

VONOVIA

# Capital Markets Day

Internet of Things

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September 27, 2022

# Recap: What Did We Talk about In 2019?

## Acquisition of IoT Team and further Development of Use Case

### Vision: Digital monitoring of building technology.

- Rationale: Customer dissatisfaction due to lack of transparency and tools to manage lift service providers.
- Start of pilot projects for remote elevator monitoring.
- In 2019, acquisition of startup *Dynamic Components*.
- Highly skilled team of software, hardware, data analytics and business experts based in Munich.
- Technology platform consisting of software and hardware.

**Operate**  
Vision (Pilot Phase)

Development of a platform for the digital monitoring of systems and building technology

**Benefits**

- > **Increased customer satisfaction** through early detection of malfunctions
- > **Improved coordination** of service providers and craftsmen through review and documentation of work completed
- > **Reduction of process costs** in-house through information-b...
- > **Direct interaction** with customer through portal or mobile ap...
- > **Better informed** field force

→ Current focus: **heating systems and elevators**

System → Out-of-order signal → Location

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### Status quo: On the way to an IoT power house.

- Further strengthening of Munich-based IoT team.
- Industrialization and rollout of IoT hardware.
- 1 Patent granted.
- Tracking lift outages and troubleshooting via ticketing system incl. communication with service providers.
- Development of an investment model for modernization based on scoring data.
- Mobile app for property managers and technical service personnel for better insights in the field.
- Further development of additional IoT use cases with strategical importance.

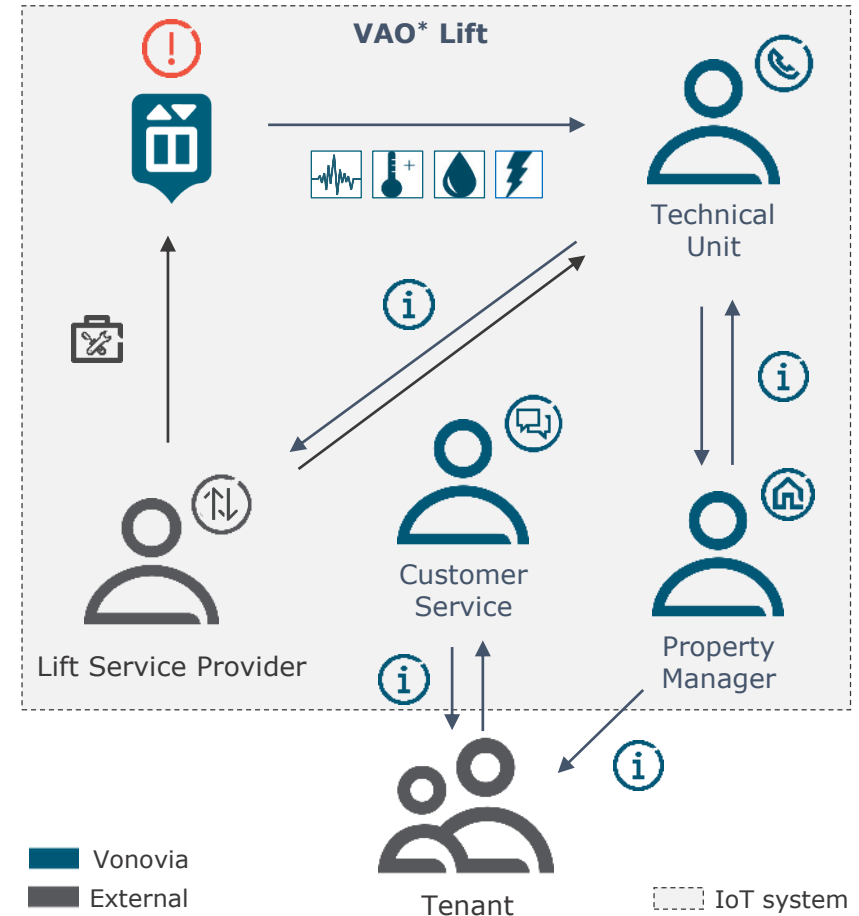
# Vonovia Is An IoT Pioneer In the Sector

Remote Monitoring 3,300+ Unit Elevator Portfolio, Generating Unique Data Sets

Rollout of IoT monitoring system complete



How does the monitoring work in practice?



\* VAO = Vonovia Asset Observation.

# Vonovia's IoT Platform Is A Powerful Tool

KPI Tracking and Seamless Information Exchange between All Stakeholders

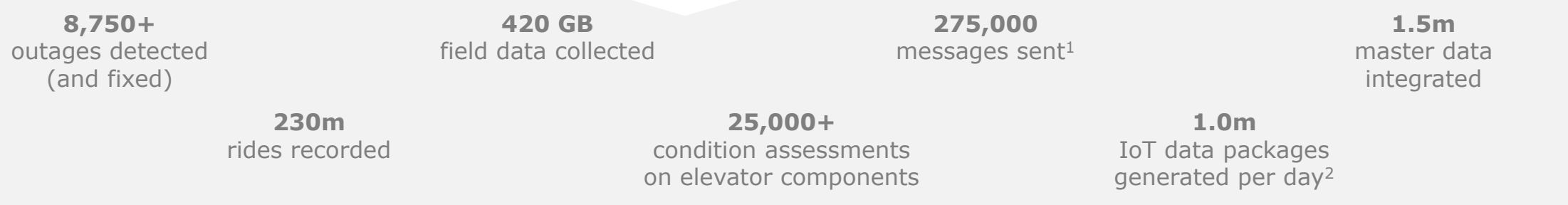
## Why is Vonovia doing this?

- Data enables unique insights and best-in-class transparency.
- Ticketing system guarantees efficient communication with all stakeholders.
- Mobile app provides property managers with all necessary information.

- Enabling of improved elevator service providers management.
- Measuring of KPIs in order to enforce service level agreements in service contracts.
- Early detection of outages and improved communication between tenants and property managers on the ground.

### Case Fundamentals

1. Improved **customer satisfaction** by reducing outage times.
2. Optimized **service provider performance** by gaining transparency of all activities at the machine (what was done by whom and when?).
3. Enabled organization to make the **right investment decisions** and **monitor performance** of new equipment.



<sup>1</sup> Messages counted from 02/2020 – mid 09/2022; <sup>2</sup> Since 04/2022 the system generates 1.0 m data packages per day; Time period all other data: 09/2020 – mid 09/2022.



# Data from the IoT Platform Is A First Step

Decision Making based on Hard Facts Instead of Regional Quotas

## What kind of data does Vonovia have?

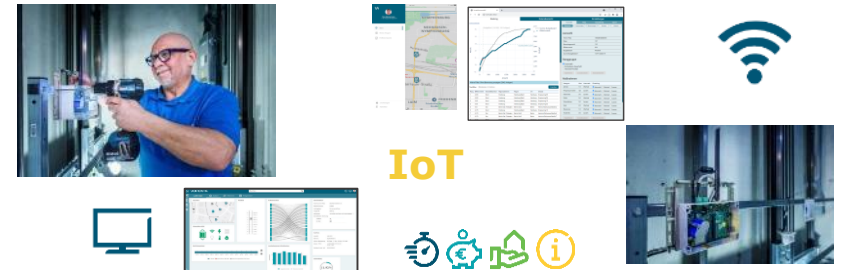
- **Elevator master data** incl. rating of specific elevator components.
- Information on **elevator rides**.
- **Sensor data** from elevator environment like information on **electric current, temperature** and **humidity**.
- Tickets for **outages** and **recommissioning** incl. lift service provider input: **Annotated data** on outages incl. component and root cause.

-> This is the **foundation for predictive maintenance**.



## How does Vonovia use the data?

- **Rating data** from **elevator components** used for data tool "Invest Model".
- This investment model helps to make **data-based decisions** on **allocation of financial resources** for modernization or complete replacement of elevators.
- Vonovia is setting up **data analytics team** in order to expand **data-based decision approach**.
- Goal is to develop **predictive maintenance models**:
  - Step 1: **Anomaly detection**.
  - Step 2: **Predictive models**.

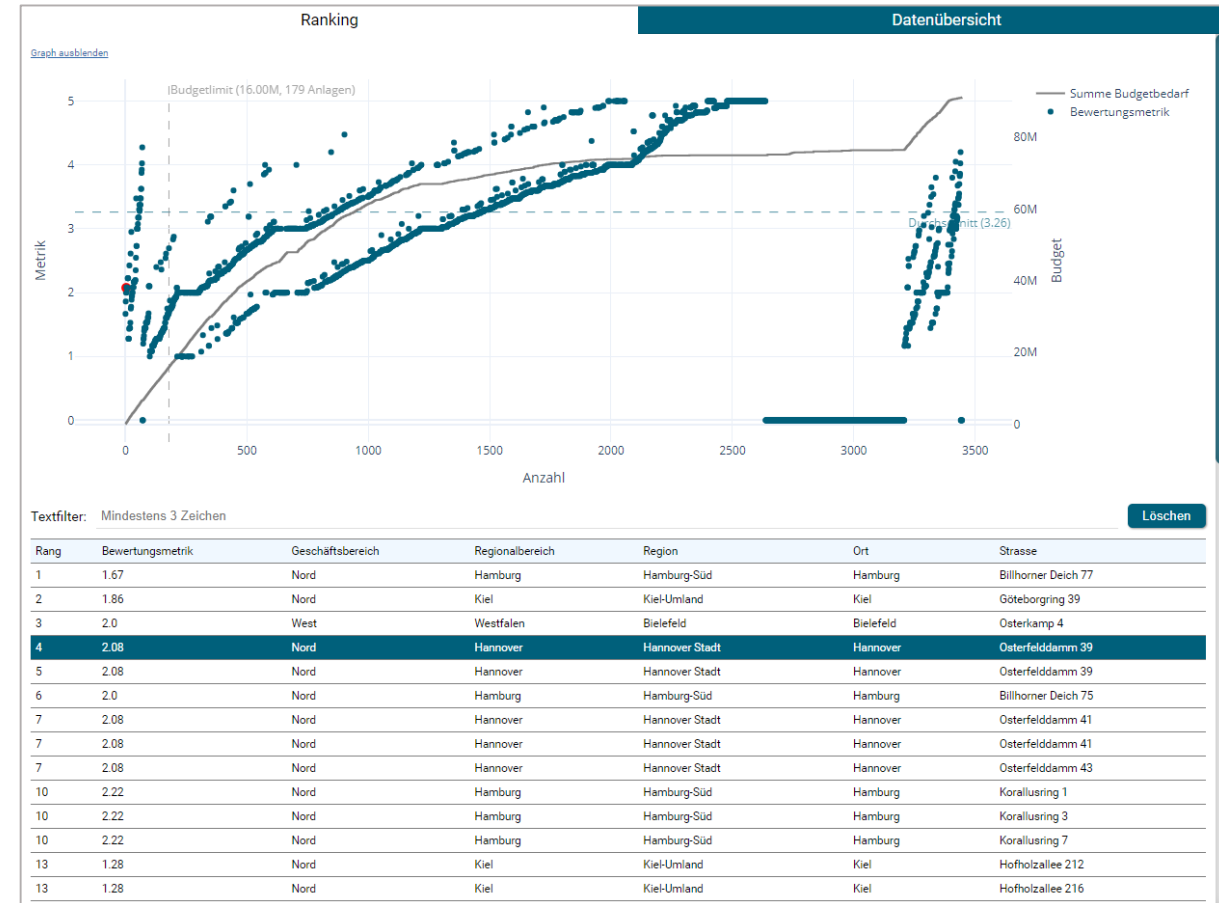


# Data Leads to ...

## Systematic Data Collection and Processing for Solid Decision Making

A data-based ranking of elevators enables a better allocation of investment budgets.

- Visualization of **rankings**.
- Overview of all **master data**.
- Rating **statistics**.
- **Export function** of rankings for further **data processing**.
- Several **data filter** and **parameter settings** for analysis.
- **Custom settings** for **actions and categories** depending on elevator specifications.
- Custom settings of **budget requirements** per elevator.
- Change logging.
- Custom notes per elevator.





# “Elevator” – Just the First of Vonovia’s IoT Use Cases

Blueprint On How to Proceed with Other Use Cases

## Vonovia’s IoT-Blueprint

- **Hardware device** incl.
  - relevant **sensors** and **interfaces**.
  - either developed **in-house** or via **partners**.
- **Rollout of hardware devices** to all properties.
- **Inspection** of assets (e.g. elevators, heating systems) incl. additional **data acquisition / verification**.
- **Collecting, processing** and **storing** (master) data.
- **Monitoring assets** incl. outage alarms.
- **Analytics, correlations, optimizations**.



## Execution

- All resources for **further rollout of use cases** available at Vonovia.
- **Expertise** in hardware, software, data analytics, rollout and project management.
- Elevator case was very focused on **customer / tenant satisfaction**.



New case “**Heat**” will be focused on **energy / cost savings** and is even more **relevant** due to **current events**.



# What Is Next?

Vonovia Has Identified Additional Use Cases Supporting Our Roadmap towards Decarbonization

## Elevator

IoT realtime data for elevators, data analytics regarding outages and digital elevator management.



## Heat

IoT realtime data for heating systems, data analytics, (sub-) metering, processes.



## Energy

IoT realtime data for photovoltaic systems, data analytics, optimized energy flows.

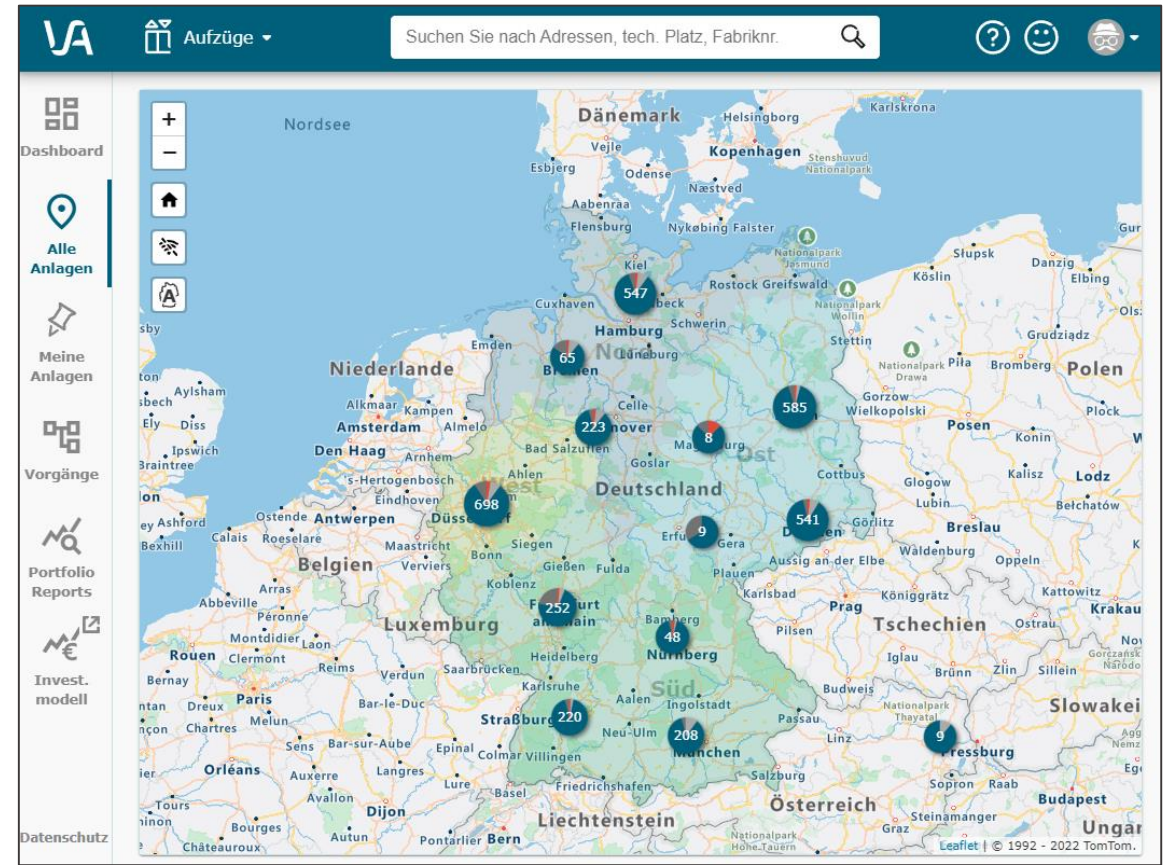


## Water

IoT realtime data for drinking water-related building technology, adjacent process monitoring.



Cross-sectional topics: **Data, Infrastructure, Operations.**





# Highly Relevant Use Case

## IoT Offers Great Potential for Remotely Monitoring Heating Systems

Rollout of IoT-monitoring system ongoing.



How does the monitoring work in practice?



What is Vonovia doing?

- Reading out of every **boiler parameter** and **visualization** in an online platform.
- **Remote parametrization** of heating systems for system **optimization**.
- Generation of **detailed error reports** for exact **root cause analysis**.
- **Direct interface** to the heating system of several manufacturers.
- Optimization management to **reduce energy consumption and carbon footprint** of heating systems (today: a manual process, in the future: smart algorithms).



# Savings Potential Is Material

Scientific Study<sup>1</sup> Suggests 15% Cost Savings on Average for Heating Systems

## BaltBest study findings.

- A lot of **heating systems** ...
  - ... are oversized: While **building shells / windows have improved** in terms of insulation, **heating systems have not been adapted** to the new situation.
  - ... are **not configured accordingly** and show a **system temperature** which is too **high in 85% of cases**, resulting in an actual heating capacity too high for local circumstances.
- In addition, it has been found that **tenant behavior** has a **large impact** – if tenants regulate room temperatures several times a day, a lot of energy can be saved – **smart thermostatic valves decrease energy consumption** in multi-family houses.
- This means with **little invest** and **optimization measures** it is possible to save an average of **15% of energy costs** on property level.

## Findings match Vonovia's approach.

### Efficient heating settings.

Heating systems and its components are adapted to local property conditions – this enables CO<sub>2</sub> savings.

### Quick reaction to heating outages.

Outage is fixed before tenants complain or even notice.

### Clear identification of root causes through direct order creation in SAP.

Multiple rides of Vonovia's service technicians are prevented.



Tenant satisfaction



Heating costs tenants



CO<sub>2</sub>-costs Vonovia



Process costs Vonovia



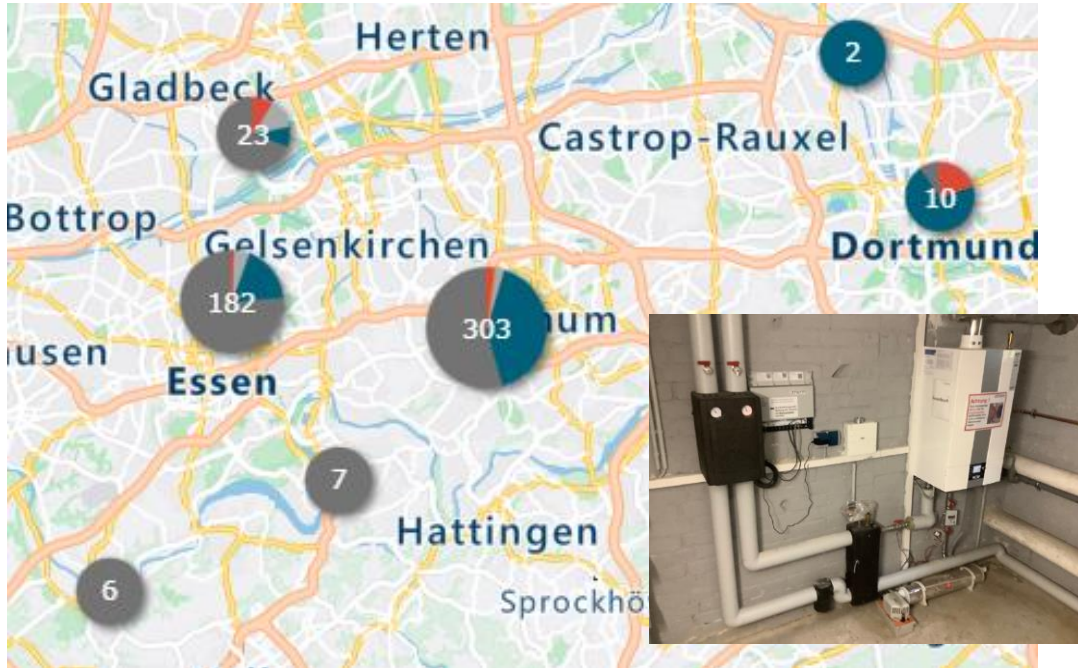
<sup>1</sup> BaltBest - Einfluss der Betriebsführung auf die Effizienz von Heizungsanlagen im Bestand.

# Vonovia's Heat Rollout Is In Full Swing

In Spite of Global Supply Chain Crisis, Vonovia's Second Use Case Is On Track

## Current status of VAO Heat rollout

- Almost **250 installations** in Ruhr Area completed.
- Completion of **500 installations** by **end of October**.
- First **heat pump installations** will be realized in October.



## What Vonovia has learned so far?

- **15% CO<sub>2</sub>-savings on average** possible through optimization of heating system.
  - **99% of outages** detected
  - **Every 2 days** an operation has been triggered since start of rollout
- 
- **Global supply chain problems** led to material shortages and delays in overall timeline.
  - **Supply problems** due to lack of electronic components are **still relevant today**.
  - **Lead times for components** need to be evaluated **before electronic layout is finished** to avoid delays in PCB assembly.
  - **Detailed training of heating technicians** is very important since installation is not part of their daily routine.
  - **Installation** possible **without prior inspection of heating system** as relevant information available in ERP system.

# Vonovia Is Well-Positioned for The Digital Future

The Combination of Technology, Team and Data Opens Up Internal and External Opportunities

## Summary

### Vonovia ...

- ✓ ... has built the expertise to **manage complex IoT projects.**
- ✓ ... has the ability to **collect** and **interpret data sets.**
- ✓ ... can use the data to **optimize operations.**
- ✓ ... can now start to **deliver new business models;** internally as well as externally.



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**Thank you!**

**Any Questions?**



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