COURSE OVERVIEW NE0011
Renewable Energy
(Photovoltaics (PV) & Battery Energy Storage System (BESS))

Course Title

Renewable Energy (Photovoltaics (PV) & Battery Energy Storage System (BESS))

Course Date/Venue

November 25-29, 2024/Al Maya 2 Meeting Room, Grand Millenium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference

NE0011

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes real-life case studies where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date overview of Renewable Energy (PV & BESS). It covers the basics of solar energy and components of PV systems and PV system design principles; predicting and calculating the energy yield of PV installations in different environmental conditions; the regulatory frameworks, incentives and policies supporting PV deployment in the utility sector; the site assessment for PV installations including PV system sizing and optimization; and the technical and regulatory considerations for integrating large-scale PV systems into the grid.

Further, the course will also discuss the PV systems and ensuring long-term reliability and performance; the fundamentals of battery energy storage systems (BESS); the various battery storage technologies; the BESS for grid applications and operational strategies for BESS; analyzing economic and environmental considerations; and reviewing safety standards and regulations for BESS.

During this interactive course, participants will learn the hybrid PV and BESS solutions for enhanced grid services and renewable integration; the energy management systems (EMS) for renewables; the demand response and load shifting; the financial modeling and project financing; the policy and market mechanisms for renewables; the project planning and development for PV and BESS; the risk management and mitigation in renewable projects; the emerging technologies and trends in the renewable energy sector; and the sustainability and environmental benefits of integrating renewable energy into utility operations.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain a comprehensive knowledge on renewable energy (PV and BESS)
- Discuss renewable energy, basics of solar energy and components of PV systems
- Recognize PV system design principles and apply techniques for predicting and calculating the energy yield of PV installations in different environmental conditions
- Discuss the regulatory frameworks, incentives and policies supporting PV deployment in the utility sector
- Carryout site assessment for PV installations including PV system sizing and optimization
- Explain the technical and regulatory considerations for integrating large-scale PV systems into the grid
- Maintain PV systems and ensure long-term reliability and performance
- Discuss the fundamentals of battery energy storage systems (BESS) and the various battery storage technologies
- Design BESS for grid applications and apply operational strategies for BESS
- Analyze economic and environmental considerations and review safety standards and regulations for BESS
- Apply hybrid PV and BESS solutions for enhanced grid services and renewable integration
- Recognize energy management systems (EMS) for renewables and apply demand response and load shifting
- Illustrate financial modeling and project financing and discuss policy and market mechanisms for renewables
- Employ project planning and development for PV and BESS as well as risk management and mitigation in renewable projects
- Explore emerging technologies and trends in the renewable energy sector and assess the sustainability and environmental benefits of integrating renewable energy into utility operations

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials, sample video clips of the instructor's actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of renewable energy (PV and BESS) for energy professionals, utility operators, energy analysts, government and regulatory professionals, energy consultants and other technical staff.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

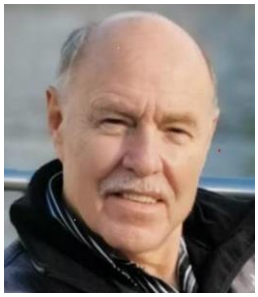
  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Fred Du Plessis is a **Senior Electrical Engineer** with over **45** years of extensive experience within the **Oil**, **Gas**, **Petrochemical**, **Refinery**, **Energy** & **Power** industries. His expertise widely covers in the areas of **Renewable Energy** Technologies, **Renewable Energy Generation & Integration**, **Solar**, **Wind & Energy Storage** Technologies, **Energy Storage** Technologies, **Renewable Energy** Sources, **Smart Grids & Grid** Integration, **Grid Integration** Strategies, **Renewable Energy** Sources Connection Optimization, **Grid** Balancing & System Optimization, **Power Generation**, **Power System** Analysis, **Power** Generation & Distribution, **Electric Power System**, **Transformer Protection**, **Transformers** Maintenance, **Power System** Operation & Control, **Power Systems** Fault Analysis, **HV/MV Cable Splicing**, **High Voltage Electrical Safety**, **Circuit Breaker** Inspection & Repair, **HV Equipment** Inspection & Maintenance, **HV Switchgear** Operation & Maintenance, **Heat Shrink & Cold Shrink** Joints, Commissioning of **LV & HV Equipment**, **Switchgear** Testing, **Cable** Testing, Line Patrol in **Low Voltage & Distribution**, **Transmission**, Abnormal Conditions & Exceptions, Live Line Work up to 33KV, **Power System** Protection, **High Voltage** Operating Preparedness Phasing (**110V to 132KV**), **HV Operating & Fault** Finding (up to 132KV), **VSD/VFD** Installations & Testing, **Electrical Panel** Design, **VSD/VFD** Installations & Testing, **AC/DC** Supplies & Change Over Systems, **AC & DC** Winders, VLF Testing, **Gas & Steam Turbine Water Treatment & Reverse Osmosis** and **Mechanical Maintenance** Management.

During Mr. Du Plessis's career life, he has gained his practical experience through several significant positions and dedication as the **Project Manager/Owner**, **Maintenance Manager**, **Project Excecution Manager**, **Commissioning & Operating Manager**, **Acting Operating Manager**, **Optimization/Commissioning Manager**, **Operating Support Manager**, **Operating Production/Shift Manager**, **Operations Lead Engineer**, **Electrical Engineer**, **Renewable Energy Engineer**, **Energy Storage Engineer**, **Production/Maintenance Planner**, **Unit Shift Supervisor**, Principal **Plant Operator**, **Workshop & Maintenace Consultant**, Assistant **Electrical Supervisor**, Trainee **Motor Mechanic** and **Senior Instructor/Trainer** from various international **power station** companies like the Dunamis Energy, Peterhead Power Station, Lijaco Services, Eskom, Matla Power Station, Grootvlei Power Station, Scatec ASA, Ellisras Brick & Ceramic, Hlalisanani Mechanical Contractor, Matimba Power Station, Eskom Kriel Power Station and Transvaal Provincial.

Mr. Du Plessis has a **Bachelor's** (with Honours) degree in **Operations Management**. Further, he holds certification in Red & Silver Seal Accreditation Power Generation – (ESETA), a SAMTRAC & NOSA **Auditor** – (NOSA), a **Certified Instructor/Trainer** and has further delivered various trainings, seminars, conferences, workshops and courses globally.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Monday, 25th of November 2024***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of Renewable Energy:*** *The Role of Renewable Energy Sources in Today's Energy Mix & their Importance for Water & Electricity Utilities*
0930 – 0945	*Break*
0945 – 1030	***Basics of Solar Energy:*** *Solar Radiation Fundamentals, the Solar Spectrum & How Photovoltaic Cells Convert Solar Energy into Electricity*
1030 – 1130	***Components of PV Systems:*** *Detailed Exploration of PV System Components, including Panels, Inverters, Mounting Systems & Balance of System (BOS) Components*
1130 – 1215	***PV System Design Principles:*** *Introduction to the Design Criteria for PV Systems, Considering Load Assessments, Solar Resources & System Sizing*
1215 – 1230	*Break*
1230 – 1330	***Energy Yield Analysis:*** *Techniques for Predicting & Calculating the Energy Yield of PV Installations in Different Environmental Conditions*
1330 – 1420	***Regulations & Incentives:*** *Overview of Regulatory Frameworks, Incentives, & Policies Supporting PV Deployment in the Utility Sector*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: ***Tuesday, 26th of November 2024***

0730 – 0830	***Site Assessment for PV Installations:*** *Procedures for Conducting Site Assessments, including Solar Resource Assessment & Site-Specific Constraints*
0830 – 0930	***PV System Sizing & Optimization:*** *Advanced Methodologies for Sizing PV Systems & Optimizing for Maximum Efficiency & Economic Return*
0930 – 0945	*Break*
0945 – 1100	***Grid Integration of PV Systems:*** *The Technical & Regulatory Considerations for Integrating Large-Scale PV Systems into the Grid*
1100 – 1215	***Case Studies of Utility-Scale PV Projects:*** *Analyzing Real-World Examples of Utility-Scale PV Installations & their Operational Insights*
1215 – 1230	*Break*
1230 – 1420	***Maintenance & Reliability of PV Systems:*** *Strategies for Maintaining PV Systems & Ensuring Long-Term Reliability & Performance*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3: ***Wednesday, 26th of November 2024***

0730 – 0830	***Fundamentals of Buttery Energy Storage Systems (BESS):*** *The Role of Energy Storage in Electricity Networks, Focusing on the Integration with Renewable Energy Sources*
0830 – 0930	***Battery Technologies:*** *Overview of Various Battery Storage Technologies, including Lithium-Ion, Flow Batteries & their Suitability for Utility-Scale Applications*
0930 – 0945	*Break*

0945 – 1100	***Designing BESS for Grid Applications:*** *Principles of BESS Design Tailored for Grid Stability, Peak Shaving & Renewable Integration*
1100 – 1215	***Operational Strategies for BESS:*** *Exploring How BESS can be Operated to Enhance Grid Reliability, Provide Ancillary Services & Support Renewable Energy Sources*
1215 – 1230	*Break*
1230 – 1330	***Economic & Environmental Considerations:*** *Analyzing the Economic Viability & Environmental Impact of Incorporating BESS into Utility Operations*
1330 – 1420	***Safety Standards & Regulations for BESS:*** *Overview of Safety Standards, Best Practices & Regulatory Considerations for BESS Deployment*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4: Thursday, 27th of November 2024

0730 – 0830	***Hybrid PV & BESS Solutions:*** *Design Principles & Benefits of Combining PV & BESS for Enhanced Grid Services & Renewable Integration*
0830 – 0930	***Energy Management Systems (EMS) for Renewables:*** *The Use of EMS to Optimize the Operation of Renewable Energy Sources C BESS in Utility Networks*
0930 – 0945	*Break*
0945 – 1100	***Demand Response & Load Shifting:*** *Utilizing PV & BESS for Demand Response Initiatives & Load Shifting to Meet Peak Demand Efficiently*
1100 – 1215	***Case Studies on PV & BESS Integration:*** *Detailed Discussion on Successful Case Studies of PV & BESS Integration by Utilities Worldwide*
1215 – 1230	*Break*
1230 – 1330	***Financial Modeling & Project Financing:*** *Techniques for Financial Modeling of Renewable Energy Projects & Understanding the Nuances of Project Financing*
1330 – 1420	***Policy & Market Mechanisms for Renewables:*** *Current Market Mechanisms, Policy Drivers & Challenges for Renewable Energy Integration in the Utility Sector*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5: Friday, 28th of November 2024

0730 – 0930	***Project Planning & Development for PV & BESS:*** *Key Stages in the Project Development Lifecycle, from Conception Through to Execution*
0930 – 0945	*Break*
0945 – 1100	***Risk Management & Mitigation in Renewable Projects:*** *Identifying, Assessing & Mitigating Risks Associated with Renewable Energy Projects*
1100 – 1230	***Innovations in Renewable Energy Technologies:*** *Exploring Emerging Technologies & Trends in the Renewable Energy Sector that Could Impact Future Projects*
1230 – 1245	*Break*
1245 – 1345	***Sustainability & Environmental Impact:*** *Assessing the Sustainability & Environmental Benefits of Integrating Renewable Energy into Utility Operations*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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