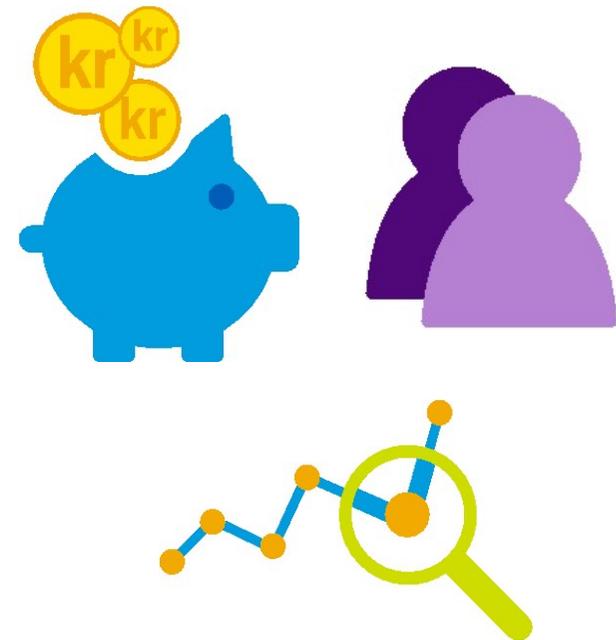


# Digitalisation & Smart Metering for more efficient district heating systems

Heat in the city  
Brussels, December 2019

Steen Schelle Jensen  
Head of Product Management  
Kamstrup A/S



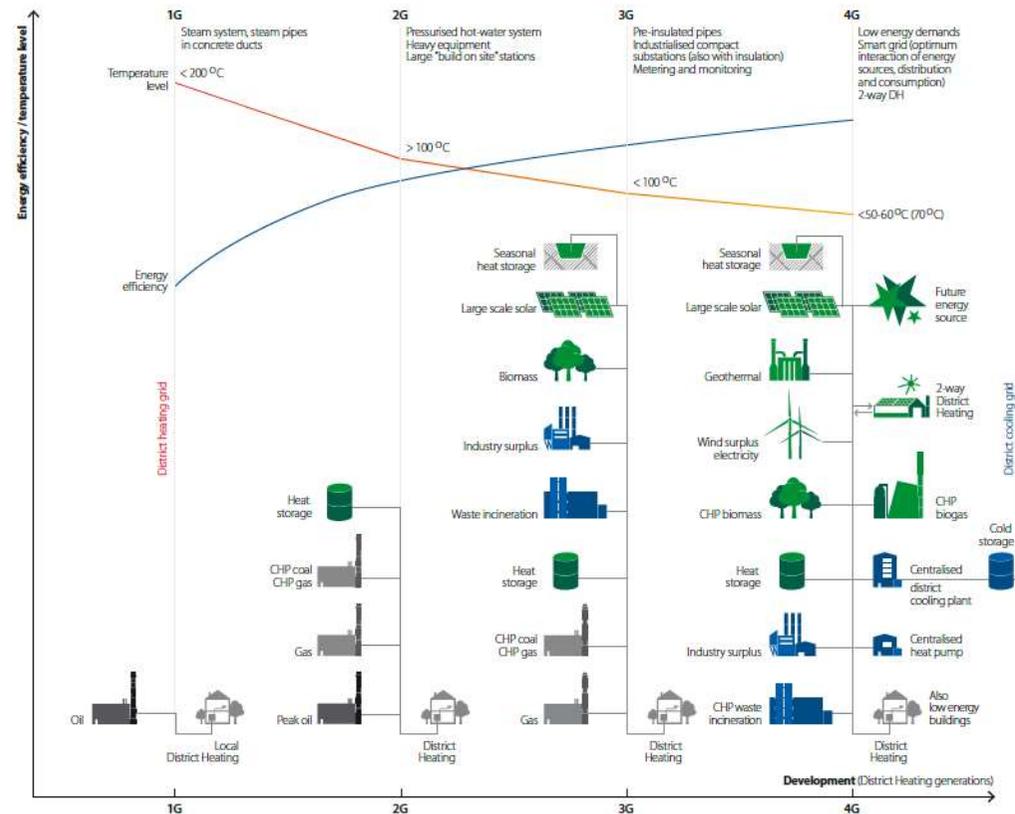
# Challenged by complexity ... the future of district energy



District heating holds the potential to decarbonise heating of buildings, which counts for 40% of the total EU energy consumption

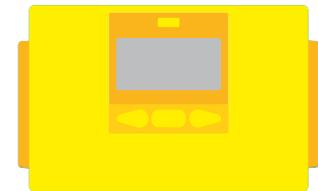
Increased energy efficiency and a fully optimised system is necessary to support the green transition of district heating

- More sustainable**
  - More renewable energy and waste heat
  - Sector coupling
- More efficient**
  - Lower temperatures, reduce losses, run closer to limits
  - Improve heat installations and take use of building flexibility
- More profitable and competitive**
  - Lower operational cost (OPEX)
  - Improved asset management (CAPEX)



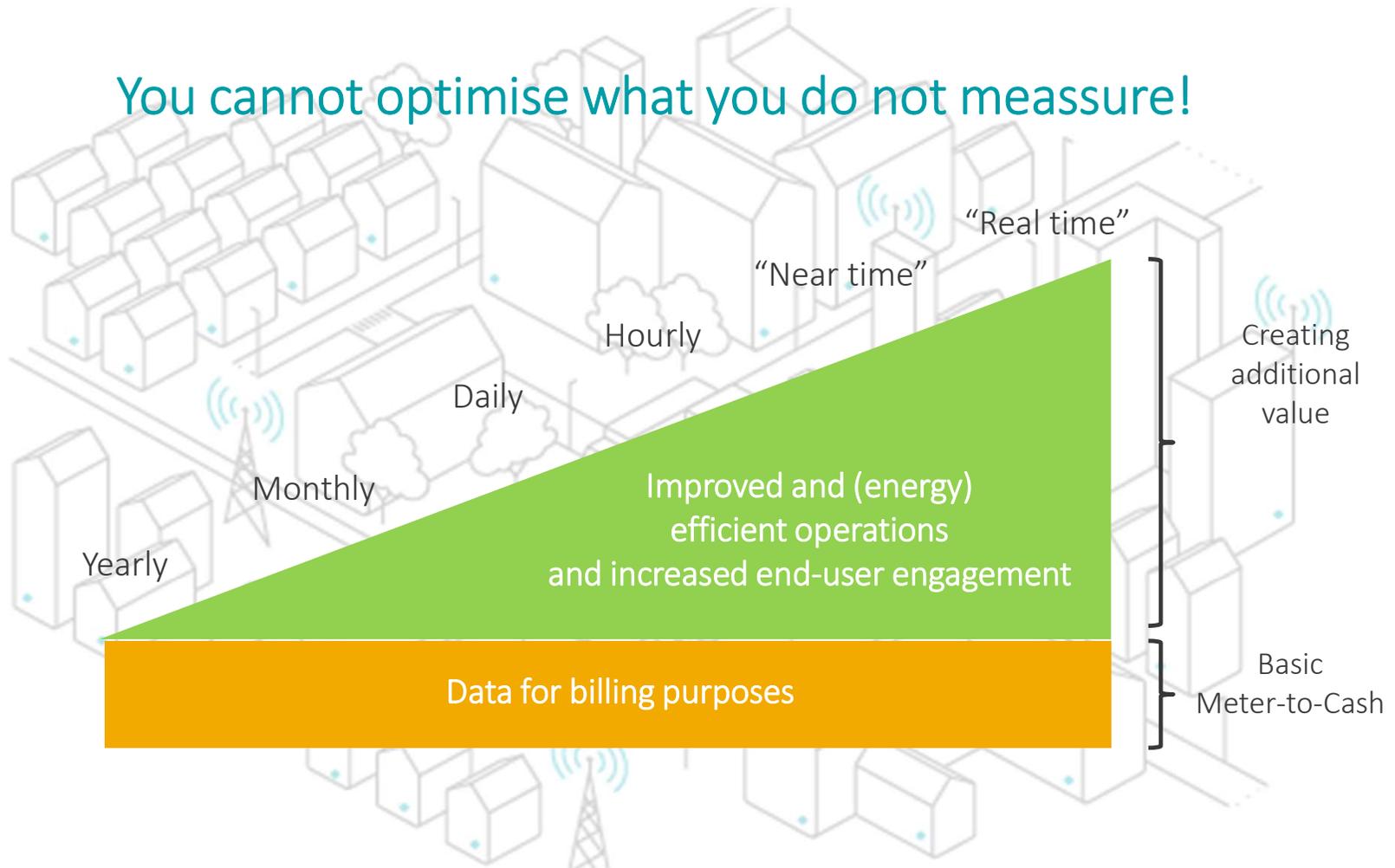
## New metering requirements in the revised Energy Efficiency Directive

- Heat meters installed after 25 October 2020 must be remotely readable
- All existing meters must be remotely readable 1 January 2027.
- Remotely readable is defined as reading the meter without physical access to the buildings
- Data must be provided to the final customer at least 12 times per year
- Same requirements goes for final customers and final users, though submetering is subject to technical feasibility and cost effectiveness
- The general criteria to determine technical non-feasibility and non-cost effectiveness shall be clearly set out. No general exceptions will be accepted



The digital (R)evolution is here

You cannot optimise what you do not measure!



# The digital value chain from Kamstrup

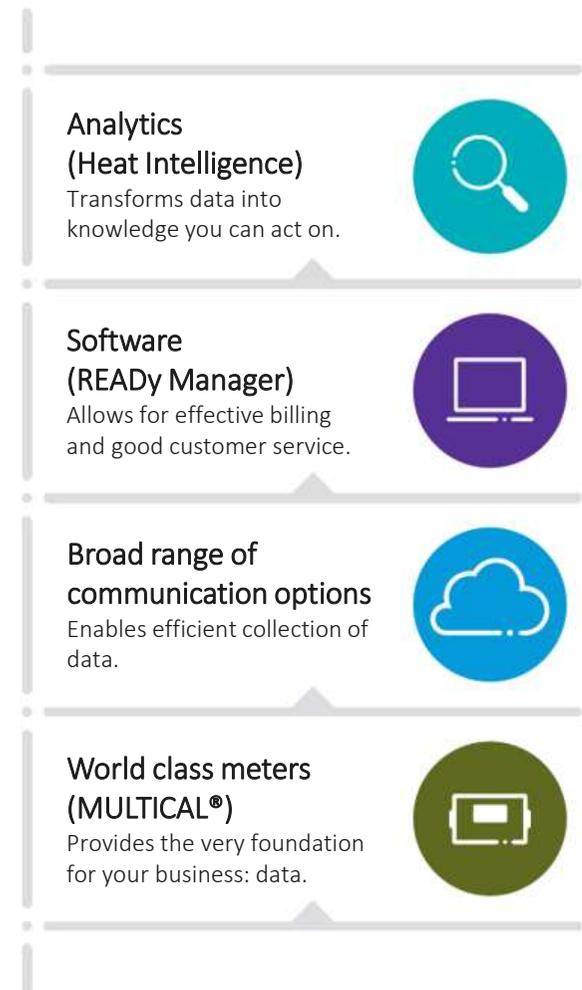
You cannot optimise what you do not measure, but...

Unlocking the true potential in data requires the right tools to turn it into knowledge you can act on

The digital value chain includes everything from the meter to the communication, software and analytics.

The higher up you are in this chain, the more value your system can create ...

- Reduced operational costs
- Targeted investments
- Improved customer service



## Digitalisation is good business

### Assens District Heating, Denmark (100.000 MWh)

“Based on the continuous digitalization of our operations, we have actually been able to lower the forward temperature by 6-8 degrees”

“We have been able to remove more than 100 bypasses around the network”

“By optimizing our network operations we have, over the last few years, saved 2,500-3,000 MWh – that’s approx. 2.5% – and reduced pipeline losses by 12%”



The utility has managed to lower the temperature in the network by 6-8 degrees



The network consists of approximately 3300 metering points



The utility has reduced its annual heat production by 2.5%



As a result of the optimizations the utility has realized savings in equivalence of € 33 per household

Sensors and data are already there ... but how can we put data into play?



## Smart meters fuels the digitalisation

Temperature and flow sensors in every connected building

Provide valuable data that can tell something about:

- end-user behaviour
- heat installations
- buildings
- distribution network
- ...

Meter readings  
65300224 - Nørregade  
From: 13/09/2015 To: 23/09/2015  
Visualization Readings Logger data  
Values: Pressure Show info codes Max. pressure 4.80 bar Min. pressure 4.40 bar

22 Sep 2015 05:19  
4.66 bar  
4.64 bar

ep 2015

READY Manager 1.3

Reading time	Address	Serial number	Info code	Info code (historical)
21/07/2021 04:00	Planvej 13, 2800	18036480	▲ Specify meter type to see info code(s)	
21/07/2021 03:00	Fordøjvej 758	18048510	▲ Leak; Reverse	Burst has been recorded for 1 - 8 hours within the last 30 days; Leak h...
21/07/2021 02:00	Kyngårdsvej 4508	18048528	▲ Leak; Dry	Leak has been recorded for 9 - 24 hours within the last 30 days; Rever...
21/07/2021 01:00	Færevang 1819	18013305	▲ Specify meter type to see info code(s)	
21/07/2021 00:00	Fordøjvej 6828	18054514	▲ Specify meter type to see info code(s)	
20/07/2021 23:00	Fordøjvej 3833	18024617		Leak has been recorded for 9 - 24 hours within the last 30 days; Rever...
20/07/2021 21:00	Høvedmølerevej 10961	18023802	▲ Leak; Reverse	Leak has been recorded for more than 21 days within the last 30 days;...
20/07/2021 20:00	Guldbjergvej 463	18021311	▲ Supply voltage has been interrupted; Temperature sensor T2 outsid...	
20/07/2021 19:00	Sjællandsgade 1127	18021573	▲ Reverse; Dry	Burst has been recorded for 1 - 8 hours within the last 30 days; Rever...
20/07/2021 18:00	Vedhøjvej 9425	18039863	▲ Burst; Reverse	Leak has been recorded for 9 - 24 hours within the last 30 days; Rever...
20/07/2021 17:00	Fordøjvej 8132	18023811	▲ Burst; Leak	Leak has been recorded for 7 - 14 days within the last 30 days; Rever...

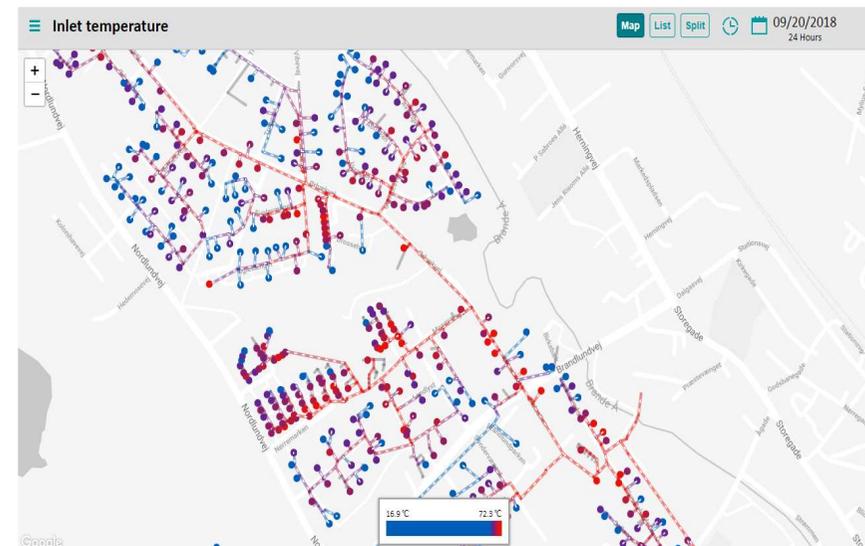
# Kamstrup Heat Intelligence – creating SCADA for district heating distribution

- **Heat Intelligence** - one of the first commercial products with the field of advanced analytics for district heating systems
- Cloud based platform
- Full Data-driven model of what goes on in the distribution network – without the need for additional sensors
- Combines meter data with a digital GIS model of the pipe network
- Creates a digital twin showing temperatures and flows throughout the system (and soon also pressure)
- Can handle complex network structures with multiple heat sources, ring connections, zones, mixing loops ...

**How Kamstrup can fulfil our dreams!**  
**Prof. Sven Werner, Sweden**

“Supervisory control and data acquisition (SCADA) systems have so far been absent for heat distribution networks.

When Kamstrup is now offering to provide future SCADA systems for heat distribution based on all heat measurements in substations, many old dreams can come true in district heating systems”



# Heat Intelligence Example – building level

**kamstrup** Heat Intelligence

**TEMPERATURE**

- Temperature deviation
- Supply temperature: 15.5 °C to 71.2 °C
- Return temperature

**FLOW**

- Volume flow rate
- Flow velocity

**VIEW OPTIONS**

- Include meters without temperature values

**Supply temperature** | **Map** | **List** | **Split** | 16/06/2019 24 hours

**SKOLESTIEN 15 1. 1**  
7330 Brande

Supply temperature: 69.7 °C +0.3 °C  
Return temperature: 35.2 °C  
[More consumer information](#)

Supply temperature: 15.5 °C to 71.2 °C

**SKOLESTIEN 15 1. 1**  
7330 Brande

Date  
Volume  
Supply temperature  
Return temperature

Jun 2019

DATA PERIOD (394 days)  
Start date: 5/17/2018

[See details](#)

# Digitalised District Heating



Digitalisation creates transparency and reduces losses

Because you cannot optimise what you do not measure



Data could have located the leak



### Search for leakages with Heat Intelligence

In the area around the leakage, the temperature pattern changes significantly

In this case, the consumers downstream from the leakage are marked blue due to temperatures lower than expected

Based on data from Heat Intelligence, the first dig would have been done between the blue consumers (with deviations) and the consumers without deviations

The concrete repair of the broken pipe demonstrated that instead of digging 4 places before finding the leakage, 1 dig would have been enough as the leakage was found exactly where Heat Intelligence indicated it should be!

# Heat Intelligence Example – high return temperatures

Heat Intelligence

Steen Schelle Jensen

TEMPERATURE

- Temperature deviation
- Supply temperature
- Return temperature

90.4 °C  
79 °C

FLOW

- Volume flow rate
- Flow velocity

VIEW OPTIONS

Include meters without temperature values

### Return temperature

Map List Split

17/10/2019  
24 hours

Supply temperature 92.7 °C +4.4 °C

Return temperature 87 °C

More consumer information

Return temperature 3.6 °C 90.4 °C

Oct 2019

SUMMARY (30 days)

Start date	9/18/2019
Energy delivered	24.681 MWh
Volume delivered	4,957 m <sup>3</sup>
Avg. supply temp.	91.7 °C
Avg. return temp.	87.3 °C

## “Intelligent district heating”

... a joint development initiative that challenges technology providers

**kamstrup**

It is estimated that 50% of all heat installations in buildings perform inefficiently – both in old and new buildings

Heat installations are increasingly complex, and the process of troubleshooting is difficult

Building owners and facility managers often focus on fixing the problem at hand – not on long-term performance optimization

There is a competence gap among professionals working with heat installations

  
**15** mill.  
EUR per year  
savings

  
**5%**  
reduction in total  
heat demand



Think digital to be  
able to scale!

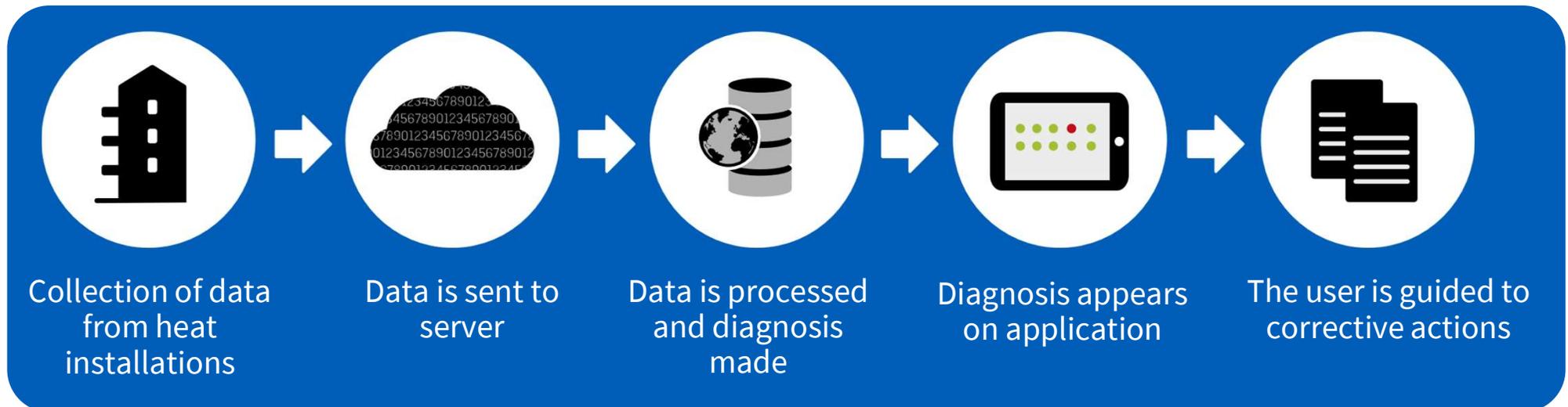


**kamstrup**

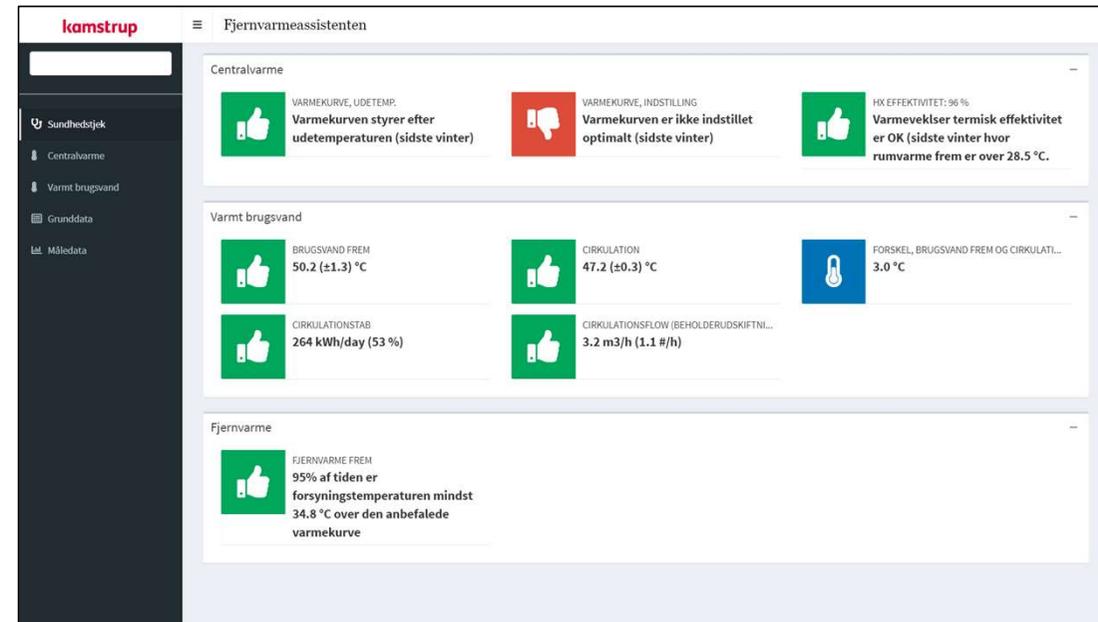
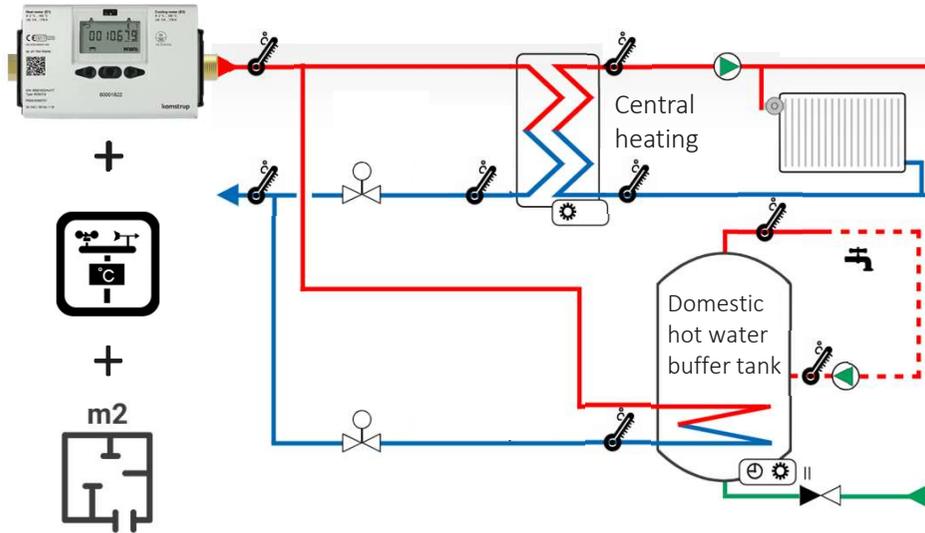
## “Heat Assistant” prototype for heat installation performance monitoring

The “Heat Assistant” prototype – a fully data-driven decision support tool removes the barriers and makes troubleshooting easy and understandable

Yes! – data-driven troubleshooting can be done. 77% of the analyzed heat installations can be optimized



# "Heat Assistant" prototype for heat installation performance monitoring



# Think forward!

Steen Schelle Jensen  
Head of Product Management  
[ssj@kamstrup.com](mailto:ssj@kamstrup.com)



# GDPR and the rights to use data for optimisation

### Do we need end-user consent to collect data?

Because smart meter data is personal data, processing it raises the question of the need for individual customer consent ...

... especially when meters are read more frequently than required for billing purposes and consumer information, e.g. on hourly basis

Knowing that end-user consent is an administrative burden

Knowing that lack of consent will have a negative effect on the data-based optimisation – not just for a specific building but also for the planning and distribution



## The Danish interpretation of Article 6 of the GDPR

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The Danish Energy Agency and Department of Justice has looked into whether legal basis for processing smart meter data can be found in Article 6 of the GDPR: **Lawfulness of processing**

They state that **processing of personal data is lawful to the extent** that:

(e) processing is necessary for the performance of a task carried out in the **public interest** or in the exercise of official authority vested in the controller;

(f) processing is necessary for the purposes of the **legitimate interests** pursued by the controller or by a third party (...)

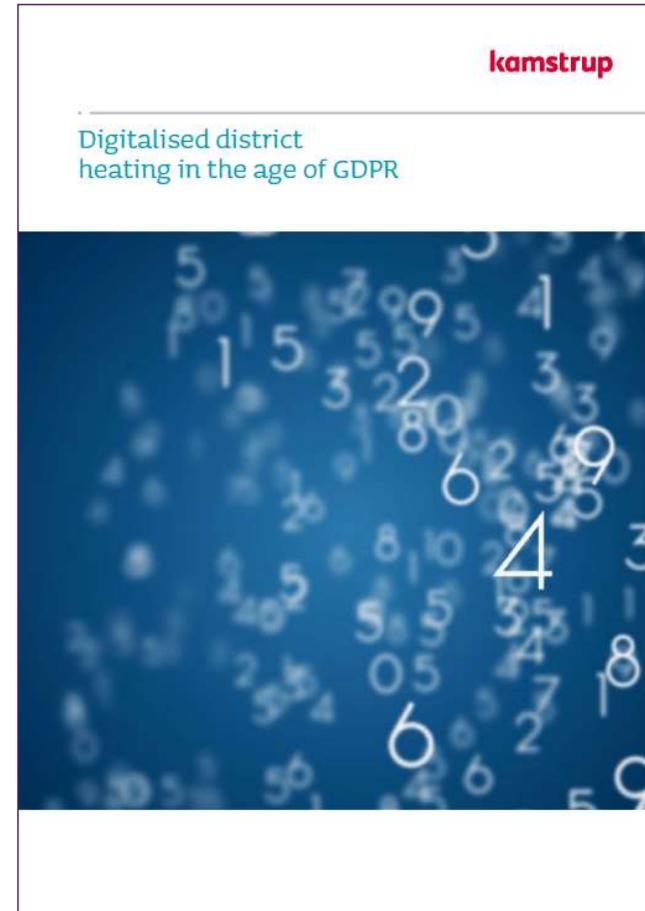


## The Danish interpretation of Article 6 of the GDPR

In conclusion, the official Danish position states that frequent data collection from heat meters **can be done without customer consent** ..

... as long as the energy supplier uses that data either in the interest of the public to save energy and **minimise energy losses**, or for the legitimate purpose of **improving the energy efficiency** of its operations

... may only take place if providers of smart metering solutions also **comply with the fundamental principles set out in Article 5** on processing of personal data.



## DHC+ Digital Roadmap – insights on how digitalisation impacts the industry

The Digital Roadmap provides a comprehensive overview and nuanced insight into digitalisation

### Describing digitalisation on six different levels:

- Production
- Distribution
- Building
- Consumption / end-users
- Design and planning
- Sector coupling

Describing state-of-art, objectives, recommendations and barriers with digitalisation

Downloadable at the DHC+ Knowledge Hub:

<https://www.euroheat.org/knowledge-hub/>

