

# VONOVIA

## Capital Markets Day

Decarbonization Software

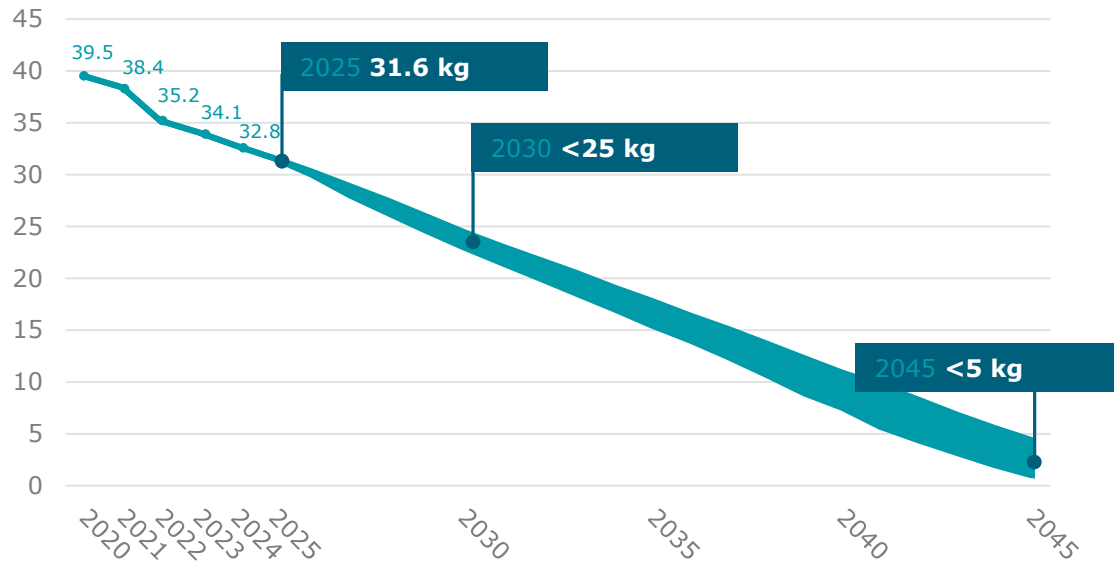
September 27, 2022



# Commitment to Sustainability

## Climate-neutral Portfolio by 2045

### CO<sub>2</sub> intensity in kg CO<sub>2</sub>e/sqm per year<sup>1</sup>



### The 3 levers of our climate path

- 1 Continue **deep renovation**.
- 2 **Replace conventional heating** with hybrid systems and heat pumps.  
**PV** on all suitable roofs.  
Own local **heating networks in Urban Quarters** powered with renewable energy.
- 3 **Transformation of the energy sector** towards carbon-free district heating and green electricity.

<sup>1</sup> Includes scopes 1 & 2 as well as scope 3.3 "Fuel- and energy-related activities upstream;" referring to German building stock excl. Deutsche Wohnen. Development of energy sector according to Scenario Agora energiewende KNDE 20245; For comparison: CRREM pathway MFH 1.5° DE 2045=5.4kg CO<sub>2</sub>e/sqm per year (07/2021); Climate pathway development supported by Fraunhofer ISE. Per-sqm values based on rental area, not total floor space.

# Sustainability

Strategy Defined und Targets Set

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## Public conditions and obligations...

- **EU & Federal Government**  
Climate neutrality in 2045; EU taxonomy regulations
- **ESG Ratings / TCFD**  
Vonovia is industry leader and represented in leading indices
- **Sustainability Performance Index SPI**  
Leading non-financial metric
- **Climate path**  
Nearly carbon-neutral portfolio until 2045

## ... meet real life challenges

- Numerous and diverging accounting standards and rating models
- Social acceptance and responsibility
- Lack of capacities
- Lack of data
- Long approval procedures
- Variety of regulations
- Technological gaps
- Holistic neighborhood developments
- Changing financial environments
- ...

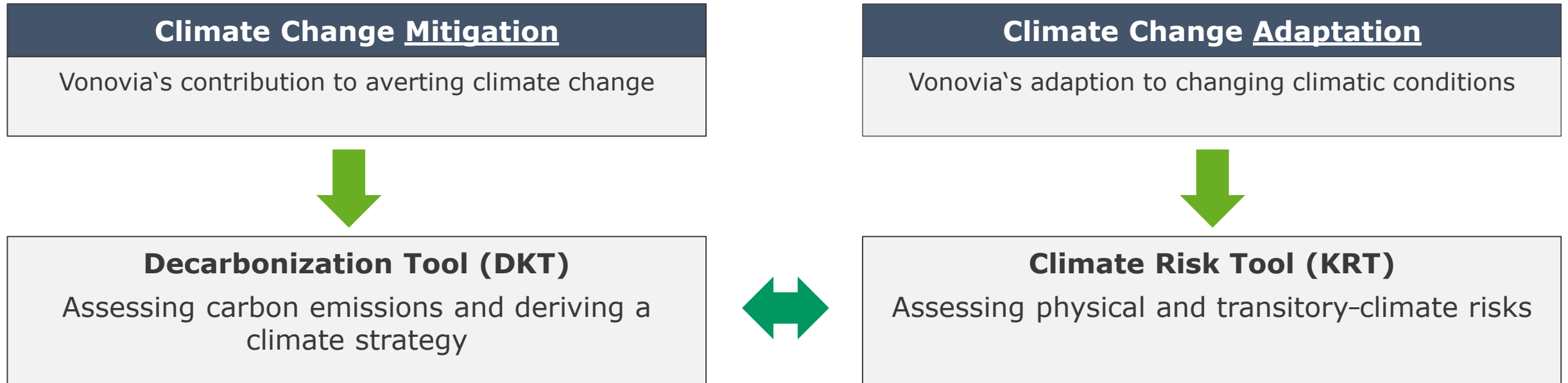
# Increasing ESG Reporting Requirements...

...Underline Need for Digitalization

Increasing requirements by capital markets and stricter regulation.

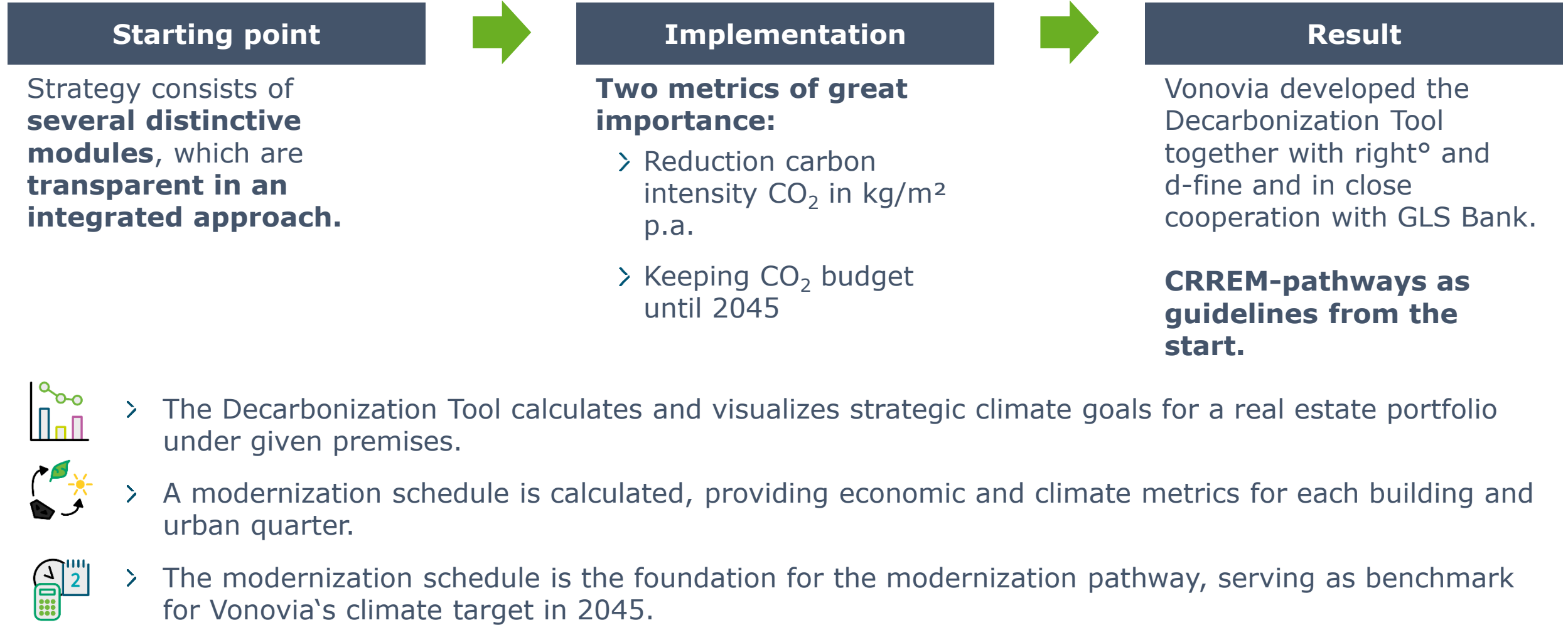
Real estate companies are bound to give transparent account of their climate strategy and risk assessments (CSRD, Taxonomy, TCFD etc.)

EU taxonomy defines **two central climate goals** with conditions.



# From Strategy to Implementation

Successful Decarbonization and Digitalization...



# Decarbonization Tool

Digital Representation of the Real Estate Portfolio and Its Carbon Emissions

## Energetic portfolio data

Data from Energy Performance Certificates (EPC) for final energy demand and heating source. Emission factors with projection until 2045.



## Clustering and building costs

Clustering according to IWU<sup>1</sup> typology with sophisticated cost assumptions. Inclusion of current investment programs.



## Rents

Current rents of portfolio. Calculation model for rent increases by modernization according to German law and subsidies.



Climate algorithm uses input data to prioritize



urban quarters



&

buildings



chronologically, based on:

- Calculated yield
- CO<sub>2</sub> reduction
- Further restrictions (i.g. monument protection)

An ambitious bottom up climate pathway based on existing real estate portfolio data.

A realistic pathway by virtue of combining climate targets with economic criteria.

It serves as a benchmark for current and future investments.

<sup>1</sup> Institute for Housing and Environment at TU Darmstadt.

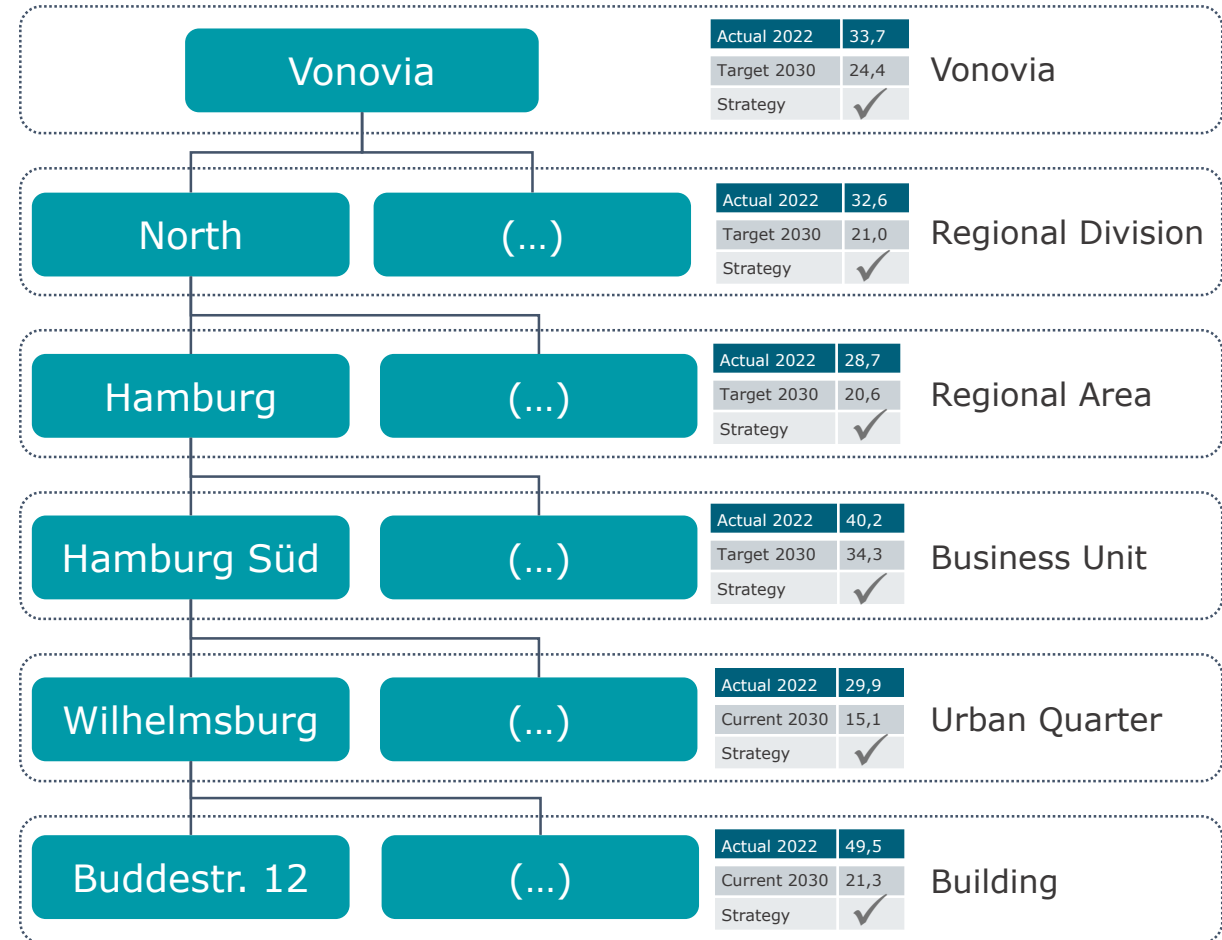
# Climate-neutral Real Estate Portfolio...

...Has to Be Managed On Various Levels

## Building on rich data sources

- > **Data base**  
EPC and basic building data
- > **Scope**  
Heating and hot water energy demand
- > **Emission calculation**  
Final energy demand x emission factor
- > **Emission factors**  
Derived from GEMIS 5.0<sup>1</sup> and Agora<sup>2</sup> as well as specific factors for district heating
- > **Emission scopes**  
Direct emissions (1), indirect emissions (2) and energy-related activities upstream (3.3)
- > **Additional data**  
Floor area, final energy consumption, energy source, building type, rents

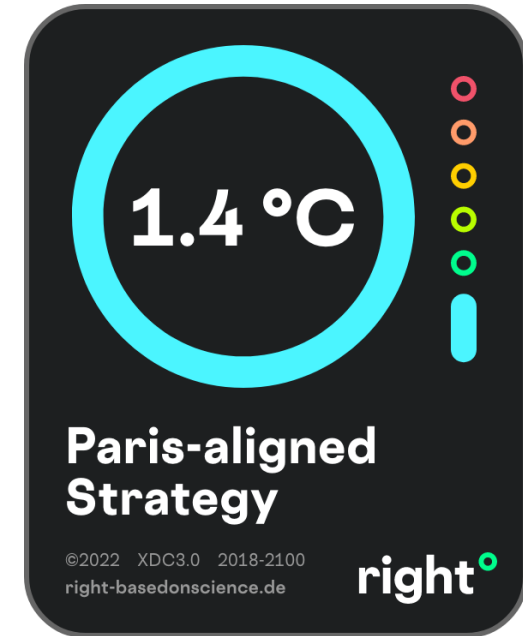
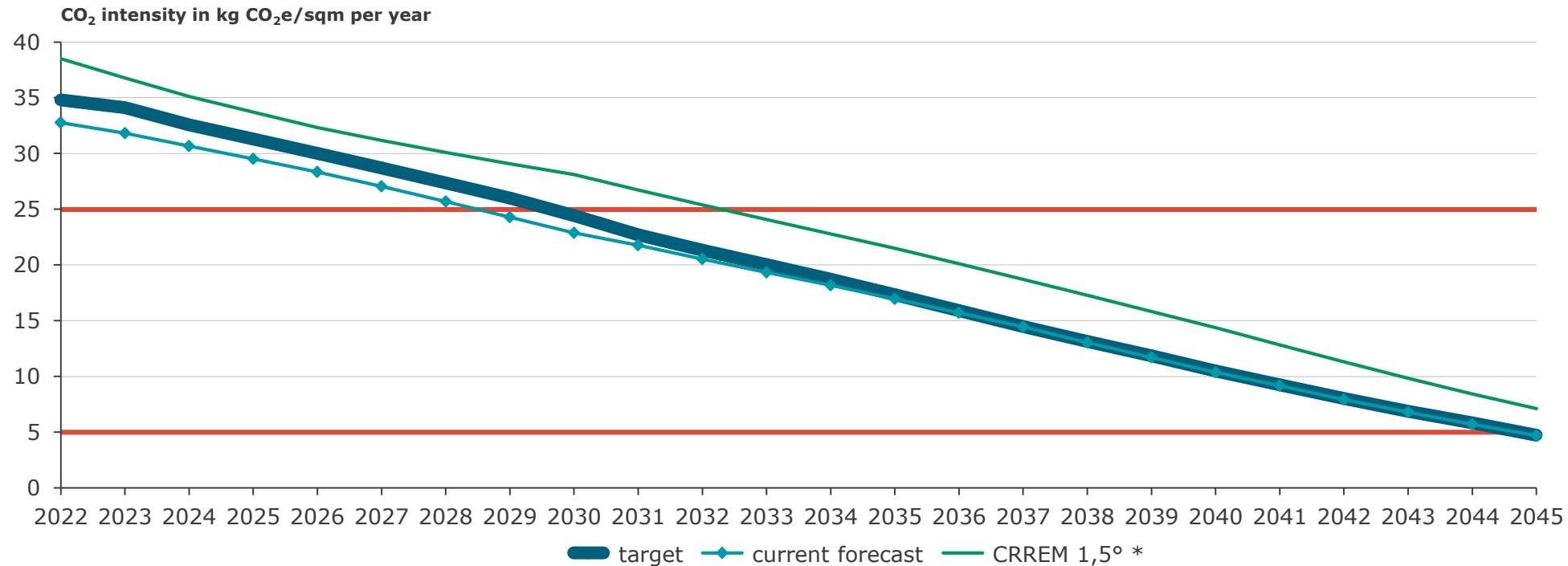
## Defining targets on every level



<sup>1</sup> GEMIS 5.0 – [www.iinas.org](http://www.iinas.org). <sup>2</sup> Agora – [www.agora-energiewende.de](http://www.agora-energiewende.de).

# Climate Pathway for CO<sub>2</sub> Reduction

Tool Calculates Modernization Pathway for Each Building and Urban Quarter in Vonovia's Portfolio



## Decarbonization tool shows long-term emission reduction until 2045

- Calculation of optimal renovation time for each building/quarter, required costs, prospective earnings, future energy demand and CO<sub>2</sub> reductions.
- **Strategy and target definition for Paris-aligned portfolio\*\***

\*) CRREM MFH-Pathway 2021; figures have been adjusted for the household electricity. \*\*) Strategy was assessed by independent rating company Right° in September 2022 based on Vonovia Core-Portfolio at 06/30/2022 (included Deutsche Wohnen) in Germany; emission factors elaborated with Fraunhofer (based on Agora-Study)



# Various Benefits...

...of Substantial Value to Vonovia

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## Long-term climate impact

Long-term climate impact of portfolio is shown by calculated XDC metric.  
Determination whether portfolio reaches climate neutrality post investment.

## Deduction of regional climate pathways

Distinctive pathway for each building, urban quarter or regional portfolio.  
Regional decision makers know their portfolio's position on the climate pathway.

## Prioritization algorithm

Algorithm, weighing CO<sub>2</sub> reduction and profitability, shows which building is to be modernized with priority and thus gives orientation to regional management.

## Feedback loop for investments

Ongoing and future investments with their CO<sub>2</sub> reduction are fed into the tool.  
Feedback loop between planned/current measures and targets is established.

## Analysis and data export

Tool serves as central data point for carbon emissions and for ESG reporting  
Each user can analyze, evaluate and export data for their portfolio.

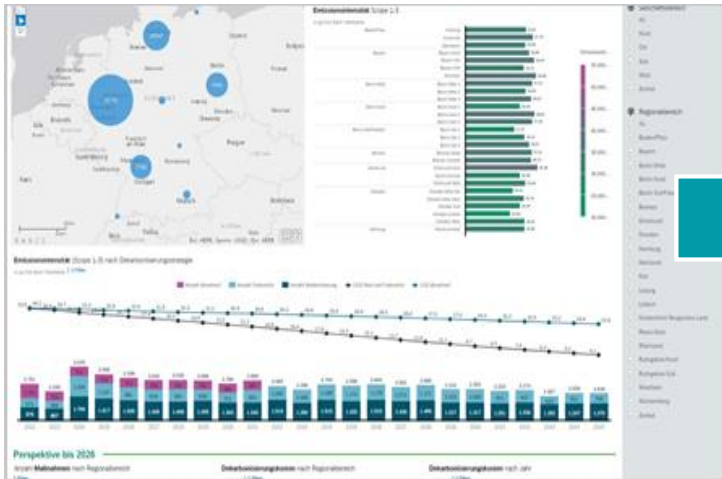
## First Mover

Vonovia sets an industry standard with its Decarbonization tool.  
Peers have not implemented a comparable system so far.

# Perspective for Internal Use

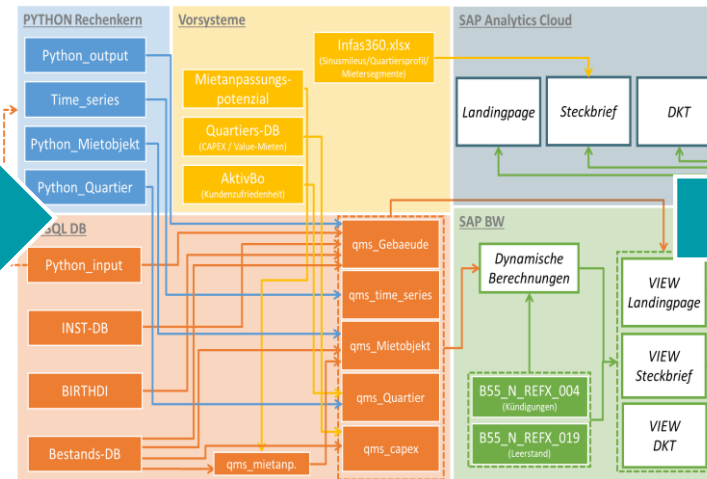
## Developing an Integrated Portfolio Management System

### Decarbonization Tool



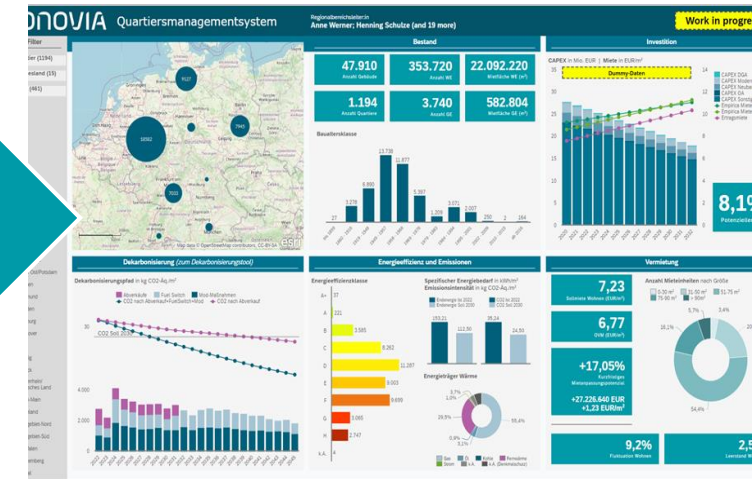
- Top-down modeling of decarbonization measures and prioritization based on climate metrics and RoI
- Visualization of the climate pathway at building and aggregate levels
- Successive replacement of model values with precise bottom-up planning
- Evaluation of climate strategies and scenarios for portfolio development

### IT & Process Integration



- Integration of existing data structures
- Dynamic calculations based on user input and return of relevant data to storage
- Establishment of a common interface to support cross-divisional processes

### Portfolio Management System



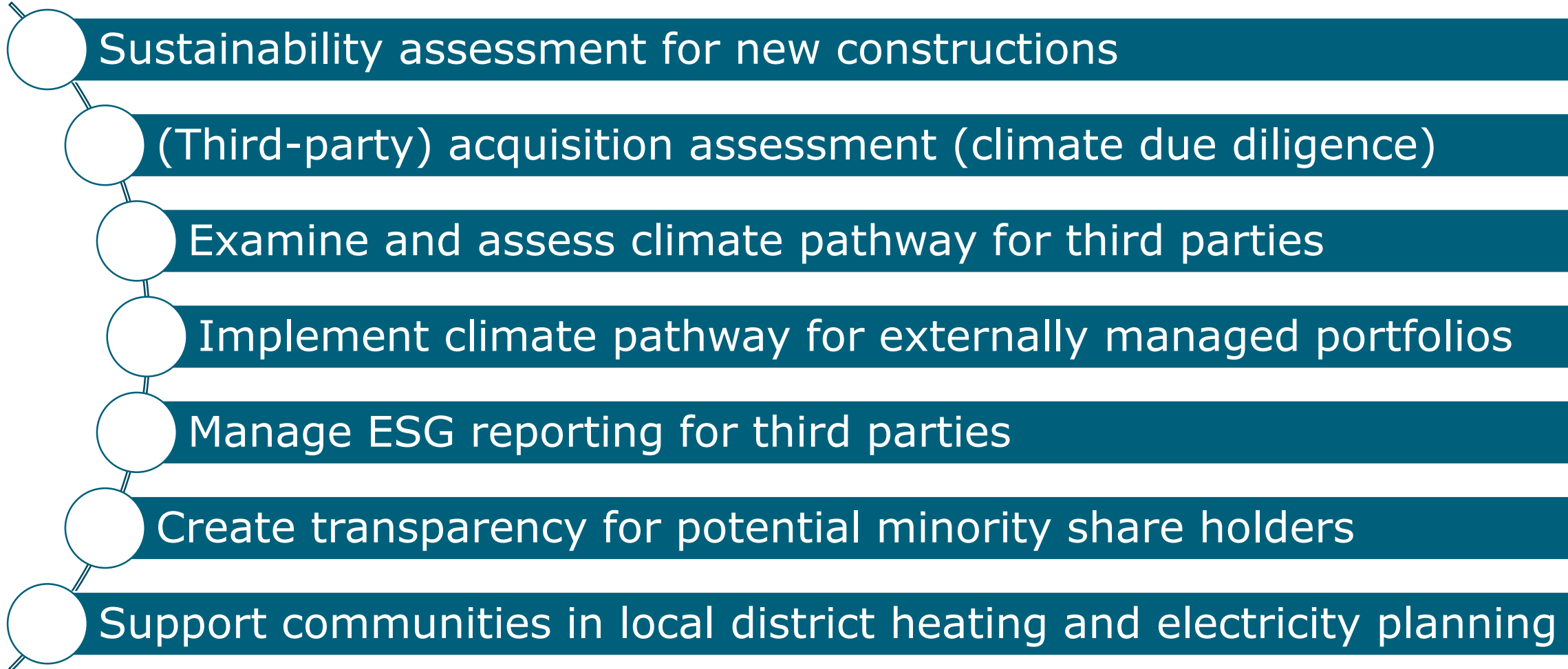
- Integrated German portfolio on single user surface with varying aggregation levels – Landing page, quarter profiles etc.
- One stop shop for portfolio data - Basis for ESG-Group Reporting
- Real-time access to contextualized data of individual portfolios – also for third parties
- Management and economic perspective complements sustainability focus

The Decarbonization Tool is the nucleus of a corporate portfolio management system with a focus on urban quarters.

# Potential External Use

## Possible Applications

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- 
- Sustainability assessment for new constructions
  - (Third-party) acquisition assessment (climate due diligence)
  - Examine and assess climate pathway for third parties
  - Implement climate pathway for externally managed portfolios
  - Manage ESG reporting for third parties
  - Create transparency for potential minority share holders
  - Support communities in local district heating and electricity planning



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