

SDH 2013, Malmö

IP-Solar
 an intelligent monitoring service

IP-Solar an intelligent monitoring tool

Bernhard Gerardts, Solid



IP = Intelligent Platform

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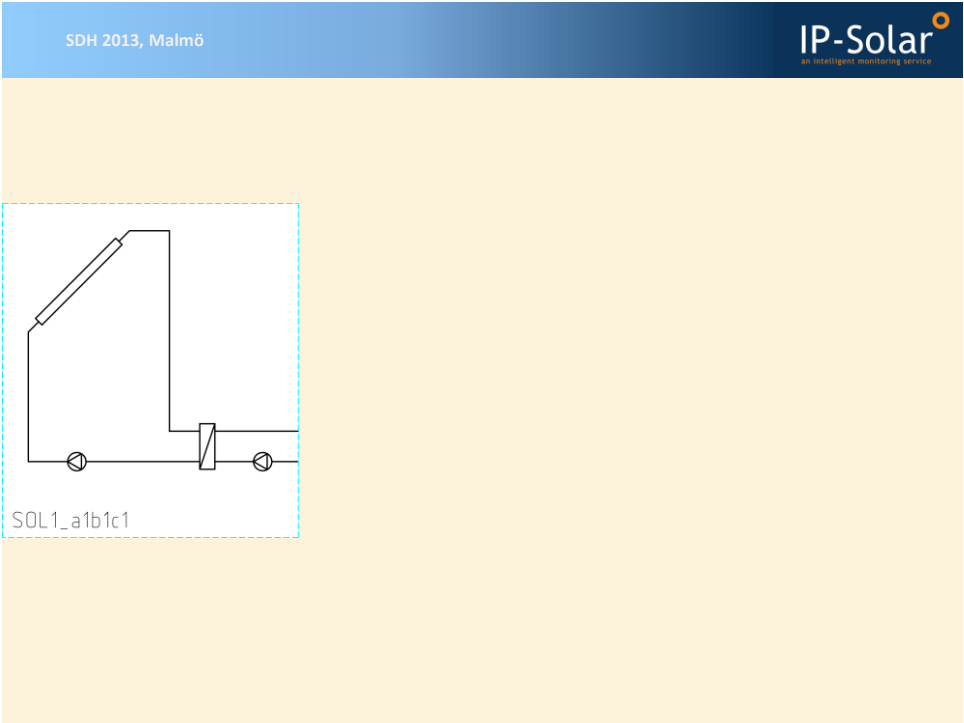
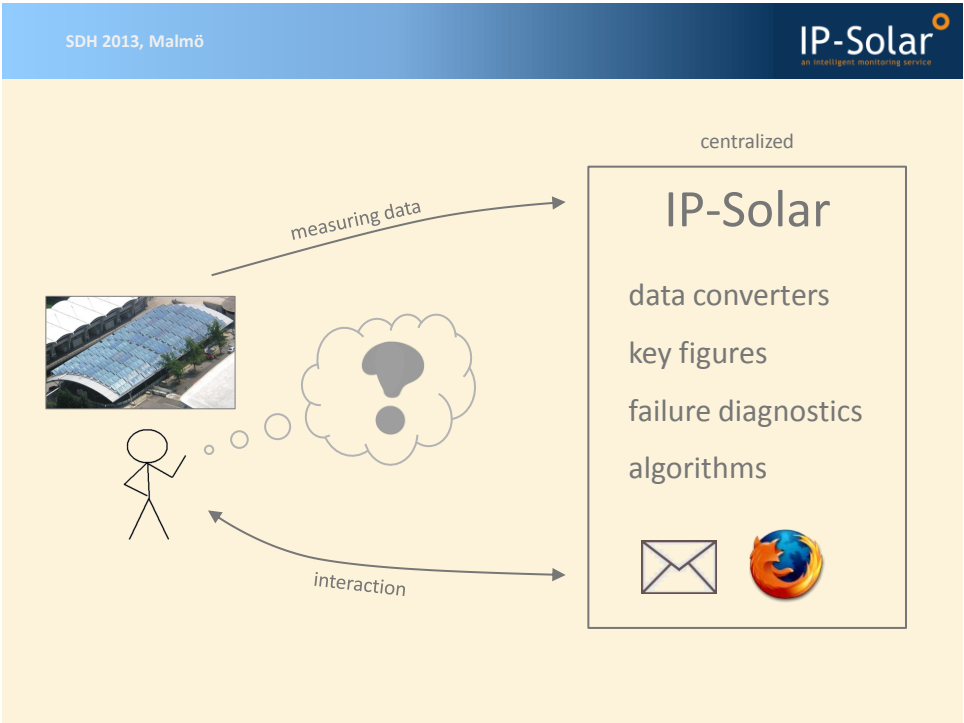
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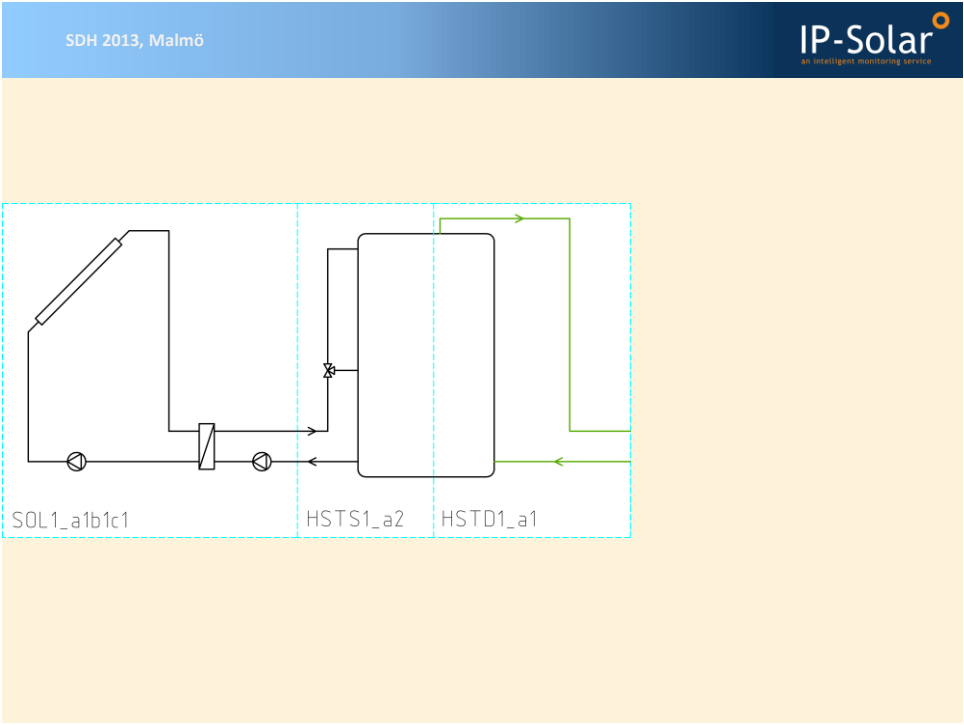
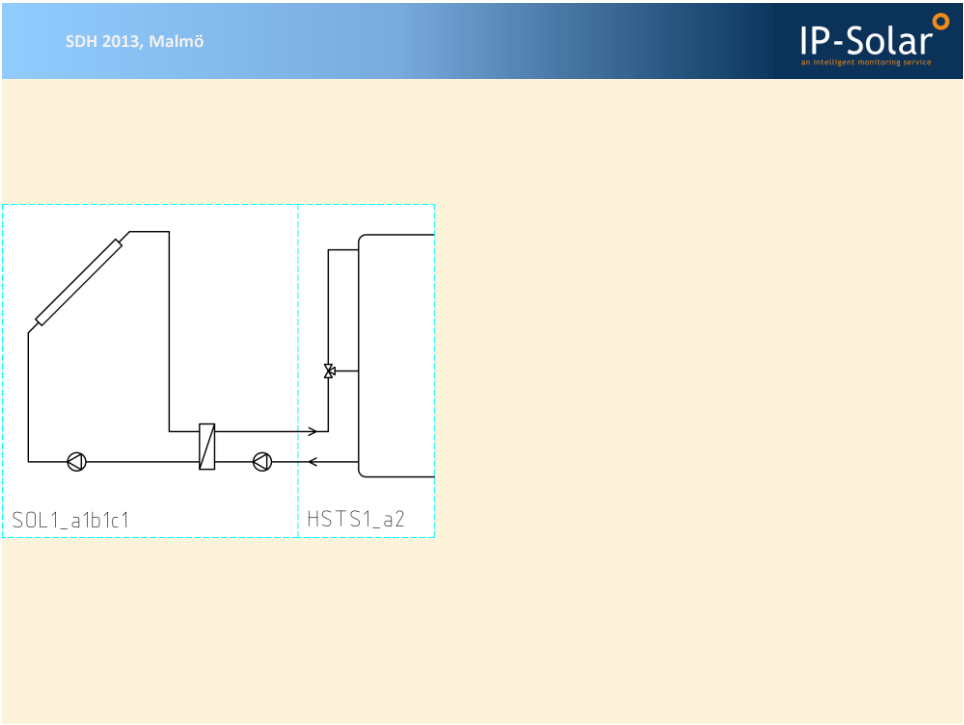


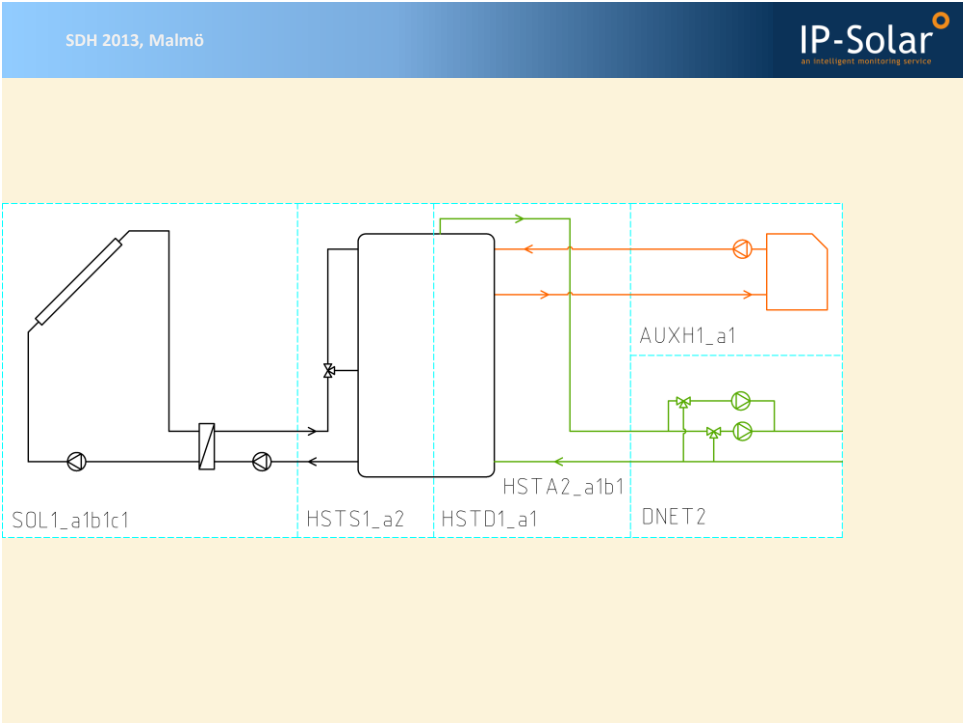
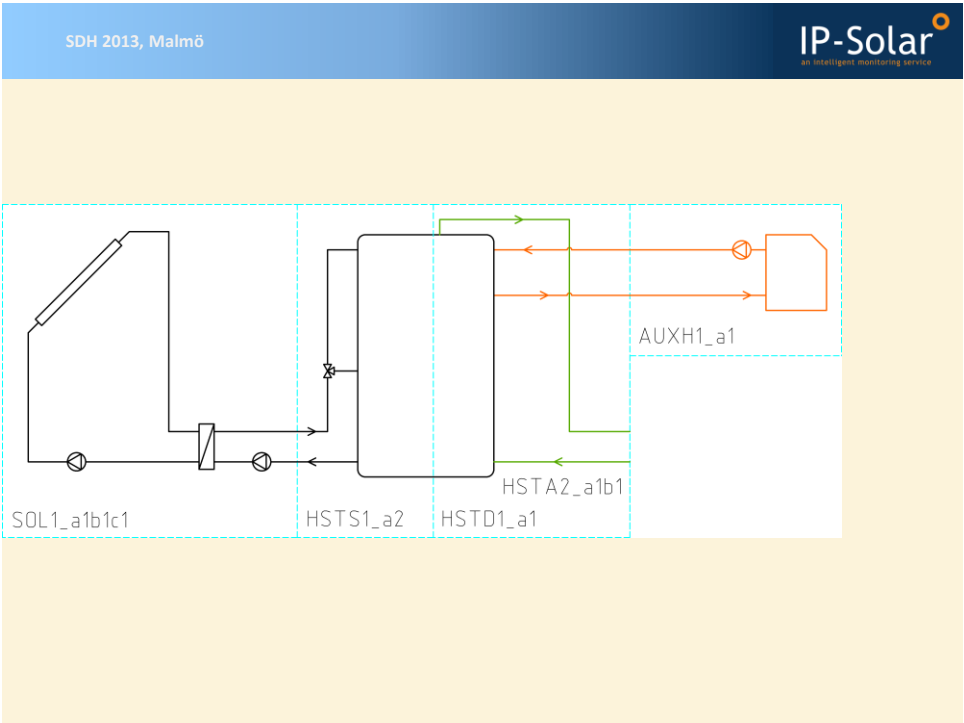
Monitoring Options

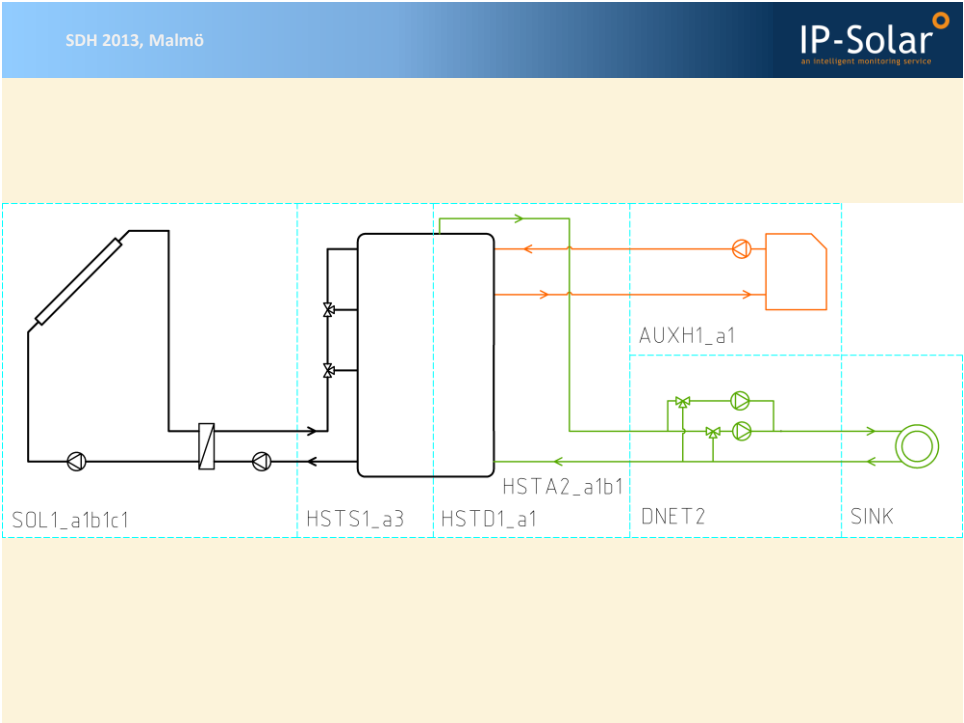
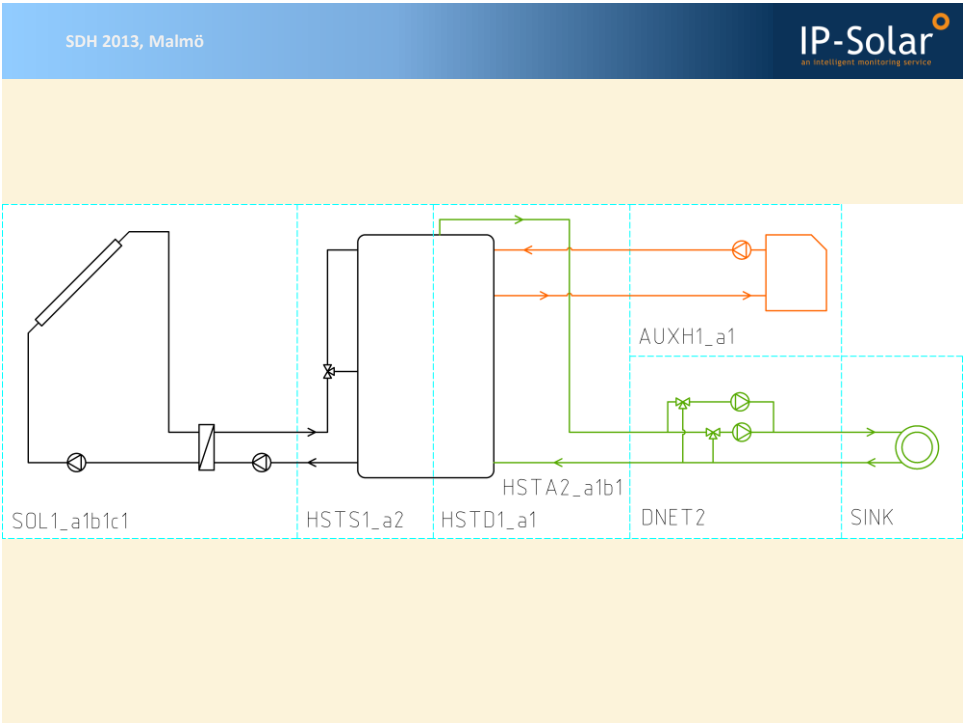
- | | |
|-------------------------------|------------------------------|
| (1) skip or infrequent | not a good idea... |
| (2) manual monitoring | good, but very expensive |
| (3) monitoring in R&D project | good, but limited |
| (4) long-term, computer-aided | good & inexpensive
but... |

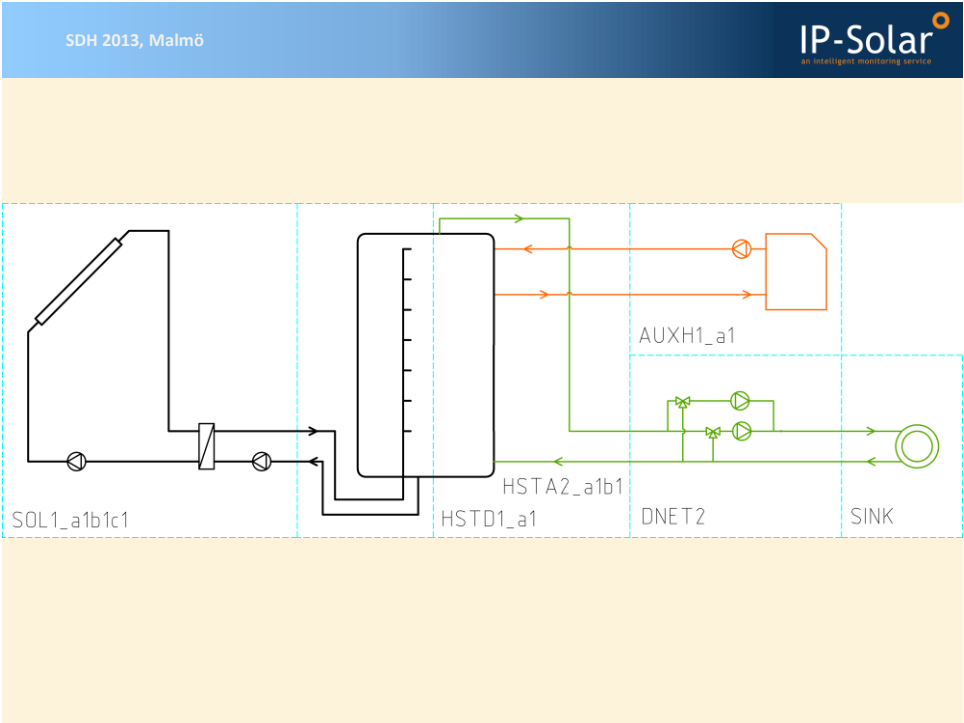
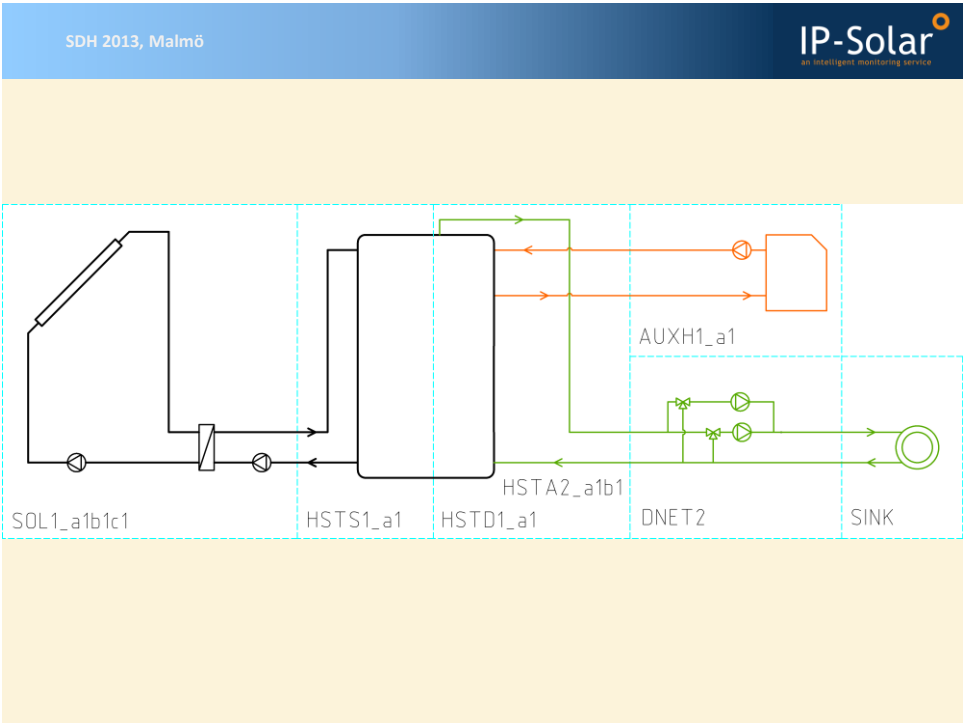












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modules

module		detail variants
SYS	system	1
SOL	solar circuit	13
HP	heat pump	2
HST	heat storage	24
AUXH	auxiliary heating	4
DHWP	DHW preparation	32
DNET	distribution net	2
SINK	sink	3
	others	4

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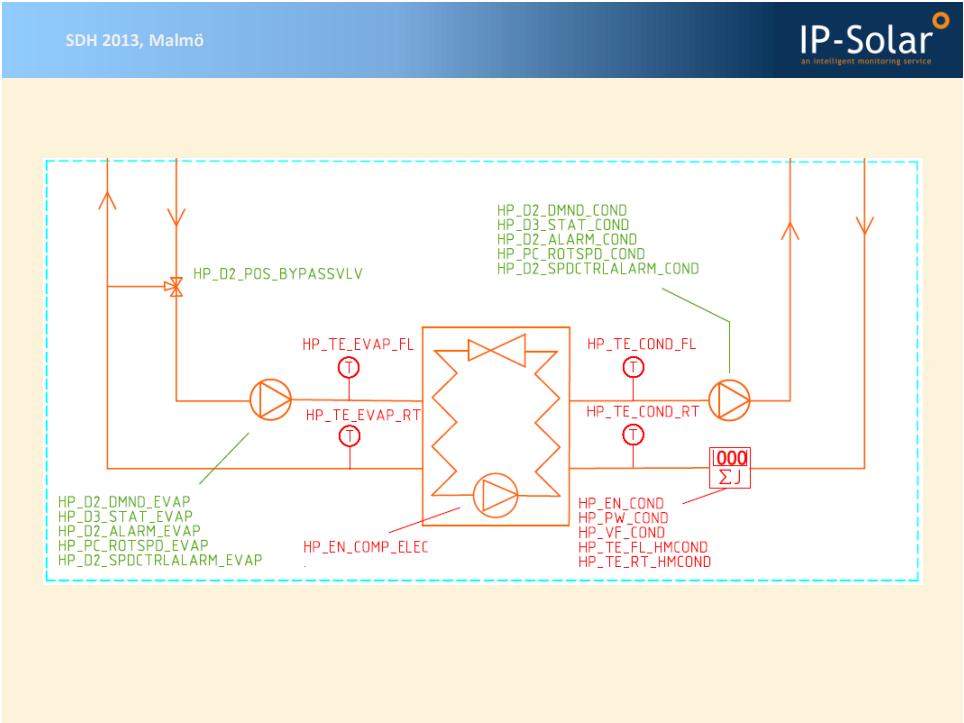
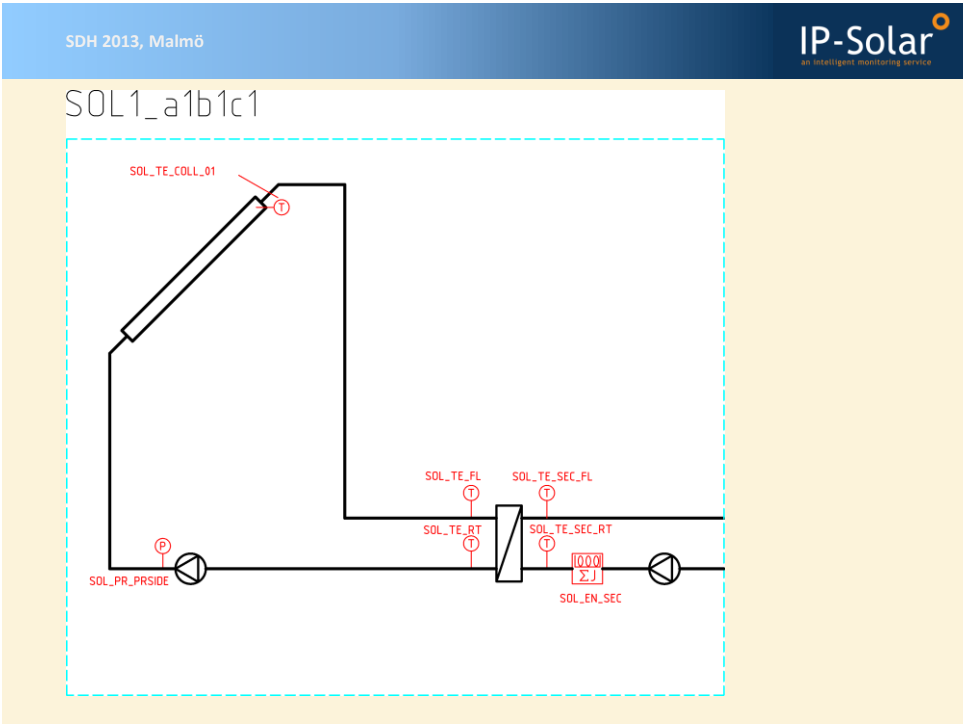
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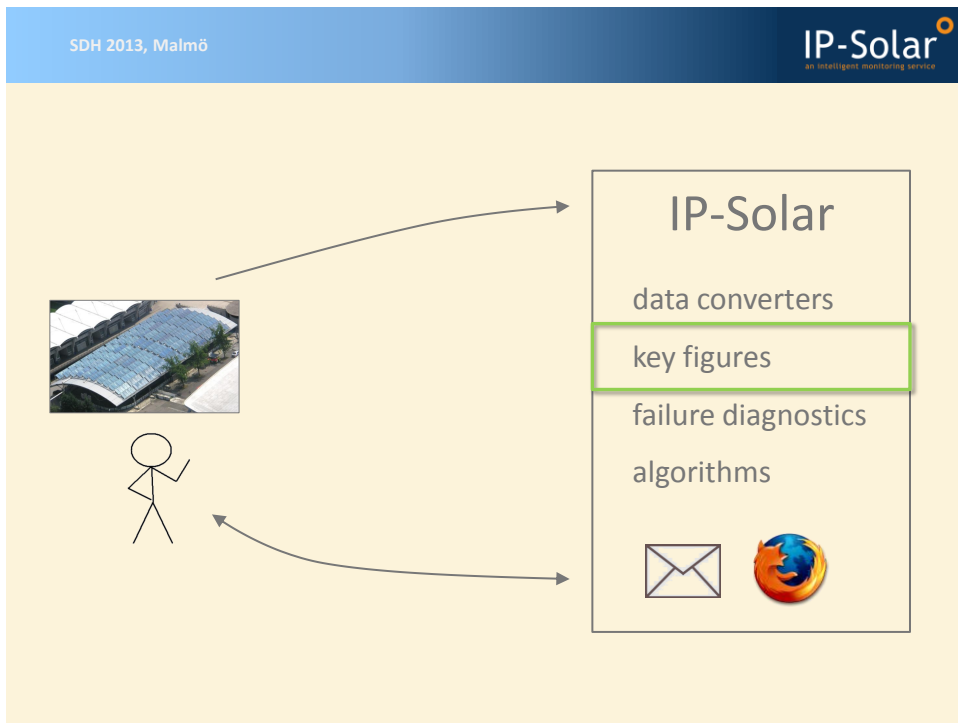
SOL1_a1b1c1

The diagram illustrates a solar heating system layout. A dashed blue box encloses the main components: a solar collector loop, a pump, and a distribution network. The collector loop includes a collector (SOL_TE_COLL_x) and a manifold (SOL_PR_BFHEX). The pump is labeled SOL_PR_PRSIDE. The distribution network includes a manifold (SOL_PR_SEC_AFHEX) and a return line (SOL_PR_SEC_RT). Various temperature (T) and pressure (P) sensors are indicated throughout the system. A list of sensor identifiers is provided at the bottom of the diagram.

Sensors listed at the bottom:

- SOL_D2_DMND_PRI PUMP1
- SOL_D3_STAT_PRI PUMP1
- SOL_D2_ALARM_PRI PUMP1
- SOL_PC_ROTSPD_PRI PUMP1
- SOL_D2_SPOCTRLALARM_PRI PUMP1
- SOL_EN_SEC
- SOL_PW_SEC
- SOL_VF_SEC
- SOL_TE_FL_HMSEC
- SOL_TE_RT_HMSEC
- SOL_D2_DMND_SECPUMP1
- SOL_D3_STAT_SECPUMP1
- SOL_D2_ALARM_SECPUMP1
- SOL_PC_ROTSPD_SECPUMP1
- SOL_D2_SPOCTRLALARM_SECPUMP1



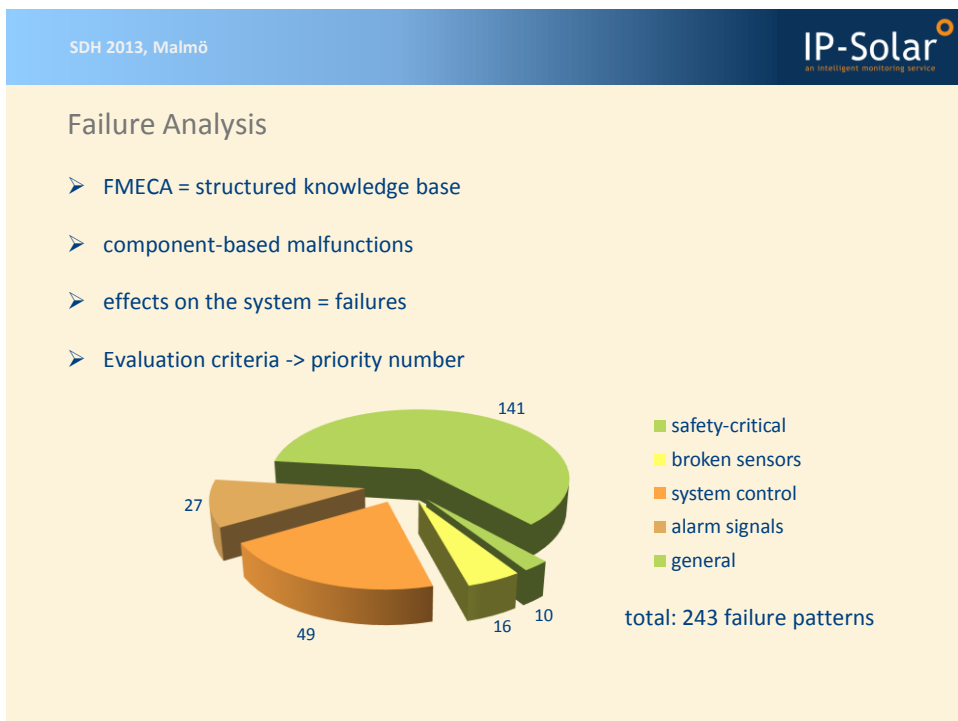
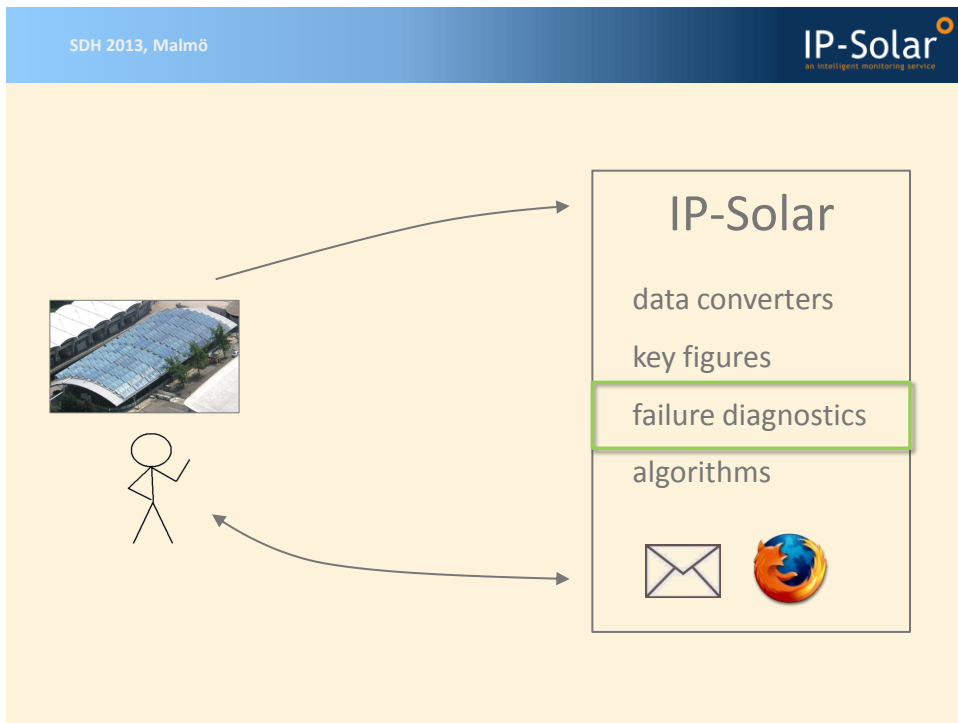


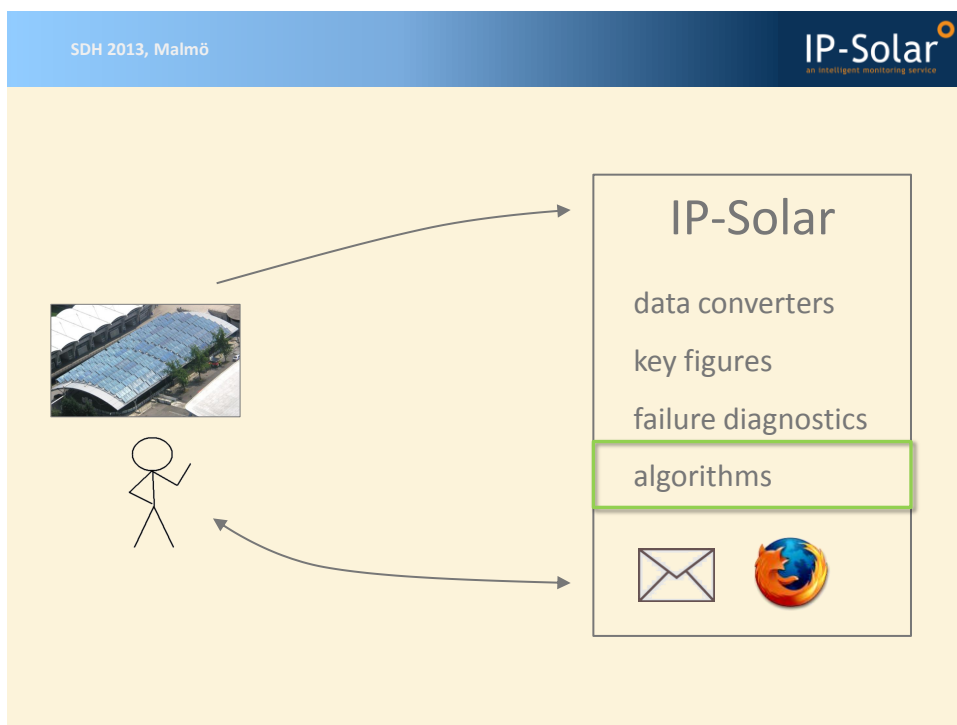
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Key Figures

- **examples**
 - specific solar energy yield
 - average return temperature to storage
 - solar fraction(s)
 - number of heat storage charging cycles
 - system performance factors (IEA Task 44 / Annex 38)
 - > including electrical energy consumed by the pumps
- **117 key figures**
- **calculated per day, month, year**
- **quick system characterization & www monitoring**



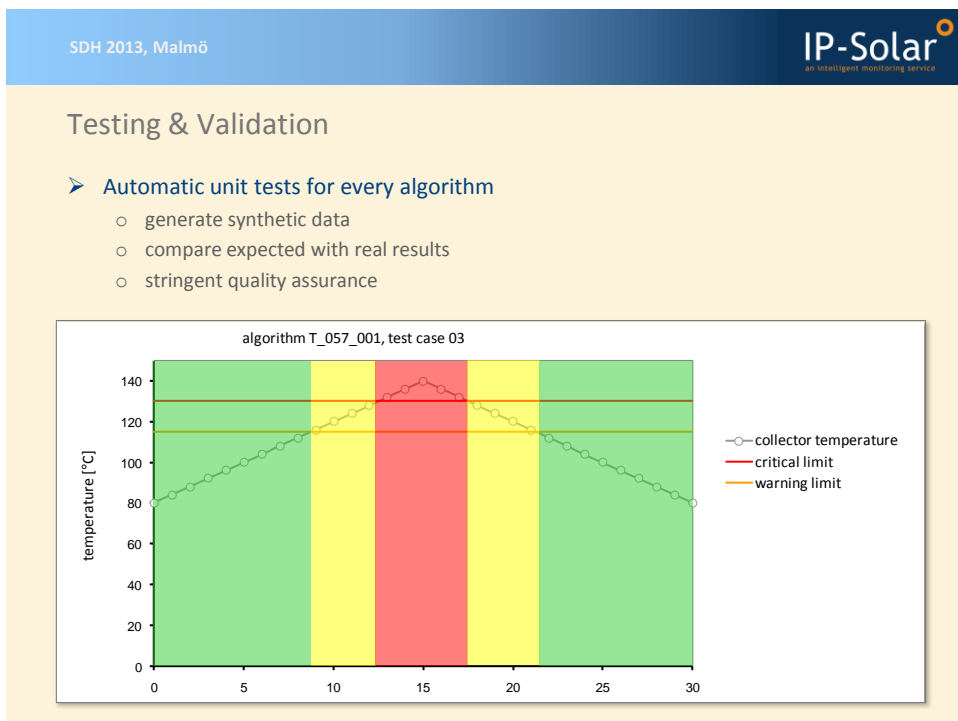
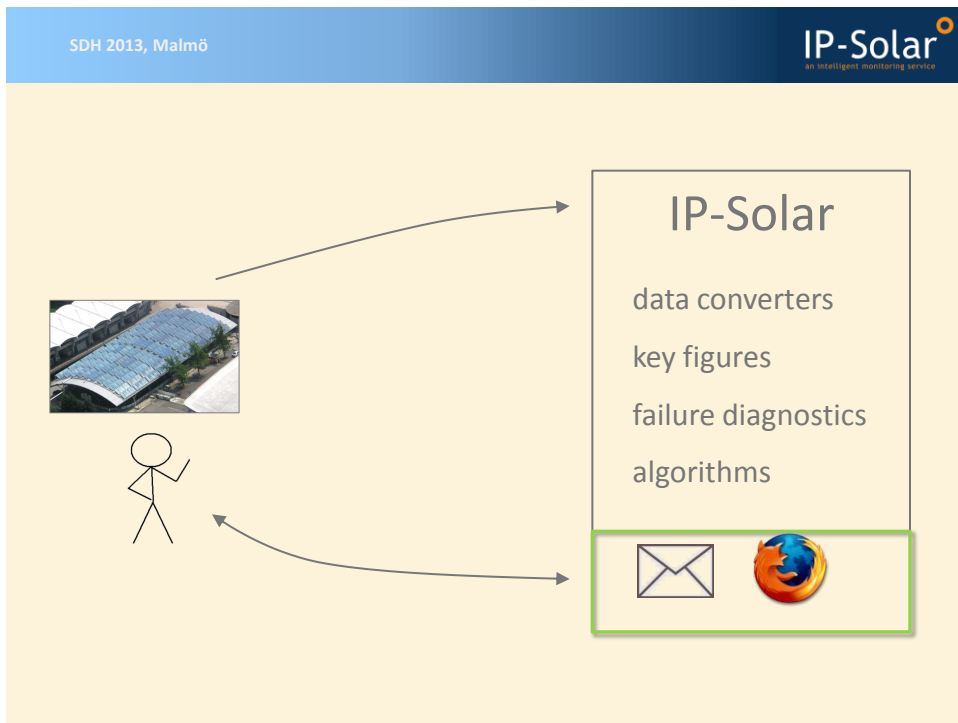


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Algorithms

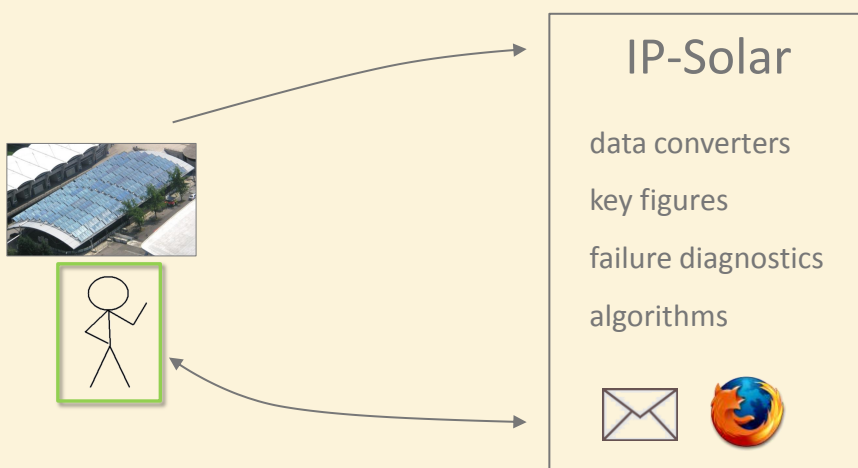
- answer failure questions
- short-term
 - collector temperature too high? last 3 minutes
- long-term
 - heat exchanger capacity decreasing? last months?
- total of 136 algorithms developed
 - ok – warning – critical
 - limits adjustable (173 parameters)
 - “criticality value” = system damage



Testing & Validation

➤ Validation: 3 pilot plants in Graz

- | | |
|-------------------------------------------|---------------------|
| ○ DHW | 114 m ² |
| ○ 2-line system | 153 m ² |
| ○ district heating | 1404 m ² |
| ○ Combination solarthermal with heat pump | 3885 m ² |



Target User Groups

- operators / end users
- public institutions / funding authorities
- scientific institutions

Key Features

- | | |
|------------------------------------------------|----------------------------|
| ✓ independent of control system / manufacturer | standardized diagnostics |
| ✓ understands "every" data format | data converter / filter |
| ✓ includes entire energy supply system | auxiliary heating, DHW,... |
| ✓ no obligatory measurement equipment | take what you get |
| ✓ no extra peripheral hard- or software | www access |
| ✓ permanent surveillance | automatic |
| ✓ automatic notification | if failure occurs |

Thank you!