

## Wind Forecast and the Single Electricity Market European Study Group with Industry ESGI102

### Background

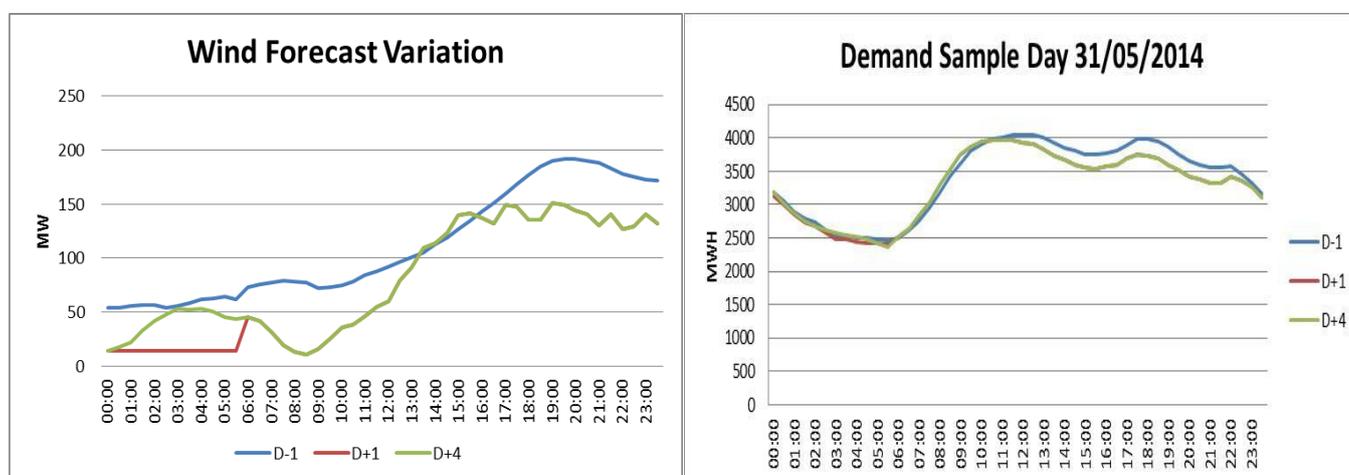
In Ireland there is a wholesale electricity market which has been in operation since November 2007. This market is known as the Single Electricity Market (SEM) and incorporates all generation on the Island of Ireland. The market was designed as a gross mandatory pool with ex-post pricing. This means that all generation over 10MW is obliged to participate in the market and that there are strict principles around the bidding of the generators within the market. The ex-post element means that the final revenues to the generators are only determined four days after the fact once all variable elements such as wind and demand are finally determined.

Variable renewable sources such as wind are a growing part of the generation portfolio. However, research has shown that the Root Mean Square Error for wind forecast is 4.5% Day Ahead (DA) and reduces to 3% intraday (ID)<sup>1</sup>.

This variation in wind can cause significant changes in the prices in the market and open up exposures for generators. It will be more important in the future that the wind is forecast accurately and that its implications on prices are understood clearly for trading purposes.

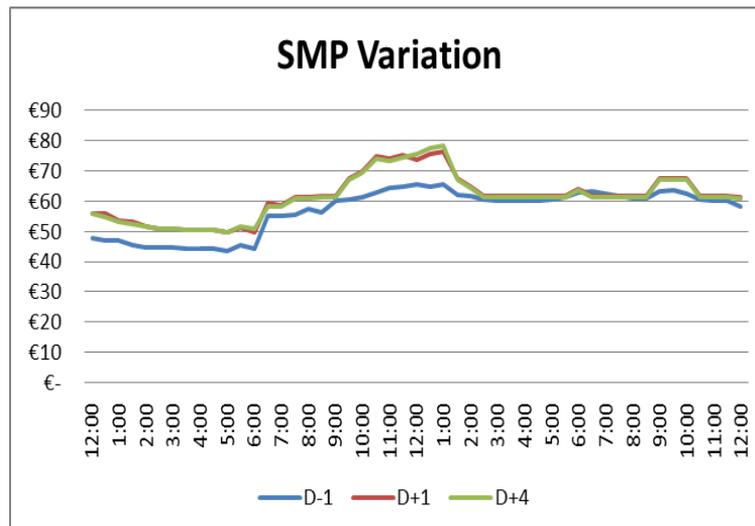
There is a significant amount of data within the SEM. Currently the Market Operator (MO) publishes their expectations of wind and demand on a Day Ahead basis. They also publish their expectations as to what prices will outturn in the market. This is their Forecast or Ex-Ante view of the market. As more information becomes available these views are refined. One day after the fact an Initial pricing schedule is issued based on more refined data on wind generation, demand profiles and outages of plants. Finally, four days after the fact the MO publishes the actual wind, the actual demand and the actual prices in the market. These actual figures are the basis for trading within the SEM currently.

The following graphs show how wind forecast varies between the different timeframes (Day Ahead=D-1, One Day After = D+1 and Four Days After = D+4).



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Subsequently these variations in wind, demand and forced outage profiles for generators impact the actual prices in the market (called System Marginal Price or SMP) as demonstrated by the following graph.



### Problems to be explored

1. Given certain Day Ahead forecasts for wind and demand is there a relationship between these forecasts and the D+4 actual prices in the market (SMP)?
2. Can we identify wind and demand patterns that impact prices? An example of this would be wind starting off at very low levels at the start of the day and ramping up significantly in a very short time frame. Does a wind pattern such as this have a more significant impact on forecasts and subsequently prices?

A possible extension to this problem would be to consider if these relationships could help improve decision-making when scheduling marginal generation based on different costs – more information will be provided on this point during the week.