Onshore Wind Farm Development and O&M Course: Yield, SCADA and Turbine Maintenance

12 – 16 April 2027
Barcelona - Eixample district four-star



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Ref: 1580_25372 **Date:** 12 – 16 April 2027 **Location:** Barcelona - Eixample district four-star **Fees:** 23500 SAR

Introduction:

Onshore wind farm development and O&M is the subject of this 1-week course for developers, asset managers and maintenance leads running land-based wind projects, ending with a Wind Farm O&M and Performance Improvement Plan. Projects often lose revenue when energy yield is overstated, wake losses are underestimated and gearbox or blade defects are found only after failure. Nominees already work on wind project development, plant operation or turbine maintenance, and teaching is by case study on SCADA records, inspection reports and service agreements. CoreConcept Training Center delivers this onshore wind farm course.

Course Objectives:

- Review wind measurement data and P50 and P90 energy yield reports for an onshore wind project
- Select a turbine class and drivetrain type and test a turbine layout against wake losses and terrain
- Verify turbine power curves and availability from SCADA data using the IEC 61400-12-1 and IEC TS 61400-26 methods
- Diagnose gearbox, main bearing and blade defects from condition monitoring, oil analysis and inspection findings
- Negotiate availability-based service agreement terms, warranties and major component exchange arrangements
- Prepare a Wind Farm O&M and Performance Improvement Plan that ranks actions by recoverable energy

Target Audience:

- Managers responsible for developing onshore wind projects from site measurement to financial close
- Asset managers accountable for the energy output, availability and revenue of operating wind farms
- Engineering leads who review turbine performance, SCADA data and power curve results
- Maintenance supervisors who plan turbine service campaigns, spares and major component exchanges
- Contract managers who administer turbine supply and long-term service agreements

Course Outline:

Day 1: Onshore Wind Project Landscape and Resource Data

- Onshore Wind Project Lifecycle From Land Lease to Repowering
- Met Mast and Lidar Campaign Data Quality Screening
- Measure-Correlate-Predict Long-Term Wind Speed Adjustment for Arid Sites
- P50 and P90 Energy Yield Uncertainty Budget Review
- Current Wind Fleet Availability and Yield Gap Assessment

Day 2: Turbine Technology, Layout and IEC 61400 Design Basis

- IEC 61400-1 Turbine Class Selection by Turbulence and Gust
- Geared Versus Direct-Drive Drivetrain Architecture Trade-Offs
- Micro-Siting on Complex Terrain With Rotor Diameter Spacing
- Wake Loss Modelling and Wind Sector Management Strategies
- Balance-of-Plant Scope With Foundations, Crane Pads and Collector Cables

Day 3: Construction, Commissioning and SCADA Performance Monitoring

- Turbine Erection Sequence and Crane Hardstand Logistics Planning
- Commissioning Punch Lists and Taking-Over Certificate Criteria
- IEC 61400-12-1 Power Curve Verification Test Method
- SCADA Ten-Minute Data Filtering and Power Curve Deviation Analysis
- IEC TS 61400-26 Time-Based and Energy-Based Availability Reporting

Day 4: Component Failures, Condition Monitoring and Service Contracts

- Gearbox and Main Bearing Vibration Condition Monitoring Diagnostics
- Oil Debris Analysis and Gearbox Endoscope Inspection Findings
- Blade Leading-Edge Erosion, Dust Soiling and Lightning Damage Repair
- Major Component Exchange Planning With Crane and Spares Strategy
- Full-Service Availability Agreement Clauses, Warranties and Liquidated Damages

Day 5: Case Study on a Wind Farm O&M and Performance Improvement Plan

- Case Wind Farm SCADA Underperformance and Alarm Log Review
- Case Gearbox and Blade Defect Prioritisation by Lost Energy
- Case Service Agreement Availability Warranty Gap Analysis
- Corrective, Preventive and Predictive Maintenance Strategy Comparison
- Wind Farm O&M and Performance Improvement Plan Completion

Skills You Will Gain:

- Wind Resource Data Review
- Energy Yield Uncertainty Analysis
- Turbine Class Selection
- Wake Loss Assessment
- Power Curve Verification
- Drivetrain Condition Monitoring
- Blade Damage Assessment
- Service Agreement Administration

Why Attend This Course:

- Deliver a Wind Farm O&M and Performance Improvement Plan to the asset owner, plant manager and technical director
- Decide whether a turbine underperforms because of its power curve, wake effects, curtailment or a developing component fault
- Avoid unplanned gearbox and main bearing failures, long crane waits and availability shortfalls that the service contract does not compensate
- Coach site technicians and analysts on SCADA filtering, inspection records and lost-energy ranking

Conclusion:

Back at work, the participant presents the Wind Farm O&M and Performance Improvement Plan to the asset owner, plant manager and technical director, who use it to fund condition monitoring upgrades, blade repair campaigns, spares holdings and service contract changes. Engineering teams use its SCADA filters and lost-energy ranking to direct maintenance effort to the turbines that matter most. After the first maintenance season, the unit should review recovered energy, availability against contract terms and component failure rates, then update the plan.

Frequently Asked Questions FAQ:

What should participants know before an onshore wind farm development and O&M course?

Participants should already work on wind project development, plant operation or turbine maintenance and be comfortable reading data tables. Bringing anonymised SCADA extracts, inspection reports or service agreement terms from their own wind farm makes the case study more useful.

How does an onshore wind farm development and O&M course differ from a general renewable energy course?

It concentrates on land-based wind farms only and spends most of its time on operating assets: power curves, availability, drivetrain and blade defects and service contracts. A general renewable energy course spreads its time across solar, storage, grid connection and several technologies.

Why does onshore wind farm O&M rely on SCADA power curve analysis?

SCADA records show every turbine's output against wind speed every ten minutes. Filtered properly, they reveal underperformance from pitch, yaw or blade problems, separate curtailment from faults and quantify lost energy, so maintenance effort goes where it recovers the most revenue.

What do participants take back from the onshore wind farm development and O&M course?

Participants take back a Wind Farm O&M and Performance Improvement Plan, plus a SCADA filtering checklist, a defect prioritisation matrix by lost energy and a service agreement review template adaptable to their own wind farm.