Heat Pump city of the year: Vienna, and other examples

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European Heat Pump Association

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Talking about heat pumps in Europe means …

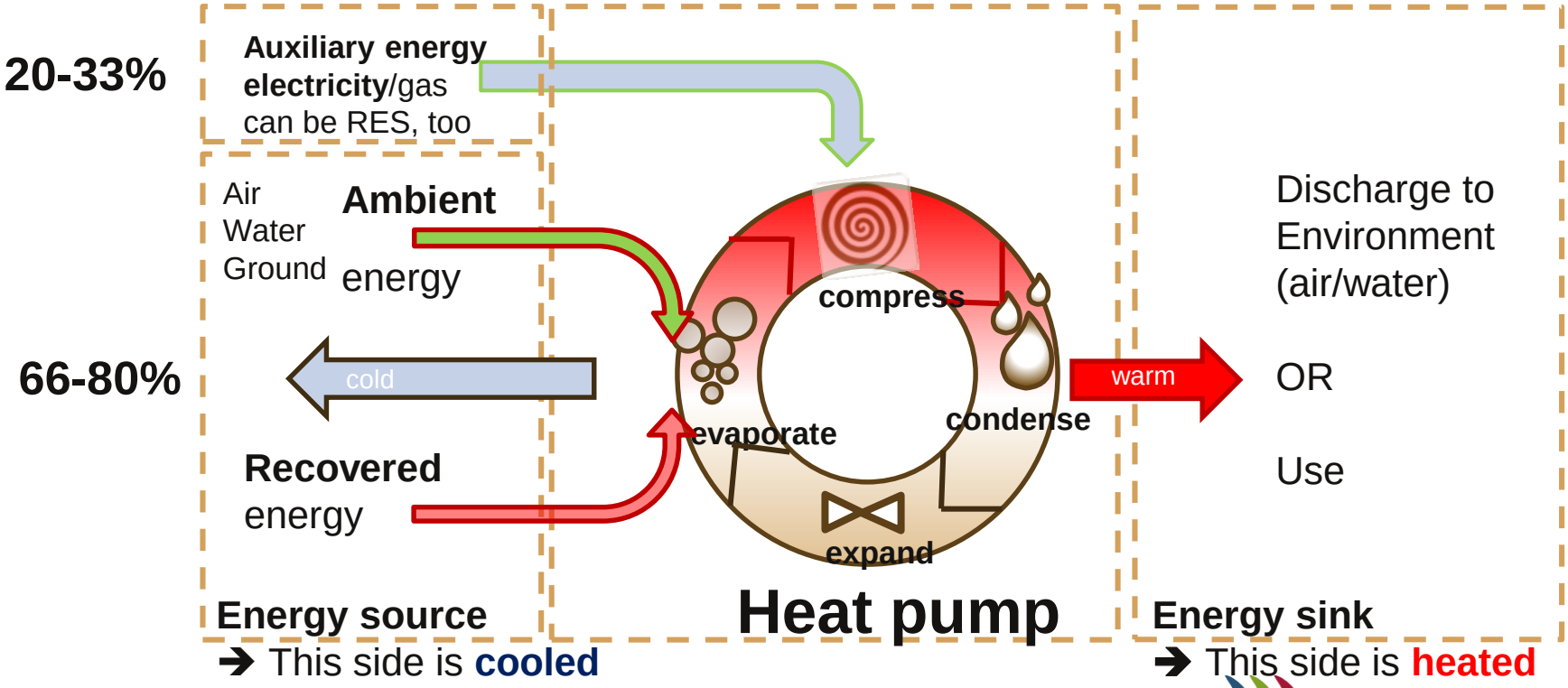
- Heating
- Cooling
- Hot water

- For all cold, average, warm climates

- Residential
- Commercial
- Industrial applications

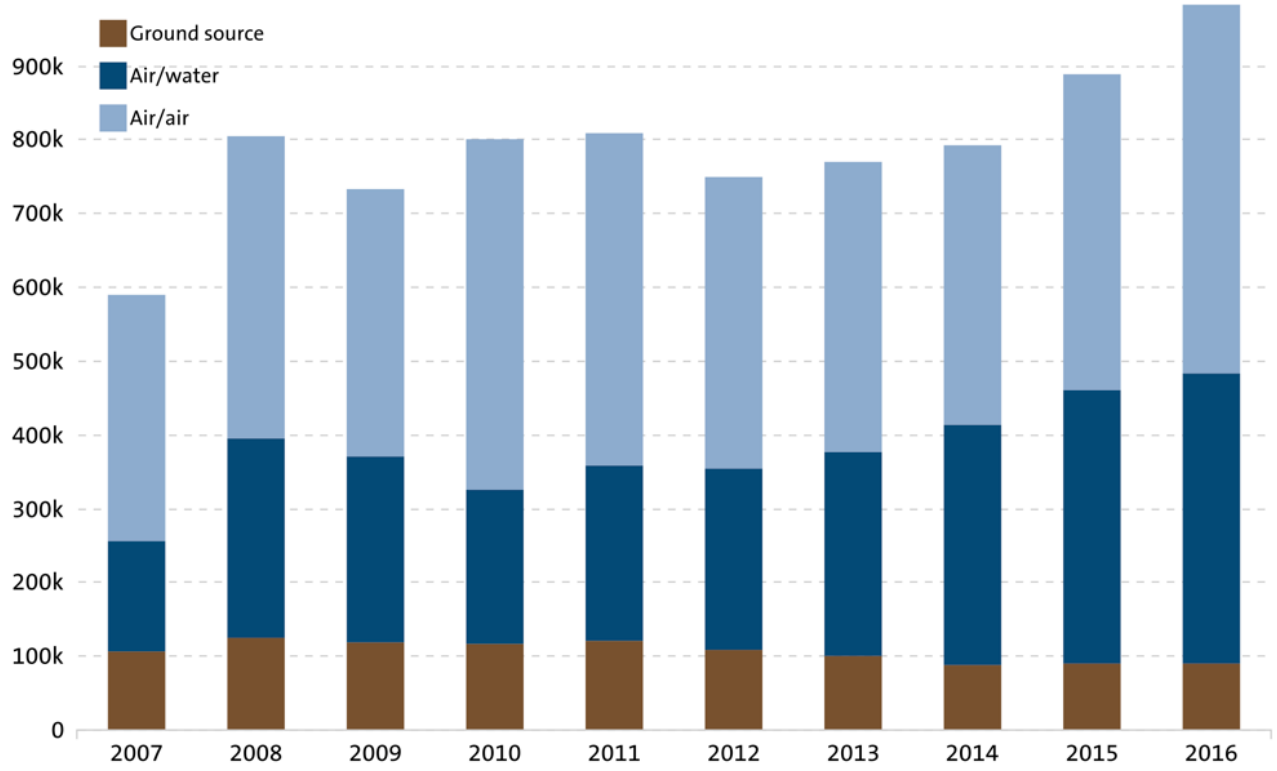
- Alone or in combination (hybrid)

Basic principle: Heat pumps always provide heating & cooling



Heat pump sales 2007 – 2016 By energy source

Trend #1: air source

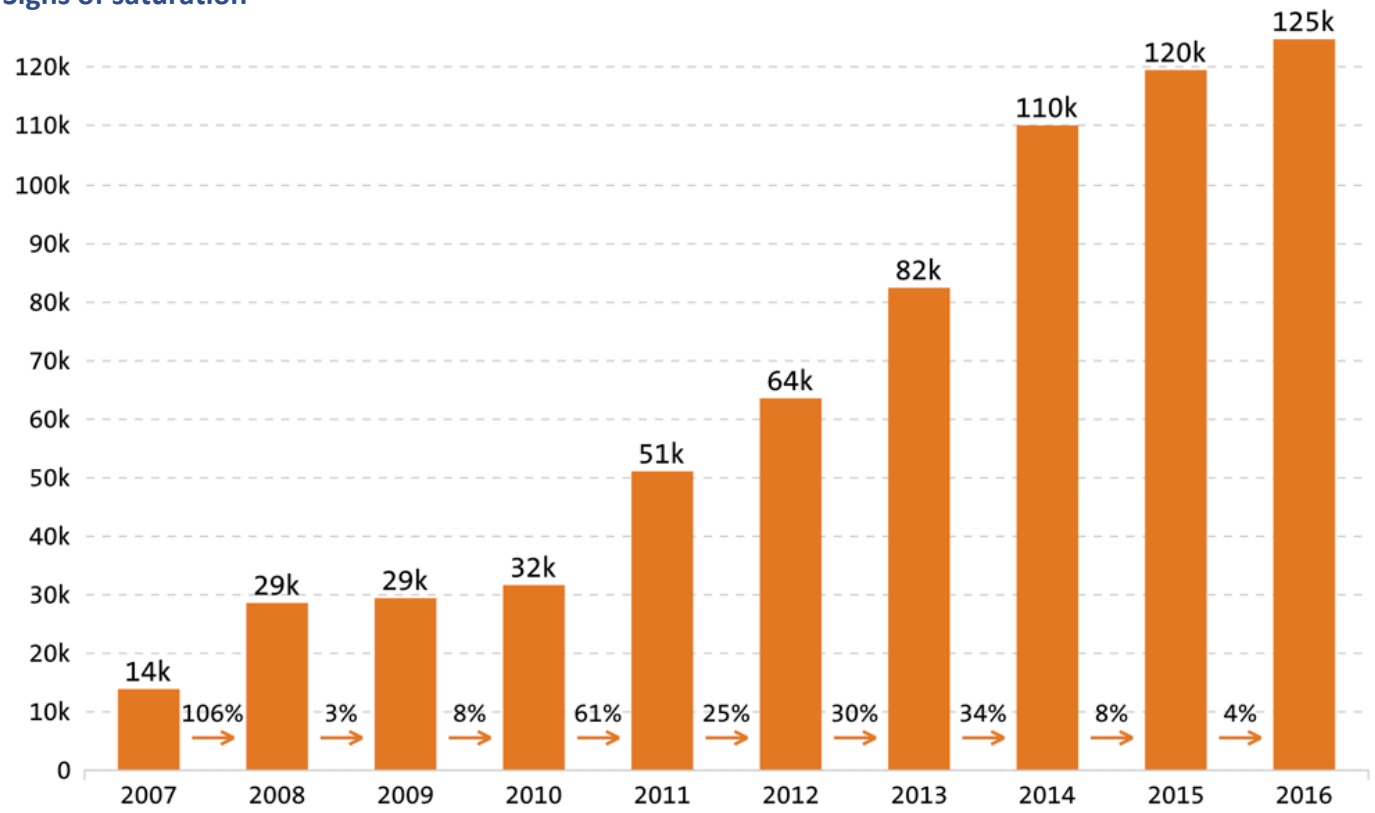


*For some definitions of heat pumps the energy source is unknown (e.g. district heating). Those are omitted here.

ehpa european heat pump association

Sanitary hot water sales 2007 - 2016

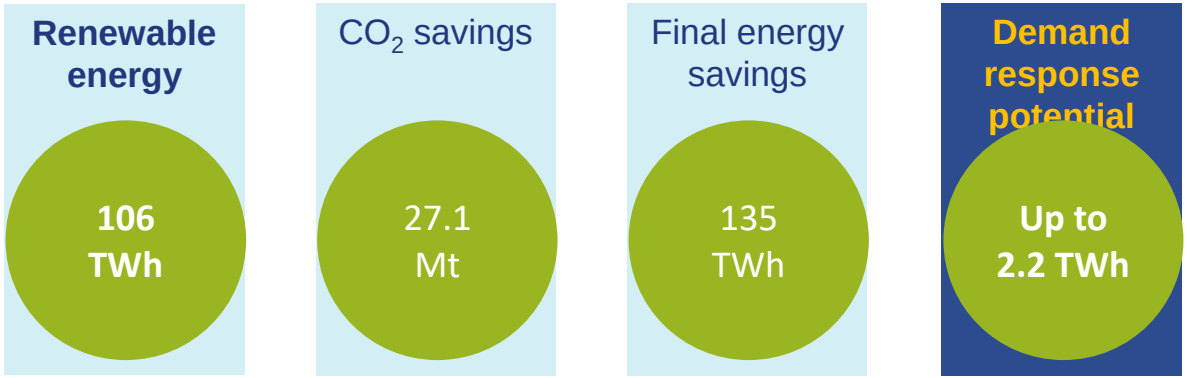
Signs of saturation



Trend #2: hot water

Heat pump benefits 2016

Base on 9.5 million heat pumps installed



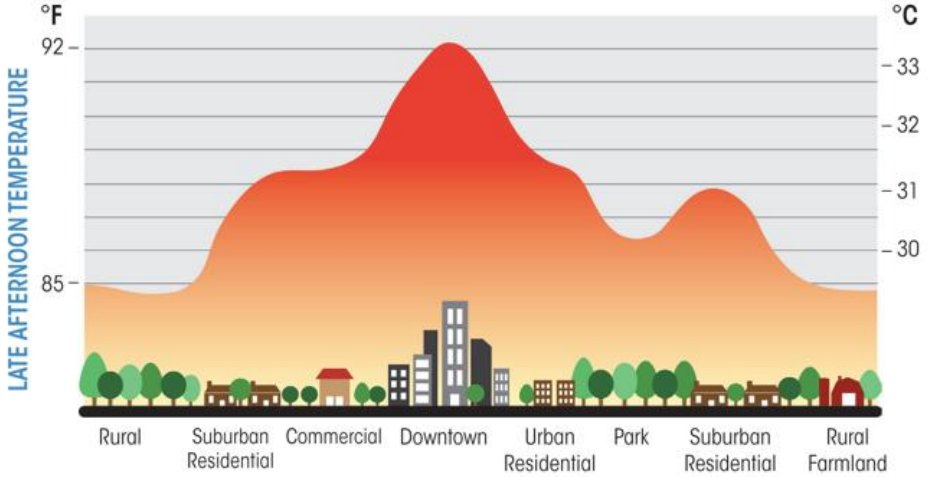
Demand side flexibility (theoretical potential):
3,6 – 11 GWh per instance

Assuming 200 instances (theoretical potential):
0.7 – 2.2 **TWh** per year

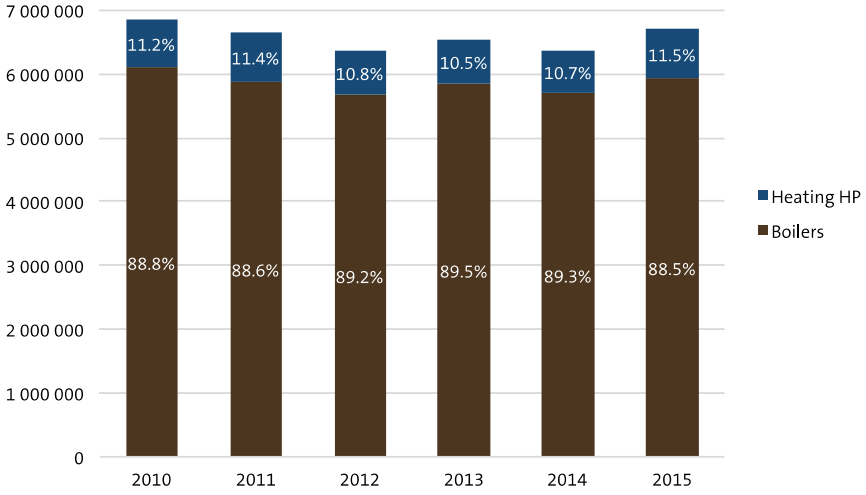
Heat pump benefits:
less air pollution in cities: example Krakow

Reduction of heat islands

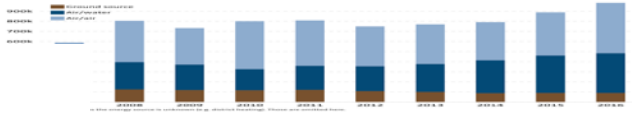
- **No thermal pollution of cities as a result of waste heat**
- **Cooling requirement can be covered by PV surplus energy**
- **If properly done: waste heat from cooling/air conditioning becomes an energy source**



European boiler market 2016
6.5 million boilers sold per year vs.
Heat pump stock of 9.5 Mil.



Source: BRG / EHPA



Systematic support for
zero carbon heating/cooling system needed!

Heat pump city of the year award

- **Annual award introduced 2011 by EHPA to encourage work of cities and municipalities supporting heat pumps**
  - systematic support **(„more than individual projects“)**
  - systematic integration of several solutions, **(“closing energy cycles“)**
- **Standardized application form**
- **Jury of 5-7 members: industry, planners, architects**
- **http://hpcy.ehpa.org/**

Winner 2012: Etten-Leur (NL)

- **Municipality since 1980 involved in sustainable building and energy savings**
  - First heat pump project in 2002
- **2005: decision for new “zero-energy” neighbourhood (Schoenmakerhoek)**
  - In total **over 1000 houses all** with individual closed loop GSHPs.
  - One of the largest projects in the world, high building density (100 houses/hectare).
  - monitoring system for evolution of the ground temperatures has been set up
- **2011: construction of housing in “Schoenmakershoek-Oost” started.**
  - A total of 500 dwellings will be realized
- **11/2011 - decision: no gas infrastructure in new neighbourhood “De Streek” with 370 dwellings planned**

european heat pump association

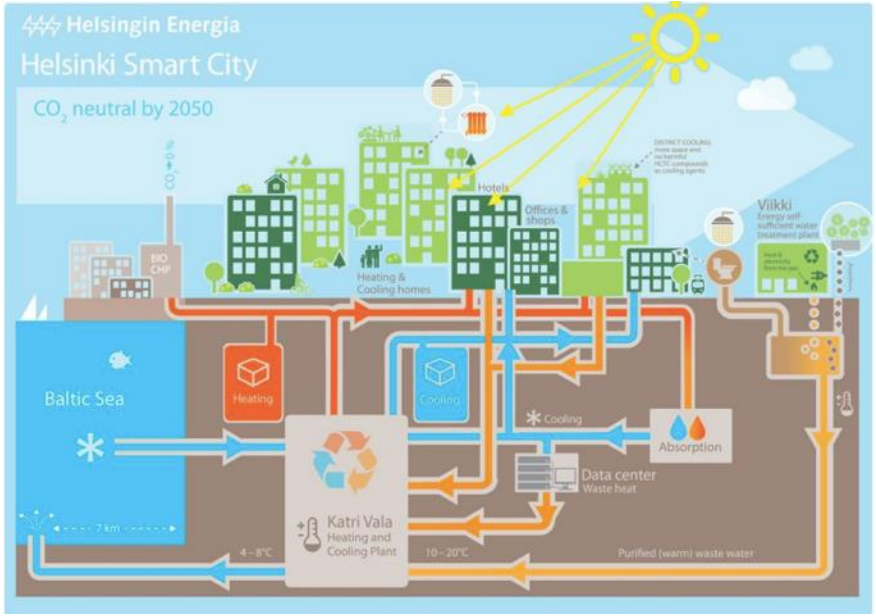
Winner 2013: Amstetten (AT)

Amstetten: City with 20.000 inhabitants,
very active in terms of sustainable city development

- Austrian pilot project to **explore/optimize waste heat use**
- System: **waste water heat exchanger;**
  230 kW heat pumps, three 1.500 liter tanks; 210m district heating pipe
- **HP covers 99,9% of energy demand; existing gas-boilers as back-up**
- **COP 5.6: only 18% of energy comes from electricity > 82% is renewable heat + use of hydro-electricity ➔ emission free operations**
- **ROI: 12 years**
- **Multiplication effect**:
  - Concept fully transferrable to many communities in Austria and worldwide
  - Also applicable for purified waste water

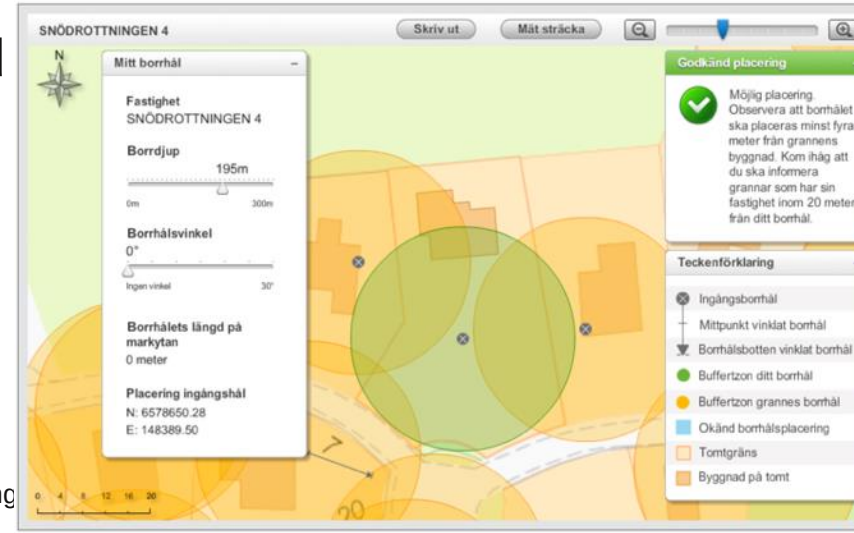
Systematic approach: Heating and cooling @ Katri Vala plant, Helsinki, FI

90MW heating, 60MW cooling ➔ balancing power to the grid



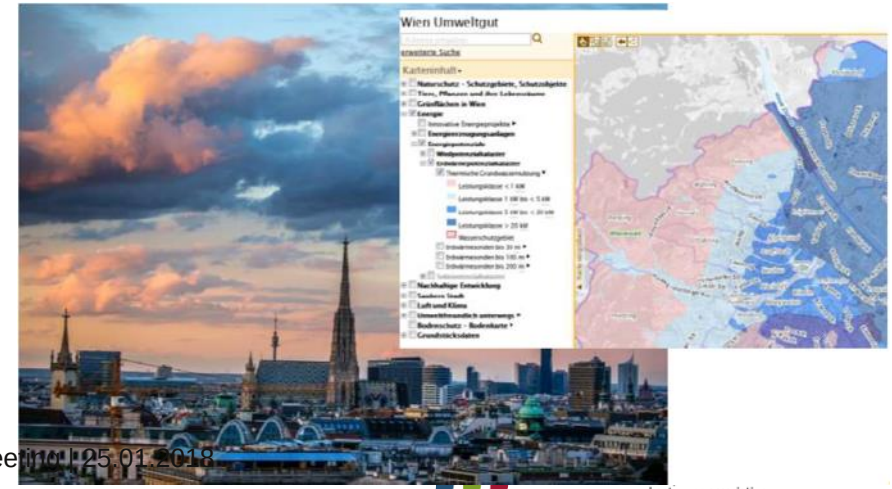
Systematic approach:
planning support in Stockholm, Sweden

- Very high density of ground source heat pump
- Planning support needed to protect city infrastructure and avoid competition for geothermal resource
- Simplified, electronic planning and administration procedure
- http://varmepumpar.stockholm.se
- ➔ fast and successful



Winner 2017: City of Vienna
a systematic approach for an energy strategy

- **Fast growing city**
- **Aim to reduce energy demand & avoid local pollution => fuel switch**
- **Recognition of the potential of central and decentral heat pumps**
- **Annual energy report**
- **Information & promotion strategy**
  - Online map of geothermal potential
  - Funding scheme for renewable heat, storage and low temp heat
  - Heat pump guidelines



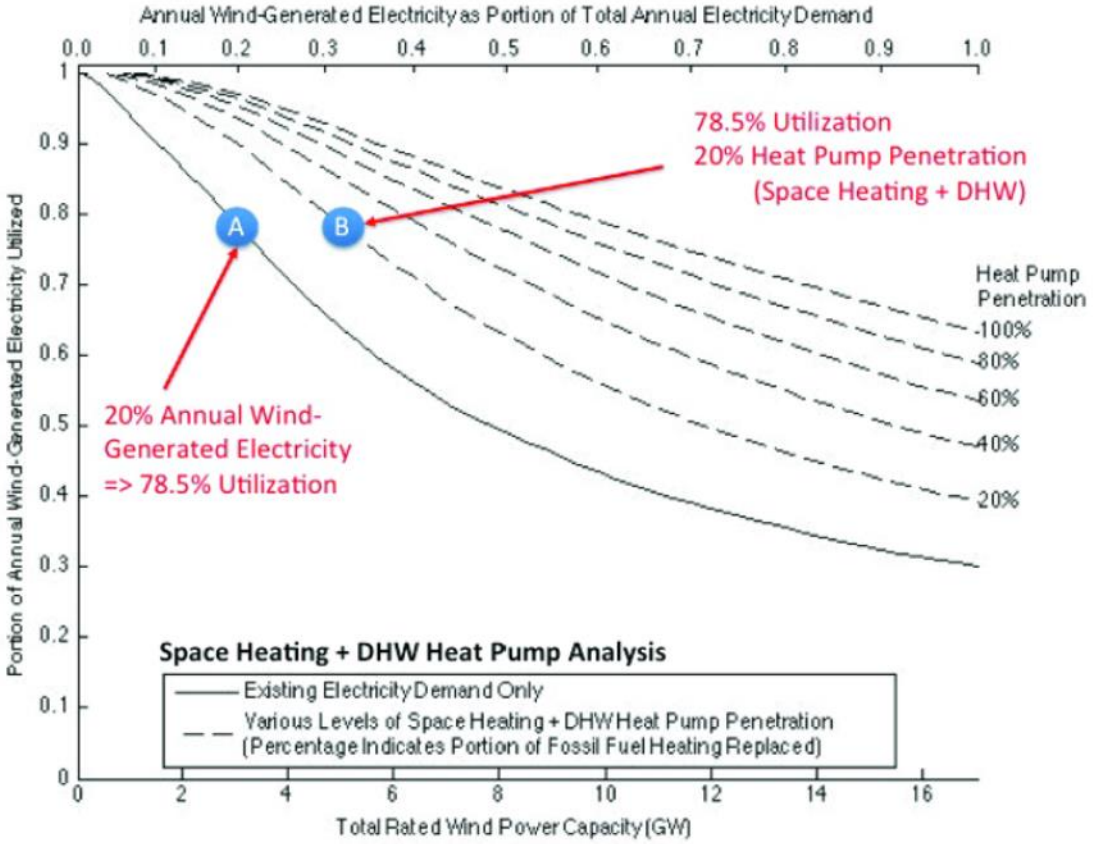
Systematic approach: Vienna /2
Information brochures

Information and planning support state of NRW (DE)

- **Heat Pump Market Place NRW (State of North Rhine-Westalia)**
- **Information platform jointly financed by industry and the state (50:50)**
- **Provision of documents**
  - Market guide
  - Planning guide for heat pump installations
  - Information & decision making support for housing industry
- **Information dissemination at fairs and events**
- **More Info in German:** http://www.energieagentur.nrw.de/waermepumpen/

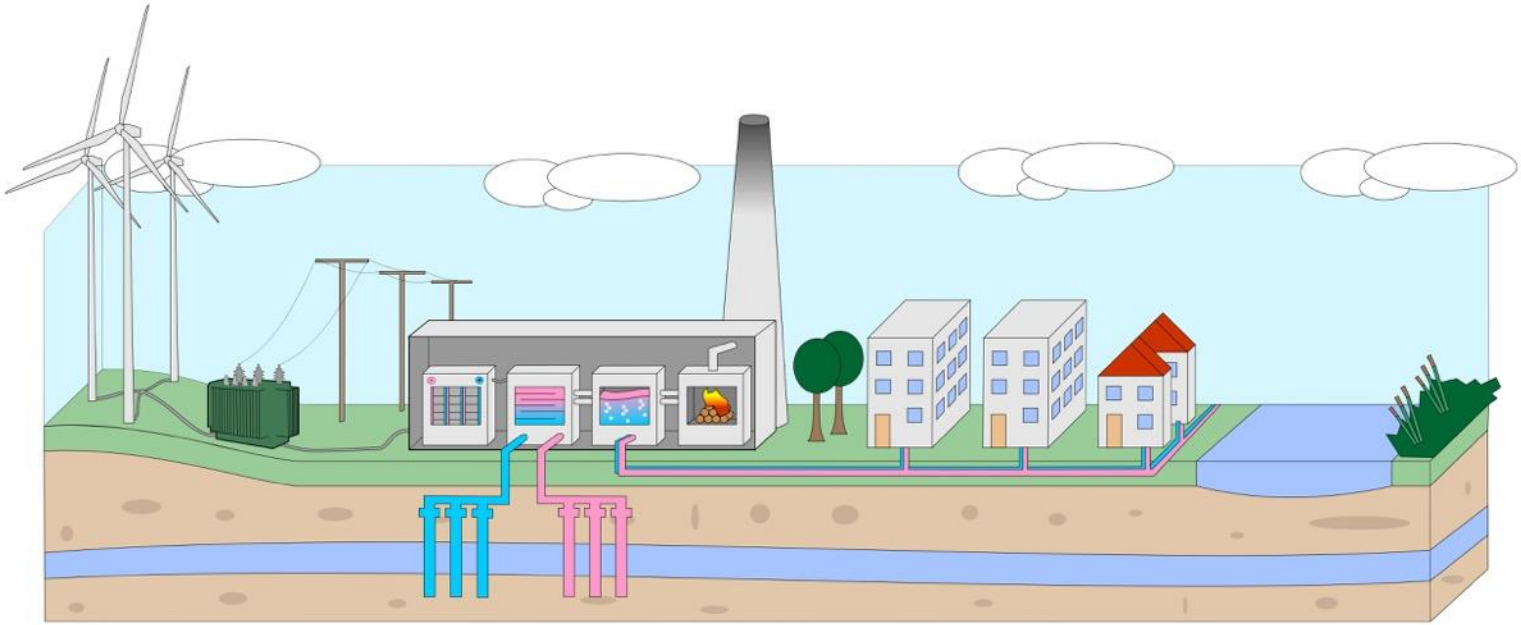
Increase New York's Wind potential

- **Wind turbines**
- **Heat pumps**



Waite, M.; Modi, V. (2014): Potential for increased wind-generated electricity utilization using heat pumps in urban areas. In: Applied Energy, V 135, pp 634-642.

Connecting large heat pumps with district heating
The case of Lapy, Poland (Ca. 3,5MWel)
„Can heat pumps follow the supply curve of wind energy?“



For more info contact Dominik Böhlein at www.energievision-franken.de

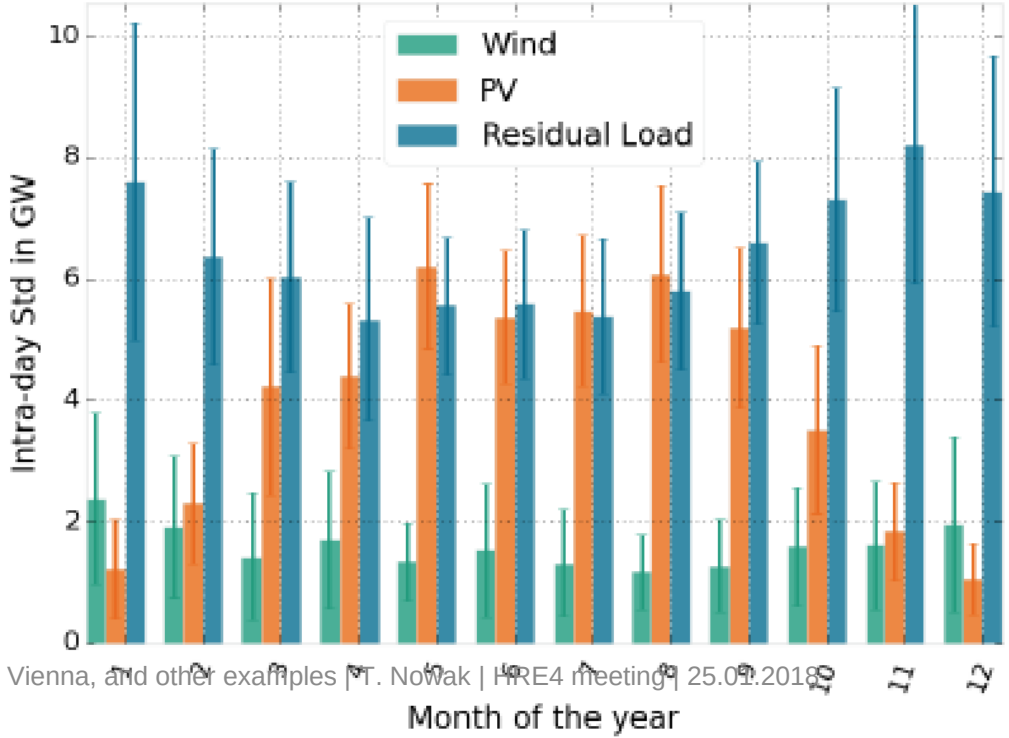
Multi system integration and balancing
A model approach for Würzburg, Germany for the year 2012

- **Simulation of office and residential buildings equipped with storage**
- **Services: heating, cooling, domestic hot water**
- **Evaluation of the impact of heat pumps on the variable supply of electricity**

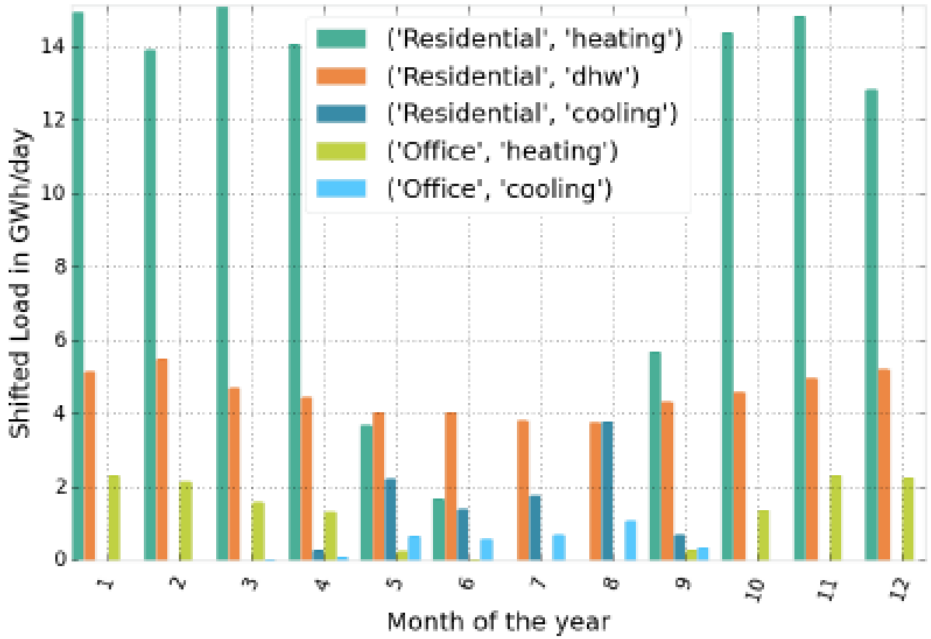
- More info: Fischer, D. et al (2014): Potential for Balancing Wind And Solar Power Using Heat Pump Heating And Cooling Systems. Download at: http://www.greenhp.eu/work-packages/wp10-smart-grid/?eID=dam_frontend_push&docID=2584

"This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 30881

Mean daily standard deviation of PV and wind generation and the residual load in the German transmission grid for each month in 2012.



Daily mean values of shifted energy for each month when balancing the residual load.



The Decarb Heat Initiative | www.decarbheat.eu

DecarbHeat vision:
100% decarbonised heating and cooling system in Europe by 2050

industry pledge

policy requests

support document

Industry plattform

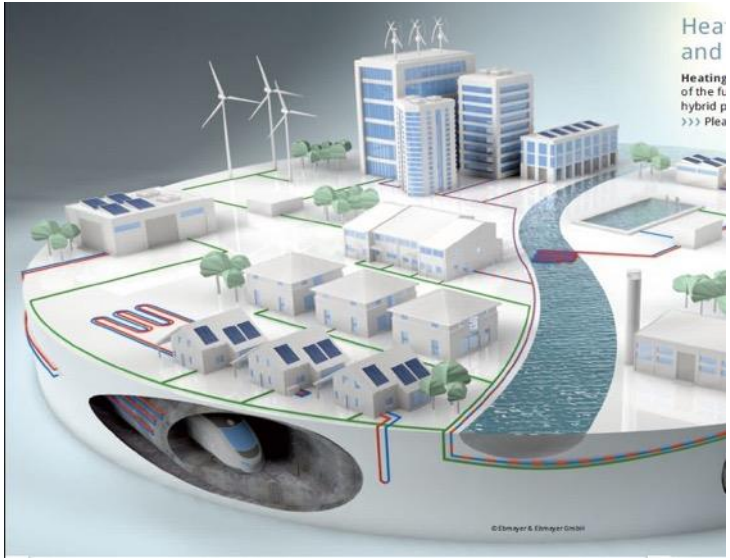
Start of the campaing with the joint decarbheat conference

Lot’s of goodies! Decarbheat mugs, beers, pins and pens.

Decarbheat pledge&support:

71 signatures from the industry, associations and policy makers.

We can decarbonise electricity, heating and cooling



Join us at www.decarbheat.eu

The European Heat Pump Association AISBL

- EHPA is a Brussels based industry association which aims at promoting awareness and proper deployment of heat pump technology in the European market place for residential, commercial and industrial applications. EHPA provides technical and economic input to European, national and local authorities in legislative, regulatory and energy efficiency matters. All activities are aimed at overcoming market barriers and dissemination of information in order to speed up market development of heat pumps for heating, cooling and hot water production.
- EHPA coordinates a quality initiative including a Quality label for heat pumps and Certification standards for heat pump installers. The association compiles the annual heat pump statistics and organizes a number of events, among them an annual heat pump conference.
- Contact: Thomas Nowak - thomas.nowak@ehpa.org - http://www.ehpa.org

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