4th Successful Run in Asia!

SOLAR ENERGY & PHOTOVOLTAIC POWER

An essential & comprehensive course on solar energy and photovoltaic power, covering solar energy resources, PV technology and grid-connected and stand-alone PV applications & Project Financial Analysis

28 – 29 JANUARY 2015, SINGAPORE

Expert Course Faculty Leader

Dr Hugh Outhred

Hugh has 30+ years' experience in energy markets in research, consulting & teaching

Dr.Maria Retnanestri

PAST TESTIMONIALS

"A tailor made course on PV for non-professionals. Excellent. Topped up to the required level of knowledge for me."
- Managing Director, Neat Solutions Pvt Ltd

"Concise yet complete brief course to bring professionals up to date with the latest issues and trends with photovoltaic systems."
- Engineer, Public Utilities Board

"The course is comprehensive and has increased my knowledge and competency."
- Senior Engineer, Tenaga Nasional Berhad

"This training has opened my eyes to other country's case studies on solar PV systems."
- Engineer, TNB Energy Services Sdn Bhd

energy institute Approved Training Provider

CPD MEMBER The CPD Certification Service

HRDF CLAIMABLE *Subject to terms and conditions

Another Quality Training By powerEDGE® Empower your future

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About This Training Course

This course will provide a comprehensive discussion of solar energy resources, PV and balance of system technologies, technical standards for PV, grid-connected and stand-alone PV applications and project financial analysis.It will discuss international trends in the deployment of PV and present case studies on the experience to date and future prospects for PV in Australia and Indonesia.

Learning Outcomes

- Characteristics of solar energy resources
- PV and balance of system technologies, including PV modules, inverters, batteries, maximum power point trackers, wiring, DC circuit breakers, fuses and lightning protection
- Technical standards for PV systems
- Design of grid-connected and stand-alone PV systems
- International deployment and cost trends for PV systems
- PV project financial analysis
- Insights from case studies of the deployment of PV systems in Australia and Indonesia

Who Should Attend

The course is designed for professionals from the electricity industry, PV system designers and government policy makers. Participants should have some technical knowledge of the electricity industry.

Unique Features with powerEDGE Training

- Pre-Course Questionnaire to help us focus on your learning objectives
- Detailed Course & Reference Manual for Continuous Learning and Sharing
- Practical Exercises & Case Examples to better understand the principles
- Limited class size to ensure One-to-One Interactivity
- Assessment at the end of the course to help you develop a Personal Action Plan

This training course has a limited attendance for up to 20 participants only.

Sessions commence at 9am on all days, with short intervals at 10.30am and 3.30pm respectively.
Refreshments will be provided in the short intervals.
Lunch will be provided at 12:30pm for 1 hour. Sessions will end at 5pm on all days.

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2 Day Course Outline

Solar energy resources

- Solar radiation from the sun at the top of the earth's atmosphere and at the surface
- Effects of clouds & other atmospheric phenomena on ground-level solar radiation
- Measurement of direct and diffuse insolation
- Apparent motion of the sun at a point on the earth's surface
- Estimating the solar energy resource available for a particular array at a particular site

PV cells, modules and arrays

- Semiconductors, photovoltaic effect & basic PV cell, spectral response, effect of temperature
- PV modules: designs to minimise the effects of cell mismatch & shading
- PV arrays: types and characteristics, including fixed and tracking flat plate and concentrator systems
- Mounting of PV arrays – ground mounted, building mounted and building integrated, fixed & tracking
- PV array temperature distribution and local heating effects
- Array degradation and failure modes
- Current status and future prospects for technical performance and cost of PV arrays

Balance of system components for electricity generation

- Maximum power point trackers
- Inverters: self-commutated and line-commutated, string inverters and module inverters
- PV cell mismatch effects & their management
- Circuit components: wiring, junction boxes, fuses, DC circuit breakers, lightning protection
- Batteries: lead acid, lithium ion and other battery types
- Battery management: depth of discharge, effects of cycling, charge regulators

Technical standards for PV systems

- PV modules and arrays
- Grid-connected PV using inverters
- Stand-alone power systems

Design of grid-connected PV systems

- Design of grid-connected PV systems: siting, sizing, component matching, managing fire and electrocution risks
- Power system issues for grid-connected PV systems: voltage rise, harmonics, islanding, under/over voltage and under/over frequency protection, uncertain, time-varying operating level, forecasting
- Operation and maintenance, decommissioning
- Examples of grid-connected PV system design

Design of grid-connected PV systems

- Design of grid-connected PV systems: siting, sizing, component matching, managing fire and electrocution risks
- Power system issues for grid-connected PV systems: voltage rise, harmonics, islanding, under/over voltage and under/over frequency protection, uncertain, time-varying operating level, forecasting
- Operation and maintenance, decommissioning
- Examples of grid-connected PV system design

Design of stand-alone PV systems

- Applications for stand-alone PV systems: remote housing, portable lighting, portable refrigeration, charging stations for phones and laptop computers, water pumping, navigation, telecommunications, PV-diesel hybrid power systems
- Design of stand-alone PV systems: siting, sizing, component matching, protection, operation and maintenance, decommissioning, managing fire and electrocution risks
- Design tools for stand-alone PV systems,
- Examples of stand-alone PV system design

PV project financial analysis

- NPV, LCOE, IIR & payback period
- Sensitivity analysis, real option analysis

Case study: PV system deployment in USA: experience & future prospects

- Evolution of PV-related policies
- Trends in deployment and installed prices
- Performance of installed systems
- Integration issues & responses
- Current trends and future prospects

Case study: PV system deployment in Australia: experience & future prospects

- Evolution of PV-related policies
- Trends in deployment and installed prices
- Performance of installed systems
- Integration issues & responses
- Current trends and future prospects

Case study: PV system deployment in Indonesia: experience & future prospects

- Evolution of PV-related policies
- Trends in deployment and installed prices
- Performance of installed systems
- Integration issues & responses
- Current trends and future prospects

Case study: PV system deployment in Singapore: experience & future prospects

- Evolution of PV-related policies
- Trends in deployment and installed prices
- Performance of installed systems
- Integration issues & responses
- Current trends and future prospects

Your Expert Faculty

Dr. Hugh Outhred

In a 35-year research career, Hugh Outhred (PhD) has contributed to electric power system analysis and control, the theory of electricity industry restructuring and electricity market design, renewable energy technology, renewable energy integration, energy sector policy and sustainability policy. He has taught nearly 100 short courses on electricity industry restructuring and sustainability in a range of countries since 1988.

In 1993 and 1994 he co-authored a report on electricity industry restructuring for the California Energy Commission that highlighted the complexity of electricity restructuring in that context.

In 1995 and 1996 he led a project for the Australian National Grid Management Council to undertake electricity-trading experiments according to the proposed National Electricity Market trading rules prior to their formal implementation.

From 2004 to 2007, he was the founding Presiding Director of the Centre for Energy and Environmental Markets at the University of New South Wales. From 2009 to 2011, he was a Lead Author for the International Panel on Climate Change (IPCC) Special Report on Renewable Energy Sources and Climate Change Mitigation, published in 2011.

Hugh has been a Fulbright Senior Fellow at the University of California Berkeley, USA and has held visiting positions at Massachusetts Institute of Technology in the USA, the University of Liverpool in Britain and the Universidad Pontificia Comillas in Spain.

He has been a Board member of the Australian Cooperative Research Centre for Renewable Energy and an Associate Director of the Centre for Photovoltaic Devices and Systems at the University of New South Wales. He was a member of the NSW License Compliance Advisory Board and a member of the National Electricity Tribunal throughout their existence from 1997 to 2000 and 1998 to 2006 respectively.

Hugh Outhred (PhD), a Fellow of the Australian Institute of Energy & was, prior to his retirement in 2007, Presiding Director of the Centre for Energy & Environmental Markets at the University of New South Wales, Sydney Australia.

Dr. Maria Retnaestri

Dr. Maria Retnanestri is a Visiting Fellow in the School of Electrical Engineering and Telecommunications at the University of New South Wales.

She holds the degrees of Bachelor of Electrical Engineering (STTNAS Jogjakarta), Master of Engineering Science in Electrical Engineering (UNSW) and PhD in Electrical Engineering (UNSW).

In her PhD research, Maria Retnanestri developed the I3A (Implementation, Accessibility, Availability and Acceptability) Framework to investigate overall sustainability of renewable energy projects, considering their institutional, financial, technological, social and ecological sustainability dimensions. From 2008 to 2011, she then further developed and applied this research to identify ways to overcome barriers to renewable energy for sustainable development in Indonesia with financial support from an Australian Development Research Award.

With that financial support, she conducted more than 20 workshops, seminars, public lectures, field visits and study tours in Indonesia involving various kinds of renewable energy stakeholders in knowledge sharing and capacity building activities.

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Courses Available

4 Pillars of Transformer Condition
Advanced Project Finance for Power
Advanced Technical Report Writing & Presentation Skills
Advanced Turnaround Shutdown & Outage Management
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 API 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 Mechanisms
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

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.

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REGISTRATION FORM

	NORMAL PRICE	Early Bird Ends 07 Jan 2015	GROUP OF 3 or More
2 Day Programme	SGD 3, 299 Per Participant (*GST Exclusive)	SGD 3, 099 Per Participant (*GST Exclusive)	SGD 2, 799 Per Participant (*GST Exclusive)
	SGD 3, 529.93 Per Participant (GST Inclusive)	SGD 3, 315.93 Per Participant (GST Inclusive)	SGD 2,994.93 Per Participant (GST Inclusive)

ATTENDEE DETAILS

Name ..... Job title .....

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

Name ..... Job title .....

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

Name ..... Job title .....

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

Name ..... Job title .....

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

Name ..... Job title .....

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

COMPANY DETAILS

Organisation name .....Industry.....

Address .....

Postcode..... Country.....

Tel .....Fax.....

4 ways to Register

Online Web Registration
info@poweredgeasia.com
(65) 6741 9927
(65) 67478737

RELATED COURSES

- ✓ Keeping Electrical Switchgear Safe
- ✓ Introduction to Power Systems
- ✓ Excitation Systems
- ✓ Fundamentals of Power Generation

On Site Training

Can't make it for the Course? We'll make the course come to you!!

Simply let us know your preferred time and dates and we will meet you at your schedule and venue.

With a host of highly trained experts, we will be happy to customize your programme with your needs 100% fulfilled.

Contact us today at

info@poweredgeasia.com
(65) 6741 9927

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.
ank Code: 7339 Branch code: 686 Account Number: 686-253386-001 Swift Code: OCBCSGSG
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.

PAYMENT POLICY

Payment is due in full at the time of registration. Full payment is mandatory for event attendance. I agree to PowerEdge Pte Ltd. payment terms
* GST- Exclusive price is only applicable for overseas corporate customers subject to qualifying conditions.

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