Topics Covered

Review of Biomass Resources

Sustainable Biomass Supply Chain

Economics and Risk Management

Properties of Biomass Fuels
The combustion of biomass is arguably the oldest known and most widely used controllable energy source on earth. In recent years, the fluctuations in the costs of fossil fuels; measures to restrict global greenhouse gas emissions; and the development of improved equipment have made biomass combustion an alternative, economical, efficient, and practical energy source.

Biomass Combustion refers to both dedicated combustion and/or co-firing of biomass for the production of usable energy and includes the market introduction and optimisation of biomass combustion technologies.

Concerns about climate change and energy security of supply are changing the energy sector at a rapid pace. Energy scenarios in many countries now involve renewable energy sources at much higher degrees of penetration than in previous years.

Energy planning in many countries relies on the increasing use of biomass resources for direct combustion/co-firing in the production of heat and/or electricity generation.

Several factors determine the best use of the biomass resources which are available. These can include the types of biomass materials, the supply chain and logistical issues, and the combustion or other conversion technologies employed.

More advanced processing of biomass materials can also produce syngas, liquid biofuels and a wide range of chemical products.

**What will I learn?**

This course will provide a comprehensive overview of energy from biomass combustion. The focus will mainly be on biomass for electricity and heat production.

This course will review fuel supply options and key emissions implications.

The use of biomass for energy production has several associated technical, environmental and socio-economic challenges. Some of these, particularly the technical challenges, will be comprehensively examined during this course.

**How will I benefit?**

The course will give you a sound understanding of the fundamentals and practicalities of:

- Biomass resources and sustainability issues
- Basics of solid biomass combustion
- Dedicated biomass installations
- Biomass for electricity generation
- Fuel production and the storage of biomass materials
- Health and safety issues
- Development of advanced technologies: gasification and the production of liquid fuels and chemicals from biomass materials
- The course contains a range of relevant case studies of plants operating / planned where biomass materials are the primary fuels or used in co-firing.

**Who Should Attend**

This course is targeted at persons needing to increase their understanding of biomass as a fuel source. It will be of particular interest to the following groups:

- Project Financiers and Power Project Developers;
- Other Energy Professionals, Researchers and Government Policy-makers wanting to obtain a technical perspective on biomass fuel sources;
- Process, Project and Consultant Engineers interested in enhancing their knowledge on current and future technologies;
- Environmental managers involved with biomass and related fuels.
What is Biomass?
- Main classification of biomass materials

Why use Biomass?

Review of Biomass Resources
- Recent national and global resource assessments

Sustainable Biomass
- Understanding requirements concerning sustainability
- Overview of Life Cycle Analysis and Sustainability
- Principles of a “Carbon Neutral” Fuel

Supply Chain Economics and Risk Management

Properties of Biomass Fuels

Fuel Production and Storage of Biomass
- Biomass drying and milling
- Biomass spontaneous combustion

Other Health and Safety Issues
Fundamentals of Biomass Combustion

Direct Combustion of Biomass
- Advantages and disadvantages
- Emissions from biomass combustion

Types of Plant used for Biomass Combustion
- Pulverised fuel (PF) systems
- Fluidised bed combustion (bubbling and circulating systems)
- Other types of solid biomass furnaces and boilers: stoker, pellet and batch burning

The Problem of Trace Metals in Biomass/biofuels
- Potential influences on combustion processes and ash content
- Corrosion, slagging and fouling – special issues relating to biomass firing

Biomass Co-firing
Combustion Stoichiometry of Solid Biofuels and Thermal Efficiency

Practical Experience of Biomass Firing and Co-firing
- Experience in large pulverised fuel coal-fired utility boilers and fluidised bed combustion plants

Other Biomass Technologies

Review of Biomass Conversion Processes

Biomass Gasification
Main gasification technologies
[These technologies are often suitable for ‘difficult’ fuels]
Synthesis gas (producer gas)

Pyrolysis of Biomass for the Production of Liquids
Description of main pyrolysis technologies (slow and fast pyrolysis)

Pyrolysis Oil (renewable liquid fuel made from biomass, is twice as energy dense as wood pellets. It has the potential to replace fossil oil in many industrial, commercial and residential applications

Torrefaction Processes
This is thermal process to convert biomass into a coal-like material, which has better fuel characteristics than the original biomass. Torrefied biomass is generally more brittle, making grinding easier and less energy intensive.
Biorefineries
General concepts - increased value from biomass conversion
Range of chemicals/products that can be produced at a biorefinery
Case studies and designs of biorefineries
Key technical and economic challenges

A biorefinery is a facility that integrates biomass conversion processes and equipment to produce fuels, power, heat, and value-added chemicals from biomass. The biorefinery concept is analogous to today's petroleum refinery, which produce multiple fuels and products from petroleum.

Conclusion to the Course
OTHER AVAILABLE COURSES

4 Pillars of Transformer Condition
Advanced Project Finance for Power
Advanced Technical Report Writing & Presentation Skills
Ancillary Services in Competitive Electricity
Asset Management for the Power Industry
Best Practice Renewable Energy Capital & Project Management
Biomass Power Generation
CFB Combustion for Boiler Operations
Clean Development Mechanism and Carbon Markets
Coal Contracts
Combined Cycle Power Plants Operation
Combined Heat & Power (CHP) and Co-Generation Plant Operations
Competency Management System for the Power Industry
Design & Operations of Circulating Fluidized Bed Boiler
Developing & Structuring Public-Private Partnership (PPP) for Infrastructure
Effective Tender Process Management for Power & Utilities
Electrical Hazop [eHazop] Studies for the Power Industry
Electricity Demand-Side Management
Electricity Industry Design
Electricity Network Planning
Electricity Retail Contracts
Electricity Theft
Electricity Trading Essentials
Energy Efficiency
EPC Contract Management for Power & Utilities
Essentials of Coal Markets and Trading
Essentials of Power Trading
Excitation Systems
Feed-In Tariffs for PV Systems
Finance for Non-Finance Professionals in Power & Utilities
Financial Modelling for Project Finance in Power & Utilities
Fitness-For-Service AP1 579 & High Energy Piping Life Management
Fundamentals of Geothermal Energy
Fundamentals of Power Generation
Gas & LNG Contract Negotiation
Gas Turbine Generator Selection, Operation & Maintenance
Gas Turbine Hot Gas Paths, Rotors & Failure Analysis
Gas Turbine Major Inspection & Overhaul
GE Gas Turbine Operations Simulation Based
HRSG Design, Operations & Understanding, Controlling of HRSG Damage
HV Substation Design & Construction
IEC for Utilities
Integration of Distributed Generation
Introduction to Carbon Capture & Storage
Introduction to Clean Coal Technology
Introduction to Power Systems
Keeping Electrical Switchgear Safe
Leadership & Team Dynamics for Power & Utilities
LNG Fundamentals
LNG Markets & SPOT Trading
Maintenance Planning & Scheduling
Making IPP & Renewable Energy Projects Contract Frameworks Bankable
Managing Complex Projects for Power and Utilities Professionals
Medium Voltage & High Voltage Switchgear
Metallurgy for Engineers
Mechanical Engineering for Non-Mechanical Engineers
Mini Hydro Project Analysis
MKV Speedtronic Control System
MK VI Speedtronic Control System
Nuclear Energy Project Planning & Economics
Nuclear Power
Offshore Platforms Electrical Systems Design & Illustrations
Operations of Coal Fired Power Plants
Power Generation Commissioning, Operations & Maintenance
Power Generation Operation, Protection & Excitation Control
Power Plant Chemistry for Chemist & Chemical Engineers
Power Purchase Agreements
Process Control Methods
Programmatic CDM
Project Management for Power and Utilities
Relay Protection in Power Systems
Reliability Centered Maintenance Masterclass
Reliability Engineering
Renewable Energy Development & Investment
Renewable Energy Integration
Risk Based Inspection
Risk Management in Power Markets
Root Cause Analysis
Rotating Equipment Maintenance & Reliability Excellence
SCADA & Power Systems
Smart Grid
Solar Energy & Photovoltaic Power
Spare Parts Optimisation
Supercritical and Ultra-Supercritical Coal-Fired Power Plant
Technical Report Writing & Presentation Skills for Power & Utilities Professionals
Ultra Low NOx Gas Turbine Combustion
Uninterruptible Power Supply
Vibration Analysis & Condition Monitoring
Waste to Energy Plant Operations
Water Treatment and Corrosion Control for Steam Generation and Power Production
Writing Effective Standard Operating Procedures (SOP) for Power & Utilities Professionals & Engineers

www.poweredgeasia.com
Frequently Asked Questions (FAQs)

1. Does PowerEdge have other programmes than those listed? 
   We have more than 200 programmes that we are capable of running. All we need is for you to contact us and request for the preferred programme and we will able to develop it.

2. Where is PowerEdge based? 
   PowerEDGE is headquartered in Singapore but we run our training programmes in different venues around Asia.

3. What does PowerEdge do? 
   We are a Power & Utilities Training Specialist.

4. Can this course be done in our city? 
   It absolutely can. Get in touch with us to request for a training programme to be carried out in your city.

5. Can you reduce the price of our preferred course? 
   While our price has been reduced before it is even launched, we are always happy to help you with further discounts.

6. Can you change the dates of the course? 
   If you have a special requested date, let us know and we will arrange another session for you.

7. Who are the companies that will be participating? 
   This varies from a diversity of Power Operators, Regulators, Financiers, to Vendors in the Power & Utilities industry.

8. Where is the venue for the course? 
   We usually engage a 4 to 5 star hotel meeting room to ensure the comfort of our participants.

9. How many delegates should we expect for each course? 
   This varies from 15 to 20 participants. Class sizes are kept small to allow trainers to focus better on each participant.

10. What are the different payment modes? 
    We accept Visa/MasterCard, cheques, bank transfers and cash on site.

11. Is accommodation included when I sign up for a course? 
    Accommodation is not included in the course fee but we are always happy to advise on available accommodations.

12. Can I get a cheaper accommodation through PowerEdge? 
    We will be pleased to help you negotiate a better rate with hotels.

13. Is lunch provided during the course? 
    We provide lunch and 2 tea breaks every day during our training programmes.

14. Are the training materials included once I have signed up for a course? 
    Yes, training and course materials are included in the course fee.

15. Will there be a certificate for the course? 
    Yes, there will be a certificate of participation upon completion of a course.

16. Who are PowerEdge trainers? 
    They are expert consultants and practitioners with many years of experience in the subject matter that they deliver on.

17. Are PowerEdge trainers competent? 
    We have received numerous favourable feedbacks on our trainers from past participants.

18. Can PowerEdge assist with Visa travel applications? 
    We can assist in advising you on the relevant procedure(s) and embassies/consulates that provide Visa for travel purposes.

19. Can we purchase training materials without attending a course? 
    Unfortunately this option is not available as training materials are specially developed for courses.

20. Can course content be tweaked to cater to our needs? 
    Of course! Just let us know your request and we will get the trainer to assist in carrying it out.
CANCELLATIONS & SUBSTITUTIONS

You may substitute delegates at any time. POWEREDGE PTE LTD does not provide refunds for cancellations. For cancellations received in writing more than seven (7) days prior to the training course you will receive a 100% credit to be used at another POWEREDGE PTE LTD training course for up to one year from the date of issuance. For cancellations received seven (7) days or less prior to an event (including day 7), no credits will be issued. In the event that POWEREDGE PTE LTD cancels an event, delegate payments at the date of cancellation will be credited to a future POWEREDGE PTE LTD event. This credit will be available for up to one year from the date of issuance. In the event that POWEREDGE PTE LTD postpones an event, delegate payments at the postponement date will be credited towards the rescheduled date. If the delegate is unable to attend the rescheduled event, the delegate will receive a 100% credit.

PAYMENT METHODS

By Cheque/Bank Draft: Make Payable to PowerEdge Pte Ltd.
By Telegraphic Transfer: Please quote AE1 with the remittance advise
Account Name: PowerEdge Pte Ltd.
Bank Address: 65 Chulia Street OCBC Centre, Singapore 049513
All bank charges and payment in Singapore dollars (SGD) to be borne by payer. Please ensure that PowerEdge Pte Ltd receive the full invoiced amount.

* GST: Exclusive price is only applicable for overseas corporate customers subject to qualifying conditions.

*GST FOR SINGAPORE REGISTERED COMPANIES

oweredMinimum 40% Off

Normal Price

PER PARTICIPANT | 2 PARTICIPANTS OR MORE | IN-HOUSE TRAINING
---|---|---
3 Day Programme | SGD 3,900 Per Participant | SGD 3,700 Per Participant
| *SGD 4,173 Per Participant (GST INCLUSIVE) | *SGD 3,959 Per Participant (GST INCLUSIVE) | Guaranteed Minimum 40% Off Normal Price

ATTENDEE DETAILS

Name ......................................................... Job title .................................................................
Tel ........................................... Department ................................................ Email ......................

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Tel ........................................... Department ................................................ Email ......................

Name ......................................................... Job title .................................................................
Tel ........................................... Department ................................................ Email ......................

COMPANY DETAILS

Organisation name ......................................................... Industry .................................................................
Address ..........................................................................................................................
Postcode ........................................................................ Country .................................................................
Tel ........................................................................ Fax ..................................................................

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