COFIRING & COCOPENHAGEN
WORKSHOP 11-13 SEPTEMBER 2018

PROGRAMME

COFIRING BIOMASS WITH COAL

SPONSORED BY

IEA CLEAN COAL CENTRE

SPONSORED BY COWI
**DAY 1  11 SEPTEMBER 2018**

12.30 - 13.00  **REGISTRATION FOR SITE VISIT AND WORKSHOP**  AT ADMIRAL HOTEL LOBBY

13.00 - 17.00  **SITE VISIT TO AMAGERVÆRKET**

**DAY 2  12 SEPTEMBER 2018**

08.30 - 09.00  **WORKSHOP REGISTRATION**

09:00  **WELCOME TO COPENHAGEN**  - CHAIR ANDREW MINCHENER

09:00  Welcome and introduction  
Andrew Minchener, General Manager, IEA Clean Coal Centre, UK

09:15  Welcome and introduction  
Brian Seeberg Larsen, Senior Vice President, Industry and Energy, COWI, Denmark

09:30  Denmark energy situation  
Jane Glindvad Kristensen, Head of Division, Danish Energy Agency, Denmark

09:45  **SESSION 1 - INTERNATIONAL COFIRING ACTIVITIES**  - CHAIR ANDREW MINCHENER

09:45  Status quo and development prospects of cofiring biomass with coal in China  
Rui Sun, Electric Power Planning & Engineering Institute, China

10:10  Global trends in biomass to energy  
Marius Noer and Simon L Bager, COWI, Denmark

10:35  Status of cofiring for selected countries  
Xing Zhang, IEA Clean Coal Centre, UK

11:00 - 11:15  **COFFEE BREAK**

11:15  **SESSION 2 - CASE STUDIES AND DEMONSTRATIONS**  - CHAIR KEES VAN WINGERDEN

11:15  Ørsted experience. Utilisation of biomass for combined heat and power production  
Jørgen P Jensen, Ørsted, Denmark

11:40  Aspects of biomass cofiring for utility-sized CFB boilers  
Frank Leuschke, Doosan Lentjes, Germany

12:05  Cofiring of refined pellets on Nordjylland Unit 3  
Jeppe Grue, COWI, Denmark

12:30  Coal to wood pellets biomass conversions  
Raphael Han, Mitsubishi Hitachi Power Systems Europe, Germany

12:55 - 13:45  **LUNCH AND NETWORKING**
### SESSION 3 - FIRE PREVENTION - CHAIR PREBEN MESSERSCHMIDT

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<th>Time</th>
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<th>Speaker</th>
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<tr>
<td>13:45</td>
<td>Fire and explosion hazards related to bulk material handling and storage of coal and biomass</td>
<td>KEES VAN WINGERDEN, GEXCON, NORWAY</td>
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<td>14:10</td>
<td>Prevention of fires and dust explosions when handling biomass</td>
<td>ANDERS BERGSTROM, FIREFLY, SWEDEN</td>
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<td>14:35</td>
<td>Fire and explosion control measures for biomass storage and handling at Lynemouth Power Station</td>
<td>DAVEY WHARRIER, LYNEMOUTH POWER, UK</td>
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<td>15:00</td>
<td>Best practice for biomass store fire protection</td>
<td>RICHARD FARNISH, THE WOLFSON CENTRE FOR BULK SOLIDS HANDLING TECHNOLOGY, GREENWICH UNIVERSITY, UK</td>
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<td>15:25</td>
<td>Safety issues in relation to storage and handling of biomass: research and standardisation</td>
<td>ANDERS LÖNNERMARK, RISE RESEARCH INSTITUTES OF SWEDEN</td>
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### 15:50 - 16:05 COFFEE BREAK

### SESSION 4 - BIOMASS PRE-TREATMENT - CHAIR JEPPE GRUE

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<tr>
<td>16:05</td>
<td>Economic torrefied pellets from herbaceous biomass</td>
<td>JAVIER GIL, NATIONAL RENEWABLE ENERGY CENTRE, SPAIN</td>
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<td>16:30</td>
<td>Co-grinding of waste pellets in a vertical roller mill with coal</td>
<td>ROLAND AECERSBERG, LOESCHE GMBH, DUSSELDORF, GERMANY</td>
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<td>16:55</td>
<td>Self-steam explosion pretreatment technology for milling application of wet biomass</td>
<td>DEDY EKA PRIYANTO, IHI CORPORATION, JAPAN</td>
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### 19:00 DINNER AT SALT RESTAURANT ADMIRAL HOTEL

### DAY 3  13 SEPTEMBER 2018

### SESSION 5 - INDUSTRY DEVELOPMENT - CHAIR JØRGEN JENSEN

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<tr>
<td>09:00</td>
<td>Optimising wood pellet transportation by CFD simulation</td>
<td>PREBEN V. MESSERSCHMIDT, RAMBOLL, DENMARK</td>
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<td>09:25</td>
<td>Diffusion coatings for corrosion protection of ferritic-martensitic steels for cofiring biomass with coal</td>
<td>TOBIAS MEISSNER, DEHEMA-FORSCHUNGSINSTITUT, GERMANY</td>
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<td>09:50</td>
<td>Field experience in biomass cofiring on SCR catalyst technology</td>
<td>TERESA HITZKE, JOHNSON MATTHEY CATALYSTS, GERMANY</td>
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<tr>
<td>10:15</td>
<td>High value utilisation of biomass gasification coupled coal-fired unit power generation technology</td>
<td>SHOUJUN ZHANG, HEFEI DEBO BIOENERGY SCIENCE&amp; TECHNOLOGY CO, CHINA</td>
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### 10:40 - 11:00 COFFEE BREAK

### SESSION 6 - RESEARCH AND INDUSTRY DEVELOPMENT - CHAIR PATRICK MASON

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<tr>
<td>11:00</td>
<td>Management of ashes from cofiring biomass with coal</td>
<td>ANGELO SARABER, VLIEGASUNIE, THE NETHERLANDS</td>
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<td>11:25</td>
<td>Air monitoring devices for co-combustion of biomass with coal</td>
<td>DARIO DIMAGGIO, KURZ INSTRUMENTS, USA</td>
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<td>11:50</td>
<td>Managing fuel and air distribution to improve combustion and reduce NOx when cofiring coal with biomass</td>
<td>GUISHU LIU, AMMEGEN LTD USA – PART OF GREENBANK GROUP UK</td>
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<td>12:15</td>
<td>Ecological fuel from biomass residues and mineral coal rejectments</td>
<td>LUIZ H ALEXANDRE, 1C2C BIOCOMBUSTÍVEL DE CARBONO RECICLADO, BRAZIL</td>
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### 12:40 - 13:50 LUNCH AND POSTER VIEWING

### 13:50 – 14:00 Best poster prize presentation
14:00 - 16:30 SESSION 7 - RESEARCH AND DEVELOPMENT - CHAIR FRANK LEUSCHKE

14:00 Supply chain costs of biomass cofiring
   PATRICK E MASON, AYUP, UK
14:25 Oxyfuel cofiring of Miscanthus char and coal in a 300 kW furnace with integrated carbon fixation
   MING-HSUN WU, NATIONAL CHENG KUNG UNIVERSITY, TAIWAN
14:50 Experience of cofiring non-woody fuel in a pilot scale (500 kW) pulverised test facility
   MANOJ PANERU, UNIVERSITY OF STUTTGART, GERMANY
15:15 The biomass combustion and preparation technology development in anthracite coal fired boiler units
   NATALIYA I DUNAYEVSKA, COAL ENERGY TECHNOLOGY INSTITUTE OF THE NATIONAL ACADEMY OF SCIENCES OF UKRAINE
15:40 Workshop summary and closing remarks
   ANDREW MINCHENER, IEA CLEAN COAL CENTRE, UK

16:00 - 16:30 TEA/COFFEE AND NETWORKING

POSTERS

Improvement of combustion stability of a fluidised bed boiler for solid refuse fuel
   DAL-HEE BAE AND OTHERS, KOREA INSTITUTE OF ENERGY RESEARCH

How ATP’s CRBBP process produces cost-advantaged bio-coal
   JOSEPH J JAMES, AGRI-TECH PRODUCERS, LLC (ATP)

Combustion behaviour of raw and pelletised wood at suspension-fired conditions
   MARVIN MASCHE, PETER A JENSEN, PETER GLARBORG DEPARTMENT OF CHEMICAL AND BIOCHEMICAL ENGINEERING, DTU

High temperature corrosion in a waste-fired combustion boiler
   DOYEON LEE AND OTHERS, KOREA INSTITUTE OF ENERGY RESEARCH

Co-firing of HTC bio-coals and coal in pulverised coal plant: the potential for HTC to overcome inherent biofuel limitations and utilise lower value biomass
   AIDAN M SMITH, AARHUS UNIVERSITY

The impact of biomass ash as an additive on the nitrogen partitioning of coals and NOx emissions
   R.I BIRLEY AND OTHERS, UNIVERSITY OF LEEDS

Opportunities and challenges for cofiring biomass with coal for the UK low-carbon energy transition
   C. CHARALAMBOUS AND OTHERS, UNIVERSITY OF EDINBURGH

Modeling biomass behavior during combustion: A thermochemical approach to predict slagging
   IBAI FUNCIA MUGUERZA AND OTHERS, NATIONAL RENEWABLE ENERGY CENTRE

COWI

COWI is a leading consulting group that creates value for customers, people and society through our unique 360° approach. Based on our world-class competencies within engineering, economics and environmental science, we tackle challenges from many vantage points to create coherent solutions for our customers - and thereby sustainable and coherent societies in the world.

In the area of Bioenergy and Thermal Power COWI focuses on four business areas:
- Coal and biomass fired power plants – including partly or full conversion from coal to biomass and power plant flexibility
- Biomass power plants, Combined Heat and Power plants (CHP) and District Heating Plants
- Waste-to-Energy plants based on MSW or RDF
- Specialist services for operation, maintenance and optimisation