



## Wind Power Forecasting

5th June 2018

Location: IWEA Offices, Naas, Co. Kildare

### Course Outline

With the new day-ahead and intra-day energy trade market arrangement being introduced through the I-SEM Project, short term wind power forecasting in Ireland is becoming increasingly important. Although wind power generation is variable and cannot be scheduled like conventional sources of energy. It is predictable, and accurate wind power forecasts provide economic and social value to a wide range of users including energy traders, wind assist operators and grid operators.

The one day course provides a comprehensive introduction to wind power forecasting methodology and an insight into the wide range of applications of wind power forecasts.

### Course Objectives

At the end of the course participants will gain knowledge on:

- Wind Power forecasting modelling techniques and key data required
- Forecast accuracy analysis methods and industry standard error metrics
- Real values associated with accurate forecasts

### Who Should Attend?

Wind farm asset energy traders, wind farm operators, grid operators.

- Little or no background in forecasting is required
- Suitable for attendees interested in the day-ahead and intra-day markets of the I-SEM Project.

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**Green Tech Skillnet**

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## Course Content

### **Section 1: Wind power forecast methodology**

This section will comprise 70% of the training course. This section explores the key input data and state of art power forecast modelling techniques to produce highly accurate wind power forecasts.

#### **Introduction and overview**

Insight into the history and current state of renewables forecasting. The motivation behind developing highly accurate forecasts will be introduced. Additionally, an overview of a standard wind power forecasting system will be described so the trainees gain a high level understanding of general data flow and analytical procedures before going through the detailed methodology contents.

#### **Meteorological forecast review**

Meteorological forecast data are one of the key inputs for wind power forecast modelling. Meteorology fundamentals, weather modelling and key forecast parameters relevant to wind power forecasting will be introduced, along with example data sets. A wide range of national and international weather data providers and their characteristics will also be explored.

#### **Physical modelling approach**

When forecasting for a wind farm with little or no historical measurement data, power forecasts must be calculated based on a physical modelling approach. This part focuses on how to downscale Numerical Weather Prediction (NWP) models which tend to have relatively lower resolution compared to a typical wind farm size (< 10km across). The physical modelling approach to this challenge includes site specific condition modelling such as localised weather and terrain effects and wake effects.

#### **Statistical modelling approach**

For wind farms where good quality measurement data is available, higher forecast accuracies can be achieved by building statistical models to downscale the NWP data and optimize the tuning of meteorological and power models. This part is where the core of state of art forecasting techniques lie and will be explored in detail using real data interactively.

#### **Getting the best out of measurement data**

Continuing from the previous section's use of on-site measurement data for statistical modelling, this part explores further use of measurements for various purposes

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such as: short horizon (T+1 to 6-hour horizon) forecast accuracy improvements using ARMA model and Kalman filter, off-site measurement incorporation to statistical modelling using pattern recognition, neural network/machine learning algorithms.

### **Expected forecast accuracy levels**

Throughout this section, various forecasting techniques have been explored. This part looks into examples of forecast accuracy levels achieved by these modelling techniques, using data from Ireland and Europe. Industry standard error metrics and forecast accuracy analysis methods will be explained interactively using real data.

### **Section 2: Wind power forecast applications**

This section will compromise 30% of the training course. Wind power forecasts are utilized by various users across the energy chain and this section explores the application of forecasts and the values associated with accurate forecasts.

**Forecasting for asset operations** Forecasts can be utilized by O&M users and this mainly focuses on health & safety aspects, but there are also economic values associated when planning maintenance and inspections. Extreme weather warnings and icing forecasts will be explored in this part.

### **Forecasting for energy trading**

Short term forecasting is becoming increasingly important in Ireland with the introduction of the day-ahead and intra-day energy trade market through I-SEM. A case study on added value of using state of art forecasts for day-ahead trading using real GB market data will be shared in detail where findings have been verified by energy trader customers.

### **Forecasting for grid operation**

As more renewables generation are connected to the grid, the variable nature of renewables can introduce challenges for grid operators to manage and operate the grid reliably. Accurate regional and country level forecasts can aid the grid operation. In this part, a case study from an Egyptian Transmission System Operator will be shared, which explores the impact of increasing renewables on grid stability using country level forecasts with an economic dispatch program and a power balance model.

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Date: 5th June 2018

Registration: 09:00am                      Start: 09:30am                      Finish: 5.00pm  
Location: IWEA offices, Naas, Co. Kildare

Cost:                      Company Member                      : €395                        
                                 Non Company Member                      : €570                     

Trainers: Ayumu Suzuki, Senior Engineer, DNV GL

I wish to reserve:                        
No. of Places:                      €                     

Trainee (s) Details:

Name: \_\_\_\_\_

Company (as invoice) \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Email: \_\_\_\_\_

Phone: \_\_\_\_\_

**Please tick your preferred method of payment. Please note payment must be received in advance of course.**

**Failure to give 48 hours notice of cancellation will result in loss of refund**

Payment Options:

Cheque                       Credit Card   
Invoice                       PO Number   
Card No:   
Expiry:                       Name:                       CCV no:

***Please forward registration form and payment to Green Tech Skillnet, c/o IWEA Sycamore House, Millennium***

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