

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



PROGRAMME AALBORG
MONDAY 5 OCTOBER 2020

SMART ENERGY SYSTEMS TECHNICAL TOUR

8 MW HEAT PUMP AT STØVRING CHP

MONDAY 5 OCTOBER 2020
13:00-16:30 PM

Wind power is covering 50 % of the Danish electricity demand, which makes it attractive to use the fossil free electricity in the district heating system. Due to the attractive conditions, many Danish utilities are investing in large heat pumps.

At this technical tour, we will visit Støvring CHP, 20 km. south of Aalborg, which has invested in an air to water heat pump with a capacity of approximately 8 MW. Støvring has 8221 inhabitants, and the heat pump is designed to cover 80 % of the town's heat demand. With this investment, Støvring CHP can replace 80 % natural gas with sustainable wind energy.

The technical tour is organised by Green Hub Denmark.

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PROGRAMME AALBORG
TUESDAY 6 OCTOBER 2020

08:00-09:00 Registration and breakfast

09:00-11:15 1st plenary session chaired by Professor Poul Alberg Østergaard

RADIOALEN, 1st floor

09:00-09:15 Professor Henrik Lund: Opening speech

09:15-09:45 Keynote by Mogens Lykketoft, former president of the UN General Assembly: On track towards a sustainable future?

09:45-10:15 Keynote by Michael Lundgaard Thomsen, Managing Director at Aalborg Portland: Cement production in Denmark - the Climate Partnership for Energy Intensive Industry

10:15-10:45 Keynote by Catharina Sikow, Director of the EC Directorate General for Energy: EC Strategy on Energy System Integration

10:45-11:15 Questions and discussion

11:15-11:45 Coffee break

Parallel sessions 1-3

11:45-12:45 RADIOALEN, 1st floor

Session 1: Smart Energy Systems analyses, tools and methodologies

Chair: Jakob Zinck Thellufsen

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

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

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

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

11:45-12:45 MUSIKSALEN, 1st floor

Session 2: The production, technologies for and use of electrofuels in future energy systems

Chair: Reinhard Haas

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

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

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

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

11:45-12:45 DET LILLE TEATER, 1st floor

Session 3: Planning and organisational challenges for smart energy systems and district heating

Chair: Jesper Møller Larsen

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

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

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

Stefano Morgione: A comprehensive framework for District Energy Systems Upgrade

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PROGRAMME AALBORG
TUESDAY 6 OCTOBER 2020

12:45-13:45 Lunch

Parallel sessions 4-6

13:45-15:00 RADIOSALEN, 1st floor

Session 4: Smart Energy Systems analyses, tools and methodologies

Chair: Peter Sorknæs

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

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

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

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

13:45-15:00 MUSIKSALEN, 1st floor

Session 5: Electrification of transport, heating and industry

Chair: Henrik Brink

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

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

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

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

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

13:45-15:00 DET LILLE TEATER, 1st floor

Session 6: 4th Generation District Heating concepts, future district heating production and systems

Chair: Anders N. Andersen

Michel Gross: Model based analysis of future district heating networks

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

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

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

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

15:00-15:30 Coffee break

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PROGRAMME AALBORG
TUESDAY 6 OCTOBER 2020

Parallel sessions 7-8

15:30-17:00 RADIOSALEN, 1st floor

Session 7: Renewable energy sources and waste heat sources for district heating

Chair: Morten Karstoft Rasmussen

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

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

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

Wiebke Meesenburg: Flexible heat supply from supermarket refrigeration systems

Tobias Reiners: Waste heat from mine water in an ultra low temperature District Heating network

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

15:30-17:00 MUSIKSALEN, 1st floor

Session 8: Integrated energy systems and smart grids

Chair: Peter Jorsal

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

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

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

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

Dietrich Schmidt: Digitalisation of district heating systems

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

17:00-19:00 Break

19:00 Conference dinner, Restaurant Fusion

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PROGRAMME AALBORG
WEDNESDAY 7 OCTOBER 2020

Parallel sessions 9-11

09:00-10:15 RADIOSALEN, 1st floor

Session 9: Smart energy system analyses, tools and methodologies

Chair: Goran Krajačić

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

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

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

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

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

09:00-10:15 MUSIKSALEN, 1st floor

Session 10: 4th Generation District Heating concepts, future district heating production and systems

Chair: Nina Detlefsen

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

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

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

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

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

09:00-10:15 DET LILLE TEATER, 1st floor

Session 11: Special Session on Innovating SMEs

Chair: Anne Baastrup Holm

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

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

Bo Eskerod Madsen: Clamp-on Monitoring of Energy from the Outside of Existing Multiconductor Cables and Pipes

Mario Javier Rincón: Micro-ORC Technology Development

Bjarke Henriksen: Total Building Automatic Energy Management

10:15-10:45

Coffee break

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PROGRAMME AALBORG
WEDNESDAY 7 OCTOBER 2020

Parallel sessions 12-14

10:45-12:15 RADIOSALEN, 1st floor

Session 12: Smart energy infrastructure and storage options

Chair: Steffen Petersen

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

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

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

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

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

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

10:45-12:15 MUSIKSALEN, 1st floor

Session 13: Energy savings in the electricity sector, buildings, transport and industry / GIS for energy systems, heat planning and district heating

Chair: Steffen Nielsen

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

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

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

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

10:45-12:15 DET LILLE TEATER, 1st floor

Session 14: Institutional and organisational change for smart energy systems and radical technological change/

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

Chair: Jan Eric Thorsen

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

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

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

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

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

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

12:15-13:15 Lunch break

13:15-15:15 2nd plenary session chaired by Professor Brian Vad Mathiesen

RADIOSALEN, 1st floor

13:15-13:45 Plenary keynote by **Soteris Kalogirou, Professor at Cyprus University of Technology:** Renewable Energy Systems - Current status and Prospects in the World

13:45-14:15 Plenary keynote by **Lauren Edelman, Energy Specialist at Facebook:** Innovative Heat Recovery Solution - Facebook's commitment to renewable energy and energy efficiency

14:15-14:45 Questions and discussion

14:45-15:15 Closing session and Best Presentation Award ceremony

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PROGRAMME AALBORG
THURSDAY 8 OCTOBER 2020

SMART ENERGY SYSTEMS TECHNICAL TOUR

SMART ENERGY IN SMART AALBORG - on the way to becoming 100 % fossil free

THURSDAY 8 OCTOBER 2020
9:00 AM - 12:00 NOON

The city council in Aalborg has decided to outphase coal from the local CHP plant Nordjyllandsværket by 2028. This requires that a combination of renewable energy sources is implemented in the district heating system. For several years, the utility has been considering sustainable alternatives, especially excess heat, geothermal solutions, large heat pumps, pit storages, solar and wind power.

On this technical tour, we will take a bus trip around Aalborg and gain insight into various renewable energy sources and examples of collaboration between the municipality, the utility, businesses, the university and citizens, who are all involved in testing and developing new, green solutions.

The technical tour is organised by Green Hub Denmark.