Data driven asset management – online distribution grid analysis based on GIS and meter consumption data.

Smart Energy Systems, 7. Oct. 2020, Aalborg Morten K. Rasmussen, Data Scientist, Kamstrup





MULTICAL[®] Heat/cooling meters





MULTICAL[®] and flowIQ Water meters

OMNIPOWER Electricity meters 0000 IS4 w agles CE M15 0200

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

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

Kamstrup's value chain includes everything from the actual meter to the communication, software and analytics.



Heat Intelligence - digitalised district heating





- GIS data
 - Pipe diameter
 - Casing diameter
 - Etc.
- Device information (geo coordinates)



- Meter data
 - Volume/flow data
 - E1/E2: Volume or energy weighted forward/return temperature (accumulated value),

Or

- T1/T2: Forward/return temperature (instantanous value)



Making use of data from thousands of meters, continuesly updated







... Easy insight of the energy flow, temperatures and much more, in any region of the network by combining meter data and GIS-data

.... Beat Demo Customer Varme Analytics internal de.. kamstrup Heat Intelligence TEMPERATURE Inlet temperature 17/03/2019 Temperature deviation + Outlet temperature - FLOW Inlet temperature 70.5 °C Volume flow rate Outlet temperature 36.1 °C Flow velocity Volume flow rate 0.78 m³/h 0.2 m/s Flow velocity VIEW OPTIONS More pipe information Include meters without temperature values Animate flow Olume flow rate - m³/h O Flow velocity - m/s lap data ©2019 Google

Many utilities expresses a desire for a more realistic benchmarking and evaluation of performance

This calls for a data driven approach.

All heat distribution grids are in principle large sensor networks with hundreds or often thausands of flow and temperature sensors (smart meters)

Commonly used KPI: delivered vs. produced heat, this KPI varies a lot, and is among other things dependent on:

- seasonal trends
- Distribution grid layout
- Customer density
- Distribution of one family houses, multi family dwellings, industry

Data driven approach: What is the actual potential for optimization?





Modelling heatloss in Heat Intelligence



- **Q**_d Heat delivered (measured quantity from energy meter, always available)
- **Q**_i Heat input to distribution network (district energy meter, data normally not readily available)
- $oldsymbol{Q}_l$ Heat dissipation from the distribution grid to the surroundings

$$Q_i - Q_d = Q_l$$



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$$Q_i - Q_d = Q_l = Q_n + Q_e$$



Varmetab, Heat Intelligence, model



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Relative heatloss, and potential heatloss reduction



Benchmarking performance of different network regions

kamstrup



Data driven analytical methods should be used as input for renovation plans and in asset management to



https://www.kamstrup.com/en-en/heat-solutions/heat-analytics