Covenant of Mayors Investment Forum
Brussels 18.10.2022

Alex Søgaard Moreno Project Manager at Mayor's Department, City of Aalborg, Denmark

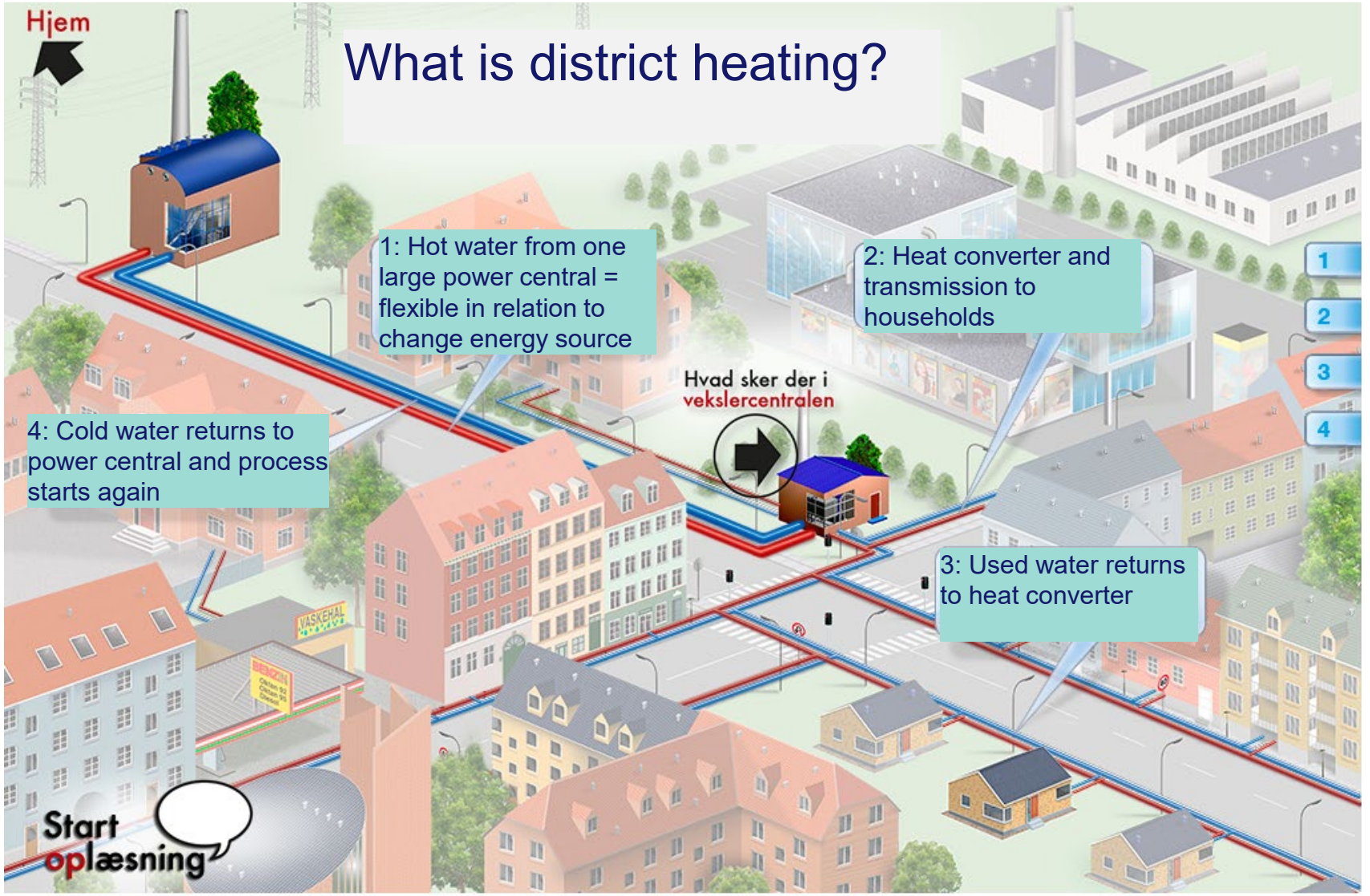
Co-funded by the Horizon 2020 programme of the European Union

ELENA European Local Energy Assistance

European Investment Bank

INDDEAT

What is district heating?



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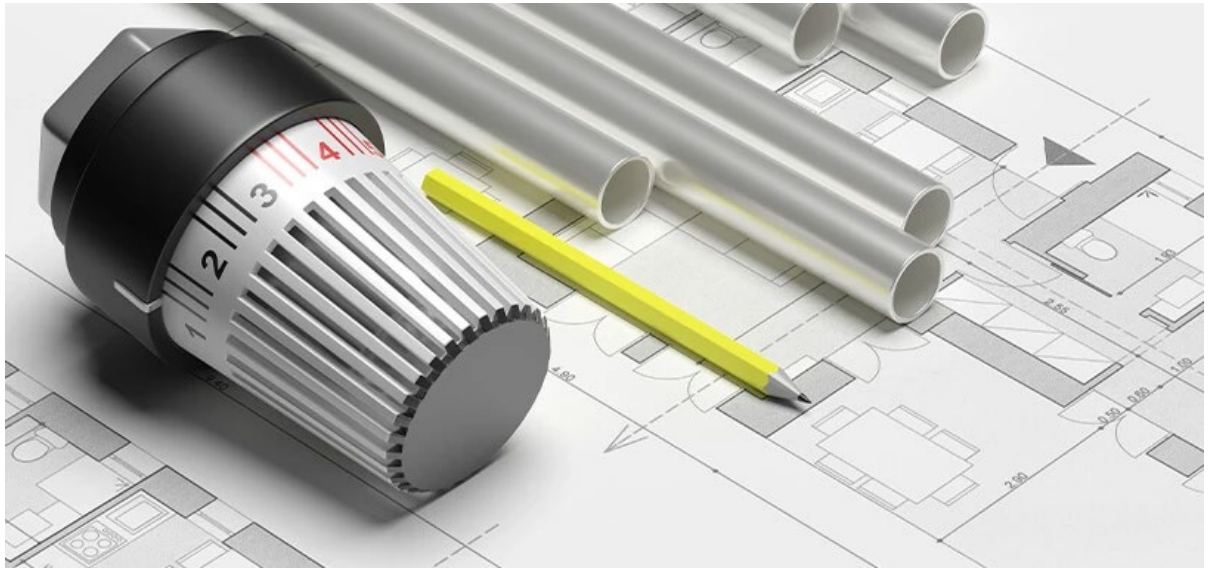
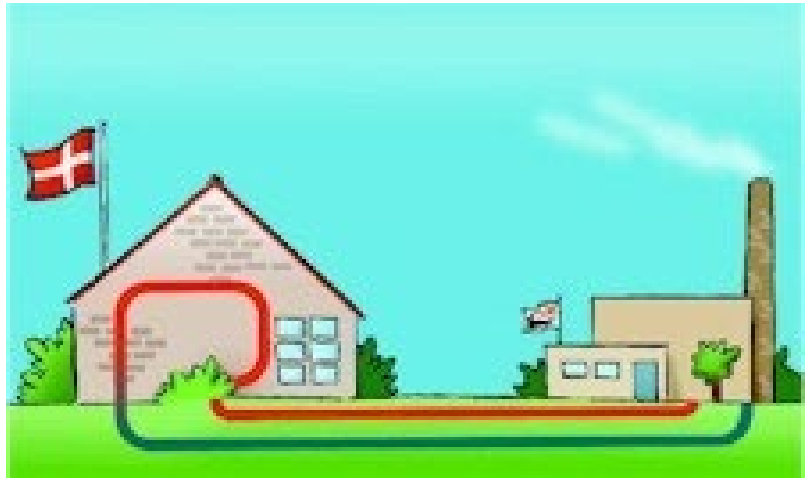
District heating in Denmark

- 65% of all houses in Denmark are connected to district heating. Some cities have 100 % depending on demography
- District heating began in large-scale during the oil-crisis in the 1970s
- Industrial symbiosis since early 1990s
- 72 % of district heating is produced from renewables
- 410.000 households still depend on natural gas
- District heating needs a number of houses/costumers to be financial sustainable





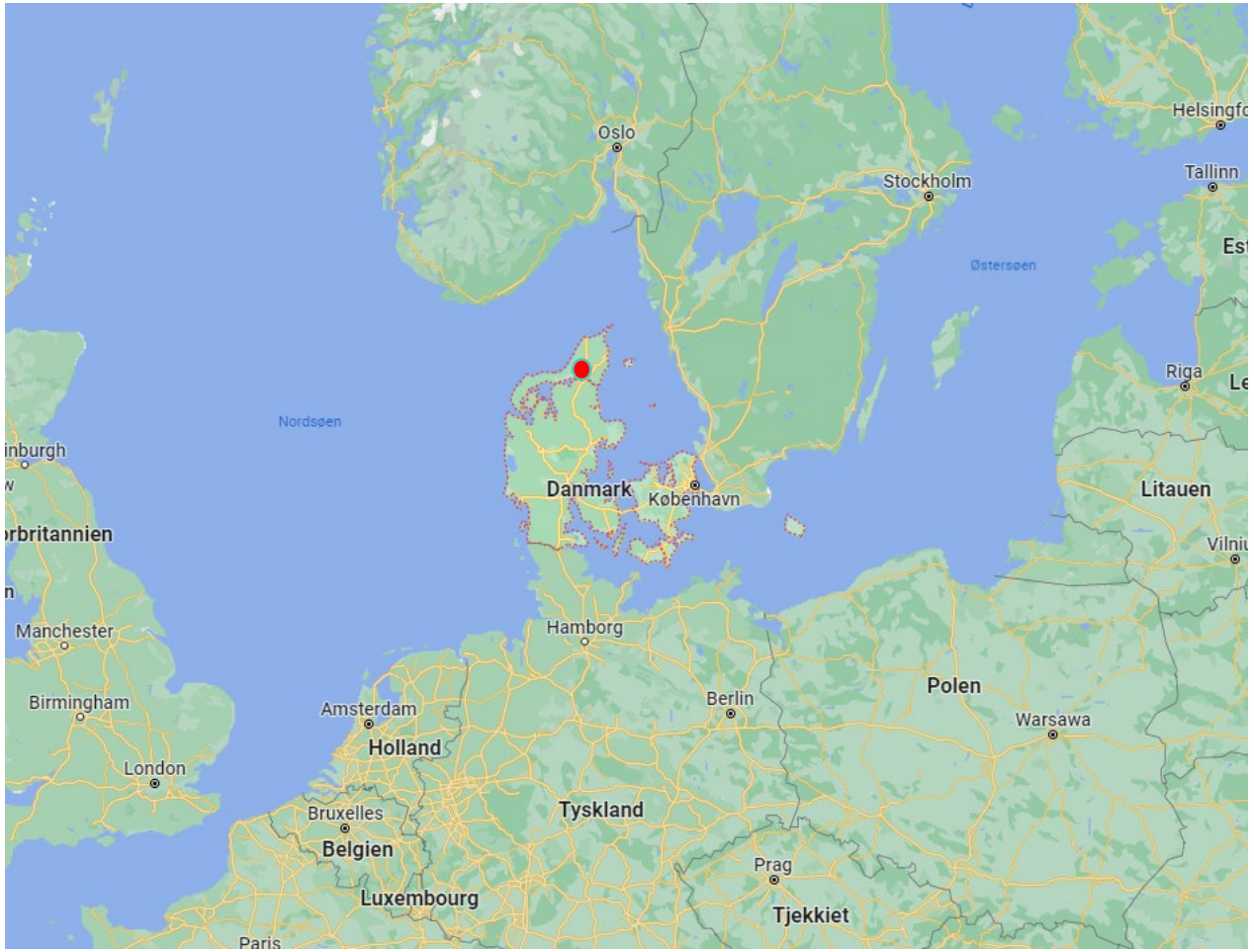
- Energy mix is waste, biomass, wind, solar power, geothermal power, natural gas, oil, coal and surplus heat from industry
- 60.000 km of pipes
- The ‘district heating law’: All district heating companies are obliged to invest profit in energy efficiency, convert to renewables and/or lower the prices for the consumers

Where are we?

North Denmark Region

600.000 people

Largest city Aalborg: 130.000 people



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The INDDHEAT project

INDDHEAT stands for “Improving renewable energy and anergy efficiency in North Denmark District HEATing

2,8 million € in funds from European Investment Bank for green transition of district heating in North Denmark

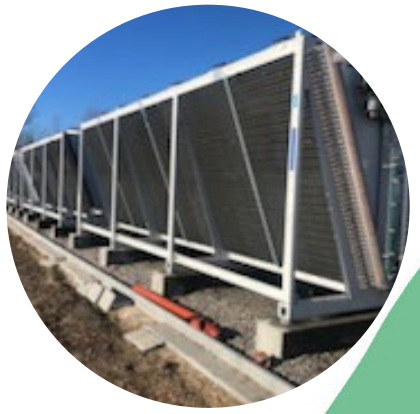
The project contributes to more than €130 million in local investments

More than 40.000 tons of CO2 reduction

16 projects and 11 partners all over North Denmark

Project period 1. July 2018 to 31 December 2021

iNDDHEAT



- Heat pump
- Renovation of distribution grid
- Expansion of distribution grid
- District cooling
- Heat storage facilities
- Transmission grid
- Electrical boiler

Bindslev Fjernvarme
Sindal Varmeforsyning
Frederikshavn Forsyning
Vrå Varmeværk
Jerslev Kraftvarmeværk
Sæby Varmeværk
Saltum Fjernvarme
Brønderslev Forsyning
Aalborg Forsyning
Aars Fjernvarme
Sdr. Herreds Kraftvarmeværker

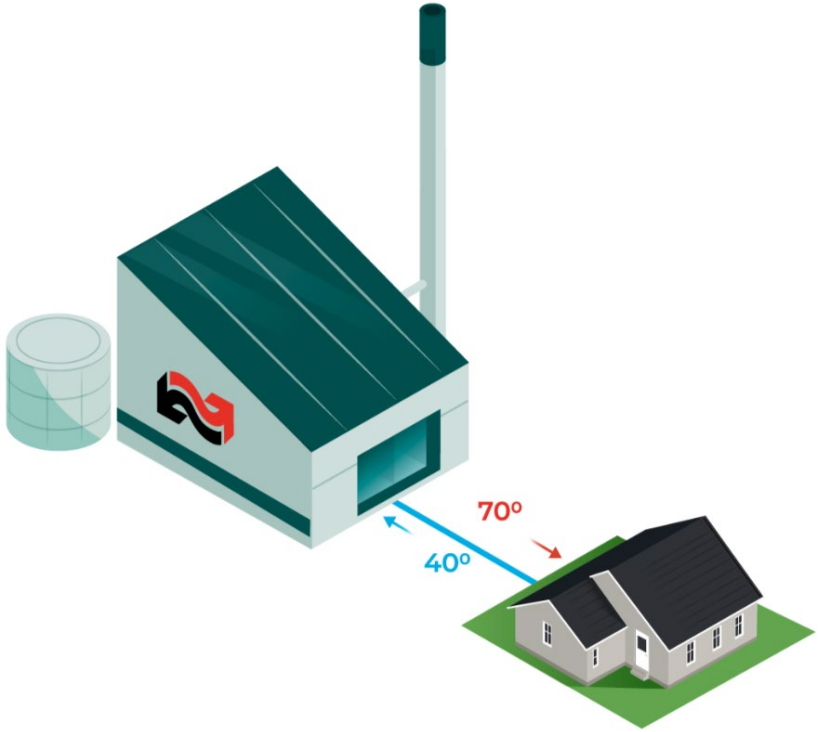
The INDDHEAT project

Main results 1/2

2,8 million € in support from EIB has contributed to more than €130 million in local investments

Investments in local challenges like

- Master planning/strategy
- Heat pumps,
- Renovation of distribution grid
- Expansion of distribution grid
- District cooling
- Heat storage facilities
- Transmission grid
- Electrical boilers



More than 500 local jobs created/supported in the project phase

The INDDHEAT project

Main results 2/2

Significantly increased efficiency in energy production = stable prise for consumers

Spin-offs initiatives and knowledge sharing between project partners = new projects and collaboration

District cooling identified as new business area at Aalborg Utility – approved by EIB

Courtesy of Brønderslev Utility

District heating in the future?

Collaboration between municipalities due to high gas prices.
Cooling as a larger business area (primarily around larger cities)
Triple-helix cooperation (public sector, private sector and academia)
Carbon Capture, Utilization and Storage + Transport, CCUS+T
Power-to-X projects
Biogas +30 new plants in the next 5 years

Aalborg Portland symbioses

Reno Nord, incineration plant

Green Gas Vraa

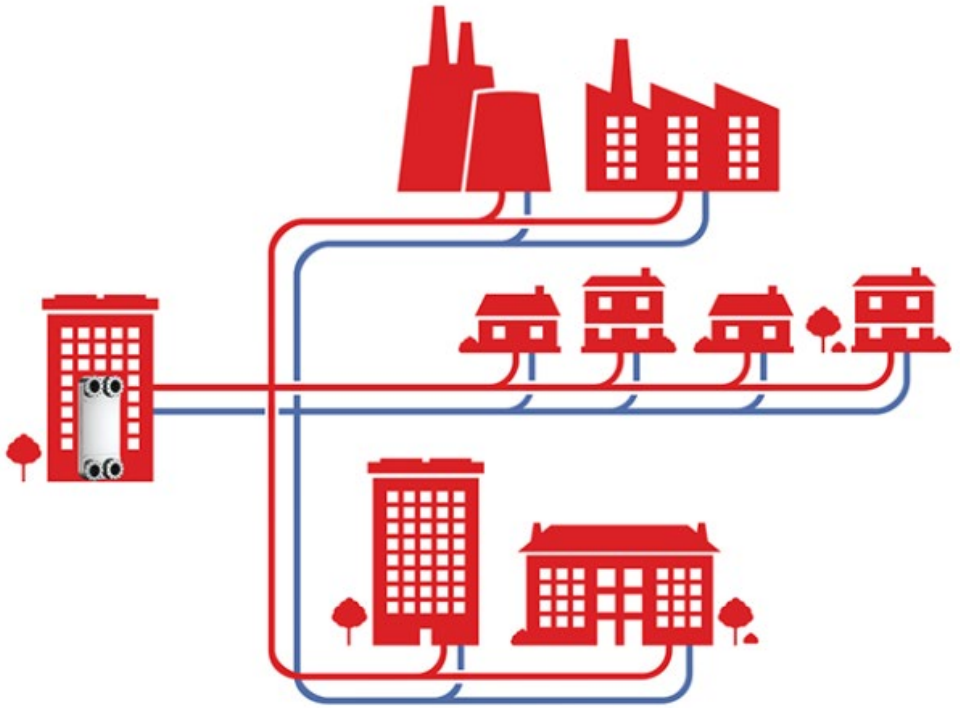
Smart district heating – 2030 vison for North Denmark

Objective

- Sustainable energy production, 100 % fossil-free power plants
- Energy efficiency
- Costumer and sevice orientated
- Low temperature DH
- 100% digitalisation of value chain
- Sector coubling with industry,
  - electrical production
  - agricultural sector
  - waste- and water sector

Partners

District heating companies
Municipalities and regions
Private sector
Universities and knowledge institutions



Courtesy of SWEP

Thank you for your attention

Covenant of Mayors Investment Forum

Brussels 18.10.2022

Thorkil Neergaard, CEO at Brønderslev Forsyning A/S, Denmark

INNOVATIVE CO-GENERATION OF DISTRICT HEATING AND POWER BASED ON SUSTAINABLE RESOURCES

Co-funded by the Horizon 2020 programme of the European Union

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Aalborg Kommune

Short facts about Brønderslev Utility Ltd.

- 100% Owned by the Municipality
- Founded as LTD-Company in 2007
- 34 Employees
- Turnover: 22 Mio. €
- Non-profit business model

Working areas:

District Heating	5.000 households
Water Supply	6.500 households
Waste Water Handling	15.000 households

Main Business Challenges

INDDHEAT: Masterplan - Aims for 2030

- 100% sustainable production
- Lowering DH-temperatures (60°/30°)
- More digitization
- Remote management of consumers DH-units
- More energy savings esp. in the network
- Less losses of water in Network
- SDG7 – a part of the strategy

The Big Picture

- **2014 :** Remote-readable heat meters installed
- **2015 - > :** Overall production strategy with new sustainable district heating production established and new BIO-CSP-ORC plant subsequently established.
- **2015-19:** Focus on "bad coolers" with less than 25°C cooling -> we got lowered T-Return by 5-6°C.
- **2019-22:** INDDHEAT-project:

  A new Master Plan:
  - Production optimization (continued lowering of forward and return temperature)
  - Analysis of future distribution area and sections
  - Renovation of pipes energy optimization
  - Strategy for placing peak load and emergency production
  - Consumer installations and behavior
- **2019-22:** HEATMAN project: "Digitalization of district heating "
- **2020:** New consumer-App introduced
- **2021:** Motivation tariff for billing of district heating introduced (30°C limit)

Main Productions units

New units in **Red**

Combined Heat and Power Units:

- 7 Gas Engines (natural gas), Total 22,8 MW^{power} and 30 MW^{heat}
- 1 ORC-unit, 4 MW^{power} and 16 MW^{heat}

Only Heat Production Units:

- 2 Gasboilers, 34,8 MW^{heat}
- 1 Electrical Boiler, 20 MW^{heat}
- 3 Heat Pumps for cooling of flue gas, 2 MW^{heat}
- 1 CSP Plant, 17 $MW^{heat\ (peak)}$

PV-Plant:

- 400 kWp power installed (+ new plant decided)

New sustainable productionconcept 2017

5 km parabolic sun troughs (”CSP”)
Peak effekt: 16.6 MWh

2 Biomass boilers a 10 MWh

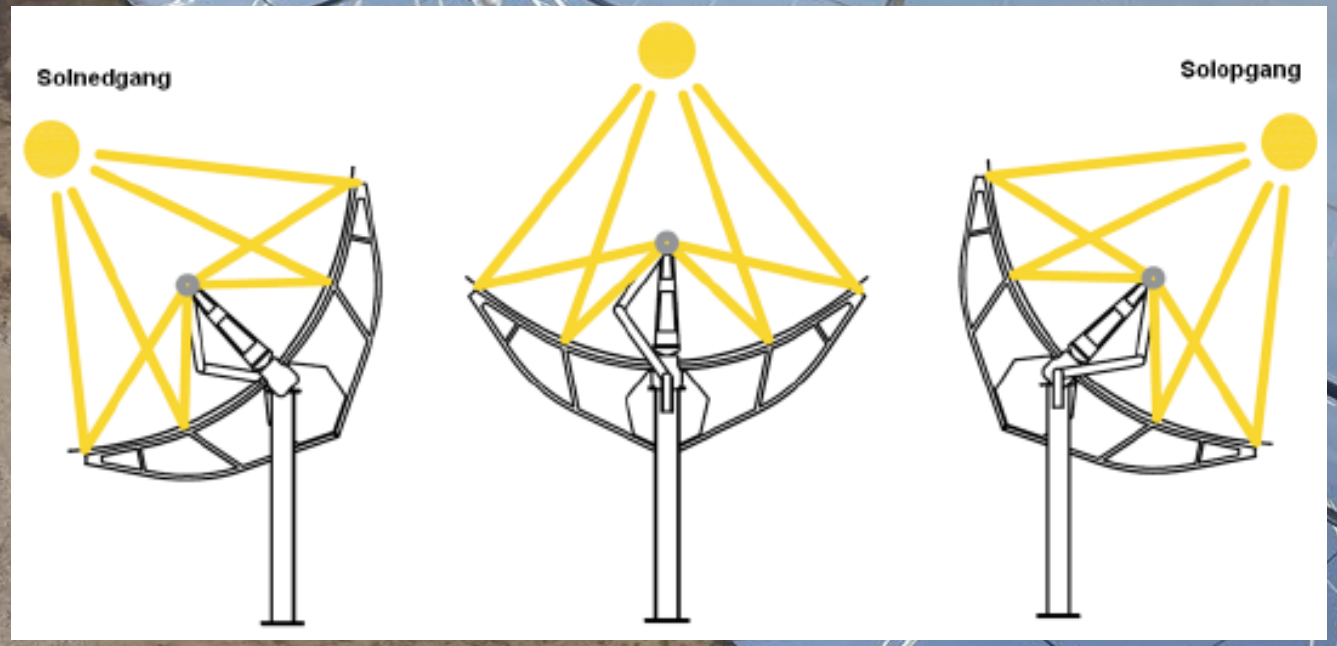
1 Powerproducing
ORC-turbine (4 MW-el)

3 Heatpumps

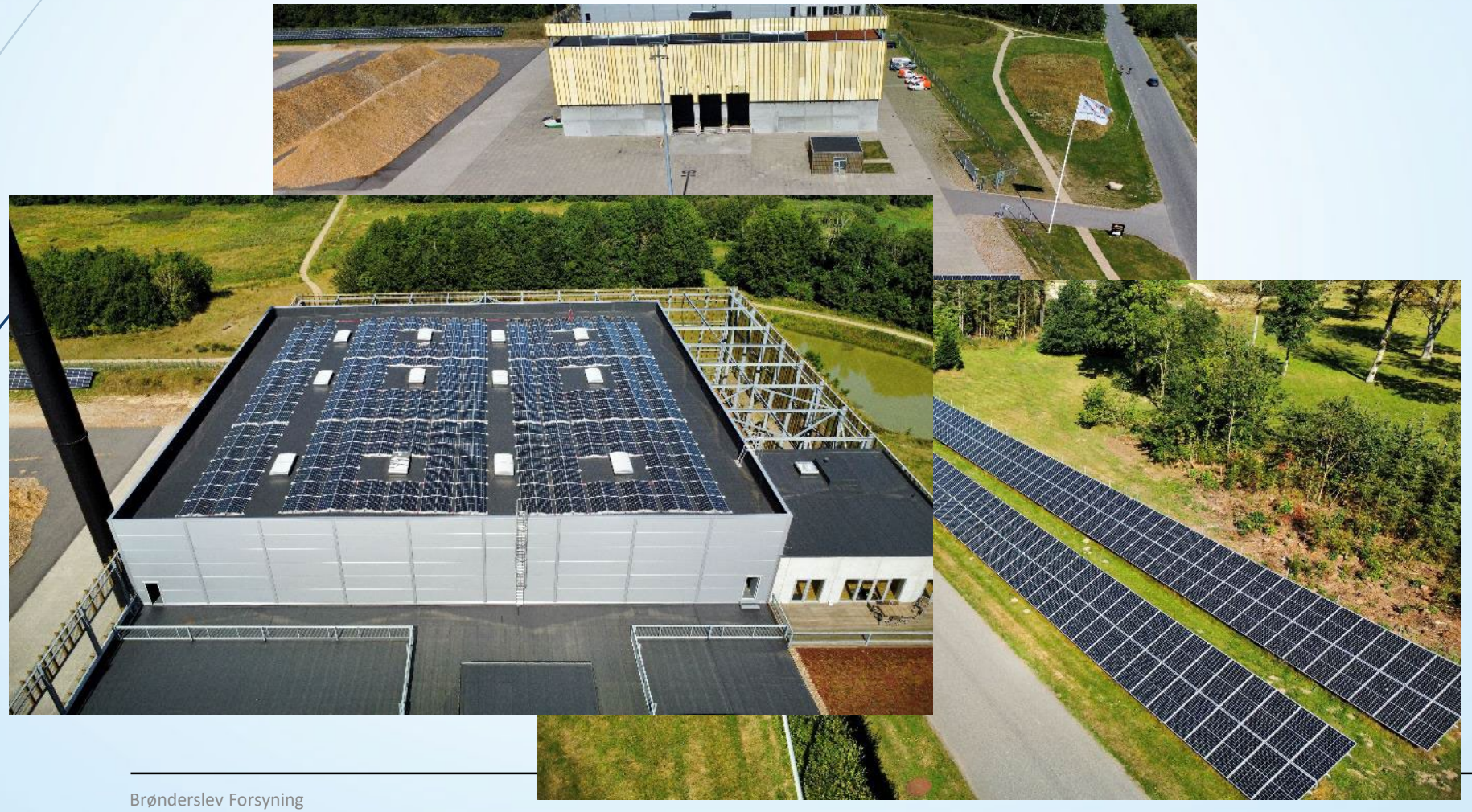
Biomass plant

- Two independent lines for flexibility

CSP Plant (Concentrated Solar Power)



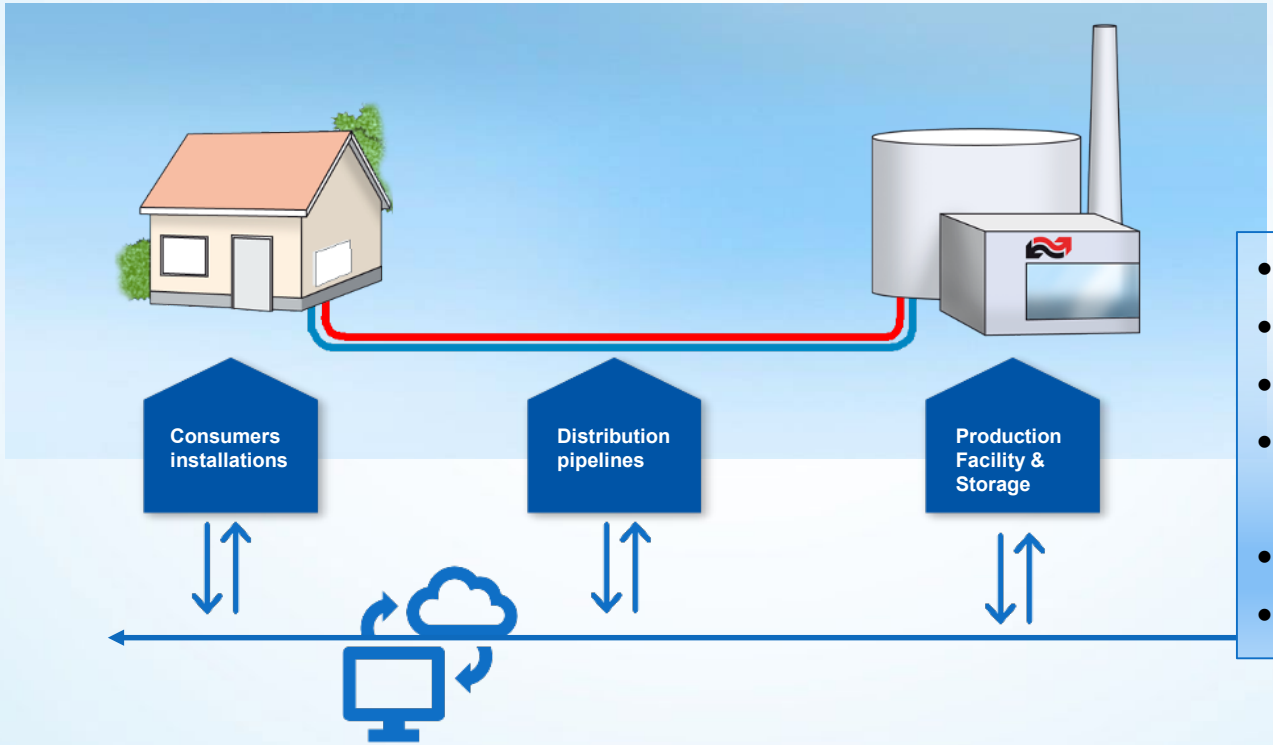
From 2022: A new PV-solar plant is added



SMART District Heating:

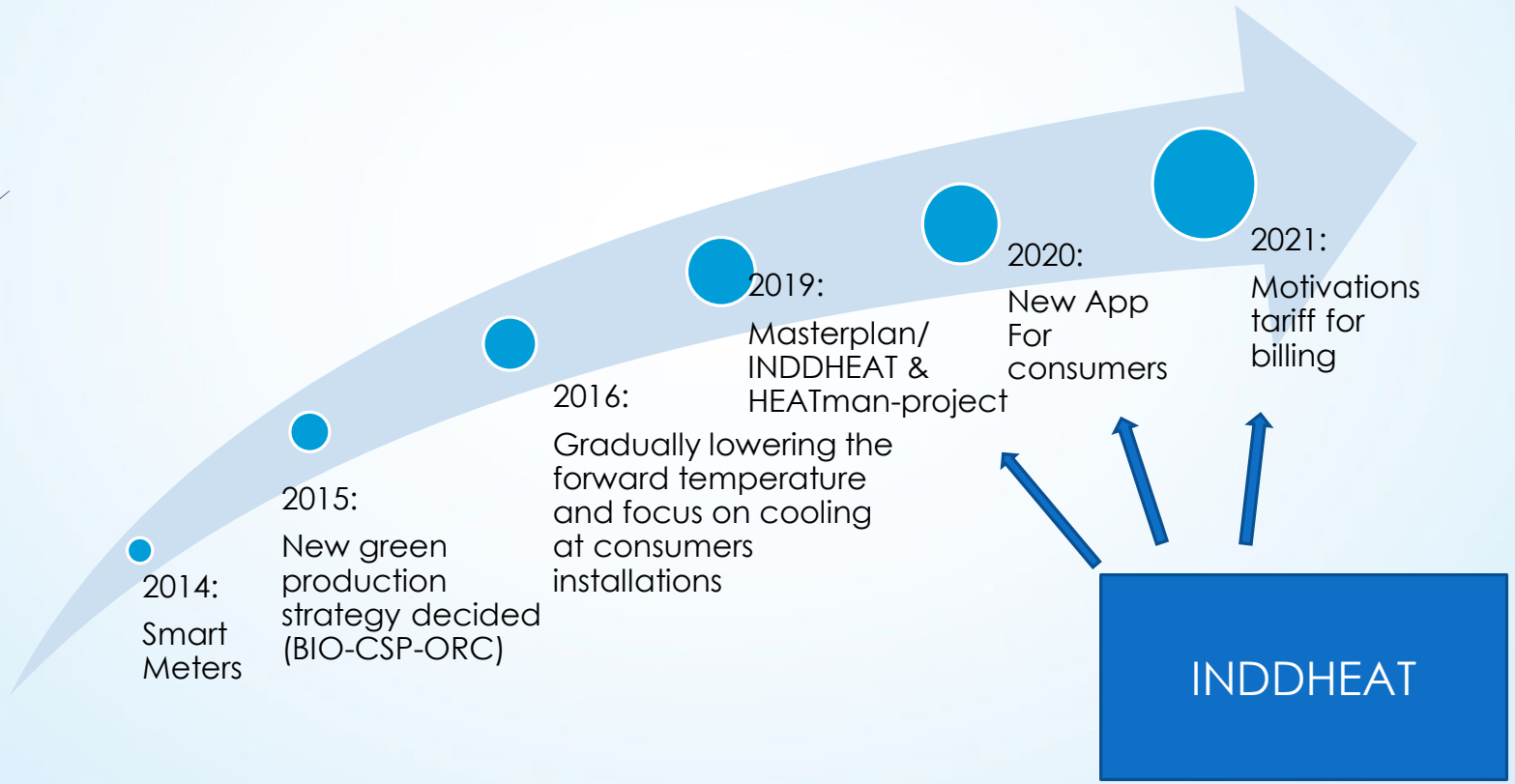
- New, sustainable concept: BIO-CSP-ORC
- "120 pct. Energi-efficiency"
- Production integreted with Power-grid (In/Out)
- Smart meters
  - Leakage Monitoring
  - Focus at high Cooling (delta T)
- Optimisation of Forward and Return Temperatures in Network
- High degree of interaction with Consumers

The Digital District Heating

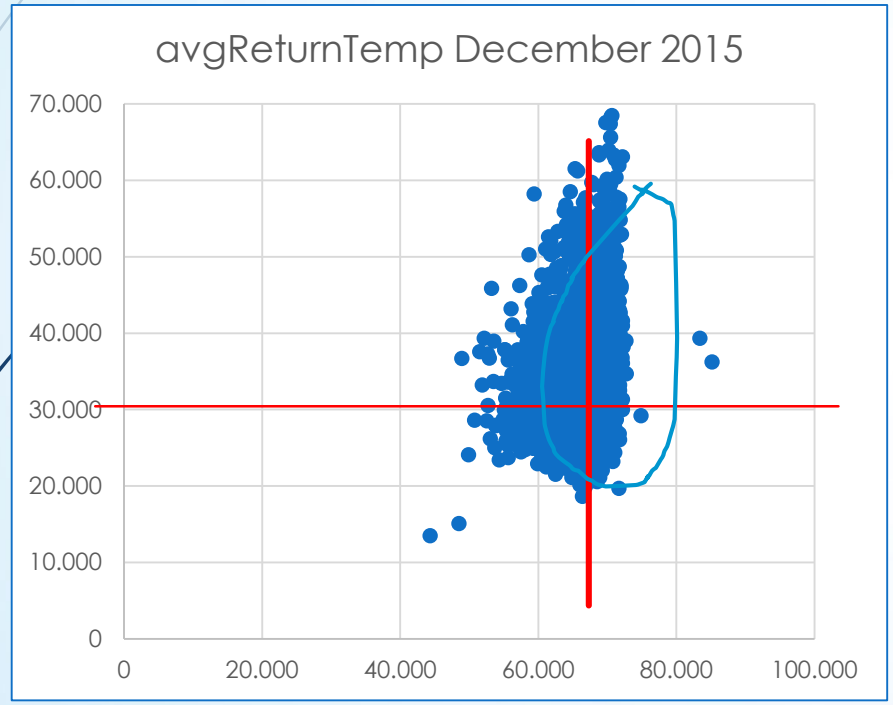


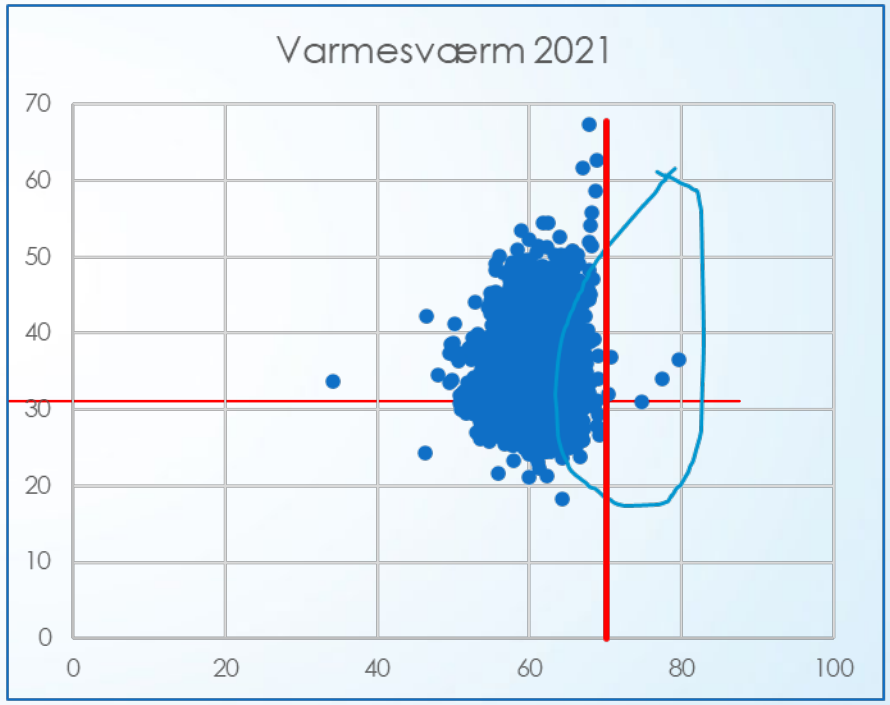
- Historical data
- Online data
- Weather forecast
- Electricity price forecast
- Measuring points
- …and more

Digitalization of Brønderslev District Heating
- an ongoing journey



"Heatswarm" december 2015 vs. december 2021



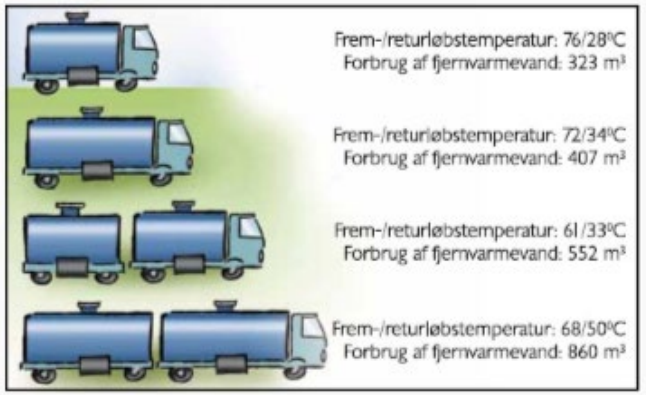


Source: Measured from Smart Meters

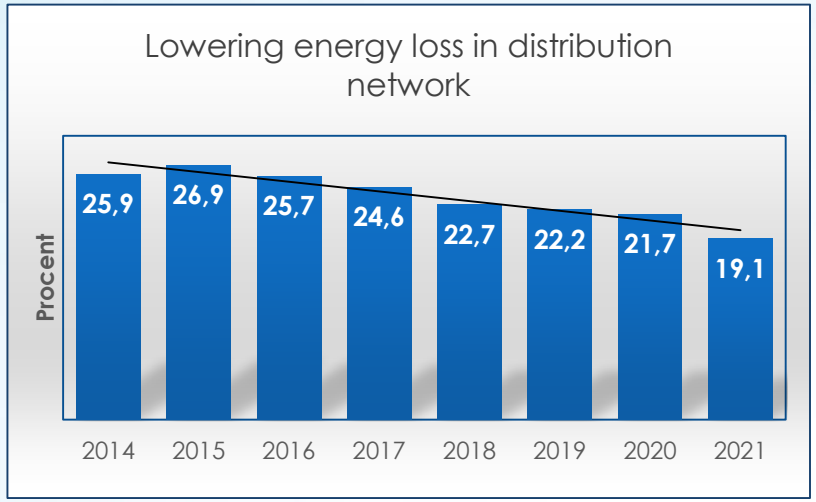
Better cooling of the water in the district heating system

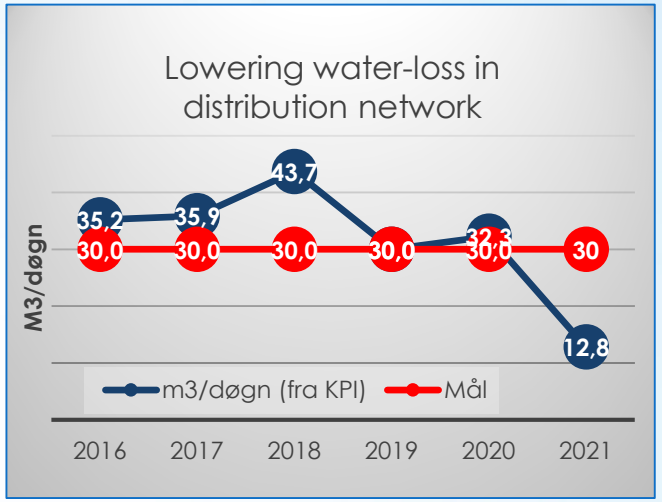
Focus from 2015 -> :
Lowering the average return temperature 5°C has reduced the running costs by DKK 2 million kr. = Each consumer saves 500 kroner a year.

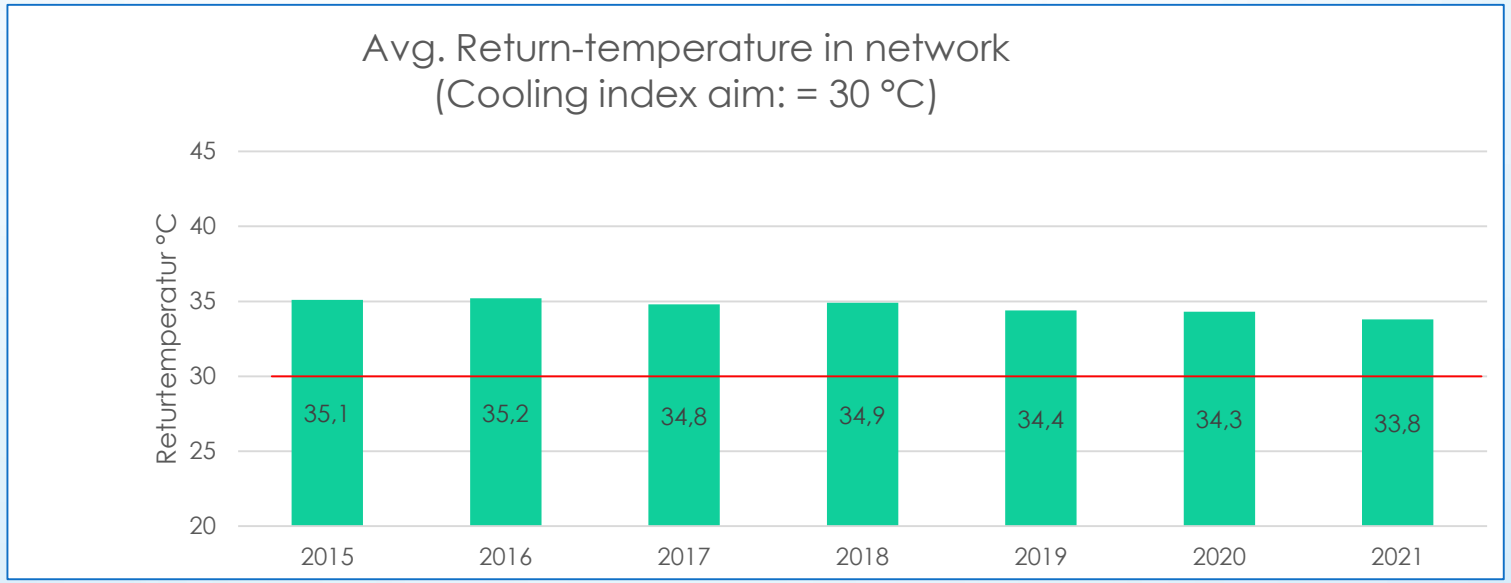
Old knowledge…but..



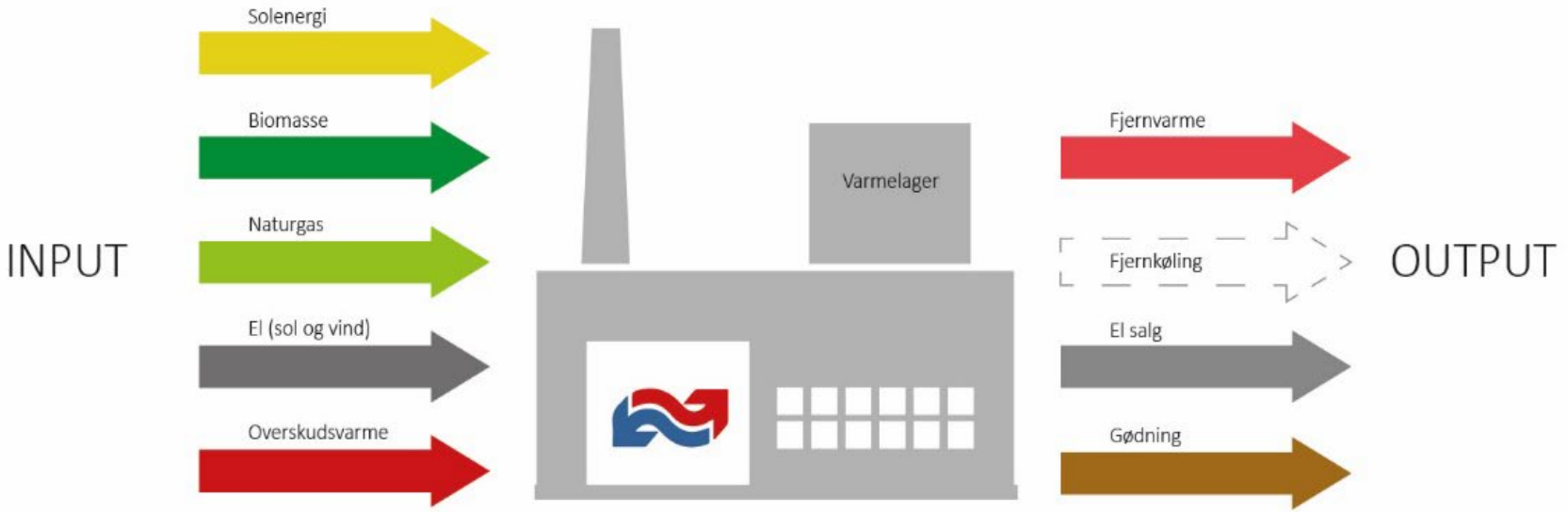
Other results







BRØNDERSLEV SMART ENERGY CONCEPT



BRØNDERSLEV FORSYNING

Thank you!

We are here:


Skagen
40
E39
Hirtshals
Ålbæk
Bindslev
Strandby
Lønstrup
Hjørring
Sindal
35
Frederikshavn
55
E45
Tårs
Løkken
Vrå
Vendsyssel
Østervrå
E39
Sæby
Jammerbugten
Brønderslev
Læsø Rende
Blokhus
E45
Pandrup
Aabybro
Dronninglund
Vodskov
Fjerritslev
11
Brovst
29
Aalborg
187
Nibe
Hals
Ålborg Bugt
Løgstør
29
Ranum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Prag
Luxembourg
Tjekkiet
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