5th International Conference on Smart Energy Systems
Copenhagen, 10-11 September 2019
#SESAAU2019

Implementation of low temperature district heating systems

– Successful case studies of IEA DHC Annex TS2

IEA DHC|CHP

Dietrich Schmidt, Fraunhofer IEE/Germany

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Solutions for urban districts

Innovative heat supply on a community level

„Low temperature district heating is a key technology for an efficient integration of renewable energy sources and waste heat in our energy systems.“

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IEA DHC Annex TS2

Implementation of low temperature district heating systems

=> The purpose of Annex TS2 is to facilitate the wider *implementation* of 4GDH systems.

- Participating countries:
  Austria, Denmark, Germany, Norway, Sweden, and United Kingdom.
- Observing partners from
  Ireland and Korea

Coordination by Halmstad University/Sweden: Kristina Lygnerud&Swen Werner

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Demonstration projects from Annex TS2

- Demonstration of realized projects: New construction
- Demonstration of realized projects: Conversion and existing projects
- Demonstration of realized projects: Building scale
- Demonstration of simulation and design studies
- Demonstrators on lab scale

In total 39 demonstrators from 9 countries reported so far…

Examples…..

Woergl (AT)

⇒ Realised new construction

Low temperature secondary network for 20 affordable row houses (60/40)

- Innovative pre-fabricated piping systems
- Heat supply form industrial biomass plant and from 3 heat pumps
- Direct connection of the heating system

Benjamin Franklin in Mannheim (GER)

⇒ New construction and existing buildings

Smart thermal subgrid

- Integration of renewable heat (ca. 20%) from heat pumps / PV systems (ca. 25.000 m²) in addition to the classic district heating supply
- Heat pumps are operated with 100% PV power
- Utilization of surplus electricity in summer time for the operation of cooling machines
- Smart control of subgrids
- Modular expansion

Copenhagen Fredriksberg (DK)

⇒ Building scale

Return temperature optimization in cities

- Central substation including weather compensation
- Online control of substation
- Radiators are equipped with smart electronic thermostats and return pipe temperature sensor
- Optimisation of operation and monitoring

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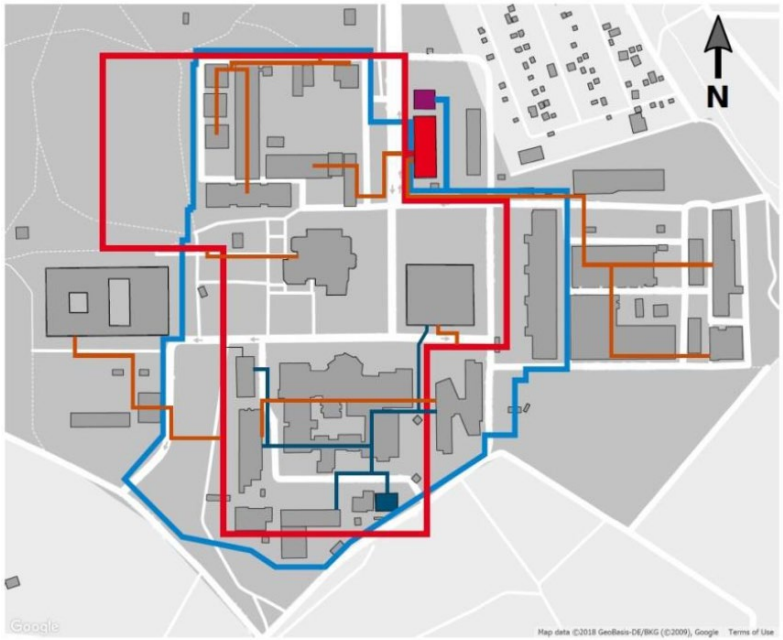
Darmstadt „Lichtwiese“ (GER)

⇒ Simulation study



Source: TU Darmstadt

Energy efficient campus Lichtwiese

- Heating and cooling network
- Based on monitoring a virtual model / digital twin has been up
- Strategy developed to reduce network temperatures
- Waste heat utilisation from high performance computer centre

See presentation for more details later

Sigtuna (SE)

⇒ Realised new construction

Low temperature neighbourhood (60°C supply)

- Solar heating parking (1000m² collector)
- Electric heat pumps with geothermal source

Lagarde District in Bamberg (GER)

⇒ New construction and existing buildings

Source: SW Bamberg and architects

Innovative energy supply

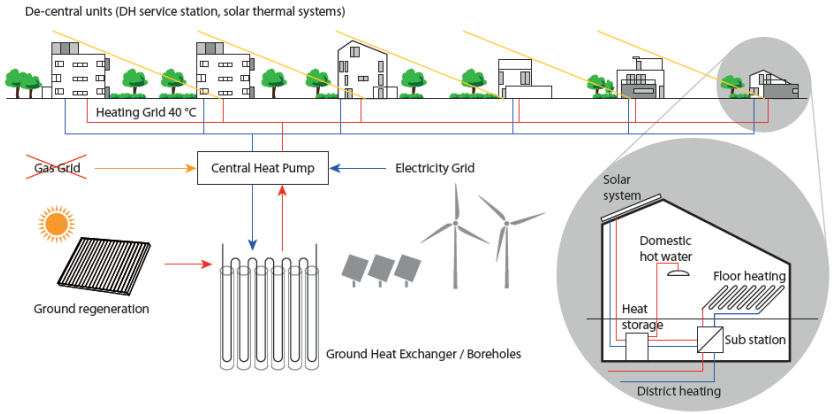
- Ultra-low temperature heating network (10°C) and conventional grid
- Different ground collectors, DH pipes and fresh water as heat source
- Heat pump on building level
- High temperature cooling for offices
- Sector coupling / e-mobility / PV

Kassel „Zum Feldlager“ (GER)

⇒ Simulation study

Geo-solar district heating

- Low temperature DH (40°C) with ground coupled HP and solar collectors
- Decentral DHW-preparation
- Solution for new housing areas
- New business and pricing models



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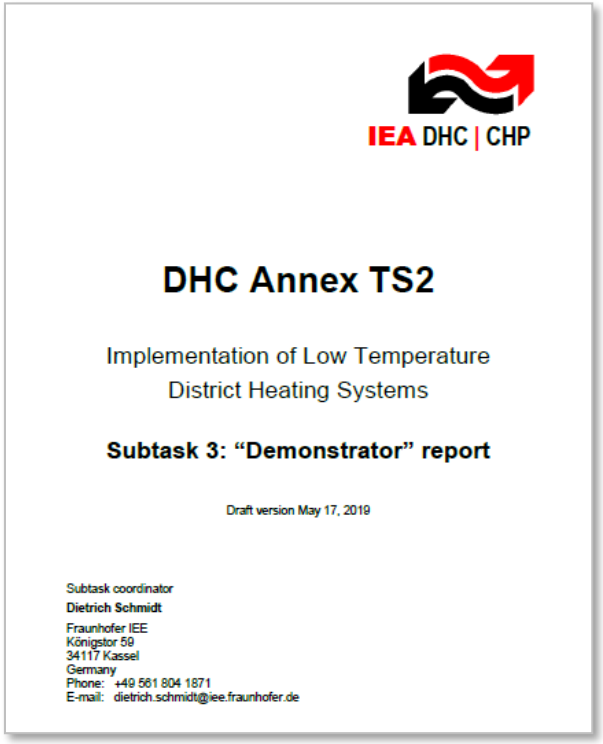
Internal „Demonstrator“ report

⇒ actual information on demonstrators



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DHC Annex TS2

Implementation of Low Temperature
District Heating Systems

Subtask 3: “Demonstrator” report

Draft version May 17, 2019

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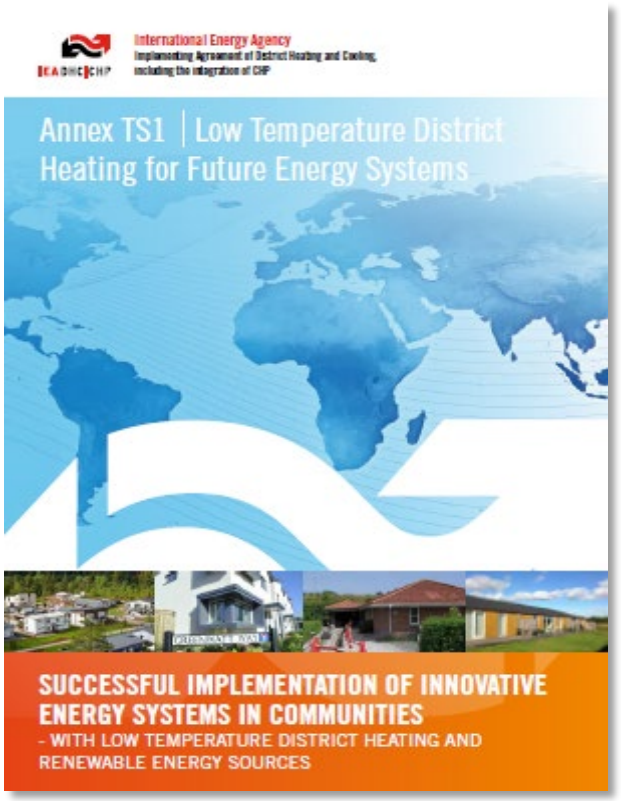
Work in progress…..

- Just an overview inside TS2
- Draft from May 18, 2019
- 191 pages
- Draft for the final report

Brochure of Case Studies

⇒ example from former Annex TS1



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Review/analysis of case studies from others

⇒ TS2 gross list with 132 identified cases

- Cases from different countries:
  Austria, Belgium, Canada, Switzerland, Germany, Denmark, Estonia, Spain, France, Ireland, Italy, Netherlands, Norway, Serbia, Sweden, Finland, Turkey, United Kingdom, United States

- Various system configurations:
  Innovative 3GDH, 4GDH with 2,3 & 4 pipes, ultra-low temperature, multi level supply, secondary grids, return temperature reduction….

- Work in progress…

Summary

- IEA DHC Annex TS2 is facilitating the wider implementation of 4G District Heating Systems
- Many successful implementation projects show that 4GDH is a proven technology
- Implementation cases in many countries & various system configurations
- Important/mandatory technology for the decarbonisation of the heating sector and for sector coupling!

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The new Annex TS 4:
Digitalisation of District Heating and Cooling:
Optimised Operation and Maintenance of District Heating and Cooling Systems via Digital Process Management

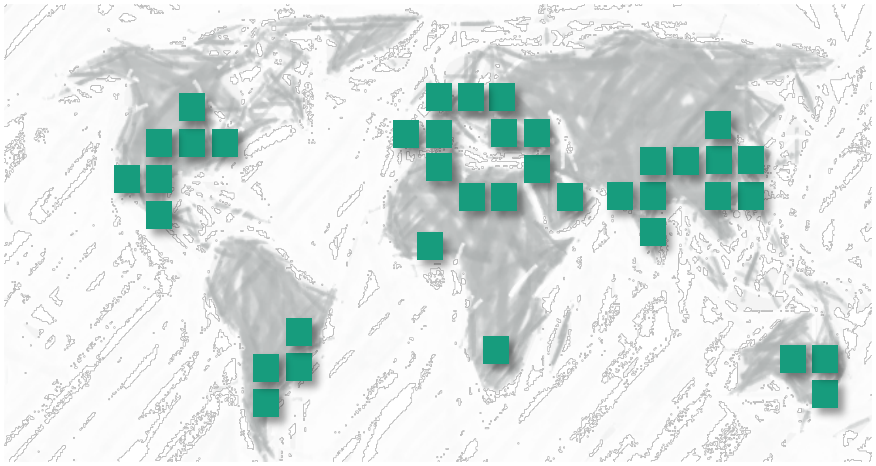
1st preparation Phase Meeting

September 12-13, 2019 at

DTU in Lyngby-Copenhagen/Denmark

www.iea-dhc.org

Contact



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