

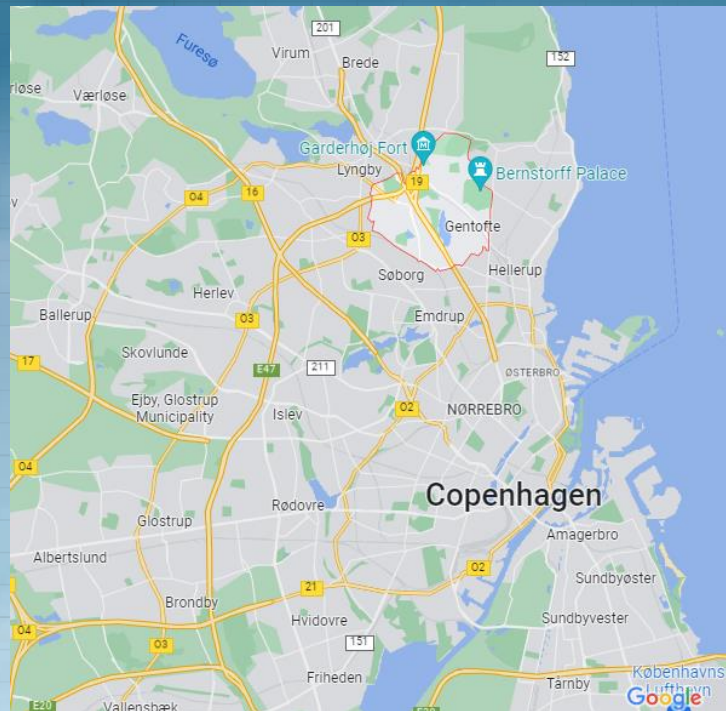
GRUNDFOS- Case Study – Gentofte, Denmark

Optimising a district heating grid using low temperature zone philosophies

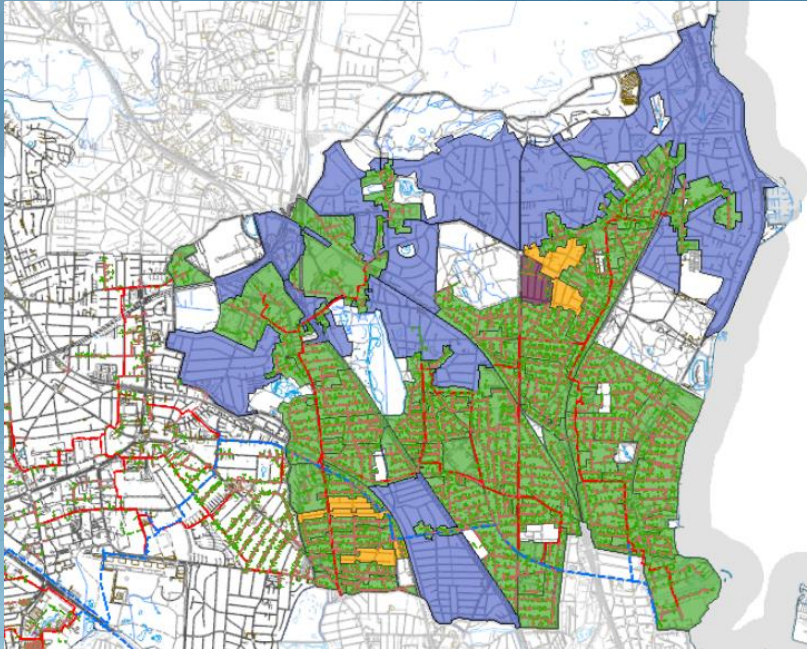
Agenda

- **The situation – Gentofte, Denmark**
- The challenges
- Value proposition- A fresh way of thinking
- The Solution
- The outcome
- Questions

Where is Gentofte- Denmark



Pre existing situation in Gentofte

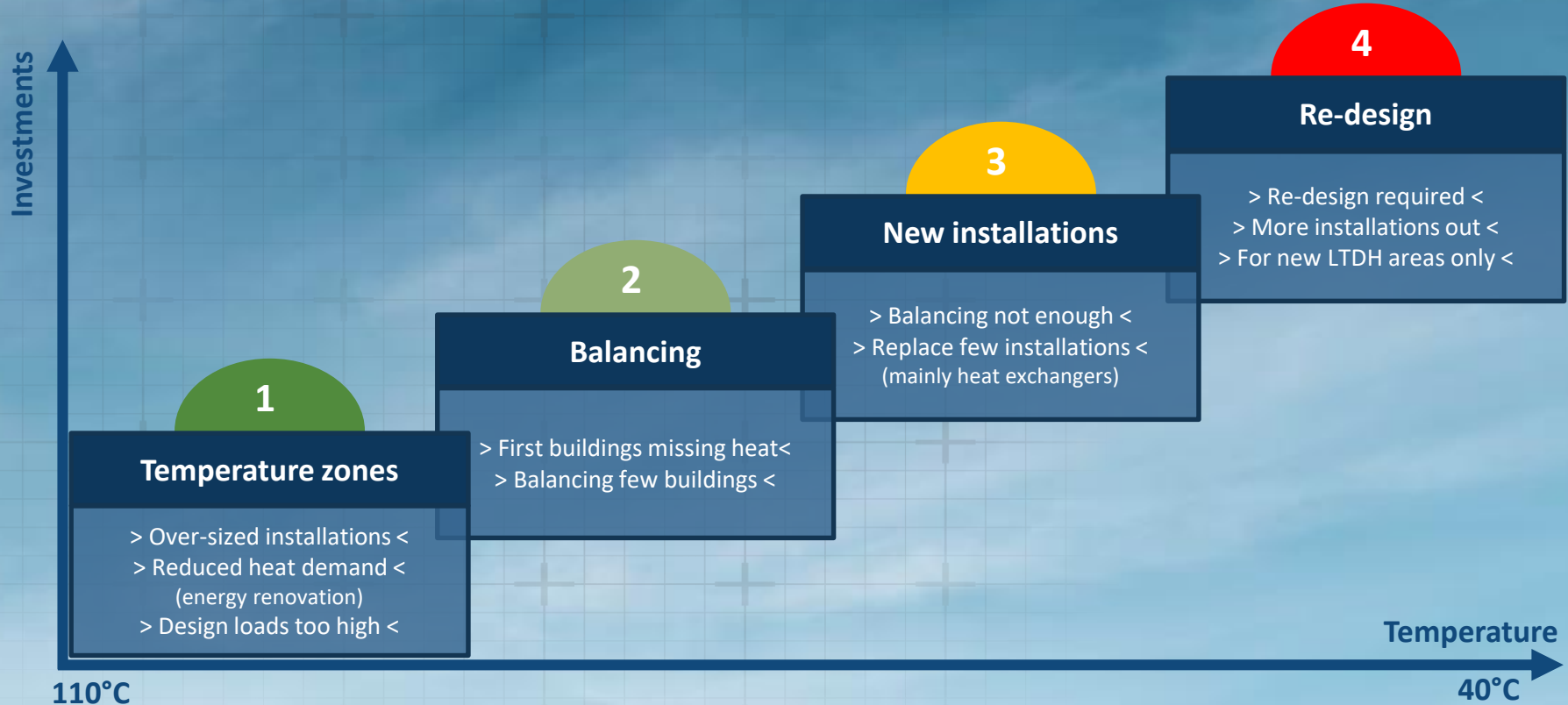


- Old network with high temperatures during winter time
- Some success on controllability from an older low temperature zone at Gentofte Hospital
- A long inefficient process to change the system to seasonal conditions

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Issue decision points for the end client – where to go

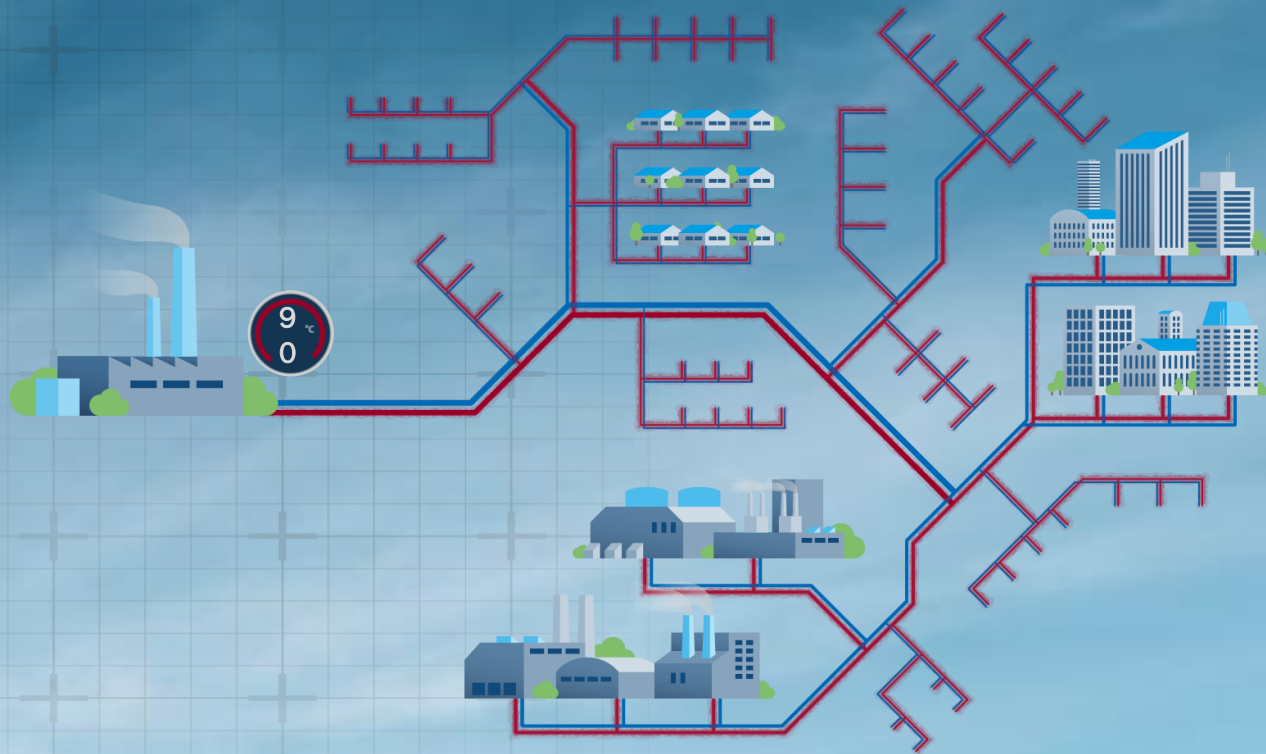


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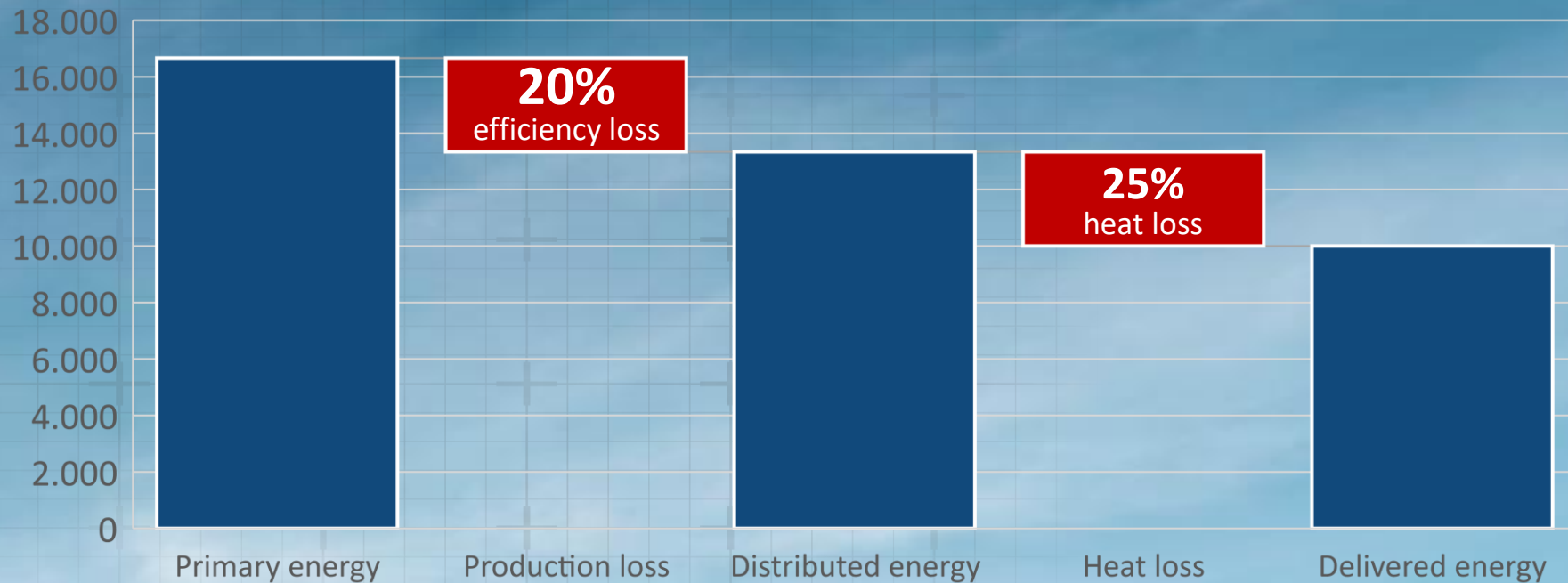
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A typical district heating network

- Supply temperature, made to serve the 'worst' customers
- High heat losses
- Main pumps delivering all flow and pressure
- Big pressure drops

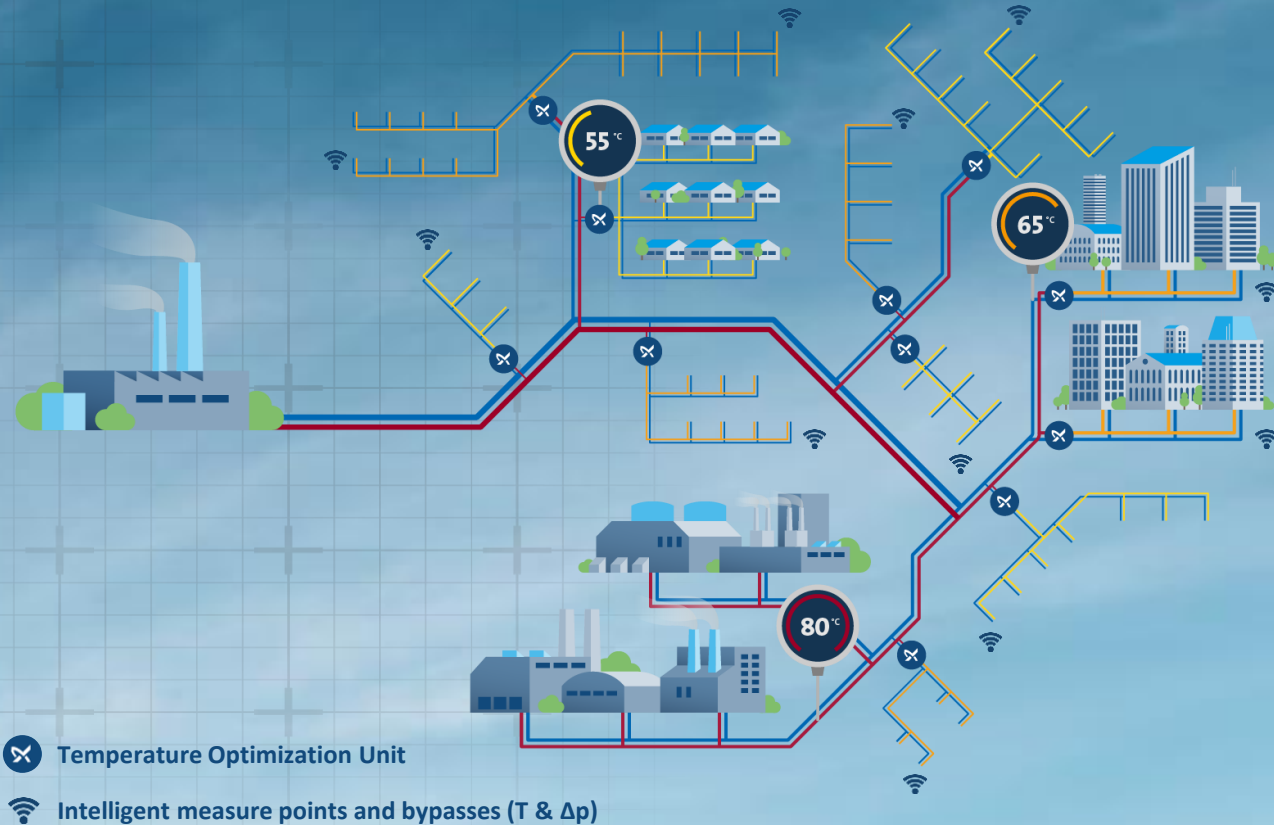


Heat losses in traditional District Heating

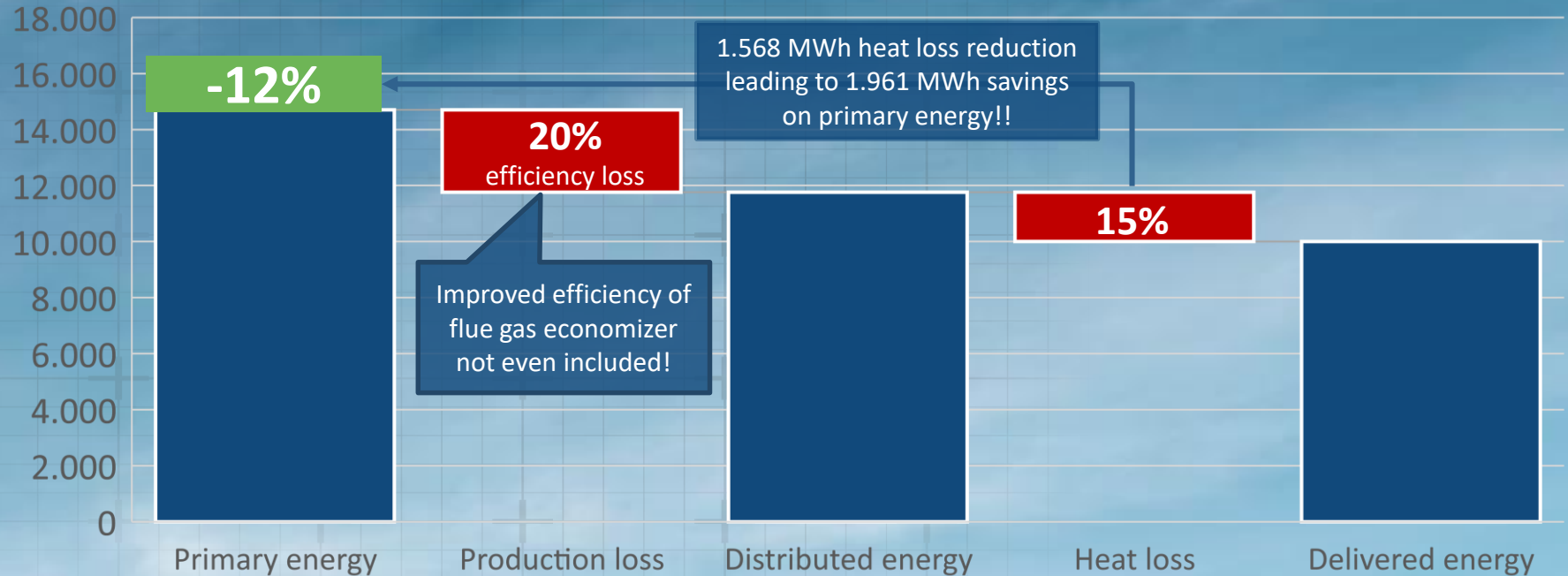


A zone-divided district heating network

- Demand driven supply
- Temperature and pressure adjusted according to consumer, reducing heat losses
- Distributed pumping, reducing pressure and energy consumption



Heat losses in Low Temperature District Heating



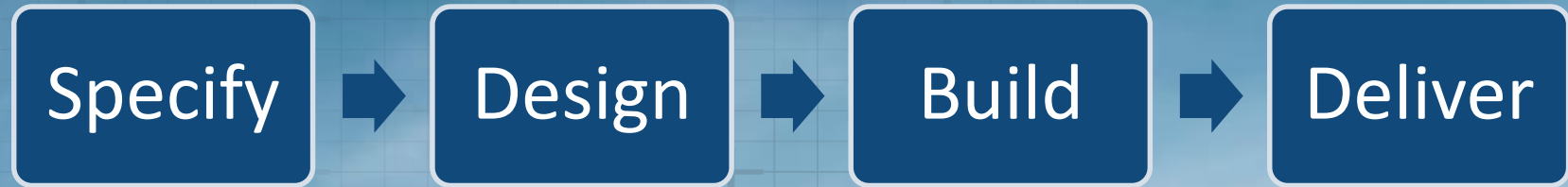
Mixing loops vs heat exchangers in low temperature zones – end to end advantages

Criteria	Temperature Zone solution	Typical heat exchanger solution
Energy/CO ₂	No heat loss → optimal energy reduction	Higher return temperature
Design, Build, Installation	Industrialized plug'n'pump solution Easy dimensioning	Typically built from scratch More complex solution
Maintenance	Very limited	Clogging in heat exchanger and valves
Intelligence	Peak shaving and optimization algorithm based on temperatures and pressures from critical points in network	Based on input from DH only
Return on investment	Very low	Medium
<i>ONLY for new areas with low pressure and low temperature pipes...</i>		
Safety	Normally closed magnetic valves	Hydraulic separation
High pressure difference	Pressure reduction valves	Hydraulic separation

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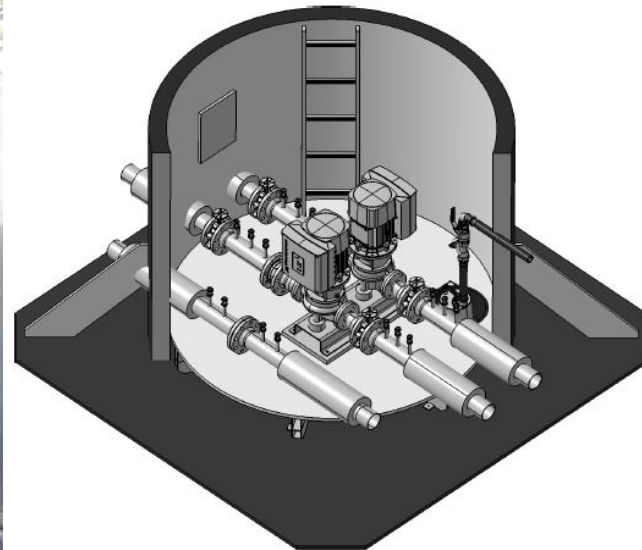
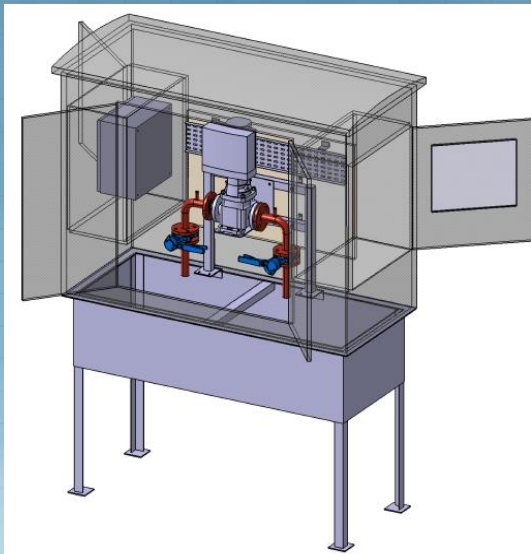
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Working in partnership with the client – End to End



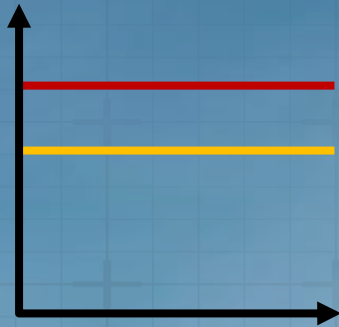
Reduced Risk (Safety, Quality, Commercial)

TEMPERATURE ZONE plug and play installations



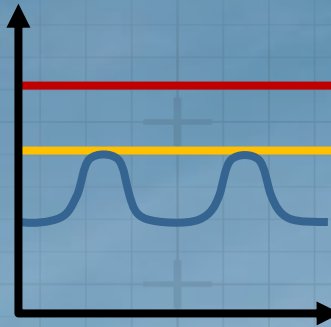
3 levels of temperature optimization across network

iGRID Temperature Zone



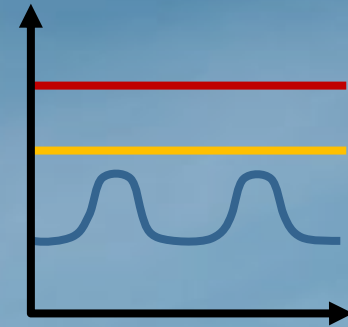
Makes it possible to **lower the temperature** for a specific zone

iGRID controller



Adjusts the standard temperature setting based on **weather compensation and peak shaving**

iGRID measure points



Further optimization based on the **actual achieved temperature** in the critical parts of the zone (wireless and real-time data)

Combining HW, SW, physical services and digital solutions

New building installations

Installation of components for increased efficiency and optimization

- Customer Coordination
- New installations
- iGRID Building Balancing

GRUNDFOS 
ENERGY-SERVICES

Temperature zones

Pre-fabricated mixing loops for lower supply temperatures

- Configuration & Consultancy
- iGRID T-ZONE
- iGRID Pit Measure Point
- iGRID Controller
- Commissioning

Physical services

Balancing of buildings for lower return temperatures

- Handling building metering data
- iGRID Energy Analysis
- Customer Coordination
- iGRID Building Balancing

- Hardware
- Service

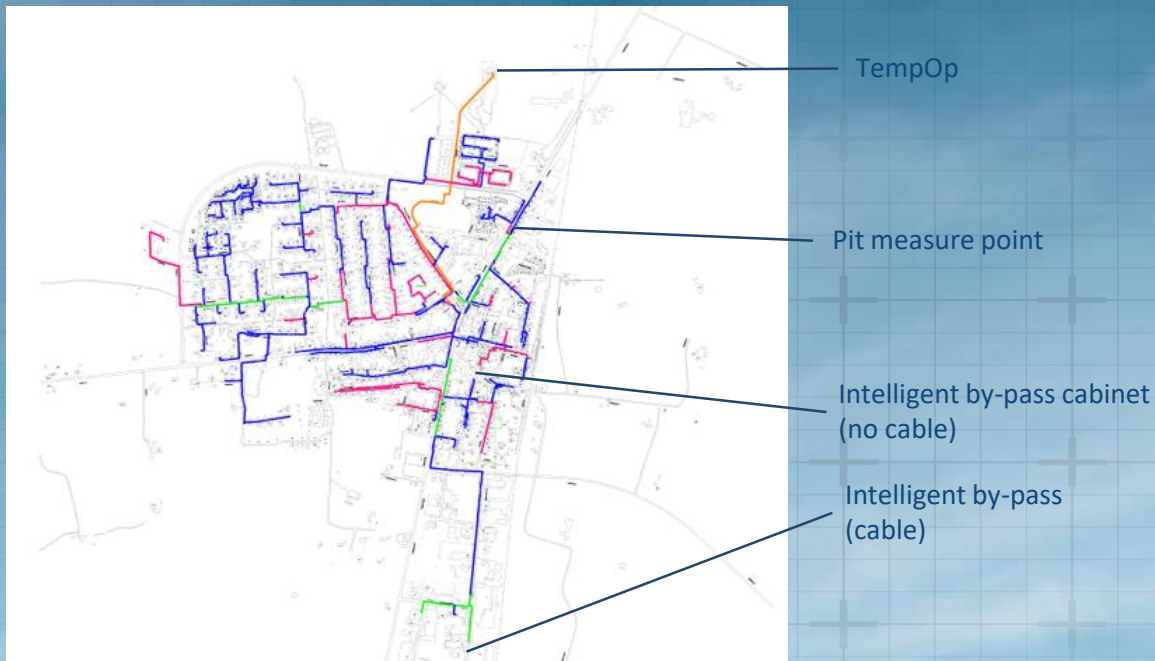
A couple of pictures from Gentofte



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CASE: Temperature optimization in Gentofte



- General reduction of front end temperature generation
- Automatic system adjustments according to morning and evening peaks
- Significant reduction of heat loss

Savings in an extension area with a low temperature zone

(highly insulated piping)

Annual customer demand:
9,000 MWh for 300 older houses

Avg. temperatures (flow/return)

Heat loss in pipes per year

Pump energy per year

Carbon emission due to heat loss

USUAL DESIGN

79°C - 48°C

—

2.570 MWh

—

0 MWh

—

195 tonnes

EXPECTED NEW TEMPERATURE

60°C - 38°C

—

1.950 MWh

—

14 MWh

—

148 tonnes



Heat loss reduction
24%

CO2 reduction
47 tonnes

Calculations are based on the calculation principles of the Danish District Heating Association CTR that is delivering energy to Gentofte with a carbon emission of only 76 g/kWh

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Thank you 😊

