

ENERGY SYSTEMS AND TECHNOLOGIES FOR THE COMING CENTURY



Risø International Energy Conference 2011

At Risø National Laboratory for Sustainable Energy,
Technical University of Denmark, 10-12 May 2011

Final programme

INTRODUCTION

The world faces a major challenge as global CO₂ emissions must be reduced dramatically, in the long term even below zero, in order to limit climate change. At the same time, however, it is necessary to provide energy services to accommodate economic growth and, in particular, to meet the growing needs of the developing countries and to ensure secure energy supplies. Furthermore, the energy sector has to cope with the current financial crisis which is having a significant impact on almost all countries.

Therefore, significant changes to the global energy systems are necessary, which calls for long-term planning. There is a pressing need to enhance the ongoing development of new and sustainable energy technologies which can provide a key role for renewable energy resources and lead to the phase-out of fossil fuels in the long term.

New, intelligent energy systems are necessary in order to accommodate fluctuating sustainable energy resources to a much greater extent than is currently the case. In such an intelligent energy system, a close link between end-use and supply must be established to create links between low-energy housing, industry and the transport sector.

It will be necessary to utilise all sustainable energy technologies to meet future global energy needs. No single technology will be able to solve the task. The combination of energy technologies will vary from one region to another, depending on local conditions.

Fossil energy resources will, to a large extent, continue to be used in the coming decade, and for this reason it is important that more efficient and climate-friendly fossil energy applications are developed until renewables can assume a leading role in global energy supplies.

Risø International Energy Conference 2011 will highlight and discuss these topics with the aim of identifying solutions which can fulfil the urgent global need to change energy technologies in a sustainable direction and create the new intelligent energy systems that can accommodate substantial amounts of fluctuating, sustainable energy.

THE CONFERENCE IS SPONSORED BY:



FOCUS



THE CONFERENCE WILL FOCUS ON:

- Future global energy development options, scenarios and policy issues
- Intelligent energy systems of the future, including the interaction between supply and end-use
- New and emerging technologies for extended utilisation of sustainable energy
- Distributed energy production technologies (including fuel cell, hydrogen, bioenergy, wind, hydro, wave, solar and geothermal technologies)
- Centralised energy production technologies such as clean coal, CCS and nuclear technologies
- Renewable energy for the transport sector and its integration in the energy system.

TARGET GROUP

The target group for the conference is researchers, the energy industry, policy-makers, energy sector decision-makers, funding organisations as well as international organisations, e.g. the EU, IEA and the UN.

SESSIONS OVERVIEW



TUESDAY 10 MAY 2011		
08:00-09:00	COFFEE AND REGISTRATION	
Room	Niels Bohr Auditorium	Main hall
09:00-10:30	OPENING SESSION	
10:30-11:00	BREAK	
11:00-12:30	SESSION 2A SCENARIO AND POLICY ISSUES	
12:30-14:00	LUNCH in H.H. Koch Auditorium	POSTER SESSION
14:00-15:30	SESSION 3A ENERGY SYSTEMS	
15:30-16:00	BREAK	
16:00-17:30	SESSION 4 EFFICIENCY IMPROVEMENTS	
17:30-18:30	RECEPTION	

WEDNESDAY 11 MAY 2011		
Room	Niels Bohr Auditorium	H. H. Koch Auditorium
09:00-10:30	SESSION 5A WIND ENERGY I	SESSION 2C PLANNING ENERGY SUPPLY WITHOUT CO ₂
10:30-11:00	BREAK	
11:00-12:30	SESSION 6A BIOENERGY I	SESSION 3B SMART GRIDS
12:30-13:30	LUNCH in Main Hall	
13:30-15:00	SESSION 8 FUEL CELLS AND HYDROGEN	SESSION 5B WIND ENERGY II
15:00-15:30	BREAK	
15:30-17:00	SESSION 2B SUSTAINABLE ENERGY PLANNING	SESSION 6B BIO ENERGY II
17:00-18:00	BREAK	
19:00	CONFERENCE DINNER	AT NIMB IN TIVOLI

THURSDAY 12 MAY 2011		
Room	Niels Bohr Auditorium	H. H. Koch Auditorium
09:00-10:30	SESSION 11 MECHANISMS AND MARKETS	SESSION 12 ENERGY FOR DEVELOPING COUNTRIES
10:30-11:00	BREAK	
11:00-12:30	SESSION 13 ENERGY STORAGE	SESSION 2D ECONOMIC PLANNING FOR A LOW-CARBON SOCIETY
12:30-13:00	SUMMARY AND CLOSING REMARKS	
13:00-14:00	LUNCH in Main Hall	

TUESDAY 10 MAY 2011

08:00 – 09:00 COFFEE AND REGISTRATION

09:00 – 10:30 OPENING SESSION

Niels Bohr Auditorium

Chairman: Hans Larsen, Head of Systems Analysis Division, Risø DTU, Denmark

WELCOME AND INTRODUCTION

Anders Bjarklev, acting director, Risø DTU, provost, DTU

KEYNOTE PRESENTATIONS

- **Global challenges and perspectives for the energy sector**, Diana Ürge-Vorsatz, Central European University, Hungary
- **The Industry's role in the development of sustainable energy system**, Dieter Wegener, CTO of Siemens Industry Solutions, Germany

10:30 – 11:00 BREAK

11:00 – 12:30 SESSION 2A – SCENARIO AND POLICY ISSUES

Niels Bohr Auditorium

Chairman: Lars Martiny, Deputy Director, Risø DTU

- **Penetration of new energy technologies: insights from techno-socio-economic factors**, Peter Lund, Aalto University, Finland
- **A 100% renewable power system for Europe**, Martin Greiner, Aarhus University, Denmark
- **Dong Energy's 85/15 strategy for the conversion to 85% renewables**, Charles Nielsen, DONG Energy, Denmark

12:30 – 14:00 LUNCH IN H. H. KOCH AUDITORIUM

14:00 – 18:30 POSTER SESSION IN MAIN HALL

14:00 – 15:30 SESSION 3A – ENERGY SYSTEMS

Niels Bohr Auditorium

Chairman: Diana Ürge-Vorsatz, Central European University, Hungary

- **Development of market design with focus on demand site participation**, Mikael Togeby, EA Energi Analyse, Denmark
- **The huge geothermal energy potential in the Danish subsurface – challenges and possibilities**, Lars Henrik Nielsen, GEUS, Geological Survey of Denmark and Greenland, Denmark
- **Integration of fluctuating energy**, Klaus Hilger, DONG Energy, Denmark
- **Performance of Space Heating in a Modern Energy System**, Brian Elmegaard, DTU Mechanical Engineering, Denmark

15:30 – 16:00 BREAK

16:00 – 17:30 SESSION 4 – EFFICIENCY IMPROVEMENTS

Niels Bohr Auditorium

Chairman: Kim Dam-Johansen, DTU Chemical Engineering, Denmark

- **Improving energy efficiency in industrial solutions – walk the talk**, Dieter Wegener, Siemens AG, Germany
- **Intelligent Urban Heating**, Anders Dyrelund, Rambøll Energy, Denmark
- **Influence of increased insulation levels on regional air quality**, Ulrik Smith Korsholm, Danish Meteorological Institute, Denmark

17:30 – 18:30 RECEPTION

WEDNESDAY 11 MAY 2011

09:00 – 10:30 SESSION 5A – WIND ENERGY I

Niels Bohr Auditorium

Chairman: Kristine van het Erve Grunnet, Danish Energy Industries Federation, Denmark

- **Status and perspectives for the expansion of Dong Energy's offshore wind power**, Uffe Jørgensen, DONG Energy, Denmark
- **Trends in wind energy technology development**, Flemming Rasmussen, Risø DTU, Denmark
- **A high resolution global wind atlas – improving the estimation of world wind resources**, Hans Ejsing Jørgensen, Risø DTU, Denmark

SESSION 2C – PLANNING ENERGY SUPPLY WITHOUT CO₂

H. H. Koch Auditorium

Chairman: Stine Grenaa Jensen, Danish Energy Association, Denmark

- **Factors affecting stakeholder perception of carbon capture and storage acceptability**, Laura Kainiemi, Aalto University, School of Science and Technology, Finland
- **The potential for geological storage of CO₂ in Denmark is very promising**, Karen L. Anthonson, GEUS, Geological Survey of Denmark and Greenland, Denmark
- **Long-term modelling of carbon capture and storage, nuclear fusion and large-scale district heating**, Poul Erik Grohnhøj, Risø DTU, Denmark

10:30 – 11:00 BREAK

11:00 – 12:30 SESSION 6A – BIOENERGY I

Niels Bohr Auditorium

Chairman: Peter Lund, Aalto University School of Science and Technology, Finland

- **Integration of basic biomass conversion processes with communal CHP plant - Influence on energy and environmental performance**, Thomas Kohl, Aalto University, Finland
- **Biomass plans and developments at DONG Energy**, Jeppe Bjerg, DONG Energy, Denmark
- **The role of biomass and CCS in China from a climate mitigation perspective**, Mikael Lüthje, Risø DTU, Denmark
- **The European biofuels policy: from where and where to?** Henrique Pacini, Royal Institute of Technology, Sweden

SESSION 3B – SMART GRIDS

H. H. Koch Auditorium

Chairman: Anders Troi, Risø DTU, Denmark

- **Dynamic power system investment modelling and analysis**, Hans Ravn, RAM-løse, Denmark
- **Scheduling home appliances usage to reduce electricity demand peaks**, Ana Rosselló-Busquet, DTU Fotonik, Denmark
- **Energy-efficient refrigeration and flexible power consumption in a SmartGrid**, Tobias Gybel Hovgaard, Danfoss A/S/DTU Informatics, Denmark
- **The FlexControl concept - a vision, a concept and a product for the future power system**, Per Nørgaard, Risø DTU, Denmark

12:30 – 13:30 LUNCH IN MAIN HALL

13:30 – 15:00 SESSION 8 – FUEL CELLS AND HYDROGEN

Niels Bohr Auditorium

Chairman: Henrik Carlsen, DTU Mechanical Engineering, Denmark

- **Integrated Gasification SOFC Plant with a Steam Plant**, Rokni Masoud, DTU Mechanical Engineering, Denmark
- **Use of Methanation for Optimization of a Hybrid Plant Combining Two-Stage Biomass Gasification, SOFCs and a Micro Gas Turbine**, Christian Bang-Møller, DTU Mechanical Engineering, Denmark
- **Metal-supported SOFCs - development of cost-effective and robust fuel cells for operation at intermediate temperatures**, Trine Klemensø, Risø DTU, Denmark
- **Electrolysis for synthesis gas production**, Sune Ebbesen, Risø DTU, Denmark

SESSION 5B – WIND ENERGY II

H. H. Koch Auditorium

Chairman: Peter Hauge Madsen, Head of Wind Energy Division, Risø DTU

- **Influence of rare earth element supply on future offshore wind turbine generators**, Bogi Jensen, DTU Electrical Engineering, Denmark
- **Improved high temperature superconductor materials for wind turbine generators**, Jørn Bindslev Hansen, DTU Physics, Denmark
- **Offshore wind energy**, Thomas Buhl, Risø DTU, Denmark

15:00 – 15:30 BREAK

15:30 – 17:00 SESSION 2B – SUSTAINABLE ENERGY PLANNING

Niels Bohr Auditorium

Chairman: Poul Erik Morthorst, Risø DTU, Denmark

- **Spurring investments in renewable energy technologies in non-OECD countries. A quantitative analysis on how to design and finance NAMAs**, Tobias Schmidt, ETH Zurich, Switzerland
- **Integrating climate change adaptation in energy planning and decision-making - key challenges and opportunities**, Anne Olhoff, Risø DTU, Denmark
- **Policies for achieving a low-carbon transport sector in India**, Subash Dahr, Risø DTU, Denmark

SESSION 6B – BIO ENERGY II

H. H. Koch Auditorium

Chairman: Nicolai Zarganis, Danish Energy Agency, Denmark

- **Algal biofuels: key issues, sustainability and life cycle assessment**, Anoop Singh, DTU Management Engineering, Denmark
- **Greenhouse gas emissions from cultivation of energy crops may affect the sustainability of biofuels**, Mette S. Carter, Risø DTU, Denmark
- **Liquid biofuels from blue biomass**, Zsófia Kádár, Risø DTU, Denmark

19:00

CONFERENCE DINNER AT NIMB IN TIVOLI, COPENHAGEN

THURSDAY 12 MAY 2011

09:00 – 10:30 SESSION 11 – MECHANISMS AND MARKETS

Niels Bohr Auditorium

Chairman: Dieter Wegener, Siemens, Germany

- **On the effectiveness of standards versus taxes for reducing CO₂ emissions in passenger car transport Europe**, Amela Ajanovic, Vienna University of Technology, Austria
- **Dynamic regulatory behaviour in the context of changing policy terrain and market forces: a case of electricity regulation in India**, Gopal Krishna Sarangi, TERI University, India
- **What are customers willing to pay for future technology vehicles**, Jørgen Jordal-Jørgensen, COWI A/S, Denmark
- **The business potential and market opportunities for polymer solar cells**, Torben Damgaard Nielsen, Risø DTU, Denmark

SESSION 12 – ENERGY FOR DEVELOPING COUNTRIES

H. H. Koch Auditorium

Chairman: Mark Radka, UNEP, France

- **Alternative energy for Nepal**, Hari Tiwari, Social Welfare Council, Nepal
- **Identifying technologies for sustainable energy development options in the developing world: the case of providing access to electricity**, Willington Ortiz, Wuppertal Institute, Germany
- **Smart pathways for providing electricity in developing countries**, Brijesh Mainali, Royal Institute of Technology, Sweden
- **Mode of transport to work, car ownership and CO₂ emissions in Mauritius**, Vishal Jaunky, ETH Zürich, Switzerland

10:30 – 11:00 BREAK

11:00 – 12:30 SESSION 13 – ENERGY STORAGE

Niels Bohr Auditorium

Chairman: Søren Linderoth, Head of Fuel Cells and Solid State Chemistry Division, Risø DTU

- **Grid scale energy storage in salt caverns**, Fritz Crotogino, KBB Underground Technologies GmbH, Germany
- **Sensitivity on battery prices versus battery capacity on plug-in hybrid electric vehicles and the effects on the power system configuration**, Nina Juul, Risø DTU, Denmark
- **Wind power impacts and electricity storage - a time scale perspective**, Karsten Hedegaard, Risø DTU, Denmark
- **Compressed air energy storage in offshore grids**, Sascha T. Schröder, Risø DTU, Denmark

SESSION 2D – ECONOMIC PLANNING FOR A LOW CO₂ SOCIETY

H. H. Koch Auditorium

Chairman: Knud Pedersen, DONG Energy, Denmark

- **Efficiency and effectiveness of promotion systems for electricity generation from renewable energy sources - an update on lessons learned from EU countries**, Reinhard Hass, Vienna University of Technology, Austria
- **The development and diffusion of renewable energy technologies in Norway and Denmark**, Antje Klitkou, NIFU STEP Norwegian Institute for Studies in Innovation, Research and Education, Norway
- **Trade disputes over clean technology-supporting policies: theories, recent cases, and possible solutions**, Xianli Zhu, Risø DTU, Denmark

12:30 – 13:00 SUMMARY AND CLOSING REMARKS

Anders Bjarklev, acting director, Risø DTU, provost, DTU

Hans Larsen, Head of Systems Analysis Division, Risø DTU

13:00 – 14:00 LUNCH IN MAIN HALL

POSTER SESSION – TUESDAY 10 MAY 2011

12:30 – 18:30 POSTERS ACCEPTED FOR THE POSTER SESSION

Main Hall

Characterisation of bio-petroleum from hydro-thermal processing of algae, Chima Amadi, University of Leeds, UK

Statistical analysis for the wind speed in the region of Tetouan in the Kingdom of Morocco, Redouane Abdelbari, Energy Laboratory, Faculty of Science of Tetouan, Morocco

Novel catalyst and micro-reactor concept for preferential oxidation of CO, Oliver Görke, Karlsruhe Institute of Technology, Germany

Dynamic simulation of a proton exchange membrane fuel cell for automotive systems, Raja Abid Rabbani, DTU Mechanical Engineering, Denmark

Application of proton exchange membrane fuel cell for lift trucks, Elham Hosseinzadeh, DTU Mechanical Engineering, Denmark

An investigation of the application aspects of torrefaction, Lei Shang, Risø DTU, Denmark

Superconductor-ferromagnet composite materials for wind turbine generators, Jørn Bindslev Hansen, DTU Physics, Denmark

The use of local dynamic power prices - example and perspectives, Per Nørgaard, Risø DTU, Denmark

Risø is the National Laboratory for Sustainable Energy at the Technical University of Denmark - DTU.

Risø carries out scientific and technical-scientific research that can provide Danish society with new opportunities for technological development and is responsible for applying the results in practice.

Our work is based on the idea that knowledge is the key to developing an innovative and sustainable society capable of facing global competition.

Risø's hallmarks are large-scale strategic research and development projects and research quality at international level.

We take initiatives and set targets for research through continuous dialogue with the business sector, the political system and the research community and our research is part of national and international networks.

Our research has particular impact in relation to energy supply, energy consumption and nuclear technologies.

Risø has large test facilities and interdisciplinary research environments that enable us to solve problems across traditional professional boundaries and competences.

Training and education as well as innovative activities are naturally integrated with Risø's research activities.

Our research is furthermore the basis of customer-driven activities including providing consulting services for the business community, institutions and authorities.

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