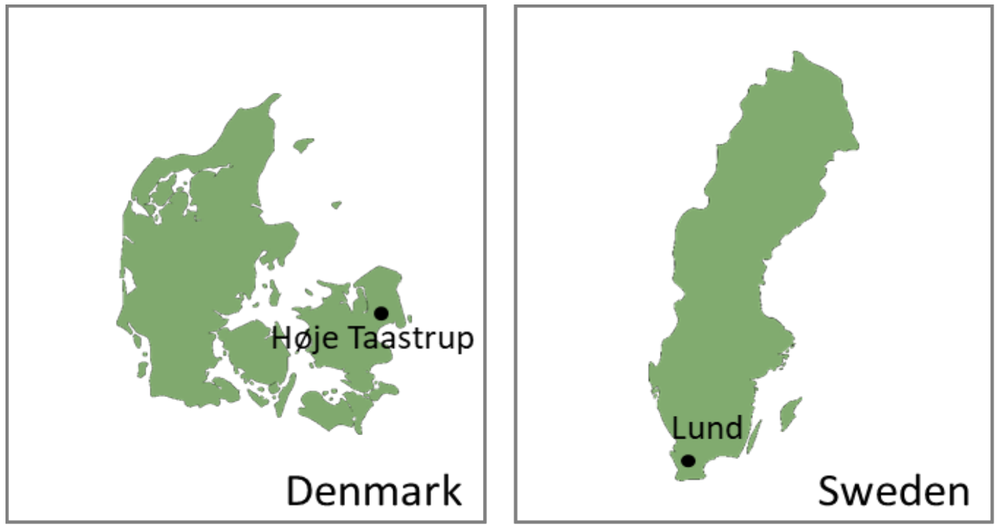
Distributed Heating Stations Supplied by a LTDH System

MONITORING & EVALUATION

"The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 767799-COOL DH- H2020-EE-2016-2017/H2020-EE-2017-RIA-IA"

Monitoring & Evaluation of COOL DH

- Energy performance (Losses, COP, Temp.)
- Environmental impacts (CO_2 Emissions)
- Economic analysis
- Social studies (Experiences, Feedback)
- ***Preliminary Results on this presentation***



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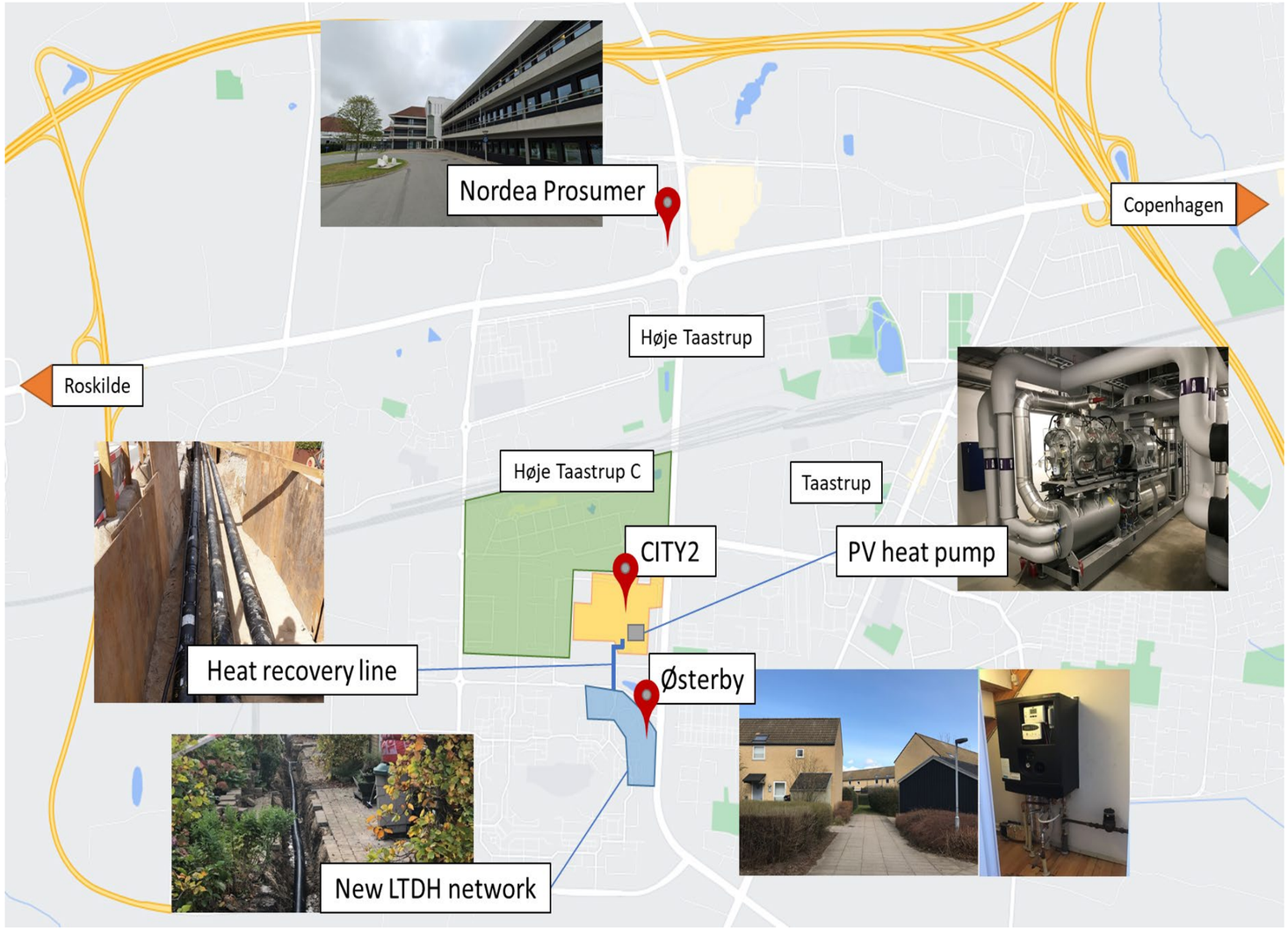
Høje Taastrup – Østerby

1. Converted LTDH network + Flat Stations (Hating Units)
2. Prosumer at Nordea

3. Heat recovery pipe
4. PV HP at CITY2



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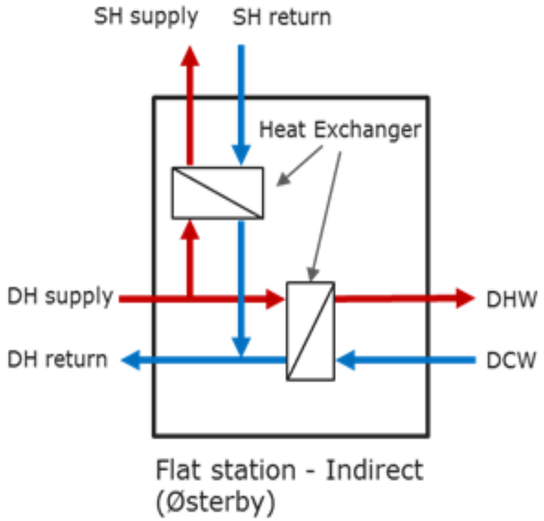
1. LTDH Network + Flat Stations (Heating Units)

- 158 houses + Kindergarten (13,000 m² heated area)
- Flat Stations are installed in the houses
- Built almost by PE-RT pipes (93% of 3119 m)



Flat station - Indirect (Østerby)

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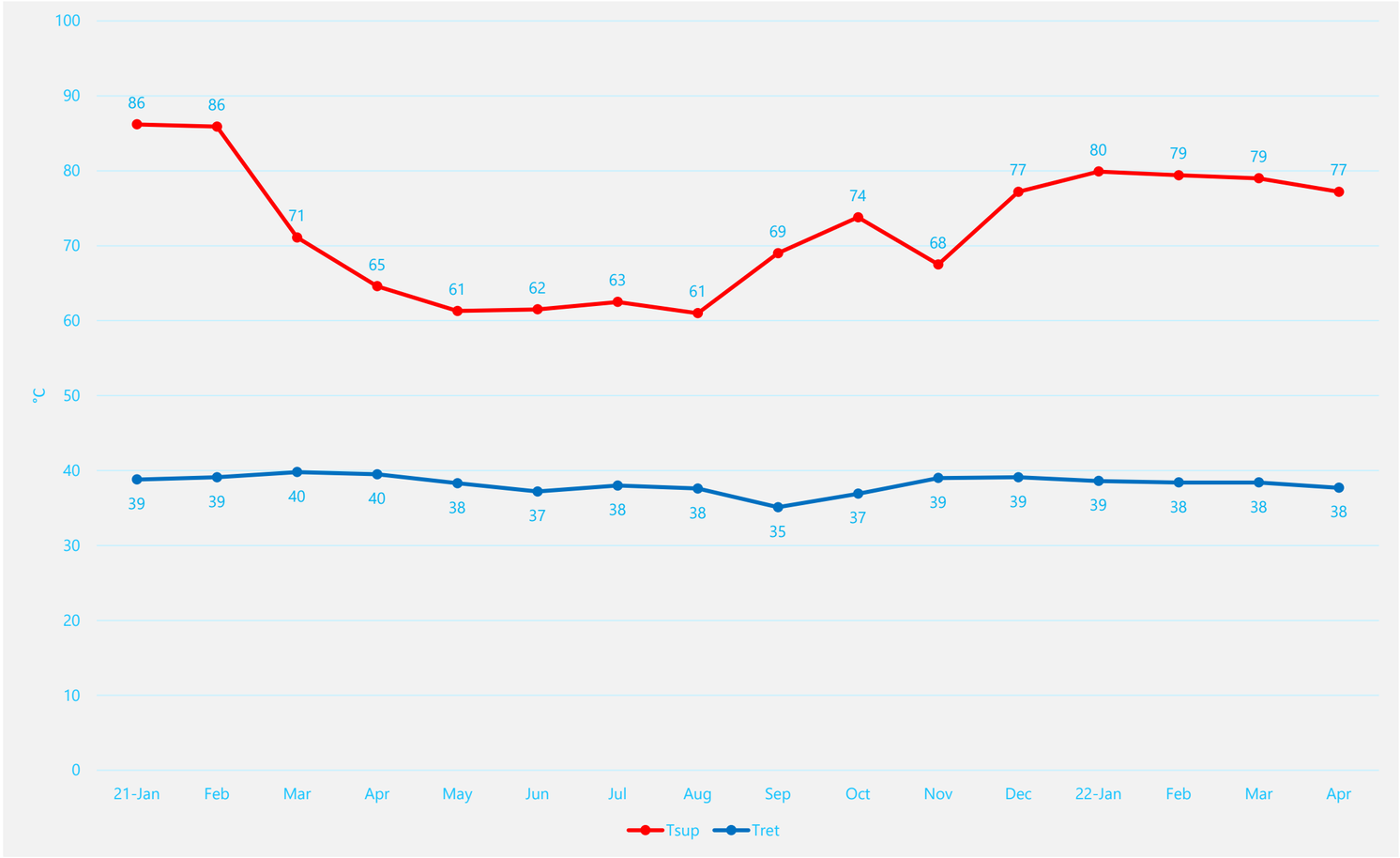
1. LTDH Network

- Started in March 2021
- Average LTDH Supply Temp. = 70°C
- Average Return Temp. = 38°C



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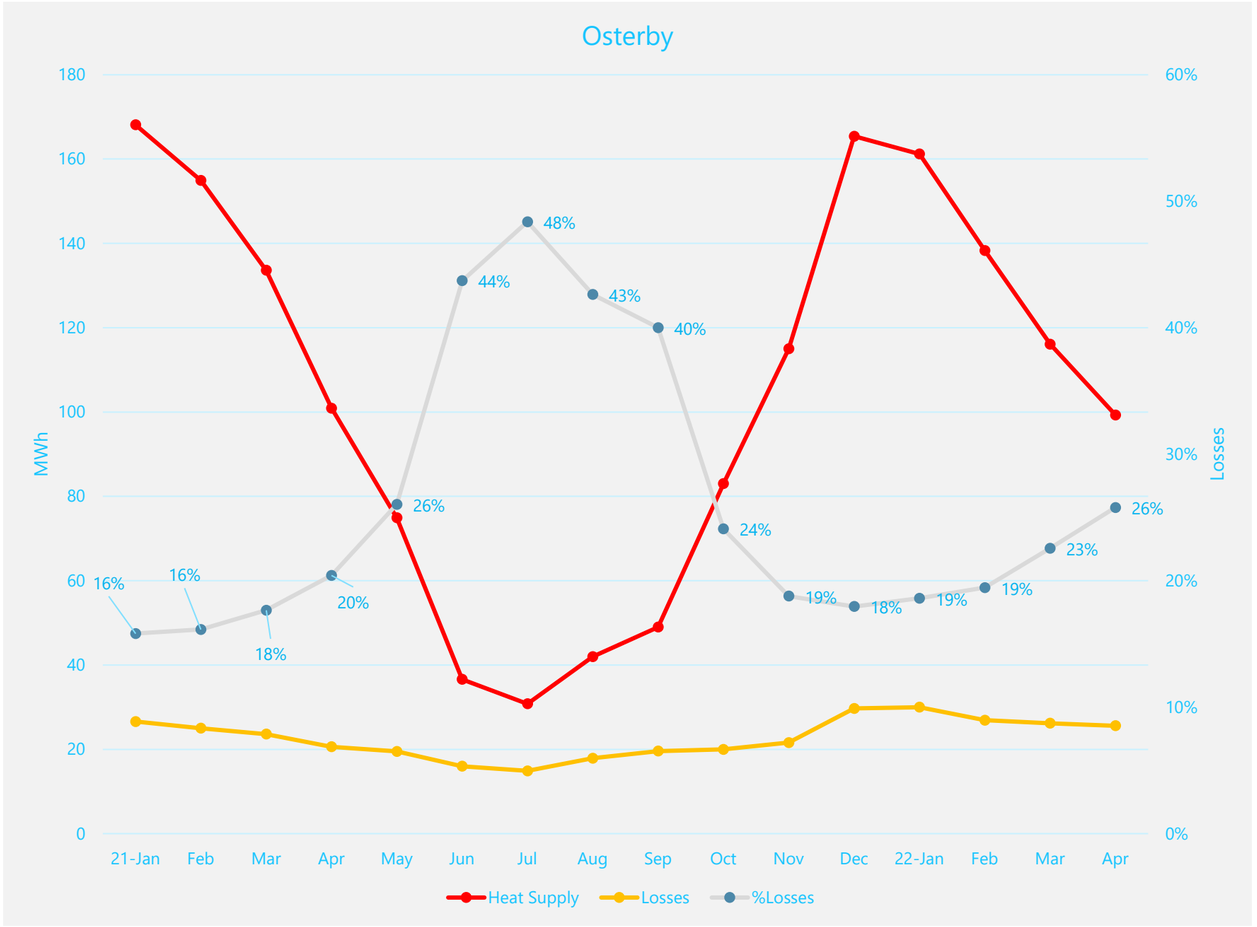
1. LTDH Network – Heat Profile

- Heat supply: 1.35 GWh
- Heat use: 1.05 GWh
- Improvements by reducing distribution temperatures from 70/40°C to 58/30°C



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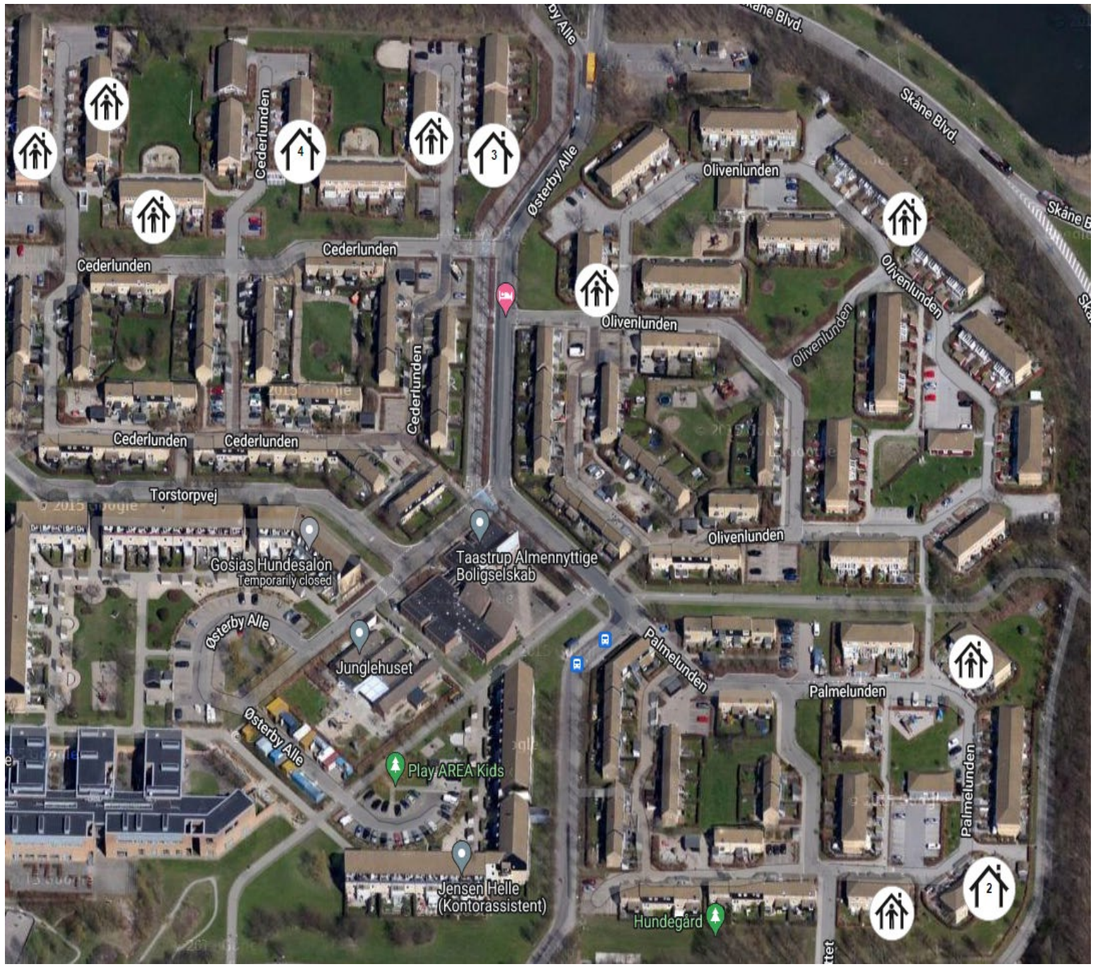
1. LTDH Network – Indoor Sensors

- Measuring indoor temperature in **11 dwellings**
- Compare before and after the project
- Not significant difference
- Minimum indoor temperature: **20°C in Nov. 2021**
- LTDH sys. meets comfort temperature for inhabitants



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1. Flat Stations– Economic Data

Flat Stations – DH Units	€ 270,000
Total (Units, Installing etc.)	€ 458,000
Total with VAT	**€ 547,000**
Average per unit	€ 3,500

- 2021 Customer pay: 2485DKK x 158 units = 392,630 DKK = **€ 52,700**
- Simple Payback = 547,000 / 52,700 = **10.4 years**

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1. LTDH Network – Economic Analysis

- Total Investment = **€ 2,000,000**
- Customer payment bill = 1,104,775 DKK = **€ 148300**
- Simple Payback = 1,996,000 / 148,000 = **13.5 years**

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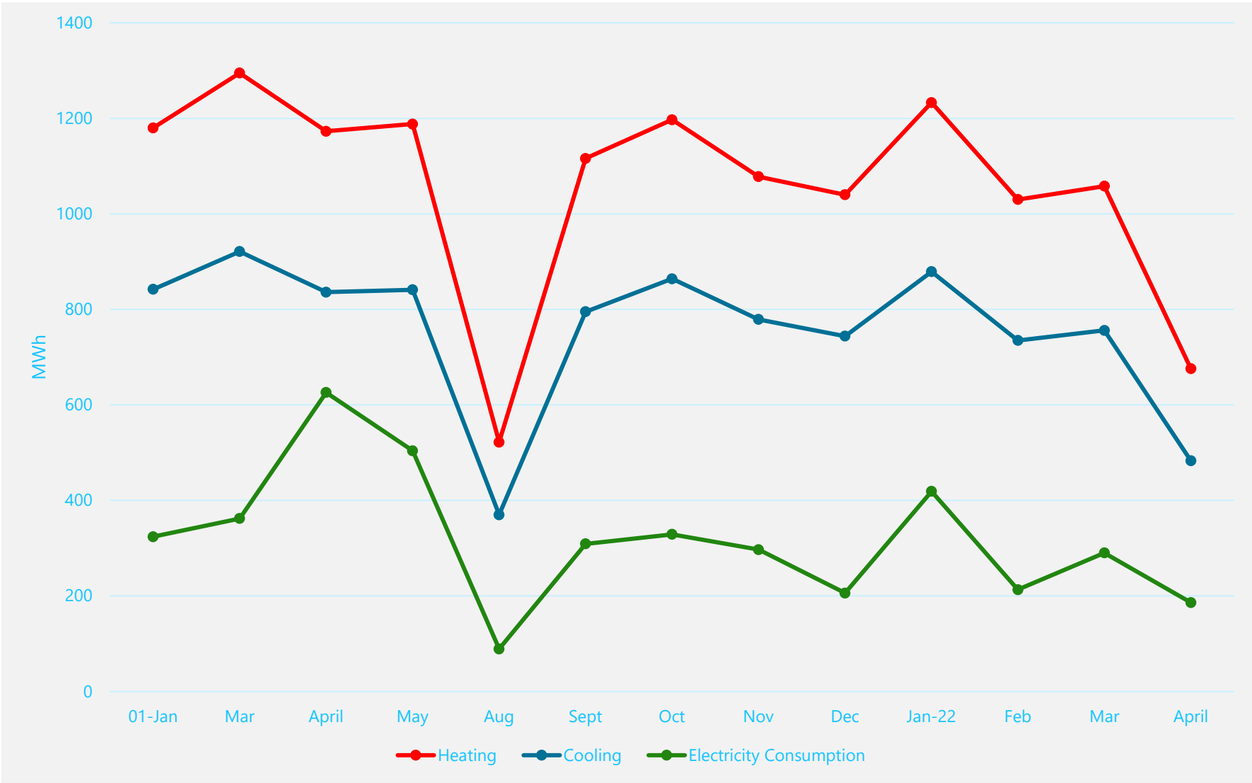
2. Prosumer: Nordea Data Center

- Exchange surplus heat of cooling with LTDH network

- **2021**
  - Heating Production = 9.8 GWh
  - Cooling Production = 7.0 GWh
  - Electricity Consumption = 3.0 GWh



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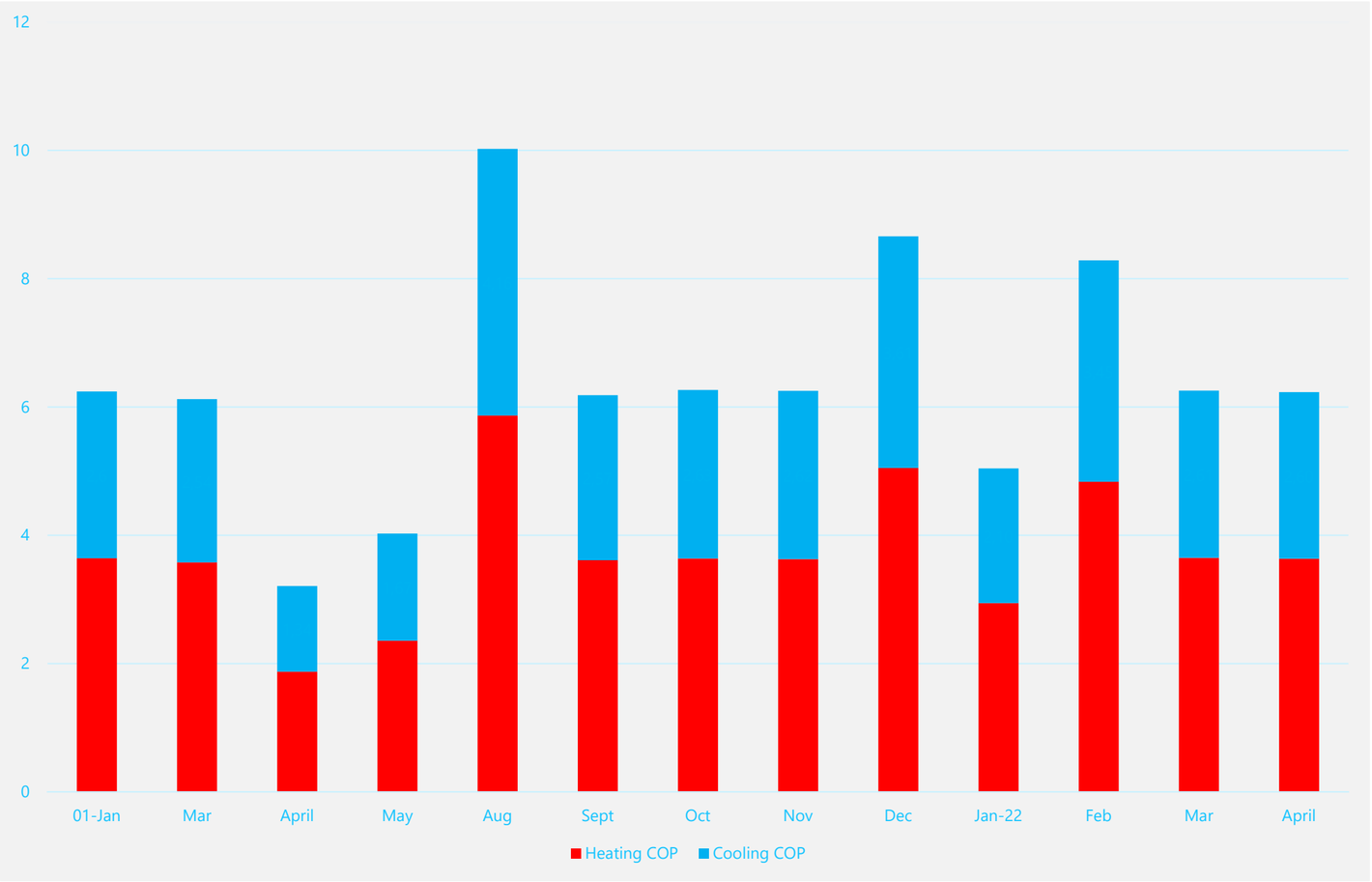
2. Nordea – HP Performance - 2021

- COP_h = 3.2 (73/43 °C)
- COP_C = 2.3 (9/14 °C)
- Total COP = 5.5



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2. Nordea – Environmental Impacts in 2021

- Reference values: *Heating: 54.5 kg/MWh ; Cooling: 80.75 kg/MWh; Electricity: 161.9 kg/MWh*

- **CO_2 emissions:**
  - (3000 x 161.9) – (9800 MWh x 54.5 kg/MWh) – (7000 x 80.75) = **- 614 tons**

- **If it would be in Lund**
  - (3000 x 41.9) – (9800 MWh x 11.4 kg/MWh) – (7000 x 1.3) = **+ 5 tons**

- **Primary Energy Saving (PES):**
  - Heating bonus method: 9.8 GWh
  - Allocation method: **6.1 GWh**

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2. Nordea – Economic data

- Total cost in project: **€ 1,610,000**

- Heat cost: 9800 MWh X 30 €/MWh = € 294000
- Electricity cost: 1750 (Allocated to heating) X 24 = € 42,000
- Annual saving: 294000 – 42000 = **€ 252,000**

- Payback = 1610000 / 252000 = **6.4 years**
- Heating bonus method: PB = 1,610,000 / 294,000 = ***5.5 years***

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Thanks For Your Attention

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