Danvak dagen 2022:

Case Study, Blåa Huset Malmö

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“Blue House”, a virtuous example of the future HVAC design and operation.

What's going on in Malmö?

Blåa Huset (Blue House)

The Building

- Office building, Malmö Sweden
- 2000 sqm, 3 floors
- In use, since July 2021
- Space cooling 11800 kWh
- Space heating 48000 kWh

Request for cooling, heating, ventilation and full HVAC system management

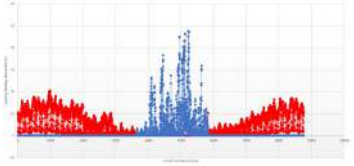
Swegon partnership with consultants, installer and owner

SYSTEM OPTIMIZATION

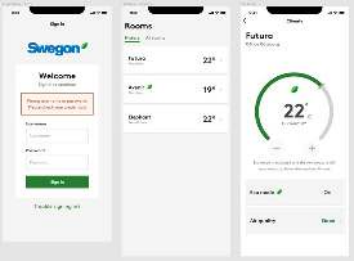
1) Design of the HVAC systems:

2) Choice of the right HP/CH & refrigerant:

3) Energy saving:



4) Customer satisfaction by digitalization:



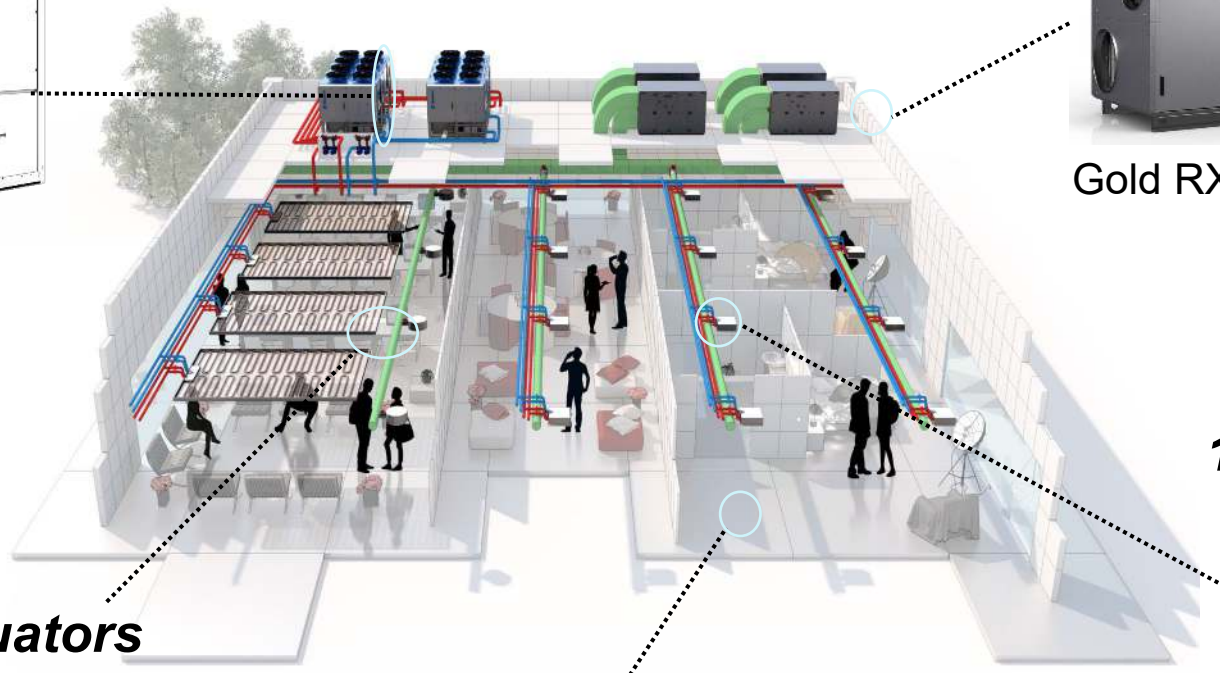
Blåa Huset (Blue House), Products & Systems

1 x Reversible A/W HP

Zeta SKY Hi HP 6.2 R7

2 x AHU with rotary exchanger

Gold RX 35, 05



100 x Comfort module

Wise Parasol

Diffusers, dampers, attenuators

Room Sensors

Selection of the air/water inverter heat pump

First HP specifications:

- Heat pump with **on/off ressors**
- **60kW heating**, **80kW**

ld water 14- 18°C
water 35 - 40°C

Cold water 12 - 7°C
Hot water 28 - 23°C

First HP selection

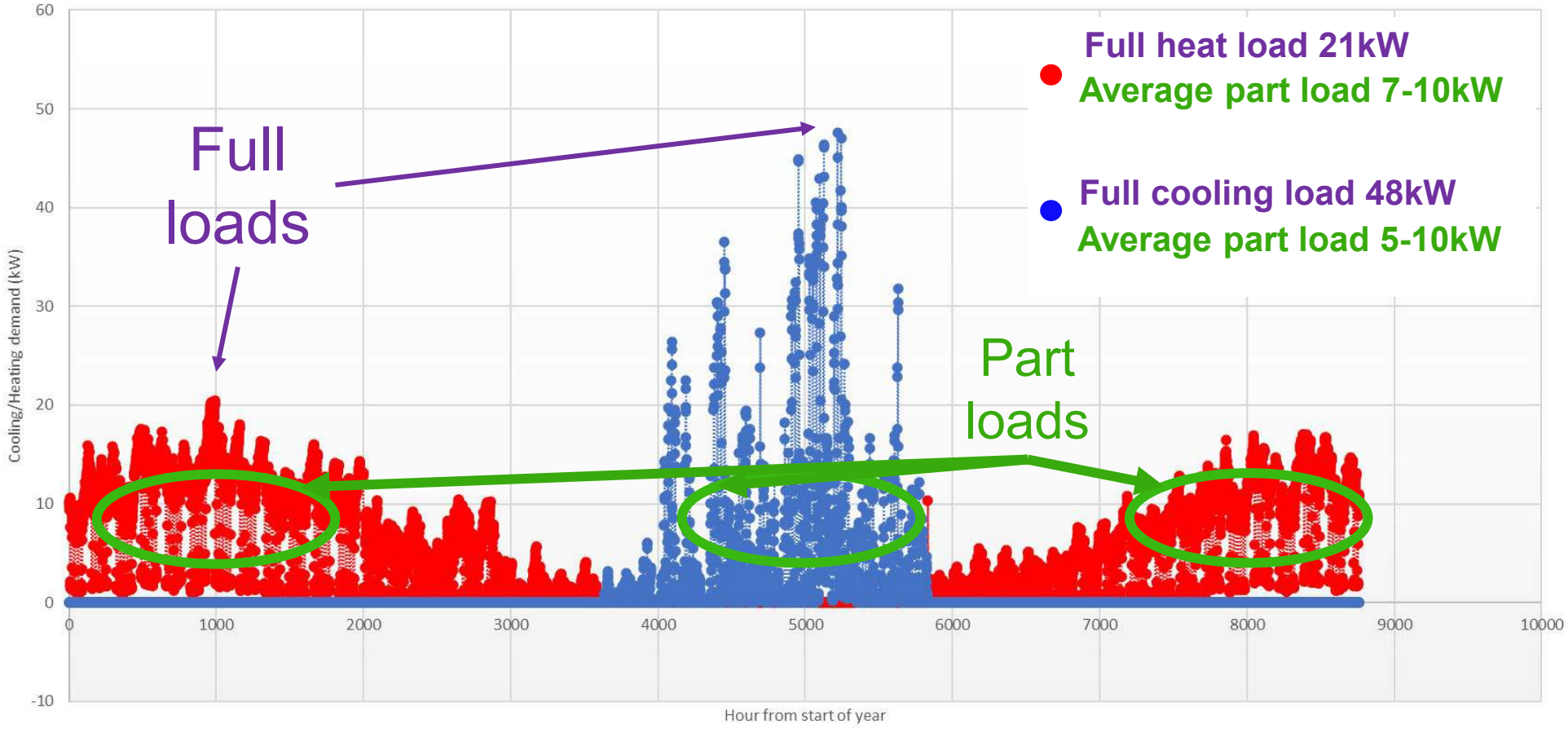
- High tempe hea mp based on R410A
- 2 on/off compr **% minimum step)**
- 80kW capacity
- **High GWP ant**

LIMITED OPTIMIZATION CAPABILITY

Selection of the air/water inverter heat pump

Real Load simulation:

- external air temperature was complemented with simulations based on internal needs/load
- one hour granularity
- variable load during the working day



Selection of the air/water inverter heat pump

Results from plant simulation:

→ Minimum part load 3-5kW
→ High variable load
→ Risk of compressor cycling
→ **-38% cooling capacity needed**

New HP specifications:

- Heat pump with **inverter** compressors
- HP capacity reduced from 80kW to **60kW** capacity
- Adoption of Low GWP refrigerant

Zeta SKY Hi HP 6.2 R7
60kW* nominal heating capacity

* user 40/45°C source A7°C EN14511

Reversible HP reselection:

Strengths

- **SKY generation, low environmental impact**
- Inverter heat pump, 8% minimum capacity step
- Accurate regulation by inverter technology and EEV

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design according to real part load operation

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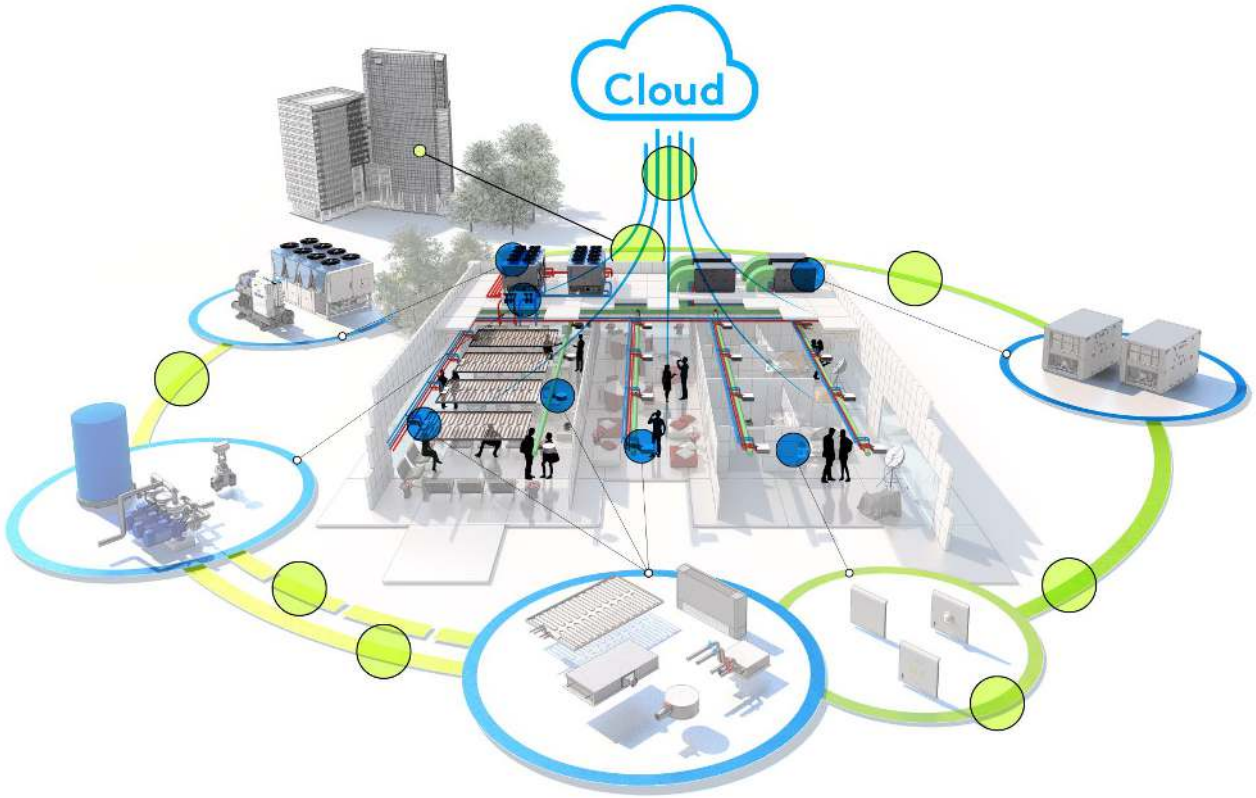
Blåa Huset (Blue House), Products & Systems

Swegon IEQ System

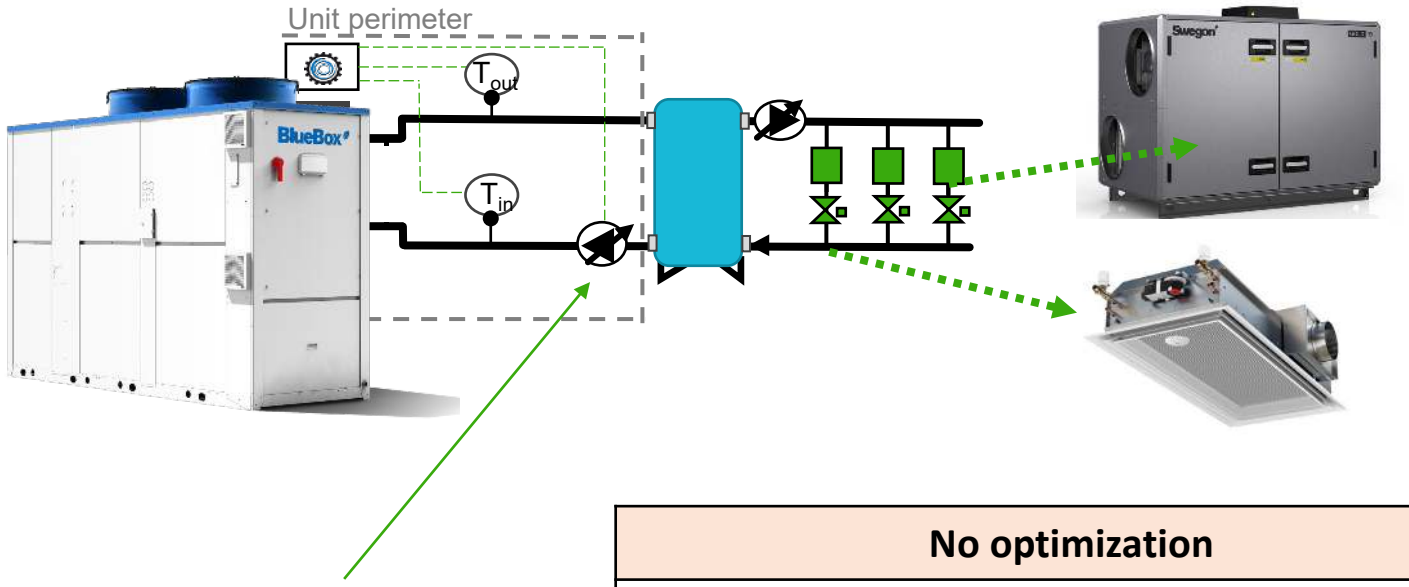
- Indoor climate control
- System optimization

1. **Hydronic distribution**
2. **Water temperature**



1) Hydronic distribution OPTIMIZATION

Target: saving pumping energy

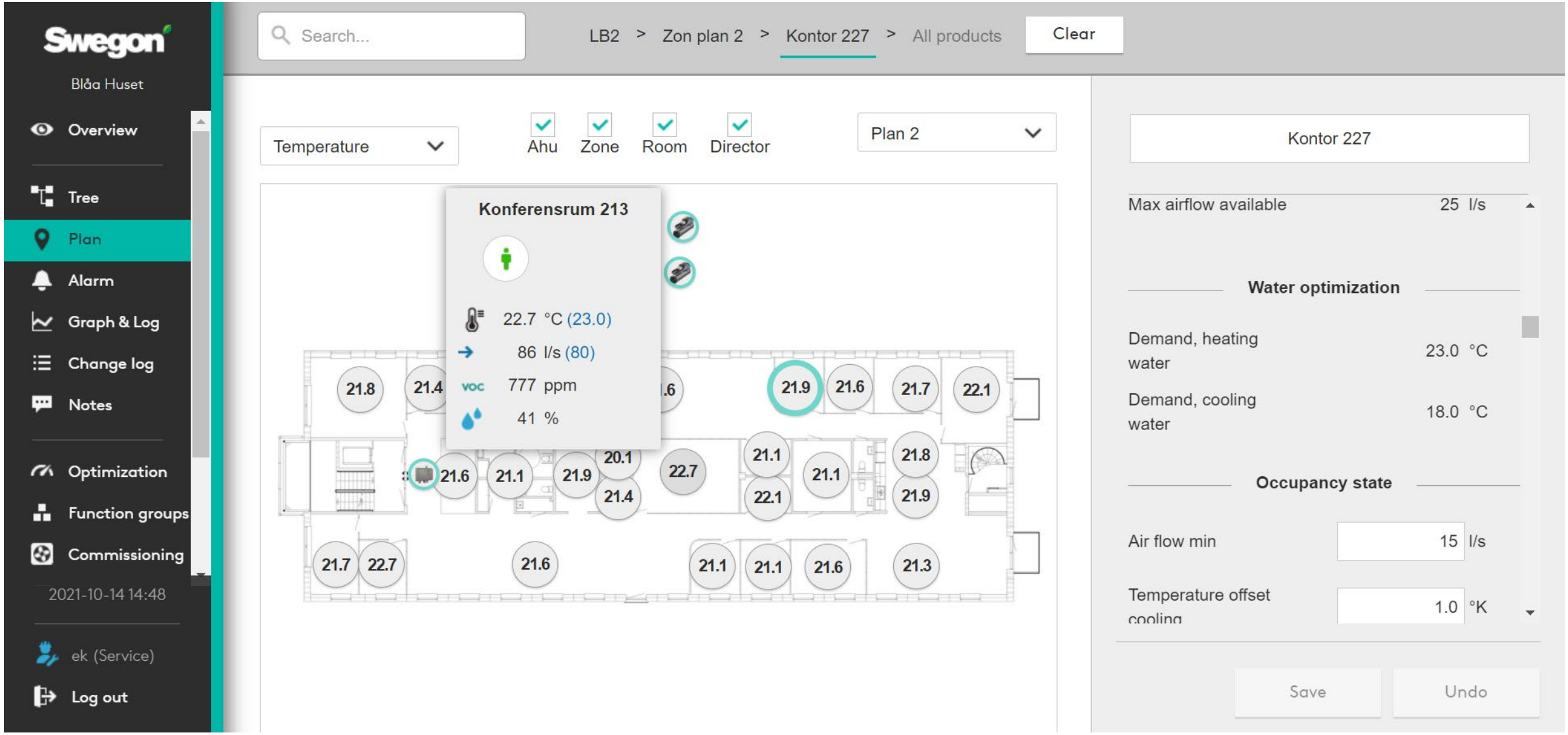


Inverter Pump

- **If comfort demand is satisfied pumps are switched-off**
- **Automatic pump speed regulation** according to delta temperature

No optimization				System Optimization			
Load [%]	**Tin-Tout**	**Pump speed [%]**	**Pump [W]**	**Load [%]**	**Tin-Tout**	**Pump speed [%]**	**Pump [W]**
100%	5°C	100%	900	100	5°C	100%	900
75%	3,75°C	100%	900	75	5°C	75%	800
50%	2,5°C	100%	900	50	5°C	50%	600

2) Water temperature OPTIMIZATION



2) Water temperature OPTIMIZATION

Climate beam

Capacity request is calculated according to room setpoint and current load.

According to capacity request the room unit can work at different water temperatures

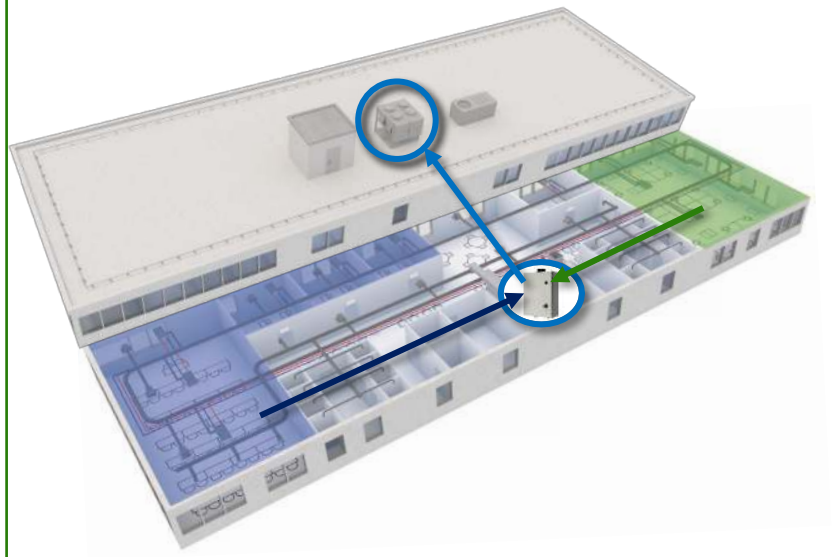
Request is sent to the function group

Function group

Common water temperature setpoint is defined within the function group.

Request is sent to the optimization system

SuperWise Swegon optimization system



Optimum water setpoint is defined collecting all the function group requests and the AHU requests

Setpoint request is sent to the HP unit

2) Water temperature OPTIMIZATION

Target: increase energy efficiency of the reversible heat pump

Plant modelling and simulation showed that with water optimization:

- Cooling: Average hourly EER 4,62 ------> 5,08 (**10% Improvement**)
- Heating: Average hourly COP 3,04 ------>3,43 (**12.8% Improvement**)

<u>Plant under supervision to verify simulation data</u>

Minimum **design** cooling water temperature was 5°C

Real data summer cooling setpoint between **<u>10-15°C</u>**

Maximum **design** heating water temperature was 47°C (30-47°C)

Real data winter heating setpoint never higher then **<u><35°C, 90% of time <32°C</u>**

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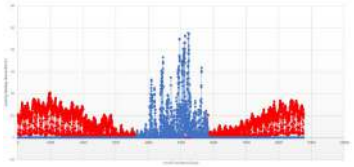
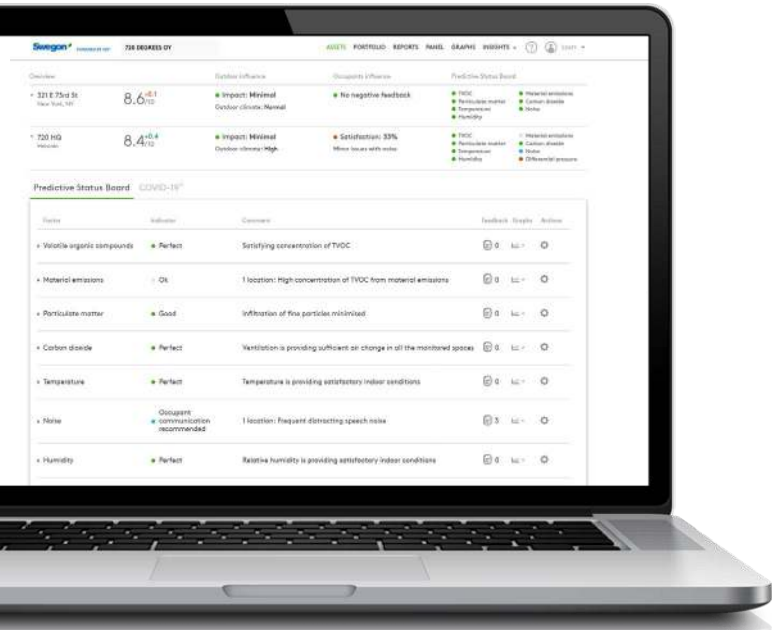


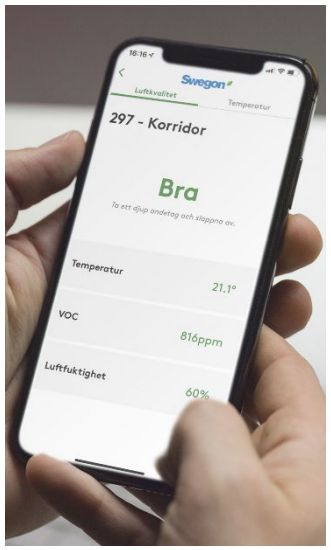
3) Energy saving:
Energy saving according to real-time demand

4) Customer satisfaction by digitalization:

Inside – Swegon digital offerings

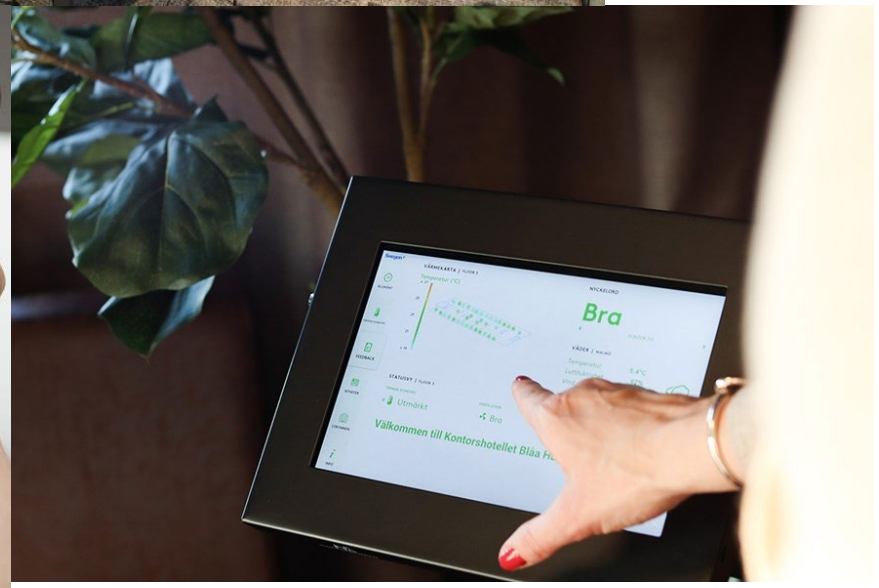
- Partner-API
- Inside Analytics - AI-driven analyze tool for indoor climate
- Inside Visualization
- Inside App





Inside – Swegon digital offerings

- Swegon Indoor Air Quality Dashboard in lobby's and break rooms
- Swegon APP via API
- Remote access via mobile connectivity for users and services
- Feedback (complain) function via dashboard instead of telephone call or mail
- New Cloud based functionality (based on weather, energy cost, etc…)



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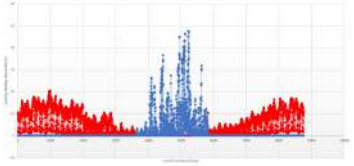

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Enabling of new services and further optimizations

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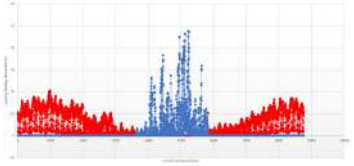


4) Customer satisfaction by digitalization:
Enabling of new services and further optimizations

Another reference projects

SCM-Frigo, Italy
(Beijer REF)

SCM Frigo is a production and office building in Italy

20 000 sqm

Delivered products and functions: GOLD Units, Wise and Cooling/heating production

In use 2021

Indigo, Gothenburg

Indigo is a School, Gym and Padel building in Hovås, outside Gothenburg

5 000 sqm

Delivered products and functions: GOLD Units, Wise and Cooling/heating production

In use February 2022

NODI, Gothenburg

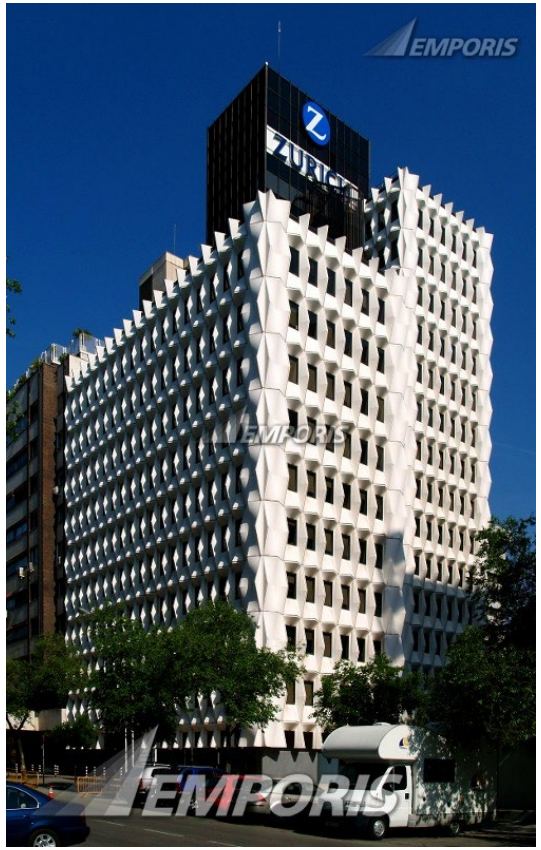
Nodi is a high-end office building in Hovås, outside Gothenburg

4 600 sqm

Good relations with installer led to order of both Gold and Wise in this design-build project

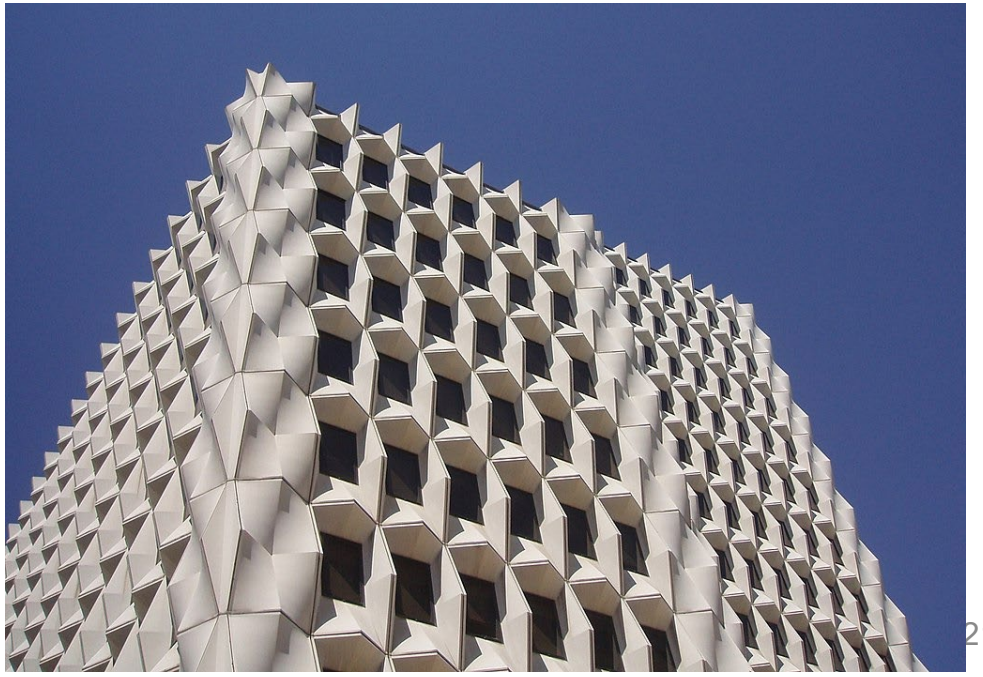
In use 2021

New Project in Madrid with system approach.



Francisco Gervas 10, Office complex with two buildings 10 and 14 floors in total 8000 m2

- 2 pcs GOLD40RX
- Catalytic filters / Active polarizing (local trade)
- Humidifiers
- 2 pcs Omicron Rev S4 HE LN – Incl. Flowzer och Hyzer
- Wise system:
  - 1 pcs SuperWise II
  - 14 pcs Wise Director
  - 64 pcs Wise IAQ CO2
  - 32 pcs Wise Dampers
  - Optional approx. 32 extra Wise Dampers
- System functions
  - Smart Link
  - Wise Water Optimization



Feel good **inside**