Program in brief

11:30 - 12:45 Registration & Lunch

13:00 - 14:30 Plenary Session
SUSTAINABLE HORIZONS – Global impact and Nordic contributions

14:45 - 16:00 Parallel Sessions A
- Integrated & flexible energy systems
- Skills for the energy transition
- Speeding up the intro of E-mobility

16:15 - 17:30 Parallel Sessions B
- Sustainable Horizons for Heating & Cooling
- Negative CO₂ – The Need for Removal of Carbon Dioxide from the Atmosphere
- The future role of carbon capture and utilization in a Danish energy system context

17:45 - 19:00 Reception with refreshments

Presented by
Plenary Session 13:00 - 14:30
SUSTAINABLE HORIZONS – Global impact and Nordic contributions

We need a more integrated and intelligent energy system to meet future energy needs, in ways that are safe, secure, sustainable and affordable. This is only achievable if we consider all parts of the system and how they interact, all types of participant and all possible technologies; by necessity, this requires a cross-disciplinary approach.

- The European policy on clean energy investments
  - Mr. Tudor Constantinescu, Principal advisor, DG Energy, European Commission

- The Smart Energy System: Synergies in low-cost energy storages across sectors
  - Brian Vad Mathiesen, Professor at Aalborg University

- Business prospective in energy efficient solutions
  - Vesa Laisi, CEO Danfoss Drives

- The Nordics as a net negative CO₂ emission region by 2040
  - Kenneth Karlsson, Head of Energy System Analysis Group at DTU

- Clean energy in Korea – future opportunities
  - Mr. Jae Young Park, Director for Energy and Resource Policy

- Deep decarbonization, electrification and the role of Europe in the energy shift
  - Rebecca Collyer, Director of Power Programme at European Climate Foundation

- How to increase grid stability in a low inertia system with 100% renewable resources: the Icelandic approach
  - Iris Baldursdottir, Executive Vice President of System Operations and ICT at Landsnet

Panel discussion with all speakers
Moderator: Bo Diczfalussy, Senior Advisor at Nordic Energy Research

Need a lift?
Enjoy beautiful sightseeing in an electric shuttle boat, which will transport you from the center of Copenhagen directly to our event in Sydhavnen, and back again. The shuttle boat will start operating at 10 am from Nyhavn (Nyhavnsbroen) and depart approximately every hour until 4 pm.
## Integrated & flexible energy systems

**Moderator:** Claire Bergaentzlé, DTU

- **Flex4RES - A Nordic solution to decarbonized, flexible, and coherent energy systems**
  - Klaus Skytte, DTU, Denmark
- **RE-Invest - Smart Energy Systems, Flexibility potentials and costs**
  - Henrik Lund, Aalborg University, Denmark
- **Benefits of flexible use of electricity in the district heating sector**
  - Torjus Folsland Bolkesjø, NMBU, Norway
- **Vestas Hybrid Solutions - from global wind turbine manufacturer to renewable energy systems provider**
  - Mads Blumensaat, Vestas, Denmark.
- **Policies On Energy System Flexibility Accelerating Clean Energy Transition**
  - Peter Lund, Aalto University, Finland.

**Panel debate:** Pathways to a decarbonised, reliable energy system.

## Skills for the energy transition

**Moderator:** Jakob Stoustrup, Aalborg University

- **The system operator of the future**
  - Sonja Berlijn, Fou-direktør Statnett
- **Innovation across academic and industrial institutions**
  - Charles Anthony Bates, Danfoss Power Solutions ApS
  - Birgitte Bak-Jensen, Aalborg University
- **Current investment schemes into education and training providing the skills for energy transition**
  - Asgeir Tomasgard, NTNU
- **Skills for smart energy systems integration**
  - Poul Alberg Østergaard, Aalborg University
- **Data science and analytics for smart energy**
  - Torben Bach Pedersen, Aalborg University

**Panel debate:** Discussing the needed skills for the transition to a green future energy system. The panelists will address the issues departing from European university point of view and the guidelines set up in “Energy Transition and the Future of Energy, Research, Innovation and Education: An Action Agenda for European Universities” from December 2017 made by UniSet, EuA-EPUE and InnoEnergy.

## Speeding up the intro of E-mobility

**Moderator:** Henrik Gudmundsson, Concito

- **Nordic Electric Vehicles Outlook 2018, reviewing the status of electrical mobility in the Nordics and key successful policies enabling EV leadership**
  - Jacopo Tattini, International Energy Agency
- **Biggest loser - which country reduced emissions the most per euro/krona spent? Inspiring examples from cost-efficient transitions to electro-mobility**
  - Mattias Goldmann, Fores
- **Transition of the Nordic transport system to low GHG emissions: the role of electro-mobility**
  - Raffaele Salvucci/Kenneth Karlsson, DTU
- **Emission free transport: How cities can change a whole sector**
  - Jenny Skagestad
- **Increasing the electric vehicle share from a regional perspective: Inspiring examples from Capital Region of Denmark**
  - Kathrine Marie Fjendbo Jørgensen, Copenhagen Electric
- **Zero Emission Vessels cruising the Seven Seas. Business drivers & Technology enablers**
  - Sigurd Enge, Bellona

**Panel debate:** How to speed up the introduction of Electro-Mobility for passenger transport and distribution of goods: The role of different actors and key measures. All speakers + Kenneth Karlsson, DTU and Julia Hansson, IVL.
Parallel Sessions B 16:15 - 17:30

Sustainable Horizons for Heating & Cooling

Moderator: Jesper Koch, Danish District Heating Association
- Cutting edge DHC research and development - Heat Roadmap Europe, 4th generation District Heating and Cooling - Brain Vad Mathiesen, Aalborg University
- Utilization of excess heat from data centers for district heating - Paw V. Mortensen, House of Energy
- Business opportunities and R&D in District Heating - Oddgeir Gudmundsson, Director Projects & Applications, Danfoss Heating Segment
- District cooling to reduce energy consumption - Jens Ole Hansen, Ramboll Group

Panel Debate: What are the obstacles for expanding district energy solutions in Europe and to

Negative CO₂ – The Need for Removal of Carbon Dioxide from the Atmosphere

- Are Negative Emissions Needed to meet Climate Targets Decided? - Keith Whiriskey, Project Manager at Bellona Europe
- Negative CO₂ emissions in the Nordic energy systems, perspectives towards 2060 - Tomi Lindroos, VTT
- Why can the Cost of CO₂ Capture be Dramatically Reduced with Chemical-Looping Combustion? - Magnus Rydén, Chalmers
- Chemical-Looping Combustion of Biomass – Operation in Three Pilot Units - Øyvind Langørgen, Sintef Energy
- 10 MW boiler tests: conclusions - Magnus Rydén, Chalmers

The future role of carbon capture and utilization in a Danish energy system context

Moderator: Tejs Lausten Jensen, Hydrogen Denmark
- The role of electro-fuels in the future Danish energy system, outlook towards 2035 - Anders Bavnhej, Energinet.dk
- A novel efficient and low cost cryogenic carbon capture technology with integrated energy storage capability - Larry Baxter, Sustainable Energy Solutions
- Recycling of unavoidable CO₂ emissions in electro-fuels - Søren K. Kær Aalborg University

Panel debate: How to promote Carbon Capture & Utilization technology development and demonstration.

Related Event Aalborg University Campus

Clean Energy Hackathon - ActionLab
After the final on May 23rd, all participating groups from the Clean Energy Hackathon are invited to the intensive day at the ActionLab on 24th May. The impact of all the students’ ideas are taken a level further, when they spend a whole day elaborating and conceptualizing the ideas in collaborations with experts within climate impact assessment, business modelling, public acceptance.
Meet the projects...
In this section you will find an overview of the projects represented at Sustainable Future Energy Systems.

**Heat Roadmap Europe**

Session: Sustainable Horizons for Heating & Cooling, (B) 16:15-17:30

HRE4 combines local thermal mapping and energy system analysis to show, not only the nature but also the impact that heating and cooling, which represents almost half the energy demand in Europe, has on our national energy systems.

By combining these two analysis, it is possible to develop and assess scenarios that are inherently decentralised, but on a large scale. So far, previous Heat Roadmap Europe studies have concluded that energy efficiency in the heating sector, which primarily includes heat savings in buildings, district heating in urban areas, and heat pumps and solar thermal in rural areas, will result in a cheaper, more local, and far more renewable heating and cooling sector in the future.

The aim of Heat Roadmap Europe 4 is to test and develop these ideas over the next 3 years. By looking at the 14 largest consumers of heating and cooling in Europe, we will develop country-specific Roadmaps and also be able to discuss the future of 85-90% of European heating and cooling demands.

www.heatroadmap.eu
@HeatRoadmapEU

**4DH**

Session: Sustainable Horizons for Heating & Cooling, (B) 16:15-17:30

4DH is an international research centre, which develops 4th generation district heating technologies and systems. This development is fundamental to the implementation of the Danish objective of being fossil fuel-free by 2050 and the European 2020 goals.

With lower and more flexible distribution temperatures, 4th generation district heating (4GDH) can utilize renewable energy sources, while meeting the requirements of low-energy buildings and energy conservation measures in the existing building stock.

In 4GDH systems, synergies are created between three areas of district heating, which also sum up the work of the 4DH Centre: Grids and components; Production and system integration, and Planning and implementation.

Funded by Innovation Fund Denmark
Session: **Integrated & flexible energy systems, (A) 14:45 - 16:00**

RE-INVEST aims is to design robust and cost-effective investment strategies that will facilitate an efficient transformation towards a sustainable or 100% renewable energy system in Denmark and Europe. RE-INVEST is a four-year research project that gathers 17 partners from universities and key energy players in a unique approach to the transition as a complete redesign of the whole energy system, utilizing the synergies between heat, electricity and transport. RE-INVEST addresses how to overcome silo-thinking that characterizes traditional energy sectors, by using a two dimensional interconnectivity approach as well as existing and new energy infrastructures.

Funded by [Innovation Fund Denmark](https://www.reinvestproject.eu)

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Session: **Speeding up the intro of E-mobility, (A) 14:45 - 16:00**

Shift develops and applies tools that integrate several poorly understood factors of transport – modal shifts, fuel options, new business models and consumer behaviour – into scenario modelling, and carry out in-depth analysis of two key areas: long-haul freight and urban passenger transport.

Shift is funded by Nordic Energy Research, led by IVL Swedish Environmental Research Institute and state of the art researchers from DTU Technical University of Denmark, TOI Institute of Transport Economics and Viktoria Swedish ICT.

At the heart of the project lies a strong collaboration with three nordic think tanks all oriented towards sustainability and working to influence policy, Swedish Fores, Norwegian Zero, and Danish Concito.

Shift has strong bonds to stakeholders in industry and in the policy arena and aims to keep an ear to the ground throughout the project by continuously taking stock with target groups as well as the research community and the Shift advisory board.

Ultimately, the project will inform smarter transport and energy policy.

Funded by [Nordic Energy Research](https://www.nordicenergy.org/flagship/project-shift)

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Session: **Negative CO2 – The Need for Removal of Carbon Dioxide from the Atmosphere, (B) 16:15 - 17:30**

The Negative CO2 project uses and strengthens Nordic expertise and competence in fluidized bed technology, used in Bio-CLC.

Bio-CLC: Chemical-Looping Combustion (CLC) captures CO2 by separating it from other gases in the combustion process, which eliminates the need for costly and energy demanding CO2 separation later. CLC is expected to have at least 50% lower energy penalty and cost than any other CO2 capture technology.

Chemical-Looping Combustion of biomass (BioCLC) would allow biomass-burning operators to achieve not just neutral, but negative CO2 emissions – taking it out of the atmospheric cycle and thereby helping to combat climate change.

Funded by [Nordic Energy Research](https://www.nordicenergy.org/flagship/negative-co2)
Session: Integrated & flexible energy systems, (A) 14:45 - 16:00

The Flex4RES project investigates how an intensified interaction between coupled energy markets, supported by coherent regulatory frameworks, can facilitate the integration of high shares of variable renewable energy, in turn ensuring stable, sustainable and cost-efficient Nordic energy systems.

Flex4RES develops and applies a multidisciplinary research strategy that combines technical analysis of flexibility needs and potentials, economic analysis of markets and regulatory frameworks, and energy system modelling that quantifies impacts. The project develop coherent regulatory frameworks and market designs that facilitate market interactions, which are optimal for the Nordic conditions in an EU context, and identify transition pathways to sustainable Nordic energy systems.

Funded by

www.goflex-project.eu
@GoFlexH2020

#Flex4RES