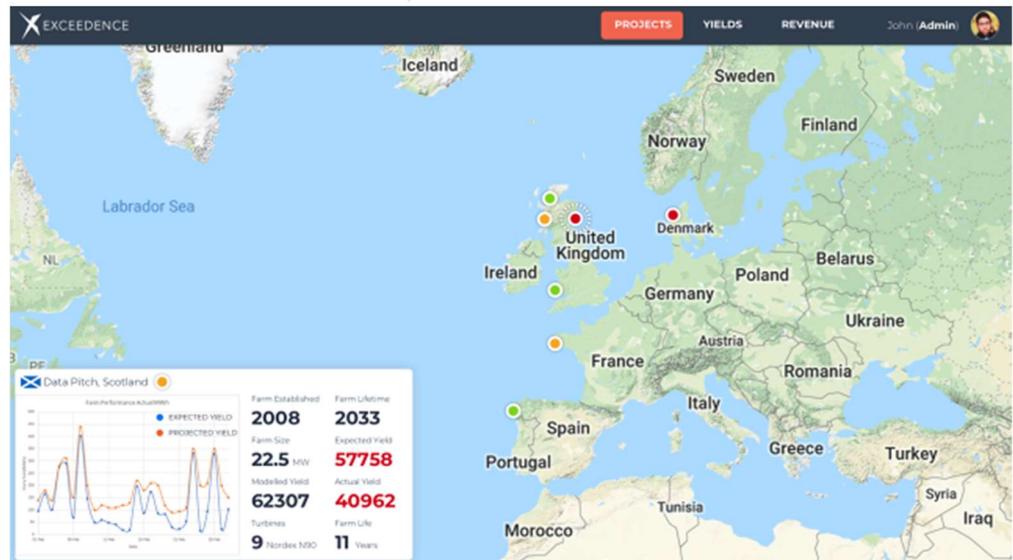


Key Findings:

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
- See the full technical and financial picture
- **Left unchecked the lifetime performance will be 36% less than at financial close equating to an Absolute loss of £41m**



Overview screen of portfolio performance in Exceedence Compare

Exceedence COMPARE – Offshore Wind

Case study: Identifying underlying farm wide underperformance and its future impact

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. Currently there are on the market several operational software packages that will help analyse **technical** underperformance.

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.

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 wind farm and focuses on identifying farm wide underperformance and extrapolating this for its lifetime.

The farm consists of 9 turbines with an installed capacity of 22.5MW that was built in 2008. Data for each turbine was available as well as overall farm performance.

The problem

The portfolio dashboard above 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.

Technical Performance

Factor	Modelled	Expected	Actual	Delta
Yield (ADE)	62307 MWh	57758 MWh	40962 MWh	-34%
Availability	95%	95%	96%	1%
Capacity Factor	31.60%	29.3%	23%	-29%
Average Resource	7.14 m/s	6.82 m/s	6.92 m/s	-3%
LCOE	£83.67	£90.23	£127.90	53%

Financial Performance

IRR	13.73%	12.33%	6.50%	-53%
Revenue Per Month	£192.25	£813.16667	£413.53	-34%
Annual Revenue	£649031.25	£601645.83	£426691.08	-34%
Simple Payback (years)	7	8		-100%
Discounted Payback	10	12		-100%
NPV/MW	£1334694.12	£1040192.60	-£47533	-100%

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

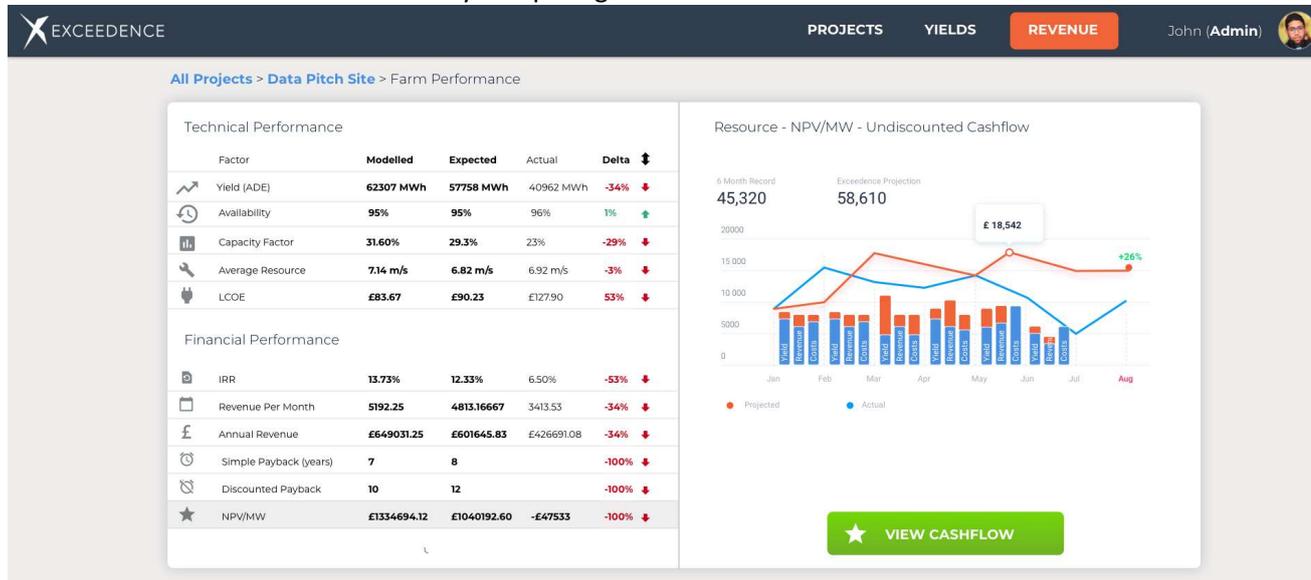
For more information on Exceedence Compare please visit:

Exceedence.com



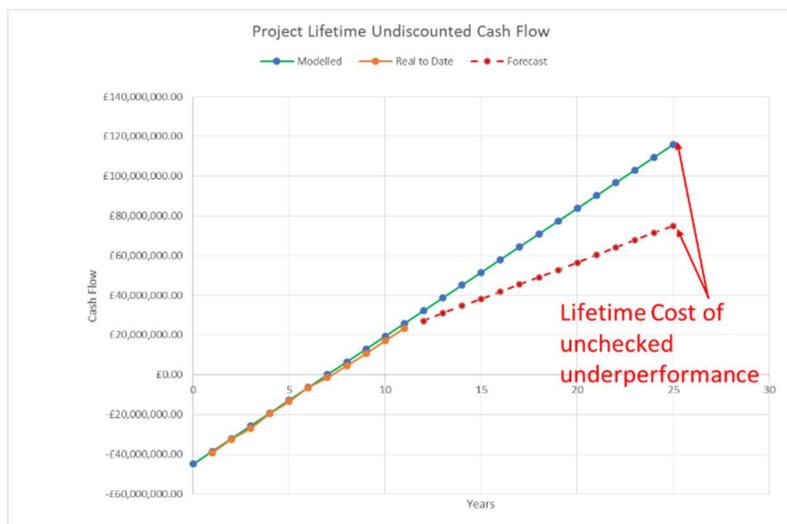
For more information on our EU Datapitch project that has funded the development of Exceedence Compare See www.datapitch.eu

The dashboard highlights both technical and financial **deltas** in performance with negatives highlighted in red. This 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 wind is not as high as originally modelled
- The capacity factor is lower across the farm due to lower yield
- A number of assets are systematically underperforming for multiple reasons
- The OPEX is higher than originally modelled

As we show in another case study, many of these issues can be rectified. The power of the underlying Exceedence financial model is that it has been run for the lifetime of the project. The performance that we show is a snapshot in time in this case the past month. Clicking the cash flow button takes us to the timeline



and shows the cumulative past performance of the farm since its inception and it will be possible to look back in time with the same techno-financial KPIs as shown on the initial dashboard. However we also have the ability to aggregate this past data and to project forwards for the remainder of the farms lifetime.

- KPIs**
- Availability
 - Yield
 - Capacity factor
 - Resource
 - LCOE
 - IRR
 - Revenue per month
 - Annualised Revenue
 - Simple payback
 - Discounted payback
 - NPV/MW

In this case, left unchecked, the next 14 years bring a **36% loss** from the original model used for financial close. In absolute terms, an **undiscounted loss of £41m** by the end of the life of what is a relatively small farm.

“Exceedence Compare highlights farm wide underperformance and shows the potentially huge financial impact if left unchecked”