

#### Smart energy systems analyses, tools and methodologies

**Anas Algaref:** Evaluating Tools for Integrating District Cooling into Wider Energy Models

**Markus Auer:** Optimising District Heating Substation Bypass Flow Control: a Practical Approach Combining Simulation- and Case-Study

**Edison Guevara Bastidas:** Prioritisation of faults in district heating substations: towards predictive maintenance and optimised operation

**Maarten Blommaert:** Balancing Centralized and Decentralized Heat Pump Solutions for Heating Networks Using Design Optimization

**August Brækken:** Integrated port energy systems for decarbonized maritime industry

**Miguel Chang:** Assessing operationally robust long-term capacity expansion plans – A model coupling approach

**Amin Darbandi:** Machine Learning for Prediction of Heat Demand and Applying Reinforcement Learning to Schedule Energy Hubs

**Jonne van Dreven:** Optimizing Fault Detection and Diagnosis in District Heating: The Impact of Data Source and Sampling Frequency

**Julia Eicke:** Simplified representation of buildings in district heating network models – a data driven approach

**Paula Ferreira:** Energy Demand Forecasting for Developing Economies in Sub-Saharan Africa

**Aoife Foley:** From Contentious to Consensus - Expert Consultation and Perspectives on the Net Zero Energy Transition Applied to Northern Ireland

**Michael Frank:** Algorithm-Supported Operation and Investment Planning of Decentralized Energy Infrastructure at Production Sites

**Lilli Frison:** Comparison of different transformer based neural network architectures for load forecasting in district heating networks under changing conditions

**Chris Hermans:** Gaussian Process Based Fault Detection in District Heating Substations

**Stefan Holler:** Building Supply Temperature Cadastre (BSTC) for analysing low-temperature feasibility of residential buildings

**Laura Kuper:** Heating network topology design by price-collecting Steiner trees

**Saltanat Kuntuarova:** Operational Flexibility of Integrated Power and District Heating Systems: Modeling of Heat Flow Directions

**Ali Kök:** Modelling Uncertainties in District Heating Supply Modelling

**Henrique Lagoeiro:** FAST DHC project: initial findings on the development of a decision support tool for the techno-economic evaluation of low-temperature DHC networks

**Jinze Li:** Optimization and techno-economic analysis of a hybrid renewable energy system for covering energy and water needs in remote island

**Alena Lohrmann:** Go with the flow: a new approach to leveled cost estimation to account for water use in power generation

**Dennis Lottis:** Benchmarking optimization problem formulations for Model Predictive Control of District Heating systems with a Software-in-the-Loop approach

**Andrew Lyden:** Exploring sector-coupled flexibility in energy markets with locational pricing

**Gideon Mbiyzenyuy:** Practical Considerations for Bi-directional Long Short-Term Memory Anomaly Detection in District Heating Networks

**Mohammad Kiani Moghaddam:** A double-layer many-objective stochastic optimization model to handle many uncertainties in the operation of smart energy systems

**Ryoga Ono:** The analysis of a woody biomass-to-X model based on high-resolution dataset by 1,741 municipalities in Japan

**Marius Reich:** Harnessing Machine Learning for Rapid Optimization: Integration of Time Series Data into Prior Approximation of Energy System Simulations

**Lukas Richter:** Synergizing Investment and Cooperation: An Agent-Based Modelling Framework for Optimized Energy Distribution in Cellular-Structured Systems

**Jonathan Riofrío:** Towards Sustainable Energy Transition: Guidelines for Wind Energy Expansion and Power-to-X Integration in Small Island States

**Daniel Rohde:** Dynamic Energy System Optimization: A unique methodology for simultaneous sizing and optimal operation

**Ralf-Roman Schmidt:** A techno-economic and investment risk analysis of ambient and waste heat supply technologies considering future uncertainty for a case study in Poland

**Martin Sollich:** Integrating short-term storage in optimal heating network design to reduce back-up capacity and increase renewable heat supply

**Dominik Stecher:** Data Set & Fault Signature Generation for District Heating with Generative and Transformative Neural Networks

**Jan Stock:** Construction of large district heating networks based on open-source data and demonstration of possible transformation measures

**Umberto Tesio:** Operation optimization of a Multi Energy System with a District Heating Network

**Gerhard Totschnig:** Optimal supply portfolio in a decarbonised district heating system - results of a model-based investigation for two case studies

**Nora Yusma Mohamed Yusop:** Optimal Decarbonisation Pathways for Malaysia's Energy System: Mapping a Long-Term Transition to Net Zero Emissions by 2050

**Tuomas Vanhanen:** Energy System Modeling of Sector Coupling in a Sustainable City: A Policy Scenarios Approach

**Vittorio Verda:** Integration of large-scale heat pumps in high temperature district heating systems

**Volodymyr Voloshchuk:** Digital twin-based smart heating system with a condensing boiler

**Marie Therese Warnecke:** Analysing and Monitoring Building Energy Efficiency via Web Scraping of Property Listings

**Samanta Alena Weber:** Feature Engineering for Machine Learning to predict heat networks on the end-user level

# ONLINE PROGRAMME SESSION PRESENTATIONS - ACCESSIBLE FROM 6 TO 13 SEPTEMBER 2024

## Planning and organisational challenges for smart energy systems and district heating

**Nermina Abdurahmanovic:** Enhancing Energy Efficiency through User Engagement and Behaviour Change: A review on gamification approaches and serious games in energy systems

**Andra Blumberga:** Overcoming sociotechnical challenges: How to model the probability of investing in climate-friendly energy technologies

**Stine Bülow:** Decision Making under Uncertainty in Coupled Multi-Energy Systems

**Max Guddat:** The Municipal Heat Planning Toolbox - Conceptual Approaches to Heat Planning, Based on Danish Practical Experience

**Gareth Jones:** Upcoming changes to heat network regulation in the UK – overview of the Heat Network Technical Assurance Scheme

**Alwina Kaiser:** Bridging the Implementation Gaps: A Multi-Criteria Decision Support Approach for Enhancing Municipal Heat Supply and Social Acceptance

**Nina Kicherer:** Three heat marketplaces for the cost-efficient integration of renewable heating plants into district heating systems

**Hironao Matsubara:** Challenges in Planning and Implementing Decarbonized Advanced Areas in Japan

**Bent Ole Gram Mortensen:** Framework for Energy Data Spaces - Let's share energy data for a greener future

**Gianmarco Preso:** Scenario analysis for efficient transition of a district heating network – Case study in Göttingen

**Adithya Ramachandran:** Unveiling Consumer Behavior in District Heating Network: A Contrastive Learning Approach to Clustering

**Vedant Sinha:** Industrial Load Flexibility in California: Challenges and Opportunities to Unlocking Cost And Carbon Savings

## Smart energy infrastructure and storage options

**Hamza Abid:** Techno-economic analysis of offshore energy hubs: Enabling Europe's energy transition

**Ali Pour Ahmadiyan:** Simulation and optimization of high temperature waste heat storage and recovery through a city scale borehole storage field

**Michael Bayer:** Methodological Development of a Reduced-Order Data-Driven Model from Detailed Numerical Simulations for Seasonal Thermal Energy Storage (STES)

**Fabian Borst:** Managing Complexity in Industrial Heating and Cooling Systems: A Local Energy Market Framework for Transactive Control with Technical Constraints

**William Delgado-Diaz:** Hybrid seasonal heat storage systems using phase change materials: Economic and Environmental Optimization

**Jes Donneborg:** Energy on Demand - A Renewable Sector-Coupling Energy Park

**Daniel Friedrich:** Short Borehole Thermal Energy Storage cycles charged with otherwise curtailed wind energy

**Geoffroy Gauthier:** Large Thermal Energy Storages (LTES) are a key element of the future energy system

**Jonathan Hachez:** Building load profile synthesis: a stochastic approach to model building energy consumption timeseries

**Martin Hartvig:** Pathway 2.0: Sector coupling is a driver for offshore shore hubs and spokes

**Kristina Haaskjold:** Value of energy storages in ancillary and energy markets in the Norwegian low-carbon energy transition towards 2050

**Richard van Leeuwen:** Development and implementation of a Smart Energy System for local energy communities to improve sustainability and decrease electricity grid loads

**Simon Nießen:** Hydrogen as a key technology in modern energy systems

**Henning Rahlf:** Analysis of bidirectional EV charging infrastructures within industrial DC grids

**Julio Vaillant Rebollar:** Operational assessment of Large-Scale Ground Source Heat Pump and Borehole Thermal Energy Storage System

**Dmitry Romanov:** Techno-economic analysis of utilization of waste heat from a data center combined with a borehole thermal energy storage

**Dietrich Schmidt:** Digitalization of district heating systems – Transforming heat networks for a sustainable future

**Martin Stroleny:** Innovations in District Heating and Cooling: ground-breaking projects reshaping the DHC landscape

**Sreenath Sukumaran:** Enhancing the Sustainability of District Cooling Networks Through Integration of Snow Storage Systems: A Case Study of Tallinn, Estonia

## Geographical Information Systems (GIS) for energy systems, heat planning and district heating

**Ruihong Chen:** GIS-based landscape scenicness estimation using machine learning for visual impact assessment of wind projects deployment in Europe

**Stanislav Chicherin:** Improving design of the 5th generation district heating and cooling systems (5GDHC) systems: a robust GIS-driven approach

**Britta Kleinertz:** Spatial prioritization of heat supply systems – experience from literature and practise combined in a practical guideline

**Franz Mauthner:** Agent-based simulation of energy transition pathways in urban environments

**Bernd Möller:** Assessment of thermal infrastructure needs in fast-growing urban areas of the Global South

**Johannes Pelda:** MEMHIS 2.0 - Spatial identification and evaluation of the temporal availability and economic assessment of waste heat sources

**Urban Persson:** Data categories and selection criteria for an evaluation of the potential for solar district heating with pit thermal energy storage in Sweden

**Alexander Rehbogen:** Spatial Energy Planning for Heat Transition - Steering Transition by Information

**Abdulraheem Salaymeh:** Assessing the Thermal Potential and Sustainable Water Withdrawal Rates from German Waterbodies for District Heating

**Annette Steingrube:** The potential role of island heating networks in decarbonizing heating supply of districts. A case study for the district of Freiburg Waldsee

**Eva Wiechers:** German and Danish Case Studies undertaken on the Citiwatts platform replacing the Hotmaps platform

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## CCUS and PtX technologies and the production and use of electrofuels in future energy systems

**Anders Borup:** Depending on your neighbor - Sector coupling challenges of the future

**Christine Brandstätt:** Incentives for pipeline decommissioning and repurposing in regulated grids

**Alexandros Flamos:** Bidirectional soft-linking of open-source energy models to evaluate the feasibility of transition pathways to carbon neutrality in the power sector

**Lissy Langer:** Conditions on electricity purchasing: More (emission reduction) bang for your buck?

**Marie Münster:** Why do we see differences in results when modeling hydrogen in integrated energy systems?

**Hossein Nami:** Optimizing Regional Electrolysis Capacity

**Anne Neumann:** Regulatory framework for hydrogen hubs: Taking stock and looking ahead

**Thomas Helmer Pedersen:** Direct Air capture cost reduction and market development via process intensification. Establishing the DAC insetting concept

**Kirill Resnikow:** Modelling Electrolyser Systems – The research project BOOST

**Leon Schumm:** Offtaker regulation: Impacts on New Zealand hydrogen export ambitions

**Lars Schwarzer:** Carbon management in a volatile energy system – DTI's research in flexible carbon capture, utilization, and storage

**Jens Weibezahn:** Fueling the Future: Optimizing Power-to-X Production in Renewable Energy Hubs through Flexible Operating Units

**Henrik Wenzel:** Local Energy Parks in Northern Fun

**Meng Yuan:** Beyond Borders: Alternative Renewable Energy Export Strategies

## Renewable energy sources and waste heat sources including PtX for DH

**Anna Billerbeck:** Increasing the spatial resolution of climate-neutral district heating supply in European energy system models

**Sina Dibos:** Impact Analysis of Electrolyzer Waste Heat on Low Temperature District Heating and Cooling Networks

**Hanne Kauko:** Electrolysis waste heat utilization towards district heating – a case study for Norway

**Leander Kimmer:** Decarbonising district heating with hydrogen: A comparison of business and economic optimums

**Dan Staunton:** How large-scale ASHP deployed on DH networks can decarbonise challenging urban environments

## Institutional and organisational change for smart energy systems and radical technological change

**Søren Djørup:** A Framework for Heating Technology Characterisation and its Relevance to Energy Policy Design

**Lisa Hjerrild:** Experiences with economic compensation to neighbors of large-scale renewable energy farms

**Kristina Lygnerud:** Increased district energy competitiveness through social sustainability

**Bernhard Mayr:** Introducing the concept of an integrated decision-making framework for sustainable heating (and cooling) technologies

**Lucy Sherburn:** Establishing Key Performance Indicators for heat networks for use within the UK's Heat Network Technical Assurance Scheme

**Daniel Møller Sneum:** Making district heating bankable: District heating as an asset class

## Sino-Danish Special session: Harvesting waste heat sources and better understanding heat demands patterns for 4th generation district heating in China and in Denmark

**Siyue Guo:** Waste heat recovery for urban heating in northern China

**Zanyu Yang:** Intermittent and Fluctuating Waste Heat Characteristics in Steel Plants: Recovery Optimization Study

**John Tang Jensen:** Heat source pricing - District Heating Networks

**Lipeng Zhang:** Insights from Danish Heating Metering and Billing: Implications for China's Clean Heating Development

**Zhaoyang Liu:** Aligning Heat Demand with Sources Based on Heat Intensity: A Heat Roadmap for China

## Special session: IEA DHC Annex TS5 - Integration of RES into existing DHC systems

**Ingo Leusbrock:** Transformation of large district heating and cooling systems to higher shares of renewable energy sources

**Alice Dénarié:** Decentral integration of renewables in existing district heating networks - results and lessons learned from IEA DHC Annex TS5

**Mohammad Saeid Atabaki:** A systematic approach to analyze methodologies for renewables-based district heating potential assessments – A categorization and literature review

**Giulia Spirito:** A GIS-based tool to optimally plan and operate renewables-based DH systems

**Frederik Feike:** Modeling heat loads and return temperatures of buildings connected to a district heating network using a neural network

**Poul Thøis Madsen:** The involvement of stakeholders when decarbonizing larger existing DHC plants. A guide for politicians, planners, and operators of DHC plants

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## Integrated energy systems and smart grids

**Faraedoon Ahmed:** The complementary role of interconnector and demand side unit in facilitating grid transition towards achieving 80% RES in the I-SEM system by 2030

**Abdul Azzam:** Development and Evaluation of a model predictive control strategy for an operational analysis in district energy systems

**Christian Møller Jensen:** Delay compensated peak shaving in district heating zones by automatic setpoint scheduling

**Valentin Kaisermayer:** A Distributed Demand Response Approach for Heating Networks

**Nicholas Long:** Ambient loop network and capacity expansion modeling case study in the USA and Austria

**Nils Namockel:** Wholesale electricity market modeling with distribution grid constraints

**Nicola Cesare Di Nunzio:** District cooling system: energy, economic and environmental analysis of a case study in Tunisia

**Tijs Van Oevelen:** Peak load reduction in a district heating network by means of demand response and supply temperature control: Evaluation of test results

**Dabrel Prits:** Demand side management (DSM) key performance indicators as a value driver for large scale DSM implementation in district heating networks

**Faran Ahmed Qureshi:** Comparing and evaluating different predictive control configurations in a district heating network – Simulation study

**Costanza Saletti:** Coordination of multi-energy prosumers with demand side management

**Nicolas Vasset:** Optimal control for gas distribution networks with flexibility and biomethane injection targets

## Energy savings in the electricity sector, buildings, transport and industry

**Naomi Adam:** Co-design of Thermal Systems in a Collective Low-Carbon District

**Philipp Althaus:** Intelligent control using flexible controller architecture for improved energy efficiency of room heating: Design and evaluation in a living lab

**Cameron Downing:** Comparison of the Thermal Experience & Controllability of Gas Boilers and Air Source Heat Pumps

**Wen Liu:** The impacts of behavioral variables on heat demand in the built environment and on the economic consequences of energy efficiency measures investment

**Mazarine Roquet:** Decarbonation of an Existing Building Asset Energy Supply: A Case Study on Low Temperature Thermal Network

**Vassilis Stavrakas:** Advancing integrated and smart renovation packages for efficient, sustainable, and inclusive energy use: Modelling of real-life residential buildings

## Components and systems for district heating, energy efficiency, electrification and electrofuels

**Simran Chaggar:** Assessing the suitability of existing buildings to operate at lower temperatures via in field temperature lowering testing

**Maya Neyhousser:** Adaptive Control for Decentralized Feed-in of Solar Heat into District Heating Networks Based on Reinforcement Learning

**Sadia Ferdous Snigdha:** AI based heat pump controller for power grid resilience enhancement

**Anna Volkova:** Decarbonisation options of district heating peak loads

**Johannes Nicolás Wildfeuer:** Continuous commissioning of hot water installations using a digital twin

**Poul Alberg Østergaard:** District heating in Denmark – Dynamically reshaping the composition of heat supply

## Electrification of transport, heating and industry

**Wellington Alves:** A Data-Driven Exploration of End-of-Life Scenarios for Lithium-ion Batteries in Electric Vehicles

**Torstein Balle:** Analyzing the Impact of Wind Power Forecasts on the operation of Thermal Energy Storage in heat pump based Residential Heating Systems

**Christopher Graf:** Domestic Hot Water Systems in existing residential buildings: A Comparative Simulation Study on Efficiency and Hygiene Challenges

**Oddgeir Gudmundsson:** Economic comparison of hydronic based heating and multi-split A2A heat pumps – using a case study

**Peiyao Guo:** Equilibrium Analysis of Coupled Energy Sharing Community and Transportation Network: A Game-theoretic Approach

**Julian Hermann:** A surrogate model for residential heat pump COP estimation in the context of energy system optimisations

**Noémie Jeannin:** Using electric vehicle as flexibility asset for photovoltaic electricity production: A geographical approach

**Antoine Laterre:** Comparing Carnot batteries and chemical batteries for residential heat and electricity management: a prospective life-cycle assessment

**Mirko Morini:** Trends in smart energy in airports

**Lucas Verleyen:** The battery – A blessing or a curse for Positive Energy Districts?

## Special session: IEA Annex 84

**Anna Cadenbach:** Novel Concepts and Technologies for Demand Side Management in Thermal Networks – A review of selected Case Studies

**Anna Marszal-Pomianowska:** Demand Response application – A survey with district heating professionals

**Yangzhe Chen:** Flexibility potential analysis with quantifiable KPI assessment for energy sector coupling leveraging advanced thermal storage solutions

**Zeng Peng:** Critical Review of Digital Infrastructures on the Interoperability between Buildings and 4th Generation District Heating System

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## 4th Generation District Heating concepts, future district heating production and systems

**Jake Adamson:** Optimising thermal storage volume to reduce the electric peaking plant capacity

**Jens Møller Andersen:** Comparison of direct and indirect district heating systems in Denmark

**Orestis Angelidis :** A Scottish Case Study: Can 5th Generation District Heating and Cooling Facilitate Holistic Decarbonisation in Clyde Gateway?

**Carolin Ayasse:** Heating System Optimization considering Technology, Temperature, and Retrofit Flexibility Model-endogenously

**Dagnija Blumberga:** Multi-energy Hub Forwards to Decarbonisation

**Gerrid Brockmann:** Economic and ecological investigation of a heating network in the suburban area Leeste in Germany

**Tom Burton:** Heat Network Optimisation Guidance: Standardising the approach to improving the performance of legacy systems

**Martina Capone:** Enhancing District Heating Transition through the Integration of Groundwater Heat Pumps

**Luca Casamassima:** Comparative study of LTDH distribution systems in urban heating: a cost-effectiveness and sustainability analysis

**Afraz Mehmood Chaudhry:** A framework for optimizing prosumer-based thermal networks in urban communities: robust design approach with uncertain energy markets

**Johan Dalgren:** Circulation flows in District Heating Systems – A comparison between necessary, demanded and real flows

**Denis Divkovic:** Optimising heat planning: Cost effective refurbishment for enabling low carbon district heating

**Nina Dungworth:** Impact of technical assurance on reducing heat network capital cost by addressing oversizing in design

**Mieczysław Dzierzgowski:** Sustainable district heating in Łódź - on the road to decarbonisation

**Enric Gonzalez Gonzalo:** Heat Roadmap Europe: Key findings across five EU countries comparing district heating options compared to EU27

**Aya Heggy:** Decarbonising the UK's Heat Networks: A Framework for Archetype-Based Strategies and Case Study Analysis

**Mu Huang:** Energy performance assessment of heat pump systems in three existing multi-family buildings in Europe based on field measurement

**Lars Krusborg Jakobsen:** Intelligent heat management and distribution are crucial in a district heating network

**Femke Janssen:** Integrated Design and Operational Optimisation for District Heating Networks: Seasonal Subsurface Storage and Heat pumps

**Lars Skytte Jørgensen:** Advancing Sustainable Energy Solutions: Aalborg Forsyning's Strategic Green Transition Initiatives

**David Kodz:** Grid Stabilization with Mega Heat Pumps

**Thomas Licklederer:** Controlling the Interaction of Prosumers in Smart Thermal Grids – Experimental Investigation of Different Approaches

**Aadit Malla:** Assessing the Economic Viability of Thermal Source Networks: The Role of Temperature Sensitivities

**Giulia Manco:** Design optimization for solar thermal prosumers in district heating networks

**Ana Catarina Marques:** A district heating network with heat recovery from waste water treatment plant

**Nicolas Oliver Marx:** Techno-Economic Feasibility of District and Individual Heating & Cooling Solutions – A Preliminary Assessment of Selected Case Studies

**Brian Vad Mathiesen:** Heat Roadmap Europe: Electrification versus low temperature district heating for heating buildings

**Daniel Muschick:** Implementation results from an optimization-based, predictive supervisory controller for a district heating network in Austria

**Simon Müller:** Modern benchmark of adaptive thermal source network at industrial site – The Incampus

**Ieva Pakere:** District heating resilience under high energy price shocks

**Nirav Patel:** Optimizing District Heating Supply for Positive Energy Districts

**Els van der Roest:** Collective or individual heating solutions - the case of Utrecht (NL)

**Michela Romagnosi:** A modelling tool for dynamic simulations of a 5th generation district heating and cooling system applied to Italian case studies

**Kobus van Rooyen:** Integral Heating and Cooling Optimization; Design and Operation

**Christina Rosan:** How Can District-Wide Heat Pumps be used to meet Climate and Equity Goals in U.S. Cities? Translating Lessons from Europe

**Jan Eric Thorsen :** Aftercooling concept for 4th generation district heating substations

**Ulrich Trabert:** Optimised Operation of Industrial Prosumers in District Heating Systems

**Carles Ribas Tugores:** Enabling Return Temperature Reduction in Austrian District Heating System: Absorption Heat Exchanger Integration and Impact Analysis

**Michele Tunzi:** Enhancing Temperature Optimization and Economy in a Danish District Heating Network through Domestic Hot Water Substation Renovation

**Jelena Ziemele:** Synergies between heat production, distribution, and consumption for decarbonizing strategy of urban district heating system

**Theda Zoschke:** Survey of optimal dispatch methods of decentralised production units in district heating networks: A technical review

### DHC+ Platform Special Session: Experiences and outlooks on digitalisation of district heating & cooling

**Matteo Pozzi:** Fostering Digitalisation to enhance DHC Systems: progresses and perspectives by the DHC+ platform

**Steen Schelle Jensen:** Leveraging End-User Engagement for Enhanced District Heating Systems

**Ard de Reus:** Real-time dynamic pressure and temperature control of a District Cooling system

**Luca Scapino:** A Real-Case Study on Dynamic Operational Optimization of Thermal Energy Storage with an end-to-end Live Digital Twin