Introducing SCADA for district heating distribution

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Steen Schelle Jensen
Head of Product Management
Kamstrup A/S
The digital (R)evolution

You cannot optimise what you do not measure!

Improved and efficient utility operations and increased end-user engagement

Data for billing purposes

Basic Meter-to-Cash

Creating additional value

"Near time"

"Real time"

Monthly

Hourly

Daily

Yearly
Indisputable potential

Study in Denmark demonstrating the value of the potential in digitalised district heating.

Savings will come from using data-based transparency to reduce losses, increase operational efficiency as well as streamline the heavy investments in this area.

In total, this amounted to an efficiency potential of 11 to 30 times the cost of going from basic meter reading to frequent and intelligent meter reading.

The total savings potential from digitalisation in the Danish utility sector is estimated at between 360 million and 1.3 billion euros.

Additional cost of EUR 8 per year per connected customer.
Digitalisation creates transparency and reduces losses

Because you cannot optimise what you do not measure
Smart metering for heating and cooling

Smart meters are fuelling the digitalisation

Temperature and flow sensors in every connected building

Provide valuable data that can tell something about both the building, end-user behaviour and the distribution network

No need for additional sensors in the distribution network
Creating SCADA for District Heating distribution

“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”
Creating virtual meters throughout the distribution network

New data-driven model of the distribution network

Combines meter data with a digital GIS model of the pipe network.

Data-driven model of what goes on in the distribution network – without the need for additional sensors.

Going from a theoretic, hydraulic model to one that is fully driven by data presents a number of new possibilities.
Creating virtual meters – also for return temperature
Look into the individual buildings
Temperature deviations reveals many secrets

From temperature deviations you can among others ...

- Locate heat loss in service pipes
- Detect leakages in the distribution network 365/24/7
- Find bypasses and estimate the amount of flow caused by the bypass
- Identify rings in the distribution network where the risk of stationary flow is high
Data could have found that leak!

Leakage detection using Heat Intelligence

New disruptive approach to leakage detection

During the leak Heat Intelligence detects multiple temperature outliers (red and blue dots), where the temperatures measured by the meters deviate significantly from the predicted temperature values.

In this way, the leak can be located near the point indicated in the figure.
Detecting service pipes with high heat loss

- After new service pipes are installed:
  - Forward temperature goes up
  - Flow reduced

Temperature deviations disappear after new service pipes are installed.

Identifying broken pipes with high heat loss

Heat Intelligence detects multiple temperature outliers with lower temperatures than expected. In this case, the reason was broken service pipes with wet insulation. This caused forward temperature to be >10°C lower than expected.

- After new service pipes are installed:
  - Forward temperature goes up
  - Flow reduced
How is the actual load in the distribution network?

Model vs. reality!
Actual load and capacity compared to design criterias - does it match?
Utilise excising capacity better and avoid or defer investments
Evaluate design rules – e.g. coincidence factors and pipe dimensions

Morning peak flow
160 liters/min during heating season
Detecting bypasses and stationary flows

B Bypass  S Stationary flow (dead spot)
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

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 (...)

legitimate interests
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.
Digitalised District Heating

Digitalisation creates transparency and reduces losses.

Because you cannot optimise what you do not measure.
Digitalisation in the DH industry is much more than new customer services or consumer apps.

Digital technologies hold the potential to make the entire energy system both more efficient, reliable and intelligent.

The roadmap provides a comprehensive overview and nuanced insight into digitalisation.

Describing digitalisation on six different levels:
- Production
- Distribution
- Building
- Consumption
- Design and planning
- Sector coupling
Think forward!

Steen Schelle Jensen
Head of Product Management
ssj@kamstrup.com