Energy storage for demand response port vila

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As with other industry sectors, UK ports and harbours are working hard to decarbonise ahead of the 2050 Net Zero deadline. Some operators such as ABP and Peel Ports are more ambitious, aiming for Net Zero a full decade earlier.

A key element in their decarbonisation strategies is the electrification of vehicles and material handling equipment (MHE), as well as providing ship-to-shore power. In some cases, it will also mean providing charge points for all-electric leisure boats.

However, for many UK ports and harbours, their local grid infrastructure is insufficient to support these electrification targets. In this article we look at what ports are trying to achieve, some of the challenges they face, and how battery energy storage systems can help solve these issues.

The International Maritime Organisation (IMO) is asking for a 40% reduction in carbon intensity of international shipping by 2030 compared with 2008 – and to reach net-zero greenhouse gas emissions by or around 2050.

The nature of port operations means they are currently quite carbon intensive. For example, a recent study by Transport & Environment found that Rotterdam was responsible for almost 14 million tonnes of CO2 per year, making it the largest industrial polluter in Europe.

Grid capacity constraints are a serious issue. British Ports Association research found that 70% of UK ports are already at or near their ceiling in terms of available power. This means that, in order to support electrification, they must either invest in costly grid upgrades, generate their own energy from on-site renewables, or install battery energy storage systems (BESS) to overcome grid capacity challenges.

All industrial and commercial facilities have an agreed maximum import capacity (MIC) with their energy provider. Sometimes also known as a kVA allowance, this is the limit on how much power the site can draw down from the grid. Breaching MIC results in significant surcharges.

This poses problems for ports planning to deploy EV charging stations at scale, in order to support electric vehicles, electric MHE, and electric leisure boats - if too many EVs are plugged in at once, the site could go over its kVA allowance.

BESS is a proven way to provide the power needed while avoiding MIC surcharges. The BESS acts as a reservoir, drawing down energy during quiet periods and providing it during times of peak demand.

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Many ports are installing solar PV arrays to generate as much of their own clean energy as possible. However, ports are 24-hour operations, and clearly solar does not provide power at night.

A BESS solves this issue as it can store surplus solar energy generated during the day and provide it during hours of darkness. In this way, ports can "oversize" their solar capacity to power more night-time operations with renewable electricity.

Even without factoring in ship-to-shore provision, some ports are already unable to access more power from the grid to support other electrification goals. Where a new substation is simply not a viable option, BESS can provide a more affordable alternative.

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