17 march 2022 | 8:30-17:30

POLICIES & INNOVATIVE SOLUTIONS FOR EFFICIENT DISTRICT HEATING

TownHall Europe, Square de Meeûs 5-6, Brussels
The Vision

- Demonstrate DHC networks, which are able to recover renewable and waste heat available at low temperature, i.e. lower than 40°C
  - Reduce supply temperatures
  - Focus is on the exploitation of the energy sources available within the urban context
No Energy Transition without Sustainable Heating and Cooling

Heating & Cooling represents 50% of the EU total annual energy consumption.

75% of EU citizens will live in urban areas in 2022, with an increase to 84% by 2050.
The Fit for 55 Package

- Published on 14 July 2021
- A comprehensive and interconnected set of proposals to deliver the “EU Green Deal” and its climate targets for 2030 & 2050
- More emphasis on heating and cooling
- Reinforcement of existing framework, further recognition that the recovery and use of WH is key for decarbonisation

Main proposals relating to waste heat (and DHC):
- Energy Efficiency Directive (EED)
- Renewable Energy Directive (RED)
- EU Emissions Trading System Directive (EU ETS)
Project Context

- Overview of the most relevant aspects of these proposals for the H&C sector
- Embodies the EE1st principle
  - Highly-efficient networks
  - 80% RES / WH
  - Integrate low-temp heat sources

Provide expert knowledge and input to the ongoing policy discussion and the revision of the chosen directives
Energy Efficiency Directive

- Applying the EE1st principle
  - Article 3 = more solid basis
  - Reducing fossil fuel consumption by lowering temperatures
    - Reduce heat losses
    - Integrate sustainable energy sources

- Energy savings obligations
  - Savings from fossil fuels excluded
  - Art 8 excludes savings in distribution
    - Focus on end-use savings
Energy Efficiency Directive

A circular approach: recovering waste heat

- **Conventional WH sources**: industrial processes
  - Potential to cover all our buildings’ H&C Demand (Source: Heat Roadmap Europe)

- **Unconventional WH sources**: service/tertiary sector (metro station, data centre, sewage, hospital, supermarkets)
  - low-temperature sources (<50°C) can cover more than 10% of cities’ H&C demand

Increasing interest in developing projects using waste heat from the tertiary sector

Implications for role of HP in the system
Energy Efficiency Directive

• Enabling H&C planning
  • Art 23 strengthens the Comprehensive Assessment and H&C plans in municipalities > 50,000

• Future envisaged
  • Municipalities <50,000 participate voluntarily
  • Involvement of all relevant stakeholders
  • Support from Member States and EU
    • Open-access technical tools available
    • Financing instruments
The Renewable Energy Directive (RED III)

**Renewable and WH Targets**
*REDIII Article 15a, 23, 24*

- Renewables in Buildings
- Renewables in Heating and Cooling
- Renewables in District Heating and Cooling
  - Set direction for Member States and operators but remaining distinctions RES/WH
  - REDII target is not being met
  - Greater ambition & action needed in H&C decarbonisation

**Toolbox for Member States**
*REDIII Article 23*

To achieve the res-H&C targets, article 23 lists a broad range of measures:
- renewable heat planning
- capacity building for national and local authorities
- inclusion of waste heat recovery
- risk mitigation schemes

**Cooperation on Waste Heat**
*Article 24*

Member States to set
**coordination frameworks between waste heat actors** to unlock potential of waste heat
- Potential for energy sector integration through digitalization and AI-management
- Coordination b/w DHC operators and TSO/DSO

→ Set direction for Member States and operators but remaining distinctions RES/WH
→ REDII target is not being met
→ Greater ambition & action needed in H&C decarbonisation
EU ETS

• Fossil fuels used in buildings now covered in ETS 2
• Level playing field across the H&C sector
• Applies to DHC installations ≤ 20 MW

• DHC Installations > 20 MW remain in ETS 1
• HPs users currently ‘penalised’ through ETS 1

• Easy implementation & clear scope
• Address decarbonisation of H&C and building efficiency
• Distribution should reduce fuel poverty (SCF)
Conclusions

➢ Make use of waste heat

➢ Define waste heat in legislation

➢ Make waste heat recovery standard

➢ Put a price on carbon that reflects the future damage costs
REWARDHeat

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Thank you
www.rewardheat.eu

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Policies & Innovative Solutions for Efficient District Heating

TownHall Europe, Square de Meeûs 5-6, Brussels
Roundtable 1: Realising the potential of renewable DHC through European policy

Pauline Lucas  
Policy Manager  
Euroheat & Power

Ralf-Roman Schmidt  
Senior Research Engineer  
Austrian Institute of Technology

Amélie Ancelle  
EU Policy & Project Officer  
Energy Cities
Technology Panel - District Heating & Cooling and Thermal Storage

Strategic Research Priorities

Ralf-Roman Schmidt (Chairman) (AIT, Austrian Institute for Technology GmbH)
• Waste Heat
  • Boost the recovery and use of waste heat in DH networks, to help decarbonise cities
  • Develop new technologies for utilization of high and low temperature waste heat in industrial systems

• District Cooling
  • Develop cooling networks’ design and solutions integrating recovered and renewable energy sources and exploiting synergies with existing heating infrastructure
  • Support R&D to test innovative concepts (such as hybrid systems) and technologies
Research Priorities

• Thermal Energy Storage
  • Improve the performance of above ground and underground energy storages
  • Enable TES technologies for a large variety of heat sources and to adjust them to a large range of DH characteristics
  • Boost the market deployment of large and cost-effective sensible TES in DH systems

• Low-temperature DHC
  • Minimise the operating temperature in DHC networks by developing multi-source district heating, higher temperature district cooling and optimization of building heating systems
  • Reduce the return temperatures in existing DH networks
Research Priority Objectives

• Energy System Integration
  • Increase the short-term flexibility of DH and DC networks and enable its efficient utilization
  • Develop innovative business models that enable energy systems integration, favourable to all involved stakeholders
  • Study innovative market designs and support schemes towards energy systems integration

• Digitalisation
  • Generation and update mechanisms for digital twins on the basis of digital information to replicate real-life plants accurately.
  • Approaches to realize a data market and data governance models
  • Integration of production, distribution and consumption to exploit flexibility potentials
Contact: Ralf-Roman.Schmidt@ait.ac.at
EU policies & potential of DHC

Towards 100% emission-free DH systems

Speaker: Amélie Ancelle – amelie.ancelle@energy-cities.eu

Event: REWARDHeat & Celsius Policy Workshop
14
- First district heating in Chaudes-Aigues (FR)
- Major developments started mid 20th century

50
- % of heat demand which could be covered by DH by 2050
- Current % of heat demand covered by DH = 12%

100
- Goal: only renewable and waste heat by 2050
- Currently, disparities from 0% to 80%
Roadmaps towards fossil-free H/C systems

Decarb City Pipes 2050

- 7 cities
- 7 with gas grids
- 7 including DH as a solution
- 2 without existing DH networks
- 6 roadmaps
- 100% decarbonised urban H/C systems
- 2050 the latest for net-zero emissions

March, 17 2022
CHALLENGES TO OVERCOME

1. Mapping & Planning
2. Renovation & Urban development
3. System integration & Waste heat
17 March 2022 | 8:30-17:30

Policies & Innovative Solutions for Efficient District Heating

TownHall Europe, Square de Meeûs 5-6, Brussels
Roundtable 2: Local actions for a sustainable heat supply

Riccardo Battisti
Senior Project Manager
Ambiente Italia

Aksana Krasatsenka
Head of Knowledge Transfer
DHC+ Platform

Matteo Pozzi
Partner and General Manager
Optit
The Celsius Initiative

Accelerate the **energy transition** through the deployment of **smart** and sustainable heating and cooling solutions in cities and accelerating their **market uptake**.
Celsius Stakeholder Survey

✓ Analyse stakeholders’ awareness and understanding of DHC and its role in realising the EU’s climate and energy objectives

✓ Relevant stakeholders include the European institutions and the wider EU policy community, representatives of civil society, industry and academia
Organisation type
53 responses

How much do you know about district heating & cooling (DHC)?

- 45.3% I am an expert
- 54.7% I know a bit
- 13.2% I don't know anything about DHC

- Academic - University / Institute / Research
- Consultancy - Engineering / Design / Consultancy
- Utility / Operator
- Association / Federation
- Municipal Sector - City / County
Topics Important to Achieve a Fast Heat Transition in Cities

- CO2 taxation or similar market signals
- Citizen engagement
- Municipal heat plans
- Building renovations
- Public subsidies, targeted financing and investments
- Political will on local, regional and national level
- Fuel switch: hydrogen and other green gases to heat buildings
- Fuel switch: waste heat and cold
- Fuel switch: solar thermal and geothermal
- Fuel switch: DHC and heat pumps to heat buildings

5 (very important)  4 (important)  3 (neutral)  2 (rather not important)  1 (not important at all)
District Heating and Cooling Networks are...

- A well-known technology that requires modernisation
- An established and future-proofed technology in urban areas
- It's an old technology that is still improving with different generations
- An old and well-tested method to achieve system efficiency
- An important technology that can be modern (4GDH) but also out-dated (1GDH)
- A key to a successful Energy Transition of the heating sector
- Promising
District Heating and Cooling Networks are...

- Depends on the local conditions
- should be running on renewables but they need to transition like all other energy systems
- must be transformed to low-temperature distribution systems with high shares of waste heat or renewable heat
- Currently not good enough but have a large potential for decarbonisation
District Heating and Cooling Networks are...

- some are inefficient but the path to make them more efficient is well documented
- Efficiency is related to system age and energy sources
- Efficient when exploit renewables and low temperature fluid
- very varied, but should all be brought to high performance
District Heating and Cooling Networks are...

- we need to be aware that not all are operating in a green way - coal, gas and out of date and inefficient systems
- This is dependent upon the energy sources and system efficiency
- Highly efficient with the potential to be green
- a key infrastructure in cities
District Heating and Cooling Networks are...

• there will be the future only if the boundary conditions allow in some countries
• part of an integrated fully electrified (renewable) energy system
• important not to forget the past (especially all the warmth DH brought, even if not done in a most efficient way)
DHC networks support the energy transition. DHC networks are the most cost-efficient way to decarbonise heating systems in European cities.

Only some district heating networks (efficient, renewable-based, ...) support the energy transition.

District heating systems empower cities to tap into their locally available renewables and waste heat for their citizens.

Biomass should make an important contribution to the decarbonisation of Europe’s district heating grids.

Most existing district heating networks must be modernised and made more efficient.

There is little or no place for district heating systems in the future energy system.

District heating systems support the wider energy transition, including the growth of RES electricity, by providing storage and balancing services to the grid.

City administrations are best placed to decarbonise their local heating and cooling systems.

District cooling will grow in scale and importance in the coming decades.

District heating networks need to be decarbonised at a much faster rate than is currently the case.

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Rate the Statements

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Today, DH accounts for about 13% of the heating and cooling in Europe. According to you, which role will district heating and cooling networks play in the future energy system, especially in cities?

53 responses

- Will increase: 98.1%
- Will remain the same: 1.8%
- Will shrink: 0%

Funded by the European Union’s Horizon 2020 Programme

Swedish Energy Agency
Save the date for the Joint ReUseHeat-Celsius Final Conference!

7 September 2022
L42 Business Center, Brussels, Belgium
Join us!

Celsius Initiative

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Celsius Initiative

Funded by the European Union’s Horizon 2020 Programme
Local actions for a sustainable heat supply

Policy workshop - roundtable

17th March 2022 - Brussels
A multi-faceted perspective on local action planning and implementation

Provision of Decision Support Systems based on Mathematical modelling and Advanced Analytics to optimize DHC plant & network operations and development

Best practices and demo case experience in several countries aiming to upgrade and modernise DH systems across the whole value chain

Support to the Secretariat as Vice-Chair of the DHC+ platform, with particular focus on digitalization and sector integration
As part of the “National and Regional Action Planning” activity included in the UpgradeDH project, the Italian Association for Urban Heating (AIRU) presented at a large web conference in October 2020 the study of the Politecnico of Milan and Turin regarding the potential for DH in Italy (currently 3% of Heat Demand). This research showed:

• **DH is the most viable/valueable option for 12% (x4) of current demand, leveraging on geothermal, waste heat, solar thermal and CHP**

• **DH is technically applicable to 35% of total demand (x10+)**

Effective uptake is made difficult by several national regulations that distort the market:

• **DHC not included as part of “super-bonus” incentives, that distorts the market favouring (for instance) local gas-fuelled condensing boilers**

• **DHC excluded from measures to support customers in view of the increasing energy costs (VAT reduction)**
Planning the right investments to balance future demand and supply

Several Utilities are investing on integrating new local heat resources to decarbonise the energy mix, through a combination of:

- **Waste heat recovery** from thermal plants, industry, WTE, data centres, ...
- **Heat Pumps** installation to exploit (green?) electric energy at low price
- **Adapt/expand the network** to exploit this extra capacity

Planning should account for **technical-economic optimisation**
Digitalisation is becoming a key enabler for Operational efficiency

- **GENERATION**
  - Plant optimisation
  - Sector integration

- **DISTRIBUTION**
  - Network management
  - Maintenance optimisation

- **FINAL USER**
  - Customer involvement
  - Multi-Energy community
Optimizing production mix with increasing RES and sector integration

**PLANT CONFIGURATION**

**LONG TERM (YEAR)**

**SHORT TERM (NEXT DAYS)**

**FORECASTING**

**TRADING (SAME DAY)**

**SYSTEM INTEGRATION**
- Field data
- Market data
- Price estimates
- Economics
- Weather forecasts

**STRATEGIC DECISIONS**
- Investments
- Sensitivity (what-if)
- Budgeting

**OPS DECISIONS**
- Unit commitment
- Margin optimisation
- Automatisation

**TRADING DECISIONS**
- DA/SD adj. Trading
- Capacity markets
- XBID
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