

5TH INTERNATIONAL CONFERENCE ON

Smart Energy Systems

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

10-11 SEPT 2019 • COPENHAGEN



AALBORG UNIVERSITY
DENMARK

PROGRAMME

Monday 9 September 2019

#SESAAU2019

Smart Energy System Tour: Wind Energy Monday 9 September 2019 at 14:00-16:30

Boat tour to Middelgrunden Offshore Wind Farm with participation from Middelgrunden Wind Turbine Cooperative

The Middelgrunden Offshore Wind Farm is one of the first offshore wind farms in the world. It has a total capacity of 40 MW and consists of 20 Bonus turbines each with a power of 2 MW. Middelgrunden Offshore Wind Farm provides 3 per cent of the electricity consumption in Copenhagen.

Ten of the wind turbines are owned by the energy company HOFOR and the remaining ten belong to Middelgrunden Wind Turbine Cooperative. This means that a number of Copenhagen citizens own a share of the turbines. More than 90% of all offshore wind turbines worldwide come from Danish companies. Offshore wind power requires specialised expertise, and Danish companies have vast experience in meeting the challenges of constructing offshore wind power plants.

Time and venue

14:00 Departure from Nyhavn Hotel, Nyhavn 71, 1051 Copenhagen. The boat departs from this harbour and returns to the same place.

Price

60 EUR including boat trip, guided visit and coffee/tea.

Registration

Registration at <https://smartenergysystems.eu/registration/> before 31 August 2019.

Registration is binding. Limited number of seats.

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PROGRAMME

Tuesday 10 September 2019

#SESAU2019

08:00-09:00 Registration and breakfast Lobby 1st floor

09:00-11:00 1st plenary session chaired by Professor Poul Alberg Østergaard Mermaid /Citadel 1st floor

- 09:00 Opening speech by Professor Henrik Lund
- 09:15 Plenary keynote by Professor Jianjun Xia: District Energy Systems in China
- 09:40 Plenary keynote by Kristian Ruby, Secretary General: Dispatches from the European energy transition
- 10:05 Plenary keynote by David Connolly, PhD, CEO: Wind power and district energy in Ireland
- 10:30 Questions and discussion

10:45-11:15 Coffee break Lobby 1st floor

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|-----------------------|--|--|--|--|---|---|
| Parallel sessions 1-6 | 11:15-13:00 LOUNGE 1, 2nd | 11:15-13:00 CITADEL 1, 1st | 11:15-13:00 LOUNGE 2, 2nd | 11:15-13:00 CITADEL 2, 1st | 11:15-13:00 MERMAID, 1st | 11:15-13:00 HARBOUR, 1st |
| | Session 1: Smart Energy Systems analyses, tools and methodologies | Session 2: Smart Energy Systems analyses, tools and methodologies | Session 3: Integrated energy systems and smart grids | Session 4: GIS for energy systems, heat planning and DH | Session 5: Energy Lab Nordhavn | Session 6: 4GDH concepts, future DH production and systems |
| | Chair: Paula Ferreira | Chair: Reinhard Haas | Chair: David Connolly | Chair: Steffen Nielsen | Chair: Svend Svendsen | Chair: Henrik Madsen |
| | Session keynote: Dagnija Blumberga | Session keynote: Pierrick Haurant | Session keynote: Ralf-Roman Schmidt | Session keynote: Bernd Möller | Session keynote: Jan Eric Thorsen | Session keynote: Ingo Weidlich |
| | Amir Mohammad J. Khoshbaf Borna Doračić Carles Ribas Tugores Ingo Leusbrock Carlo Winterscheid | Bernhard Gerardts Jes Donneborg Arthur Clerjon Michael-Allan Millar Mariagrazia Dotoli | Behnam Zakeri Akos Revesz Mathieu Vallée Edward O'Dwyer Jens Brage | Eva Wiechers Hermann Edtmayer Marcus Hummel Magda Kowalska Mostafa Fallahnejad | Christine Emilie Sandersen Hanmin Cai Henrik Pieper Kevin Michael Smith Morten Herget Christensen | Annelies Vandermeulen Jens Møller Andersen Janette Webb Helge Averfalk Anna Volkova |

13:00-14:00 Lunch Lobby 1st floor

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PROGRAMME Tuesday 10 September 2019 (continued)

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| Parallel sessions 7-12 | <p>14:00-15:45 LOUNGE 1, 2nd</p> <p>Session 7: Production, technologies and electrofuels in future energy systems</p> <p>Chair: Iva Ridjan Skov</p> <p>Session keynote: Mads Friis Jensen</p> <p>Steffen Nielsen Alessandro Guzzini Andrei David Benedetto Nastasi Jesper Schramm</p> | <p>14:00-15:45 CITADEL 1, 1st</p> <p>Session 8: Smart Energy Systems analyses, tools and methodologies</p> <p>Chair: Ralf-Roman Schmidt</p> <p>Session keynote: Gorm Bruun Andresen</p> <p>Egbert-Jan van Dijck Rowan Molony Kun Zhu Kristoffer Steen Andersen Roberto Bricalli</p> | <p>14:00-15:45 LOUNGE 2, 2nd</p> <p>Session 9: Planning and organisational challenges for SES and DH</p> <p>Chair: Frede Hvelplund</p> <p>Session keynote: Bent Ole Gram Mortensen</p> <p>Christian Thommessen Paolo Leoni Richard van Leeuwen Zhikun Wang Michiel Fremouw</p> | <p>14:00-15:45 CITADEL 2, 1st</p> <p>Session 10: Smart Energy Systems analyses, tools and methodologies</p> <p>Chair: Peter Sorknæs</p> <p>Session keynote: Paula Ferreira</p> <p>Géremi Gilson Dranka Rasmus Elbæk Hedegaard Sara Månsson Shahrooz Abghari Weronika Radziszewska</p> | <p>14:00-15:45 MERMAID, 1st</p> <p>Session 11: 4GDH concepts, future DH production and systems</p> <p>Chair: Peter Jorsal</p> <p>Session keynote: Sara Kralmark</p> <p>Steen G. Olesen Klaus G. Lauridsen Dennis Kerkhof Klara Ottosson David Edsbäcker</p> | <p>14:00-15:45 HARBOUR, 1st</p> <p>Session 12: RES and waste heat sources for district heating</p> <p>Chair: Morten Abildgaard</p> <p>Session keynote: Goran Krajačić</p> <p>Hiroyasu Shirato Shalika Walker Allan Oliveira Friederike Stelter Julio Vaillant Rebollar</p> |
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15:45-16:15 Coffee break

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|--------------------------------|---|--|--|---|---|---|
| Parallel sessions 13-18 | <p>16:15-17:45 LOUNGE 1, 2nd</p> <p>Session 13: Institutional and organisational change for SES</p> <p>Chair: Bent O.G. Mortensen</p> <p>Session keynote: Alessandro Provaggi</p> <p>Ari Laitala Kirsten Hasberg Max Fette Renee Heller</p> | <p>16:15-17:45 CITADEL 1, 1st</p> <p>Session 14: Smart Energy infrastructure and storage options</p> <p>Chair: Anders Dyrelund</p> <p>Session keynote: Reinhard Haas</p> <p>Michael Reisenbichler Keith O'Donovan Tiziano Gallo Cassarino Joseph Maria Jebamalai</p> | <p>16:15-17:45 LOUNGE 2, 2nd</p> <p>Session 15: Electrification of transport, heating and industry</p> <p>Chair: Jesper Schramm</p> <p>Session keynote: Tobias Fleiter</p> <p>Amela Ajanovic Eliana Lozano Timo Kannengiesser Elisa Guelpa</p> | <p>16:15-17:45 CITADEL 2, 1st</p> <p>Session 16: Smart Energy Systems analyses, tools and methodologies</p> <p>Chair: Søren Djørup</p> <p>Session keynote: Peter Sorknæs</p> <p>Raffaele De Iulio Els van der Roest Costanza Saletti Matteo Giacomo Prina</p> | <p>16:15-17:45 MERMAID, 1st</p> <p>Session 17: 4GDH concepts, future DH production and systems</p> <p>Chair: Richard van Leeuwen</p> <p>Session keynote: Henrik Madsen</p> <p>Igor Krupenski Phil Jones Sabine Jansen Tobias Sommer</p> | <p>16:15-17:45 HARBOUR, 1st</p> <p>Session 18: Smart Energy Systems analyses, tools and methodologies</p> <p>Chair: Gorm Bruun Andresen</p> <p>Session keynote: Brian Elmegaard</p> <p>Francesco Neirotti Jann Launer Ashish Chawla Tom Prinzie</p> |
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17:45-19:30 Break

19:30 Conference dinner Restaurant "GRØFTEN", Tivoli

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AALBORG UNIVERSITY
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TENTATIVE PROGRAMME

Wednesday 11 September 2019

#SESAU2019

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|-------------------------|---|---|---|---|---|--|
| Parallel sessions 19-24 | 9:00-10:45 LOUNGE 1, 2nd Session 19: Smart Energy Systems analyses, tools and methodologies Chair: Jakob Z. Thellufsen Session keynote: Philipp Schütz Hagen Braas Martin Heine Kristensen Michele Tunzi Pierre J.C. Vogler-Finck Andra Blumberga | 9:00-10:45 CITADEL 1, 1st Session 20: 4GDH concepts, future DH production and systems Chair: Jan Eric Thorsen Session keynote: Alfred Heller Basak Falay Gerald Schweiger Leire Chavarri Richard Büchele Maria Jangsten | 9:00-10:45 LOUNGE 2, 2nd Session 21: Integrated energy systems and smart grids Chair: Tom Brown Session keynote: Vittorio Verda Inger-Lise Svensson Monica Arnaudo Olatz Terreros Tijs Van Oevelen Shadie Broumandi | 9:00-10:45 CITADEL 2, 1st Session 22: Smart Energy infrastructure and storage options Chair: Anton Ianakiev Session keynote: Anders Dyrelund Gunnar Rohde Hans Christian Gils Sina Steinle Søren Møller Thomsen Giorgio Cucca | 9:00-10:45 MERMAID, 1st Session 23: 4GDH concepts, future DH production and systems Chair: Marie Münster Session keynote: Dietrich Schmidt Hjörleifur G. Bergsteinsson Johannes Oltmanns Johan Dalgren Tobias Ramm Vilhjálmur Nielsen | 9:00-10:45 HARBOUR, 1st Session 24: Smart Energy Systems analyses, tools and methodologies Chair: Steen Schelle Jensen Session keynote: Morten Karstoft Rasmussen Etienne Cuisinier Thibaut Résimont Can Tümer Ana Turk Danica Maljkovic |
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10:45-11:15 Coffee break

Lobby 1st floor

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|-------------------------|--|---|---|---|---|--|
| Parallel sessions 25-30 | 11:15-13:00 LOUNGE 1, 2nd Session 25: Smart Energy Systems analyses, tools and methodologies Chair: Brian Elmegaard Session keynote: Henrik Dalsgaard Stefan Holler Johannes Pelda Charlotte Marguerite Johannes Röder Saleh Mohammadi | 11:15-13:00 CITADEL 1, 1st Session 26: Smart Energy Systems and 4GDH concepts, production and systems Chair: Vittorio Verda Session keynote: Tom Brown Dominik Franjo Dominković Hironao Matsubara Behzad Rismanchi Tetsunari Iida | 11:15-13:00 LOUNGE 2, 2nd Session 27: Smart Energy Systems analyses, tools and methodologies Chair: Goran Krajačić Session keynote: Marie Münster Daniel Møller Sneum Sylvain Quoilin Frederik Banis Naoya Nagano Steven de Jongh | 11:15-13:00 CITADEL 2, 1st Session 28: UN District Energy Chair: Bernd Möller Session keynote: Morten Jordt Duedahl Dejan Ivezic Nyamtsetseg Ivanov Romanas Savickas Susana Paardekooper Zhuolun Chen | 11:15-13:00 MERMAID, 1st Session 29: 4GDH concepts, future DH production and systems Chair: Ingo Weidlich Session keynote: Mei Gong Hanne Kauko Hannes Poier Marco Cozzini René Kofler | 11:15-13:00 HARBOUR, 1st Session 30: Smart Energy Systems analyses, tools and methodologies Chair: Dagnija Blumberga Session keynote: Jakob Zinck Thellufsen Ewoud Werkman Kristine Askeland Roberto Vaccaro Salman Siddiqui Isabelle Best |
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13:00-14:00 Lunch

Lobby 1st floor

14:00-16:30 2nd plenary session chaired by Professor Brian Vad Mathiesen

Mermaid /Citadel 1st floor

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| 14:00 | Plenary keynote by Poul Skjærbæk, Chief Innovation Officer: Offshore Wind Power & Electrofuels |
| 14:30 | Plenary keynote by Jean-Michel Glachant, Director: The second wave of electricity system revolutions: Peer-2-Peer and Communities |
| 15:00 | Plenary keynote by Søren Hermansen, CEO: Resilient communities – Samsø island - a living lab for community ownership |
| 15:30 | Questions and discussion |
| 16:00 | Closing session and award ceremony |

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AALBORG UNIVERSITY
DENMARK

PROGRAMME

Thursday 12 September 2019

#SESAAU2019

Smart Energy System Tour: District Heating and Cooling Thursday 12 September 2019 at 9:00-14:00

Visit to Albertslund Utility and HOFOR District Cooling

Albertslund Fjernvarme (Utility) supplies the municipality of Albertslund, a suburb to Copenhagen, with district heating. Albertslund Utility is establishing a new low-temperature district heating system. A change to 4th generation district heating, where the supply temperature is lowered from 90 to 55 °C, gives considerable advantages. The lower return temperature allows higher overall efficiency in the CHP plant and lower overall temperatures mean less heat loss from the grid. Lower operation temperatures also facilitate the connection of low-temperature heat sources, such as industrial process heat, solar and geothermal energy, both directly and via heat pumps.

HOFOR is the largest utility company in Denmark, with core business areas within water supply, wastewater management, district heating, district cooling, and gas supply. One million Danish consumers (20% of the population) depend on the supplies. Introduction to remote metering data and data usage for grid efficiency purposes and low-temperature district heating. In response to increasing demands for air conditioning and cooling in Copenhagen, HOFOR, has built a district cooling system, which consists of a distribution net and two cooling plants. The district cooling system uses seawater to cool the water supplied to consumers. HOFOR can supply the increased demand for cooling in Copenhagen and help reduce CO₂ emissions by up to 30,000 tonnes each year.

Time and venue

09:00 Pick-up at Hotel Wakeup Copenhagen, Borgergade 9, 1300 Copenhagen

14:00 Drop-off at Kastrup Airport

Price

60 EUR including bus trip, guided visits, sandwich and beverages

Registration

Registration at <https://smartenergysystems.eu/registration/> before 31 August 2019.

Registration is binding. Limited number of seats.

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Tuesday 10 September 2019 - Contents of sessions 1-6

Session 1: Smart Energy Systems analyses, tools and methodologies

Session keynote Dagnija Blumberga: Solar Thermal or Solar Electricity, that is the question for 4GDHC

Amir Mohammad J. Khoshbaf: Technical Feasibility Assessment of 4th Generation Solar-Assisted District Heating System in Melbourne

Borna Doračić: Analysis of the integration of heat and electricity prosumers into the existing energy system with the focus on solar technologies

Carles Ribas Tugores: Large-scale solar thermal and storage for district heating in Austria: Results of techno-economic evaluation and detailed simulation studies

Ingo Leusbrock: Lessons learnt and guidelines for large-scale solar thermal and storage applications for district heating in an Austrian context

Carlo Winterscheid: Evaluation of solar district heating opportunities in Lithuania and Bosnia and Herzegovina

Session 2: Smart Energy Systems analyses, tools and methodologies

Session keynote Pierrick Haurant: Generation of daily load typology for district heating simulation and optimisation

Bernhard Gerardts: There is no need for complexity in diversifying the district heating sector

Jes Donneborg: Replacing Coal-Fired Plants with Renewable Sources Integrated with Thermal Storage

Arthur Clerjon: Matching intermittent electricity supply and load with energy storage: An optimization based on a time scale analysis

Michael-Allan Millar: Thermal Supply Peak Shaving for Residential Housing Stock in the UK

Mariagrazia Dotoli: Energy Scheduling of a Smart District Microgrid with Shared Photovoltaic Panels and Storage: the case of the Ballen marina in Samsø

Session 3: Integrated energy systems and smart grids

Session keynote Ralf-Roman Schmidt: Blockchain Applications and Case Studies in District Energy and Power-to-Heat

Behnam Zakeri: Interconnection of Denmark and UK: A comparative cost-benefit analysis

Akos Revesz: Conceptual design of a large scale 5G district energy network in London

Mathieu Vallée: A techno-economic assessment of combined heating and cooling production plant for district thermal network

Edward O'Dwyer: Coordination of district-level smart energy systems: multi-objective considerations

Jens Brage: Demand-side management in district heating and cooling: Final overview and conclusions from the Horizon 2020 STORM project

Session 4: GIS for energy systems, heat planning and DH

Session keynote Bernd Möller: The scale of district heating based on excess and geothermal heat in Europe

Eva Wiechers: A new basis for heat sector planning in Schleswig-Holstein: development of a regional heat atlas

Hermann Edtmayer: Spatial Agent-based simulation of thermal energy transition pathways in urban environments

Marcus Hummel: Possible synergies of heat planning processes across different cases in Europe. Applying the Hotmaps Toolbox

Magda Kowalska: Application of Hotmaps toolbox in the project DeCarb Supporting the Clean Energy Transition of Coal-Intensive EU Regions

Mostafa Fallahnejad: Determining District Heating Transmission Line Routes and Costs

Session 5: Energy Lab Nordhavn

Session keynote Jan Eric Thorsen: Smart operation of ULTDH booster substation for multifamily building

Christine Emilie Sandersen: Flexsumers - smart-energy ready heat customers

Hanmin Cai: Flexibility in integrated energy system: experimental insights from EnergyLab Nordhavn project

Henrik Pieper: The integration of seasonal characteristics of heat sources and sinks in energy planning and their impact on heat pump performance and dimensioning

Kevin Michael Smith: Online MPC of a heat-booster substation for ultra-low temperature district heating

Morten Herget Christensen: Heating demand peak shaving in smart homes

Session 6: 4GDH concepts, future DH production and systems

Session keynote Ingo Weidlich: Durability of DH pipe systems exposed to thermal ageing and cyclic operational loads

Annelies Vandermeulen: Simulation-based assessment of energy flexibility offered by the thermal capacity in district heating network pipes

Jens Møller Andersen: 4-pipe District heating system

Janette Webb: Heat networks in the UK

Helge Averfalk: Heat loss comparison for single pipe, twin pipe and triple pipe configurations

Anna Volkova: Scenario development methodology for the district heating regions in Estonia

Tuesday 10 September 2019 - Contents of sessions 7-12

Session 7: Production, technologies and use of electrofuels in future energy systems

Session keynote Mads Friis Jensen: Power2liquids – Methanol as Electro fuel in efficient methanol Fuel cell vehicles

Steffen Nielsen: Assessing the geographical potential of biogas methanation in Denmark based on the existing biogas sources

Alessandro Guzzini: Analysis of the existing barriers and of the suggested solutions for the implementation of Power to Gas (P2G) in Italy

Andrei David: The potential of methanated biogas in the Danish transport sector

Benedetto Nastasi: Power-To-Gas potential for energy flexibility of grid-connected and off-grid geographical islands

Jesper Schramm: Review of ammonia as an electrofuel for Internal Combustion Engines

Session 8: Smart Energy Systems analyses, tools and methodologies

Session keynote Gorm Bruun Andresen: Impact of climate change on the most cost-effective technologies for decentralized heating in Europe

Egbert-Jan van Dijck: Effective use of Stakeholder Management Technology to stimulate system innovation: initial lessons from a multiple case study of 4DHC in NW Europe

Rowan Molony: Development of an Irish energy system model for the analysis of current Irish energy policy and possible alternatives

Kun Zhu: Go or wait? The impact of emission pathways on the European energy system transition under myopic planning

Kristoffer Steen Andersen: To EE or to VE: Interaction between VE and EE in meeting long term climate policy

Roberto Bricalli: Impact of climate change on long-term planning of electrical systems based on renewable sources in Europe

Session 9: Planning and organisational challenges for SES and DH

Session keynote Bent Ole Gram Mortensen: Purpose limitation for smart metering data

Christian Thommessen: An innovative concept to increase the efficiency of existing combined heat and power plants in developing district heating systems

Paolo Leoni: Developing innovative business models for reducing return temperatures in district heating systems: approach and first results

Richard van Leeuwen: Towards municipal heat solution strategies

Zhikun Wang: Sizing of district heating systems based on smart meter data – Understanding aggregated domestic energy demand in Great Britain

Michiel Fremouw: How LowEx can you go? Validating the PLANHEAT (D)HC toolkit at the TU Delft campus

Session 10: Smart Energy Systems analyses, tools and methodologies

Session keynote Paula Ferreira: The importance of demand response for low carbon energy scenarios

Géremi Gilson Dranka: Demand Response Potential in Brazil: Theoretical Assessment

Rasmus Elbæk Hedegaard: Investigation of the energy flexibility potential of Danish residential building archetypes

Sara Månsson: Validation of fault detection methods for district heating customer installations

Shahrooz Abghari: Data Analysis Techniques for Monitoring District Heating Substations

Weronika Radziszewska: Testing of a price-based decentralized system for power balancing on real-life HVAC installation

Session 11: 4GDH concepts, future DH production and systems

Session keynote Sara Kralmark: Introduction to COOL DH

Steen G. Olesen: How to convince the locals to change to LTDH, Østerby example

Klaus G. Lauridsen: Development of a 4th generation District Heating preinsulated piping system

Dennis Kerkhof: Xplorion - energy efficient building using low temperature district heating

Klara Ottosson: Heat driven appliances

David Edsbäcker: Securing a lower grid temperature through increased digitalization—Using heat load forecasting and feedback from the grid

Session 12: RES and waste heat sources for district heating

Session keynote Goran Krajačić: Techno-economic analysis of upgrading heating systems into sustainable DHS

Hiroyasu Shirato: Development and Application of New Heat Supplying Systems Utilizing Hot Spring Water in the Northern Island of Japan

Shalika Walker: Analyzing possibilities of using energy from surface and sewage water for the energy transition of the built environment - Study in the Netherlands

Allan Oliveira: Low-Enthalpy Geothermal Heating Systems Modeling: Reducing Risks for Decision Makers and Consumers

Friederike Stelter: Trends of hybrid energy systems with the focus on power-to-heat technologies

Julio Vaillant Rebollar: A framework for energy performance assessment of a large BREEAM certified GEOTABS implemented in Kortrijk

Tuesday 10 September 2019 - Contents of sessions 13-18

Session 13: Institutional and organisational change for SES

Session keynote Alessandro Provaggi: What are the next priorities for innovation in Europe?

Ari Laitala: Organizational challenges and possibilities for energy efficiency enhancement in the Finnish municipality sector

Kirsten Hasberg: From distribution grid to interaction grid: Fundamental questions of roles and tariffs of distribution grids in 100 % renewable energy systems

Max Fette: System friendly operation of sector coupling devices: between welfare requirements and business reality

Renee Heller: Progress towards 4DHC in different national and regional contexts

Session 14: Smart Energy infrastructure and storage options

Session keynote Reinhard Haas: On the role of storage in smart energy systems

Michael Reisenbichler: Towards large-scale thermal energy storages for renewable district heating systems

Keith O'Donovan: gigaTES: Giga Scale Pit Storage as essential part of district heating system

Tiziano Gallo Cassarino: Designing zero emission, least cost, and high renewable energy systems that optimise storage and interconnections

Joseph Maria Jebamalai: Influence of centralized and decentralized thermal energy storage on district heating network design: A comparative case study

Session 15: Electrification of transport, heating and industry

Session keynote Tobias Fleiter: Deep decarbonisation of the EU industry - A model-based assessment of alternative pathways

Amela Ajanovic: Prospects for the electrification of passenger cars

Eliana Lozano: Electro-HTL biorefinery for the production of advanced liquid biofuels

Timo Kannengiesser: Design and Evaluation of Flexible Sector-coupling Pathways in Future Urban Energy Supply Systems

Elisa Guelpa: Integration of power to heat technology in thermal networks

Session 16: Smart Energy Systems analyses, tools and methodologies

Session keynote Peter Sorknæs: Livø – A micro-scale smart energy system

Raffaele De Iulio: Analysis of Smart Energy System approach in local Alpine regions - a case study in Northern Italy

Els van der Roest: Power to X: a novel, reliable, affordable and clean energy and water system for a neighbourhood

Costanza Saletti: A smart controller for small-scale district heating and cooling networks: development and testing

Matteo Giacomo Prina: EPLANopt optimization model based on EnergyPLAN applied at regional level: the future competition on excess electricity production from renewables

Session 17: 4GDH concepts, future DH production and systems

Session keynote: Henrik Madsen: Perspective in Using Meter Data for Temperature Optimization

Igor Krupenski: Low temperature district heating network energy cascade connection to the return line of a high-temperature district heating network

Phil Jones: 5th Generation Heat Networks - A Roadmap to decarbonising heat using ultra low temperature networks

Sabine Jansen: Designing smart low temperature heat grids based on spatial allocation of demands and sources

Tobias Sommer: The reservoir low temperature network: A new topology for simultaneous heating and cooling

Session 18: Smart Energy Systems analyses, tools and methodologies

Session keynote Brian Elmegaard: Accurate modeling of heat pumps and excess heat sources in energy system models

Francesco Neirrotti: Comparison of electricity mixes in generation and demand: the case of heat pumps in Alpine regions

Jann Launer: Open models of optimal system operation in central vs. decentral heat supply

Ashish Chawla: A practical approach to performing Pinch Analysis followed by Heat Exchanger Network retrofit of an oil refinery

Tom Prinzie: Floating Solar Photovoltaic System: Part 2 - Insight on the feasibility and optimal design considering ecosystem thermodynamics

Wednesday 11 September 2019 - Contents of sessions 19-24

Session 19: Smart Energy Systems analyses, tools and methodologies

Session keynote Philipp Schütz: Automated building modelling based on Smart Meter Monitoring Data

Hagen Braas: Generating DHW load profiles of buildings with realistic simultaneity for DH system simulations using DHWcalc and TRNSYS

Martin Heine Kristensen: Citywide hourly dynamic heat load forecasts using building archetype modelling

Michele Tunzi: Smart double loop network for ultra-low temperature district heating in low-heat density areas

Pierre J.C. Vogler-Finck: Data-driven control for efficient and flexible energy use at building level – field investigations in Denmark

Andra Blumberga: Smart Urban Regeneration in Transition to Positive Energy Block

Session 20: 4GDH concepts, future DH production and systems

Session keynote Alfred Heller: HEAT 4.0 – Digitally supported Smart District Heating

Basak Falay: Enabling large-scale dynamic simulations and reducing model complexity of district heating and cooling systems by aggregation

Gerald Schweiger: 4th Generation District Heating - a SWOT-AHP Analysis

Leire Chavarri: Flexible district heating network model that predicts mass flow, pressure and temperature losses

Richard Büchele: Opportunities and challenges of future district heating portfolios

Maria Jangsten: High Temperature District Cooling – Challenges and Possibilities

Session 21: Integrated energy systems and smart grids

Session keynote Vittorio Verda: Proper modelling approaches for operational simulation and optimization of large district heating networks

Inger-Lise Svensson: Reducing local energy system CO2 emissions by exploiting differences in district heating and electricity CO2 intensity in a local energy market

Monica Arnaudo: Techno-economic Assessment Of Distributed Heat Pumps Integration Within a Swedish Neighbourhood

Olatz Terreros: Pooling concepts for domestic heat suppliers in Austria

Tijs Van Oevelen: Testing and evaluation of the STORM controller in two demonstration sites

Shadie Broumandi: Residential heat consumption drivers towards 4th generation district heating: An econometric approach for Viborg district heating in Denmark

Session 22: Smart Energy infrastructure and storage options

Session keynote Anders Dyrelund: Smart integration of district heating, district cooling, waste water and ground source cooling

Gunnar Rohde: Improving Effectiveness and Efficiency of Smart Energy System using the Nerve Switch® Technology Stack

Hans Christian Gils: Integrated modelling of the future electricity and gas supply in Germany

Sina Steinle: Time dependent flexibility potential of Heat Pump Systems for Smart Energy System Operation

Søren Møller Thomsen: Smart integration of fluctuating renewable energy into the energy system

Giorgio Cucca: Co-simulation tool for hybrid energy system optimization

Session 23: 4GDH concepts, future DH production and systems

Session keynote Dietrich Schmidt: Implementation of low temperature district heating systems - Successful case studies of IEA DHC ANNEX TS2

Hjörleifur G. Bergsteinsson: Methods for Identifying Critical Temperature for Control of Low-Temperature DH Systems

Johannes Oltmanns: Decreasing the temperature of an existing district heating network

Johan Dalgren: Temperature utilization in Thermal Energy Storage and its system impact on future (4th) Generation of District Heating Systems

Tobias Ramm: Development and investigation of optimised operation strategies for district heating systems with variable temperatures

Vilhjálmur Nielsen: Preparing a school building from 1920's for low temperature district heating while improving indoor climate by use of wireless sensors

Session 24: Smart Energy Systems analyses, tools and methodologies

Session keynote Morten Karstoft Rasmussen: Data-driven decision support for optimisation of heat installations

Etienne Cuisinier: Energy system investment planning: a methodological review towards a new approach at the territorial level

Thibaut Résimont: A multi-period MILP model for the topological optimization of a district heating network

Can Tümer: Challenges in Heat Network Topology Optimization

Ana Turk: Two -stage stochastic day-ahead scheduling for integrated heat, electricity and gas system as MILP model

Danica Maljkovic: Machine learning algorithms for modelling consumption in district heating systems

Wednesday 11 September 2019 - Contents of sessions 25-30

Session 25: Smart Energy Systems analyses, tools and methodologies

Session keynote Henrik Dalsgaard: A pathway to emission free district heating in a world driven by data and electricity – Case: data center waste heat utilization

Stefan Holler: Methodology to assess the potential of waste heat from industry, service sector and sewage water

Johannes Pelda: sim4dhs – an algorithm to simulate tree and meshed district heating networks dynamically

Charlotte Marguerite: Optimization of flexible electricity loads of a buildings cluster using distributed model predictive control

Johannes Röder: Design of renewable and system-beneficial district heating systems using dynamic emission factors for grid-sourced electricity in optimization models

Saleh Mohammadi: Optimization of temperature levels in decentralized solar feed-in heat grids, A case study of Dutch refurbished building in a residential neighbourhood

Session 26: Smart Energy Systems and 4GDH concepts, production and systems

Session keynote Tom Brown: The cost-benefit of transmission grid reinforcement in a highly-renewable European smart energy scenario

Dominik Franjo Dominković: A Potential for Interconnecting District Heating Grids: The Case of the Greater Zagreb Region

Hironao Matsubara: Current Status and Issues of Renewable Heating System towards 4DH in Japan

Behzad Rismanchi: Resilience metrics and drivers for energy system planning at the community level

Tetsunari Iida: Issues of renewable energy heat policy and establishment of 4DH forum in Japan

Session 27: Smart Energy Systems analyses, tools and methodologies

Session keynote Marie Münster: What is the benefit from sector coupling?

Daniel Møller Sneum: Evaluating barriers to flexible grid integration of district energy

Sylvain Quoilin: Modeling the flexibility offered by coupling the heating sector and the power sector: an assessment at the EU level

Frederik Banis: Handling Uncertainty in Sector Coupled Systems using Dynamic Programming and Model Predictive Control

Naoya Nagano: Introducing sector coupling to utilize renewable resources for regional decarbonization in Japan

Steven de Jongh: Machine learning based state-estimation in sector coupled energy distribution systems

Session 28: UN District Energy

Session keynote Morten Jordt Duedahl: Internal Rate of Return and how it affects development of city wide district heating projects

Dejan Ivezić: The State and Perspective of Belgrade District Heating System Development

Nyamtsetseg Ivanov: Applicability of Solar-Assisted Heat Pump System for Space Heating in Mongolia

Romanas Savickas: Challenges of Development of Green Field District Heating technologies in Latino America. Temuco city case in Chile

Susana Paardekooper: Heat Roadmap Europe: Heating typology as a basis for policy recommendations

Zhuolun Chen: Fast Decision Making Tools for District Cooling Project Development in Urban Planning Stage

Session 29: 4GDH concepts, future DH production and systems

Session keynote Mei Gong: Enhanced Biomass CHP plants for district heating systems

Hanne Kauko: Local thermal grids with waste heat utilization: low- or medium-temperature supply?

Hannes Poier: Model-based control of absorption heat pumping systems

Marco Cozzini: Techno-economic scenarios for neutral-temperature district heating and cooling networks based on decentralized heat pumps

René Kofler: Performance analysis of a heat pump system, providing district heating and cooling through gradual heating and cooling

Session 30: Smart Energy Systems analyses, tools and methodologies

Session keynote Jakob Zinck Thellufsen: Benefits to single country modelling: Comparing 14 interconnected individual country models to a single 14-country model

Ewoud Werkman: Modelling Energy Systems in an interoperable, reusable and comparable way

Kristine Askeland: The impact of geographical resolution of hydropower in energy systems modelling

Roberto Vaccaro: A computational model linking EnergyPLAN with Input-Output analysis for evaluating the economy-wide impact of the transition at regional level

Salman Siddiqui: A novel method for forecasting electricity prices in a system with renewables and large scale grid storage for use in energy system models

Isabelle Best: Systematic investigation of the building envelope's and hot water production systems' influence on the heat load profile of districts