

## What our previous delegates say

“Irrespective of existing knowledge, everyone who attends the course will come away with a greater understanding and enthusiasm for bio fuels.”

“This gave me a great overview of the ‘biomass to energy’ market.”

“Covered all aspects of biomass from fuel to processing to products and waste, with a good mix of speakers from academia, research and industry, giving a varied, interesting and informative course.”

“A thoroughly informative course covering the major aspects of biomass combustion.”

## Administration Details

### Venue

The course venue will be the School of Process, Environmental and Materials Engineering, the Houldsworth Building of the University of Leeds. The University campus is ten minutes by foot from Leeds city centre. Limited car parking is available on the University campus at an approximate cost of £5.00 per day.

### Course Fees

The following course fees include the cost of tuition, course notes, lunches and light refreshments for the day(s) of attendance:

**£1250 Full five days**

**£310 Any one day**

### Accommodation

Delegates are responsible for their own evening meals and accommodation, except Monday when the course dinner is included for all delegates. A list of hotels close to the University is available on request and will be provided within the delegate joining instructions.

### Course Dinner

The course dinner will be held at a Leeds city centre restaurant and is included in the course fee. This will take place on Monday evening and delegates are responsible for making their own way to and from the restaurant. The dress code is smart casual. If you would like to attend please indicate when booking.

### Special Requirements

Potential delegates who have any special requirements should contact the course co-ordinator as soon as possible.

## How to Book

Booking for this course should be completed through our secure Online Store.

To complete your booking please follow the instructions below:

1. Log on to our Online Store at: <https://store.leeds.ac.uk/>
2. Select ‘Conferences and Events’ in the left-hand navigation bar.
3. Select ‘CPD Faculty of Engineering’.
4. Select the course or event for which you wish to register and click on ‘Book’.
5. If you are a new user, please follow the instructions to register. If you already have an account, log in as instructed.
6. Complete the application process as directed by the booking system.

You will receive an automatic confirmation email within 24 hours of your booking.

### For online booking queries and for all other enquiries

If you are experiencing problems with booking online or have any queries about the course please contact:

Rachael Lawson, CPD, Conference and Events Co-ordinator,  
CPD, Conference & Events Unit,  
Engineering Research & Innovation Service,  
c/o School of Civil Engineering, Room 209  
University of Leeds  
LEEDS, LS2 9JT, UK

T: + 44 (0)113 343 8104

F: + 44 (0)113 343 2511

E: [cpd@engineering.leeds.ac.uk](mailto:cpd@engineering.leeds.ac.uk)

W: [www.engineering.leeds.ac.uk/short-courses/](http://www.engineering.leeds.ac.uk/short-courses/)

Potential delegates who have any special requirements should contact the above as soon as possible.

#### Terms and conditions for online booking

Payment in full should accompany your booking. The course fee is exempt from VAT. Fees must be paid in full no later than 15 working days before the course commences. Failure to pay may result in attendance being refused.

Registrations are accepted on the understanding that the printed programme is given in good faith but may have to be re-scheduled or the speakers changed for reasons outside our control. The University of Leeds reserves the right to cancel or postpone the course, in which case fees will be refunded in full. In the event of cancellation, the University will not be held liable for delegates travel or accommodation expenses.

Delegates will receive a full refund for cancellations made within 7 days of online booking, except where the booking has been made for an event commencing within the next 7 days. Where a delegate wishes to cancel a registration after this 7 day period, written cancellations received up to 15 working days before the course will be subject to an administrative charge of 20% of the total remittance. After this date the full fee is chargeable and no refunds will be made, this also applies for non-attendance but copies of the course documents will be sent. Substitutions may be made at any time. If you are unable to complete your registration using the online booking system please contact the CPD, Conference & Events Unit to discuss alternative arrangements.

# Faculty of Engineering



# Energy from Biomass Combustion

Monday 9 – Friday 13  
January 2012

### Course Director:

Professor Jenny Jones  
SUPERGEN Bioenergy

Professor Gordon Andrews,  
Professor Bernard Gibbs  
Energy and Resources  
Research Institute

School of Process, Environmental  
and Materials Engineering

Please pass this leaflet to a  
colleague if this course is not  
relevant to you.



Programme includes a  
**TOUR OF DRAX**

All Biomass images on this leaflet are courtesy of Coppice Resources Ltd



The University of Leeds



# Information about the course

## Energy from Biomass Combustion

Monday 9 – Friday 13 January 2012

### Course Aims

Following the overwhelming response in previous years, the newly developed Energy from Biomass Combustion short course will run again in January 2012. The course has been developed by the Energy and Resources Research Institute at the University of Leeds in conjunction with SUPERGEN Bioenergy, following extensive market demand and subsequent market research.

Biomass is a key element in government plans to increase renewable energy sources and reduce greenhouse gases. It is unique as a renewable fuel since it can contribute to all three energy sectors – electricity, heat and transport fuels. The main energy crop candidates in the UK are short rotation willow coppice and Miscanthus, although other source of biomass, such as forestry residue, agricultural residue and waste woods find use in the production of electricity and heat. The use of biomass for transport fuels using so-called first generation technologies has led to environmental and economic impacts, and alternative technologies are currently under development. This course looks at fuel supply options and the emissions implications. The use of biomass for energy production has several associated technical, environmental and socioeconomic challenges. Some of these, particularly the technical challenges, will be addressed in this course.

### Expected Outcomes and Course Delivery

This course will provide a comprehensive overview of energy from biomass combustion and will give delegates a sound understanding of the fundamentals and practicalities of the following:

- Basics of solid biomass combustion
- Dedicated Biomass Installations
- Solid biomass for electricity generation
- Biogas and landfill gas for process heat and power generation
- Sustainability and Safety for Biomass
- Storage of Biomass
- Liquid biofuels for transportation petrol and diesel engines

Delegates are free to attend the full 5 days or may choose to attend the day(s) most relevant to them.

The course will be delivered by a team of practitioners and academics, all experts in their particular fields of contribution. Lectures will be supported by a full set of course notes and delegates' learning experience will be enhanced by a site visit as detailed below.

### New for 2012

The 2012 programme has been developed to include a number of new lectures to reflect the current climate and delegate feedback. This includes:

- A case study of the **Steven's Croft Biomass Plant at Lockerbie** by a speaker from Eon
- A lecture on **torrefaction**
- An afternoon entitled "**Sustainability and Safety for Biomass**" including lectures on Life Cycle Analysis, Sustainability, Safety and Storage in relation to Biomass. This includes speakers from DECC, the Tyndall Centre and Rothamsted Research

### Site Visit

The 2012 course includes a site visit to Drax Power Station near Selby, including a presentation by Drax Biomass Procurement Team.

### Intended Audience

- Process engineers and chemists new to the bioenergy field
- Regional developers wanting to obtain a technical perspective on bioenergy
- Energy and Environmental managers interested in utilising bioenergy
- Process heat system designers interested in biomass as a heat source

# Full course programme

A full programme including detailed lecture descriptions can be viewed online at:

[www.engineering.leeds.ac.uk/short-courses](http://www.engineering.leeds.ac.uk/short-courses)

## Monday 9 January 2012

### Basics of Solid Biomass Combustion

- 08.30 Registration
- 09.00 Solid biomass resources**  
Fiona McDermott, National Non Food Crops Centre
- 10.00 Coffee
- 10.15 Fuel properties of wood, straw, grasses, residues and other biomass fuels**  
Professor Bernard Gibbs, Energy and Resources Research Institute, University of Leeds
- 11.30 Fundamental of burning solid biofuels: wood, straw, grasses and other solid bio resources**  
Professor Jenny Jones, Supergen and Energy and Resources Research Institute, University of Leeds
- 12.30 Lunch
- 13.15 Combustion stoichiometry of solid biofuels**  
Professor Gordon Andrews, Energy and Resources Research Institute, University of Leeds
- 14.15 Combustion control, combustion and thermal efficiency, excess air and emissions for solid biofuels**  
Professor Bernard Gibbs, Energy and Resources Research Institute, University of Leeds
- 15.00 Gaseous and particle emissions from a biomass heater – Case Study**  
Professor Gordon Andrews, Energy and Resources Research Institute, University of Leeds
- 15.30 Tea
- 15.45 Solid biomass batch burning with heat output controlled by fan air supply and the benefits of co-combustion with natural gas in small scale (<100KW) furnaces – is pulverisation of solid biomass necessary?**  
Professor Gordon Andrews, Energy and Resources Research Institute, University of Leeds
- 16.30 Emission standards and regulations for biomass heat and power**  
Robert Stewart, AEA Group
- 17.30 End of day one
- 19.00 Course Dinner**

## Tuesday 10 January 2012

### Dedicated Biomass Installations

- 08.45 Registration
- 09.00 Types of solid biomass furnaces and boilers: stoker, pellet and pulverised**  
Professor Bernard Gibbs, Energy and Resources Research Institute, University of Leeds
- 10.15 Coffee
- University of Leeds biomass heating programme:**
- 10.30 The design, hardware and installation of the Binder boiler**  
Chris Birrell, Wood Energy Ltd
- 11.15 Biomass installations at the University of Leeds and other UK biomass projects**  
Tanya Christensen, Consulting With Purpose Ltd
- 12.15 Lunch
- 13.00 The Steven's Croft Biomass Plant at Lockerbie**  
Daniel Allen-Baines, E.ON Climate & Renewables
- 14.00 Renewable Energy – The highs and pitfalls**  
Mark Paulson, Coppice Resources Ltd
- 15.15 Tea
- 15.30 Practical 100% biomass electrical generation plant – design, planning and environmental issues**  
Chris Day, C J Day Associates
- 17.00 End of day two

## Wednesday 11 January 2012

### Solid Biomass for Electricity Generation

- 08.45 Registration
- 09.00 Practical experience with biomass co-firing in large pulverised coal boilers**  
Dr Bill Livingston, Doosan Babcock
- 10.00 Coffee
- 10.15 Torrefaction**  
Professor Jenny Jones, Supergen and Energy and Resources Research Institute, University of Leeds
- 11.15 The problem of metals in biofuels – combustion and ash influences**  
Professor Jenny Jones, Supergen and Energy and Resources Research Institute, University of Leeds and Professor Bernard Gibbs, University of Leeds
- 12.15 Lunch

- 13.00 Transportation to DRAX Power, Selby  
**SITE VISIT**
- 14.00 DRAX Tour / Presentation**  
Drax Biomass Procurement Team
- 16.30 Return transportation to the University
- 17.30 End of day three

## Thursday 12 January 2012 a.m

### Biogas and Landfill Gas for Process Heat and Power Generation

- 08.45 Registration
- 09.00 Biogas and landfill gas resources, current utilisation and future potentials**  
Chris Hatton, Viridor Waste Management
- 10.00 Coffee
- 10.15 Fundamentals and practical experience of biomass gasification**  
Dr Nigel Simms, Energy Technology Centre, Cranfield University
- 11.15 Biomass digesters**  
Professor Michael Chesshire, Biogen Greenfinch and Visiting Professor at University of Southampton
- 12.30 Lunch

## Thursday 12 January 2012 p.m

### Sustainability and Safety for Biomass

- 13.15 Sustainable Biomass – understanding and meeting the UK, EU and global requirements on sustainability**  
Caroline Season, Department of Energy & Climate Change (DECC)
- 14.15 Life cycle analysis and sustainability**  
Patricia Thornley, Tyndall Centre, University of Manchester
- 15.15 Tea
- 15.30 Issues during the storage of Biomass**  
Ian Shield, Rothamsted Research
- 16.00 Issues during the storage of Biomass (continued)**  
Professor Jenny Jones, Supergen and Energy and Resources Research Institute, University of Leeds
- 16.30 End of day four

## Friday 13 January 2012

### Liquid Biofuels for Transportation Petrol and Diesel Engines

- 08.45 Registration
- 09.00 Setting the scene – first, second and third generation biofuels. Life cycle analyse and well to wheels approaches**  
Professor Gordon Andrews, Energy and Resources Research Institute, University of Leeds
- 10.00 Coffee
- 10.15 Review of diesel engine emissions influences of biofuels**  
Professor Gordon Andrews, Energy and Resources Research Institute, University of Leeds
- 11.15 Review of SI engine emissions influence of ethanol**  
Professor Gordon Andrews, Energy and Resources Research Institute, University of Leeds
- 12.15 Lunch
- 13.00 Practical considerations and experience of using biodiesel – low temperature handling, stability and deposit control**  
Tom Hawkins, Innospec
- 14.00 Practical experience of E85 SI ethanol operation and emissions**  
Richard Pearson, Lotus Engineering
- 15.00 Tea
- 15.15 Novel approaches to the uses of bio-methanol**  
Richard Pearson, Lotus Engineering
- 16.30 End of day five and course

### Course Accreditation

This course has been developed in conjunction with **SUPERGEN Bioenergy**. The **Energy Institute** has approved Leeds University – Faculty of Engineering as an **Approved Training Provider**.

### Other Environmental and Waste Management courses:

**Industrial Air Pollution Monitoring**  
27 – 29 February 2012

**Thermal Treatment of Municipal Waste**  
17 – 18 September 2012