



# RE070: Advanced Renewable Energy Modeling Tools: WindPRO, SolarGIS & Pvsyst (Intensive Hands-On Training Program)

## Training Description:

The increasing deployment of renewable energy projects requires professionals to possess advanced technical capabilities in resource assessment, energy yield analysis, project optimization and financial feasibility evaluation. Accurate modeling and simulation are critical for reducing project risks, improving investment decisions and maximizing renewable energy production.

This intensive training course provides participants with comprehensive practical knowledge and hands-on experience using three of the industry's leading renewable energy modeling tools: **WindPRO**, **SolarGIS** and **PVsyst**. Participants will learn how to assess renewable energy resources, conduct energy yield calculations, optimize system design, analyze losses, evaluate uncertainties and generate bankable reports for utility-scale and commercial renewable energy projects.

The training course combines theoretical concepts, practical exercises, real-world case studies and instructor-led workshops, enabling participants to develop advanced competencies in renewable energy project development, feasibility studies, technical due diligence, and performance assessment.

Throughout the training course, participants will work directly with industry-standard software applications under expert guidance, developing practical skills that can be immediately applied to wind and solar energy projects.

## Training Objectives:

**By the end of the training, participants will be able to:**

- ✓ Understand renewable energy resource assessment methodologies
- ✓ Perform advanced wind and solar energy project modeling
- ✓ Utilize WindPRO for wind farm design and energy production analysis
- ✓ Apply SolarGIS data for solar resource assessment and project planning
- ✓ Develop comprehensive PV system simulations using PVsyst
- ✓ Evaluate technical and environmental constraints affecting project performance
- ✓ Conduct energy yield assessments and uncertainty analyses
- ✓ Optimize renewable energy system design for maximum performance
- ✓ Analyze losses, degradation factors, and operational risks
- ✓ Generate technical reports suitable for investors, lenders, and project stakeholders
- ✓ Interpret simulation results for decision-making and project development
- ✓ Apply best practices for utility-scale and commercial renewable energy projects

## Expected Outcomes:

Upon completion, participants will be able to independently:

- ✓ Conduct professional wind and solar resource assessments
- ✓ Use WindPRO for wind farm design and energy modeling
- ✓ Utilize SolarGIS for solar resource evaluation and site analysis
- ✓ Develop advanced PV simulations using PVsyst
- ✓ Perform uncertainty and risk assessments
- ✓ Optimize renewable energy project performance
- ✓ Produce bankable energy yield assessments
- ✓ Support investment and financing decisions with technical analysis
- ✓ Prepare industry-standard technical reports for renewable energy projects

- ✓ Apply international best practices in renewable energy project development and modeling

### Training Designed for:

This training course is intended for Renewable Energy Engineers, Solar PV Engineers, Wind Energy Engineers, Electrical Engineers, Power System Engineers, Energy Analysts, Project Development Managers, Technical Consultants, Asset Managers, Feasibility Study Specialists, Sustainability Professionals, Energy Planning Specialists, Utility Engineers, EPC Contractors, Technical Due Diligence Professionals, Financial Analysts involved in renewable energy investments, Government Energy Officials and Researchers and Academics in Renewable Energy.

### Training Requirement:

"Hand's on practical sessions, equipment and software will be applied during the course if required and as per the client's request."

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client's learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

### Training Program:

#### DAY ONE:

#### RENEWABLE ENERGY RESOURCE ASSESSMENT & INTRODUCTION TO MODELING PLATFORMS

##### ❖ Module 1: Renewable Energy Project Development Fundamentals

- Global renewable energy market trends
- Wind and solar project development lifecycle
- Resource assessment fundamentals
- Bankability requirements for renewable projects
- Energy yield assessment methodologies
- Overview of industry standards and guidelines

##### ❖ Module 2: Renewable Energy Data Sources

- Meteorological measurements
- Satellite-derived resource datasets
- Ground-based monitoring systems
- Resource data quality assessment
- Data validation techniques
- Long-term resource correction methods

##### ❖ Module 3: Introduction to WindPRO, SolarGIS & PVsyst

- Software architecture and capabilities
- Workflow integration among platforms
- Input data requirements
- Project setup procedures
- Data import and management
- Best practices for modeling accuracy

##### ❖ Hands-On Workshop

Participants will:

- Install and configure software environments
- Create initial project files
- Import weather and resource datasets
- Review sample renewable energy projects
- Navigate software interfaces

### DAY TWO:

#### ADVANCED WIND RESOURCE ASSESSMENT AND WINDPRO MODELING

##### ❖ Module 1: Wind Energy Fundamentals

- Wind resource characteristics
- Wind speed distributions
- Weibull analysis
- Wind shear and turbulence
- Wake effects and losses
- Wind farm performance indicators

##### ❖ Module 2: WindPRO Project Development

- Site terrain analysis
- Wind resource mapping
- Wind turbine selection
- Layout optimization
- Environmental constraints
- Grid connection considerations

##### ❖ Module 3: Advanced WindPRO Applications

- Wind farm energy production modeling
- Wake loss calculations
- Noise analysis
- Shadow flicker analysis
- Micrositing optimization
- Production uncertainty assessment

##### ❖ Hands-On Workshop

###### Participants will:

- Create a wind farm model
- Analyze wind resources
- Design turbine layouts
- Perform wake effect calculations
- Generate production estimates
- Produce technical reports

### DAY THREE:

#### SOLAR RESOURCE ASSESSMENT AND SOLARGIS APPLICATIONS

##### ❖ Module 1: Solar Resource Fundamentals

- Solar radiation concepts
- Global Horizontal Irradiance (GHI)
- Direct Normal Irradiance (DNI)
- Diffuse Horizontal Irradiance (DHI)
- Solar geometry principles

- Climate impacts on solar performance
- ❖ **Module 2: SolarGIS Resource Assessment**
  - SolarGIS platform overview
  - Satellite-based solar datasets
  - Solar resource mapping
  - Historical climate data analysis
  - Resource variability assessment
  - Data validation and benchmarking
- ❖ **Module 3: Site Suitability Analysis**
  - GIS-based solar site selection
  - Terrain assessment
  - Shading analysis
  - Environmental constraints
  - Land-use considerations
  - Grid accessibility evaluation
- ❖ **Hands-On Workshop**  
Participants will:
  - Access SolarGIS datasets
  - Conduct solar resource assessment
  - Analyze historical weather conditions
  - Generate solar maps
  - Evaluate project sites
  - Develop preliminary resource reports

#### DAY FOUR:

#### **ADVANCED PV SYSTEM DESIGN AND SIMULATION USING PVSYS**

- ❖ **Module 1: PV System Design Principles**
  - PV technologies and performance characteristics
  - Module selection criteria
  - Inverter technologies
  - System architecture design
  - Utility-scale PV systems
  - Commercial and industrial PV applications
- ❖ **Module 2: PVSyst Project Development**
  - Project creation procedures
  - Meteorological data integration
  - System configuration
  - Module and inverter selection
  - Array design optimization
  - Shading and orientation analysis
- ❖ **Module 3: Loss Analysis and Performance Evaluation**
  - Thermal losses
  - Soiling losses
  - Mismatch losses
  - Cable and electrical losses

- Availability assumptions
- Performance ratio calculations

#### ❖ Hands-On Workshop

##### Participants will:

- Build a complete PV project model
- Configure PV arrays
- Optimize inverter sizing
- Conduct shading analysis
- Simulate annual energy production
- Analyze system losses
- Generate performance reports

#### DAY FIVE:

#### INTEGRATED RENEWABLE ENERGY MODELING, FINANCIAL ANALYSIS & PROJECT OPTIMIZATION

#### ❖ Module 1: Advanced Energy Yield Assessment

- P50, P75 and P90 energy estimates
- Uncertainty analysis methodologies
- Sensitivity analysis
- Risk assessment techniques
- Performance benchmarking
- Production forecasting

#### ❖ Module 2: Technical and Financial Evaluation

- Levelized Cost of Energy (LCOE)
- CAPEX and OPEX analysis
- Cash flow modeling
- Return on Investment (ROI)
- Net Present Value (NPV)
- Internal Rate of Return (IRR)

#### ❖ Module 3: Integrated Project Case Study

- Combining WindPRO, SolarGIS and PVsyst outputs
- Hybrid renewable energy projects
- Technical due diligence review
- Project optimization strategies
- Bankability assessment
- Investor reporting requirements

#### ❖ Capstone Hands-On Project

##### Participants will:

- Develop a complete renewable energy project model
- Conduct resource assessment
- Perform energy yield analysis
- Optimize project design
- Evaluate financial viability
- Present findings and recommendations
- Generate a professional bankable feasibility report

#### ❖ Course Conclusion



## ❖ POST-ASSESSMENT and EVALUATION

### Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

#### The course utilizes:

- Interactive Lectures
- Software Demonstrations
- Guided Hands-On Exercises
- Real Project Case Studies
- Group Workshops
- Simulation Modeling Sessions
- Energy Yield Analysis Exercises
- Practical Assignments
- Technical Discussions
- Final Integrated Project

### Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

### Training Fees:

**USD\$ TBA** - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

*Note: The 5% VAT (Value Added Tax), will be effective starting 01<sup>st</sup> of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.*

### Training Timings:

#### Daily Timings:

|               |                               |
|---------------|-------------------------------|
| 07:45 - 08:00 | Morning Coffee / Tea          |
| 08:00 - 10:00 | First Session                 |
| 10:00 - 10:20 | Recess (Coffee/Tea/Snacks)    |
| 10:20 - 12:20 | Second Session                |
| 12:20 - 13:00 | Recess (Prayer Break & Lunch) |
| 13:00 - 14:00 | Last Session                  |

#### For training registrations or in-house enquiries, please contact:

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