**Forecasting Case study: Windmill plc. BN2230 Business Analytics in practice**

Windmill plc is considering expanding an existing wind-farm it owns and operates out of the Thames Estuary. In order to assess the viability of the investment, it requires a forecast of the revenue that is typically generated by a medium-sized off-shore wind turbine, similar to those that the company is already operating and is considering on further investing on. To assist in this process it has gathered some historic data from its current operations; the data relates to the revenue that has been generated by one such wind turbine, the average wind capacity factor for each quarter (WCF, which is a measure of output – actual electricity generated by the turbine relative to potential) and the average price of an electricity ‘forward’ contract (a measure of the average price of electricity sold by the company).

The historic data are given in the table below:

**Table 1: Data relating to a ‘typical’ wind turbine**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Quarter** | **Revenue** | **Wind Capacity Factor** | **Electricity 'forward' prices** |
| **1** | 1 | 904.1 | 43.20% | 0.077 |
| **1** | 2 | 555.2 | 24.70% | 0.096 |
| **1** | 3 | 198.9 | 21.80% | 0.051 |
| **1** | 4 | 706.7 | 35.20% | 0.088 |
| **2** | 1 | 709.2 | 42.50% | 0.057 |
| **2** | 2 | 265.1 | 22.30% | 0.058 |
| **2** | 3 | 253 | 20.70% | 0.056 |
| **2** | 4 | 914.2 | 33.40% | 0.093 |
| **3** | 1 | 1519.2 | 67.70% | 0.095 |
| **3** | 2 | 1052.1 | 44.30% | 0.09 |
| **3** | 3 | 874.3 | 25.70% | 0.109 |
| **3** | 4 | 1004.4 | 47.80% | 0.087 |
| **4** | 1 | 1256 | 50.40% | 0.099 |
| **4** | 2 | 687.1 | 39.10% | 0.065 |
| **4** | 3 | 843.1 | 31.30% | 0.091 |
| **4** | 4 | 1211.7 | 52.20% | 0.085 |
| **5** | 1 | 672.8 | 47.90% | 0.073 |
| **5** | 2 | 574.4 | 34.20% | 0.068 |
| **5** | 3 | 596.3 | 35.80% | 0.055 |
| **5** | 4 | 750.9 | 37.10% | 0.089 |
| **6** | 1 | 1537.1 | 57.00% | 0.098 |
| **6** | 2 | 770.7 | 45.30% | 0.06 |
| **6** | 3 | 577.5 | 25.90% | 0.082 |
| **6** | 4 | 1138.3 | 41.70% | 0.098 |

Use the above data to forecast revenue for the next three year period (year 7,8 and 9), under the following two scenarios:

1. Base: The Base scenario assumes that the conditions that affect the WCF (such as prevalent wind speed and direction) and electricity ‘forward’ prices (such as level of completion and government policy on renewables) will not change substantially in the near future.
2. ‘New competitor’: This scenario assumes that a competitor will be granted license to invest in a further off-shore site in the Estuary. This will have a detrimental effect on both the WCF and the electricity ‘forward’ prices. In more detail, WCF is expected to be reduced by a certain percentage relative to the Base scenario, while electricity ‘forward’ prices are expected to develop as shown in table 2 below:

**Table 1: ‘Uplift’ factors for WCF and expected values for electricity ‘forward’ prices**

|  |  |  |
| --- | --- | --- |
| Year | WCF ‘uplift’ | Electricity 'forward' prices |
| 7 | -15% | 0.075 |
| 8 | -10% | 0.07 |
| 9 | -5% | 0.068 |