energy
Service pte



International projects

EAR Tower Pristina (2002/2003), 7th operating season



2 thermal driven
absorption cooling
machines with a total
load of 70 kW

226 m² solar collectors

4 m³ storage tank

back up for peak load:
electric chiller 30 kW.

Operating projects



Peitler Winery, 5th operating season



1 thermal driven
ammonium absorption
cooling machines

Temperatures down to
2°C/35° F in wine
provided

100 m²/70 kW solar
collectors

4 m³/1050 gal storage
tank

International projects



Desert Outdoor Center Phoenix, AZ, (2006)

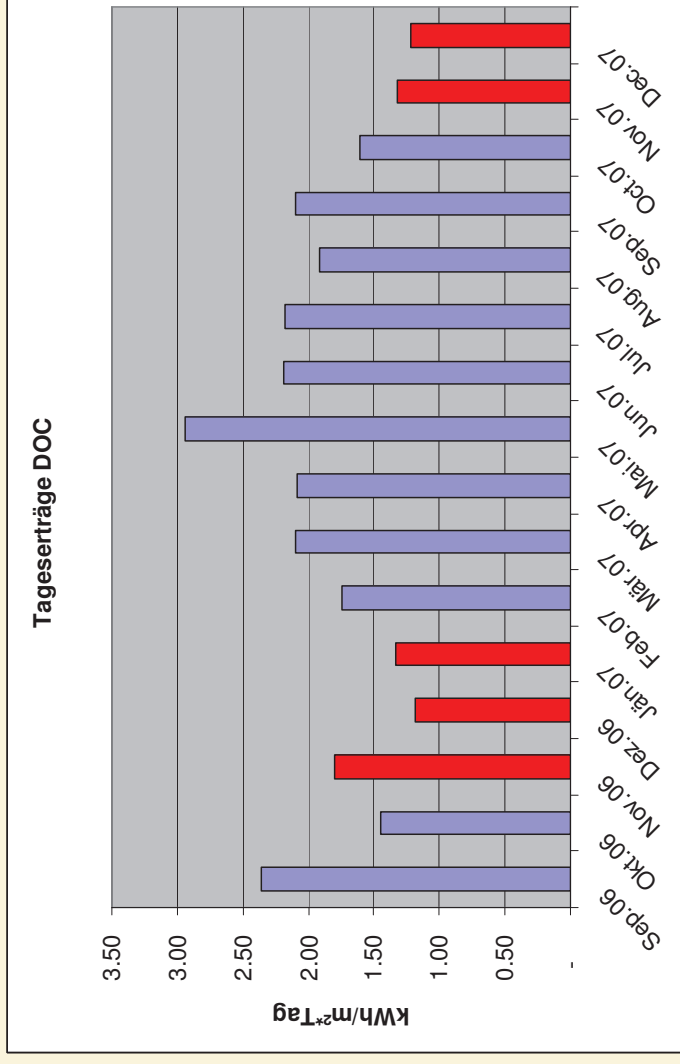
**Solar Panels:
124 m²**

**Cooling Power:
70 kW**

**Project Partner :
Arizona Public Service**



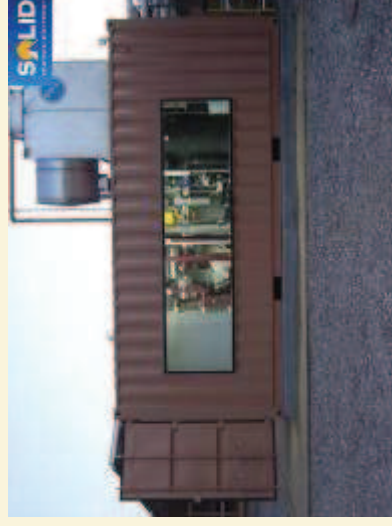
Desert Outdoor Center



Solar gains
approx. 750 kWh/m²*y

3 months heating

8 months cooling



International projects



Lanta Self Storage, Phoenix , AZ, (2008)

Solar Panels: 500 m² Cooling Power: 105 kW

Gatorade Pepsico



Gatorade (Pepsi Cola) Phoenix, AZ, (2008)

Solar Hot Water for
process heat in the soft
drink industry.

Biggest process heat
installation on the
American continent.

Solar Panels:
893 m² / 9,600 ft²
625 kW



Gatorade Pepsico

SOLID
solar installation + design



Gatorade Pepsico



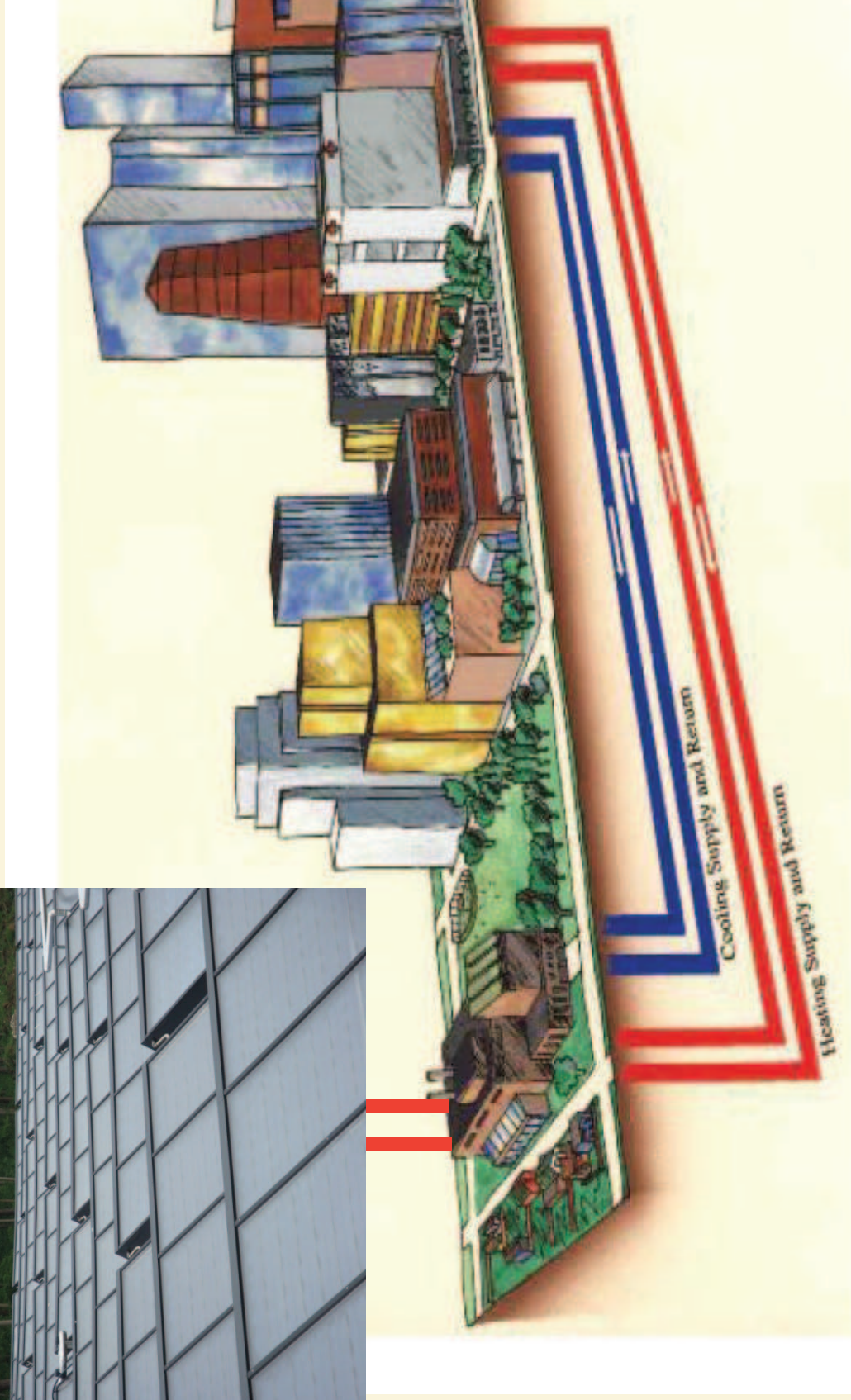
Gatorade Pepsico

SOLID
solar installation + design



PROCESS HEAT & DISTRICT HEATING

District Heating & Cooling



Large Solar Thermal Systems

SOLID
solarinstallation+design

Waterworks Andritz, DHW+ Heating+ District Heating



Solar Panels: 3855 m²

Storage: 65 m³

Market potential Process Heat



industrial heat demand can be partly covered by solar process heat

(Source : IEA SHC Task 33 Task 33 report)

Higher potential than the whole domestic hot water market !

District Heating

AEVG Graz District Heating

Solar Panels erected:
5.000 m²/ 3.5 MW



Latest Projects



**Harvard University,
Boston**

DHW only

Hyatt´ -Regency

**United World
College (UWC),
Singapore**

Contract signed

**500 ton cooling
+DHW**

**Parliament of
Lisbon / Portugal**

Desert Mountain High School



- Cooling, Heating and DHW for Middle School and High school
- 500 tons / 1750 kW_{therm} of Cooling
- 10% larger than SOLID's Singapore project



Desert Mountain High School

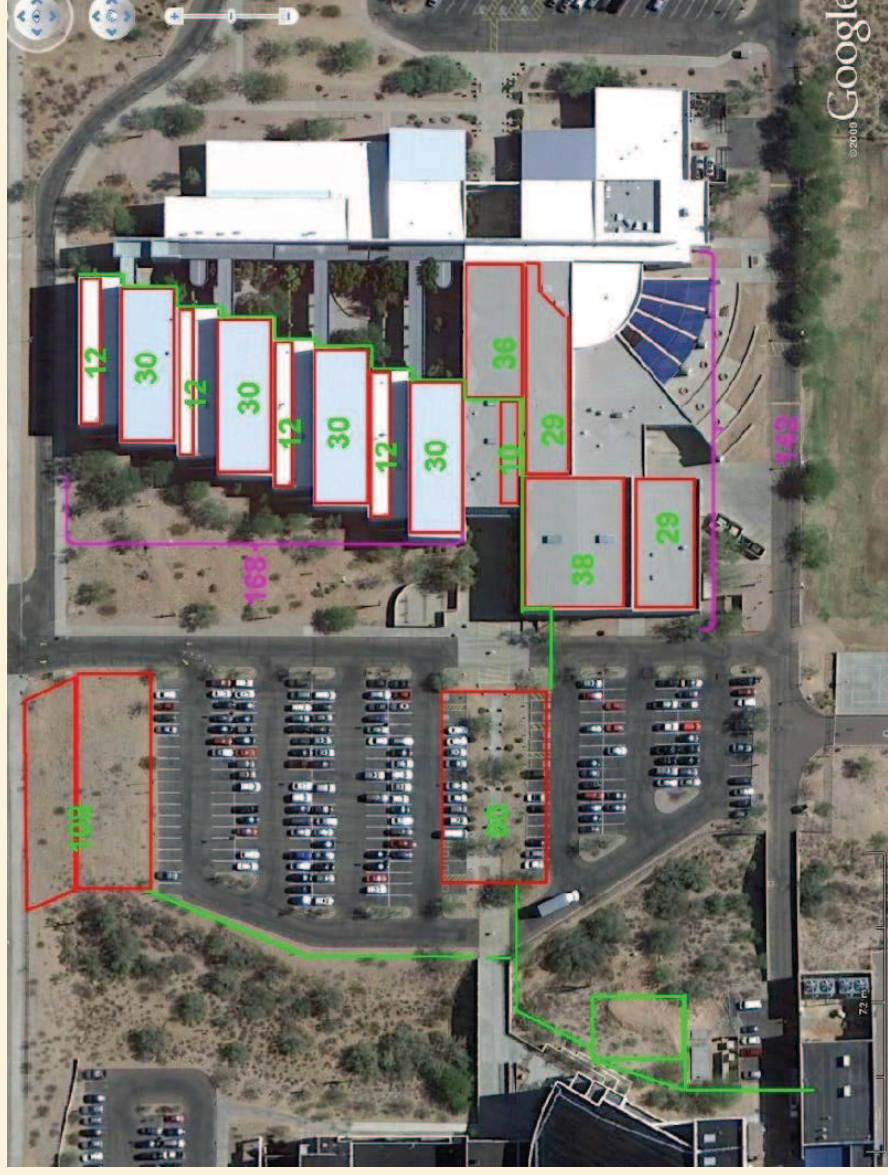
Arizona, Phoenix

5.000 m² Solar
Array

500 Ton Chiller

Energy Service
Agreement

Construction started
in 12/2010



Large Solar Thermal Systems



Nahwaerme Gleinstaetten



Solar covering 90% of the summer load

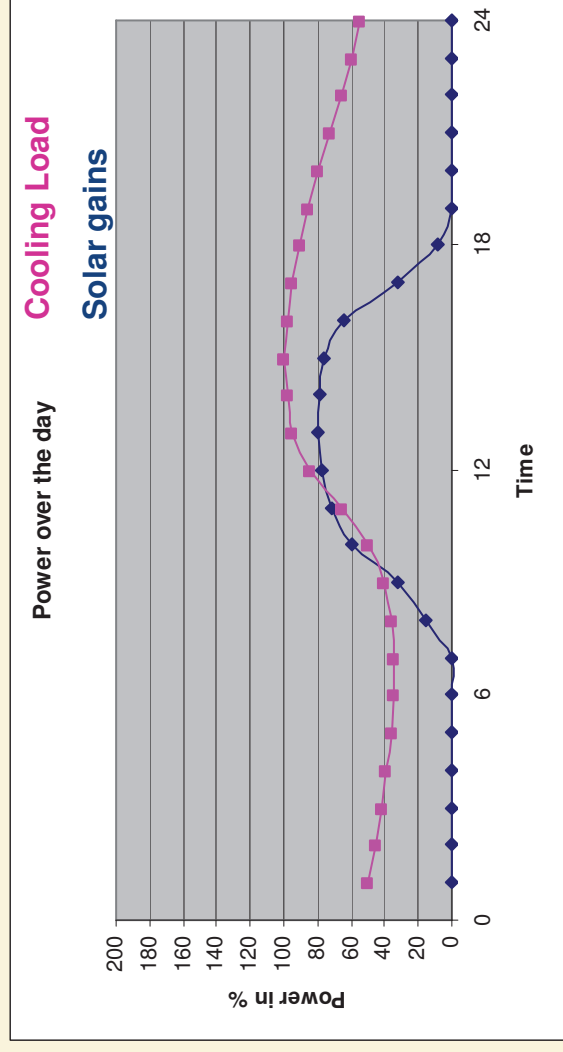
Main boiler off from May – October
reduces wear & maintenance needs,
significantly increases boiler lifetime.

Start of operation:	12/2006
Total installed thermal power (max. grid load)	4.200 kW
Heat supplied yearly:	6.500 MWh
Length of district heating network:	5.7 km
Wood chip boiler :	2.500 kW
Heat recovery (Exhaust condensation):	300 kW
Needed amount of wood chips:	10.000 m ³ /a
Customers:	75 objects
Collector area:	1,315 m ²

Concepts on Sizing

The easy and secure way-“Solar Instant“

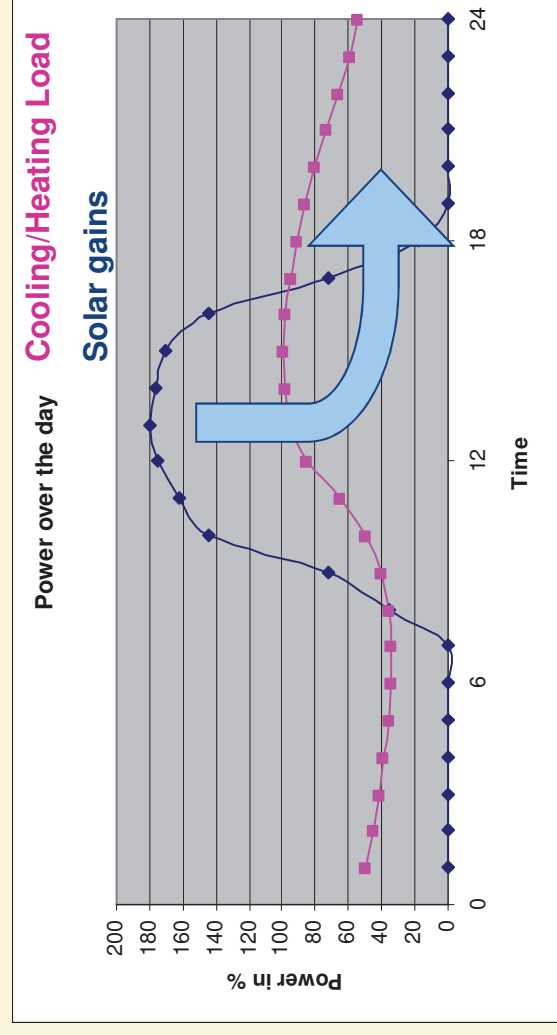
- Solar System provides never more than 90% of actual load
- Solar energy is used immediately
- Daily electricity peak is reduced
- Energy savings
- Relatively small tanks are needed
- Back up needed either thermal or electric
- Easy to design
- Lowest investment



Concepts on Sizing

Challenge one “Surplus during Daytime“

- Solar System provides 100% on sunny days during daytime AND surplus stored for the evening & night
- Bigger Tanks needed for storing heat
- During daytime/peak electric chiller is off
- Back up needed either thermal or electric
- Energy Savings more
- Good information needed on daily/ yearly consumption profile (measured ton hours chilled water)
- Best Payback



Large scale Solar Thermal

Thank you !

