COURSE OVERVIEW NE0335
Modern Trends in Renewables: Insights into Solar Power, Wind Power Developments & Technologies

Course Title
Modern Trends in Renewables: Insights into Solar Power, Wind Power Developments & Technologies

Course Date/Venue
September 13-17, 2026/Musandam Meeting Room, Royal Tulip Muscat Hotel, Muscat, Oman

Course Reference
NE0335

3.0 CEUs (30 PDHs) AWARD

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Modern Trends in Renewables: Insights into Solar Power, Wind Power Developments & Technologies. It covers the role of renewables in energy transition and decarbonization; the key policies and regulatory drivers for renewable adoption; the fundamentals of solar power technologies and wind power technologies; the key challenges in renewable energy deployment; the battery storage technologies and applications, pumped hydro and compressed air storage systems; and the role of storage in balancing renewable supply and demand.

Further, the course will also discuss the renewable energy policy and market drivers and advances in PV cell technologies; the concentrated solar power (CSP) innovations, solar tracking and control systems and solar power plant design and optimization; the off-grid and distributed solar solutions and solar power O&M and lifecycle management; the next-generation wind turbine designs, offshore wind power technologies and wind speed and direction measurement techniques; the control systems and smart turbine operation; and the hybrid wind power systems and wind power O&M and asset management.

During this interactive course, participants will learn the energy storage for renewables, smart grids and renewable integration and power electronics for solar and wind systems; the digitalization and IoT in renewable energy, hydrogen production from renewables and resilience and cybersecurity in renewable energy systems; the emerging solar power trends, emerging wind power trends and floating renewable energy platforms; and the decarbonization and sector coupling and roadmap for the future of renewables.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain an in-depth knowledge on modern trends in renewables covering solar power, wind power developments and technologies
- Identify the role of renewables in energy transition and decarbonization including key policies and regulatory drivers for renewable adoption
- Discuss the fundamentals of solar power technologies and wind power technologies as well as the key challenges in renewable energy deployment
- Recognize battery storage technologies and applications, pumped hydro and compressed air storage systems and role of storage in balancing renewable supply and demand
- Discuss renewable energy policy and market drivers and advances in PV cell technologies
- Recognize concentrated solar power (CSP) innovations, solar tracking and control systems and solar power plant design and optimization
- Explain off-grid and distributed solar solutions and solar power O&M and lifecycle management
- Apply next-generation wind turbine designs, offshore wind power technologies and wind speed and direction measurement techniques
- Carryout control systems and smart turbine operation, hybrid wind power systems and wind power O&M and asset management
- Employ energy storage for renewables, smart grids and renewable integration and power electronics for solar and wind systems
- Recognize digitalization and IoT in renewable energy, hydrogen production from renewables and resilience and cybersecurity in renewable energy systems
- Identify emerging solar power trends, emerging wind power trends and floating renewable energy platforms
- Explain decarbonization and sector coupling and roadmap for the future of renewables

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 conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of modern trends in renewables for energy managers, engineers, technologists and technicians active in the energy sector. Architects, planners, developers, government and local authority staff will also find this course very useful.

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

Haward's certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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.

- 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.

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:

Dr. Ahmed El-Sayed, PhD, MSc, BSc, is a **Senior Electrical, Instrumentation Engineer & Energy Consultant** with over **30 years** of extensive experience in the **Oil**, **Gas**, **Power**, **Petroleum**, **Petrochemical**, **Water** Utilities and Other **Energy Sectors**. He specializes in **Fire Fighting** System Instrumentations, **Fire Protection** System, **Fire & Gas Detection** & Alarm System, **Energy Management** System Awareness, **Process Energy** Efficiency, **Renewable Energy** Generation, **Energy Storage** Systems, Integrated **Renewable Energy** Resources, **Solar Energy, Renewable & Non-Renewable Energy** Sources, Future Trends in **Renewable Energy Operation** & **Maintenance** of **Renewable Systems, High Renewable Penetration, Renewable Energy in Sustainable Development, Smart Grids/Micro Grids, Smart Grid** Solutions for Flexibility & DER Integration, **Instrumentation Protection Devices** Maintenance & Testing, **Protection Devices** Troubleshooting, Water **Meter Calibration**, Liquid & Gas Flowmetering & **Meter Calibration**, **Testing & Calibration of Energy Meters**, **DCS & ESD** System Architecture, **Distributed Control System**, **DCS** & **SCADA**, Distributed Control System (**DCS**) Selection & Troubleshooting, Advanced **DCS Yokogawa**, **Yokogawa CENTUM VP DCS**, **Modern Distributed Control System** (**DCS**) **& Process Instrumentation**, **Cyber Security** of Industrial System, **DCS System** (**Honeywell**), **DCS Experion** System, **DCS Siemens Telepherm XP**, **Relay Coordination Using ETAP Software**, **Power System Study on ETAP**, **ETAP-Power System Analysis**, **Flow Measurement** Foundation, **Hydrocarbon** Measurement & Sampling, **Gas Dosiers** Preparation, **Gas/Liquid Fuel** Measurement, **Instrumentation Measurement & Control System**, **Flow** Measurement, **Pressure** Measurement, **Level & Temperature** Measurement, **Measurement Devices & Control System**, **Instrumentation & Control** Systems, **Control System** Orientation, Uninterruptible Power Supply (**UPS**) **Battery Charger**, **Industrial UPS Systems Construction & Operation**, **Test Lead-Acid & Ni-cad Battery Systems**, **Hazards & Safe Work Practice**s, **Transformer** Operational Principles, Selection & Troubleshooting; **HV & LV Transformers**, **Control Valves & Actuators**, **Electrical Safety**, **Protection Relay Application**, **Maintenance & Testing**, **NEC** (National Electrical Code), **NESC** (National Electrical Safety Code), **Electrical Safety**, **Electrical Hazards Assessment**, **Electrical Equipment**, **Personal Protective Equipment**, Lock-Out & Tag-Out (**LOTO**), Confined Workspaces, Alerting Techniques, Electrical Transient Analysis Program (**ETAP**), Power **Quality**, Power **Network**, Power **Distribution**, **Distribution Systems**, **Power Systems Control**, **Power Systems Security**, Power **Electronics**, Electrical **Substations**, **UPS** & **Battery System**, **Earthing & Grounding**, **Load Forecasting**, Power **Generation**, **Protective Systems**, **Electrical Generators**, **Power** & **Distribution Transformers**, **Electrical Motors**, **Switchgears**, **Transformers**, **AC** & **DC Drives**, **Variable Speed Drives** & **Generators**, **Generator Protection**, **GE Gas Turbines**, PLC, SCADA, DCS, Process Control, Control Systems & Data Communications, Instrumentation, Automation, Valve Tuning, SIS, SIL, ESD, **Alarm Management** Systems, **Energy** Management System, Engine Management System, Bearing & Rotating Machine, Fieldbus Systems and Fiber Optics Technology. He is currently the **Systems Control Manager** of **Siemens** where he is in-charge of Security & Control of Power **Transmission Distribution** & **High Voltage** Systems and he further takes part in the Load Records Evaluation & Transmission Services Pricing.

During his career life, Dr. Ahmed has been actively involved in different Power System Activities including Roles in Power System Planning, Analysis, Engineering, **HV Substation** Design, Electrical Service Pricing, Evaluations & Tariffs, Project Management, Teaching and Consulting. His vast industrial experience was honed greatly when he joined many International and National Companies such as **Siemens**, **Electricity Authority** and **ACETO** industries as the **Instrumentation & Electrical Service Project Manager**, **Instrumentation & Control Engineer**, **Fire Protection Engineer**, **Energy Management Engineer**, **Department Head**, **Assistant Professor**, **Instrumentation & Control Instructor**, **Project Coordinator**, **Project Assistant and Managing Board Member** where he focused more on dealing with Technology Transfer, System Integration Process and Improving Localization. He was further greatly involved in manufacturing some of **Power System** and **Control & Instrumentation Components** such as Series of Digital Protection **Relays**, MV **VFD**, **PLC** and **SCADA** System with intelligent features.

Dr. Ahmed is well-versed in different electrical and instrumentation fields like **ETAP**, Load Management Concepts, **PLC** Programming, Installation, Operation and Troubleshooting, **AC Drives** Theory, Application and Troubleshooting, Industrial Power Systems Analysis, AC & DC **Motors**, Electric Motor **Protection**, **DCS SCADA**, **Control** and Maintenance Techniques, Industrial Intelligent Control System, **Power Quality** Standards, Power Generators and Voltage Regulators, Circuit Breaker and Switchgear Application and Testing Techniques, **Transformer** and **Switchgear** Application, Grounding for Industrial and Commercial Assets, Power Quality and **Harmonics**, **Protective Relays** (O/C Protection, Line Differential, Bus Bar Protection and **Breaker Failure Relay**) and Project Management Basics (PMB).

Dr. Ahmed has **PhD**, **Master** & **Bachelor** degrees in **Electrical Engineering** from the **University of Wisconsin Madison**, **USA** and **Ain Shams University**, respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/ Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**), an active member of IEEE and ISA as well as numerous technical and scientific papers published internationally in the areas of Power Quality, Superconductive Magnetic Energy Storage, SMES role in Power Systems, Power System **Blackout** Analysis, and Intelligent Load Shedding Techniques for preventing Power System Blackouts, HV **Substation Automation** and Power System Stability.

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.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

Accommodation

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

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.

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: Sunday, 13th of September 2026

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Global Renewable Energy Landscape*** *Current Global Market Trends & Growth Forecasts • Role of Renewables in Energy Transition & Decarbonization • Key Policies & Regulatory Drivers for Renewable Adoption • Comparative Analysis of Solar, Wind & Other Renewables*
0930 – 0945	*Break*
0945 – 1030	***Fundamentals of Solar Power Technologies*** *Photovoltaic (PV) Technology Principles • Types of PV Cells: Mono-Crystalline, Poly-Crystalline & Thin-Film • Concentrated Solar Power (CSP) Overview • Efficiency Factors Affecting Solar Performance*
1030 – 1130	***Fundamentals of Wind Power Technologies*** *Basic Wind Energy Conversion Principles • Horizontal versus Vertical Axis Turbines • Onshore versus Offshore Wind Power Systems • Key Efficiency Determinants in Wind Energy*
1130 – 1215	***Key Challenges in Renewable Energy Deployment*** *Intermittency & Variability of Renewable Resources • High Upfront Capital Cost Barriers • Grid Integration & Transmission Challenges • Environmental & Land Use Considerations*

1215 – 1230	*Break*
1230 – 1330	***Energy Storage & Integration Overview*** *Battery Storage Technologies & Applications • Pumped Hydro & Compressed Air Storage Systems • Role of Storage in Balancing Renewable Supply & Demand • Hybrid Renewable-Storage Projects*
1330 – 1420	***Renewable Energy Policy & Market Drivers*** *International Agreements (Paris Agreement, COP) • Government Subsidies & Feed-in Tariffs • Corporate Renewable Energy Purchase Agreements (PPAs) • Impact of Carbon Pricing & Emission Trading Schemes*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2: Monday, 14th of September 2026

0730 – 0830	***Advances in PV Cell Technologies*** *High-Efficiency Cell Designs (PERC, TOPCon, HJT) • Bifacial Solar Panels & Yield Improvements • Perovskite Solar Cells & Hybrid Tandems • Flexible & Building-Integrated PV (BIPV)*
0830 – 0930	***Concentrated Solar Power (CSP) Innovations*** *Parabolic Trough & Solar Tower Systems • Molten Salt Thermal Energy Storage • Dish Stirling & Fresnel Lens Designs • Efficiency & Scalability Improvements*
0930 – 0945	*Break*
0945 – 1100	***Solar Tracking & Control Systems*** *Single-Axis versus Dual-Axis Tracking Mechanisms • Automation & Smart Tracking Algorithms • Impact on Yield & Cost-Benefit Analysis • Maintenance Requirements for Tracking Systems*
1100 – 1215	***Solar Power Plant Design & Optimization*** *Site Assessment & Solar Resource Evaluation • Panel Orientation & Tilt Optimization • Minimizing Shading & Soiling Losses • Digital Twin Technology for Performance Simulation*
1215 – 1230	*Break*
1230 – 1330	***Off-Grid & Distributed Solar Solutions*** *Rooftop Solar Applications for Households & Businesses • Solar Microgrids in Remote Communities • Solar-Powered Irrigation & Water Pumping • Portable Solar Systems for Disaster Relief*
1330 – 1420	***Solar Power O&M & Lifecycle Management*** *Predictive & Preventive Maintenance Strategies • Drone-Based Inspection & Fault Detection • Recycling & End-of-Life Management of PV Modules • Performance Monitoring & Degradation Analysis*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3: Tuesday, 15th of September 2026

0730 – 0830	***Next-Generation Wind Turbine Designs*** *Larger Rotor Diameters & Taller Towers • Direct-Drive & Gearless Systems • Lightweight Blade Materials & Aerodynamics • Floating Offshore Wind Turbines*
0830 – 0930	***Offshore Wind Power Technologies*** *Fixed-Bottom Offshore Wind Farms • Floating Platform Designs (Spar, Semi-Submersible, Tension-Leg) • Cabling & Subsea Transmission Systems • Challenges in Offshore Construction & Maintenance*
0930 – 0945	*Break*
0945 – 1100	***Wind Resource Assessment & Siting*** *Wind Speed & Direction Measurement Techniques • GIS & Remote Sensing Tools for Site Analysis • Wake Effect & Turbulence Modeling • Environmental & Social Impact Considerations*
1100 – 1215	***Control Systems & Smart Turbine Operation*** *SCADA & Real-Time Monitoring • Pitch & Yaw Control Optimization • Predictive Analytics for Fault Prevention • Energy Curtailment & Grid Demand Response*
1215 – 1230	*Break*
1230 – 1330	***Hybrid Wind Power Systems*** *Wind-Solar Hybrid Integration • Wind-Diesel Hybrid for Remote Applications • Wind-Hydrogen Production for Energy Storage • Case Studies of Hybrid Projects*
1330 – 1420	***Wind Power O&M & Asset Management*** *Condition Monitoring Systems (CMS) • Drone & Robotic Inspection Technologies • Predictive Maintenance Using AI & Machine Learning • End-of-Life Recycling & Repowering Strategies*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4: Wednesday, 16th of September 2026

0730 – 0830	***Energy Storage for Renewables*** *Lithium-Ion, Sodium-Ion & Flow Batteries • Thermal & Mechanical Storage Solutions • Hydrogen as an Energy Carrier • Storage Sizing & Economics*
0830 – 0930	***Smart Grids & Renewable Integration*** *Advanced Metering Infrastructure (AMI) • Demand Response & Load Balancing • Grid Stability with High Renewable Penetration • Microgrids & Virtual Power Plants (VPPs)*
0930 – 0945	*Break*
0945 – 1100	***Power Electronics for Solar & Wind Systems*** *Inverters: String, Central & Micro-Inverters • Maximum Power Point Tracking (MPPT) Technology • Grid-Forming versus Grid-Following Inverters • Fault Ride-Through (FRT) Capabilities*
1100 – 1215	***Digitalization & IoT in Renewable Energy*** *IoT-Enabled Monitoring Systems • Big Data Analytics for Performance Optimization • AI-Driven Predictive Maintenance • Blockchain for Renewable Energy Trading*

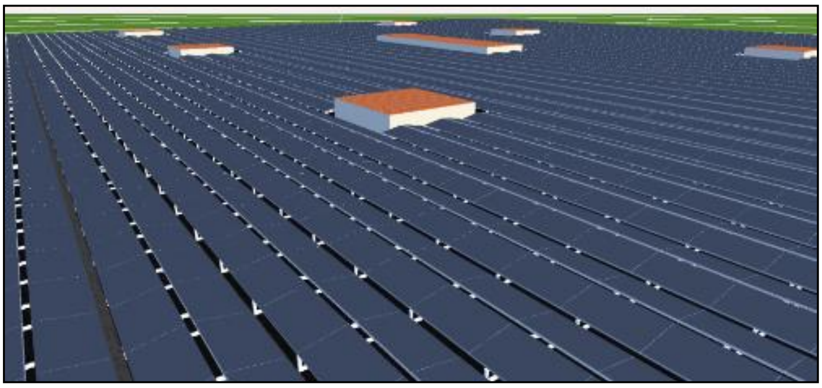
1215 – 1230	*Break*
1230 – 1330	***Hydrogen Production from Renewables*** *Electrolysis Powered by Solar & Wind • Green Hydrogen versus Blue Hydrogen • Storage & Transportation Challenges • Emerging Hydrogen Economy Opportunities*
1330 – 1420	***Resilience & Cybersecurity in Renewable Energy Systems*** *Vulnerabilities in Digital Energy Systems • Cybersecurity Best Practices for Renewable Assets • AI-Based Threat Detection & Mitigation • Disaster Recovery & Continuity Planning*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

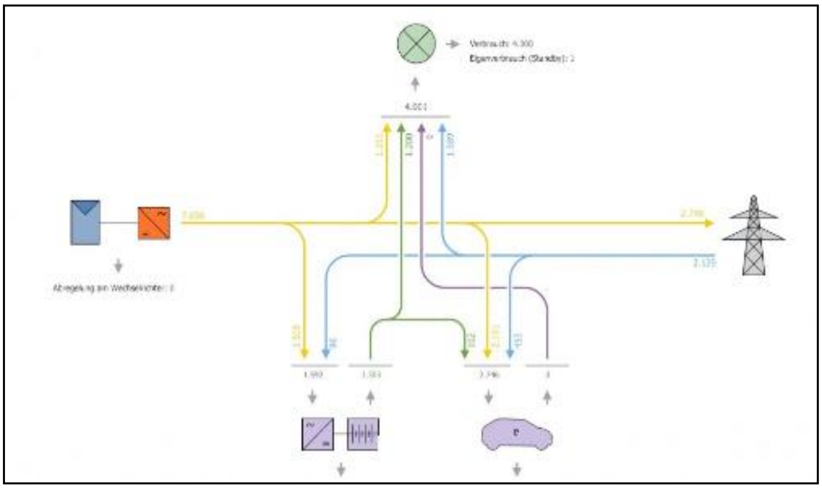
Day 5: Thursday, 17th of September 2026

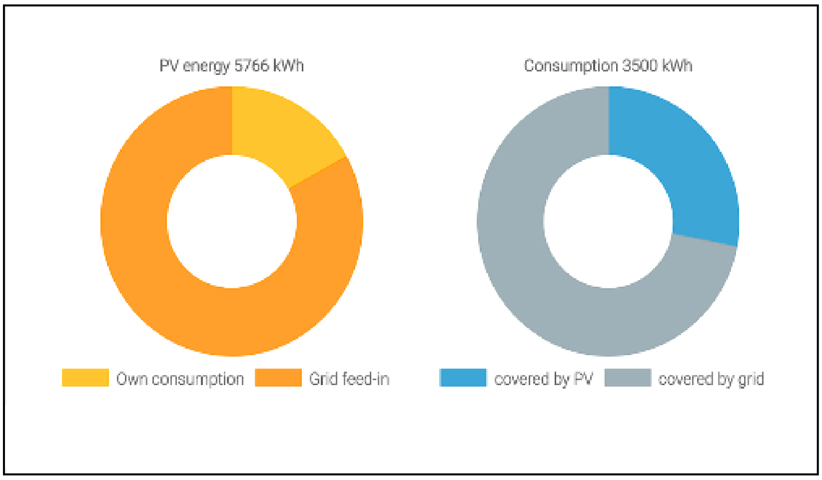
0730 – 0830	***Emerging Solar Power Trends*** *Tandem Perovskite-Silicon PV Breakthroughs • Space-Based Solar Power Concepts • Agrivoltaics & Dual Land-Use Innovations • Solar Energy in Transportation Applications*
0830 – 0930	***Emerging Wind Power Trends*** *Ultra-Large Offshore Wind Projects (>15 MW Turbines) • Airborne Wind Energy Systems • 3D-Printed Wind Turbine Components • Bio-Inspired Blade Designs*
0930 – 0945	*Break*
0945 – 1040	***Floating Renewable Energy Platforms*** *Hybrid Floating Solar & Wind Farms • Marine Energy Integration (Tidal, Wave) • Anchoring & Mooring Innovations • Environmental & Navigational Safety*
1040 – 1135	***Decarbonization & Sector Coupling*** *Electrification of Heat & Transport • Power-to-X (PtX) Technologies • Coupling Renewable Energy with Desalination • Industrial Decarbonization through Renewables*
1135 - 1230	***Global Case Studies & Best Practices*** *Successful Utility-Scale Solar Power Projects • Pioneering Offshore Wind Farms • Hybrid Renewable-Storage Deployments • Policy Models from Leading Renewable Nations*
1230 – 1245	*Break*
1245 – 1345	***Roadmap for the Future of Renewables*** *Technology Cost Reduction Pathways • Global Investment Trends & Financing Models • Opportunities for Developing Countries • Long-Term Sustainability & Climate Goals Alignment*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulators (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulator “PV*SOL Premium”.







PV*SOL Premium

Course Coordinator

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