

6th INTERNATIONAL CONFERENCE on

Smart Energy Systems

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

6-7 October 2020, Aalborg

#SESAAU2020



AALBORG UNIVERSITY
DENMARK



LIST OF PRESENTATIONS

ON = exclusively online AAL = Aalborg and online

Keynote speakers

Mogens Lykketoft, former president of the UN General Assembly:
On track towards a sustainable future?

Catharina Sikow, Director of the EC Directorate General for Energy:
EC Strategy on Energy System Integration

Michael Lundgaard Thomsen, Managing Director at Aalborg Portland:
Cement production in Denmark - the Climate Partnership for Energy Intensive Industry

Lauren Edelman, Energy Specialist at Facebook:
Innovative Heat Recovery Solution - Facebook's commitment to renewable energy and energy efficiency

Soteris Kalogirou, Professor at Cyprus University of Technology:
Renewable Energy Systems - Current status and Prospects in the World

Renewable energy sources and waste heat sources for district heating

Lina Aglén: Potential of unutilised waste-heat possible to incorporate into UK district heating production (ON)

Lisa Altieri: Selecting the right heat source in an ultra-low temperature heating network (AAL)

Helge Aeverfalk: Low-temperature excess heat recovery in district heating systems: The potential of European Union metro stations (ON)

Federico Bava: Feasibility analysis of renewable DHC concepts in different climatic zones (ON)

Roman Geyer: Implementation of low-temperature district heating and its benefits (AAL)

Stefan Holler: Feasibility study on solar thermal process heat in the beverage industry (ON)

Anna Kallert: A Showcase Project: 4th Generation District Heating in Moosburg an der Isar (AAL)

Brage Rugstad Knudsen: Demand-side management for reducing peak-heating costs in a local low-temperature district heating grid with waste-heat utilization (ON)

Hironao Matsubara: Heat Roadmap Japan: Smart energy system combining renewable energy and district energy to decarbonize urban area in Japan (ON)

Wiebke Meesenburg: Flexible heat supply from supermarket refrigeration systems (AAL)

Francesco Mezzera: District heating potential in a hydrogen-based energy system - An exploratory focus on Italy (ON)

Peter North: A pathway towards the heat autonomous city (ON)

Henrik Pieper: Ranking of heat sources and sinks based on seasonal performance estimation and demands for heating and cooling areas (ON)

Tobias Reiners: Waste heat from mine water in an ultra low temperature district heating network (AAL)

Akos Revesz: Waste heat integration into heat networks; a UK wide assessment (ON)

Dirk Vanhoudt: TEMPO - Results of the first temperature reduction measures in the demo sites (AAL)

Jelena Ziemele: A multi-factorial decision support tool for integration of small-scale industrial heat pumps and solar PVs into a district heating system (ON)

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Smart energy system analyses, tools and methodologies

Weena Bergstraesser: Lessons learned from Excess flow analyses for various district heating systems (AAL)

Andra Blumberga: Achieving Positive Energy Block in historic urban environment: simulation and evaluation of alternative scenarios (ON)

Stef Boesten: Water to water heat pump for district heating: modeling for MILP optimization and application to a real case study (AAL)

Hermann Edtmayer: Sector Coupling Potentials of a 5th Generation District Heating and Cooling Network (AAL)

Thomas Estermann: Method for determining the feasibility of Grid and Ancillary Services by Smart Meters (ON)

Luca Ferrari: Integrated planning of multi-energy systems (PlaMES): comprehensive modelling framework and decision support tool (AAL)

Hans Christian Gils: The Contribution of Flexible Sector Coupling to Fully Renewable Electricity Generation in Australia (AAL)

Elisa Guelpa: Maximize the effects of district heating demand response in multi-energy optimization (ON)

Marnoch Hamilton-Jones: Fault detection and optimization potential on the demand side of district heating systems (ON)

Aleksandar Ivancic: Evaluation of district energy systems with shared systems for heating and cooling generation (ON)

Hicham Johra: Using data from smart energy meters to gain knowledge about building clusters connected to district heating networks: A Danish example (AAL)

Goran Krajačić: Modelling the water-energy nexus of the future smart island (AAL)

Shravan Kumar: Comparison of modelling approaches for operational optimization of district cooling networks (ON)

Ari Laitala: Modelling one hour level heating energy consumption of buildings – can AI algorithms enhance the understanding? (ON)

Thomas Lickleder: A Thermohydraulic Model of Bidirectional Heat Networks with Prosumers (AAL)

Danica Maljkovic: Evaluation of energy efficiency measures in district heating systems with deep learning (ON)

David Maya-Drysdale: How scenarios can facilitate local energy planning in cities (AAL)

Andrea Menapace: A flexible methodology to analyse 100 % renewable energy cities (ON)

Steffen Petersen: Evaluating the temperature performance of Danish building typologies in district heating networks (AAL)

Uni Reinert Petersen: Pathways towards 100% renewable energy on the Faroe Islands (AAL)

Stefan Petrović: An improved modelling of Danish district heating supply and demand in the future energy system (AAL)

Marianna Pozzi: A transparent assessment of retrofit potential in Italy based on open data (ON)

Matteo Giacomo Prina: Optimization method to obtain marginal abatement cost-curve through EnergyPLAN software (ON)

Diego Viesi: A cost-optimized approach in regional decarbonisation: the integrated and dynamic energy modelling of the Province of Trento (ON)

Fan Zhang: Night Setback Identification of District Heat Substations using Bidirectional Long Short Term Memory with Attention Mechanism (AAL)

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

Theofanis Benakopoulos: Faults detection and low operating temperatures in radiator system by using data from existing digital heat cost allocators in a multi-family building (AAL)

Tom Burton: Techno-economic assessment of external HIU cupboards on low temperature heat networks (ON)

Michel Gross: Model based analysis of future district heating networks (AAL)

Oddgeir Gudmundsson: Central heat plant vs decentral temperature boosting in district heating (AAL)

Mengting Jiang: A data-driven approach for fast and accurate dynamic simulation of district heating networks (ON)

Gareth Jones: Acceptance Testing: Improvement of network performance through standardised dwelling test regime (ON)

Mathias Kersten: Emission reduction in 4th generation district heat supply networks (AAL)

Igor Krupenski: District cooling system operation in cold climates with existing district heating networks (ON)

Ingo Leusbrock: DESTOSIMKAFE – Development & rating of technical & organizational system solutions for cold DH to supply heating and cooling (AAL)

Lefki Loverdou: Robust thermo-hydraulic design of prosumer district heating networks (ON)

Graeme Maidment: Exploring 5th Generation Integrated energy systems (ON)

Sara Månsson: A taxonomy for labelling deviations in district heating systems (ON)

Thomas Naughton: Process for optimising heat network performance of existing buildings in the UK (ON)

Pavel Rušeljuk: Economic Dispatch of District Heating Networks via Consumption-Based Management (ON)

Costanza Saletti: Enabling smart control by optimal management of the State of Charge of district heating networks (ON)

Amos Schledorn: An advanced optimization-based bidding method for district heating providers considering uncertainty and block bids (AAL)

Annette Steingrube: Transformation strategies to decarbonize district heating networks (ON)

Tim Taylor: Case study of a 3rd gen CHP district heating system that got updated to a 5th gen system with a shared ground source heat pump system (ON)

Jan Eric Thorsen: Experience with booster for DHW circulation in multi apartment building (AAL)

Riccardo Toffanin: Impact of Legionella regulation on a 4th generation district heating substation energy use and cost: the case of a Swiss single-family household (ON)

Ulrich Trabert: Feasibility study and techno-economic evaluation of a DH integration of a river water heat pump at a CHP plant in Germany (AAL)

Anna Vannahme: Comparison of Different District Heating Substation-Systems in a Hardware-in-the-Loop-Test Rig (AAL)

Yannick Wack: Showcasing the potential of adjoint-based topology methods to optimize District Heating Network design on district level (AAL)

Sven Werner: Vocabulary for fourth generation of district heating (ON)

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Smart energy infrastructure and storage options

Christine Damgaard Asmussen: Optimizing a grid-connected household photovoltaic installation in Denmark (AAL)

Diederik Coppitters: Epistemic and aleatory uncertainty quantification of a grid-connected photovoltaic system with battery storage and hydrogen storage (ON)

Steven Dijkstra-Downie: Energy Strategy for Expanding Scottish Towns Greenspaces, waterbodies, shared ambient loops, heat pumps and PV to heat and power town growth projects (ON)

Julian Formhals: Dynamic transition to a renewable and efficient campus solar district heating grid with integrated medium deep borehole thermal energy storage (AAL)

Luka Herc: Economic viability of flexibility options for smart energy systems with high share of renewable energy (ON)

Martin Heine Kristensen: Heat load demand response experiment in social housing apartments using wireless radiator setpoint control (AAL)

Poul E. Kristensen: Wind + sun for 100% RE heating of buildings (AAL)

Kertu Lepiksaar: Increasing CHP flexibility to improve energy system efficiency (ON)

Rasmus Lund: Combined heat and power storage: Feasibility in a national renewable energy system context (AAL)

Johannes Röder: Decentral Heat Storages in System-Beneficial District Heating Systems – an Integrated Optimization Approach (AAL)

Yi Zong: Converting wastes efficiently and flexibly for grid-balancing services and sector coupling (ON)

Integrated energy systems and smart grids

Hamza Abid: Energy storage integration with solar PV for increased electricity access: A case study of Burkina Faso (AAL)

Frederik Palshøj Bigum: Real-scale integrated renewable energy systems (ON)

Matthias Greiml: Assessing usage of power-to-gas as an alternative to electricity grid expansion to increase photovoltaic generation in south-east Austria (AAL)

Bastian Hase: Using Short-Time Storage Potentials of Run-of-River Hydroelectric Plants for Frequency Control (ON)

Gauthier Limpens: Intermittent renewable energy integration: assessing the benefits of the flexibility options (ON)

Pia Manz: Future synergies of industrial excess heat potentials and buildings energy demand in Germany (AAL)

Torben Ommen: Economic feasibility of fuel-shift appliances supplied by gas, electricity and district heating in Denmark (AAL)

Dietrich Schmidt: Digitalisation of district heating systems (AAL)

Vittorio Verda: Challenges in adoption of district cooling in densely populated areas (ON)

Marta Victoria: Early decarbonisation of the European energy system pays off (AAL)



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

Debmalya Biswas: Reinforcement Learning based HVAC Optimization in Factories (ON)

Henrik Brink: Identifying optimisation potential in electricity consumption profiles from hourly smart meter data at scale (AAL)

Sverre Stefanussen Foslie: Integrated heating and cooling in the industry through heat pumps and thermal energy storages – case study of an electrified dairy (ON)

Daniel Heidenthaler: Thermally activated building systems in wooden structures (ON)

Marcus Hummel: Using least cost renovation combinations in buildings for developing future heat demand density maps: case studies in three cities in Europe (AAL)

Paolo Leoni: Lowering the operating temperatures in old-generation district heating systems: first results from the TEMPO demonstration project in Brescia (Italy) (ON)

Antoine Levesque: Decarbonising buildings energy services through demand and supply (ON)

Chiara Piccardo: Life cycle cost and primary energy analysis of a multi-storey residential building retrofit to different energy levels with varied materials (ON)

Dimitra Tzani: Different portfolios of measures to improve efficiency in the residential sector in Greece towards the achievement of the 2030 targets (ON)

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

Alice Dénarié: Assessment of renewable and waste heat recovery in DH through GIS mapping: the national potential in Italy (ON)

Mostafa Fallahnejad: District Heating Grid Planning (ON)

Fabrizio Fattori: A Regression Model to Estimate the Dwelling-Network Connection Length Starting from Aggregated Information per Census Area (ON)

Markus Groissböck: Energy hub optimization framework based on open-source (software & data) – Review of frameworks and concept for districts & industrial complexes (ON)

Nina Kicherer: Design of a District Heating Roadmap for Hamburg (ON)

Hannes Koch: Rooftop photovoltaic - an algorithmic solution for obtaining total potential power generation by processing solar irradiance data (ON)

Samuel Macchi: A validated method to simulate district heating network topologies to enable assessing district heating cost (ON)

Johannes Pelda: FERNWÄRMEATLAS – An Online Tool to Collect Information about District Heating Systems in Germany (AAL)

Morten Karstoft Rasmussen: Data driven asset management – online distribution grid analysis based on GIS and meter consumption data (AAL)

Abdulraheem Salaymeh: Determination of the district heating supply structure based on geospatial and statistical data (ON)

Martin Santa Maria: District heating system optimization with RIVUS, Case study Salzburg (ON)

David Schmidinger: Assessment of future heat demand and supply with the HOTMAPS toolbox: A case study for San Sebastian (ON)

Giulia Spirito: Potential diffusion of renewable based 3GDH and 4GDH assessment through energy mapping: a case study in Milano (ON)

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

Gatis Bazbauers: Linking energy efficiency policies toward 4th generation district heating system (ON)

Andrej Guminski: Holistic evaluation scheme for industrial greenhouse gas abatement measures – bringing together research and practice (ON)

Andreas Müller: How much to invest? Balancing investment costs and economic benefits of reducing the temperature levels in existing district heating networks (AAL)

Robert Pratter: HEATflex: Development of a common technical & economic strategy to increase the competitiveness of CHP & district heating plants (ON)

Callum Rae: Practical learnings from deployed Smart Local Energy Systems: technical barriers to scale-up (ON)

Leon Joachim Schwenk-Nebbe: CO2 quota attribution effects on the European electricity system (AAL)

Daniel Møller Sneum: Flexibility in the interface between district energy and the electricity system (AAL)

Karl Vilén: The Impact of Climate Policy on the District Heating System in a Nordic city (ON)

Behnam Zakeri: Aftermath of COVID19 and the Energy Sector: Is a green recovery from economic slowdown possible? (ON)

Planning and organisational challenges for smart energy systems and district heating

Dagnija Blumberga: How to start the waste heat and boiler house competition in Latvia (ON)

Hrvoje Dorotić: Cost and Benefits of Shifting Towards Low Temperature District Heating Networks – Energy Planning Approach (ON)

Leire Gorroño-Albizu: How could heat consumers' trust in district heating solutions be enhanced? Insights from Denmark and Sweden (AAL)

Britta Kleinertz: District heating supply transformation – Strategies, measures and status quo of network operators transformation phase (AAL)

Louise Krog: 4th generation district heating, consumers, consumer involvement (AAL)

Stefano Morgione: A comprehensive framework for District Energy Systems Upgrade (AAL)

Matteo Pozzi: Supporting Electricity Trading towards XBID implementation through innovative District Energy plant management (ON)

Saeid Charani Shandiz: Towards net-zero emission and energy resilient communities: a multi-dimensional approach to energy master planning (ON)

Tars Vershelde: Case studies on a decision support tool for thermal networks (ON)

Special session on Innovating SMEs

Hans Jørgen Brodersen: Turning SME ideas into New Smart Energy Solutions (AAL)

Henning Schmidt-Petersen: Biomass treatment - How to turn a problem into a resource (AAL)

Bo Eskerod Madsen: Clamp-on Monitoring of Energy from the Outside of

Existing Multiconductor Cables and Pipes (AAL)

Mario Javier Rincón: Micro-ORC Technology Development (AAL)

Bjarke Henriksen: Total Building Automatic Energy Management (AAL)



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Electrification of transport, heating and industry

Amela Ajanovic: Impact of coronavirus crisis on electrification of mobility (ON)

Nina Detlefsen: How electrification of the heating and transportation sector affects the load in low voltage electricity grids (AAL)

Christine Gschwendtner: Uncertain impacts of technology, infrastructure, and vehicle use types on the integration of Vehicle-to-grid (V2G) into distribution networks (ON)

Reinhard Haas: Potential of wind & solar power for Sector Coupling with the heating&cooling and transport sector (AAL)

Sajjad Haider: Uncontrolled Electric Vehicle Charging in Low Voltage Grids – Impacts (ON)

Simon Meunier: Towards mapping grid reinforcement costs from residential low-carbon technologies penetration in Europe (ON)

Adrian Ostermann: Potential of vehicle to grid charging control of electric vehicles in congestion management (AAL)

Niklas Wulff: Vehicle Energy Consumption in Python (VencPy): Presenting and demonstrating an open source tool to calculate electric vehicle charging flexibility (AAL)

Meng Yuan: The role of transportation electrification in the energy transformation of urban agglomerations: A case study of Beijing-Tianjin-Hebei region (AAL)

The production, technologies for and use of electrofuels in future energy systems

Christian Bundgaard: System Effects of Implementing Electrofuels for Decarbonisation of the Transport Sector in a Danish Perspective (AAL)

Tobias Hübner: Simulation-based analysis of synthetic fuels in the industry in relation to climate protection level (ON)

René Kofler: Comparison of different biorefinery systems integrating the electricity, heating and transport sector (AAL)

Xavier Rixhon: The role of electro-energy carriers under uncertainties for Belgian energy transition (ON)

Hamam Soliman: Contribution of Power-to-X-to Power in retrofitting of Coal-Fired Power Plants (AAL)

Christian Thommessen: Techno-economic System Analysis of an Offshore Energy Hub and Outlook of Electrofuel Applications (AAL)

Kevin Verleysen: Influence of parametric and operational uncertainties on the dynamic operation of the Haber-Bosch synthesis process for seasonal hydrogen storage (ON)

Components and systems for DH, energy efficiency, electrification and electrofuels

Louise Christensen: Thermal comfort and technology acceptance in homes with demand-responsive control of radiator thermostats (AAL)

Yuriy Lobunets: Regenerative Thermoelectric Heat Pump for HVAC Systems (ON)

Dmitry Romanov: Technical, economic and ecological effects of lowering temperatures in the Moscow district heating system (ON)

Pierre JC Vogler-Finck: Field experience of data-driven control and monitoring to support energy efficient and flexible building operation (AAL)

Benjamin Zühlsdorf: Model-based fault detection for use in digital twins of large-scale heat pump systems (AAL)