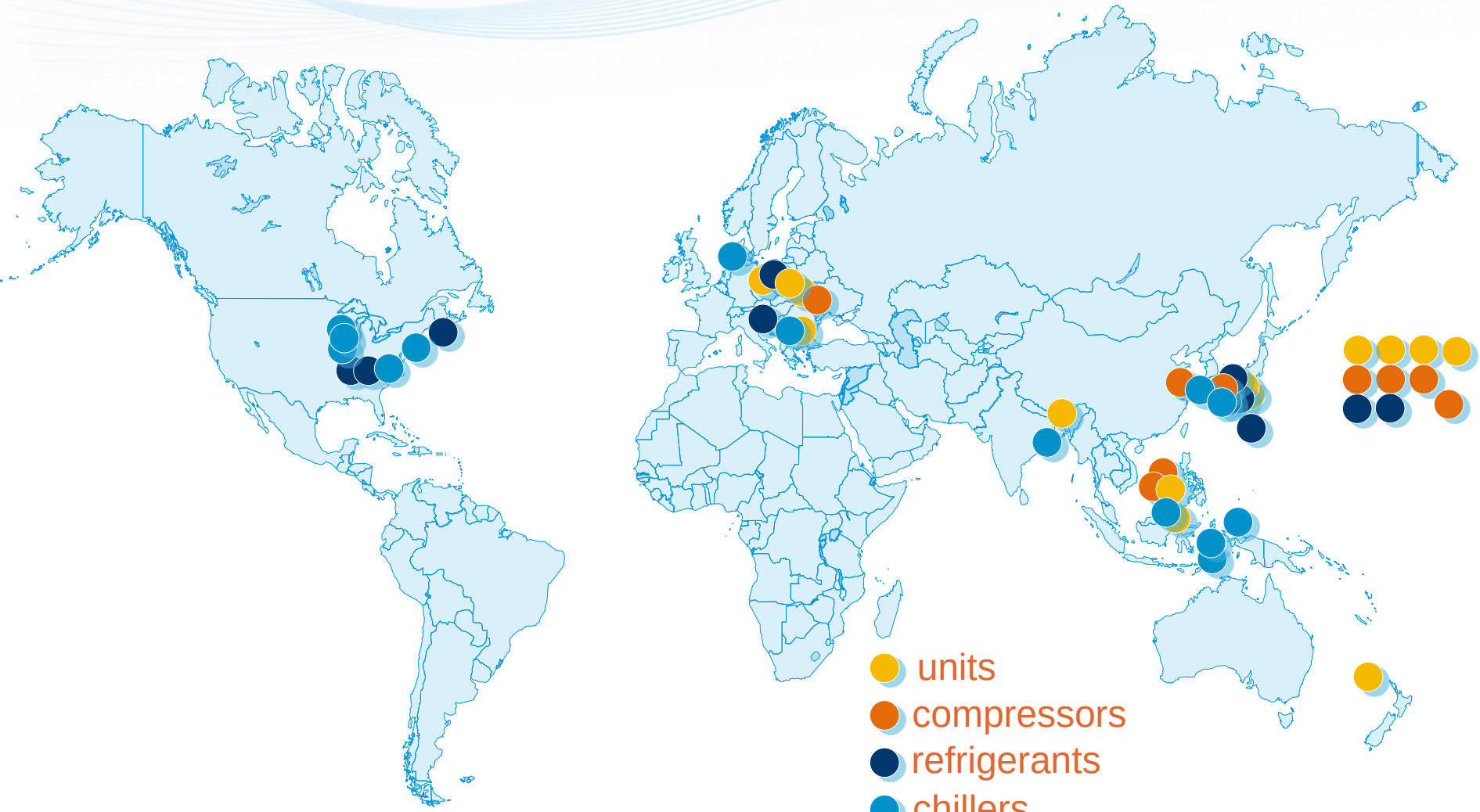
ASTRO Tower (Archi Urbain)

NZEB:
The new challenge
of
HVAC Manufacturers

Who are we?



35 production sites

Who are we?

- Daughter company (100%) of Daikin Europe
- Specialised managers for non-stop advice
- Service team per pillar for daily support:
  - 40 technical people with many years of experience
  - 24h/7d-hotline availability (start-up, spare-parts, …)
  - planning
  - service-contract
- Daikin EMEA spare parts center located in Ostend:
  - local disposal of spare-parts
  - guaranteed fast delivery (even on saturday)
- Support from Daikin Europe

Who are we?

Gent

Herentals

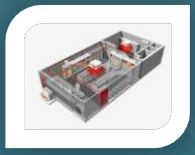
Wavre

- Heating solutions ROTEX

- Commercial + residential solutions

- Industrial solutions
  - chillers
  - AHU
  - fancoils

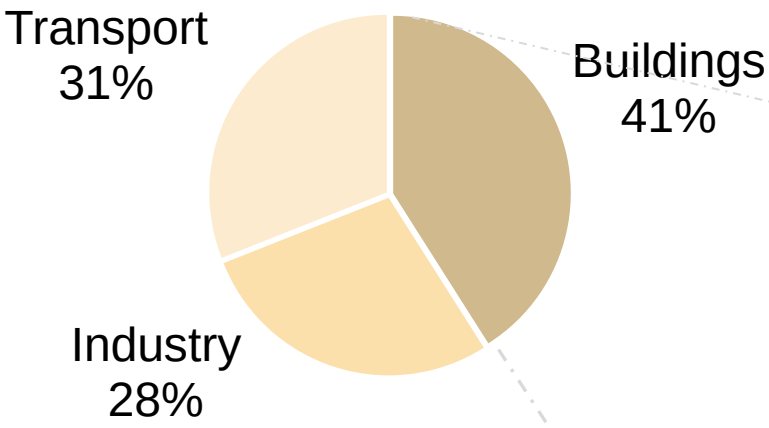
- Commercial cooling



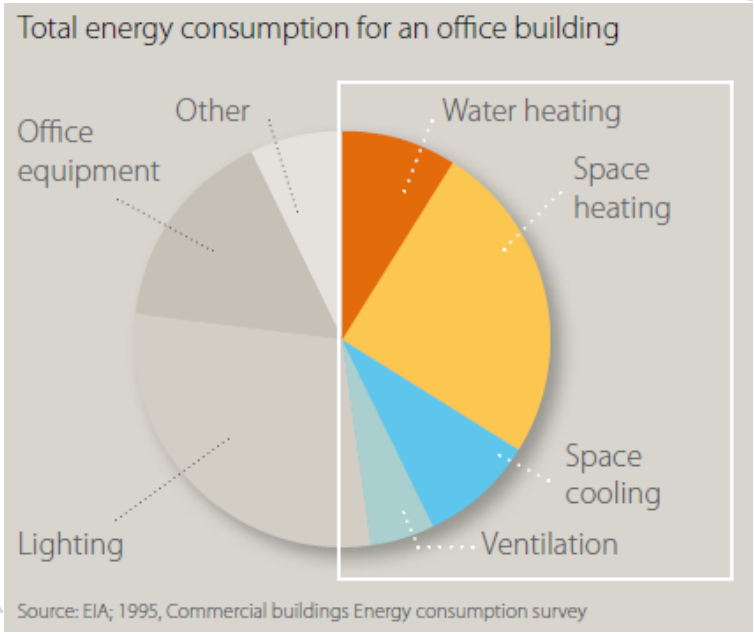
2030 Policy framework (Oct 2014)

- Increasing the share of renewable energy to at least 27%
- Increasing energy efficiency by at least 27%
- Reducing greenhouse gas emissions by at least 40% (compared to 1990)

Primary energy consumption within EU



Daikin takes the challenge



Source: Eurostat

Energy Performance of Buildings Directive

2018 all public buildings **nearly zero energy** (nZEB)

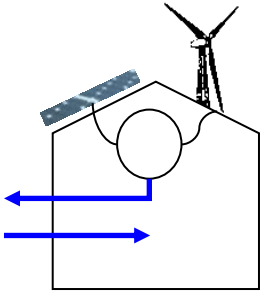
2020 all new buildings **nearly zero energy**

Energy saving

- Conservation
- High performance
- …

Generation of renewable energy on site

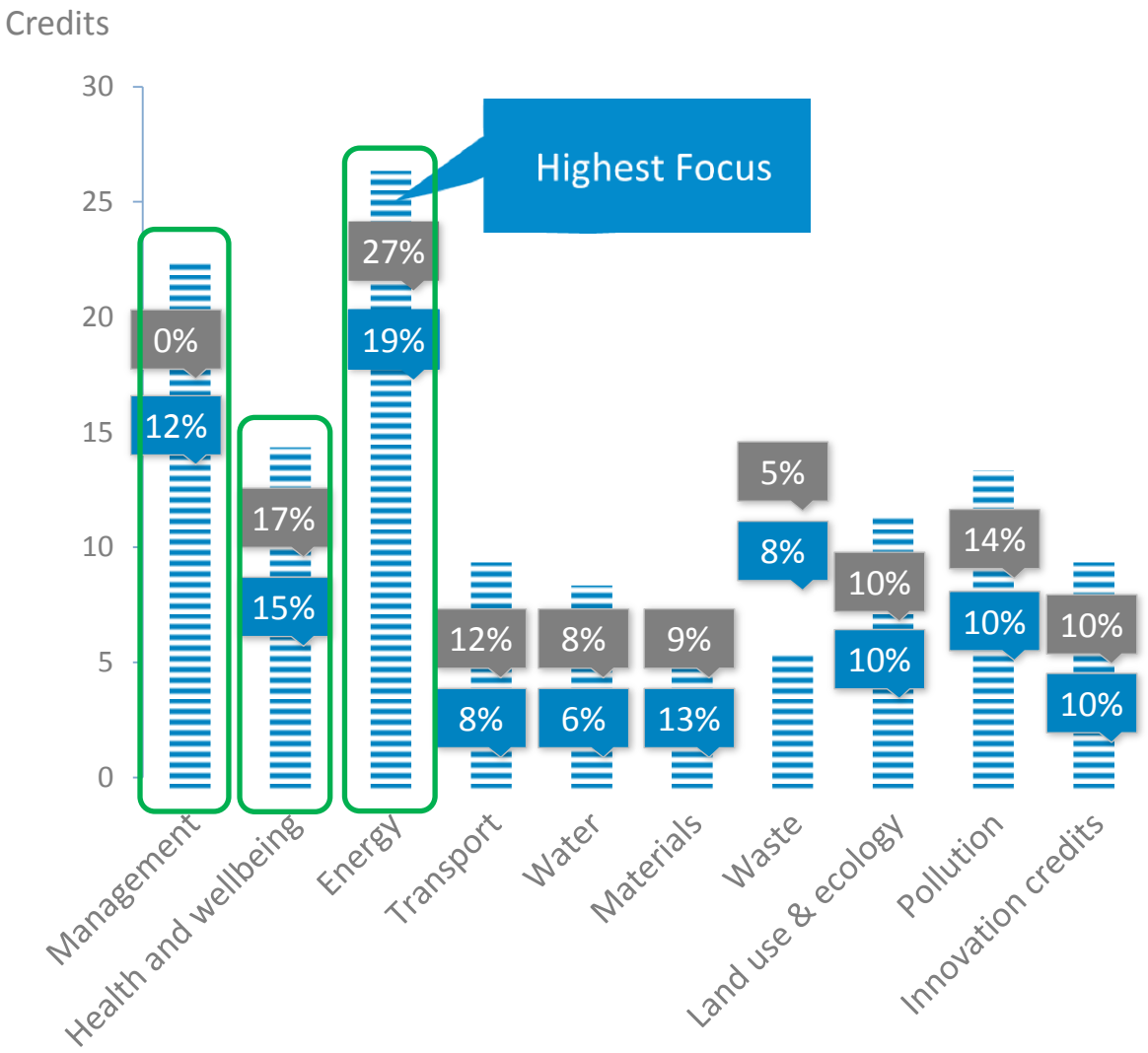
- Photovoltaic
- Wind energy
- CHP
- …



Nearly zero energy building


Management
Pollution
Land use and Ecology
Materials
Transport
Health and wellbeing
Waste
BREEAM
Water
Energy

WHAT ARE THE MOST IMPORTANT CATEGORIES OF SUSTAINABLE DESIGN?



Max. Credits:

New construction: Weight %

In-use building : Weight %

BREEAM®

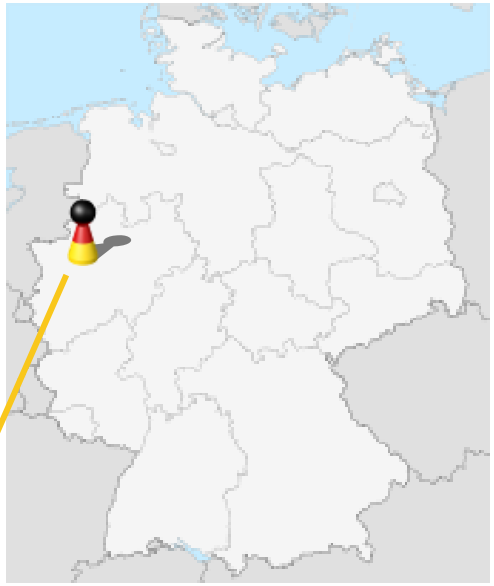
*Based on
BREEAM International New Construction 2013

DAIKIN

How Heat Pumps help a BREEAM rating?

Management
Man 02 Lifecycle cost and service life planning
Man 04 Commissioning and handover
Man 05 Aftercare
Health and Wellbeing
Hea 02 Indoor air quality
Hea 04 Thermal comfort
Hea 05 Acoustic performance
Energy
Ene 01 Reduction of energy use and carbon emissions
Ene 02 Energy monitoring
Ene 04 Lowcarbon design
Materials
Mat 03 Responsible sourcing of materials
Pollution
Pol 01 Impact of refrigerants
Innovation
Inn 01 Innovation

Building concept



Location: Herten, Ruhr region, Germany

Warehouse (1 floor)

Office (2 floors)

Project partners

Research Topics

CETIAT

Indoor Air Quality / Comfort / Ventilation / Energy saving + Alternative solutions

technische universität dortmund

Monitoring, analysis and verification of the installed photovoltaic system + Relation of Building Energy Management and intelligent grid

Fraunhofer UMSICHT

Monitoring of Daikin Altherma-VRV combination + Alternative solutions

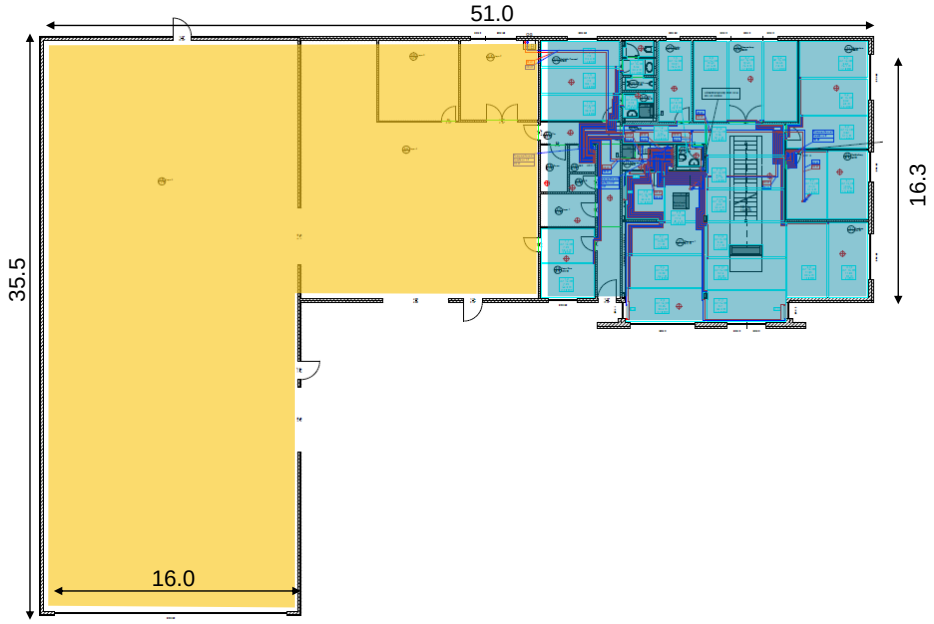
Fraunhofer IBP

Net Zero Energy Building (nZEB) concept Design alternative concept, modelling in TRNSYS

MANCHESTER 1824

Potential of Daikin concept & environmental impact + Influence of different climates

Building concept



Warehouse 800 m²

Office zone 535m²

(305m² + 230m²)

* EnEV building code

	Material	U value (W/m²K)	Reference Construction*
External walls	Brickwork (insulation 14cm) + sandwich panels (insulation 10cm)	0.23 -0.25	0.28
Roof	Steel deck (insulation 20cm)	0.19	0.2
Windows	Double glazing + insulated aluminum frames	1.3	1.3
Office envelope (average)		0.41	

All

Measuring & monitoring

Temperature sensors – 53

- Room temperature
- Ventilation air temperature
- Floor contact temperature
- PV tube temperature
- Outdoor temperature
- Roof temperature

Humidity sensors – 17

- Outdoor humidity
- Room humidity

Power meters – 14

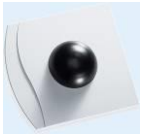
- Electricity

Other sensors – 19+

- CO2 concentrations
- Solar radiation
- Presence detection
- Window/door contacts
- Weather station

More than 100 sensors installed

Duct temp. & humidity sensor



Thermal radiation

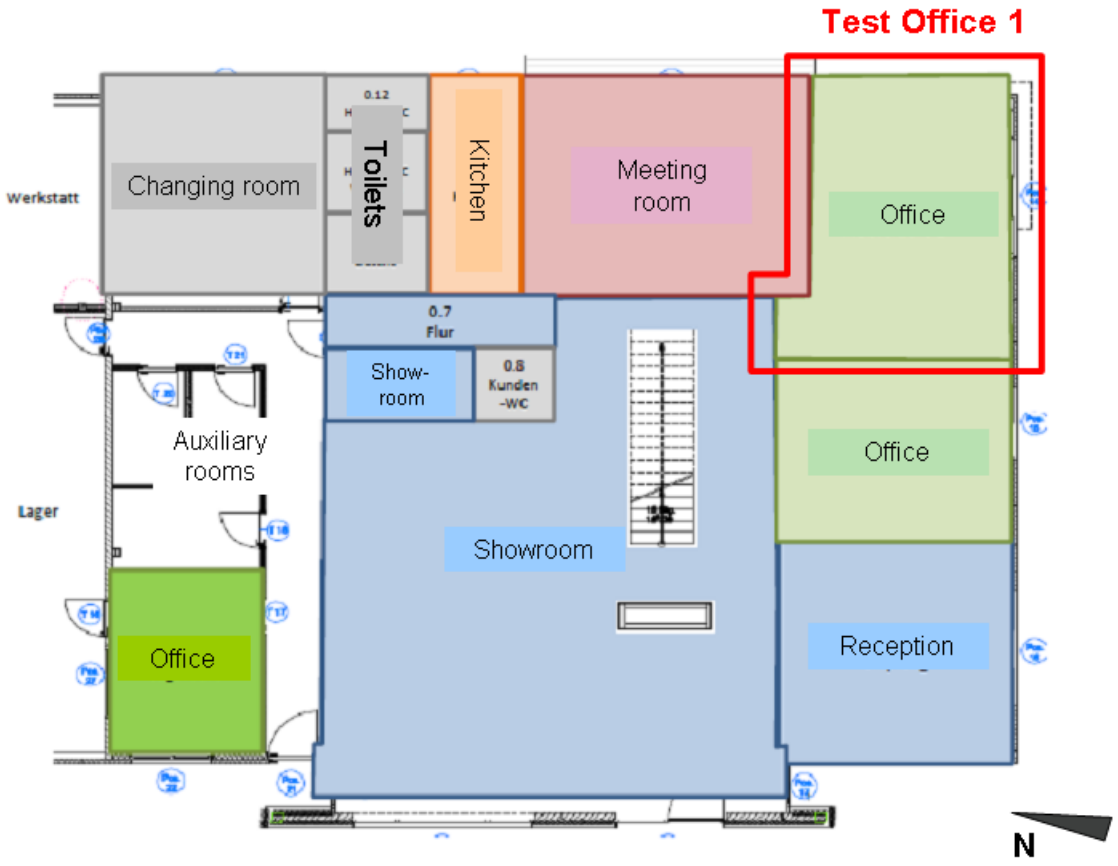
Strap on temp. sensor

CO_2 sensor

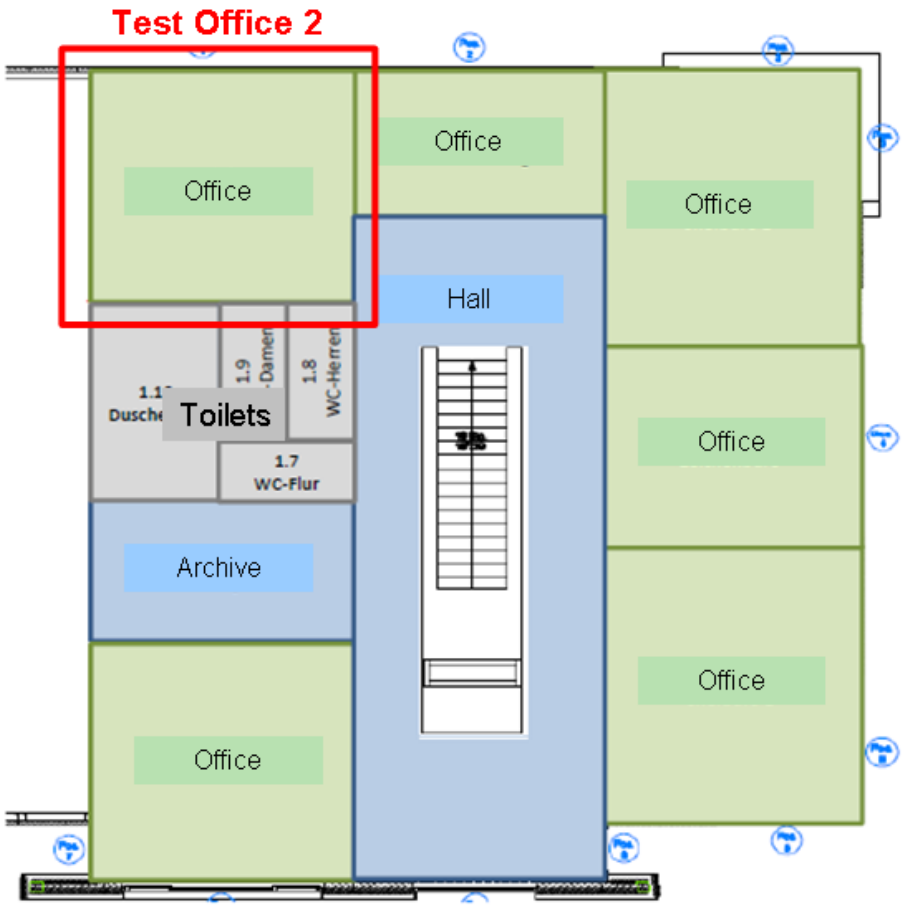
Power meter

Weather station

Building concept: ground floor



Building concept: first floor



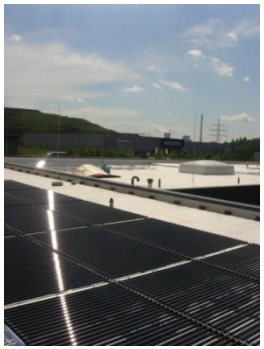
Building technologies

Heating — **Daikin Altherma** – Air to Water heat pump
VRV – Air to Air heat pump

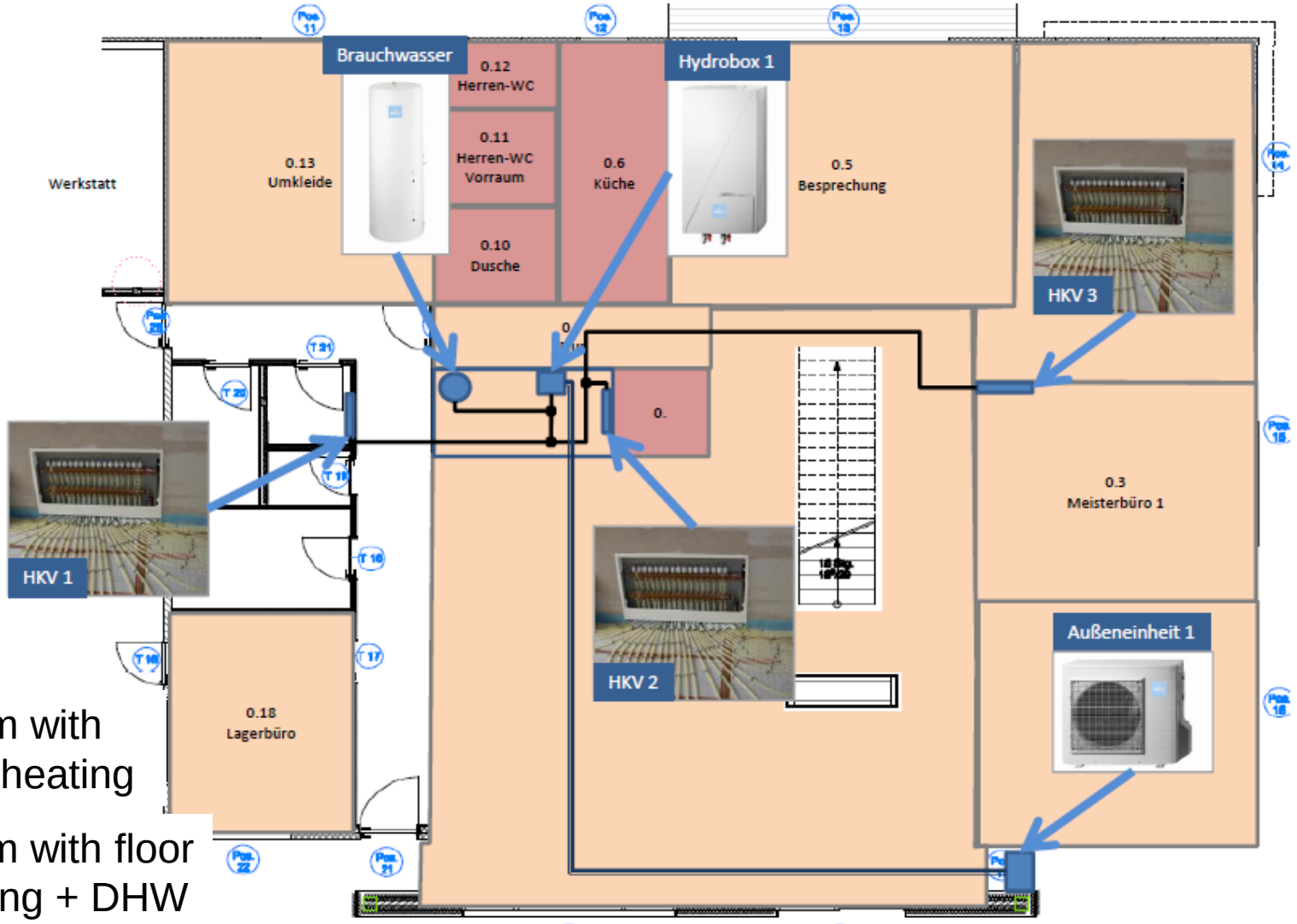
Cooling — **VRV** – Air to Air heat pump
Cooling + Dehumidification in summer

Ventilation — **VAM** – heat recovery ventilation

Power generation — **Thin film Photovoltaic** with 27 kWp



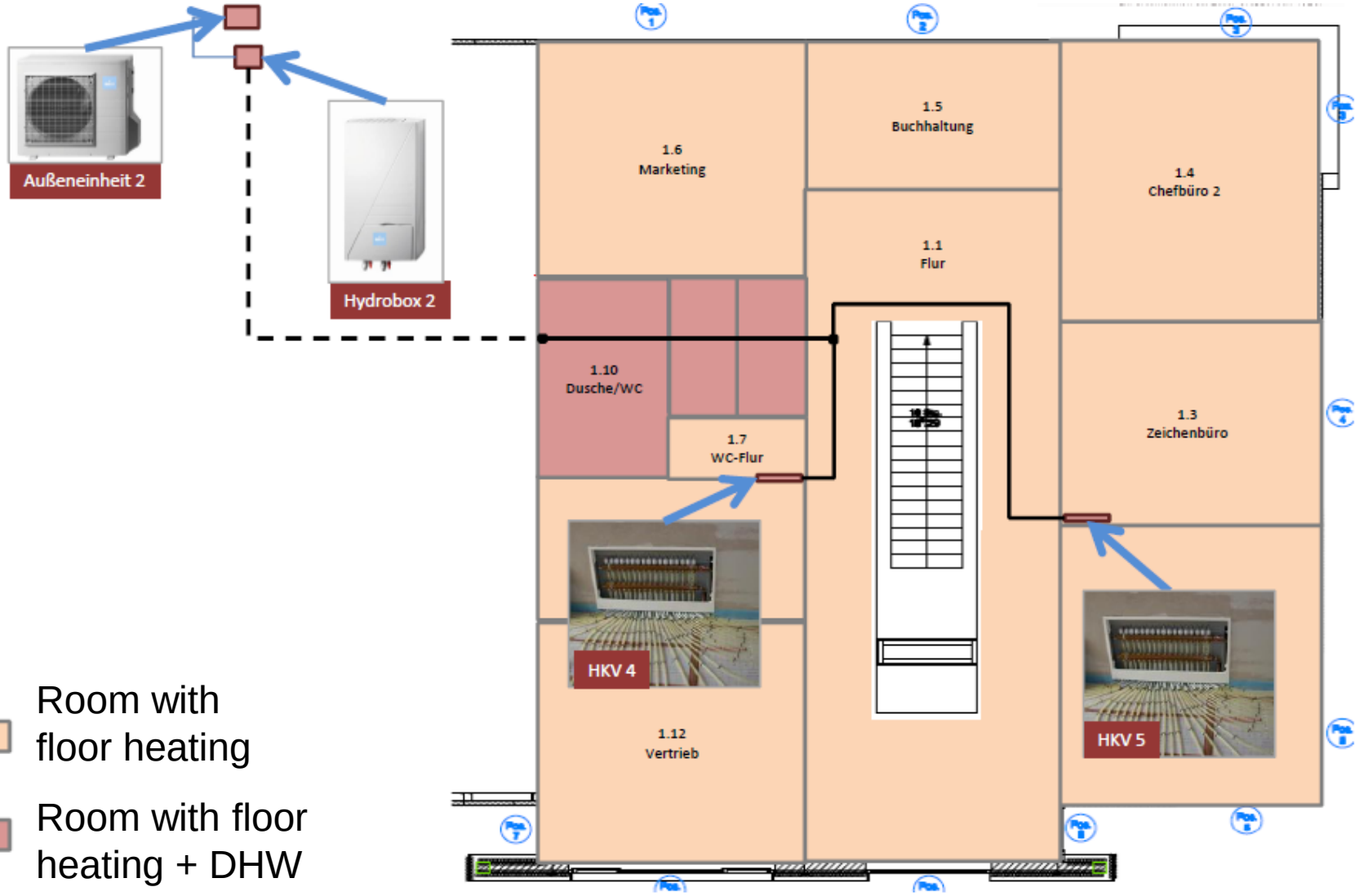
Daikin Altherma: ground floor



Room with floor heating

Room with floor heating + DHW

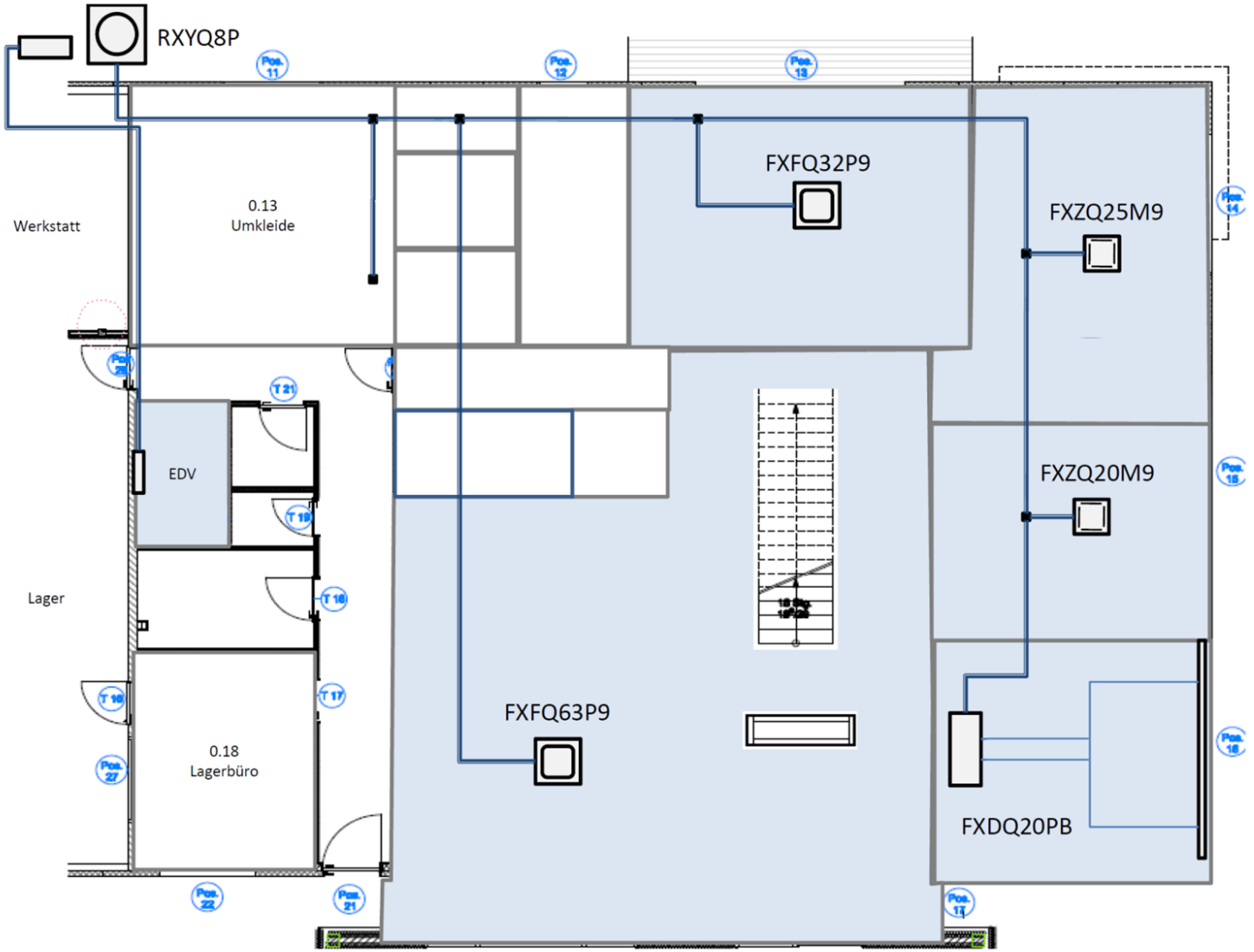
Daikin Altherma: first floor



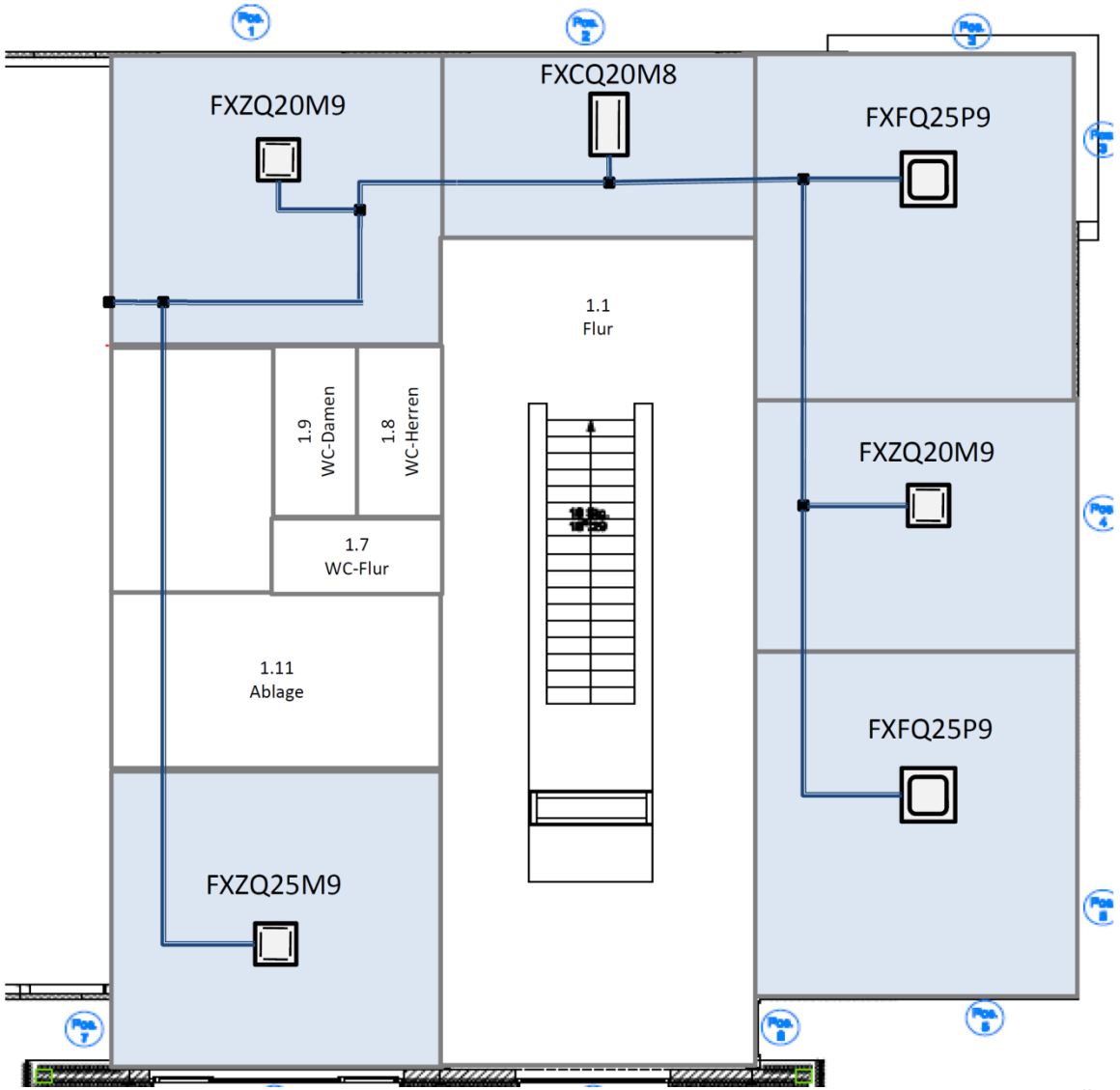
Room with floor heating

Room with floor heating + DHW

VRV: ground floor



VRV: first floor

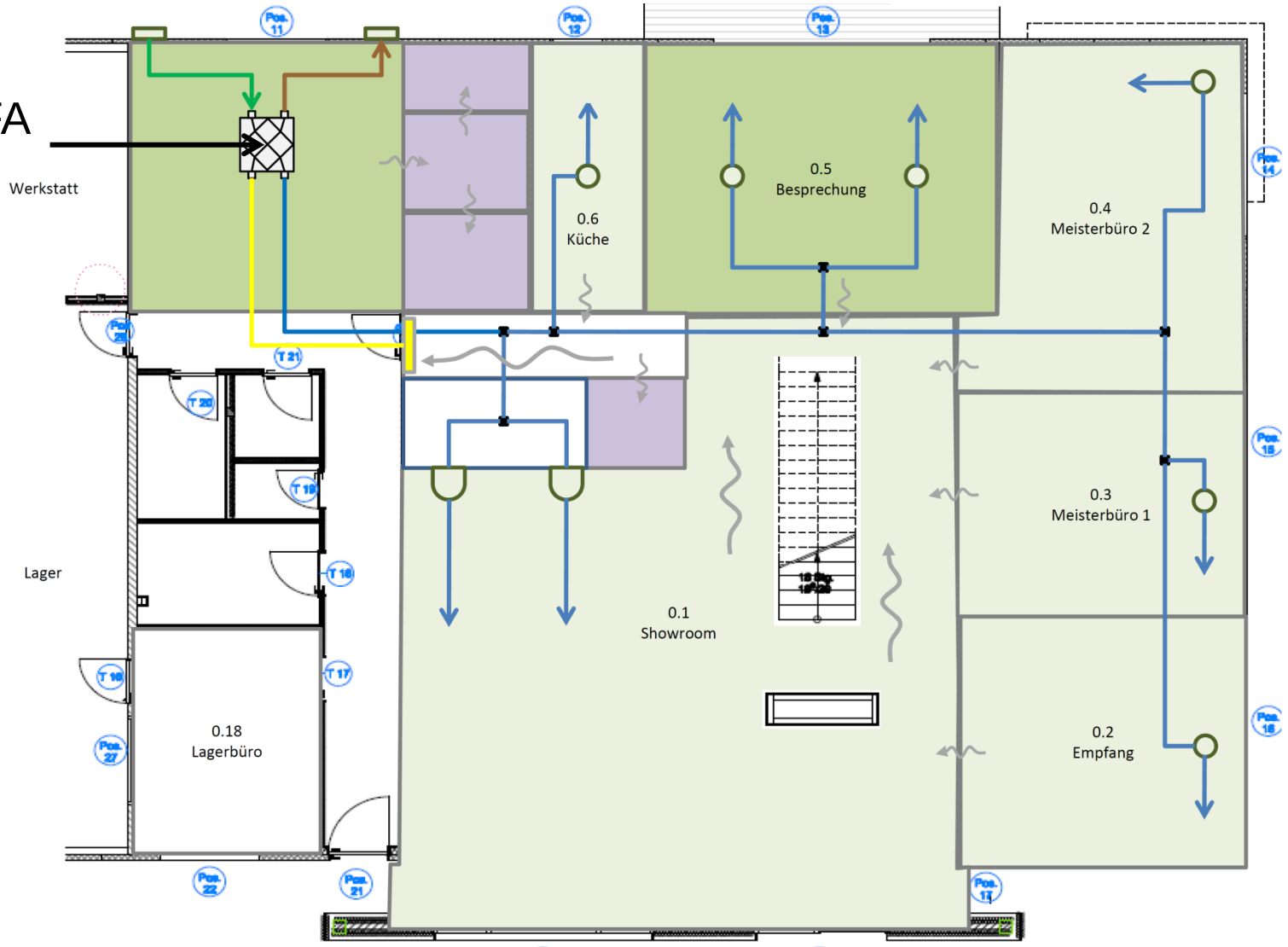


Daikin VAM heat recovery ventilation

Ground floor	Supply air: 860 m³/h	→	VAM1000FAVE
First floor	Supply air: 400 m³/h	→	VAM650FAVE

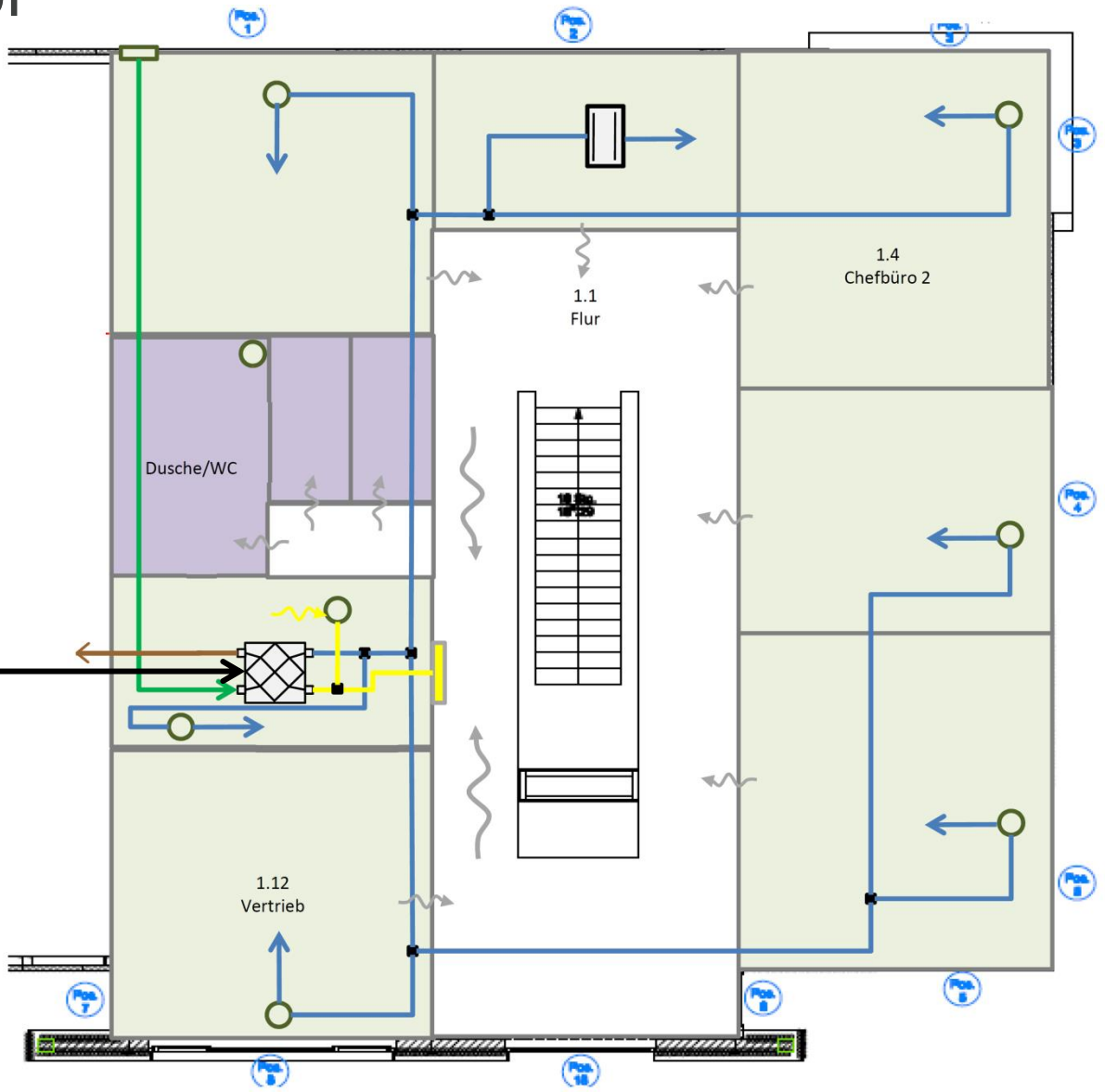
VAM: ground floor

VAM 1000FA
860m³/h



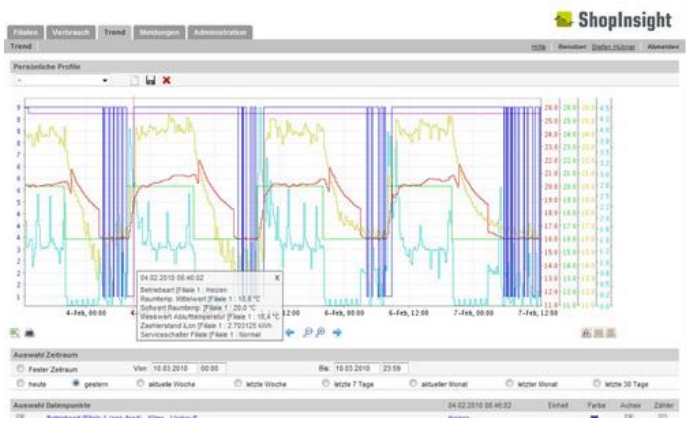
VAM: first floor

VAM 650FA
400m³/h

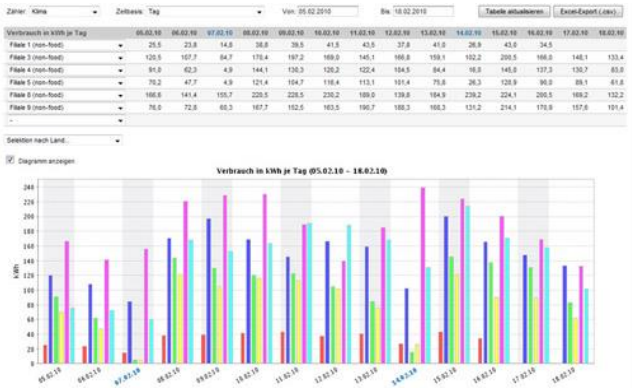


Measuring & monitoring

Sensors



Measurement
&
Visualisation
System

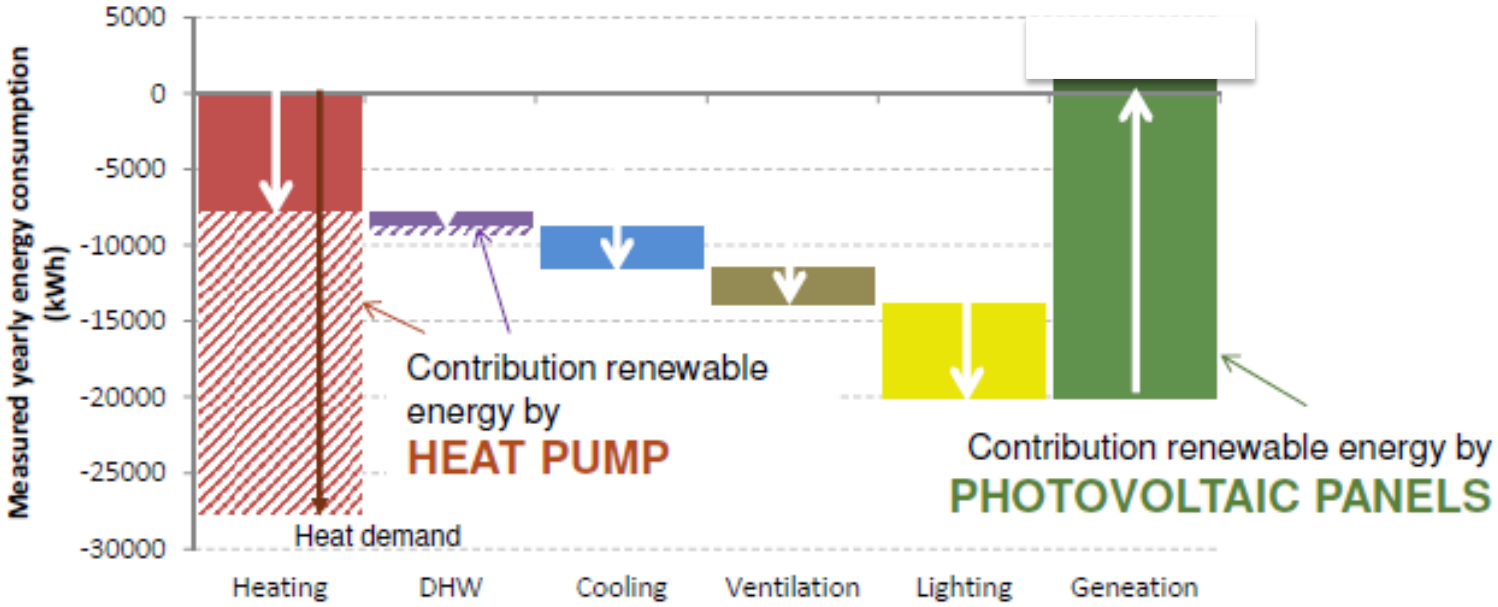


electronic data recording every
15 min
web-based data management

DAIKIN + Research Partners

Results: the energy balance

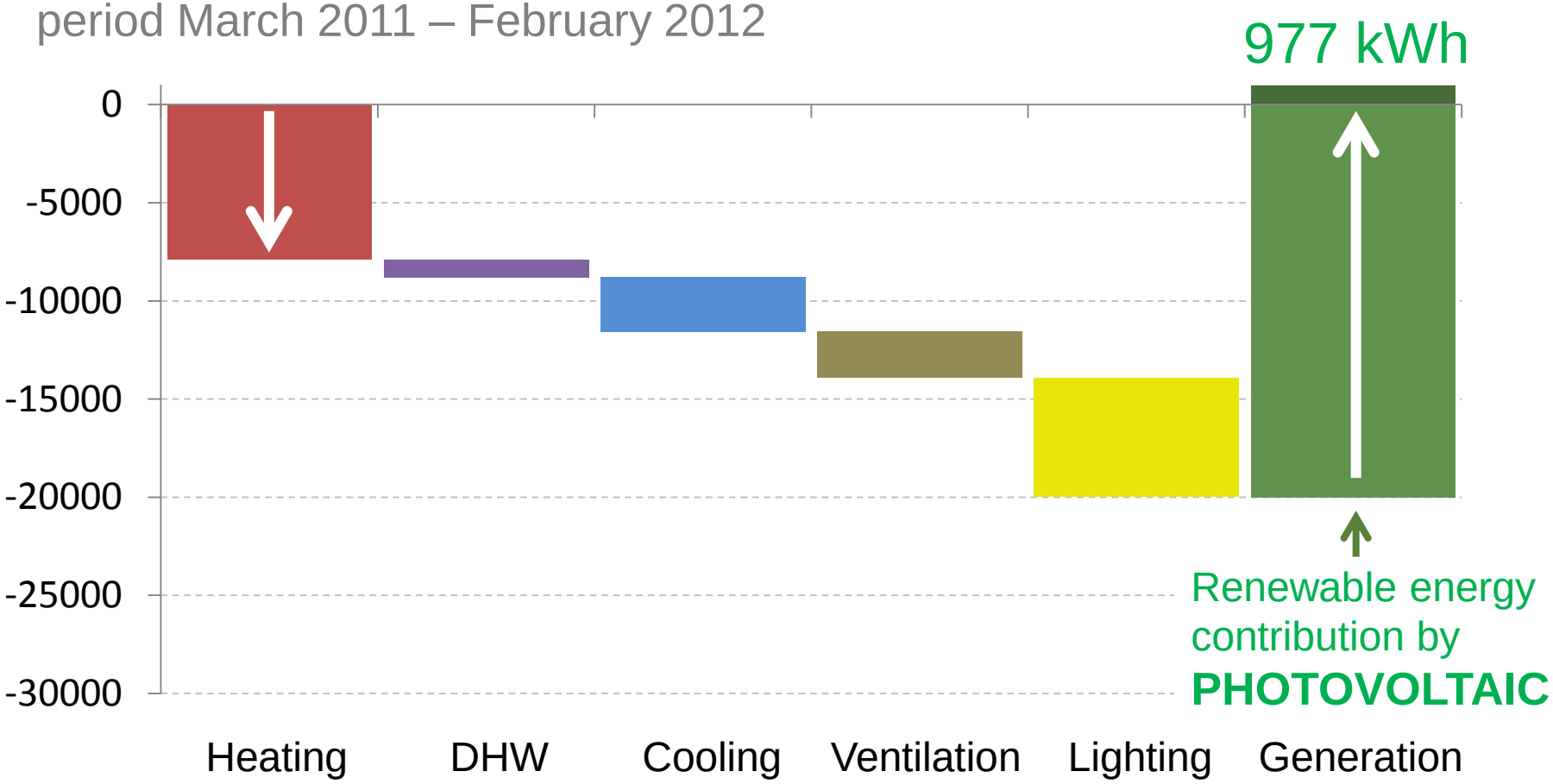
Target
- Daikin builds a net Zero energy building around it's core technology: heat pumps
- Energy flows measured during one year (March 2011 till March 2012)
  → **Result** test year '11-'12 = consumed less energy then produced



- Heat pumps contribute the same amount of energy to the Zero Energy target as photovoltaic panels.
- By using energy efficient heat pumps and heat recovery ventilation, the amount of energy which needs to be covered by photovoltaic panels is drasticly reduced.

Measured Yearly Energy Consumption (kWh)

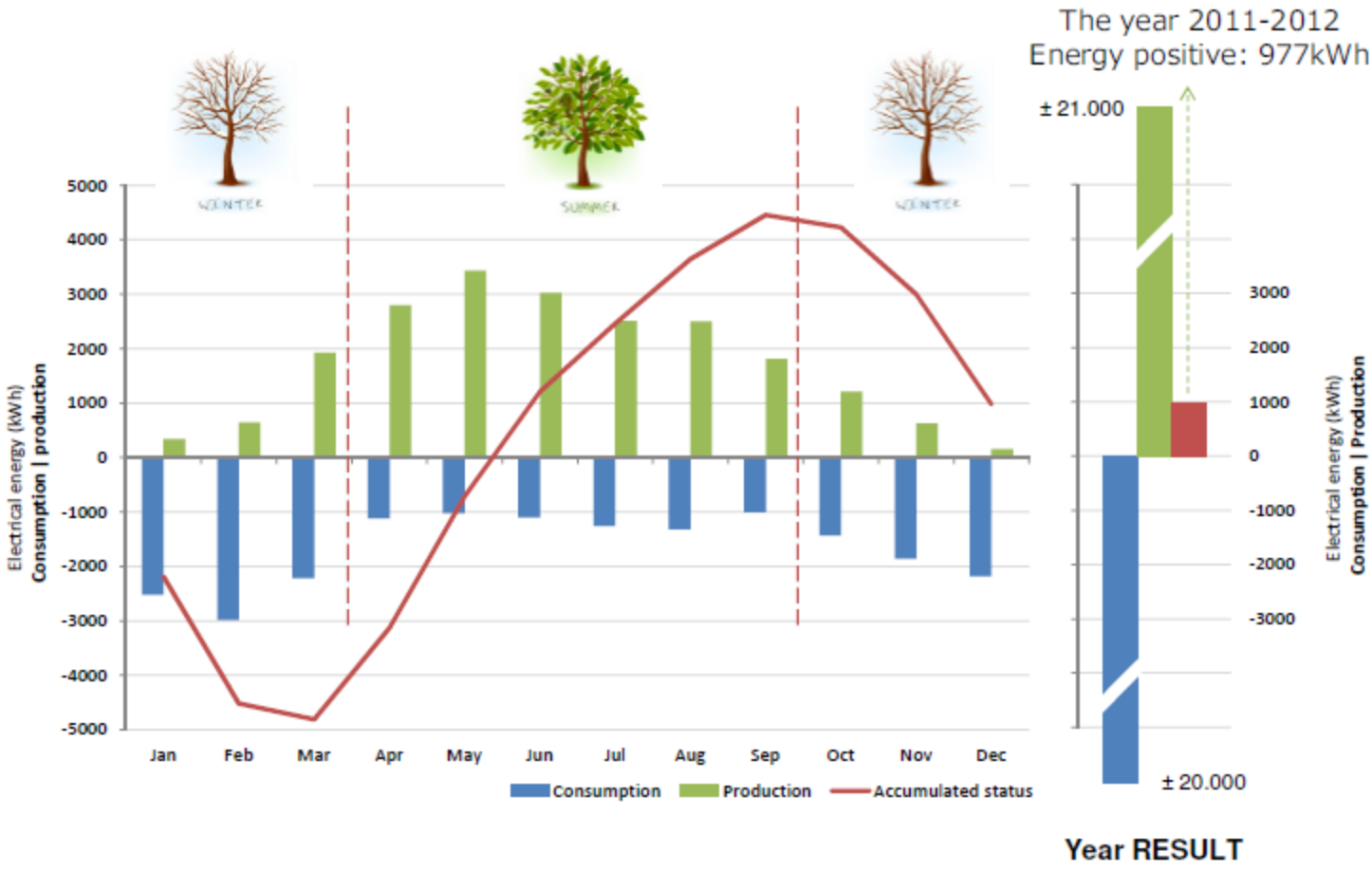
period March 2011 – February 2012



Heating is dominant consumer (40%), followed by the lighting (30%)
Year netto result 977kWh energy positive

Results: the energy balance

PUBLIC



Conclusion

The European target is clear: Nearly Zero Energy Buildings
→ PAC wants to contribute to this with energy efficient products

› Results of the first measurements: Zero energy buildings with heat pump technology are technically feasible

› The comfort was guaranteed throughout the year

› **Due to their contribution with renewable energy and excellent performance heat pumps are a key technology to achieve this ambitious target**

New solutions

URURU SARARA

- **Size 25-35-50**
- Refrigerant **R32**
- Low soundlevel 19dB(A)
- Energylabel

  (EN 14825)

SEER Till 9,54

SCOP Till 6,10

HPSU Compact

4 kW

COP **5,23**

(T°ext: 7°C – T°eau: 35°C; ΔT=5K)

VRVIV HR = Total Solution

→Production of domestic hot water max. 80°C

→Production hot water for floor heating

→With connection to DX air curtain

→With connection to a central air handling unit

Variable Refrigerant Temperature

+

Continuous Heating

EWAD-TZ : Air cooled chiller

COOLING CAPACITY(kW)

0 50 100 250 500 750 1000 1250 1500 2000

INVERTER

New Monoscrew Inverter ‘EWAD-TZ’

	New series ‘EWAD-TZ’
Capacity range	170÷730kW
Full load efficiency	Up to 3,5 EER
Seasonal efficiency	Up to 6 ESEER
Footprint	3 ÷ 12 ventil.

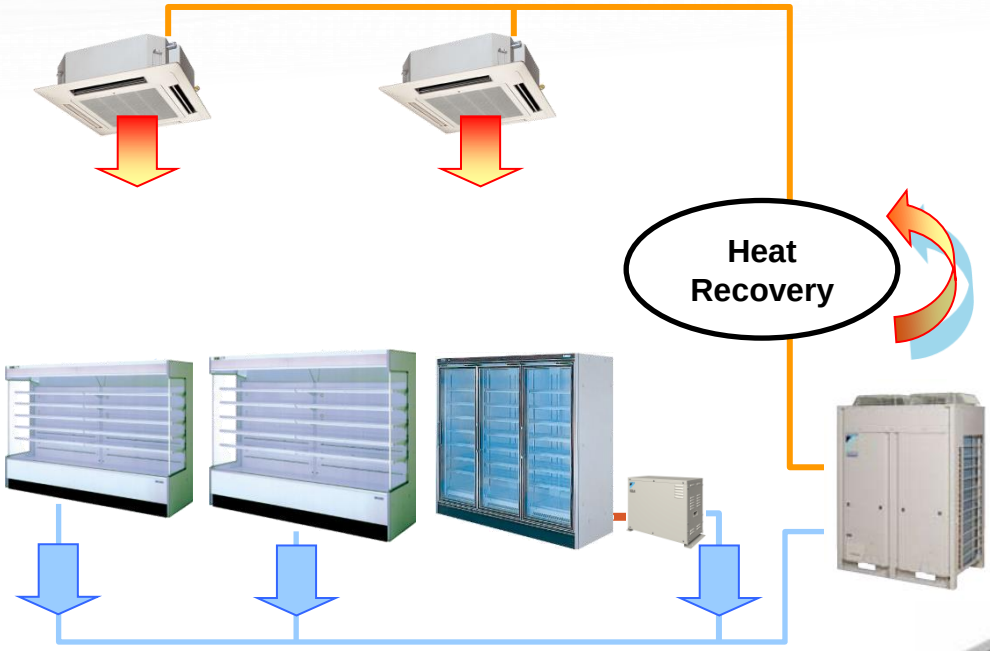
3 times wider

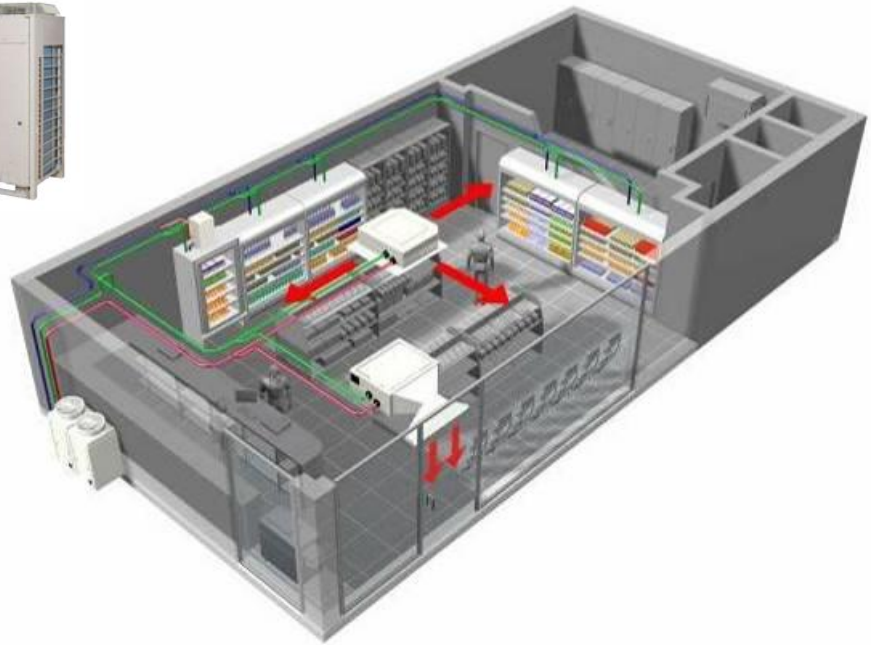
+ 25% EER

+ 18% ESEER

30% more compact

Conveni-Pack – The integrated system





THANK YOU

QUESTIONS ?