

Innovations in Comfort and Energy Efficiency in Buildings: Leveraging System Design Methods and Data Analytics

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HVAC Goes Digital



Key Takeaways



1. HVAC goes Digital
 2. Cloud Integration of Building Data is a great opportunity to improve the performances of a building
 3. Think about content and not only about infrastructure!
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St. Peters Basilica in Rom





Where are Belimo products installed?



Burj Khalifa, Dubai



National Aquatic Center, Beijing



Empire State Building, NY



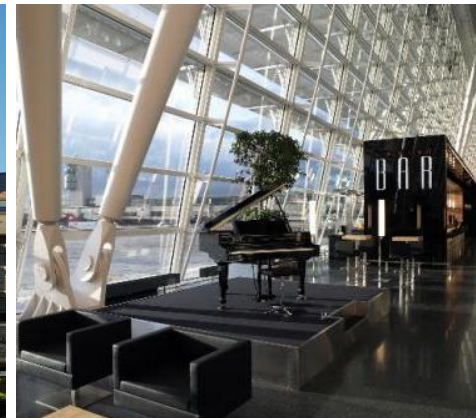
THE SQAIRE, Frankfurt (Source: Roland Horn)



Rail vehicles



Princeton University Princeton, NJ



Airport Zurich (Source: Flughafen Zürich AG)



Vessels

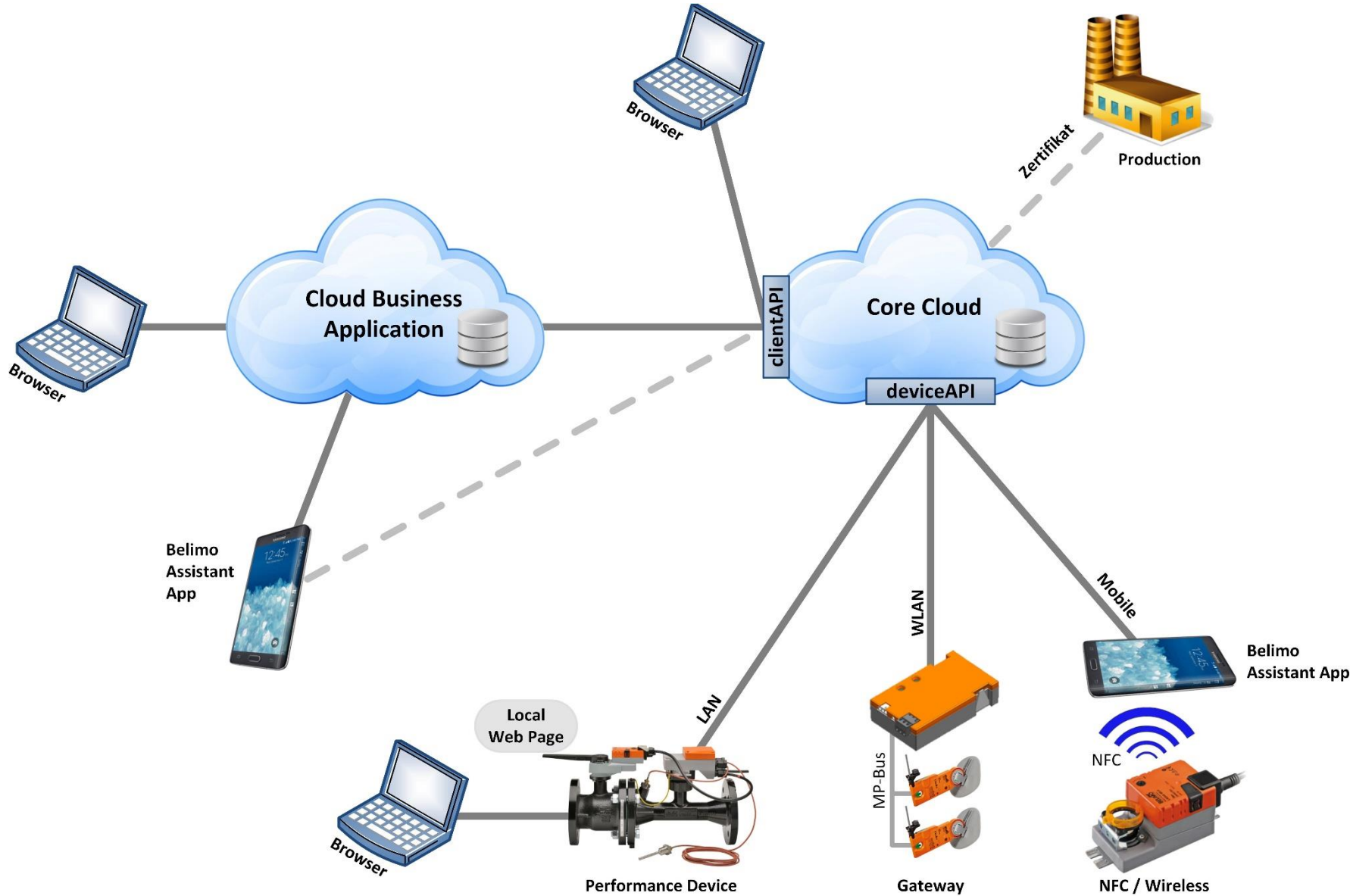
Everywhere in buildings...



smart and connected



Belimo - Cloud



Near Field Communication

Diagnostic included




Home Screen Diagnosis Self Check Data Analysis

Diagnosis Data:


Torque	0%	L
Fully cycles	19578	
Change of direction	19578	
Operating time	1100h	
Active time	12h	
Stop and Go ratio	10.2 %	
Power Supply	24V / AC	L
Number of power ups	15	
Actuator temperature	60°C	L
Temperatur T1	60°C	L
Temperatur T2	60°C	L

Self Check Data:

Power	✓
Troque	✓
Setpoint available	✓
BACnet available	✗ [i]
Cycles	✓
Valve Range	✓
Super Cap	✗ [i]


The left half of the slide features a photograph of the Chicago skyline, including prominent skyscrapers like the Willis Tower, reflected in the calm waters of a lake. The sky is a clear, bright blue.

Buildings are an integral and elementary part of the global energy system

The right half of the slide features a photograph of the same Chicago skyline, but the foreground is dominated by a vast expanse of cracked, dry earth, symbolizing water scarcity. The sky is a hazy, greyish-blue.

Buildings use about:

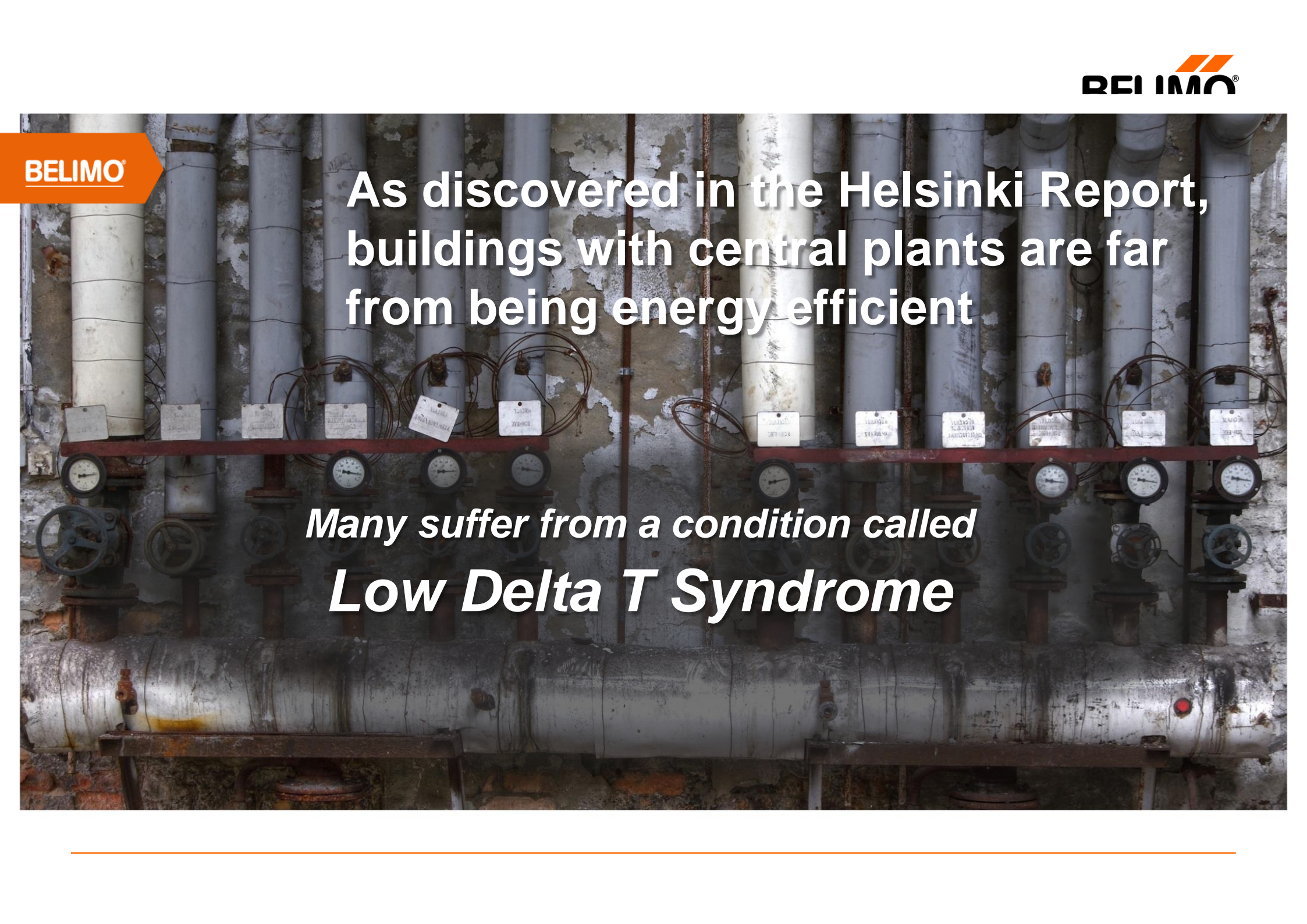
- 40% of global energy
- 25% of global water
- 40% of global resources they emit 1/3 of GHG

The logo for BELIMO, consisting of the word "BELIMO" in a white, bold, sans-serif font, set against an orange arrow-shaped background pointing to the right.A large background image showing a wooden boardwalk with railings extending from the foreground towards a large tree. The tree is split vertically: the left side is lush with green leaves, while the right side is bare and skeletal. The background is split horizontally: the top half shows a blue sky with white clouds, and the bottom half shows a vast, orange desert landscape with sand dunes under a hazy, orange sky.

For buildings to be able to realize their potential, they must first and foremost be energy efficient

According to LEED 33- 39% of a building's energy use is HVAC

Greenbuild estimates that 6% of the world's energy is used for cooling

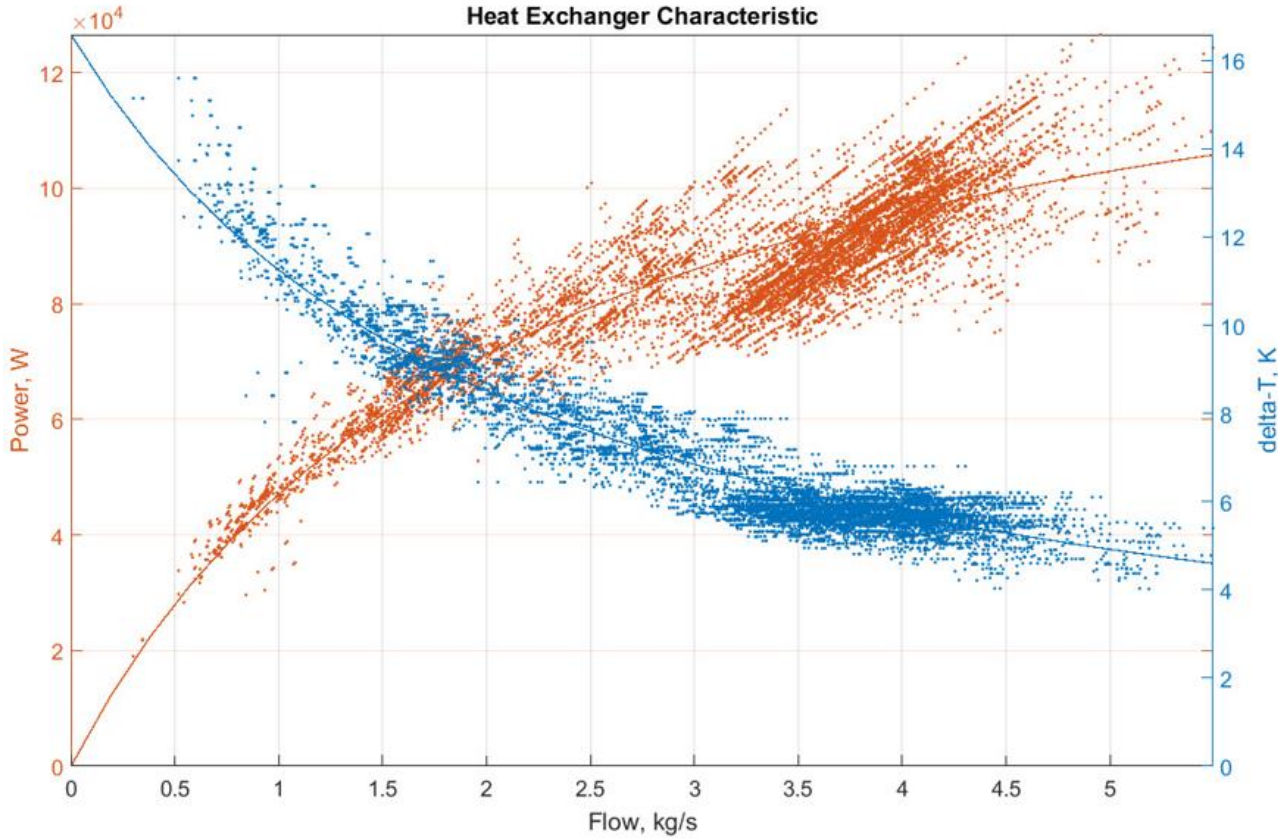
The background of the slide is a photograph of a mechanical room. It shows a series of vertical pipes, each with a pressure gauge and a valve. The pipes are arranged in a row, and the gauges are mounted on a horizontal metal bar. The room appears to be old and somewhat neglected, with some peeling paint and rust visible on the pipes and walls.

**As discovered in the Helsinki Report,
buildings with central plants are far
from being energy efficient**

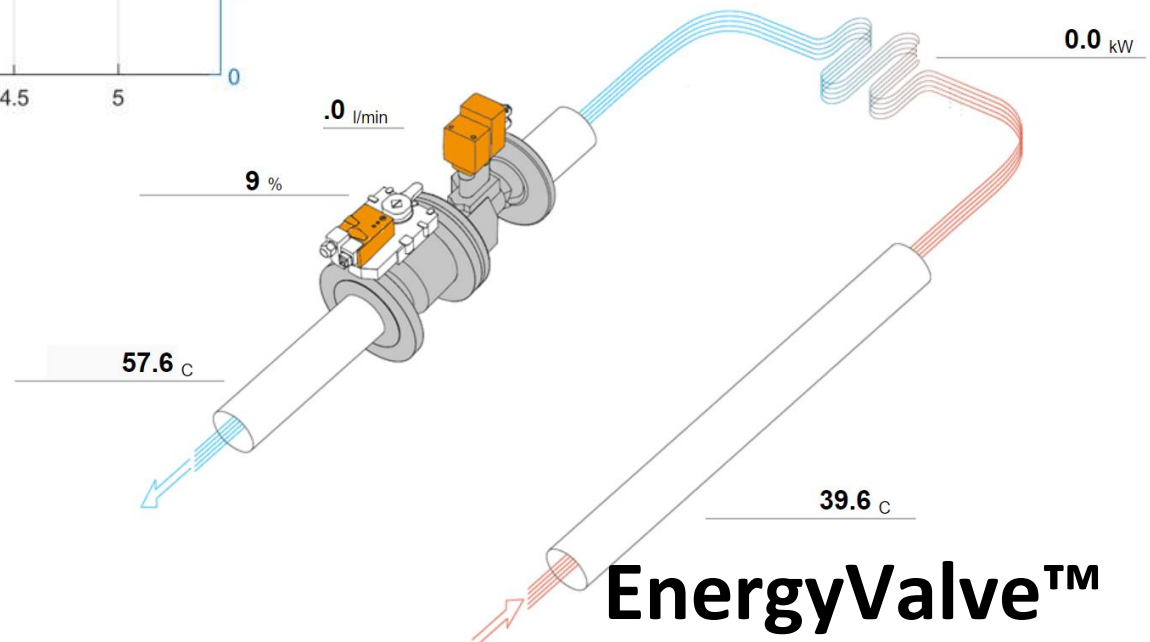
***Many suffer from a condition called
Low Delta T Syndrome***

EnergyValve™, the problem solver



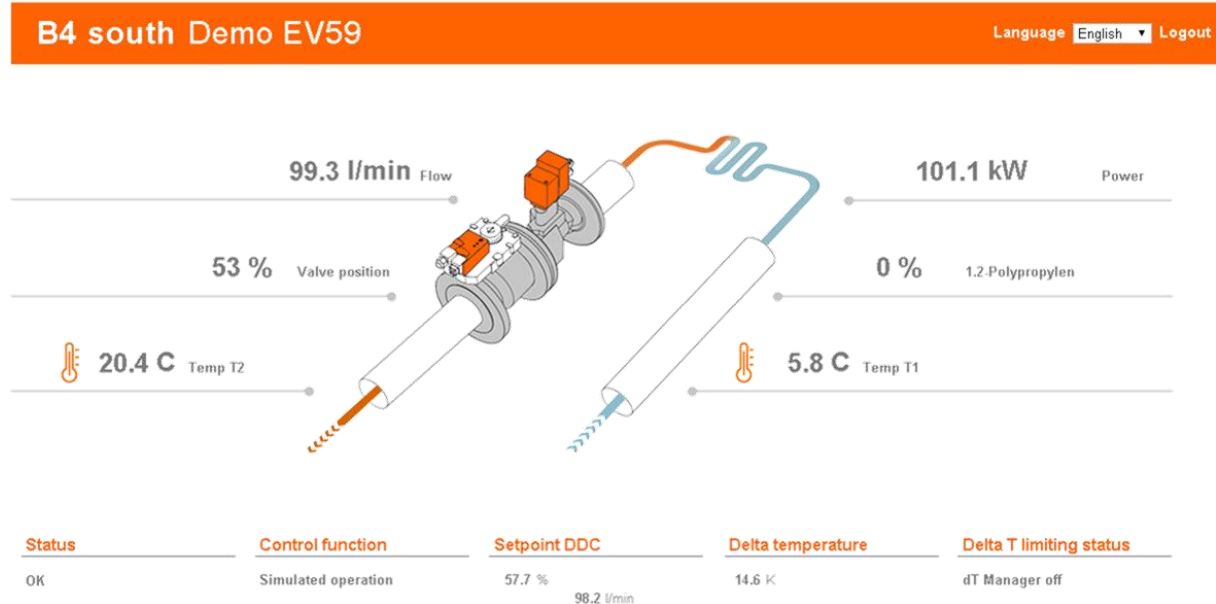
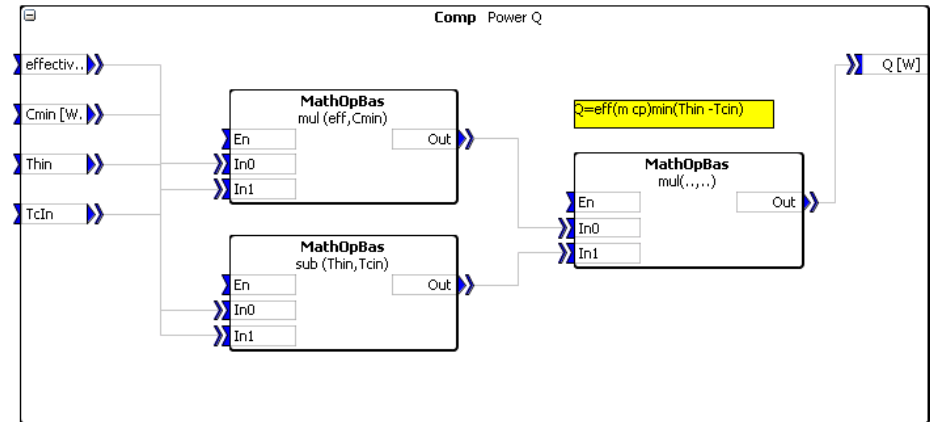


Online Data analytics to prevent energy waste



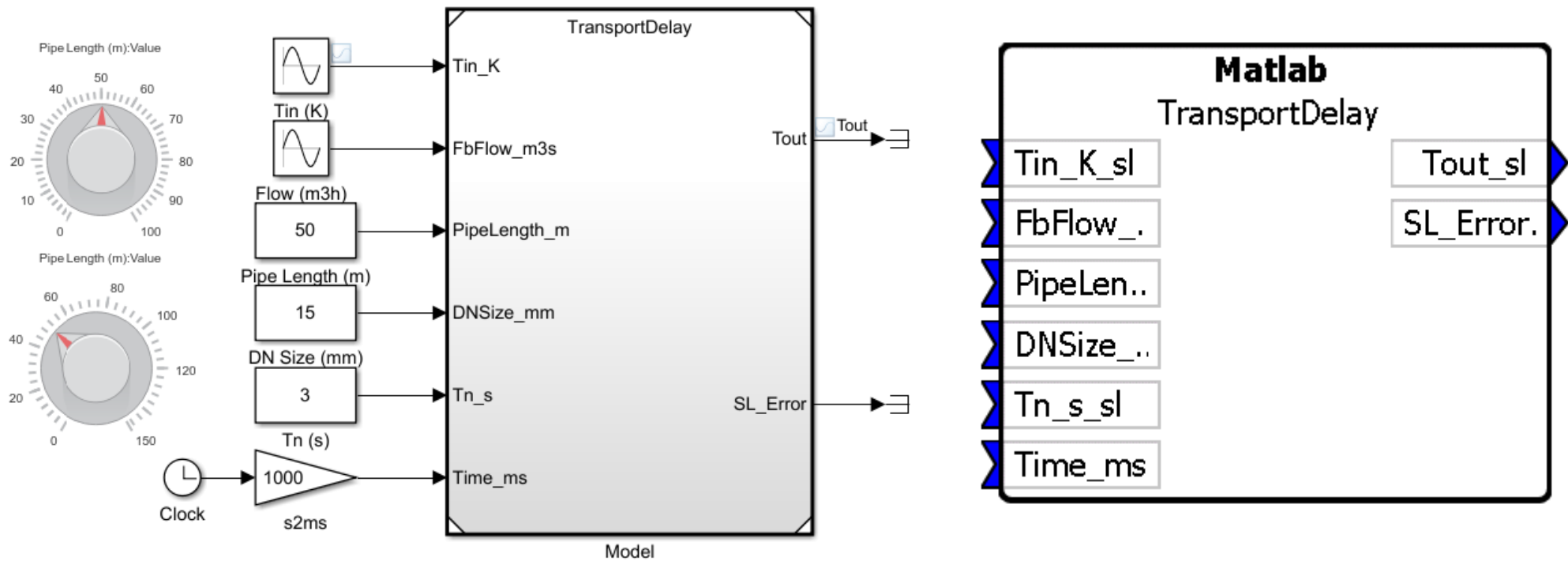
EnergyValve™

- **Strengths**
 - HVAC Control
 - Graphical Programming
 - Belimo Cloud Integration
 - Integrated Web Server
- **Limitations**
 - Real time simulation
 - Complex logic, state machines

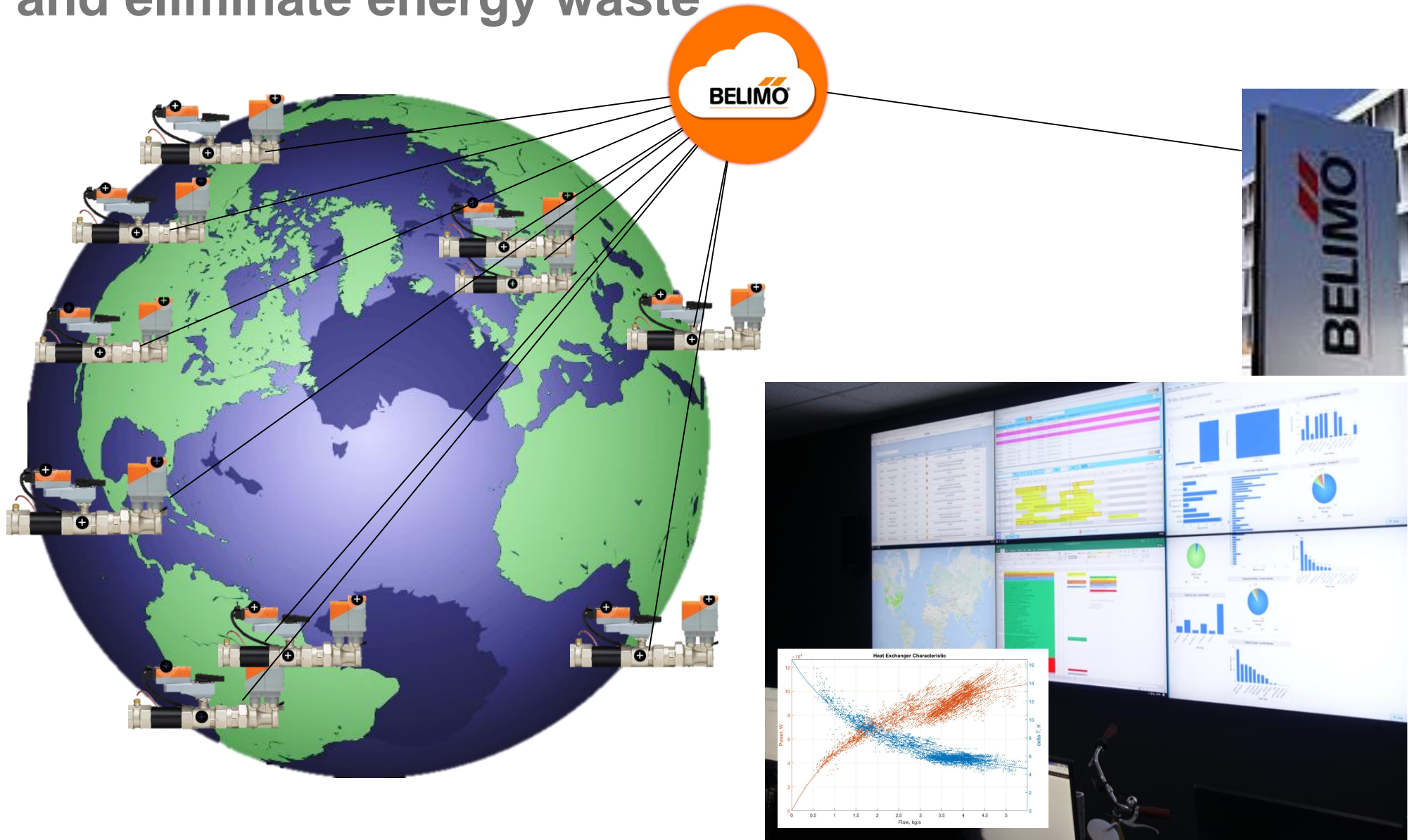




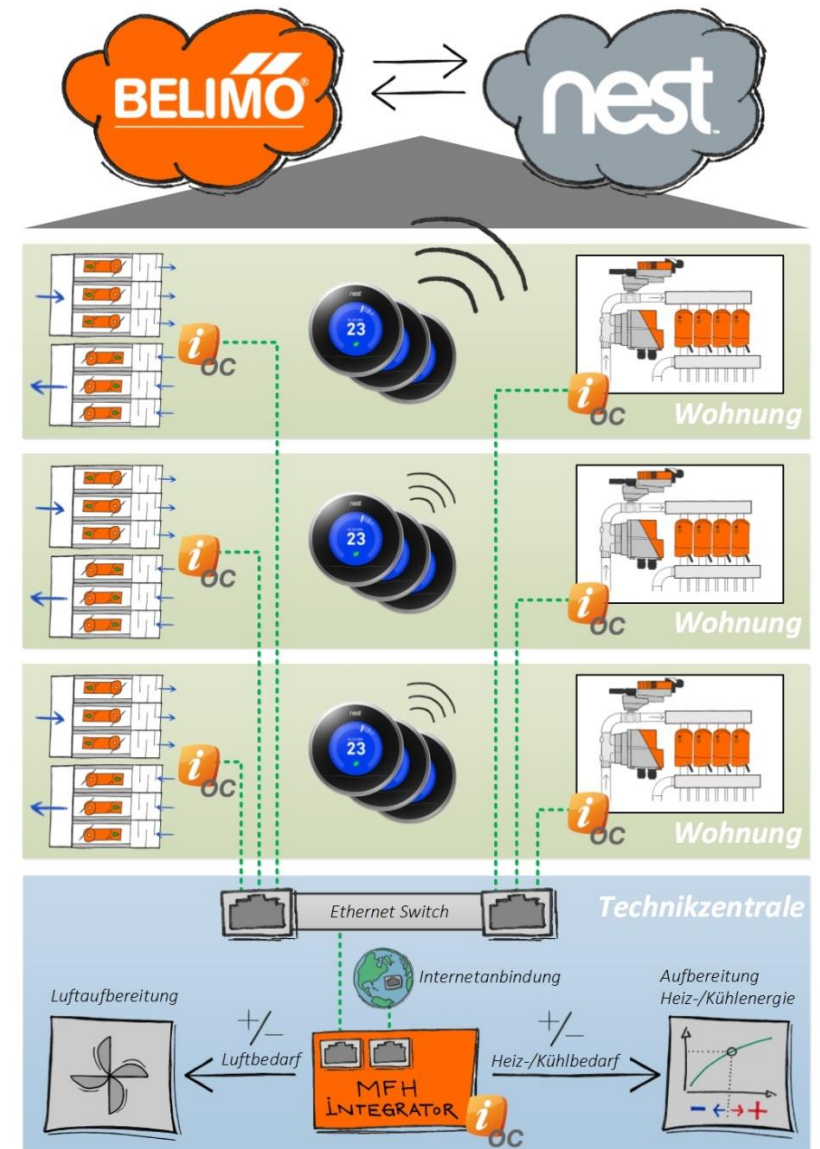
- **Simulink:** Model based design and testing, rapid development, and code generation.



INTERNET connected to optimize operation and eliminate energy waste



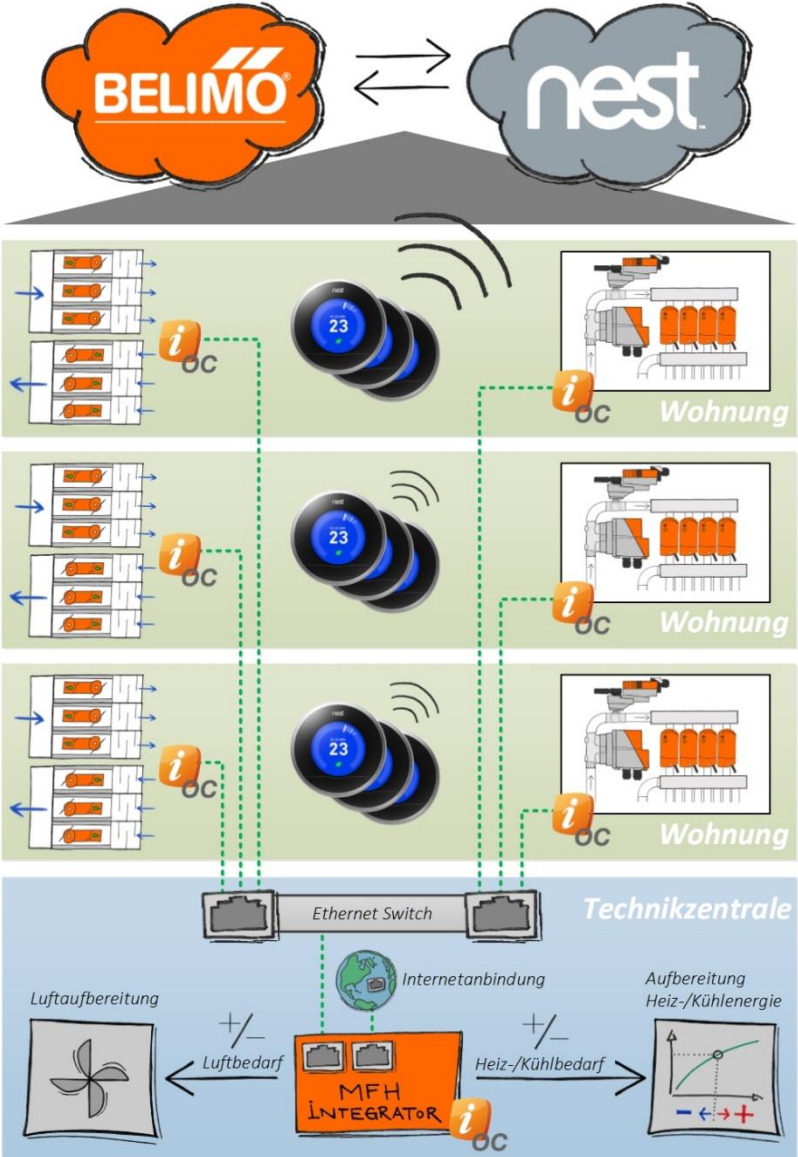
Added value studies - «Concept Cars»



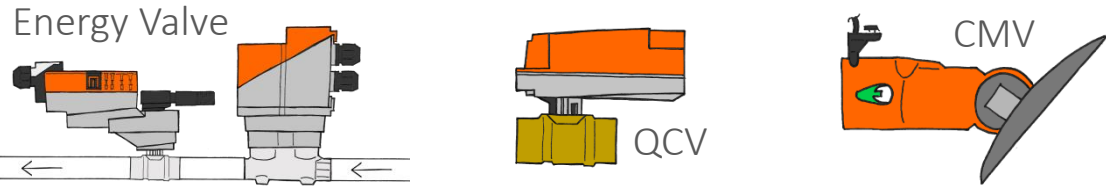
Apartmentum Hamburg



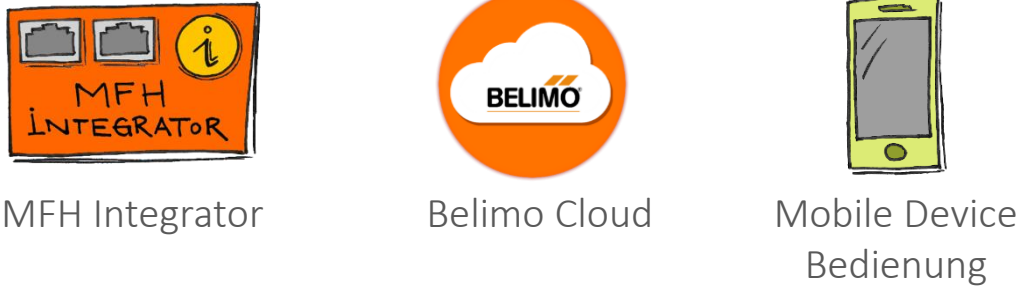
Co-evolution of products and needs



Belimo standard products



Belimo pre-series



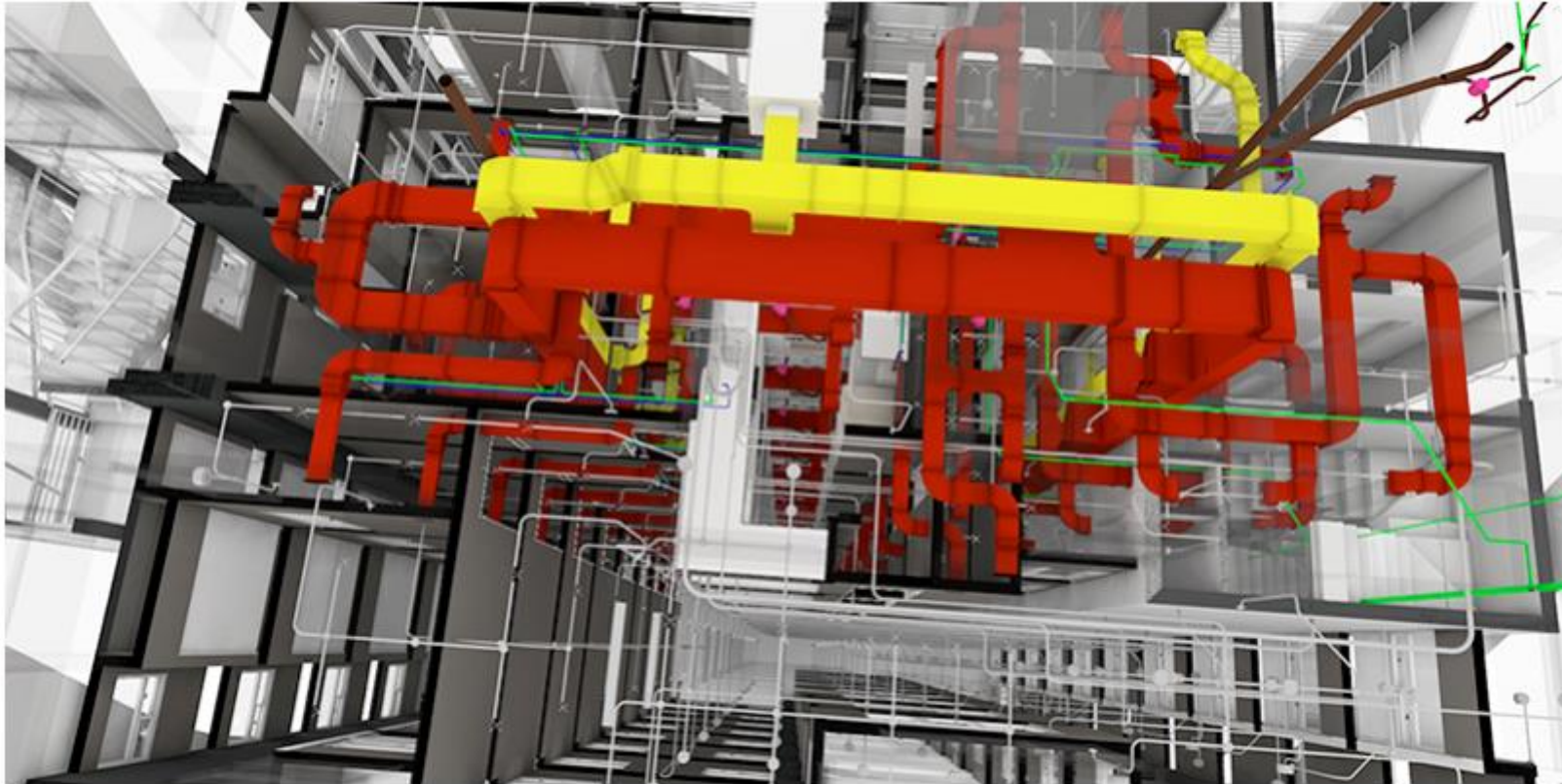
Concluding Remarks and Outlook



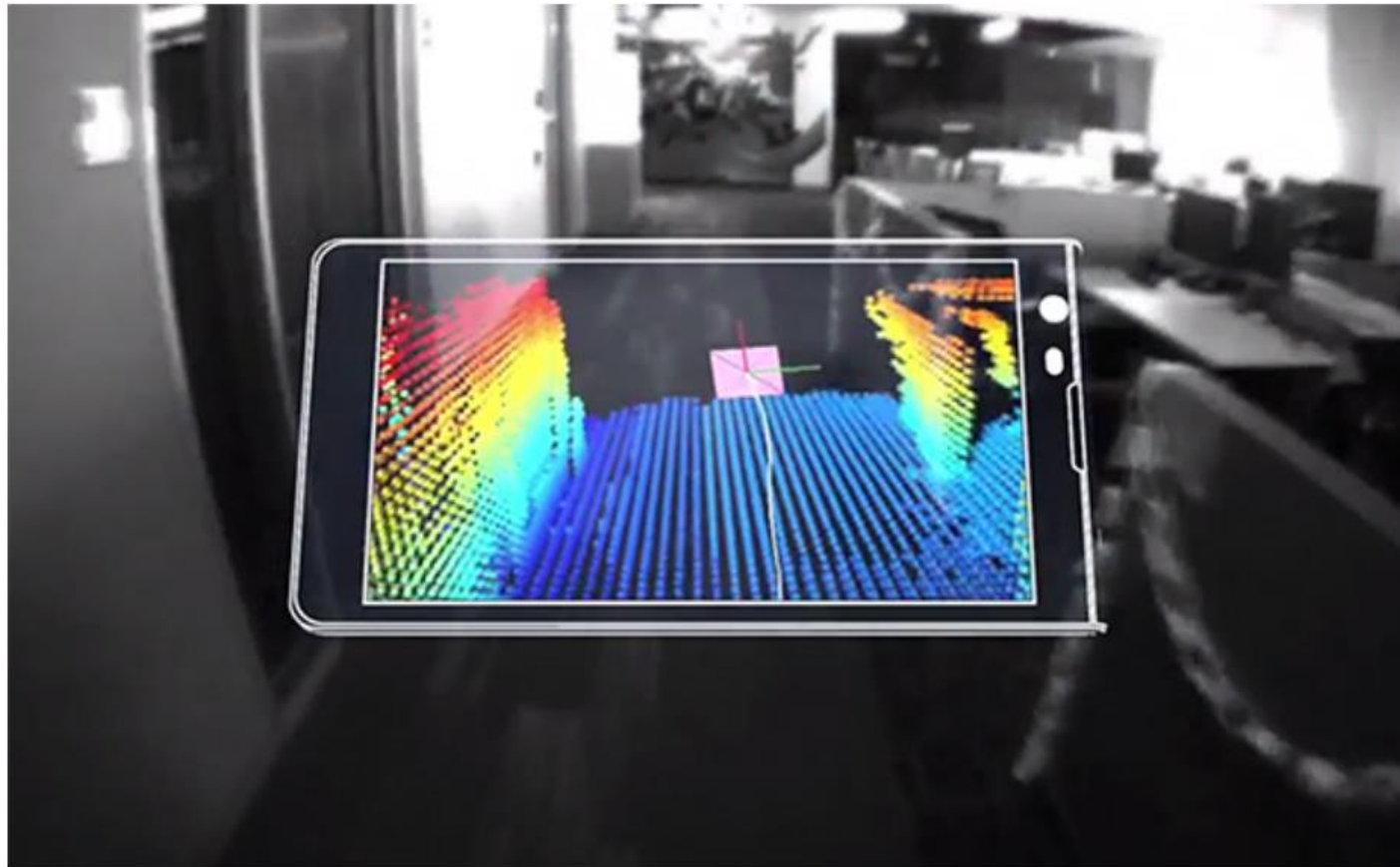
- A Vision becomes Reality: Digitalization in Building Design and Management



Digital Planing and simplified commisionning



Energy, Comfort Simulations

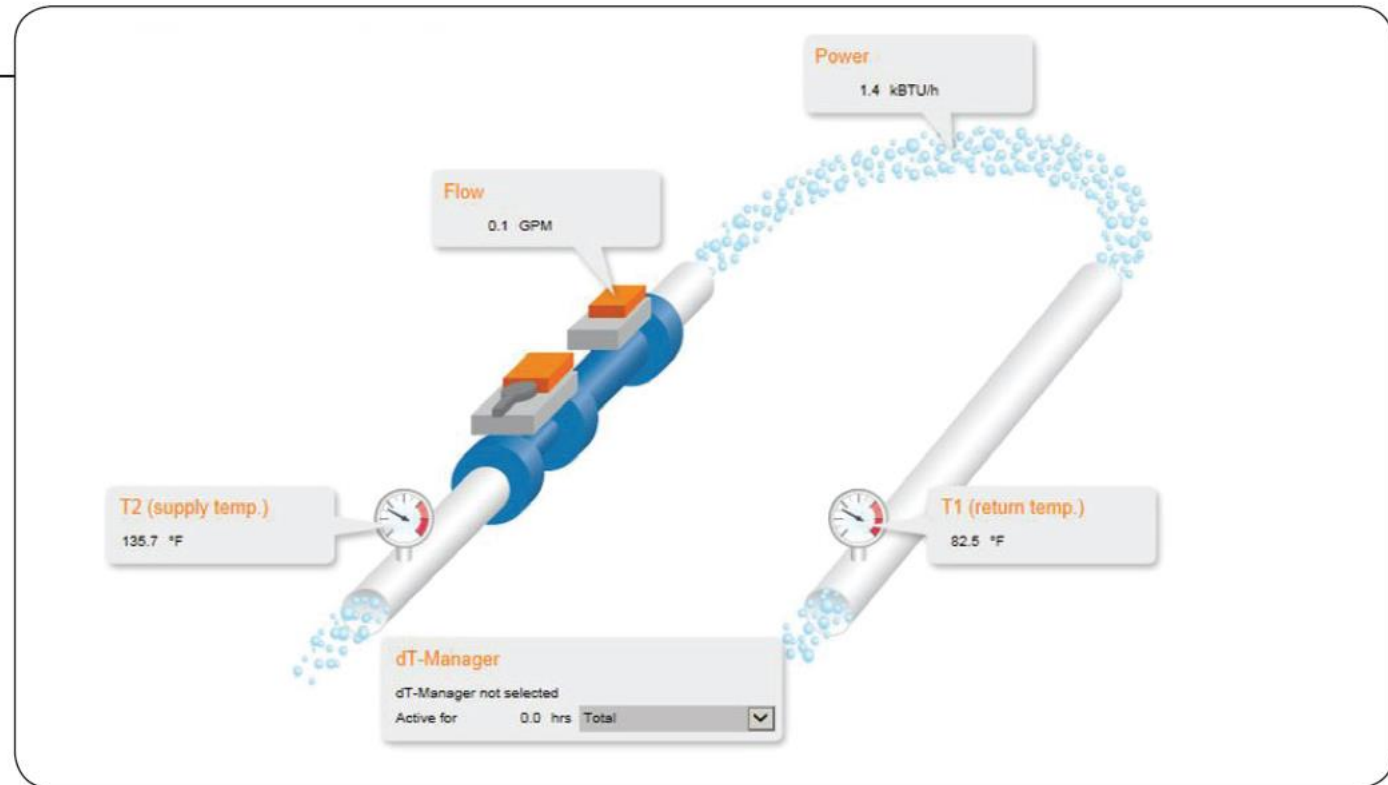


Verification I: Is everything mounted at the right place

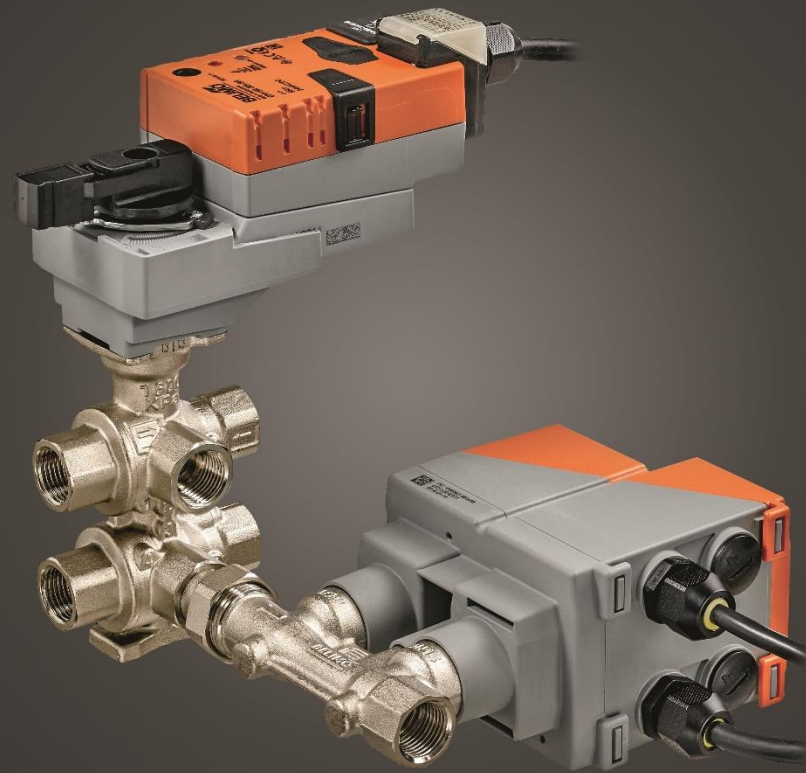
A Vision becomes Reality: Digitalization in Building Design and Management

Dashboard

Provides a dynamic view of the current flow, power and temperature values.



Validation Performance/ Continuous Improvement/Documentation:



Thank You