

THE INTERNET OF THINGS (IOT) IN RENEWABLE ENERGY

"Harnessing Smart Technology for Monitoring, Optimization, and Sustainability in Clean Energy Systems"

Schedule

Date	Venue	Fees (Face-to-Face)
18 - 22 May 2026	London, UK	USD 3495 per delegate

► **Available delivery methods:** Face-to-Face & Online Training

Introduction

The renewable energy sector is undergoing rapid transformation through the integration of Internet of Things (IoT) technologies. Smart sensors, real-time data analytics, and intelligent automation are enabling operators to improve the efficiency, reliability, and scalability of solar, wind, hydro, and grid-connected systems.

This hands-on course explores the application of IoT within renewable energy systems, focusing on remote monitoring, predictive maintenance, grid integration, and data-driven energy management. Participants will gain practical knowledge in system architecture, sensor selection, IoT platforms, and cybersecurity considerations for clean energy environments.

Objectives

By the end of this course, participants will be able to:

- Understand the role of IoT in enhancing renewable energy generation and distribution
- Design IoT-enabled systems for real-time monitoring and performance optimization
- Integrate smart sensors and edge devices into renewable installations
- Utilize data analytics for predictive maintenance and efficiency improvements
- Address cybersecurity and interoperability issues in energy IoT deployments

Why Attend

- Learn how IoT is reshaping the future of renewable energy systems
- Gain practical skills to implement smart monitoring and diagnostics
- Understand how to increase asset lifespan and reduce downtime with IoT tools
- Explore real-world case studies from solar, wind, and smart grid projects
- Prepare for digital transformation in your energy or engineering role

Target Audience

This program is designed for:

- Electrical, energy, and systems engineers
- Project managers and operations teams in the energy sector
- IoT developers and solution architects
- Renewable energy consultants and planners
- Policy makers and smart grid analysts

Individual Benefits

Key competencies that will be developed include:

- System design for IoT-based renewable energy monitoring
- Integration of sensors, controllers, and cloud platforms
- Use of data for energy forecasting and performance tracking
- Understanding of communication protocols and security layers
- Skills in building dashboards and control interfaces

Organizational Benefits

Upon completing the training course, participants will demonstrate:

- Improved energy yield and operational control in renewable assets
- Reduced maintenance costs and unplanned downtime
- Enhanced use of data analytics in strategic energy decisions
- Greater alignment with digitalization and sustainability goals
- Stronger technical and cross-functional collaboration

Instructional Methodology

The course follows a blended learning approach combining theory with practice:

- Strategy Briefings - Smart energy systems, IoT trends, digital infrastructure
- Case Studies - Solar PV monitoring, wind turbine diagnostics, energy storage IoT
- Workshops - Sensor integration, dashboard design, predictive analytics
- Peer Exchange - Renewable project experiences and IoT deployment challenges
- Tools - Device connectivity frameworks, cloud platforms, data models

Course Outline

Training Hours: 7:30 AM - 3:30 PM Daily Format: 3-4 Learning Modules | Coffee breaks: 09:30 & 11:15 | Lunch Buffet: 01:00 - 02:00

Day 1: IoT and the Renewable Energy Landscape

- Module 1: The Role of IoT in Clean Energy (07:30 - 09:30) • Drivers, benefits, and architecture of IoT in energy
- Module 2: Renewable Systems and Key Metrics (09:45 - 11:15) • Solar, wind, hydro—KPIs, uptime, generation data
- Module 3: IoT Ecosystem Overview (11:30 - 01:00) • Sensors, edge devices, gateways, cloud platforms
- Module 4: Workshop - Map IoT Use Cases for a Solar Farm (02:00 - 03:30) • Identify sensor points and monitoring targets

Day 2: Sensor Integration and Data Acquisition

- Module 5: Sensor Types and Network Topologies (07:30 - 09:30) • Temperature, vibration, irradiance, current, voltage
- Module 6: Connectivity Protocols (09:45 - 11:15) • Zigbee, LoRaWAN, MQTT, Modbus, 5G
- Module 7: Edge and Gateway Device Configuration (11:30 - 01:00) • Data filtering, real-time response, latency management
- Module 8: Workshop - Design a Sensor Network (02:00 - 03:30) • Configure a network layout for a wind farm

Day 3: Data Management and Analytics

- Module 9: Data Collection and Cloud Platforms (07:30 - 09:30) • Azure, AWS, Google Cloud for energy monitoring
- Module 10: Predictive Maintenance and Diagnostics (09:45 - 11:15) • Machine learning, alerts, failure prediction
- Module 11: Visualization and Dashboard Tools (11:30 - 01:00) • SCADA, Grafana, Power BI, custom dashboards
- Module 12: Workshop - Build an Energy Monitoring Dashboard (02:00 - 03:30) • Display KPIs from mock IoT data

Day 4: Grid Integration and System Optimization

- Module 13: Smart Grid Communication and Control (07:30 - 09:30) • Demand response, frequency control, grid balancing
- Module 14: Energy Storage and Battery Monitoring (09:45 - 11:15) • IoT for SoC, DoD, charge cycles, battery health
- Module 15: Load Forecasting and Efficiency Models (11:30 - 01:00) • Data analytics for supply-demand matching
- Module 16: Workshop - Optimize a Hybrid Energy System (02:00 - 03:30) • Simulate data to optimize output and storage

Day 5: Security, Compliance, and Future Trends

- Module 17: Cybersecurity in Energy IoT Systems (07:30 - 09:30) • Threat vectors, encryption, access control
- Module 18: Regulatory and Sustainability Standards (09:45 - 11:15) • IEC, ISO, ESG reporting, smart energy policy
- Module 19: Future Trends - AI, Digital Twins, Blockchain (11:30 - 01:00) • Next-gen tools transforming renewable energy
- Module 20: Final Workshop - Design an IoT-Enabled Renewable Strategy (02:00 - 03:30) • Create a roadmap for IoT deployment in a real project

Certification

Participants will receive a Certificate of Completion in The Internet of Things (IoT) in Renewable Energy, confirming their ability to design, integrate, and optimize IoT-based monitoring and control systems that enhance performance and sustainability in clean energy operation.

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