IEA Technology Collaboration Programme on

District Heating and Cooling

IEA DHC

What is IEA DHC?

IEA DHC, the International Energy Agency Technology Collaboration Programme on District Heating & Cooling, is **the only international research funding and collaboration programme** focussing on DHC.

Why DHC?

Countries around the world are looking for ways to **reduce greenhouse gases** and **increase energy security**.

Electrification or using synthetic green gases are in many cases not the most cost- or resource-effective ways to achieve this target in the heating and cooling sector.

This is where district heating and cooling comes in.

It provides an infrastructure to use **zero-carbon energy sources** that are otherwise largely lost to the energy system.

The fundamentals of DHC are simple but powerful:

Connect multiple buildings through a hot water, steam and/or chilled-water piping network to environmentally optimal – and often local – energy sources.

Customer buildings use the energy for space heating, domestic hot water and/or air conditioning. Thermal energy sources compatible with a zero-carbon economy include unavoidable excess heat, geothermal and solar thermal heat, as well as free cooling with sea or lake water. But it does not stop there. DHC can also bring the benefits of heat pumps to towns and cities where individual heat pumps are often not feasible.

By coupling the sectors of thermal energy and electricity, DHC can help the electricity sector to stabilize the grid and enable more solar- and wind power. Furthermore, DHC provides the flexibility to combine different zero-carbon energy sources to supply urban areas with decarbonized heating and cooling at minimal cost.

Finally, DHC supports local tax revenue and employment more than many other heating and cooling systems. As a result of the growing awareness of these benefits, various countries are establishing or renewing their commitment to DHC and the potential it holds. IEA DHC supports international research and development to help deploy DHC systems that contribute best to global resource efficiency and climate stability.

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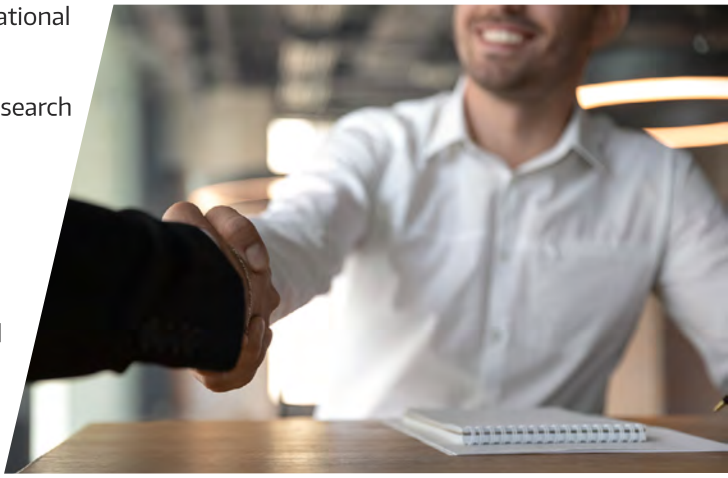
What IEA DHC can do for you

- You can find well-grounded answers to your questions on DHC in our research publication and events.

If you represent a member country

- You can influence future research topics of IEA DHC.
- You receive expert, up-to-date information on international DHC developments.
- You can influence the publications and messages of the IEA on DHC.
- You enable your Nation's researchers to apply for our international funding.
- You give your Nation's researchers access to international research collaboration platforms on DHC.



If you are a researcher from a member country

- You can receive up to 100% funding from IEA DHC for your project idea.
- You can join our DHC collaboration platforms to identify and develop international best practice.
- You can start your own DHC collaboration platform under IEA DHC supervision.

About IEA DHC

IEA DHC is an international funding and collaboration programme for research on district heating and cooling under the umbrella of the the International Energy Agency.

Since it began in 1983, the IEA DHC has operated under the supervision of the International Energy Agency (IEA), bringing countries together to research, innovate and grow DHC.

Countries that participate in the IEA DHC research programme leverage their resources to conduct research that they may not be able to accomplish on their own through international collaboration.

The result is that participants gain leading-edge knowledge and insights that can improve energy performance, increase resilience, and reduce greenhouse gas (GHG) emissions, effectively helping to mitigate the impacts of climate change.

As of 2021, the IEA DHC includes participants from Austria, Belgium, Canada, China, Denmark, Finland, France, Germany, Italy, Korea, Norway, Sweden, United Kingdom, and United States of America.

Participants gain leading-edge knowledge and insights that help improve energy performance, increase resiliency, and **reduce greenhouse gas (GHG) emissions.**

How IEA DHC research projects work

The IEA DHC research programme addresses technical and policy issues aimed at **lowering environmental impact of heating and cooling**.

The programme's members select, fund, manage and publish collaborative co-funded projects. Furthermore, members oversee DHC collaboration platforms for exchanging information on national R&D projects between IEA DHC member countries.

Every three years – a time period referred to as an Annex – the programme's Executive Committee launches a competitive request for proposal process to solicit research project proposals on specific DHC theme areas. Research teams from IEA DHC member countries can propose research projects, and the Executive Committee evaluates and selects which of these research projects should be undertaken during the upcoming three-year period.

The selected project teams represent at least two countries and are headed by a project manager who coordinates project meetings and oversees the completion of project tasks and deliverables. Each project team also arranges two to three meetings with experts nominated from each member country, as a form of ongoing peer review, further sharing knowledge and optimising research results.

The member countries have direct access to the research progress and interim results. Final research results are made publicly available via the programme website once they are published.

Countries may become a member of the IEA DHC research programme by paying an annual subscription fee based on the country's gross domestic product, and by assigning a representative to actively participate on the Executive Committee.

Member benefits include:

- **Influencing research** valued at more than US $1 million for each three-year Annex, for a fraction of that cost;
- **Sharing knowledge** and **networking** with countries with diverse DHC markets and industry maturities;
- Actively **supporting the integration of DHC** into national decarbonisation plans;
- **Collaborating** with other international energy groups especially within IEA;
- Having a **global policy voice** through the International Energy Agency.

How IEA DHC is organized

IEA DHC is one of many IEA technology collaboration programmes. IEA Technology Collaboration Programmes (TCPs) are vessels to **further international collaborative research** in various technology fields. The IEA DHC programme has played a significant role in the DHC industry's history, and aims to play a vital role in its future.

The control of the IEA DHC programme is vested in its Executive Committee, which comprises at least one official representative from each participating country. The Executive Committee meets twice a year, normally in May and November. The bi-annual meetings enable continued coordination of the research programme as a whole, dealing with technical, financial and organisational issues.

Members are also able to share and compare the status of the DHC industry in respective countries, discuss project progress, prepare for new projects and plan upcoming workshops for sharing information.

The programme also maintains close links with other key organisations in the DHC sector, such as Euroheat & Power and the International District Energy Association. The latter is a sponsor of IEA DHC as of 2021.

In between decision-making meetings, the IEA DHC Programme manager executes tasks mandated by the Executive Committee and serves as a one-stop access point to the programme.

JOIN US!

Please contact the programme manager at **iea-dhc@agfw.de** for further information on bringing the benefits of our programme to your country.

IEA DHC projects as of 2021

This is an overview of **IEA DHC projects** sorted by topic.

The links connect you directly to the respective web page of the project. Please use the search on our website in case a link is broken due to website updates.

For projects started after 2021 please visit **www.iea-dhc.org**.

Field	Year of publication	Title & Link	Annex
Benefits, Analysis and Evaluation of DHC	2007	NUON – Cost benefits and long term behaviour of new all plastic piping system	VIII
	2005	A Comparison of distributed CHP/DH with large-scale CHP/DH	VII
	1999	Fatigue Analysis of District Heating Systems	V
	1999	District Heating and Cooling in Future Buildings	V
	1996	Temperature Variations in Preinsulated DH Pipes Low Cycle Fatigue	IV
	1996	Quantitive heat loss determined by means of infrared themography – The TX model	IV
	1993	Quantitative Heat Loss Analysis of Heat and Coolant Distribution Pipes by Means of Thermography	III
	1992	The environmental benefits of District Heating and Cooling	III
	1992	DETECT – Consequence model for assessing the environmental benefits of district heating and cooling in a well defined area	III
CHP	2008	HUT – Improved Cogeneration and Heat Utilization in DH Networks	VIII
	1999	District Cooling, Balancing the Production and Demand in CHP	V
	1996	Integrating district cooling with combined heat and power	IV
District cooling	2019	Sustainable District Cooling Guidelines	XII
	2008	IDEA – Assessing the Actual Energy Efficiency of Building Scale Cooling Systems	VIII
	2002	Absorption Refrigeration with Thermal (ice) Storage	VI
	1993	The Design and Operation of Ice-slurry based District Cooling Systems	III
Guidebooks, Tools and Guidelines for DHC	2023	The district heating business model 2050	XIII
	2017	Reducing greenhouse gas emissions and energy consumption by optimizing urban form for district energy	XI

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	2014	Development of an Universal Calculation Model and Calculation Tool for Primary Energy Factors and CO_2 Equivalents in District Heating and Cooling including CHP	X
	2005	Two-step decision and optimisation model for centralised or decentralised thermal storage in DH&C systems	VII
	2002	District Heating and Cooling Building Handbook	VI
	1999	Plastic Pipe Systems for DH, Handbook for Safe and Economic Application	V
	1996	Guideline to planning and building of district heating networks	IV
	1993	Promotional Manual for District Energy Systems	III
Industry and DHC	2025	Industry-DHC Symbiosis	TS7
Low temperature DH	2023	CASCADE: A comprehensive toolbox for integrating low-temperature sub-networks in existing district heating networks	XIII
	2023	Leave 2nd generation behind: cost effective solutions for small-to-large scale DH networks	XIII
	2023	Optimized transition towards low-temperature and low-carbon DH systems (OPTiTRANS)	XIII
	2021	Annex TS2: Implementation of Low Temperature District Heating Systems	TS2
	2017	Low Temperature District Heating for Future Energy Systems	TS1
	2017	Transformation roadmap from high to low temperature district heating system	XI
	2002	Optimisation of Cool Thermal Storage and Distribution	VI
	2002	Optimisation of a DH System by Maximising Building System Temperatures Differences	VI
	1999	Optimisation of Operating Temperatures and an Appraisal of the Benefits of Low Temperature District Heating	V
	1996	Managing a hydraulic system in district heating	IV
	1996	Efficient substations and installations	IV
Metastudies on DHC	1996	A review of European and North American water treatment practices	IV
	(informal report 1996)	Long-term cooperation with East-European countries	
	1992	R&D Project Review	III
Modern Buildings and DH	2023	Cost Benefit study on the building secondary network for improving DH performance	XIII
	2011	District Heating for Energy Efficient Building Areas	IX

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	2011	Interaction Between District Energy and Future Buildings that have Storage and Intermittent Surplus Energy	IX
	2008	District Heating Distribution in Areas with Low Heat Demand Density	VIII
	1992	CHESS, Consumer Heating System Simulation	III
Network Operation of DHC Nets	2025	Annex TS4: Digitalisation of District Heating and Cooling	TS4
	2024	Annex TS3: Hybrid Energy Networks	TS3
	2023	Artificial Intelligence for Forecasting of Heat Production and Heat demand and Fault Detection in District Heating Networks	XIII
	2017	Smart use as the missing link in district energy development	XI
	2005	Strategies to manage heat losses – Technique and Economy	VII
	2005	Improvement of operational temperature differences in district heating systems	VII
	2005	Biofouling and Microbiologically Influenced Corrosion in District Heating Networks	VII
	2005	Dynamic Heat Storage Optimisation and Demand Side Management	VII
	2002	Optimised District Heating Systems Using Remote Heat Meter Communication and Control	VI
	2002	District Heating Network Operation	VI
	2002	Simple Models for Operational Optimisation	VI
Network Technology of DHC Nets	2025	Life-time prediction of DHC pipes	TS6
	2020	Effects of Loads on Asset Management of the 4th Generation District Heating Networks	XII
	2014	Improved maintenance strategies for district heating pipelines	X
	2008	Chalmers – New materials and constructions for improving the quality and lifetime of district heating pipes including joints – thermal, mechanical and environmental performance	VIII
	2005	How cellular gases influence insulation properties of district heating pipes and the competitiveness of district energy	VII
	2002	Pipe Laying in Combination with Horizontal Drilling Methods	VI
	1999	Cold Installation of Rigid District Heating Pipes	V
	1999	New ways of installing District Heating Pipes	V
	1999	Reuse of Excavated Materials	V
	1996	Bend Pipes	IV

Field	Year of publication	Title & Link	Annex
	1996	Execution of connections to pipelines in operation	IV
	1996	Advanced Energy Transmission Fluids Final Report of Research, ANNEX IV	IV
	1993	Advanced Energy Transmission Fluids Final Report of Research, ANNEX III	III
	1992	CFC-Free Plastic Jacket pipes	III
	1992	District Heating Piping with plastic-medium pipes, status of the development and laying costs	III
	1992	Bends for Plastic Jacket Pipe Systems, able to withstand high transvers loadings	III
Policy and DHC	2020	Stepwise transition strategy and impact assessment for future district heating systems	XII
	2017	Governance models and strategic decision making processes for deploying thermal grids	XI
	2011	Policies and barriers for District Heating and Cooling outside EU countries	IX
	2002	Promotion and Recognition of DHC/CHP benefits in Greenhouse Gas Policy and Trading Programs	VI
	2023	MEMPHIS 2.0: Advanced algorithm for spatial identification, evaluation of temporary availability and economic assessment of waste heat sources and their local representation	XIII
Potential assessment	2020	MEMPHIS – Methodology to evaluate and map the potential of waste heat from industry, service sector and sewage water by using internationally available open data	XII
	2014	Towards Fourth Generation District Heating: Experiences with and Potential of Low Temperature District Heating	X
	2011	The Potential for Increased Primary Energy Efficiency and Reduced CO_2 Emissions by DHC	IX
Renewable Energy and DH	2024	Annex TS5: Integration of Renewable Energy Sources into existing District Heating and Cooling Systems	TS5
	2020	Integrated Cost-effective Large-scale Thermal Energy Storage for Smart District Heating and Cooling	XII
	2014	Economic and Design Optimization in Integrating Renewable Energy and Waste Heat with District Energy Systems	X
	2011	Distributed Solar Systems Interfaced To A District Heating System That Has Seasonal Storage	IX

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2021.08