



Key Findings:

By using Exceedence Compare we were able to prove the following:

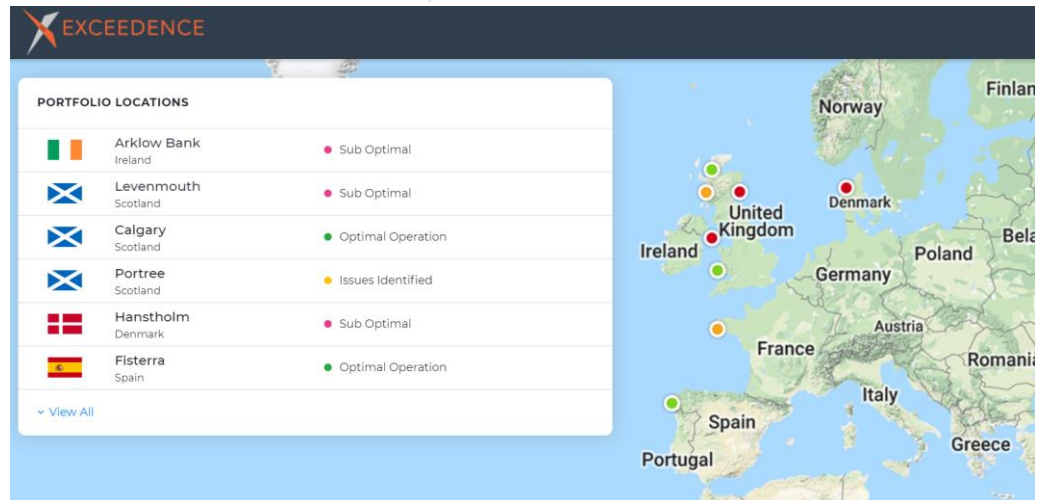
- Quickly highlight issues from portfolio to farm to individual assets
- Follow a simple workflow trail
- Find systemic issues in single turbines
- See the full technical and financial picture

For more information on Exceedence Compare please visit:

Exceedence.com



For more information on our EU Datapitch project that has funded the development of Exceedence Compare See www.datapitch.eu



Overview screen of portfolio performance in Exceedence Compare

Exceedence COMPARE – Offshore Wind

Case study: Levenmouth Offshore Wind Turbine – Options for improvement

Many wind energy projects underperform after they have been built. The reasons are various however one thing is constant. Unpicking and rectifying the cause is difficult as the drivers behind the performance are complex. There are several operational software packages currently on the market that will help analyse **technical** under performance

Exceedence go further and are the first to offer a solution to build a digital twin of the project from a technical and financial performance approach and use such key figures such as monthly **yield, revenue, IRR, NPV, LCOE** to highlight the **performance delta** from the ORIGINALLY financed project.

FINANCIAL PERFORMANCE					
	IRR	11.64%	10.59%	7.03%	-40% ↓
	Revenue per Month	8845.33	8483.25	6193.64	-30% ↓
	Annual Revenue	£14,435,584	£13,844,664	£13,285,024	-8% ↓
	Simple Payback	9	9	12	-33% ↓
	Discounted Package	13	14	25	-92% ↓
	NPV/MW	£1334694	£1040192	-£47533	-104% ↓

[Cashflow Summary](#)

[Export Summary](#)

We provide a series of comparison screens **OVER TIME** that show the deltas and allow a deeper dive into the farm performance

down to each of the turbines. This case study shows a worked example of a real offshore wind turbine operated by ORE Catapult. The turbine is a 7MW Samsung S17 171 demonstrator unit. ORE provided access to both financial and technical operational data sets with 200+ parameters typical of a full scale farm.

The problem

The portfolio dashboard highlights in red the underperforming farms and a quick mouse over shows the extent of the problem. A quick click and the past months ACTUAL data is loaded in and is then compared against the expected.

1. The Modelled output – What was originally forecast in the techno-financial model.
2. Expected output – the original model run with the actual wind data



The dashboard highlights both technical and financial **deltas** in performance with negatives highlighted in red. This

TECHNICAL PERFORMANCE

FACTOR	MODELLED	EXPECTED	ACTUAL	DELTA
Yield (ADE)	106144 MWh	101799 MWh	97684 MWh	-8% ↓
Availability	95%	95%	76%	-20% ↓
Capacity Factor	35.69%	34.23%	34%	-5% ↓
Average Resource	7.39m/s	7.28m/s	8.25m/s	+12% ↓
LCOE	£101.37	£105.70	£135.75	-34% ↓

[Turbine Summary](#)

dashboard belies the complexity below as the software is using the ExceedenceFinance engine in the background to build parts of the Modelled, Expected and Actual data. Looking at the financial dashboard below shows us that the past months performance of the farm as a whole is lower than expected. This is due to a number of reasons that can be seen by comparing KPIs.

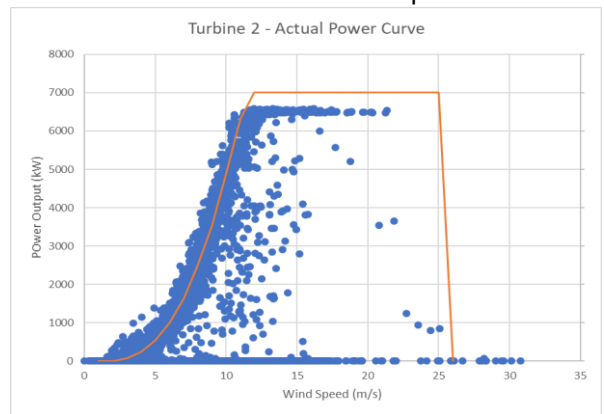
The software has easily allowed us to follow the trail from the portfolio level right down to a single asset in a farm. There are number of reasons for underperformance and

these can be easily identified with the software such as availability, lack of resource, under rating, under performance to power curve, higher opex, capex, interest rates.

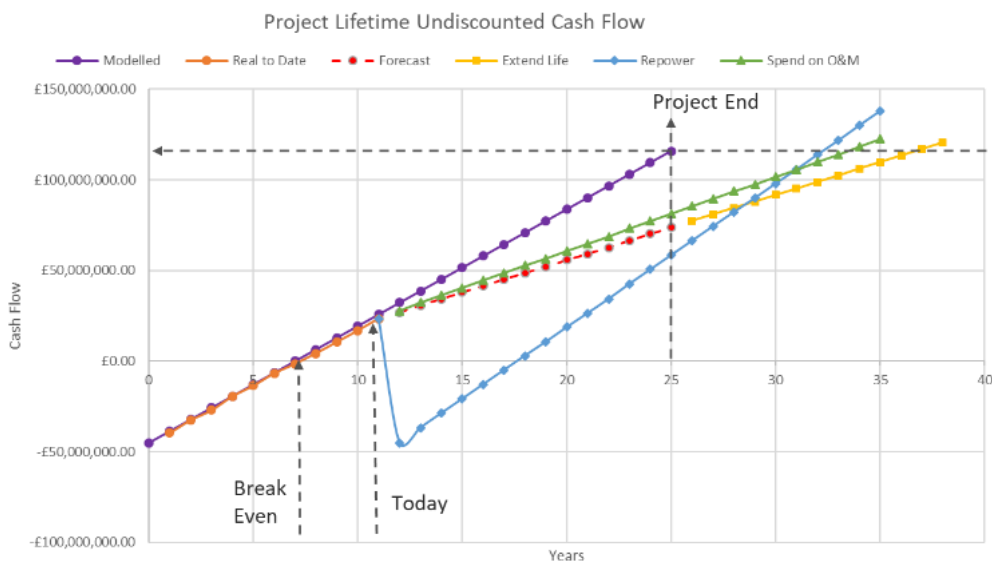
What the industry has been asking when presented with these insights is “what can we do?”. We have provided a solution.

The SOLUTION – Scenario options

A new feature of the software is that it surfaces a number of scenarios options based on possible actions that the farm owner could follow.



1. **Status Quo** – This shows the baseline case if the project continues as is. Given the underperformance it will show the total loss in \$m at the end of life
2. **Extend Life** – This option will extend the existing lifetime to extrapolate how much longer the farm needs to operate to generate the same return as baseline
3. **Increase O&M** – Increasing OPEX to give an increase in performance and to show both the financial and time benefit of doing this.
4. **Repower**– Replace existing assets with modern higher powered units and extend the life. Show the cost benefit and time horizon.



“Exceedence Compare quickly allows the user to identify asset underperformance and to run realistic scenarios to understand how to rectify it”