GreenHP

GreenHP unit design and influencing factors of the system layout

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GreenHP - Motivation

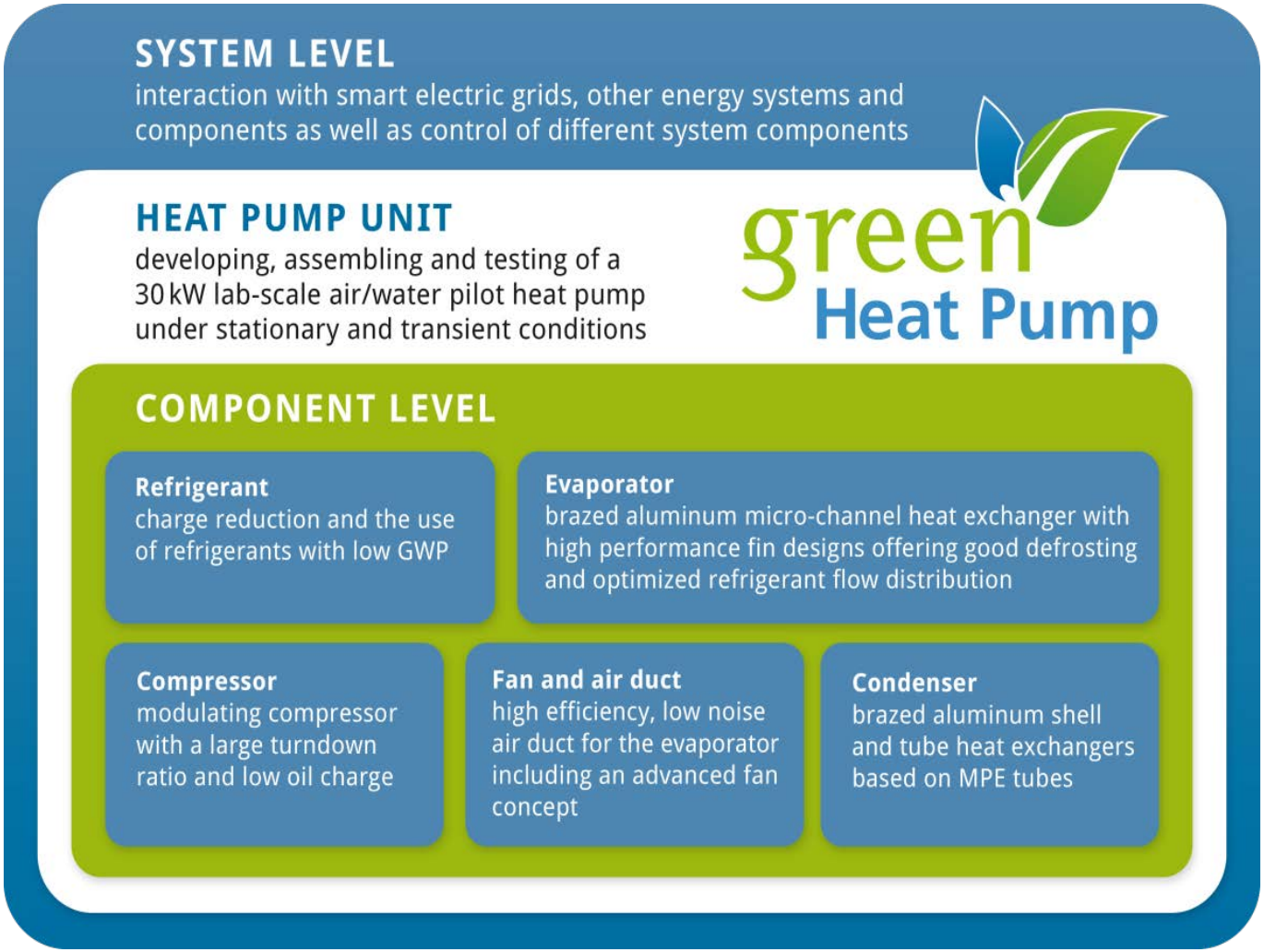
- Address research aspects “characteristic” for a next generation heat pump technology:

- Enabling new applications with high market potential:
  - High capacity air/water heat pumps for retrofitting in urban buildings
  - Multifamily and commercial buildings

- New functionality and high performance:
  - Interaction with Smart Grids
  - High seasonal performance through intelligent integration concepts

- Development of innovative technological concepts:
  - Low GWP refrigerants and low refrigerant charge
  - Development of innovative components:
    - Controls, Compressor, HEX, Fans

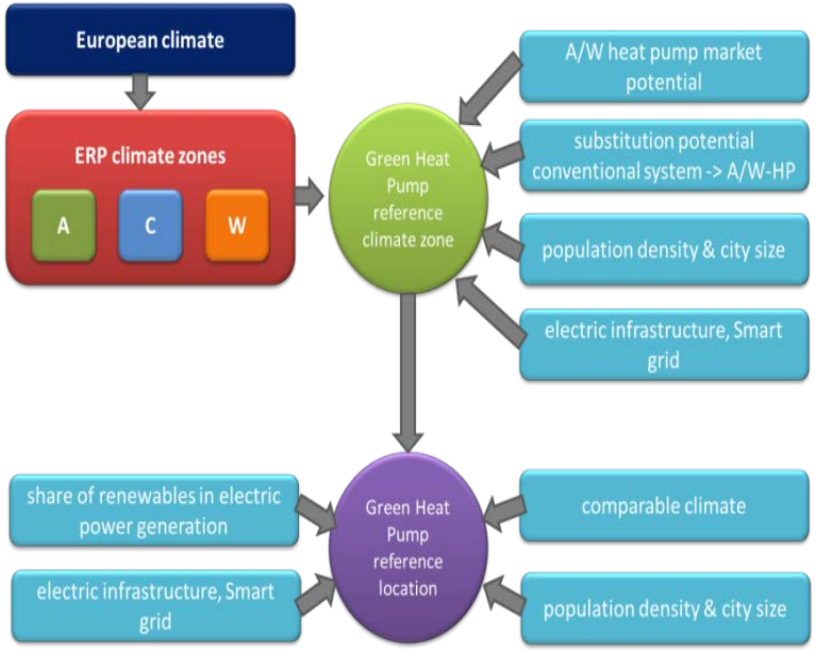
GreenHP Approach



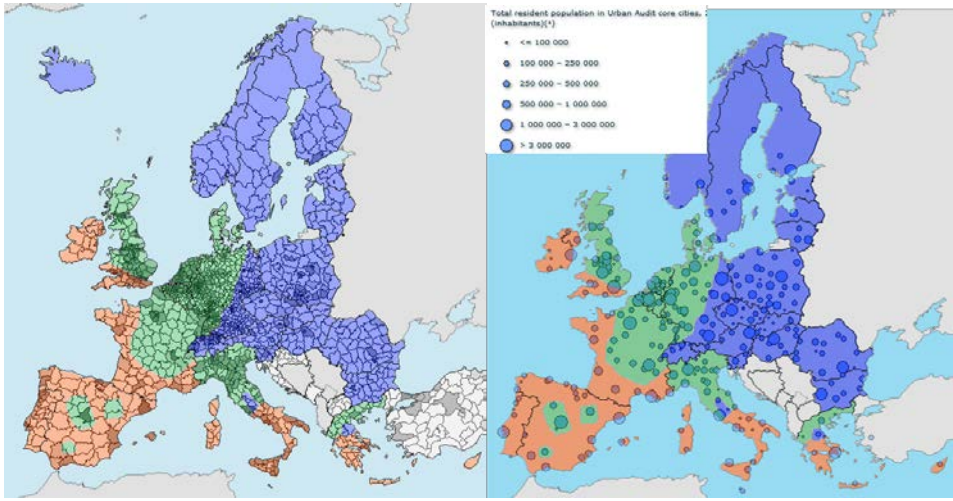
GreenHP Design – System Specification

- Primary reference climate zone: ErP “Average (A)” Zone
- Reference locations: Düsseldorf (primary), Stockholm, Barcelona
- Reference building type: MFH I and MFH II (TABULA specification); build before 1990

Criteria for selection of GreenHP reference conditions



Population density and size of cities in the in den ErP climate zones



GreenHP Design – Specification

- Reference building specification in Dusseldorf for designing the GreenHP

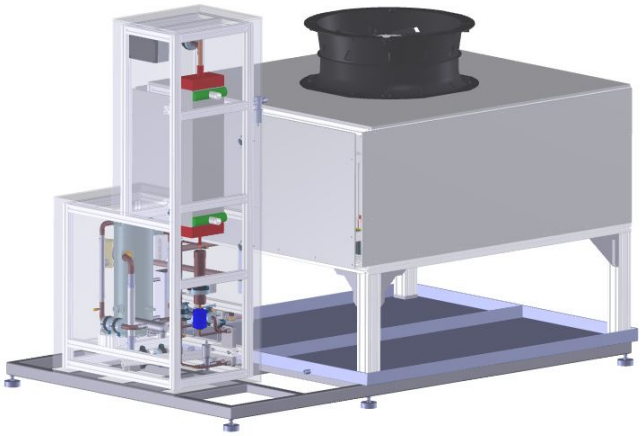
	MFH I	MFH II
Construction year	- 1978	1979 - 1994
Heated area (m²)	412	609
Number of flats	6.33	8.9
Specific heat demand (kWh/m²a)	142.6	118.3
Heat load (kW)	33	37
Specific heat demand (kWh/m²a), renovated	69.1	73.5
Heat load (kW), renovated	16	23

- Heating Capacity: 30 kW (Design point A-10/W55)
- Refrigerant: Propane (R290)

Quelle: IWU, 2011 / Tabula

GreenHP Design - Research Priorities

- **Refrigerant** - reduction of refrigerant charge, use of new refrigerants with low global warming potential
- **Compressor** - modulating compressor with a large turndown ratio and low oil charge
- **Condenser** - brazed aluminum shell and tube heat exchangers based on MPE tubes
- **Evaporator** - brazed aluminum micro-channel heat exchanger with high performance fin design offering good defrosting and optimized refrigerant flow distribution
- **Fan** - Low-noise air duct for the evaporator including an advanced, highly efficient fan concept.
- **Controls** - Development of a control platform for air/water heat pumps integrating other renewable energy sources including thermal storages and interfacing the smart grid



Thank you for your attention!

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