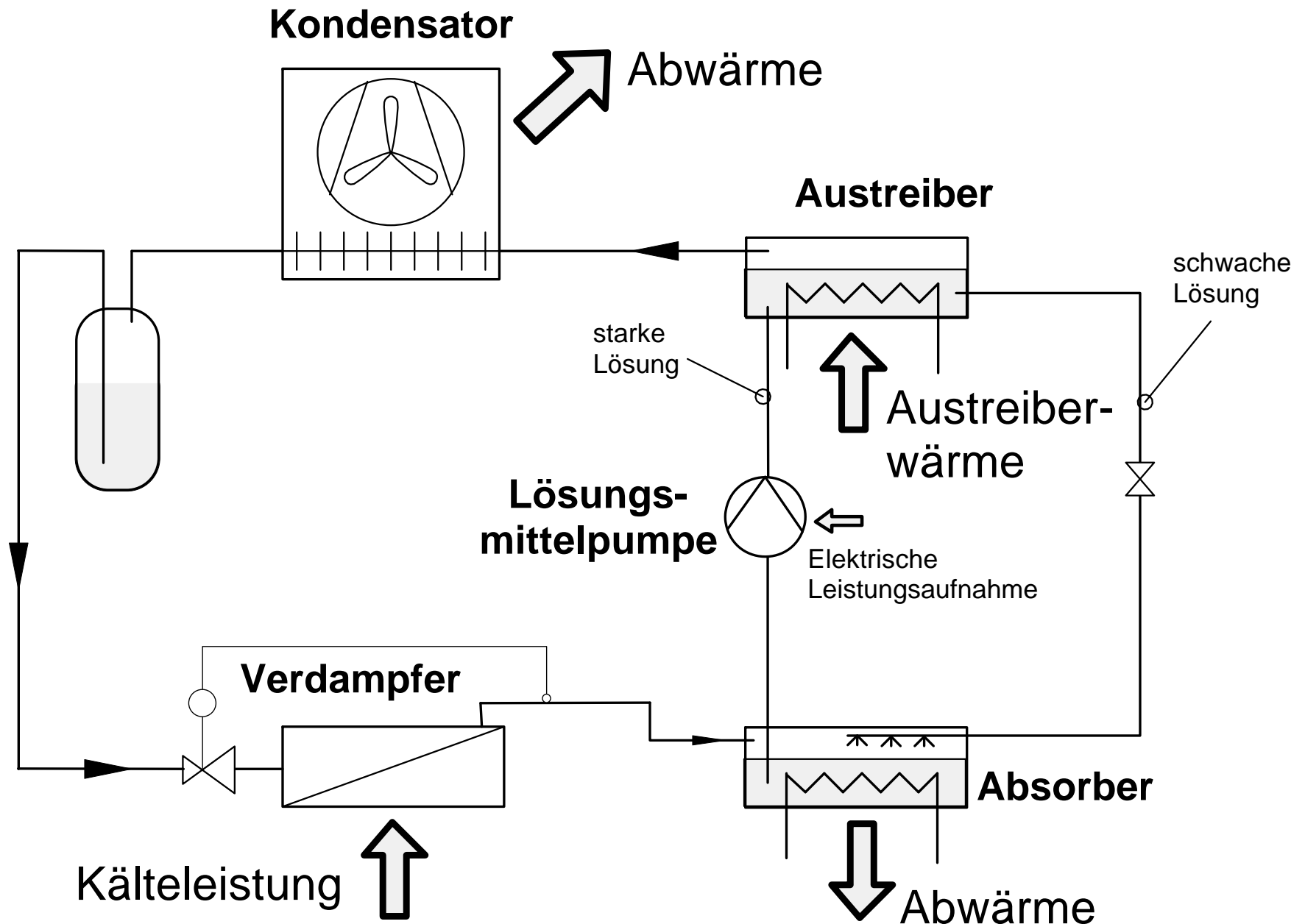


Cooling by district heating

DI Dr. Richard Zweiler



absorption cooling device - basic principle



Design point / Operating conditions:

Cooling power: 210 kW (3 * 70 kW)

Required thermal power: 234 kW

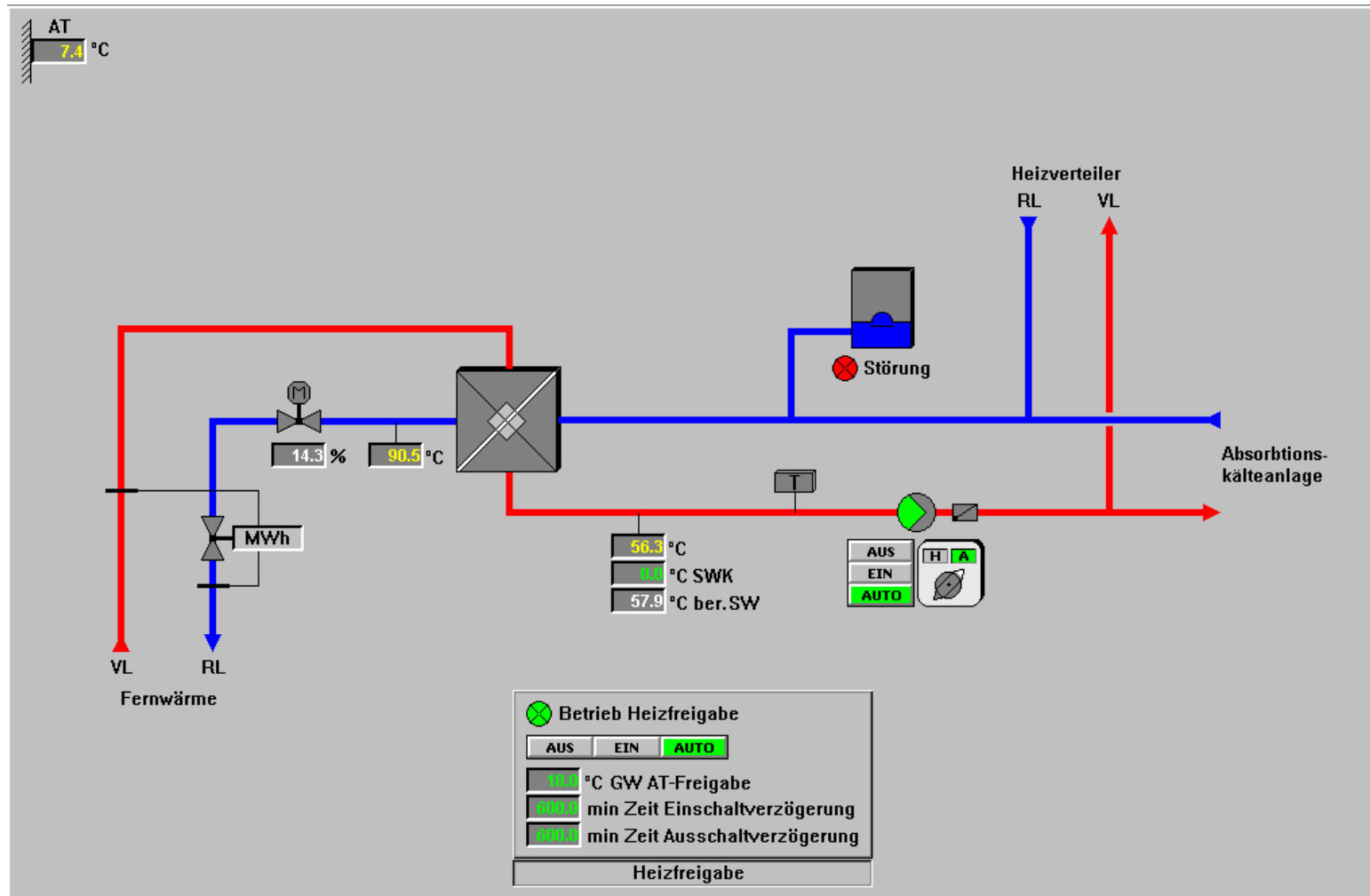
Cooling loop: 10°C / 14°C

District heating: 95°C / 85-90°C

Wet Cooling tower: 35°C / 25°C

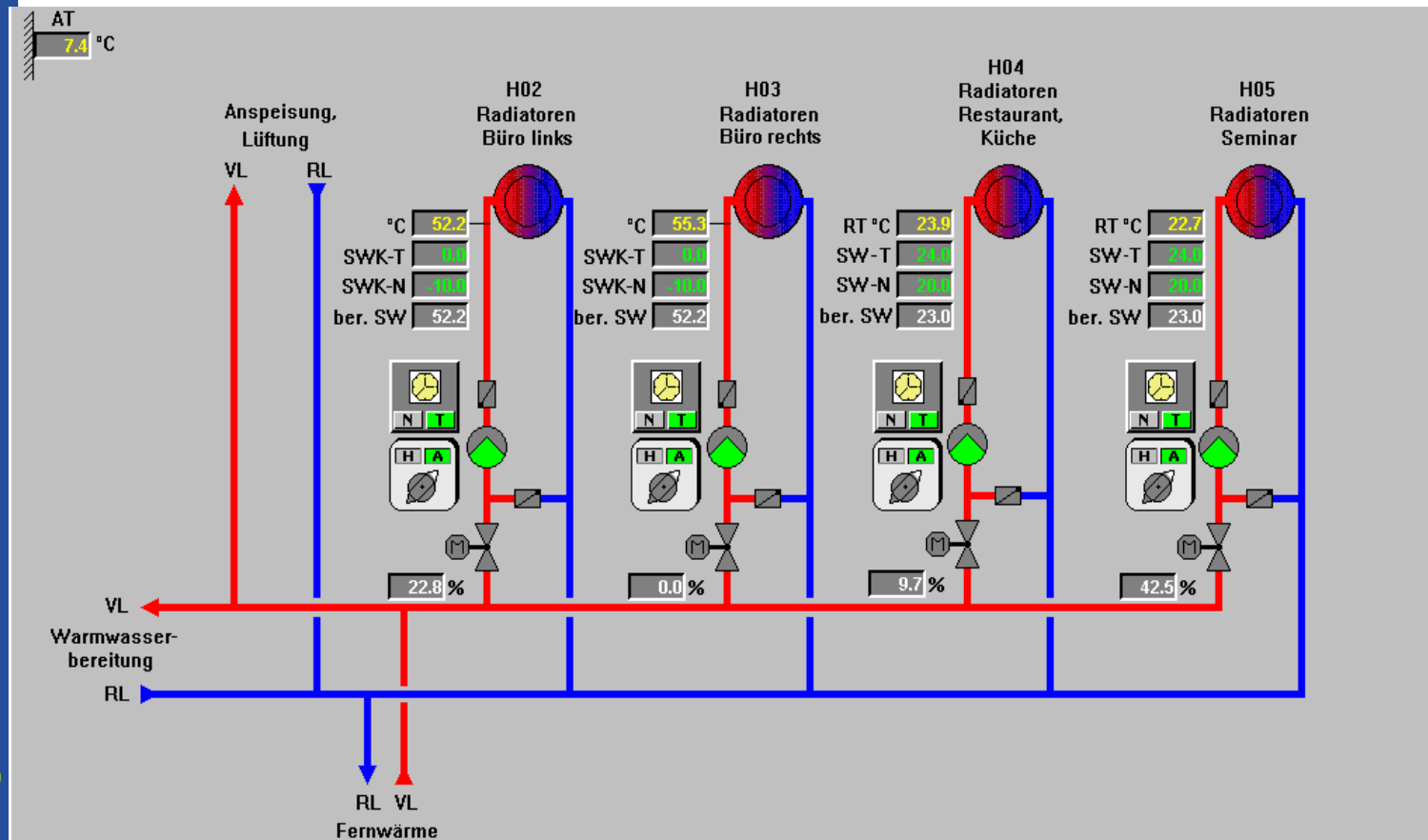
Buffer storage: 3000 Liter

Connection to the grid

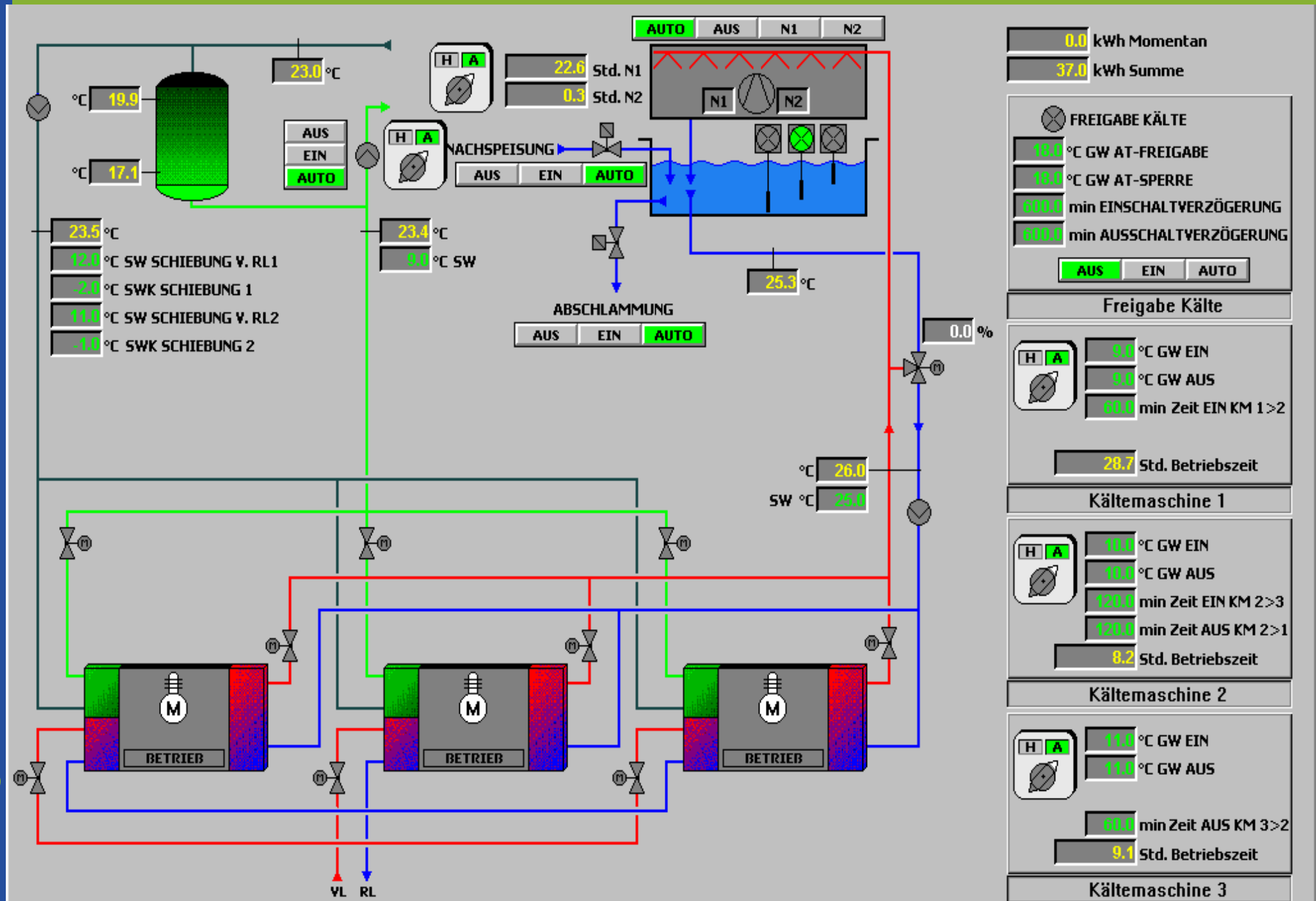


Distribution system

Hot water kitchen	35,0 kW
Air conditioning	75,6 kW
H02	92,1 kW
H03	81,2 kW
H04	5,8 kW
H05	7,0 kW



PLS - Screenshot



Wet cooling tower

- Highly effective cooling due to evaporation of the water
- Water treatment system required



District heating:

Flow to low.

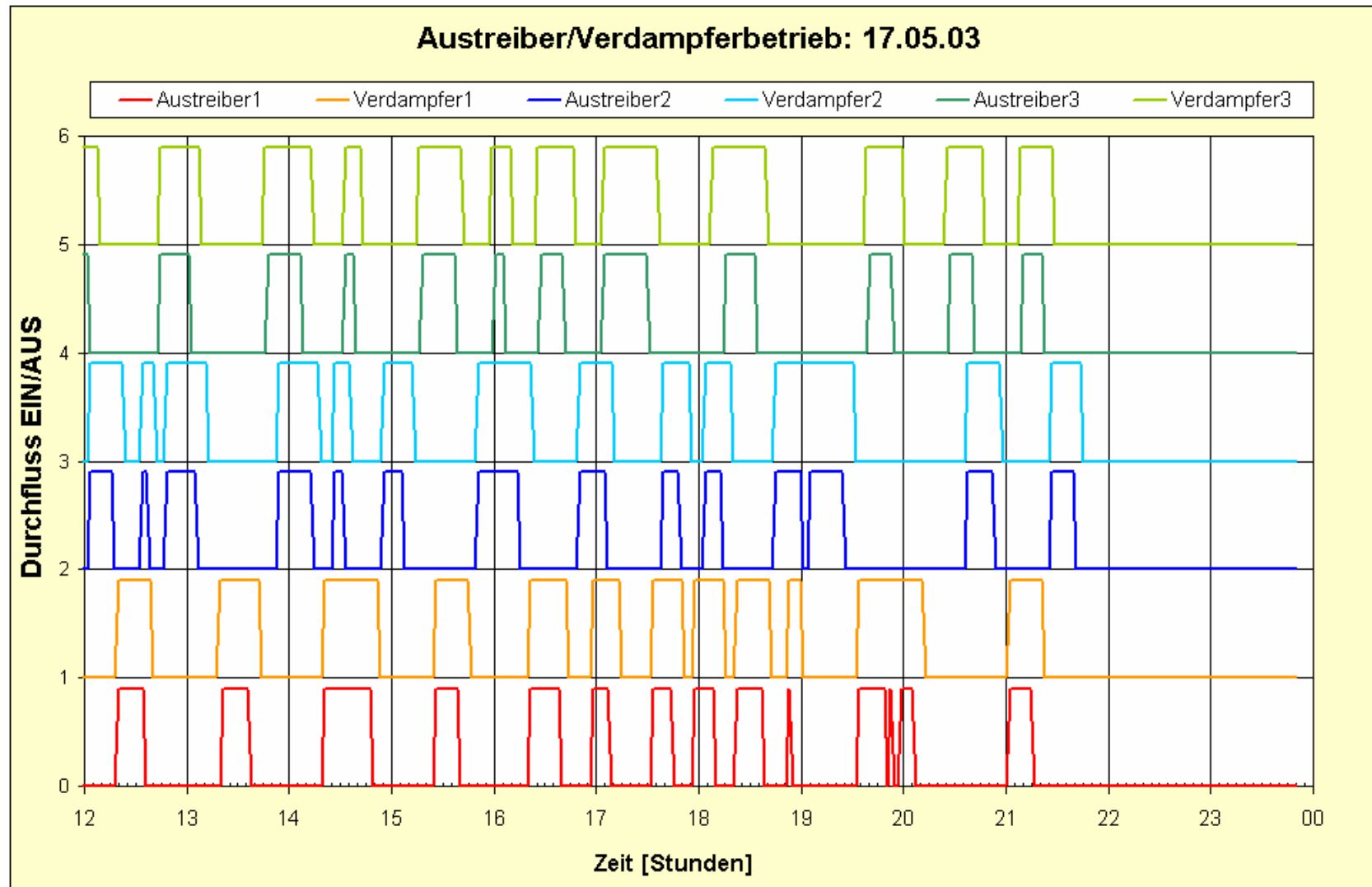
Pump control system calibrated to fix that problem.

Cooling water:

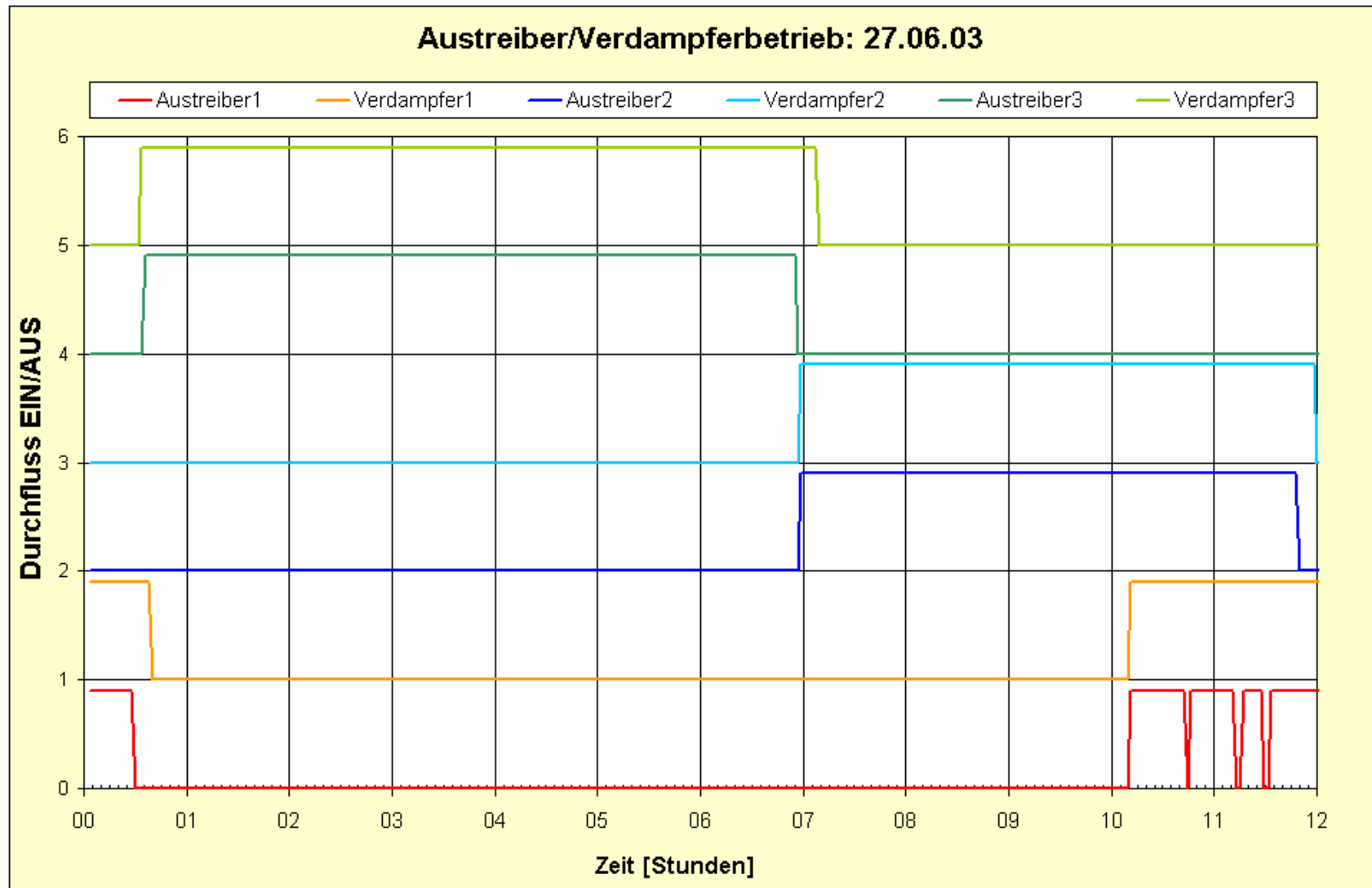
Flow to high.

Calibration of distribution system.

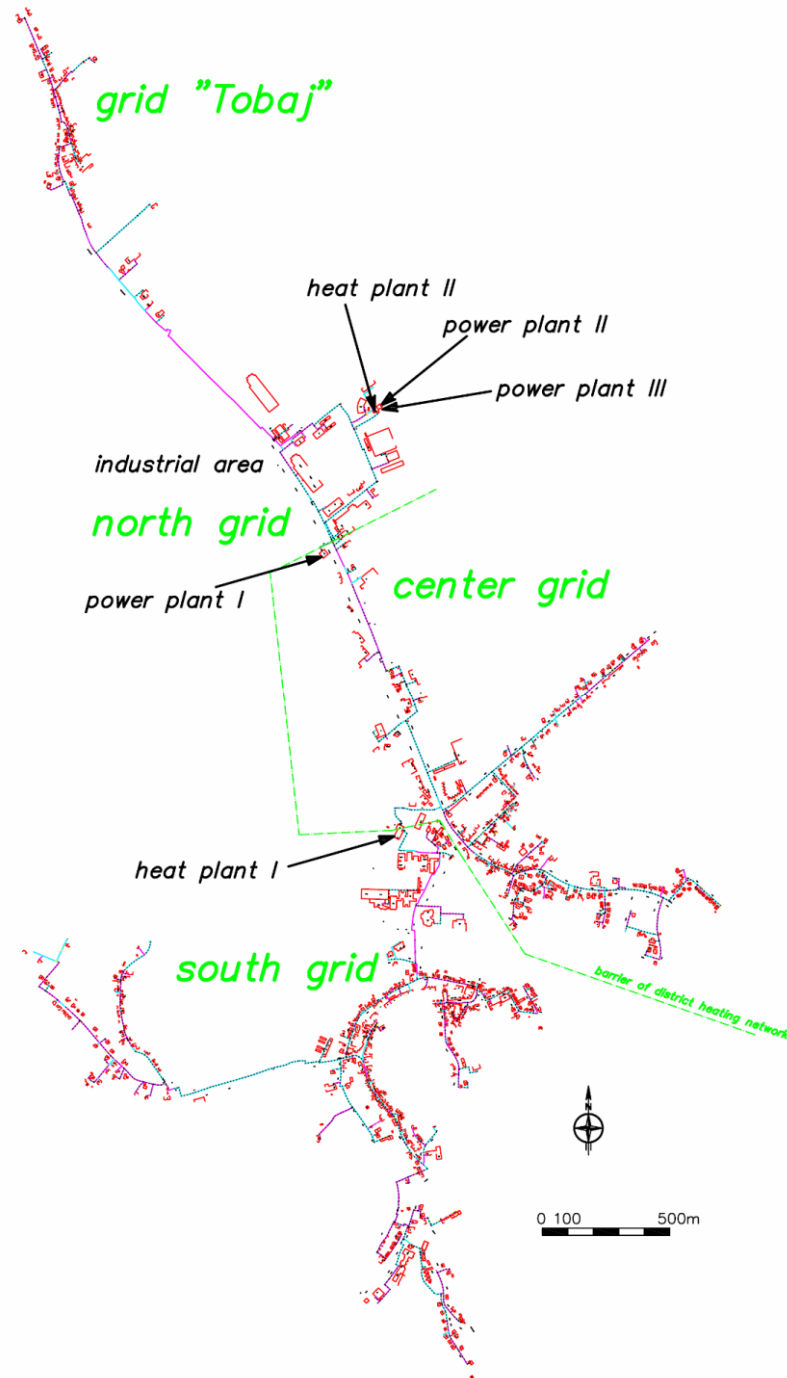
Operation cycle before optimization



Operation cycle after optimization



District heating system Güssing



temperature level:

120°C / 70°C

Consumers:

Constant thermal load of 2 MW

This means lucky conditions
with a high base load

Operation during summertime:

120°C / 70°C for industrial consumers

95°C / 85°C for **A**dsorption **C**ooling **D**evice

Power ACD: ~ 200 kW

Power district heating system: ~ 2000 kW

Power ratio (ACD / ind. consumers) ~ 1:10

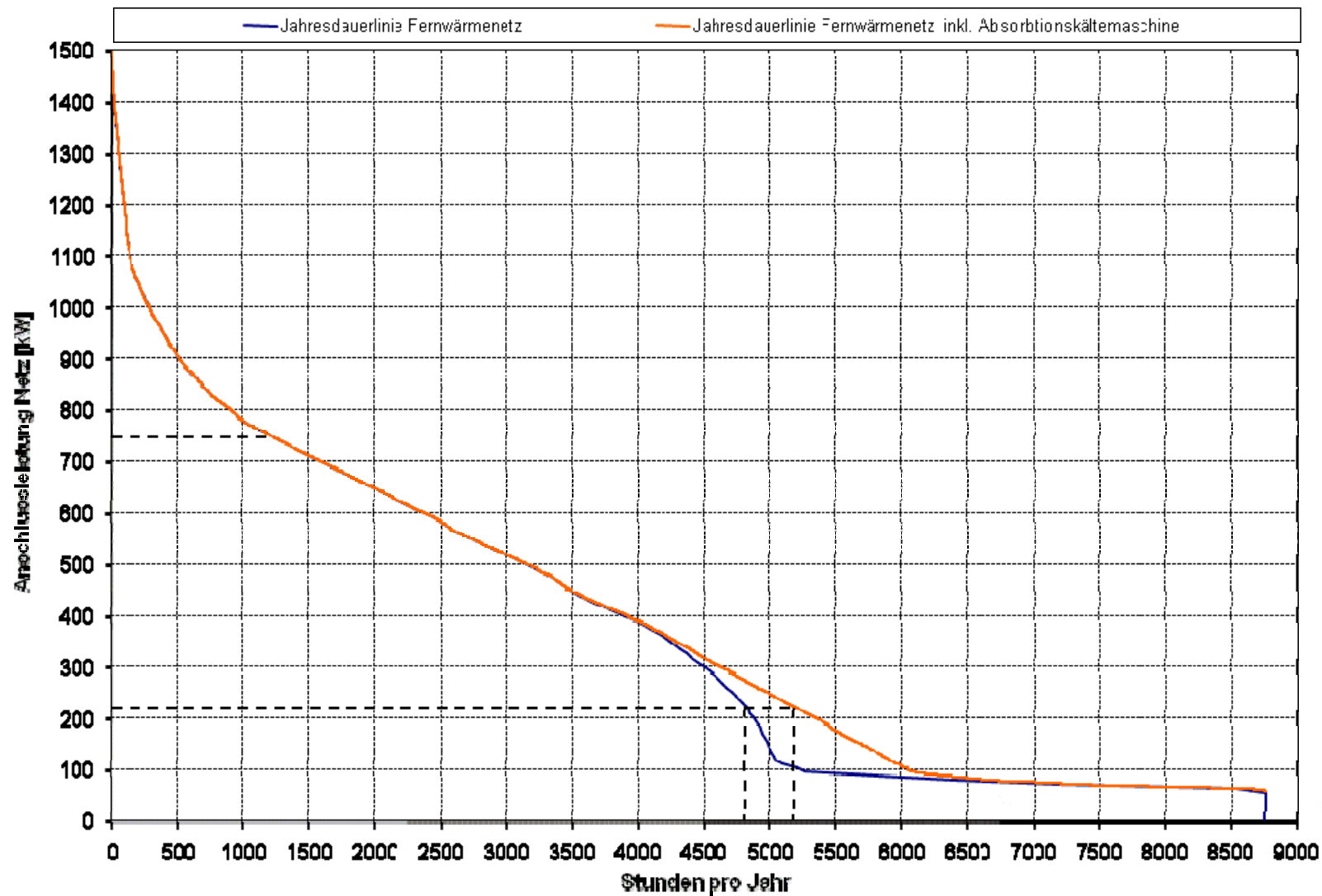
Ratio mass flow (ACD / ind. consumers) ~ 1:2

Annual load line

- ◆ Cooling power corresponding to outside temperature 20°C – 36°C
- ◆ Max. power district heating ACD 250 kW_{therm}
- ◆ Peak power district heating 1500 kW
- ◆ thermal power boiler 750 kW
- ◆ Minimum load biomass boiler 30%

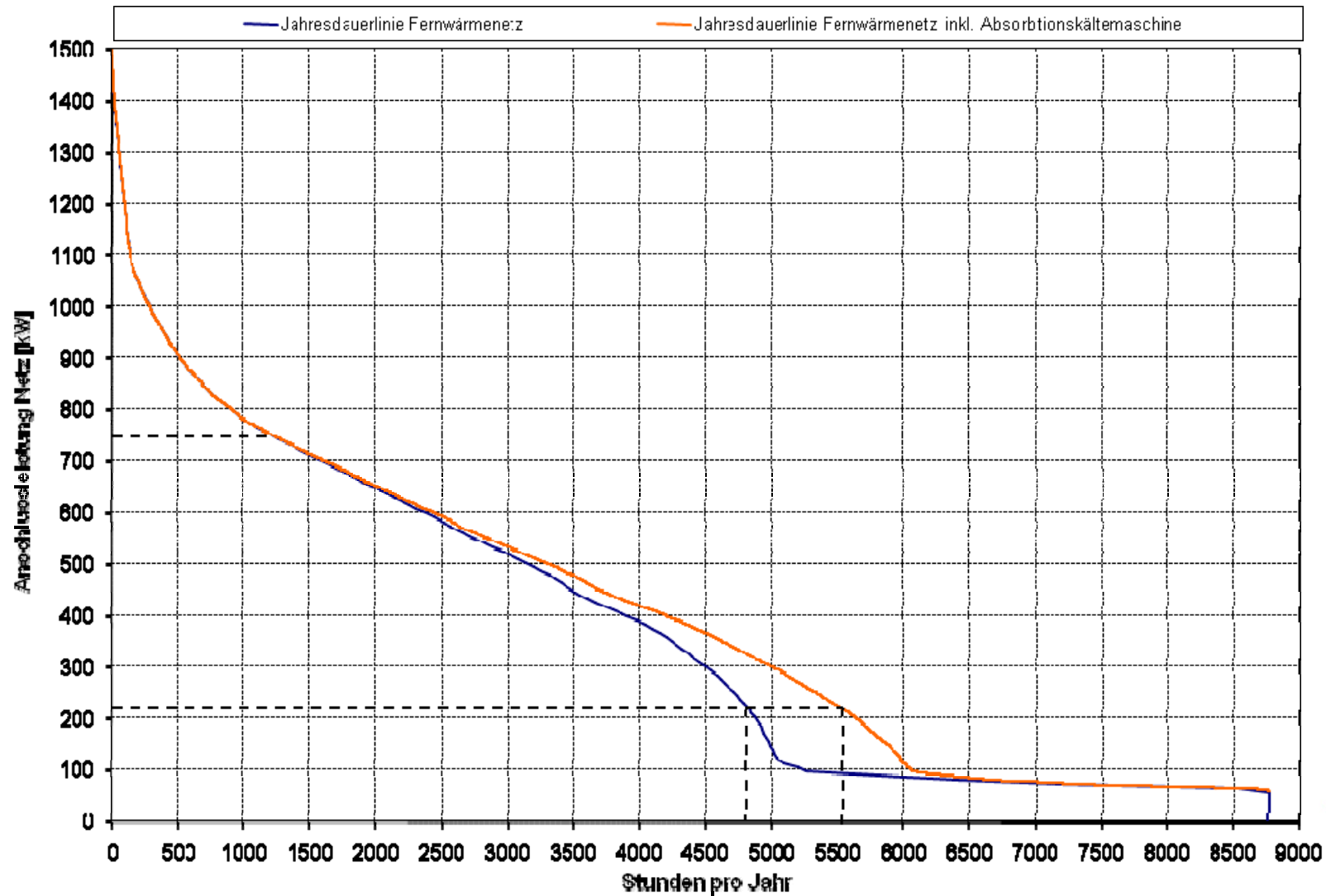
3295 MWh total
2680 MWh Biomass
615 MWh Oil

3414 MWh total
2804 MWh Biomass
610 MWh Oil



3295 MWh total
2680 MWh Biomass
615 MWh Oil

3533 MWh total
3191 MWh Biomass
559 MWh Oil



Border conditions for evaluation of economic efficiency:

- ◆ 2003
- ◆ Costs district heating 33,4 €/MWh

Specific costs conventional systems

Operational costs conventional air conditioner (01.04.2003 - 30.09.2003) Cooling Power 120 kW	
COP	2,76
Cooling demand [kWh]	47730
Network access fee [€]	2943
Electricity costs [€]	1628
Total costs for cooling [€]	4571
Specific costs [€/kWh]	0,095

Calculation of economy for ACD

(01.04.2003 - 30.09.2003)

cooling power 120 kW

COP	COP 2003	COP	COP	COP
	0,36	0,5	0,6	0,7
Cooling demand [kWh]	47730	47730	47730	47730
Network access fee [€]	1149	1149	1149	1149
Electricity costs [€]	450	450	450	450
Costs district heating [€]	4491	3188	2657	2277
Total [€]	6090	4787	4256	3876
Specific costs [€/kWh]	0,127	0,100	0,089	0,081

