EXCEEDENCE
MAKING RENEWABLES COMMERCIAL

## Case Study 3 - EMEC Wave and Wind Energy Project

This exercise involves a pre-loaded project with the following parameters shown in the different sections below. Note that the values used in this project are purely for the purposes of showing the functionality and are not intended to be representative of real projects or the devices used in the case study. This exercise will investigate larger changes to the different tabs in ExceedenceFinance.

### Original Project Details

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|---|---|
| **Farm Technology** | Combination Wave and Offshore Wind |
| **Farm Size** | 300 MW |
| **Currency** | US Dollars |
| **Operating Duration** | 20 Years |
| **Location and Year** | EMEC 2005 |
| **Devices** | Generic F-3OF 1665kW & Vestas V90 3000kW<br>'Power Law Exponent' of 0.142 |
| **Capex**<br><br><br>**Generic F-3OF**<br>**Vestas V90 3.0MW** | Detailed Capex<br>Farm Share and Interarray Cabling/Piping<br>Electrical Cabling<br>'Moorings'<br>'Foundation' |
| **F-3OF – Device Costs**<br>- **Hull**<br>- **PTO**<br>- **Control System**<br>- **Miscellaneous** | <br>$850,000<br>$1,000,000<br>$350,000<br>$750,000 |
| **F-3OF – Balance of Plant**<br>- **Balance of System** | <br>$1,000,000 |
| **F-O3F – Moorings**<br>- **Mooring Line**<br>- **Anchor**<br>- **Deployment** | <br>$250,000<br>$150,000<br>$350,000 |
| **F-3oF – Cabling (Whole Farm)**<br>- **Export**<br>- **Substation**<br>- **Onshore**<br>- **Interarray** | <br>$15m<br>$25m<br>$20m<br>$10m |
| **V90 – Device Costs**<br>- **Turbine**<br>- **Tower**<br>- **Blades**<br>- **Transition Piece** | <br>$255,000<br>$250,000<br>$550,000<br>$550,000 |
| **V90 – Balance of Plant**<br>- **Balance of System** | <br>$500,000 |
| **V90 – Foundations**<br>- **Materials**<br>- **Fabrications**<br>- **Transport** | <br>$100,000<br>$100,000<br>$100,000 |

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|---|---|
| **Opex**<br>**'Planned O&M'**<br>**'Unplanned O&M'**<br>**'Spare Parts'** | Breakdown Total Opex per Farm<br>Fixed $20m per year<br>Variable ($10m every year except for year 5, 10, 15 and 20 - $20m)<br>Fixed $15/MWh |
| **Revenue Inputs**<br>- **Revenue Basic Inputs** | 'Fixed' $160/MWh |
| **Input per Annum**<br>- **Grant** | $10m per year for first 5 operating years |
| **Apply Cash Flows in Nominal Terms**<br>- **Nominal Discount Rate**<br>- **Inflation Rate** | 6%<br>3% |
| **Debt/Equity Ratio** | 50/50 |
| **Debt term** | 20 years |
| **Borrowing Rate** | 2%<br>Annual Repayments |
| **RESULTS**<br>**Net Present Value (NPV)**<br>**Levelised Cost of Electricity (LCOE)**<br>**Internal Rate of Return %** | <br>$1,255,312,153<br>$105.62/MW<br>38.70% |

**Questions**

1. An investor sees this project and thinks there must be a mistake in the calculations with an IRR of 38.70%. They have some concerns that the mistake might in the resources or in the energy calculations. Find the mistake and fix it. Their threshold is an IRR of 12%. After fixing the issue does the project deliver above that threshold?

2. At what interest rate from the bank does the project not make any more sense? What is a reasonable interest rate for this project?

3. Project Operator is interested in buying the project. However, they are concerned about the risk of getting a grant. What happens to the project viability if there is no grant?

4. With this new information how much does CAPEX need to decrease to produce an IRR of 12%? How does this affect LCOE and NPV?

5. Export the results from Q.3 to Excel

6. Save and Close down current project. Compare Ex1, Ex 2 & Ex3
    a. Which would you invest in and why?
    b. How could you improve the other projects?