

9th International Conference on

Smart Energy Systems

4th Generation District Heating,
Electrification, Electrofuels and
Energy Efficiency

ONLINE PROGRAMME - KEYNOTE PRESENTATIONS

ACCESSIBLE FROM 12 TO 15 SEPTEMBER 2023



Keynote presentations

Kristian Jensen, CEO Green Power Denmark: Energy security <-> secure energy

Christina Grumstrup Sørensen, Senior partner Copenhagen Infrastructure Partners: Supplier of green capital to large-scale renewable energy projects

Philip Cole, Director WindEurope: Accelerating Wind Energy Growth in Europe: A Call for Robust Industrial Policy

Hans van Steen, Principal Adviser EU DG Energy: Towards a Sustainable and Resilient European Energy System with Energy Efficiency

Aurélie Beauvais, Managing Director Euroheat and Power: Resource efficiency: a new motto for the heating & cooling transition

Goran Krajačić, Associate Professor University of Zagreb: Opportunities for increasing energy efficiency and decarbonisation of heating in the Eastern and Southeastern Europe

ONLINE PROGRAMME SESSION PRESENTATIONS - ACCESSIBLE FROM 8 TO 15 SEPTEMBER

Smart energy systems analyses, tools and methodologies

Felix Agner: Numerical Estimation of Improved Heat Transport Capacity using Load Control in a District Heating Grid

Arnau Aliana: Unpacking the black box: A review of policy representation in energy system models

Gorm Bruun Andresen: Exploring 2030 decarbonization scenarios of the European electricity sector using Modeling All Alternatives

Daniël Bakker: Advancing the use of datacenter waste heat, solar thermal, power-to-heat and heat storage with a digital twin for district heating supply in Groningen

Moritz Bitterling: Evaluating different artificial neural network approaches for forecasting heat demand in district heating networks

Andreas Bott: Efficient Training Data Generation for Learning-Based State Estimation in 4th Generation District Heating Grids

Anna Cadenbach: IEA DHC Annex TS8: Experimental investigations of district heating systems

John Counsell: Intelligently Controlled Solar Powered Energy Storage & Air-Source Heat Pump Home Heating System

Sina Dibos: Development of the simulation tool HeatNetSim for thermal networks

Cameron Downing: A Simulink Based Dynamic Home Heating Model Calibrated with BREDEM 12

Jonne van Dreven: A Systematic Approach for Data Generation for Intelligent Fault Detection and Diagnosis in District Heating

Hermann Edtmayer: Virtual reality digital twin for immersive energy research and communication

Julia Eicke: Development of simplified models for future district heating networks

Paula Ferreira: Citizens' attitudes towards energy policy to foster the energy transition

Pascal Friedrich: Effects of network model simplifications in local heat markets on district heating system operation

Nicolas Ghuyts: Integrating Energy System Optimization and Life Cycle Assessment for a Comprehensive Assessment of Sustainable Energy Transitions

Jonas Gottschald: Lessons Learned: On the Potentials and Challenges of a Model Predictive Controlled DHN Heat Supply

Mominul Hasan: Techno-economic and geospatial opportunities for meeting Bangladesh's energy demand by solar PV systems

Gerd Hofmann: Decarbonizing Municipal Utilities: A Strategy for Achieving CO₂-Neutrality by 2035

Jelger Jansen: Model predictive control of a 4th generation district heating network – comparison with rule-based control and impact of prediction uncertainties

Rasmus Magni Johannsen: Developing energy system scenarios for municipalities - introducing MUSEPLAN

Saltanat Kuntuarova: Design and simulation of district heating and cooling networks: A review of modelling approaches and tools

Ari Laitala: A hybrid city – how the combined production curve of solar and wind electricity looks like in urban locations?

Kertu Lepiksaar: Integration of solar energy into district heating and cooling systems – Tallinn case study

Manuela Linke: Grid operation management with Convolutional Neural Networks

Dennis Lottis: Collaborative Laboratory Testing of District Heating Networks Using a Hardware-in-the-Loop Framework: A Proof-of-Concept Study

Pia Manz: Heating density as main factor for district heating: Empirical data analysis and outlook

Nicolas Marx: Heat transmission network design optimization and robustness analysis for a case study in Tyrol

Klaas Mielck: Permutation-based Feature Importance Analysis for Medium-Term Heat Load Forecasting in District Heating Systems

Sara Månsson: Enhancing Efficiency and Reliability in 4th Generation District Heating: Insights from Automated Fault Detection Implementations

Benedetto Nastasi: Digitalization and Smartness of Energy Systems from interactive models to Digital Twins

Pavel Paulau: Building physics monitoring with open standards

Aljoscha Pollmann: Waste heat as a driver for greenfield heat networks? Planning trade-offs illustrated using a case study for Zelzate, Belgium

Matteo Giacomo Prina: Machine learning with EPLANopt to speed up the optimization process and explore uncertainty in energy system modelling

Parisa Rahdan: Distributed photovoltaics provides key benefits in a highly renewable European energy system

Lea Rehlich: Mixed-integer nonlinear optimization approach for district heating networks

Marius Reich: Prior-Approximation of Rule-Based Energy System Simulation for Fast Design Optimization

Patricia Reindl: Redensification potentials through building renovation in a test area in Salzburg considering the existing district heating network

Ard de Reus and Luca Scapino: Real-time non-linear optimization of three district-heating connected heat pumps and a buffer with a Digital Twin

Xavier Rixhon: Robust policy optimization for the pathway towards a sustainable energy system using a hierarchical multi-objective reinforcement learning approach

Maximilian Roth: SlothBrAI:n: a holistic energy operating system

Alessandro Sartori: Optimizing the integration of renewable energy sources, energy efficiency, and flexibility solutions in a multi-network pharmaceutical industry

Kevin Michael Smith: Utilizing Digital Twins to Optimize District Heating Substations and Minimize Return Temperatures

Dominik Stecher: Creating a labelled district heating data set: From anomaly detection towards fault detection

Jan Stock: Automated separation of existing district heating networks for the utilisation of available heat sources

Goran Stunjek: Data-Based Correlation Analysis and Modelling of Water and Energy Systems on an Island Using Renewable Energy Sources for Desalination

Signe Swarttouw: Combining Diverse Datasets for Whole Systems Local Area Energy Planning

Paolo Thiran: The role of renewable fuels in a fossil-free European whole-energy system

Yannick Wack: The Role of Demand Variability and Intermittent Supply on the Optimal Routing and Design of District Heating Networks

Thibaut Wissocq: Strategies for decarbonisation of a heat district network using an optimization tool: Application to Grenoble city

ONLINE PROGRAMME SESSION PRESENTATIONS - ACCESSIBLE FROM 8 TO 15 SEPTEMBER

Planning and organisational challenges for smart energy systems and district heating

Maarten Blommaert: Automated Design Strategies for Low-Temperature District Heating Networks with Multiple Producers

Dhekra Bousnina: Optimal Multi-Energy Management in Smart Energy Systems: a Deep Reinforcement Learning approach and a case-study on a French eco-district

Alessandro Capretti: City-scale, multi-year and multi-stakeholder optimal district heating network developments planning

Mostafa Fallahnejad: Validation of calculated heat demand of the building stock using consumption data under GDPR

Seán Harty: Starting a district heating network in locations with no experience of district heating

Thomas Haupt: Cost-optimized decarbonization strategy for an existing residential area in Germany

Steen Schelle Jensen: Consumers role in the transition to low temperature heat networks

Peter Lorenzen: A new classification for district heating activities and the gap of a comprehensive methodology for the green transition

Andreas Möbius: Heat transformation tool to support communities with "municipal heating planning"

Ralf-Roman Schmidt: Risk minimization for decarbonizing heating networks via network temperature reductions and flexibility utilization – concepts and measures

Hinnerk Willenbrink: The new housing area "Warendorf In de Brinke" - 5GDH: from project to principle?

Smart energy infrastructure and storage options

Torstein Balle: Inspection of added thermal storage to increase the match of consumption and renewable generation, analysed for domestic heating on the Faroe Islands

Maximilian Bernecker: The Value of Information – How Enhanced Load Profiles Save Costs for Local Congestion Management

August Brækken: Energy system modelling of a future zero-emission neighbourhood with seasonal thermal energy storage

Toke Kjær Christensen: The Role of Thermal Energy Storages in Smart Energy Systems

Sleiman Farah: Investment-based optimisation of energy storage parameters in a grid-connected hybrid renewable energy system

Alaa Farhat: A Novel Aggregator Algorithm for Coordinated Control of Multiple Battery Energy Storage Systems

Ebbe Kyhl Gøtske: Cost and efficiency requirements for a successful electricity storage in a highly renewable European energy system

Lukas Hofmann: How seasonal heat storage can benefit power system flexibility and power-to-heat integration? An optimisation on the scale of the French territory.

Kristian Honoré: The age of Digitalization and Flexibility - from consumer to FLEXUMER in the district heating system

Pascal Häbig: Quantifying the Standardization Gap in Smart Energy Systems: Standardizing Information and Communication Interfaces for Small-Scale Flexibility

Emanuela Marzi: Coordinating multiple Power-to-Gas plants for optimal management of e-fuel seasonal storage

Miguel Herrador Moreno: Design of a renewable district heating and cooling plant for a university Campus in Cyprus

Mathieu Peeters: Optimal Extension Planning of District Heating Networks by Phased Investment

Matteo Pozzi: Digitalisation of the DHC industry: a review by DHC+ and Euroheat & Power

Daniel Trier: Simple real time monitoring of large thermal storages

Anna Vannahme: Study of the optimization of an existing local district heating network with an increasing degree of digitalization

Karl Vilén: The role of Thermal Energy Storages in Future Heating system – A Long-term Study of an Evolving Heating System

Zhiyuan Xie: Interactions between energy storage and electricity prices in a highly renewable energy system for Europe

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

Shravan Kumar: Integrating excess heat in district energy systems based on a long-term spatiotemporal and dispatch optimisation

Giovanni Dalle Nogare: GIS tool for the individuation of waste heat recovery opportunities

Juan Pedrero: Review of georeferenced energy planning tools and methods for the assessment of decarbonization scenarios

Robbe Salenbien: Using geographically informed non-linear district heating topology design to support higher level assessment methodologies for the potential of DHN

Marvin Schnabel: Interactive geodata analyses to support the multi-stakeholder process of thermal energy planning

Sreenath Sukumaran: Site suitability Assessment for Solar-Based Snow-Assisted District Cooling System in Estonian Context

Hyunkyo Yu: Heat Decarbonization and leveraging local resources in Rural Areas - A case of Holbæk Municipality

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Integrated energy systems and smart grids

Abdulrahman Azzam: Intelligent Operation Management System for Urban Districts – Conceptualization of a Dynamic Simulation as a Foundation for a Digital Twin

Sigurd Bjarghov: Coordination mechanisms in local energy communities for connection of industry in congested grids

Andra Blumberga: When does Energy Island transfer to Energy Community?

Miguel Chang: Energy transition scenarios on Norwegian islands: The case of Utsira

Sverre Stefanussen Fosløe: Leveraging industrial flexibility, sector coupling and wind power production to mitigate power grid capacity limitations

Vladimir Z. Gjorgievski: Optimal management of community energy systems considering different energy sharing incentives

Kushagra Gupta: Integrated Assessments of City Energy Systems: City Planning Vs National Targets

Kristina Haaskjold: Effect and value of end-use flexibility in the low-carbon transition of the Norwegian energy system

Kai Hoth: The Energy Aggregator Problem – A Holistic MILP Approach

Thanh Huynh: Local energy market for thermal-electric energy systems with consideration of temperature flexibility in heating subnetworks

Joseph Jebamalai: Optimization of thermal energy storage in district heating systems using Comsof Heat and GBOML

Lykke Mulvad Jeppesen: Unleashing renewable energy potential through anticipatory grid investments and risk sharing models

Dana Kirchem: Power sector effects of different roll-outs of flexible versus inflexible heat pumps

Igor Krupenski: Geothermal energy implementation in Estonian District Heating Networks

Christine Nowak: Integrated energy system flexibility options when using heat pumps to save carbon emissions

Nicolas Lamaison: Operational long-term management of a salt cavern for green H₂ production for industry

Lukas Peham: Implementation of a lifetime prediction model for crosslinked, foamed polyolefin insulation of pit thermal energy storages

Silvia Ricciuti: Modelling the optimal transition of an urban neighborhood towards an energy community and a Positive Energy District

Jim Rojer: Dynamic GROW Model for Heat District Network feasibility by Techno-economic Planning and Design Optimization with a Mixed Integer Linear strategy

Costanza Saletti: Concurrent optimal management of communities of multi-energy prosumers

Rasul Satymov: From Winter Wind to Summer Sun: Unlocking the Arctic Region's Renewable Energy Potential

Jens Schmutz: Transformation of the heat and gas infrastructure for a cost-optimised climate-neutral European energy system

Christian Schützenhofer: Industrial energy demand and GHG emission scenarios under changing technologies

Jan Eric Thorsen: Sønderborg (DK) case example of district heating sector coupling and the related control solution

Renewable energy sources and waste heat sources including PtX for DH

Hamza Abid: Existing and future potential hydrogen demands in Europe

Doris Beljan: Utilization of the available offshore wind potential - case study for the North Adriatic with the focus on HVDC, hydrogen and ammonia infrastructure

Dagnija Blumberga: How to integrate carbon farming in smart district heating energy systems?

Frederik Feike: Different scenarios for the decarbonization of a campus district heating system

Max Fette: CHG - Combined Heat and Gas: what are the potentials and barriers of using the waste heat of electrolyzers and how can it be utilised?

Maximilian Fey: A combined stochastic wind power forecasting and operational optimisation approach for off-grid offshore green hydrogen

Markus Fritz: What to do with the excess heat? - Assessing the techno-economic potential of different excess heat transport technologies in the European Union

Gabriele Humbert: Optimal sizing and operation of hydrogen generation sites with waste heat recovery for district heating network integration

Ulrike Jordan: Potential analysis for phasing out coal, oil and natural gas for heat supply in Kassel, a medium-sized city in Germany

Bjarne Jürgens: Covering district heating demand by waste heat usage from data centres – a feasibility study in Frankfurt, Germany

Jacek Kalina: Sizing large-scale industrial heat pump for heat recovery from treated municipal sewage in coal-fired district heating system

Henrique Lagoeiro: The Potential of Crematoria as Waste Heat Resources in the UK

Ana Catarina Marques: A Smart Local Energy System with heat recovery from power stations

Martin Colla: A comparative analysis of the energy return on energy invested (EROI) for different biomass district heating systems

Frederik Dahl Nielsen: Case study of local sector coupling strategies for e-methanol synthesis

Ieva Pakere: Optimizing Energy Independence for Achieving Climate Neutrality Goals

Thomas Pauschinger: IEA DHC Annex T55 – Integration of Renewable Energy Sources into existing District Heating and Cooling Systems

Michał Raczkiwicz: The use of heat pumps in a district heating in selected European countries

Stefan Reuter: Optimizing the Domestic Production and Infrastructure for Green Hydrogen in Austria for 2030

Luis Sánchez-García: Viability of district heating networks in temperate climates: Benefits and barriers of cold and warm temperature networks

Carina Seidnitzer-Gallien: Transition of district heating and cooling systems to a higher share of renewable energy sources - Outcomes from six European countries

Giulia Spirito: Has the global energy crisis enhanced the potential of district heating?

Anna Volkova: Waste Heat-Based District Heating Network for Industrial Buildings With Low Energy Intensity

Jelena Ziemele: Potential of treated wastewater as an energy source for district heating: a multi-factorial comparative assessment for the cities of London and Riga

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Special session: IEA DHC Annex TS7

Gabriela Jauschnik: How can industrial waste heat be used in district heating networks? Insights on effective project initiation and business models

Thomas Kohne: Planning District Heating Connections of Multi-Modal Industrial Energy Systems: Optimization Approach from an Industrial Perspective

Peter Sorknæs: Reviewing Methods for Identifying Waste Heat Potentials for District Heating

Lukas Theisinger: Living Lab DELTA: Development of an Interacting Energy-Optimized Industrial District

Special session: IEA DHC Annex TS4

Chris Hermans: Instance-based approach for fault detection in district heating substations

Mohammed Ali Jallal: Advancing Smart Heating and Cooling Networks: Deep Learning-Based Fault Detection for Substation Fouling in Heating and Cooling Networks

Tijs Van Oevelen: Testing and evaluation of a smart controller for peak reduction in an Italian thermal network

Dietrich Schmidt: Digitalization as the basis for efficient and flexible district heating systems

Ulrich Trabert: Flexible Use of Thermal Storage in a Large District Heating Substation using Incremental Deep Learning Heat Load Forecasts

Qinjiang Yang: Identifying Common Faults and Misuses in Large Multifamily Building Heating Systems Through Digitalization: A Survey

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

Diederik Coppitters: Evaluating the Environmental Impacts of Importing Electrofuels Using Planetary Boundaries: A Multi-Objective Optimisation Approach

Aurélia Hernandez: Hydrogen in Power System Adequacy Studies

Lazaara Ilieva: Toward holistic sustainability assessments of CCUS pathways

Carina Jensen: Accelerating Green Transition: Scaling CCUS Technologies and Green Fuels towards Denmark's Climate Goals

Andreas Krogh: Economic and environmental feasibility of biofuel production facilities based on a Geographical Information System approach

Eliana Lozano: Integrated e-methanol and drop-in fuels HTL platform –Techno-economic assessment for flexible operation

Nikola Mößner: Modelling the flexibility of process engineering PtX processes to achieve dynamic operation with volatile energy availability

Federico Parolin: The role of electrofuels in carbon-neutral scenarios of multi-sector integrated energy systems: An analysis for Italy

Shivaraj Chandrakant Patil: Current and Emerging Technologies for Waste-to-Energy Conversion: A Comparative Study with Multi-criteria Decision analysis approach

Dirk Vries: Control strategies for flexible hydrogen production by a 2.5MW electrolyser stack supplying a filling station

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

Enrico Ghidoni: Analysis of the impact of energy savings interventions on key performance indicators of a university campus

Christopher Graf: Domestic Hot Water Preparation in Residential Buildings: Comparison of Current Challenges and Future Solutions

Valentin Kaisermayer: Intelligent Building Control with User Feedback in the Loop

Hanne Kauko: The impact of energy efficiency, heat pumps and district heating on the future power demand in Norway

Peter Lierhammer: Proposal of a Modular Management System to Quantify Suitable Smart Heating Approaches in Existing Buildings

Pernille Seljom: The value and impact of building mass upgrade on the Norwegian energy system transition

Lucas Verleyen: Positive energy districts – Performance assessment of different collective energy systems in a tiny residential cluster of buildings

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

Martin Buitink: Effects of smart control of PVT heat pump systems on PV self-consumption

Stefan Hay: Sustainable Asset Management District Heating - a Future Perspective

Myeongsik Kong: Risk of pipe fault analysis process for safety diagnosis of district heating network pipe

Ding Mao: Study on the identification of critical pipe segments and reliability design methods for district heating networks based on vulnerability

Jonas Ottosson: Accelerate your growth of DHC with Demand Side Flexibility

Constantin Völzel: Open source model of a shallow geothermal heat collector as a component for 5GDHC simulation frameworks

Gerald Zotter: Using of a special heat pump to lift the district heating supply temperature for an industrial facility

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

Şirin Alibaş: Hybrid heat pump systems as bridging technology in the natural gas independence of Germany's residential buildings

Orestis Angelidis: Operational Designs for District Heating and Cooling Networks with Decentralized Energy Substations: Development and Validation

Isabelle Best: System temperature reduction for new DH systems in low-energy residential areas: cost-effectiveness and eco-efficiency as a function of plot ratio

Marek Brand: Economic comparison of 4GDH&C and 5GDH&C in Rome

Alixé Degelin: Influence of supply temperature and booster technology on the energetic performance of a district heating network

Jakub Garbacik: Heat pumps with thermal energy storage for district heating – standalone or integrated with fossil fuel heat plant

Lucien Genge: Evaluating Germany's Ammonia Economy: A Comprehensive Analysis of Application-Specific Demands and Well-to-Tank Supply Costs

Elisa Guelpa: Solutions to reduce supply temperature in existing small-to-large scale DH networks: lesson learnt by the project "Leave 2nd generation behind"

Aleksandr Hlebnikov: Evaluation of a Technical Solution for Seawater District Heating and Cooling Systems

Rahul Mohandasan Karuvingal: Analyzing Complex Network Hydraulics and Control Strategies in Cold District Heating Networks via Dynamic Thermo-Hydraulic Simulations

Ali Kök: Achieving Carbon Neutrality in District Heating: The Impact of Temperature Levels on the Supply Mix of EU-27 in 2050

Niklas Kracht: Feasibility study of an innovative drilling method for inclined medium-deep borehole heat exchangers in a 5th generation district heating concept

Alessandro Maccarini: Techno-economic evaluation of 4th and 5th gen. DH networks and comparing to individual heat pumps: Idea and concept of a simple decision support tool

Graeme Maidment: Energy Superhubs - the use of supermarkets as local energy centres

Aadit Malla: Modelling the potential for district cooling

Houssam Matboui: Assessing the ability to reduce the supply temperature of a district heating network following the oversizing of diameters due to building renovations

Tom Naughton: Practical experience of converting a 1970s UK social housing block into a 4GDH network with independent quality assurance support

Henrik Pieper: Heat pump configurations for aquifer thermal energy storage

Eftim Popovski: The role of solar district heat in the energy transition of the German heating sector

Els van der Roest: Flexibility of a low temperature District Heating system with Power-to-Heat and ATEs

Thomas Schmidt: Emission-free heat supply for a large new residential area with a smart combination of natural heat sources

Martin Sollich: Unlocking the energy efficiency potential of heating networks through low-temperature design and optimal retrofit

Seyed Shahabaldin Tohidi: Optimal price signal generation for local energy management using flexibility function

Lei Wang: Case study of a local district heating expansion scenario n scenario within the framework of EMB3Rs

Daniel Zinsmeister: Flow direction in district heating and cooling grids with booster heat pumps: Does it make sense to have unidirectional flow?

Electrification of transport, heating and industry

Benjamin Blat-Belmonte: Smart Energy Systems and Electrified Transport: Analyzing the Flexibility Potential of Bus Fleet Operators in Germany

Noémie Jeannin: From PV to EV: Mapping the Potential for Electric Vehicle Charging with Solar Energy in Europe

Alaize Dall'Orsoletta: The systemic impacts of electric vehicles' uptake: A conceptual model

Oliver Ruhnau: Representing electric vehicles in energy system models: an accurate and scalable aggregation approach

Judith Stute: How do dynamic electricity tariffs and dynamic grid charges interact?

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

Anders N. Andersen: Major economic opportunities and challenges for Danish wind farms and district energy plants of German special regulation and netting

Elisabeth Andreae: The impact of offshore energy hub and hydrogen integration on the Faroe Island's energy system

Julia Barbosa: Game-theoretic Analysis of Suppliers' Market Power in Local Multi-Energy Markets

Anna Billerbeck: Is Germany on the right way for the market uptake of large-scale heat pumps in district heating? An analysis of the economic framework conditions

Nina Kicherer: District heating organizational models for a cost-effective energy transition

Kristina Lygnerud: Business models for low temperature district heating - 10 case studies

Hironao Matsubara: Design of smart energy system for decarbonization leading areas in Japan

Bent Ole Gram Mortensen: Consumer empowerment in a time of change in the energy sector

Christoph Neumann: Redispatch approaches in European power systems – towards harmonization or divergence?

Marianne Petersen: Vision of Offshore Energy Hub at Faroe Islands: The Market Equilibrium Impact

Lucy Sherburn: Development of a heat network typology for use within a heat network technical assurance scheme

Daniel Møller Sneum: End-users' up-front payments in district heating: Striking the balance between competitive price and long-term risk

Freddie Valletta: Development of a new standardised testing regime to improve performance levels of residential heat interface units in the UK district heating market

Zhe Zhang: Challenges of setting up energy communities involving the Danish public sector: lessons learned