



# **Harnessing digitalized monitoring of building heating to unlock energy efficiency**

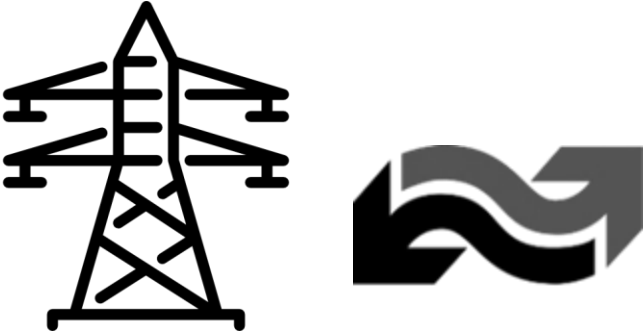
Demand response and digitalization of demand side in district heating and cooling systems.

*@ AAU, Aalborg (IEA EBC)– 15/09/2022*

# Many challenges at different levels



Reduce the global climate footprint



- Integrate renewable sources
- Improve planning and operation
- Reduce losses

Ensure cost-efficient operation

- Maintain buildings and systems in a healthy state
- Secure comfort and quality of service

# *Introduction to our solution*

# Purpose of our solution

**Segment:** Buildings with heating, ventilation and cooling systems

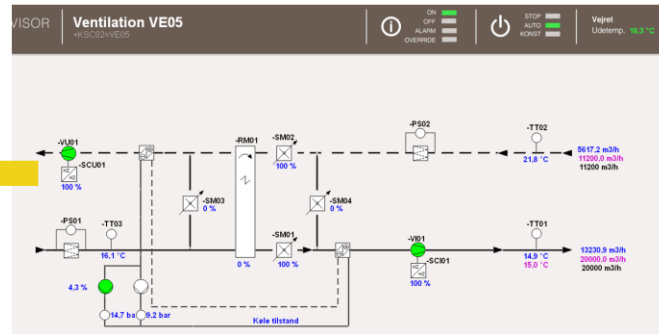
**Purpose:**

- Improve indoor climate
- Reduce energy demand
- Improve cooling (to district heating)
- Deliver energy flexibility
- All of the above **concurrently**

# Mapping a building model from BMS

Name	Group name	Type	Unit	Data Type	Objektid	Writable	
▼ Default Group							
1	VE01_T001_UDE_TEMP	Select	Analog Input	Select	Value	1	Readonly
2	VA01_RESET_DRIFT_CIRK_PUMPE	Select	Binary Value	Select	Value	1	Writable
3	VE01_MV01_MV_VARMEFLADE	Select	Analog Output	%	Value	1	Writable
4	BRANDSPJELDLS_ALARM_STOP_ALT	Select	Binary input	Select	Value	1	Readonly
5	VE01_FORsinkET_START_VENT	Select	Analog Value	Select	Value	1	Writable
6	VE01_T101_TILLUFT	Select	Analog Input	Select	Value	2	Readonly
7	VE01_RV01_ROTORVEKSLER	Select	Analog Output	%	Value	2	Writable
8	VE01_SETP_TRYK_INDBLESNING	Select	Analog Value	Pa	Value	2	Writable
9	VE02_DRIFT_FRA_ZONE1_1_3_OS12	Select	Binary input	Select	Value	2	Readonly
10	VE01_TRV01_TEMP_RETURLVF	Select	Analog Input	Select	Value	3	Readonly
11	VE01_FV01_MIN_HASTIGHED	Select	Analog Value	%	Value	3	Writable
12	VE02_NATKOL_DRIFT_FRA_Z_1_3	Select	Binary input	Select	Value	3	Readonly
13	DISP	Select	Analog Output	%	Value	3	Writable
14	VE01_DISP	Select	Analog Input	Select	Value	4	Readonly
15	VE01_SETP_TRYK_UDSUGNING	Select	Analog Value	Pa	Value	4	Writable
16	VE01_DRIFT_FRA_ZONE1_4_9_OS13	Select	Binary input	Select	Value	4	Readonly
17	VA02_RESET_DRIFT_CIRK_PUMPE	Select	Binary Value	Select	Value	4	Writable
18	VE01_VL_INDBLESNING	Select	Analog Output	%	Value	4	Writable
19	VE01_TRV01_TEMP_FREM_KOL	Select	Analog Input	Select	Value	5	Readonly
20	VE01_FV01_MIN_HASTIGHED	Select	Analog Value	%	Value	5	Writable
21	VE01_NATKOL_DRIFT_FRA_Z_4_9	Select	Binary input	Select	Value	5	Readonly

BMS signals



BMS screendumps

## Zoner

Tilføj zone

- First\_floor
  - Zone\_1
  - Zone\_10
  - Zone\_2
  - Zone\_3
  - Zone\_4
  - Zone\_5
  - Zone\_6
  - Zone\_7
  - Zone\_8
  - Zone\_9
- Ground\_floor
  - Zone\_11
  - Zone\_12
  - Zone\_13

BYGNING OG ZONER    ENHEDER OG STYRING

Enheder

- 1 Hovedmåler
- 1 Varmt vand
- 4 Varme
- 1 Køling
- 1 Koldt vand
- 3 Elektricitet
- 19 Indendørsklima
- 2 Ventilation
- 1 Varmepumpe
- 8 Brugedefineret enhed

Importer bygningsopsætning

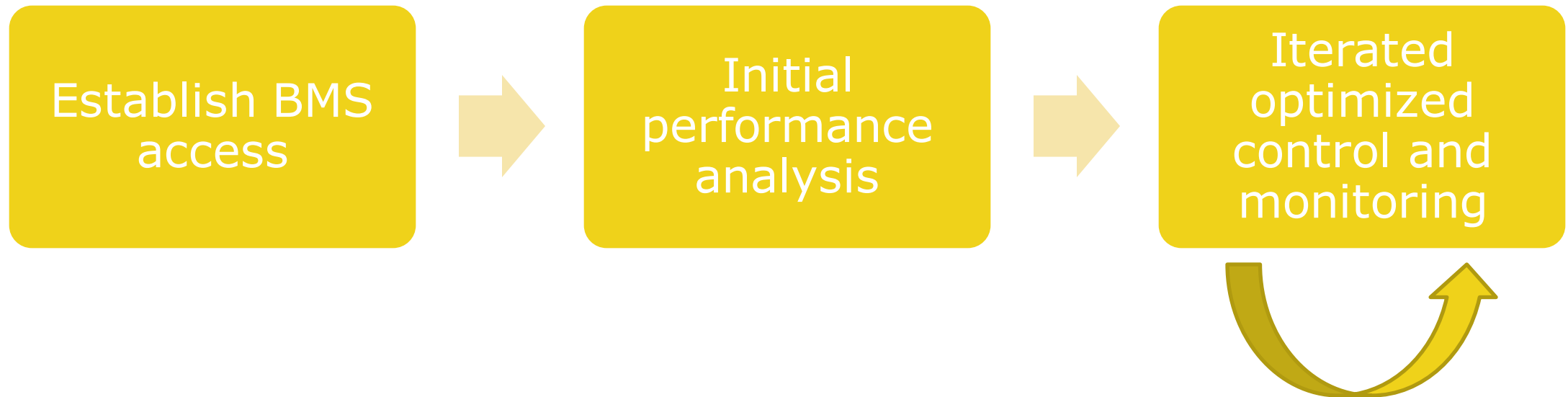
Tilføj varme (primærside)    Gem alle ændringer for denne type

Udfold alle enheder

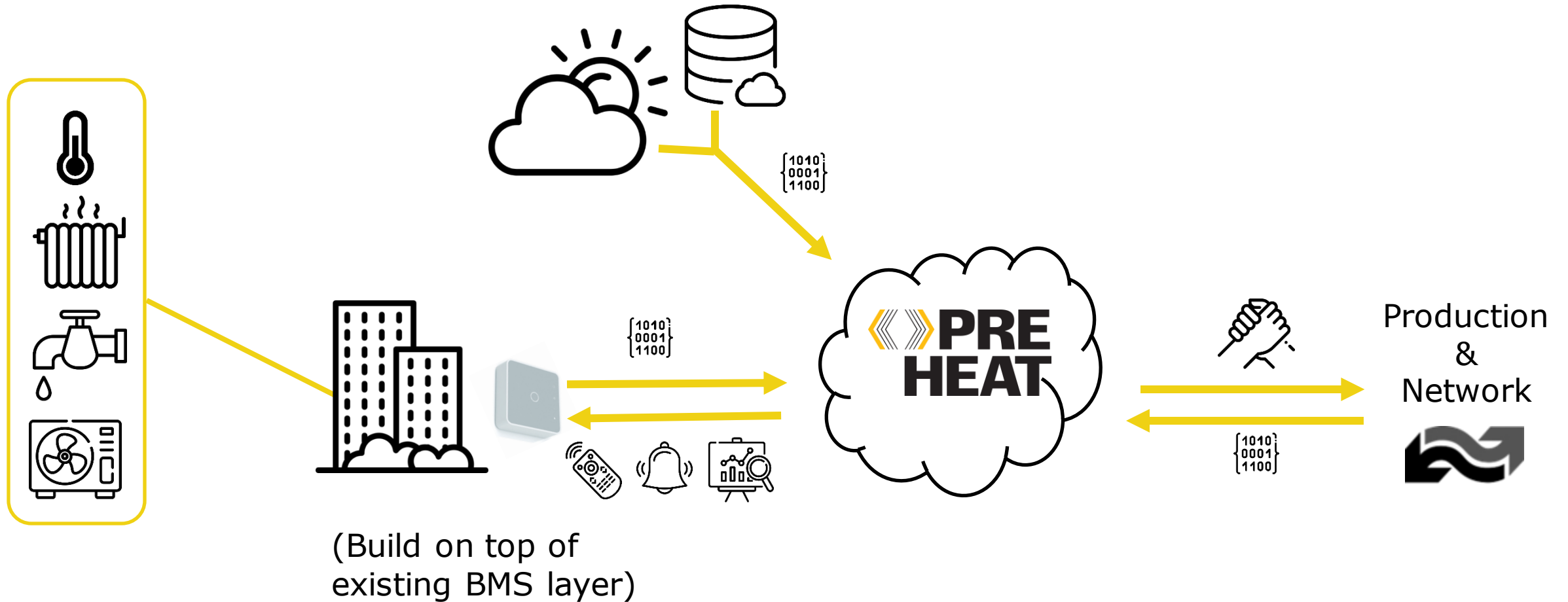
- Varme (primærside) Radiator heating VA02    Sæt enhed
- Sekundærside (blandesøjfe) Radiator    Sæt enhed
- Varmestyring VA02\_CONTROL    Sæt enhed
- Varme (primærside) Floor heating VA01    Sæt enhed
- Sekundærside (blandesøjfe) Floor heating loop    Sæt enhed
- Varmestyring VA01\_control    Sæt enhed
- Anden/ekstern styring VA01\_loop\_1    Sæt enhed
- Varme (primærside) Ventilation VE01    Sæt enhed
- Sekundærside (blandesøjfe) Loop VE01    Sæt enhed

Abstract building model  
(the foundation of our operation)

# The solution is a 3-stage rocket



# Digitalization means breaking silos



# *Unlocking energy efficiency*



# Demonstration in Heat 4.0 project

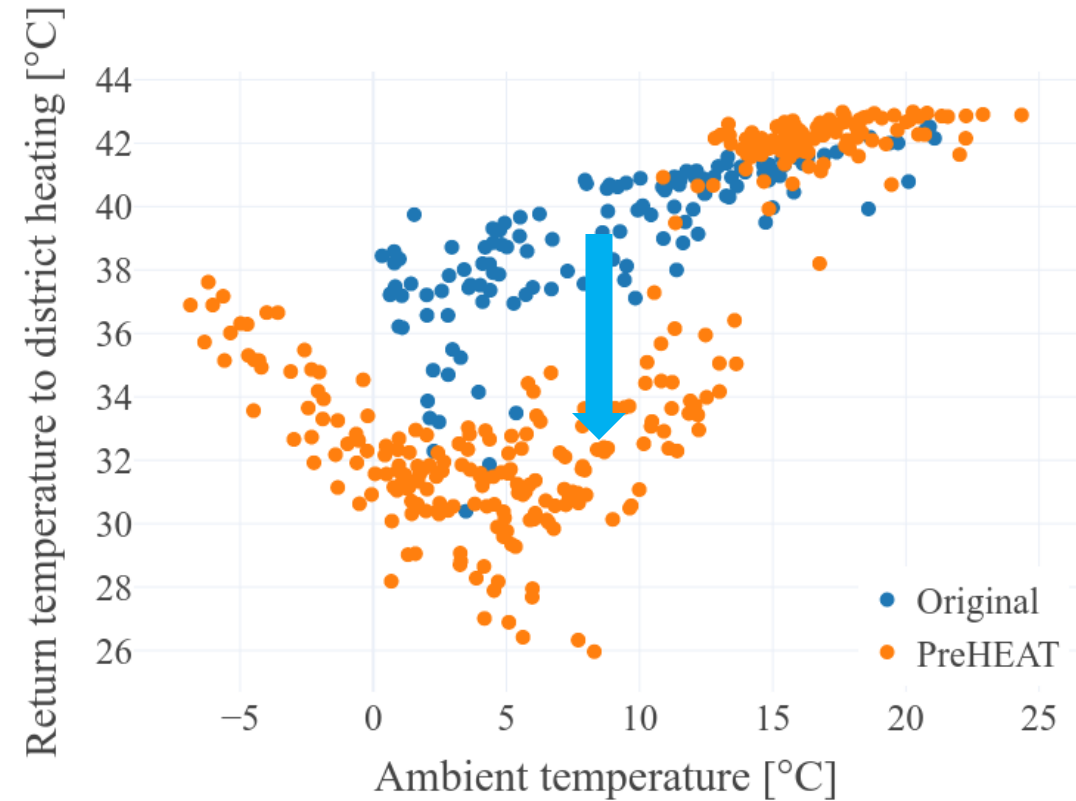
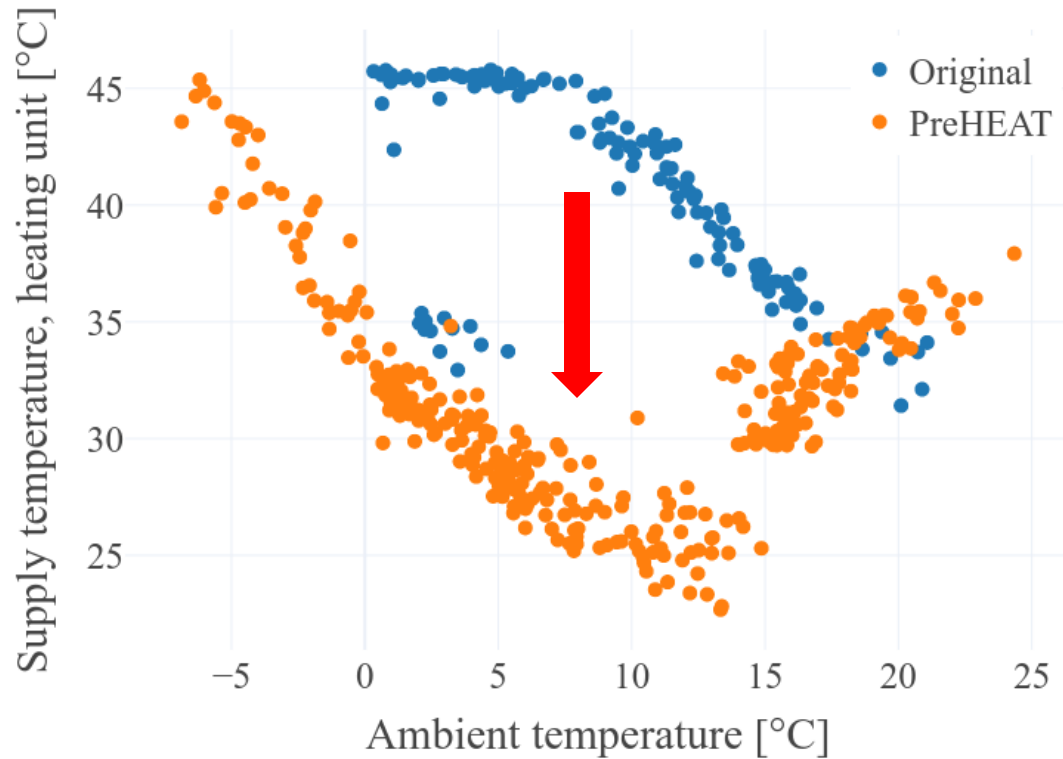


Hillerød

# Supply and return temperature reductions



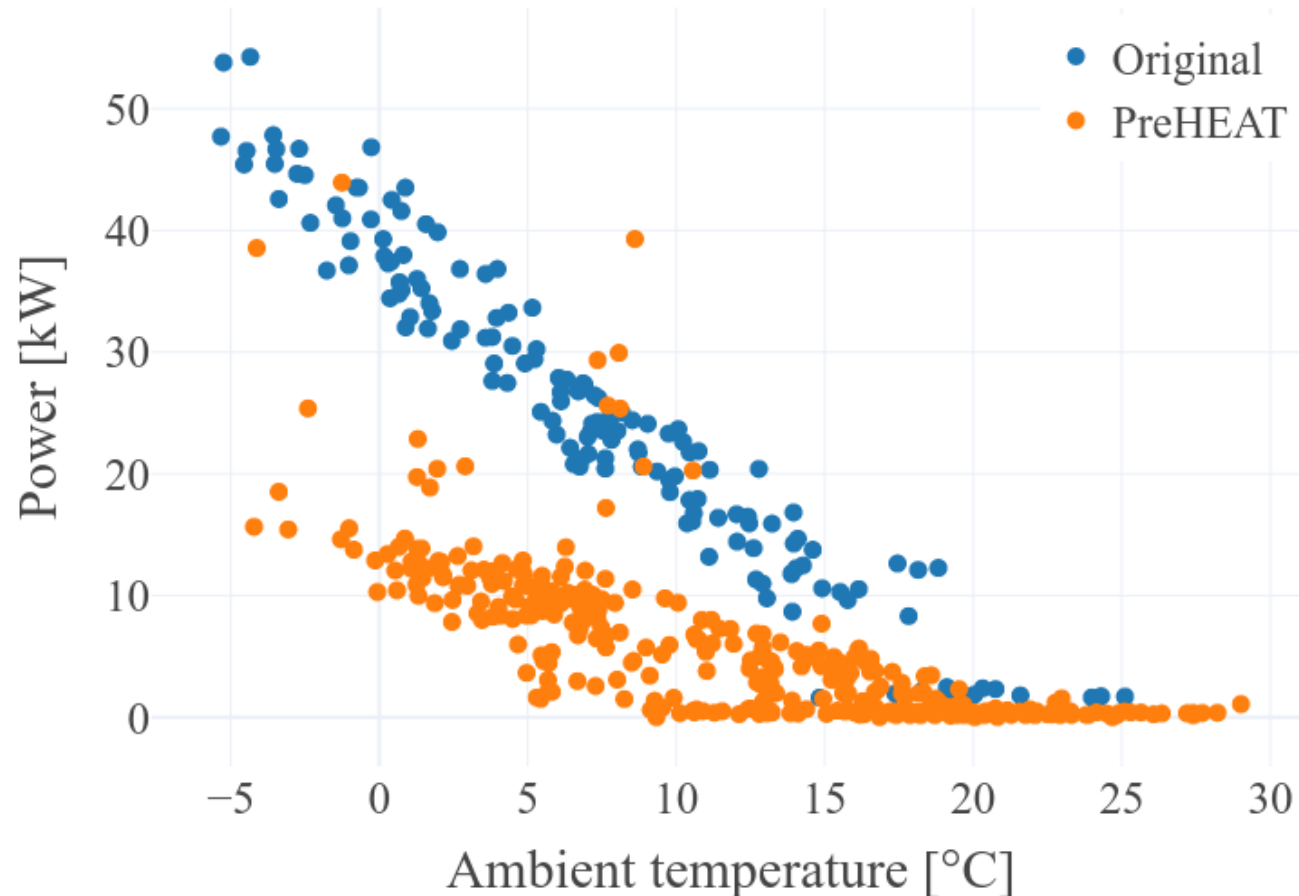
Control of residential building connected to Brønderslev Forsyning. Our optimized control managed to significantly lowered the supply temperature and increased cooling while adhering to comfort constraints.



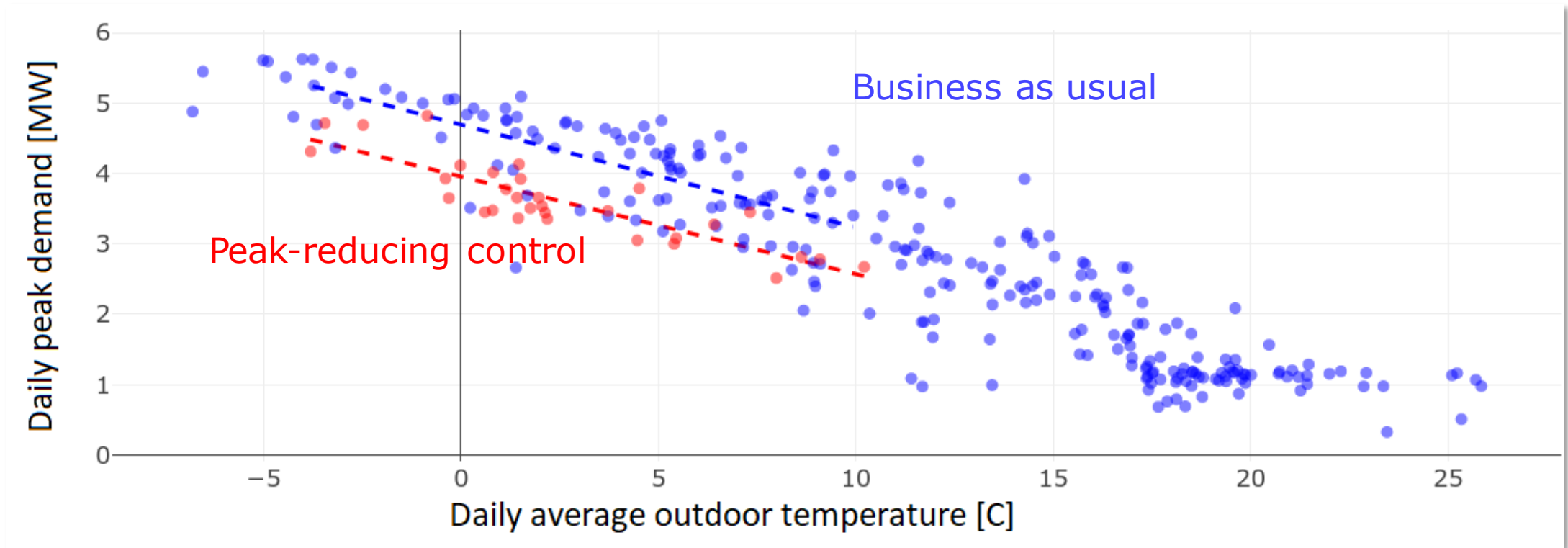
# Reduction of contribution to system peak

Control of institutional building connected to Brønderslev Forsyning.

Typical demand reduction of 20 kW in system peak hours (16:30 to 18:30) on cold days.



# Peak reduction in building aggregates



Result of a winter trial for a group of 36 apartment blocks (from Neogrid's commercial pool)

# Challenges for digitalization

## Human challenges

- Convincing customers of the business proposition
- Building trust with and empowering the end user

## Technical challenges

- Lack of standardization and plug-and-play solutions can delay implementation by months
- Energy shifting requires aggregation of many buildings, especially low energy buildings
- ROI is low for B2C, need B2B (e.g. BMS developers and DH suppliers) to unlock volume

# *Conclusions*

# Harnessing digitalization

The technical solutions are taking shape

- Modern digitalization means breaking silos
- With smart energy solutions like PreHEAT we can provide benefit to both heating consumers and suppliers
- The human factor can make or break digital solutions (trust is key!)
- Cooperation between suppliers is necessary for enabling roll out and unlocking scale



## **Neogrid Technologies ApS**

Niels Jernes vej 10, Aalborg Øst, Danmark /

[www.neogrid.dk](http://www.neogrid.dk)