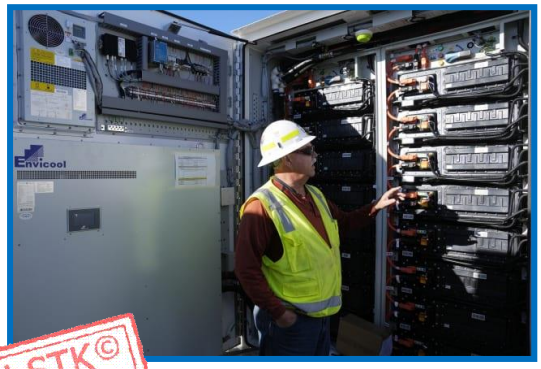
# COURSE OVERVIEW NE0025
# Batteries Storage for Renewable Energy & Grid Stability (Basic)

**Course Title**
Batteries Storage for Renewable Energy & Grid Stability (Basic)






**Course Date/Venue**
July 27-31, 2026/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

**Course Reference**
NE0025

**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 Batteries Storage for Renewable Energy & Grid Stability (Basic). It covers the energy storage systems (ESS), basics of electrical energy and power and renewable energy systems; the role of batteries in renewable energy, battery technologies and basic power system concepts; the battery chemistry fundamentals, lithium-ion battery technology and lead-acid and alternative batteries; the battery performance parameters, battery lifecycle and degradation and battery management systems (BMS); and the grid integration of battery storage, power conversion systems (PCS) and applications of battery storage.

During this interactive course, participants will learn the load management techniques, microgrids and off-grid systems and energy storage system design basics; the power system stability concepts, frequency regulation with batteries and voltage control and reactive power support; the integration challenges, safety in battery energy storage systems and monitoring and control systems; and the economic and financial considerations, economic and financial considerations and emerging technologies.

## Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain a basic knowledge on batteries storage for renewable energy and grid stability
- Discuss the energy storage systems (ESS), basics of electrical energy and power and renewable energy systems
- Identify the role of batteries in renewable energy, battery technologies and basic power system concepts
- Recognize battery chemistry fundamentals, lithium-ion battery technology and lead-acid and alternative batteries
- Explain battery performance parameters, battery lifecycle and degradation and battery management systems (BMS)
- Discuss grid integration of battery storage, power conversion systems (PCS) and applications of battery storage
- Carryout load management techniques, microgrids and off-grid systems and energy storage system design basics
- Determine power system stability concepts, frequency regulation with batteries and voltage control and reactive power support
- Identify integration challenges, safety in battery energy storage systems and monitoring and control systems
- Discuss economic and financial considerations, economic and financial considerations and emerging technologies

## 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 basic batteries storage for renewable energy and grid stability for project managers and energy developers, electrical and power engineers (entry to mid-level), technicians and maintenance staff, renewable energy professionals project managers and energy developers, utility and grid operators, energy policy makers and regulators (basic level), graduates and career starters (engineering / energy fields).

## 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 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 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. Herman Eksten**, PE, PgDiP, is a **Senior Electrical Engineer** with over **30 years** of extensive experience **Oil**, **Gas**, **Petrochemical**, **Refinery** & **Power** industries and **Water & Utilities** specializing in **Electrical Safety**, Certified **HV Electrical Safety**, **Low Voltage Electrical Safety**, **Electrical Circuits**: Series and Parallel Connection, **Electrical Faults & Protective Devices**, **Renewable Energy Integration**, **Photovoltaic (PV) Systems**, **Solar Radiation & Site Analysis**, **Safety Protocols & Compliance**, **Batteries Energy Storage Systems (BESS)**, **Energy Management & Grid Integration**, **Smart Grids & Solar Energy**, **Hybrid Systems & Microgrids**, **Smart Grid** & **Renewable Integration**, **Renewable Energy** Storage Systems, **Renewable Energy** Economics & Finance, Risk Control Methods, **LOTO – Breakers** Operation in Electricity Substation, **LOTO** Principles and Procedures, **Arc Flash Risk Assessment**, Safety in **Power Electronic Equipment & Lasers**, **Circuit Breakers & Switchgears**, **Switchgear Assets Management**, **Circuit Breakers Control Circuits**, **Substation Maintenance** Techniques, **High Voltage Operation, Electrical Protection**, **Overhead Lines & Substation**, **Power Supply**, **High Voltage Substation**, **Electrical Protection Design**, **Earthing & Lightning Protection Design, Underground Equipment**, **Distribution Network Maintenance & Construction**, **Transformers Operation & Maintenance**, **Electric Power System, Power Plant Management**, **Substation Commissioning & Troubleshooting**, **Cable Splicing & Termination, Electrical Installation & Maintenance**, **Power Generation Operation & Control, Switchgear Life Assessment**, **Structured Cabling, Electric Power System, Power System Stability, Power System Planning & Economics**, **Power Flow** Analysis, **Combined Cycle Power Plant**, **UPS & Battery System, Variable Speed Drives,** and **HV Motors & Transformers**. He is currently the **Lead Electrical Engineer** of **SNC-LAVALIN** wherein he is responsible for basic designs and successful implementation of electrical engineering to plant overhead lines and substations.

During his career life, Mr. Eksten held various positions such as the **Lead Electrical Engineer**, **Operations Manager**, **Project Engineer**, **Technical Specialist**, **Customer Executive**, **District Manager**, **Electrical Protection Specialist**, **High-Voltage Operator** and **Apprentice Electrician** for FOX Consulting, UHDE (ThyssenKrupp Engineering), TWP Projects/Consulting (EPMC-Mining), ISKHUS Power, Rural Maintenance (PTY) Energia de Mocambique Lda., Vigeo (PTY) Ltd and ESKOM.

Mr. Eksten is a **Registered Professional Engineering Technologist** and has a Postgraduate Diploma in Management Development Programme and a National Higher Diploma (NHD) in Electrical Power Engineering. Further, he is a **Certified Instructor/Trainer**, a Senior member of the South African Institute Electrical Engineers (**SAIEE**) and holds a Certificate of Registration Membership Scheme from the Engineering Council of South Africa (**ESCA**). He has further delivered numerous trainings, courses, seminars, workshops and conferences internationally.

## Accommodation

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

## 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.

## 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, 27th of July 2026***

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| *0730 – 0800* | *Registration & Coffee* |
| *0800 – 0815* | *Welcome & Introduction* |
| *0815 – 0830* | ***PRE-TEST*** |
| *0830 – 0930* | ***Introduction to Energy Storage Systems (ESS)***<br>*Definition and Importance of Energy Storage • Role in Modern Power Systems • Types of Energy Storage Technologies • Applications in Grid and Off-Grid Systems* |
| *0930 – 0945* | *Break* |
| *0945 – 1030* | ***Basics of Electrical Energy & Power***<br>*Energy versus Power Concepts • Units (Wh, kWh, MW, MWh) • Load Demand and Supply Balance • Energy Conversion Efficiency* |
| *1030 – 1130* | ***Overview of Renewable Energy Systems***<br>*Solar PV Systems Basics • Wind Energy Systems • Variability and Intermittency Challenges • Grid Integration Issues* |
| *1130 – 1215* | ***Role of Batteries in Renewable Energy***<br>*Energy Shifting and Storage • Peak Shaving and Load Leveling • Backup Power and Reliability • Enhancing Renewable Penetration* |
| *1215 – 1230* | *Break* |
| *1230 – 1330* | ***Basics of Battery Technologies***<br>*Lead-Acid Batteries • Lithium-Ion Batteries • Flow Batteries • Emerging Battery Technologies* |

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| 1330 – 1420 | ***Basic Power System Concepts***<br>*Grid Structure (Generation, Transmission, Distribution) • Frequency and Voltage Basics • Load Demand Patterns • Grid Stability Fundamentals* |
| 1420 – 1430 | ***Recap***<br>*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:*** ***Tuesday, 28th of July 2026***

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| 0730 – 0830 | ***Battery Chemistry Fundamentals***<br>*Electrochemical Principles • Anode, Cathode, Electrolyte Roles • Charge and Discharge Processes • Energy Storage Mechanisms* |
| 0830 – 0930 | ***Lithium-Ion Battery Technology***<br>*Types (LFP, NMC, etc.) • Advantages and Limitations • Applications In Grid Storage • Safety Considerations* |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Lead-Acid & Alternative Batteries***<br>*Flooded and Sealed Lead-Acid • Nickel-Based Batteries • Flow Batteries Basics • Comparison f Technologies* |
| 1100 – 1215 | ***Battery Performance Parameters***<br>*Capacity (Ah, Wh) • Energy Density and Power Density • Efficiency and Round-Trip Efficiency • Depth of Discharge (DoD)* |
| 1215 – 1230 | *Break* |
| 1230 – 1330 | ***Battery Lifecycle & Degradation***<br>*Charge/Discharge Cycles • Factors Affecting Lifespan • Thermal Effects • Maintenance Considerations* |
| 1330 – 1420 | ***Battery Management Systems (BMS)***<br>*Purpose and Functions • Monitoring Voltage, Current, Temperature • State of Charge (SoC) Estimation • Safety and Protection Mechanisms* |
| 1420 – 1430 | ***Recap***<br>*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:*** ***Wednesday, 29th of July 2026***

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| 0730 – 0830 | ***Grid Integration of Battery Storage***<br>*Connection to Distribution and Transmission Systems • Grid Codes and Standards • Interfacing with Inverters • Synchronization with Grid* |
| 0830 – 0930 | ***Power Conversion Systems (PCS)***<br>*Role of Inverters and Converters • AC/DC and DC/AC Conversion • Efficiency Considerations • Control Strategies* |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Applications of Battery Storage***<br>*Frequency Regulation • Voltage Support • Renewable Smoothing • Spinning Reserve Replacement* |
| 1100 – 1215 | ***Load Management Techniques***<br>*Peak Shaving • Load Shifting • Demand Response • Time-of-Use Optimization* |
| 1215 – 1230 | *Break* |

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| 1230 – 1330 | ***Microgrids & Off-Grid Systems***<br>*Microgrids & Off-Grid Systems • Definition and Components • Role of Batteries in Microgrids • Islanding Operation • Hybrid Systems (Solar + Battery + Diesel)* |
| 1330 – 1420 | ***Energy Storage System Design Basics***<br>*Sizing Battery Systems • Selecting Appropriate Technology • Site Considerations • Basic System Configuration* |
| 1420 – 1430 | ***Recap***<br>*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: Thursday, 30th of July 2026***

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| 0730 – 0830 | ***Power System Stability Concepts***<br>*Frequency Stability • Voltage Stability • Transient Stability Basics • Causes of Instability* |
| 0830 – 0930 | ***Frequency Regulation with Batteries***<br>*Frequency Deviation Causes • Fast Response of Batteries • Primary and Secondary Control • Grid Support Services* |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Voltage Control & Reactive Power Support***<br>*Voltage Fluctuations • Role of Inverters in Voltage Control • Reactive Power Compensation • Maintaining Voltage Profiles* |
| 1100 – 1215 | ***Integration Challenges***<br>*Intermittency of Renewables • Grid Congestion • Coordination with Conventional Generation • Technical Limitations* |
| 1215 – 1230 | *Break* |
| 1230 – 1330 | ***Safety in Battery Energy Storage Systems***<br>*Thermal Runaway Risks • Fire Hazards and Prevention • Safety Standards and Protocols • Emergency Response Procedures* |
| 1330 – 1420 | ***Monitoring & Control Systems***<br>*SCADA Systems Basics • Real-Time Monitoring • Data Analytics for Performance • Fault Detection and Diagnostics* |
| 1420 – 1430 | ***Recap***<br>*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: Friday, 31st of July 2026***

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| 0730 – 0830 | ***Case Studies of Battery Storage Projects***<br>*Utility-Scale Battery Systems • Residential Storage Systems • Industrial Applications • Lessons Learned from Deployments* |
| 0830 – 0930 | ***Economic & Financial Considerations***<br>*Capital and Operational Costs • Cost-Benefit Analysis • Payback Period and ROI • Incentives and Policies* |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Environmental Impact***<br>*Lifecycle Environmental Effects • Recycling and Disposal • Sustainability Considerations • Comparison with Other Storage Methods* |

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| *1100 – 1215* | ***Emerging Technologies***<br>*Solid-State Batteries • Hydrogen Storage Integration • Advanced Flow Batteries • Hybrid Storage Systems* |
| *1215 – 1230* | *Break* |
| *1230 – 1315* | ***Future of Energy Storage in Grids***<br>*Smart Grids and Digitalization • AI in Energy Management • Decentralized Energy Systems • Role in Energy Transition* |
| *1315 - 1345* | ***Capstone Project & Evaluation***<br>*Designing a Basic Battery Storage Solution • Selecting System Components • Presenting Design and Justification • Feedback and Improvement* |
| *1345 – 1400* | ***Course Conclusion***<br>*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* |

## Practical Sessions

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

## Course Coordinator

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