THE ROAD TO DIGITALIZATION, AND USAGE OF CUSTOMER DATA FOR OPTIMIZATION

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HEAT PRODUKTION 2026

op til 45MW

8 MW AirtoWater Heatpump
50 MW elektrical boiler

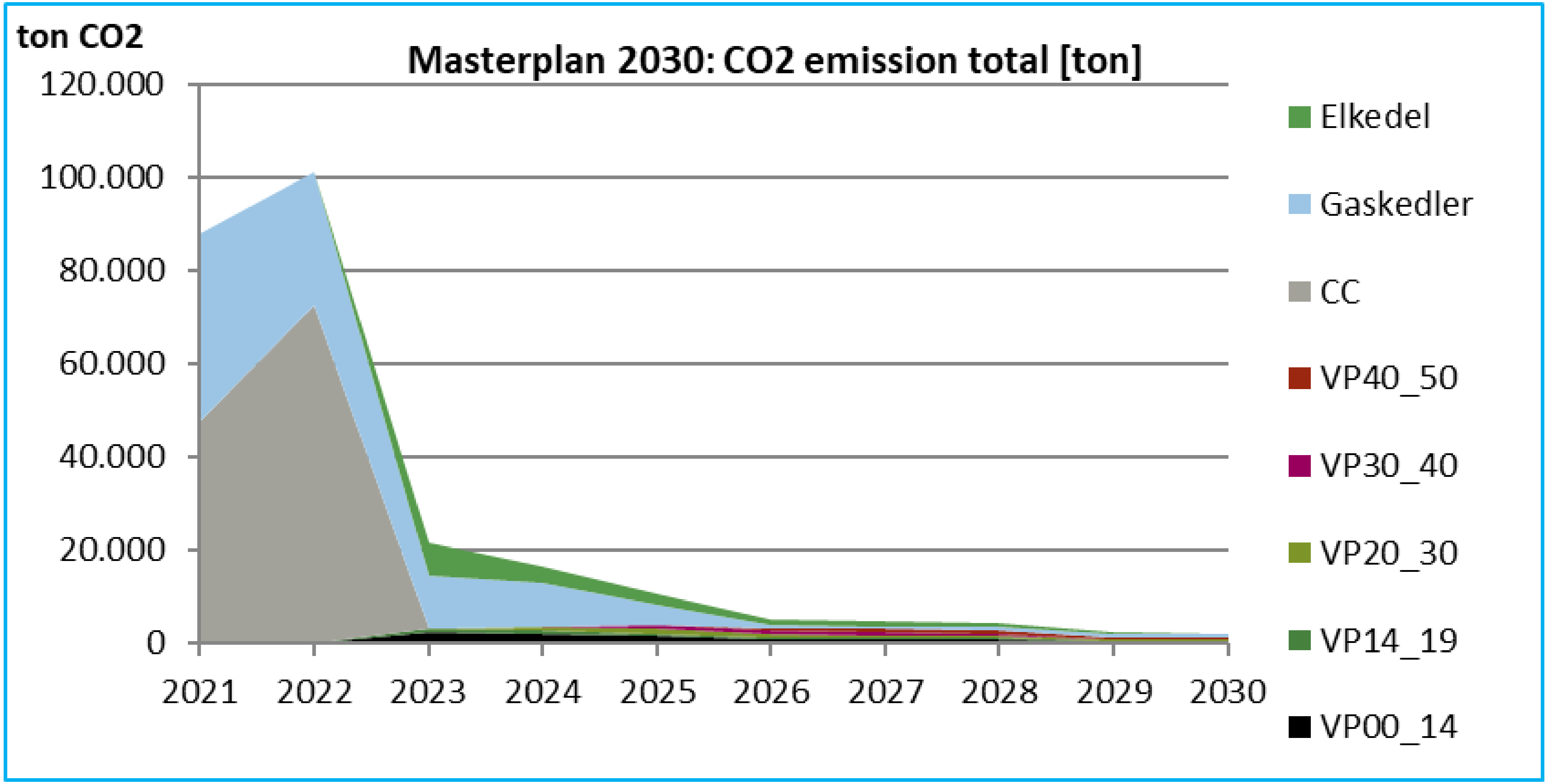
Datacenter Heatpump

8 MW Air to Water Heatpump

Existing gasboilers – will eventually be on biogas

5 MW groundwater Heatpump

PLAN FOR REDUKTION OF CO2



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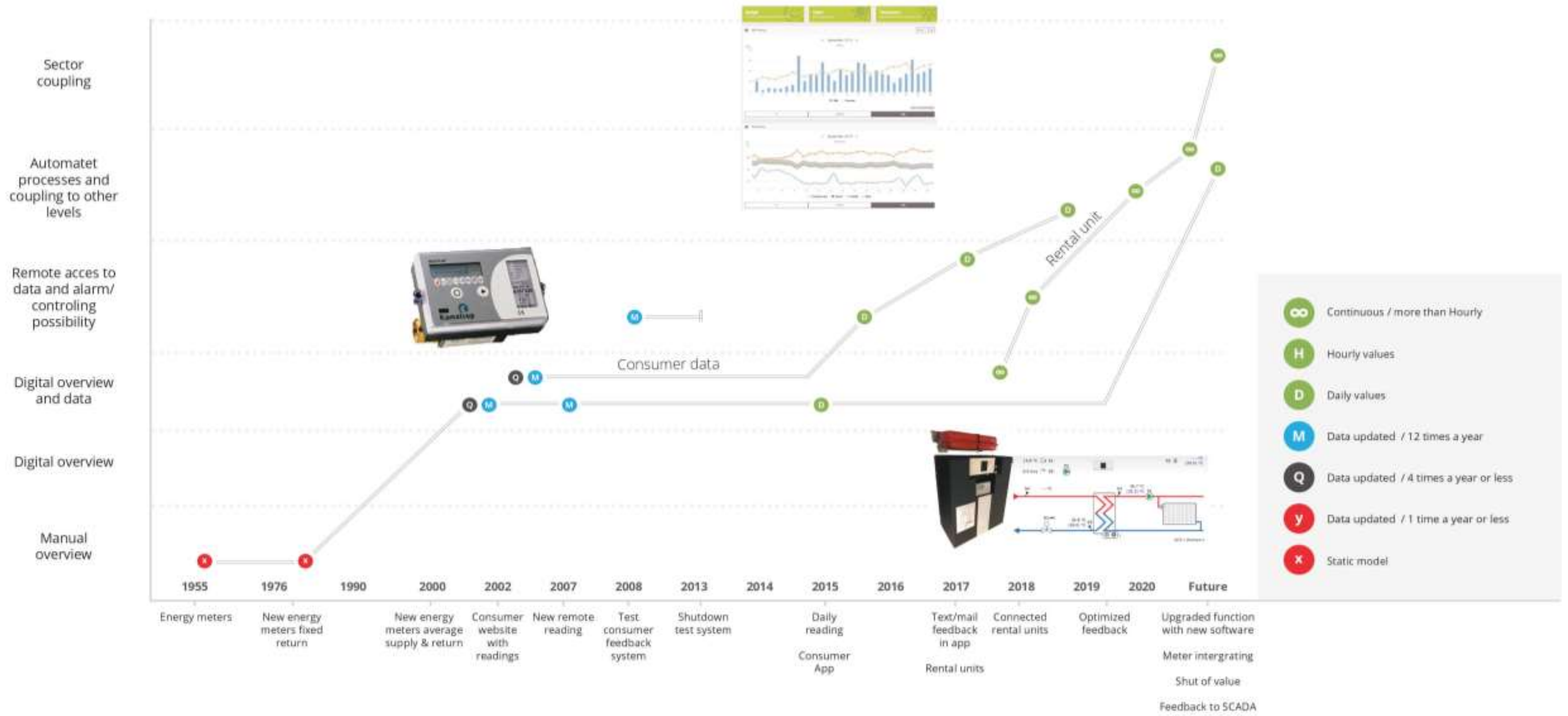
IEA'S GUIDEBOOK OF IMPLEMENTATION OF LOW TEMPERATURE DISTRICT HEATING SYSTEMS

- Why optimization is more important now
  - Having the right temperature has 6 times more impact on the production price in the future

Table 1. Overview of projected economic effects, according to the cost reduction gradient (CRG) in euro/(MWh·°C), of reduced system temperatures.

	Chapter section and heat supply technology (either the technology itself or as the dominant component of a system)	Cost reduction gradient (CRG) in euro/(MWh·°C)	
		Investment cases where investment costs are reduced	Existing cases where operation costs are reduced
Future production sources	2.1 Low-temperature geothermal heat	0.45–0.74	0.67–0.68
	2.2 Heat pump	0.41	0.63–0.67
	2.3 Low-temperature waste heat	0.65	0.51
	2.4 Solar thermal – flat plate collectors	0.35–0.75	Not available
	2.4 Solar thermal – evacuated tube collectors	0.26	Not available
Old production sources	2.6 Biomass-CHP with back-pressure turbine	Not available	0.10–0.16
	2.6 Biomass-CHP with extraction turbine	Not available	0.09
	2.6 Waste-CHP with flue gas condensation	Not available	0.07
	2.7 Daily storage as tank thermal storage	0.01	0.07
	2.7 Seasonal storage as pit thermal storage	0.07	0.07
	2.8 Heat distribution loss	Not available	0–0.13

DEMAND SIDE


Sector coupling
Automatet processes and coupling to other levels
Remote acces to data and alarm/ controling possibility
Digital overview and data
Digital overview
Manual overview
Consumer data
Rental unit
1955
1976
1990
2000
2002
2007
2008
2013
2014
2015
2016
2017
2018
2019
2020
Future
Energy meters
New energy meters fixed return
New energy meters average supply & return
Consumer website with readings
New remote reading
Test consumer feedback system
Shutdown test system
Daily reading
Consumer App
Text/mail feedback in app
Rental units
Connected rental units
Optimized feedback
Upgraded function with new software
Meter intergrating
Shut of value
Feedback to SCADA
Continuous / more than Hourly
Hourly values
Daily values
Data updated / 12 times a year
Data updated / 4 times a year or less
Data updated / 1 time a year or less
Static model

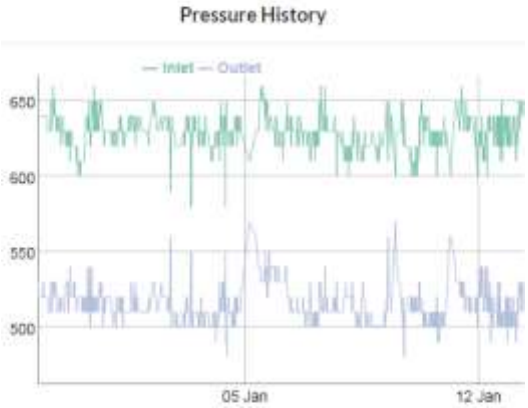
WHAT CAN DATA BE USED FOR AT DEMAND SIDE

- Optimize returntemperature by feedback to customer
  - This is what we primarily have done for the last 25 years
- Lowering the supply temperature in buildings
- Optimize performants of rental heat interface units
- Lowering the network pressure and optimize cirkulationloops
- Maybe peak shaving of larger buildings

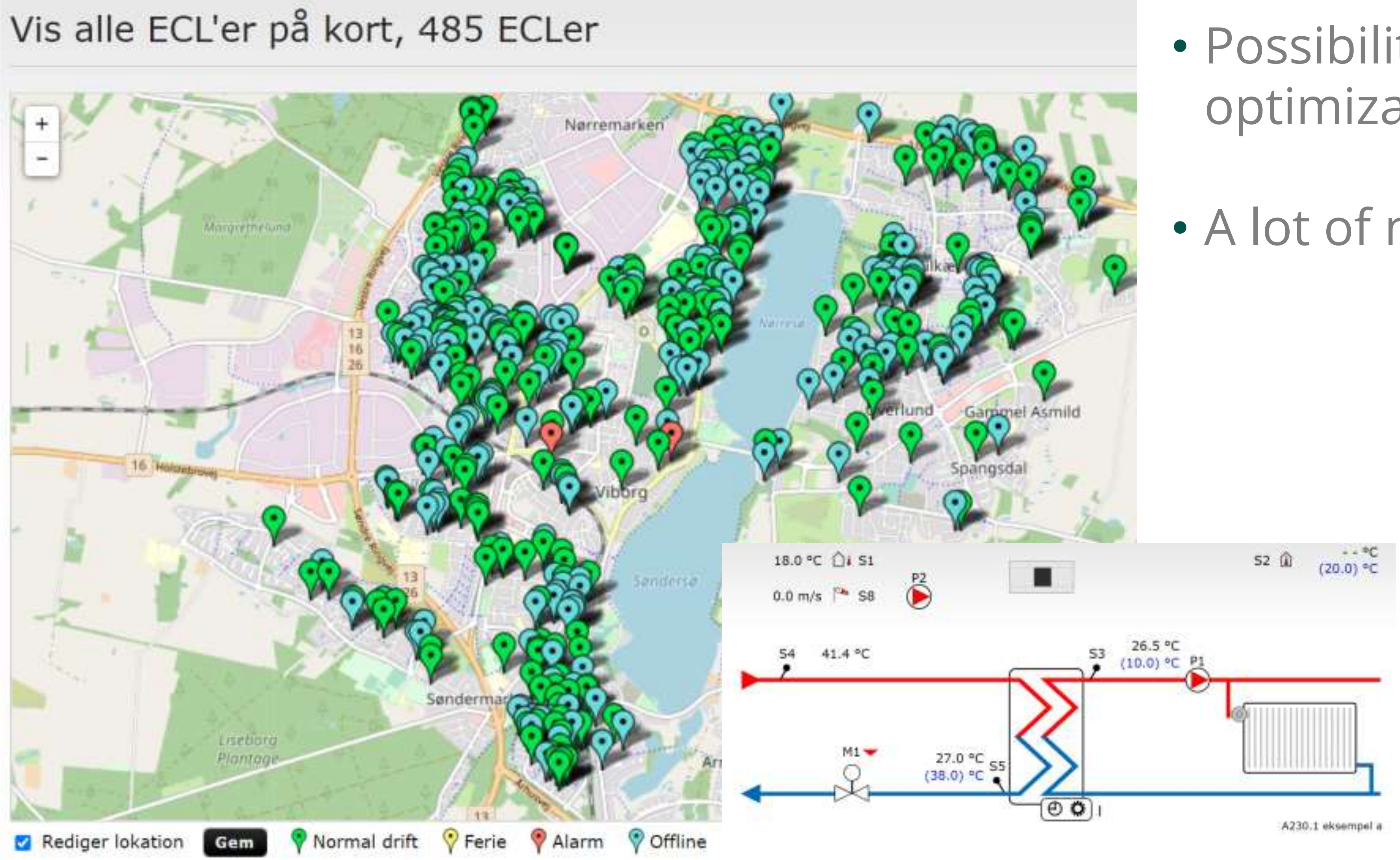
MORE DATA CAN RESULT IN HIGHER KNOWLES AND ENERGY SAVINGS

- By having more data from e.g. Frese circulation Valves – gives Knowles of necessary pressure further out in system

- Example
- 1.3 bar to 1.0 bar on main pumps
- Savings 31.000 kWh on main pump
- Extra energy consumption at distributed pump 3.600 kWh
- Total savings 26,3 MWh electricity at 700 kr. per MWh (2019 prices)
- 18.400kr per year

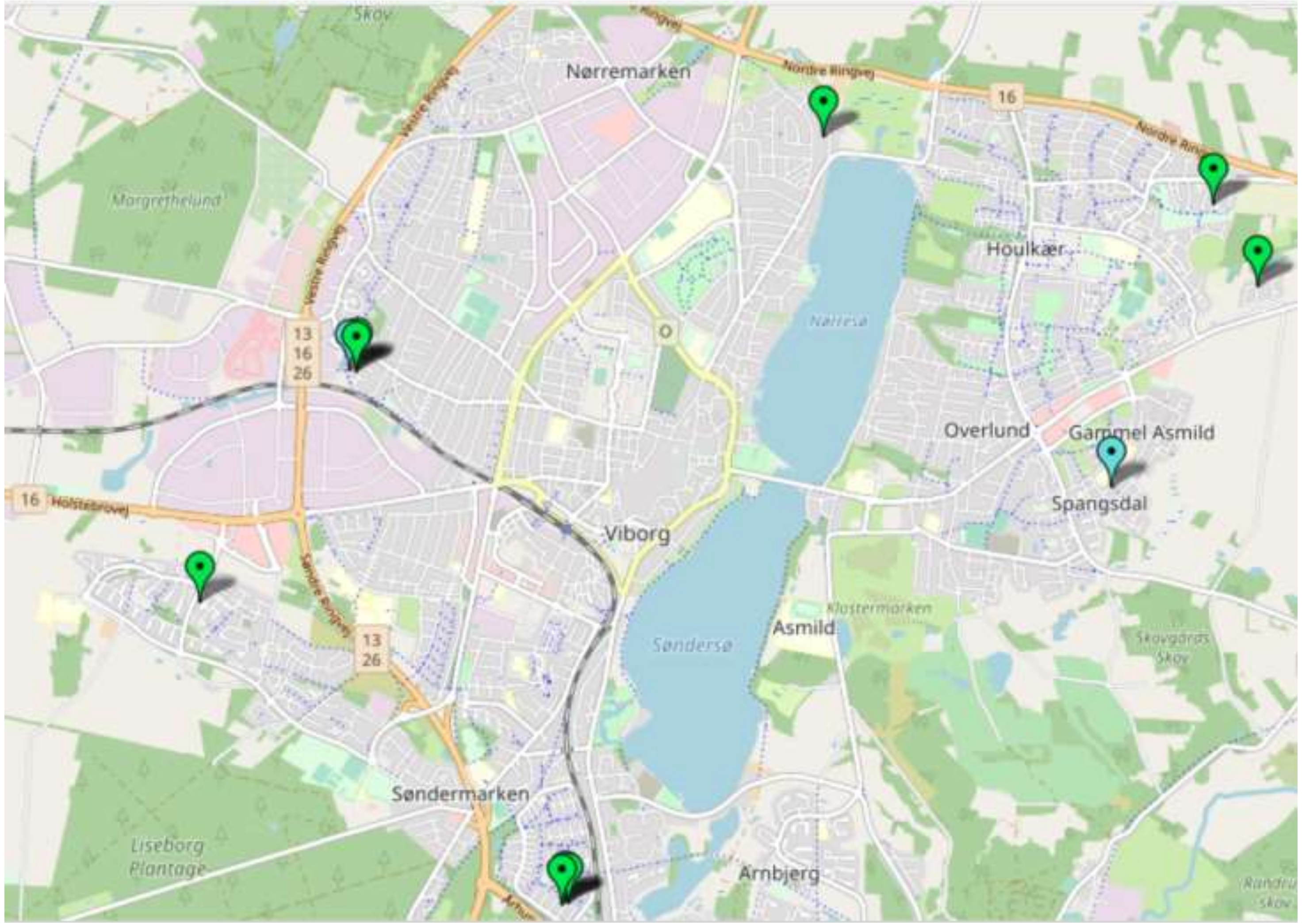


DATA FROM RENTAL UNITS



- Possibility of online optimization of the units
- A lot of new data points

DATA POINTS IN CRITICAL POINTS OF THE NET



- We install a GSM card to secure the data flow by 30 sek. datapacked
- We install 2 pressurepoints
- We bundle datapoints to get and average differential pressure
- We get access to the data in the scada system
- We hope to be able to control the pumps from this average bundle differential pressure
- We expect to be able save a lot of pump energy in the system

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DATA FROM HEAT COST ALOCATORS

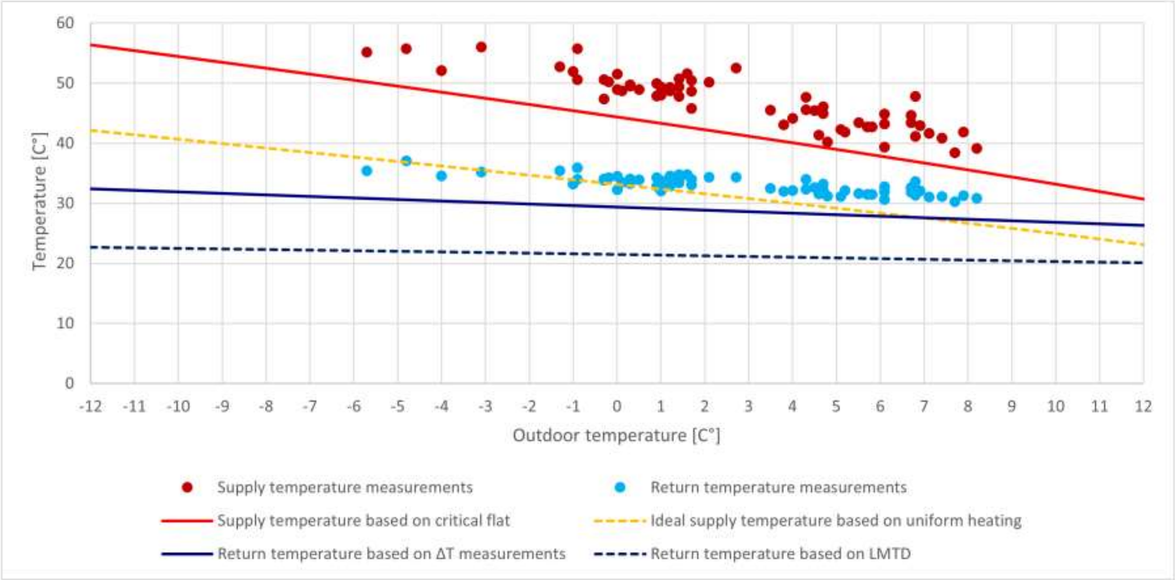

Figure 1: Potential lowest supply/return temperatures using different approaches

Apartment	Part load	Radiators in use	Related Riser	Riser return temp(°C)	Required Ts(°C)	Required Tr(°C)
Building1 3 st th	15%	3\5			37.3	32.9
Building1 3 1 th	15%	5\5	Riser 7	32.1	37.3	32.9
Building1 3 2 th	22%	4\5			42.1	36.2
Building1 4 st tv	18%	6\6			39.7	34.6
Building1 4 1 tv	20%	3\6	Riser 5	41.1	41.0	35.4
Building1 4 2 tv	13%	2\6			34.7	31.2
Building1 4 st th	0%	0\6			30.7	28.3
Building1 4 1 th	25%	6\6	Riser 8	36	44.5	37.8
Building1 4 2 th	11%	6\6			33.4	30.2
Building1 5 st tv	17%	4\6	Riser 10	28.7	38.5	33.8
Building1 5 1 tv	12%	3\5			33.4	30.2
Building1 5 st th	7%	4\6	Riser 6	28.3	30.7	28.3
Building1 5 1 th	14%	2\6			36.0	32.1
Building1 6 st tv	10%	4\5	Riser 3	31.5	32.1	29.3
Building1 6 1 tv	17%	3\5			38.5	33.8
Building1 6 st th	1%	1\8	[illegible]	[illegible]	30.7	28.3

- Can be used to calculate the optimized temperatures
- And can be used to find critical apartments – or failures in the system

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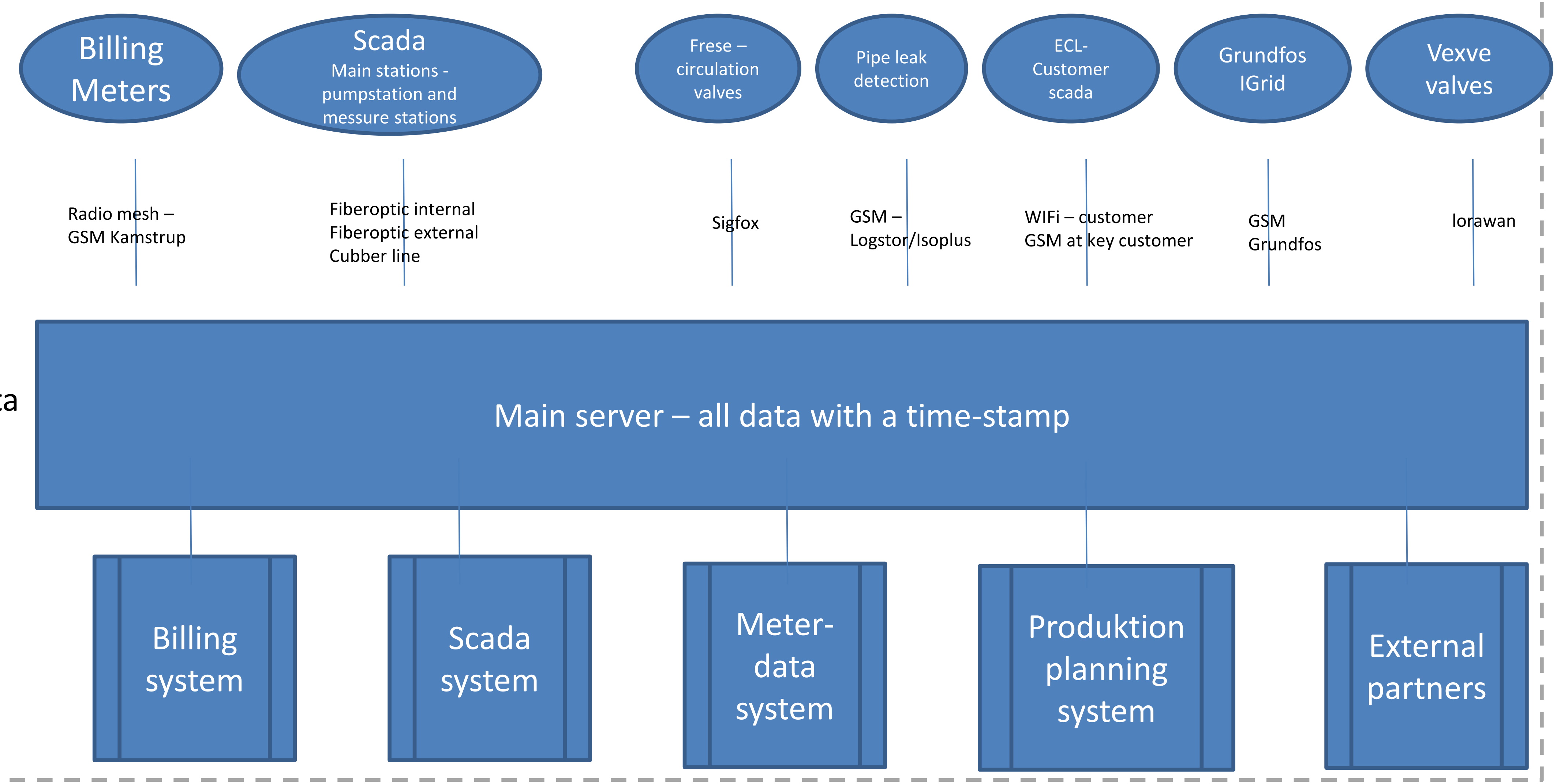
THOUGTS ON NEW DATA INFRASTRUCTURE

More and more hardware to come

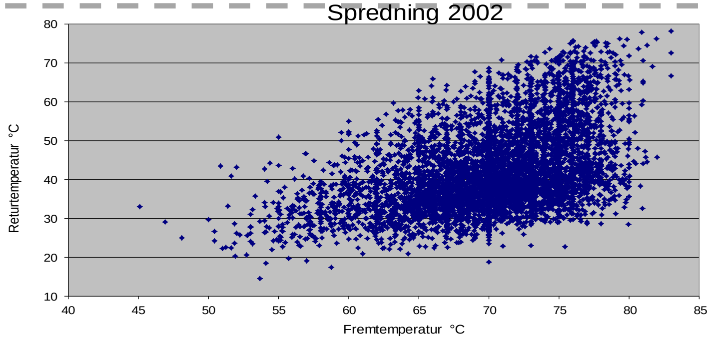
Need to reduce infra-structure tecnologies
And have a plan for data freqency

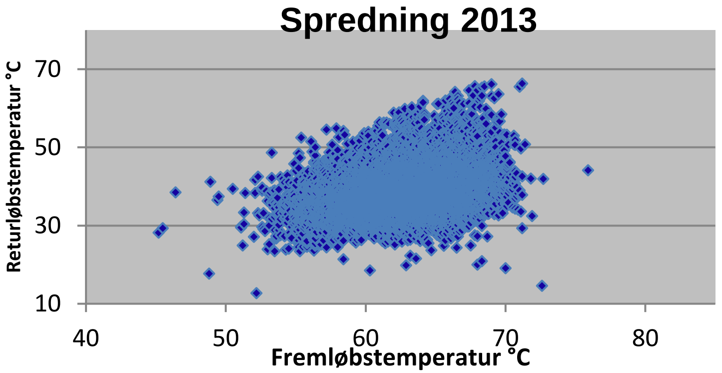
Ownership of data need to be ours

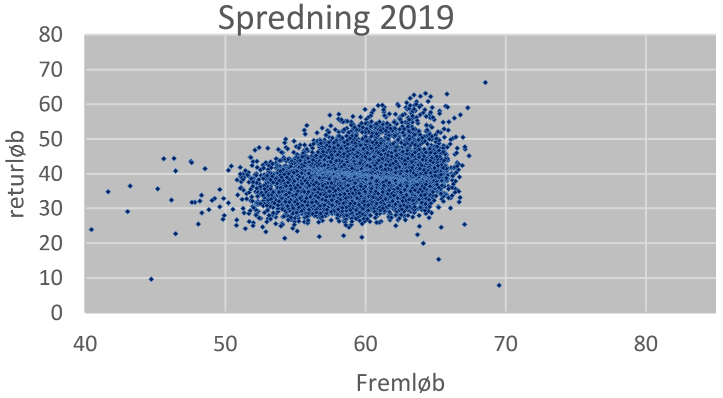
Can choose and change to the company with the best product



OUR TEMPERATURE HISTORY







8 STEPS TO LOW TEMPERATUR


International Energy Agency Technology Collaboration Programme on
District Heating and Cooling including Combined Heat and Power

Annex XII final report

Stepwise transition strategy and impact assessment for future district heating systems

Project short title:
STEP
Date of publication:
13.12.2019
Authors:
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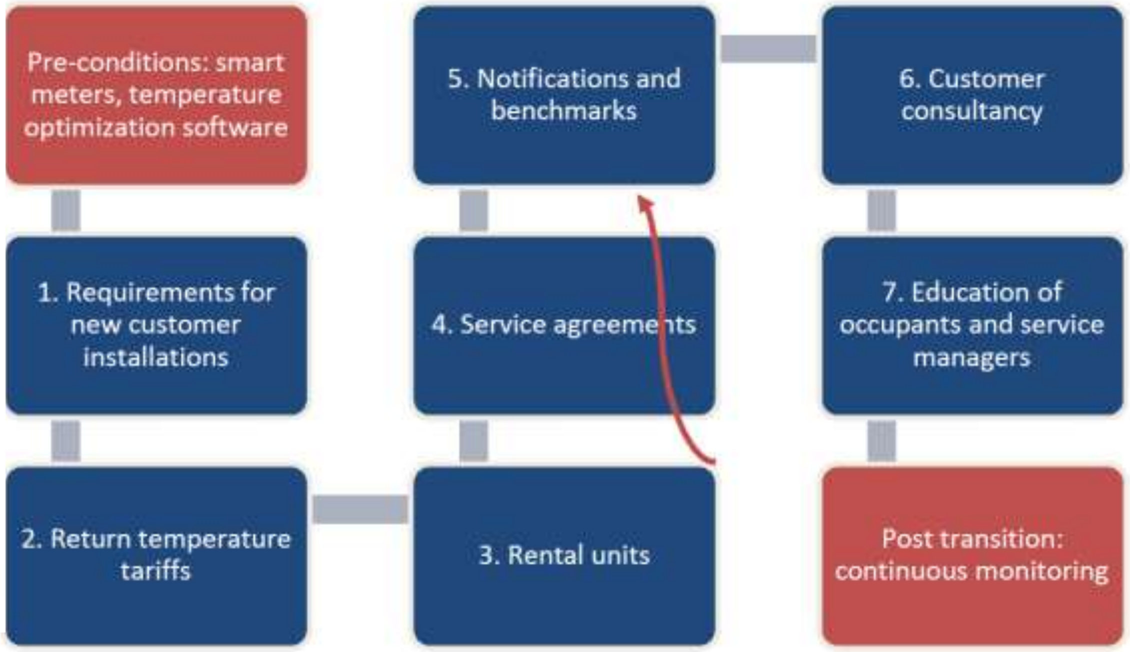

Figure 17. Tools and methods in the transition to lower temperatures [14].

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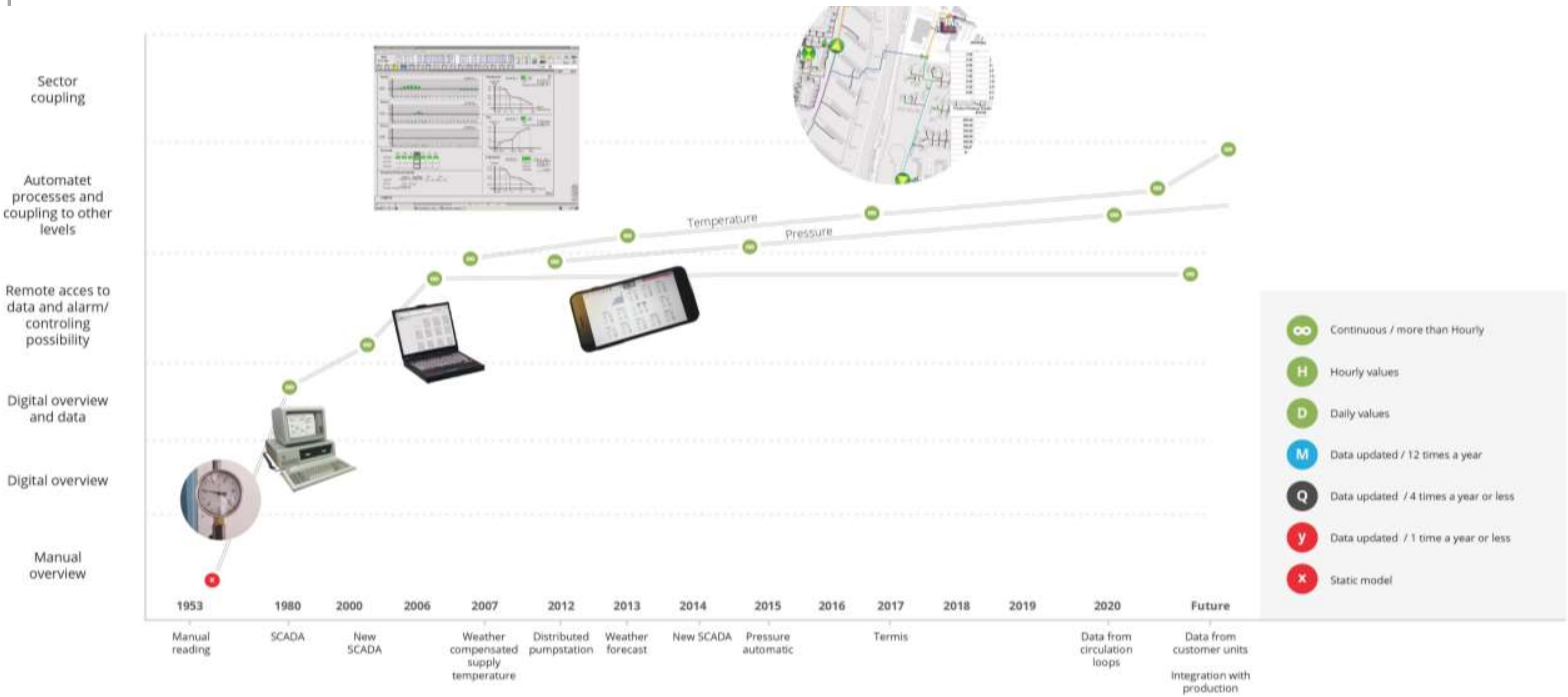
DIGITALIZATION IN SCADA AN MAIN STATIONS - DISTRIBUTION



DIGITALISATION OF THE PIPE NETWORK