

Award-winning solar farm with battery storage delivers carbon savings and revenue for West Sussex County Council

Like all local authorities, West Sussex County Council (WSCC) is under pressure to meet substantial environmental targets to reduce carbon emissions. Working with nPower Business Solutions (nBS), it's been able to take a step closer to its 2030 net zero goal – while also generating additional income – by developing a disused landfill site in Westhampnett, near Chichester. And in June 2021, the project won a Special Award for Contribution to Net Zero (Highly Commended) in the Association of Decentralised Energy (ADE) Awards.

The site became the UK's first subsidy-free solar farm operated by a local authority when it became fully operational in January 2019. A 7.4MW solar photovoltaic (PV) array sits alongside a co-located large-scale lithium-ion battery, which allows the power generated to be commercially optimised.

Optimising the strategy for commercial benefit

In partnership with LASER, a public sector buying group, nBS worked closely with WSCC upfront to gain a comprehensive technical and commercial understanding of the council's challenges and ambitions for the site.

Overlaying these requirements with nBS's expertise in complex market forecasting and revenue modelling, Demand Side Response (DSR) and Power Purchase Agreements (PPAs), WSCC was presented with an operating strategy optimised over multiple benefit streams.

The multi-faceted strategy, delivered through nBS's in-house aggregation platform and award-winning Optimisation Desk, ensured benefits between the PV array and storage asset were operated for optimal commercial benefit.

The strategy included:

- Sale of power and embedded benefits via a PPA
- Access to DSR including:
 - Triad export benefit
 - Firm Frequency Response (FFR), both Static and Dynamic
 - Capacity Market (CM) participation
- Price arbitrage and targeted activity in wholesale markets

Delivering record value

With the strategy in place, nBS began the delivery of value for WSCC in winter 2018/19.

Product	DEC 2018	JAN 2019	FEB 2019	MAR 2019	APR 2019	OCT 2019	NOV 2019	DEC 2019	JAN 2020	FEB 2020	MAR 2020	JUN 2020	2020 >
PPA													
Triad Export													*
Dynamic FFR													
Capacity Market													
Static FFR													
Price Arbitrage/MA													

* up to 2021/22

The principal combination of a flexible PPA, targeted discharge against Triad warnings, contracting to National Grid's FFR service and securing contracts in the CM auctions aligned with nBS's original strategic recommendations to WSCC. The asset was also one of the first batteries to commence participation in National Grid's new weekly FFR auction trial, at the beginning of 2020.

Coupled with this strategy, the modelling of the DSR markets by nBS yielded increasingly valuable results which helped drive the recovery of Static FFR prices back to the highest levels since 2017. Once the asset had participated in the Dynamic FFR market, it achieved the highest accepted tendered price in 2019 of £60.42/MW/hour – a price that made delivery of Dynamic FFR more lucrative than targeting Triads.

Highest accepted availability price in 2019



Figure 1 An example of nBS's success with the WSCC asset; achieving a £60.42 availability price in TR118, the highest in 2019.

The asset has also delivered as expected in support of stability of the network. This was most apparent during the large national power outage on 9 August 2019, with a loss of generation of nearly 1,700MW, when the asset responded within two seconds to help reduce the sudden shortfall in supply.

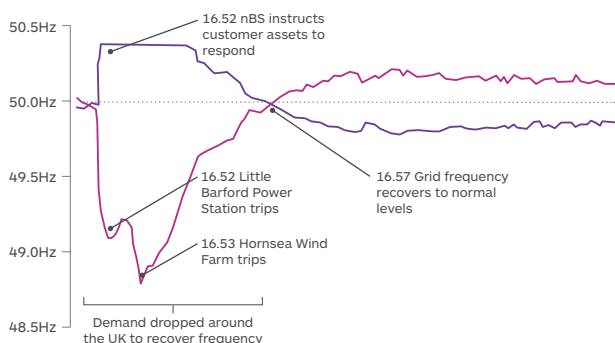


Figure 2 The near instantaneous reaction of the WSCC asset to the power outage on 9 August 2019 discharging capacity to help mitigate the drop in frequency caused by multiple reductions in national generation capability.

“Through this innovative, flexible approach, we have seen WSCC achieve significant success against its sustainability and financial objectives for the site,” says Dan Jerwood, Demand Side Response Manager at nBS. “It was a big investment but, at a time when public sector costs are being scrutinised alongside challenging net zero targets, they are continuing to reap the rewards.”

Glowing independent endorsement

Daire Casey, Energy Services Manager at WSCC at the time of project, adds: “nBS suggested the best approach to DSR and has been with us each step of the way to get everything up and running, keeping us updated with regular performance reporting. They worked with us on the financial modelling, creating an accurate and robust business case for investing in the solar farm and battery solution in the first place.

“To help us assess the first financial year of operation of the battery, we commissioned a report from independent consultants, Cornwall Insight. This provided a glowing overview of the optimisation strategy and overall performance against the market. Of particular interest was the conclusion that once the battery was fully up and running in the second half of the year, it secured the second largest weighted average FFR price for that period compared to similar assets in the market”, Daire concludes.

Support for wider project work

As part of WSCC's ongoing energy strategy, nBS has supported a number of additional battery energy storage projects for the council, building on the success of the Westhampnett project.

This includes revenue and financial modelling, asset specification recommendations, operational strategies and training on market context, industry and policy risks. Despite a challenging market landscape, these projects are being developed as part of WSCC's ongoing sustainability targets.

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