Breakout Session

The Heat Pump (HP) Cube. Building Element for Serial Heat Transition

Analyst & Investor Day
Bochum
July 1, 2025

Agenda

1. Motivation: Market & Real Estate Specific Challenges

2. Product Presentation: Heat Pump Cube & Vonovia Potential

3. Deep Dive: Rollout & Industrialization of the Heating Transition

4. Pilot Project: Implementation & First-year Experience

A Climate-neutral Real Estate Portfolio by 2045

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Fuel Switch as an Essential Lever

Vonovia Climate pathway

Fuel switch

Heat pump

Science based target aiming for a **climate-neutral portfolio by 2045**.

01

Besides increasing **energy efficiency**, the transition from **fossil to 100% renewable energy** sources is an essential lever.

02

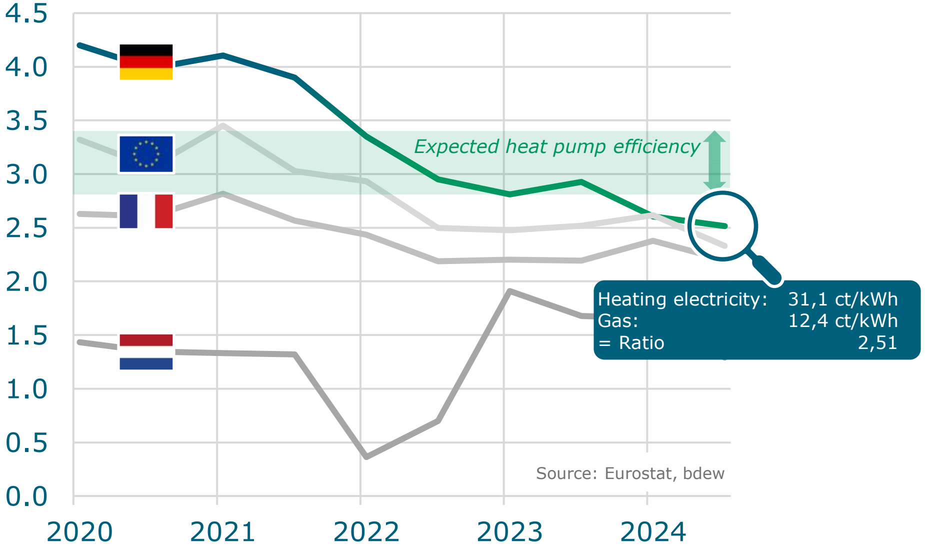
Where district heating is not viable, **heat pumps** offer the **best decentralized, renewable heat solution**.

03

Market Context: Energy Price Development

Electricity/gas Price Ratio vs. Annual Performance Factor

Price ratio electricity / gas vs. HP performance



Development of price ratio

2020/2021
Ratio: ~4,0

2024
Ratio: ~2,5

Expected annual performance factor*:

Air-to-water heat pump 2,8 – 3,4

Positive reinforcement

- Change in influence factors of energy price
- Technological developments

Substantial improvement of economic efficiency

*Definition: Heat output divided by electricity input

Challenges of Heating Transition in Existing Buildings

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Boiler Rooms in existing buildings

- Designed for fossil fuel systems = often too small for renewable systems
- Low ceiling heights
- Limited accessibility

Installation time

- Installation of conventional heat pump systems involves significant effort (approximately 300 to 350 hours)

Shortage of skilled workers

- Bottleneck for heating transition

Serial Fuel Switch with Industrial Prefabrication to Accelerate the Heating Transition

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SOLUTION

Simplify the fuel switch through standardization and the implementation of a scalable approach for a fast, technically und cost-efficient, sustainable heat supply

Serial, sustainable and technology-driven modernization of heating systems to ensure climate neutrality by 2045 as an important investment driver.

PRODUCT APPROACH

Heat Pump Cube: Turning an Individual Solution into a Scalable Standard to Accelerate the Heating Transition

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Serial heating transition

- Standardization enables serial heating transition
- Short retrofit times
- Economies of scale & cost security

Product Advantages

- Easy transportation
- Natural refrigerants
- Minimally invasive
- System concepts for maximum efficiency
- Quiet operation thanks to integrated soundproofing

Reduction of complexity

- Product approach
- No space requirement in the building
- Easy maintenance
- Reduced potential for errors

Providing heat for ~800 bis 3,000 sqm

We Defined Concise Selection Criteria for Heat Pump Cube Projects to Identify Possible Cube Sites

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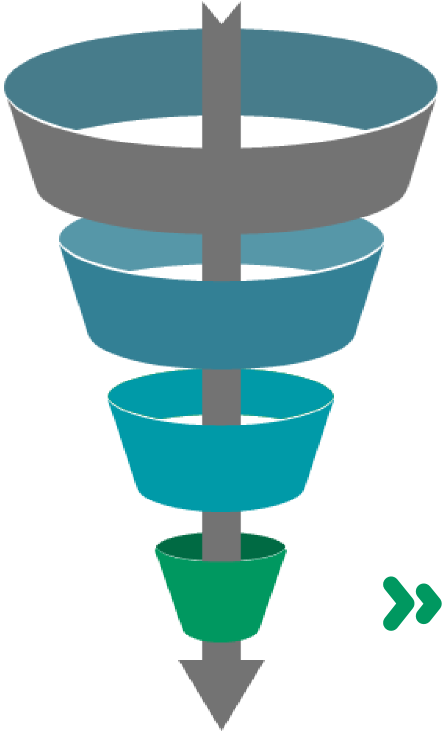

Multi-family housing stock

Total portfolio reduced by single-family homes and high-rise buildings

K.O. criteria Extract

Criteria for filtering the portfolio according to buildings relevant for decentral fuel switch, e.g.

- No district heating
- No renewable heating system

Prioritization factors Extract

Factors for prioritizing optimal projects for Heat pump cubes, e.g.

- Energy efficiency of building
- Existing heating system
- Sufficient space for installation

» 30 % of the Vonovia portfolio is currently in scope for HP cubes until 2045

Standardised Heating Transition: Roll-out Plan for Pilot Projects in 2026/2027

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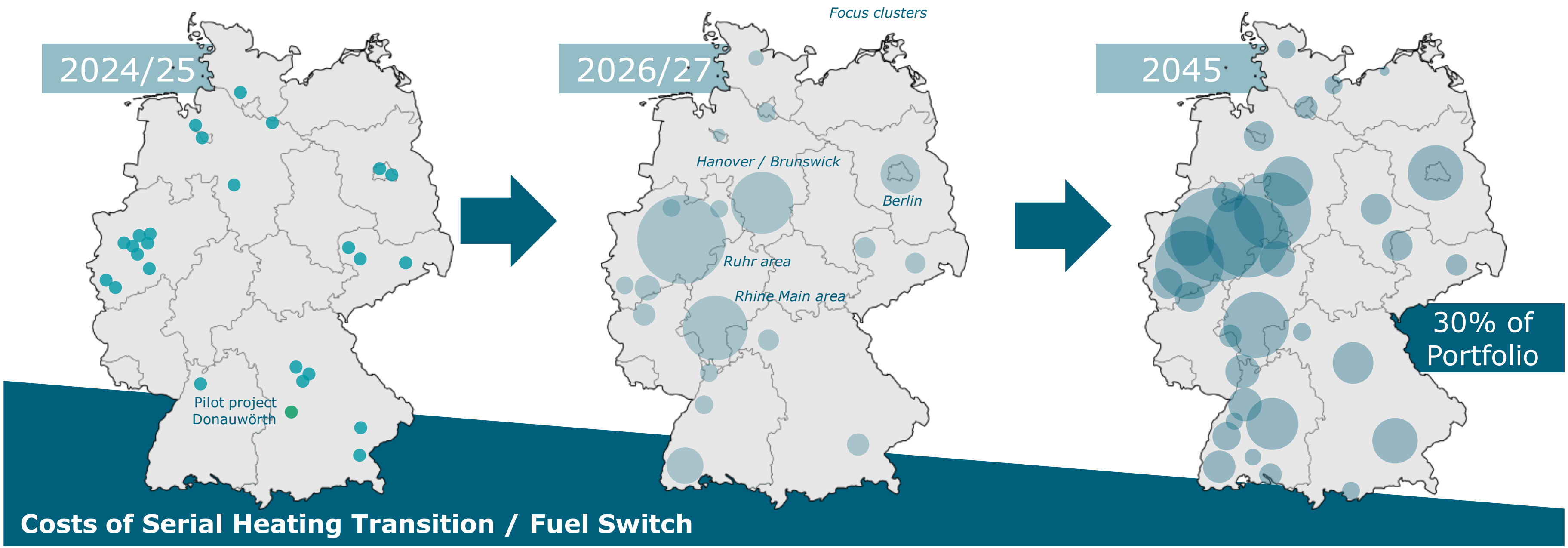
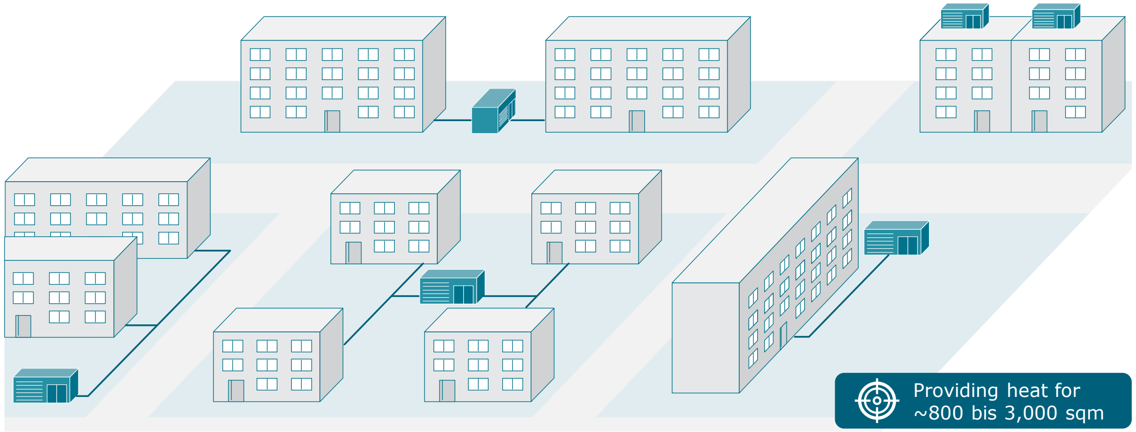
Pilot project → **Pilot phase to reach series maturity** → **Scaling serial fuel switch**



To Accomplish Our Ambitious Heat Pump Ramp-up, We Leverage the Effects of Industrial Prefabrication



Long-term target picture

- Plug & Heat - central heating system for apartment buildings
- Vonovia value chain from planning to maintenance
- Industrial production and assembly for scaling & cost benefits
- Mass processing: specialized installation and service network (internal and external)

2024	2025											
Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

- Operational pilot phase
- Transition to pre-series phase
- Conception of industrialization
- Implementation of production concept & optimization of internal processes

We Are Working on Establishing the Complete Value Chain with External and Internal Stakeholders

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ILLUSTRATIVE

Sourcing → **Planning** → **Installation**

Product Development & Production Roll-Out

- Completing product development & ramping up series production
- Initializing a resilient & reliable supply chain

Supplier diversification

- Challenging recent concepts of suppliers
- Piloting systems
- Secure consistent processes

Internal value chain & operating model

- Creating organizational requirements and project resources
- Establishing the digital processing chain

Installation & service network

- Developing a subcontractor network in target regions
- Ramping up internal resources

By Leveraging the Standardized Approach, We Expect to Realize Four Benefits with Major Financial Impact

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1 Increasing rents earlier

- **2-3 months earlier rent adjustment** compared to conventional heating replacement

2 Being part of the value chain

- Potential for **additional revenue** with planning, installation & service
- But: Vonovia will never produce the cubes itself

3 Accelerating the heating transition

- Driving **high-yield investments** through **prefabrication** and **reduced reliance** on **skilled labor**

4 Reducing yearly energy costs

- **Heating costs** for tenants **reduced by 40%**
- Potential for contracting business model

The Fulfilment of the Three Most Significant Prerequisites Drive Our Project Efforts

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Constructional prerequisites

EU energy efficiency class of buildings across Vonovia building stock of at least **class "C" achieved.**

01

Technical prerequisites

Power grids to serve required heat pump power input in cooperation with grid operators **upgraded**.

02

Organizational prerequisites

Organizational enablement for the industrialized handling of projects **nearly completed.**

03

Pilot Project „Donauwörth“

Now 1 Year in Operation

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February 2024:
Delivery and installation

May 2024:
Initial operation

May 2025:
1 year in operation

On-site procedure:
- ~ 1 day Preparation steps
- ~ 2 days Electrical installation
- ~ 2 days Installation and hydraulic balancing

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After One Full Year in Operation: the Pilot Project Proves Our Hypothesis and Shows Significant Benefits

- Warm water supply only interrupted for 6 hours

- Efficient installation:
  Rent yield better than planned initially

- Reduction of tenants monthly heating costs:
  1,11 €/m² ↘ 0,65 €/m²

- Annual performance factor* exceeds expectations
  Warm water supply = 3,1
  Heating = 4,1
  } = ø 3,5

- No operational malfunctions
- Few compressor starts promoting longevity

* Definition: Heat output divided by electricity input

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