BUSINESS PLAN

CEN/TC 107

District heating and cooling systems

EXECUTIVE SUMMARY

CEN/TC 107 was established in 1982 to develop European Standards at product level for factory made assemblies for straight and flexible pipes, fittings, valves, and joint casing systems for district heating (DH) pipe systems, for surveillance systems which are based on electrical (components) and for design and installation of straight pipe systems.

In 1993 it was decided to also develop a standard for design and installation of directly buried straight pipe systems.

In 2012 CEN/TC 107 decided to expand its scope to include district cooling (DC).

In August 2023, a BT decision was taken to extend the scope of TC 107 to also include district heating and cooling at a system level. Establishing a standardization framework at system level is essential to support the integration of district heating and cooling (DHC)" solutions and a cost-effective transition to a fluctuating energy system based on several different renewable sources.

The CEN TC 107 business plan has been revised to reflect this extension of scope. The main justification for this extension has been the EU Fit for 55 package that provides the regulatory instruments for the European Union to reduce its greenhouse gas emissions by 55% by 2030 and is expected to drive forward the integration of sustainable heat sources and enhance system optimization synergies with other energy grids – called "system integration" or "sector coupling".

To support the ambitions of Fit for 55 it is necessary to revitalize CEN/TC 107 so that work is not only done on the standardization of factory made pipe systems, but in parallel, the focus is also placed on system optimization and energy system integration. A mindset where focus is on horizontal solutions across sectors as an alternative to the vertical thinking in separate sectors that often applies today. The future CEN/TC 107 will therefore consist of two parts - one existing part for "development of factory-made components, design, installation, commissioning and operation for DHC pipe systems" and one new part for "development of system optimization and energy system integration".

The committee will be the place to coordinate DHC aspects both at system- and product level in Europe at CEN level to facilitate dialogue, cooperation, and consensus-making between all relevant stakeholders.

Further, the committee will cooperate and coordinate with ISO/TC 341 District Heating Networks. To avoid overlap and double work appropriate projects should be developed under the Vienna agreement while at the same time ensuring a strong European footprint on global standards in line with the EU standardization strategy.

Background

The European Union has a climate target to become climate neutral by 2050 and a target to cut CO2 emissions by 55 percent in 2030. The objectives must be met through an extensive expansion of renewable energy sources based on wind, solar, biomass, geothermal energy, as well as the utilization of various forms of waste heat.

The EU Fit for 55 package contains measures to ensure that the EU climate targets are met, including revision of the directives on renewable energy, energy efficiency, and the Building Directive (EPBD). Further, the principle of "energy efficiency first" is one of the guiding principles of the EU's climate policy.

As a concept DHC provides for one of the most energy efficient solutions with the potential to utilize energy for heating purpose from multiple sources. It is a low-hanging fruit in terms of CO2 reductions and according to the Heat Roadmap Europe 2018[1] , DHC systems could supply 50 % of the European heat market by 2050.

The EU strategy on energy system integration[2] points to the importance of DHC in making the energy system more circular by utilizing the enormous amounts of waste heat from industrial processes and data centers in district heating. Moreover, waste heat from multiple energy sources like hydrogen production, wind or solar energy in a fluctuating energy system can also be utilized in the DHC system.

Further, to tap into the potential of DHC, new provisions in the energy efficiency directive require mandatory local heating and cooling planning for municipalities with more than 45.000 citizens.

Integration of DHC in the energy system is key to achieve Fit for 55 and the EU climate targets and break free from fossil import dependency, see the figure below.

1 Heat Roadmap Europe Quantifying the Impact of Low-carbon Heating and Cooling Roadmaps, EU Horizon2020 project, ref. arres(2018)5127516 - 05/10/2018.
2 EU Strategy for Energy System Integration COM (2020) 299 final, July 2020.

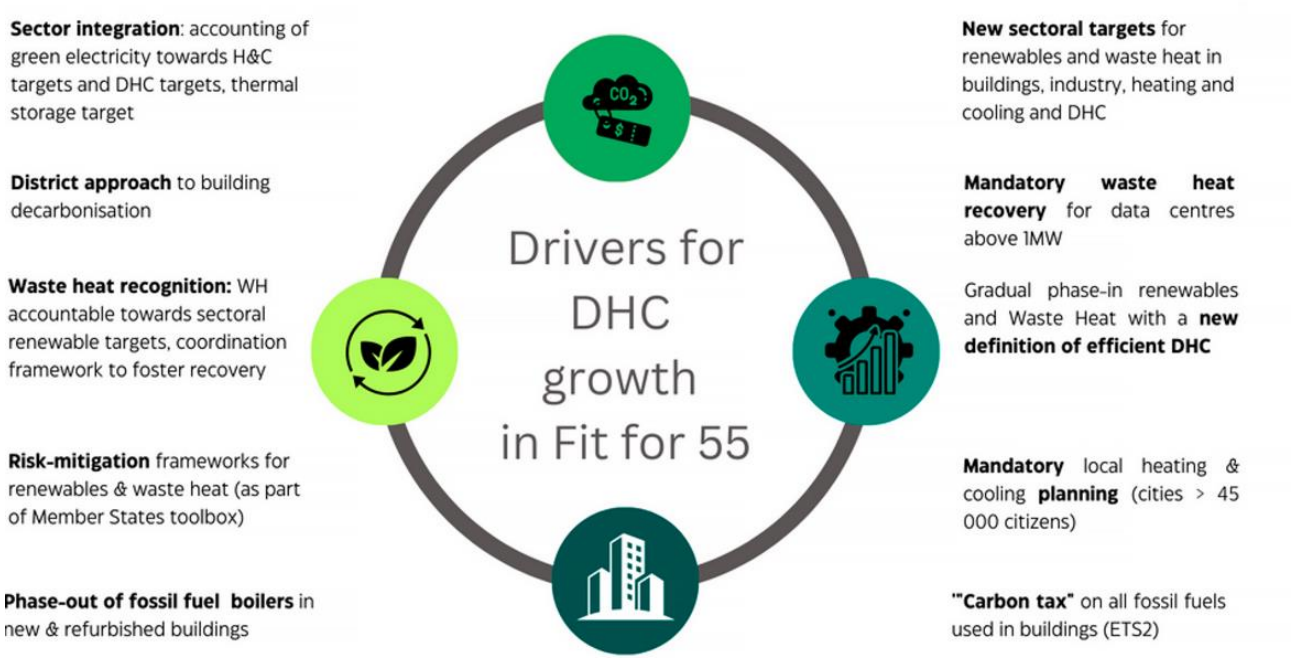

Illustration: Euroheat & Power: DHC Market – Outlook, Insights & Trends, May 2023

1 BUSINESS ENVIRONMENT OF THE CEN/TC 107

1.1 Business Environment for DHC systems

The scope of CEN/TC 107 has been extended to cover both DHC at product- and energy system level to support the implementation of the EU climate targets.

According to EHP[3] a total of 144 billion euros must be invested in EU district heating and cooling networks by 2030. To ensure that DHC is competitive with other energy solutions and offers an attractive solution for the consumer it is important to "get it right". Therefore, it is key to plan and implement future proof DHC systems ready for a fluctuating energy system based on several different renewable sources.

Standardization is an important tool to disseminate knowledge in the field of future proof DHC systems to support decision making regarding the development of existing and new systems including planning, financing, implementation, and operation. Integration of renewable energy and waste heat in district heating needs to be accustomed to local conditions, one size will not fit all. Consequently, guidance developed in the framework of CEN/TC 107 needs to provide for different scenarios.

The use of European standards has secured a necessary uniformly quality of equipment leading to longer lifetime of the components and better quality of the thermal insulation of the pipes systems leading to higher DHC operational efficiency.

[3] https://www.euroheat.org/news/fit-for-2050-unleashing-the-potential-of-efficient-district-heating-and-cooling-to-decarbonise-europe

DC is an environmentally optimized cooling solution, using natural resources like cold water or energies to produce compression and sorption-based cooling systems. At the same time DC helps to build a sustainable future and to achieve the CO2 savings in Europe's key urban centers.

1.2 CEN/TC107 structure

Current structure

The current structure of CEN/TC 107 covers DHC at product level and the work is organized in the following working groups (WG):

- CEN/TC 107/WG 2 Basic consideration
  Responsible for EN 253, EN 17248 and for the coordination between the standards from TC 107.
- CEN/TC 107/WG 3 PUR-foam properties
  Responsible for dealing with the properties of the polyurethane (PUR) foam thermal insulation.
- CEN/TC 107/WG 4 Joint casing systems
  Responsible for the maintenance of EN 489-1 and development of standards for examination of fitter and PE-welder.
- CEN/TC 107/WG 5 Fittings, Valves and Twin Pipes
  Responsible for the maintenance of EN 448, series EN 488 and series 15698
- CEN/TC 107/WG 9 PE Casings
  Responsible for dealing with the properties of PE-casings for straight pipe systems.
- CEN/TC 107/WG 10 Flexible pipe systems for DH
  Responsible for the maintenance of series 15632 and series 17878.
  Development of CEN/TS 17889 and future standards for joint casing systems and for design and installation of flexible pipe systems.
- CEN/TC 107/WG 11 Surveillance systems
  Responsible for the maintenance of EN 14419
- CEN/TC 107/WG 12 Polymer Service Pipes
  Polymer service pipe materials used for flexible pipes systems in district heating (se WG10).
- CEN/TC 107/WG 13 Pre-insulated DH pipe systems - Design and installation (for straight pipe systems)
  Responsible for the maintenance of EN 1391-1 and EN 13941-2.
- CEN/TC 107/WG 14 District cooling
  Responsible for the maintenance of series 17414 and series 17415.

Future structure

The future structure of CEN/TC 107 will consist of two parts - one for the "development of factory made DHC pipes, their design, installation, commissioning, and operation" and one for the "development of system optimization and energy system-integration" where the continued development of factory made DHC pipe systems is a prerequisite for the desired future system integration.

Concerning the development of system optimization and energy system-integration the focus will be on DH, but still DC is relevant in the bigger energy system integration perspective noting that development path for DH is more investigated and documented than DC and there could be situations where DH and DC should

be handled different in that perspective, including more energy system-wide synergies with DH and DC integrated in city districts and municipalities' energy plans.

The new scope of CEN/TC107 involving participation from all actors in the DHC value chain calls for a close dialogue, knowledge sharing, cooperation, and consensus as illustrated by the figure below:

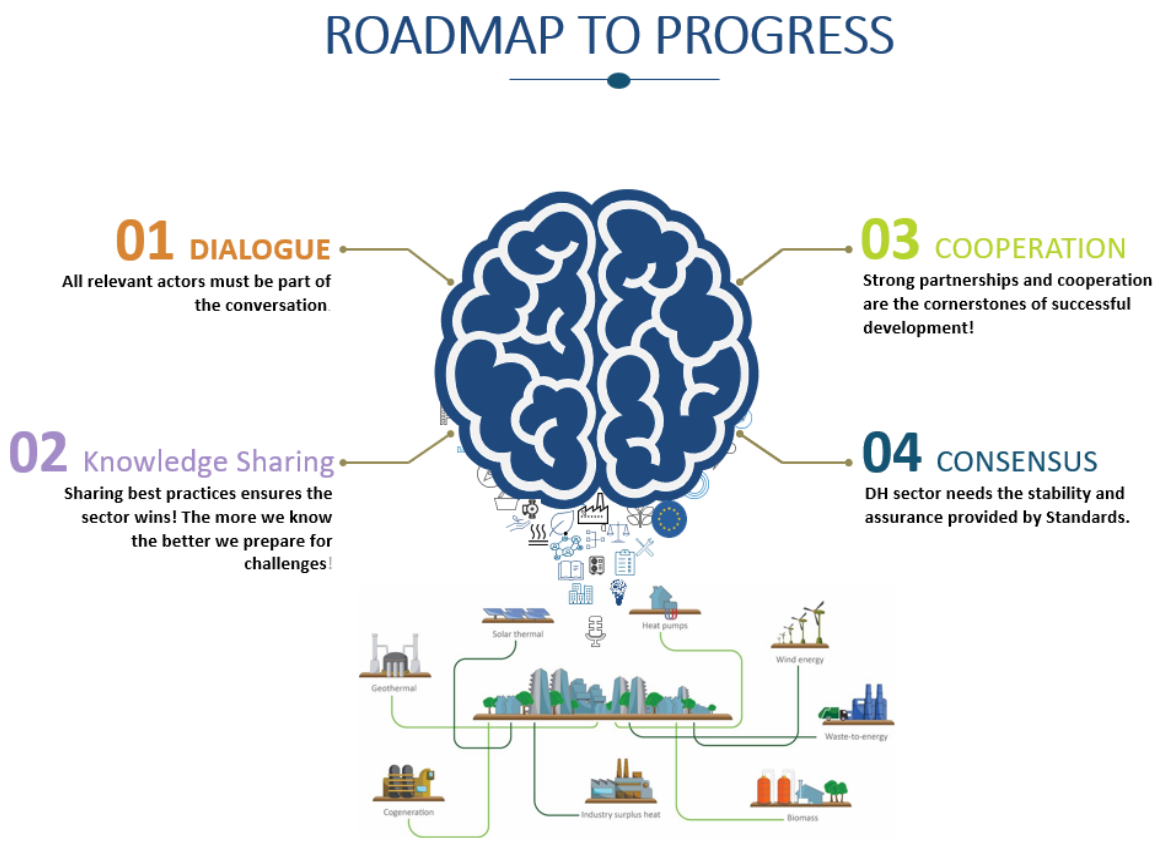

Illustration: Euroheat & Power: CEN/TC 107 Meeting, Stockholm, April 2023

A broad participation will support a mindset where the focus is on horizontal solutions across sectors as an alternative to the vertical thinking in separate sectors that often applies today.

Therefore, CEN/TC107 must move away from thinking in "silos" and instead adopt a horizontal way of thinking, where the focus is on energy sector integration. In other words, CEN/TC107 must prepare system standards that support a "smart, energy sector coupled, renewable based and cost-efficient energy system" in all its phases from planning & financing to design, operation, and maintenance in other words “system-integration and system optimization, see illustration showing a holistic approach below:

The holistic approach in the energy sector is the key cost-effective sector couplings for the green transition.

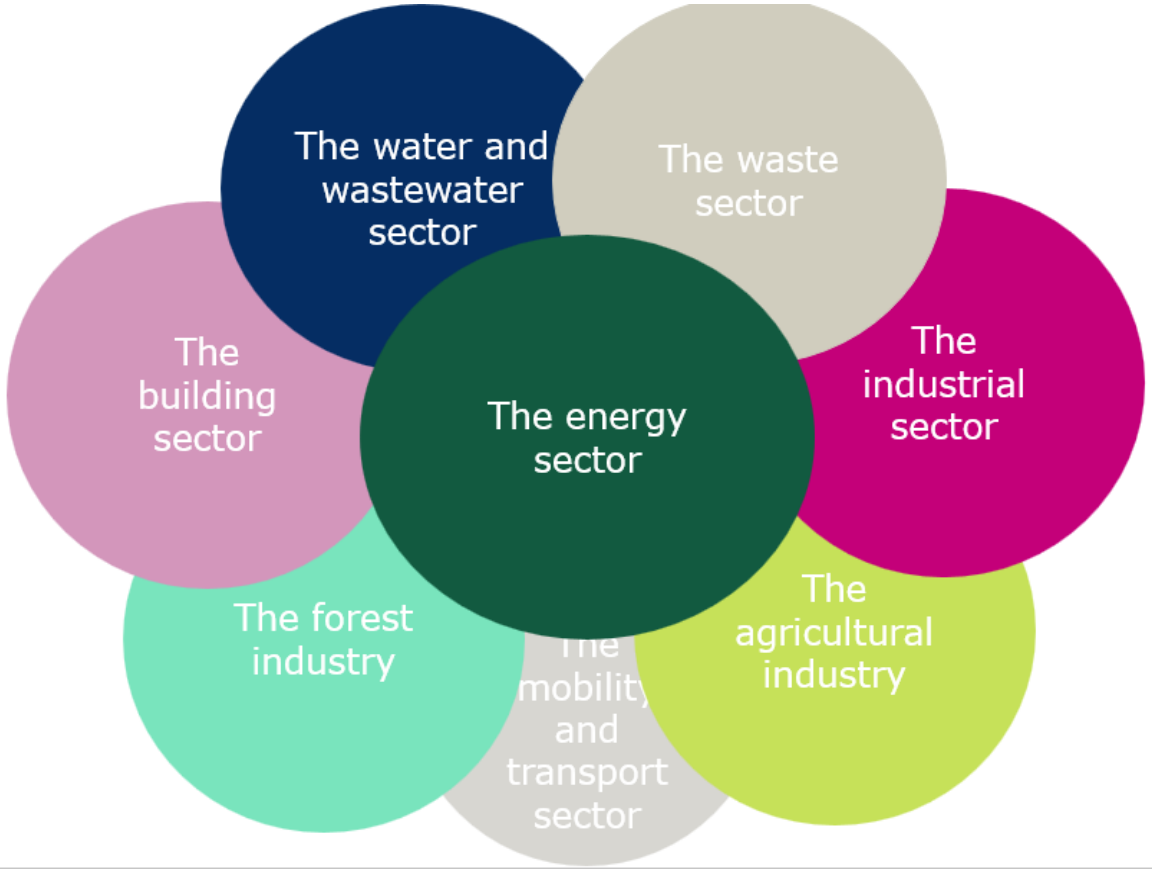

Illustration: Ramboll Energy: CEN/TC 107 Expert Meting, January 2024

Advisory Board

An Advisory Board should be established to coordinate activities between the "products and DHC system level" and "energy systems integration". Participants should represent the committee across the future structure of CEN/TC107 and could include representation from manufacturers of factory-made DHC system components, customers, design companies, universities, research institutes, consultants, DH utilities, planning authorities, investors, district heating companies, waste companies, sewage companies, Euroheat & Power, DHC+ Platform. Further, the committee will seek dialogue and collaboration with the EU Commission including DG Grow and DG Energy.

Boundaries

The boundary for development of energy system-integration is the customer installation behind the transition station.

Coordination with ISO/TC 341 Heat Supply Network (HSN)

In 2023, TC 341 Heat Supply Network was established under ISO. The committee covers standardization in the field of HSN including design, construction, integration, control, and regulation based on heating and cooling supply pipeline system.

Part of the intention behind the widening of the CEN/TC 107 scope was to enable cooperation with ISO/TC 341 to ensure a continued strong European footprint on global standards in line with the EU standardization strategy.

2 BENEFITS EXPECTED FROM THE WORK OF THE CEN/TC

The work of the committee is expected to create an overview and disseminate knowledge regarding the benefits of DHC systems and energy system integration.

The work is expected to ensure that DHC is competitive with other energy solutions and offers an attractive solution for the consumers.

The deliverables are expected to support decision making by relevant actors regarding the large and long-term investments envisaged before 2030. This is expected to benefit all decision-making levels including political and project level, i.e. politicians, investors, authorities, planners, project owners, consultants.

Concerning product level, the work regarding pipe systems is expected to ensure a continued uniform quality of pipe components leading to long lifetime high quality of the thermal insulation leading to high DHC operational efficiency.

The result of the work is and will be also an agreed high level of designing and operating the DHC systems for utilization of heat from different sources at low temperature levels – energy system integration.

Overall, the work of the committee will help to build a sustainable future and to achieve the CO2 savings in Europe that is expected to contribute to substantial energy and resource savings and reduced installation and maintenance costs.

3 PARTICIPATION IN CEN/TC 107

All the CEN national members are entitled to nominate delegates to CEN Technical Committees and experts to Working Groups, ensuring a balance of all interested parties.

Participation as observers of recognized European or international organizations are also possible in principle.

To participate in the activities of this CEN/TC, please contact the national standards bodies (NSB) in your country.

4 OBJECTIVES OF THE CEN/TC AND STRATEGIES FOR THEIR ACHIEVEMENT

4.1 Defined objectives of the CEN/TC107

The objective for the future is to maintain the standards (CEN EN, CEN TS, CEN TR), keeping them up to the state of the art and taking into consideration the technical, political, and social development.

Overall, the objective is to develop new standards and maintain existing standards within the scope of the CEN/TC 107, including but not limited to:

- Standards for factory-made thermal insulated system components for straight and flexible DHC pipe systems with service pipes of metallic and plastics,
- Umbrella standards for Design, Installation and Operation of (directly) buried pipe systems for heating and cooling supply,
- Standards with a focus on environmental sustainability,
- Guidelines for energy system-integration between the DH sector and natural gas, waste, electricity, and transport sectors with the aim to increase the total energy and resource efficiency in the society, waste companies, sewage companies,
- Standards for the operation of existing, renovated, and new buildings with low-temperature DH pipe systems for room heating and domestic hot water (DHW),
- Standards for the operation of existing, renovated, and new buildings to make use of waste heat, cooling in thermal networks (differentiated temperatures),
- Standards for the operation of existing, renovated, and new DC pipe systems.

4.2 Identified strategies to achieve the CEN/TC107's defined objectives

The strategy for obtaining the objective is to maintain and strengthen the interest from the market and thus, be able to maintain a strong, well-functioning CEN/TC107 with working groups with a high level of technical expertise, capable of maintaining and revising the standards.

The Committee will strive to include relevant experts required to develop deliverables desired. These should include representatives from manufacturers of factory-made DHC system components, customers, design companies, universities, research institutes, consultants, DH utilities, companies operating DHC systems, planning authorities, investors, Euroheat & Power, DHC+ Platform, and the EU Commission.

The tasks will be allocated to the individual WG's in accordance with the respective scopes.

Deliverables will support energy integration of smart thermal grids into future sustainable energy systems. Work titles could for example include "Strategic Energy Planning", "Integration between DH/Carbon Capture+PtX" and "Integration between DH/Power System".

4.2.1 Liaisons

CEN/TC 107 Technical Committee foresees a close cooperation with existing committees that may support DHC at system level such as:

• CEN/TC 113, CEN/TC 155, CEN/TC 156, CEN/TC 197, CEN/TC 228

• CLC/ TC 88

• ISO/ TC 60, ISO/TC 265, ISO/TC 341

• IEC /TC 14, IEC/ TC 88

Excluded from the new CEN/TC 107 are aspects of DHC systems already covered by existing committees.

4.3 Environmental aspects

The European policy setting, starting at the Green Deal, has placed Europe at the frontline in a transition towards a green and sustainable future. Several initiatives within the green deal intends to transform the European economy to support the goal of reaching net zero greenhouse gas (GHG) by 2050, make sustainable products the norm. The future standards of CEN/TC107 will provide a stable platform for this transition enabling European DHC industry to increase alignment and maximize their impact.

Further, standards will contribute to the development of cost-efficient solutions, which is essential in a deregulated market. The work of CEN/TC 107 will also support the Directive 2012/27/EU of the European Parliament and of the Council of 25th October 2012 on energy end-use efficiency and energy services.

CEN/TC107 will focus on environmental aspects such as:

• Environmentally responsible production to reduce the use of resources and increase the total energy efficiency in society,

• Efficient use of materials, including use of recycled materials for the manufacture of factory-made system components and recommendations for the reuse or disposal of system component materials,

• Based on the type and technical characteristics of the applied material (e.g. service pipes of metallic and plastics, thermal insulation, PE-casings, etc.) product standards specify test methods, design factors and procedures to allow determination of the most efficient product regarding lifetime, strength, and thermal insulation,

• Fitness for purpose of the products during product lifetime

• Efficient and smart use of fluctuating renewable electrical and thermal energy – wind and solar – using DH systems as energy storage

• Today the design of factory-made DH pipe systems with metallic service pipes is based on a minimum 30-year lifetime at continuous operating temperature of 120^0C with peak temperatures of up to 140^0C for a maximum of 300 hours/year). If lower the annual and peak operating temperature of the service pipe if longer is the expected lifetime. Today in Europe extensive experiences available for DH pipe systems over almost six decades without systematic damages.

• Furthermore, the design for flexible pipe systems with a plastic service pipe is based on at least 30 years at a continuous operating temperature of 80°C (peak temperature up to 100°C) and at least 50 years at a continuous operating temperature of 70°C (peak temperature up to 95°C), respectively.

Due to the increased use of renewable heat sources, there is a trend to lower operating temperatures in district heating networks. This leads to longer lifetime of the corresponding pipe network and increased sustainability.

5 FACTORS AFFECTING COMPLETION AND IMPLEMENTATION OF THE CEN/TC 107 BUSINESS PLAN

The main factors affecting completion and implementation of the CEN/TC 107 business plan are:

Completion:

- Relevant experts joining the development of standardization at DHC system level
- Engagement and alignment between experts

Implementation:

- Deliverables are user-friendly, and targeted relevant customers
- Dissemination of standards to relevant actors and decision makers
- Standards promote cost-effective solutions
- DHC does prove cost-efficient and competitive to other energy forms