6th International Conference on Smart Energy Systems
6-7 October 2020
#SESAAU2020

Low-temperature excess heat recovery in district heating systems: Towards a potential of European Union metro stations

by

Helge Averfalk (presenter) & Urban Persson
Halmstad University, Sweden

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 767429.

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Background

- Part of EU-project: ReUseHeat
- Examining unconventional excess heat sources
  - Data centres
  - **Metro stations**
  - Service sector buildings
  - Waste water treatment plants
- Typically, low-temperature (<50°C), non-industrial excess heat

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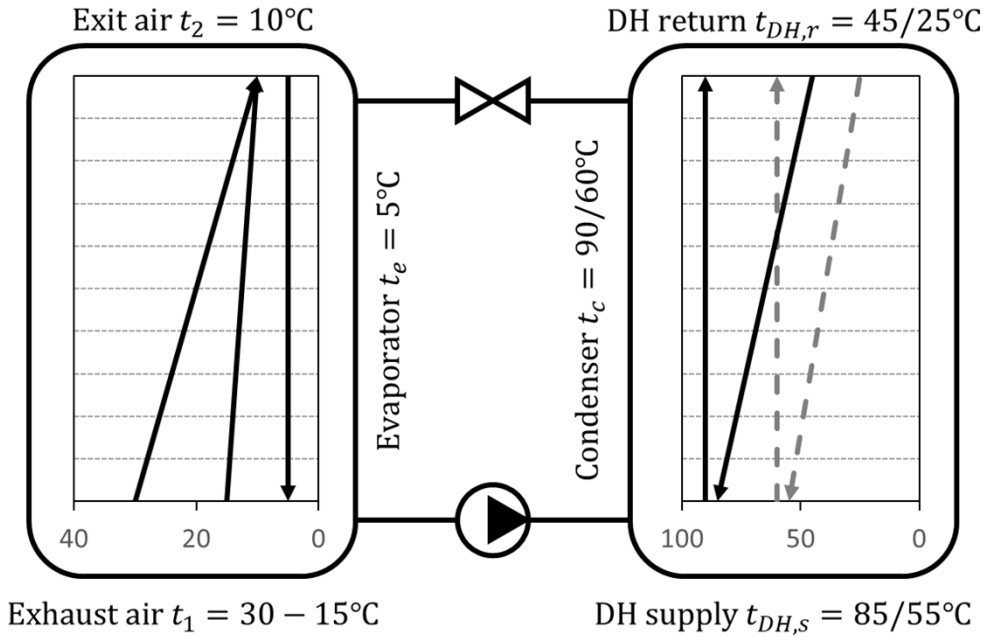
Technical assessment conditions



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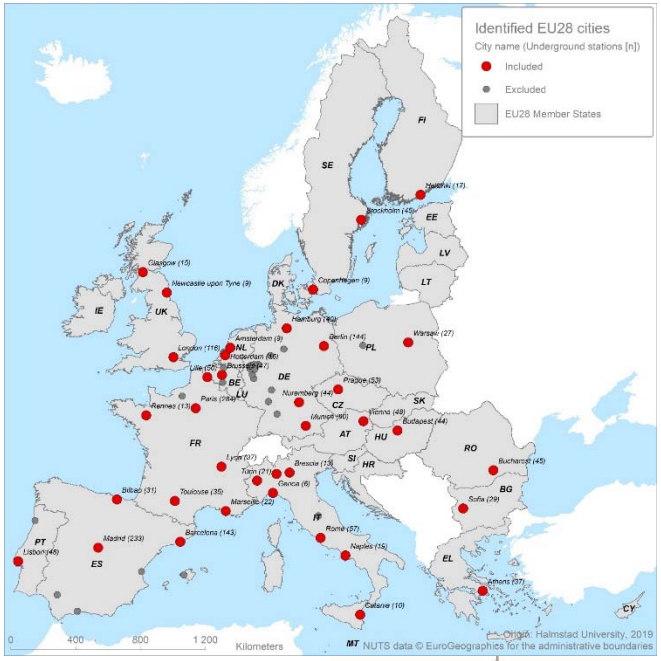
Mapping of cities with metro systems

- 37 cities with heavy rail systems
  - Total amount of stations 2677
  - Whereof 1994 underground
- In addition, 26 non-heavy rail systems where located (excluded)



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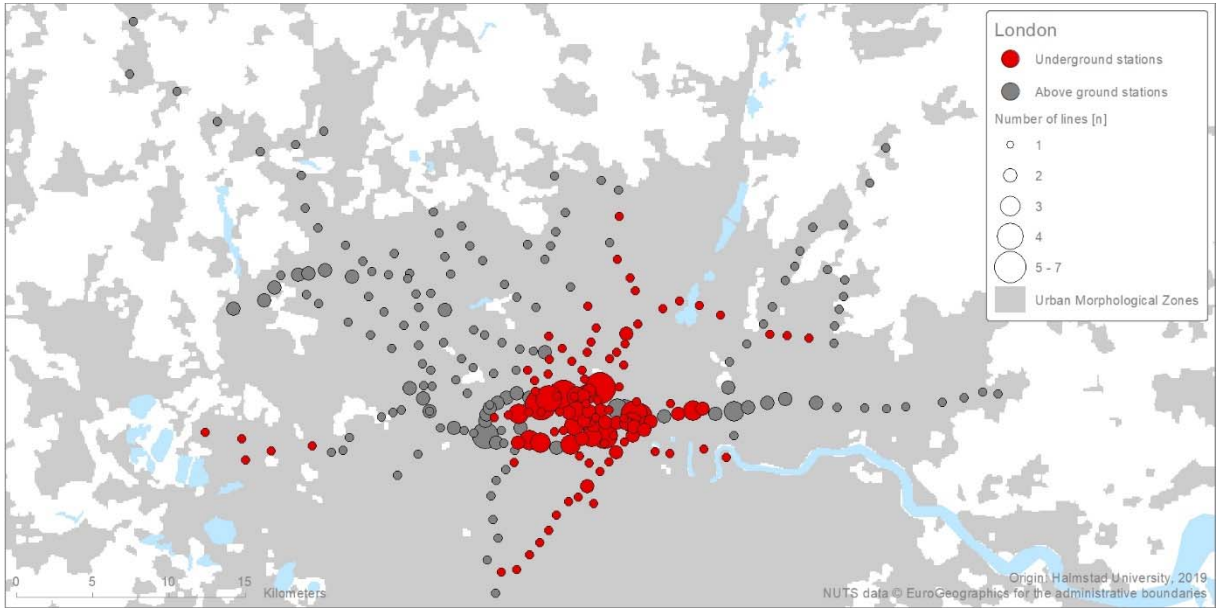
Mapping of metro system stations



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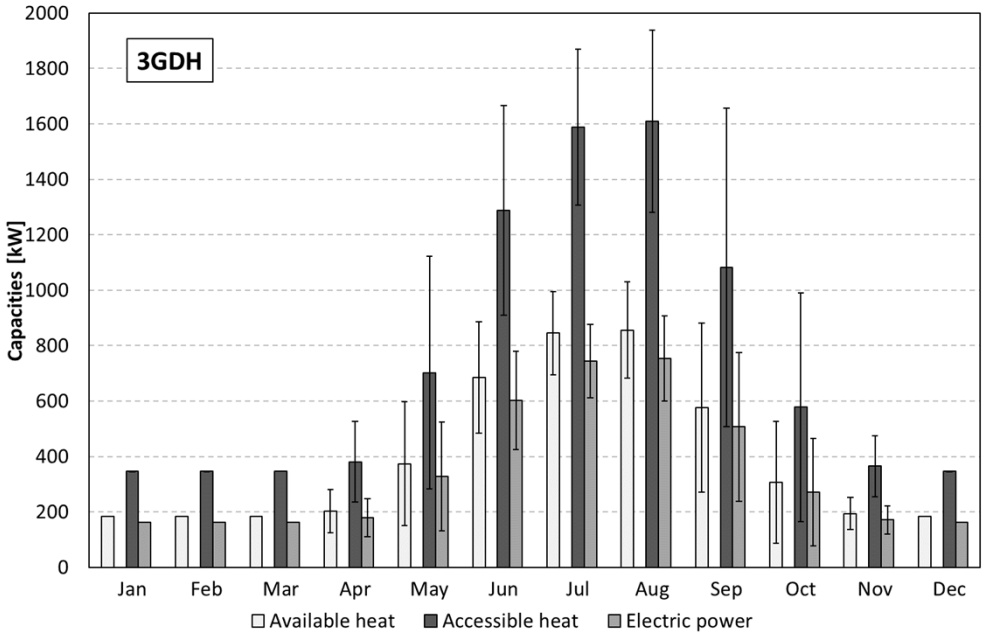
Heat recovery potentials, DH supply temperatures 85°C



Average COP
2.14

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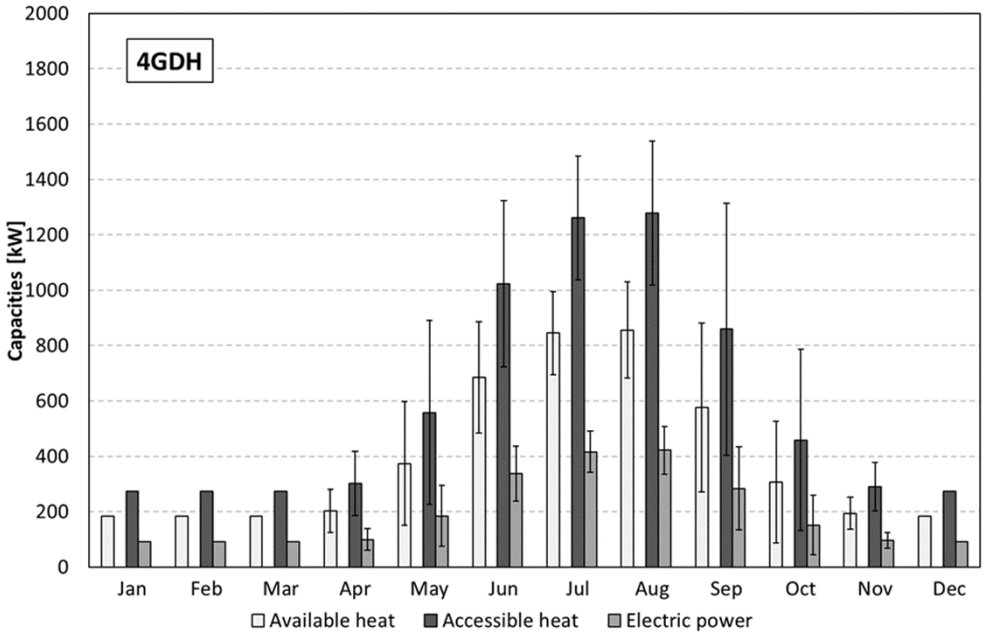
Heat recovery potentials, DH supply temperatures 55°C



Average COP
3.03
Power demands
~56% lower

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Conclusions

- Metro stations heat recovery potential is limited with respect to total heat demands within the European Union
- Under local conditions it may still be an interesting solution, however, individual local conditions is not the focus of this assessment
- Under 3GDH conditions, a potential of:
  - 40 PJ total heat, whereof 18 Pj_{el} (0.36% heat demand res. & serv. Sector)
- Under 4GDH conditions, a potential of:
  - 31 PJ total heat, whereof 10 Pj_{el} (0.29% heat demand res. & serv. Sector)

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