

Weekend Review

28th/29th July 2018

A look at the events leading up to and resulting in the actions required over the 28th/29th July 2018



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Summary

The 28th-29th July was a weekend of challenging conditions driven by high wind output and low demands across the network.

There were several limitations on system operation for the ESO, across both System and Energy.

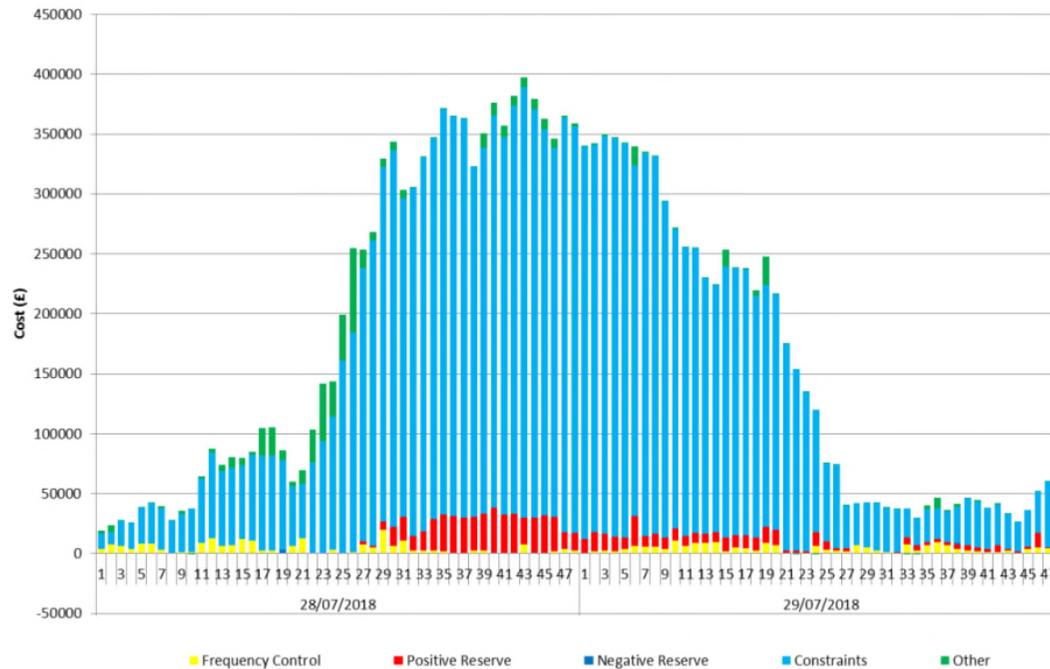
The flow of power North to South was restricted by a significant year ahead outage coupled with the HVDC not yet commissioned.

In addition, a lack of conventional generation, displaced by high wind output, resulted in Negative Reserve, Voltage and ROCOF problems.

This resulted in actions on high priced wind units to solve Negative Reserve and Response requirements.

Cost Overview

Cost by Settlement Period



Wind volatility required additional levels of response, procured through repositioning of plant and utilising wind units (yellow and green).

Negative Reserve issues were experienced throughout Saturday (blue and green).

Constraint costs increased significantly overnight (light blue)

System Operation - Constraints

Approximate Location of Constraint Boundary



Constraint boundary driven by year ahead planned outage on West coast. This outage could not be recalled.

Year ahead planned outage on the East Coast had 48hr ERTS, however this circuit would give little to no benefit if recalled.

Intertrip armed for weekend to increase boundary limit by ~1000MW

Large offshore windfarms connected behind constraint

Constraint Management

How are specific transmission constraints forecast given these were the vast majority of costs that weekend.

- Network Access Planning develop the outage plan at year ahead, handing over to within year teams in January
- Any new cost risk outages are taken through a sanction process by Commercial Operations, a cost risk analysis determines whether new outages can be accommodated
- The analysis applies a range of system conditions to determine a cost exposure and central forecast
- If the cost risk is accepted then the outage is added to the plan
- When difficult conditions occur, outages are recalled where possible
- Depending on the work, it is sometime not possible to return a circuit in short timescales, known as the Emergency Return to Service time, which can range from hours to days

System Operation - Energy

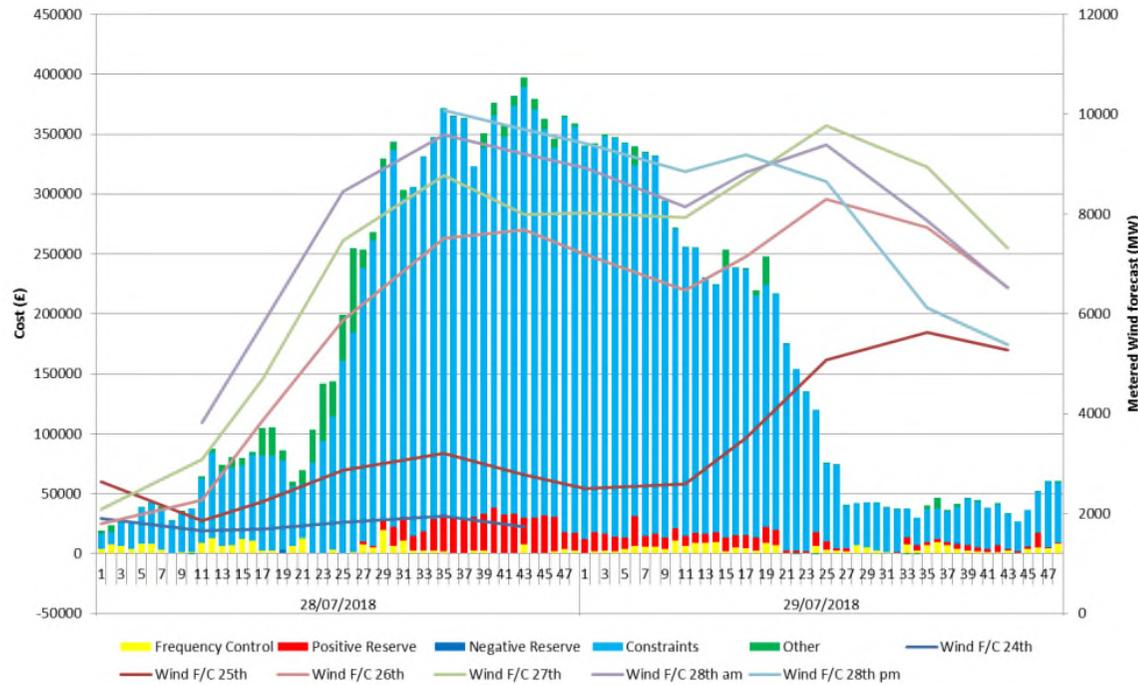
Market dispatch, Demand Forecast, Super-SEL Contracts and NRAPM.

Saturday

- Demand over-forecast by 2.1-2.7GW through morning and afternoon.
- Market despatch also long by 1.8GW
- With the volume of wind bids required to solve the constraint, it was possible a localised NRAPM would be required
- Super-SEL contracts were unavailable
- ENCC liaised with EDF over possible Emergency Instruction – EDF submitted bids on Northern Nuclear fleet which helped meet Negative Reserve requirement
- The Demand Turn Up Service was utilised to help with Negative Reserve
- ROCOF trades on Interconnectors also help with Negative Reserve

System Operation – Prior Weeks

Cost by Settlement Period vs Wind Forecast

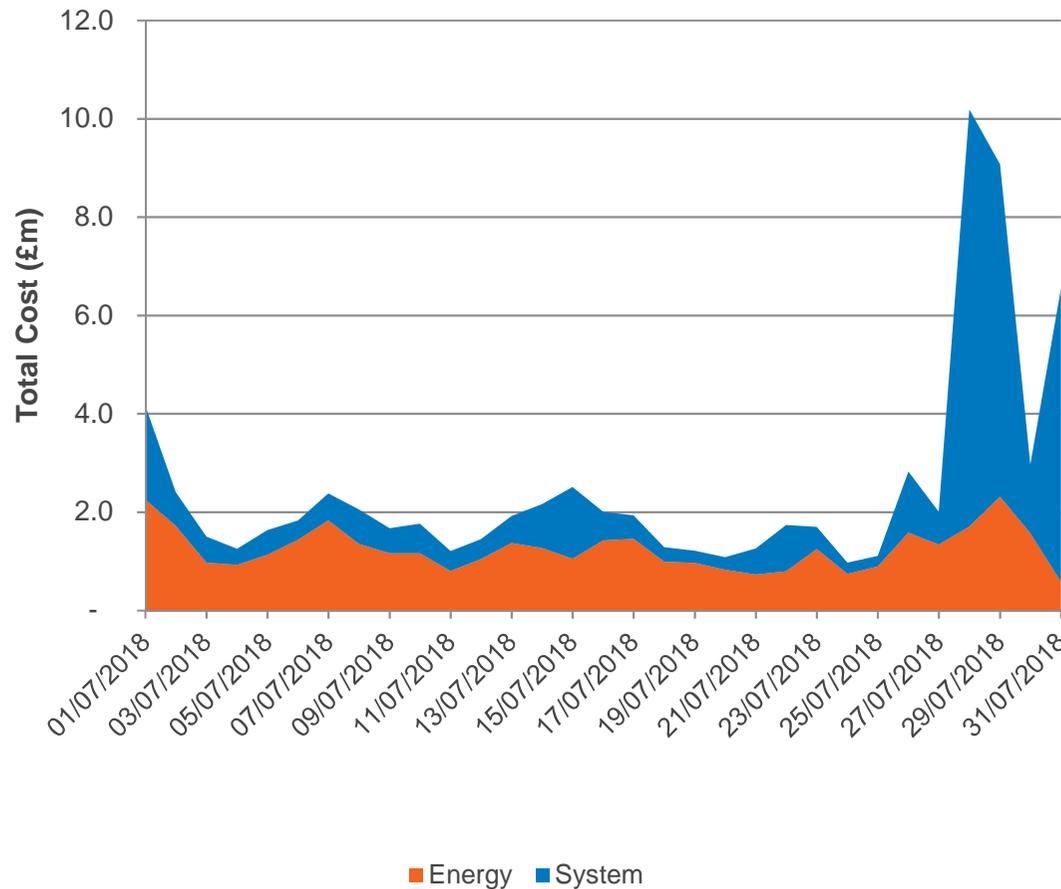


Wind forecast increased by c. 4.3GW between Wed and Thu for Sat 17:00.

Forecast increased by further 2GW by Sat am.

System Operation – Prior Weeks

July Daily Costs – Split by Energy and System Actions

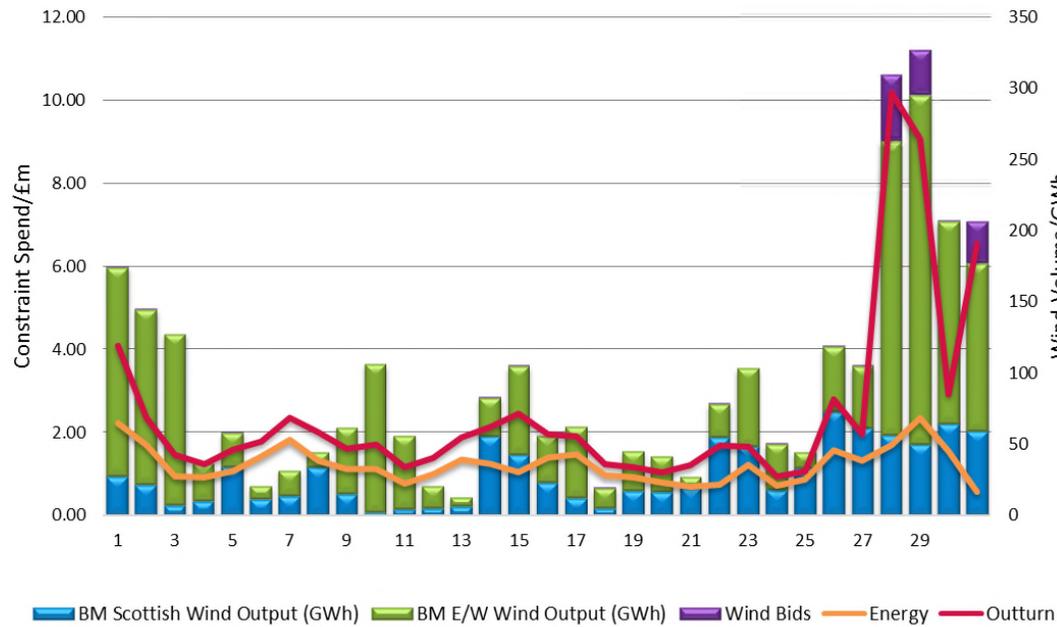


Costs fairly stable throughout July helped by stable weather patterns and low wind output in Scotland and Northern England

Significant increase (greater than 4x higher) in System costs during the weekend

System Operation – Prior Weeks

July Daily Costs and Daily Wind Output



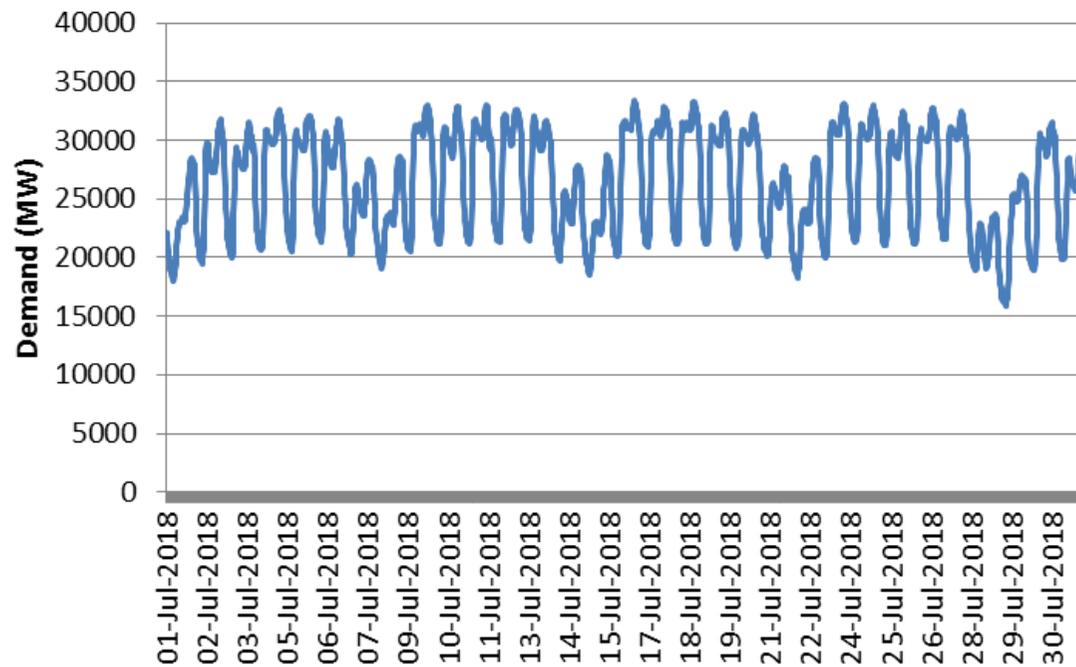
E&W wind output increased 5 fold over the weekend

These wind farms are mostly offshore and receive more ROCs per MW

Increased constraint costs ensue

System Operation – Prior Weeks

Half Hourly National Demand during July



Standard pattern for 4 previous weeks

Substantial drop in demand and abnormal shape over the weekend

Energy Forecasting

How does the ESO monitor and correct advanced forecasts, how is the control room updated during the day

Forecasting handover schedule:

- DA forecast at 9am, update at 12 noon
- Physical handover from Energy Forecasters at 5pm
- Control Room Operational Strategy Manager re-forecasts DA at 19:30, 23:00, 05:00
- Handover-update from Forecasters 9am covering within day
- 2nd within day forecast update from forecasters at 11am
- OSM makes adjustments for embedded PV and wind
- From 4hrs to real time OEM adjusts forecasts