COURSE OVERVIEW TE0299
Water-Energy Nexus and Water Efficiency

Course Title
Water-Energy Nexus and Water Efficiency

Course Date/Venue
Session 1: June 23-27, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: October 13-17, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
TE0299

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 Water-Energy Nexus and Water Efficiency. It covers the key concepts and water-energy nexus including global and regional significance; the role in sustainable development and challenges in resource interdependency; the water use in power generation, cooling technologies and water demand; the water footprint of energy production and desalination energy needs; the energy requirements for water supply, wastewater treatment and energy consumption, pumping, distribution and desalination and energy audit in water systems; and the integrated resource management, water supply infrastructure and energy use in water systems.

Further, the course will also discuss the desalination technologies and energy use; the efficiency measures in water supply including benchmarking and performance monitoring; the energy recovery in RO systems, wastewater energy reuse potential, heat exchangers, pressure turbines and financial evaluation of recovery systems; and the water use assessment, water efficiency technologies, process optimization for water efficiency and leakage control and reduction.

During this interactive course, participants will learn the utility best practices, water-efficient design and retrofitting; the regulatory frameworks, water-energy pricing and cost recovery; the sustainability and SDG integration and economic evaluation of efficiency projects; the incentive and funding mechanisms, policies for future development, digital transformation in water-energy nexus and advanced water efficiency technologies; the renewable energy in water systems; and the risk assessment, resilience planning and drought management strategies.

Course Objectives

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

- Apply and gain a comprehensive knowledge on water-energy nexus and water efficiency
- Discuss the key concepts of water-energy nexus including global and regional significance, role in sustainable development and challenges in resource interdependency
- Identify water use in power generation, cooling technologies and water demand, water footprint of energy production and desalination energy needs
- Recognize energy requirements for water supply, wastewater treatment and energy consumption, pumping, distribution, and desalination and energy audit in water systems
- Carryout integrated resource management, water supply infrastructure overview and energy use in water systems
- Discuss desalination technologies and energy use and apply efficiency measures in water supply including benchmarking and performance monitoring
- Recognize energy recovery in RO systems, wastewater energy reuse potential, heat exchangers and pressure turbines and financial evaluation of recovery systems
- Apply water use assessment, water efficiency technologies, process optimization for water efficiency, leakage control and reduction
- Employ utility best practices, water-efficient design and retrofitting as well as discuss regulatory frameworks
- Carryout water-energy pricing and cost recovery, sustainability and SDG integration and economic evaluation of efficiency projects
- Discuss incentive and funding mechanisms, policies for future development, digital transformation in water-energy nexus and advanced water efficiency technologies
- Recognize renewable energy in water systems and apply risk assessment and resilience planning and drought management strategies

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 water-energy nexus and water efficiency for utility managers and engineers, policy makers and regulators, environmental and sustainability professionals, facility and energy managers and other technical staff.

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: -

- 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.

- 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. Kyle Bester is a **Senior Water Engineer** with extensive years of practical experience within the **Oil & Gas**, **Power & Water Utilities** and other **Energy** sectors. His expertise includes **Sewage & Industrial Water Distribution & Pump** Station, **Water Reservoir**, **Water Tanks**, **Water Pumping** Station, **Water Distribution** System, **Water Network** System, **Water Pipes & Fittings**, **Water Hydraulic** Modelling, **Water Storage Reservoir**, **Reservoirs & Pumping** Stations Design & Operation, **Pumping** Systems, Interconnecting **Pipelines**, **Water Network Hydraulic** Simulation Modelling, **Water Supply** Design, **Water Balance Modelling**, **Water Distribution Network**, **Water Network** System Analysis, **Water Forecasts** Demand, **Water Pipelines** Materials & Fittings, **Water Network** System Design, Pump Houses & Booster Pumping Stations, **Potable Water Transmission**, **Water Distribution Network**, **Wastewater** Treatment & Environmental Protection, Supervising & Monitoring **Sewage Works**, **Water Desalination** Technologies, Districts Meters Areas (DMAs), **Water Supply & Desalination Plants** Rehabilitation, **Water Reservoirs & Pumping Stations**, **Water Network System** Extension, Water Network System Replacement & Upgrade, **Water Networks** Optimization, **Water Supply & Distribution** Systems Efficiency & Effectiveness, **Pipe** Materials & Fittings, **Service Reservoir** Design & Operation, **Pipes & Fittings**, **Water Network** System Design & Operation, **Supply Water Network** Rehabilitation, **Water Loss** Reduction, **Main Water** System Construction, **Main Water Line** Construction, Transmission & Distribution **Pipelines**, **Water Distribution** Design & Modelling, **Water Supply** System, Oilfield **Water Treatment**, Best Practice in **Sewage** & Industrial **Wastewater Treatment** & Environmental Protection, **Water Distribution** Design & Modelling, **Desilting**, Treating & Handling Oily **Water**, **Water Chemistry** for **Power Plant**, **Water** Sector Orientation, Environmental Impact Assessment (**EIA**), **Potable Water**, **Reverse Osmosis** Treatment Technology and **Chlorination** System, **Well** Inventory, Monitoring & Conservation, **Qualitative Analysis** of Soil & Ground Water, **Water** Networking, **Hydraulic Modelling** Systems, **Pumping** Stations, **Centrifugal Pumps**, **Pipelines & Pumping**, **Water Reservoirs**, **Water Storage Tanks**, Extended Activated **Sludge** Treatment, Best **Water Equipment** Selection & Inspection, **Hydraulic Modelling** for Water Network Design, **Water Utility** Industry, **Water Desalination** Technologies & New Development, **Water Hydrology**, **Water Conveyors**, **Water Networks** Rehabilitation. He is currently the **Part Owner & Manager** of Extreme Water SA wherein he manages, re-designed and commissioned a water and wastewater treatment plants.

During his career life, Mr. Bester has gained his practical and field experience through his various significant positions and dedication as the **Project Manager**, **Asset Manager**, **Manager**, **Water Engineer**, **Supervisor**, **Team Leader**, **Analyst**, **Process Technician**, **Landscape Designer** and **Senior Instructor/Trainer** for various international companies, infrastructures, water and wastewater treatment plants from New Zealand, UK, Samoa, Zimbabwe and South Africa, just to name a few.

Mr. Bester holds a **Diploma** in **Wastewater Treatment** and a **National Certificate** in **Wastewater & Water Treatment**. Further, he is a **Certified Instructor/Trainer**, an **Approved Chemical Handler** and has delivered numerous courses, trainings, conferences, seminars and workshops 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.

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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Understanding the Water-Energy Nexus*** *Definition and Key Concepts • Global and Regional Significance • Role in Sustainable Development • Challenges in Resource Interdependency*
0930 – 0945	*Break*
0945 – 1030	***Water for Energy*** *Water Use in Power Generation • Cooling Technologies and Water Demand • Water Footprint of Energy Production • Desalination Energy Needs*
1030 – 1130	***Energy for Water*** *Energy Requirements for Water Supply • Wastewater Treatment and Energy Consumption • Pumping, Distribution, and Desalination • Energy Audit in Water Systems*
1130 – 1215	***Integrated Resource Management*** *Importance of Cross-Sector Planning • Institutional and Policy Frameworks • Stakeholder Collaboration • Integrated Water-Energy Modeling*
1215 – 1230	*Break*
1230 – 1330	***Global Trends & Case Studies*** *Water-Energy Strategies in Arid Regions • International Initiatives and Reports (e.g., IEA, UN) • Desalination-Powered Renewable Energy Case • Smart Grids and Water Infrastructure*

1330 – 1420	***Nexus in the UAE Context*** *UAE Water-Energy Statistics and Policies • EWEC's Strategic Role and Projects • Synergies in Integrated Utility Planning • Regulatory and Sustainability Frameworks*
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

0730 – 0830	***Water Supply Infrastructure Overview*** *Sources of Water (Surface, Groundwater, Desalination) • Water Transmission and Distribution • Urban and Industrial Water Systems • Infrastructure Energy Footprints*
0830 – 0930	***Energy Use in Water Systems*** *Electricity Demand Across Water Lifecycle • Pump Efficiency and Selection • Energy-Intensive Components • Power Factor and Motor Efficiency*
0930 – 0945	*Break*
0945 – 1100	***Desalination Technologies & Energy Use*** *RO, MSF, MED Technologies Comparison • Energy Consumption by Process • Hybrid and Advanced Desalination Systems • Renewable Integration Opportunities*
1100 – 1215	***Efficiency Measures in Water Supply*** *Variable Frequency Drives (VFDs) • Leak Detection and Pressure Management • Smart Metering and Control Systems • Maintenance and Operational Best Practices*
1215 – 1230	*Break*
1230 – 1330	***Benchmarking & Performance Monitoring*** *KPIs for Energy and Water Efficiency • Benchmarking Tools and Indices • EWEC Asset Performance Review • Real-Time Monitoring Technologies*
1330 – 1420	***Energy Recovery Systems*** *Energy Recovery in RO Systems • Wastewater Energy Reuse Potential • Heat Exchangers and Pressure Turbines • Financial Evaluation of Recovery Systems*
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

0730 – 0830	***Water Use Assessment*** *Water Balance and Flow Mapping • Audit and Monitoring Methods • Identifying Water Losses • Metering Strategies*
0830 – 0930	***Water Efficiency Technologies*** *High-Efficiency Fixtures and Systems • Recirculating and Greywater Systems • Industrial Reuse and Zero Liquid Discharge • Condensate Recovery*
0930 – 0945	*Break*
0945 – 1100	***Process Optimization for Water Efficiency*** *Cooling Tower Efficiency • Boiler Water Management • Water Reuse in Cleaning/CIP Systems • Automation and SCADA Integration*

1100 – 1215	***Leakage Control & Reduction*** *Types and Causes of Leaks • Network Monitoring Tools • Acoustic and Thermal Imaging • Pressure Zoning*
1215 – 1230	*Break*
1230 – 1330	***Utility Best Practices*** *Utility-Level Conservation Programs • Benchmarking Industrial Performance • Incentive Schemes and Partnerships • Case Studies from Utilities (EWEC, DEWA)*
1330 – 1420	***Water-Efficient Design & Retrofitting*** *Designing for Water Reuse • Green Building Water Systems • Retrofitting Existing Systems • Cost-Benefit and Lifecycle 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 Three*

Day 4

0730 – 0830	***Regulatory Frameworks*** *UAE and GCC Water/Energy Regulations • Efficiency Standards and Codes • Role of Municipalities and Authorities • Impact of Water Tariffs and Subsidies*
0830 – 0930	***Water-Energy Pricing & Cost Recovery*** *Full Cost Recovery Models • Block Tariffs and Progressive Pricing • Water-Energy Price Interactions • Financing Efficiency Improvements*
0930 – 0945	*Break*
0945 – 1100	***Sustainability & SDG Integration*** *SDG 6 (Clean Water) and SDG 7 (Energy) • SDG 12 (Responsible Consumption) • Climate Adaptation and Resilience • Nexus in National Sustainability Strategies*
1100 – 1215	***Economic Evaluation of Efficiency Projects*** *Net Present Value (NPV) and IRR • Payback Period Analysis • Financial Modeling Tools • Energy Service Companies (ESCOs)*
1215 – 1230	*Break*
1230 – 1330	***Incentive & Funding Mechanisms*** *Green Finance Opportunities • Grants, Rebates, and Subsidies • PPPs in Water-Energy Infrastructure • Carbon Credits and Water Offsetting*
1330 – 1420	***Policies for Future Development*** *National Water Security Strategies • Energy Diversification Impact • Role of Innovation and R&D • Capacity Building and Governance*
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*

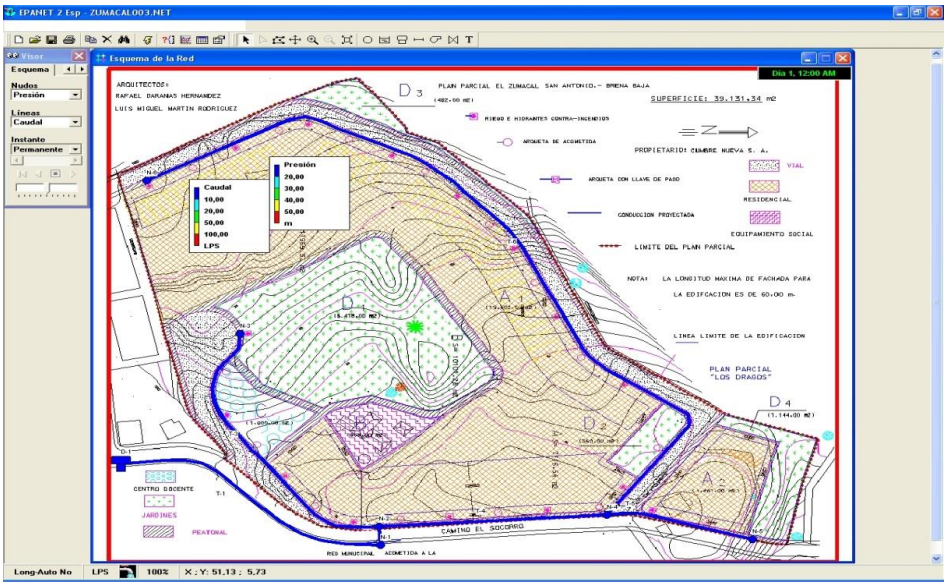
Day 5

0730 – 0930	***Digital Transformation in Water-Energy Nexus*** *IoT in Water and Energy Metering • Data Analytics for Performance Tracking • AI for Demand Forecasting • Cybersecurity in Smart Utilities*
0930 – 0945	*Break*

0945 – 1100	***Advanced Water Efficiency Technologies*** *Membrane and Nanotech Innovations • Atmospheric Water Generation • Low-Energy Desalination Trends • Intelligent Irrigation*
1100 – 1215	***Renewable Energy in Water Systems*** *Solar Desalination Systems • PV-Powered Pumping • Off-Grid Water Systems • Hybrid Renewable Systems*
1215 – 1230	*Break*
1230 – 1330	***Resilience & Climate Change Adaptation*** *Risk Assessment and Resilience Planning • Drought Management Strategies • Energy Grid and Water Supply Shocks • Adaptation Case Studies*
1330 – 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*

Simulator (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 the latest revision of "EPANET" simulators.



EPANET Simulator

Course Coordinator

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